IN THE HIGH COURT OF SOUTH AFRICA
GAUTENG DIVISION, PRETORIA

Case No:_____

In the matter between:

BIRDLIFE SOUTH AFRICA	First Applicant
SOUTH AFRICAN FOUNDATION FOR THE CONSERVATION OF COASTAL BIRDS	Second Applicant
and	
THE MINISTER OF FORESTRY, FISHERIES AND THE ENVIRONMENT	First Respondent
THE DEPUTY DIRECTOR-GENERAL: FISHERIES MANAGEMENT, DEPARTMENT OF FORESTRY, FISHERIES AND THE ENVIRONMENT	Second Respondent
THE DEPUTY DIRECTOR-GENERAL: OCEANS AND COASTS, DEPARTMENT OF FORESTRY, FISHERIES AND THE ENVIRONMENT	Third Respondent
THE SOUTH AFRICAN PELAGIC FISHING INDUSTRY ASSOCIATION	Fourth Respondent
EASTERN CAPE PELAGIC ASSOCIATION	Fifth Respondent

FOUNDING AFFIDAVIT

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I, the undersigned,

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do hereby make oath and state that:

1. I am an adult marine ecologist and the Seabird Conservation Programme Manager at BirdLife South Africa, the first applicant (**BLSA**).

2. I am duly authorised to depose to this affidavit on behalf of BLSA. The relevant resolution is attached as "**AM1**". I also attach as "**AM2**" and "**AM3**":

   2.1 the resolution of the Board of the second applicant, the South African Foundation for the Conservation of Coastal Birds (**SANCCOB**), which authorises this litigation; and

   2.2 the supporting affidavit of Dr Katrin Ludynia, who is authorised to bring this litigation on SANCCOB's behalf.

3. I have worked in the conservation sector since 1998. I hold a MSc in Zoology from the University of KwaZulu-Natal and obtained a PhD from the University of Cape Town in 2016. My PhD research focused on *"Fine-scale drivers of African Penguin prey dynamics in Algoa Bay, South Africa, and their impacts on penguin foraging ecology"*. Subsequently, I worked as a post-doctoral fellow in the Marine Apex Predator Research Unit at Nelson Mandela University (**NMU**), focusing on the foraging ecology of African Penguins and Cape Cormorants at Stony Point and Dyer Island, including developing tools to inform marine ecosystem management. I held this position until mid-2019 when I took up my current

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position at BLSA, which entails overseeing projects concerned with mitigating threats to seabirds within the South African Exclusive Economic Zone.

4. The facts contained herein are within my personal knowledge, unless otherwise stated or as appears from the context, and are to the best of my belief both true and correct.

5. Insofar as I make legal submissions, I rely on the advice of the applicants' legal representatives, which advice I accept to be true and correct.

6. In addition to this affidavit, the applicants rely on the expert affidavits of Dr Richard Sherley of Exeter University, attached as "**AM4**"; and Ms Eleanor Weideman, attached as "**AM5**". Confirmatory affidavits have been provided by Mr Mark Anderson, Chief Executive Officer of BLSA; Adj. Prof. Lorien Pichegru of NMU; Mr Craig Smith of World Wide Fund for Nature South Africa (**WWF-SA**); and Dr Lauren Waller, formerly of SANCCOB and now of the Endangered Wildlife Trust (**EWT**). Copies of these confirmatory affidavits are attached marked "**AM6**" to "**AM9**". The applicants have filed this application in the absence of commissioned affidavits from Adj. Prof. Pichegru and Dr Sherley who were outside South Africa and unable to appear before a commissioner before these papers were served. Their duly commissioned and/or apostilled affidavits will be filed before the hearing of this matter.

THE PARTIES

7. The first applicant is **BIRDLIFE SOUTH AFRICA** (**BLSA**).

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7.1 BLSA is registered as a non-profit organisation and public benefit organisation in terms of the laws of South Africa. Its principal place of business is at Isdell House, 17 Hume Road, Dunkeld West, Johannesburg.

7.2 BLSA's vision is a country and region where nature and people live in greater harmony, more equitably and more sustainably, while its mission is to conserve birds, their habitats and biodiversity through, *inter alia*, scientifically-based programmes and supporting the sustainable and equitable use of natural resources. A copy of BLSA's constitution is attached as "**AM10**".

7.3 BLSA is recognised as a member of the Conservation Sector Group (**CSG**) concerned with African Penguin conservation by the Department of Forestry, Fisheries and the Environment (**the DFFE**) (alongside SANCCOB, EWT, WWF-SA and NMU) and has been a participant in the processes and fora with which this application is concerned.

8. The second applicant is the **SOUTH AFRICAN FOUNDATION FOR THE CONSERVATION OF COASTAL BIRDS (SANCCOB**).

8.1 SANCCOB is registered as a non-profit company, non-profit organisation and public benefit organisation in terms of the laws of South Africa. Its registered address is at 22 Pentz Drive, Table View, Western Cape.

8.2 SANCCOB's primary objective is to conserve seabirds, the African Penguin being the flagship species of focus, as well as other complementary marine species. A copy of SANCCOB's memorandum of incorporation is attached as "**AM11**".

8.3 SANCCOB is recognised by the DFFE as a member of the CSG concerned with African Penguin conservation and has been a participant in the processes and fora with which this application is concerned.

9. The applicants bring this application in their own interest, in the interest of their respective members, in the interest of the African Penguin and in the interest of the public. As such, the applicants have legal standing in terms of sections 38(a), 38(c), 38(d) and 38(e) of the Constitution as well as sections 32(1)(a), 32(1)(c) and 32(1)(d) of the National Environmental Management Act, 107 of 1998 (**NEMA**).

10. The applicants also bring these proceedings in the interests of protecting the environment in terms of section 32(1)(e) of NEMA.

11. The first respondent is the **MINISTER FOR FORESTRY, FISHERIES AND THE ENVIRONMENT** (**the Minister**) who has her office at Environment House, 473 Steve Biko Road, Arcadia, Pretoria. The Minister is cited in her official capacity by virtue of having taken the decision which is subject to review in these proceedings.

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12. The second respondent is the **DEPUTY DIRECTOR-GENERAL: FISHERIES MANAGEMENT** (**DDG: Fisheries**) who has her office at Environment House, 473 Steve Biko Road, Arcadia, Pretoria. The DDG: Fisheries is cited by virtue of the interest her directorate has in this matter and no relief is sought against her, save for costs in the event of opposition.

13. The third respondent is the **DEPUTY DIRECTOR-GENERAL: OCEANS AND COASTS** (**DDG: O&C**) who has his office at Environment House, 473 Steve Biko Road, Arcadia, Pretoria. The DDG: O&C is cited by virtue of the interest his directorate has in this matter and no relief is sought against him, save for costs in the event of opposition.

14. The fourth respondent is **THE SOUTH AFRICAN PELAGIC FISHING ASSOCIATION (SAPFIA)**.

    14.1 SAPFIA's offices are at 1st Floor, Harbour Place, 7 Martin Hammerschlag Way, Foreshore, Cape Town.

    14.2 SAPFIA is an association constituted as a non-profit organisation whose object is to promote and protect the interests of its members. It is the recognised industry body for small-pelagic fisheries in South Africa in terms of section 8 of the Marine Living Resources Act, 18 of 1998 (**MLRA**) pursuant to Government Notice 270 in *Government Gazette* 19792 of 5 March 1999.

    14.3 SAPFIA is cited by virtue of the interest it has in the matter with no relief sought against it, save for costs in the event of opposition.

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15. The fifth respondent is the **EASTERN CAPE PELAGIC ASSOCIATION** (**ECPA**).

15.1 ECPA is recognised as an industry representative body for small-pelagic fisheries in terms of section 8 of the MLRA pursuant to Government Notice 183 in *Government Gazette* 36225 of 15 March 2023.

15.2 I note that while this is the body formally recognised in the *Government Gazette,* the association with which the conservation sector has engaged, representing holders of small-pelagic fishing rights in the Eastern Cape, is the **EASTERN AND SOUTHERN CAPE PELAGIC ASSOCIATION (ESCPA)**. To the best of my knowledge, ECPA and ESCPA are one and the same association and I therefore refer to it as ESCPA throughout.

15.3 The address used by ESCPA in its correspondence, and assumed to be its principal place of business, is 131 Albert Road, Walmer, Port Elizabeth (Gqeberha).

15.4 ESCPA is cited by virtue of its interest in the matter and no relief is sought against it, save for costs in the event of opposition.

OVERVIEW

16. This application is brought on an expedited basis in order to secure relief designed to prevent the imminent extinction of Africa's only penguin: *Spheniscus demersus* or the African Penguin.

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17. The African Penguin is recognised as a threatened species under South African law[1] and is currently classified as "*Endangered*" on the International Union for the Conservation of Nature (**IUCN**) Red List of Threatened Species (the most comprehensive global classification of global extinction risk). The most recent IUCN Red List assessment, dated 2020, is attached as "**AM12**". It records the IUCN's justification for assessing the African Penguin as "*Endangered*" as follows:

> *"This species is classified as Endangered because it is undergoing a very rapid population decline, probably as a result of commercial fisheries and shifts in prey populations. This trend currently shows no sign of reversing, and immediate conservation action is required to prevent further declines. Recent count data for the number of breeding pairs suggests that the rate of decline may actually have increased in recent years. If the estimated rate of population decline is confirmed to have accelerated, the species may require uplisting."*

18. The IUCN's prediction of accelerated population decline has been confirmed by the latest African Penguin census concluded in December 2023: the African Penguin is now subject to consideration for reclassification as "*Critically Endangered*" – just one step away from being extinct in the wild, which is anticipated to occur as early as 2035. I refer in this regard to Dr Sherley's expert affidavit (i.e. "**AM4**").

19. Since at least 2008, BLSA and SANCCOB have worked as part of an international group of African Penguin specialist scientists on addressing the role of prey availability in driving African Penguin declines. Since at least 2018, the

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[1] Lists of Marine Species that are Threatened or Protected, Restricted Activities that are Prohibited and Exemption from Restriction published under GN 476 in *Government Gazette* 40875 of 30 May 2017.

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resulting scientific studies have demonstrated that population declines may be partly arrested by optimising availability of African Penguins' preferred prey of sardine (*Sardinops sagax*) and anchovy (*Engraulis encrasicolus*) around their largest breeding colonies and that a precautionary approach requires fishing closures in the vicinity of African Penguin breeding colonies. This demonstrates the immediate need for long-term closures of African Penguin preferred foraging areas to commercial sardine and anchovy fisheries i.e. the small-pelagic[2] purse-seine fishing industry (**Industry**).

20. Despite acknowledging the plight of the African Penguin and the urgent need to implement timeous conservation actions (including the appropriate fishing closures) to prevent this species' extinction, the Minister has consistently failed to implement appropriate and effective measures. Rather than taking decisive steps to protect the African Penguin population and fulfil their constitutional and international environmental protection obligations, the DFFE and the Minister have engaged in at least four rounds of "scientific review" for purposes of, *inter alia*, determining the delineation of island closures.

21. The last of these scientific review processes involved the appointment by the Minister in October 2022 of the International Review Panel Regarding Fishing Closures Adjacent to South Africa's African Penguin Breeding Colonies and

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[2] I note that small-pelagics in South African waters include sardine, anchovy and red-eye. Studies of African Penguin diets have indicated that by far the major portion of their diet consists of sardine and anchovy – however, they do also consume red-eye. Similarly, Industry is focused on anchovy and sardine which are subject to the current issuance of small-pelagic fishing rights (and expressly referred to by the Minister in the decision). It is for this reason that while we have included red-eye in our application of the Panel's recommended trade-off mechanism (as further addressed in Ms Weideman's expert affidavit attached as "**AM5**") I have referred, in this affidavit, to competition between African Penguins and Industry over sardine and anchovy biomass as the core issue. To the extent that red-eye is caught in South African waters now and in the future, this species should be considered as part of the closures under consideration in this application.

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Declines in the Penguin Population (**the Panel**). The Panel, comprised of leading international experts in the field, was convened "*to advise on the proposed closure of fishing areas adjacent to South Africa's African Penguin breeding colonies and the decline in the penguin population*". A copy of the Panel's terms of reference is included in the attachment marked "**AM13**" (**the Terms of Reference**).

22. It is evident from the Terms of Reference that it was specifically contemplated by the Minister that the Panel would finally break the deadlock between penguin scientists and conservationists on the one hand, and Industry on the other by presenting a consolidated set of clear recommendations to enable the Minister to put appropriate fishing closures in place.

23. While the Panel process was underway, the Minister implemented a set of temporary closures which were highly compromised, not aligned with the conservation sector's input and largely ineffective in stemming the decline of the African Penguin population (**the Interim Closures**).

24. In their report (attached marked "**AM14**") the Panel endorsed the need for fishing closures and made clear, scientifically supported recommendations for the optimal approach to determining their delineation (referred to below as the recommended "**trade-off mechanism**").

25. On 4 August 2023, when announcing the publication of the Panel's report, the Minister communicated the decision forming the focus of these proceedings (**the decision**), namely that:

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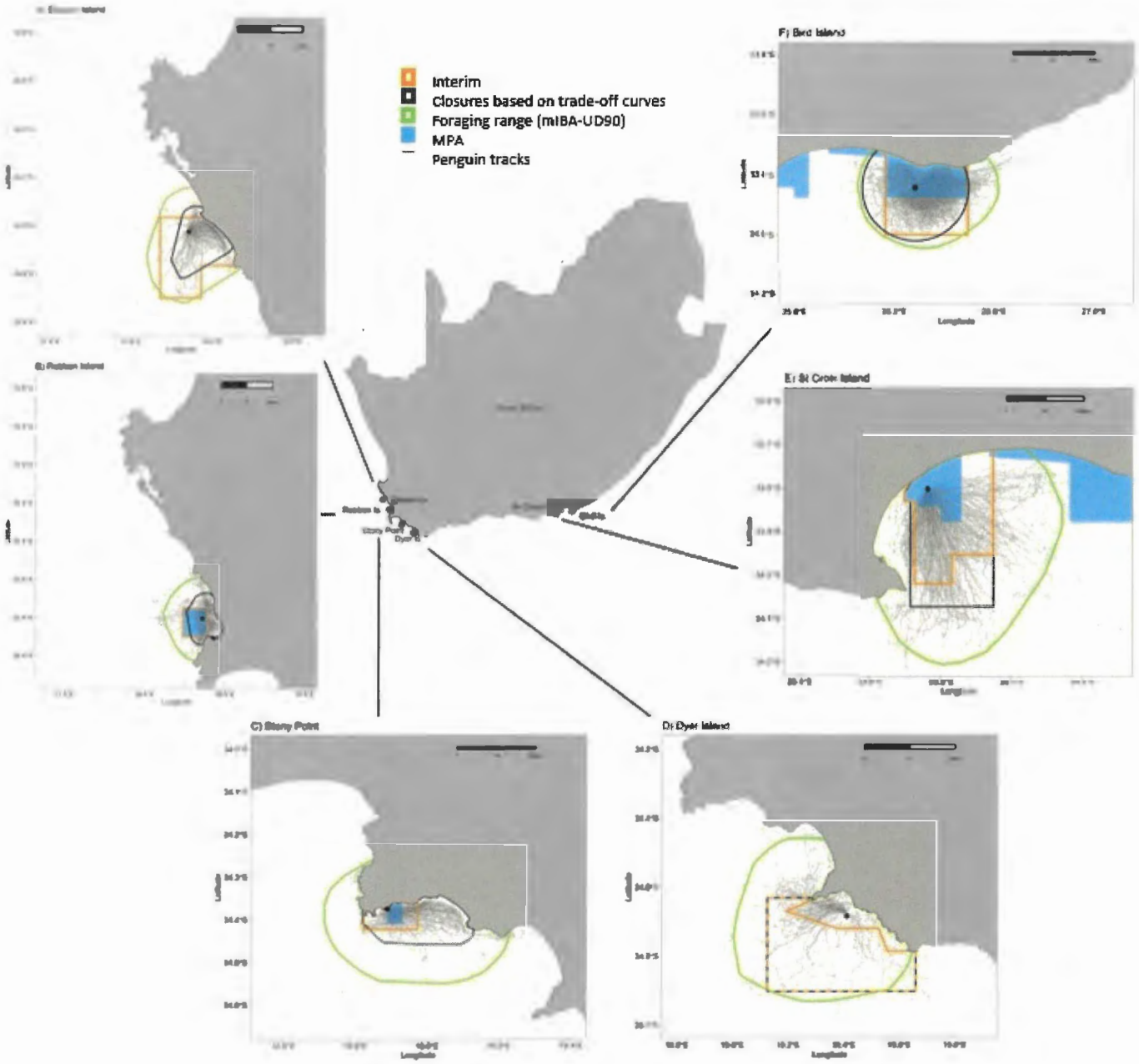
25.1 restrictions on purse-seine sardine and anchovy fishing would be implemented in the waters around African Penguin colonies for a minimum of 10 years, with a review after 6 years (**the monitoring period**); and

25.2 unless the conservation sector and Industry agreed to alternative closure delineations by 31 December 2023 (**the deadline**), the Interim Closures would become "permanent".

26. The media statement conveying the Minister's decision is attached as "**AM15**".

27. The map below shows the locations of the six African Penguin breeding colonies which are relevant to the decision (**the breeding colonies**). It also indicates the Interim Closure delineations (shown in orange) as well as those applicable should the Panel's recommendations be applied (shown in black). These are placed in context by also including the full foraging range used by African Penguins in each colony (shown in light green) and the foraging tracks generated through tracking data (using grey lines). To provide further context, where existing fisheries restrictions associated with marine protected areas (**MPAs**) have been declared, I have indicated these in light blue. As can be seen in all cases, the results of applying the Panel's recommended trade-off mechanism covers a greater extent of areas in fact used by African Penguins to forage than the Interim Closures – although this remains only part of the full range used by African Penguins which we have recorded through scientific monitoring.



28. Predictably, no agreement on alternative island closures was reached by the deadline. Absent this Honourable Court's intervention, the Interim Closures will now remain in place until 31 December 2033 – just over a year from the anticipated extinction date of this charismatic and unique African species.

29. The applicants bring this application in terms of the Promotion of Administrative Justice Act, 3 of 2000 (**PAJA**), alternatively the constitutional principle of legality.

The applicants also rely on the provisions of the Constitution, including sections 7(2) and 24.

30. The applicants seek the review of the decision on the following grounds.

30.1 The decision to perpetuate the Interim Closures, unless the conservation sector and Industry could reach an alternative agreement, was irrational considering the purpose for which the Panel was appointed; the Panel's recommendations; and the historical impasse between the Industry, on the one hand, and penguin scientists and conservation NGOs, on the other, regarding the need for, and delineation of, island closures.

30.2 The Interim Closures were intended to be of a temporary nature to enable the Panel to produce its findings. These closure delineations were at no time accepted as fit-for-purpose by the conservation sector.

30.2.1 In all cases of African Penguin-Industry competition, the science indicates that the Interim Closures do not provide the requisite protections for African Penguins.

30.2.2 It was thus irrational for the Minister to rely on these delineations for purposes of closures to remain in place over the next ten years (particularly in light of the rate of African Penguin population decline).

30.3 Further, the Panel not only found that island closures are a valid intervention to prevent African Penguin population declines, but also

provided specific recommendations regarding the best available scientific basis for delineating closures that have biological benefit for African Penguins (i.e. a benefit in relation to protection of their preferred foraging areas as a mechanism for reducing competition between African Penguins and Industry with the ultimate effect of improving the availability of sardine and anchovy within African Penguins' preferred foraging areas).

30.3.1 The Panel resolved scientific debates regarding the appropriate method to be used to indicate "benefit to penguins" by endorsing the "mIBA-ARS" method as the best available scientific method to delineate preferred foraging areas. This puts an end to debates regarding what method to use for identifying areas of African Penguin "benefit" and the most appropriate method to delineate areas of most forage value to African Penguins.

30.3.2 Resolving scientific debates regarding how a trade-off between maximum benefits to African Penguins and minimal costs to Industry could be achieved, the Panel recommended a trade-off mechanism which would assess the relative costs and benefits of different closure delineation options (including one aligned with preferred foraging area determined using mIBA-ARS). It, further, indicated that these delineations should be put in place at the commencement of the *monitoring period* using data currently available – despite the need for

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further refinement of, *inter alia*, the economic modelling currently available.

30.4 Moreover, it was irrational for the Minister to have accepted the Panel's recommendations regarding the need for closures as well as the period of time required for closures to have effect and be effectively monitored, but then to fail to delineate the closures using the recommended trade-off mechanism which included using the mIBA-ARS method and which could achieve the purpose of contributing to slowing African Penguin population declines.

30.5 This is still more egregious because the Interim Closures themselves lack a clear relationship with the objective of improving African Penguins' access to prey, through reduction in competition over sardine and anchovy between these endangered birds and Industry.

30.6 Finally, it was entirely irrational to consider that an "agreement" over alternative closure delineations could be achieved between Industry and the conservation sector given the impasse between these stakeholders which had been unresolved since at least 2019, and which was the primary reason for constituting the Panel. In effect, the Minister's deferral to such agreement, without any process or parameters in place for these stakeholder groups, had the effect of rendering the Panel's recommendations writ in water – and returned the parties to the stalemate which had precipitated the Panel process.

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31. In addition, the Minister's decision (compounded by her failure to act decisively to protect African Penguins), is unlawful and unconstitutional.

31.1 The State has clear obligations to respect, protect, promote and fulfil constitutional rights – including the rights set out in section 24(b) of the Constitution. As such, the applicants were entitled to rely on the Minister, in her role as Minister responsible for administration of NEMA and the National Environmental Management: Biodiversity Act, 10 of 2004 (**NEM:BA**), to protect and enforce the rights to prevent degradation of marine biodiversity and promote the conservation of the African Penguin.

31.2 The Minister has self-evidently been aware of declining African Penguin populations since at least 2018. Her announcement (i.e. "**AM15**") indicates that the African Penguin is "critically endangered" and that urgent measures are required to prevent its extinction. She has also acknowledged that island closures are a necessary conservation measure to prevent African Penguin population declines.

31.3 Despite this, the Minister has failed to take the necessary action to protect this threatened species.

31.4 In addition, the legal basis on which the Minister has imposed the Interim Closures and taken the decision is entirely unclear. While, as already noted and elaborated below, the Minister has clear constitutional, statutory and international obligations to act to protect and conserve threatened species, she has not indicated in the

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announcement of her decision what the relevant empowering statute or provision is which provides the legal basis for the decision taken.

31.5 It also appears that the Minister has unlawfully referred the question of island closure delineation to private parties – namely "the industry" and "the conservation sector". The Minister's insistence on "agreement" goes well beyond consultation with interested and affected parties or seeking advice from experts in the field of marine ecology and conservation. Rather, she has placed herself in a position to rubber stamp whatever compromise positions may be achieved by "agreement" notwithstanding the legal obligations placed upon her and the merits or otherwise of these parties' bargaining positions. In effect, the Minister has subordinated her duty to take steps to ensure the survival of the African Penguin to a stillborn negotiation between Industry and the conservation sector.

32. In the light of the above, the applicants seek the review and setting aside of the decision and the substitution thereof with a decision to implement no-take small-pelagic fishing areas around the breeding colonies in accordance with the maps attached marked "**AM16**", which apply the Panel's recommendations regarding the methods for determining preferred foraging areas and appropriate trade-offs to determine closure delineations (**the proposed closures**).

33. In the alternative to the substituted relief, the applicants seek that the decision be remitted to the Minister for reconsideration, on the basis that the new fishing closures be based on the Panel's recommended trade-off mechanism and

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endorsement of the mIBA-ARS method to determine the preferred foraging area of African Penguins and that, pending the Minister's decision, the proposed closures are to be imposed around the breeding colonies.

SCHEME OF THIS AFFIDAVIT

34. I structure the remainder of this affidavit as follows:

34.1 First, I explain the need for urgent intervention driven by the impending extinction of the African Penguin.

34.2 Second, I set out the factual background to the decision and this application.

34.3 Third, I outline the relevant legislation.

34.4 Fourth, I address the applicants' grounds of review.

34.5 Fifth, I detail the relief sought.

34.6 Sixth, I explain why the applicants ought to be granted an extension, or condoned, to the extent this application was not brought without unreasonable delay.

34.7 Finally, I address the issue of costs.

IMPENDING EXTINCTION

35. The African Penguin has long been recognised as a seabird requiring legal protection. Over the past three decades, its populations have dwindled to the

precipice of extinction. And as the African Penguin's populations have decreased, global recognition of its threatened status has steadily increased. This is best demonstrated with reference to the milestones set out below.

1999: 42,768 breeding pairs

36. In 1997, the African Penguin was listed in Appendix II of the Convention on the Conservation of Migratory Species of Wild Animals (**the Bonn Convention**).

36.1 Appendix II lists species with an "*unfavourable conservation status and which require international agreements for their conservation and management, as well as those which have a conservation status which would significantly benefit from the international co-operation that could be achieved by an international agreement*".[3]

36.2 In this context, "*conservation status*" refers to the "*sum of the influences acting on the migratory species that may affect its long-term distribution and abundance*".[4]

36.3 A "*conservation status*" is <u>unfavourable</u> when population dynamics data indicate that a species is failing to maintain itself on a long-term basis as a viable part of its ecosystem; its range is being reduced or is likely to be reduced on a long-term basis; there is, and will in the foreseeable future be, insufficient habitat to maintain the species' population on a long-term basis; and the distribution and abundance of

[3] Bonn Convention, Art IV(1).

[4] Bonn Convention, Art I(1)(b).

the species approaches historic coverage and levels that indicate that suitable ecosystems do not exist.[5]

37. In 1999, just two years after the Bonn Convention listing, the total South Africa population of African Penguins was estimated at 42,768 breeding pairs.

2007: 27,151 breeding pairs

38. In 2007, the Policy on the Management of Seals, Seabirds and Shorebirds: 2007 was published in terms of the MLRA by the Minister responsible for environmental affairs.[6] It recognised a number of threats to seabirds, including insufficient availability of food through competition with fisheries, and contemplated prohibition of "*specified types of fishing in the vicinity of... seabird breeding localities, where such fishing may reduce concentrations of fish available to the breeding...seabirds*".[7] This policy specifically listed the African Penguin as a seabird species needing protection.[8]

39. At the time the Policy on the Management of Seals, Seabirds and Shorebirds was published, the African Penguin was listed as "*Vulnerable*" in terms of the IUCN Red List with a recorded estimate of 27,151 breeding pairs in South Africa.[9]

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5 Bonn Convention, Art I(1)(d) read with Art I(1)(c).

6 At the time, the Minister for Environmental Affairs and Tourism.

7 Department of Environmental Affairs and Tourism, *Policy on the Management of Seals, Seabirds and Shorebirds: 2007*, published as GN1717 in *Government Gazette* 30534 of 7 December 2007, para 4.1.6.

8 Ibid Appendix C.

9 I note that Annexure A to the Policy on the Management of Seals, Seabirds and Shorebirds: 2007, which sets out the conservation status of African Seabirds, reflects 56,900 breeding pairs based Du Toit, M. et al. (Eds) (2003) *Conservation Assessment and Management Plan for Southern African*

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2010: 22,802 breeding pairs

40. In 2010, the African Penguin was uplisted from "*Vulnerable*" to "*Endangered*" in terms of the IUCN Red List.

41. In 2010, the African Penguin population in South Africa was estimated at 22,802 breeding pairs.

2013: 18,835 breeding pairs

42. In June 2013, the African Penguin was listed in Appendix II of the Convention on International Trade in Endangered species of Wild Fauna and Flora (**CITES**).[10] Appendix II lists those species which may become threatened with extinction if their trade is not clearly controlled.

43. A few months later, in October 2013, an African Penguin Biodiversity Management Plan was gazetted (**the 2013 BMP**).[11] It recognised various threats affecting the decline of the African Penguin population since the 1920s, but highlighted that "*[o]ne of the most important current threats to African Penguins is considered to be the abundance and availability of prey.... In the Benguela Upwelling Ecosystem, changes in the relative abundance of sardine and anchovy*

Coastal Seabirds. Cape Town; Avian Demography Unit and IUCN/SSC Conservation Breeding Specialist Group. This technical report in fact reports a figure of 56,873 breeding pairs in South Africa which appears to be based on the 2001 census figures.

[10] See Convention on International Trade in Endangered Species (CITES) Regulations published as GNR 629 in *Government Gazette* 36770 of 23 August 2013.

[11] Department of Environmental Affairs, *African Penguin Biodiversity Management Plan*, published as GN824 in *Government Gazette* 36966 of 31 October 2013.

have been linked to changes in diet, breeding population size and breeding success of various seabird populations, including…. African Penguin….".[12] The interventions contemplated in the 2013 BMP included investigating the possibility of spatial fishery management to address mismatches between fish location and catches, and benefits for African Penguins.[13]

44. At the time the relevant CITES listing was gazetted and the 2013 BMP was published, South Africa had an estimated 18,835 breeding pairs of African Penguins.

2015: 19,284 breeding pairs

45. As set out below, the Agreement on the Conservation of African-Eurasian Migratory Waterbirds (**AEWA**) gives effect to obligations in respect of African Penguins pursuant to the Bonn Convention. In 2015, AEWA published its International Multi-species Action Plan for the Conservation of Benguela Current Upwelling System Coastal Seabirds (**the AEWA Action Plan**). The AEWA Action Plan recognised that readily available and good quality prey affected all four species of seabird which fed predominantly on sardine and anchovy (i.e. the African Penguin, Cape Cormorant, Cape Gannet and Greater Crested Tern).[14]

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[12] BMP 2013 para 2.2.11. See also para 3.3.

[13] BMP 2013, Action 4.3.1.7.

[14] AEWA (2015) *International Multi-species Action Plan for the Conservation of Benguela Upwelling System Coastal Seabirds.* AEWA Technical Series No. 60 Bonn, Germany (**AEWA Action Plan**), p 7.

45.1 Lack of food and low-quality prey was ranked as a "very high" – and indeed as the foremost – threat to these species.[15]

45.2 The AEWA Action Plan indicated that *"[t]his is driven by a combination of historical overfishing, the risk of current overfishing at small spatio-temporal scales, and large-scale shifts in the abundance and distributions of prey species. As seabird populations shrink, smaller impacts, such as predation by seals, gulls and pelicans, can become more significant at particular colonies."*[16]

46. In 2015, the number of African Penguins in South Africa was estimated as 19,284 breeding pairs.[17]

2017: 17,277 breeding pairs

47. In May 2017, the African Penguin was listed as an endangered species in terms of section 56(1) of NEM:BA and the Marine Threatened or Protected Species Regulations.[18]

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[15] AEWA Action Plan, p 23.

[16] AEWA Action Plan, p 23.

[17] Note that the AEWA Action Plan reflected 2013 figures which, at that stage, demonstrated that two colonies had become extinct (Bird Island: Lamberts Bay and Geyser Island). Colonies at Dassen, Robben, Dyer, St Croix and Bird islands as well as Stony Point were all reflected as decreasing. See p 11.

[18] Lists of Marine Species that are Threatened or Protected, Restricted Activities that are Prohibited and Exemption from Restriction published under GN 476 in *Government Gazette* 40875 of 30 May 2017.

48. At the time these regulations were published (in the first half of 2017), it was estimated (based on counts conducted in 2016) that the number of African Penguins in South Africa had dwindled to 17,277 breeding pairs.

2019: 15,187 breeding pairs

49. The Robben Island MPA and Addo Elephant MPA were declared in part to contribute to the conservation and protection of threatened seabird and shorebird species including the African Penguin.[19] I emphasise that these MPAs were declared with regard to these ecosystems as a whole – and not with particular consideration of African Penguin foraging ranges or preferred foraging areas.

50. At the time these MPAs were gazetted in May 2019, the African Penguin count (determined in 2018) had further reduced to an estimated 15,187 breeding pairs in South Africa.

2023: 8,750 breeding pairs

51. The latest African Penguin census, completed in December 2023, has shown that over three generations of birds, the global population has declined by 77.9% (from approximately 44,300 breeding pairs in 1993 to approximately 9,900

[19] Notice Declaring the Robben Island Marine Protected Area in terms of section 22A of the National Environmental Management: Protected Areas Act, 57 of 2003, published as GN774 in *Government Gazette* 42478 of 23 May 2019; GN757 in *Government Gazette* 42478 of 23 May 2019.

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breeding pairs in 2023).[20] In South Africa, the population has declined by 76.9% to approximately 8,750 breeding pairs in the same period.[21]

52. I refer in this regard to the assessment of current African Penguin population trajectory prepared by Dr Richard Sherley for purposes of submission to the peer-reviewed journal *Ostrich* and attached to his expert affidavit (i.e. "**AM4**") as "**RS2**". The data and analysis in this article is the technical assessment which will be submitted for review by BirdLife International, on behalf of the IUCN, with a view to updating the status of the African Penguin on the IUCN Red List from "*Endangered*" to "*Critically Endangered*".

2035: projected date of extinction in the wild

53. Since penguin scientists indicated, in 2018, that small-pelagic purse-seine fishing closures around breeding colonies may have positive impacts on arresting population declines and that a precautionary approach supported such closures as a conservation measure, a staggering 44% of the African Penguin population in South Africa has been lost based on the official "counts". Put differently, the African Penguin population has nearly halved in the time the Minister has had the scientific input needed to help arrest these declines.

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[20] Note that these figures are those calculated for the purposes of the IUCN Assessment model.

[21] I flag that the estimate provided in the DFFE's unpublished data referenced below is the slightly lower figure of 8,534. This is because the figures used in the model employed for purposes of the IUCN technical analysis utilises a series of adjustments to account for variability and/or errors in the annual African Penguin count. The figures cited elsewhere in this affidavit are those sourced from the DFFE's unpublished data.

54. Each year that passes without implementing science-backed mitigation measures, including island closures, is likely to contribute to the exponential decrease in the opportunity to conserve this population and prevent its extinction. This has already been seen in Namibia, where remaining colonies – historically threatened by inadequate prey availability due to overfishing of sardine and anchovy between the 1960s and 1980s – now show very little chance of recovery.[22]

55. It is in the face of the rapidly declining African Penguin population, and the imminent risk of extinction, that the Minister has failed to implement adequate fishing closures. It is in the same context that the applicants have been constrained to approach this Honourable Court on an expedited basis for the necessary relief. We have done so as soon as possible after (1) being notified on 19 December 2023 (after BLSA had commenced its annual shut-down) that the "Interim Closures" would remain in place; (2) the passing of the Deadline of 31 December 2023; and (3) the entrenchment of the Interim Closures in the permit conditions approved on 17 January 2024 for the 2024 anchovy and sardine fishing season.

56. In the light of the above, the applicants have brought these proceedings in the form of an expedited review application with truncated time periods. The urgency of the matter is self-evident. Any delays in the grant and implementation of the relief sought in these proceedings will result in further population decline of the

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[22] See JP Roux, CD van der Lingen, MJ Gibbons, NE Moroff, LJ Shannon, ADM Smith and PM Cury (2013) "Jellyfication of marine ecosystems as a likely consequence of overfishing small pelagic fishes: lessons from the Benguela", *Bulletin of Marine Science*, 89 (1), 249-284, available online <http://dx.doi.org/10.5343/bms.2011.1145> (accessed 15 February 2024).

African Penguin at the material risk of it soon becoming extinct in the wild. In the circumstances, I am advised that the minor truncation of the time periods, as provided for in the applicants' notice of motion, is both reasonable and entirely justified. Bearing in mind that the applicants must still receive the Rule 53 record and supplement their founding papers before the respondents are required to answer the case, there can be no prejudice to the respondents.

FACTUAL BACKGROUND

2008-2020: South Africa's ground-breaking Island Closure Experiment and the need for precautionary closures

57. The appointment of the Panel marked the fourth comprehensive scientific review process initiated by the DFFE to re-examine the scientific rationale for closing small-pelagic fishing grounds in the vicinity of African Penguin breeding colonies. These reviews followed the internationally ground-breaking Island Closure Experiment (**ICE**) which was piloted and implemented between 2008 and 2020/2021. The ICE was designed to empirically test whether closures could reduce resource competition between the threatened African Penguin (a specialist feeder on anchovy and sardine) and Industry. The ICE results supported the merits of using targeted fishing closures to reduce resource competition which, in turn, improved African Penguin prey availability as a key contributor to species survival.

58. The ICE commenced with a feasibility study between 2008 and 2014. The feasibility study was followed, between 2015 and 2021 by the experimental

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imposition of closures to small-pelagic fishing within a radius of 20 km from selected African Penguin colonies.

59. Three aspects of the ICE bear specific consideration in the context of this application:

59.1 First, the experimental phase of the ICE involved alternative cycles of three years of "open" and three years of "closed" fishing (periods not aligned with African Penguin life cycles, as African Penguins reach breeding maturity from only four years old).[23] These open and closed cycles become relevant to economic and catch data available for purposes of calculating appropriate trade-offs following the Panel's recommended trade-off mechanism.

59.2 Second, the extent of scientific knowledge about African Penguin foraging behaviour at the commencement of the ICE was appreciably more limited than it is today. For example, tracking data has shown that African Penguins forage further than 20 km from breeding colonies even during the periods of their life cycles when they are most restricted (such as during breeding). In addition, there are more sophisticated methods determining the preferred foraging area of African Penguins around a specific colony – including the "marine Important Bird Area –

[23] Panel Report p 15. I note that, at the time the ICE was commenced, our knowledge of African Penguin foraging ranges was limited. We have subsequently used telemetry data to better understand foraging behaviour – which extends well beyond the 20 km radius even during the periods of restricted forage applicable to the breeding season. See for example, Pichegru et al (2012) "Industrial fishing, no-take zones and endangered penguins" *Biological Conservation,* 156, 117-125, available online <https://doi.org/10.1016/j.biocon.2011.12.013> (accessed 15 February 2024). See "**AM17**".

Area Restricted Search" (**mIBA-ARS**) method relevant to the Panel's recommendations and these proceedings. Once again, these advances in scientific knowledge and method become relevant to the irrationality of the Interim Closures and application of the Panel's recommendations pertaining to closures which are central to this application.

59.3 Third, findings of the ICE published in 2018 indicated that fishing closures were a legitimate management intervention to contribute to African Penguin protection, preservation and conservation.[24] This lent empirical support to the conservation sector's and penguin scientists' emphasis on the importance of imposing closures consistent with African Penguins' foraging behaviour in line with the precautionary principle.

60. Accordingly, on 1 November 2019, a formal recommendation to the Minister regarding the need for purse-seine small-pelagic fishing closures was addressed by BLSA and SANCCOB, together with colleagues in the scientific community affiliated with the University of Cape Town, NMU and WWF-SA. This correspondence, attached as "**AM18**", highlighted the trajectory of African Penguin decline, the danger of imminent extinction in the wild, the core role of

[24] The relationship between food shortages and African Penguin population decline was formally reported in scientific publications as early as 2006 as demonstrated by the references cited in BMP 2013 as well as the Draft African Penguin BMP gazetted for comment on 18 October 2019 under GN1328 in *Government Gazette* 42775. See in particular RJM Crawford, PJ Barham, LG Underhill, LJ Shannon, JC Coetzee, BM Dyer, T Mario Leshoro and L Upfold (2006) "The influence of food availability on breeding success of African penguins *Spheniscus demersus* at Robben Island, South Africa", *Biological Conservation*, 132 (1), 119-125, available online <https://doi.org/10/1016/j.biocon.2006.03.019> (accessed 15 February 2024). See also BMP 2013, p 26 recognising the possibility of resource competition between fisheries around breeding colonies and African Penguins.

declining sardine and anchovy availability in driving African Penguin population decline and the evidence supporting island closures for a minimum of 10 years around the six largest breeding colonies representing, at the time, 90% of the South African breeding population. Despite follow-up, including on 3 and 29 April 2020 (attached as "**AM19**"), no response was received to this letter.

61. At the time this letter was drafted, the African Penguin population in South Africa was estimated at 13,312 breeding pairs according to the DFFE unpublished census data. The latest census data presented by the DFFE on 23 August 2023 – a mere four years later – shows a meagre remaining population count of an estimated 8,534 South African breeding pairs.[25]

62. However, as set out below, during the intervening four years and despite the need for island closures being confirmed repeatedly by scientific review, the Minister has persistently failed to take decisive action. Instead, she has ignored the precautionary principle and allowed the DFFE to vacillate over the optimal delineation of fishing closures to the point of paralysis. Meanwhile, all indications are that sardine and anchovy biomass continues to decline; resource competition between Industry and African Penguins continues; African Penguins' mounting pressures in accessing prey leave them increasingly vulnerable to other threats – and African Penguins are sliding towards extinction.

[25] Note that the census for the global population, including Namibia, was completed in December 2023.

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2021-2022: Analysis paralysis in three rounds of scientific review

Round 1: The Joint Government Forum

63. During the course of January 2021, the Minister requested that DFFE officials synthesise the available scientific information relating to island closures and African Penguin population declines. This led to the constitution of the Joint Governance Forum (**JGF**) on 22 February 2021.

64. In anticipation of the JGF, on 10 February 2021, BLSA addressed correspondence to the Minister, providing a detailed account of all scientific evidence which, as at that date, supported the importance of forage fish prey to African Penguins and the benefits of island closures demonstrated by the ICE. The scientific review was authored by scientists affiliated with BLSA, SANCCOB, WWF-SA, NMU, the Universities of Cape Town, the Western Cape and Exeter, as well as government-employed scientists at SANParks, CapeNature and DFFE: O&C. I attach the e-mail and review as "**AM20**".

65. On 24 March 2021, further correspondence followed from BLSA to the Minister recording meetings and future collaborations between BLSA and SANParks. This correspondence, once again, emphasised lack of prey as the most significant threat to African Penguins and the importance of the ICE. It particularly noted SANParks' report of dramatic declines in African Penguin numbers on St Croix Island and the need for the Minister exercising her decision-making authority to impose island closures based on the precautionary principle. BLSA's covering e-mail highlighted that the African Penguin was "*edging closer*

and closer to the edge of the extinction precipice". I attach this correspondence as "**AM21**".

66. The Minister appeared to recognise the need to take action when, on 19 April 2021, a meeting was convened for BLSA, SANCCOB and WWF-SA to present their concerns to the Minister and DFFE officials, including Dr Ashley Naidoo (of DFFE: O&C) and Dr Kim Prochazka (of DFFE: Fisheries). During this meeting, I, and the other conservation sector representatives, emphasised the crisis facing African Penguins; the threat of extinction; and the peer-reviewed scientific papers identifying reduced food availability as contributing to population declines. We stressed that the science warranted urgent and decisive action which (1) reduced Industry-penguin competition for access to sardines and anchovy around African Penguin breeding colonies; and (2) addressed the long-term sustainability of the small-pelagic fisheries industry. I attach follow-up correspondence sent to the Minister, including the meeting minutes, as "**AM22**".

66.1 I note that the minutes record that "*BC [i.e. the Minister] highlighted the importance of having the scientific evidence to back up decisions and thus to resolve differences in scientific outputs to motivate for a management decision on island closures. BS [sic] further noted that this was important to minimise potential litigation from the fishing industry*".

66.2 Further, among the *"[p]roposed ways forward*" was *"[a] transparent, impartial, peer-reviewed process be initiated that includes FAO member and seabird-prey specialists"*.

67. On 22 July 2021, the Minister responded to BLSA's letter of 24 March 2021. In doing so she confirmed that a technical task team had been established (referring to the JGF). She also recognised that, *"[a]lthough the African penguin population is exposed to a multitude of stressors, the technical task team has identified food availability, habitat degradation as a result of increased anthropogenic activity around breeding colonies and oil pollution as the main reasons for the continuing decline of the African penguins*". I attach this letter as "**AM23**".

68. On 12 August 2021, the Minister held a public meeting at which the JGF's *Synthesis Report* was presented. This report was intended, *inter alia,* to enable the Minister to make decisions regarding closures to small-pelagic sardine and anchovy fisheries around African Penguin breeding colonies – with the principles of conservation, sustainable use and precaution expressly forming part of the JGF's brief.[26] The *Synthesis Report* recognised that:

68.1 abundance of and quality of prey (particularly sardine and anchovy) were important to African Penguins during breeding and before and after moulting (activities occurring year-round); and

68.2 there was disagreement between seabird scientists and marine ecologists on the one hand, and fisheries scientists on the other, as to whether prey availability was the primary driver of African Penguin population declines.[27]

[26] *Synthesis Report* pp 2; 52.

[27] *Synthesis Report* p 15.

69. The e-mail following this meeting, attaching the meeting presentation and *Synthesis Report* itself, is attached as "**AM24**".

70. Despite the Minister's emphasis on precaution and the JGF's express acknowledgment that prey was important to African Penguin populations, the Minister once again failed to take any decision regarding island closures. Instead, a further round of discussions and analysis in the form of the "Extended Task Team" (**ETT**) was set in motion.

71. By this stage, the African Penguin population had fallen further in South Africa: from the estimated number of 13,312 breeding pairs in November 2019 to an estimated 10,117 breeding pairs.

Round 2: The Extended Task Team

72. Rather than the independent review agreed to between the conservation sector and the DFFE in April 2021, the ETT consisted of a series of meetings between August and November 2021 at which SAPFIA represented Industry and the conservation sector was represented by Dr Lauren Waller (at the time of SANCCOB), Mr Craig Smith (WWF-SA) and myself (see "**AM25**"). Predictably, the ETT meetings merely rehashed old debates over the necessity and relative impacts of closures on African Penguin population stability and entirely failed to address the urgent need to arrest African Penguin population declines. The conservation sector highlighted these issues in its submission dated 2 November 2021, attached as "**AM26**".

73. We also made it clear in this submission and throughout the ETT that the closures proposed by the DFFE would not have meaningful biological impacts for African Penguins. Notwithstanding this analysis being provided to the DFFE in November 2021, on 1 September 2022 the DFFE imposed these "**DFFE 2021**" closures as the Interim Closures around Robben, Dassen and Dyer islands – with a modification around Dyer Island further reducing African Penguin benefits by allowing vessels being 26 m or shorter, to continue sardine and anchovy fishing within the closure area (see further the explanation at paragraph 97.1 below). I highlight that a consequence of the Minister's decision which forms the subject of this review, is that these closures are now in place until 31 December 2033.

74. Unsurprisingly, the ETT concluded without any clear resolution. Accordingly, in January 2022, the Minister referred the issues to yet another review: the "Consultative Advisory Forum for Marine Living Resources".

Round 3: The Consultative Advisory Forum for Marine Living Resources (**CAF**)

75. The CAF was established in terms of section 5 of the MLRA on 21 June 2021 and entailed eight all-day meetings in the period 1 February 2022 to 8 March 2022. According to its terms of reference, this "*Special Project to Review Penguin Conservation and Small Pelagic Fisheries Interactions*" required the CAF to *"[c]onsider outputs from the Extended Task Team on Penguin Conservation and make agreed upon recommendations to the Minister on limiting of Small Pelagic Fishing Activities adjacent to penguin colonies*". I attach the terms of reference as "**AM27**".

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76. Industry was represented by Dr Mike Bergh, Mr Mike Copeland (both of SAPFIA) and Mr Redah de Maine (of ESCPA) while the conservation sector was represented by myself, together with Dr Lauren Waller (representing both SANCCOB and EWT) and Mr Craig Smith of WWF-SA. As expressed in my "*observer letter*" (attached as "**AM28**"), the purpose of appointing conservation sector representatives was to:

> *"1.1 Consider outputs from the Extended Task Team on Penguin Conservation and make recommendations on the limiting of Small Pelagic Fishing Activities adjacent to penguin colonies….*
>
> *1.2 To provide the Minister with agreed upon recommendations to the approach to possible island closures.*
>
> *1.3 Make additional recommendations on other conservation measures that may be adopted by the Minister."*

77. Almost no weight, however, was ultimately given to conservation sector recommendations and, predictably, there were no "*agreed upon recommendations*" between those representing Industry interests and those focused on African Penguin conservation imperatives. Critically, the science-backed rationale for biologically meaningful closures was ignored and the CAF stood as yet another avoidance of decisive Ministerial action. Meanwhile, the African Penguin census for 2022 reflected an alarming decline in the South African population to an estimated 9,997 breeding pairs.

March-August 2022: Origin of the Panel and the Interim Closures

78. Following the failure of the CAF, the conservation sector engaged with the Minister, representatives of the DFFE as well as Industry to explore solutions to

the urgent crisis of population decline faced by African Penguins. While the conservation sector at all times motivated for the adoption of scientifically determined island closures based on increasing scientific evidence and the precautionary principle, the Minister continued to insist on consensus-driven delineations. Meanwhile, Industry persisted in questioning the findings of the ICE and the need for imposing any anchovy and sardine fisheries closures at all.

79. In what follows, I outline the steps in the negotiations led by the conservation sector (and compromises that became necessary, including over the woefully inadequate Interim Closures) to establish an international expert panel to finally break the impasse between Industry and conservationists over what the science indicated and what the Minister should do about it.

Step 1: Despite CAF failures, the Minister insists on compromise

80. On 16 March 2022, following a call with the Minister, Mr Mark Anderson, sent the Minister an e-mail (later forwarded to key individuals in the conservation sector – including myself) which pointed out key procedural and substantive irregularities in the CAF's conduct. These shortcomings were elaborated in the conservation representatives' report on the "*Failed Consultative Process*" of the CAF which he enclosed. I attach this e-mail and report as "**AM29**".

81. Subsequently, on 28 March 2022, the CAF's findings were presented at a meeting which I attended together with other conservation sector representatives. Tellingly, during the course of the meeting, the Minister suggested that the conservation sector had three options, namely that we: (1)

accept the recommendations made by the CAF; (2) re-enter discussions with Industry; or (3) accept that the CAF process failed and take such action as we deem fit.

82. On 5 April 2022, Mr Anderson engaged in a lengthy meeting with the Minister, the details of which he recorded in an e-mail to conservation sector members, including myself. As indicated in the e-mail, attached as "**AM30**", and confirmed in Mr Anderson's confirmatory affidavit, the Minister:

82.1 expressed her concern about legal action and indicated that the "*fishing industry has deep pockets and that a legal process could delay the closures by years*";

82.2 requested that Mr Anderson reach out to Mr Copeland of SAPFIA; and

82.3 recommended that the conservation sector meet with Mr Copeland as well as Mr de Maine of ESCPA.

83. Mr Anderson accordingly called Mr Copeland on 5 April 2022, and a meeting between Messrs Anderson and du Plessis representing the conservation sector and Messrs Copeland and de Maine was arranged for 13 April 2022. These engagements clarified that, like the conservation sector, Industry was dissatisfied with the procedure and outcomes of the CAF and supported an independent review – albeit for different reasons. It was equally apparent that Industry fundamentally questioned the need for island closures.

84. Consequently, on 27 April 2022, the conservation sector addressed correspondence to the Minister, which I attach as "**AM31**", recommending that:

84.1 an independent international review panel be convened to review the information before the CAF as well as the CAF's recommendations; and

84.2 as an urgent measure to prevent further population declines, closures to small-pelagic fishing be implemented on a temporary basis around the six islands supporting more than 1,000 breeding pairs of African Penguins, on the basis that they would be revised based on the independent review panel's recommendations.

85. This led to the Minister inviting the leadership of the NGOs comprising the core conservation sector group to meet with her on 6 May 2022. Mr Anderson attended the meeting and subsequently provided feedback. As appears from his e-mail, attached as "**AM32**", the Minister continued strongly to urge compromise between Industry and the conservation sector.

Step 2: Industry refuses to compromise

86. On 25 May 2022, Mr Anderson and Mr du Plessis again met with Industry to discuss a way forward. On this occasion, Industry was represented by Mr Copeland and Mr Mike van den Heever of Pioneer Fishing. It was agreed that joint correspondence would be drafted to the Minister recommending an independent review panel and proposing urgent and temporary closures of St Croix, Dyer and Dassen Islands. Mr Anderson e-mailed a recordal of the agreed

next steps to Mr Copeland and Mr van den Heever on 27 May 2022 which I attach as **AM33**".

87. Soon afterwards, and on 30 May 2022, Dr Waller reported her engagements with another industry stakeholder, Mr Andre Coetzee of Gansbaai Marine (operating a factory in Mossel Bay and engaged in purse-seine small-pelagic fishing around Dyer Island). As appears from Dr Waller's correspondence, attached as "**AM34**", Mr Coetzee was unhappy about the proposed closures around Dyer Island on the basis of economic concerns; his perceptions of the scientific position (which were misconceived); and fears of competition from larger "West Coast" fishing operations within the small-pelagic sector.

88. These attempts by the conservation sector to compromise on closures with various Industry representatives had clearly come to nought. In the result, Mr Anderson addressed correspondence to the Minister's office on 5 June 2022 requesting a meeting to discuss the "*way forward for (a) the island closures and (b) the international review*". Mr Anderson's e-mail is attached as "**AM35**".

Step 3: proposing an international review to break the stalemate

89. It appears that, on or about 29 June 2022, SAPFIA addressed correspondence to the Minister, supporting the need for an international review panel. I attach this letter as "**AM36**".

90. On 5 July 2022, the conservation sector (including BLSA, WWF-SA, EWT, SANCCOB as well as SANParks) sent the Minister its report *"on the outcomes*

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of the consultations between the Conservation Sector and the Fishing Industry on Island Closures and the conservation of the "Endangered" African Penguin". This report again implored the Minister to appoint an international review panel and to implement closures based on the precautionary principle. I attach the report as "**AM37**".

91. Following a meeting between Mr Anderson and the Minister on 6 July 2022, Mr Anderson addressed an e-mail to the Minister on 10 July 2022 forwarding documents she had requested together with a description of the outcome of Dr Waller's attempts to agree on a Dyer Island closure with the CEO of Gansbaai Marine. I attach this e-mail with its attachments as "**AM38**".

92. What followed between 12 July 2022 and 12 August 2022 were a series of meetings and e-mails between the conservation sector and Industry (eventually also including Dr Naidoo of DFFE: O&C) as well as regular updates to the Minister. These engagements focused on compiling terms of reference and the composition of the mooted expert panel. This process concluded on 12 August 2022, when Dr Naidoo circulated the final version of the terms of reference to be provided to the Minister, together with a list of prospective members. I attach Dr Naidoo's e-mail as "**AM39**".

<u>Step 4: Arbitrary "Interim Closures" to facilitate the Panel process</u>

93. For the purposes of facilitating the Panel process, the conservation sector was prepared to accept that temporary closures around the six major African Penguin breeding colonies could be imposed based on delineations presented at the end

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of the JGF process. As indicated above, post-CAF negotiations with Industry had indicated that it was not prepared to compromise on closure delineations. This refusal to compromise extended to temporary closures. As shown by the correspondence exchanged between 15 and 18 August 2022, the result was DFFE imposing a set of arbitrary Interim Closures – which, as a result of the Minister's decision, are now in place for the next ten years.

94. The discussions regarding temporary closures between 15 and 16 August 2022 were facilitated by the DFFE, led by Dr Naidoo who engaged separately with Industry and the conservation sector. However, it appeared ultimately to be the DFFE which decided on the temporary closure delineations – the reasons and internal processes being unclear.

94.1 While the conservation sector had indicated that it was prepared to accept the closure delineations presented at the end of the JGF as temporary measures, this was clearly not acceptable to Industry.

94.2 This was highlighted when, on 15 August 2022, Dr Naidoo asked Dr Waller and I whether the conservation sector would make various concessions for purposes of delineating temporary closures around Dyer and St Croix islands. Dr Waller responded, detailing the conservation sector's prior engagements with Gansbaai Marine in relation to Dyer Island and explaining that the "trade off" which allowed Gansbaai Marine to fish within African Penguins' preferred foraging area (and which had been discussed in the context of the CAF's flawed approach to closures) was highly imbalanced when it came to

promoting African Penguin prey availability. This exchange of correspondence is attached as "**AM40**".

94.3 We next heard from Dr Naidoo on 16 August 2022 when he set out Industry's proposed temporary closures as follows:

> *"1. Dassen - 60 %*
>
> *2. Robben - 100%*
>
> *3. Stony – as per MPA*
>
> *4. Dyer – 40% as per CAF, but allowing vessel less than 24m in the areas between this and the red no go area – need to confirm this with their stakeholders – so a variation of the GF limits – you proposed*
>
> *5. St Croix – 27% – as per CAF*
>
> *6. Bird – 93 % as per CAF".*

94.4 As Dr Naidoo acknowledged, these were "*quiet* [sic] *a departure*" from the closures proposed at the end of the JGF and to which the conservation sector had been prepared to agree on a <u>temporary</u> basis.

94.5 Indeed, these closures were covered in part or entirely by existing MPA closures or non-fishing zones in the case of Robben, Stony and Bird Islands; effectively allowed all local industry fishing to continue around Dyer Island; and presented entirely inadequate fishing closure extents around St Croix and Dassen islands.

94.6 It should be noted that Dassen, Dyer and St Croix islands receive the most purse-seine fishing in the waters around breeding colonies while the waters around Bird Island experience relatively little purse-seine small-pelagic fishing. As such the meagre concessions by Industry

were focused on those colony waters that already received less (to negligible) fishing pressure.

95. This lack of compromise, the inadequacy of Industry's concessions and the absence of a clear socio-economic basis for Industry's proposed temporary closures were pointed out in Mr Anderson's response of 16 August 2022. He emphasised the following:

> *"Given the dire situation for the African Penguins, the proposals do not meet the minimum requirement of an adequate response to this crisis. The Eastern Cape penguin population is Critically Endangered, yet the closure extent in this proposal is less than that of the closure experiment, which was already insufficient. Furthermore, St Croix was closed for three consecutive years on two different occasions during ICE. The industry did not provide any real-time evidence for socio-economic costs due to closures during this time. There is no justification for a 27% closure.*
>
> *Furthermore, industry, on the whole, has provided no evidence for actual socio-economic costs. This continues to limit a transparent negotiation based on the best available data to weigh up costs to industry and benefits to penguins.*
>
> *Another breeding season with no closures has gone by and this is the second year that the breeding foraging areas have not been protected. We are now moving into the moult period, and a recent study has shown that closures will benefit the non-breeding birds. Since no closures have been implemented for the last 1 ½ years, with seasonal closures the year before, and most of the TAC already caught, implementing the Governance Forum proposals for the remainder of the year has the most support. The Governance Forum proposals were also supported by both DFFE's Oceans & Coasts and Fisheries branches.*
>
> *The industry's concern that they don't want to support the Governance Forum closures in the interim because they believe they may become permanent is unfounded, given that DFFE has agreed that these measures are temporary.*

Given the rationale, we maintain that the strongest defensible position for interim closures is to implement the recommendations from the Governance Forum with proposed adjustments for the Dyer and Stony colonies."

95.1 I attach the relevant e-mail chain as "**AM41**".

96. The debate regarding temporary closure delineations concluded on 18 August 2022, when Dr Lisolomzi Fikizolo (at the time, the Chief Director: Specialist Monitoring Services; DFFE: O&C) circulated an e-mail announcing temporary closures. In outlining these "*interim closures*", Dr Fikizolo:

96.1 indicated that they would be recommended to the Minister for implementation from 1 September 2022 to 14 January 2023;

96.2 emphasised that these closures were of a temporary nature, with a new decision to be imposed from 15 January 2023; and

96.3 suggested that the Interim Closures represented an "uneasy" consensus between the industry and the conservation sector.

97. I flag that Dr Fikizolo referred to the origin of each closure with reference to when, and by which party, it had first been proposed. While St Croix, Stony Point and Bird Island reflected various Industry proposals, Dassen, Robben and Dyer islands were described as originating as "DFFE 2021" (i.e. the DFFE's proposals at the commencement of the ETT). This is relevant, not only in reflecting the entire absence of reference to conservation sector proposals, but also in an important inaccuracy in relation to Dyer Island.

97.1 As Dr Waller had explained, the closure to be imposed around Dyer Island was in fact based on the discussions between the conservation sector and Gansbaai Marine during the CAF which imposed a closure on all fishing in a relatively little-used fishing area near the coast (proposed by Industry during the CAF) and allowing vessels under 26m in length, including those of Gansbaai Marine, to continue fishing in the area between this boundary and the perimeter of "DFFE 2021".

97.2 Accordingly, the Interim Closures effectively acceded to Industry in relation to four of the six breeding colonies and this was, by no means a consensus. This absence of consensus was pointed out in Mr Anderson's response to Dr Fikizolo (which the latter conceded).

97.3 I attach Dr Fikizolo's original e-mails and the exchange between he and Mr Anderson that followed as "**AM42**".

98. In the result, with effect from 1 September 2022 to 14 January 2023, the DFFE declared that certain areas around the six major African Penguin colonies would be closed to commercial fishing for anchovy and sardine (i.e. **the Interim Closures**) [28] and the sardine/anchovy fishing permit conditions were amended accordingly.

99. The Interim Closures were, by definition, at all times intended to be nothing more than a temporary measure to help protect the declining African Penguin

[28] DFFE, (2022) *Forestry, Fisheries and the Environment on interim fishing closures and limitations around key penguin colonies*, available online <https://www.gov.za/news/media-statements/forestry-fisheries-and-environment-%C2%A0-interim-fishing-closures-and-limitations> (accessed 16 February 2024).

population whilst the international review panel was constituted and prepared its report. Indeed, the media statement announcing the Interim Closures indicated that they would "*be temporary to allow for an international scientific panel to be set up to review all related science output over recent years*" and to "*advise the Department on the value of fishing limitations for penguins' success, as well as the impacts such limitations will have on the fishing industry*". The media statement is attached marked "**AM43**".

100. As a result of the haphazard manner in which the Interim Closures were determined, they do not align with the preferred foraging range of African Penguins (save for Bird island, where there is minimal to negligible purse-seine fishing activity – although this is a coincidence as the Bird Island closure delineation originates in an irrational method as explained at paragraphs 179 to 183 below).

101. The Interim Closures were in fact delineated using a confusing mix of different delineation methods, all of which pre-date (1) the Panel's consolidated examination of the ICE, JGF, ETT, CAF; and (2) the latest scientific data and methods for determining African Penguins' preferred foraging ranges. I elaborate at paragraphs 165 to 183 below.

October 2022: The Minister formally convenes the Panel

102. On 28 October 2022, the Minister gave notice in the Government Gazette of her intention to establish a panel of experts in terms of section 3A of NEMA "*to advise on the proposed closure of fishing areas adjacent to South Africa's African*

Penguin breeding colonies and the decline in the penguin population". This notice, attached as "**AM13**", included the Panel's Terms of Reference.

103. The Terms of Reference explained that prior studies concerning the effects of fishing closures on African Penguin breeding colonies had resulted in "*lengthy debate with dichotomous views*" and that comments and recommendations of the ETT and CAF "*remain contested*".[29] Accordingly, the Terms of Reference made it clear that the Panel was being convened with the purpose of providing an independent, scientific review of prior scientific disagreements and presenting consolidated recommendations to enable the Minister to make a decision about closures.

104. This purpose was detailed through specific objectives which required the Panel, *inter alia:*

    104.1 To evaluate whether the scientific evidence from the ICE and subsequent publications "*indicates that limiting small pelagic fishing around* [African Penguin] *colonies provides a meaningful improvement to penguin parameters that have a known scientific link to population demography in the context of the present rate of population decline*" and "*[a]ssess the cost-benefit trade-off of 1) costs to fisheries, versus 2) the proportion of penguin foraging range protected during the breeding season, for different fisheries exclusion scenarios*".[30]

[29] Terms of Reference, para 1.

[30] Terms of Reference, para 2(a).

104.2 "*Within the context of an urgent need to implement timeous conservation actions for the African Penguin and considering the information and rationale of the various scientific reviews and associated documents of the Island Closure Experiment evaluate the evidence supporting the benefits of fishery restrictions around African Penguin colonies to adopt precautionary measures by implementing long-term fishery restrictions*"[31] (emphasis added).

104.3 "*If closures or fishing limitations are viewed to contribute positively to the support of the African Penguin population, [to] recommend a trade-off mechanism as a basis for setting fishing limitations and mapping*"[32] (emphasis added).

104.4 Also if determining that fishing limitations were of benefit to African Penguins to recommend "*Delineation of fishery no-take areas around six African Penguin colonies (Dassen Island, Robben Island, Dyer Island, Stony Point, St Croix Island and Bird Island) and the duration of the closures, considering life history traits, e.g. age when most birds start breeding, and associated duration required to signal potential population benefits*".[33]

105. The Panel's recommendations thus had to include:

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[31] Terms of Reference, para 2(b).

[32] Terms of Reference, para 2(c).

[33] Terms of Reference, para 2(c)(a).

105.1 "*whether, based on the results from ICE and other evidence-based information, island closures are likely to benefit penguins*";[34]

105.2 "*whether a percentage (%) of penguin foraging range and other* biological *criteria ... provide a basis for determining benefits from closures for penguins and assess the merits of different proposed methods to delineate important penguin foraging habitat*";[35] and

105.3 "*trade-off mechanisms for island closures in the event that the panel finds that the results of the ICE and other evidence demonstrate that island closures are likely to benefit penguins, including specific areas and durations [and]...advise on biologically meaningful penguin habitat extents for fishery limitations per island, recommendations must be spatially and temporally explicit, and provided on a map*".[36]

106. As explained at paragraphs 113 to 114 below, the Panel duly:

106.1 determined that island closures were likely to benefit African Penguins;

106.2 endorsed the "mIBA-ARS" method as appropriate for delineating important penguin foraging habitat and determining benefits to African Penguins; and

[34] Terms of Reference, para 5(a).

[35] Terms of Reference, para 5(c).

[36] Terms of Reference, para 5(d).

106.3 critically, provided a clear trade-off mechanism which would enable the Minister to determine biologically meaningful African Penguin habitat extents for fishery limitations per island.

107. The second of these recommendations was omitted from the Minister's decision, leading to continued debates about the validity of using "mIBAs" in determining African Penguin foraging areas. However, it is the Minister's failure to follow the last of these three recommendations which is central to this application and the urgent need to intervene to prevent African Penguins' fight for food over the next ten years.

108. Before I elaborate on these consequences for African Penguins, I return to the events of 2023, commencing with the Panel process itself and the other aspect of the Minister's irrationality: the expectation of "agreement".

March-July 2023: The Panel process and attempted Eastern Cape agreement

109. The Panel process involved comprehensive engagements between the members of the Panel and the interested community of penguin scientists, marine ecologists, conservationists, Industry and the DFFE through e-mail correspondence; written submissions; online presentations and meetings between 20 and 23 March 2023 and on 15 May 2023; and in-person stakeholder meetings on 5 and 6 June 2023.

110. During the 6 June 2023 session Mr de Maine of ESCPA indicated his willingness to discuss closures around St Croix and Bird islands – both located in Algoa Bay

(**the Eastern Cape closures**). This initiated a course of events which would highlight the futility of the Minister's continued emphasis on "agreement" but also cast into the relief the DFFE and Minister's apparent refusal to take decisive action to benefit African Penguins. Nevertheless, on 9 June 2023, the conservation sector followed Mr de Maine's lead and confirmed that Adj. Prof. Pichegru would be their representative in further Eastern Cape closure discussions due to her expertise in the Algoa Bay area and her being based in Gqeberha, as was Mr de Maine. This e-mail, and Mr de Maine's confirmation of the arrangement, is attached as "**AM44**".

111. Further steps were delayed until 20 July 2023 when, after Adj. Prof. Pichegru returned from a period abroad, I am advised that a meeting was held between her, Mr de Maine and Ms Tasneem Wesley (also of ESCPA). A further call on 2 August 2023 and subsequent e-mail correspondence appeared to confirm a potential compromise on the boundaries of the Eastern Cape closures. I attach the relevant e-mails as "**AM45**, "**AM46**" and "**AM47**".

112. The fate of these discussions which commenced before the Minister's decision; which the DFFE ironically celebrated as a consequence of her decision; and which unravelled on the very day the "agreement" was to be implemented, demonstrate the inherent unworkability of the Minister's contemplation of any "agreement" being reached between the "conservation sector" and Industry. I have not detailed every tortious step of this (non)agreement. However, I touch on its conclusion; ESPCA's reversal; and the DFFE's yielding to Industry's complaints in their chronological context below (see paragraphs 122 to 125; 130 to 131; 152 to 153; and 161).

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July-August 2023: The Panel's Recommendations

113. The Panel appears to have provided its report to the Minister during the course of July 2023. As foreshadowed above, its key findings include the following:

113.1 Despite its weaknesses, the ICE showed that excluding purse-seine sardine and anchovy fishing from waters around the breeding colonies is likely to contribute to reducing the rate of decline of the African Penguin population.[37] In other words, the Panel answered the questions posed at paragraphs 2(a) and 5(a) of the Terms of Reference (paragraphs 104.1 and 105.1 above) to confirm that "*the results of the ICE and other evidence-based information*" showed that island closures are likely to benefit African Penguins.

113.2 In determining that fishing limitations would likely benefit African Penguins, the Panel recommended that closures should be year-round and reviewed after a period corresponding with African Penguin life-histories i.e. between six and ten years after designation of closures.[38] This answered the question at paragraph 2(c)(a) of the Terms of Reference cited at paragraph 104.4 above.

113.3 The best scientific basis for delineating preferred foraging areas of African Penguins during breeding was the mIBA-ARS method.[39] This method would provide a conservative indication of where these

[37] Panel Report, p 8; p 23, para 2.3; p 26 para 2.5; p 44 para 7.1.

[38] Panel Report, p 33 para 4.1; p 46 para 7.3; p 47 para 7.6.

[39] Panel Report, p 34, para 4.3; p 46 para 7.3.

seabirds forage year-round (including during moult).[40] This is because the mIBA-ARS for each island is based on telemetry data collected for African Penguin at-sea movements collected when African Penguins are engaged in early chick-rearing and they travel the shortest distances from the colony. In other words, the Panel responded to paragraph 5(c) of the Terms of Reference cited at paragraph 105.2 by stating that the most appropriate method for delineating important penguin foraging habit was the "mIBA-ARS" method which remained conservative in terms of African Penguins' year-round foraging behaviour.

113.4 It is desirable to identify a trade-off solution that minimises societal costs and maximises benefits to African Penguins. In this regard, the point at which the change in African Penguin benefits matches the change in costs to Industry based on the Opportunity Based Model (**OBM**) was recommended as a reference point to guide the selection of optimal closures.[41] In other words, a trade-off mechanism was provided as contemplated by paragraphs 2(c) and 5(d) of the Terms of Reference cited respectively at paragraphs 104.3 and 105.3 above.

113.5 The Panel made further specific recommendations regarding the recommended trade-off mechanism as well as how the mechanism could be applied using currently available economic and scientific data. Accordingly, the Panel recommended that:

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[40] Panel Report, p 34, para 4.3.

[41] Panel Report, p 36, para 4.4.

113.5.1 Although the OBM and Social Accounting Matrix (**SAM**) used by SAPFIA's commissioned consultants to estimate the costs of different closure delineations to Industry likely overestimate the actual costs and needed refinement,[42] existing OBM outputs could be used to assess and rank closure options in a relative sense.[43] In other words, it was possible to use this data in determining an appropriate trade-off so that island closures could be immediately delineated and implemented.

113.5.2 Closure areas should be selected based on the suitability of these delineations to evaluate the effectiveness of alleviating resource competition on African Penguins.[44] This meant that the rationale for the trade-off mechanism (and island closures imposed) had to in fact reduce resource competition. If a closure was imposed in an area where there was in fact little to no fishing for sardines and anchovy, that closure would have no bearing on reducing resource competition and would, accordingly, be meaningless.

113.5.3 Closures that reflect valuable African Penguin foraging areas will have greater benefits than those that close less valuable foraging areas.[45] In other words, it was necessary to assess those areas which were valuable to African Penguins (which

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[42] Panel Report, p 31, para 3.3; p 44 para 7.2; p 46 para 7.3. See also p 30 and Appendix E.

[43] Panel Report, p 8; p 44 para 7.2.

[44] Panel Report, p 33, para 4.1.

[45] Panel Report, p 36, para 4.4.

the Panel indicated should be considered in terms of the mIBA-ARS method). Moreover, when imposing island closures, these would only have meaning if they in fact covered the areas in which African Penguins preferred to forage.

114. The three consequences of the Panel's recommendations that are of immediate relevance to these proceedings are:

114.1 First, the Panel recommended that island closures were an appropriate conservation intervention. This should have settled debates regarding whether small-pelagic no-take areas around African Penguin breeding colonies should be implemented. As indicated below, the Minister's decision accepted this recommendation. Whether or not closures should be implemented is thus not subject to dispute.

114.2 Second, the Panel recommended that the appropriate method for delineating important penguin foraging habitat was "mIBA-ARS". This recommendation was made without qualification and answered a specific question posed to the Panel (as indicated above). This was distinct from other questions put to the Panel and Panel recommendations regarding the merits or otherwise of the ICE; economic models used by Industry; the need for ongoing monitoring; and the possibility of future revision of closure delineations. The Panel thus settled what should define a "valuable area for African Penguins" when the Minister considered how to balance African Penguin needs

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with Industry interests. This appears to have been omitted from the Minister's considerations.

114.3 Third, the Panel recommended an appropriate "trade-off mechanism" to be used by the Minister when deciding which particular delineation to impose around each specific breeding colony. The Panel's recommendation allowed for a comparison of relative costs to Industry and benefits to African Penguins for the primary delineation proposals submitted by the conservation sector, Industry and the DFFE to date (including the original 20 km delineations of the ICE, the DFFE 2021 closures presented at the commencement of the ETT, CAF delineations, the delineations imposed as Interim Closures, and delineations based on mIBA-ARS). The recommended trade-off mechanism accounted for the existing state of scientific and fisheries data to enable biologically meaningful closures to be imposed at the commencement of the Monitoring Period. It is this particular recommendation which has not been followed by the Minister and which is central to the relief sought in these proceedings.

115. In summary, the Panel supported the immediate imposition of biologically meaningful closures using a clearly articulated trade-off mechanism which required an assessment of a range of delineation options, including one based on African Penguins' preferred foraging area determined using the mIBA-ARS method.

4 August 2023: The impugned Decision

116. On 4 August 2023, the Minister released the Panel's report and communicated her decision regarding island closures. In material parts, it provided that:

    116.1 The Minister had made her decision "*in the light of the report*". This suggests approval of the report;

    116.2 Restrictions on purse-seine sardine and anchovy fishing would be implemented in the waters around African Penguin colonies for a minimum of 10 years, with a review after 6 years (i.e. the monitoring period); and

    116.3 The fishing restrictions would use the "Interim Closure" delineations unless "the conservation sector" and "the fishing industry" agreed to alternative closure delineations by 31 December 2023 (i.e. the deadline).

117. The media statement in terms of which the decision was announced is referenced above as "**AM15**". It is the only documentary record of the Minister's decision available to the applicants.

118. The effect of the decision was that:

    118.1 On the one hand, the Minister accepted the importance of island closures as a conservation measure consonant with the Panel's findings and imposed closures for a period consonant with Panel's

recommendations (for ten years until December 2033, subject to review at the end of 2029).

118.2 On the other hand, the Minister inexplicably imposed delineations entirely at odds with the Panel's recommendations regarding its recommended trade-off mechanism and confirmation that the most valuable African Penguin areas should be assessed using the mIBA-ARS method (as had been their brief). Moreover, she rendered the Interim (now permanent) Closures subject to further "agreement" by private actors which was contrary to the very purpose and objects of the Panel i.e. to remove the debate from these stakeholder groups and enable the Minister to take a decision regarding island closures and their delineations, informed by the best available science.

119. Instead of acting on the Panel's clear recommendations regarding closure delineations, the Minister ignored them, imposed closures with little to no basis in scientific data (let alone the recommended methods) and, once again, referred the matter to "agreement" between stakeholders.

120. Predictably, no agreement was reached between Industry and the conservation sector to alter the Interim Closures by the deadline and, as set out in the sections which follow, events between August and December 2023 demonstrated the fundamental flaws in the Minister's conduct. The Interim Closures are now "permanent" and will remain in place for the next decade. This sounds the death knell of the African Penguin.

August to October 2023: Illustrating the fundamental flaws of the Minister's decision

121. Following the Minister's decision, the conservation sector attempted to understand the basis for her decision-making and how the Minister and DFFE envisaged implementing the decision. We also made various attempts to mitigate the decision having ignored the trade-off mechanism and reverting to the pre-Panel approach of stakeholder "agreement". As is illustrated by the events between August and October 2023, it was simply impossible to overcome the fundamental flaws in the Minister's decision which disregarded the crux of the Panel's recommendations – and its central rationale.

Illustration 1: The Eastern Cape (non)agreement

122. Between 8 and 31 August 2023, the pre-decision discussions regarding Eastern Cape closures continued with a focus on St Croix. On 25 August 2023 at a meeting between ESCPA, the DFFE and conservation sector representatives, "agreement" appeared to be reached which was confirmed by way of a series of e-mails exchanged on 28 August 2023. The relevant e-mails are attached as "**AM48**"; "**AM49**"; "**AM50**" and "**AM51**".

123. Accordingly, on 30 August 2023 Dr Naidoo circulated a revised St Croix delineation map and, on 31 August 2023 the DFFE issued a media release celebrating this compromise (implying that it was a consequence of the decision, which it clearly was not) while DFFE: Fisheries issued amended permit conditions incorporating the agreed St Croix and Bird islands delineations for

implementation from 1 September 2023. The media release is attached as "**AM52**".

124. In any event, on 1 September 2023, the commencement date of the "agreed" closures, Mr de Maine called Dr Naidoo and Adj. Prof. Pichegru indicating that there was an error in the amended permit conditions. This was despite clear consensus on the closures indicated by me, Adj. Prof. Pichegru, Dr Waller, Mr Smith and Mr de Maine himself. To the conservation sector's surprise, Dr Naidoo appeared to contemplate acceding to Mr de Maine's demands. I attach the relevant e-mail chain as "**AM53**".

125. In the result, the DFFE showed no signs of enforcing the "agreement" and on 19 December 2023, Dr Naidoo informed the conservation sector that the anchovy and sardine fishing permit conditions would be amended at the commencement of the January 2024 fishing season to reflect the Interim Closures around St Croix and Bird islands (see paragraph 161 below). Once again, the DFFE had bowed to resistance from Industry at the expense of African Penguins.

Illustration 2: The DFFE fails to appreciate the Panel's recommendations

126. Between September and November 2023, the conservation sector attempted to co-operate with a process led by Dr Naidoo which appeared to have very little relationship with the Panel's recommendations; little potential to use the Panel's recommendations to break the impasse that had led to the Panel being convened; and generally little relationship with rational or logical decision-making reflecting the Panel's history and outcomes.

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127. On 13 September 2023, Dr Waller raised some of these concerns with Dr Naidoo by way of the e-mail attached as "**AM54**". Amongst other things, Dr Waller:

127.1 pointed out that the Panel had recommended that the most scientifically defensible areas for closures could be determined using the "mIBA-ARS" method;

127.2 asked what had led to the Minister deciding to continue the Interim Closures which were not aligned with the Panel's recommendations; and

127.3 sought the basis on which the DFFE had determined not to follow the Panel's recommendations.

128. Dr Naidoo's response on 15 September 2023, attached as "**AM55**", indicated that:

128.1 he did "*not have insights into the Minister's processes*";

128.2 the outcome of the Panel's process resulted in the ICE being considered final and that "*closures or limitations of fishing adjacent to penguin colonies does have a positive effect for penguins*";

128.3 a "policy" decision had been taken to impose fishing limitations as a penguin conservation measure which required implementation through (1) continuation of Interim Closures unless replaced by agreement; and (2) scientific investigation as recommended by the Panel;

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128.4 further scientific investigation over the next six years (i.e. the monitoring period) would include investigating "*ARS for MIBAS, fishing costs estimates etc*"; and

128.5 the policy decision to use fishing closures as a conservation measure had been made and could not be revised.

129. It was clear from Dr Naidoo's e-mail, that he had not properly appreciated the Panel's recommendations regarding closure delineations, the trade-off mechanism and the use of mIBA-ARS to assess foraging areas of value to African Penguins. I am further advised that his approach was irrational in light of the purpose, objects and legal context of the Panel's appointment and the Minister's obligations regarding the protection of threatened species.

130. On 21 September 2023, Adj. Prof. Pichegru responded to Dr Naidoo's e-mail pointing out that he had not properly answered Dr Waller's queries regarding the DFFE's decision to retain the Interim Closures rather than following the Panel's recommend method for delineating closures. In her e-mail, a copy of which is attached as "**AM56**", Adj. Prof. Pichegru also:

130.1 noted that Dr Naidoo had not explained how the DFFE could entertain amendment to the Eastern Cape closures in light of the agreement reached with ESCPA; and

130.2 emphasised that waiting out a six-year review period to revise Interim Closures was entirely inappropriate as the Interim Closures would not

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have meaningful biological impacts for African Penguins which were "*on the verge of being critically endangered*".

131. Dr Naidoo's response on 22 September 2023 (attached as "**AM57**") stated:

131.1 in respect of the DFFE's process prior to the Minister's decision:

> *"There was a submission to Minister, as is usually the case. This one was initially drafted by myself, this follows the hierarchy for comment / amendments the DDG (Deputy-Director General), DG (Director General) and then to the Minister. On extending the interim closures, I did not see that the Panel made recommendations on limitations (maps) in the Report, but offered a process and mechanisms to look at trade-offs…. I thought extending the interim closures for the remainder of this year will allow some time for all involved to look at the report. I was hoping that before January 15th next year there could be more and better agreements based on the Panel Report, while the other work is set in motion and was trying to avoid a break in fishing limitations while these discussions took place. This plan has been impacted by the 're-negotiation', as Eastern Cape Agreement will have been a good base to encourage negotiations on the other colonies".*

131.2 in respect of Mr de Maine's attempt to renegotiate:

> *"this is certainly not for me to allow or not allow, this is an initiative among yourselves as conservation representatives and the fishing industry".*

132. It is apparent from Dr Naidoo's e-mail that the Minister's decision may have been heavily influenced by Dr Naidoo's misinterpretation of the Panel's recommendations and that the notion of "agreement" was integral to Dr Naidoo's approach. It is also clear that Dr Naidoo had not fully appreciated the DFFE's and the Minister's obligations to intervene to protect threatened species. Indeed, the DFFE and the Minister subordinated both their duty to intervene, and the

Panel's scientifically informed recommendations, to the negotiating foibles of Industry and the conservation sector.

133. It was also increasingly apparent that the DFFE and Minister's attention needed to be drawn to these issues directly so the Panel process did not – like those before it – amount to an exercise in futility. With this in mind, I replied to Dr Naidoo welcoming the suggestion of a meeting to discuss our understanding of the Panel's recommendations. The relevant e-mail chain is attached as "**AM58**".

Illustration 3: Attempting to persuade Oceana to lead in African Penguin conservation

134. To mitigate the impact of the Minister's decision, but mindful of the historic impasse with SAPFIA regarding closure delineations, the conservation sector reached out to the CEO of the Oceana Group (**Oceana**) to discuss whether Oceana would voluntarily avoid fishing in African Penguin preferred foraging areas. We hoped that Oceana, as a member of the Responsible Fisheries Alliance and the largest small-pelagic rights holder, could be persuaded to take a lead in supporting urgent African Penguin conservation measures despite there being no incentive for Industry to move from the Interim Closures to more meaningful conservation measures for African Penguins.

135. With this in mind, Mr Smith and I met with Mr Suleiman Salie, the Managing Director of Oceana, on 18 September 2023. Although Mr Salie reiterated Oceana's support for following the Panel's recommendations, he was non-committal about voluntarily agreeing to meaningful closures. Mr Salie also expressed concern that any steps taken by Oceana to adopt closures voluntarily

and in the absence of formally-imposed DFFE no-take zones, would likely result in skippers leaving the Oceana fold for other Industry players that had not made commitments to stop fishing in African Penguins' preferred foraging grounds.

136. It was clear that there was little (if any) prospect of Oceana breaking the Industry mould. It was equally evident that a clear decision on no-take zones from the DFFE or Minister was the only way that this major Industry player would risk its competitive advantage by acting in the interests of African Penguins. Again, "agreement" seemed to be wishful thinking.

Illustration 4: Attempting to identify and engage directly with smaller Industry players

137. As another avenue for mitigating the effect of the Minister's decision, the conservation sector considered engaging directly with holders of small-pelagic purse-seine fishing rights (other than Oceana). We knew that not all rights holders were affiliated with SAPFIA and ESCPA. We also knew that the leadership of SAPFIA was unlikely to move from old positions (subsequently confirmed as set out below). Our difficulty was the absence of a publicly available register of small-pelagic purse-seine fishing rights holders that would allow us to identify these rights holders. Further, the DFFE had not taken steps to facilitate engagement beyond SAPFIA and ESPCA or clarify precisely who "Industry" was.

138. Consequently, on 19 September 2023, Mr Smith approached the DDG: Fisheries to obtain the information necessary to progress inclusive and transparent engagements with Industry that could reflect the interests of all small-pelagic rights holders – including those outside the SAPFIA and ESCPA fold. The DFFE,

however, insisted on a request being filed in terms of the Promotion of Access to Information Act, 2 of 2000 (**PAIA**).

139. It struck us as peculiar that the DFFE would insist on a PAIA request to obtain information required to give effect to the "agreement" contemplated by the Minister's decision. We consequently presented our difficulty to the Minister by way of correspondence addressed by BLSA on 2 October 2023 (attached as "**AM59**").

140. Despite follow-up on 16 October 2023, nothing was forthcoming until 24 November 2023. Rather than tendering the requested information, the Minister proceeded to invoke the Protection of Personal Information Act, 4 of 2013 to explain why the details of rights holders could not be provided in the absence of a PAIA request. As an alternative to submitting a PAIA request, BLSA was unhelpfully advised that "*the industry can also be engage [sic] through the South African Pelagic Fishing Industry Association (SAPFIA), which is a legally recognised industrial body which represents a large number of Rights Holder [sic] in the small pelagic sector*". The correspondence of 16 October and 24 November is attached as "**AM60**" and "**AM61**" respectively.

141. The Minister's response entirely failed to appreciate that the request for rights-holder details was made in an attempt to implement the Minister's call to reach "agreement" and <u>because</u> SAPFIA had been intransigent. It further failed to recognise that SAPFIA was not the sole representative of small-pelagic fishing rights holders. I am advised that this correspondence may well misconstrue the true legal position regarding the information requested and is also a further

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example of the Minister's irrationality of expecting "agreement" between parties which had been unable to agree on the need for and extent of closures since the ICE and where the Panel was constituted to advise the Minister on how she could end this very impasse.

142. The events that occurred between Mr Smith's initial request for rights-holders' details on 19 September 2023 and the date of the Minister's letter on 24 November 2023 (set out below), emphasise that the Minister's insistence on agreement was not only clearly a continued unlawful abrogation of her responsibilities but has also been conclusively proved to be entirely unworkable.

Illustration 5: The conservation sector applies the Panel's recommended trade-off mechanism while the DFFE and Minister fail to do so

143. Still another avenue for trying to mitigate the effect of the Minister's decision was pursued by the conservation sector in preparing a consolidated analysis of the Panel's recommendations which also demonstrated how its recommendations regarding the application of the mIBA-ARS method and trade-off mechanism could be immediately implemented (**the Assessment**). Since the decision itself made provision for "*both the fishing industry and the conservation sector [studying] the Panel's Report*", we anticipated that Industry would be undertaking a similar exercise.

144. Accordingly, on 17 October 2023, Adj. Prof. Pichegru e-mailed the Assessment to Dr Naidoo for his information and consideration (see "**AM62**") while Mr

Anderson sent the Assessment under cover of a letter from the conservation sector to the Minister (see "**AM63**").

145. The letter to the Minister:

145.1 made it clear that the conservation sector had carefully analysed the Panel's report, considered it "*scientifically robust and well balanced*" and wished to ensure that its recommendations were implemented – including in respect of selection of optimal island closure delineations;

145.2 emphasised that the seabird scientists had relied on the Panel's recommendations to assess the suitability of the Interim Closures relative to the methodology for closure design recommended by the Panel and had found that the Interim Closures neither maximised positive outcomes for African Penguins nor represented an appropriate trade-off between benefits to African Penguins and costs to Industry; and

145.3 requested that the Assessment be circulated to Industry.

146. The Assessment itself set out the key findings of the Panel's report (at paragraph 3); explained how the conservation sector had assessed Interim Closures in light of the Panel's findings (at paragraph 4.1); and applied the Panel's recommended mechanism to each colony which remained subject to Interim Closures (at paragraph 4.2). In doing so, the Assessment:

146.1 defined the preferred foraging areas of the African Penguin by using the mIBA-ARS method for each colony based on colony-specific foraging data; and

146.2 presented a trade-off analysis, as recommended by the Panel, which illustrated that implementing closures around the preferred foraging areas determined according to the mIBA-ARS method for the relevant islands would incur very little and, in some instances, negligible costs to Industry.

147. The Assessment did not analyse St Croix or Bird Islands because, at this time, the conservation sector still understood these islands to be subject to closures which had been agreed with ESCPA and pre-dated the Panel recommendations. In addition, we omitted Dyer Island as we lacked OBM data to account for the "split" zone imposed by the Interim Closure which allowed vessels of 26 m in length or less to continue fishing (and we had not yet been able to establish a method for applying the trade-off mechanism to account for this – which has proved unnecessary as illustrated in Ms Weideman's expert affidavit attached as "**AM5**").

148. A week later, on 24 October 2023, Dr Ludynia, Dr Waller, Adj. Prof. Pichegru and I met with Dr Naidoo (and Mr de Maine) to discuss next steps. During the course of this meeting, it became apparent that the DFFE had not completed its own analysis of the Panel's recommendations. The inescapable inference was that the DFFE (and, thus, the Minister's advisors) had not properly considered the

Panel's recommendations prior to the decision. It was entirely unclear whether the Minister herself had (or could have) done so.

149. On 30 October 2023, I addressed an e-mail to Dr Naidoo, a copy of which is attached as "**AM64**", in which I summarised the next steps agreed to at our meeting of 24 October 2023, namely:

> *"1. The Governance Forum will be reconstituted to consider the merits of the analyses of the Panel's Report by the "conservation sector" (already provided to you) and the "fishing industry". As we understand it, Alison's suggestion allows for an existing forum to consider the merits of both analyses and to then provide an updated memorandum to the Minister which applies the recommended methodology from the Panel Report. This would build on the study of the Panel Report by ourselves and fisheries which the Minister contemplated.*
>
> *2. To facilitate this process, you will circulate our Assessment to Fisheries and invite them to submit their own assessment of the Panel Report to the DFFE;*
>
> *3. If helpful to DFFE, a presentation of both assessments would be arranged (along the lines of the presentation we gave on 24 October) to ensure the Governance Forum is fully appraised of both assessments.*
>
> *4. The Governance Forum will then consider both assessments and draft a memorandum of their recommendations to the Minister."*

150. On 31 October 2023, Dr Naidoo replied, once again signalling the DFFE's "hands off" approach by stating, *inter alia*, that he had not understood that the DFFE was responsible for facilitating agreement. His e-mail is attached as "**AM65**".

November 2023: SAPFIA rejects the need for island closures

151. On 3 November 2023, Dr Naidoo sent the conservation sector and Industry representatives a request for a meeting to be held on 10 November 2023 to discuss the Panel's recommendations.

151.1 Concerned about Dr Naidoo's response to our summary of the agreed way forward on 31 October 2023, we sought clarity on the meeting agenda and requested that Industry provide its own analysis in advance so that we could have a meaningful discussion.

151.2 On 9 November 2023, Dr Naidoo responded by conceding the merits of having both analyses circulated prior to an all-party meeting and postponed the meeting to allow Industry to prepare its equivalent of the Assessment. Dr Naidoo also appeared to back-track on the agreed way forward of 24 October 2023 by indicating that it was unlikely that an updated recommendation could be drafted for purposes of clarifying the Panel's recommendations with the Minister.

151.3 The relevant chain of correspondence is attached as "**AM66**".

152. Until this point, the conservation sector was unaware of ongoing discussions Dr Naidoo had been having with Industry regarding the Eastern Cape closures. However, on 8 November 2023, Mr de Maine again reached out to Adj. Prof. Pichegru to "*discuss that mistake… with the St Croix closure*" and followed with an e-mail which gave insight into what had transpired. It appears that from at least 26 September 2023, the DFFE, with the assistance of Zishan Ebrahim of

SANParks, had circulated various maps to Mr de Maine as well as to Messrs Copeland, Mike Bergh and Matt Horton (all representing SAPFIA) for purposes of "rectifying" the maps. I attach the WhatsApp exchange and e-mail chain reflecting these interactions as "**AM67**" and "**AM68**".

153. I mention this correspondence as the Eastern Cape closures were rapidly becoming an issue muddying the waters in relation to implementing the Panel's delineation recommendations. It was also becoming apparent that ESCPA was again aligning with SAPFIA's position. In the event, Dr Naidoo agreed to add the Eastern Cape closures to the agenda for the meeting he had called to address the Panel's recommendations – and which was now rescheduled for 16 November 2023.

154. On 14 November 2023, Dr Naidoo circulated the document entitled *SAPFIA's initial comments and view on the International Review Panel report and on the trade-off between the costs and benefits of island closures* (dated 13 November 2023). Alarmingly, the opening paragraph of this document stated the following in bold and underlined text:

> ***"In SAPFIA'S view, given its knowledge and opinion of the economic impacts, and the benefits reported by Punt et al (2023) there should be no closures."***

155. This was directly contrary to the Panel's recommendations. It was contrary to the position taken by Dr Naidoo that the "policy decision" to use closures as a conservation measure had been taken (and would not change). It was also entirely destructive of a viable solution or "agreement" being found. The e-mail and SAPFIA's "*initial comments*" are attached as "**AM69**".

156. Given the position taken in SAPFIA's "*initial comments*", the conservation sector had grave concerns about the merit of further meetings. These were articulated in an e-mail sent to Dr Naidoo on 15 November 2023, attached as "**AM70**".

157. In reply, Dr Naidoo cancelled the planned meeting of 16 November 2023. In doing so, he confirmed the conservation sector's concerns that the Panel's recommendations regarding closure delineations were unlikely to be followed in saying "*the Fisheries Sector Reps or ourselves at DFFE were not on the same work schedule as the Conservations Reps in assessing use of the Panel Report – trade-off method*". This correspondence is attached as "**AM71**".

December 2023: The end of the road

158. During the course of December 2023, no further progress was made.

158.1 On 1 December 2023, we were advised that Mr de Maine had sent a formal request to the DFFE to "correct" the Eastern Cape Closures.

158.2 On 11 December 2023, we were asked by the DFFE to consider the "two options" proposed by Mr de Maine, neither of which adhered to either the Panel's recommendations or the agreed Eastern Cape closures.

158.3 On 13 December 2023, we received further correspondence from Mr de Maine justifying his position.

159. These e-mails and the responses from the conservation sector are attached as "**AM72**" and "**AM73**".

160. The conservation sector accordingly addressed correspondence to the Minister's office on 13 December 2023 pointing out the difficulties with the approach adopted and the need to act urgently to ensure implementation of the Panel's recommendations – including implementing island closures which would ensure ecologically meaningful outcomes for African Penguins. This letter is attached as "**AM74**". To date, no response has been received.

161. Two further updates were provided by Dr Naidoo on 14 and 19 December 2023 – neither of which indicated any determination to implement the closure designs according to the method recommended by the Panel (and the second of which I received upon my return from leave, in January 2024). The e-mail of 19 December 2023 further confirmed that, in the absence of agreement regarding the Eastern Cape closures, Bird and St Croix islands would be subject to the Interim Closures from 15 January 2023. The relevant e-mail chain is attached as "**AM75**".

162. On the same day, Mr Copeland forwarded a further assessment of SAPFIA's position (which I also only received once back from leave in January). This e-mail is attached as "**AM76**".

163. As matters stand, there is little to no prospect of the conservation sector reaching agreement with Industry to agree to island closures. This being so, the Interim Closures – without any rational connection to the preferred foraging areas of African Penguins around colonies where the activities of purse-seine small-pelagic fishing are a known risk to this species are now in place for the next ten

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years. This is the very period during which this endemic species is anticipated, at current rates of population declines, to become extinct in the wild.

January 2024 to 31 December 2033: Dire consequences for African Penguins

164. The decision is not merely irregular. It has dire consequences. This is because the Interim Closures do not adequately protect the rapidly declining African Penguin population. If not urgently addressed, these closures will facilitate the extinction of this Endangered species. I explain why this is so by expanding on the shortcomings of each of the Interim Closures. The expert affidavit of Ms Weideman (i.e. "**AM5**") explains the underlying methods used which support the analysis below, insofar as it touches on the use of mIBA-ARS, the application of the Panel's recommended trade-off mechanism and the results of such application.

<u>Dassen Island: Inadequate inclusion of African Penguins' valuable foraging areas and no real reduction in resource competition</u>

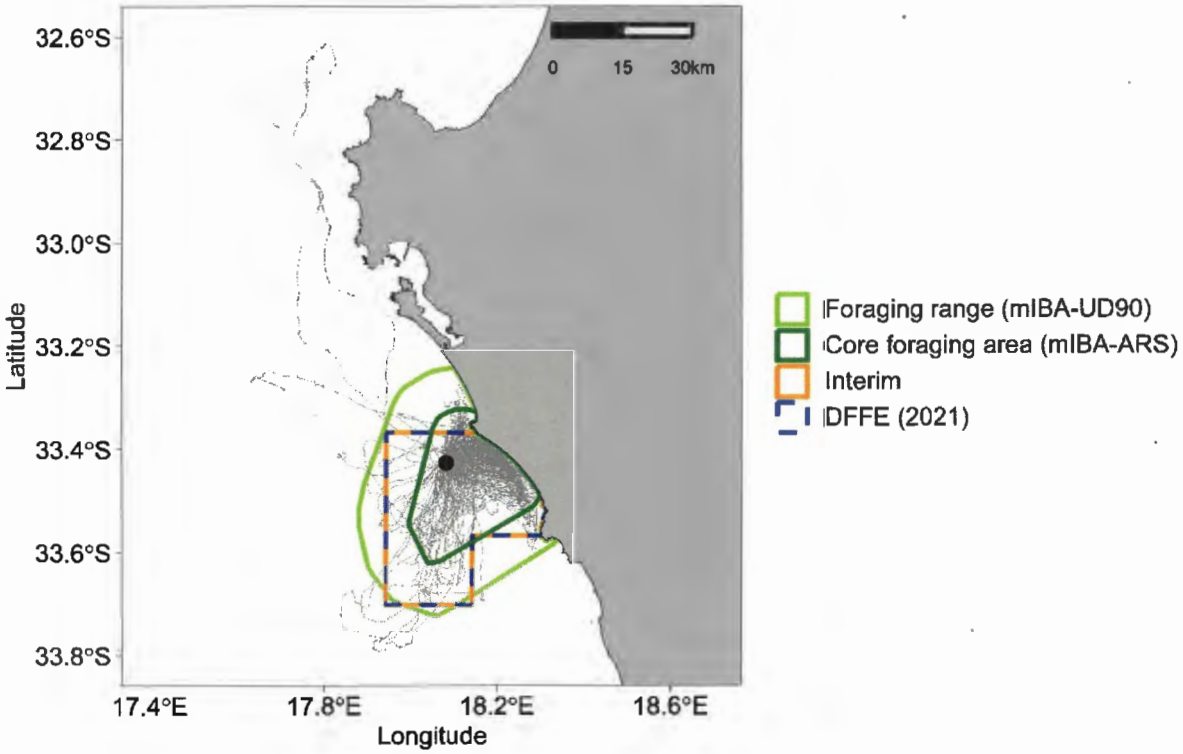
165. This Interim Closure was based on the DFFE 2021 proposal (presented in August 2021). Contrary to Panel recommendations (see paragraph 113.5.3 above) it does not adequately represent the preferred foraging areas of African Penguins. In particular, it excludes a region of the preferred foraging area to the north of the Interim Closure in close proximity to this colony which is especially valuable to these African Penguins during their breeding season.

166. Moreover, the Interim Closure is inconsistent with using the best available science to inform environmental management decisions. This is because DFFE 2021 used an outdated method for delineating penguin foraging areas, namely "combined kernel density estimates" – as opposed to more accurate methods such as the Panel-recommended mIBA-ARS method to determine African Penguins' preferred foraging area.

167. There is an additional, practical consideration linked to the Panel's recommendation that closure delineations should in fact reduce resource competition between Industry and African Penguins (see paragraph 113.5.2 above). It should be noted that juvenile anchovies move southward along the West Coast between autumn and winter. This period corresponds with the most important breeding period for the Dassen Island African Penguins. As can be seen from the map below, as this important source of African Penguin nutrition moves south, it passes through areas open to purse-seine anchovy fishing to the north of the Interim Closure – including the key northern portion of African Penguins' preferred foraging area. Not only does this mean that competition between African Penguins and Industry continues inside a key area which is valuable to African Penguins, but it also means that prey availability in the "no-take zone" further south could be reduced. In combination, this means that the purpose of the closure could be negated. It certainly means that critical aspects of the Panel's recommendations are ignored.

168. I illustrate these difficulties using the map below. It shows the area of most value to African Penguins using the Panel's recommended method of determining preferred foraging area i.e. mIBA-ARS in dark green. The DFFE 2021 / Interim

Closure (now in place for the next decade) is shown using a line of dark blue and orange dashes. It is clear that an important segment of the mIBA-ARS lies to the north of this area. To place the most valuable foraging area and Interim Closure in perspective, I have also included the full foraging range of Dassen Island's African Penguins in light green.



Robben Island: No meaningful reduction in resource competition or correlation with valuable foraging areas

169. This Interim Closure, which was also based on the DFFE 2021 proposal presented in August 2021, is not really a closure at all. This is because it is aligned with the no-take fishing zone of the existing MPA implemented around

Robben Island. This no-take fishing zone includes only 43% of this island's African Penguins' preferred foraging area.

170. In 2021, the conservation sector pointed this out. At the time, we were using the "mIBA-h7" method to reflect African Penguins' preferred foraging area – and thus their most valuable feeding grounds. On this metric, the DFFE 2021 closure covered a mere 41% of African Penguins' preferred foraging area. (See "**AM26**"). Both the mIBA-h7 and mIBA-ARS methods are well-recognised, peer reviewed methods for identifying preferred penguin foraging areas.[46] The Panel elected to endorse mIBA-ARS.[47] Little turns on this for present purposes: the point remains that the DFFE 2021 delineation covers a fraction of the foraging area of most value to the Robben Island African Penguins and does not accord with the Panel's recommendation that closures need to account for the foraging areas of most value to this species.

171. This is evident from the map below. As above, the full foraging area of this island's African Penguins is shown in light green. Of this extensive area, the most valuable foraging area has been delineated using the mIBA-ARS method which is shown in dark green. This is self-evidently <u>not</u> the relatively small Interim Closure / DFFE 2021 closure represented on the map by a dark blue and orange dashed line. It is also evident that this closure – now in place for 10 years – merely reflects the MPA area already out-of-bounds to Industry. It is neither

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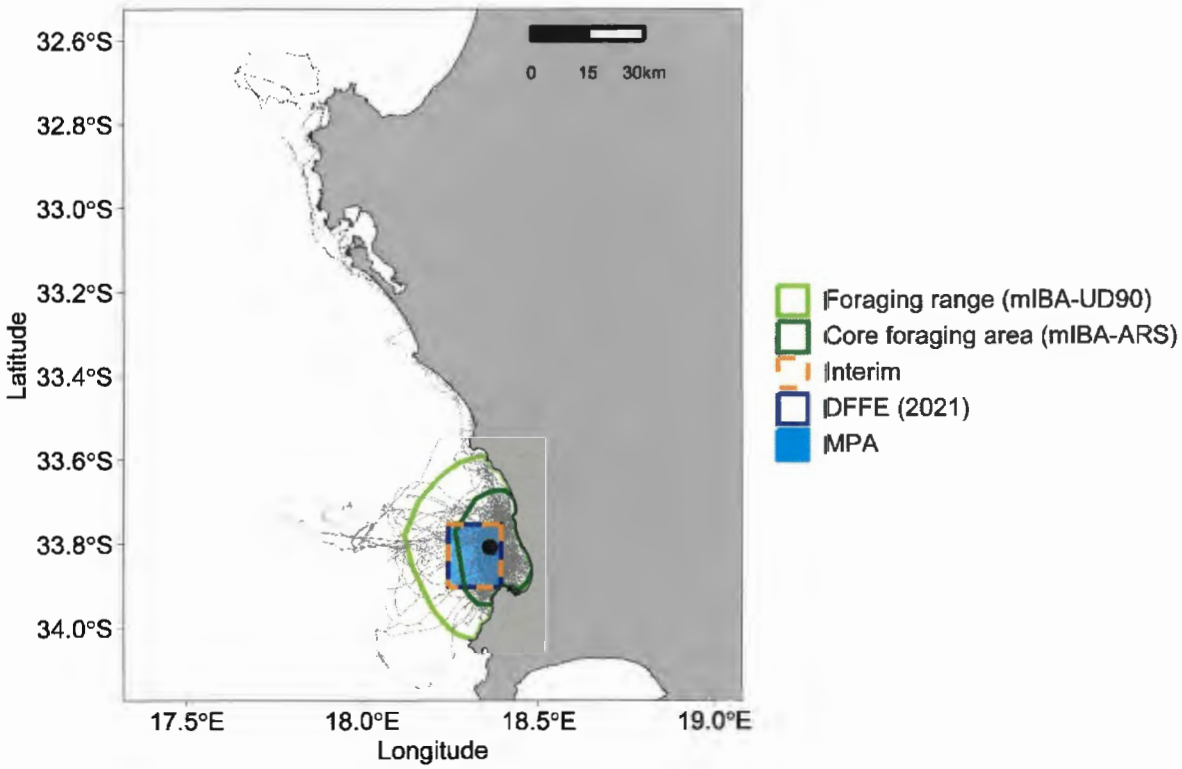
[46] The mIBA-h7 method is, like the mIBA-ARS method, more accurate than the older "combined kernel density estimates" method. During the Panel process, the conservation sector presented both "mIBA" methods as viable methods of using tracking data to determine the foraging areas of most benefit to African Penguins. The Panel elected to endorse to endorse mIBA-ARS.

[47] Panel Report pp 34 and 46.

representative of an area valuable to African Penguins, nor meaningful in reducing competition over fish.

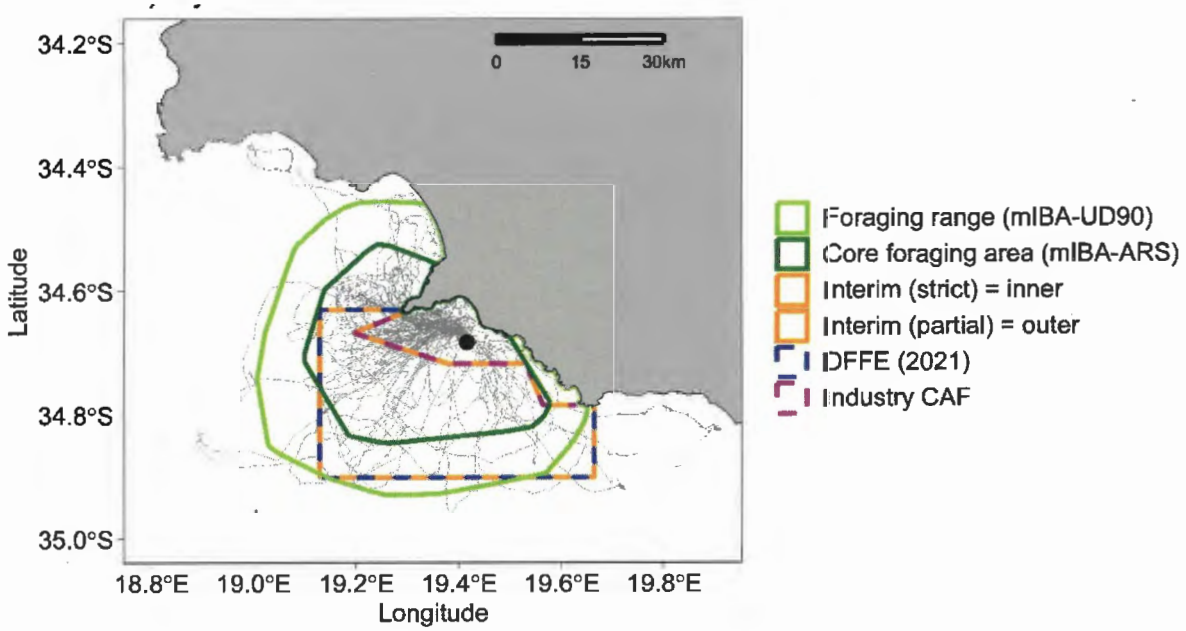


Dyer Island: no meaningful reduction in resource competition

172. This is the third and final Interim Closure that the DFFE indicated was determined using the DFFE 2021 proposals. As indicated in paragraph 97.1 above, this is not entirely accurate. The Interim Closure is based on a compromised closure originating in the CAF. Accordingly this closure is "split" between a complete closure and an area allowing fishing to continue.

173. The map below illustrates this "split" approach. The area closest to shore, which is represented by a dashed orange and purple line, represents Industry's CAF

proposal which corresponds to an area where very little fishing occurs. No fishing is permitted within this area. However, vessels of 26 m (and less) are permitted to fish between the boundary of this "no-take area" and the DFFE 2021 perimeter represented by a dashed dark blue and orange line. This effectively enables the local industry, including the largest regional player which is Gansbaai Marine, to continue to compete with African Penguins for sardine and anchovy biomass.



174. Accordingly, it is not clear that the Interim Closure may achieve the purpose of reducing resource competition and thus improving African Penguins' prey availability. It certainly does not follow the Panel's recommendations regarding the need for delineations to focus on reducing resource competition and maximising African Penguins' access to preferred foraging areas.

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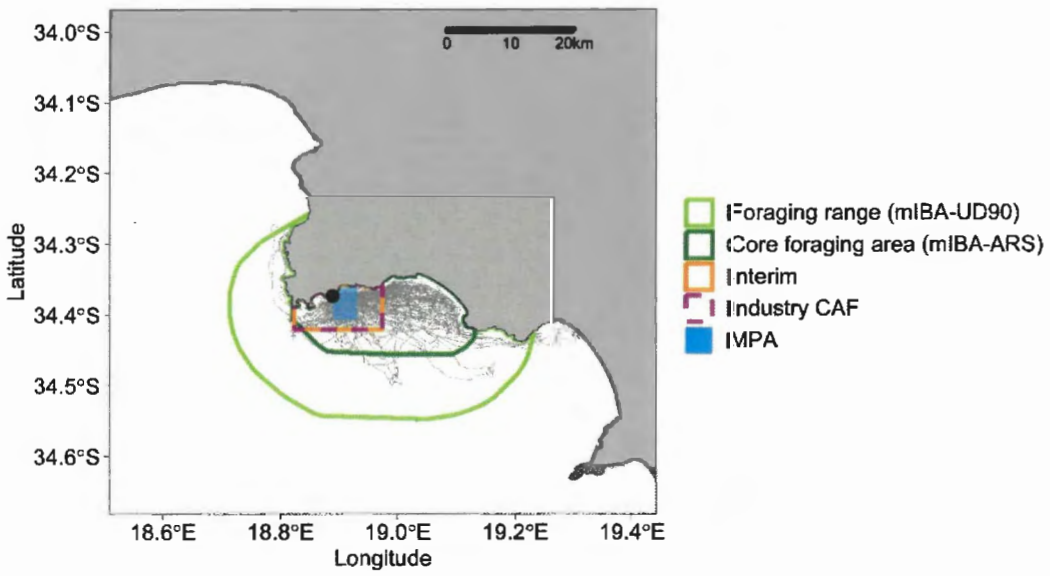
Stony Point: no reduction in resource competition

175. This Interim Closure was based on the proposal presented by Industry during the CAF in March 2022. It, too, is a closure in name only which has no clear basis in scientific data. This is because it mostly reflects areas in which Industry does not fish. What is more, it represents only 30% of preferred foraging area for Stony Point's African Penguins. This "closure" therefore does not in any way reduce competition over sardines / anchovies between Industry and African Penguins. This being so, it is entirely inconsistent with the Panel's recommendations and cannot possibly help conserve these African Penguins through improving adequate prey availability.

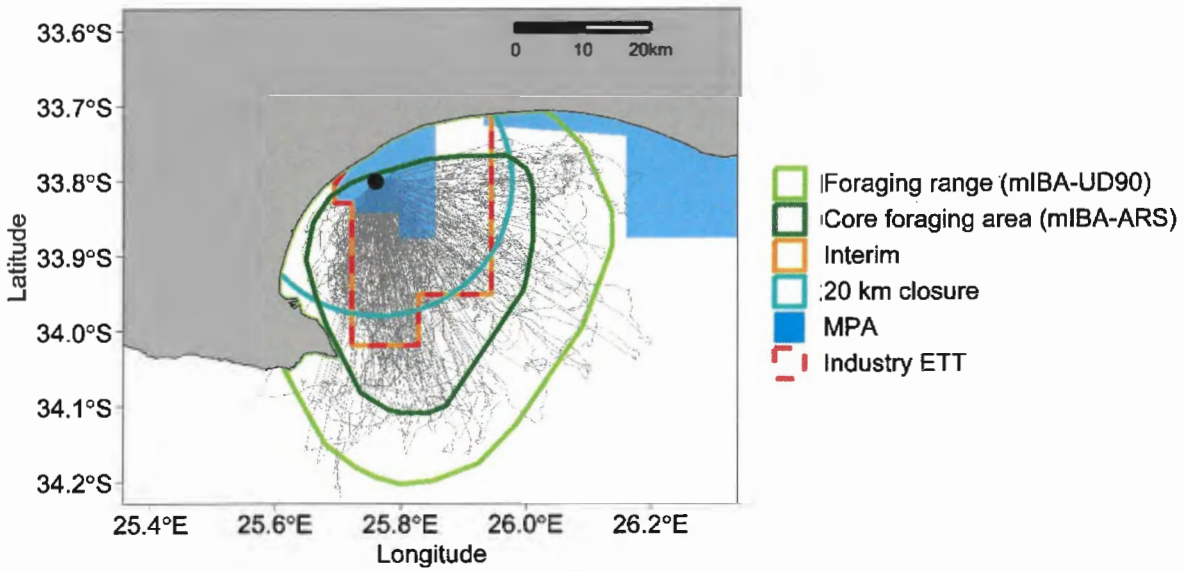
176. This is clearly illustrated using the map below. The Interim Closure is shown here as reflecting the "Industry CAF" proposal using an orange and purple dashed line. This is clearly a fraction of Stony Point's African Penguins' preferred foraging area shown in dark green (let alone the full foraging range shown in light green).



St Croix: little to no value to African Penguins

177. This closure was based on the proposal presented by Industry during the ETT in November 2021. The basis of that proposal was, and remains, unclear. It does not appear to be based on any scientific method for delineating preferred foraging areas, let alone the best available science. In the event, the Interim Closure covers only 50% of African Penguins' preferred foraging area.

178. As shown in the map below, this Interim Closure (represented by a red and orange dashed line) overlaps with and is smaller than the 20 km radius around St Croix (shown as a turquoise line). This 20 km radius, imposed during the ICE, was shown by Pichegru et al in 2012[48] to have provided insufficient protection from purse-seine fishing for this critical island population. Accordingly, it is entirely questionable whether this "closure" can possibly achieve its objective of conserving St Croix's African Penguins by reducing their competition with Industry and taking account of their valuable foraging areas.



[48] See "**AM17**".

Bird Island: no scientific basis but a happy accident

179. The inclusion of this island in closure discussions has always been something of an anomaly. While it is one of the islands with the largest numbers of breeding pairs and was part of the ICE (which is why it has been included), it is located in an area where very little fishing takes place.[49] It is, therefore, not surprising that a relatively arbitrary closure would not materially affect African Penguin prey access.

180. I emphasise, however, that the Interim Closure around Bird Island is a good illustration of the generally arbitrary nature of the Interim Closures and their continuation in light of the Panel's recommendations.

181. The Bird Island Interim Closure is based on the proposal presented by Industry during the CAF in March 2022. The context of this proposal was a direction by the CAF panel that closures should be determined by (1) aggregating all core-foraging areas around six colonies calculated by the marine scientists; (2) dividing this aggregated area in half; and (3) assigning 50% of this area to "closures" and allowing fishing to continue in the remaining 50%.[50] The caveat was that existing fishing no-take zones (including those corresponding with MPAs) would form part of the 50% designated as no-take fishing zones and set aside for the benefit of African Penguin foraging areas. This meant that almost no closures to reduce resource competition would in fact be proposed, with "CAF"

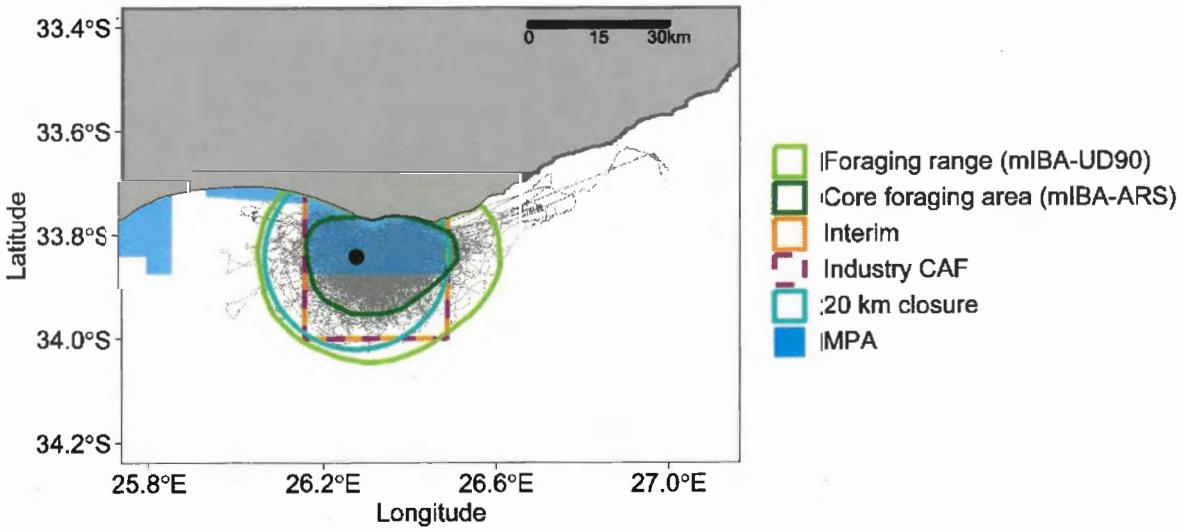
[49] See Panel Report, p 25.

[50] See the criticism of this approach in the Panel Report, p 46.

closures reflecting areas where fishing already did not take place or was very limited. It is in this context that the Bird Island closure was proposed.

182. This closure is <u>not</u> based on the Panel's recommendations, but since there is almost no small-pelagic fishing in this area (as it is not a preferred fishing ground), this "closure" is essentially meaningless. As explained in Ms Weideman's expert affidavit (i.e. "**AM5**") applying the Panel's recommended mechanism for selecting an appropriate delineation in fact indicates that the original (and larger) 20 km closure imposed during the ICE has the greatest benefit to African Penguins at the lowest cost to Industry.

183. This is evident from the map below. Here the full foraging range around Bird Island is shown in light green, the preferred foraging area in dark green and the 20km ICE shown in turquoise. By contrast, the Interim Closure is shown using a line of purple and orange dashes.



THE APPLICABLE LEGAL FRAMEWORK

The Constitution

184. Section 24(b) of the Constitution provides that:

> *"Everyone has the right:*
>
> *(a) [...]*
>
> *(b) to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that:*
>
> *(i) prevent pollution and ecological degradation;*
>
> *(iii) promote conservation; and*
>
> *(iii) secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development".*

185. The rapidly declining population and impending extinction of the African Penguin constitutes an actual or threatened infringement of the rights of the applicants, their members', the general public's, and "everyone's" rights under section 24(b) of the Constitution.

186. Section 7(2) of the Constitution obliges the Minister and the DFFE to "*respect, protect, promote and fulfil the rights in the Bill of Rights*". Under the current circumstances, this imposes a positive obligation on the Minister and DFFE officials to ensure that the necessary measures are put in place to protect the African Penguin from extinction.

The National Environmental Management Act, 107 of 1998 (NEMA)

187. NEMA is the central, overarching legislation which gives effect to section 24(b) of the Constitution. As such it provides the framework and principles for all environmental decision-making, including that applicable to biodiversity and protection of threatened species.[51]

188. Section 2 of NEMA sets out the binding environmental management principles applicable to all environmental management and decision-making (**the environmental management principles**). I draw particular attention to the following principles:

188.1 *"the disturbance of ecosystems and loss of biological diversity are avoided, or, where they cannot be altogether avoided, are minimised and remedied"*;[52]

188.2 *"a risk averse and cautious approach is applied, which takes into account the limits of current knowledge about the consequences of decisions and action"* (**the precautionary principle**);[53]

188.3 *"the use and exploitation of non-renewable natural resources is responsible and equitable and takes into account the consequences of the depletion of the resource"*;[54]

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[51] NEM:BA, ss 6(1) and 7.

[52] NEMA, s 2(4)(a)(i).

[53] NEMA, s 2(4)(a)(vii).

[54] NEMA, s 2(4)(a)(v).

188.4 "*the environment is held in public trust for the people, the beneficial use of environmental resources must serve the public interest and the environment must be protected as the people's common heritage*";[55] and

188.5 "*sensitive, vulnerable, highly dynamic or stressed ecosystems, such as coastal shores, estuaries, wetlands, and similar systems require specific attention in management and planning procedures, especially where they are subject to significant human resource usage and development pressure*".[56]

189. The Benguela Upwelling System of which African Penguins are part is such a "*sensitive, vulnerable, highly dynamic and stressed ecosystem*".

190. The environmental management principles set out in section 2 are integral to the framework of South African environmental law. They apply to any decision taken in terms of, and must guide the interpretation, administration and implementation of, NEMA as well as any other statutory provision or decision-making concerned with protection or management of the environment.[57]

191. In accordance with NEMA's role as framework legislation, section 3A of NEMA deals with the establishment of fora or advisory committees. As with all provisions of NEMA, the powers conferred by section 3A must be exercised

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[55] NEMA, s s(4)(o).

[56] NEMA, s 2(4)(r).

[57] NEMA, s 2(1)(c) and (e). See also NEMA, s 23(2)(a).

consistently with both the environmental management principles set out in section 2 and the purpose of NEMA in giving effect to section 24 of the Constitution.

192. All administrative processes or decisions taken in terms of NEMA must adhere to PAJA unless otherwise specified in NEMA.[58]

The National Environmental Management: Biodiversity Act, 10 of 2004 (NEM:BA) and relevant international conventions

The purpose of NEM:BA and relationship with NEMA and international biodiversity obligations

193. NEM:BA is a specific environmental Act as contemplated in NEMA and must therefore be interpreted pursuant to the environmental management principles and read with applicable provisions of NEMA.[59]

194. NEM:BA is the primary legal instrument concerning the management of South Africa's mega-biodiverse environment. Section 2 of NEM:BA sets out the objectives of the Act, which are principally the management and conservation of biological diversity and its components in South Africa[60] and the protection of ecosystems as a whole, including species not targeted for exploitation (such as the African Penguin).[61] In addition, it aims to ensure consideration of the well-

[58] NEMA, s 1(5).

[59] NEM:BA, s 6(1) and s 7.

[60] NEM:BA, s 2 (a)(i).

[61] NEM:BA, s 2(a)(iA).

being of animals in their management, conservation and sustainable use[62] and to give effect to international biodiversity agreements which are binding on the State.[63]

195. NEM:BA thus not only deals with biodiversity issues with regard to the environmental management principles expressed in NEMA, but also is the primary instrument giving effect to South Africa's international obligations under the Convention on Biological Diversity (**CBD**) as well as the Convention on Conservation of Migratory Species of Wild Animals (**Bonn Convention**) and Agreement on the Conservation of African-Eurasian Migratory Waterbirds (**AEWA**).[64]

Relevant international obligations

196. The CBD is the chief international treaty determining international biodiversity conservation obligations. The definitions in NEM:BA largely domesticate the CBD and the CBD's provisions regarding "*in situ conservation*" are essential to interpreting and implementing the provisions of NEM:BA. The obligations placed on State parties in respect of in-situ conservation include the duty to:

196.1 *"[r]egulate or manage biological resources important for the conservation of biological diversity whether within or outside protected*

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62 NEM:BA, s 2(a)(iiA).

63 NEM:BA, s 2(b). See also s 5.

64 South Africa has been party to the Bonn Convention since 1991 and a party to AEWA since 2002.

areas, with a view to ensuring their conservation and sustainable use";[65]

196.2 "*[p]romote the protection of ecosystems, natural habitats and the maintenance of viable population species in natural surroundings*";[66]

196.3 "*[r]ehabilitate and restore degraded ecosystems and promote the recovery of threatened species, inter alia, through the development and implementation of plans and other management strategies*";[67]

196.4 "*[e]ndeavour to provide the conditions needed for compatibility between present uses and the conservation of biological diversity and the sustainable use of its components*";[68]

196.5 "*[d]evelop or maintain necessary legislation and/or other regulatory provisions for the protection of threatened species and populations*";[69] and

196.6 *"Where a significant adverse effect on biological diversity has been determined... regulate or manage the relevant processes and categories of activities".*[70]

197. The Bonn Convention is the key United Nations instrument applicable to South Africa's obligations in relation to African Penguins. The agreement concluded

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65 CBD, art 8(c).

66 CBD, art 8(d).

67 CBD, art 8(f).

68 CBD, art 8(i).

69 CBD, art 8(k).

70 CBD, art 8(l).

pursuant to the Bonn Convention which addresses the details of these international obligations is AEWA. The African Penguin is the only penguin species covered by this agreement.[71]

197.1 Article III of AEWA, which sets out the general conservation measures to be taken by convention parties, includes the obligation to "*investigate problems that are posed or are likely to be posed by human activities and endeavour to implement remedial measures, including habitat rehabilitation and restoration, and compensatory measures for loss of habitat*".

197.2 I have already addressed the findings of the AEWA Action Plan that identified prey availability as the foremost threat to African Penguins. I emphasise that AEWA does not merely entail an investigatory obligation, but also requires positive interventions to rehabilitate and restore African Penguin habitats. Indeed, the "Conservation Measures" in the AEWA Action Plan specifically reference the ICE and state that "*a permanent purse-seine fishing exclusion zone has been recommended*".[72]

197.3 The recommendations of the Benguela Current Forage Fish Workshop (convened to give effect to the AEWA Action Plan) held between 2 and

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[71] AEWA, Table 1 (as amended at the 8th session of the Meeting of the Parties to AEWA, 26-30 September 2022, Budapest, Hungary and corrected by the Contracting States via silence procedure with effect as of 10 August 2023, available online <https://www.unep-aewa.org/sites/default/files/uploads/aewa_agreement_text_2023-2025_corrected%20version%20as%20of%2010%20August%202023_EN.pdf> (accessed 15 February 2024).

[72] AEWA Action Plan, p 77.

4 November 2020 committed to a number of actions, including, *inter alia,* to:

197.3.1 develop a forage fish management "toolbox" including "*closing of key foraging areas to fishing adjacent to major seabird colonies during the critical stages of their life cycle" and "implementing spatial management of fishing pressure in important foraging areas for non-breeding seabirds*";

197.3.2 "*[e]nsure the existence or creation of suitable seabird breeding habitat within the contracted or altered distributions of forage fish species to partially alleviate the impact of an altered distribution of prey on affected seabird species;* and

197.3.3 *"[f]acilitate and prioritise the recovery of seabird colonies to sufficient size to minimise known and potential Allee effects thus reducing the probability of colony extinction".*[73]

The State's trusteeship of biodiversity and Minister's obligation to protect threatened species

198. The State's trusteeship of the country's biodiversity derives primarily from section 24(b) of the Constitution.

[73] *Final Recommendations of the Benguela Current Forage Fish Workshop, 2-4 November 2020* – Online via GoToMeeting, available online <https://www.unep-aewa.org/sites/default/files/document/FINAL_recommendations_benguela_workshop_nov2020.pdf > (accessed 15 February 2024).

199. It is, in turn, entrenched by section 3(1) of NEM:BA, which provides that "*[i]n fulfilling the rights contained in section 24 of the Constitution, the state through its organs that implement legislation applicable to biodiversity, must – (a) manage, conserve and sustain South Africa's biodiversity and its components and genetic resources; and (b) implement this Act to achieve the progressive realisation of those rights*".

200. The obligations of the State under section 3(1) of NEM:BA buttress its obligation under section 7(2) of the Constitution to "*respect, protect, promote and fulfil the rights in the Bill of Rights*" and the corresponding positive obligation it bears to ensure that reasonable and effective measures are put in place to ensure the protection and fulfilment of the environmental protection rights under section 24(b) of the Constitution.

201. To enable compliance with section 3(1), NEM:BA empowers the Minister to:

    201.1 issue norms and standards to achieve any objectives in NEM:BA including for the "*(i) management and conservation of South Africa's biological diversity and its components; (ii) restriction of activities which impact on biodiversity and its components*";[74]

    201.2 prohibit any activity that "*may negatively impact on the well-being of an animal*" – including African Penguins;[75]

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[74] NEM:BA, s 9(1)(a).

[75] NEM:BA, s 9A.

201.3 approve biodiversity management plans for purposes of ensuring the long-term survival of a species listed as threatened or in need of national protection in terms of section 56, which includes the African Penguin;[76]

201.4 publish a national list of threatened ecosystems in need of protection;[77]

201.5 identify threatening processes in such ecosystems;[78]

201.6 publish lists of "*critically endangered species*" (at extremely high risk of extinction in the wild in the immediate future), "*endangered species*" (facing a high risk of extinction in the wild in the near future), "*vulnerable species*" (facing extremely high risk of extinction in the wild in the medium-term) and "*protected species*" (being of high conservation value or national importance and requiring ecologically sustainable management through regulation);[79]

201.7 prohibit the carrying out of any activity "*which is of a nature that may negatively impact on the survival of a listed threatened or protected species...*" throughout South Africa or a smaller, specified area, with reference to a specific species and/or specific persons or categories of

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[76] NEM:BA, s 43(1)(b)(i) read with ss 45(a) and 56.

[77] NEM:BA, s 52(1)(a).

[78] NEM:BA, s 53(1).

[79] NEM:BA, s 56(1).

persons.[80] As indicated at paragraph 17 above, the African Penguin is such a species.[81]'

202. Having regard to:

202.1 the obligations on the State under sections 7(2) and 24 of the Constitution and the environmental management principles set out under NEMA – which inform the interpretation and implementation of NEM:BA;

202.2 the State's international obligations and commitments under the CBD, Bonn Convention and AEWA which must similarly inform the interpretation and implementation of NEM:BA;

202.3 the State's trusteeship role in terms of section 3(1) of NEM:BA and the powers and duties imposed on the Minister by NEM:BA in respect of South Africa's international obligations to protect African Penguins; and

202.4 the scheme of NEM:BA, which grants express powers to the Minister to prevent activities which threaten an animal's well-being and species survival –

the Minister was under an obligation to impose fishing closures to limit purse-seine sardine and anchovy fishing activities that negatively impact the survival and well-being of the African Penguin.

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[80] NEM:BA, s 57(2)(a) read with section 57(5).

[81] Lists of Marine Species that are Threatened or Protected, Restricted Activities that are Prohibited and Exemption from Restriction published under GN 476 in *Government Gazette* 40875 of 30 May 2017.

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GROUNDS OF REVIEW

203. The applicants reserve the right to supplement their review grounds once they have received the record of the decision. However, for present purposes, the applicants contend that the decision is subject to review on two grounds, both capable of being accommodated under PAJA and the principle of legality.

First ground of review: the decision is irrational

204. The decision is irrational in a number of important respects.

205. First, the decision bears no connection to the purpose for which it was ostensibly taken.

205.1 The Minister appointed the Panel to provide recommendations, *inter alia*, regarding "*a trade-off mechanism as a basis for setting fishing limitations and mapping*". The purpose for constituting the Panel and the decision to be taken pursuant to its recommendations was thus to put in place scientifically-informed fishing closures which could strike an optimal trade-off between protecting African Penguins and minimising impact to Industry.

205.2 The Panel concluded that the best available science indicated that the recommended approach to implementing island closures was to employ a trade-off mechanism incorporating (1) the mIBA-ARS method for purposes of identifying African Penguins' preferred foraging areas;

and (2) using the OBM model in a relative sense to compare the impact of different delineations on Industry.

205.3 But instead of acting on the Panel's recommendations, the Minister ignored them and decided that, unless the conservation sector could negotiate improved fishing closures with Industry, the Interim Closure delineations would remain in place for the next ten years.

205.4 As indicated in paragraphs 165 to 183 above, these closures are not informed by the best available science and are incapable of achieving the objective of science-based conservation measures to reduce competition between Industry and African Penguins. Consequently, the decision is not rationally connected to the purpose for which it was taken, and bears no connection to the purpose sought to be achieved. Indeed, the closures imposed pursuant to the decision on 4 August 2023 and confirmed in revised permit conditions on 17 January 2024 were already in place from September 2022 (albeit only on a temporary basis). The decision has accordingly served no purpose at all.

206. Second, the decision is not supported by the evidence and information specifically procured by the Minister for purposes of the closure decision. Indeed, having sought and obtained expert recommendations from the Panel, the Minister's decision bears little relation to it.

206.1 The decision reflects certain of the Panel's recommendations regarding the need for and duration of island closures, however, not the basis for determining their delineation. However, there is no point in adopting

the former recommendations without adopting the latter. Nor is there any basis for doing so. There was simply no reason why the Minister should follow the Panel's recommendations on the need for and duration of closures, but not those specifically relating to the manner in which the closures should be determined.

206.2 As indicated above, there are indications from correspondence with the DFFE that the Minister may not have considered accurate and complete information prior to taking the decision.

206.3 In the result, the decision is inconsistent with the evidence and information that served before the Minister; suffers from a failure to consider a relevant material factor; and is both irrational and potentially unreasonable.

207. Third, the decision is not capable of advancing the purpose for which it was ostensibly taken.

207.1 The decision leaves it to the conservation sector to negotiate closures which strike a better trade-off between African Penguin imperatives and Industry interests than the Interim Closures. This reflects an implied acknowledgment that Interim Closures are unlikely to contribute to reducing the rate of decline of the African Penguin population.

207.2 However, any revision to the delineations of the Interim Closures which better adheres to African Penguins' preferred foraging ranges is likely to lead to a position for Industry that is less favourable than the *status*

quo. The decision has thus provided no impetus for cooperation from Industry. This has been clearly illustrated by the conservation sector's engagements with ESCPA, SAPFIA and Oceana.

207.3 What makes the Minister's decision particularly egregious is that her preceding decision to constitute the Panel was explicitly driven by the "*urgent need to implement timeous conservation actions for the African Penguin*"[82] and the "*lengthy debate*" and "*dichotomous views*" which had persisted regarding the effects of fishing closures on African Penguin breeding colonies.[83] It is plainly irrational, under these circumstances, to leave it to the conservation sector to reach agreement with Industry on the appropriate closure parameters. Doing so could never advance the purpose for which the decision was purportedly taken. Indeed, the decision does nothing to address either the urgency of conservation measures or the disputes which necessitated the decision in the first place.

208. Accordingly, the decision falls to be reviewed and set aside in terms of:

208.1 section 6(2)(f)(ii)(aa) of PAJA as the decision was not rationally connected to the purpose for which it was taken;

208.2 sections 6(2)(f)(ii)(cc) and 6(2)(e)(iii) of PAJA as the decision was not rationally connected to the information before the Minister and failed to

[82] Terms of Reference, para 2(b).

[83] Terms of Reference, para 1.

take into account relevant aspects of the Panel's report and recommendations;

208.3 section 6(2)(h) of PAJA as the decision was unreasonable; and

208.4 section 6(2)(c) of PAJA as the decision was not taken in a manner that was procedurally fair and rational.

209. Alternatively, the decision stands to be reviewed and set aside in terms of the principle of legality.

Second ground of review: unlawfulness and unconstitutionality

210. As indicated above, trusteeship of the country's biodiversity falls to the State. It is the State which, in terms of section 7(2) of the Constitution, bears the obligation to "*respect, protect, promote and fulfil*" the rights in section 24(b). Accordingly, when fulfilling the rights under section 24(b) to *"protect the environment for the benefit of present and future generations*", the State "*through its organs that implement legislation applicable to biodiversity, must ... manage, conserve and sustain South Africa's biodiversity*" (my emphasis).

211. The Minister and the DFFE are the primary State actors that "*implement legislation applicable to biodiversity*" and those who therefore "*must ... manage, conserve and sustain South African's biodiversity*". This is not a function which they may subordinate to a negotiation between the conservation sector and Industry. It goes without saying that this is a function that must be performed in full accordance with the law – including the precautionary principle and

requirement that decisions that affect the environment are based on the best available science. It is further self-evident that the Minister may not simply defer decision-making and the taking of decisive measures to prevent environmental degradation while waiting for "more and better science" or where scientific debate exists. Debate, the accrual of knowledge and scientific development is inherent to science – and the very rationale for the precautionary principle.

212. In any event, the Minister and DFFE have acknowledged that access to prey availability is a threat to African Penguin population survival since at least the publication of the Policy on the Management of Seals, Seabirds and Shorebirds in 2007 and commencement of the ICE in 2008 to test the hypothesis that reducing African Penguin-Industry competition could contribute to improving African Penguin population survival. Further, the Minister has acknowledged the need to act urgently at least since engaging with the conservation sector in 2019 while the DFFE's own scientists, during the JGF process expressly acknowledged that prey was important to sustaining African Penguin populations. The ETT and CAF have not demonstrated anything contrary to this position (other than that scientific debate exists). The Panel – appointed to resolve the debate about the merits of island closures to remedy the issue of access to prey – has concluded that island closures are a valid conservation intervention. The Minister has accepted the <u>need</u> for closures in her decision. However, the Minister has not, in fact, adhered to her positive obligations to <u>intervene in the interests of African Penguins; prevention of their extinction; their conservation; or in ensuring that the food chain and ecosystem of which they are part is in fact ecologically sustainably used and managed</u>.

213. Moreover, by subordinating the protection of an Endangered species (likely soon to be formally recognised as "*Critically Endangered*") to the preservation of healthy relationships with Industry, the Minister has fundamentally misconstrued her function, powers and constitutional obligations. Her constitutional mandate is not to appease Industry but to protect our country's biodiversity and, in this instance, the Endangered African Penguin and ecologically sustainable use of sardine and anchovy. Her preference for consultation and consensus, however virtuous it may be, must yield to her superseding obligation to put reasonable and effective measures in place to ensure the survival of the African Penguin.

214. Indeed, having regard to the obligations on the State under section 24 of the Constitution and section 3(1) of the NEMBA (read with the Minister's powers and obligations under NEM:BA and the relevant international conventions) the Minister is obliged to implement urgent measures including the imposition of fishing closures which limit purse-seine anchovy and sardine fishing activities to prevent the impending extinction of the African Penguin. The Minister has simply failed to do so. The unlawfulness of her decision is compounded by the series of delays over at least the past four years. The Minister has thus acted in breach of her obligations to ensure the survival and well-being of the African Penguin and to adhere to the environmental management principles under the Constitution, NEMA and NEM:BA as well as in violation of South Africa's international obligations arising from commitments made under, *inter alia*, AEWA. Accordingly, the Minister has acted unlawfully and unconstitutionally.

215. Accordingly, the decision stands to be reviewed and set aside in terms of:

215.1 section 6(2)(d) of PAJA, in that it was materially influenced by an error of law;

215.2 section 6(2)(e)(vi) of PAJA, in that it was taken arbitrarily or capriciously;

215.3 section 6(2)(f)(i) of PAJA, in that it contravenes a law or is not authorised by the empowering provision; and

215.4 section 6(2)(j) of PAJA, in that it was unlawful and unconstitutional.

216. Alternatively, the decision stands to be reviewed and set aside in terms of the principle of legality.

RELIEF

217. For the reasons set out above, the applicants seek that the decision be reviewed and set aside.

218. As consequential relief, flowing from the above, the applicants seek an order substituting the decision with a decision to implement no-take small-pelagic fishing areas around the breeding colonies in accordance with the Panel's recommended trade-off mechanism. The application of such trade-off – including the incorporation of the important mIBA-ARS areas and use of the OBM model in a relative sense – is reflected in the maps attached marked "**AM16**". The circumstances of this case are sufficiently exceptional to warrant substituted relief. This is for, at least, the following four reasons:

218.1 First, if the Panel's recommendations are to be followed, the delineation of the closures is a foregone conclusion. The Panel has clearly recommended the trade-off mechanism for determining the fishing closures around the breeding colonies. The maps attached as "**AM16**" were prepared in accordance with the trade-off mechanism based on data available to the conservation sector at this time. The fishing closures reflected in the maps are therefore the only fishing closures which can be imposed in alignment with the Panel's recommendations given the currently available data. This is explained further in Ms Weideman's expert affidavit (i.e. "**AM5**").

218.2 Second, the African Penguin population has been severely prejudiced by the Minister's dithering and delay in dealing with their rapid decline. I refer in this regard to the Minister's countless scientific review processes, as set out above, none of which yielded a decisive resolution. For too long, the Minister has placed her preference for a consensus-driven solution above her obligation to ensure the survival of the African Penguin. All the while, the African Penguin population has steadily declined on her watch. The African Penguin cannot afford further fence-sitting by the Minister. Its survival and well-being depends on the correct decision being taken now, by order of this Honourable Court, and not being, once again deferred.

218.3 Third, the Minister's decision was so patently irrational and unlawful that it would be entirely unfair to remit the decision to the Minister. The Minister has shown over a prolonged period that she lacks the appetite

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to deal decisively with the African Penguin crisis. It took the Minister years to take a decision to impose fishing closures around the breeding colonies. When she finally did so, her decision was so irrational and unlawful that it has served no purpose at all. It would thus be unfair to subject the applicants to yet a further process in terms of which the Minister is required to take a decision on the matter. The prejudice to the applicants, their members, the broader public and African Penguins is self-evident.

218.4 Fourth, this Honourable Court is as well placed as the Minister to take a decision on the matter. Having been presented with the Panel's recommendation, as well as the applicants' assessment and application thereof together with the maps of the proposed closures, this Honourable Court will have before it not only the same information as that which served before the Minister and supposedly informed her decision, but more. With the benefit of considered input from a Panel of leading international experts in the field, and its subsequent application by local experts (all of which have international standing), this Honourable Court is at least as well placed to take a decision as the Minister, if not better.

219. Should this Honourable Court not be minded to grant substituted relief, the applicants seek, in the alternative, that the decision on the delineation of the new fishing closures around the breeding colonies be remitted to the Minister for reconsideration, subject to the following directions:

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219.1 the Minister must base the delineation of the new fishing closures on the Panel's recommendation to apply the trade-off mechanism in respect of closure delineation – including by incorporating delineations based on the mIBA-ARS method and using existing OBM model data in a relative sense;

219.2 to the extent that the Panel report does not determine specific closure delineations for each island, the Minister must refer the conservation sector's analysis and any Industry assessment to the Panel to confirm the accuracy of application of the trade-off mechanism and the delineations identified through its application based on currently available data;

219.3 the Minister shall be required to take a decision on the delineation of the new fishing closures within 90 days of this Honourable Court's order, which period shall cover any referral to the Panel for confirmation; and

219.4 pending the Minister's decision, the Minister shall be required to implement fishing closures around the breeding colonies in accordance with the maps attached as "**AM16**".

EXTENSION OR CONDONATION

220. I am advised that a review application under PAJA must be brought within 180 days of becoming aware of the decision being reviewed and the reasons for it. Where an applicant fails to bring its application in time, the court may *extend* the

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180-day time period where the interests of justice so permit. Similarly, a review application under the principle of legality must be brought within a reasonable period of time. Where an applicant fails to bring such an application in time, the court may *condone* the failure.

221. The applicants submit that this application was brought within time and without unreasonable delay. Indeed, the applicants have not received reasons for the Minister's decision and, in fact, do not even know in terms of which power it was ostensibly taken. However, to the extent it is considered to have brought this application outside of the 180-day period under PAJA or a reasonable period under the principle of legality, the applicants request an extension of the 180-day period under section 9 of PAJA or condonation, as the case may be.

222. The applicants sought to bring this application with all possible urgency once it became clear that they had been left with no choice but to approach this Honourable Court for the relief sought. Any delay in taking steps to launch court proceedings was a consequence of the applicants' attempt to mitigate the Minister's decision during the period between 4 August 2023 and December 2023. I have set these steps out in detail above.

223. It was only during the course of October 2023 that it became apparent that the DFFE and the Minister were not prepared to provide definitive guidelines to implement the Panel's recommendations and on 14 November 2023 that the applicants received SAPFIA's *Interim Comments* confirming their position that no island closures should be in place. Further, the Minister's refusal to provide details of rights holders was made known only on 24 November 2023, while Dr

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Naidoo finally confirmed that the DFFE would not support the agreement that had been achieved in respect of the Eastern Cape Closures on 19 December 2023 (an e-mail I received on my return from leave on 8 January 2024). The futility of all efforts to seek "agreement" thus became entirely apparent only after the passing of the deadline, in early January 2024.

224. As soon as possible in January 2024, BLSA and SANCCOB's management convened to confirm the necessity of litigation. Resolutions to this effect were obtained by BLSA on 1 February 2024 and circulated by SANCCOB on 2 February 2024 (with the final signature obtained on 13 February 2024). In parallel, BLSA and SANCCOB instructed their legal representatives to obtain the views of Senior Counsel which was only possible on her return from leave on 26 January 2024. While the applicants had at all times understood the Minister's decision to overlook the relevant science and the Panel's recommendations, it was not at all times apparent to us that this translated into a reviewable irregularity. It was only upon taking the necessary legal advice that this was confirmed. These proceedings were instituted promptly after such advice and the relevant resolutions having been obtained. In the circumstances, to the extent the applicants delayed, they did not do so unreasonably.

225. We emphasise that the number of role-players and extent of the evidence has required considerable review by our legal team who have also had to consult with multiple experts, including those located outside of South Africa. The measure of context and technical detail incorporated in this affidavit speaks for itself in demonstrating the significant time and effort taken to prepare this application. I

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submit that the applicants have moved with all due alacrity to bring this application as soon as reasonably possible.

226. More critically, the applicants bring these proceedings overwhelmingly in the public interest. The issue in question is one of life and death: the very survival of the African Penguin is at stake. The interests of justice self-evidently warrant that extension or condonation be granted. Further, there can be no conceivable prejudice to the respondents.

227. Therefore, to the extent necessary, the applicants seek either an extension of the 180-day period under PAJA or, should PAJA not apply, condonation for any unreasonable delay in bringing these proceedings.

COSTS

228. BLSA and SANCCOB are instituting these proceedings in their own interest as African Penguin conservation organisations, out of a concern for the public interest and in the interest of protecting the environment. They also bring these proceedings in the interest of the well-being of African Penguins – a species which has no standing before a South African court of law.

229. At all times, the applicants have acted reasonably and made due efforts to use other means reasonably available, to obtain the relief sought. Accordingly, in terms of section 32(2) of NEMA as well as the "*Biowatch*" principle, the applicants should not be held liable for any costs arising from this application.

CONCLUSION

230. For these reasons, the applicants pray for relief set out in the notice of motion.

ALISTAIR MC INTYRE MC INNES

The deponent has acknowledged that he knows and understands the contents of this affidavit, which was signed and sworn to before me at CAPE TOWN on this the 18TH day of **MARCH 2024**, the regulations contained in Government Notice No. R1258 of 21 July 1972, as amended, and Government Notice No. R1648 of 19 August 1977, as amended, having been complied with.

COMMISSIONER OF OATHS

Full Names:
Capacity:
Designation:
Address:

COMMISSIONER OF OATHS
NAME: M. KOYAMA
PRACTISING ATTORNEY - RSA
1st FLOOR. BIRKDALE 2. RIVER PARK,
1 RIVER LANE. LIESBEEK PARKWAY.
MOWBRAY 7700
CAPE TOWN

APPENDIX A

ROUND ROBIN RESOLUTION OF THE BOARD OF DIRECTORS

BIRDLIFE SOUTH AFRICA

Non-profit registration: NPO 001-298

PBO Number: 930 004 518

IN RESPECT OF INSTITUTING PROCEEDINGS TO REVIEW AND SET ASIDE THE DECISION OF THE MINISTER OF FORESTRY, FISHERIES AND THE ENVIRONMENT, DATED 4 AUGUST 2023

It is resolved that:

1. BirdLife South Africa, on its own behalf; in the interests of protecting the environment; as a member of, or in the interests of, a group or class of persons; in the public interest; and/or as an association acting in the interests of its members, will:

   1.1 Institute legal proceedings to review and set aside the decision, as the case may be, of the Minister of Forestry, Fisheries and the Environment (**Minister**), dated 4 August 2023, to impose interim closures around six key island breeding colonies for African Penguins for a period of ten years (subject to review after six years), subject to "agreement" being reached in respect of alternative closures between the Conservation Sector and Fishing Industry by 31 December 2023 (**the Anticipated Review**);

   1.2 Seek any such interim relief as may be necessary in the context of the legal proceedings described above, and pending the final determination thereof;

   1.3 Seek an appropriate costs order against the respondents should BirdLife South Africa be successful in any of the legal proceedings described above, and to enforce such costs order; and

   1.4 Seek any further appropriate relief in relation to the above legal proceedings.

Authorised persons

2. The Seabird Conservation Programme Manager of BirdLife South Africa, in his capacity as such, is hereby authorised to depose to any affidavit and sign any other documents which may be required in the aforesaid administrative and legal proceedings and to take all other necessary steps to fulfil this resolution on behalf of BirdLife South Africa.

3. The Biodiversity Law Centre (**BLC**) is hereby appointed to represent BirdLife South Africa in all of the aforesaid administrative and legal proceedings; and Katherine Handley, Executive Director of the BLC, Nina Braude, attorney at the BLC, and/or any other attorney employed as such by the BLC are hereby authorised to depose to any affidavit and take any steps as may be required in the aforesaid legal proceedings.

4. All steps taken by BirdLife South Africa and the BLC on behalf of BirdLife South Africa in the Anticipated Review are ratified to the extent necessary.

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5. This resolution may be signed in one or more counterparts, all of which together shall be considered to constitute one and the same resolution as at the date of the signature by the party last signing one of the counterparts.

_____ Date: 1 February 2024

Chairperson: Yvonne Patricia Pennington

_____ Date: 1 February 2024

Chief Executive Officer: Mark David Anderson

_____ Date: 1 February 2024

Honorary Treasurer: Philip Calinikos

_____ Date: 1 February 2024

Co-opted Member: Ismail Ebrahim Bhorat

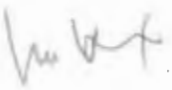
AM M.K

Date: 1 February 2024

Co-opted Member: Xolani Nicholus Funda

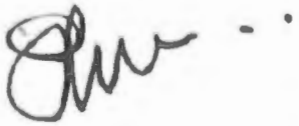
Date: 1 February 2024

Co-opted Member: Linda Anne Hart



Date: 1 February 2024

Co-opted Member: Vernon Richard Laurence Head



Date: 1 February 2024

Co-opted Member: Galeboe Thomas Modisapodi

Date: 1 February 2024

Members' Director: Louise Coetzee

NT Forbes

Date: 1 February 2024

Members' Director: Nicolette Tracy Forbes

Date: 1 February 2024

Members' Director: Matthew Philip Biden

Date: 1 February 2024

Chief Financial Officer: Stephanus Cornelius Venter du Plessis

Resolution approved at the BirdLife South Africa Board meeting held on 1 February 2024, with a quorum present.

SANCCOB™
saves seabirds

NPO number: 003-134 NPO
Registration Number: 2001/026273/08
PO Box 11116, Bloubergrant, Cape Town, 7443, South Africa
Physical Address: 22 Pentz Drive, Table View, 7441
Telephone: + 27 21 557 6155 Fax: + 27 21 557 8804
Email: info@sanccob.co.za Website: www.sanccob.co.za

SANCCOB "NPC"
REGISTRATION NUMBER 2001/026273/08
(the "Company")

ROUND ROBIN RESOLUTION PASSED BY THE DIRECTORS OF THE COMPANY ON 2 FEBRUARY 2024 IN TERMS OF SECTION 74 OF THE COMPANIES ACT, NO 71 OF 2008 (THE "ACT")

IT IS NOTED THAT the Resolution had been submitted to the Directors of the Company, and that the Directors had waived their rights to receive notice of the resolutions contained herein, all in terms of section 74 of the Companies Act, No 71 of 2008 (the **"Act"**).

RESOLUTION NUMBER 1
WAIVER OF NOTICE PERIOD IN TERMS OF SECTION 73(5)(A) (III) OF THE ACT:

It was **RESOLVED:**

That in accordance with the provisions of section 73(5)(a)(iii) of the Act, the Directors of the Company had duly waived the respective notice period for the adoption of the below resolutions.

RESOLUTION NUMBER 2
IN RESPECT OF INSTITUTING PROCEEDINGS TO REVIEW AND SET ASIDE THE DECISION OF THE MINISTER OF FORESTRY, FISHERIES AND THE ENVIRONMENT DATED 4 AUGUST 2023:

It was **RESOLVED:**

That the Directors agree to proceed with litigation proceedings to review and set aside the decision of the Minister of Forestry, Fisheries and the Environment dated 4 August 2023, to impose interim closures around six key island breeding colonies, subject to the following terms and conditions:

- Litigation must be implemented by the Biodiversity Law Centre (BLC) in a phased approach, whereby at the start of each round of litigation, the BLC provides a risk and cost assessment for Board approval, prior to proceeding with further litigation.
- SANCCOB actively fundraises, to reduce litigation and public relations costs.
- SANCCOB and BirdLife South Africa enter into an agreement to confirm the financial roles and responsibilities of each organisation as co-litigants.

RESOLUTION NUMBER 3
AUTHORITY TO TRANSACT:

It was **RESOLVED:**

That each and every Director of the company, be and is hereby authorised to carry out and to do all such things necessary in connection with the subject matter of the aforesaid resolutions including without limitation being authorised to make, amend and sign all and any such necessary documents, letters, applications, announcements and affidavits as may be required for and in connection with aforesaid resolutions.

I. C. ILLIERS DATE: 2 February 2024

V.J.M. BOULLE DATE: 02 February 2024

SANCCOB
saves seabirds

J. COOPER

DATE: 4 February 24

S.L. DE VILLIERS

DATE: 3 Feb 2024

P.A. ISDELL

DATE: 13 FEBRUARY 2024

K. HANDLEY

DATE: 4 February 2024

N.C. MASKELL

DATE: 02 February 2024

A.C. WOLFAARDT

DATE: 02 February 2024

ROUND ROBIN RESOLUTION OF THE BOARD OF DIRECTORS

SANCCOB NPC

Registration Number: 2001/026273/08

("SANCCOB")

IN RESPECT OF INSTITUTING PROCEEDINGS TO REVIEW AND SET ASIDE THE DECISION OF THE MINISTER OF FORESTRY, FISHERIES AND THE ENVIRONMENT DATED 4 AUGUST 2023

It is resolved that:

1. SANCCOB, on its own behalf; in the interests of protecting the environment; as a member of, or in the interests of, a group or class of persons; in the public interest; and/or as an association acting in the interests of its members, will:

   1.1 Institute legal proceedings to review and set aside the decision, as the case may be, of the Minister of Forestry, Fisheries and the Environment (**Minister**), dated 4 August 2023, to impose interim closures around six key island breeding colonies for African penguins for a period of ten years (subject to review after six years), subject to "agreement" being reached in respect of alternative closures between the Conservation Sector and Fishing Industry by 31 December 2023 (**the Anticipated Review**);

   1.2 Seek any such interim relief as may be necessary in the context of the legal proceedings described above, and pending the final determination thereof;

   1.3 Seek an appropriate costs order against the respondents should SANCCOB be successful in any of the legal proceedings described above, and to enforce such costs order; and

   1.4 Seek any further appropriate relief in relation to the above legal proceedings.

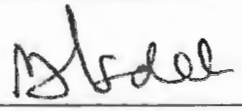
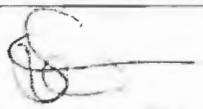
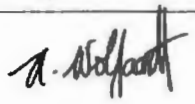
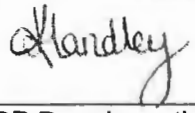
Authorised persons

2. The Chief Executive Officer, Head of Conservation and Research Manager of SANCCOB, in their capacities as such, are hereby authorised to depose to any affidavit and sign any other documents which may be required in the aforesaid administrative and legal proceedings and to take all other necessary steps to fulfil this resolution on behalf of SANCCOB.

3. The Biodiversity Law Centre (**BLC**) is hereby appointed to represent SANCCOB in all of the aforesaid administrative and legal proceedings; and Katherine Handley, Executive Director of the BLC, Nina Braude, attorney at the BLC, and/or any other attorney employed as such by the BLC are hereby authorised to depose to any affidavit and take any steps as may be required in the aforesaid legal proceedings.

4. All steps taken by SANCCOB and the BLC on behalf of SANCCOB in the Anticipated Review are ratified to the extent necessary.

5. This resolution may be signed in one or more counterparts, all of which together shall be considered to constitute one and the same resolution as at the date of the signature by the party last signing one of the counterparts.

NAME	SIGNATURE	DATE
INGE CILLIERS		2 February 2024
NATALIE MASKELL		2 February 2024
PAMELA ISDELL		13 FEBRUARY 2024
VERNON BOULLE		02 February 2024
SAMANTHA PETERSEN		3 Feb 2024
ANTON WOLFAARDT		02 February 2024
JOHN COOPER		04 February 24
KATHERINE HANDLEY		4 February 2023
Resolution approved at the SANCCOB Board meeting held on 31 January 2024, with a quorum present.		

"AM3"

IN THE HIGH COURT OF SOUTH AFRICA
GAUTENG DIVISION, PRETORIA

Case No:_____

In the matter between:

BIRDLIFE SOUTH AFRICA	First Applicant
SOUTH AFRICAN FOUNDATION FOR THE CONSERVATION OF COASTAL BIRDS	Second Applicant
and	
THE MINISTER OF FORESTRY, FISHERIES AND THE ENVIRONMENT	First Respondent
THE DEPUTY DIRECTOR-GENERAL: FISHERIES MANAGEMENT, DEPARTMENT OF FORESTRY, FISHERIES AND THE ENVIRONMENT	Second Respondent
THE DEPUTY DIRECTOR-GENERAL: OCEANS AND COASTS, DEPARTMENT OF FORESTRY, FISHERIES AND THE ENVIRONMENT	Third Respondent
THE SOUTH AFRICAN PELAGIC FISHING INDUSTRY ASSOCIATION	Fourth Respondent
EASTERN CAPE PELAGIC ASSOCIATION	Fifth Respondent

SUPPORTING AFFIDAVIT

I, the undersigned,

KATRIN LUDYNIA

do hereby make oath and state that:

1. I am an adult female with identity number 7506021590186 and am the Research Manager at South African Foundation for the Conservation of Coastal Birds, the Second Applicant (**SANCCOB**), a registered non-profit company; non-profit

organisation and public benefit organisation with its registered address at Seabird Centre, Pentz Drive, Table View, Western Cape.

2. I am duly authorised to bring these proceedings and to depose to this affidavit on behalf of SANCCOB. The relevant Board resolution is attached to the founding affidavit as "**AM2**"

3. The facts and circumstances set out in this supporting affidavit are within my personal knowledge and belief, unless otherwise stated or as appears from the context – and are to the best of my belief both true and correct.

4. I have read the Founding Affidavit deposed to by **ALISTAIR MC INTYRE MC INNES** and confirm that its contents are true and correct insofar as they pertain to me as well as to SANCCOB.

KATRIN LUDYNIA

The deponent has acknowledged that she knows and understands the contents of this affidavit, which was signed and sworn to before me at CAPE TOWN on this the 18TH day of **MARCH 2024**, the regulations contained in Government Notice No. R1258 of 21 July 1972, as amended, and Government Notice No. R1648 of 19 August 1977, as amended, having been complied with.

COMMISSIONER OF OATHS

Full Names:
Capacity:
Designation:
Address:

COMMISSIONER OF OATHS
NAME: M. KOYAMA
PRACTISING ATTORNEY - RSA
1st FLOOR. BIRKDALE 2. RIVER PARK
1 RIVER LANE. LIESBEEK PARKWAY
MOWBRAY 7700
CAPE TOWN

M.K AM M.K

"AM4"

IN THE HIGH COURT OF SOUTH AFRICA
GAUTENG DIVISION, PRETORIA

Case No:_____

In the matter between:

BIRDLIFE SOUTH AFRICA	First Applicant
SOUTH AFRICAN FOUNDATION FOR THE CONSERVATION OF COASTAL BIRDS	Second Applicant
and	
THE MINISTER OF FORESTRY, FISHERIES AND THE ENVIRONMENT	First Respondent
THE DEPUTY DIRECTOR-GENERAL: FISHERIES MANAGEMENT, DEPARTMENT OF FORESTRY, FISHERIES AND THE ENVIRONMENT	Second Respondent
THE DEPUTY DIRECTOR-GENERAL: OCEANS AND COASTS, DEPARTMENT OF FORESTRY, FISHERIES AND THE ENVIRONMENT	Third Respondent
THE SOUTH AFRICAN PELAGIC FISHING INDUSTRY ASSOCIATION	Fourth Respondent
EASTERN CAPE PELAGIC ASSOCIATION	Fifth Respondent

EXPERT AFFIDAVIT

I, the undersigned,

RICHARD BRIAN SHERLEY

do hereby make oath and state that:

1. I am an adult male marine ecologist and conservation biologist and a Senior Lecturer at the University of Exeter, United Kingdom as well as a Research Fellow at the University of the Western Cape, South Africa.

AM M.R

2. The facts contained in this affidavit are within my personal knowledge and belief, unless otherwise stated or appears from the context, and are to the best of my belief both true and correct.

3. My qualifications are set out in my curriculum vitae, attached marked "**RS1**". In brief my qualifications and expertise are as follows:

3.1. I hold a Bachelor of Science (Honours) in Psychology and Zoology as well as a Doctorate from the University of Bristol, United Kingdom. My doctoral thesis was entitled "*Factors influencing the demography of Endangered seabirds at Robben Island, South Africa*".

3.2. I have subsequently held positions as a Postdoctoral Fellow at the University of Cape Town, South Africa, Research Fellow at the Bristol Zoological Society and University of Exeter, Lecturer at the University of Exeter and, since 2022 I have been a Senior Lecturer at the University of Exeter, United Kingdom. I have, in addition, been a Research Fellow at the University of the Western Cape, South Africa since 2023.

3.3. I have been a member of the IUCN Species Survival Commission Penguin Specialist Group since 2017 and have advised the South African Government as a member of the Seabird Technical Team of the Top Predator Working Group (currently convened by the Department of Forestry, Fisheries and the Environment, Branch: Oceans and Coasts) since 2020. I have also previously advised the South African Government as a scientific observer of the Small Pelagic Working Group (currently convened by the Department of Forestry, Fisheries and the Environment, Branch: Fisheries Management) and served as the chairperson of the Population Reinforcement Working Group convened

between 2012 and 2015 to develop the African Penguin Biodiversity Management Plan, 2013.

3.4. I have published 66 academic papers in peer-reviewed journals and have over 3,100 citations. In addition, I have been co-author of over 80 government reports and IUCN Red List texts and have provided expert advice to government fora in three countries on marine policy. I have also served as a peer-reviewer for over 29 journals concerned with marine ecology and conservation biology.

4. I am the lead author of the article "*The African Penguin should be considered Critically Endangered*" submitted as a Short Note to the peer-reviewed journal *Ostrich* (Manuscript ID: TOST-2024-0008) on 13 February 2024 (**uplisting submission**).

5. This uplisting submission presents the calculations and outcome of a modelling process based on the latest census of the global population of the African Penguin concluded in December 2023. The method and calculations used will be incorporated in the submission made to BirdLife International for purposes of assessing whether the African Penguin meets the International Union for Conservation of Nature (**IUCN**) criteria for uplisting the status of the African Penguin from "Endangered" to "Critically Endangered" on the IUCN Red List of Threatened Species. BirdLife International conducts this assessment on behalf of the IUCN.

6. The IUCN considers a status of "Critically Endangered" to mean that a species faces an extremely high risk of extinction in the wild. The uplisting submission concludes that the African Penguin faces an extremely high risk of extinction in the wild by 2035.

M.K AM

7. The IUCN Red List uses five different criteria (A to E) to assess the conservation status of species. These criteria assess extinction risk on the basis of population reduction, very small population size, and/or restricted geographic range. A species must be evaluated against all five criteria and is then assigned to a threat category if any one criterion is met and according to the criterion that indicates the highest level of extinction risk.

8. The uplisting submission has assessed African Penguins' conservation status under two relevant sub-categories of criterion A, namely criteria "A2" and "A4":

8.1. The IUCN Red List criterion "A2" assess reductions in a species' population over the longer of (a) the last ten years; or (b) three generations.[1] In the case of African Penguins, the longer period is three generations, i.e. 30 years.

8.2. The IUCN Red List criterion "A4" assesses a species based on "*an observed, estimated, inferred, projected or suspected population size reduction… over any 10 year or three generation period… where the time period must include both the past and the future*".[2]

9. The uplisting submission concludes that a combination of observed and projected data indicates that by 2027 the median decline of the global African Penguin population over three generations would exceed the 80% threshold for a "Critically Endangered" listing with a probability of 56%. However, when examining the data from 2028 onwards, this probability increases to more than 95%. Further, the projections suggest that the present decline shows no clear sign of a reversal if the conditions over the next ten years (i.e. until the end of 2033, beginning of 2034)

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[1] See IUCN (2022) *Guidelines for Using the IUCN Red List Categories and Criteria* Version 15.1, available online <https://www.iucnredlist.org/resources/redlistguidelines> (accessed 29 February 2024) p 63.

[2] *Ibid.*

reflect those of the recent past. For this reason, the uplisting submission concludes that the threshold under category A4 has been met and the African Penguin's conservation status qualifies for uplisting to "Critically Endangered".

10. The uplisting submission uses the results of counts of African Penguin breeding pairs at 26 South African and Namibian breeding colonies. These counts (conducted between 1979 and 2023) are used together with a recognised "Bayesian state-space model" to reassess the species' conservation status. A Bayesian state-space model is a robust modelling framework for analysing ecological time-series data.

11. The resulting figures show that over the last 30 years (i.e. across three African Penguin generations since 1993), the global African Penguin population has declined by 77.8% (from an estimated 44,300 to 9,900 breeding pairs). The model used to calculate the African Penguin population decline generates a credible range[3] of 71.8% to 84.6%. This provides some support for listing African Penguins as "Critically Endangered" under criterion "A2" (based on past considerations), which requires the rate of decline to be at least 80%.

12. In addition, the threshold for listing as "Critically Endangered" under criterion "A2" has been exceeded in Namibia with a high degree of certainty, while the rate of population decline in the Eastern Cape of South Africa has worsened significantly. The South African population has declined by 76.9% since 1993.

[3] This range covers the most plausible 95% of all the decline rates estimated by the model, given the data.

13. Overall, the last ten years has seen the global population reduced by more than half its numbers. It has now fallen below 10,000 breeding pairs for the first time. I pause to note that –

13.1. until 2007, Dassen Island alone had approximately 11,000 breeding pairs;

13.2. until 2003, St Croix held more than 12,000 breeding pairs; and

13.3. until 1990, Dyer Island had more than 10,000 breeding pairs.

14. With an estimated global number of 9,900 breeding pairs (31,700 individuals) (in 2023),[4] there are now fewer African Penguins globally than at the time of the *MV Treasure* oil spill in 2000 when approximately 38,500 individual birds were oiled, cleaned and released or relocated.

15. At these rates of decline, there is a real threat that the global African Penguin population could be extinct in the wild by 2035.

16. We have also had regard to the recent increase in the rates of declines of African Penguin populations under criterion A4. Using this criterion (explained above), and with regard to the dramatic recent rates of population declines, our assessment indicates that the African Penguin will <u>almost certainly</u> exceed the relevant "Critically Endangered" threshold of an 80% decline over a 30-year period by 2028 in the event that the rates of decline observed over the last decade persist into the near future.

17. In the result, and subject to review by BirdLife International on behalf of the IUCN, in my opinion (and as borne out in the uplisting submission) the African Penguin now meets the criteria for uplisting to "Critically Endangered".

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[4] Note that scientific convention multiplies the number of breeding pairs by 3.2 in order to account for birds who may not breed in a given year or are immature.

18. Given my qualifications and experience, as set out above, I am duly qualified to express an expert opinion on the data provided in the uplisting submission.

19. I confirm the content of the uplisting submission and the expert opinion expressed therein. I further confirm that the method and data relied upon are robust, credible and based on methods recognised by the IUCN according to v. 3.1 of the IUCN Red List categories and criteria, second edition (https://portals.iucn.org/library/node/10315) and version 15.1 (July 2022) of the guidelines for their use (https://www.iucnredlist.org/resources/redlistguidelines).

20. The uplifting submission is attached marked **"RS2"**.

_____

RICHARD BRIAN SHERLEY

The deponent has acknowledged that he knows and understands the contents of this affidavit, which was signed and sworn to before me at _____ on this the _____ day of _____ **2024**, the regulations contained in Government Notice No. R1258 of 21 July 1972, as amended, and Government Notice No. R1648 of 19 August 1977, as amended, having been complied with.

_____

COMMISSIONER OF OATHS

Full Names:

Capacity:

Designation:

Address:

R.J.C AM

University of Exeter

Richard Brian Sherley

http://richardsherley.com/

Summary

Marine Ecologist and Conservation Biologist: studying human impacts on the oceans using long-term data on marine vertebrates, technology-led approaches to study behaviour and powerful analytical techniques. My work on the interactions between fish populations, economically important fisheries and marine predators is influencing marine spatial planning in southern Africa and contributing to ecosystem-based fisheries management.

Publications: 66 in peer-reviewed journals, >3100 citations. H-Index = 31.

Research Income: >£2 million from research councils, governments, and charitable trusts.

Impact: Input into government fora on marine policy. Author or co-author of >80 government reports and IUCN Red List texts with strong track record of REF impact case studies.

Professional Experience

2023–present	**Research Fellow,** University of the Western Cape, South Africa.
2022–present	**Senior Lecturer,** University of Exeter, UK.
2020–2022	**Lecturer,** University of Exeter, UK.
2019–2022	**Pew Marine Conservation Fellow,** University of Exeter, UK.
2015–2018	**Independent Research Fellow,** Bristol Zoological Society.
2011–2014	**Postdoctoral Fellow**, University of Cape Town, South Africa.
2005–2006	**Editorial Assistant**, F1000, Science Navigation Group, UK.

Qualifications

2022 **PGCert (Academic Practise): University of Exeter, UK**

2010 **PhD: University of Bristol, UK***:* 'Factors Influencing the Demography of Endangered Seabirds at Robben Island, South Africa".

2005 **BSc (Hons): University of Bristol, UK***:* Psychology and Zoology (1st Class).

Teaching Experience

Includes: **supervising research students**, often actively in the field; invited **contributions to undergraduate and postgraduate education** at several institutions; teaching on **marine field courses;** and **developing teaching material** on ecology, conservation, fisheries science and applied statistical modelling. I use real world content drawn from my research to enthuse students and I recognize the value of continually developing my skills. I have been a Fellow of the HEA since 2022.

Postgraduate Level

- PhD Student Supervision – 5 completed (University of Cape Town [UCT], University of Exeter [UoE]), 8 ongoing (UoE, Heriot-Watt University, University of St. Andrews).
- MSc/MSci Student Supervision – 20 completed (UoE, UCT, University of Bristol, University of the Western Cape), 4 ongoing (UoE).
- Lecturing – *Ecosystem-based Management of Marine Systems*, University of St. Andrews (2015), *Numerical Skills and Statistics*, UCT (2013), *Statistical Modelling in R*, UoE (2020), *Marine Vertebrate Ecology and Conservation*, UoE (2020–2023).

Undergraduate Level

- BSc (Hons) Student Supervision – 12 completed (UCT, UoE), 1 ongoing (UoE).
- Lecturing – Level 1: *Integrated Wildlife Conservation*, University of the West of England (2016–2018) and *Biological Diversity*, UCT (2012). Level 2: *Biology of Aquatic Vertebrates*, UoE (2019–2022). Level 3: *Conservation Biology*, UCT (2012).
- Marine Biology field courses – UoE (2018–2023) and UCT (2013).

M.K A01

Key Research Income

Principal Investigator:

2023 **SuMMeR CDT PhD Studentship (£102,721):** "Predicting regional vulnerability of threatened seabirds to offshore wind energy developments".

2022 **Natural England (£38,159):** 'Supporting Protected Seabird Populations'.

2022 **Joint Nature Conservation Committee (£13,336):** 'Bird collision and avoidance data review'.

2019 **Marie Skłodowska-Curie Global Fellowship (~£205,000)** (Awarded but handed back).

2019 **Pew Charitable Trusts Marine Conservation Fellowship, USA (~£115,000).**

2017/18 **Zoological Society of San Diego, USA (~£41,200).**

2016/18 **Leiden Conservation Foundation, USA (~£67,000):** 3-year fellowship at Bristol Zoological Society and University of Exeter.

2015/21 **Earthwatch Institute, USA (~£150,000):** 'South African Penguins' Citizen Science project, renewal of funding for 2016–2018 and 2019–2022.

2014/15 **Leiden Conservation Foundation, USA (~£21,000):** 2-year Fellowship at UCT.

2011 **Various Zoos, USA and Europe (~£26,000):** Satellite tracking fledgling penguins over 3 years (output published in *Current Biology*).

Co-investigator:

2023 **Bromley PhD Studentship (£104,886):** "Protecting foraging fish and seabird populations in the Isles of Scilly" – 3.5-year Philanthropic funding.

2021/22 **Darwin Plus (£50,298):** 1-year grant to rationalise the Ascension Island Green Turtle Monitoring Programme.

2021 **Bertarelli Foundation (£713,854):** 4-year grant to study population connectivity of seabirds in the Chagos Archipelago (£259,808 to Exeter).

2019 **Agri-Food and Biosciences Institute, UK (£294,000):** 1.5-year government tender to conduct surveys of nesting seabirds in Scotland (MarPAMM project).

2019 **Oiled Wildlife Care Network (£27,000):** 3-year grant to study post-oiling rehabilitation outcomes and long-term survival in seabirds.

2016/17 **British Antarctic Survey and Trans-Antarctic Association, UK (£8,300):** 3-month research expedition to South Georgia.

2016 **National Research Foundation, South Africa (~£12,000):** 1-year grant to identify foraging hotspots for non-breeding seabirds.

2012 **National Research Foundation, South Africa (~£30,000):** 3-year research grant for bank cormorant conservation research.

Impact and Leadership

2017–present **IUCN Species Survival Commission Penguin Specialist Group**
Commission member, providing advice to SSC Chairs on African penguin conservation

2020–present **Seabird Technical Team Member, Top Predator Working Group**
Advising the South African (SA) government on seabird conservation and policy needs.

2010–2021 **Scientific Observer, Small Pelagic Working Group**
Advising the South African (SA) government on penguin-fisheries interactions and policy to account for seabirds in fisheries management.

2012–2015 **Population Reinforcement Working Group Chairperson**
Contributing to the development of the African Penguin National Biodiversity Management Plan and leading advice to the SA government on the required conservation actions.

Plenary and Keynote Conference Talks

2021 **Plenary Presentation:** British Ornithologists Union (BOU), "Birds and People", Autumn Scientific Meeting 2021, Online conference.

2016 **Opening Keynote:** 9th International Penguin Congress, Cape Town, South Africa.

2015 **Plenary Presentation:** Workshop on 'Guidelines and best practise to determine potential fisheries competition with seabirds', Cape Town, South Africa.

Media Engagement

Television and Radio: Live TV interviews on South African Broadcasting Corporation channels in 2007, 2011 and 2012, and on Talk Radio (2012), Radio Today (2013) and BBC Cornwall (2019).

Online and print: Press coverage includes *Audubon* (USA), *BBC News* (UK), *Bloomberg* (USA), *CNN* (USA), *Conservation Magazine* (USA), *Guardian* (UK), *Independent* (UK), *National Geographic* (USA), *New Scientist* (UK), *New York Times* (USA), *Scientific American* (USA), *Smithsonian* (USA), *Spiegel* (Germany) and *Times of India* (India). See: https://sites.google.com/view/rbsherley/media-coverage for more detail.

Academic Citizenship

PGR Pastoral Tutor: University of Exeter (2022–present).

Fellow of the Higher Education Academy: (2022–present).

Travel Awards Committee Member: 3rd World Seabird Conference (2019–2020).

Social Committee Member: University of Exeter (2018–present).

Graduate Network Committee Member: African Climate Change and Development Initiative, University of Cape Town (2012–2013).

Zoology Departmental Seminar Convener: University of Cape Town (2010–2012).

Editorial roles: *Editor* of *Seabird* (2016–2018); *Associate Editor* of *Ostrich* (2014–present) and *Journal of Applied Ecology* (2023–present).

Peer-review roles: Reviewing for the Natural Environment Research Council (NERC, UK), the National Research Foundation (South Africa) and 29 journals including *Biological Conservation, Biology Letters, Conservation Biology, Ecology, Frontiers in Ecology and the Environment, Journal of Applied Ecology, Marine Ecology Progress Series, Methods in Ecology and Evolution, Nature Communications, Oecologia* and *Proceedings B.*

Skills Training

2022 **EMBO Leadership Course:** four-day course.

2022 **Hierarchical statistical modelling with NIMBLE:** half-day course.

2022 **Bayesian Analysis of Capture-Recapture Data with Hidden Markov Models in NIMBLE:** half-day course.

2021/22 Academic Professional Programme: level 7 teaching qualification.

2020 **Learning and Teaching in Higher Education (Stage 1):** one-day course.

2015 **Bayesian Integrated Population Modelling:** five-day course.

2015 **Bayesian Approaches and Mixed Effects Models**: one-day workshop.

2014 **Introduction to E-SURGE**: two-day capture-mark recapture course.

2013 **Spatial analysis using R**: two-day course.

References

Professor Astrid Jarre: Marine Research Institute, University of Cape Town, Rondebosch 7701, South Africa. Email: astrid.jarre@uct.ac.za

Professor Stephen Votier: The Lyell Centre, Heriot-Watt University, Research Avenue South, Edinburgh, EH14 4AP, UK. Email: s.votier@hw.ac.uk

Key Publications

Soriano-Redondo, A., Inger, R., **Sherley, R.B.**, Rees, E., Gebreselassie, F.A., McElwaine, G., Einarsson, O., Thorstensen, S., Newth, J., Hodgson, D. and Bearhop, S. 2023. Demographic rates reveal the benefit of protected areas in a long-lived migratory bird. ***Proceedings of the National Academy of Sciences USA*** 120: e2212035120.

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Votier S.C., **Sherley R.B.**, Scales K.L., Camphuysen C.J. and Phillips R.A. 2023. An overview of the impacts of fishing on seabirds, including identifying future research directions. ***ICES Journal of Marine Science*** 80: 2380–2392.

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Sherley R.B., Crawford R.J.M., de Blocq A.D., Dyer B.M., Geldenhuys D., Hagen C., Kemper J., Makhado A.B., Pichegru L., Tom D., Upfold L., Visagie J., Waller L.J. and

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The African Penguin should be considered Critically Endangered

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Short Note

The African Penguin should be considered Critically Endangered

The African Penguin *Spheniscus demersus* has been considered a threatened species since 1984 and, aside from a short period around 2000, its population has been in constant decline since at least the 1950s. By combining counts of the numbers of breeding pairs made at 26 colonies in South Africa and Namibia between 1979 and 2023 with Bayesian state-space models we reassess the species' conservation status. The breeding population has declined by 77.9% (95% credible intervals: 71.8–84.6%) over the last 30 years (3 generations) from ~44,300 breeding pairs in 1993 to ~9,900 pairs in 2023. This falls just below the threshold for a global IUCN Red List status of Critically Endangered (CR) under criterion A2. However, the decline in Namibia exceeds that threshold at the national level (30-year decline = 82.3: 78.2–86.2%) following the loss of ~3,600 breeding pairs there in the last 5 years. In South Africa, the Western Cape population is now declining at <1.5% *per annum*, but the annual rate of decline in the Eastern Cape has worsened substantially reaching 13% over the last 10 years. Overall, the global population has more than halved in the last decade and has fallen below 10,000 pairs for the first time. Moreover, "moving window" reductions over 3 generations using observed and projected population trajectories (up to 2033) indicate that the decline of the African Penguin population will exceed the 80% CR threshold (under criterion A4ab) with a high probability by 2028. Accordingly, we suggest that the African Penguin should now be considered Critically Endangered.

The African Penguin *Spheniscus demersus* is one of seven seabird species endemic to southwest Africa's Benguela upwelling ecosystem, where it currently breeds at 26 localities clustered in three regions, South Africa's Western Cape and Eastern Cape Provinces and central/southern Namibia (Makhado et al. submitted). Although the total population at the start of the 20th century is unknown, the African Penguin may have been the region's most abundant seabird with 1.5–3.0 million individuals across the species' range (Shannon & Crawford 1999, Crawford et al. 2007). By 1956, ~0.3 million individuals remained, and the population has declined consistently since then, apart from a brief recovery in the late 1990s and early 2000s (Crawford et al. 2011, Sherley et al. 2020a; Figure 1). Since the first formal attempts to estimate the population size in 1956 (Rand 1963a,b), the conservation status of the species has been reviewed several times (e.g. Frost et al. 1976, Brooke 1984, Shelton et al. 1984, Kemper et al. 2007, Sherley et al. 2020a). The species was first considered to have met the criteria to be listed as Vulnerable (VU) in 1984 (Brooke 1984, Shelton et al. 1984) and Endangered (EN) in 2007 (Kemper et al. 2007), with formal IUCN Red List assessments following suite in 2000 (VU), 2010 (EN) and 2016 (EN). Here, we follow the methods outlined in Sherley et al. (2020a), which reassessed the species' conservation status up to 2019, and use updated counts of the numbers of breeding pairs made at 26 colonies in South Africa and Namibia between 1979 and 2023, combined with Bayesian state-space models implemented via the *JARA* R package (https://github.com/Henning-Winker/JARA) to consider the current population size and reassess the conservation status of the African Penguin under criterion A2ab and A4ab (see Table 1). We do not discuss the threats to the African Penguin or drivers underpinning their decline, as these have been discussed extensively elsewhere (e.g. Crawford et al. 2011, Sherley et al. 2020a, Crawford et al. 2022). The state-space models were run using three chains of 25,000 iterations each, with a burn in of 10,000 and a thinning rate of 5. We used a generation length of 10 years (Sherley et al. 2020a; but explore sensitivity to generation length in Appendix 1), the "census" model type in JARA, and set the proj.r setting to "GL1" to generate future projections based on the median rate of change over the final 10 years (1 generation length) of the observed data. Full methods detailing how the nest counts are undertaken can be found in Shelton et al. (1984) and Crawford et al. (2011) (and are summarised in Sherley et al. 2020a). Full details of the JARA state-space framework can be found in Sherley et al. (2020a,b) and Winker et al. (2020), and the full dataset and code needed to reproduce the analysis reported in this paper, along with all of the JARA outputs, are available on GitHub (https://github.com/rbsherley/AP_IUCN_CR).

Table 1. Summary of the A criterion used to evaluate if a species belongs in an IUCN Red List threatened category, along with the Critically Endangered (CR) and Endangered (EN) thresholds for each of the subcriteria (IUCN 2012). The A criterion assess population size reduction, measured over the longer of 10 years or 3 generations, based on *inter alia* (a) direct observation [cannot be used for A3] and (b) an index of abundance appropriate to the taxon (see IUCN 2012, page 16, for data types c, d, and e, which were not used here). Criteria A2ab and A4ab were used in this analysis.

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Subcriteria	Description	CR threshold	EN threshold	Applicable to African penguin
A1	Population reduction observed, estimated, inferred, or suspected in the past where the causes of the reduction are clearly reversible AND understood AND have ceased.	≥90%	≥70%	No
A2	Population reduction observed, estimated, inferred, or suspected in the past where the causes of reduction may not have ceased OR may not be understood OR may not be reversible.	≥80%	≥50%	Yes
A3	Population reduction projected, inferred or suspected to be met in the future (up to a maximum of 100 years).			
A4	An observed, estimated, inferred, projected or suspected population reduction where the time period must include both the past and the future (up to a max. of 100 years in future), and where the causes of reduction may not have ceased OR may not be understood OR may not be reversible.			

Global population and Red List status under criterion A2: The African Penguin population has declined from ~44,300 breeding pairs in 1993 to ~9,900 pairs in 2023. This corresponds to an estimated decline of 77.8% (95% credible intervals: 71.8–84.6%) over the last 3 generations (3G), with 77% of the posterior distribution falling within the range for Endangered (EN) status under the A2ab criteria (past decline) and 23% meeting the criteria for Critically Endangered (CR) (Figure 1A). This represents a worsening situation relative to an assessment conducted up to 2019, where the decline over 3G was 64.1% (51.0–77.5%) (Sherley et al. 2020a). Although the observed decline falls just short of the 80% threshold for CR, this long-term trend should be viewed in the context of four key observations. First, the global rate of decline over the last 10 years (or 1 generation, 1G) has nearly doubled from 4.3% *per annum* in the 2019 assessment (Sherley et al. 2020a) to 7.9% (3.9–11.8%) here. Second, the annual rate of decline over the last 10 years (1G) was 9.9% (3.1–17.4%) in Namibia and 12.9% (5.9–20.6%) in the Eastern Cape. Third, this is the first time that the global breeding population of African Penguins has fallen below 10,000 pairs. To contextualise this, three islands each held more breeding pairs than the current global population for periods between 1979 and 2007; Dassen Island had ~11,000 pairs as recently as 2007, Dyer Island had >10,000 pairs until 1990, and St Croix Islands held >12,000 until 2003. There are also now considerably fewer individual African Penguins in the population (~31,700) than the number affected by the MV *Treasure* Oil spill in 2000 when ~38,500 individuals were either oiled, cleaned, and released, or relocated to stop them becoming oiled (Crawford et al. 2000). And fourth, the global population has more than halved in the last decade, largely because of the combined loss of >12,500 breeding pairs in Namibia (~4,450) and the Eastern Cape (~8,100) since 2015. In other words, substantially (>25%) more birds have been lost in less than 10 years than now remain in the African Penguin population. Thus, it is not unreasonable to be concerned that – if these rates of decline persist – the species could be extinct in the wild by 2035.

Namibia – national Red List status and trend: The African Penguin has been considered Endangered at a national level since 2007 (Kemper et al. 2007, Kemper 2015), but breeding numbers had been relatively stable at ~5,000 breeding pairs for about two decades between 1997 and 2017. The assessment using data to 2019 suggested a rate of decline over 3G of 38.1% (23.4%–51.0%) and a national Red List status of Vulnerable (VU) for Namibia (Sherley et al. 2020a). However, the population has subsequently declined sharply from ~4,800 pairs in 2018 to ~1,200 pairs in 2023 (Figure 1B). Consequently, we recommend that the Namibian population be up listed to a national Red List status of CR as it exceeds the A2ab criterion with 87% probability and median decline over 3G of 82.4% (78.2–86.2%) (Figure 1B). Worryingly, the 2023 census detected no breeding pairs at Mercury Island – the colony that had held around 50% of the Namibian population in the period of stability between 1997 and 2017. The 2023 counts also suggest that only one of the Namibian colonies (Halifax Island) currently holds more than 500 breeding pairs (see Appendix 2); dropping below this number empirically implies a <50% probability of still being extant in the next 40 years (Crawford et al. 2001). Moreover, our projections over the next 10 years suggest that four of the seven major colonies in Namibia will be effectively extinct (fewer than 10 pairs) by 2034.

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South Africa – national Red List status and regional trends: In South Africa, the breeding population has declined by 76.9% (69.4–84.0%) over the last 3GLs, to ~8,750 pairs in 2023 (Figure 1C). As in Namibia, this decline rate has worsened relative to the 2019 assessment where the median decline was 67.7% (52.9–82.5%) over 3G (Sherley et al. 2020). EN remains the best supported national status in South Africa under criterion A2ab, with 81% of the posterior distribution within the EN decline range (Figure 1C). This national pattern, however, is made up of quite different regional trajectories.

In the Western Cape Province, the population at the seven colonies north of Cape Town (the West Coast region) declined by 75.3% (68.2–81.6%) over the last 3G (vs. 68.7% in the 2019 assessment), but a period of rapid decline between 2004 and 2014 was followed by 10 years of relative stability when the population only declined at 0.6% (−5.1–6.1%) *per annum* from ~3,500 pairs in 2014 to ~3,170 pairs in 2023. Meanwhile, the population in the South-West Coast region (the five Western Cape colonies south and east of Cape Town) declined slowly and fairly consistently (at 1.4%: –2.4–5.2% *per annum*), leading to an overall decline of 31.1% (9.6–49.9%) over the last 3G (vs. 53.1% in the 2019 assessment) from ~4,300 pairs around 1994 to ~3,100 pairs by 2023. Until recently this trajectory was dominated by the long-term decline at Dyer Island being partially offset by increases at Stony Point and the colony at Simonstown. Over recent years, however, these two mainland colonies have also declined: Stony Point from ~2,460 pairs in 2015 to ~1,260 in 2023 and Simonstown from ~1,100 pairs in 2020 to ~870 in 2023 (see Appendix 3).

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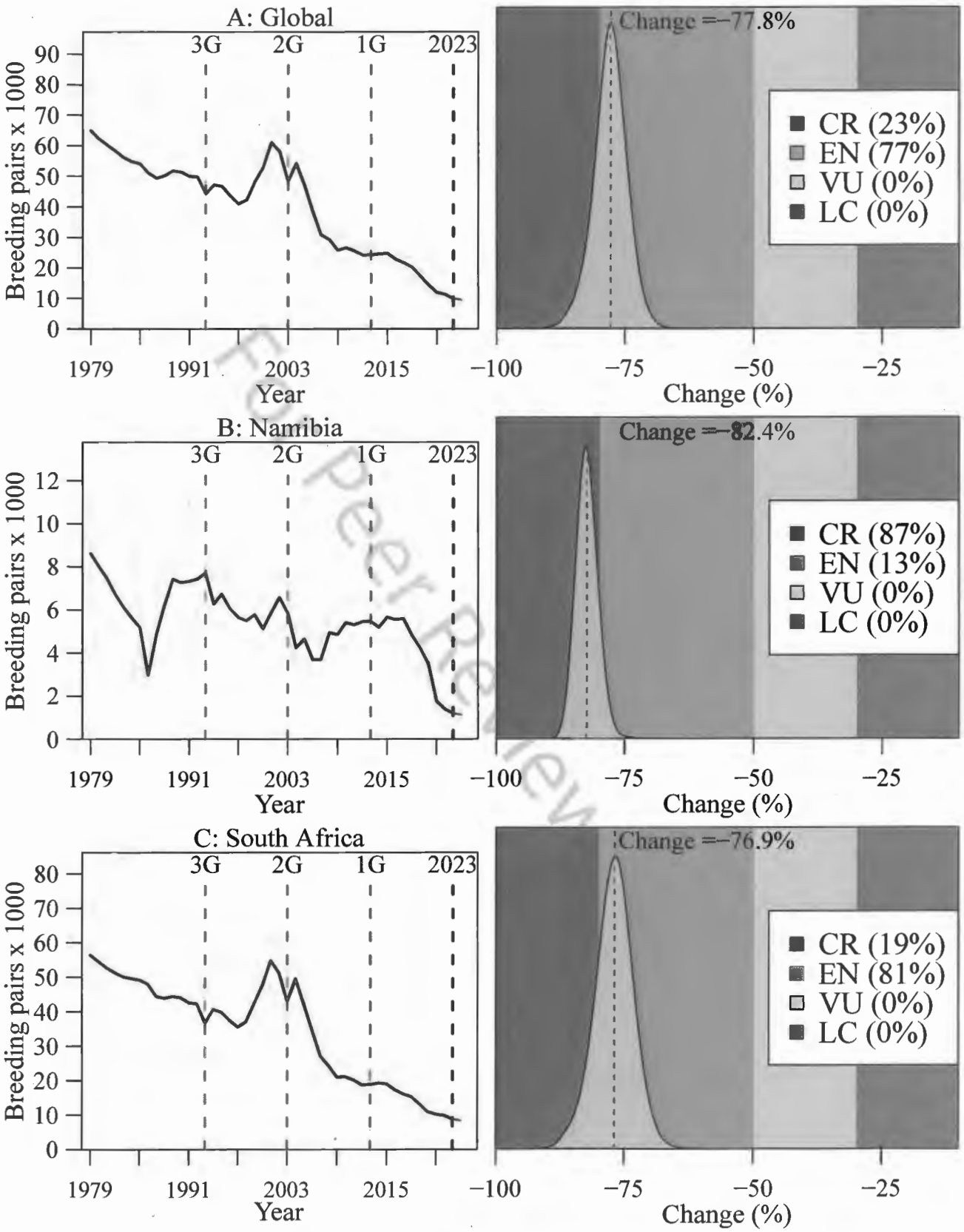

Figure 1. Left panels: The modelled trajectory (black line, posterior median) and 95% highest posterior density intervals (HPDI; grey polygon) for the global African Penguin population at 26 breeding colonies (A: Global), the Namibian population at 7 colonies (B: Namibia), and the South African breeding population at 19 colonies (C: South Africa) based on nest counts made between 1979 and 2023. The 10-year generation lengths before 2023 are denoted by a blue dashed line (1G, 2013), a green dashed line (2G, 2003) and a red dashed line (3G, 1993). Right panels: the associated median change (%, dashed line) in the breeding population

of penguins globally (top right), in Namibia only (middle right) and South Africa only (bottom right) over three generations (3G) or 30 years and the corresponding posterior probability (grey polygon) for that change, overlaid on the IUCN thresholds for the Red List criterion A2ab (LC—dark green, VU—yellow, EN—orange, CR—red).

Most concerning, however, is the regional trend in the Eastern Cape. Here, the numbers breeding were relatively stable at ~10,000 pairs for about a decade between 2003 and 2015. Thereafter, they declined sharply over the last 10 years (1G) from ~11,450 pairs in 2014 to ~2,540 pairs in 2023 at an unsustainable annual rate of change of −12.9% (−20.6–−5.9%), resulting in an overall decline of 88.1% (78.2–94.9%) in the breeding population in this Province over the last 30 years (3G). This represents a substantive worsening of both population trajectory and status since the 2019 assessment, when the 3G decline was 66.2% and the annual rate of change over the last 1G was −3.5% (Sherley et al. 2020a). If the IUCN Red List criterion A2 were to be applied to the Eastern Cape subpopulation, it would qualify for CR with 93% probability.

Future population projections and Red List status under criterion A4: The IUCN Red List allows for a species to be assessed against the categories based on a "population size reduction… over any 10 year or three generation period… where the time period must include both the past and the future" (Criterion A4, Table 1; IUCN 2012). Given the concerning loss of ~14,000 breeding pairs in less than a decade, that only around 70% of that number persist today, and that the estimated global decline over the last 3G was very close to the CR threshold (80%) under Criterion A2ab, we used JARA to assess the decline trajectory under Criterion A4ab. Although the IUCN Red List guidelines allow for projections up to 3G into the future (e.g. under Criterion A3, Table 1), uncertainty increases and projections become less reliable further into the future. Thus, we used the projection function in JARA to project 10 years of future breeding counts (with uncertainty; Figure 2), with the projections at each of the 26 colonies based on the median annual rate of change at that colony over the final 1G (10 years) of data (Sherley et al. 2020b; Appendix 2). In this way, we assume that the near future (10 years after 2023) will be like the recent past (10 years prior to and including 2023). We then used a combination of the last 20 years (2G) of observed data and 10 years (1G) of projected data to estimate "moving window" reductions over 3G where the terminal year spanned 2023 (the A2 reduction in Figure 1) to 2033. In other words, each 3G period would span 1993 to 2023, 1994 to 2024, and so on until 2003 to 2033. For each 3G period, we recorded the posterior distribution of all population change percentages, the posterior median, the best supported IUCN Red List Category based on the posterior distribution and the probability supporting a listing of CR (Figure 3).

With 2024 as the terminal year of the "moving window", the median decline over 3G was 77.7% (70.6–85.1%) with 27% of the posterior distribution of change percentages exceeding the 80% threshold for a CR listing (i.e. the probability supporting a listing of CR was 27%); thus EN would remain the best supported category based on the A criteria (Figure 3). However, by 2027 the combination of the observed and projected data indicated that the median decline over 3G would exceed the 80% threshold for a CR listing under criterion A4ab with 56% probability. From 2028 onwards, CR was the best supported category based on the criterion A4ab with >95% support in each instance (Figure 3). The projections also suggest that the present decline shows no clear sign of reversing if conditions over the next 10 years reflect conditions in the recent past (Figure 2 and 3). We therefore propose that the African Penguin has met the IUCN Red List threshold for a global status of CR under criterion A4ab and should now be considered a Critically Endangered species.

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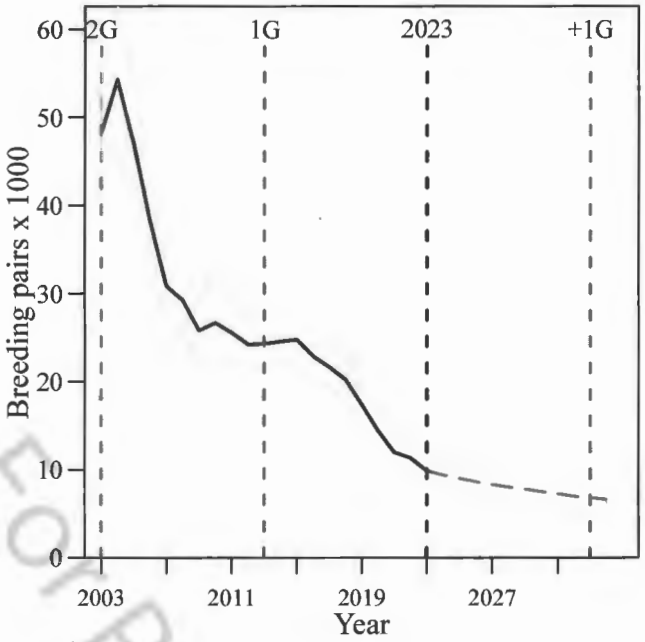

Figure 2. The modelled population trajectory (black line, posterior median) and 95% highest posterior density intervals (HPDI; dark grey polygon) for the African Penguin breeding population based on observed nest counts made at 26 colonies over the last 2 generations (2G), i.e. between 2003 (vertical dashed green line) and 2023 (vertical dashed black line), and the projected population trajectory (red dashed line) and 95% highest posterior density intervals (HPDI; light grey polygon) 10 years, or 1 generation (1G), into the future (+1G). The projections are based on the median annual rate of change at each colony over the final 10-year generation before 2023 (i.e. from the 1G blue dashed line to the 2023 black dashed line).

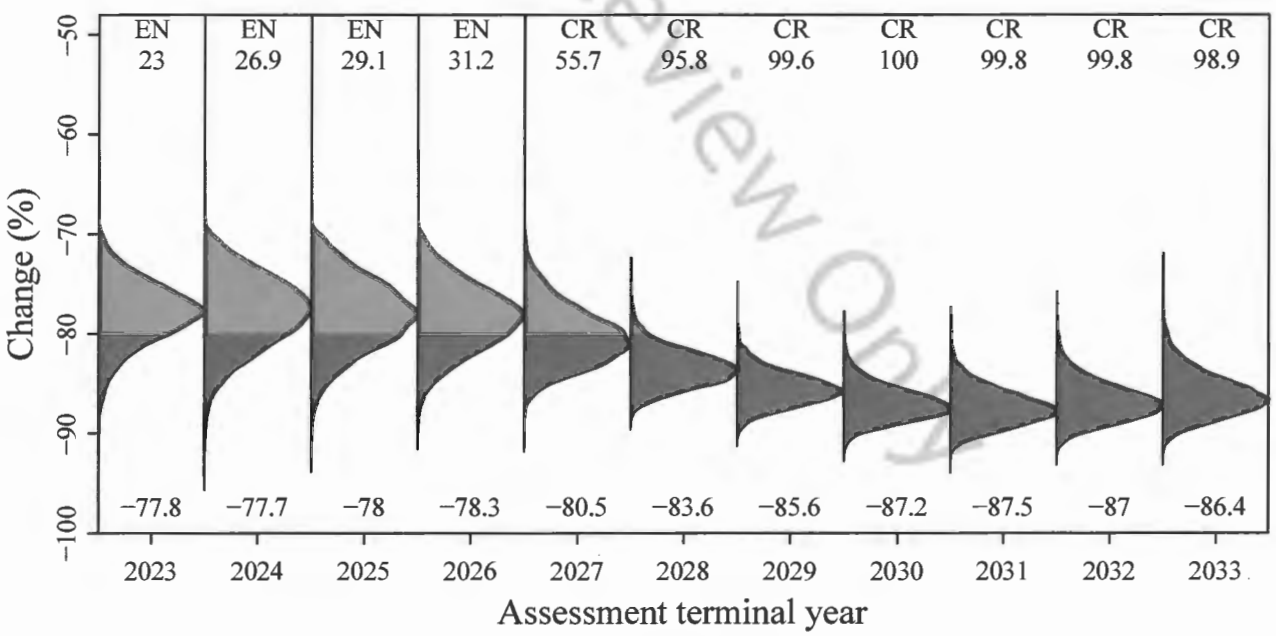

Figure 3. Posterior distribution of population change percentages for "moving window" assessments of the global African Penguin population against criterion A4ab. Decline percentages are based on a combination of observed and projected data to give 3 generations where the terminal year spanned 2023 to 2033 (e.g. Figure 2). The left most distribution is based on the population trajectory between 1993 and 2023 (the 3G and 2023 lines in Figure 1) and the right most distribution is based on the trajectory between 2003 and 2033 (the 2G and +1G lines in Figure 2), with the terminal year of the moving window shifting one year to the right along the x-axis. The median change (%) in the breeding population over each 30-year period is shown above the x-axis (e.g. 83.6% decline for 1998 to 2028) Orange denotes declines that exceed the Endangered (EN) threshold (50% over 3G) and red denotes declines that exceed the Critically Endangered (CR) threshold (80% over 3G).

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The best supported global Red List status at each terminal year (based on criterion A4ab) is shown at the top of the plot, along with the probability that the species will meet the CR threshold (e.g. 55.7% in 2027).

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Appendix 1

The generation length (G) for the African penguin has usually been calculated using the second option in the IUCN Red List guidelines (IUCN Standards & Petitions Subcommittee 2022), commonly referred to as the adult mortality proxy (Bird et al. 2020), such that:

$$G = A + \frac{1}{(1 - \phi_a)} \quad \text{(A1)}$$

where A is age of first breeding and ϕ_a is adult survival. Following Sherley et al. (2020), we used values of ϕ_a = 0.81, A = 5 years, which yields G = 10.3 years, which we rounded to 10 years. This value is also a value supported by a recent meta-analysis of generation lengths in birds which returned estimated generation lengths for the African penguin of 9.5 to 10.5 years, depending on the method used (Bird et al. 2020). However, there are sources of uncertainty in the estimation of a species' generation length. To acknowledge this, below we outline our rationale for using 10 years in more detail and explore the sensitivity of our results to a series of reasonable (given the data available) alternative generation lengths.

The IUCN Red List guidelines state "where generation length varies under threat… the more natural, that is predisturbance, generation length should be used… to avoid a shifting baseline effect [that] would arise because using current, shorter generation length (under disturbance, such as harvest) may result in a lower threat category (because a shorter period is used to calculate the reduction)" (IUCN Standards & Petitions Subcommittee 2022). Accordingly, in the past we have used ϕ_a = 0.81 (e.g. Sherley et al. 2020) based on capture-mark-recapture studies at Dassen and Robben Islands between 1989 and 1998 (Whittington 2002) and between 1994/95 and 1998/99 (Sherley et al. 2014). The African penguin population was recovering for much of this period (see Figure 1 in the main text), thus these survival rates might indicate a more natural situation than e.g. post 2001 when annual survival was generally below 0.7 at Dassen and Robben Islands (Sherley et al. 2014).

However, a long-run average adult survival of 0.81 is still relatively low both for a *Spheniscus* penguin and amongst similarly-sized penguins in general. For example, even in a declining colony, long-term mean adult survival of breeding Magellanic penguins *S. magellanicus* was ~0.87 (Boersma and Rebstock 2010, Gownaris & Boersma 2019) and apparent mean survival of Galápagos penguins *S. mendiculus* has been estimated as 0.84 for males and 0.85 for females (Cappello 2022). More broadly, adult survival is generally higher than 0.81 in both northern rockhopper penguins *Eudyptes moseleyi* and southern rockhopper penguins *Eudyptes chrysocome* at 0.84 (Guinard et al. 1998) and 0.84 to 0.96 (Dehnhard et al. 2013) respectively; these are similarly sized penguin species to the African penguin (all around 2–3 kg body mass when breeding; Garcia Borboroglu & Boersma 2013). And even little penguins *Eudyptula minor*, which weigh around 1 kg when breeding, have long-term mean adult survival rates that range from 0.83 to 0.91 (Sidhu et al. 2007, Dann et al. 2014). A plausible range for "predisturbance" survival for African penguins, therefore, could be 0.81 to 0.87, based on the data from other *Spheniscus* penguins in particular.

There is also potential uncertainty in the age of first breeding. African penguins will usually breed for the first time at between 4 and 6 years of age (Crawford et al. 1999, Whittington et al. 2005). Using data on 473 penguins flipper banded as chicks and later recorded breeding at 5 colonies between 1992 and 1995, Whittington et al. (2005) found that <33% of birds were breeding at the age of 3 at each of the colonies, but by the age of 6 between 81% and 100% were breeding in each colony. At Dassen and Robben Islands, where resighting effort was the highest, 87% and 89% were breeding by age 5 respectively. Overall, the annual means and medians at each colony ranged from 4.3 to 5.8 years (Whittington et al. 2005). Thus, 4 to 6 years represents a plausible range for age at first breeding in African penguins.

Together these plausible ϕ_a values of 0.81 to 0.87 and A values of 4 to 6 years yield generation length estimates of between 9.3 and 13.7 years. Accordingly, Table A1 below explores the implications on the results reported in the main text of using a generation length of 9, 10, 12 or 14 years for an A2 assessment (e.g. Figure 1 in the main text) and the A4 assessment with 2028 as the terminal year. Regardless of the generation length used, CR was the best supported category based on the criterion A4ab with >75% probability in 2028 (Table A1).

Table A1. The median and 95% highest density interval decline (%) of the African penguin population using a generation length of 9, 12, 10 or 14 years along with the percentage of the decline posterior falling within each of the Least Concern (LC), Vulnerable (VU), Endangered (EN) and Critically Endangered (CR) decline ranges and the most likely IUCN Red List status based on the A2 or A4 assessment with 2028 as the terminal year.

Dataset	Relevant IUCN criteria	Assessment terminal year	Generation Length (yrs)	Median decline (95% HDI) %	LC	VU	EN	CR	Likely Status
Global observed	A2	2023	9	75.2 (67.0–84.2)	0	0	85	15	EN
			10	77.8 (71.8–84.6)	0	0	77	23	EN
			12	78.8 (68.1–88.8)	0	0	59	41	EN
			14	81.9 (70.7–90.8)	0	0	36	64	CR
Global observed + projected	A4	2028	9	86.9 (83.4–90.1)	0	0	0	100	CR
			10	83.6 (79.9–87.2)	0	0	4	96	CR
			12	82.4 (78.1–86.8)	0	0	14	86	CR
			14	82.9 (74.4–90.2)	0	0	24	76	CR

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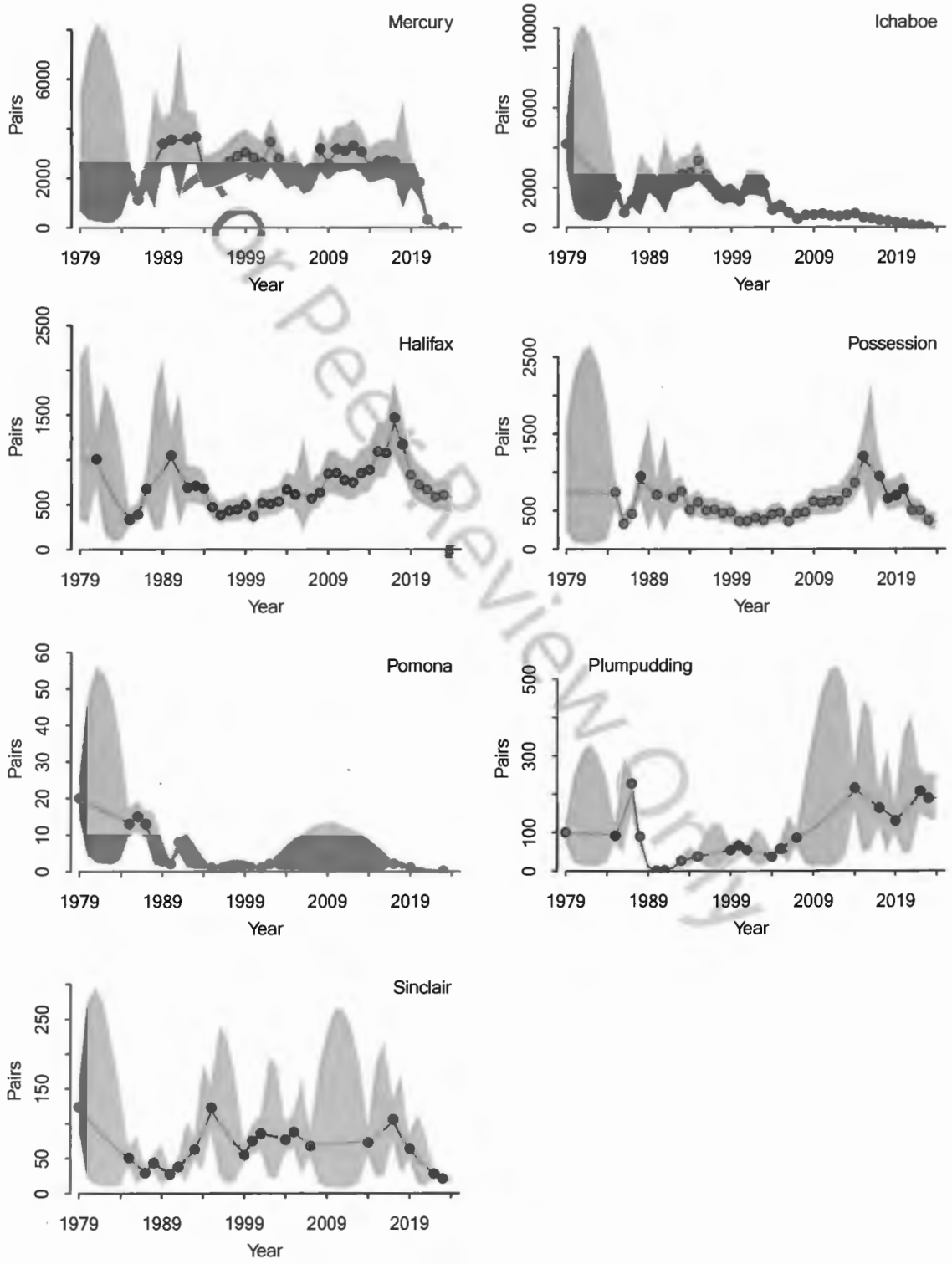
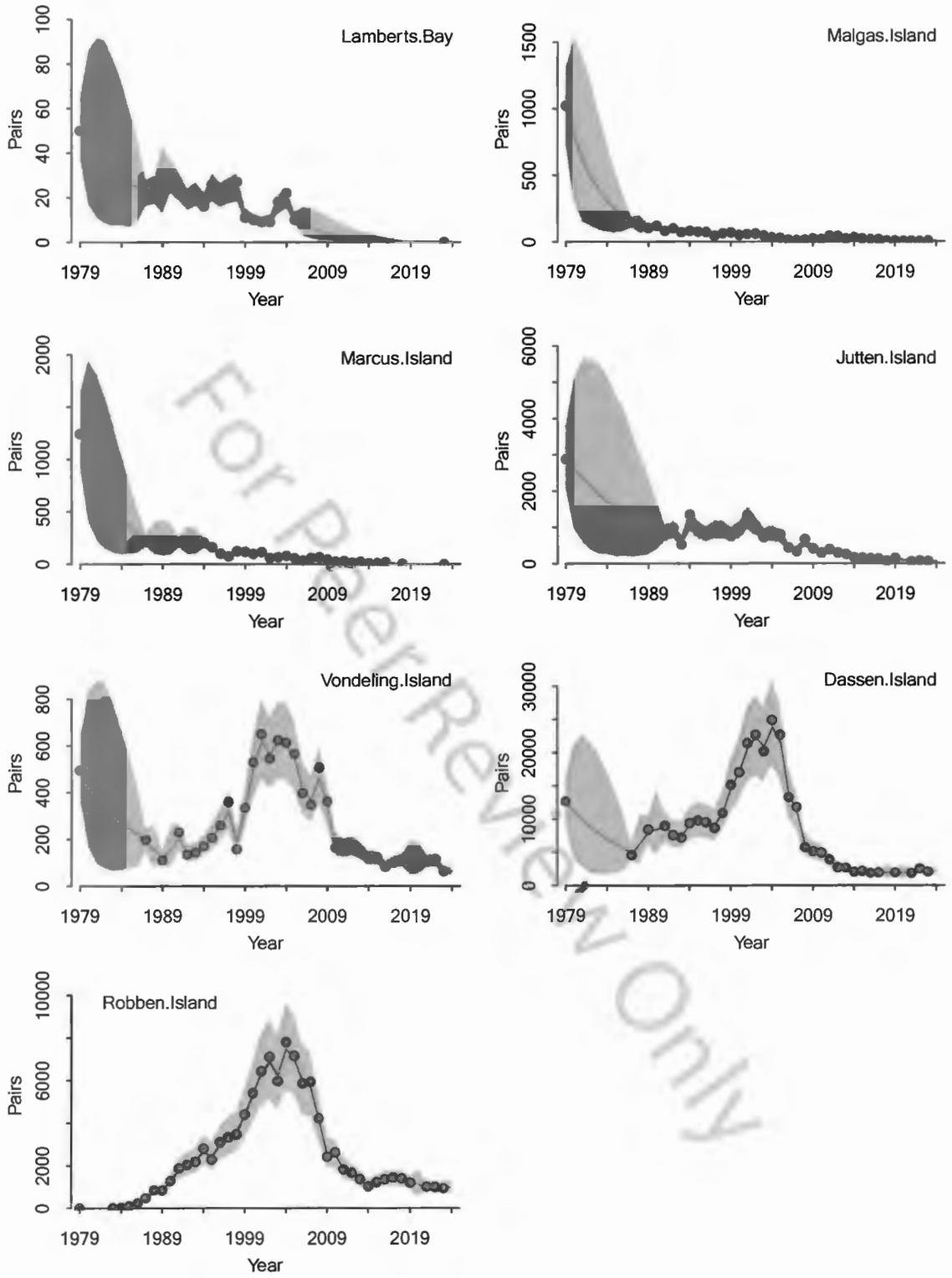
Appendix 2

Individual population counts (breeding pairs, points) with Bayesian State-space model fits (lines) and 95% credible intervals (grey polygons) at 26 African Penguin colonies in Namibia and South Africa between 1979 and 2023. Colonies are presented from North to South, and West to East. Green = Namibian colonies; Red = South African colonies in the West Coast region (Western Cape, north of Cape Town); Orange = South African colonies in the South Coast region (Western Cape, south and east of Cape Town); Pink = South African colonies in the Eastern Cape.





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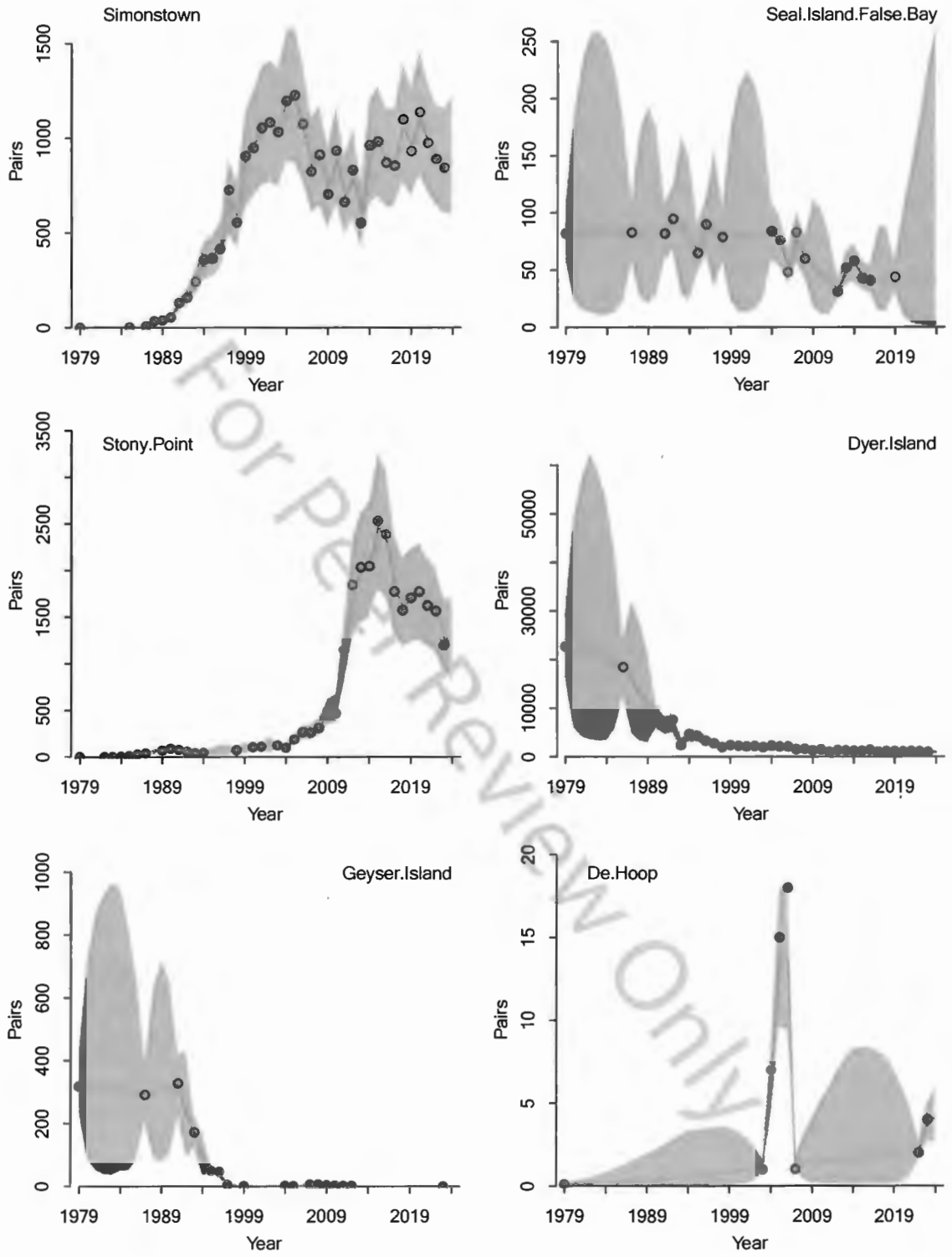

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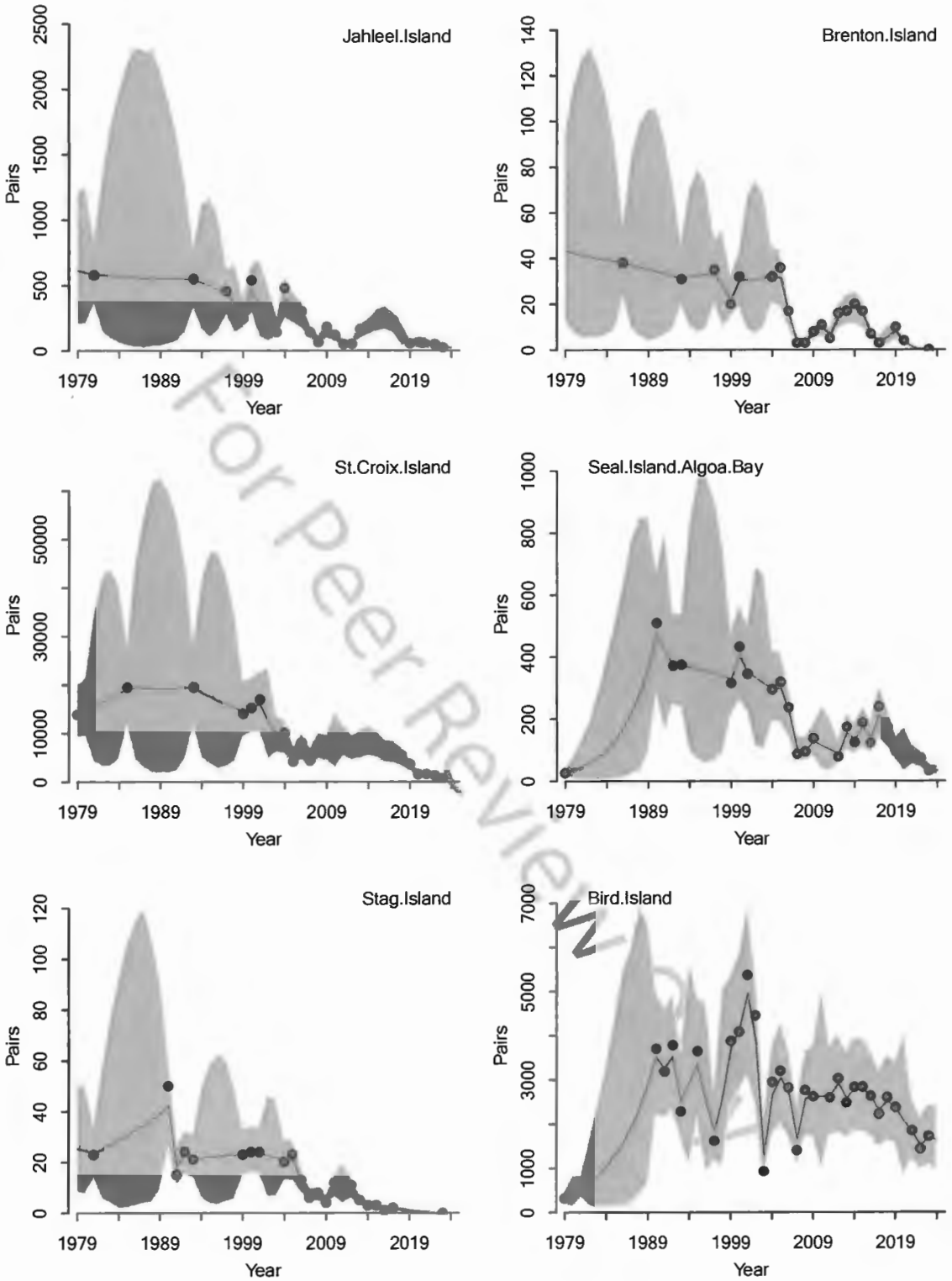
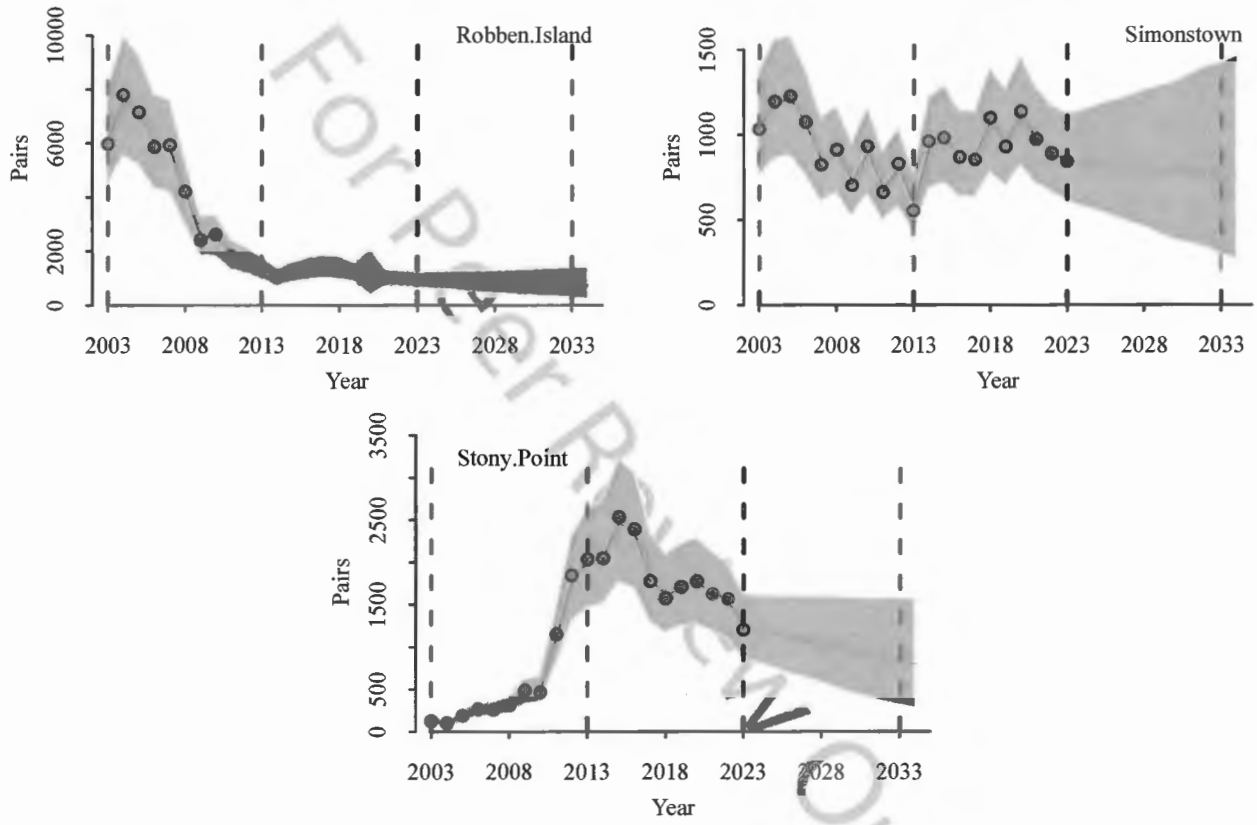


Appendix 3

Examples of individual population counts (breeding pairs, points) with Bayesian State-space model fits, including future projections (lines) and 95% credible intervals (grey polygons) at 3 African Penguin colonies in South Africa 2003 and 2033. Data from 2024 to 2033 inclusive are projections based on the posterior median of the annual rate of change over the last 1G (10 years) of observed data (2014 to 2023). The examples show colonies that have been relatively stable over the last 20 years (Simonstown), declined fairly consistently over the last 20 years (Robben Island), and increased strongly over about a decade and then declined over the last 10 years (Stony Point). The median annual percentage change over the last 1G were −2.1% (−6.6–2.8%) at Robben Island, −1.0% (−5.8–3.9%) at Simonstown, and −3.9% (−8.4–1.0%) at Stony Point. The vertical dashed lines mark 2023 in black (final observed data point), 2013 in blue (1G in the past), 2003 in green (2G in the past) and 2033 in red (1G in the future).



IN THE HIGH COURT OF SOUTH AFRICA
GAUTENG DIVISION, PRETORIA

Case No:_____

In the matter between:

BIRDLIFE SOUTH AFRICA	First Applicant
SOUTH AFRICAN FOUNDATION FOR THE CONSERVATION OF COASTAL BIRDS	Second Applicant
and	
THE MINISTER OF FORESTRY, FISHERIES AND THE ENVIRONMENT	First Respondent
THE DEPUTY DIRECTOR-GENERAL: FISHERIES MANAGEMENT, DEPARTMENT OF FORESTRY, FISHERIES AND THE ENVIRONMENT	Second Respondent
THE DEPUTY DIRECTOR-GENERAL: OCEANS AND COASTS, DEPARTMENT OF FORESTRY, FISHERIES AND THE ENVIRONMENT	Third Respondent
THE SOUTH AFRICAN PELAGIC FISHING INDUSTRY ASSOCIATION	Fourth Respondent
EASTERN CAPE PELAGIC ASSOCIATION	Fifth Respondent

EXPERT AFFIDAVIT

I, the undersigned,

ELEANOR ASHLEY WEIDEMAN

do hereby make oath and state that:

1. I am an adult female marine ecologist and conservation biologist and the Coastal Seabird Project Manager at BirdLife South Africa (**BLSA**), the first applicant.

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2. The facts contained in this affidavit are within my personal knowledge and belief, unless otherwise stated or as appears from the context, and are to the best of my belief both true and correct.

3. My qualifications are set out in my curriculum vitae, attached marked "**EW1**". In brief, my qualifications and expertise are as follows:

3.1. I hold a Bachelor of Science (**BSc**) in Applied Biology and Ecology & Evolution, a BSc Honours in Biology and a Master of Science degree in Biology, all from the University of Cape Town.

3.2. I have subsequently held positions as a field assistant working on seabirds at Nelson Mandela University and currently hold the position of Coastal Seabird Project Manager at BLSA.

3.3. Since 2023, I have advised the South African Government as a member of the Seabird Technical Team of the Top Predator Working Group (currently convened by the Department of Forestry, Fisheries and the Environment, Branch: Oceans and Coasts).

3.4. I have published 19 academic papers in peer-reviewed journals and have over 580 citations. In addition, I have been co-author of four South African government reports and a consultation report for the Nairobi Convention of the United Nations Environment Programme.

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4. My role at BLSA entails working as part of the penguin-specialist team. As such, I have been a co-author of BLSA's submissions to the Panel as well as the Assessment (both as defined in the founding affidavit). I have worked as part of the team applying the trade-off mechanism recommended by the Panel, which I have done using the R statistical software, and which has identified the results of such application as the delineations produced in "**EW2**".

5. Accordingly, I am well-placed to explain what is entailed by the "marine Important Bird and Biodiversity Area – Area Restricted Search" (**mIBA-ARS**) method in the context of delineating island closures which was recommended by the Panel as the best scientific basis for delineating the preferred foraging habitats of African Penguins during breeding[1] and how this method has been used to indicate the preferred foraging areas around the six breeding colonies using existing tracking data collected between 2008 and 2022. I am also able to explain the application and results of the Panel's recommended trade-off mechanism. I do so with reference to the maps and graphs attached as "**EW3**".

The mIBA-ARS Method endorsed by the Panel

<u>The development of Marine Important Bird and Biodiversity Areas (**mIBAs**)</u>

6. Marine Important Bird and Biodiversity Areas (**mIBA**) are globally significant sites identified for the conservation of seabird species. They are a recognised means of determining such sites for the purposes of informing conservation management decisions.

[1] Panel Report, p 34, para 4.3.

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7. Methods to delineate mIBAs have evolved since the introduction of tracking technology and the resulting telemetry data. Current best scientific practice developed by BirdLife International has advanced the methods used for "translating" tracking data into "mIBAs".

8. These latest methods have been used to identify significant sites for Chinstrap, Adélie and Gentoo penguin conservation in the Antarctic Peninsula and the Southwest Atlantic Ocean. We have drawn from the relevant studies in our own delineation of mIBAs for African Penguins.

9. Key improvements to this method include (1) identifying important areas that are more robust, accounting for the variation in movements between individual seabirds from the same colony; and (2) determining the representation of the spatial extent of their core (or preferred) usage areas within the marine environment at the colony population level. This means that the mIBA method used in our assessment is more accurate than older methods which used "combined kernel density" estimates and which did not necessarily assess whether a sample of tracking data around a particular colony was adequate to draw conclusions about the use of marine space by that colony population as a whole.

<u>Measuring mIBAs for African Penguins based on tracking data</u>

10. In South Africa, there are protocols for ongoing monitoring of African Penguins using GPS tracking devices. This data is collected by scientists focusing on specific colonies (including those at Dassen, Robben, Dyer, St Croix, and Bird islands and Stony Point i.e. "**the breeding colonies**"). Approximately on an annual basis, this

data is collected by penguin scientists from BLSA, Nelson Mandela University (**NMU**), the Department of Forestry, Fisheries and the Environment (**the DFFE**), Cape Nature and the University of Exeter. BLSA is largely responsible for processing the tracking data using the R statistical computing software. Following this process, BLSA generates mIBAs to inform marine spatial prioritisation in South Africa's exclusive economic zone. I pause to note that BLSA focuses on threatened seabird species in the Benguela Upwelling System of which the African Penguin is one key example.

11. We determine two important areas for the purpose of discussing delineations.

11.1. First, we determine the African Penguins' full foraging range for a particular colony (which we refer to as "UD90" and represent as a light green line in the maps enclosed as "**EW3**"). We determine the full foraging range using well-recognised methods published in the peer-reviewed studies authored by Dias et al. (2018), Lascelles et al. (2016), Beal et al. (2021) and Borger et al. (2006).[2]

11.2. Second, we determine the "core" or "preferred" foraging area (which we refer to as mIBA-ARS and as represented in dark green in the attached maps). "ARS" stands for "area restricted search" i.e. the area where animals (in this case, African Penguins) are concentrating their searching / foraging effort. This

[2] Martin Beal et al (2021) "track2KBA: An R package for identifying important sites for biodiversity from tracking data", *Methods Ecol. Evol,* 12(12), 2372–2378, available online <https://doi.org/10.1111/2041-210X.13713> (accessed 11 March 2024); Luca Börger et al (2006) "Effects of sampling regime on the mean and variance of home range size estimates", *Journal of Animal Ecology*, 75(6), 1393–1405, available online < https://doi.org/10.1111/j.1365-2656.2006.01164.x> (accessed 11 March 2024); Maria Dias et al (2018) "Identification of marine Important Bird and Biodiversity Areas for penguins around the South Shetland Islands and South Orkney Islands", *Ecology and Evolution*, 8(21), 10520-10529, available online < https://doi.org/10.1002/ece3.4519> (accessed 11 March 2024); BG Lascelles et al (2016) "Applying global criteria to tracking data to define important areas for marine conservation", *Diversity an Distributions*, 22(4), 422-431, available online < https://doi.org/10.1111/ddi.12411> (accessed 11 March 2024).

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method, based on the work of Lascelles et al. (2016), Beal et al. (2021), Van der Waal and Rogers (2012) and Fauchald and Tveraa (2003)[3] was recommended by the Panel as the best scientific basis for delineating the preferred foraging habitats based on available data.[4] Accordingly, we have used this method to delineate those areas around each colony of most value to African Penguins.

The Panel's recommended trade-off mechanism

12. The Panel recommended a clear mechanism for identifying optimal no-take zone delineations which maximise benefits to African Penguins while minimising costs to the purse-seine small-pelagic fisheries industry (**the trade-off mechanism**). This is described in paragraph 4.4 of the Panel's report dated July 2023. Further, "colony-specific considerations" are set out at paragraph 4.5.

13. I explain here how we have applied the considerations set out in paragraph 4.4. in order to identify the specific delineation which is most appropriate based on existing available data. This data includes:

13.1. Telemetry data obtained from BLSA, DFFE, NMU, UCT, Cape Nature and University of Exeter; and

[3] Beal et al *supra*; Lascelles et al *supra*; Per Fauchald and Torkild Tveraa (2003) "Using first-passage time in the analysis of area-restricted search and habitat selection", *Ecology* 84(2), 282–288, available online < https://doi.org/10.1890/0012-9658(2003)084[0282:UFPTIT]2.0.CO;2> (accessed 11 March 2024); E Vander Wal and AR Rodgers (2012) "An individual-based quantitative approach for delineating core areas of animal space use", *Ecological Modelling*, 224(1), 48–53, available online < https://doi.org/10.1016/j.ecolmodel.2011.10.006> (accessed 11 March 2024).

[4] Panel Report, p 34.

13.2. Fisheries catch loss data generated by the "opportunity based model" (**OBM model**) which uses the locations of fishing catches recorded by purse-seine fishing vessels and submitted as part of their permit requirements to DFFE to assess catches "lost" due to closures. This data was provided to us by the Panel in August 2023.

The parameters of the trade-off mechanism

14. The Panel established a set of parameters which define the relevant trade-off mechanism. These are:

14.1. A trade-off mechanism is ideal if it *"minimizes societal costs and maximizes benefit to penguins; however, an optimal solution (or acceptable 'balance') between competing objectives is not simply obtained by closing 50 percent of any given area"*.[5]

14.2. It is possible to identify the trade-off between *"expected benefits to penguins and impacts on fishing"* using trade-off curves which plot closure options as points on a graph measuring the relationship between a particular closure area / delineation and (1) benefits to penguins, on the one hand, and (2) costs to fisheries on the other.[6] I explain how we used these trade-off curves in paragraphs 21 to 41 below.

[5] Panel Report, p 36, para 4.4.
[6] Panel Report, p 36, para 4.4.

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14.3. If curves can be created that compare the relative costs and benefits for different delineation options, it is possible to find the point at which the change in benefits to penguins (i.e. through changing closure extents) matches the *"change in costs to society"*.[7] We refer to this as the "balance point" below (and have represented it as a yellow dot on the graphs represented in **EW3**).

14.4. This comparison should be done on an island-by-island basis as trade-offs will differ among islands and sectors of the small-pelagic fishery. It is for this reason, that we have employed the trade-off mechanism on a colony-by-colony / island-by-island basis and for each potential small-pelagic catch (to the extent we have such catch data). We note that while we have accounted for directed sardine, anchovy, sardine bycatch and red-eye, our understanding is that current allocations have been made only for sardine and anchovy and it is thus these catches that are of primary concern.

14.5. The likely overestimates of lost catch resulting from the OBM analysis means that, for the purposes of the trade-off-mechanism at this point in time, lost catches should be considered *"in a relative sense… for ranking closure options"*. We have thus used OBM data to rank closure options as further detailed at paragraph 21.2 below.

14.6. Closure areas should be selected based on how effective a closure is in terms of alleviating resource competition between small-pelagic purse-seine fisheries and African Penguins (i.e. a closure will only be suitable if it covers an area

[7] Panel Report, p 36, para 4.4.

where there is in fact resource competition between African Penguins and fisheries).[8]

14.7. Closures reflecting valuable African Penguin foraging areas will have greater benefits than those that close less valuable foraging areas.[9]

Representing benefits to African Penguins and costs to fisheries on a trade-off curve

15. Central to the trade-off mechanism was the ability to represent the benefits to African Penguins and costs to the fishing industry on a graph for each colony; for each catch type (of anchovy, sardine, bycatch sardine and redeye) and for each delineation option considered by the Panel, namely:

15.1. UD90 (described above as the "foraging range" of a particular colony);

15.2. mIBA-ARS (described above as the "preferred foraging area" of a particular colony);

15.3. the 20 km no-take zones that had been employed during the Island Closure Experiment (**20 km closure**);

15.4. no-take zones proposed by the DFFE in 2021 (**DFFE 2021**);

15.5. no-take zones proposed by the CAF (**CAF**); and

[8] Panel Report, p 33, para 4.1.
[9] Panel Report, p 36, para 4.4.

15.6. no-take zones proposed by Industry during the panel proceedings in 2023 (**Industry**).

16. Due to the origin of the closures actually imposed as temporary measures in September 2022 (the "**Interim Closures**"), we added closures proposed by industry during the ETT (**ETT Industry**) and those proposed by industry during the CAF (**CAF Industry**).

17. I refer to all those closures considered by the Panel together with the ETT and CAF Industry closures as "**the closure options**".

18. Accordingly, we prepared graphs or "trade-off curves" which compare the penguin benefits (measured on the x-axis) with the costs to the purse-seine small-pelagic fishing industry (measured on the y-axis) in respect of each catch-type for each closure option. We did so on a colony-by-colony basis using different colours and shapes on the graphs to represent the different closure options. The resulting graphs are shown in **EW3** with the key as follows:

UD90	Light green square	■
mIBA-ARS	Dark green circle	●
20 km	Turquoise upside-down triangle	▼
DFFE 2021	Dark blue diamond	◆
CAF	Pink triangle	▲
Industry	Grey star	✳

19. In the case of each colony, the balance point is determined by having regard to all these closure options and their positions once plotted on the graphs.

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20. Below I explain the process of developing and analysing these trade-off curves with reference to Stony Point.

Application of the trade-off mechanism to Stony Point

Placing penguin benefits and fishing costs on a graph

21. Our graphs plotted penguin benefits using a *"penguin utility index"* on the x-axis and fishery costs on the y-axis.

21.1. The Penguin utility index ("U_R") is a measure of the estimated number of individual penguins that regularly forage in a particular cell on a grid which we overlay onto penguin foraging tracks. One cell measures 0.5 km^2 in extent and the grid system allows us to more accurately identify the use of space by African Penguins around a particular colony.

21.2. Fishery costs used were derived from the OBM developed by fisheries scientists contracted to the fishing industry. This information was made available to BLSA by the Panel during August 2023. The OBM data was expressed as the percentage of regional catch loss due to closures.

21.2.1. Because the OBM data had several estimates of catch loss associated with closures, we used the model outputs used by the Panel to indicate the average (median) assessed costs associated with predicted lost catch to industry.

21.2.2. As indicated at paragraph 14.5 above, the Panel indicated that OBM outputs could be used to rank different closure options. Accordingly, we used this data, on the y-axis to show whether, for example, a delineation based on mIBA-ARS would incur greater or lesser industry costs than a delineation based on "DFFE 2021" proposals.

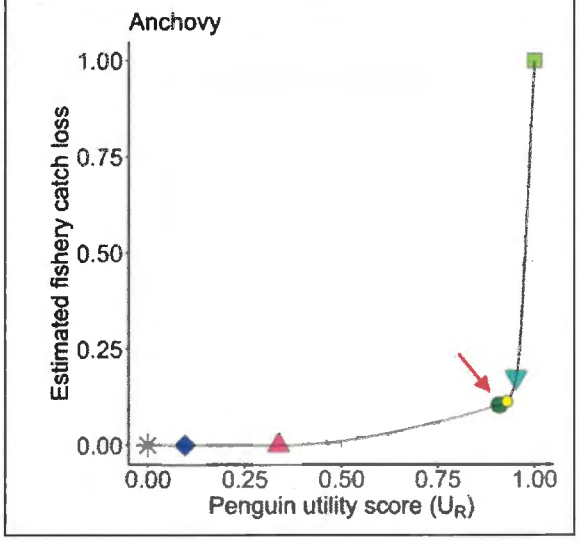
22. The trade-off mechanism required that we use a common scale for each axis which allowed us to compare "penguin benefits" with "industry costs" by finding the optimal point (or "balance point") at which there was a balance between costs and benefits (see paragraph 14.3 above regarding the "balance point"). Accordingly, we used a scale of 0 to 1 on each axis of our graph where:

22.1. "0" on the x-axis represented no benefits to African Penguins at all and "1" represented the maximum benefit; and

22.2. "0" on the y-axis represented no catch-loss (and therefore no costs) to the fishing industry at all, while "1" represented maximum costs attributed to the closures assessed.

23. I explain this scale using the example representing anchovy catches around Stony Point produced in Figure 1 below:

Figure 1



23.1. First, with reference to the x-axis reflecting "penguin utility scores":

23.1.1. If the closure option provides a good representation of African Penguins' preferred usage area around a particular colony, the closure option will be plotted along the x-axis closest to "1". In the case of Stony Point, this means that mIBA-ARS, the 20 km closure and the full foraging range of UD90 are all beneficial to African Penguins.

23.1.2. Those closures which lie closest to "0", however, would be of minimal benefit. Using the same graph, DFFE 2021 and CAF thus show little benefit to African Penguins at Stony Point – while the Industry proposal of "no closure" indicates no benefit to African Penguins at all.

23.2. Second, with reference to the y-axis, reflecting "estimated fishery catch loss":

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23.2.1. In the case of anchovy catches for Stony Point, this meant that the closure option with the highest cost to industry (closest to "1" on the y-axis) was the UD90 foraging range represented by the light green square.

23.2.2. The closure option with the least cost to industry (closest to "0" on the y-axis) was the DFFE 2021 closure option (represented by the dark blue triangle). (Naturally, "no closure" would entail no cost to industry – represented by the grey star).

Fitting a trade-off curve and identifying the "balance point"

24. The next step was to fit a trade-off curve to the different closure option points to identify the point on the curve where the rate of increase in penguin benefits equals the rate of increase in costs to fisheries i.e. the "balance point". Such a point represents a "balanced" compromise between maximising benefits to penguins and minimising costs to fisheries. As indicated in Figure 1 above, the trade-off curve is convex in shape (i.e. shaped like the right half of the letter "U"). This is the case for all trade-off curves. Consequently, the shape of this curve is such that there can only be one such balance point on the trade-off curve.

25. Again using Stony Point as an example and with reference to Figure 1:

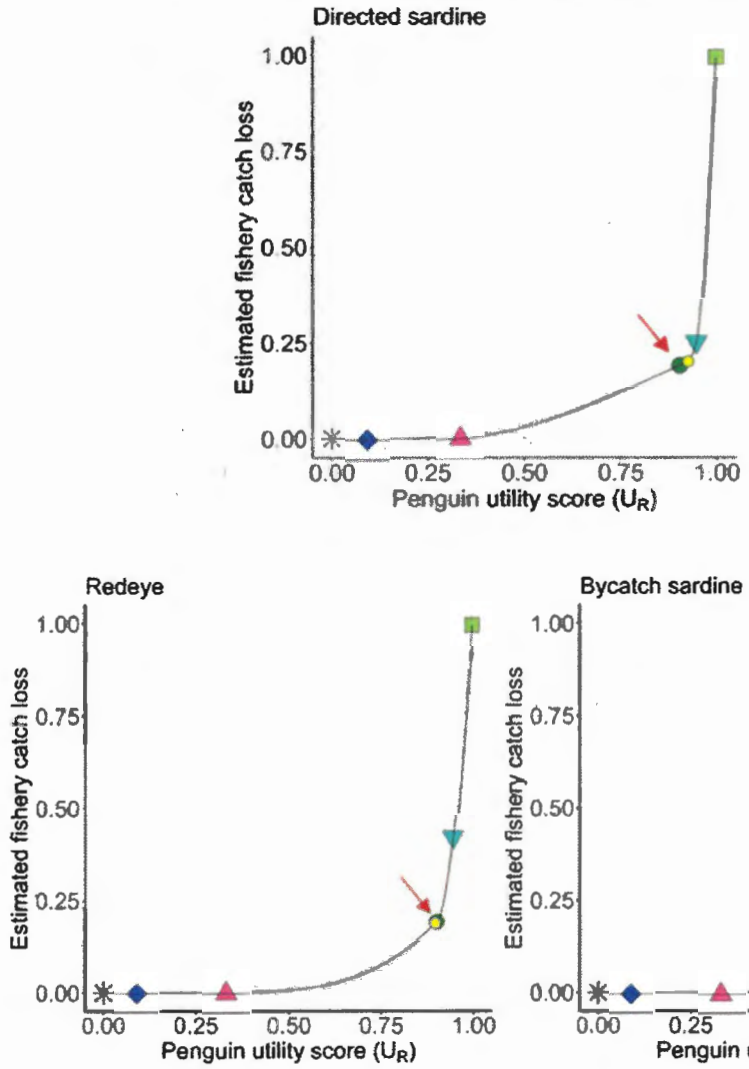
25.1. The Stony Point trade-off curve for anchovy indicates a balance point coinciding with the green dot representing the mIBA-ARS closure option.

25.2. Reading from left to right along the curve (and from 0 to 1 along the x-axis or "least to most benefit" to African Penguins), the incline of the curve from the grey star (no closure), dark-blue diamond (DFFE 2021) and pink triangle (CAF) increases only slightly towards the green dot (representing mIBA-ARS). Because the green dot is closer to "1" on the x-axis it is a closure option which provides greater benefit to African Penguins than the closure options represented by the dark blue diamond and pink triangle. This means that for a relatively small increase in cost to the fishing industry, the mIBA-ARS closure is likely to provide significantly greater benefits to African Penguins than the DFFE 2021 and CAF closures.

25.3. Following this curve further: the closures represented by the upside-down turquoise triangle (20 km closure) and light-green square (UD90) are more beneficial to African Penguins than mIBA-ARS as they lie closer to "1" on the x-axis of the graph. However, the trade-off curve shows a dramatically increased incline when accounting for these points on the graph. This means that these two closure options result in increased costs to industry (in the case of UD90 – significantly so). The result is that the "balance point" or optimal balance point lies with the mIBA-ARS closure. This is shown on the graph by using a yellow dot.

25.4. In the case of Stony Point, trade-off curves for directed sardine, redeye and sardine bycatch all reflect the same outcome i.e. the "balance point" coincides with the plot point representing the mIBA-ARS closure. This is shown in Figure 2 below.

Figure 2



25.5. When looking at all four trade-off curves (i.e. that for anchovy shown in Figure 1 above and those for directed sardine, redeye and bycatch sardine shown in Figure 2 above), the trade-off mechanism indicates that, for Stony Point, the mIBA-ARS closure is the optimal trade-off for all potential catch-types based on existing available data.

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25.6. We are then able to represent this on a map showing the spatial impacts of the preferred closure relative to the other closure options (as shown in Figure 3 below). We are also able to identify a single closure option as the most appropriate closure delineation for purposes of inclusion in small-scale pelagic purse-seine fishing permit conditions (as shown in Figure 4 below and summarised for all colonies in **EW2**).

Figure 3

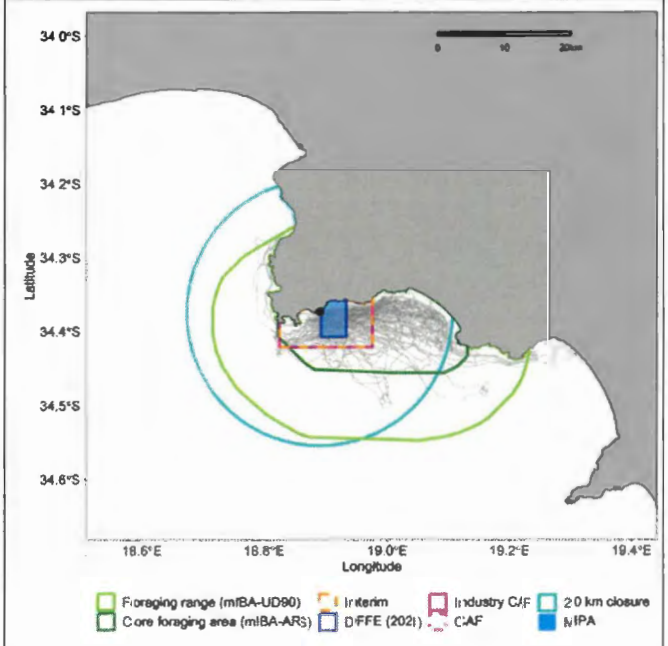
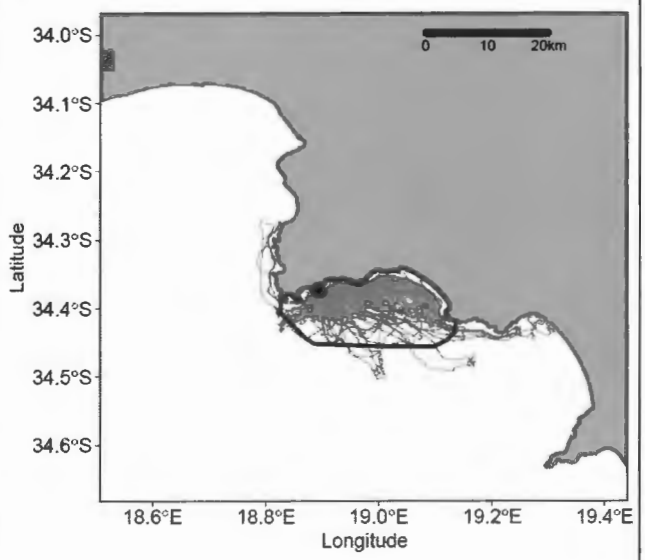


Figure 4



26. I explain the results of the application of the trade-off mechanism for the remaining islands below.

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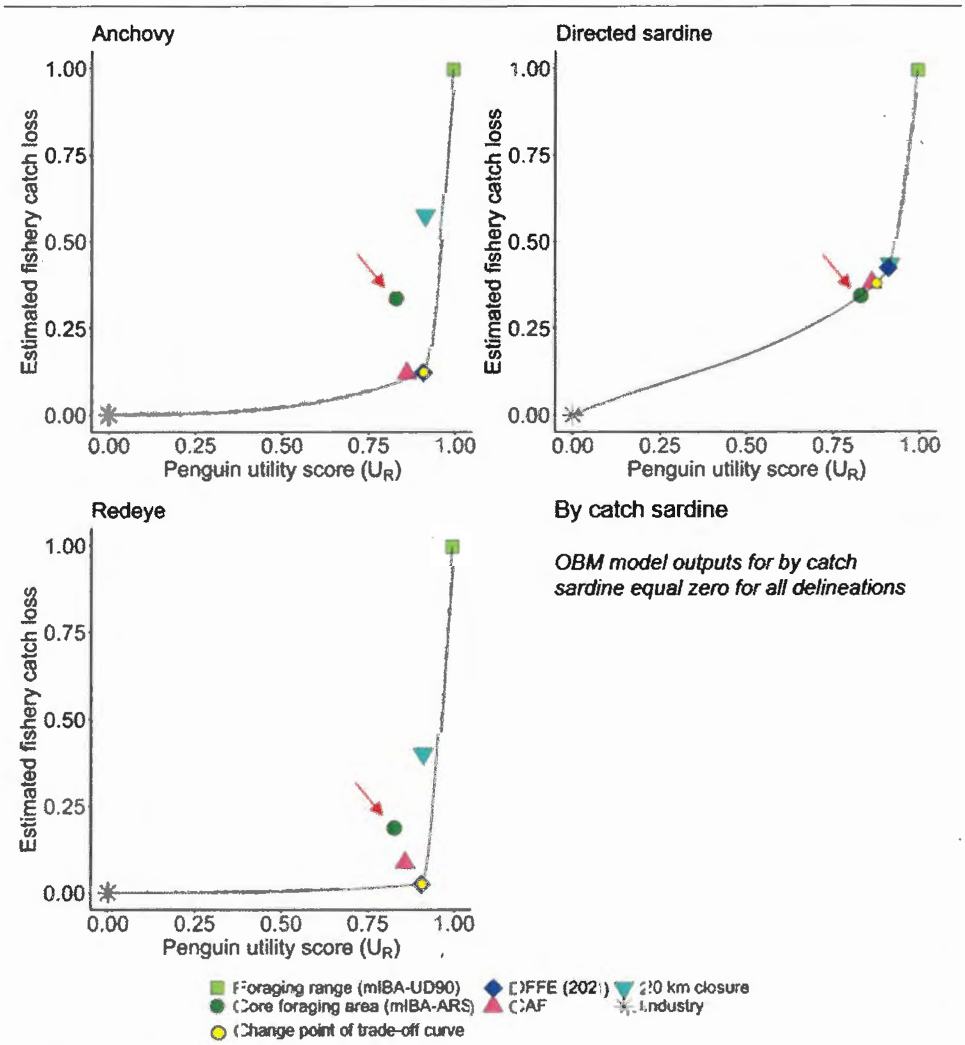
The results of applying the trade-off mechanism

.Dassen Island: mIBA-ARS

26.1. We were able to use OBM model outputs for anchovy, directed sardine and redeye. In the case of this colony, however, the OBM model outputs for sardine bycatch equalled "zero" for all delineations and could not be used. It is for this reason that only three graphs appear in Figure 5 below.

Figure 5

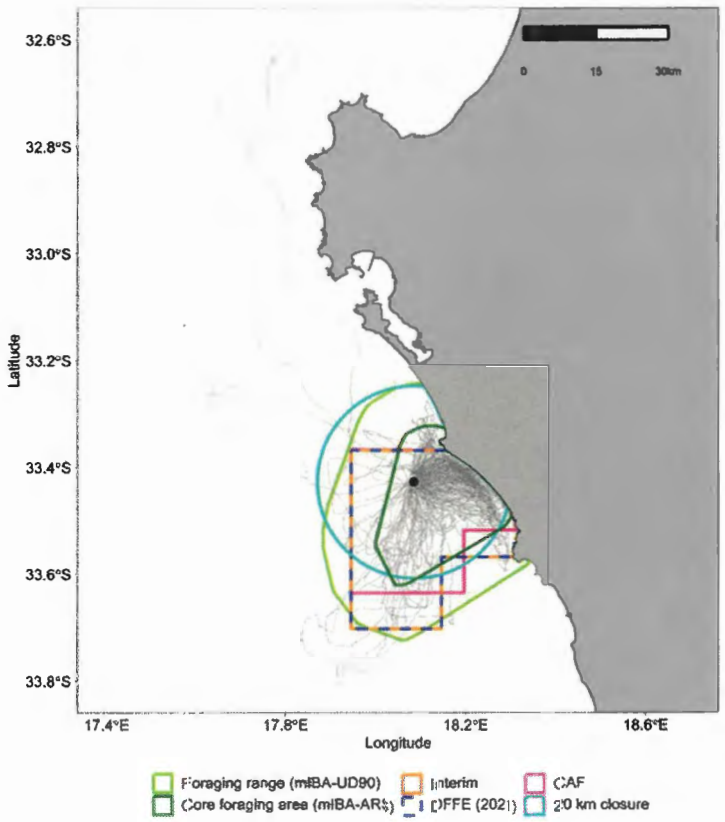


27. In all three graphs, the various closure options are clustered towards "1" on the x-axis. This meant that all closure options had relatively high utility scores and would be beneficial to African Penguins. However, in all cases, the trade-off curve indicated that the point beyond which costs to industry increased was closest to the point on the graph represented by the blue diamond – i.e. the DFFE 2021 option.

28. In this case, however, it is necessary to have regard to the purpose of the closures in having real life impacts on reducing competition between African Penguins and industry – and ensuring that African Penguins have adequate access to small-pelagic resources. When matching the various closure options to their location on the map around Dassen Island, it soon becomes clear that DFFE 2021 will not in fact meet these purposes. This is because 8% of the northern portion of the preferred foraging area (mIBA-ARS) is omitted from the DFFE 2021 closure.

29. This is shown in Figure 6 below. The preferred foraging area is shown in dark green while the DFFE 2021 closure (and Interim Closure) is shown using a dark-blue and orange dashed line. The important northern portion of the mIBA-ARS appears north of the area delineated by the dark-blue and orange dashed line and within the area bounded by the dark-green line. The density of the grey foraging tracks reflects the importance of this area for African Penguins, relative to the areas covered by DFFE 2021 where the grey lines appear "thinner" or less dense (and which lie to the west and south of the dark-green bounded area and within the area bounded by the orange and dark-blue dashed line).

Figure 6



30. There is a clear ecological explanation for the importance of the northern area of the mIBA-ARS for African Penguins. Anchovy recruits migrate southward during the autumn/winter months and become available to African Penguins who are engaged in breeding during this time. African Penguins will thus be inclined to forage where fish is abundant in areas closest to the colony. Continued fishing in these northern areas is likely to result in fisheries-African Penguin competition over important anchovy biomass and will have downstream effects of prey availability in the preferred foraging areas of African Penguins south of this area.

31. Given the above importance of the northern region of the mIBA-ARS and given that the mIBA-ARS had relatively high penguin utility scores and relatively low costs to

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20 EW
M.I.C

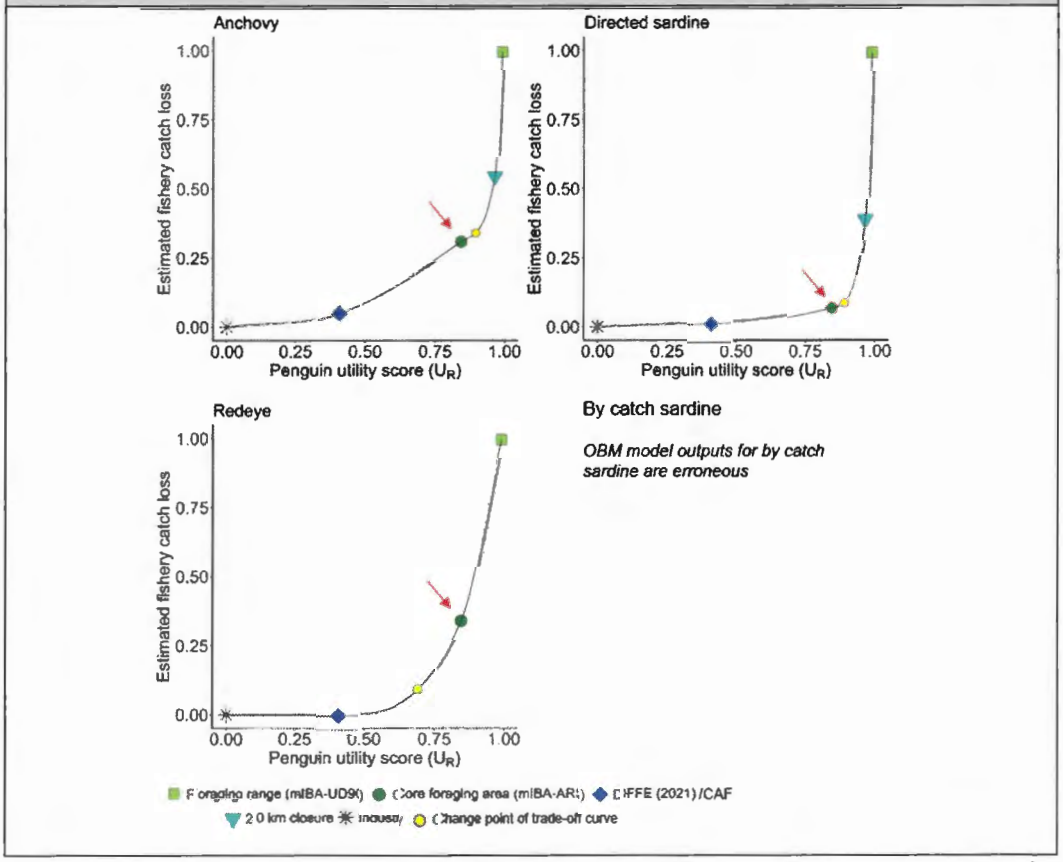
industry, this is the preferred closure delineation for this colony. The preferred closure reflected in Figure A of **EW2** thus corresponds with the mIBA-ARS delineation.

Robben Island: mIBA-ARS

31.1. Again, we were able to use OBM model outputs for anchovy, directed sardine and redeye only. We could not use bycatch sardine figures from the OBM model as these were erroneous (sometimes eliciting negative results).

31.2. The plots for anchovy, directed sardine and redeye all reflected the mIBA-ARS closure as the most appropriate delineation as shown in the graphs in Figure 7 below:

Figure 7



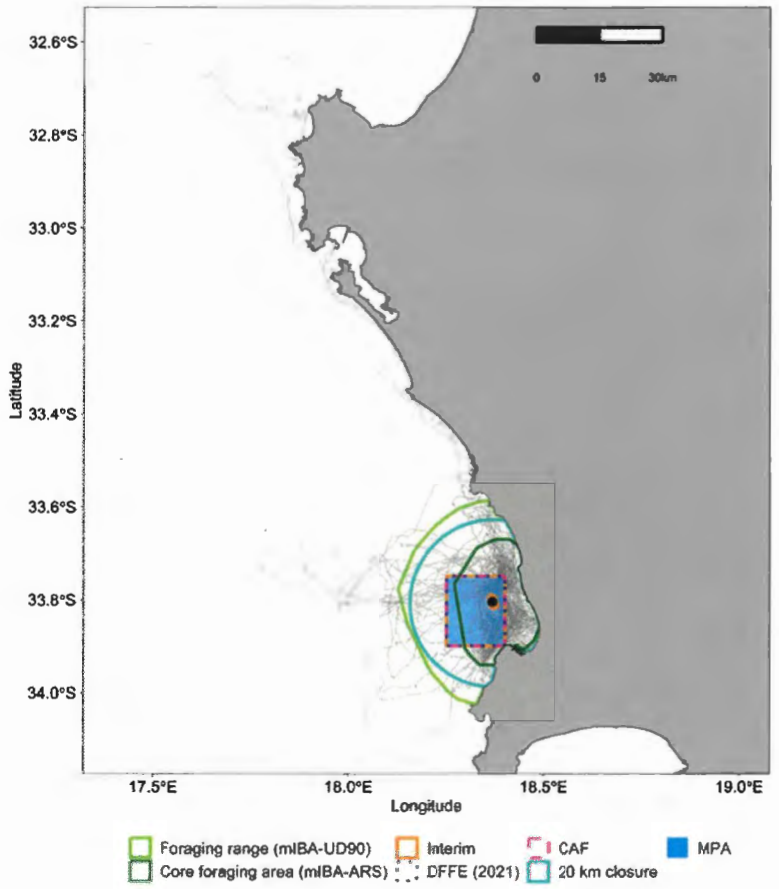
M.L AM M.L
21 EW

32. In the case of anchovy, the "balance point" (indicated by the yellow dot) marked a sharp increase in costs for the 20km closure and UD90 (turquoise and light green respectively). Meanwhile, the additional cost to industry as between the DFFE 2021 closure and a delineation based on mIBA-ARS indicated increase in costs that was relatively small when measured against the significant increase in African Penguin benefits. The balance point for sardine was, similarly, aligned with mIBA-ARS while it lay in the space between DFFE 2021 and mIBA-ARS in the case of redeye.

33. When taking account of the relatively low losses in real terms for redeye catches around this island, it became important to focus on the trade-off curves for anchovy and directed sardine. As these both indicated that mIBA-ARS was most closely aligned with the "balance point"/ "change point", this is the most appropriate closure delineation based on currently available data.

34. The map below demonstrates the consequence of the mIBA-ARS option as a delineation (in dark green), relative to other closure options. This reflects the preferred closure option indicated in Figure B of **EW2**.

Figure 8

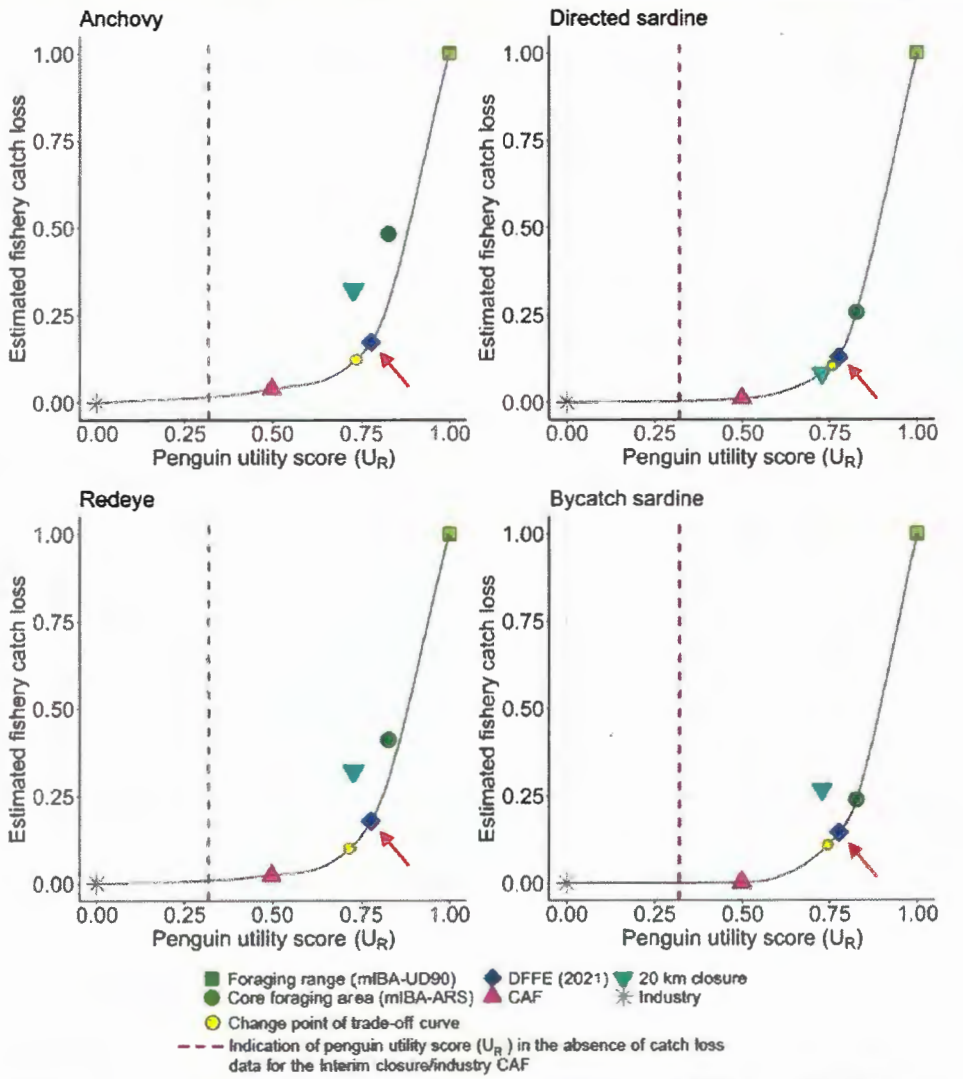


Dyer Island: DFFE 2021

35. As indicated in the graphs in Figure 9 below, the balance point for anchovy, directed sardine and sardine bycatch is closest to the point reflecting the DFFE 2021 closure option (indicated by the dark blue diamond). While the balance point for redeye did not align precisely with a particular closure, it was most closely aligned with the DFFE 2021 option. This option had a relatively high African Penguin utility score of 0.78 and relatively low overall costs to industry when compared to the 20 km, mIBA-ARS and UD90 closure options.

M.K AM M.IC EW

Figure 9



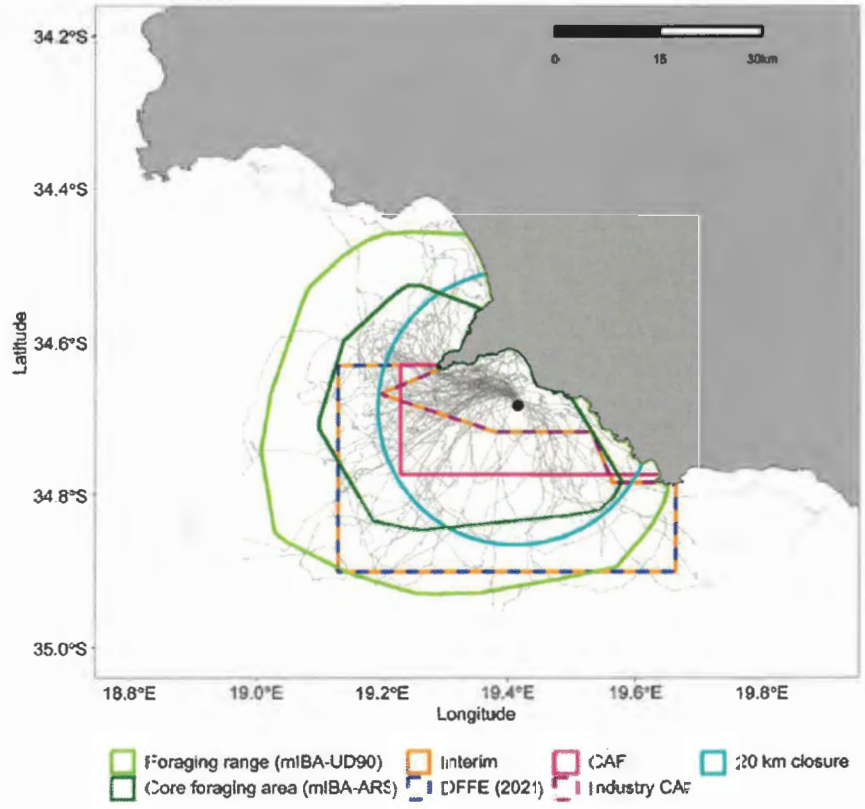
36. I note that the DFFE 2021 option shown to be the optimal closure in line with the Panel's trade-off mechanism, is <u>not</u> the closure imposed as an "interim closure" in September 2022 (and currently in place around Dyer Island). As indicated in the map in Figure 10 below, the "interim closure" reflects a split zone which has only its outer boundary aligned with the DFFE 2021 closure delineation.

AM
M.K M.K
EW

36.1. The local small-pelagic purse-seine industry with boats of 26 m in length or less are permitted to fish between the outer boundary of the DFFE 2021 closure and its "inner" boundary reflected by the dotted purple and orange line on the map.

36.2. It is only in the near-shore area bounded by this purple and orange line that a total small-pelagic no-take zone is currently in place.

Figure 10



37. Because no OBM data was available to assess the current blend of continued fishing and no-take zones, this "split" approach could not be assessed. In the circumstances, and based on the available data, we assessed the <u>original</u> DFFE (2021) closure and it is thus, the full DFFE (2021) closure option imposing an

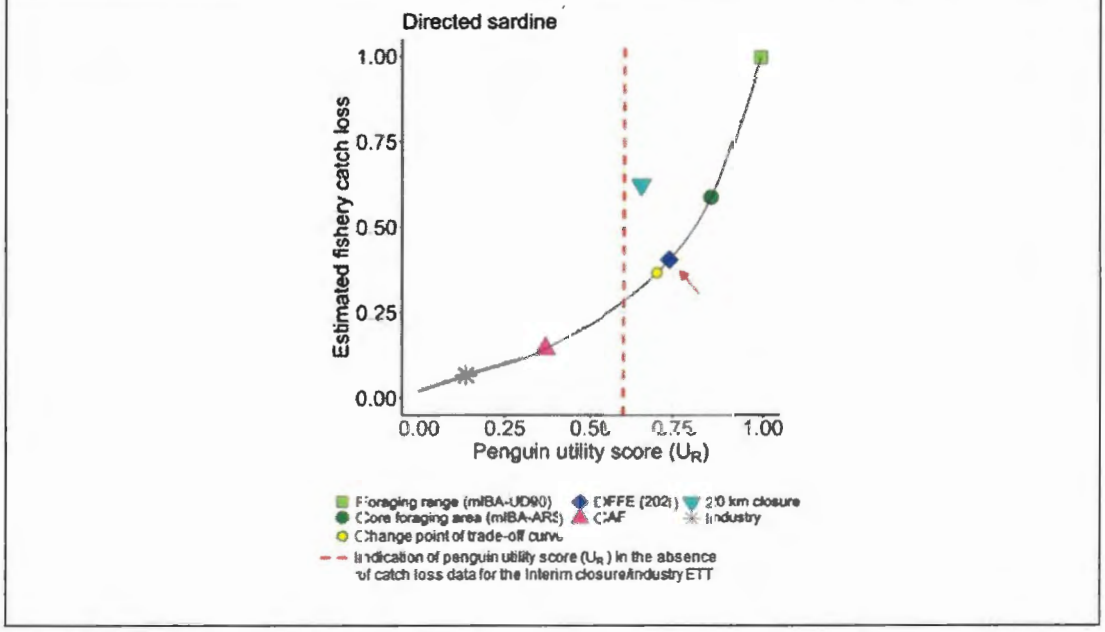
AM PL.1C EW 25 PL.1C

exclusion zone on <u>all</u> purse-seine small-pelagic fishing regardless of vessel size represents the optimal trade-off and which is reflected in Figure D of **EW2**

<u>St Croix Island: DFFE 2021</u>

38. The only OBM data relevant for this island was that relating to directed sardine (the only major stock caught around this island). The relevant graph (in Figure 11 below) indicated that the 20 km closure, DFFE 2021, mIBA-ARS and UD90 closure options all had relatively high utilisation scores (and thus would be relatively beneficial to penguins). The balance point, however, indicated that the closure achieving the best balance between benefits to penguins and costs to industry was the DFFE (2021) closure option.

Figure 11



39. The resulting closure is that shown using the dark-blue boundary on the map below. This corresponds with the closure option shown in Figure E of **EW2**.

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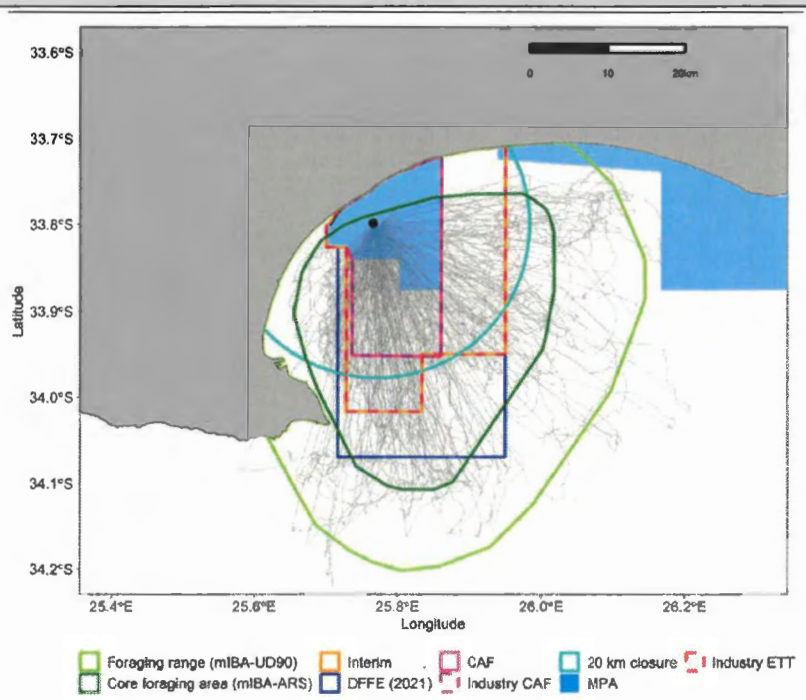
Figure 12

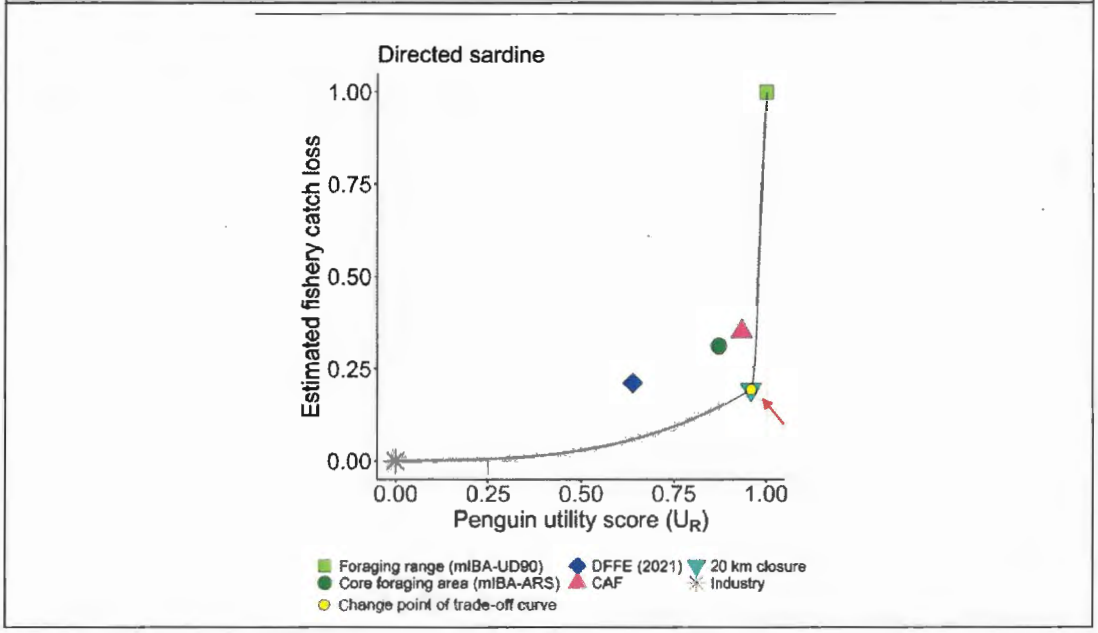


Bird Island: 20 km closure

40. I flag that there is very little fishing around Bird Island and the only fishing in evidence relates to directed sardine. Accordingly, we plotted the closure options for this stock, illustrating relatively high utilisation scores for mIBA-ARS, CAF, 20 km and UD90 closures. Consonant with application of the trade-off mechanism, however, the balance point aligned with the 20km closure (the delineation with one of the lowest costs to fisheries and the greatest benefit to penguins after the full foraging range). This appears on the graph in Figure 13 below.

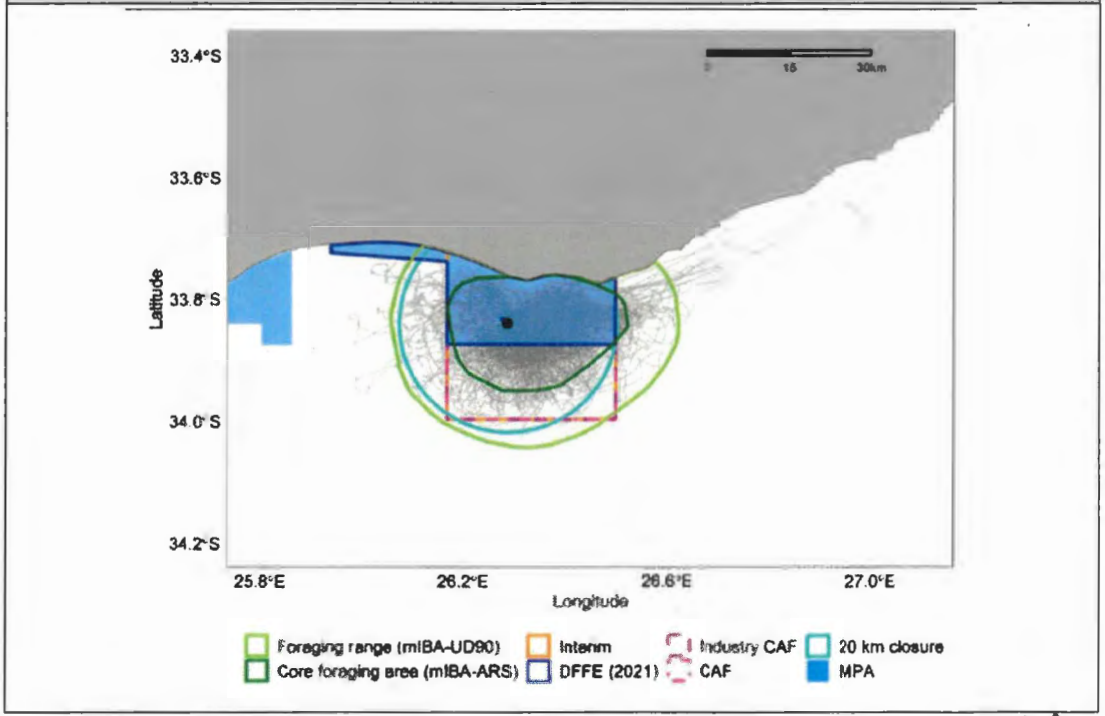
AO M.K M.K EW 27

Figure 13



41. The resulting closure is represented by the turquoise line on the map in Figure 14 below. This corresponds with the preferred delineation reflected in Figure F of **EW2**.

Figure 14



AM MLC MLC EW

42. A summary of the six closures resulting from application of the trade-off mechanism is attached as "**EW2**".

43. Given my qualifications and experience, I am duly qualified to express an expert opinion on the methods used to delineate MIBAs and the trade-off mechanism.

44. I confirm the content of the mIBA method and trade-off mechanism and the expert opinion expressed therein. I further confirm that the methods and data relied upon are robust, credible and based on methods recognised by BirdLife International and consonant with the trade-off mechanism recommended by the Panel.

ELEANOR ASHLEY WEIDEMAN

The deponent has acknowledged that he knows and understands the contents of this affidavit, which was signed and sworn to before me at CAPE Town on this the 15 day of **MARCH 2024**, the regulations contained in Government Notice No. R1258 of 21 July 1972, as amended, and Government Notice No. R1648 of 19 August 1977, as amended, having been complied with.

COMMISSIONER OF OATHS

Full Names:
Capacity:
Designation:
Address:

COMMISSIONER OF OATHS
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MOWBRAY 7700
CAPE TOWN

AM M.L

200

Eleanor Ashley Weideman "EW1"

· curriculum vitae ·

PERSONAL DATA
Born: 18 July 1994
ID: 9407180058081
Citizenship: South African
Driving license: Code B (South African)

CONTACT DETAILS
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Skype: el.weideman
ResearchGate profile: https://www.researchgate.net/profile/Eleanor-Weideman

English (written and spoken)
●●●●●

Conversational Afrikaans
●●●○○

Data management and analysis
●●●●○

Ability to work long hours in the field
●●●●●

Organisation
●●●●○

Teamwork
●●●●○

ACADEMIC REFERENCES
Prof. Pierre Pistorius (previous employer)
Email: pierre.pistorius@mandela.ac.za

Dr Maëlle Connan (previous employer)
Email: maelle.connan@gmail.com

Prof. Peter Ryan (MSc supervisor and previous employer)
Email: pryan31@gmail.com

WORK EXPERIENCE

2023-present **Coastal seabird project manager (BirdLife South Africa)**
Deployment of GPS/camera/accelerometer devices on African Penguins, Cape Cormorants, Cape Gannets; analysing and publishing geospatial data to inform marine spatial planning initiatives and to promote an ecosystem approach to fisheries; building and maintaining Automated Penguin Monitoring Systems to monitor the health status of African Penguin breeding colonies; sitting on two government working groups: the Seabird Technical Task Team and the African Penguin Working Group

2022 **Research assistant (MAPRU, NMU)**
Processing and analysing camera and accelerometer data collected from Chinstrap Penguins; assistance with camera, hydrophone, GPS and accelerometer/depth recorder deployments on African Penguins with BirdLife South Africa

2021-2022 **Over-wintering field assistant on Marion Island (MAPRU, NMU)**
Deployment of GPS and GLS devices on Brown Skuas; retrieval of GLS devices from Wandering Albatrosses, Blue Petrels and Great-winged Petrels; population counts, breeding success monitoring and ringing of Northern Giant Petrels, Wandering Albatrosses, Grey-headed Albatrosses, Kelp Gulls, Brown Skuas and Black-faced Sheathbills; deployment and maintenance of acoustic monitoring devices; collation and analysis of data; report writing; training of new field personnel

2020-2021 **Consultant to WIOMSA**
Writing of reports and peer-reviewed scientific articles on marine litter in the Western Indian Ocean and conducting extensive stakeholder consultations

2020 **Research assistant (MAPRU, NMU)**
Programming and deploying GPS and camera devices on Cape Gannets, African Penguins and Cape Cormorants with BirdLife South Africa; processing seabird diet samples; co-ordinating second-year Population Ecology course

2020 **Volunteer at SANCCOB**
Handling and rehabilitating African Penguins and ringing Cape Cormorants and Cape Gannets

2018 **Ship-based scientist, team leader (UCT)**
Plastics at Sea research team, SCALE Spring cruise

2018 **Ship-based scientist, field assistant**
Plastics at Sea research team, SEAmester and SCALE Winter cruises

2018 **Lecturer**
Plastics, plastics everywhere lecture series, UCT Summer School

2016, 2019 **Research assistant to Prof. Peter Ryan (UCT)**
Seabird dissections, long-term monitoring of marine litter and microplastics

TERTIARY EDUCATION

2022 **Udemy online coursework** – (1) Core Spatial Data Analysis: Introductory GIS with R and QGIS; (2) Intermediate Spatial Data Analysis with R, QGIS & More
Skills learnt: Analysing vector, raster and point data; interpolation; mapping; creation of heat maps; estimating space-use using kernel density estimations

2018-2020 **MSc Biological Sciences (FIAO, UCT, awarded with distinction)**
Thesis: Quantifying land-based sources of plastic pollution in South Africa
Skills learnt: Knowledge of R and QGIS; collection and processing of quality field data; writing and publishing peer-reviewed articles

2017 **BSc Honours Biological Sciences (FIAO, UCT, 1st class pass)**
Thesis: Land cover change homogenizes functional and phylogenetic diversity within and among African savanna bird assemblages
Skills learnt: Calculation and analysis of species diversity indices in R

2014-2016 **BSc Applied Biology and Ecology & Evolution (UCT)** – 1st class pass

AWARDS AND SCHOLARSHIPS

2018-2019 DST – NRF Innovation Master's Scholarship
2017 DST – NRF Innovation Honours Scholarship
2017 Hyman Liberman Scholarship
2015 Class medal (BIO20120F second-year ecology)
2014-2016 Dean's Merit List, Science Faculty Scholarship

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Peer-reviewed journal articles

Perold V, Connan M, Suaria G, **Weideman EA**, Dilley BJ, Ryan PG (under review) Skua pellets containing the remains of South Atlantic seabirds can be used as biomonitors of small buoyant plastics at sea. Marine Pollution Bulletin.

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McInnes A, Carpenter-Kling T, Sherley RB, Christian M, Hagen C, **Weideman EA**, Carneiro A, Clark B, Lang S, Waller L, Glencross J, Ludynia K, Smith C, Barham P (2023) Using Global Fishing Watch data to quantify comparative purse-seine fishing effort during open and closed periods to fishing around African Penguin colonies on South Africa's west coast.

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UNEP-Nairobi Convention/WIOMSA (2021) A review of the current status of marine litter and microplastics knowledge in the Western Indian Ocean region: amounts, sources, fate and resultant ecological impacts on the coastal and marine environment and on human health. WIOMSA, Zanzibar, WIOMSA Series (Online).

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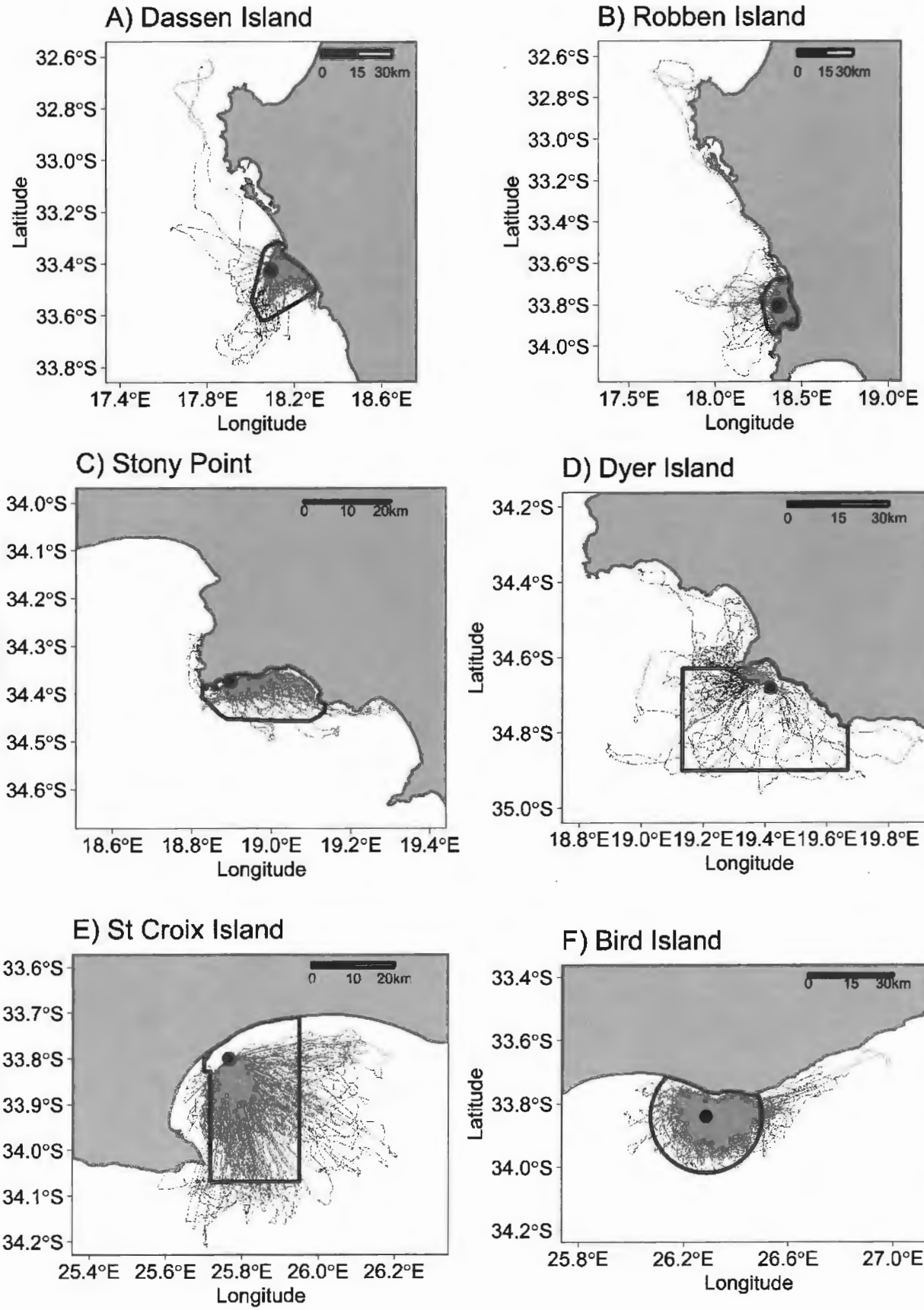
Connan M, **Weideman EA**, Ryan PG (2023) Seasonal attendance patterns and habitat use of three avian scavengers at sub-Antarctic Marion Island. 6th South African National Antarctic Programme (SANAP) Research Symposium, South Africa.

Weideman EA, Slingsby JA, Thomson RL, Coetzee BWT (2017) The effect of land use change on the phylogenetic diversity of bird communities in Phalaborwa, Kruger National Park. 8th Oppenheimer De Beers Group Research Conference, South Africa.

"EW2"

Closures resulting from application of Panel's recommended trade-off mechanism



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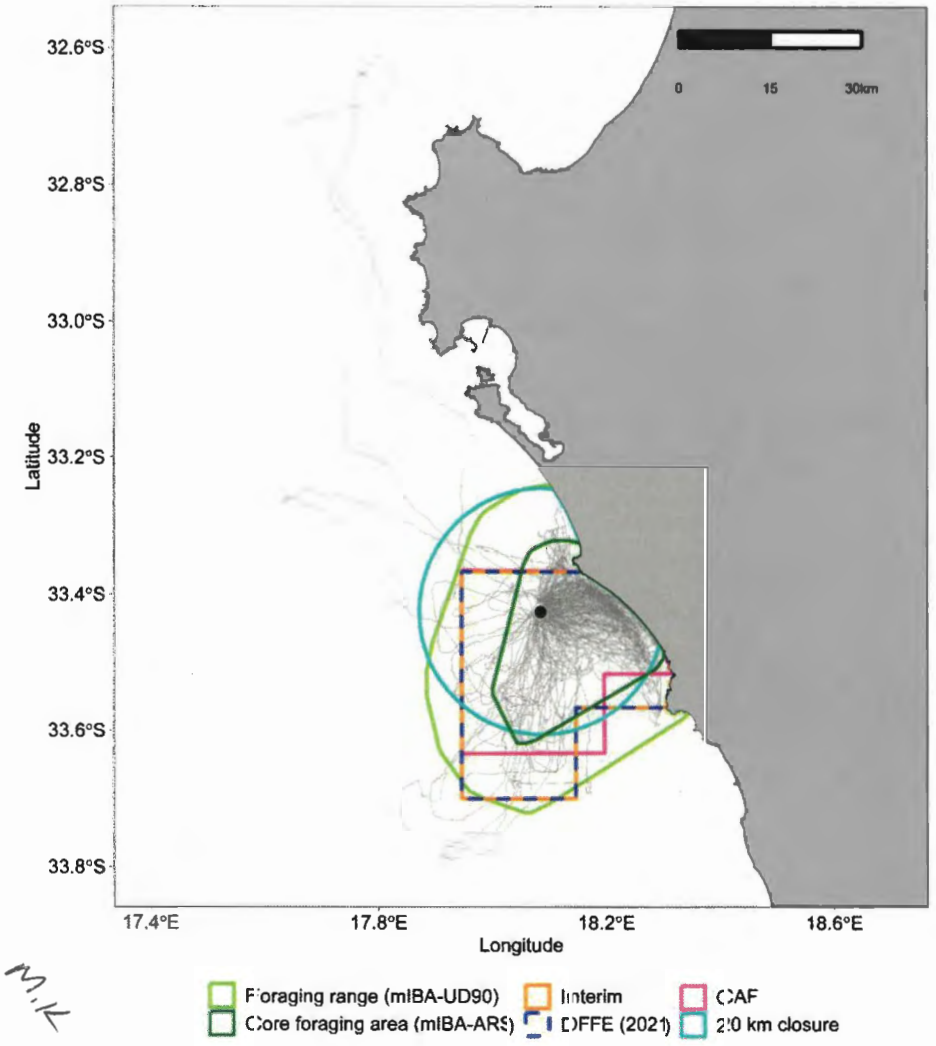
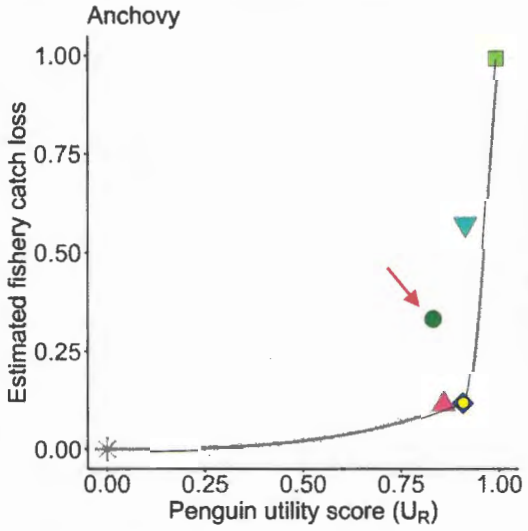
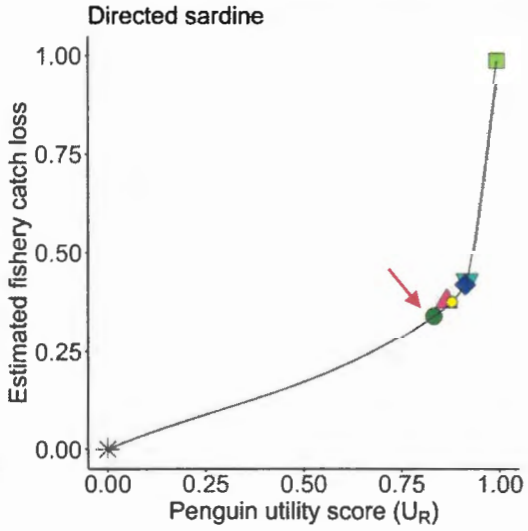
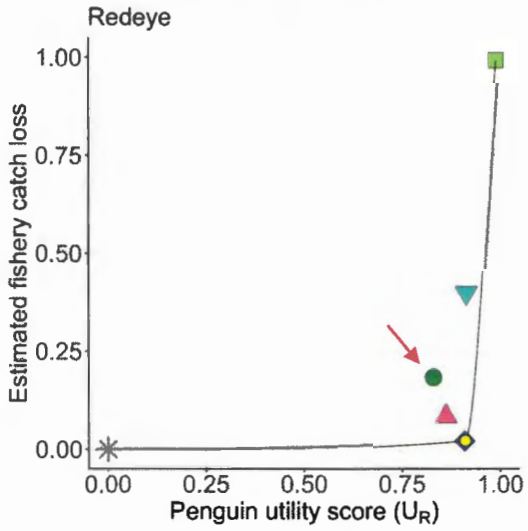
EW

Dassen Island "EW3"







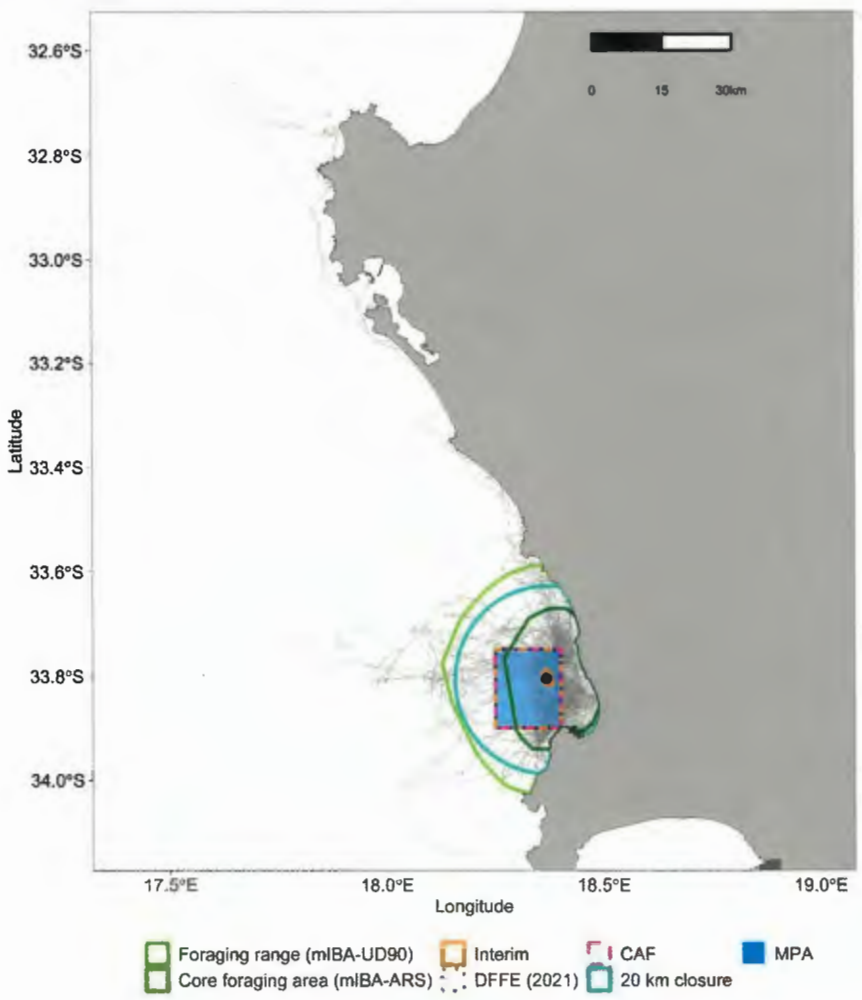


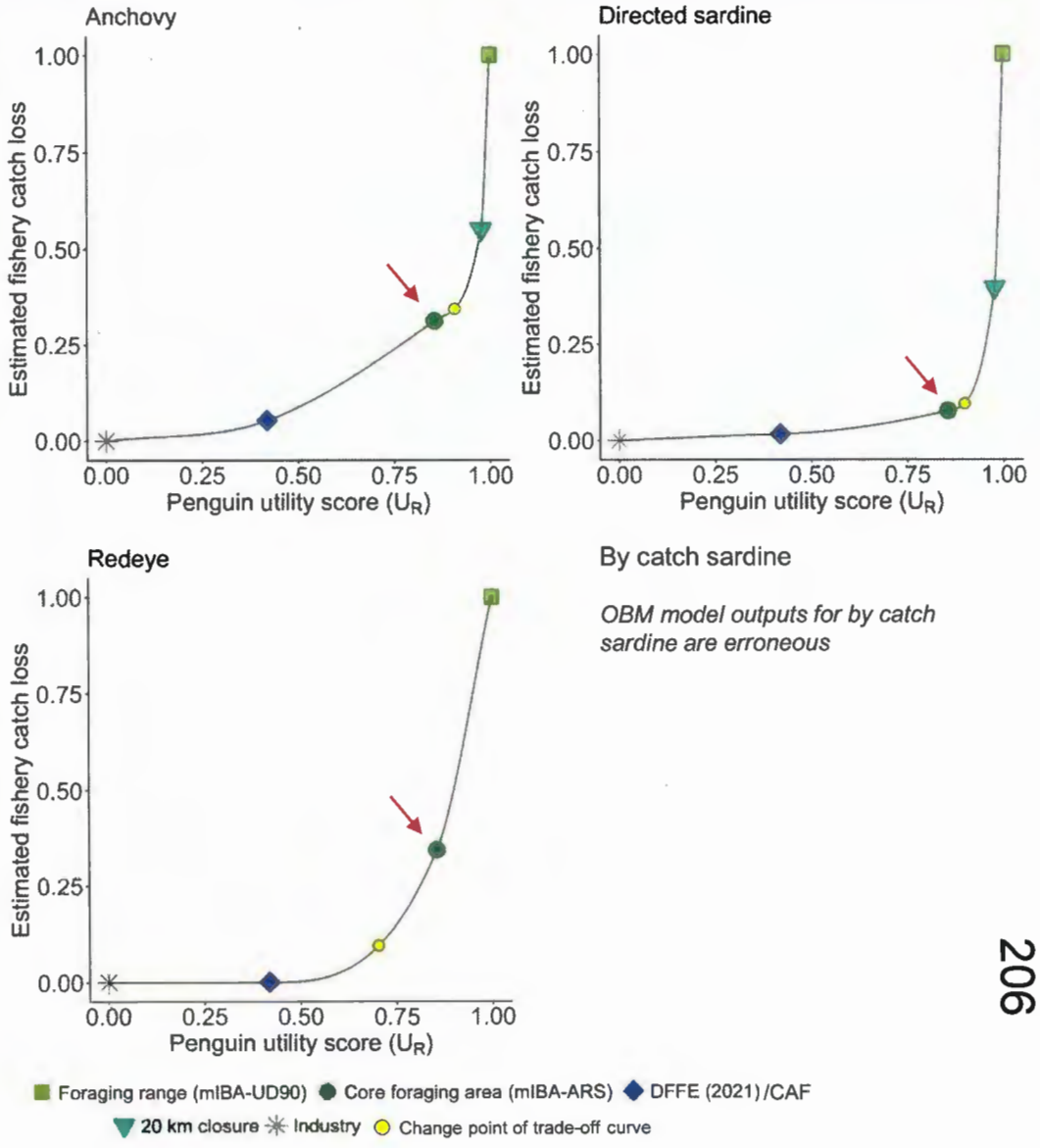
By catch sardine

OBM model outputs for by catch sardine equal zero for all delineations

Foraging range (mIBA-UD90)
Core foraging area (mIBA-ARS)
Change point of trade-off curve
DFFE (2021)
CAF
20 km closure
Industry

Robben Island

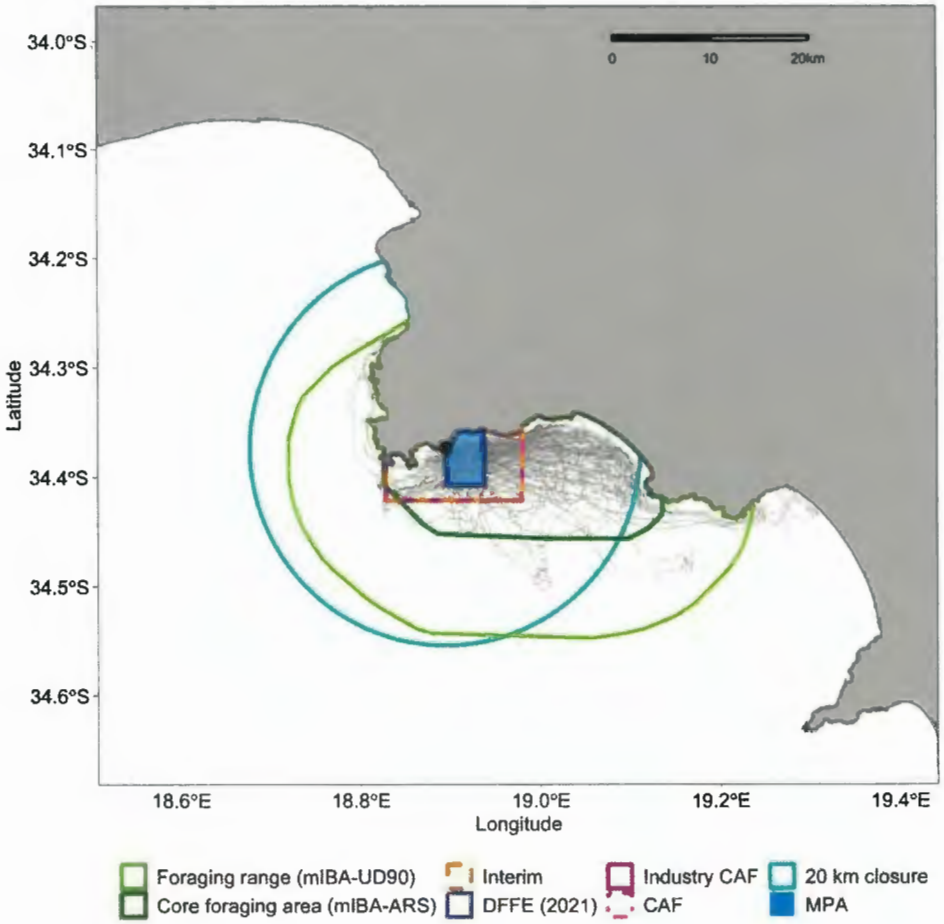


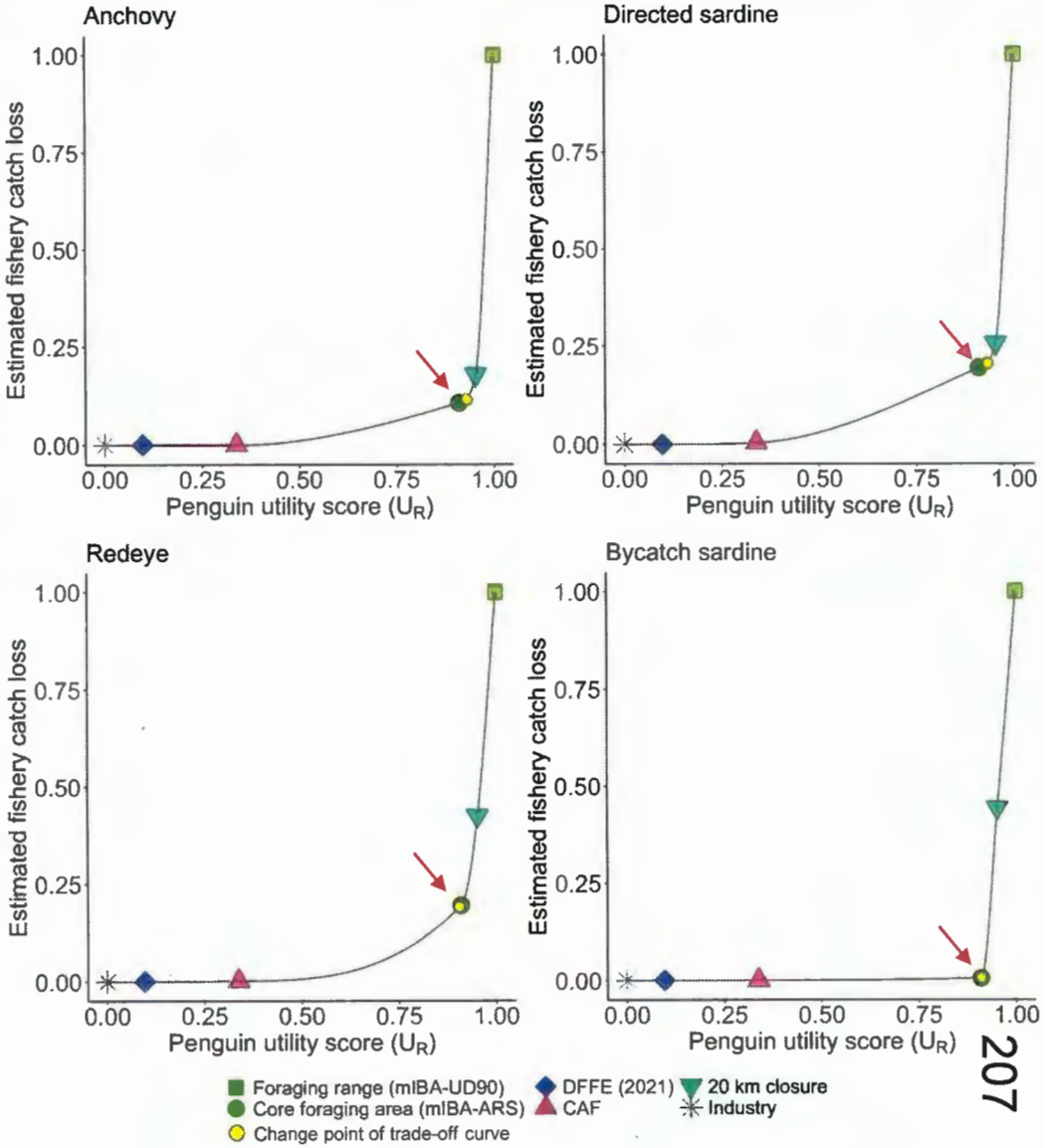


By catch sardine

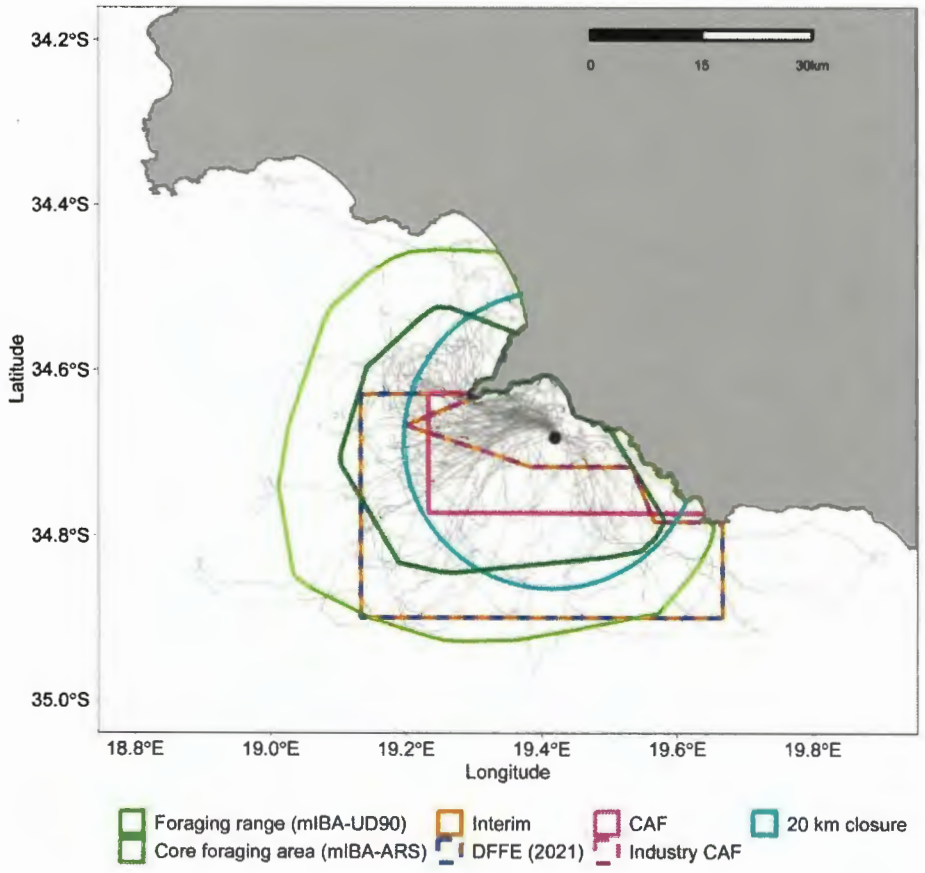
OBM model outputs for by catch sardine are erroneous

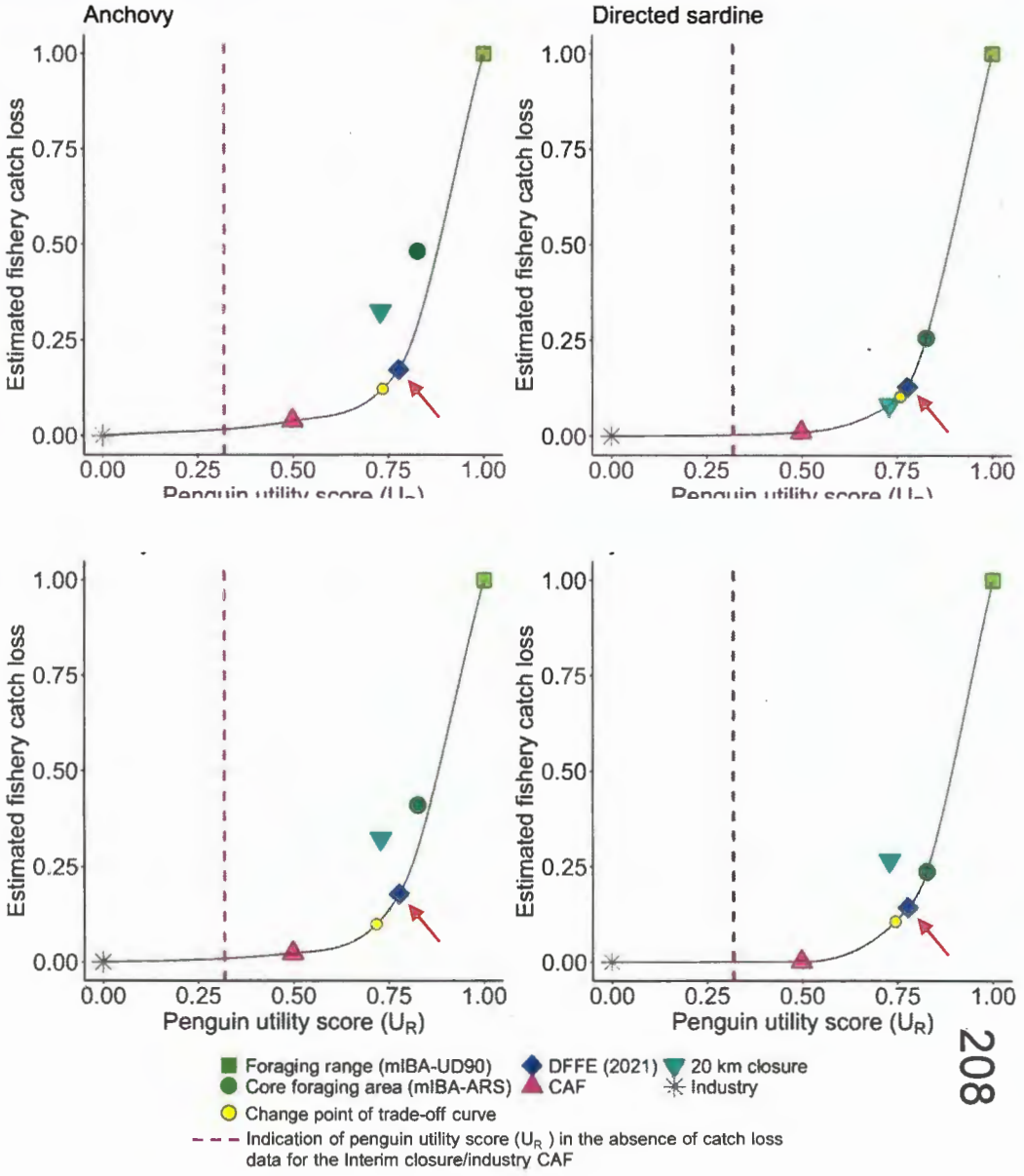
Stony Point


0
10
20km
34.0°S
34.1°S
34.2°S
34.3°S
34.4°S
34.5°S
34.6°S
Latitude
18.6°E
18.8°E
19.0°E
19.2°E
19.4°E
Longitude
Foraging range (mIBA-UD90)
Core foraging area (mIBA-ARS)
Interim
DFFE (2021)
Industry CAF
CAF
20 km closure
MPA

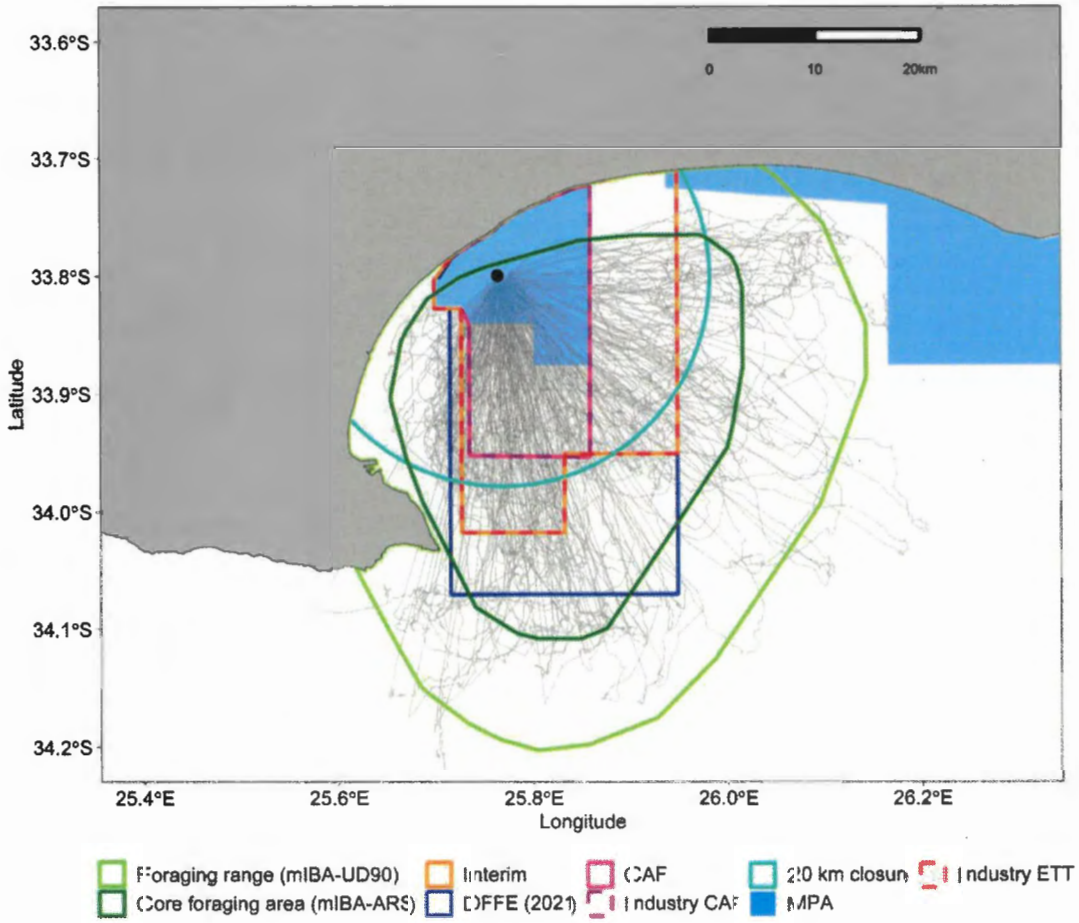

Anchovy
Directed sardine
Redeye
Bycatch sardine
Estimated fishery catch loss
Penguin utility score (U_R)
0.00
0.25
0.50
0.75
1.00
Foraging range (mIBA-UD90)
Core foraging area (mIBA-ARS)
Change point of trade-off curve
DFFE (2021)
CAF
20 km closure
Industry

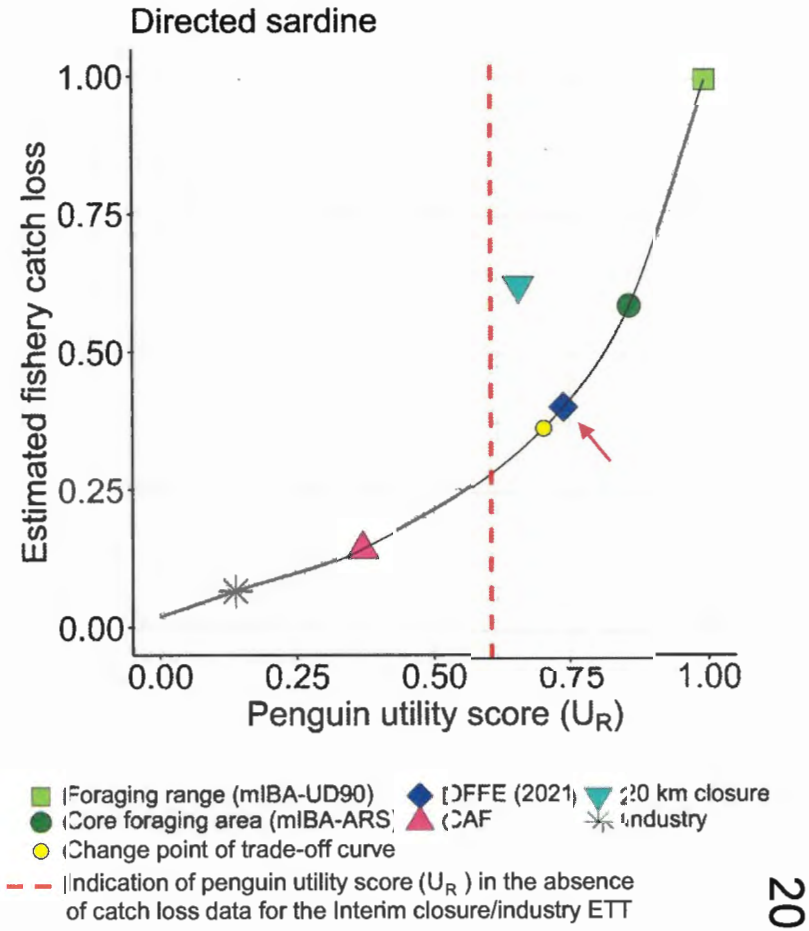
Dyer Island


34.2°S
34.4°S
34.6°S
34.8°S
35.0°S
Latitude
18.8°E
19.0°E
19.2°E
19.4°E
19.6°E
19.8°E
Longitude
0
15
30km
Foraging range (mIBA-UD90)
Core foraging area (mIBA-ARS)
Interim
DFFE (2021)
CAF
Industry CAF
20 km closure

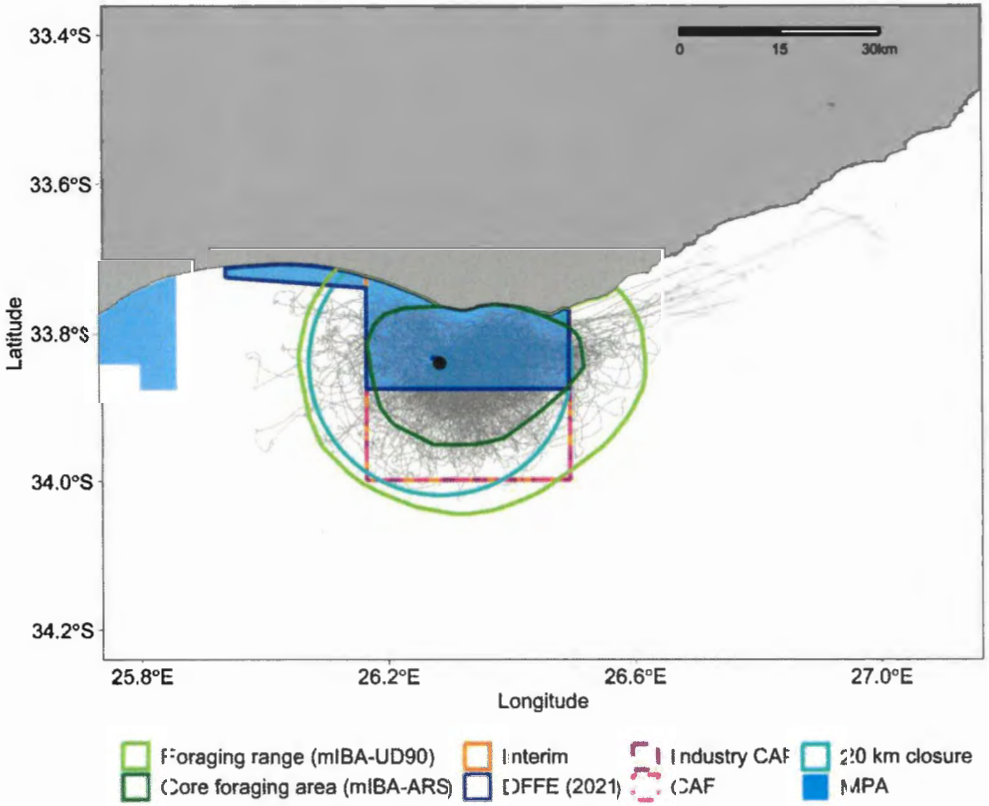

Anchovy
Directed sardine
Estimated fishery catch loss
0.00
0.25
0.50
0.75
1.00
Penguin utility score (U_R)
Foraging range (mIBA-UD90)
Core foraging area (mIBA-ARS)
DFFE (2021)
CAF
20 km closure
Industry
Change point of trade-off curve
Indication of penguin utility score (U_R) in the absence of catch loss data for the Interim closure/industry CAF

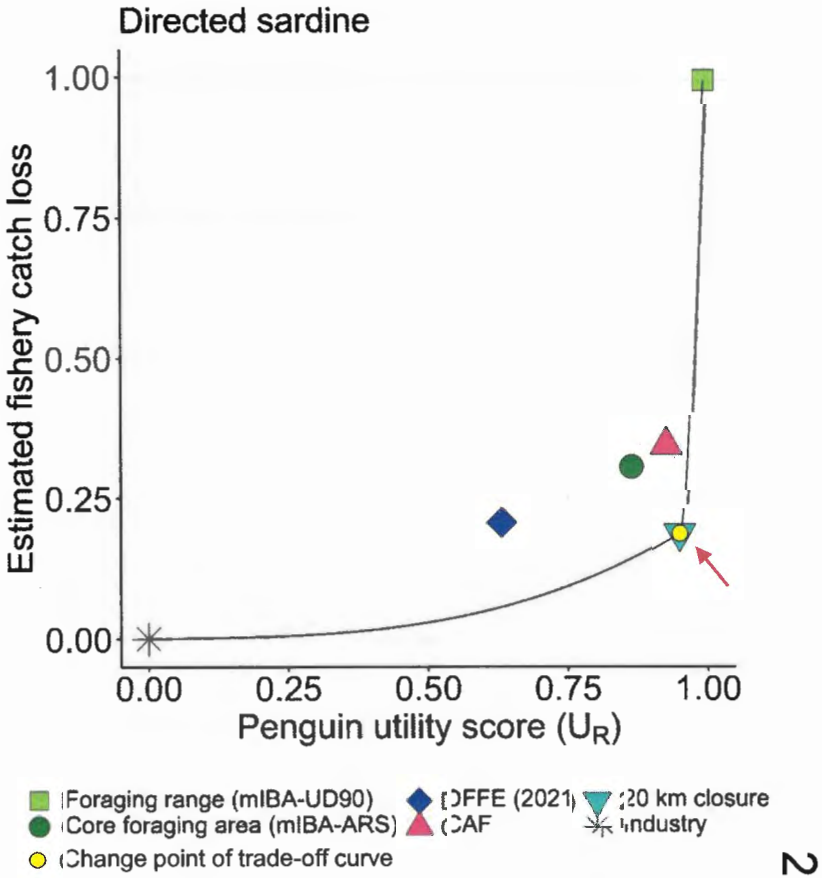
St Croix Island





Bird Island


33.4°S
33.6°S
33.8°S
34.0°S
34.2°S
Latitude
25.8°E
26.2°E
26.6°E
27.0°E
Longitude
0
15
30km
Foraging range (mIBA-UD90)
Core foraging area (mIBA-ARS)
Interim
DFFE (2021)
Industry CAF
CAF
20 km closure
MPA


Directed sardine
Estimated fishery catch loss
1.00
0.75
0.50
0.25
0.00
0.00
0.25
0.50
0.75
1.00
Penguin utility score (U_R)
Foraging range (mIBA-UD90)
Core foraging area (mIBA-ARS)
Change point of trade-off curve
DFFE (2021)
CAF
20 km closure
Industry

"AM6"

IN THE HIGH COURT OF SOUTH AFRICA
GAUTENG DIVISION, PRETORIA

Case No: _____

In the matter between:

BIRDLIFE SOUTH AFRICA	First Applicant
SOUTH AFRICAN FOUNDATION FOR THE CONSERVATION OF COASTAL BIRDS	Second Applicant
and	
THE MINISTER OF FORESTRY, FISHERIES AND THE ENVIRONMENT	First Respondent
THE DEPUTY DIRECTOR-GENERAL: FISHERIES MANAGEMENT, DEPARTMENT OF FORESTRY, FISHERIES AND THE ENVIRONMENT	Second Respondent
THE DEPUTY DIRECTOR-GENERAL: OCEANS AND COASTS, DEPARTMENT OF FORESTRY, FISHERIES AND THE ENVIRONMENT	Third Respondent
THE SOUTH AFRICAN PELAGIC FISHING INDUSTRY ASSOCIATION	Fourth Respondent
EASTERN CAPE PELAGIC ASSOCIATION	Fifth Respondent

CONFIRMATORY AFFIDAVIT

I, the undersigned,

MARK DAVID ANDERSON

do hereby make oath and state that:

1. I am an adult male with identity number 6404265054088 and am the Chief Executive Officer of BirdLife South Africa, the First Applicant (**BLSA**), a registered non-profit organisation (NPO Number:001-298) and public benefit

AM M.K

MC

organisation (PBO Number: 930 004 518). I am based at BLSA's head office at Isdell House, 17 Hume Road, Dunkeld West, Johannesburg.

2. The facts and circumstances set out in this Confirmatory Affidavit are within my personal knowledge and belief, unless otherwise stated or as appears from the context – and are to the best of my belief both true and correct.

3. I have read the Founding Affidavit deposed to by **ALISTAIR MC INTYRE MC INNES** and confirm that its contents are true and correct insofar as they pertain to me, my role as Chief Executive Officer and BLSA.

MARK DAVID ANDERSON

The deponent has acknowledged that he knows and understands the contents of this affidavit, which was signed and sworn to before me at Rosebank on this the 18 day of **MARCH 2024**, the regulations contained in Government Notice No. R1258 of 21 July 1972, as amended, and Government Notice No. R1648 of 19 August 1977, as amended, having been complied with.

COMMISSIONER OF OATHS
Full Names: Lizzy Mojalefa
Capacity: U
Designation: W/O Mojalefa
Address: Rosebank Sate.

SOUTH AFRICAN POLICE SERVICE
CLIENT SERVICE CENTRE
2024 -03- 18
CSC
ROSEBANK
SUID-AFRIKAANSE POLISIEDIENS

AM MK

IN THE HIGH COURT OF SOUTH AFRICA
GAUTENG DIVISION, PRETORIA

Case No: _____

In the matter between:

BIRDLIFE SOUTH AFRICA	First Applicant
SOUTH AFRICAN FOUNDATION FOR THE CONSERVATION OF COASTAL BIRDS	Second Applicant
and	
THE MINISTER OF FORESTRY, FISHERIES AND THE ENVIRONMENT	First Respondent
THE DEPUTY DIRECTOR-GENERAL: FISHERIES MANAGEMENT, DEPARTMENT OF FORESTRY, FISHERIES AND THE ENVIRONMENT	Second Respondent
THE DEPUTY DIRECTOR-GENERAL: OCEANS AND COASTS, DEPARTMENT OF FORESTRY, FISHERIES AND THE ENVIRONMENT	Third Respondent
THE SOUTH AFRICAN PELAGIC FISHING INDUSTRY ASSOCIATION	Fourth Respondent
EASTERN CAPE PELAGIC ASSOCIATION	Fifth Respondent

CONFIRMATORY AFFIDAVIT

I, the undersigned,

LORIEN PICHEGRU

do hereby make oath and state that:

1. I am an adult female with identity number 8002041304187 and am an Adjunct Professor in the Institute of Coastal and Marine Research at Nelson Mandela University, Gqeberha.

M.K AM

2. The facts and circumstances set out in this Confirmatory Affidavit are within my personal knowledge and belief, unless otherwise stated or as appears from the context – and are to the best of my belief both true and correct.

3. I have read the Founding Affidavit deposed to by **ALISTAIR MC INTYRE MC INNES** and confirm that its contents are true and correct insofar as they pertain to me, my research output and role as a member of the conservation sector and Conservation Sector Group (as defined in the Founding Affidavit).

_____

LORIEN PICHEGRU

The deponent has acknowledged that she knows and understands the contents of this affidavit, which was signed and sworn to before me at _____ on this the _____ day of _____ **2024**, the regulations contained in Government Notice No. R1258 of 21 July 1972, as amended, and Government Notice No. R1648 of 19 August 1977, as amended, having been complied with.

_____

COMMISSIONER OF OATHS

Full Names:

Capacity:

Designation:

Address:

"AM8"

IN THE HIGH COURT OF SOUTH AFRICA
GAUTENG DIVISION, PRETORIA

Case No: _____

In the matter between:

BIRDLIFE SOUTH AFRICA	First Applicant
SOUTH AFRICAN FOUNDATION FOR THE CONSERVATION OF COASTAL BIRDS	Second Applicant
and	
THE MINISTER OF FORESTRY, FISHERIES AND THE ENVIRONMENT	First Respondent
THE DEPUTY DIRECTOR-GENERAL: FISHERIES MANAGEMENT, DEPARTMENT OF FORESTRY, FISHERIES AND THE ENVIRONMENT	Second Respondent
THE DEPUTY DIRECTOR-GENERAL: OCEANS AND COASTS, DEPARTMENT OF FORESTRY, FISHERIES AND THE ENVIRONMENT	Third Respondent
THE SOUTH AFRICAN PELAGIC FISHING INDUSTRY ASSOCIATION	Fourth Respondent
EASTERN CAPE PELAGIC ASSOCIATION	Fifth Respondent

CONFIRMATORY AFFIDAVIT

I, the undersigned,

CRAIG DEON SMITH

do hereby make oath and state that:

1. I am an adult male with identity number 7402275155084 and am the Senior Manager: Marine Portfolio at the World Wide Fund for Nature South Africa (**WWF-SA**). WWF-SA is an environmental organisation that works with a range

of partners to promote the wellbeing of the environment for the benefit of people and nature. . I am based at WWF-SA's offices located at 1st Floor, Bridge House, Boundary Terraces, Mariendahl, Newlands.

2. The facts and circumstances set out in this Confirmatory Affidavit are within my personal knowledge and belief, unless otherwise stated or as appears from the context – and are to the best of my belief both true and correct.

3. I have read the Founding Affidavit deposed to by **ALISTAIR MC INTYRE MC INNES** and confirm that its contents are true and correct insofar as they pertain to me and my activities on behalf of WWF-SA.

Smith

CRAIG DEON SMITH

The deponent has acknowledged that he knows and understands the contents of this affidavit, which was signed and sworn to before me at RONDEBOSCH on this the 18 day of **MARCH 2024**, the regulations contained in Government Notice No. R1258 of 21 July 1972, as amended, and Government Notice No. R1648 of 19 August 1977, as amended, having been complied with.

SUID-AFRIKAANSE POLISIEDIENS
STASIEBEVELVOERDER
2024 -03- 18
STATION COMMANDER
RONDEBOSCH, K.P/C.P.
SOUTH AFRICAN POLICE SERVICES

COMMISSIONER OF OATHS
Full Names: VUYISA RASMENI
Capacity: SERGEANT / EX officio
Designation: SERGEANT
Address: 108 CHURCH STREET
RONDEBOSCH 7625

M.I.C AM

IN THE HIGH COURT OF SOUTH AFRICA
GAUTENG DIVISION, PRETORIA

Case No: _____

In the matter between:

BIRDLIFE SOUTH AFRICA	First Applicant
SOUTH AFRICAN FOUNDATION FOR THE CONSERVATION OF COASTAL BIRDS	Second Applicant
and	
THE MINISTER OF FORESTRY, FISHERIES AND THE ENVIRONMENT	First Respondent
THE DEPUTY DIRECTOR-GENERAL: FISHERIES MANAGEMENT, DEPARTMENT OF FORESTRY, FISHERIES AND THE ENVIRONMENT	Second Respondent
THE DEPUTY DIRECTOR-GENERAL: OCEANS AND COASTS, DEPARTMENT OF FORESTRY, FISHERIES AND THE ENVIRONMENT	Third Respondent
THE SOUTH AFRICAN PELAGIC FISHING INDUSTRY ASSOCIATION	Fourth Respondent
EASTERN CAPE PELAGIC ASSOCIATION	Fifth Respondent

CONFIRMATORY AFFIDAVIT

I, the undersigned,

LAUREN JANE WALLER

do hereby make oath and state that:

1. I am an adult female with identity number 7604200199083 and am the IUCN SSC CPSG Southern and East Africa Regional Planning Coordinator at The Endangered Wildlife Trust (**EWT**) which has its principal place of business at 27

and 28 Austin Road, Glen Austin AH, Midrand, Gauteng. I am based at 34 Fourie Street, Northcliff, Hermanus.

2. Until 31 December 2021, I was the Leiden Conservation Fellow at the South African Foundation for the Conservation of Coastal Birds, the Second Applicant (**SANCCOB**), the Second Applicant in these proceedings.

3. The facts and circumstances set out in this Confirmatory Affidavit are within my personal knowledge and belief, unless otherwise stated or as appears from the context – and are to the best of my belief both true and correct.

4. I have read the Founding Affidavit deposed to by **ALISTAIR MC INTYRE MC INNES** and confirm that its contents are true and correct insofar as they pertain to me.

A Waller

LAUREN JANE WALLER

The deponent has acknowledged that she knows and understands the contents of this affidavit, which was signed and sworn to before me at Hermanus on this the 18 day of **MARCH 2024**, the regulations contained in Government Notice No. R1258 of 21 July 1972, as amended, and Government Notice No. R1648 of 19 August 1977, as amended, having been complied with.-

COMMISSIONER OF OATHS

Full Names: [illegible]

Capacity: POLICE OFFICIAL

Designation: CONST

Address: [illegible]

SUID-AFRIKAANSE POLISIEDIENS
KLIENTE DIENS SENTRUM
HERMANUS
2024 -03- 18
HERMANUS
CLIENT SERVICE CENTRE
SOUTH AFRICAN POLICE SERVICE

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CONSTITUTION

BirdLife South Africa, previously known as the Southern African Ornithological Society, and tracing its history back to the 1930s, is the South African partner of BirdLife International.

1. NAME

The name of the organisation shall be "BirdLife South Africa" (hereinafter referred to as "the organisation".)

2. DEFINITIONS

The Act: The Income Tax Act, No 58 of 1962 and any and all amendments thereto.

SARS: The South African Revenue Service or the Commissioner, South African Revenue Service, as the context requires.

Republic: The Republic of South Africa.

The Board: The Board of Directors as defined in paragraph 8.

Secretary: The Secretary of the Board of Directors.

3. LEGAL STATUS

The organisation shall have legal personality distinct from its members who shall have no right to its assets. The liability of members shall be limited to the amount of unpaid subscriptions, if any.

4. OBJECTIVE

The objective of the organisation is to promote the conservation, study, understanding and enjoyment of birds and their habitats.

5. PUBLIC BENEFIT ORGANISATION – SPECIAL CONDITIONS

The organisation shall comply with the following and any future relevant requirements of SARS:

5.1. The sole objective of the organisation is to carry on, in a non-profit making manner, one or more public benefit activities as defined in Section 30(1) of the Act.

5.2. Such public benefit activities, or substantially the whole thereof, shall be carried on in the Republic.

5.3. At least three of the persons who accept fiduciary responsibility for the organisation shall not be connected persons as defined in the Act. No single person may directly or indirectly control the decision-making powers relating to the organisation.

5.4. No funds shall be distributed to any person other than in the course of undertaking any public benefit activity.

5.5. The funds of the organisation shall be used solely for the objects for which it was established, or shall be invested with registered financial institutions as defined in Section 1 of the Financial Sector Regulation Act (No. 9 of 2017) or in securities listed on a Stock Exchange as defined in the Stock Exchanges Control Act (No. 1 of 1985).

5.6. The organisation shall not carry on any business undertaking or trading activity unless specifically permitted in terms of Section 30(3)(b)(iv) of the Act.

5.7. On dissolution, any remaining assets shall be transferred to:

5.7.1. Any similar public benefit organisation which has been approved in terms of Section 30 of the Act,

5.7.2. Any institution, board or body which is exempt from the payment of income tax in terms of Section 10(1)(cA)(i) of the Act, which has as its sole or principal object the carrying on of any public benefit activity, or

5.7.3. Any department of state or administration in the national, provincial, or local sphere of government in the Republic as contemplated in Section 10(1)(a) or (b) of the Act.

5.8. No donation will be accepted which is revocable at the instance of the donor for reasons other than a material failure to conform to the designated purposes and conditions of such donation, including misrepresentation with regard to the tax deductibility thereof in terms of Section 18A of the Act; provided that a donor may not impose any conditions which could enable such donor or any

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connected person in relation to such donor to derive some direct or indirect benefit from the application of such donation.

5.9. A copy of all amendments to the constitution shall be submitted to SARS.

5.10. No remuneration will be paid to any employee, office bearer, member or other person which is excessive having regard to what is generally considered reasonable in the sector and in relation to the service rendered.

5.11. The organisation shall submit, as and when due, all required income tax returns together with supporting documentation when requested.

5.12. In the event that the organisation provides funds to any association of persons contemplated in the definition of "public benefit activity" in the Act, reasonable steps will be taken to ensure that the funds are utilised for the purpose for which they had been provided.

5.13. The organisation shall, within such period as SARS shall determine, register in terms of Section 13(5) of the Non-profit Organisations Act (No. 71 of 1997), and comply with any requirements imposed in terms of that Act.

5.14. Where the organisation has been approved in terms of Section 18(A) of the Act, 50% of the funds received by or accrued to the organisation by way of donations that qualify for a deduction in terms of that section, will be distributed (or an obligation will be incurred to so distribute) within twelve months from the financial year-end during which such donations were received.

6. POWERS

Subject to the special conditions contained in paragraph 5 above, the organisation may do all things required to achieve its objectives and, without in any way limiting its general powers, may operate in the Republic and elsewhere, in co-operation with like-minded organisations where appropriate, and may:

6.1. Purchase, acquire, invest in, lease and let out, improve, pledge, mortgage and alienate movable or immovable property.

6.2. Lend and borrow money, with or without security, and on such terms as considered appropriate.

6.3. Employ, pay and indemnify agents, trustees, and advisers and establish trusts, corporations and associations.

6.4. Engage in legal proceedings and sue or be sued in its own name.

6.5. Open and operate accounts at banks and other financial institutions under the signatures of not less than two persons authorised thereto by the Board (referred to more fully in paragraph 8 below).

6.6. Engage in educational activities relating to birds and the environment.

6.7. Co-operate with and assist other environmental, conservation, scientific and educational institutions, both governmental and non-governmental.

6.8. Accept as members of the organisation both natural persons and legal persona, including bird clubs.

7. MEMBERS

7.1. The members of the organisation shall be:

7.1.1. Natural persons in good standing and who qualify to be a member and who are admitted to membership by the Board, (which natural persons may or may not also be members of affiliated clubs as referred to in paragraph 7.1.3 and 7.2 below).

7.1.2. Legal persona, excluding bird clubs, admitted to membership by the Board.

7.1.3. Bird clubs (which shall have their own separate legal status) which have signed an affiliation agreement with the organisation and paid a nominal affiliation fee set by the Board.

7.1.4. Honorary members who shall be natural persons and number no more than 20 (twenty) at any given time who, in the opinion of the Board, have made a significant contribution towards the work of the organisation.

7.2. Those members referred to in paragraph 7.1 shall be referred to as "direct members". Individual members of bird clubs that are affiliated to the organisation but who are themselves not direct members shall be referred to as "affiliated members".

7.3. Applications for membership shall be submitted to the Secretary of the organisation.

7.4. Any person, legal persona or club (as referred to in paragraph 7.1 above) applying for membership shall be bound by the Constitution of the organisation, a copy of which shall be available for inspection at the organisation's offices and/or shall be made available to such member.

7.5. A register of members reflecting their names, addresses and category of membership shall be maintained by the organisation. The contents of the register shall be deemed to be correct and members shall be responsible for ensuring that the information on the register is correct.

7.6. The Board shall determine the different membership categories and shall from time to time prescribe the membership fees payable by such categories as well as the time and manner of payment, and shall determine the different benefits accruing to the various membership categories.

7.7. Membership shall terminate when:

7.7.1. A member has not paid the annual subscription or affiliation fee within two (2) months of due date, provided that the organisation shall have the right to reinstate membership on such terms as it may impose.

7.7.2. A written notice of resignation is received from a member.

7.7.3. A member acts in a manner contrary to any of the objectives or interests of the organisation as determined by the Board and, after due and proper enquiry, is expelled.

8. BOARD OF DIRECTORS

8.1. Function

The Board shall be the primary authority and decision-making body of the organisation and will guide its business and operations subject to the powers and duties set out in paragraph 8.6 below, and will assist the Chief Executive Officer, where appropriate, in the execution of his duties.

8.2. Composition

The Board shall comprise the following members:

8.2.1. The Chairman.

8.2.2. The Treasurer.

8.2.3. The Chief Executive Officer.

8.2.4. The Chief Financial Officer.

8.2.5. A maximum of four members of the organisation of at least two years standing, referred to as Members' Directors.

8.2.6. A maximum of six co-opted members.

8.3. Nomination and election of Directors

8.3.1. The Chairman and Treasurer shall be elected by members in General Meeting.

8.3.2. The Chief Executive Officer and the Chief Financial Officer shall be appointed as such by the Board and act ex officio.

8.3.3. The Members' Directors referred to in paragraph 8.2.5 above shall be elected in accordance with the provisions of Paragraph 8.4 below.

8.3.4. Co-opted members shall be appointed by the Board as and when required.

8.4. Nomination and election of Members' Directors specifically

8.4.1. The Secretary shall, at least sixty days before every Annual General Meeting, circulate to all members a note:

8.4.1.1. Specifying the number and identities of the Members' Directors referred to in 8.2.5 above who have or will have retired by the date of the Annual General Meeting as a result of their term of office having expired or for any other reason.

8.4.1.2. Calling for nominations for Members' Directors.

8.4.1.3. Requiring that all nominations be accompanied by a proposer and seconder, a form of acceptance by the person nominated and a short curriculum vitae.

8.4.1.4. Specifying that all nominations should be lodged with the Secretary in the form and manner prescribed by him/her no later than thirty days before the Annual General Meeting.

8.4.2. All nominations shall be referred by the Secretary to the Chairman of the organisation's Nominations Committee. The Nominations Committee shall, following the comprehensive procedure set out in its Term of Reference for the purpose of facilitating the election and appointment of Board members, prepare a short list of nominees for Members' Directors.

8.4.3. The names of the short-listed nominees shall be circulated by the Secretary with the agenda for the Annual General Meeting in a form and manner in his/her sole discretion.

8.4.4. The agenda for the meeting shall contain a provision for the election of Members' Directors and the Secretary shall decide the method of voting and announce the outcome of the election before the conclusion of the Annual General Meeting.

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8.5. Tenure of Members of the Board

8.5.1. The Chairman, Treasurer and Members' Directors shall all be elected for a period of four years but if willing to continue in office shall be eligible for re-election for a further period of four years only.

8.5.2. The Chief Executive Officer and Chief Financial Officer shall remain ex officio members of the Board as long as they remain in office.

8.5.3. Co-opted members shall serve for a period of four years, and shall be permitted to serve one further period of four years only if so invited and appointed by the Board.

8.5.4. Should a vacancy occur among that group comprising, the Chairman, the Treasurer and Members' Directors, the remaining members of the Board shall have the right to co-opt a replacement, to serve only until the end of the next Annual General Meeting.

8.5.5. Should a vacancy occur amongst the group of co-opted members, the remaining members of the Board shall have the right to co-opt a replacement to serve until the expiry of the term of the outgoing director.

8.6. Meetings

8.6.1. The Board shall meet on a bi-monthly basis or, should circumstances so require, on a more or less frequent basis as its members in their sole discretion shall decide. It may also meet on an ad hoc basis if required.

8.6.2. The quorum for any meeting shall be 60% (sixty percent) of the number of members of the Board in office at that time.

8.6.3. Members of the Board not resident in Johannesburg at the time may join the meeting via Skype or similar communication method and shall for all purposes be deemed to have attended the meeting in person.

8.7. Powers and responsibilities

The Board shall, without derogating from the generality of its powers in executing its duty to manage the affairs of the organisation in all its aspects, have the following specific powers, namely to:

8.7.1. Agree and articulate overall strategy.

8.7.2. Appoint members to the Board in terms of paragraph 8.2.6 above.

8.7.3. Approve the organisational structure and the appointment of the Chief Executive Officer.

8.7.4. Approve the annual budget.

8.7.5. Assume responsibility for the review and approval of the annual financial statements.

8.7.6. Manage the investments of the organization.

8.7.7. Approve marketing and communication, and fundraising strategies.

8.7.8. Review bi-monthly reports submitted by the Chief Executive Officer and the Chief Financial Officer.

8.7.9. Decide and approve membership categories and subscription levels.

8.7.10. Review and approve the recommendations of the Chief Executive Officer and any Remuneration Committee regarding annual and periodic (other than minor) salary adjustments.

8.7.11. Appoint committees and determine their terms of reference and composition and the conditions under which they shall operate.

8.7.12. Draft and confirm a Board Charter to regulate the operation of the Board and the conduct and contribution of its members.

8.7.13. Make all such further regulations and guidelines as are necessary for the due and proper functioning of the Board.

8.7.14. Commission a review and submit to members a report as more fully described in paragraph 10 hereunder.

9. AUDIT AND RISK COMMITTEE

9.1. Function

The Audit and Risk Committee shall fulfil the function traditionally allocated to an Audit Committee and shall, in addition, act on behalf of members by ensuring that the election of office bearers is carried out in accordance with the Constitution and that an opinion is expressed annually regarding the effectiveness and performance of both the Board and the organisation as a whole.

9.2. Composition

9.2.1. The Committee shall comprise a maximum of five (5) members appointed by the Board in terms of its powers as specified in Paragraph 8.7.11. above.

9.2.2. A maximum of two (2) members may be members of the Board, but shall not be the Chairman of the Board, the Chief Executive Officer or any other executive of the organisation.

9.2.3. The members of the committee shall elect from their number a Chairman from among those members who are not members of the Board.

9.2.4. The tenure of all members of the Committee shall be three (3) years but they shall be eligible for further periods of three (3) years if they are so willing.

9.2.5. Should a vacancy occur among the members referred to in 9.2.2 above, the Board shall have the right to appoint a replacement to hold office until the next Annual General Meeting.

9.3. Meetings

The Audit and Risk Committee shall meet twice in each calendar year or, at the sole discretion of its Chairman, more frequently if required, and the dates of all meetings shall be decided by the Chairman.

9.4. Powers and responsibilities

The powers and responsibilities of the Audit and Risk Committee, in both its audit and general oversight role, shall include but not be limited to the following:

9.4.1. Liaise with the organisation's external auditors in the planning and execution of the annual audit.

9.4.2. Act on any and all recommendations arising out of the audit.

9.4.3. Report to the Board on the completion of the audit.

9.4.4. Review and evaluate adequacy and effectiveness of internal controls, including financial controls.

9.4.5. Regularly assess risks that the organisation does or may face and make recommendations to the Board in regard thereto.

9.4.6. Supervise and approve the organisation's insurance programme and other risk control measures.

9.4.7. Approve annually a schedule of competencies for the Board and the Chief Executive Officer.

9.4.8. Review the Annual Financial Statements and recommend approval by the Board.

9.4.9. Recommend to the Board the appointment or reappointment of the organisation's external auditor.

10. GOVERNANCE

The Board shall commission an annual review, at each year end, of the performance of the organisation as a whole as well as of the Board itself; which review shall result in a report prepared by the Chairman of the Board, reviewed by the Audit and Risk Committee for its members' comment and input, and finally included in the organisation's annual report presented to members at the Annual General Meeting.

11. CHIEF EXECUTIVE OFFICER AND HONORARY PRESIDENT

11.1. The Board shall appoint a Chief Executive Officer of the organisation, who shall be an ex officio member of the Board, for such period and on such terms as it shall determine.

11.2. The Chief Executive Officer shall have those powers and responsibilities normally associated with such office and shall report to the Board at its regular meetings on the business and the affairs of the organisation.

11.3. Between regular meetings of the Board, the Chief Executive Officer shall be also responsible to, and report to, the Chairman of the Board.

11.4. An Honorary President of the organisation shall be elected at the Annual General Meeting for a period of four (4) years

12. GENERAL MEETINGS OF MEMBERS

12.1. The Board shall each year convene an Annual General Meeting within six months of the organisation's financial year-end. The business of the Annual General Meeting shall include:

12.1.1. Confirmation of the minutes of the previous meeting and any general meetings.

12.1.2. Consideration and adoption of the annual report of the Chief Executive Officer.

12.1.3. Consideration and adoption of the annual report of the Chairman of the Board, including the annual review referred to in paragraph 10 above.

12.1.4. Consideration and adoption of the report of the Treasurer.

12.1.5. Consideration and adoption of the audited annual financial statements.

12.1.6. When necessary, the election of Board members, the Treasurer and the Honorary President.

12.1.7. Appointment of the external auditor.

12.1.8. Consideration of resolutions submitted by members, notice of which shall have been submitted to the Secretary not less than 2 months before the date of the meeting.

12.1.9. Any other business allowed by the Chairman of the Board.

12.2. The financial year of the organisation shall be the twelve-month period preceding the 31 December each year.

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12.3. The Secretary of the organisation shall, at the request of the Board or on receipt of a requisition signed by one hundred (100) direct members, or 10% (ten percent) of the direct membership, whichever is the lesser, convene a Special General Meeting. A meeting convened in such manner shall be subject to the provisions of this constitution, mutatis mutandis, relating to Annual General Meetings.

12.4. Notice of any General Meeting of members shall be sent to members by post, facsimile or electronic mail not less than four (4) weeks before the meeting and shall be deemed to have been received if sent to the postal address, facsimile number or electronic mail address of the member as recorded in the register.

12.5. The quorum for a meeting shall be thirty (30) members present and entitled to vote.

12.6. If insufficient members are present to constitute a quorum, a meeting convened in terms of paragraph 11.4 may be adjourned for not more than sixty (60) days and notice of the adjourned meeting shall be despatched to all members within fourteen (14) days of the original meeting.

12.7. If within thirty (30) minutes of the time fixed for the adjourned meeting insufficient members are present to constitute a quorum, the adjourned meeting shall be deemed to form the requisite quorum.

12.8. Proxy forms and nomination forms for the posts of the elected officials referred to in paragraphs 8, 9 and 10 above shall be included with the notice of the Annual General Meeting.

13. VOTING

13.1. Unless otherwise provided in this Constitution, the vote of the majority of those direct members present and entitled to vote at any meeting shall prevail. Voting shall be by show of hands unless a ballot is demanded by a majority of those direct members present in person or by proxy who are entitled to vote.

13.2. All direct members shall have a single vote each.

13.3. The Chairman presiding at the meeting shall have a deliberative and a casting vote.

13.4. A direct member entitled to vote may appoint another person for one (1) meeting as his proxy to represent him and to vote. This proxy shall be delivered in writing to the Secretary before a meeting. The proxy form shall be signed by the direct member and shall specify the date of the meeting and the name of the proxy.

14. REGIONAL FORUMS

14.1. Those bird clubs that have become members of the organisation and signed an affiliation agreement, as provided in paragraph 7.1.3 above shall be encouraged to form a minimum of three (3) Regional Forums representing the geographical areas in which the said clubs are located.

14.2. The purpose of the Regional Forums shall be to co-ordinate the affairs of the clubs in their specific regions, to promote and where possible further the aims and ethos of the organisation, and to act as a link between the clubs and their members and the organisation.

14.3. Each affiliated club will be admitted to the Regional Forum of its choice. Each club so admitted shall have at least one (1) vote in the affairs of the Regional Forum.

14.4. Each Regional Forum will elect a chairperson who will be responsible for preparing a report, in the prescribed manner, after every meeting of the Regional Forum. Such report, which will contain details of the activities of the Regional Forum and its associated bird clubs as well as any recommendations for the organisation, will be submitted within 30 days of such meeting to the Secretary who shall table the report at the next Board meeting.

15. AMENDMENT OF CONSTITUTION AND DISSOLUTION

The Constitution may be amended or the organisation may be dissolved by a resolution passed by two-thirds of the direct members present in person and entitled to vote or by proxy at a General Meeting of direct members, provided that the notice of the meeting shall have set out the proposed amendments and the reasons therefore or the proposed dissolution and the reasons therefore as the case may be. The provisions of paragraph 5.7 shall apply in the case of dissolution.

10 March 2022

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Republic of South Africa

Companies Act, 2008

MEMORANDUM OF INCORPORATION FOR A NON-PROFIT COMPANY

Name of Company: SANCCOB NPC

Registration No.: 2001/026273/08

This Memorandum of Incorporation was adopted by Special Resolution passed on 17 April 2013 in substitution for the existing Memorandum of Incorporation of the Company.

TABLE OF CONTENTS

1. INTERPRETATION

In this MOI, unless the context otherwise requires –

1.1.1. "Accounting Records" means information in written or electronic form concerning the financial affairs of the Company as required in terms of the Companies Act including, but not limited to, purchase and sales records, general and subsidiary ledgers and other documents and books used in the preparation of Financial Statements;

1.1.2. "Address" shall include Electronic Address, business, residential or postal or any other address;

1.1.3. "Annual General Meeting" means the meeting required to be held in terms of clause 20.1;

1.1.4. "Auditing Profession Act" means the Auditing Profession Act, No. 26 of 2005, as amended or any legislation which replaces it;

1.1.5. "Auditor" has the meaning set out in the Auditing Profession Act;

1.1.6. "Board" means the Board of Directors of the Company;

1.1.7. "CEO" means the Executive Director of the Company appointed by the Board, and a member of the Board;

1.1.8. "Chairperson" means the Chairperson of the Board elected to act as such in terms of clause 31.7;

1.1.9. "Commission" means the Companies and Intellectual Property Commission established by section 185;

1.1.10. "Companies Act" means the Companies Act, No 71 of 2008, as amended or any legislation which replaces it;

1.1.11. "Company" means SANCCOB NPC, registration number 2001/026273/08, or by whatever other name it may be known from time to time;

1.1.12. "Deliver" means deliver in the manner in which the Company is entitled to give notice or deliver documents in accordance with this MOI and the Companies Act;

1.1.13. "Director" means a member of the Board of the Company and the alternate thereof;

1.1.14. "Effective Date" means the general effective date of the Companies Act, namely 1 May 2011;

1.1.15. "Electronic Address" means in regard to Electronic Communication, any email Address furnished to the Company by a Member or Director of the Company;

1.1.16. "Financial Statements" includes –

1.1.16.1. annual financial statements and provisional annual financial statements;

1.1.16.2. interim or preliminary reports;

1.1.16.3. group and consolidated financial statements in the case of a group of companies; and

1.1.16.4. financial information in a circular that an actual or prospective creditor, or the Commission, Panel or other regulatory authority, may reasonably be expected to rely on;

1.1.17. "Income Tax Act" means the Income Tax Act, No 58 of 1962, as amended or any legislation which replaces it;

1.1.18. "Ineligible or Disqualified" means ineligible or disqualified as contemplated in the Companies Act or as contemplated in this Memorandum of Incorporation;

1.1.19. "Knowing", "knowingly" or "knows", when used with respect to a person, and in relation to a particular matter, means that the person either had actual knowledge of the matter, or was in a position in which the person reasonably ought to have had actual knowledge, or investigated the matter to an extent that would have provided the person with actual knowledge or taken other measures which, if taken, could reasonably be expected to have provided the person with actual knowledge of the matter;

1.1.20. "LRA" means the Labour Relations Act 66 of 1995, as amended, or any legislation which replaces it;

1.1.21. "Material", when used as an adjective, means significant in the circumstances of a particular matter, to a degree that is –

1.1.21.1. of consequence in determining the matter; or

1.1.21.2. might reasonably affect a person's judgement or decision-making in the matter;

1.1.22. "Member" means a Person who holds membership in, and specified rights in respect of the Company;

1.1.23. "Members Register" means the register of Members required to be kept in terms of section 24(4);

1.1.24. "MOI" means this Memorandum of Incorporation;

1.1.25. "Ordinary Resolution" means a resolution adopted with the support of more than 50% (fifty percent) of the Voting Rights exercised on the resolution, or a higher percentage as contemplated in section 65(8);

1.1.26. "Paid-up Members" means Members who have paid their annual subscription for the current financial year;

1.1.27. "Panel" means the Takeover Regulation Panel, established by section 196;

1.1.28. "Person" includes a juristic person;

1.1.29. "Personal Financial Interest" means when used with respect to any person:

1.1.29.1. means a direct Material interest of that person, of a financial, monetary or economic nature, or to which a monetary value may be attributed; but

1.1.29.2. does not include any interest held by a person in a unit trust or collective investment scheme in terms of the Collective Investment Schemes Act, No 45 of 2002), unless that person has direct control over the investment decisions of that fund or investment;

1.1.30. "Prescribed Officer" means a person who, within a company, performs any function that has been designated by the Minister in terms of section 66(10);

1.1.31. "Record Date" means the date established under section 59 on which the Company determines the identity of its Members;

1.1.32. "Registered Office" means the office of the Company that is registered as required by section 23;

1.1.33. "Regulations" means regulations published pursuant to the Companies Act;

1.1.34. "Related", when used in respect of two persons, means persons who are connected to one another in any manner contemplated in the Companies Act;

1.1.35. "Representative Member" means any person recognised as such in terms of clause 11 hereof;

1.1.36. "Republic" means the Republic of South Africa;

1.1.37. "Round Robin Resolution" means a resolution passed other than at a –

1.1.37.1. Members meeting, which –

1.1.37.1.1. was submitted for consideration to the Persons entitled to exercise Voting Rights in relation to the resolution; and

1.1.37.1.2. was voted on by the requisite percentage of the Persons entitled to vote contemplated in clause 20.30 by signing a resolution in counterparts within 20 (twenty) business days after the resolution was submitted to them;

1.1.37.2. meeting of Directors, in respect of which, subject to clause 31.13, a majority of the Directors who may at the time be present in South Africa being not less than a quorum of Directors, voted in favour by signing in Writing a resolution in counterparts, within 20 (twenty) business days after the resolution was submitted to them;

1.1.38. "Scrutineer" means an employee of the Company's Auditor appointed by the Board and mandated to declare the result of a poll;

1.1.39. "Special Resolution" means a resolution adopted with the support of at least 75% (seventy five percent) of the Voting Rights exercised on the resolution, or a different percentage as contemplated in section 65(10);

1.1.40. "Treasurer" means the Treasurer as referred to in clause 18.7;

1.1.41. "Voting Rights" means the rights of a Member to vote in connection with a matter;

1.1.42. "Writing" includes Electronic Communication;

1.2. references to Members represented by proxy shall include Members entitled to vote represented by an agent appointed under a general or special power of attorney;

1.3. references to Members entitled to vote present at a meeting or acting in person shall include Juristic Persons represented by duly authorised representatives or acting in the manner prescribed in the Companies Act;

1.4. all references to "section/s" in this MOI refer to the sections of the Companies Act unless the context indicates otherwise;

1.5. all references to "clause/s" in this MOI refer to a corresponding provision of this MOI;

1.6. the headings are for reference purposes only and shall not affect the interpretation of this MOI;

1.7. words in the singular number shall include the plural, and words in the plural number shall include the singular, words importing the masculine gender shall include the female gender, and words importing persons shall include created entities (corporate or not);

1.8. if any term is defined within the context of any particular clause in the MOI, the term so defined, unless it is clear from the clause in question that the

term so defined has limited application to the relevant clause, shall bear the meaning ascribed to it for all purposes in terms of this MOI, notwithstanding that that term has not been defined in this interpretation provision;

1.9. the rule of construction that a contract shall be interpreted against the party responsible for the drafting or preparation of the contract, shall not apply to this MOI.

2. CALCULATION OF BUSINESS DAYS

When a particular number of business days is provided for between the happening of one event and another, the number of days must be calculated by —

2.1. excluding the day on which the first such event occurs;

2.2. including the day on or by which the second event is to occur; and

2.3. excluding any public holiday, Saturday or Sunday that falls on or between the days contemplated in clauses 2.1 and 2.2 respectively.

3. NON-PROFIT COMPANY

3.1. The Company was incorporated on 1 November 2001 and is therefore a pre-existing company as defined in the Companies Act and, as such, continues to exist as if it had been incorporated and registered as a non-profit company in terms of the Companies Act, as contemplated in item 2 of the Schedule 5 of the Companies Act.

3.2. The Company is a Non-Profit Company as it is:

3.2.1. incorporated for a public benefit or other object as required by item 1(1) of Schedule 1 to the Companies Act;

3.2.2. consistent with the principles set out in items 1(2) to 1(9) of Schedule 1 to the Companies Act;

3.2.3. a public benefit organisation as contemplated in section 30 of the Income Tax Act; and

3.2.4. is prohibited from directly or indirectly distributing any of its funds to any Person (otherwise) than in the course of carrying out its stated objects and is required to solely utilise its funds for the purpose that it has been established.

4. OBJECTS OF THE COMPANY

4.1. The primary object of the Company is to conserve seabirds, the penguin being the flagship species of focus, and, upon identification thereof, other complementary marine species. This includes –

4.1.1. oiled wildlife preparedness, planning and response;

4.1.2. rehabilitation, chick-rearing and breeding programmes;

4.1.3. original and collaborative research which contributes towards achieving the Company's conservation goals;

4.1.4. training people to handle and care for seabirds and other marine species, oil spill response procedures, safety and other relevant skills that will benefit conservation;

4.1.5. education and public awareness which informs and encourages people to develop positive habits which contribute towards a healthy ocean and to the animals which depend on it;

4.1.6. fundraising, revenue-generating activities and project administration which support the objects of the company;

4.1.7. informing and influencing local and global consciousness and action, promoting responsible governance of marine eco-systems and the conservation of marine animals that depend on it, and

working towards harmonious coexistence between humans and marine life.

5. CONDITIONS

5.1. The Company :

5.1.1. must apply all of its assets and income, however derived, to advance its stated objects, as set out in this MOI; and

5.1.2. subject to clause 5.1.1, may -

5.1.2.1. acquire and hold securities issued by a profit company; or

5.1.2.2. directly or indirectly, alone or with any other Person, carry on any business, trade or undertaking consistent with or ancillary to its stated objects.

5.2. The Company shall not accept a donation that is revocable at the instance of the donor, other than a material failure to conform to the designated purpose and conditions of such donation, including any misrepresentation regarding the tax deductibility thereof; provided that a donor, may not impose conditions which could enable such donor or any Connected Person in relation to such donor to derive some direct or indirect benefit from the application of such donation.

5.3. The Company must not, directly or indirectly, pay any portion of its income or transfer any of its assets, regardless how the income or asset was derived, to any Person who is or was an incorporator of the Company, or who is a Director, or Person appointing a Director, of the Company, except -

5.3.1. as reasonable -

5.3.1.1. remuneration for goods delivered or services rendered to, or at the direction of, the Company; or

5.3.1.2. payment of, or reimbursement for, expenses incurred to advance a stated object of the Company;

5.3.2. as a payment of an amount due and payable by the Company in terms of a *bona fide* agreement between the Company and that Person or another; or

5.3.3. as a payment in respect of any rights of that Person, to the extent that such rights are administered by the Company in order to advance a stated object of the Company; or

5.3.4. in respect of any legal obligation binding on the Company,

subject always to the requirement that any such distribution must not directly or indirectly promote the economic self-interest of any fiduciary or employee of the Company.

6. MEMBERSHIP

6.1. Application for membership of the Company shall be submitted on the application form prescribed, from time to time, by the Board, or any person to whom the receipt of applications on behalf of the Board is delegated by the Board.

6.2. Any Person who makes a written application, in terms of this clause 6, to become a Member of the Company and whose application is accepted by the Board shall be and become a Member of the Company, subject to clause 6.3.

6.3. Despite anything to the contrary in this MOI, the Company's rules, if any, or any agreement between the Company and a prospective Member, or between any Members and a prospective Member, no Member shall be admitted unless he agrees to be bound by this MOI and any agreement in force between the Company and its Members and/or between the Members governing their relationship as Members in the Company.

6.4. Admission to membership of the Company shall be in the sole discretion of the Board or its delegate, which may either admit or refuse to admit any applicant, and in the event of its refusing to admit any applicant, it shall not be obliged to furnish reasons for its refusal. On the admission of a Person to membership, he shall be issued with a certificate of membership in the form prescribed by the Board which certificate shall bear his full name and be signed by the Chairperson of the Board, provided that for administrative ease and for purposes of implementing the provisions of this MOI, all certificates of membership issued by the Company to any Person becoming a Member shall at all times be retained and kept in safekeeping by the Company.

6.5. The Board shall be entitled to impose the payment of an entrance fee upon any Person applying for membership, which amount shall be determined by the Board.

6.6. The Board shall fix the annual subscriptions, levies or other charges, if any, payable to the Company by the Members.

6.7. The Company shall not restrict or regulate, or provide for any restriction or regulation of membership in any manner that amounts to unfair discrimination in terms of section 9 of the Constitution of the Republic.

7. MEMBERSHIP CATEGORIES

7.1. The membership categories of the Company are as follows –

7.1.1. Life Members are those persons who have made a contribution of not less than the amount determined by the Board in terms of clause 8.1;

7.1.2. Corporate Members are those organisations paying an annual subscription of not less than the amount determined by the Board in terms of clause 8.1;

7.1.3. Ordinary Members are those persons paying an annual subscription of not less than the amount determined by the Board

in terms of clause 8.1 or, in the case of pensioners, not less than a lower amount as determined by the Board in terms of clause 8.1;

7.1.4. Junior Members are those persons under the age of 18 (eighteen) years paying an annual subscription of not less than the amount determined by the Board in terms of clause 8.1;

7.1.5. Student Members are those persons over the age of 18 (eighteen) years who are *bona fide* students at any duly constituted educational facility, whether a state institution or private institution, and paying an annual subscription of not less than the amount determined by the Board in terms of clause 8.1;

7.1.6. Honorary Members and Honorary Life Members are those organisations or persons who have rendered exceptional service to the Company, who have been appointed as such by the Board and who are not liable for annual subscriptions.

7.2. All such Members, excluding Junior Members, shall have full voting rights at annual and all other Members meetings.

7.3. The Board shall ensure that, at all times, there are a minimum of 5 (five) Members of the Company. Should the number of Members fall below the stipulated minimum, the Board shall fill the necessary vacancy/ies within a period of 60 (sixty) calendar days of such vacancy/ies having occurred.

8. MEMBERSHIP FEES

8.1. The Board shall, prior to the end of each financial year, determine the membership fees payable by each category of Members as set forth in clause 7, in respect of the next financial year.

8.2. Not less than 1 (one) month prior to the end of each financial year, membership renewal notices shall be sent out to all Paid-up Members, except those falling into the categories of Members referred to in clauses

7.1.1 and 7.1.6. The renewal notices shall specify the fee due in respect of the following financial year as determined by the Board in terms of clause 8.1.

8.3. Membership shall run from the date of acceptance of an application for membership until renewal of a specific financial year, from the beginning of that financial year to the end of that financial year.

8.4. A Person who applies for membership shall be deemed to be a Member as from the date of which a letter of acceptance of the application is dispatched by the Company, which letter shall be dispatched within 30 (thirty) Business Days after receipt by the Company of such Persons application for membership, provided that such a Person shall only acquire voting rights 3 (three) months after acceptance.

9. SUSPENSION AND TERMINATION OF MEMBERSHIP

9.1. In the event that the annual membership fee of an existing Member for a specific year is not paid within 3 (three) months of the end of the previous financial year, the Member's membership shall be suspended. A Member shall have his or its voting rights suspended until such time as he or it has paid the full subscription for the current financial year.

9.2. The Board, shall in writing and on fair and reasonable grounds, be entitled to suspend the membership of any Member after having given such Member a reasonable opportunity of addressing the Board in relation thereto.

9.3. A suspended Member shall take no part in any activities of the Company and shall not be permitted to enter the Company's premises.

9.4. Notwithstanding anything to the contrary contained herein, membership of the Company may be terminated by the Board by resolution adopted with the support of at least 75% (seventy five percent) of the Board, at its sole discretion, should it deem this to be in the best interests of the Company.

9.5. Membership of the Company may be terminated by the Board should a Member fail to comply with any conditions and obligations of membership or fail to observe the provisions of this MOI, upon the expiration of a period of 3 (three) months reckoned from the date of Written notice by the Company to the Member concerned; save that the Board is entitled to extend the period of grace allowed to a particular Member to such extent and for such reasons as it may in its sole discretion deem appropriate.

9.6. A Member shall, subject to the provisions of clauses 9.4 and 9.5, *ipso facto* cease to be a Member of the Company –

9.6.1. in the case of a natural person, if such:-

9.6.1.1. Member dies; or

9.6.1.2. Member tenders 1 (one) month's Written notice of his resignation as a Member to the Board; or

9.6.1.3. Member becomes a lunatic or of unsound mind; or

9.6.1.4. Member's estate is surrendered or sequestrated, whether voluntarily or compulsorily; or

9.6.1.5. Member commits any act of insolvency;

9.6.2. in the case of a Member which is not a natural person, if such Member:-

9.6.2.1. tenders 1 (one) month's Written notice of resignation as a Member to the Board; or

9.6.2.2. is liquidated, wound up or placed under judicial management, whether provisionally or finally and whether compulsorily or voluntarily.

10. RIGHTS AND OBLIGATIONS OF MEMBERSHIP

10.1. In addition to the rights of membership conferred by the Companies Act, Members may –

10.1.1. appoint the members of the Board;

10.1.2. receive copies of the annual Financial Statements of the Company from time to time;

10.1.3. receive notice of, attend, speak and vote at, all Members meetings of the Company in accordance with the provisions of this MOI.

10.2. Notwithstanding anything to the contrary contained herein, the termination of membership shall not release a Member from any obligation undertaken by him prior to the termination of such membership.

11. REPRESENTATIVE MEMBERS

11.1. The Board is entitled (but not obliged) to recognise any Person as a Member, by reason of his appointment as –

11.1.1. an executive office holder or duly authorised representative of a particular organisation, statutory body or company;

11.1.2. an executor, administrator, trustee, curator or guardian of the estate of a deceased or sequestrated Member, or of a Member who is otherwise under disability;

11.1.3. the liquidator of any Member which is a body corporate in the course of being wound up.

11.2. Should the Board recognise a Representative Member, from the date of such recognition and submission of any proof required by the Board, he shall be deemed to be a Member of the Company in the relevant capacity or of the same class as the Member concerned.

12. NON-TRANSFERABILITY OF MEMBERSHIP

Membership may not be assigned or transferred unless the Board determines otherwise, and in that event, subject to such conditions as the Board may, in its sole discretion, deem appropriate.

13. POWERS AND CAPACITY OF THE COMPANY

The Company has the powers and capacity of an Individual save to the extent set out in the Companies Act and Regulations, as well as the limitations in clause 5. Notwithstanding the omission from this MOI of any provision to that effect, the Company may do anything which the Companies Act empowers a Non-Profit Company to do if so authorised by its MOI.

14. AMENDMENTS TO THE MOI

14.1. Save for correcting errors substantiated as such from objective evidence or which are self-evident errors (including, but without limitation *eiusdem generis*, spelling, punctuation, reference, grammar or similar defects) in the MOI, which the Board is empowered to do, all other amendments of the MOI shall, subject to section 16, be made at any time if a Special Resolution to amend the MOI –

14.1.1. is proposed by –

14.1.1.1. the Board; or

14.1.1.2. Members entitled to exercise at least 10% (ten) percent of the Voting Rights that may be exercised on such a resolution; and

14.1.2. is adopted at a Members meeting, or in accordance with clause 1.1.37.1.

14.2. Notwithstanding the provisions of clause 14.1.2, if the Company has non-Voting Members –

14.2.1. the Board may amend this MOI in the manner contemplated in clause 14.1.1.1; and

14.2.2. the requirements of clause 14.1.2 shall not apply to the Company.

14.3. A copy of any amendment to the MOI must be submitted to the Commissioner of the South African Revenue Services.

15. THE MAKING OF RULES

15.1. The authority of the Board to make rules for the Company, as contemplated in section 15(3) to (5), is not limited or restricted in any manner by this MOI.

15.2. The Board must –

15.2.1. publish any rules made in terms of section 15(3) to (5) by delivering a copy of those rules to the Electronic Address of each Member or by ordinary mail; and

15.2.2. file a copy of those rules.

15.3. The Board must -

15.3.1. publish a notice of any alteration of the MOI or the Rules, made in terms of section 17(1), by delivering a copy of those rules to the Electronic Address of each Member or by ordinary mail; and

15.3.2. file a copy of those alterations.

16. MEMBERS REGISTER

16.1. The Company must maintain a Members Register, in accordance with the provisions of section 24(4).

16.2. The Company shall cause the Members Register to reflect –

16.2.1. the names and identity numbers or passport numbers or registration numbers of the Members;

16.2.2. the Member's business, residential or postal Address;

16.2.3. the Member's Electronic Addresses who have furnished them;

16.2.4. the date on which the Person became a Member of the Company and if applicable, the date on which such Member ceased to be a Member of the Company; and

16.2.5. any other information prescribed in terms of the Companies Act from time to time.

16.3. The Company shall not be bound to enter any Person in the Members Register until that Person gives the Company an Address for entry on the Members Register.

17. APPLICATION OF OPTIONAL PROVISIONS OF THE ACT

17.1. The Company elects, in terms of section 30(2)(b)(ii)(aa), that the annual Financial Statements of the Company be audited voluntarily.

17.2. The Company elects, in terms of section 34(2), to comply voluntarily with the extended accountability provisions set out in Chapter 3 of the Act to the extent required by clause 17.1.

18. ACCOUNTING RECORDS AND FINANCIAL STATEMENTS

18.1. The Company shall maintain the necessary Accounting Records which shall be accessible from its Registered Office, and shall at all times be open to inspection by the Directors.

18.2. The Company must maintain adequate records of all revenue received from donations, grants and Member's fees (if any), or in terms of any funding contracts or arrangements with any party or Person for a period of at least 5 (five) years after receipt of same.

18.3. The Company shall prepare its Financial Statements in accordance with the applicable Regulations to the Companies Act which shall be presented to the Annual General Meeting after the statements have been approved by the Board.

18.4. The Board shall from time to time determine at what times and places (save in the case of Accounting Records which shall be accessible from the Registered Office) and under what conditions, subject to the requirements of the Regulations, the documents which the Members are entitled to inspect and take copies of (being the MOI, amendments to the MOI, records in respect of Directors, Accounting Records required to be maintained by the Company, reports to Annual General Meetings, annual Financial Statements, notices and minutes of Members meetings, communications generally to Members and the Members Register), shall be open to inspection by Members not being Directors. In addition the Members have rights to information regarding Directors declarations of interests.

18.5. Apart from the Members, no other Person shall be entitled to inspect any of the documents of the Company (other than the Members Register) unless expressly authorised by the Board or by Ordinary Resolution.

18.6. The Company shall notify the Members of the publication of any annual Financial Statements of the Company, setting out the steps required to obtain a copy of those Financial Statements. If a Member demands a copy of the annual Financial Statements, the Company shall make same available to such Member free of charge.

18.7. At each Members meeting, a Treasurer shall be appointed from the Board to oversee the finances of the Company and to keep proper records thereof and shall arrange for all funds to be deposited into bank accounts in the name of the Company.

19. AUDITOR

19.1. The Company shall appoint an Auditor annually at its Annual General Meeting provided that if an Annual General Meeting does not appoint or reappoint an Auditor, the Board must fill the vacancy in the office in terms of the procedure contemplated in section 91 within 40 (forty) business days after the date of the Annual General Meeting. A retiring Auditor may be automatically re-appointed at an Annual General Meeting after the year-end without any resolution being passed, unless –

19.1.1. the retiring Auditor is –

19.1.1.1. no longer qualified for appointment;

19.1.1.2. no longer willing to accept the appointment, and has so notified the Company; or

19.1.1.3. required to cease serving as Auditor, in terms of section 92;

19.1.2. the Company has notice of an intended resolution to appoint some other Person or Persons in place of the retiring Auditor.

19.2. Any firm of Auditors appointed by the Company as the Auditor shall ensure that the Individual responsible for performing the Audit must comply with the requirements of section 90(2), provided that –

19.2.1. the same Individual may not serve as the Auditor or designated Auditor for more than 5 (five) consecutive financial years;

19.2.2. if an Individual has served as the Auditor or designated Auditor for 2 (two) or more consecutive financial years and then ceases to be the Auditor or designated Auditor, the Individual may not be appointed again as the Auditor or designated Auditor until after the expiry of at least 2 (two) further financial years.

19.3. The Auditor –

19.3.1. has the right of access at all times to the Accounting Records and all books and documents of the Company, and is entitled to require from the Board or Prescribed Officers any information and explanations necessary for the performance of the Auditor's duties;

19.3.2. is entitled to –

19.3.2.1. attend any Members meeting;

19.3.2.2. receive all notices of and other communications relating to any Members meeting; and

19.3.2.3. be heard at any Members meeting on any part of the business of the meeting that concerns the Auditor's duties or functions -

19.3.3. may not perform any services for the Company that would place the Auditor in a conflict of interest as prescribed or determined by the Independent Regulatory Board for Auditors in terms of section 44(6) of the Auditing Profession Act.

19.4. If a vacancy arises in the office of Auditor, the Board –

19.4.1. must appoint a new Auditor within 40 (forty) business days, if there was only 1 (one) incumbent Auditor; and

19.4.2. may appoint a new Auditor at any time, if there was more than 1 (one) incumbent, but while any such vacancy continues, the surviving or continuing Auditor may act as Auditor of the Company.

19.5. If, by comparison with the membership of a firm at the time of its latest appointment, less than ½ (one half) of the Members remain after a change in

the composition of the Members, that change constitutes the resignation of the firm as Auditor of the Company, giving rise to a vacancy.

19.6. The Auditor may resign from office by giving the Company 1 (one) month's Written notice or less than that with the prior Written approval of the Board.

19.7. If the Auditor is removed from office by the Board, the Auditor may, by giving Written notice to that effect to the Company by not later than the end of the financial year in which the removal took place, require the Company to include a statement in its annual Financial Statements relating to that financial year, not exceeding a reasonable length, setting out the Auditor's contention as to the circumstances that resulted in the removal. The Company must include this statement in the Director's report in its annual Financial Statements.

20. MEMBERS MEETINGS AND ROUND ROBIN RESOLUTIONS

20.1. The Company shall convene an Annual General Meeting once in every calendar year, but no more than 15 (fifteen) months after the date of the previous Annual General Meeting, or within an extended time allowed by the Companies Tribunal, on good cause shown, which must, at a minimum, provide for the following business to be transacted –

20.1.1. presentation of –

20.1.1.1. the Directors' report;

20.1.1.2. audited Financial Statements for the immediately preceding financial year;

20.1.2. election and/or removal of Directors, to the extent required by the Companies Act or the MOI;

20.1.3. appointment of an Auditor for the ensuing year;

20.1.4. any matter/s raised by Members, with or without advance notice to the Company.

20.2. The Company shall, as determined by the Board, either –

20.2.1. hold a Members meeting in order to consider one or more resolutions; or

20.2.2. as regards such resolution/s that could be voted on at a Members meeting, instead require them to be dealt with by Round Robin Resolution contemplated in clause 1.1.37.1.

20.3. Within 10 (ten) business days after a Round Robin Resolution is adopted, the Company must deliver a statement describing the results of the vote, consent process, or appointment to every Member who was entitled to vote on or consent to the Round Robin Resolution.

20.4. The Company must hold a Members meeting or put the proposed resolution by way of a Round Robin Resolution contemplated in clause 1.1.37.1 -

20.4.1. at any time that the Board is required by the Companies Act or the MOI to refer a matter to Members entitled to vote for decision;

20.4.2. whenever required to fill a vacancy on the Board.

20.5. Each resolution shall be expressed with sufficient clarity and specificity and accompanied by sufficient information / explanatory material to enable a Person who is entitled to vote on the resolution to determine whether to participate in the Members meeting, if applicable, and to seek to influence the outcome of the vote on the resolution. Once a resolution has been approved, it may not be challenged or impugned on the ground that it did not comply with the aforegoing.

20.6. The Board, CEO or Members holding not less than 10% (ten percent) of the Voting Rights may, whenever they/he think/s fit, convene a Members meeting or put the proposed resolution by way of a Round Robin Resolution

contemplated in clause 1.1.37.1. A Members meeting must be convened or the Board must put the proposed resolution by way of a Round Robin Resolution contemplated in clause 1.1.37.1. if one or more Written and signed demands for such a Members meeting or Round Robin Resolution is/are delivered to the Company, and —

20.6.1. each such demand describes the specific purpose for which the Members meeting is proposed; and

20.6.2. in aggregate, demands for substantially the same purpose are made and signed by the Members at the earliest time specified in any of those demands, of at least 10% (ten per cent) of the Voting Rights entitled to be exercised in relation to the matter proposed to be considered at the Members meeting.

20.7. Round Robin Resolutions contemplated in clause 1.1.37.1 will be passed if signed by Persons entitled to exercise sufficient Voting Rights for it to have been adopted as an Ordinary or Special Resolution, as the case may be, at a properly constituted Members meeting.

20.8. Every Members meeting shall be held where the Board determines from time to time. The authority of the Company to conduct a Members meeting entirely by Electronic Communication, or to provide for participation in a Members meeting by Electronic Communication so long as the Electronic Communication employed ordinarily enables all Persons participating in that Members meeting to communicate concurrently with each other without an intermediary, and to participate reasonably effectively in the Members meeting, as set out in section 63(2), is not limited or restricted.

20.9. An Annual General Meeting and a meeting called for the passing of a Special Resolution shall be called by at least 31 (thirty one) business days' notice and any other meeting shall be called by at least 15 (fifteen) business days' notice Delivered by the Company (and for this purpose clause 35.3 shall not apply) to all Members entitled to vote or otherwise entitled to receive notice.

20.10. The Company may call a Members meeting with less notice than required by clause 20.9, but such a Members meeting may proceed only if every Person who is entitled to exercise Voting Rights in respect of any item on the meeting agenda -

20.10.1. is Present at the Members meeting; and

20.10.2. votes to waive the required minimum notice of the Members meeting.

20.11. A Member entitled to vote, who is Present at a Members meeting –

20.11.1. is regarded as having received or waived notice of the Members meeting if at least the required minimum notice was given;

20.11.2. has a right to —

20.11.2.1. allege a Material defect in the form of notice for a particular item on the agenda for the Members meeting; and

20.11.2.2. participate in the determination whether to waive the requirements for notice, if at least the required minimum notice was given, or to ratify a defective notice; and

20.11.3. except to the extent set out in clause 20.11.2.1 is regarded to have waived any right based on an actual or alleged Material defect in the notice of the Members meeting.

20.12. A notice of a Members meeting must be in Writing, in plain language and must include -

20.12.1. the date, time and place for the meeting, and the Record Date for the meeting;

20.12.2. the general purpose of the meeting, and any specific purpose contemplated in clause 20.1, if applicable;

20.12.3. in the case of an Annual General Meeting a summarised form of the Financial Statements to be presented and directions for obtaining a copy of the complete annual Financial Statements for the preceding financial year;

20.12.4. a copy of any proposed resolution of which the Company has received notice, and which is to be considered at the meeting, and a notice of the percentage of Voting Rights that will be required for that resolution to be adopted;

20.12.5. a reasonably prominent statement that -

20.12.5.1. a Member entitled to attend and vote at the Members meeting shall be entitled to appoint a proxy to attend, participate in, speak and vote at the Members meeting in the place of the Member entitled to vote or give or withhold written consent on behalf of the Member entitled to vote to a decision by Round Robin Resolution contemplated in clause 1.1.37.1;

20.12.5.2. a proxy need not be a Member;

20.12.5.3. a Member entitled to vote may appoint more than 1 (one) proxy to exercise Voting Rights held by that Member entitled to vote in respect of any Members meeting;

20.12.5.4. the proxy may not delegate the authority granted to him as proxy;

20.12.5.5. participants in a Members meeting are required to furnish satisfactory identification in terms of

section 63(1) in order to reasonably satisfy the Person presiding at the Members meeting;

20.12.5.6. where applicable, if participation in the Members meeting by Electronic Communication is available, and provide any necessary information to enable Members entitled to vote or their proxies to access the available medium or means of Electronic Communication and advise that access to the medium or means of Electronic Communication is at the expense of the Member entitled to vote or proxy, except to the extent that the Company determines otherwise.

20.13. A Members meeting may proceed notwithstanding a Material defect in the giving of the notice, subject to clause 20.14, only if every Person who is entitled to exercise Voting Rights in respect of each item on the agenda of the Members meeting is present at the Members meeting and votes to approve the ratification of the defective notice.

20.14. If a Material defect in the form or manner of giving notice of a Members meeting relates only to one or more particular matters on the agenda for the Members meeting -

20.14.1. any such matter may be severed from the agenda, and the notice remains valid with respect to any remaining matters on the agenda; and

20.14.2. the Members meeting may proceed to consider a severed matter, if the defective notice in respect of that matter has been ratified.

20.15. An immaterial defect in the form or manner of Delivering notice of a Members meeting, or an accidental or inadvertent failure in the Delivery of the notice to any particular Member to whom it was addressed if the Company elects to do so, does not invalidate any action taken at the Members meeting.

20.16. No business may commence to be transacted at any Members meeting unless a quorum is present.

20.17. The quorum shall be sufficient Persons present at the Members meeting to exercise, in aggregate, at least 10% (ten percent) of all of the Voting Rights that are entitled to be exercised in respect of at least one matter to be decided at the Members meeting but if the Company has more than 2 (two) Persons entitled to vote, the Members meeting may not begin unless at least 3 (three) Persons entitled to vote are Present.

20.18. A matter to be decided at the Members meeting may not begin to be considered unless sufficient Persons are present at the Members meeting to exercise, in aggregate, at least 10% (ten percent) of all of the Voting Rights that are entitled to be exercised on that matter at the time the matter is called on the agenda for the Members meeting but if the Company has more than 2 (two) Persons entitled to vote, a matter may not begin to be debated, unless at least 3 (three) Persons entitled to vote, are Present.

20.19. If within 45 (forty-five) minutes from the time appointed for the Members meeting to commence, a quorum is not present, the Members meeting shall be postponed, without motion, vote or further notice, subject to clause 20.23, for 2 (two) weeks to the same day after two weeks or, if that day be a public holiday, to the next succeeding day which is not a public holiday, and if at such adjourned Members meeting a quorum is not present within 30 (thirty) minutes from the time appointed for the Members meeting then, the Person/s entitled to vote Present shall be deemed to be the requisite quorum.

20.20. A Members meeting, or the consideration of any matter being debated at the Members meeting, may be adjourned from time to time without further notice on a motion supported by Persons entitled to exercise, in aggregate, a majority of the Voting Rights —

20.20.1. held by all of the Persons who are present at the Members meeting at the time; and

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20.20.2. that are entitled to be exercised on at least one matter remaining on the agenda of the Members meeting, or on the matter under debate, as the case may be.

20.21. Such adjournment may be either to a fixed time and place or until further notice (in which latter case a further notice shall be Delivered to Members), as agreed at the Members meeting.

20.22. A Members meeting may not be adjourned beyond the earlier of -

20.22.1. the date that is 120 (one hundred and twenty) business days after the Record Date; or

20.22.2. the date that is 60 (sixty) business days after the date on which the adjournment occurred.

20.23. No further notice is required to be Delivered by the Company of a Members meeting that is postponed or adjourned as contemplated in clause 20.19, unless the location for the Members meeting is different from -

20.23.1. the location of the postponed or adjourned Members meeting; or

20.23.2. a location announced at the time of adjournment, in the case of an adjourned Members meeting.

20.24. After a quorum has been established for a Members meeting, or for a matter to be considered at a Members meeting, the Members meeting may continue, or the matter may be considered, so long as at least 3 (three) Persons with Voting Rights entitled to be exercised at the Members meeting, or on that matter, are Present at the Members meeting.

20.25. The Chairperson, if any, of the Board shall preside as Chairperson at every Members meeting. If there is no such Chairperson, or if at any Members meeting he is not present within 30 (thirty) minutes after the time appointed for holding the Members meeting or is unwilling to act as Chairperson, the vice-Chairperson shall act as Chairperson in his place, and if he is not

present or willing to act as Chairperson, the Persons entitled to vote which are Present shall select a Director present at the Members meeting, or if no Director be present at the Members meeting, or if all the Directors present decline to take the chair, the Persons entitled to vote shall select one of their number which is Present to be the Chairperson of the Members meeting.

20.26. At any Members meeting a resolution put to the vote shall be decided on a show of hands, unless before or on the declaration of the result of the show of hands a poll shall be demanded by –

20.26.1. not less than 2 (two) Persons having the right to vote on that matter; or

20.26.2. a Person/s entitled to exercise not less than 1/10th (one tenth) of the total Voting Rights entitled to vote on that matter,

and, unless a poll is so demanded, a declaration by the Chairperson that a resolution has, on a show of hands been carried, or carried unanimously, or by a particular majority, or lost, and an entry to that effect in the minute book of the Company, shall be conclusive evidence of the fact, without proof of the number or proportion of the votes recorded in favour of, or against, such resolution. No objection shall be raised as to the admissibility of any vote except at the Members meeting or adjourned Members meeting at which the vote objected to is or may be given or tendered and every vote not disallowed at such Members meeting shall be valid for all purposes. Any such objection shall be referred to the Chairperson of the Members meeting, whose decision shall be final and conclusive.

20.27. If a poll is duly demanded it shall be taken in such manner as the Chairperson directs, and the result of the poll shall be deemed to be the resolution of the Members meeting at which the poll was demanded. Scrutineers may be appointed by the Chairperson to declare the result of the poll, and if appointed their decision, which shall be given by the Chairperson

of the Members meeting, shall be deemed to be the resolution of the Members meeting at which the poll is demanded.

20.28. In the case of an equality of votes, whether on a show of hands or on a poll, the Chairperson of the Members meeting at which the show of hands takes place, or at which the poll is demanded, shall not be entitled to a second or casting vote.

20.29. A poll shall be taken forthwith. The demand for a poll shall not prevent the continuation of a Members meeting for the transaction of any business other than the question upon which the poll has been demanded. The demand for a poll may be withdrawn.

20.30. Every resolution of Members is either an Ordinary Resolution or a Special Resolution. An Ordinary Resolution, save to the extent expressly provided in respect of an particular matter contemplated in this MOI, shall require to be adopted with the support of more than 50% (fifty per cent) of the Voting Rights exercised on the resolution. A Special Resolution, save to the extent expressly provided in respect of an particular matter contemplated in this MOI, shall require to be adopted with the support of at least 75% (seventy five per cent) of the Voting Rights exercised on the resolution.

20.31. On a show of hands and on a poll a Person entitled to vote Present at the meeting shall have only 1 (one) vote. A proxy shall irrespective of the number of Members entitled to vote he represents have only 1 (one) vote on a show of hands.

20.32. No form appointing a proxy shall be valid after the expiration of 1 (one) year from the date when it was signed unless the proxy itself provides for a longer or shorter duration. The appointment is revocable at any time unless the proxy appointment expressly states otherwise, and may be revoked by cancelling it in Writing, or making a later inconsistent appointment of a proxy, and delivering a copy of the revocation instrument to the proxy, and to the Company. The revocation of a proxy appointment constitutes a complete

and final cancellation of the proxy's authority to act on behalf of the Member as of the later of either the date stated on the revocation, if any, or the date on which the revocation instrument was delivered to the Company. The appointment is suspended at any time and to the extent that the Member entitled to vote chooses to act directly and in person in the exercise of any rights as a Member entitled to vote.

20.33. The form appointing a proxy and the power of attorney or other authority, if any, under which it is signed or a notarially certified copy of such power or authority shall be delivered to the Company 48 (forty-eight) hours prior to the Members meeting, before the proxy exercises any rights of the Member entitled to vote at a Members meeting.

20.34. A vote given in accordance with the terms of an instrument of proxy shall be valid notwithstanding the death or mental disorder of the principal or revocation of the proxy or of the authority under which the proxy was executed, provided that no intimation in Writing of such death, insanity or revocation as aforesaid shall have been received by the Company at its Registered Office before the commencement of the Members meeting or adjourned Members meeting at which the proxy is used.

20.35. Subject to the provisions of the Companies Act, a form appointing a proxy may be in any usual or common form. The Company shall supply a generally standard form of proxy upon request by a Member entitled to vote.

20.36. If a proxy is received duly signed but with no indication as to how the person named therein should vote on any issue, the proxy may vote or abstain from voting as he sees fit unless the proxy indicates otherwise.

20.37. A Member entitled to vote may appoint more than 1 (one) proxy to exercise Voting Rights held by that Member in respect of any Members meeting.

20.38. A proxy may not delegate the authority granted to him.

21. RECORD DATE

21.1. If the Board determines the Record Date, it may not be earlier than the date on which the Record Date is determined or more than 10 (ten) business days before the date on which the event or action, for which the Record Date is being set, is scheduled to occur.

21.2. If, at any time, the Board fails to determine a Record Date, the Record Date for the relevant matter is –

21.2.1. in the case of a Members meeting, the latest date by which the Company is required to Deliver to Members entitled to vote, notice of that Members meeting; or

21.2.2. the date of the action or event, in any other case.

21.3. The Company must publish a notice of a Record Date for any matter by –

21.3.1. Delivering a copy to each Member (and clause 35.3 shall not apply); and

21.3.2. posting a conspicuous copy of the notice –

21.3.2.1. at its principal office; and

21.3.2.2. on its web-site, if it has one.

22. ELECTION/APPOINTMENT OF DIRECTORS AND FILLING OF CASUAL VACANCIES

22.1. Unless otherwise determined by the Company in a Members meeting, there shall be not less than 5 (five) Directors and not more than 10 (ten) Directors of the Company, provided that the CEO shall always be an *ex officio* Director of the Company.

22.2. A Director shall not be required to be a Member in order to be elected or appointed a Director of the Company.

22.3. The Directors must not be connected persons in relation to each other. At least 2 (two) members of the Board (excluding the CEO) shall be persons from businesses or professions broadly forming part of the conservation field.

22.4. The continuing Directors may act, notwithstanding any vacancy in their number, but if and for so long as their number is reduced below the minimum number of Directors required to act as such for the time being, the continuing Director(s) may act only for the purpose of increasing the number of Directors to the required minimum or of convening a Members meeting but for no other purpose.

22.5. The CEO shall, not fewer than 30 (thirty) days prior to the date of the meeting at which Directors are to be elected, cause a nomination paper to be sent to each Member.

22.6. Each Member or Director shall be entitled to nominate a maximum of 2 (two) persons as candidates for election to the Board.

22.7. A nomination shall only be valid if –

22.7.1. the nomination paper is signed by both the proposer and the candidate; and

22.7.2. the nomination paper is returned to the Company by no later than the date stipulated thereon.

22.8. The Board shall verify –

22.8.1.1. that each nomination paper has been correctly completed;

22.8.1.2. that the candidate is eligible for election; and

22.8.1.3. that the proposer is a Member or Director who is entitled to nominate a candidate.

22.9. The CEO shall prepare a ballot paper on which the names of all the duly nominated candidates shall appear. These ballot papers and *curricula vitae* of the candidates shall be annexed to the nomination papers and posted to all voting Members at least 31 (thirty one) days before the Members meeting at which the election is to be held.

22.10. Voting Members shall be entitled to submit completed ballot papers by –

22.10.1. posting to the Company's postal address; or

22.10.2. delivering the papers by hand to the Company's Registered Office;

22.10.3. scanning the papers and attaching them to emails.

22.11. The ballot papers shall be sealed and shall remain sealed and under the control of the Chairperson, who shall declare the election closed at the time determined by the ballot notice.

22.12. The Board shall appoint 1(one) or more Scrutineer(s) to count the ballot papers and then provide the Chairperson with a certificate of the result.

22.13. The Scrutineer(s) shall endeavour to provide the Chairperson with the result certificate at the meeting at which voting takes place, but in any event not more than 5 (five) Business Days after the close of voting.

22.14. The Chairperson shall provide the Members with written notification of the results of the election within 14 (fourteen) Business Days of receipt of the result certificate frome the Scrutineers.

22.15. Subject to clauses 22.16 and 22.17, each of the Directors shall be elected to serve as Director of the Company for an indefinite term.

22.16. At each Annual General Meeting in every year one third of the Directors for the time being, or if their number is not 3 (three) or a multiple of 3 (three), the number nearest to one third, shall retire from office.

22.17. The Directors to retire in every year shall be those who have been longest in office since their last election, but as between persons who become Directors on the same day, those to retire shall, unless they otherwise agree amongst themselves, be determined by lot.

22.18. A Director shall be eligible for re-election at the expiry of his term of office.

22.19. The Company, at the Annual General Meeting at which a Director retires in the manner aforesaid or at any Members meeting, may fill the vacancy by electing a person thereto in terms of this clause 22.

22.20. If at any meeting at which an election of Directors ought to take place the offices of the retiring Director(s) is/are not filled, unless it is expressly resolved not to fill such vacancies, the meeting shall stand adjourned and the provisions of clauses 20.19 and 20.20 shall apply *mutatis mutandis* to such adjournment, and if at such adjourned meeting the vacancies are not filled, the retiring Director(s) or such of them as have not had their offices filled shall be deemed to be re-elected at such adjourned meeting unless a resolution for the re-election of any such Director shall have been put to the meeting and negated.

22.21. There are no general qualifications prescribed by the Company for a person to serve as a Director in addition to the requirements of the Companies Act.

22.22. No person shall be elected as a Director, if he is Ineligible or Disqualified and any such election shall be a nullity. A person who is Ineligible or Disqualified must not consent to be elected as a Director nor act as a Director. A person placed under probation by a court must not serve as a Director unless the order of court so permits.

22.23. No election of a Director shall take effect until he has delivered to the Company a Written consent to serve.

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22.24. A Board meeting shall have the power, from time to time, to appoint anyone as a Director, either to fill a vacancy in the Board or as an additional Director, provided that –

22.24.1. the total number of Directors shall not at any time exceed the maximum number fixed in terms of clause 22.1; and

22.24.2. the appointment of the Director is ratified by the Members at the next Members meeting.

22.25. If there is no Director able and willing to act, then any Member entitled to exercise Voting Rights in the election of a Director may convene a Members meeting for the purpose of electing Directors.

23. ALTERNATE DIRECTORS

23.1. Each Director shall have the power to nominate any other Member of the Company to act as Alternate Director in his absence or inability to act as such, provided that the appointment of any person who is not a Member or Director shall require the approval of the Board, whose consent may not be unreasonably withheld. Upon such appointment being made, the Alternate Director shall, in all respects, be subject to the terms, qualifications and conditions existing with reference to the other Directors of the Company. A person may be appointed as alternate to more than one Director. If a person is alternate to more than one Director or where an Alternate Director is a Director, he or she shall have a separate vote on behalf of each Director he is representing in addition to his own vote, if any.

23.2. Any Alternate Director, whilst acting in the stead of the Director who appointed him, sahll exercise and discharge all the powers, duties and functions of the Director he represents. The appointment of an Alternate Director shall be revoked, and the Alternate Director shall cease to hold office, when the Director who appointed him ceased to be a Director, or should such Director or the Alternate Director himself, give notice to the

Company Secretary that such Alternate Director has ceased to represent the Director concerned.

24. INELIGIBILITY/DISQUALIFICATION OF A DIRECTOR

24.1. A person is Ineligible to be a Director if the person –

24.1.1. is a Juristic Person;

24.1.2. is an unemancipated minor, or is under a similar legal disability; or

24.1.3. does not satisfy any qualification set out in this MOI;

24.2. A person is Disqualified to be a Director if –

24.2.1. a court has prohibited that person to be a Director, or declared the person to be delinquent in terms of the Companies Act as amended from time to time or the Close Corporations Act, No 69 of 1984, as amended from time to time; or

24.2.2. the person –

24.2.2.1. is an unrehabilitated insolvent;

24.2.2.2. is prohibited in terms of any public regulation to be a Director;

24.2.2.3. has been removed from an office of trust, on the grounds of misconduct involving dishonesty; or

24.2.2.4. has been convicted, in the Republic or elsewhere, and imprisoned without the option of a fine, or fined more than R1 000,00 (one thousand rand), for theft, fraud, forgery, perjury or an offence –

24.2.2.4.1. involving fraud, misrepresentation or dishonesty;

24.2.2.4.2. in connection with the promotion, formation or management of a company, or in connection with any act as contemplated in the Companies Act as amended from time to time; or

24.2.2.4.3. under the Companies Act, the Insolvency Act, No 24 of 1936, the Close Corporations Act, No 69 of 1984, the Competition Act, No. 89 of 1998, the Financial Intelligence Centre Act, No 38 of 2001, the Securities Services Act, No 36 of 2004, or Chapter 2 of the Prevention and Combating of Corruption Activities Act, No 12 of 2004.

25. CESSATION OF OFFICE AS DIRECTOR

25.1. A Director shall cease to hold office as such –

25.1.1. immediately he becomes Ineligible or Disqualified or the Board resolves to remove him on such basis, and in the latter case the Director has not within the permitted period filed an application for review or has filed such an application but the court has not yet confirmed the removal (during which period he shall be suspended);

25.1.2. when his term of office contemplated in clause 22 expires;

25.1.3. when he dies;

25.1.4. when he resigns by Written notice to the Company;

25.1.5. if there are more than 3 (three) Directors in office and if the Board determines that he has become incapacitated to the extent that the person is unable to perform the functions of a Director, and is unlikely to regain that capacity within a reasonable time, and the Director has not within the permitted period filed an application for review or has filed such an application but the court has not yet confirmed the removal (during which period he shall be suspended);

25.1.6. if he is declared delinquent by a court, or placed on probation under conditions that are inconsistent with continuing to be a Director of the Company;

25.1.7. In the case of a Director elected onto the Board by Members, if he is removed by Ordinary Resolution of the Persons entitled to exercise Voting Rights in an election of that Director;

25.1.8. In the case of a Director appointed onto the Board by Persons named in, or determined in terms of this MOI, if he is removed by Written notice to the Company by the Person(s) who appointed such Director;

25.1.9. if there are more than 3 (three) Directors in office and if he is removed by resolution of the Board for being negligent or derelict in performing the functions of a Director, and the Director has not within the permitted period filed an application for review or has filed such an application but the court has not yet confirmed the removal (during which period she/he shall be suspended);

25.1.10. if he files a petition for the surrender of his estate or an application for an administration order, or if he commits an act of insolvency as defined in the insolvency law for the time being in force, or if he makes any arrangement or composition with his creditors generally; or

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25.1.11. if he is otherwise removed in accordance with any provision of this MOI.

26. REMUNERATION OR REIMBURSEMENT

26.1. Apart from the CEO, the Directors of the Company shall not receive any remuneration for their services to the Company.

26.2. The Directors may however be paid all travelling, hotel and other expenses properly incurred by them in or about the performance of their duties as Directors including those of attending and travelling to and from meetings of the Directors or any committee of the Directors or at any meeting of Members of the Company.

27. FINANCIAL ASSISTANCE FOR DIRECTORS AND PRESCRIBED OFFICERS AND THEIR RELATED AND INTER RELATED PARTIES

The Company may not provide a loan to, secure a debt or obligation of, or otherwise provide direct or indirect financial assistance to, a Director of the Company or of a related or inter-related company, or to a Person related to any such Director, other than a transaction if it –

27.1. is in the ordinary course of the Company's business and for fair value;

27.2. constitutes an accountable advance to meet-

27.2.1. legal expenses in relation to a matter concerning the Company; or

27.2.2. anticipated expenses to be incurred by the Person on behalf of the Company;

27.3. is to defray the Person's expenses for removal at the Company's request; or

27.4. is in terms of an employee benefit scheme generally available to all employees or a specific class of employees.

28. GENERAL POWERS AND DUTIES OF DIRECTORS

28.1. The business and affairs of the Company shall be managed by or under the direction of the Board, which has the authority to exercise all of the powers and perform any of the functions of the Company, except to the extent that the Companies Act or this MOI provides otherwise.

28.2. The Directors may -

28.2.1. establish and maintain any non-contributory or contributory pension, superannuation, provident and benefit funds for the benefit of; and

28.2.2. give pensions, gratuities and allowances to and make payments for or towards the insurance of,

any persons who are employees or ex-employees (including Directors or ex-Directors) of the Company and the wives, widows, families and dependants of such persons.

28.3. The Board may from time to time appoint one or more of the Directors to the office of managing Director or CEO for such period and at such remuneration and generally on such terms they may think fit, and it may be made a term of his appointment that he be paid a pension, gratuity or other benefit on his retirement from office.

28.4. The Board may from time to time entrust to and confer upon a managing Director or CEO for the time being such of the powers vested in the Directors as they may think fit, and may confer such powers for such time and to be exercised for such objects and upon such terms and with such restrictions as they may think expedient; and they may confer such powers either collaterally or to the exclusion of, and in substitution for, all or any of the powers of the Directors, and may from time to time revoke or vary all or any of such powers. A managing Director or CEO appointed pursuant to the provisions hereof shall not be regarded as an agent or delegate of the

Directors and after powers have been conferred upon him by the Board in terms hereof he shall be deemed to derive such powers directly from this clause.

28.5. The Board shall have the power on behalf of the Company to –

28.5.1. appoint managers, including the CEO, from time to time in order to carry out certain functions of the Company in the pursuance of the Company's objectives.

28.5.2. discipline and dismiss the CEO and other managers both in terms of the LRA and in terms of any specific conditions contained in this MOI;

28.5.3. appoint a panel of advisors of up to 5 (five) Members who shall report to and assist the CEO from time to time;

28.5.4. appoint a membership panel to review and make recommendations regarding the application, acceptance, appointment, discipline and dismissal of all or any of the Members or proposed Members of the Company from time to time;

28.5.5. delegate powers to the CEO;

28.5.6. upon the CEO's request, consider and decide on the appointment of such staff and their remuneration (if any) and other conditions of service as it may deem necessary from time to time.

29. BOARD COMMITTEES

29.1. The Directors may appoint any number of Board committees and delegate to such committees any authority of the Board. The members of such committees may include persons who are not Directors.

29.2. No person shall be appointed as a member of a Board committee, if he is Ineligible or Disqualified and any such appointment shall be a nullity. A person who is Ineligible or Disqualified must not consent to be appointed as a member of a Board committee nor act as such a member. A person placed under probation by a court must not serve as a member of a Board committee unless the order of court so permits.

29.3. There are no general qualifications prescribed by the Company for a person to serve as a member of a Board committee in addition to the requirements of the Companies Act.

29.4. A member of a Board committee shall cease to hold office as such immediately when he becomes Ineligible or Disqualified in terms of the Companies Act.

29.5. Committees of the Board may consult with or receive advice from any person.

29.6. Meetings and other proceedings of a committee of the Board consisting of more than 1 (one) member shall be governed by the provisions of this MOI regulating the meetings and proceedings of Directors.

30. PERSONAL FINANCIAL INTERESTS OF DIRECTORS

30.1. For the purposes of this clause 30 (Personal Financial Interests of Directors), "Director" includes a Prescribed Officer, and a person who is a member of a committee of the Board, irrespective of whether or not the person is also a member of the Board.

30.2. At any time, a Director may disclose any Personal Financial Interest in advance, by delivering to the Board a notice in Writing setting out the nature and extent of that Personal Financial Interest, to be used generally by the Company until changed or withdrawn by further Written notice from that Director.

30.3. If a Director has a Personal Financial Interest in respect of a matter to be considered at a meeting of the Board, or Knows that a Related Person has a Personal Financial Interest in the matter, the Director -

30.3.1. must disclose the Personal Financial Interest and its general nature before the matter is considered at the meeting;

30.3.2. must disclose to the meeting any Material information relating to the matter, and Known to the Director;

30.3.3. may disclose any observations or pertinent insights relating to the matter if requested to do so by the other Directors;

30.3.4. if present at the meeting, must leave the meeting immediately after making any disclosure contemplated in clauses 30.3.2 or 30.3.3;

30.3.5. must not take part in the consideration of the matter, except to the extent contemplated in clauses 30.3.2 or 30.3.3;

30.3.6. while absent from the meeting in terms of this clause 30.3.3:

30.3.6.1. is to be regarded as being present at the meeting for the purpose of determining whether sufficient Directors are present to constitute a quorum; and

30.3.6.2. is not to be regarded as being present at the meeting for the purpose of determining whether a resolution has sufficient support to be adopted; and

30.3.7. must not execute any document on behalf of the Company in relation to the matter unless specifically requested or directed to do so by the Board.

30.4. If a Director acquires a Personal Financial Interest in an agreement or other matter in which the Company has a Material interest, or Knows that a

Related Person has acquired a Personal Financial Interest in the matter, after the agreement or other matter has been approved by the Company, the Director must promptly disclose to the Board, the nature and extent of that Personal Financial Interest, and the material circumstances relating to the Director or Related Person's acquisition of that Personal Financial Interest.

30.5. A decision by the Board, or a transaction or agreement approved by the Board, is valid despite any Personal Financial Interest of a Director or Person Related to the Director, only if -

30.5.1. it was approved following the disclosure of the Personal Financial Interest in the manner contemplated in this clause 30 (Personal Financial Interests of Directors); or

30.5.2. despite having been approved without disclosure of that Personal Financial Interest, it has been ratified by an Ordinary Resolution following disclosure of that Personal Financial Interest or so declared by a court.

31. PROCEEDINGS OF DIRECTORS

31.1. A Director authorised by the Board -

31.1.1. may, at any time, summon a meeting of the Directors; and

31.1.2. must call a meeting of the Directors if required to do so by at least 2 (two) Directors.

31.2. The Directors may determine what period of notice shall be given of meetings of Directors and may determine the means of giving such notice which may include telephone, telefax or Electronic Communication. It shall be necessary to give notice of a meeting of Directors to all Directors even those for the time being absent from South Africa.

31.3. If all of the Directors -

31.3.1. acknowledge actual receipt of the notice;

31.3.2. are present at a meeting of the Directors; or

31.3.3. waive notice of the meeting,

the meeting may proceed even if the Company failed to give the required notice of that meeting, or there was a defect in the giving of the notice.

31.4. The Directors may meet together for the despatch of business, adjourn and otherwise regulate their meetings as they think fit.

31.5. Unless otherwise resolved by the Directors, all their meetings shall be held in the city or town where the Company's Registered Office is for the time being situated. A meeting of Directors may be conducted by Electronic Communication and/or one or more Directors may participate in a meeting of Directors by Electronic Communication so long as the Electronic Communication facility employed ordinarily enables all persons participating in that meeting to communicate concurrently with each other without an intermediary, and to participate effectively in the meeting.

31.6. The quorum for a Directors' meeting shall be -

31.6.1. 2 (two) Directors if the total number of Directors is not more than 3 (three), or

31.6.2. 4 (four) Directors in any other case.

31.7. The Directors may elect a Chairperson and a vice-Chairperson of the Board and determine the period for which each of them is to hold office; but if no such Chairperson is elected, or if at any meeting the Chairperson is not present within 15 (fifteen) minutes after the time appointed for holding it, the Directors present may choose one of their number to be Chairperson of the meeting, provided that if a vice-Chairperson has been elected he shall be the Chairperson of the meeting.

31.8. Each Director has 1 (one) vote on a matter before the Board and a majority of the votes cast on a resolution is sufficient to approve that resolution.

31.9. In the case of a tied vote the Chairperson may not cast a deciding vote even if the Chairperson did initially have or cast a vote.

31.10. The Company must keep minutes of the meetings of the Board, and any of its committees, and include in the minutes –

31.10.1. any declaration given by notice or made by a Director as required by clause 30 (Personal Financial Interests of Directors);

31.10.2. every resolution adopted by the Board.

31.11. Resolutions adopted by the Board –

31.11.1. must be dated and sequentially numbered; and

31.11.2. are effective as of the date of the resolution, unless the resolution states otherwise.

31.12. Any minutes of a meeting, or a resolution, signed by the Chairperson of the meeting, or by the Chairperson of the next meeting of the Board, are/is evidence of the proceedings of that meeting, or adoption of that resolution, as the case may be.

31.13. A Round Robin Resolution of Directors, consented to by a majority of the Directors (given in person or by electronic communication), shall be as valid and effectual as if it had been passed at a meeting of the Directors duly called and constituted, provided that each Director in South Africa who is able to receive notice, has received notice of the matter to be decided upon.

32. PRESCRIBED OFFICERS

32.1. No person shall hold office as a Prescribed Officer, if he is Ineligible or Disqualified. A person who is Ineligible or Disqualified must not consent to be appointed to an office or undertake any functions which would result in

him being a Prescribed Officer nor act in such office nor undertake any such functions. A person placed under probation by a court must not consent to be appointed to an office or undertake any functions which would result in him being a Prescribed Officer nor act in such office nor undertake any such functions unless the order of court so permits.

32.2. A Prescribed Officer shall cease to hold office as such immediately when he becomes Ineligible or Disqualified in terms of the Companies Act.

33. APPOINTMENT OF SECRETARY

33.1. The Directors may appoint a company secretary from time to time, who –

33.1.1. shall be a permanent resident of South Africa and remain so while serving as secretary; and

33.1.2. shall have the requisite knowledge of, or experience in, relevant laws; and

33.1.3. may be a Juristic Person subject to the following -

33.1.3.1. every employee of that Juristic Person who provides company secretary services, or partner and employee of that partnership, as the case may be, is not Ineligible or Disqualified;

33.1.3.2. at least 1 (one) employee of that Juristic Person, or one partner or employee of that partnership, as the case may be, satisfies the requirements in clauses 33.1.1 and 33.1.2.

33.2. Within 60 (sixty) business days after a vacancy arises in the office of company secretary, the Board must fill the vacancy by appointing a Person whom the Directors consider to have the requisite knowledge and experience. A change in the membership of a Juristic Person or partnership that holds office as company secretary does not constitute a casual vacancy

in the office of company secretary, if the Juristic Person or partnership continues to satisfy the requirements of clause 33.1.3.

33.3. If at any time a Juristic Person or partnership holds office as company secretary of the Company –

33.3.1. the Juristic Person or partnership must immediately notify the Directors if the Juristic Person or partnership no longer satisfies the requirements of clause 33.1.3, and is regarded to have resigned as company secretary upon giving that notice to the Company;

33.3.2. the Company is entitled to assume that the Juristic Person or partnership satisfies the requirements of clause 33.1.3, until the Company has received a notice contemplated in clause 33.1.3; and

33.3.3. any action taken by the Juristic Person or partnership in performance of its functions as company secretary is not invalidated merely because the Juristic Person or partnership had ceased to satisfy the requirements of clause 33.1.3 at the time of that action.

33.4. The company secretary may resign from office by giving the Company 1 (one) month's Written notice or less than that with the prior Written approval of the Board.

33.5. If the company secretary is removed from office by the Board, the company secretary may, by giving Written notice to that effect to the Company by not later than the end of the financial year in which the removal took place, require the Company to include a statement in its annual Financial Statements relating to that financial year, not exceeding a reasonable length, setting out the company secretary's contention as to the circumstances that resulted in the removal. The Company must include this statement in the Directors' report in its annual Financial Statements.

33.6. Whenever a company secretary has been appointed as contemplated in clause 33.1, the Company must maintain a record including –

33.6.1. the name, including any former name of each such person; and

33.6.2. the date of every such appointment; and

33.6.3. any changes in the particulars referred to in clause 33.6.1 and 33.6.2, as they occur, with the date and nature of each such change.

34. LOSS OF DOCUMENTS

The Company shall not be responsible for the loss in transmission of any document sent through the post either to the registered Address of any Member or to any other Address requested by the Member.

35. NOTICES

35.1. The Company may give notices, documents, records or notices of availability of the aforegoing by personal Delivery to the Member or by sending them prepaid through the post or by transmitting them by email, telegram, telex or fax.

35.2. Any Member who/which has furnished an Electronic Address to the Company, by doing so –

35.2.1. authorises the Company to use Electronic Communication to give notices, documents, records or statements or notices of availability of the aforegoing to him; and

35.2.2. confirms that same can conveniently be printed by the Member within a reasonable time and at a reasonable cost.

35.3. Any notice required to be given by the Company to the Members and not expressly prohibiting the provisions of this clause from applying, shall be sufficiently given (subject to giving a notice of availability in accordance with

clause 35.1 or 35.2), if given by posting it on the Company's web site, if any, until at least the date when the event to which the notice refers occurs.

35.4. Any notice, document, record or statement or notice of availability of the aforegoing sent by the Company shall be deemed to have been Delivered on the date and time determined in accordance with the provisions of the Companies Act.

35.5. A Member shall be bound by every notice. The Company shall not be bound to enter any Person in the Members Register until that Person gives the Company an Address for entry on the Members Register.

35.6. The Company shall not be bound to use any method of giving notice, documents, records or statements or notices of availability of the aforegoing, contemplated in the Regulations in respect of which provision is made for deemed Delivery, but if the Company does use such a method, the notice, document, record or statement or notice of availability of the aforegoing shall be deemed to be Delivered on the day determined in accordance with the Regulations. In any other case, when a given number of days' notice or notice extending over any period is required to be given (which are not business days which shall be calculated in accordance with clause 2), the provisions of clause 2 shall also be applied.

35.7. As regards the signature of an Electronic Communication by a Member, it shall be in such form as the Directors may specify to demonstrate that the Electronic Communication is genuine, or failing any such specification by the Directors, it shall be constituted by the Member indicating in the Electronic Communication that it is the Member's intention to use the Electronic Communication as the medium to indicate the Member's approval of the information in, or the Member's signature of the document in or attached to, the Electronic Communication which contains the name of the Member sending it in the body of the Electronic Communication.

36. INDEMNITY

36.1. For the purposes of this clause 36 (Indemnity), "Director" includes a former Director, a Prescribed Officer, a person who is a member of a committee of the Board, irrespective of whether or not the person is also a member of the Board.

36.2. The Company may -

36.2.1. not directly or indirectly pay any fine that may be imposed on a Director, or on a Director of a related company, as a consequence of that Director having been convicted of an offence in terms of any national legislation;

36.2.2. advance expenses to a Director to defend litigation in any proceedings arising out of the Director's service to the Company; and

36.2.3. directly or indirectly indemnify a Director for –

36.2.3.1. any liability, other than in respect of -

36.2.3.1.1. any liability arising in terms of sections 77(3)(a), (b) or (c) or from wilful misconduct or wilful breach of trust on the part of the Director; or

36.2.3.1.2. any fine contemplated in clause 36.2.1;

36.2.3.2. any expenses contemplated in clause 36.2.2, irrespective of whether it has advanced those expenses, if the proceedings -

36.2.3.2.1. are abandoned or exculpate the Director; or

36.2.3.2.2. arise in respect of any other liability for which the Company may indemnify the Director in terms of clause 36.2.3.1.

36.3. The Company may purchase insurance to protect -

36.3.1. a Director against any liability or expenses contemplated in clause 36.2.2 or 36.2.3; or

36.3.2. the Company against any contingency including but not limited to -

36.3.2.1. any expenses:

36.3.2.1.1. that the Company is permitted to advance in accordance with clause 36.2.2;or

36.3.2.1.2. for which the Company is permitted to indemnify a Director in accordance with clause 36.2.3;or

36.3.2.2. any liability for which the Company is permitted to indemnify a Director in accordance with clause 36.2.3.1.

36.4. The Company is entitled to claim restitution from a Director or of a related company for any money paid directly or indirectly by the Company to or on behalf of that Director in any manner inconsistent with section 75.

37. FUNDAMENTAL TRANSACTIONS AND CONVERSION

37.1. The Company may not –

37.1.1. amalgamate or merge with, or convert to, a profit company; or

37.1.2. dispose of any part of its assets, undertaking or business to a profit company, other than for fair value, except to the extent that

such a disposition of an asset occurs in the ordinary course of the activities of the Company.

37.2. If the Company has Voting Members, any proposal to –

37.2.1. dispose of all or the greater part of its assets or undertaking; or

37.2.2. amalgamate or merge with another non-profit company,

must be submitted to the Members for approval, in a manner comparable to that required of profit companies in accordance with sections 112 and 113, respectively.

37.3. Sections 115 and 116, read with the changes required by the context, apply with respect to the approval of a proposal contemplated in clause 37.

38. WINDING UP OR DISSOLUTION

Despite any provision in any law or agreement to the contrary, upon the winding-up or dissolution of the Company, after making provision for the costs of dissolving the Company, the net value of the Company shall be distributed to any similar public benefit organisation which has been approved by the Commissioner: South African Revenue Service in terms of section 30 of the Income Tax Act or any institution, board or body which is exempt from tax under the provisions of section 10(1)(cA)(i) of the aforementioned Act, which has as its sole object the carrying on of any public benefit activity and which has similar objects to those of the Company.

ANNEXURE 1

REGISTERED OFFICE OF SANCCOB NPC

A. PHYSICAL – Seabird Centre, Pentz Drive, Table View, 7441

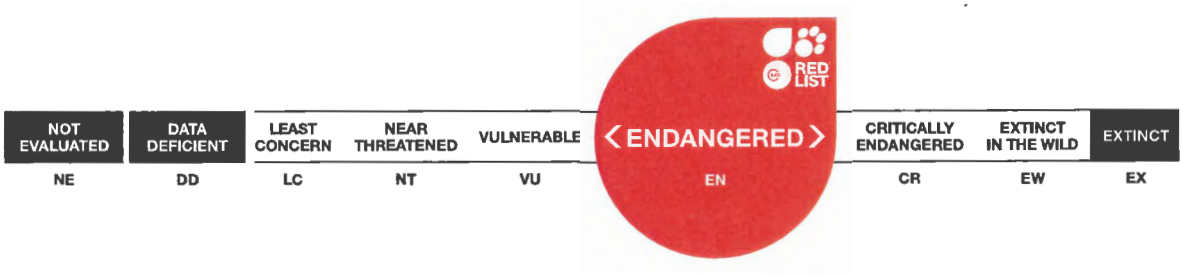
B. POSTAL - P O Box 11116, Bloubergrand, 7443

"AM12"

The IUCN Red List of Threatened Species™
ISSN 2307-8235 (online)
IUCN 2020: T22697810A157423361
Scope(s): Global
Language: English

Spheniscus demersus, African Penguin

Assessment by: BirdLife International



View on www.iucnredlist.org

Citation: BirdLife International. 2020. *Spheniscus demersus*. *The IUCN Red List of Threatened Species* 2020: e.T22697810A157423361. https://dx.doi.org/10.2305/IUCN.UK.2020-3.RLTS.T22697810A157423361.en

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Taxonomy

Kingdom	Phylum	Class	Order	Family
Animalia	Chordata	Aves	Sphenisciformes	Spheniscidae

Scientific Name: *Spheniscus demersus* (Linnaeus, 1758)

Common Name(s):

- English: African Penguin, Black-footed Penguin, Jackass Penguin
- French: Manchot du Cap
- Spanish; Castilian: Pingüino del Cabo

Taxonomic Source(s):

del Hoyo, J., Collar, N.J., Christie, D.A., Elliott, A. and Fishpool, L.D.C. 2014. *HBW and BirdLife International Illustrated Checklist of the Birds of the World. Volume 1: Non-passerines*. Lynx Edicions BirdLife International, Barcelona, Spain and Cambridge, UK.

Identification Information:

60-70 cm. Medium-sized, black-and-white penguin. Adult black above, white below with variable amount of black spotting on breast and belly. Broad, black breast-band and black-and-white facial pattern diagnostic. Whitish bare skin over the eyes becomes bright pinkish-red in very hot conditions. Male has deeper, more robust bill. Juvenile initially dark slaty-blue above, turning browner and, in second and third year, shows varying amount of adult facial pattern. **Similar spp.** Very rarely, some individuals show a double black breast-band - indicative of Magellanic Penguin *S. magellanicus*, which has never been positively recorded in Africa.

Assessment Information

Red List Category & Criteria: Endangered A2ace+3bce+4ace ver 3.1

Year Published: 2020

Date Assessed: September 9, 2019

Justification:

This species is classified as Endangered because it is undergoing a very rapid population decline, probably as a result of commercial fisheries and shifts in prey populations. This trend currently shows no sign of reversing, and immediate conservation action is required to prevent further declines. Recent count data for the number of breeding pairs suggests that the rate of decline may actually have increased in recent years. If the estimated rate of population decline is confirmed to have accelerated, the species may require uplisting.

Previously Published Red List Assessments

2018 – Endangered (EN)
https://dx.doi.org/10.2305/IUCN.UK.2018-2.RLTS.T22697810A132604504.en

2016 – Endangered (EN)

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https://dx.doi.org/10.2305/IUCN.UK.2020-3.RLTS.T22697810A157423361.en

https://dx.doi.org/10.2305/IUCN.UK.2016-3.RLTS.T22697810A93641269.en

2015 – Endangered (EN)
https://dx.doi.org/10.2305/IUCN.UK.2015.RLTS.T22697810A84636189.en

2013 – Endangered (EN)
https://dx.doi.org/10.2305/IUCN.UK.2013-2.RLTS.T22697810A48140293.en

2012 – Endangered (EN)

2010 – Endangered (EN)

2008 – Vulnerable (VU)

2005 – Vulnerable (VU)

2004 – Vulnerable (VU)

2000 – Vulnerable (VU)

1994 – Unknown (LR/NT)

1988 – Threatened (T)

Geographic Range

Range Description:

Spheniscus demersus is endemic to southern Africa, where it breeds at 28 localities in **Namibia** and **South Africa** (Kemper *et al.* 2007b, Crawford *et al.* 2013, Kemper 2015). It has been recorded as far north as Gabon and Mozambique (Crawford *et al.* 2013).

In Namibia, Neglectus Islet and Penguin Island were recolonised in 2001 and 2006 respectively (Kemper *et al.* 2007a). In the 1980s, the species colonised Stony Point and Boulders Beach on the South African mainland and recolonised Robben Island, all in the southwest of the country (Underhill *et al.* 2006). A colony formed on the southern mainland at De Hoop in 2003, but disappeared after 2007. The northernmost colony at Lambert's Bay became extinct in 2006 (Underhill *et al.* 2006, Crawford *et al.* 2011).

In 2015, the population for Namibia was estimated at 5,700 to 5,800 pairs (MFMR *unpubl. data*), the uncertainty in the estimate arising from a few islands that had not been counted for several years (J. Kemper *pers. comm.*). The most important colonies were Mercury Island: 2,646 pairs, Ichaboe Island: 488 pairs, Halifax Island: 1,092 pairs and Possession Island: 1,205 pairs (MFMR *unpubl. data*).

In 2019, c.13,300 pairs bred in South Africa: St Croix Island: 3,638 pairs, Bird Island (Algoa Bay): 2,378 pairs, Dassen Island: 1,912 pairs, Stony Point: 1,705 pairs , Robben Island: 1,190 pairs, Dyer Island: 1,071 pairs, Simonstown: 932 pairs (Department of Environmental Affairs, SANParks and CapeNature

https://dx.doi.org/10.2305/IUCN.UK.2020-3.RLTS.T22697810A157423361.en

unpubl. data). Just seven colonies now support 97% of the South African population. Recent declines at South African colonies are coincident with changes in the abundance and availability of forage fish and an eastward movement of spawning forage fish (Crawford *et al.* 2011, Waller 2011, Sherley *et al.* 2014a).

Country Occurrence:

Native, Extant (resident): Namibia; South Africa

Native, Extant (non-breeding): Angola; Mozambique

Extant & Vagrant (non-breeding): Congo; Gabon

FAO Marine Fishing Areas:

Native: Atlantic - southeast

https://dx.doi.org/10.2305/IUCN.UK.2020-3.RLTS.T22697810A157423361.en

Distribution Map

Legend

EXTANT (RESIDENT)

Compiled by:

BirdLife International and Handbook of the Birds of the World (2016) 2013

The boundaries and names shown and the designations used on this map do not imply any official endorsement, acceptance or opinion by IUCN.

https://dx.doi.org/10.2305/IUCN.UK.2020-3.RLTS.T22697810A157423361.en

Population

In 2015, the overall number of pairs was about 20,850 pairs, or 41,700 mature individuals (Sherley *et al.* 2019a). This roughly equates to about 66,720 individuals in adult plumage based on the conversion factor of 3.2 for pairs to individuals (Crawford and Boonstra 1994).

Trend Justification

The population in Namibia declined from 12,162 pairs in 1978 to an estimated 5,800 pairs in 2015. The South African population declined from c.70,000 pairs in 1978/1979 (Shelton *et al.* 1984) to 19,300 pairs in 2015. Decreases in both countries amount to > 50% in three generations (Kemper 2015, Hagen 2016).
Current Population Trend: Decreasing

Habitat and Ecology (see Appendix for additional information)

Behaviour Adults are largely resident, but some movements occur in response to prey movements (Hockey *et al.* 2005). Adults generally remain within 400 km of their breeding locality, although they have been recorded up to 900 km away (Hockey *et al.* 2005, Roberts 2015). They breed and moult on land before taking to the sea, where they can remain for up to four months (Crawford *et al.* 2013, Roberts 2015). On gaining independence, juveniles disperse up to 2,000 km from their natal colonies, with those from the east heading west, and those from the west and south moving north (Sherley *et al.* 2013a, Sherley *et al.* 2017). Most birds later return to their natal colony to moult and breed (Randall *et al.* 1987, Sherley *et al.* 2014a), although the growth of some colonies has been attributed to the immigration of first-time breeders tracking food availability (Crawford 1998, Crawford *et al.* 2013). Adults nest colonially, but may also nest in isolation. At sea they forage singly, in pairs or sometimes co-operatively in small groups of up to 150 individuals (Wilson *et al.* 1986, Kemper *et al.* 2007b, Ryan *et al.* 2012, McInnes *et al.* 2019). African Penguins forage more successfully in groups when feeding on schooling fish (McInnes *et al.* 2017). The species breeds year round with peak months varying locally (Crawford *et al.* 2013). In the north-western part of the range, peak laying occurs during the months of November to January; in the south-west it occurs between May and July, and in the east between April and June (Crawford *et al.* 2013). The average age at first breeding is thought to be 4-6 years (Whittington *et al.* 2005).

Habitat This species is marine and usually found within 40 km of the coast (Wilson *et al.* 1988, Petersen *et al.* 2006, Pichegru *et al.* 2009, 2012), coming ashore on islands or at non-contiguous areas of the mainland coast to breed, moult and rest (Hockey *et al.* 2005). *Breeding:* Breeding habitats range from flat, sandy islands with varying degrees of vegetation cover, to steep rocky islands with little vegetation (Hockey *et al.* 2005). African Penguins are sometimes found close to the summit of islands and may move over a kilometre inland in search of breeding sites (Hockey 2001). They usually feed within 20 km of the colony when breeding, although at some colonies the distance is greater (Pichegru *et al.* 2009, Waller 2011, Ludynia *et al.* 2012, Pichegru *et al.* 2012). *Non-breeding:* At sea, their distribution is mainly restricted to the greater Benguela Current region (Williams 1995). Juveniles have been observed to

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travel ~600 km from their natal colonies (Sherley *et al.* 2017), while immatures up to 700 km with an average of ~370 km from the colony (Grigg and Sherley 2019). Pre- and post moulting adults have been observed up to 550 km from their colonies (de Blocq *et al.* 2019).

Diet Adults feed predominantly on pelagic schooling fish of 50-120 mm length, with important prey including sardine *Sardinops sagax,* anchovy *Engraulis capensis*, bearded goby *Sufflogobius bibarbatus* and round herring *Etrumeus whiteheadi* (Crawford *et al.* 1985, Ludynia *et al.* 2010, Crawford *et al.* 2011). In some localities, cephalopods represent an important food source (Crawford *et al.* 1985, Connan *et al.* 2016). Juveniles are thought to prey on fish larvae (Wilson 1985).

Breeding site In the past, nests were usually built in burrows dug in guano or sand (Frost *et al.* 1976a, Shelton *et al.* 1984). Today, with the lack of guano at most colonies, nesting in open areas has become increasingly common (Kemper *et al.* 2007b, Sherley *et al.* 2012, Pichegru 2013). At some sites, artificial nest-burrows made from pipes and boxes sunken into the ground, and shelters shaped from dry vegetation have been regularly used by the species (Kemper *et al.* 2007a, Sherley *et al.* 2012, Pichegru 2013).

Systems: Terrestrial, Marine

Use and Trade

Previously egg-collecting and guano harvesting were carried out at a significant scale, but both have now ceased and are prohibited or illegal. One incident of egg poaching was recorded in South Africa in 2016.

The predominant use of the species now is as a tourist attraction, with visits to colonies a major draw for national and international wildlife tourism. Colonies are also desirable subjects for the film industry, generating significant revenue.

Threats (see Appendix for additional information)

Population declines have been attributed to food shortages resulting from shifts in the distributions of prey species, competition with commercial purse-seine fisheries and environmental fluctuations (e.g. Crawford *et al.* 2011). A decrease in foraging effort at St Croix Island (Pichegru *et al.* 2010, 2012, Sherley *et al.* 2019b) and an increase in chick survival and chick condition at Robben Island (Sherley *et al.* 2015, 2018, 2019b) following the establishment of 20 km no-take zones provides some support for this theory. In the early 2000s, there was an eastward shift in sardine and anchovy stocks, with the mature biomass of these species decreasing near the breeding islands north of Cape Town (Crawford *et al.* 2011). The abundance of these prey species is known to influence foraging success (Campbell *et al.* 2019, McInnes *et al.* 2019), breeding success (Crawford *et al.* 2006, Sherley *et al.* 2013b), adult survival (Sherley *et al.* 2014a, Robinson *et al.* 2015), and juvenile survival (Weller *et al.* 2016; Sherley *et al.* 2017), all of which may often be too low off South Africa's west coast to maintain population equilibrium (Weller *et al.* 2014, 2016). Western Cape populations declined by 69% between 2001-2009, considered at least partly due to this climate-induced shift in fish stocks. African penguin fledglings travelled to areas of low sea surface temperatures and high chlorophyll-a which were historically reliable cues for fish availability. Climate change and industrial fishing have depleted forage fish in these areas, resulting in an ecological

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trap for the species and associated low juvenile survival (Sherley *et al.* 2017). In Namibia, where sardine and anchovy are virtually absent from the foraging ranges of breeding penguins, breeding birds feed principally on the energy-poor Bearded Goby *Sufflogobius bibarbatus* (Ludynia *et al.* 2010). Limited penguin mortality in fishing nets may increase if gill-nets are set near colonies (Ellis *et al.* 1998, Crawford *et al.* 2017).

Human disturbance and egg-collecting were important factors in the decline of the species in the early 20th century (Frost *et al.* 1976b, Ellis *et al.* 1998, Shannon and Crawford 1999). While egg collection is now illegal. an incident of egg poaching was recorded in South Africa in 2016 (Brophy 2016). Guano collection was historically a major cause of disturbance at many colonies and the removal of guano deprived penguins of nest-burrowing sites, causing birds to nest on open ground where they are more vulnerable to heat stress resulting in the abandonment of nests, flooding of nests by rain, and increased predation (Frost *et al.* 1976b, Shannon and Crawford 1999, Pichegru 2013, Kemper 2015). Guano harvesting is no longer practiced in South Africa, and, according to the Namibian Island's Marine Protected Area Regulations, guano scraping is not permitted following the expiry of existing guano rights for Ichaboe Island in 2016 (MRA 27 of 2000).

Both chronic oil pollution and individual large oil spills appear to have long-term significant impacts on colonies. Past mortality from oil spills has been serious (Wolfaardt *et al.* 2009) and may increase if proposed development of harbours close to colonies proceeds. Most of the population is confined to areas that are near existing or planned major shipping ports (Nel and Whittington 2003, J. Kemper pers. comm.). There has been a dramatic increase in the number of birds oiled since 1990: two individual oil spills (in 1994 and 2000) killed 30,000 individuals, despite successful rehabilitation programmes (Nel and Whittington 2003, Wolfaardt *et al.* 2008, 2009). Ship to ship bunkering activities off the south east coast in Algoa Bay in 2016 and 2019, resulted in 200 African penguins and 125 seabirds oiled respectively (SANCCOB unpubl. data). Breeding success on Robben Island fell to 0.23 chicks per pair in 2000, compared with an average of 0.62 ±0.19 over the other 15 years from 1989 to 2004 (Crawford *et al.* 2006). Rehabilitation does not necessarily prevent problems in the years after a spill. During 2001-2005, pairs involving at least one bird rehabilitated from the oil spill in 2000 achieved lower fledging success (43%) compared to unaffected pairs (61%) and those involving at least one bird affected by a previous oil spill (71%), mostly owing to higher mortality in older chicks (Barham *et al.* 2007). This may indicate physiological or behavioural problems that reduce the parents ability to meet the food requirements of older chicks, perhaps owing to the toxicity of the heavy oil in the 2000 spill; the effects of prolonged captivity; or the time between oiling and washing (Barham *et al.* 2007).

The Cape Fur Seal *Arctocephalus pusillus* competes with penguins for food, displaces them from breeding sites and imposes significant mortality at some colonies (Crawford *et al.* 1989, Makhado *et al.* 2013, Weller *et al.* 2016, MFMR unpubl. data). Modelling of the interaction of multiple pressures on the colonies at Robben and Dyer Islands indicate that predation by Cape Fur Seals is a key driver in current population declines at Dyer Island (Weller *et al.* 2016). However, this was found to be in addition to immature emigration, suggesting there may be additional bottom-up pressures impacting the viability of colonies.

The potential effects of individual storms on breeding colonies at certain sites has been highlighted (de Villiers 2002) and, as such, the increased frequency and severity of storms may cause localised losses. Sharks take some birds at sea and Kelp Gulls *Larus dominicanus*, dogs *Canis familiaris* and feral cats *Felis*

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catus prey on eggs and chicks at colonies (Underhill *et al.* 2006, Pichegru 2013, Weller *et al.* 2014, 2016). In some mainland colonies, predation by mongooses *Herpestes* spp., leopards *Panthera pardus* and caracals *Caracal caracal*, or illegal egg collection may have notable impacts (e.g. Underhill *et al.* 2006), with the Simonstown colony experiencing considerable mortality due to caracal (SANParks and City of Cape Town, unpubl. data, Vanstreels *et al.* 2019).

While a number of diseases have been documented in African penguins, few records of mass mortality through disease have been observed in the wild, up until 2018 and 2019, when a high pathogenic avian influenza (HPAI) strain killed approximately 100 penguins in South Africa and up to 600 in Namibia respectively (Khomenko *et al.* 2018, Molini *et al.* 2020)

Conservation Actions (see Appendix for additional information)

Conservation Actions Underway

CITES Appendix II. CMS Appendix II. US Endangered Species Act. Continuous monitoring of population trends is carried out at all colonies annually in South Africa but less regularly in Namibia. In South Africa, most breeding localities are national parks or nature reserves. The colonies at Simonstown and Stony Point are in the process of receiving formal protection status. Collection of guano and eggs is prohibited within penguin colonies (Harrison *et al.* 1997, Currie *et al.* 2009).

The Namibian Islands' Marine Protected Area (NIMPA), proclaimed in 2009, protects almost 10,000 km^2 of ocean in southern Namibia, including all penguin breeding localities and key foraging habitats (Currie *et al.* 2009, Ludynia *et al.* 2012).

Oiled birds are rehabilitated with success (Barham *et al.* 2007, Wolfaardt *et al.* 2008). More than 80% of birds admitted for rehabilitation are returned successfully to the wild (Nel and Whittington 2003).

Lost nesting habitat has been augmented using artificial nests at a number of colonies. Some designs have proved successful, increasing breeding success (Kemper *et al.* 2007a, Sherley *et al.* 2012). At other locations, the same designs have not been as successful (Pichegru 2013, Lei *et al.* 2014). The optimal design of artificial nests is currently being researched. Maintenance of natural breeding habitat takes place where possible.

Research into foraging behaviour using biologging technology (GPS and satellite-transmitters) is ongoing (Ludynia 2007, Pichegru *et al.* 2010, Waller 2011, Ludynia *et al.* 2012, Pichegru *et al.* 2012, Waller 2011, Sherley *et al.* 2013a, Campbell *et al.* 2019, BirdLife South Africa unpubl. data). In South Africa, a research project into the potential positive impacts of small marine no-take zones surrounding breeding colonies is underway. Results suggest a decrease in adult foraging effort and increases in chick survival and condition, but not uniformly across the colonies involved (Pichegru *et al.* 2010, 2012; Sherley *et al.* 2015, 2018, 2019b). South Africa declared new Marine Protected Areas in 2019, including around some of the seabird colonies, but they are largely ineffective in protecting penguin foraging habitat.

Population reinforcement through hand rearing of abandoned chicks, or chicks removed from nests in compromised areas where survival was unlikely, added over 7000 fledglings to the population between 2001 and 2019. These hand-reared fledglings survive and recruit in to breeding populations at similar rates to their wild counterparts (Sherley *et al.* 2014b). Attempts are made to decrease predation of eggs, chicks and grown birds (e.g. Makhado *et al.* 2013, Pichegru 2013). A national (South African) capture-mark-recapture programme using Passive Integrated Transponders has been implemented to monitor survival, recruitment and movements amongst colonies.

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Conservation Actions Proposed

In South Africa, the African penguin Biodiversity Management Plan (BMP), gazetted in 2013, guided the conservation actions to be implemented with the aim to halt the decline of the species. This 5-year BMP included the above actions and identified additional ones, such as: ensuring adequate prey for penguins during the breeding and non-breeding seasons; spatial management of the pelagic fishery; investigating conservation translocations in this species; improving the disaster response to oiling, disease and fire; establish minimum standards for rehabilitation and rehabilitation facilities; improving penguin numbers through targeted interventions at existing but declining breeding localities where the reasons for the decline can be addressed.

This plan did not achieve its aims, and a revised plan has been prepared for the next 5 years and is expected to be approved for implementation in 2020. Threats such as predation and disaster prevention and mitigation are addressed in this plan as well as conservation translocations, habitat improvement and ongoing essential population monitoring and disease surveillance. Critically, actions dealing with the food availability threat with protecting at sea habitat and the management of resources that are critical for the penguin's survival at all phases in its life-cycle are included.

Credits

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Citation

BirdLife International. 2020. *Spheniscus demersus*. *The IUCN Red List of Threatened Species* 2020: e.T22697810A157423361. https://dx.doi.org/10.2305/IUCN.UK.2020-3.RLTS.T22697810A157423361.en

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External Resources

For Supplementary Material, and for Images and External Links to Additional Information, please see the Red List website.

Appendix

Habitats

(http://www.iucnredlist.org/technical-documents/classification-schemes)

Habitat	Season	Suitability	Major Importance?
3. Shrubland -> 3.4. Shrubland - Temperate	Breeding season	Suitable	Yes
9. Marine Neritic -> 9.1. Marine Neritic - Pelagic	Breeding season	Suitable	Yes
10. Marine Oceanic -> 10.1. Marine Oceanic - Epipelagic (0-200m)	Breeding season	Suitable	Yes
12. Marine Intertidal -> 12.1. Marine Intertidal - Rocky Shoreline	Breeding season	Suitable	Yes
12. Marine Intertidal -> 12.3. Marine Intertidal - Shingle and/or Pebble Shoreline and/or Beaches	Breeding season	Suitable	Yes
13. Marine Coastal/Supratidal -> 13.1. Marine Coastal/Supratidal - Sea Cliffs and Rocky Offshore Islands	Breeding season	Suitable	Yes

Use and Trade

(http://www.iucnredlist.org/technical-documents/classification-schemes)

End Use	Local	National	International
Pets/display animals, horticulture	No	Yes	Yes

Threats

(http://www.iucnredlist.org/technical-documents/classification-schemes)

Threat	Timing	Scope	Severity	Impact Score
3. Energy production & mining -> 3.1. Oil & gas drilling	Future	Minority (50%)	Negligible declines	No/negligible impact: 2
	Stresses:	2. Species Stresses -> 2.2. Species disturbance		
3. Energy production & mining -> 3.2. Mining & quarrying	Future	Minority (50%)	Negligible declines	No/negligible impact: 2
	Stresses:	1. Ecosystem stresses -> 1.2. Ecosystem degradation		
5. Biological resource use -> 5.1. Hunting & trapping terrestrial animals -> 5.1.1. Intentional use (species is the target)	Ongoing	Minority (50%)	No decline	Low impact: 4
	Stresses:	2. Species Stresses -> 2.3. Indirect species effects		
5. Biological resource use -> 5.4. Fishing & harvesting aquatic resources -> 5.4.4. Unintentional effects: (large scale) [harvest]	Ongoing	Majority (50-90%)	Rapid declines	Medium impact: 7
	Stresses:	1. Ecosystem stresses -> 1.3. Indirect ecosystem effects		

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		2. Species Stresses -> 2.1. Species mortality		
6. Human intrusions & disturbance -> 6.3. Work & other activities	Past, unlikely to return	Minority (50%)	Slow, significant declines	Past impact
	Stresses:	2. Species Stresses -> 2.2. Species disturbance		
8. Invasive and other problematic species, genes & diseases -> 8.1. Invasive non-native/alien species/diseases -> 8.1.2. Named species (Felis catus)	Ongoing	Minority (50%)	Negligible declines	Low impact: 4
	Stresses:	2. Species Stresses -> 2.3. Indirect species effects		
8. Invasive and other problematic species, genes & diseases -> 8.2. Problematic native species/diseases -> 8.2.1. Unspecified species	Ongoing	Minority (50%)	Slow, significant declines	Low impact: 5
	Stresses:	2. Species Stresses -> 2.1. Species mortality 2. Species Stresses -> 2.2. Species disturbance 2. Species Stresses -> 2.3. Indirect species effects		
8. Invasive and other problematic species, genes & diseases -> 8.2. Problematic native species/diseases -> 8.2.2. Named species (Larus dominicanus)	Ongoing	Majority (50-90%)	Negligible declines	Low impact: 5
	Stresses:	2. Species Stresses -> 2.3. Indirect species effects		
8. Invasive and other problematic species, genes & diseases -> 8.2. Problematic native species/diseases -> 8.2.2. Named species (Arctocephalus pusillus)	Ongoing	Majority (50-90%)	Slow, significant declines	Medium impact: 6
	Stresses:	2. Species Stresses -> 2.1. Species mortality 2. Species Stresses -> 2.2. Species disturbance 2. Species Stresses -> 2.3. Indirect species effects		
9. Pollution -> 9.2. Industrial & military effluents -> 9.2.1. Oil spills	Ongoing	Majority (50-90%)	Slow, significant declines	Medium impact: 6
	Stresses:	1. Ecosystem stresses -> 1.2. Ecosystem degradation 2. Species Stresses -> 2.1. Species mortality 2. Species Stresses -> 2.3. Indirect species effects		
11. Climate change & severe weather -> 11.1. Habitat shifting & alteration	Ongoing	Majority (50-90%)	Rapid declines	Medium impact: 7
	Stresses:	1. Ecosystem stresses -> 1.2. Ecosystem degradation 1. Ecosystem stresses -> 1.3. Indirect ecosystem effects 2. Species Stresses -> 2.3. Indirect species effects		
11. Climate change & severe weather -> 11.4. Storms & flooding	Ongoing	Minority (50%)	Negligible declines	Low impact: 4
	Stresses:	1. Ecosystem stresses -> 1.2. Ecosystem degradation 2. Species Stresses -> 2.3. Indirect species effects		

Conservation Actions in Place

(http://www.iucnredlist.org/technical-documents/classification-schemes)

Conservation Action in Place
In-place research and monitoring
Action Recovery Plan: Yes
Systematic monitoring scheme: No

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Conservation Action in Place
In-place land/water protection
Conservation sites identified: Yes, over entire range
Occurs in at least one protected area: Yes
Invasive species control or prevention: Yes
In-place species management
Successfully reintroduced or introduced benignly: No
Subject to ex-situ conservation: Yes
In-place education
Subject to recent education and awareness programmes: Yes
Included in international legislation: Yes
Subject to any international management / trade controls: Yes

Conservation Actions Needed

(http://www.iucnredlist.org/technical-documents/classification-schemes)

Conservation Action Needed
1. Land/water protection -> 1.1. Site/area protection
1. Land/water protection -> 1.2. Resource & habitat protection
2. Land/water management -> 2.1. Site/area management
2. Land/water management -> 2.2. Invasive/problematic species control
3. Species management -> 3.2. Species recovery
3. Species management -> 3.3. Species re-introduction -> 3.3.1. Reintroduction
4. Education & awareness -> 4.3. Awareness & communications
5. Law & policy -> 5.1. Legislation -> 5.1.2. National level
5. Law & policy -> 5.4. Compliance and enforcement -> 5.4.1. International level

Research Needed

(http://www.iucnredlist.org/technical-documents/classification-schemes)

Research Needed
1. Research -> 1.5. Threats
2. Conservation Planning -> 2.3. Harvest & Trade Management Plan
3. Monitoring -> 3.1. Population trends

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Additional Data Fields

Distribution
Continuing decline in area of occupancy (AOO): Unknown
Extreme fluctuations in area of occupancy (AOO): No
Estimated extent of occurrence (EOO) (km^2): 3920000
Continuing decline in extent of occurrence (EOO): Unknown
Extreme fluctuations in extent of occurrence (EOO): No
Continuing decline in number of locations: Unknown
Extreme fluctuations in the number of locations: No
Lower elevation limit (m): 0
Upper elevation limit (m): 50
Lower depth limit (m): 130
Upper depth limit (m): 0
Population
Number of mature individuals: 41,700
Continuing decline of mature individuals: Yes
Extreme fluctuations: No
Population severely fragmented: No
No. of subpopulations: 1
Continuing decline in subpopulations: Unknown
Extreme fluctuations in subpopulations: No
All individuals in one subpopulation: Yes
Habitats and Ecology
Continuing decline in area, extent and/or quality of habitat: Yes
Generation Length (years): 12
Movement patterns: Not a Migrant
Congregatory: Congregatory (and dispersive)

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The IUCN Red List Partnership

The IUCN Red List of Threatened Species™ is produced and managed by the IUCN Global Species Programme, the IUCN Species Survival Commission (SSC) and The IUCN Red List Partnership.

The IUCN Red List Partners are: Arizona State University; BirdLife International; Botanic Gardens Conservation International; Conservation International; NatureServe; Royal Botanic Gardens, Kew; Sapienza University of Rome; Texas A&M University; and Zoological Society of London.

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PART 1 OF 2

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DEPARTMENT OF FORESTRY, FISHERIES AND THE ENVIRONMENT

NO. 2684 **28 October 2022**

NATIONAL ENVIRONMENTAL MANAGEMENT ACT, 1998 (ACT NO. 107 OF 1998)

CALL FOR NOMINATIONS - PROPOSED ESTABLISHMENT OF A PANEL OF EXPERTS TO ADVISE ON THE PROPOSED FISHING-AREA CLOSURES ADJACENT TO SOUTH AFRICA'S AFRICAN PENGUIN BREEDING COLONIES AND THE DECLINE IN THE PENGUIN POPULATION

I, Barbara Dallas Creecy, Minister of Forestry, Fisheries and the Environment, hereby give notice of my intention to establish a panel of experts including international experts in terms of section 3A of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA), to advise on the proposed closure of fishing areas adjacent to South Africa's African Penguin breeding colonies and the decline in the penguin population (the Panel).

The Panel's Terms of Reference and expected scope of work are set out in the schedule to this notice. Panel - members will be remunerated in accordance with the Republic's Public Finance Management Act, 1999 (Act No.1 of 1999) and the associated Treasury Regulations, in consultation with the Minister of Finance for this panel's proposed work.

Members of the public are invited to nominate individual persons, to be considered for appointment as members of the Panel, who are suited to serve by virtue of qualifications, expertise and experience including being appropriately academically qualified and/or who hold an appropriate level of practical expertise on the subject - matter and the work set out in the Terms of Reference. The selection criteria will include the following:

- advanced post-graduate degrees in fisheries and/or ecosystem mathematical models or marine ecology.
- demonstrated expert scientific or policy contributions through peer-reviewed publications for at least a period of 10 years and experience in making science-based policy recommendations in environmental management, preferably in marine conservation; and
- prior experience in serving on a review panel would be an added advantage.

Nominations must comprise a brief covering motivational letter together with a comprehensive curriculum vitae of the nominee, their current employment status and contact details (including telephone number and email). All nominations must be in writing and must be submitted within 30 calendar days of the publication of this notice in the *Gazette*, to the following addresses:

By post to: Department of Forestry, Fisheries and the Environment
Attention: Dr Ashley Naidoo
Private Bag X4390
CAPE TOWN
THE REPUBLIC OF SOUTH AFRICA
8002

By hand at: Foretrust Building, Martin Hammerschlag Way, Foreshore, Cape Town, South Africa, 8001

By email: marinespecies@dffe.gov.za

Any enquiries in connection with the notice can be directed to Ms Millicent Makoala by telephone (+27) 66 082 1010 or email: marinespecies@dffe.gov.za.

The Minister reserves the right to appoint members to the Panel that were not nominated as a result of this call for nominations.

BARBARA DALLAS CREECY
MINISTER OF FORESTRY, FISHERIES AND THE ENVIRONMENT

forestry, fisheries & the environment
Department:
Forestry, Fisheries and the Environment
REPUBLIC OF SOUTH AFRICA

TERMS OF REFERENCE FOR THE INTERNATIONAL REVIEW PANEL REGARDING FISHING CLOSURES ADJACENT TO SOUTH AFRICA'S AFRICAN PENGUIN BREEDING COLONIES AND DECLINES IN THE PENGUIN POPULATION *[INCLUDING REVIEWING THE RECOMMENDATIONS FROM THE GOVERNANCE FORUM AND THE MARINE LIVING RESOURCES CONSULTATIVE ADVISORY FORUM]*

CONTENTS

1. BACKGROUND

In the mid-2000s, a substantial decrease in the numbers of adult African Penguins was observed off western South Africa. In response to this observed decrease from 2006 and the potential impact of food competition between penguins and fishers in the vicinity of breeding islands, a study to assess the effects of closure to purse-seine fishing around penguin breeding colonies was initiated in 2008. Since the study required income sacrifice from the industry, this study, the Island Closure Experiment (ICE), comprised two parts: (i) a feasibility study (2008– 2014) during which purse-seine fishing was prohibited in an alternating pattern around two pairs of nearby colonies and data on penguins (as well as on small pelagic fish from the routine pelagic fish management process) were collected to determine whether an experiment would have adequate statistical power to detect a significant effect of closure if such existed; and (ii) an experimental phase (2015–2019) where these alternating island closures were continued with the associated continuation of the monitoring during the feasibility study. The results, however, led to a lengthy debate with

dichotomous views. The plans for and results of the ICE were regularly reviewed by DFFE's Small Pelagic Scientific Working Group, informed by the advice provided from an annual review, i.e., a DFFE review meeting of world-leading quantitative marine resource scientists on ten occasions since 2006. Most recently, the scientific results have been debated in the peer-reviewed literature (Sydeman et al. 2021, Butterworth and Ross-Gillespie 2022, Sydeman et al. 2022).

A Governance Forum (GF), comprising researchers and managers from the Branches: Oceans and Coasts and Fisheries Management as well as SANParks (South African National Parks), was established in 2021. The aim was to prepare a comprehensive Synthesis Report on the current state of knowledge relating to African Penguins, island closures, fisheries management relevant to African Penguins and the socioeconomics of island closures and penguin-related tourism. The Governance Forum compiled a report titled "A Synthesis of Current Scientific Information Relating to the Decline in the African Penguin Population, the Small Pelagic Fishery and Island Closures" (DFFE 2021) which collated science over the last decade on penguins, small pelagic fisheries and their interactions including the Island Closure Experiments. The Synthesis Report was further scrutinized by two independent reviewers who provided extensive comments; the Governance Forum's Extended Task Team (which added fishing industry and conservation NGO representation to the Governance Forum) and then the Minister's Consultative Advisory Forum for Marine Living Resources (CAFMLR). Comments on that Synthesis Report and recommendations produced by these groups remain contested.

The Department now seeks to establish an international Panel of Experts to—

(i) Review the interpretation of the ICE

(ii) explore the value of island closures in providing meaningful benefits to penguins

(iii) review the processes and outcomes completed through the GF and the CAFMLR process

(iv) make recommendations on the implementation of island closures, including spatial delineation, time frames and

(v) advise on further science and monitoring methods.

2. OBJECTIVES

The International Review Panel will—

a) Review the quantitative scientific analyses of the Island Closure Experiment (ICE) and subsequent publications to evaluate whether the scientific evidence from ICE indicates that limiting small pelagic fishing around colonies provides a meaningful improvement to penguin parameters that have a known scientific link to population demography in the context of the present rate of population decline. Assess the cost-benefit trade-off of 1) costs to fisheries, versus 2) the proportion of penguin foraging range protected during the breeding season, for different fisheries exclusion scenarios. The losses to the fishery should be fleshed out using available economic information, such as was used in the GF and CAF processes. The panel may also comment on the limitations of available information and methods (data collection) to improve the assessment of positive penguin outcomes as well as fishery impact. Costs to fisheries must include an assessment of replacement costs accrued during periods closed to fishing during the ICE.

AM
M.C

b) Within the context of an urgent need to implement timeous conservation actions for the African Penguin and considering the information and rationale of the various scientific reviews and associated documents of the Island Closure Experiment evaluate the evidence supporting the benefits of fishery restrictions around African Penguin colonies to adopt precautionary measures by implementing long-term fishery restrictions.

c) If closures or fishing limitations are viewed to contribute positively to the support of the African Penguin population, recommend a trade-off mechanism as a basis for setting fishing limitations and mapping. This mechanism must consider a potential positive return to penguins and the impact on fisheries. (As a basis for discussion the Governance Forum Approach and the CAF approach can be considered.) Consideration must also be given to the current state of observations, data and analyses (Penguin, Environmental and Fisheries Economic data). Recommendations on these can be included under future science considerations.

    a. Delineation of fishery no-take areas around six African Penguin colonies (Dassen Island, Robben Island, Dyer Island, Stony Point, St Croix Island and Bird Island) and the duration of the closures, considering life history traits, e.g., age when most birds start breeding, and associated duration required to signal potential population benefits.

d) Recommendations on the scientific work that is required to evaluate the effectiveness of such no-take areas.

e) Recommendations about what scientific work is appropriate in the short term to determine the dominant causes of the rapid and concerning rate of decline of the penguin population, including recommendations about the use of ecosystem model approaches such as MICE (models of intermediate complexity for ecosystem assessments).

3. PANEL PROCESS AND PROCEDURES

a. The panel should attempt to reach a consensus but if not achieved, names supporting each of the alternative views should be noted. There should be no voting.

b. Virtual and physical meetings are not prescribed at this stage. One option is to have one or two brief virtual meetings to familiarise the panel with the key issues, followed by a week-long physical meeting in Cape Town to wrap it up. Travel expenses will be covered by DFFE. [Panel members may opt to join the weekly session virtually if travelling is not preferred.]

c. Members of the Panel of Experts will be remunerated in accordance with the Republic's Public Finance Management Act, 1999 (Act No.1 of 1999) and the associated Treasury Regulations, and in particular, according to the remunerative structure for non-official members of Commissions and Committees of Inquiry in consultation with the Minister of Finance for this panel's proposed work.

d. Meetings may include closed meetings, meetings with protagonists separately and together.

e. DFFE will appoint the Chair of the Panel and the Chair will report directly to the Minister.

f. DFFE will provide secretarial services.

4. TASKS

The following tasks are required from the panel (administrative and secretarial functions will be supported by DFFE):

a. Panel Members must agree to being available and accepting these Terms of Reference and constitute themselves as a Panel with the Chair.
b. Notification of stakeholders about deadlines for their submissions.
c. Drawing up of a list of attendees at plenary meetings where submissions are heard, indicating who are key participants and who are observers (Sectors will be asked to submit names of observers to be invited).
d. The appointed Panel Members to meet with DFFE Senior Managers to clarify their tasks and outputs.
e. Review documents and information pertaining to proposed island closures for penguin population recovery support. While these will initially be composed of an agreed selection (by local scientists and stakeholders) from the extensive number of documents produced over the last 1.5 years, panel members may request any additional documents such as scientific working group documents. Documents to be categorised into (a) those relevant to the interpretation of the ICE results, (b) documents that propose island closures including stakeholder reports submitted during the ETT and CAFMLR processes and (c) other related documents. This is required to facilitate the panel dividing its focus between (i) an initial assessment of whether the analysis of ICE supports the view that island closures will benefit penguins, and (ii) if (i) suggests that island closures will benefit penguins, what closures should be implemented, or what are the trade-offs involved for such closures.
f. Meet with conservation and fisheries sector scientists and where each will be allowed to present their arguments/interpretation of information. (At panel discretion, other scientists, and experts may be invited to make presentations.)
g. Respond to objectives (a) to (e) above.
h. Prepare report on outcomes.

5. OUTCOMES AND RECOMMENDATIONS

a) Recommend whether, based on the results from ICE and other evidence-based information, island closures are likely to benefit penguins.
b) Describe the scientific and evidence-based rationale for recommending implementing/not implementing fishing limitations around penguin colonies
c) Make recommendations about whether a percentage (%) of penguin foraging range and other biological criteria (such as regional representation, population recovery potential, monitoring and evaluation potential) provide a basis for determining benefits from closures for penguins and assess the merits of different proposed methods to delineate important penguin foraging habitat.
d) Make specific recommendations on trade-off mechanisms for island closures in the event that the panel finds that the results of ICE and other evidence demonstrate that island closures are likely to benefit penguins, including specific areas and durations. In addition to recommendations on trade-off mechanisms, the panel must preferably advise on biologically meaningful penguin habitat extents for fishery limitations per island, recommendations must be spatially and temporally explicit, and provided on a map. [DFFE will provide mapping capacity.]
e) Provide advice and recommendations on best estimates and uncertainties of the ratio between penguins gained and losses sustained by the industry as a result of island closures for future suggested closure options.

f) Provide advice on a well-structured analyses framework to monitor the impact of island closures, including what penguin and fish data needs to be collected; how benefits to penguins are to be determined; and how these will be analysed.

g) To recommend scientific analyses, including but not limited to MICE, to determine the reasons for the decline in the penguin population.

6. DOCUMENTS

The Department will provide the Panel Members with all the required documents. Sector representatives and panel members may request additional documents to be included. These will include:

1. Key documents detailing the ICE and the recent relevant analyses of the results of the ICE.
2. Key scientific peer-reviewed publications on the results of the ICE
3. DFFE Scientific Summary Report – Coetzee et al 2021. "A Synthesis of Current Scientific Information Relating to the Decline in the African Penguin Population, the Small Pelagic Fishery and Island Closures ". To include all comments requested and provided on this document by stakeholders including seabird conservationists, SAPFIA and other fishing industry representatives.
4. Governance Forum Recommendations (and including Maps from Extended Task Team – these were not finalised as formal recommendations but did move the discussion from the GF which used percentage forage areas to the percentage of Marine Important Bird Areas) and stakeholder reports.
5. CAFMLR Draft Report and recommendations and stakeholder reports.

7. DURATION AND WORK PLAN

The schedule of work will be determined around the earliest availability of the panel. It is however envisaged that the work of the panel should be commenced and completed as soon as possible.

(Assuming a 1-week working session in Cape Town without virtual working meetings except for one or two online introductory pre-meetings which may allow some timesaving for the in-person week schedule.)

Document Distribution as early as possible before the meeting but not less than 2 weeks before the meeting.

Sector representatives will be informed as early as possible on the meeting schedule with the panel, including timelines for submission of any documentation (such as presentations) that may need distribution to the panel. Ideally, documents should also be submitted to the Panel at least two weeks before the meeting.

DFFE (including SANParks) staff (Seabird scientists, Fisheries Scientists, and GIS expert practitioners will be on standby during Panel Deliberations.)

Invited attendees' lists will be finalised a week before the meeting.

Tentative Schedule

DAY 1

1.1 Opening and a brief description

1.2 Clarify ToRs and expected outcomes

1.3 Presentation by Conservation Sector

1.4 Presentation by Fishing Sector

1.5 [Other expert presentations, as may be requested by the panel. The panel may determine if some questions from observers may be heard.]

(Sector presentations will cover perceptions and interpretation of fishing limitations and penguin population success; ICE; GF; CAF and Future Science. Sector representations can include comments on existing/published interpretations.)

DAY 2

2.1 Panel Deliberations: fishing limitations and penguin population success

2.2 Panel Deliberations: ICE

DAY 3

3.1 Panel Deliberations: GF and CAF

DAY 4

4.1 Panel Deliberations: GF and CAF

(Possible time allocation for further engagement with Conservation/Fishing Sector reps)

DAY 5

5.1 Formulate Recommendations & Report Compilation (Contents of the report must include Items in Section 6 above - OUTCOMES AND RECOMMENDATIONS, Report Drafting can occur throughout the week.)

8. ADDITIONAL DOCUMENTS TO BE SUBMITTED TO THE INTERNATIONAL PANEL

I. Butterworth, D.S. and Ross-Gillespie, A. 2021a. A revised summary of results for the island closure experiment. Department of Forestry, Fisheries and the Environment report FISHERIES/2021/JUN/SWG-PEL/41. 5pp.

II. Butterworth, D.S. and Ross-Gillespie, A. 2021b. A response to some queries concerning the revised summary of results for the island closure experiment provided in FISHERIES/2021/JUN/SWG-PEL/41. Department of Forestry, Fisheries and the Environment report FISHERIES/2021/SEP/SWG-PEL/59. 6pp.

III. Butterworth, D.S. and Ross-Gillespie, A. 2022. Comment on "South Africa's experimental fisheries closures and recovery of the endangered_ African penguin" by Sydeman et al. (2021). ICES Journal of Marine Science. DOI: 10.1093/icesjms/fsac113. Supplementary material to this publication to be included.

IV. Makhado AB, McInnes AM, Hagen C, Ludynia K, Masotla M, Pichegru L et al. 2020a. Motivation for urgent need to implement closures to purse-seine fishing around South Africa's six largest African Penguin colonies. Report No. FISHERIES/2020/DEC/SWG-PEL/126. Cape Town, South Africa: Department of Environment, Forestry and Fisheries.

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V. Makhado A, McInnes A, Hagen C, Sherley R, Waller L, Pichegru L et al. 2020b. Recommendations for island closures around African Penguin colonies. Report No. FISHERIES/2020/OCT/SWGPEL/ 105REV. Cape Town, South Africa: Department of Environment, Forestry and Fisheries.

VI. Ross-Gillespie, A. and Butterworth, D. S. 2021. Updated analysis of results from data arising from the Island Closure Experiment. Department of Forestry, Fisheries and the Environment report FISHERIES/2021/JUN/SWG-PEL/39rev.

VII. SAPFIA, 2021. Letter to Deputy Director-General: Oceans and Coasts Ms J Beaumont dated 5 November 2021, "Re: Review of The Synthesis of Current Scientific Information Relating to The Decline in The African Penguin Population, The Small Pelagic Fishery and Island Closures, by Philip N. Trathan". 2pp.

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XVII. National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) Draft African Penguin Biodiversity Management Plan [Government Notice 2302 in *Government Gazette* No. 47061 dated 22 July 2022]

XVIII. Sectors will be allowed to add to documents list.

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REPORT

OF THE INTERNATIONAL REVIEW PANEL REGARDING FISHING CLOSURES ADJACENT TO SOUTH AFRICA'S AFRICAN PENGUIN BREEDING COLONIES AND DECLINES IN THE PENGUIN POPULATION

forestry, fisheries & the environment

Department:
Forestry, Fisheries and the Environment
REPUBLIC OF SOUTH AFRICA

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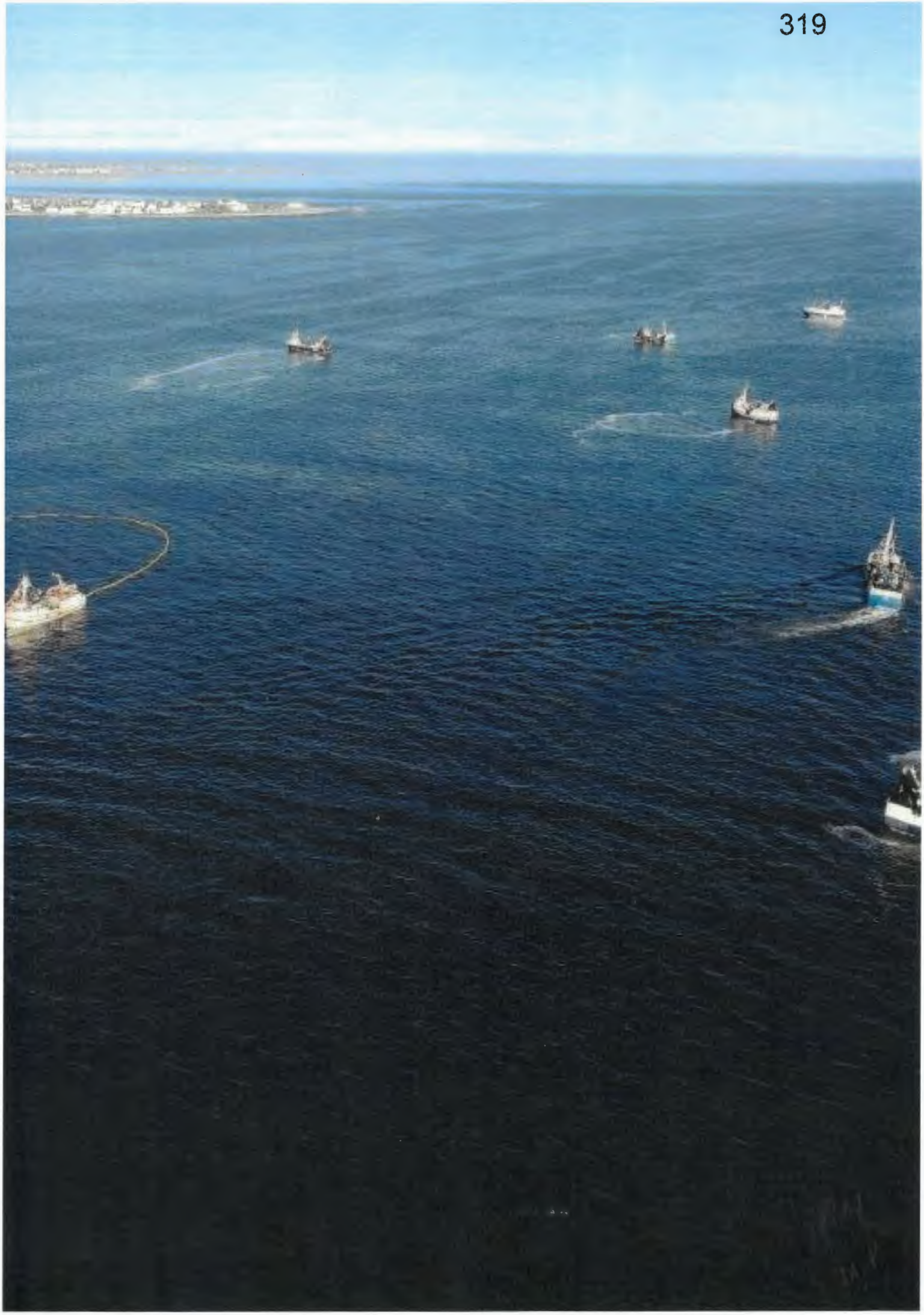
DEPARTMENT OF FORESTRY, FISHERIES
AND THE ENVIRONMENT (DFFE)

July 2023



Panel Members

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- Prof. Robert W. Furness - Principal Ornithologist at MacArthur Green, Glasgow, UK.

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- Dr. Éva Plagányi-Lloyd - Senior Principal Research Scientist at CSIRO based in Brisbane, Australia.

- Prof. James N. Sanchirico - Professor of natural resource economics and policy in the Department of Environmental Science and Policy at the University of California at Davis, USA.

- Prof. Philip Trathan - Visiting Professor at Ocean and Earth Science, National Oceanography Centre, Southampton, UK.

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EXECUTIVE SUMMARY

- The population of African penguins breeding in South Africa has been declining rapidly (approximately 8% per annum since 2005) and is consequently at a high risk of extinction in the wild in the coming decades. It is essential to understand and mitigate the primary factors leading to this decline.

- Considerable effort has been made by the fishing and conservation sectors in collaboration with government to understand the causes of the decline and how they might be mitigated. The Panel commends South Africa on its world-leading efforts to underpin challenging utilisation-conservation policy decisions with sound science.

- Implementation of closures managed within the Island Closure Experiment (ICE) aimed to understand whether reducing fishing around islands with penguin breeding colonies would help to reduce the current rate of decline. This internationally-recognised experiment involved implementing an alternating pattern of closures around four island breeding colonies on the South African west and south coasts. It is now complete and, notwithstanding the difficulties implementing the experiment, has been successful in demonstrating for the west colonies of Dassen and Robben islands (those more intensively studied within the ICE), that excluding fishing around island breeding colonies is likely to reduce the rate of decline in the population to a small extent, mediated through improvements in reproductive success. Excluding purse-seine fishing around island breeding colonies is also likely to have other positive benefits for penguin conservation, such as facilitating higher adult survival, but the ICE was not designed to estimate such effects.

- The Panel recognises that closure of purse-seine fisheries around penguin colonies will provide only a part of the measures required to slow or reverse the population decline of African penguins.

- There is a trade-off amongst maximising benefits to penguins, minimising the costs to the fishing industry, and having a reliable basis to quantify the effects of closures (including no closures) on the penguin recovery rate. The trade-off among closure options is a policy decision related to conservation, economic and social goals and objectives for South Africa. This report outlines some aspects that could form part of a decision-making framework to identify the closure options that will provide the best outcomes for penguins given some level of cost to the fishing industry.

- The effects of alternative fishery closure designs differ amongst the island breeding colonies, in terms of reducing the rate of decline, costs to the fishing industry, and social impacts. Hence, advice related to the effects of possible closure options is presented by island breeding colony, and not simply at the regional or national level; decisions on closures should also be made by colony, taking account of the unique aspects of the fishery and threats at each colony.

- The impacts to the fishing industry can be evaluated using an "opportunity-based model" (OBM) that predicts the proportion of the catch of pelagic fish in closure areas that cannot be "replaced" by fishing outside these areas, together with a Social Accounting Matrix (SAM) model that converts "lost catch" into economic impacts (loss of GDP and jobs) on the fishery, suppliers of goods and services to the fishing industry, and the broader economy. The OBM and SAM model can be used to rank closure options in terms of economic effects but the OBM likely overestimates the potential lost opportunities outside the closed area on a given day. The Panel remains concerned about: (i) the lack of information on how the closures impact fishing costs and fishing behaviour; (ii) the ability of the SAM model to adequately attribute impacts at the scale of fishing communities; and (iii) that there are social impacts that are not estimated using the SAM, but are important to consider in any trade-off analysis.

- Evidence suggests that catches from within closure areas will be more difficult to replace around Dyer Island and St Croix Island than around the other remaining five colonies with important breeding populations. Evidence also suggests that levels of lost catch can be reduced, if closures around penguin preferred habitats are well designed.

- The Panel identified (in this report) recommendations related to future monitoring of penguin colonies and research to understand the effects of closures on the change in penguin numbers and costs to the fishing industry and local communities.

- Further attempts were made to identify consensus closure options among the fishing and conservation sectors during the Panel meeting and ongoing efforts to identify such options are encouraged, particularly as closures may need to be adjusted given the results of future monitoring.

- The Panel strongly encouraged continued communication, and collaboration, with transparency of research data and analyses, as a means to build trust and strengthen these discussions. Working collaboratively will further enhance the effectiveness and social acceptability of management measures and decisions aimed at mitigating the decline of the African penguin.

1. BACKGROUND

1.1 Historical decline of African penguins

The African penguin, *Spheniscus demersus*, breeds only in Namibia and South Africa, where it is restricted to coastal waters, except over the Agulhas Bank where its preferred prey may occur further offshore. Their usual non-breeding habitat is also highly coastal, spanning ~3 200 km of coastal Namibia and South Africa, but with the occasional individual recorded as far north as Gabon, in the west, and Mozambique, in the east (Crawford et al., 2013).

In the 1920s, the African penguin may have had an estimated breeding population as large as between ~500 000 and ~1 000 000 pairs. The population subsequently decreased so that almost a century later less than ~20 000 pairs remained, of which ~25% were in Namibia and ~75% in South Africa (Coetzee et al., 2021a). As a consequence of the marked population declines across both these range states, the species was classified in 2010 as Endangered on the Red List of the International Union for Conservation of Nature (IUCN, 2018). The IUCN has not made regional assessments, but these would almost certainly show the species to be of even greater conservation concern in some parts of its range.

As recently as 2004, ~52 000 pairs of African penguins could be found at 19 breeding localities in South Africa, but by 2019 the population had fallen to ~13 200 pairs, with five colonies becoming extinct (Coetzee et al., 2021a; see Figure 1.1 for a map of the breeding colonies referred to in this report). The latest counts from 2022 show the decline continuing, with an estimated breeding population of ~10 000 pairs (Masotla et al., 2023). Further, the small size of the remaining colonies means that all now face a substantial probability of extinction; indeed, it is anticipated that a further seven colonies will become extinct in the near future (Coetzee et al., 2021a). Coetzee et al. (2021a) also note that stemming the population decline at the larger remaining colonies therefore represents the best means of maintaining the species in the wild, and that if current population trajectories continue, the species could be functionally extinct by 2035.

The latest population surveys in 2022 reported that seven colonies collectively held more than 95% of the remaining population in South Africa (Masotla et al., 2023): Dassen Island (2 513 pairs [25.1%]), Robben Island (991 [9.9%]), Boulders Beach (891 [8.9%]), Stony Point (1 565 [15.6%]), Dyer Island (1 026 [10.25]), St Croix Island (1 262 [12.6%]) and Bird Island (1 437 [14.4%]).

Against this background, it is important to recognise that a decline in the numbers of African penguins is not inevitable. Between 1987 and 2004, the number of adult African penguins at west coast sites in South Africa increased from 7 500 to 33 000 (Sherley et al., 2020; Figure 1.2). It is evident that numbers can increase during periods when conditions are favourable, but that this has rarely been the case in recent decades.

1.2 Summary of basic penguin population and feeding ecology

African penguins generally commence breeding aged around 5 to 6, but unsuccessful breeding attempts at earlier ages are also known. They can continue breeding past age 20, although this is probably uncommon (Crawford et al., 2013). Adult survival, breeding propensity and reproductive output are all highly variable, with reported links to food availability (Crawford et al., 2013). Juvenile survival, as with many seabirds, is lower in the first year after fledging (Crawford et al., 2013).

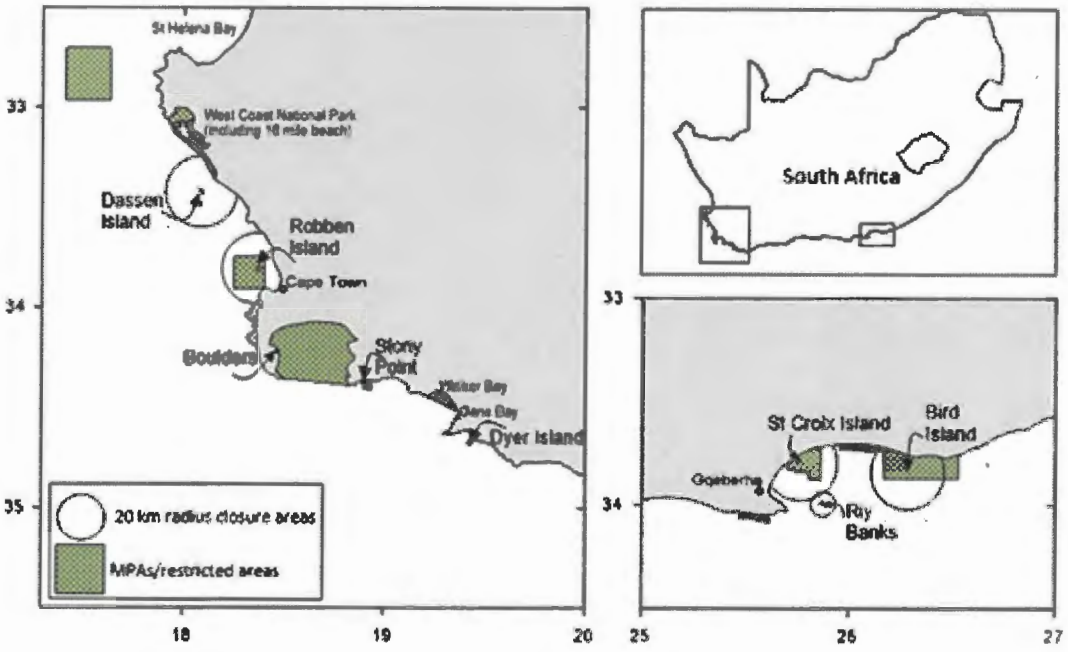

Figure 1.1: Map (courtesy of J Coetzee) of southern Africa showing the location of the breeding colonies for African penguins off South Africa

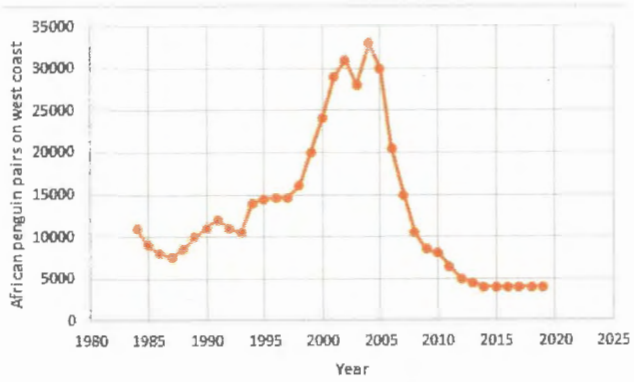

Figure 1.2: Total number of pairs of African penguins at all known west coast sites between 1984 and 2019 (data from Sherley et al., 2020)

Access to energy-dense prey (small pelagic fish) is critical to African penguins at multiple different times of year. Two periods are particularly demanding: moult and breeding. Adult penguins must build up their body reserves prior to moult, as they cannot enter the water to obtain prey within this 21-day fasting period, during which time they replace their entire plumage (Crawford et al., 2013). Moult tends to be synchronized at most individual localities, although the timing varies among localities. At Dassen Island, the peak moult is August–November; at Robben Island and Boulders Beach, most birds moult from November; at Dyer and St. Croix islands, peak moult is October–December; while a large proportion of birds at Bird Island start moult in September (Crawford et al., 2013). At all localities, most immature birds moult in October–March (Crawford et al., 2013).

Adequate prey is also important prior to and during breeding. Females must accumulate the resources necessary for egg production, whilst both parents must accumulate sufficient reserves to ensure they can repeatedly stay ashore whilst incubating, brooding or guarding their offspring. Incubation lasts 38–41 days and is shared equally by both sexes; chicks are brooded by adults until about 10 days after hatching; from 26–30 days, chicks are often left unguarded and may form crèches of up to 25 chicks; chicks fledge when between 55–130 days old (Crawford et al., 2013). During breeding, adults can sacrifice their own body condition to a certain extent, but generally not to the point beyond which their own survival is compromised (c.f. Southwell et al., 2015). Therefore, during breeding, and immediately post breeding, adequate resources are necessary to ensure adult maintenance, chick growth, and eventually to ensure independent chicks can forage successfully whilst still naïve, and adults can recover lost condition. African penguin breeding can occur throughout the year, with a second clutch possible, or with adults relaying if their first clutch is lost (Crawford et al., 2013). At Dassen Island, eggs are mostly laid in December–June, with most chicks during January–August; at Robben Island, eggs are laid in January–August, with chicks abundant in April–September; and at St. Croix Island, egg laying peaks in January (Crawford et al., 2013). Thus, as with moult, peak breeding time differs between sites.

When foraging, African penguins feed alone or in small groups and sometimes in conjunction with other seabirds. They are visual hunters but may use other cues to locate prey. Most dives are shallower than 30 m deep, although some may reach 85 m, lasting up to 2.5 minutes (Crawford et al., 2013). Almost all dives occur during daylight with virtually none at night. Adults provisioning young chicks generally forage within 40 km of their colony, but may travel up to 120 km, swimming at speeds of just under 2 m s^{-1}, or up to 5 m s^{-1} in short bursts (Crawford et al., 2013). Local forage fish abundance based on hydro-acoustic surveys has been shown to explain around 60% of the variation in time spent diving for penguins foraging within two days of the survey (Campbell et al., 2019). Penguin foraging effort (time spent diving, number of wiggles per trip, number of foraging dives and the maximum distance travelled) increased as forage fish abundance declined; in addition, quantile regression revealed that variation in foraging effort increased as prey abundance around the colony declined (Campbell et al., 2019).

Locating prey at sea is complex. Physical ocean features, such as thermoclines, are often used as foraging cues by marine predators, as these concentrate and hence increase the likelihood of locating prey. This is also true for African penguins, which have been shown to forage at and below the thermocline even though its depth and gradient may shift over time; indeed, penguins dive deeper in search of prey when there is no thermocline (van Eeden et al., 2016). Such physical cues are therefore important. However, olfactory cues have also been shown to be important. Dimethyl sulphide (DMS), an organo-sulphur compound released when phytoplankton are grazed, is known to attract seabirds (Nevitt et al., 2004), including African penguins (Wright et al., 2011). DMS-scented oil slicks attracted 2–3 times more penguins than control slicks, whereas penguins showed no response to slicks containing cod liver oil. The number of penguins attracted to DMS increased for at least 30 min, suggesting penguins could travel up to 2 km to reach scent cues. Such results also support the hypothesis that African penguins use DMS as an olfactory cue to locate prey patches at sea from a distance, which is particularly important given their slow commuting speed, relative to that of flying seabirds (Wright et al., 2011).

African penguins are known to hunt either independently or cooperatively, pursuing both solitary as well as schooling pelagic fish (McInnes et al., 2017). The most profitable foraging involves herding of fish, compressing schools upwards during the ascent phase of a dive where most prey

Pelagic fish (photo credit Carl van der Lingen)

captures then constitute isolated fish, separated from the main school (McInnes et al., 2017). Catch-per-unit-effort for penguins is significantly improved when targeting schools rather than solitary fish, especially when penguins forage in groups. It appears that African penguins have evolved specialist hunting strategies closely linked to their primary reliance on schooling pelagic fish (McInnes et al., 2017). As penguins drive prey to the surface, it is also likely to enhance the foraging efficiency of flying seabird species (McInnes and Pistorius, 2019). As such, penguins may be integral to important processes that influence the structure and integrity of marine communities. Importantly, if group foraging confers an advantage to African penguins, then dwindling populations may suffer from an Allee effect as colonies become too small to support sufficient densities of birds for foraging groups to form (Ryan et al., 2012).

Predicting how populations respond to their environment requires detailed knowledge of demographic traits, such as survival and reproduction. However, translating foraging efficiency into demographic responses remains challenging for most marine predators, including African penguins. However, for macaroni penguins, Horswill et al. (2017) have shown that when prey availability is low, foraging trips are significantly longer and extend overnight; birds forage farther from the colony, potentially to reach more-distant foraging grounds, and allow for increased search times. These extended foraging trips are also linked to a marked decrease in fledgling weight, most likely associated with reduced rates of provisioning (Horswill et al., 2017). Further, work on the same macaroni penguin population suggests that lowered first-year survival rates are, at least partially, associated with lower fledgling masses (Horswill et al., 2014).

Declines in African penguin numbers might be caused by low survival rates of penguins or by low breeding success, or a combination of these. Survival rates of adult African penguins can be estimated by analysis of re-sightings (either visual or electronic) of individually-marked birds. Survival of adult African penguins has in many recent years been considerably lower than is typical for seabird species, suggesting that factors reducing adult survival are likely to contribute to the observed population decline. Although monitored survival rates do not appear to indicate any correlation with anchovy, *Engraulis encrasicolus*, stock biomass, a strong correlation between adult survival and sardine, *Sardinops sagax*, stock biomass has been reported by Robinson et al. (2015) and by Crawford et al. (2022). Both studies found little relationship between adult survival and sardine stock biomass in years when stock biomass was average, or above average, but found very low adult survival in most years of particularly low sardine stock biomass.

1.3 Hypotheses related to how fisheries can impact penguin populations

1.3.1 Fishery related hypotheses

There is a considerable literature related to the effects of marine capture fisheries on seabird population processes (e.g., Montevecchi, 2002; Cury et al., 2011; Sydeman et al., 2017). However, for some processes relatively few studies have access to data appropriately matched to predator

Photo credit SAPFIA – South African Pelagic Fishing Industry Association

needs in both space and time (see Trathan et al., 2022). Nevertheless, it remains axiomatic that fisheries have the potential to disrupt seabird population processes. The primary impacts on predators can be characterized as either negative (e.g., bycatch, resource competition), or positive (e.g., discard provisioning), whilst converse impacts of seabirds on fisheries also exist (e.g., bait stealing); see Montevecchi (2002) for a more detailed summary. However, in terms of purse seiners targeting small pelagic fish and interactions with African penguins, the most important interactions are likely to be related to bycatch and resource competition, or possibly to disturbance of group foraging by penguins. African penguins have not been recorded as bycatch in South Africa, which may be due to a combination of spatio-temporal separation of foraging (during the day) and fishing (mostly at night) and net avoidance behaviour. In contrast, resource competition is perceived to be a major cause of African penguin decline by some authors (e.g., Sydeman et al., 2021, and cited references therein), although this is contested (Butterworth and Ross-Gillespie, 2022, and cited references therein). Disturbance of group foraging, unrelated to any prey depletion effects, could possibly occur if groups of penguins were disturbed or displaced by fishing vessels, or if their group coordination and communication while hunting was affected because of noise.

Resource competition plausibly could happen through reductions in local prey biomass, or disruption of the prey field so that preferred foraging opportunities are diminished. For example, removal of parts or even whole shoals of schooling fish would diminish local prey biomass and

specifically the prey aggregation states thought to be most attractive to penguins. However, key to the realized impact on penguins will be the rates by which local prey are replaced via regional advection or directional movement of prey and diurnal prey migrations. This means that a key aspect of management must be to consider the relative rates of various ecological processes related to prey availability.

Information documenting advection or directional movement of small pelagic fish is sparse. However, along the coast of South Africa, headlands and embayments interact with the oceanographic flow of the coastal countercurrent and shelf-edge jet currents, leading to areas of retention (Hutchings et al., 2002; Kirkman et al., 2016). Such complexities are key to understanding the local movements of fish as they come within the foraging ambit of a given penguin colony, replenishing the prey field depleted by penguins, other predators, or fisheries. Moreover, the African penguin, in common with other penguins, undergoes periods of positive and negative energy balance as they accumulate, or lose, body weight during reproduction (e.g., Southwell et al., 2015). Consequently, depletion of prey, whether due to natural predation or through resource interactions with fisheries, is likely to have variable consequences depending upon the exact timing in relation to breeding, or seasonal prey movement.

Thus, identification of how fisheries impact African penguin populations, particularly foraging, is complex, resulting from interactions between the timing and stage of moult, or breeding, at a given colony (e.g., Crawford et al., 2013; Southwell et al., 2015), the availability of prey locally (e.g., Campbell et al., 2019), advection and transport (e.g., Hutchings et al., 2002; Kirkman et al., 2016), as well as penguin foraging efficiency (e.g., McInnes et al., 2017).

1.3.2 Other hypotheses

1.3.2.1 Forage fish abundance

Butterworth et al. (2015), based on counts of moulting penguins and re-sightings of tagged penguins at Robben Island (Robinson et al., 2015), found that the primary reason for the post-2003 penguin decline was an increase in adult mortality, which they attributed to reduced abundance of sardine off the South African west coast. Analysis of African penguin annual mortality rate at Robben Island in relation to 1+ sardine stock biomass scaled to the maximum November survey estimate of 1 343 000 t in 2003

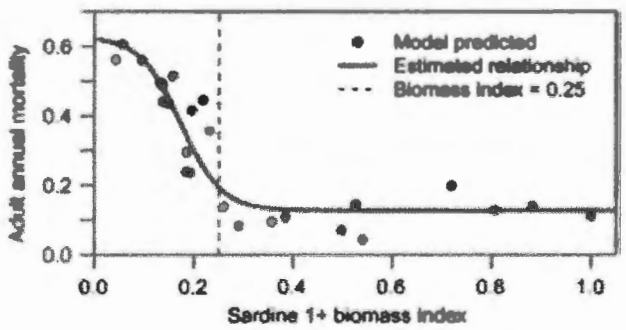

Figure 1.3: The estimated relationship between the 1+ sardine biomass index and penguin adult mortality (from Robinson et al., 2015).

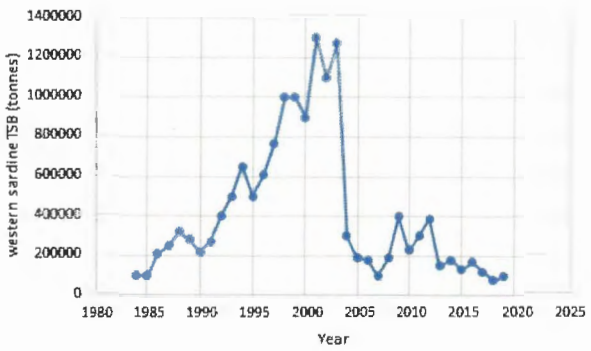

Figure 1.4: Estimated total stock biomass (TSB) of western sardine from 1984 to 2019 (data from de Moor, 2021 and Coetzee et al., 2022).

(Figure 1.4) showed no change in penguin mortality when sardine biomass exceeded about 25 to 30% of the maximum biomass (penguin annual mortality varied among years around a mean of about 15% per annum but with no trend in relation to sardine abundance). However, penguin mortality increased rapidly as sardine biomass fell below 25 to 30% of maximum biomass. Penguin annual mortality was estimated by Robinson et al. (2015) to be about 27% at a sardine biomass index of 20%, and about 55% at a sardine biomass index of 10% (Figure 1.3). Observed (and predicted) mortality exceeding 50% in years with sardine biomass below 10% of maximum represents a very unusual situation for any seabird species, as seabirds are normally long-lived, with adult survival rates typically around 0.8 or more.

Crawford et al. (2022) found that penguin survival was around 0.8 when sardine stock biomass was average or above average but declined strongly with sardine standardised stock biomasses below 40% of maximum biomass, results similar to those previously shown by Robinson et al. (2015) but based on more years of data and from two colonies (Dassen and Robben islands). Perhaps surprisingly, there seems to be no clear correlation between African penguin survival and anchovy stock biomass, suggesting that sardine may be the key forage fish determining pen-

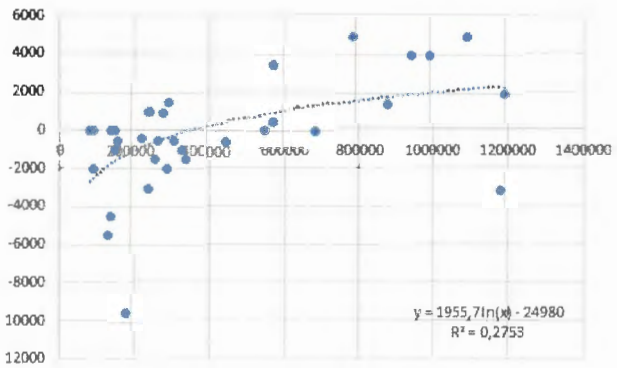

Figure 1.5: Change in numbers of pairs of African penguins between successive years (y-axis) off the South African west coast in relation to sardine total spawning biomass averaged over the year and previous year (x-axis, tonnes of total stock biomass). The dotted line is the best fit logarithmic regression. Penguin data from Sherley et al. (2020), sardine data from de Moor (2021) and Coetzee et al. (2022).

guin survival (possibly due to its higher energetic content; Balmelli and Wickens 1994).

The changes in numbers of African penguins (Figure 1.2) show a close similarity to changes in western sardine total stock biomass (Figure 1.4).

Figures 1.2 and 1.4 suggest that breeding numbers of African penguins may be strongly influenced by western sardine total spawning biomass, although this is correlational evidence so inferring a causal relationship is hazardous. Plotting the change in penguin numbers from one year to the next in relation to western sardine spawning biomass averaged over the year and previous year (Figure 1.5) and fitting a regression line to these data, indicates that breeding numbers of penguins increased in almost all years when sardine spawning biomass averaged more than about 350 000 t but decreased in most years when spawning biomass was below about 350 000 t. As inferred by Butterworth et al. (2015), these data also suggest that western sardine spawning biomass may have been one of the most important drivers of change in west coast African penguin numbers (but noting considerable noise in the data in Figure 1.5).

In relation to sardine stock dynamics, de Moor and Butterworth (2015) concluded *"Importantly, however, average recruitment for the west stock declines for spawning stock biomasses below about 800 000 t"*. Similar strong relationships where recruitment reduces rapidly at low spawning stock biomass exist for other sardines (e.g., Japanese sardine, Bai et al. 2022; Pacific sardine, McClatchie et al., 2010).

In order to ensure long-term sustainability of the western South African sardine stock, it is important to avoid depleting stock biomass below 800 000 t because recruitment from significantly smaller stock biomasses will be likely to be greatly reduced, resulting in prolonged depletion of the stock with limited potential for recovery. In that context, it is noteworthy that, rather than reducing fishing mortality continuously as stock biomass falls to low levels, the harvest control rule (HCR) for this stock allows increasing fishing mortality to be imposed as the stock biomass falls from 524 000 t to 300 000 t (Coetzee et al., 2022). A consequence of this HCR is that the exploitation rate peaked at >70% of estimated stock biomass in 2016 (de Moor, 2021) despite stock biomass being below 200 000 t and therefore already at risk of depressed recruitment. This depletion by the fishery is likely to have reduced the prospects for stock recovery by reducing future recruitment (see, for example, Essington et al., 2015). The implication of that is not only that the available stock biomass for fishing has had limited potential for recovery to allow greater Total Allowable Catches (TACs) because of impaired recruitment, but also that the reduced sardine stock biomass will have impacted African penguin adult survival (Robinson et al., 2015), contributing to the severe decline in breeding numbers of African penguins. Based on the available evidence (de Moor and Butterworth, 2015; Robinson et al., 2015; de Moor, 2021) lower survival and low sardine biomass appears to have been likely to have been one of, and possibly the single, most powerful driver of African penguin population dynamics in recent years, at least at Robben Island.

Further, prey capture, adult survival, the amount delivered to chicks, reproductive success, and other vital rates, all depend upon another set of important ecological interactions, including parental age and experience (e.g., Ainley, 2002). In a declining population, such as for African penguins, juvenile recruitment is vital; indeed, within a given year, penguins fledging with heavier body masses are likely to show higher survival rates than birds fledging lighter (Horswill et al., 2014). Thus, the individual quality of parents and juveniles becomes important, where individual quality is linked to different performance levels consistent throughout life (Lescroël et al., 2009). Seabirds respond to environmental changes by adjusting their breeding and foraging strategies (Cohen et al., 2014), and relationships exist between adult survival and quality, such that population demographic patterns affected by factors at the individuals' level (e.g., individual quality) may be obscured at the population-scale level (Lescroël et al., 2009). Also, for a given population, life-history trade-offs that connect different aspects of a population's demography may be important (Horswill et al., 2021).

Life-history theory suggests that long-lived animals (which include seabird species) should buffer their adult survival by abandoning breeding efforts if conditions are likely to have an adverse effect on adult survival, but several studies show empirical evidence of adult survival as well as breeding success of seabirds being reduced by low abundance of their preferred prey (e.g., Oro and Furness, 2002; Frederiksen et al., 2004; Davis et al., 2005). In an analogous manner, fisheries should respond to ecosystem conditions, especially for small pelagic fishes such as anchovy and sardine, which are typified by 'boom and bust' population dynamics that arise from inherent variability in their recruitment strength and short life-spans. For example, from the mid-1980s until the early-2020s, sardine biomass on both the west coast and south coast of South Africa was at low historical levels, apart from during a short period from the late-1990s, until the early-2000s (Coetzee et al., 2021a). Subsequently, fishery catches increased, as did the exploitation rate (Coetzee et al., 2021a).

1.3.2.2 Egg collecting and guano harvests

Egg collecting was a pressure but is no longer an issue. Loss of nesting habitat as a result of guano harvesting has reduced the suitability of available nest sites over many decades of guano removal. Guano harvests ended decades ago, but the legacy is that African penguins now breed in sites where they are more exposed to predators, nest flooding or overheating.

1.3.2.3 Predation

Predation by avian predators (especially kelp gulls) and by introduced alien mammal predators (such as feral cats, rats, dogs) occurs at some colonies, mainly affecting survival of eggs and chicks. Predation also occurs at sea, with penguins in some areas vulnerable to predation by Cape fur seals. Predation on adult penguins by Cape fur seals has been particularly frequent at Dyer Island. During 2004 and in 2006–2007 Cape fur seals were estimated to kill about 7% of adult African penguins, mostly when penguins were returning to the colony in the evening to feed chicks

(Makhado et al., 2013). Previous estimates of this mortality were 9% in 1994–1996 and 2 to 2.5% in 1999–2001 (Makhado et al., 2013). The predation is thought to be mainly by a small number of immature male Cape fur seals. It is considered to be a learned behaviour, and Makhado et al. (2009) suggest that the removal of these 'problem' seals may be an appropriate management response. That would appear to have the potential to reduce adult mortality by a significant amount at Dyer Island, but possibly would have relatively little benefit at most other colonies.

1.3.2.4. Noise

African penguins are known to be sensitive to underwater noise (Pichegru et al., 2017) and use acoustic communication to increase group feeding efficiency (McInnes et al., 2020). This raises the possibility that African penguin foraging success may be influenced by levels of underwater noise that could compromise group feeding efficiency and consequently result in a form of habitat loss or degradation for foraging penguins. Such impacts could arise from presence of fishing vessels in penguin foraging areas or from the presence of vessel traffic such as tankers and cargo vessels. It has been suggested that increased shipping activity in Algoa Bay may have contributed to the decline in African penguin numbers at St Croix Island, and that increased shipping noise may represent an increasing threat to African penguins in South African waters in general (Pichegru et al., 2022).

1.3.2.5 Nest boxes

African penguins are adapted to nest where they are safe from mammalian predators, historically only on offshore islands. On these islands they nest alongside large numbers of other seabirds. As cold-adapted birds they are vulnerable to overheating on land. They dig burrows in guano in which they nest so that they have a buffered microclimate with high relative humidity, protected from solar heating and safe from avian predators (Frost et al., 1976). Harvesting of guano resources from islands off southern Africa removed most of this preferred nesting habitat decades ago, forcing most penguins to nest on the surface, which exposes them to predators, rain, wind, and especially to solar heating. Solar heating can result in temporary nest desertion by adults forced to go into the sea to cool down, which leaves eggs exposed to predation and overheating, reducing their breeding success (Frost et al., 1976; Randall, 1995; Lei et al., 2014; Welman and Pichegru, 2023). Similar effects also occur in the closely-related Magellanic penguin in South America (Yorio and Boersma, 1994). One solution to this problem is to provide nest boxes that protect penguins from these pressures (see additional details in Appendix C).

1.3.2.6 Other

African penguins are vulnerable to impacts on their survival, ability to achieve breeding condition, and breeding success, of low abundance of their key forage fish (sardine, anchovy), and changes in the geographical distribution of forage fish stocks relative to the locations of penguin colonies and moulting sites. Climate change is widely considered likely to be a main factor influencing abundance and distribution of these key prey. Oil pollution has been a long-term pressure on African penguins and continues to be a pressure. Disturbance at colonies by people, and disturbance at sea by ship traffic are ongoing concerns.

African Penguin in a nest incubating an egg (photo BM Dyer)

1.4 Background to the establishment of the Expert Panel.

An African Penguin Biodiversity Management Plan (BMP-AP; Shaw et al., 2011; Anon, 2010) was developed that aimed to halt the decline of the African penguin population in South Africa within two years of its implementation and after that achieve a population growth that would result in a down-listing of the species in terms of its IUCN Red List status. These objectives were not achieved but the plan did lead to: (i) improved cooperative management; (ii) population reinforcement; (iii) improved breeding-habitat management; and (iv) improved management of the captive population (Table 1 of DFFE, 2021).

Modelling studies suggest that adult mortality is higher when sardine biomass is below a critical threshold (Figure 1.3; Robinson et al., 2015) and low adult survival is a strong driver of the reduction in the population size of African penguins since around 2003. However, projections based on the-then Operational Management Procedure (OMP) for sardine by Robinson et al. 2015; see Figure 1.4) suggested that changing the OMP was unlikely to have a marked impact on penguin growth rate relative to closing the fishery entirely (Figure 1.6). Thus, the focus for potential management actions in recent years has focused on fishing near breeding sites.

Penguins may be especially sensitive to changes in pe-

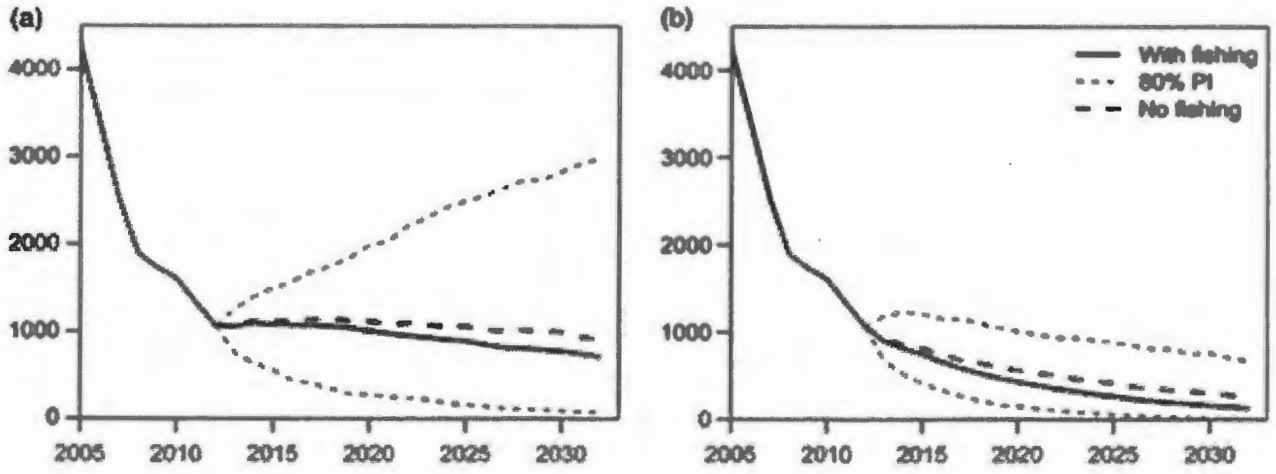

Figure 1.6: Comparison of median projected penguin numbers under Interim OMP-13, and without fishing for future sardine distributions similar to those observed in (a) 1984–1998 and (b) 1998–2012. The 80% probability intervals are indicated for the projections under Interim OMP-13. Projections commence in 2012

lagic fish abundance and distribution as a consequence of their land-based breeding sites and their limited foraging range during breeding (e.g., Sherley et al. 2013; Crawford et al. 2019). For this reason, a study to assess the effects of closure to purse-seine fishing around penguin breeding colonies was initiated in 2008. This study comprised two parts: (i) a feasibility study (2008–2012) during which purse-seine fishing was prohibited around some island breeding colonies and data on penguins and small pelagic fish were collected to determine whether an experiment would have adequate statistical power, within a reasonable time-period, to detect a statistically significant effect of closure, if such existed; and (ii) an Island Closure Experiment (ICE; 2014+), during which data were to be collected to enable a scientific evaluation of whether closures within a distance of 20 km are beneficial to penguin breeding success. In order to maximise contrast for more precise estimation, the study involved a three-year alternation of opening and closing to fishing around islands[1].

Two groups of scientists conducted analyses of the data from the ICE. The analyses were subject to review by the International Fisheries Stock Assessment Workshops (IFSAWs), and over time the differences in terms of methods, data used and results regarding the effects of island closures on penguin reproductive parameters between the two groups declined. However, the two groups of scientists could not reach agreement on some aspects of the analyses and its implications for penguin conservation (see a detailed summary in CAF [2022] and Section 2). This was despite the Minister of Forestry, Fisheries and the Environment tasking the Consultative Advisory Forum (CAF) for Marine Living Resources to develop agreed recommendations on the limiting of small pelagic fishing activities adjacent to penguin colonies. This group considered many documents and held over 50 hours of virtual meetings and several one-on-one meetings in attempts to broker consensus, but this could not be reached and as a last resort they recommended an average of 50% closed and 50% open of the marine Important Bird Areas (mIBA) (CAF, 2022).

The most recent estimates of the effects of closures on penguin reproductive parameters are documented in Sherley et al., (2018, 2021) and Butterworth and Ross-Gillespie (2021a), although these were updated for this report using data up to 2019 and a series of models proposed by the Panel. Models were developed to estimate the implications of changes to each reproductive parameter individually on population growth rate (Butterworth and Ross-Gillespie, 2021b; Sherley et al., 2018, 2021) and attempts were made to infer changes in population growth given the effects of island closures, accounting for the effects on each reproductive parameter (Butterworth and Ross-Gillespie, 2021b; Sydeman et al., 2022).

Options for area closures more aligned with the feeding behaviour of penguins or with the needs of the fishery were developed by a variety of stakeholder groups (e.g., Coetzee et al., 2021a; CAF, 2022). The benefits to penguins were quantified by estimates in the change to the population growth rate and the difference in numbers of penguins expected to be added to the population given the size of the closures (e.g., Butterworth and Ross-Gillespie, 2021b; Sherley et al., 2018, 2021; Bergh, 2022) while costs to the fishery were quantified in terms of catches in areas proposed to be closed, the amount of that catch that would be "lost", and the resulting reduction in jobs in the fishing sector and the general economy (e.g. Coetzee et al., 2021b; Bergh, 2022). Butterworth (2021) outlines a decision table approach to compare the costs and benefits of addressing potential drivers of the dynamics of African penguin. However, there was no agreement amongst the stakeholders on a closure option owing to differences regarding whether the benefits to penguins were meaningful given the predicted change in growth rate (including relative to other potential causes for the decline in abundance), as well as costs to the fishing industry, and all proposals for closures were rejected. However, the stakeholders agreed that an expert panel could help to resolve the technical issues regarding the interpretation of the ICE.

[1]This time-period was not well-matched to the biology of African penguins, which usually do not breed until aged 4–6 years, so the experiment was designed not to provide information on changes in population size, only on changes in parameters related to reproduction.

1.5 Panel process

A call was made on 28 October 2022 for nominations of qualified individuals to be members of an Expert Panel (henceforth "Panel"), and the Minister selected five scientists with expertise in seabird and penguin ecology, population ecology and ecosystem modeling, and applied statistics (Prof. Robert Furness, Dr. Ana Parma, Dr. Éva Plagányi. Prof. André Punt [Chair], and Prof. Philip Trathan) in December 2022. Recognizing the need for expertise in economics considerations, Prof. James Sanchirico was appointed to the Panel in March 2022. Appendix A lists short biographies for the expert Panel. The Terms of Reference for the Panel are summarized in Appendix B.

The Panel was provided with a list of background documents after a meeting with the Minister of Forestry, Fisheries and the Environment and departmental staff, which was supplemented by documents identified by the stakeholders. The Panel held an online meeting (March 21–23, 2023) at which stakeholders provided input to the Panel in the form of oral presentations and written submissions, after which the Panel met to discuss the implications of the material presented and the necessary next steps. The meeting led to a request for additional information on catches that were reported to have occurred in the closed areas.

A meeting of South African scientists and stakeholders took place on 15 May 2023 during which updated results related to the ICE, the impact of closures on catches and the fishery, as well as how penguin foraging areas could be specified were discussed; one Panel member acted as an observer at the May meeting.

The material from the May and March meetings, along with brief comments by meeting participants, were made available to the Panel, which then met from 5–9 June 2023. The June meeting of the Panel involved a two-day "open" session at which stakeholder groups were provided the opportunity to make presentations to the Panel, followed by a three-day "closed" session during which the Panel reviewed the available evidence, debated conclusions and identified advice and recommendations.

1.6 Current management arrangements

The Department of Forestry, Fisheries and the Environment (DFFE) implemented the following interim closures in September 2022 (Figure 1.7):

1. An L-shaped closure around Dassen Island stretching about 12.5 nm offshore from Yzerfontein and 21.5 nm offshore of Bokpunt, with an extension southward in the offshore area so that the maximum North/South extent is about 20 nm.
2. No additional closure around the Robben Island colony, with only the MPA purse-seine fishery control zone of the Robben Island MPA being closed to fishing.
3. A small closure stretching eastward from Cape Hangklip on the eastern side of False Bay for about 9 miles along the coast and about 3 nm offshore. This includes the small Betty's Bay MPA and the Stony Point penguin colony.
4. A rectangular area around Dyer Island between Danger Point and Quoin Pt, extending offshore for about 18 nm from Dyer Island and southwards for about 12 nm from the island. This rectangular area is further divided into an inshore area that is closed to all purse seiners and a larger offshore area where only vessels with a total length of less than 26 m may fish.
5. A rectangular area about 20 nm south of St Croix Island in Algoa Bay, with a maximum alongshore extent of about 20 nm, but with fishing allowed around the Riy Banks.
6. A square closure extending about 12 miles south of the Addo MPA in the vicinity of Bird Island with a maximum west/east extent of around 29 nm.

Other restricted areas include the 16-mile beach MPA inshore along the west coast, north of Dassen Island, the entire False Bay, the inshore area in Walker Bay between Stony Point and Dyer Island and the Sardinia Bay MPA, just west of Algoa Bay and the inshore parts of the Addo MPA between the interim closures of St Croix and Bird islands.

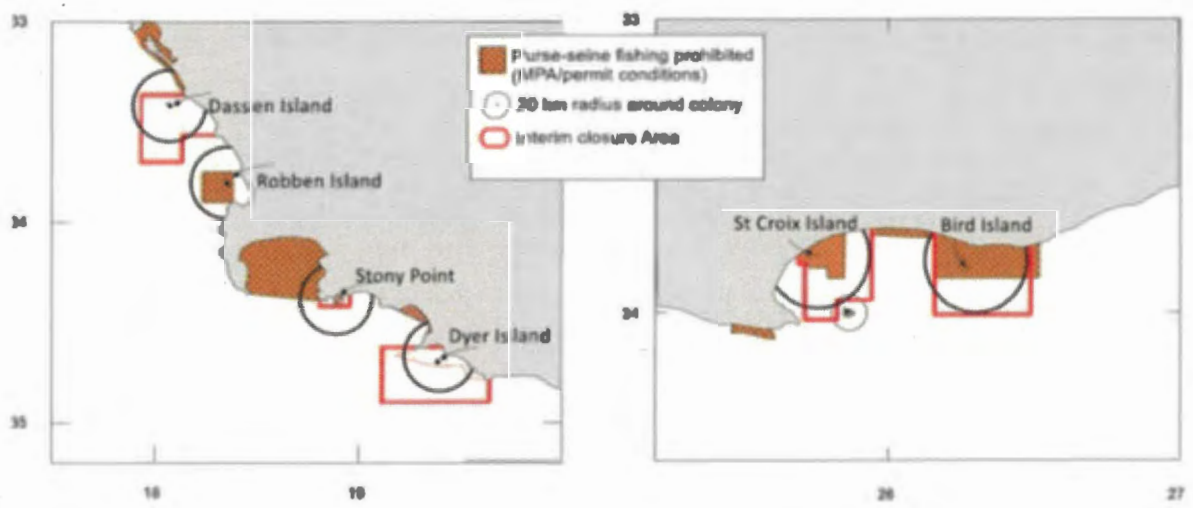

Figure 1.7: Interim closures to fishing (red polygons) as currently implemented. These closures have been implemented since September 2022. Vessels <26 m in length are allowed to fish in the offshore area (outside the red dotted line) of Dyer Island.

2. BENEFITS OF ISLAND CLOSURES TO PENGUINS

2.1 Aims and design of the ICE, and reproductive parameters monitored

The Island Closure Experiment (ICE) was established in 2007 to provide a scientific basis to assess whether closures to pelagic fishing in the neighbourhood of penguin breeding islands might provide a meaningful improvement to penguin reproductive success. The design of the ICE therefore had a basic aim to detect differential reproductive success under open and closed situations during periods when other conditions were unlikely to confound results through having changed themselves.

The ICE comprised two parts: (i) a feasibility study during which purse-seine fishing was prohibited around two pairs of penguin breeding islands: Dassen and Robben islands on the West Coast and St Croix and Bird islands in the Eastern Cape (Figure 1.1); and (ii) an experimental phase (2015–2021) where a series of three-year alternating island closures around the four breeding islands were implemented (Table 2.1). Figure 2.1 summarises the timeline of the ICE and the associated reviews of the analyses conducted.

The three-year alternation of opening and closing to fishing around islands was selected to maximise contrast for more precise estimation of closure effects (CAF, 2022). The duration of three years was selected according to DFFE (2021) to balance conflicting objectives of: (i) rapid alternation to maximise contrast in the data to enable more precise estimation; (ii) a slower alternation to take account of possible autocorrelation in the penguin indices being monitored; and (iii) the desirability to integrate the feasibility study into a possible future experiment to lead to earlier answers.

The feasibility study was originally planned to last two years (2008 and 2009), but that proved to be insufficient time to allow experimental power to be estimated for all the penguin parameters monitored, and analyses of the impacts of purse-seine fishing in the vicinities of breeding islands failed to produce clear-cut results. It was therefore agreed that the feasibility study was to be extended for an additional four years (until the end of 2014).

The penguin parameters that were intended to be measured during the experiment were: chick condition, survival and growth, fledgling success and as measures of foraging behaviour: maximum distance, path length and trip duration (see Campbell et al. [2019] for detailed specifications for how each of these variables are defined and calculated based on monitoring data). Not all response variables could be measured in all colonies; the west colonies (Dassen and Robben islands) were the most intensively monitored while only data on chick condition and foraging-related variables were collected at St Croix and Bird islands (see Table 2.2 for details regarding data availability).

Small-scale acoustic surveys using an inflatable vessel were conducted to provide direct estimates of the biomass of small pelagic fish available to penguins around some of the islands. Those surveys were initially around Robben Island (six surveys were conducted in 2009) but in later years the surveys were extended to around Dassen, St Croix and Bird islands (Coetzee et al., 2016). Fine-scale surveys were also conducted by non-governmental researchers around St Croix and Bird islands from 2014 to 2018 (McInnes et al., 2017). The small-scale surveys were subsequently abandoned at the end of 2018 given their relatively low precision, staff shortages and lack of funding (DFFE, 2021).

2.2 Methods used to estimate effects of closures (catches) on penguin population growth rate

2.2.1. Rationale for models

The impacts of fishing closures on the response variables monitored were quantified using generalised linear mixed-effects models (GLMM). Various model variants were applied since the first analyses of the ICE data were conducted during the initial feasibility period, including an analysis to evaluate the power to detect biologically meaningful impacts caused by the fishery as data accumulated. The power analyses completed in 2016 indicated that meaningful results could be obtained within 20 years of the onset of the experiment (Ross-Gillespie and Butterworth, 2016a).

Table 2.1: Schedule of closures around the four penguin breeding colonies during the ICE. Crosses indicate years in which a 20 km radius area around the island was closed to fishing.

Island	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Dassen Island	X	X					X	X	X				X	X[1]
Robben Island				X	X	X				X	X		X	X[2]
St Croix Island		X	X	X				X	X	X				X[3]
Bird Island					X	X	X				X	X	X	

[1]Closed from 15th January to 31st March and from 1st October to 31st December, and open from 1st April to 30th September.
[2]Closed from 15th January to 31st December.
[3]Closed from 1st April to 30th September, and open from 15th January to 31st March as well as from 1st October to 31st December.

Table 2.2: Reproductive parameters monitored at the four breeding colonies that were part of the Island Closure Experiment.

Response variable	Island	Year range
Chick condition	Dassen	2004–2019
	Robben	2004–2019
	Bird	2008–2019
	St Croix	2008–2019
Chick Survival	Dassen	2008–2019
	Robben	2008–2019
	Bird	–
	St Croix	–
Fledging success	Dassen	1995–2015
	Robben	1989–2015
	Bird	–
	St Croix	–
Chick growth	Dassen	1989–2014
	Robben	2004–2014
	Bird	–
	St Croix	–
Max distance	Dassen	2008–2018
	Robben	2008–2018
	Bird	2008–2018
	St Croix	2008–2018
Path length	Dassen	2003–2018
	Robben	2003–2018
	Bird	2007–2018
	St Croix	2008–2018
Trip duration	Dassen	2003–2018
	Robben	2003–2018
	Bird	2007–2018
	St Croix	2008–2018

The main features that distinguish the various model variants utilised are summarised in this section. Mathematical specifications and further details are provided in Appendix D and cited documents.

Two main classes of models were considered. These differ in the choice of independent variable used to represent the effect of fishing. In one class, fishing is included as a binary variable having a value of 1 when the island is open to fishing and 0 when it is closed. Predictions from this class of models are referred to as "closure-based estimates" of the impact of fishing. In the alternative class of models, the effect of the actual catches taken within the 20-km areas around the colonies are evaluated as covariates. In this case, the predicted "catch-based estimates" of the impact of fishing within a given closure is calculated using the average catch taken from that closure when the island was open to fishing during the ICE. A concern with the catch-based estimators is that the true impact of fishing may be underestimated if catches tend to be higher when fish biomass is higher due to the confounded effects of fishing and food availability on penguin breeding success. The preference for using the closure-based models as the base for inference regarding the impacts of island closures was supported by the finding of positive correlations between the time-series of catches taken within the 20-km areas (when open) and regional survey estimates of biomasses of anchovy in the west and sardines in the east (Ross-Gillespie and Butterworth, 2023a). In the final set of results presented in Ross-Gillespie and Butterworth (2023a), catch-based models were also examined but they were used only as sensitivity runs requested by the Panel to evaluate the impact of some non-negligible catches apparently taken within the area closed around St Croix Island mainly in 2017 (see section 2.4).

In all cases, separate analyses were conducted for the two pairs of colonies (Dassen and Robben islands on the west coast, and St Croix and Bird islands on the east), assuming that nearby colonies experienced rather similar conditions affecting breeding success, except for the experimental treatment. Separate island-specific effects of the closure were however estimated considering that several factors not controlled by the experimental design may lead to different responses to the closure between the paired islands. The significance of those differences was evaluated by Sherley (2023), and the model with a common effect was selected based on standard model-selection criteria by Sherley (2023). Concerns were expressed that the estimation of a common effect would tend to be biased towards the island with the higher sample size and/or lower variance (Bergh, 2023) and that alternative weights (e.g., size of the colony) could be used to average island-specific estimates. While this is a valid point, the differences between the results were not large and the integrated estimate of a regional impact would not be largely affected.

An important difference between the approaches favoured by different analysts was a preference to analyse the data aggregated as annual means (Ross-Gillespie and Butterworth, 2023a) versus using individual-records-based disaggregated data (Sherley et al., 2018; Sydeman et al., 2021). The relative merits of aggregated and disaggregated data models were the subject of substantial debate (e.g., Butterworth and Ross-Gillespie, 2022; Sydeman et al., 2022). The individual-based approach has the advantage of analysing the data at the level they are collected, but the model needs to appropriately capture the factors and sources of variability (observed or unobserved) impacting the observations, other than closure alone (Haddon et al., 2020). If the model is incorrectly specified and there are unaccounted common random effects that affect all observations from a given stratum (e.g., all observations from a given month, year and colony), individual observations are not independent. This so-called "pseudo-replication" may lead to underestimation of the standard errors of important model outputs. Aggregated models, on the other hand, have the advantage of not requiring assumptions about within-stratum correlation, but are vulnerable to assigning inappropriate weights by stratum (Haddon et al., 2020). Because the two approaches would be statistically equivalent provided that a correct model structure is assumed in the estimation (Butterworth and Ross-Gillespie; 2022, Haddon et al., 2020), the debate centred on the choice of a hierarchical random structure for the disaggregated models that would be able to account for the pseudo-replication.

The choice of random model structure to be used in each of the two approaches was discussed during an international review conducted in 2020 where a recommen-

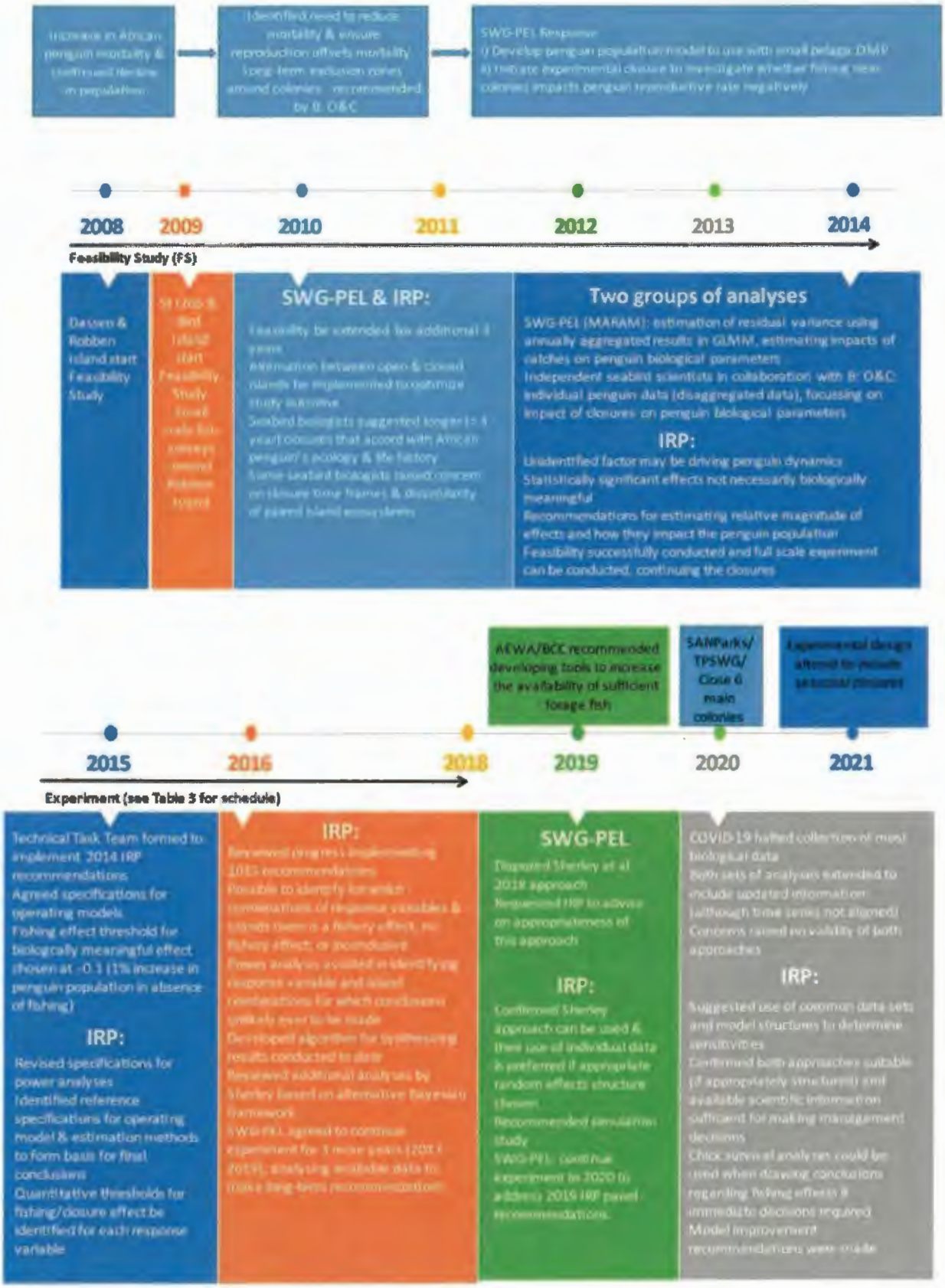

Figure 2.1: Timeline describing major events, decisions etc., during the feasibility study and experiment (Figure 9 of DFFE, 2021). SWG-PEL = small pelagic scientific working group; IRP = International Review Panel; B: O&C = Branch: Oceans and Coasts; AEWA = Agreement on the Conservation of African-Eurasian Migratory Waterbirds; BCC = Benguela Current Commission; SANParks = South African National Parks; TPSWG = Top Predator Scientific Working Group; OMP = operational management procedure; GLMM = generalised linear mixed-effects model.

dation was made to use standard model selection criteria combined with knowledge of the sampling design (Haddon et al., 2020). In both cases, a random Year effect, common to the paired islands, was incorporated to account for year-to-year changes in food availability and other unspecified factors affecting annual breeding success at a regional scale. Monthly differences in chick condition were found to be important and therefore aggregated data were first standardised for the month effect as explained in Ross-Gillespie and Butterworth (2021a), while a random Month effect, nested within Year, was incorporated in the data-disaggregated models (Sydeman et al., 2021). The remaining question, therefore, was which further random effects, if any, would need to be nested within Year (or Year/Month) to account for possible correlation between the individual observations in the disaggregated data models. Sydeman et al. (2021) found that accounting for the identity of the penguin nest (NestID) in the chick survival analysis was significant given that the survival of chicks from the same nest are expected to be correlated. However, their preferred model with random effects Year + Year/NestID did not include Island (nested within Year) and therefore could still be affected by pseudo-replication, as discussed by Butterworth and Ross-Gillespie (2022). The final set of analyses presented by Sherley (2023) used hierarchical model structures suggested by the Panel in the light of previous results presented at its March 2023 meeting. The suggested model structures attempted to address the pseudo-replication by including Island in the random effects in a way that differed depending on the response variable. For the analysis of individual chick condition data, the hierarchical random effects involved Year + Year/Month + Year/Month/Island, i.e., it included the effect of Island nested within the Year × Month interaction. Likewise, the inclusion of Island was suggested for the analysis of chick survival data as Year + Year/Island + Year/Island/NestID, which follows the natural nesting of the data collection program given that different nests are monitored in different years.

The suggested random model structures were preferred based on model selection criteria (Sherley, 2023). In the analysis of chick condition data, the inclusion of the Island random effect nested within Year + Year/Month resulted in wider confidence intervals for the predicted impacts on penguin population growth rate due to a higher standard error of the estimated fixed closure effects (compare models 3 and 3.1 respectively with models 5 and 5.1 in Sherley's Figure 2), as anticipated if observations within year-month-island strata were not independent. Furthermore, the closure effects estimated using these preferred models had very similar precision to those produced using aggregated data (model 8 in Sherley's Figure 2). A difficulty to partition the variance and to estimate the variance attributed to the Year factor was observed so a simpler random structure that excluded the Year factor was selected with no impact on the closure-effect estimates.

For the chick survival data, the inclusion of Island in the nested random structure also decreased the precision of the estimated closure effects (compare models 4 versus 8 and 5 versus 9 in Sherley's Figure 4). In this case, however, the standard errors estimated with the selected data-disaggregated model were larger than those estimated using aggregated data for models containing the equivalent fixed effects. This may be related to the shared frailty (i.e., linked probability of dying) for chicks in the same nest, which was estimated through the NestID random effect in the data-disaggregated models while it was either ignored when generating the annual aggregated survival times series (the A(B) models in Sherley's Figure 4) or it was accounted for prior to evaluating the closure effects in a separate parametric model (the A(S) models).

In conclusion, the Panel **agreed** that the debate about the relative merits of analyses based on aggregated versus disaggregated data was essentially closed based on the final set of results presented at the June 2023 meeting. Although differences in preferences between the analysts remained, the Panel **agreed** that the two approaches would provide similar results (as expected) when appropriately configured (especially to account for pseudo-replication), all other things related to data pre-processing being equal.

2.2.2 Converting impacts on reproductive parameters to changes in penguin population growth rate

Fishing effects on reproductive parameters estimated from the models need to be linked to impacts on penguin population growth rates. A method based on a demographic model described in Ross-Gillespie and Butterworth (2021b) was used by all analysts as a basis to convert changes in chick condition, fledging success and chick survival into absolute effects on annual population growth rate. In the case of chick condition, a relationship between mass at fledging and first-year survival estimated for the macaroni penguin (Horswill et al., 2014) was used to translate changes in chick condition to changes in population growth rate (Sherley et al., 2018). For the other response variables (chick growth, trip duration, maximum distance and path length), whose impact on demography are not straightforward, it was assumed that the estimated relative change in the response variable due to fishing resulted in the same relative change in juvenile survival (Robinson et al., 2014; Butterworth and Ross-Gillespie, 2021a, Table A1). This assumption is not supported by evidence available for other species, which indicates that the relationship between, for example, foraging trip duration or distance travelled with chick survival is nonlinear and involves thresholds. Aside from these nonlinearities, the assumption that the relative impacts on, say, trip duration and chick survival have the same magnitude is highly questionable. The Panel **agreed** to interpret the impacts of fishing in foraging-related parameters only qualitatively, and to not integrate them into the overall impacts on penguin population growth rates.

2.2.3. Integrating fishing impacts predicted from separate analyses into overall fishing impacts on penguin growth rate

The results of the ICE provide estimates of how closing a penguin breeding island will impact the value of a parameter related to penguin reproductive success, and models were developed that related the change in the value of one parameter to a change in population growth rate. Ultimately, it is necessary to 'integrate' the effects for each reproductive parameter to derive an 'overall' estimate of the change in population growth rate due to closing a breeding island. This calculation is complicated because of several factors:

- There are factors that will determine population growth rate other than changes in reproductive rate such as immigration/emigration and changes in survival for post-fledgling animals. Thus, reported changes in population growth rate are those related only to changes in reproductive success, essentially assuming that the survival rate for animals after the first year of life is not impacted by closures to breeding islands and that immigration and emigration balance out.
- Only a subset of the parameters were monitored on all breeding islands and some parameters were not monitored for all years (Table 2.2).
- Some of the parameters (e.g., chick survival and chick condition/growth) are not independent.
- There is a need to infer the effect of closures for breeding islands that were not part of the ICE.
- The estimates of changes in population growth rate derived from the ICE results pertain to a *status quo* of no closure, so changes in population growth rate of half those estimates are pertinent to the recent situation of closures half of the time.

Butterworth and Ross-Gillespie (2021b) provide a "qualitative" scheme for conducting the integration based on the following assumptions/algorithm:

- The three foraging metrics were assumed not to be independent nor were chick condition and chick growth, and measures of uncertainty (standard errors for the estimates of population change by reproductive parameter) were calculated based on dividing the 95% interval for the population growth rate by 4.
- Fledgling success, chick condition, and chick survival are more 'reliable' as there is a demographic model relating changes in these variables to changes in population growth rate. Thus, for example, when information about chick condition and chick growth were integrated for Dassen Island, values of 0.06% and 1.74% were averaged qualitatively to get 0.5% and the standard deviation of this value was set to that corresponding to the 0.06% estimate (i.e., 0.42%).
- Of the foraging metrics, maximum distance was considered to be less reliable than path length and trip duration, given there is more uncertainty associated with a maximum than an integrated measure. Thus, inferences regarding changes in foraging distance on population growth rate involved a "qualitative average" of the effects of primarily path length and trip duration, with the standard error set to averages of the standard errors of the change percentages by island.
- No attempt was made to infer changes on chick growth, chick survival and fledgling success for St Croix and Bird islands from the results for Dassen and Robben islands, but estimates of population growth were determined from changes in chick condition/growth and foraging alone.

In their presentation to the Panel, Butterworth and Ross-Gillespie (2023) outlined two alternatives for combining the predicted changes in population growth rate derived from changes in chick condition and chick survival, one in which the effects were averaged and a second in which the effects were added. As explained in section 2.2.2, the relationship between chick condition and juvenile survival used to translate changes in chick condition to changes in population growth rate corresponds to a relationship between mass at fledging and first-year survival (estimated for the macaroni penguin). Therefore, the Panel **agreed** that it is more appropriate to treat those effects as additive when calculating the overall impacts on population growth rates.

2.3 Predicted effects of fishery closures (catches) on penguin population growth rate

2.3.1 Summary of outcomes among analyses

A broad summary of the results in terms of the impacts of fishing around breeding colonies on penguin population growth rates obtained for the west and east colonies included in the ICE is given below. A negative value corresponds to a predicted positive effect of closing the 20-km areas on population growth rate because the reported values correspond to fishing impacts.

Results for three different closure-based estimators are shown for the analyses of chick condition and chick survival in Figures 2.2 and 2.3. The first two estimators involve models fitted to disaggregated data (D) and the third is based on the analysis of aggregated data (A). These estimators correspond to the preferred choices made by the analysts, and use the random-effects hierarchical structure that was recommended by the Panel for the case of models fitted to disaggregated data.

2.3.1.1 Dassen and Robben islands

The two alternative estimates shown in Figure 2.2 obtained using disaggregated data differ with respect to whether the effect of fishing was assumed to be the same on both islands (models W1 and W4) or was allowed to differ between them (models W2 and W5), while separate effects for the two islands were estimated by models W3 and W6, which were fitted to aggregated data. A slight preference for the models that assume the same effect size in both islands was found when the models based on disaggregated data were compared (Sherley, 2023). While some analysts argued that separate effects should be preferred independently of the results of the tests (Butterworth and Ross-Gillespie, 2023a), they acknowledged that the integrated estimates for the western Cape colonies would not be much affected.

The resulting estimates for the three selected alternative models are similar although confidence bounds were narrower when the effects were forced to be the same for both islands, as expected. The exceptions are the results for chick survival for Robben Island, which indicate a larger negative impact of fishing on population growth rate when the analysis is based on disaggregated data than when aggregated data are used. Part of the reason for this difference may be the way the individual data were aggregated to construct the time-series of chick survival.

Larger negative impacts of fishing, close to the -1% value used as a reference, were estimated for Dassen and Robben islands based on chick survival data except for the

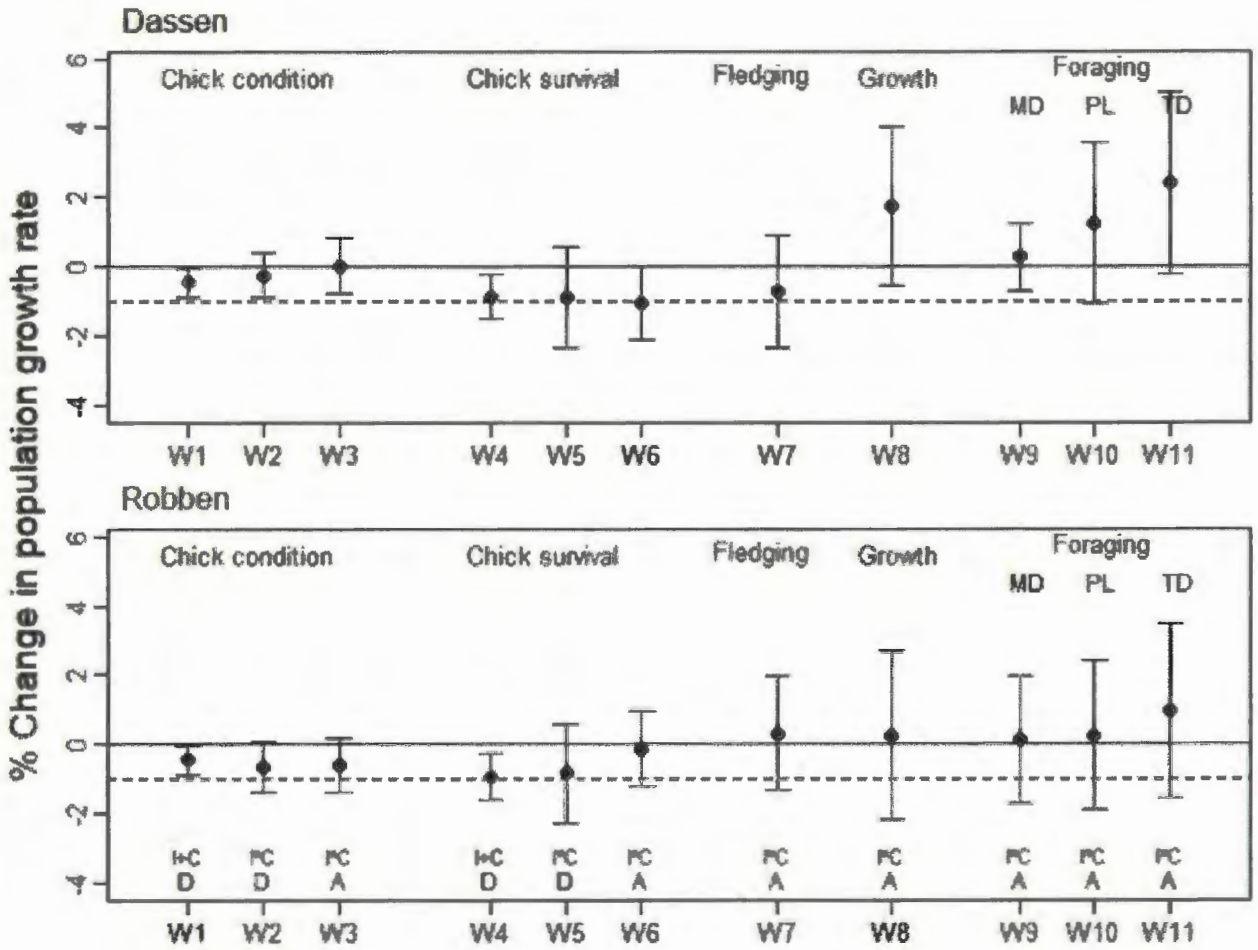

Figure 2.2: Estimates of change in population growth rate for Dassen and Robben islands as a result of fishing (expressed as a percentage per annum) resulting from the analysis of various response variables measured at those colonies: chick condition, chick survival, fledging success, chick growth, and three variables related to foraging behaviour: maximum foraging distance (MD), path length (PL) and trip duration (TD). W1–W11 = model numbers. Model specifications are detailed in Appendix D.

smaller effect estimated for Robben Island using aggregated data. Most estimated effects based on chick condition were negative but somewhat smaller, ranging from 0.04% to -0.67%.

The results based on analyses of chick growth and foraging-related parameters give little indication of a biologically meaningful impact of the closures. A reduction in chick growth rate during years when an island was open to fishing was expected but the opposite was estimated (model W8). Results are not consistent with the generally negative fishing impacts estimated from chick condition and survival, the response variables that are more directly related to population trends.

2.3.1.2 St Croix and Bird islands

The fishing impacts estimated for St Croix and Bird islands based on chick condition data were positive except that for Bird Island based on aggregated data (model E3), which was negative and very small (–0.24%) (Figure 2.3). A negative impact was estimated for some of the foraging variables in some of the island-method combinations, but the estimated impact was positive for other cases. The reliability of foraging metrics as indicators of the impact of fishing on the breeding success of penguins is therefore questionable, particularly given opposite signs of fishing impacts estimated for St Croix Island.

Overall, the Panel did not consider the results for the east colonies to be reliable, given the very little fishing that took place around Bird Island when the area was open except in the early years (Figure 2.4). Also, the first two model results based on disaggregated data included data for the year 2017 when some sizeable catches were taken from within the St Croix Island closure when the area was supposed to be closed. Some sensitivity runs conducted in response to a request by the Panel using the aggregated data (Ross-Gillespie and Butterworth, 2023b) indicate that these catches did not impact the broad results from the ICE for St Croix Island. In particular, the analyses still resulted in positive estimates of fishing impacts for St Croix Island when year 2017 was excluded from the data. This result was not substantially altered in other sensitivity runs reported by Butterworth and Ross-Gillespie (2023a, results not shown here). The only run that resulted in a negative, albeit small, impact (–0.39 in units of % population growth) was when data for 2008–2010 were excluded, Bird Island was treated as closed during all years, and St Croix Island was treated as open in 2017.

The alternative catch-based estimator, which uses actual catches taken within the 20-km areas instead of the open/closed treatment, led to negative but still very small fishing impacts (–0.28 in units of % population growth) at St Croix Island for the chick condition data (Ross-Gillespie and Butterworth, 2023a, results not shown). The results based on foraging-related variables, on the other hand, tended to show smaller negative impacts for St Croix Island than when the open/closed treatment was used.

The existence of other confounding factors not controlled by the ICE add to the difficulties in interpreting the results for the eastern colonies. In particular, the increased number of bunkering operations in Algoa Bay since 2016 may have impacted the penguin population at St Croix Island (Pichegru et al., 2022). A sensitivity run that only included years up to 2015 (Model S5 in Ross-Gillespie and Butterworth, 2023a) failed to identify any impact of the closures on chick condition, and led to lower impacts based on foraging trip parameters.

In summary, the Panel **concluded** that the ICE results for the east colonies were more uncertain and difficult to interpret given that the paired islands did not provide the anticipated contrast, and given the few response variables that could be monitored at those colonies. Notwithstanding these limitations, the Panel **concluded** that the available results only provide indirect evidence of negative impacts of fishing around St Croix Island through increased foraging distances of breeding penguins during years when the colony was open. However, these changes in foraging behaviour were not reflected in estimated poorer chick condition.

2.3.2. Integrated estimates of the overall impact of closures on penguin population growth rate

As discussed in Section 2.2.3, the Panel considered it more appropriate to treat effects estimated from impacts on chick condition and chick survival as additive when calculating the predicted overall impact on population growth rates (Table 2.3). Only the predictions for Dassen and Robben islands are shown given the concerns regarding the use of foraging-related variables (see section 2.2.1) and that fact that, for St Croix and Bird islands, only estimates based on chick condition are available.

Overall, the Panel **concluded** that the results of the ICE for Dassen and Robben islands indicate that fishing closures around the breeding colonies are likely to have a positive impact on population growth rates, but that the impacts may be small, in the range 0.71–1.51% (expressed in units of annual population growth rate). These impacts are small relative to the estimated relative reductions in penguin abundance for these two colonies overthe period 2005–2022, which were estimated by the Panel at –13% for Dassen Island and –10% for Robben Island, using abundance data provided to the Panel.

The ICE in its current form (to estimate the effects of fishing closures on reproductive success) is completed. Future closures of forage-fish fishing around penguin colonies would be likely to benefit penguin conservation, but should be part of a larger package of conservation measures as such closures alone would be unlikely to reverse the current decline in penguin population numbers.

2.4 Caveats associated with the ICE and the associated analyses

The commitment by the South African government to implementing an experimental management scheme (the ICE) to understand whether fishing near breeding colonies negatively affects African penguin populations should be recognised, notwithstanding the caveats in this section because without the ICE, management decisions would have to be based on analogy and expert opinion. The experiment aimed to collect data that could allow the effects of fishing closures on the reproductive parameters of African penguins to be estimated. It implemented several best practices, including paired controls and treatments, monitoring of key reproductive parameters, and an initial period to assess how long it would take for there to be sufficient statistical power to detect a potentially meaningful effect of fishing closures, if one existed. In addition, the data from the experiment were analysed using multiple modelling approaches and the analyses were regularly peer-reviewed within the domestic process as well as by the International Fisheries Stock Assessment Review Workshops (e.g., Haddon et al. 2020), likely increasing the robustness of the

Table 2.3: Overall integrated fishing impacts on penguin population annual growth rates estimated from the data collected during the ICE for the Dassen Island and Robben Island breeding colonies. Three estimates are provided for each island to illustrate the range of results produced by the selection of model runs shown in Figure 2.2. Note that the values provided refer to the predicted effects of fishing around the colonies, so a negative value implies a positive change in population growth rate if the areas were closed relative to if they were kept open to fishing.

Dassen Island	Chick condition	Chick survival	Added fishing impacts on population growth rate	Models	Modelling of closure effect
	–0.43	–0.86	–1.29	W1 & W4	I + C
	–0.24	–0.86	–1.10	W2 & W5	I × C
	0.04	–1.04	–1.00	W3 & W6	I × C
Robben Island	**Chick condition**	**Chick survival**	**Added fishing impacts on population growth rate**	**Models**	**Modelling of closure effect**
	–0.43	–0.91	–1.34	W1 & W4	I + C
	–0.67	–0.84	–1.51	W2 & W5	I × C
	–0.59	–0.12	–0.71	W3 & W6	I × C

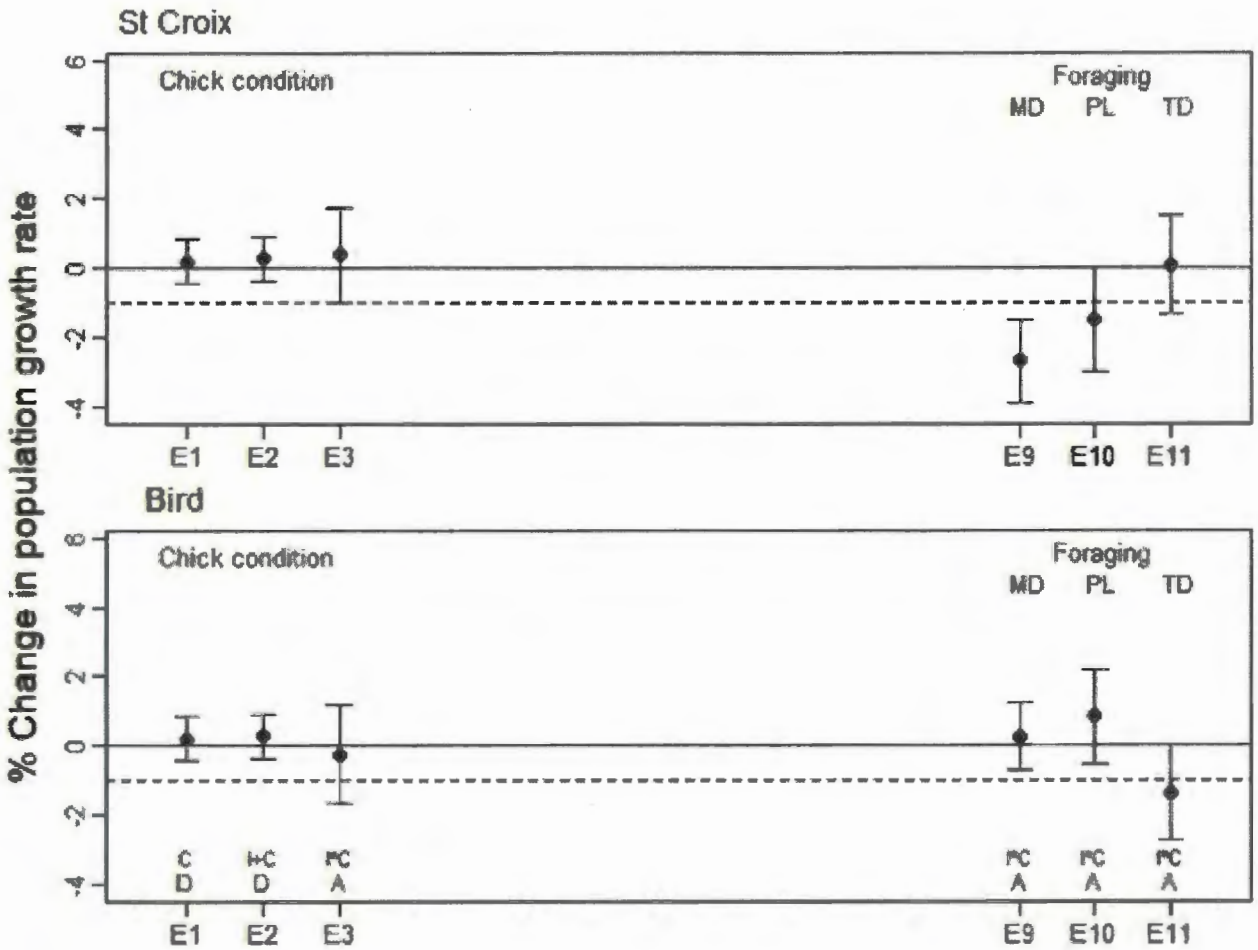

Figure 2.3: Estimates of change in population growth rate for St Croix and Bird islands as a result of fishing (expressed as a percentage per annum) resulting from the analysis of chick condition and three variables related to foraging behaviour measured in those colonies: maximum foraging distance (MD), path length (PL) and trip duration (TD). E1–E11 = model numbers. Model specifications are detailed in Appendix D.

results. The ICE was highlighted by Sydeman et al. (2017) in their review of best practices for assessing forage fish fisheries – seabird resource competition, noting that field experiments are the "holy grail" of seabird-fisheries competition studies because of the potential to detect causal effects. In fact, it is the only case where an experiment has been designed with the aim of detecting fishing effects on reproductive parameters of seabirds. However, Sydeman et al. (2017) note that field experiments can be difficult to design and implement, and the ICE is no exception in this regard.

Notwithstanding that the experiment was designed following best practices, there are several weaknesses of the design and implementation that need to be recognised and their consequences accounted for when interpreting the results in section 2.3 of this report.

- The experiment aimed to estimate the effects of fishing closures on penguin reproductive parameters, meaning that it was necessary to develop models to predict changes in the population growth rate given expected changes in reproductive parameters (see section 2.2.3). While it would have been ideal to relate fishing closures to changes in population sizes directly, it was recognised when the experiment was proposed that the time to detect changes in population size attributable to an island closure would potentially involve a much longer experiment than that needed to detect changes in reproductive parameters. This was due, for example, to the time that penguins take to recruit to the adult population, and that the results in terms of population size might be confounded by the effects of, for example, movement amongst breeding colonies.
- The experiment involved temporal blocks of 3 open and 3 closed periods (Table 2.1). This design was a compromise between longer blocks, which might permit detection of changes in population size and shorter blocks, given the focus on reproductive parameters. The design was implemented nearly as anticipated – the exception was 2021, the data for which are not used in the analyses.
- The closures pertained to 20 km around breeding colonies. However, analyses subsequent to the start of the experiment (e.g., Annexure 1 of CAF, 2022) show that penguin foraging can extend well beyond 20 km (especially for St Croix Island) so while the results of the experiment allow the effect of 20 km closures to be quantified, potentially larger effects may have been observed with closures that more closely reflected foraging areas. The ability to infer changes in reproductive parameters (and

hence population growth rates) for closures that differ from 20 km around islands requires an extra step of interpretation that is necessarily primarily qualitative.

- The experiment relates to four of six major breeding colonies. Closures have been proposed for Dyer Island and Stony Point. Inference of the effect of closures for these colonies requires extrapolation of the effects of the closures for the islands in the experiment, and are consequently more uncertain.
- The experiment manipulated the ability to fish within 20 km of the four islands. It did not specify that catches had to occur when an island was "open". One consequence of this is that catches might be low during open years. This was the case for Bird Island where catches were low irrespective of whether this island was open or closed to fishing due to operational issues. Moreover, analyses provided by Janet Coetzee (DFFE) showed that some catches had occurred inside the closure areas in years when they were supposed to be fully closed to pelagic fishing (in particular, off St Croix Island in 2017; Coetzee, 2023; Figure 2.4). In addition, some recorded catches occurred close to the 20 km closure boundaries. Whether some of these catches actually occurred within 20 km of the islands was not checked given the time available but some of these catches may have occurred inside the closures.
- A primary aim of having two colonies in each region was to enable the effects of factors other than fishery closures on reproductive parameters to be accounted for in the analyses. Given that the ICE is a natural experiment and even though the two islands on each coast are relatively close, there were still differences in distribution of pelagic fish between islands (Coetzee, 2023) that cannot be accounted for in the analyses based on results of the ICE.
- It was not possible to monitor all variables that could affect reproductive success owing to logistical constraints and the possibility that monitoring could have a negative effect on reproductive success of an endangered seabird. Several key parameters, including chick survival and fledging success, were not monitored at the eastern colonies, which reduced the potential to detect the effect of fishing near colonies on reproduction. The choice of parameters to monitor reflected monitoring that was ongoing at the time the experiment was designed. In retrospect (and subject to the constraints of available resources), monitoring of additional variables would have been desirable (see section 5).
- The modelling accounts for the effects of factors other than island, closure, and month of sampling using a year effect. In principle, a key determinant of year-to-variation in reproductive success relates to the biomass of prey species. Acoustic surveys of local biomass were undertaken, but it was found that there is considerable variation over the breeding season and high sampling error (DFFE, 2021) so this variable could not be included in the analyses. Another factor that may have impacted reproduction on St Croix Island is the effect of bunkering near Gqeberha since 2016 (Pichegru et al., 2022).

2.5 Potential but not studied benefits to adult and immature African penguins from the ICE

The ICE measured variables that were considered to be direct measures or proxies for African penguin breeding success or post-fledging survival, but did not measure impacts of island closures on African penguin adult survival or immature survival. Evidence (outlined below) indicates that increases in prey abundance/availability would be likely to result in some gains in adult survival and immature survival.

Seabirds tend to have high adult survival and low fecundity (breeding success). Life history theory predicts that seabird adult survival is likely to be more strongly buffered than breeding success by behavioural responses because seabird population dynamics is driven more strongly by adult survival than by breeding success (Cairns, 1992). The prediction is that long-lived birds will tend to protect their survival by abandoning breeding when times are bad, so low breeding success is likely to be a more conspicuous consequence of low food availability around colonies than is low adult survival. Testing whether there is a relationship between forage-fish stock biomass and adult survival of forage-fish dependent seabirds is made difficult because few studies have collected long-term data on adult survival rates of seabirds in locations where there are matching time-series of forage fish stock biomass data. Nevertheless, several studies have found that adult survival rates are influenced by food availability. While none of the studies listed below are directly comparable to the African penguin situation, they provide an *a priori* basis to raise the expectation that there are fishery-related impacts on adult and immature survival.

- Black-legged kittiwake adult survival is correlated with prey density in the non-breeding area in winter (Reiertsen et al., 2014) as well as in the breeding area in summer (Oro and Furness, 2002; SSERenewables, 2022).
- Black-legged kittiwake adult survival and breeding success at Shetland (north Scotland) were both strongly affected by Shetland sandeel stock biomass (Oro and Furness, 2002).
- Black-legged kittiwake adult survival and breeding success at the Isle of May (east Scotland) were both reduced in years when sandeel fishing occurred on the ICES Sandeel Area 4 stock compared to years when there was no sandeel fishery (Frederiksen et al., 2004).
- Return rates (a proxy for survival) of black-legged kittiwake, Atlantic puffin, common guillemot and razorbill at the Isle of May all show strong asymptotic relationships with ICES Sandeel Area 4 sandeel stock biomass (SSERenewables, 2022).
- Return rate of adult Arctic skuas (parasitic jaegers) at Shetland as well as their breeding success was increased by supplementary feeding of broods, im-

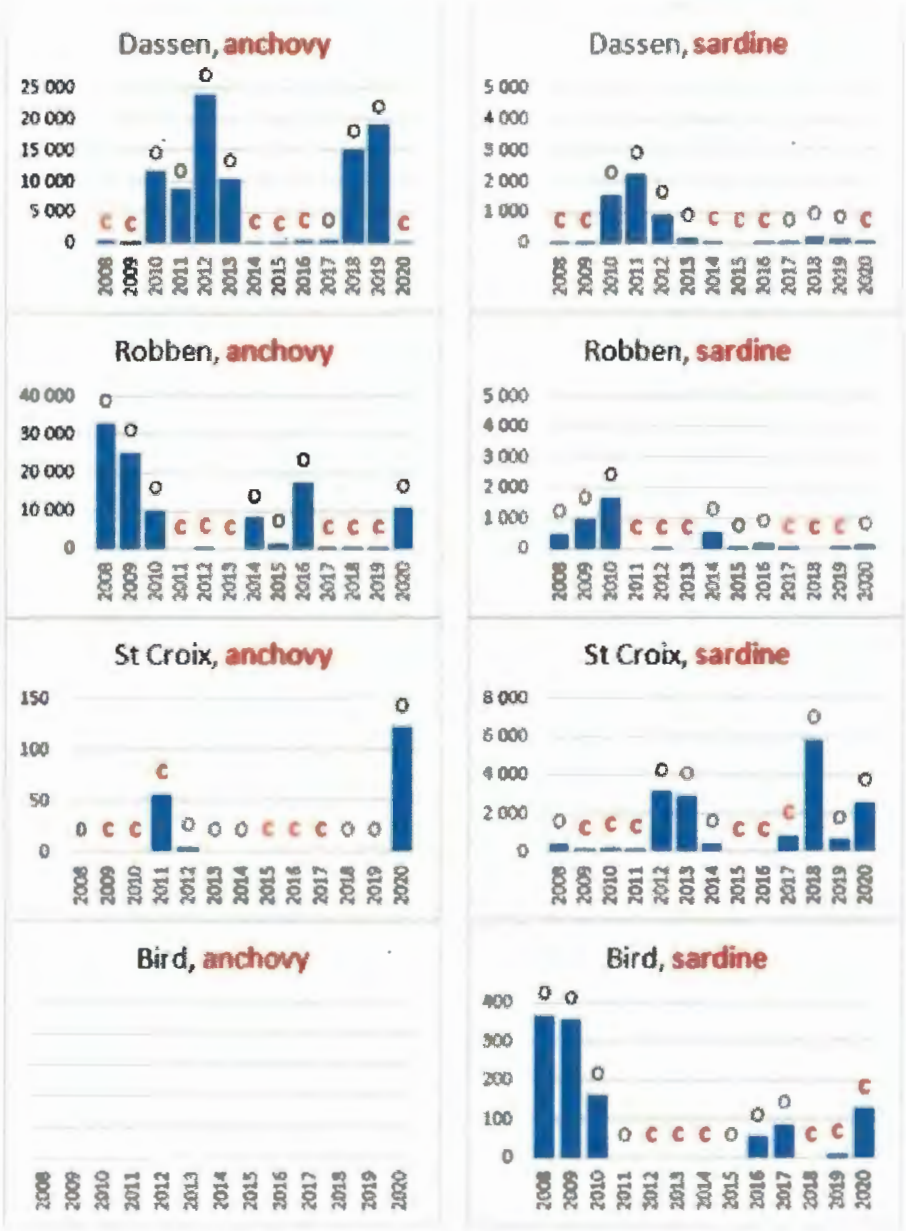

Figure 2.4: Catches of sardine and anchovy taken inside the 20-km closures during the duration of the ICE. Letters above each bar denote years when the areas were open (O) or closed (C). Figure credit to J Coetzee (DFFE, pers. comm.).

plying that low sandeel abundance was likely responsible for low adult survival in that species as a result of the increased costs of breeding when food was scarce (Davis et al., 2005).

- Low food availability reduced adult little auk body condition and reduced adult survival (Harding et al., 2011).
- Increased parental effort by breeding common guillemots (common murres) when foraging conditions deteriorated resulted in reduced adult survival rate and only partly compensated for low prey availability so also resulted in reduced breeding success (Wanless et al., 2023).

Measuring survival of immature seabirds is much more difficult than measuring survival of adults. There is evidence that survival rates of immature seabirds tend to be lower than those of adults (Horswill and Robinson, 2015), presumably because immature animals are less experienced and therefore less competitive. That suggests that low food availability would be likely to impact immature animals more strongly than adults. Therefore, gains from improved prey availability may benefit immature survival more than adult survival. Few studies report examples of change in immature survival rates, but immature survival of crested terns was strongly reduced when forage fish prey biomass was depleted (McLeay et al., 2008).

Evidence from other studies therefore suggests that the ICE is likely to have led to some unquantified improvement to adult and immature African penguins in addition to the quantified gain seen in breeding success for the western breeding colonies. It is impossible to determine the magnitude of any unquantified gain, but it is likely to have

3. BASIS FOR EVALUATING FISHING IMPACTS OF CLOSURES

3.1 Background

The literature investigating the impacts of fishery area closures on commercial fishing fleets and coastal communities highlights the importance of considering the short-run, long-run, and heterogenous effects across communities and fishers (e.g., large- vs small-scale). The short-run impacts on the harvesting sector include the displacement of the vessels from the closed areas that in turn could result in lower (or lost) catches, greater fishing costs, and lower revenues, everything else being equal. The short-run changes to the harvesting sector can also result in changes in throughput into processing facilities, which could lead to fewer shore-side jobs and less product. The long-run impacts include potential changes in shore-based infrastructure (e.g., processing capacity, fueling stations, bait stores, and ice availability), and the number of vessels operating in the fishery.

Both the magnitude and importance of the short- and long-run impacts are unlikely to be uniformly distributed across fishery participants and coastal communities. The placement and size of a closure could, for example, raise the cost of fishing for smaller vessels by increasing their steaming time to the open fishing grounds in a way that results in the exit of these vessels from the fishery over time. Vessel exit can have knock-on effects to the communities in terms of economic activity, shore-side infrastructure, employment, and social wellbeing. Implementing closures, including those to protect ecological processes, in South Africa will impact the fishing industry and local communities to some extent, but accurately quantifying this is challenging.

Economic methods to measure the changes due to a closure differ for the most part on according to whether the focus is on predicting the impacts before the intervention is implemented (*ex-ante* analysis) or measuring the impacts after the intervention is in place (*ex-post* analysis).

Section 3 is organised as follows. Section 3.1 is divided between a summary of the random utility class of model that is generally used to predict the impacts of proposed fishery closures and program evaluation methods that measure the causal impact of a fishery closure on the harvesting sector. Section 3.2 reviews the opportunity-based model (OBM) and section 3.3 reviews the social accounting matrix (SAM) modelling. Section 3.4 assesses the integration of the results from OBM and SAM modelling by highlighting how lost catches on the water are mapped back to coastal communities and regional economies.

3.1.1 *Ex-ante* analysis of the harvesting sector

The literature on the *ex-ante* analysis of the impacts of proposed fishery closures is dominated by random utility models (RUMs), which are statistical models of fleet behaviour (RUMs are a class of discrete choice models (DCMs)). While a RUM can take several forms, often researchers model the decision on whether to go fishing and where to go fishing conditional on taking a trip (see Figure 3.1). Vessels/fishers choose to go on a trip when the economic returns to taking a fishing trip are greater than the outside opportunity cost of not fishing, and fishers choose to fish in site *i* when their expected net returns from fishing in site *i* are larger than the other sites.[1] The expected net returns of a site *i* consist of the vessel's expected catch and price, travel distance to the site from their current location (port or another fishing site), fuel prices, and other variable costs.

RUMs have been applied to a range of fisheries from those for sedentary species (Smith, 2002; 2005; Marcoul

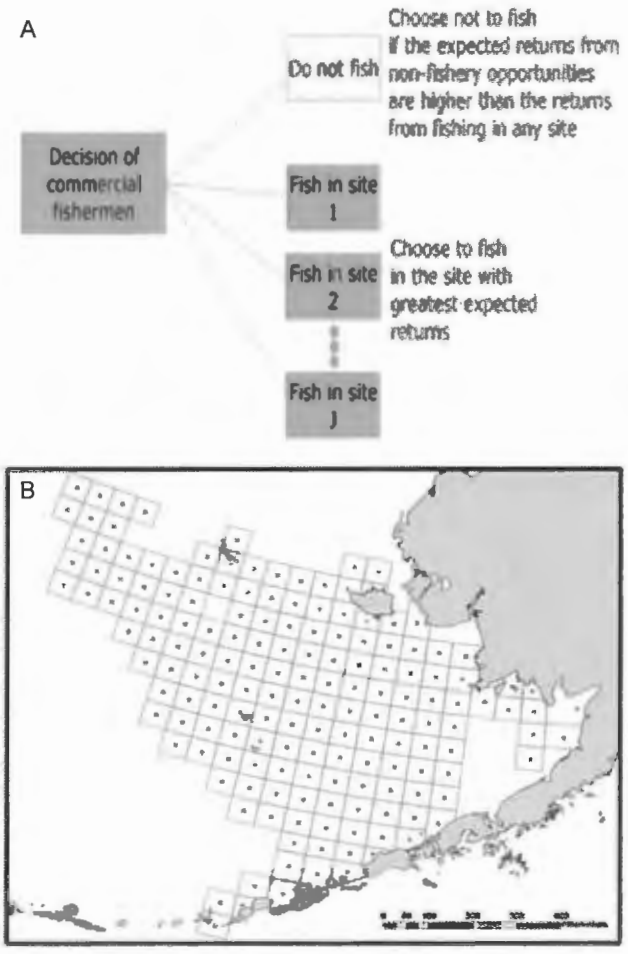

Figure 3.1: Basis of random utility models: Panel A is a stylised decision tree of a commercial fisher (vessel) in any given decision period (Source: Smith et al., 2010). Panel B is an example of the spatial choice of sites available for fishers in the Bering Sea of Alaska (Source: Abbott and Wilen, 2011)

[1]Extensions of the basic RUMs include variables such as variance of the expected net returns (Dupont, 1993; Mistiaen and Strand, 2000; Hutniczak and Münch, 2018), preference heterogeneity (Smith, 2005), state dependence (your past experience affects future choice) (Holland and Sutinen, 2000; Smith, 2005), evolving information and information sharing (Curtis and McConnell, 2004; Abbott and Wilen, 2011), spatial correlation and learning (Marcoul and Weninger, 2008; Hutniczak and Münch, 2018), bycatch avoidance (Haynie and Layton, 2010; Abbott and Wilen, 2011), and multiple fleets and fisheries (Depalle et al., 2020).

Photo credit SAPFIA – South African Pelagic Fishing Industry Association

and Weninger, 2008) to those for pelagic species (Curtis and Hicks, 2000; Mistiaen and Strand, 2000; Curtis and McConnell, 2004). For nearshore sedentary species, often vessels fish single-day trips choosing a few fishing grounds to visit (Eales and Wilen, 1986; Smith, 2005; Marcoul and Weninger, 2008). For finfish species such as groundfishes or tunas, vessels make multi-day trips (Curtis and Hicks, 2000; Curtis and McConnell, 2004; Hicks and Schnier, 2008; Abbott and Wilen, 2011; Hutniczak and Münch, 2018). When developing RUMs for multi-day trips (e.g., purse-seine tuna fisheries), it is common to treat the choice of the first location separately, and then conditional on that choice, model the subsequent site choices (Sun et al., 2016).

Two interrelated challenges to RUMs are the spatial (definition of a site or fishing ground) and temporal unit (e.g., daily, weekly), and the estimation of a vessel's expected catch at the set of fishing sites when the vessel is on a trip (Smith, 2000; Dépalle et al., 2021). Studies have employed various methods to calculate expected catches that depend on the assumptions about the set of information available to the vessel at a particular time (Abbott and Wilen, 2009 ; Dépalle et al., 2021), including the ephemeral nature of that information (e.g., fish stocks might only stay in a particular location for a short period of time or the distribution of the fish stock in a particular location might be more stable from month to month and across years). For example, it is possible to use only vessel level information (e.g., catches at a particular site within the last week/month and/or the same week/month in the previous year). However, it is also possible to assume that vessels share information by including fleet level information (e.g., catches of similar vessels at a site within the last week/month and/or fleet catches in the same window of time in the prior year). If no vessels have visited a site in the relevant window of time, then expected catches can be assumed to be zero. The formation of expected catches will lack necessary observations if the definition of a fishing site is so small that there are few past observations that fall within it or the window of time is too short (Dépalle et al., 2021). Given that there is no theory on how fishers form expectations of catches at different sites, most analyses carry out robustness checks with different weighted combinations of own and fleet information across different site definitions and time windows (Dépalle et al., 2021).

The estimated RUM can be applied removing from the choice set the sites that are included in the closure area to assess the short-run impact of a proposed closure (e.g., Smith and Wilen, 2003). Conditional on the closure, the RUM predicts the number and timing of trips, the displacement of the fleet due to the closure (the model statistically reallocates the trips to different sites based on the empirical model of fleet behaviour), increases in travel costs, and changes in the catch composition (including different target species).

3.1.2 *Ex-post* analysis on harvesting sector

While RUMs dominate the literature predicting the *ex-ante* impacts of fishery closures, more recently researchers are utilising program evaluation methods that quantify the *ex-post* impacts of closures by estimating the counterfactual (Ferraro et al., 2019). For example, Smith et al. (2006) develop an empirical model to isolate the effects of marine reserves that accounts for multiple gear production technologies, heterogeneity in vessel captain skill, spatial heterogeneity of fish stocks, seasonal patterns in abundance, the effects of coexisting management policies, and the possibility that the harvesting sector anticipates reserve establishment.

Reimer and Haynie (2018) quantified the short-run impact of large-scale closures on the net revenue of the commercial Atka mackerel fishery in the North Pacific using difference in difference (DiD), propensity score matching, and synthetic control methods. DiD measures the counterfactual (what would have happened in the absence of the closure) using the trend over time in a control group (vessels that do not fish in the closure). The assumption is that any differences between the treated group (vessels that fish in the closure area) and the control group are invariant over time and by using their parallel trends before the intervention, these differences will net out leaving the impact of the closure on the treated vessels. Favoretto et al. (2023) employed DiD methods to evaluate the impact of Mexico's Revillagigedo National Park on industrial fisheries.

While DiD assumes that all the control vessels contribute equally to the comparison group, propensity score and synthetic control methods develop a more refined measure of the control unit for each treated unit. Propensity score methods, for example, estimate for each vessel the probability of being in the treated group as a function of pre-treatment observable characteristics, such as vessel size, gear technologies, home ports, boat fixed effects, net revenue, etc. Various criteria (e.g., five nearest neighbours) are then used to match treated and control units based on similar propensity scores, which are estimated predicted probabilities of fishing in the closed area. The assumption is that treatment and control vessels with similar propensity scores are statistically identical except that the treated vessels were impacted by the closure.

Any method of evaluation will need to address the challenges associated with accounting for exogenous time-varying factors, such as stock abundance trends, prices, costs, local and regional labour markets, global market forces (exchange rates), and endogenous time-varying

factors such as behavioural responses to the closures that impact the ability to measure the counterfactual. An example of the latter is when impacted vessels are displaced to the fishing grounds occupied by the comparison set of vessels resulting in congestion on the grounds and lower catch rates for the control fleet than otherwise would have occurred had the closure not happened. Ferraro et al. (2019) discuss these challenges along with other biological and market mechanisms that can lead to contamination or biased estimates of the counterfactual.

3.2 Opportunity-Based Model (OBM) estimates of lost catch.

The OBM was used to estimate the impact of closures on catches by the South African pelagic fisheries targeting anchovy and sardine. Because the number of vessels, shoreside infrastructure, and behaviour of the fleet are held fixed over time, the impacts estimated are short-run even though they are calculated over ten years to develop an average loss. The OBM quantifies the impacts of closures under the assumption that catches that occurred in the closed area when it was open are a measure of the catches that would have occurred if the closed area was not closed.

Unlike the early literature on the impacts of marine reserves on catches, which assumed that all catches would be lost when an area is closed, the OBM introduces a set of rules to capture potential behavioural responses of the fleet to the closures. These rules were informed by interviews with fishery operators and include how to replace catches taken within closures with alternative catch opportunities observed across areas and species within a narrow window of time (generally same day and year) considering estimated boat factors (vessel fixed effects from GLMM estimation), boat caps, and potential spillover from other closures. Opportunity catches are also adjusted up or down based on an auxiliary analysis used to evaluate possible biases in predicted aggregate catch in any given year depending on the specific rules used by the OBM.

Using these rules, the OBM develops a measure of the average irreplaceable catch stemming from the proposed closures using catches in the closed areas over ten years and the average catch that could be replaced (opportunity catch) for each species at the island closure level (see Appendix E for further details together with figures and summary tables of the results).

The two key modelling assumptions of the OBM are: (a) the observed catches taken in a given day outside a proposed closure provide a complete set of potential alternative fishing opportunities for replacing the catches taken that day within the proposed closure; and (b) there is a maximum number of times each alternative fishing opportunity could be used to replace those catches (referred to as "Reuse"). The former relates to the information set the fishers have at any point in time where the OBM implicitly assumes all vessels fishing on the same day have the same set of information and there were no additional potential opportunities where and when fishing did not take place. The latter is questionable considering that additional fishing opportunities, beyond those used when the areas were opened, could be searched for and identified in response to the implementation of a closure. The search

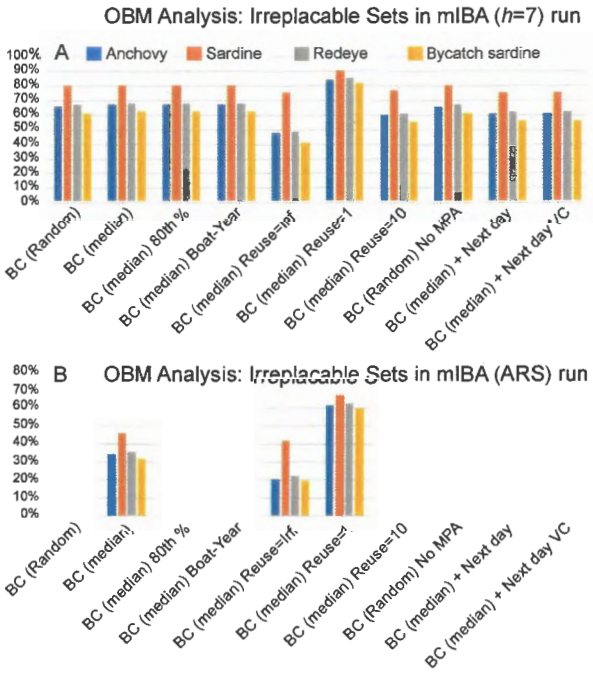

Figure 3.2: Percentage of Irreplaceable Sets in the mIBA (h = 7 km) run of the OBM model (Panel A) and in the mIBA ARS run of the OBM model (Panel B) across a set of model sensitivities. In Panel B, a blank corresponds to scenarios that were not run for the mIBA ARS case

for alternative fishing opportunities would be more effective if the fleet shared the information about fishing locations, as was reported to happen during the June Panel meeting. It also implicitly assumes the lack of seasonality of fishable aggregations from one year to the next and full information decay of fishable aggregations in a location within a day. These assumptions combine to lead to a low of 40% (Reuse = infinity for sardine bycatch) and a high of 90% (Reuse = 1 for direct sardine) of the sets within a closed area (when it is open) being classified as irreplaceable in the marine Important Bird Area (mIBA) (h = 7 km) run (Figure 3.2 Panel A). The fraction of irreplaceable sets is lower in the mIBA Area Restricted Search (ARS) run but still ranges from a high over 60% to a low around 20% depending on the scenario (Figure 3.2 Panel B). More detailed calculation of catch losses for different closure proposals and OBM assumptions, summarized in Appendix E (Figure E.3), indicate that the great majority of the estimated catch losses are due to the high fraction of sets classified as irreplaceable under the OBM rules while only a very small fraction of the catch loss was due to lower average catch rates of replacement sets ("opportunity losses"). In common with RUMs, if no vessels have fished at a site in a window of time, the expected catch of a vessel going to that site would be zero. In forming an expectation of catches for use in RUM, analysts consider a wider window of time (fishing within the last month, same month last year, etc.) while allowing for some weighted average of private information (catch rates of the vessel in the sites) and fleet-wide information (perhaps due to sharing of information at sea, observing landings, observing activity at sea) to calculate the expected catches in any site i in period t. The Panel **agreed** that the current window of

same day (or same day plus one) is likely too constraining and recommends further statistical analysis should be undertaken to better understand the seasonal nature of anchovy and sardine sets/catches across the fishing sites, especially along the west coast.

Whether to sample alternative opportunities with or without replacement is an important issue in the OBM analysis. The Panel **agreed** that the OBM would likely underestimate the potential opportunities outside the closed area on a given day (conditional on all the other assumptions being appropriate) if, for example, 100 catches (sets) within a closed area are matched to just a single catch (set). Currently, the results are presented for the case of allowing only one replacement (Reuse = 1 corresponding to sampling without replacement), only five times (sampling with replacement but only five times), and an infinite number of times (sampling with replacement). The Panel **agreed** that the random matching of catches is an improvement over the percentile method but **recommended** that all results should be presented for the Reuse = 1, 5, and infinity cases (see section 6 for additional suggestions on statistical methods to match sets).

The OBM is not able to quantify important potential changes to the net revenue of the fleet due to closures. Net revenue is the total revenue (ex-vessel price*catch) less the variable costs of fishing that include fuel costs (fuel price*fuel used), labour costs, supplies, etc. The fuel costs capture steaming time to and from the grounds, searching efforts, and fuel spent while fishing. Closures can increase fuel costs due to greater travel distances and can also reduce the quality of the catch at the time of landing, leading to lower ex-vessel prices and total revenues (e.g., greater spoilage, lower quality)[2]. The impacts on net revenues are likely not uniform, as smaller vessels might have less ability to travel further due to the riskiness of being out to sea for longer and a more limited fuel capacity. The Panel **agreed** that understanding the impact of closures on the net revenue as well as changes in catches is important for understanding both the short-run impacts and the potential long-run impacts due to changes to the fleet composition, shore-side infrastructure, and coastal community dynamics.

3.3 Social Accounting Matrix (SAM) analysis

Quantifying community economic impacts of fishery policy changes requires understanding about how changes in production on the water translate into changes in the production of goods and services shore-side either directly or indirectly. Economists use several methods to carry out such analysis, such as input-output (IO) models, social accounting matrix (SAM) models, and computable general equilibrium (CGE) models (Seung and Waters, 2006)[3]. Across the methods, the data requirements of the models are extensive, including industrial output, employment, value-added, final demands, and imports. CGE models, which are the most expensive to develop but are the gold standard for quantifying community impacts, allow for changes in relative prices, substitutions across inputs (labour, capital), and compute the welfare implications of the economic shocks (e.g., welfare impacts of job losses rather than just quantifying the number of jobs lost) (Seung and Waters, 2006). SAMs improve on simple IO models by quantifying impacts on the distribution of income, but unlike the CGE framework hold prices fixed and do not allow for substitutions (Seung and Waters, 2006). SAM results, therefore, should be viewed as a very short-run measure of the impact (snapshot) whereas a CGE model can capture more dynamic short-run and medium-run responses of the economy (Seung and Waters, 2006). Because SAMs are designed to analyse demand-driven impacts in the local economy (e.g., change in consumer spending), these models tend to overestimate the impacts of supply-side shocks, such as a reduction of catch (Seung and Waters, 2013; Seung, 2014).

UrbanEcon developed a SAM model that models a shock to the regional economy from a reduction in catches due to the closures as calculated by the OBM (irreplaceable catch). The SAM model traces the shock through the economy by modelling a set of linear relationships that capture the direct, indirect, and induced changes (Figure 3.3). Characterising the value chain of the pelagic fishing industry is a way to decompose the direct and indirect impacts of a change in the total catch of sardine, anchovy, or redeye (Figure 3.4). Vessel owners, captains, and crew experience direct income effects from a reduction in the catch, where the crew are paid on a share system based on the fishmeal price and catches rather than a fixed hourly wage. The lower catch results in less throughput into the shore-side processing facilities, which can be substituted in some situations with import quantities though often for higher prices (depending on exchange rates, and transportation costs). The higher costs of processing fish can result in a reduction in labour demanded by processing

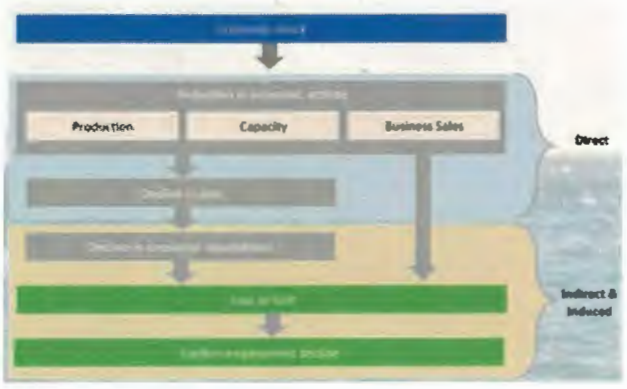

Figure 3.3: Social Accounting Matrix Framework for mapping changes in regional aggregate catches (economic shock) to changes in employment, regional gross domestic product, and regional income. (Source: UrbanEcon June 2023c)

[2]Bergh (2016) states that fuel costs will increase approximately 23% around Dassen and Robben islands when considering the location of the replaceable sets, which depends on the priority ranking of substitute locations and the assumption regarding the feasible sets from which to search for a replacement.
[3]While the use of IO, SAM, and CGE models dominate the literature in terms of quantifying the impacts of the fishing sector on local communities, a recent paper by (Watson et al., 2021) takes an econometric approach to measuring the impacts using data from Alaska. They find "that a 10% increase in a community's annual resident fishery earnings leads to a corresponding 0.7% increase in resident income. This translates to an increase of 1.54 dollars in total income for each dollar increase in fisheries earnings" where fishery earnings are defined as total revenues of fishing for local permit owners.

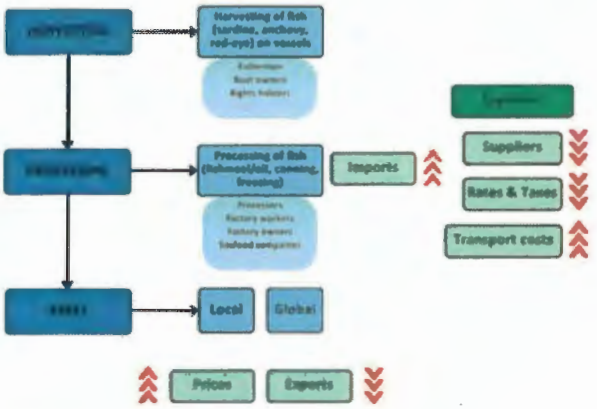

Figure 3.4: Value chain of the pelagic fishing industry, highlighting the pathways for loss in regional catches to the direct impacts in the SAM modelling (Source: UrbanEcon, 2023b).

facilities and lower overall economic performance of the industries. Sales locally or exported might also be impacted if the final output of fishmeal, canned, or bait products is lower due to the lower catches. Lost wages reduce income and purchasing power in the economy, lowering consumer expenditures. Lower expenditures, along with changes in sales, reduce economic output that can have further impacts on employment levels in sectors not directly related to fishing (induced effects in Figure 3.3).

An important impact of the proposed closures is the potential job losses both directly on the fishing industry and the knock-on losses due to lower GDP and income. UrbanEcon (2023a) predicts in the preferred scenario, for example, "full-time employment is expected to decrease substantially, with a reduction of 655 jobs" where the direct impact to harvesters is a loss of 35 with indirect losses of 93, and in the processing sector, the direct losses are 181 out of a total of 527 losses. Using the regional distribution of labour in Table 5.1 of UrbanEcon (2023b) and the direct job losses in Table 5.2 of UrbanEcon (2023b), the direct job losses regionally to the harvesting sector are 11.5 west of Cape Point, 8 between Cape Point and Cape Agulhas, 7 in Mossel Bay, and 5.6 in the east.

How to interpret the significance of job losses on regional economies and welfare depends on the quality of the local labour markets, whether the losses are seasonal workers, and whether the losses are permanent or temporary (Holland et al., 2012). If local labour markets are fluid with low unemployment, then a job loss in one sector could be negated by an increase in another sector, which makes interpretation of the economic costs associated with job losses more difficult. On the other hand, if losses occur in remote locales with incomplete labour markets with high unemployment (as is the case for several of the towns where fishers and processors are based), then these losses contribute directly to the economic costs due to closure rather than being a transfer from one sector to another. In addition, if the job losses are from seasonal workers or temporary layoffs, then the impacts are likely transient and fleeting as opposed to the case where the job losses are due to the closure of the shore-side processing facility (Watson et al., 2021). The latter will have long-run impacts on the local fishing vessels, employment, and incomes, as may be the case for several of the affected local towns. The Panel **agreed** that while the SAM is a useful tool for creating snapshots of the impacts on regional economies it **recommended** that further work needs to be done on the long-run socioeconomic impacts to local communities due to the prospective closures. Moreover, it notes that the predicted effects of closures depend on the reliability of the estimates of lost catch from the OBM, which the Panel **agreed** is likely to provide overestimates given its restrictive assumptions related to the set of opportunities that are available to replace catches in closures (Appendix E). These overestimates are of uncertain magnitude but may be large.

The heterogeneous impacts on fishing operations (e.g., small vs large vessels) are another important factor in understanding the relative significance of the changes to regional economies. In the preferred scenario, UrbanEcon (2023a) shows "that smaller vessels (less than 20 metres) will be the most highly impacted ... the largest vessels (above 25 metres) will be the least impacted... meaning that the viability of maintaining operations is variable dependent on boat size, and the larger the boat, the higher level of security it has in its operations." These impacts, however, are not evenly distributed across communities and closures, as some ports will be more dominated by larger vessels (and vertically integrated companies). The Panel **agreed** that while the SAM model provides a measure of the distributional impacts across vessel size it recommends that further work should be done to understand the impacts on local communities more dependent on smaller vessels, such as those operating in the St. Croix area.

Given the complexity of the regional economy, any model (IO, SAM, and CGE) will involve many parameters and relationships, some of which are supported empirically and some of which must be assumed. The UrbanEcon SAM model is not unique in this respect, and the use of interviews with the fishing industry is a best practice to fill in missing data. However, some important questions remain regarding the interpretation of the SAM results. Are the "losses" out of the SAM due to the proposed closures within the standard fluctuations of the local economy due to other kinds of economic shocks, such as fuel prices, exchange rate fluctuations, etc.? Fuel price increases, for example, would be expected to result in less fishing due to higher travel costs, less processing due to higher import costs of products, lower sales, lower consumer expenditures, etc. Are the short-run job losses from a fuel price

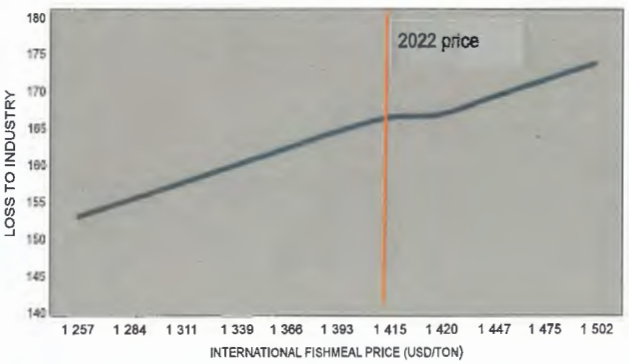

Figure 3.5: Sensitivity on the loss to the industry from the range of fishmeal prices (UrbanEcon, 2023c)

increase greater than the predicted job losses from the preferred scenario? How important for the loss estimates are the assumptions regarding the relative wages of the processing and harvesting sector, especially since most of the job losses occur in the processing sector? How do the results change if the conversion of total employment FTEs is based on a different rate of fishing days per year (currently, 175 fishing days per annum is assumed)? The Panel **agreed** that additional sensitivity analysis of the SAM results should be carried out to have a better understanding of the range of possible regional outcomes from the prospective closures.

In response to queries by the Panel, UrbanEcon carried out additional sensitivity analysis on the range of aggregate outcomes by varying expected catch loss, and fishmeal price. Variations in the global fishmeal price imply that a loss of catch in one year might not have the same economic value as a loss in another year (Figure 3.5). Specifically, UrbanEcon found that "the fishmeal industry performs at its best when international prices are highest – and therefore the largest industry loss will be experienced whereby the island closures negatively affect the level of raw input (anchovies, red-eye, and sardine off-cuts and bycatch) and international prices are highest" (UrbanEcon, 2023c). These results are not surprising, but also highlight the limitations of the SAM modelling assumptions. With the crew paid in proportion to the fishmeal price, as the fishmeal prices increase, the income of the crew increases, but because some crew also lose their job due to the catch reductions, there are then fewer crew members earning more money in a year with higher fishmeal prices. How much the increase in wages to the remaining crew offsets the losses due to fewer workers is an empirical question that cannot be addressed given the linearity and fixed prices (output, input, and wages) assumptions embedded in the SAM framework.

3.4 Downscaling lost catches at sea to regional economies

The critical piece in quantifying the regional impacts of the proposed closures is the mapping of irreplaceable catches that occur at sea to the ports/local communities. Based on responses to a query of the Panel, there appears to be a discrepancy between the regional catch loss totals provided by the OBM based on where the catch is caught, the regional economic impact measurements determined by employment shares in the SAM modelling for 2022, and the breakdown of the lost catch based on shares of regional processing (Table 3.1). The later breakdown is not currently utilised in the SAM analysis and is imputed based on the average lost catch between 2011 and 2019 for anchovy, bycatch sardine, directed sardine, and redeye considering differences in the location of industrial and sardine processing facilities and landings. While the share of catch processed in any facility and port can change from one year to the next, which is the argument UrbanEcon employs when justifying the use of employment shares (Letter from UrbanEcon to Panel dated June 9th, 2023), Table 3.1 highlights the potential for different measures of regional impacts based on the method employed and/or the catch years used in the analysis. The Panel **agreed** that given little empirical justification for one method, each allocation method should be used, and the results compared across the different cases, to better inform discussions on which communities are likely to be most impacted.

Table 3.1: Mapping lost catches to regional economies. Column 1 shows the percentage of lost catch based on the current method for how OLSPS allocates irreplaceable catches in closure areas to regions, Column 2 shows the percentages that UrbanEcon uses based on employment in the fishing sector (harvesting and processing), and Column 3 shows a new set of percentages that OLSPS calculated based on the share of the catch that is processed shore-side by region (Source: Data provided to the Panel by OLSPS on June 9, 2023)

Region	OLSPS lost catch	UrbanEcon employment shares	Regional processing
Western Cape	17%	33.0%	49.4%
Cape Point to Cape Agulhas	60%	27.1%	27.0%
Mossel Bay	0%	23.5%	12.3%
East	23%	16.5%	11.3%

Penguins at Boulders (photo BM Dyer)

4. CRITERIA AND APPROACHES FOR EVALUATING TRADE-OFFS BETWEEN BENEFITS TO PENGUINS AND COSTS TO FISHERY

4.1 Introduction

There are various aspects involved in any decision regarding the locations and duration of island closures intended to conserve African penguins. These include the location and size of the closures, their seasonal duration, and whether and when any closures will be reviewed. The technical review of these aspects is given in sections 2 and 3. There are three primary trade-off axes to consider when selecting closures (see Figure 4.1 for options considered during the Panel discussions):

- The benefit to penguins of the closure.
- The cost (economic and social) to the fishing industry and the communities, especially where fishing and processing operations are based.
- The ability to evaluate the effectiveness of the closures.

The choice of the location and size of closures, and their duration depends on the relative weights placed on the different anticipated outcomes by the decision-makers. Guidance on these weights may be informed by legislation, existing policy frameworks and international agreements. Recommendation of a specific outcome lies outside the scope of the Panel.

The Panel **recommended** that, if designated, closed areas to protect penguins during breeding, should be year-round, unless reasons demonstrate otherwise, primarily because egg laying and chick provisioning occur year-round, and these areas may be important during critical pre- and post-moult periods. The Panel further **recommended** that, if designated, closed areas to protect penguins should be reviewed at a time when results are available to investigate life-history processes such as juvenile recruitment, adult survival and hence population growth rates. This may be at a time between 6 and 10 years after designation. Other reasons to review such closed areas might include major socioeconomic changes in the fishery and processing, or stock abundance, or similar consequences of prey resource change.

4.2 Evaluating effectiveness

The "effectiveness" of a set of closures may be evaluated using a closure program that involves opening and closing areas to fishing in an experimental manner to test hypotheses and quantify changes in the demographic parameters

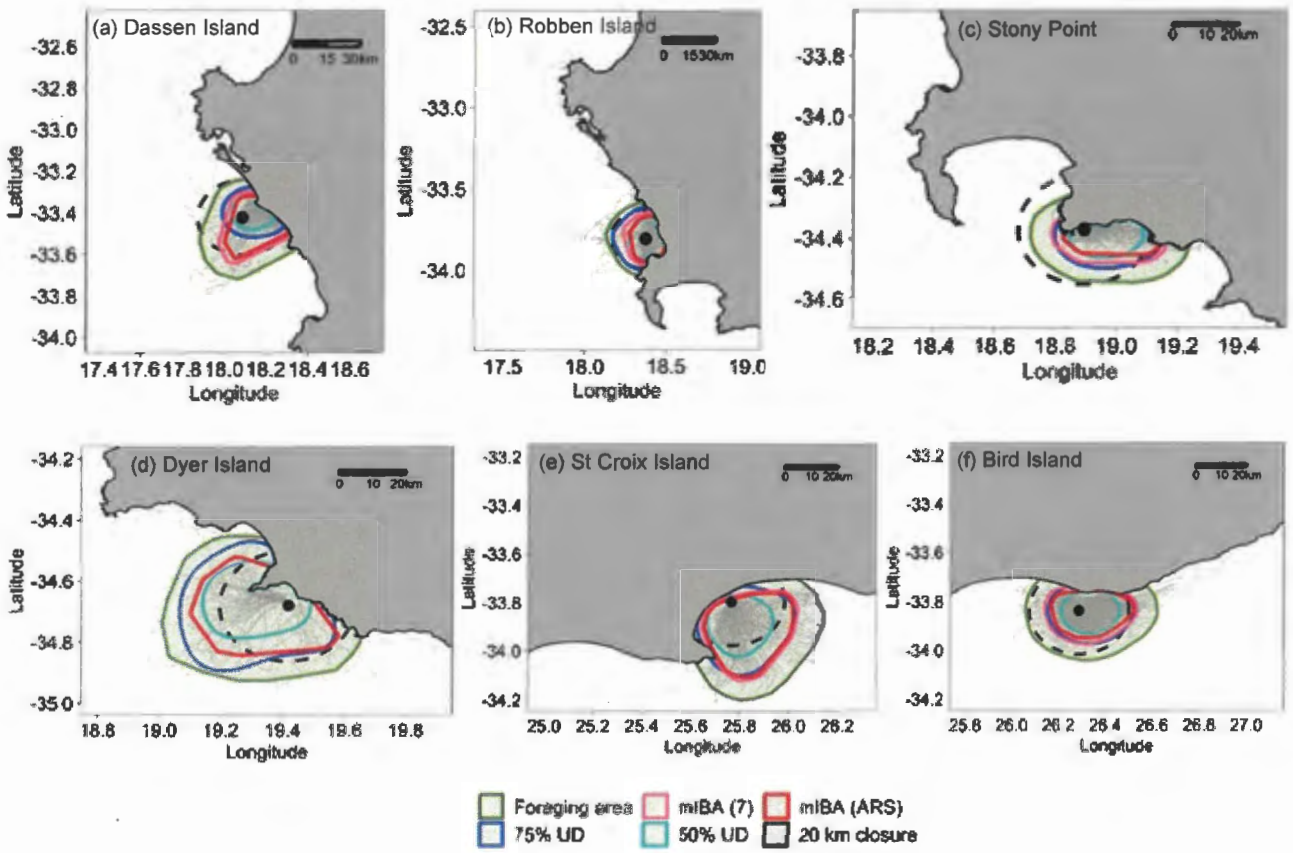

Figure 4.1: Comparison of alternative closure options including the 20-km ICE closures, the inclusive foraging areas defined as the 90% utilisation distribution—UD, (green open polygons), the UD50 and UD75 aggregated kernel density distributions, as well as two mIBA core area versions calculated using a smoothing factor of 7 km (mIBA (h = 7 km)) or the ARS scale value calculated for each colony (mIBA(ARS)) using tracking data of African penguins tagged at (a) Dassen Island, (b) Robben Island, (c) Stony Point, (d) Dyer Island, (e) St Croix Island and (f) Bird Island. From McInnes et al. (2023)

of penguins, and hence their population growth rate. However, closure programs are not usually structured in this way, with most such programs involving long-term closures and monitoring of the impacted populations. The Panel strongly **recommended** that monitoring should take place irrespective of whether there is an experimental (alternating open and closed) component to the closure program. Section 5 identifies several ways in which monitoring can be changed to more precisely capture changes in penguin demographics and behaviour and hence the effects of any closures on the penguin population. Section 6 outlines improvements to data collection and analysis to facilitate an evaluation of the effect of any closures on the fishery and associated communities.

The Panel does not consider it essential that there is an ongoing experimental approach (as opposed to monitoring for conservation purposes). However, the Panel provides the following recommendations should there be an experimental component to any future closure program:

- The aim of the experimental structure should be to not only estimate parameters related to reproductive success, but also additional parameters, in particular juvenile recruitment, adult survival and hence population growth rate. This is because there is little value in conducting future experimental manipulations if the aim is simply to estimate the effect of closures on reproductive parameters given this is already adequately informed by the ICE (see section 2).
- There is little benefit in trying to use an experimental framework in regions (e.g., the eastern Cape) where it is (currently) not possible to monitor important parameters such as adult and chick survival. Based on the data already available, and the ability to undertake regular monitoring, the western and southern Cape regions should be the focus of any future experimental closure program.
- Given the necessary focus on adult survival and population growth rate, it is desirable that a power analysis be conducted to identify an appropriate sequence of (possibly alternating open and closed) closures. The existing MPAs around some islands impose some constraints on the experimental use of closures and this should be taken into account in any power analysis.
- Conservation planning software tools, such as Marxan (e.g., Ball et al., 2009; Watts et al., 2017), provide a way to select areas given constraints on either the desired amount of closure by island or the cost to industry.

4.3 Quantify at-sea habitat area

The purpose of closing areas around penguin colonies is to protect penguin foraging habitat. Relatively little was known about the foraging behaviour of African penguins, especially about their preferred foraging habitats at the start of the ICE. The ICE had therefore been set up using a fixed 20 km radius as the open-closed management option (Figure 1.1). With recently available telemetry data, closures may be designed to achieve a more effective protection of the penguins' foraging area.

The at-sea habitat used by seabirds whilst foraging varies throughout the year. Although different seabird species have very different characteristic scales of habitat use, all species show variability in relation to their life-history constraints. Seabirds are most constrained during breeding when they need to return to land to provision their offspring. In general, seabirds, including penguins, forage across spatial scales that differ between incubation, early chick rearing (the brood stage), late chick rearing (the crèche stage) and post breeding (e.g., Warwick-Evans et al., 2018). For African penguins, due to their disturbance sensitivities, most information about foraging is only available during the early chick rearing phase when foraging scales are likely to be most constrained. During this period adults can only travel short distances given their need to return to their chick at short temporal intervals. Thus, resource availability during early chick-rearing is critical, given parents are less flexible. Consequently, all estimates of preferred foraging habitat based on tracking data from early chick-rearing are likely to be conservative.

The marine habitat available to penguins varies spatially and temporally, with some areas being preferred, given the availability of prey. Determining such preferred areas is important, especially if resource competition with fisheries is a concern. Estimating areas of preferred foraging habitat can be achieved through numerical spatial analysis of telemetry (tracking) data. Different analytical approaches are available, but in recent years robust methods that identify marine Important Bird Areas (mIBA) have become widely accepted (Lascelles et al., 2016; Dias et al., 2018), including for the identification of Key Biodiversity Areas (e.g., Handley et al., 2020).

Kernel density analysis calculates the density of locations by fitting a bivariate normal function with a pre-defined radius (smoothing parameter, h) around each location and summing up the values to create a smooth density surface. The kernel utilisation distribution (UD) is the isopleth that contains a certain percentage of the density distribution. To obtain core usage areas for foraging seabirds the 50% UD has often been selected (Lascelles et al., 2016). To align the smoothing parameter (h-value) to the scale at which birds use their marine habitat, behavioural characteristics evident within the telemetry data can be used. For example, periods of Area Restricted Search (ARS) when birds are actually feeding, can be identified through First Passage Time (FPT; Fauchald and Tveraa, 2003). Such methods are now commonly used (e.g., Trathan et al., 2008; Scheffer et al., 2010) in the analysis of penguin telemetry data.

The Panel **recommended** that analyses delineating mIBAs using ARS methods represent the best scientific basis for delineating the preferred foraging habitats during breeding. In the future, additional analyses would further improve understanding, especially with respect to how the spatial scale of any given mIBA might vary by year. The Panel **concluded** that such between-year variation is likely to be important, as the years of the ICE, during which most telemetry data have been collected, have been years of relatively low prey resource abundance.

Further, evidence related to the prolonged African penguin breeding season (e.g., Crawford et al., 2013), also highlights the need to ensure adequate resource availabil-

ity is maintained within a given mIBA around the year, as the demand is not simply seasonal.

The Panel **recommended** that further validation of mIBAs should occur, in particular using dive data that provide objective identification of foraging locations, rather than commuting (or travelling) locations (see also section 5.9). Such analyses could be included in species distribution models (e.g., Warwick-Evans et al., 2018) that could be used to identify areas of key importance. However, important uncertainties remain, particularly if mIBAs are determined (as they have been) using telemetry data predominantly limited to early chick rearing when breeding adults are most constrained; further, that mIBAs may differ in the future, should prey resource abundance increase.

The life history processes of all species do not completely compartmentalise into distinct time periods or physiological mechanisms. Life-history events are often mediated through carryover effects, with events or activities occurring in one season, habitat, or life-history stage, affecting important processes in subsequent life-history stages (Crossin et al., 2010). Thus, seabirds arriving at a colony to breed must have already initiated certain physiological transitions, including with any associated resource accumulation (Crossin et al., 2010).

For African penguins, such carryover effects almost certainly occur, requiring adults to accumulate resources prior to breeding and prior to moult. This means that adequate prey resources are needed throughout different times of the annual cycle, such that delineating where birds forage and accumulate resources requires spatial information across the complete annual cycle. Outside the breeding season, reductions in resource competition that potentially facilitate reductions in foraging effort may benefit penguins prior to moult and post-moult, especially as these periods are energetically demanding.

Accumulating evidence shows that African penguins undergo predictable movements outside the breeding period (Sherley et al., 2017; Carpenter-Kling et al., 2022), suggesting that preferred habitats are also important at other times of the year. Importantly, it is now apparent that the mIBAs delineated using telemetry data from early chick rearing, are sometimes also important during pre- and post-moult foraging trips (Figure 4.2), even though they may only represent a part of important habitat during these other periods.

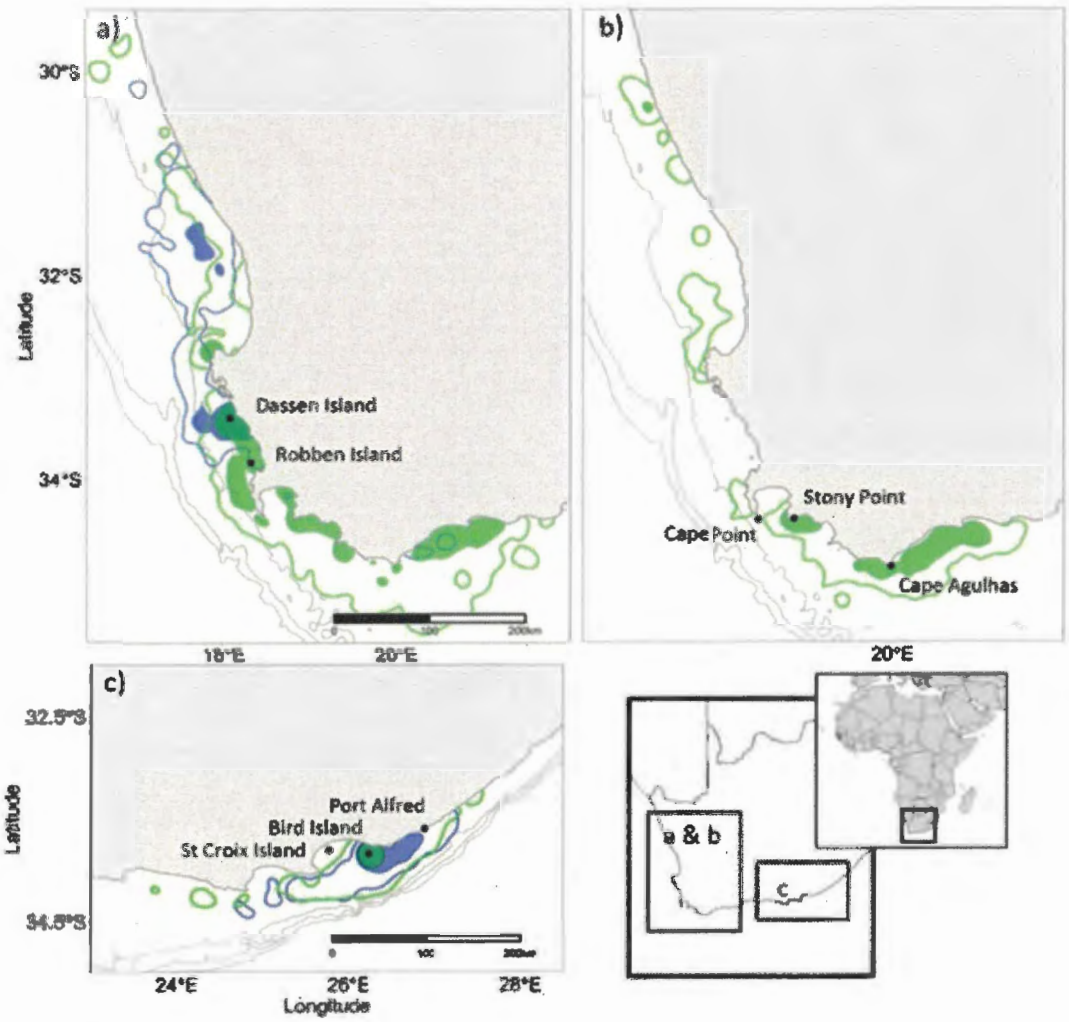

Figure 4.2: The distributional range (90% utilisation distribution—UD, open polygons) and core range (54% UD, shaded areas) of African penguins tagged at (a) Dassen Island, (b) Stony Point, and (c) Bird Island during their pre- (green) and post-(blue) moult foraging trips to the 200, 500 and 1 000 m isobaths (grey lines). Figure from Carpenter-Kling et al. (2022)

4.4 Trade-off space

One way to explore the trade-off between expected benefits to penguins and impacts on fishing is via trade-off plots (see, Hilborn et al. (2021) and Halpern et al. (2013) for examples of trade-off analyses). A trade-off curve (e.g., Figure 4.3) could demonstrate, for example, that the benefits to penguins (as quantified by the proportion of the foraging area that is protected) likely increases rapidly when small areas most used for foraging are closed, with the relative benefits to penguins declining as an increasing proportion of the foraging area is closed to fishing. Because not all closures of the same size are likely to have the same benefit, points A and B in Figure 4.3 demonstrate how a given (hypothetical) 40 km closure (point B) compares with the outcomes of another (hypothetical) closure with the same area but which more closely resembles areas of preferred penguin foraging habitat (point A). Based on the ICE experiment, it is not possible to assign quantitative estimates of the change in population growth rate associated with closed areas that differ from 20 km around colonies, but the qualitative changes in benefits to penguins with increasing closure areas are likely robust (increasing at a decreasing rate). Furthermore, for a given total closure area, closures that more adequately reflect preferred foraging areas will have greater benefits than those that simply close less valuable foraging areas. We also expect that lost fishing catches increase faster when the area closed increases in size, because as demonstrated in the OBM analysis, larger closures lead to more displaced fishing sets and a smaller area available for fishing (and hence fewer fishing opportunities). Based on the OBM results calculated for different alternative closure areas, we developed Figures 4.4 and 4.5, which provide a comparison of closure options across area closed and percent loss in regional catch. Figures 4.4 and 4.5 highlight how not all closures are equal in terms of the predicted lost catch and show that there are potential opportunities to reduce the impact on the fleet while at the same time increasing the amount of area closed (e.g., in Figure 4.4 compare the triangle and square on the blue line for Dyer Island and anchovy).

The Panel provides the following conclusions and recommendations regarding selecting closures given its review of the work identifying foraging areas and lost catch.

- It is desirable to identify a solution that minimizes societal costs and maximizes benefits to penguins; however, an optimal solution (or acceptable "balance") between competing objectives is not simply obtained by closing 50 percent of any given area.
- Conservation actions should be spread throughout the range of the species given each region is subject to different biophysical and anthropocentric threats.
- One approach (if curves such as those in Figure 4.6 can be created) is to find the point at which the change in penguin benefits (by increasing closures) matches the change in costs to society.
- The trade-offs between costs to the fishery and benefits to penguins in terms of the proportion of the foraging area closed will differ among islands and among sectors within the fishery. Consequently, the benefits to penguins and costs to industry should be considered by island (or region) and not simply at the national level (see below). In addition, given the heterogeneity within the industry, expressing costs and job losses by sector (e.g., for small scale operators) would also seem appropriate.
- The economic analysis (e.g. Urban-Econ, 2023a,b,c) provides estimates of several types of economic impacts (to the fishery as a direct consequence of the reduction in revenue [direct impacts], that occur due to suppliers of goods and services to the industry [indirect impacts], as well as due to shifts in spending on goods and services due to directly and indirectly impacted parties [induced impacts]), as well as lost jobs. However, the estimates of economic effects to the fishing industry may be more robust than estimates for the rest of the economy and for jobs (see section 3.3).
- Given that the OBM analysis likely provides an overestimate of uncertain magnitude of the loss in catch (see section 3.2) and these losses are then used in the SAM analysis, the results on economic costs (lower GDP, jobs) and lost catches should be considered in a relative sense and hence used for ranking closure options within a region. The relative ranking of the closure may, however, be sensitive to how catches are allocated to local communities (see section 3.4 for additional details). The eco-

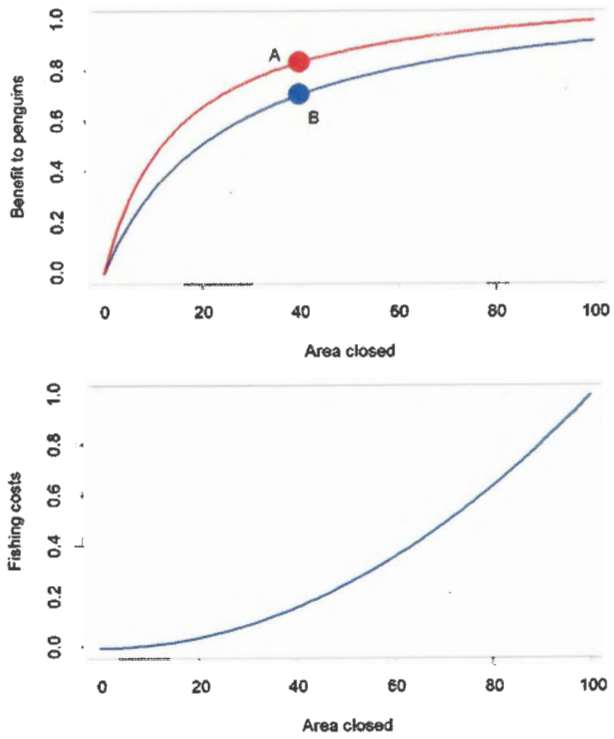

Figure 4.3: Illustrative relationships between benefits to penguins for optimally selected and simple closures given the amount of area closed (upper panel) and between area closed and fishing costs (lower panel). See text for explanations of curves A and B.

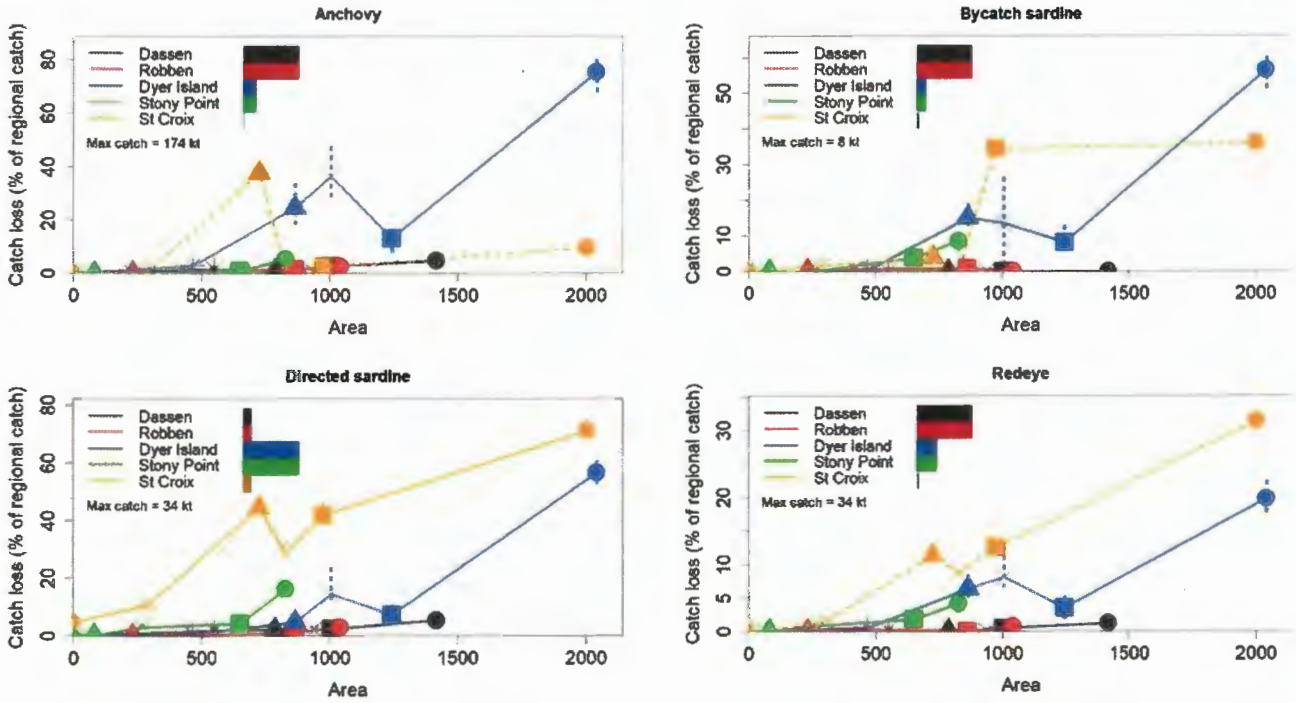

Figure 4.4: Area closed versus loss in catch for five of the six island breeding colonies. Catch losses are expressed relative to the average regional caches during 2011–2020 (west of Cape Point for Dassen and Robben islands; Cape Point to Agulhas for Dyer Island and Stoney Point; east of 24°E for St Croix). The dashed lines indicate results for island breeding colonies with very low catches relative to those for the other island breeding colonies. The different spatial closures considered for each colony are ranked by size on the x-axis: UD90 (closed circle), mIBA (ARS) (closed squares), 20 km (triangle), DFFE (cross), CAF (star), and industry (diamond). The vertical dashed lines cover the range of catch losses computed from the OBM when an alternative set can only be used once or used an infinite number of times. The symbol corresponds to using alternative sets up to five times. The length of the horizontal bars in the legend is proportional to the regional catch

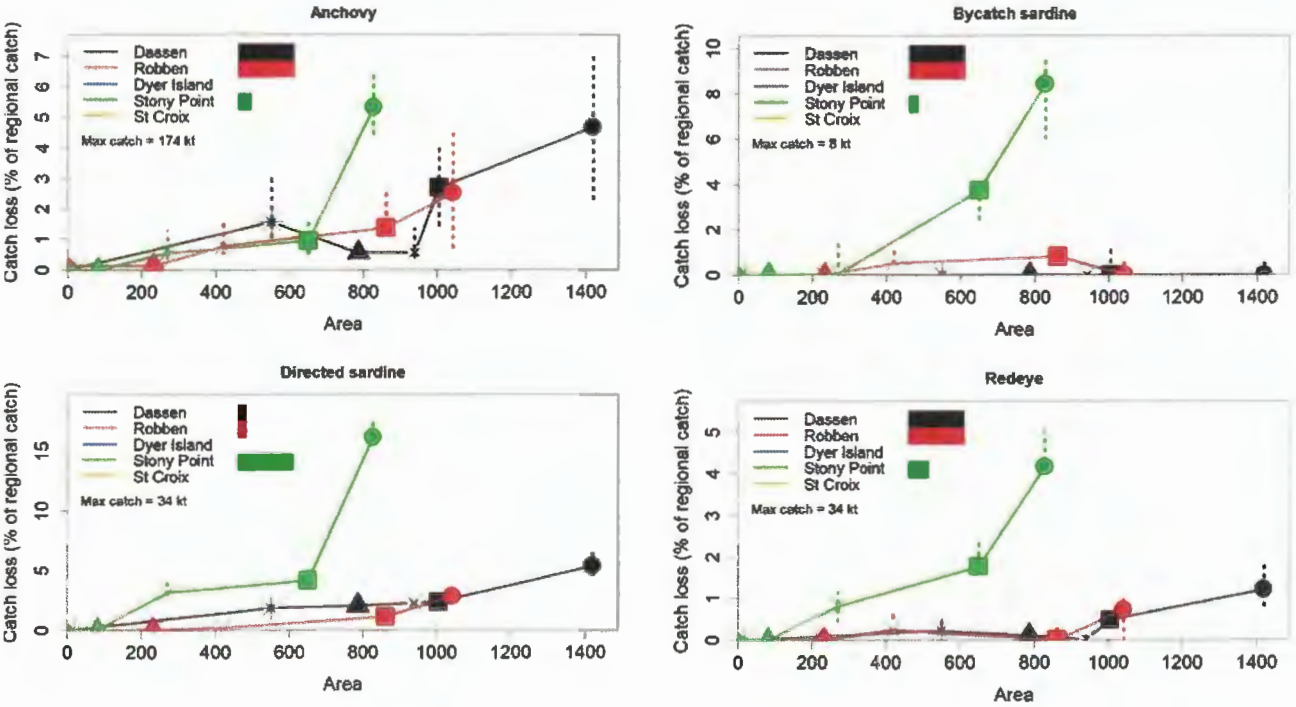

Figure 4.5: As for Figure 4.4, but restricted to Dassen and Robben islands and Stony Point.

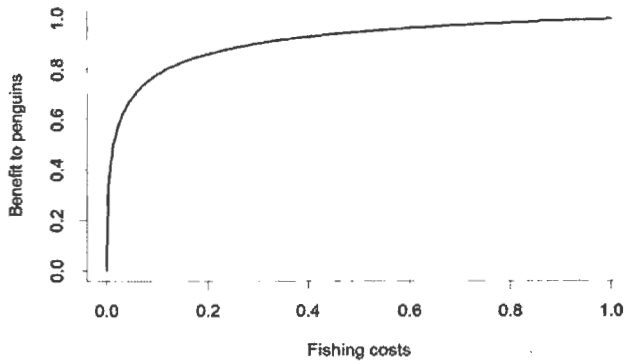

Figure 4.6: Illustrative relationship between the benefit to penguins and fishing costs based on Figure 4.3

nomic analyses are only able to quantify the social effects of closures in terms of job losses. Future work should consider broader social consequences of reduced catches and job losses on community well-being.

- It is necessary to map catch losses back into regional communities to evaluate how vulnerable these communities are because the SAM could be obscuring important local socioeconomic effects.
- The competition among the fishery and penguins would be expected to be greater in years of low prey abundance. An adaptive closure framework that changes closures among years in response to prey abundance could reduce cost to the fishery in years of high prey abundance, as closures in such years would have little or no benefit to penguins.

4.5 Colony-specific considerations

Based on the information provided to the Panel and the results from Figures 4.4 and 4.5, the Panel highlighted the different dimensions of the trade-offs in summary bullets. Across all of the regions, the various penguin foraging areas are important for the small pelagic purse seine fishery.

Dassen Island

- Regionally important for anchovy fishers and redeye fishers.
- Historically important penguin breeding habitat with sufficient habitat for growth; largest remaining breeding population.
- Relatively more susceptible because African penguins are already affected by an overall reduction in regional sardine abundance that, if persistent, may limit their capacity to reverse the declining trend.

Robben Island

- Regionally important for anchovy fishers and redeye fishers.
- Important penguin breeding population.
- Relatively more susceptible because African penguins are already affected by an overall reduction in regional sardine abundance that, if persistent, may limit their capacity to reverse the declining trend.
- Eradication of feral cats should be part of a local conservation management plan.
- Major hub for ecotourism.

Dyer Island

- Regionally important for anchovy fishers, sardine fishers and redeye fishers.
- Important penguin breeding population.
- Relatively important fur seal interactions (predation and/or resource competition) with penguins.
- Figure 4.4 indicates that anchovy catches from within a closure are difficult to replace.

Stony Point

- Regionally important for anchovy fishers, sardine fishers and redeye fishers.
- Important mainland penguin breeding population with logistical access to enhance conservation management.
- Population has increased by 15% pa since 2005.
- Major hub for ecotourism.

St Croix Island

- Fishers rely on sardine due to virtual absence of redeye and anchovy.
- Important penguin breeding population.
- Largest rate of decline since 2016 among the extant penguin colonies.
- Evidence that noise disturbance from bunkering facility is disturbing penguin foraging.
- Figure 4.4 indicates that sardine catches from within a closure are difficult to replace.

Bird Island

- Very little small pelagic fishing.
- Important penguin breeding population but limited scope for major increases.

Boulders Beach

- Fully protected from commercial fishing.
- Important mainland penguin breeding population with logistical access to enhance conservation management.
- Population is healthy and stable (891 breeding pairs in 2022).
- Major hub for ecotourism.

5. FUTURE MONITORING TO EVALUATE EFFECTIVENESS

The Panel makes the following recommendations in relation to potential scientific research questions related to the African penguin population decline, including associated monitoring techniques:

1. Continue to conduct counts of breeding numbers of African penguins at as many colonies as possible in as many years as possible.
2. Monitor adult survival of African penguins using techniques such as passive integrated transponder (PIT) tags and readers at colonies where this is practical to minimise disturbance to colonies. A comparison of time-series of adult survival at different colonies would help resolve which drivers are having the strongest influence on population change. Use of linear ground antennae is feasible when extensive areas of beach need to be monitored for PIT tags; elsewhere antennae can be incorporated into weighbridges where these are in use.
3. Continue monitoring of breeding success where it can be done without disturbance; however, the Panel considers that metrics such as chick weight/body condition/growth rate represent weak proxies of breeding success and may not be cost-effective.
4. Use automatic weighbridges to monitor weights of adult penguins at the start and end of breeding, as this should provide a direct measure of the costs of breeding in terms of the impact on penguin body condition.
5. Use automatic weighbridges to monitor weights of PIT-tagged adult penguins; departure body mass prior to foraging and return body mass subsequent to foraging should provide quantification of foraging efficiency, and potentially meal mass for offspring. Such work will be valuable in itself, but would be especially valuable if complemented by GPS tracking of some individuals.
6. Assess behavioural responses of foraging adult penguins using GPS tracking studies; these will likely remain limited to the period when adults have relatively small chicks. However, deployment of time-depth-recorder tags on these adults (together with GPS units) will provide much improved data on the foraging locations along the path of tracked birds.
7. Conduct foraging studies using telemetry methods, to further determine the impacts of vessel noise (including from bunkering) on foraging behaviour.

5.1 Population counts

African penguins are not easy to count. Breeding birds may be in burrows underground, or in nest boxes, or under bushes, although at most colonies many are visible in the open. Not all pairs breed at the same time, so synoptic counts on any particular date underestimate total breeding numbers. For large colonies, counts have generally been undertaken by teams of people walking through the colony counting occupied nest sites, mostly between February and September, but counts at other times of year are used when they are the only data available (Crawford et al., 2011; Sherley et al., 2020). Because breeding is not fully synchronous, potential sites (apparently not active but showing signs of use) may be included in counts, whilst numbers of unguarded chicks in groups (créches) are divided by two to estimate the (minimum) number of nest sites those birds represent (Sherley et al., 2020). These counts provide relatively low accuracy population estimates but are adequate to demonstrate large changes in population size over time.

Penguins nesting (photo BM Dyer)

Some birds choose not to breed, and so numbers of nests counted at colonies may underestimate the total population, by missing nonbreeding adults, especially when seabirds are under severe pressure (e.g., resource constraints, adverse weather conditions, disturbance). In addition, seabirds tend to become more vulnerable to impacts of human disturbance when already under stress from adverse environmental conditions (Diaz et al., 2021). African penguins are particularly susceptible to human disturbance (Hockey and Hallinan, 1981). Seabirds that would tolerate human activity at a colony when conditions are good may abandon their breeding attempt as a result of a similar level of human disturbance when they are stressed. It is therefore highly desirable to avoid human disturbance at penguin colonies, but especially at those that are in decline and subject to adverse environmental pressures. Use of a drone (unoccupied aerial vehicle; UAV) to overfly a colony and record digital video (or frequent static images that can be mosaiced together) of the breeding sites may allow counts without associated human disturbance, as breeding seabirds show little or no response to an overflying drone providing it is well above the colony[1]. Using drones to count breeding penguins of various species

[1]Rümmler et al. (2021) found no behavioural reactions of penguin adults or chicks to drones flown more than 70 m above the colony. Recognising that monitoring numbers and breeding success of Sandwich terns *Sterna sandvicensis* by visiting colonies tends to cause excessive disturbance, Spaans et al. (2018) tested the use of a drone, flown 15—20 m above nesting Sandwich terns at appropriate dates through the breeding season at colonies in the Netherlands, to count breeding numbers and breeding success from photographs. They found that the drone caused "hardly any visible disturbance to the birds" but gave highly accurate data on breeding numbers and breeding success, so was considered much better than using human observations at Sandwich tern colonies. The same conclusion was reached by Valle and Scarton (2021) in Italy. Geldart et al. (2022) showed that drones flying over nesting eider ducks *Somateria mollissima* did not lead to any increase in heart rate of the incubating birds.

has been shown to be highly effective, for some penguin species and in some cases more accurate than human counts, as well as reducing human disturbance (Hayes et al., 2021; Krause et al., 2021; Mattern et al., 2021; Qian et al., 2023).

Because some African penguins nest in locations where they cannot easily be seen or detected from above ground, a complementary approach to census African penguins may be to use drone counts of crèched chicks, or moulting penguin numbers. These are easier to count than breeding birds, as they tend to moult relatively synchronously and in the open, although sometimes these may include small numbers of birds breeding elsewhere. For African penguins, preliminary studies could help determine the efficacy of such techniques.

5.2 Breeding success

Breeding success is an important metric to monitor because it is likely to have a clear influence on population trend and is hence usually a high priority in any seabird monitoring programme. However, this is less straightforward with seabirds that prefer to nest in burrows but may also use open nest sites on the surface. There are likely to be differences in breeding success between nests of different types in different habitats, and this needs to be considered when setting up a monitoring programme. It would be ideal to monitor samples of nests of each type so that annual breeding success can be representative of the colony rather than of just one nest type. Breeding success can be monitored remotely using equipment such as nest cameras or acoustic monitoring, which has the potential to minimise disturbance impacts from people having to visit nests to monitor breeding. Examples of time time-lapse photography are now increasingly common in penguin behavioural studies (e.g., Jones et al., 2018).

5.3 Adult survival

There is evidence that survival of adult African penguins is strongly affected by sardine stock biomass (Robinson et al., 2015; Crawford et al., 2022; Leith et al., 2022), but apparently not to anchovy stock biomass, at least for Robben Island. There is therefore a strong case for increased monitoring of African penguin adult survival, as this is likely to be a major factor determining population trend. Marking of some penguins species with external tags (e.g., flipper bands) has been shown to have adverse effects, so future monitoring of penguin survival should focus on the use of PIT tags and deployment of tag readers at colonies to allow monitoring of adult survival with minimal human disturbance and with tags that do not affect penguin fitness. PIT tag deployments have already been made for African penguins at Robben Island and at Stony Point (Leith et al., 2022). The presence of tagged birds at nests can be determined using a hand-held tag reader carried from nest to nest, but this risks impacts from human disturbance. An alternative is to deploy tag readers at strategic locations within the colony to identify birds as they pass within range of the reader. Both approaches risk missing tagged individuals if readers are not close to particular birds, so provide incomplete assessments of adult survival. In addition, mobile robotic tag readers have also been developed, as well as linear beach antennae, both of which may be feasible to use with African penguins (Trathan and Emmerson, 2014). Experimentation with different approaches will help determine approaches appropriate to African penguins.

5.4 Weigh bridge and PIT tags

It has been possible to set up a narrow "entrance" to the nesting area at some penguin colonies so that when adults approach nests it is possible to monitor each individual's arrival and departure. This can be achieved with (PIT) tags and Radio Frequency Identification (RFID) tag readers at the entrance to colonies (Kerry et al., 1993; Denhard et al., 2013). Tag deployments can potentially be combined with a weigh bridges used to weigh birds as they arrive and depart (Lescroël et al., 2021) providing data on changes in the weight of known individuals before and after each foraging trip. However, there can be problems associated with such automatic monitoring stations, where, for example, individual penguins use different routes to enter and exit the colony. In such cases, care will be needed to ensure sample sizes are adequate to address key research objectives. Further. there remains the possibility that constrained access to the nesting area could have impacts on the breeding birds, but careful design should be able to avoid such problems.

5.5 Arrival weights of adults

Weights of individual penguins departing from and returning to the colony passing over a weigh bridge can provide data giving evidence on foraging efficiency during individual foraging trips (Lescroël et al., 2021) that could be related to food abundance/availability and other factors (such as noise, vessel traffic, weather conditions, fishing activity). Monitoring of foraging efficiency could be highly informative if such sites can be established.

5.6 Pre-moult weights

Penguins are unusual among birds in having an intense pre-moult fattening period to store resources (energy, protein and perhaps especially sulphur amino acids) to support the process of moult. Unlike most birds that moult slowly while continuing normal daily activities, penguins remain on land through a short period of starvation while a complete moult occurs. During this process they are unable

Moulting penguin chick (photo BM Dyer)

Penguin crèche (photo BM Dyer)

to return to sea because their waterproofing is compromised by the moult process until it has been completed. These birds therefore need a minimum stored amount of resource to successfully complete moult. Weights of penguins at the start of moult may indicate whether environmental conditions have allowed birds to achieve that minimum. Increased adult mortality may in part reflect an inability to achieve the key body reserves needed for moult.

5.7 Chick growth, chick body condition, and chick fledging weights

Chick metrics may provide some indication of how good environmental conditions are for penguin breeding, but they are much less useful than data on breeding success. Chick fledging weights in some seabird species are correlated with post-fledging survival, but that is not the case in all seabirds or in all populations, so fledging weight may not always link to demography. Seabird chicks can show catch-up growth where undernourished chicks end up at a similar fledgling weight because they put on weight at a later developmental stage where other chicks have reached a plateau weight. Chick condition indices may also show rather little correlation with demography, and may be affected by selective mortality of starving chicks at some colonies and during some years. However, these indices may show little relationship with demography if the main determinant of chick survival is predation rather than starvation. Further, even poor quality adults may fledge chicks in years with good environmental conditions, whereas only high quality parents may succeed in poor environmental conditions. The potential therefore exists for inverse relationships where more poor quality chicks fledge in years of abundant resources.

5.8 Recruitment of juveniles

Use of PIT tags in penguin chicks and deployment of tag readers at breeding or moulting sites may provide data on immature survival and seasonal movements of immatures. Relatively little is known about the ecology of immature seabirds as they are much more difficult to study than breeding adults. However, because immatures are less experienced they tend to have lower foraging efficiency than breeding adults and so periods of increased competition (such as during periods of food shortage) are likely to disproportionately affect immature birds. Studies of recruitment of PIT-tagged individual juvenile penguins may therefore help to shed light on population processes driving population growth or decline.

5.9 Studies with TDRs

Time-depth-recorders (TDRs) can provide data on the foraging activity of diving seabirds. For example, deployment of TDRs in combination with PIT tags on penguins that then cross a weigh bridge as they leave the colony and again as they return from a foraging trip can give information on the amount of food obtained in relation to the number of dives made while foraging (Lescroël et al., 2021). This allows foraging efficiency and effort to be related to local environmental variables. The Panel identifies this as a high priority for future research, including for further validation of any mIBA closures designated.

5.10 GPS tracking of breeding adults and video-cam studies

GPS tracking of seabirds is normally limited to short periods during breeding, as GPS tag attachment is usually temporary and devices are removed from the tagged bird after a few days or weeks. Depending on tag design (and therefore cost and battery life) GPS tags can either be designed to store data for download from the tag on recapture of the same bird, or can transmit data to a base station or to the cellphone network or to a satellite. GPS tracking can provide important data on where individuals choose to search for food in relation to local environmental conditions (Sutton et al., 2020). There is also the potential to deploy video-cameras on adult penguins to record foraging behaviour and interactions with forage fish. Such deployments could provide useful understanding of penguin group foraging behaviour. In general, the weight and induced drag of devices (especially if more than one device is deployed on a bird) must be considered, as they could potentially affect the behaviour that is being studied.

5.11 Tracking of nonbreeding season movements of adults

It is possible to use GPS tags to track African penguins before and after the moult period (Carpenter-Kling et al., 2022). Tags remain on the birds for a matter of days or weeks during the breeding season limiting the duration of such studies. Tags would need to be attached more permanently to birds to track movements throughout the nonbreeding period. That is sometimes possible by using a harness, but harnesses are not suitable for most highly marine seabirds, especially those that dive to chase prey. Permanent attachment can be achieved by implanting tags within the bird's body cavity, but such surgical procedures risk injury and increased mortality, so may be better avoided. Long-term overwinter studies on penguins have been undertaken using light-sensing geolocators (e.g., Ballard et al., 2010; Dunn et al., 2011; Thiebot et al., 2011), but care needs to be taken in deployment, not to constrict legs (which engorge with blood) during moult. The Panel recognises that such research would be useful, but also that the concerns about potential tag effects on birds would need to

6. FUTURE RESEARCH OTHER THAN MONITORING

6.1 Refining the estimation of effects of closures on catches, GDP, and jobs

- Further statistical analysis should be undertaken to better understand the seasonal nature of anchovy and sardine sets/catches across the fishing sites, especially along the west coast.
- OBM results for the random case should be presented for the 1, 5, and infinity cases.
- The impact of closures on net revenue as well as changes in catches should be explored because it is important for understanding both the short-run impacts and the potential long-run impacts due to changes to the fleet composition, shore-side infrastructure, and coastal community dynamics.
- Further work needs to be done on the long-run socioeconomic impacts to local communities due to the prospective closures. A key part of this research would be data collection at the scale of local communities to better understand how the fishing sector (onshore and offshore) and penguin tourism contribute to the local economy, jobs, and well-being. Examples of community profiles and analysis that could be used as a guide for such an effort are Colburn et al. (2016), Himes-Cornell et al (2013), and Pollnac et al. (2006).
- Some important questions remain regarding the interpretation of the SAM results:
  - Are the estimated "losses" due to the proposed closures within the standard fluctuations of the local economy due to other kinds of economic shocks, such as fuel prices, exchange rate fluctuations, fluctuations in total stock biomass etc.?
  - Are the short-run job losses from a hypothetical fuel price increase (best to consider a range of increases from 5 to 25%) greater than the predicted job losses from the preferred scenario?
  - How important for the loss estimates are the assumptions regarding the relative wages of the processing and harvesting sector, especially since most of the job losses occur in the processing sector?
  - How do the results change if the conversion of total full-time equivalent employment is based on a different rate of fishing days per year (currently, 175 fishing days per annum is assumed)? Additional sensitivity analysis of the SAM results should be carried out to have a better understanding of the range of possible regional outcomes from the prospective closures.
- Given little empirical justification for one method, alternative methods for allocating catches to regions should be used, and the results compared across the different cases, to better inform discussions on which communities are likely to be most impacted.
- Given that SAM results should be viewed as a very short-run measure of impacts, a Computable General Equilibrium model (Seung and Waters, 2006) should be developed to capture more dynamic short-run and medium-run responses of the economy.

6.2 Supporting evaluation of trade-offs, including refining estimates of foraging areas

- Further validation of mIBAs should occur, in particular using dive data that provide objective identification of foraging locations, rather than commuting (or travelling) locations.
- Between-year variation in mIBA should be explored.

6.3 Understanding and mitigating reasons for the decline in African penguins due to factors other than fishing near breeding colonies

There is broad agreement that the recent observed decline in African penguin numbers both locally and regionally may be due to a number of factors. The ICE was designed to quantify the impact of sardine and anchovy fishing in the vicinity of penguin breeding islands, and the body of evidence presented to the Panel suggests that this is a contributing factor, but the magnitude of the impacts appears small and could only explain a small part of the recent declines in penguin numbers. Plausible drivers impacting the penguin populations are likely to vary across islands and spatial scales, plus there are variable data available to inform on different impacts, as well as the likely cumulative impacts of different drivers. Future research is needed to address each of the possible drivers. The effects of several drivers could be explored by developing an integrated ecosystem model, such as a MICE (Model of Intermediate Complexity for Ecosystem assessments) (Plagányi et al., 2014; Collie et al., 2016), or so-called MRMs (Minimum Realistic Models – Punt and Butterworth, 1995)[1].

6.3.1 Forage fish abundance

Section 1.3.2.1 summarises information related to the potential for changes in the biomass of prey species to affect population parameters, in particular the effect of sardine biomass on penguin adult survival. Further evaluation of such relationships could involve (a) the development of a new MICE that addresses all of the major penguin colonies off South Africa, and (b) exploration of the consequences of using the current OMP to set catch limits for anchovy, sardine and round herring. The latter exploration may lead to different results than those found by Robinson et al. (2015), given the current (more depleted) status of the sardine population and an OMP that leads to constant catch limits over ranges of low sardine biomass, and spatial constraints. The Panel notes that the current OMP should be tested to evaluate whether it is adequately precautionary in relation to protecting future recruitment prospects of sardine, as it currently allows high exploitation rates when sardine stock

[1]See Appendix F for details

falls to levels where future recruitment may be impaired. This suggests that further consideration should be given to the role of fishing pressure on sardine stock dynamics.

6.3.2 Guano harvests

Past guano harvesting is recognised as an important possible contributory cause to the penguin decline because of its impact on optimal breeding habitat (see section 1.3.2.2). The impact of reductions in guano as nesting habitat is confounded to some extent with other changes in the system, but could be incorporated in a MICE, expanding on local efforts currently underway.

6.3.3. Resource competition with Cape fur seals

The decline of the penguin population may be related to competition with predators that depend upon small pelagic fish. For example, Cape fur seal populations have increased substantially over the previous century and have expanded into areas used by penguins (see section 1.3.2.3). This is an impact that could usefully be investigated using a MICE both in terms of direct and indirect predation effects, but also to compare the responses of other predators in the system to changes in pelagic fish abundance. Though known to occur, the incidence of predation of penguins by Cape fur seals, is unlikely to have led to the penguin population changes observed. Data on seal diet and changes in regional seal abundance would be particularly informative as inputs to models to quantify the relative contribution of seal predation (and possibly competition) to penguin mortality.

6.3.4 Noise in the marine environment

Disturbance of penguin group foraging, unrelated to any prey depletion effects, could possibly occur if groups of penguins are disturbed or displaced by fishing vessels, or noise associated with bunkering near St Croix Island (Pichegru et al., 2022), especially if their group coordination and communication while hunting is affected by the noise. Continued investigation of the effects of marine noise could involve, for example, using tracking and deployment of TDR tags to understand the changes in foraging behaviour and distribution in response to bunkering noise. Currently, including such investigations in a MICE would not be feasible.

6.3.5 Nest boxes

Although there is evidence that African penguin breeding success can be increased by providing nest boxes (section 1.3.2.5), the ideal design for such nest boxes has not been agreed by all those involved. Nevertheless, widespread gains in penguin productivity might be possible in some areas if a better design were to be found and nest boxes deployed in large numbers at the main colony sites. If deployed at such scales, the cost (including annual maintenance) of individual nest boxes would be an important consideration. Currently, including such investigations in a MICE would not be feasible.

6.3.6 Climate change

Climate change is recognised as a factor impacting seabirds in South Africa (Crawford et al., 2015), including penguins, both directly, such as impacts due to extreme events (Welman and Pichegru, 2022) and indirectly, given potential influence on the recruitment patterns and spatial distribution of anchovy and sardine in the vicinity of penguin colonies (see van der Lingen, 2023 for details). Sea surface temperature (SST) predictions of future increases (or decreases in localised areas) will variably influence different regions and hence penguin colonies. As such, the Panel highlights the need for penguin management strategies (and monitoring) that encompass multiple spatial regions to increase resilience to climate change and fish distribution changes (McInnes et al. 2023).

Given recognition of the impact on African penguins of a continued eastward shift (i.e., from the west to the south coast) in the distribution of anchovy and especially sardine (van der Lingen, 2023), this is an important factor to include in a MICE. Although it may not be possible to precisely model the exact rates of fish movement, available fishery and survey data and/or stock assessment outputs could be used to reasonably represent a restricted number of alternative scenarios to explore the impact on penguin colonies. In particular, attention needs to be paid to the potentially highly influential relationship between adult survival and sardine availability (Robinson et al., 2015; Leith et al., 2022). A MICE should ideally use and fit to all available penguin survival data. By explicitly representing the ages of tagged penguins as well as other confounding sources of mortality, such as due to oiling events and predation, an integrated MICE could assist in separating the alternative sources of mortality. This then provides an objective integrated framework for quantifying and correctly attributing the relative role of different drivers in causing the decline of the penguins. Given an improved understanding – validated to the extent possible - of the relative contributions of each driver to the penguin decline, a MICE is then a useful tool for testing the efficacy of alternative management strategies through forward projecting the effect of future mitigation measures, either on their own or in combination.

The available penguin and fishery data suggest that a pragmatic starting point is to model regional changes in penguin population dynamics due to changes in prey composition and availability. The next step could be to add to the model available environmental and climate data (such as SST, frequency of extreme events), preferably aligned with penguin monitoring data, to explore to what extent spatio-temporal changes in the environment may be contributing to the decline in penguins. Given differences in habitat and climate resilience across colonies, a spatial model structure would be informative in trying to distinguish a reliable signal from the data.

7. SUMMARY AND CONCLUSIONS AND RECOMMENDATIONS

The following sections summarise the key conclusions and recommendations. Table 7.1 provides a prioritised summary of research and other tasks.

7.1 Design, implementation and interpretation of the ICE

- The ICE has been identified as an example of a best practice for assessing forage fish fisheries – seabird resource competition, but the weaknesses of the design and implementation need to be recognised and their consequences accounted for when interpreting the results (section 2.4).
- The debate about the relative merits of analyses based on aggregated versus disaggregated data was essentially closed based on the final set of results presented at the June 2023 meeting. Although differences in preferences between the analysts remain, the two approaches provide similar results when appropriately configured (section 2.2.1).
- The response variables monitored as part of the ICE were considered to be direct measures or proxies for African penguin breeding success or post-fledging survival, but did not measure impacts of island closures on African penguin adult survival or immature survival. The Panel interpreted the estimated impacts of fishing on foraging-related parameters only qualitatively and did not integrate them into the inferences regarding overall impacts on penguin population growth rates (section 2.2.2). Only the predictions for Dassen and Robben islands are discussed in detail given the concerns regarding the use of foraging-related variables (see section 2.2.1) and the fact that only estimates based on chick condition are available for St Croix and Bird islands (section 2.3.2).
- Overall, the results of the ICE for Dassen and Robben islands indicate that fishing closures around the breeding colonies are likely to have a positive impact on population growth rates, but that the impacts may be small, in the range 0.71—1.51 % (expressed in units of annual population growth rate). These impacts are small relative to the estimated rates of reduction in penguin abundance for these two colonies over recent years (section 2.3.2).
- The change in population growth rate estimated in Section 2.3 did not include impacts of island closures on African penguin adult survival or immature survival, which are likely to exist based on evidence for other situations, but cannot be quantified for African penguins (section 2.4).
- The ICE is completed. Future closures of forage-fish fishing around penguin colonies would be likely to benefit penguin conservation, but will need to be part of a larger package of conservation measures as such closures alone would be unlikely to reverse the current decline in penguin population numbers (section 2.3.2).

Photo credit SAPFIA – South African Pelagic Fishing Industry Association

7.2 Calculating the costs to the fishery associated with closures

- Implementing closures will impact the fishing industry and local communities to some extent, but accurately quantifying this is challenging (section 3.1).
- The OBM and SAM are appropriate methods for estimating costs to the fishery but their results should be considered primarily in a relative sense (section 4.4) and as measures of short-run impacts.
- The OBM quantifies the impacts of closures under the assumption that catches that occurred in the closed area when it was open are a measure of the catches that would have occurred if the closed area was not closed (section 3.2).
- The OBM likely overestimates the loss in catches due to closures, to an unquantified extent, given its assumptions related to the set of opportunities that are available to replace catches in closures, particularly those considered "irreplaceable" because all of the catch on a given day occurred inside a closure (section 3.2; Appendix E).
- Understanding the impact of closures on the net revenue as well as changes in catches is important for understanding both the short-run impacts and the potential long-run impacts due to changes to the fleet composition, shore-side infrastructure, and coastal community dynamics (section 3.2).
- The predicted impacts of closures depend on the reliability of the estimates of lost catch from the OBM, which the Panel agreed is likely to provide overestimates (section 3.3).
- Because SAMs are designed to analyse demand-driven impacts in the local economy (e.g., change in consumer spending), these models tend to overestimate the impacts of supply-side shocks, such as a reduction of catch (section 3.3).

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Table 7.1: Prioritised summary of research and other tasks. Short-term tasks pertain to the next 1-2 years, medium-term tasks to the next 2-5 years and long-term tasks the next 6+ years. The relative priorities and timings reflect an integrated outcome of the Panel, which assigned priorities and timings to each task.

Task	Relative priority	Timing
1. Refining the estimation of effects of closures on catches, GDP, and jobs		
a. Explore the seasonal nature of anchovy and sardine sets/catches (West Coast)	Medium	Medium
b. Present OBM results for the 1, 5, infinity cases	High	Short
c. Investigate the impact of closures on net revenue	Medium	Medium
d. Analyse the long-run socioeconomic impacts	Medium	Medium
e. Conduct an in-depth interpretation of the SAM results	High	Short
f. Conduct SAM sensitivity analysis - regional outcomes	High	Short
g. Explore SAM sensitivity to allocation of catches to regions	High	Short
h. Develop a Computable General Equilibrium model	Low	Long
2. Supporting evaluation of trade-offs, including refining estimates of foraging areas		
a. Validate the mIBAs given information on foraging locations	High	Medium
b. Summarise between-year variation in mIBAs	Medium-High	Short
3. Understanding and mitigating reasons for the decline in African penguins due to factors other than fishing near breeding colonies		
a. Develop a MICE/integrated ecosystem model	High	Medium
b. Test that the current OMP is adequately precautionary at low sardine biomass for penguin conservation	High	Medium
c. Collate and collect data on changes in seal diet and regional abundance	Medium-Low	Medium-Long
d. Conduct tracking and deployment of TDR tags to understand the changes in foraging behaviour and distribution in response to bunkering noise	High	Short
e. Optimise nest box design and deployment	Medium	Medium
f. Conduct analyses related to climate change impacts and the variable role of SST on different regions/ penguin colonies	Medium	Medium-Long
g. Further explore the relationship between adult survival and sardine availability (e.g., tagging data preferably matched to estimates of regional sardine abundance)	High	Medium
4. Future monitoring to evaluate effectiveness		
a. Continue counts of breeding numbers at as many colonies as possible	High	Short-Long
b. Monitor adult survival of penguins using low disturbance methods such as PIT tags and readers	High	Short-Long
c. Continue to monitor breeding success	High	Short-Long
d. Use automatic weighbridges to monitor weights of adult penguins	Medium	Medium
e. Use weighbridges to monitor weights of PIT tagged adults + GPS tracking	High	Medium
f. Deploy time-depth-recorder tags (together with GPS units, accelerometers, or video recorders)	Medium	Medium
g. Apply telemetry methods, to examine impacts of vessel noise (including from bunkering)	High	Short-Medium
h. Use drones for monitoring	Low	Medium
j. Use PIT-tagging of juvenile penguins to understand survival	High	Short-Long
k. Conduct video-cam studies of adult group foraging behaviour	Low	Medium
5. Improving communication and collaboration		
a. Improve processes and platforms for sharing data	High	Short-Long
b. Conduct collaborative workshops to share information, jointly discuss compromises and seek solutions	High	Short-Long

Photo credit SAPFIA – South African Pelagic Fishing Industry Association

7.3 Issues pertinent to evaluating trade-offs

- There are three primary trade-off axes to consider when selecting closures: (a) the benefit to penguins of the closure; (b) the cost (economic and social) to the fishing industry and the communities where fishing and processing operations are based; and (c) the ability to evaluate the effectiveness of the closures (section 4.1).
- Closed areas to protect penguins during breeding should be year-round, unless reasons demonstrate otherwise (section 4.1).
- If designated, closed areas to protect penguins should be reviewed at a time when results are available to investigate life-history processes such as juvenile recruitment, and adult survival, and hence population growth rates. This may be at a time between 6 and 10 years after designation. Other reasons to review such closed areas might include major socioeconomic changes in the fishery and processing, or stock abundance, or similar consequences of prey resource change (section 4.1).
- Analyses needed to determine juvenile recruitment, and survival, and adult survival, will require closures of between 6 and 10 years after closure designation, if adequate responses are to be determined (section 4.1).
- Monitoring should take place irrespective of whether there is an experimental (alternating open and closed) component to the closure program (section 4.2).
- If an experimental component is to be part of any closure regime: (a) it should be focused on parameters such as juvenile recruitment and survival, and adult survival in addition to those related to breeding success monitored during the ICE; (b) the western and southern Cape regions should be the focus of any future experimental closure program given data availability and the ability to undertake regular monitoring; and (c) it is desirable that a power analysis be conducted to identify an appropriate sequence of (possibly alternating open and closed) closures (section 4.2).
- Penguin foraging areas should be quantified for trade-off analyses delineating mIBAs using ARS methods (section 4.3).
- Conservation actions should be spread throughout the range of the species given that each region is subject to different biophysical and anthropocentric threats (section 4.4).
- The following considerations are relevant to designing a framework to help decision makers select closed areas (if any):
  - An optimal solution (or acceptable "balance") between competing objectives is not simply obtained by closing 50 percent of any given area.
  - One approach is to find the point at which the change in benefits to penguins (by increasing closures) matches the change in costs.
  - The trade-offs between costs to the fishery and benefits to penguins in terms of the size of an area closed will differ among islands and among sectors within the fishery. Consequently, the benefits to penguins and costs to industry should be considered by island (or region) and not simply at the national level (see section 4.5 for aspects of each major breeding colony that are relevant for decision making). In addition, given the heterogeneity within the industry, expressing costs and job losses by sector (e.g., for small scale operators) would also seem appropriate.
  - Care should be taken when interpreting the estimated impacts to the fishing industry given the OBM likely provides an overestimate of uncertain magnitude of the loss in catch (see Section 3.2) so the results of the OBM and hence the SAM model should be considered primarily in a relative sense and hence used for ranking closure options. The relative ranking of a closure may, however, be sensitive to how catches are allocated to local communities.
  - The economic analyses are only able to quantify the social effects of closures in terms of job losses, and future work should consider broader social consequences of reduced catches, such as measures of community well-being.
- The OBM indicates that the ability to replace catches currently taken in penguin foraging areas, and in turn the impacts of closures on the fishing industry, differs among colonies (most difficult for Dyer Island and St Croix Island) (Figures 4.4 and 4.5).
- The likely effectiveness of closures for mitigating the decline in penguin abundance also differs among colonies given their variable rates of declines (largest declines in St Croix Island) and the presence of other factors unrelated to fishing contributing to those declines (e.g., bunkering close to St Croix Island) (section 4.5).
- It is possible to design closures within the overall foraging area to minimise lost catch for any given choice of percentage of penguin foraging area to be protected (Figures 4.4 and 4.5).

7.4 Monitoring and research to determine causes for the primary reasons for the decline

Section 5 provides details on potential scientific research questions related to the African penguin population decline, including associated monitoring techniques. Key tasks are:

1. Continue to conduct counts of breeding numbers of African penguins at as many colonies as possible in as many years as possible.
2. Monitor adult survival of African penguins. A comparison of time-series of adult survival at different colonies would help resolve which drivers are having the strongest influence on population change. In order to minimise disturbance to colonies; monitoring should use techniques such as PIT tags and readers at colonies where this is practical. Use of linear ground antennae are feasible when extensive areas of beach need to be monitored for PIT tags; elsewhere antennae can be incorporated into weighbridges where these are in use.
3. Continue monitoring of breeding success where it can be done without disturbance; however, the Panel considers that metrics such as chick weight/ body condition/growth rate represent weak proxies of breeding success and may not be cost-effective.
4. Use automatic weighbridges to monitor weights of adult penguins at the start and end of breeding, as this should provide a direct measure of the costs of breeding in terms of the impact on penguin body condition.
5. Use automatic weighbridges to monitor weights of PIT-tagged adult penguins; departure body mass prior to foraging and return body mass subsequent to foraging should provide quantification of foraging efficiency, and potentially meal mass for offspring. Such work will be valuable in itself, but would be especially valuable if complemented by GPS tracking of some individuals.
6. Assess behavioural responses of foraging adult penguins using GPS tracking studies; these will likely remain limited to the period when adults have relatively small chicks. However, deployment of TDR tags on these adults (together with GPS units) would provide much improved data on the foraging locations along the path of tracked birds.
7. Conduct foraging studies using telemetry methods, to further determine the impacts of vessel noise (including from bunkering) on foraging behaviour.

7.5 Future research

Sections 1, 4 and 6 summarise hypotheses related to aspects other than fishing near island breeding colonies leading to resource competition, that could explain past and ongoing declines in African penguin populations. Section 6 identifies data sources and analysis methods (including the use of Models of Intermediate Complexity for Ecosystem Assessment – MICE) that could assist in understanding the effect of these aspects and how they can be mitigated.

Section 6.3.1 offers further information related to the potential for changes in the biomass of prey species to affect African penguin population parameters, in particular exploration of the consequences of using the current OMP to set catch limits for anchovy, sardine and round herring. The latter exploration may lead to different results than those found by Robinson et al. (2015), given the current (more depleted) status of the sardine population and an OMP that leads to constant catch limits over ranges of low sardine biomass, and spatial constraints.

7.6. Other

If designated, closed areas to protect penguins should be reviewed at a time when results are available to investigate life-history processes such as juvenile recruitment, and adult survival, and hence population growth rates. This may be at a time between 6 and 10 years after designation. Other reasons to review such closed areas might include major socioeconomic changes in the fishery and processing, or stock abundance, or changes in estimates of core foraging areas, for example, due to mIBAs being based on where foraging occurs and not entire tracks, or similar consequences of prey resource change (section 4.1).

7.7 Communication and collaboration

Continued communication, collaboration, and transparency of research data and analyses, are strongly encouraged to build trust and strengthen progress towards seeking acceptable solutions. Working collaboratively will further enhance the effectiveness and social acceptability of management measures and decisions aimed at mitigating the decline of the African penguin.

Clear, fair and objective communication around this controversial issue is important to ensure the best possible outcomes for penguins whilst respecting that conservation decisions may impact to varying extents on livelihoods and community well-being.

Penguin colony, Bird Island, Algoa Bay (photo BM Dyer)

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Adult Penguin and chick (photo credit Dr. Éva Plagányi-Lloyd)

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Penguins on the rocks, Boulders (photo BM Dyer)

APPENDIX A
PANEL BIOGRAPHIES

Robert W. Furness is Principal Ornithologist at MacArthur Green, working mainly on impacts of offshore wind farms on seabird populations and appropriate compensation measures. He was previously Professor of Seabird and Fishing Interactions at the University of Glasgow, Scotland. His scientific publications have been important in influencing policy in marine conservation with over 33,800 citations in Google Scholar and an H index of 100. As International Fish Meal and Oil Manufacturers' Association (IFOMA) Professor he developed plans for a sandeel closed box near kittiwake colonies while allowing continued sandeel harvest in offshore areas of the North Sea with no reduction in the total allowable catch. That closed box was implemented by the European Commission in 2000 and is still functioning. He was appointed by Scottish Government Ministers to the Board of Scottish Natural Heritage (SNH), the statutory adviser to Scottish Government on wildlife conservation and management, where he has played a role in developing government policy in wildlife conservation and management. He chaired SNH's Scientific Advisory Committee, a panel of experts drawn from Universities and Research Institutes to assess the science underpinning conservation policy. He has served as a member of the JNCC Marine Subgroup, developing UK policy on marine protected areas. Professor Furness chaired the International Panel of Experts in Marine Ecology (IAPEME) set up by the Danish Government to review the scientific programme monitoring impacts of the world's first major offshore wind farms (Nysted and Horns Rev). He has chaired several panels of experts set up by the International Council for the Exploration of the Sea (ICES) to advise the European Union on fisheries management, including Benchmark Workshops on sandeel stock assessment and management, assessment methods for short-lived fish stocks (e.g. sprat), and the ICES Working Group on seabird ecology. He was a member of the Marine Stewardship Council certification panels for several important North Pacific fisheries, including Western Bering Sea and Gulf of Alaska walleye pollock, Canadian sablefish, Pacific halibut, and Alaskan sablefish.

Ana M. Parma is a Principal Scientist with the National Scientific and Technological Research Council of Argentina (CONICET), working at the Center for the Study of Marine Systems, the National Patagonic Center in Puerto Madryn. Argentina. She earned her Ph.D. in Fisheries Science in 1989 from the University of Washington, and worked as an assessment scientist at the International Pacific Halibut Commission until 2000, when she returned to Argentina, her home country. Dr. Parma has worked on different aspects of fisheries modelling, assessment and management of a diverse range of fisheries, from artisanal coastal fisheries targeting benthic shellfish to large-scale international fisheries targeting tunas. The main focus of her research has been on the evaluation and design of management strategies, attending to ecological and institutional dimensions, both in data-rich and in data- and capacity-limited contexts. She was awarded a PEW Fellowship in Marine Conservation and a Guggenheim Fellowship for her contributions in this field. Dr. Parma has always worked at the interface between science and management, being involved in several scientific and policy advisory boards and review panels at the national and international levels. She co-chaired a National Research Council (NRC) panel on evaluating the effectiveness of fish stock rebuilding in the United States, was a member of four other NRC committees focused on diverse aspects of stock assessments, marine protected areas and ecosystem-based fisheries management, and was a lead author of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) Assessment Report on the Sustainable Use of Wild Species. She chairs the modelling group of the Commission for the Conservation of Southern Bluefin Tuna, is a member of the Steering Committee of the bluefin tuna program at the International Commission for the Conservation of Atlantic Tunas, and until recently was a member of the Science Council and Global Board of The Nature Conservancy. She has been part of several of the international panels that regularly review South African stock assessments and management strategy evaluations, including those that advised on the design and analyses of the penguin Island Closure Experiment.

Éva Plagányi is a Senior Principal Research Scientist at CSIRO based in Brisbane, Australia since 2009, where she is also Domain leader for Climate Impacts and Adaptation. She has broad experience working on a range of natural ecosystems, mostly marine, from tropical through temperate to Antarctic systems, and focused on species ranging from plankton, sea cucumbers, crustaceans, fish to whales, with a strong focus also on climate change impacts. Her specific skills relate to using mathematics and mathematical models to model the dynamics of natural populations to support sustainable management of natural resources and contribute to conservation outcomes. Her research focuses on stock assessment modelling, ecosystem modelling and management strategy evaluation (MSE) and she has collaborated widely internationally, plus is currently a scientific member of three Australian Resource Assessment Groups: Torres Strait tropical rock lobster, Torres Strait Hand Collectable Fishery and the Northern Prawn Fishery. She has pioneered the approach she coined MICE (Models of Intermediate Complexity for Ecosystem assessments) which is being used to underpin natural resource decision-making in Australia and globally. Dr Plagányi has a joint mathematical-biological background and after completing a Masters degree in the Zoology Department of the University of Cape Town (focussed on anchovy-copepod interactions), she completed a PhD in 2004 from the Department of Mathematics and Applied Mathematics. Before relocating, she was awarded a National Research Foundation (NRF) President's Award and was a senior lecturer in the latter department, whereafter she has remained an Honorary Research Associate of the University of Cape Town. She was a member of the Lenfest Forage Fish Task force (2009-2014) which focussed on global recommendations for forage fish management. She has published over 120

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peer-reviewed papers, ca.400 technical reports, 50 popular articles, and is on the editorial board of Ecological Applications and Reviews in Fish Biology and Fisheries.

André E. Punt is a professor in the School of Aquatic and Fishery Sciences at the University of Washington, Seattle, USA and a past Director of the School. He received his B.Sc, M.Sc and Ph.D. in Applied Mathematics at the University of Cape Town, South Africa. Before joining the University of Washington, Dr Punt was a Principal Research Scientist with the CSIRO Division of Marine and Atmospheric Research in Australia. Dr. Punt has been involved in stock assessment and fisheries management for over 35 years and has been recognized for his contributions in this area with awards from the CSIRO, the University of Washington, the Australian Society for Fish Biology, and the American Fisheries Society. The research undertaken by Dr. Punt and the MPAM (Marine Population and Management) group at the University of Washington relates broadly to the development and application of fisheries stock assessment techniques, bioeconomic modelling, and the evaluation of the performance of stock assessment methods and harvest control rules using the Management Strategy Evaluation approach. Currently, projects that Dr. Punt is undertaking with his research group include ecosystem modelling, assessment and management methods for data-poor fisheries, and understanding the impact of climate change and environmental variation on the performance of assessment and management methods. Dr. Punt has conducted stock assessments for a wide range of species, ranging from anchovies and sardines, to groundfish, tunas, and cetaceans. He has published over 420 papers in the peer-reviewed literature, along with over 400 technical reports. He was a member of a National Research Council panel on evaluating the effectiveness of fish stock rebuilding in the United States and has been a member of the panel that reviews aspects of South African stock assessments and management strategy evaluations since its establishment. Dr Punt is currently a member of the Scientific and Statistical Committee of the Pacific Fishery Management Council, the advisory committee for the Center for the Advancement of Population Assessment Methodology, the Standards and Petitions Committee for the International Union for the Conservation of Nature, the Crab Plan Team of the North Pacific Fishery Management Council, and the Scientific Committee of the International Whaling Commission.

James N. Sanchirico is a professor of natural resource economics and policy in the Department of Environmental Science and Policy at the University of California at Davis. His main research interests are the economic analysis of policy design, implementation, and evaluation for marine and terrestrial species conservation, and the development of economic-ecological models for forecasting the effects of resource management policies. Before coming to UC Davis, he was a Senior Fellow at Resources for the Future (RFF) in Washington DC (non-profit think tank on environmental and natural resource policy) and is currently a University Fellow of RFF. He received the Rosenstiel Award for Oceanographic Sciences in 2012 given to researchers who have made outstanding contributions to Ocean Science, the UC Davis Distinguished Scholarly Public Service Award in 2014, and the 2023 Publication of Enduring Quality Award from the Association of Environmental and Resource Economists. He is currently co-Editor at the Journal of the Association of Environmental and Resource Economists and the Journal of Environmental and Resource Economics, member of the U.S. National Academies of Science Ocean Studies Board, chair of the U.S. National Academies Standing Committee on Offshore Wind Energy and Fisheries, and principal investigator on the NSF-funded Sustainable Oceans National Research Training program at UC Davis. Past professional service includes the Lenfest Fishery Ecosystem Task Force, a National Research Council (NRC) committee evaluating the effectiveness of stock rebuilding plans of the 2006 Fishery Conservation and Management Reauthorization, and six years on NOAA's Science Advisory Board.

Philip Trathan has an extensive publication record on the biology, ecology and management of marine ecosystems in the Southern Ocean. He has wide experience and an established track record of interdisciplinary research, commissioned research and international collaboration. Before retiring from the British Antarctic Survey in 2022, Phil had authored 286 peer-reviewed publications, giving him an academic H-index of 56. Whilst at BAS, Phil was Head of Conservation Biology, a diverse group of marine predator scientists that undertook ecological research on a wide variety of Southern Ocean seabirds and marine mammals. Key components of this research focused upon food-web interactions (e.g. foraging ecology, energetic requirements), critical constraints on life histories (e.g. environmental impacts, breeding performance), circumpolar connections (e.g. post-breeding dispersal) and anthropogenic impacts (e.g. climate change, and resource competition with fisheries). The Conservation Biology group managed BAS long-term monitoring of key marine predators in the Antarctic and Sub-Antarctic. The group provided national capability and advocacy for science into Antarctic policy arenas, including for the Commission for the Conservation of Antarctic Marine Living Resources, the International Whaling Commission, and the Agreement for the Conservation of Albatrosses and Petrels. Phil was personally involved with CCAMLR for over 30 years, providing advice on the management of the fishery for Antarctic krill, on the designation of Scientific Special Areas, on Marine Protected Areas, and on climate change. Phil was the UK's senior ecological advisor to CCAMLR for more than 16 years. Phil participated in 20 Antarctic field trips, having been involved in predator studies (primarily penguin species, but also marine mammals) for over 20 years. He is particularly interested in how marine predators utilise their available habitat and how this relates to their reproductive output and performance. He has strong links with BirdLife International and WWF (UK) and is a member of the IUCN Species Survival Commission Penguin Specialist Group. Phil was the founding Chair of the Science Advisory Group, Antarctic Wildlife Research Fund, a novel collaboration between the krill fishing industry, NGOs and scientists. Phil is now a Visiting Professor at Ocean and Earth Science, National Oceanography Centre, Southampton, he is a BAS Emeritus Fellow, and an Honorary Fellow of Bangor University. Phil was honoured with an OBE in 2018 for his contribution to Antarctic science and conservation.

APPENDIX B
EXTRACTS FROM THE TERMS OF REFERENCE

1. BACKGROUND

In the mid-2000s, a substantial decrease in the numbers of adult African Penguins was observed off western South Africa. In response to this observed decrease from 2006 and the potential impact of food competition between penguins and fishers in the vicinity of breeding islands, a study to assess the effects of closure to purse-seine fishing around penguin breeding colonies was initiated in 2008. Since the study required income sacrifice from the industry, this study, the Island Closure Experiment (ICE), comprised two parts: (i) a feasibility study (2008– 2014) during which purse-seine fishing was prohibited in an alternating pattern around two pairs of nearby colonies and data on penguins (as well as on small pelagic fish from the routine pelagic fish management process) were collected to determine whether an experiment would have adequate statistical power to detect a significant effect of closure if such existed; and (ii) an experimental phase (2015–2019) where these alternating island closures were continued with the associated continuation of the monitoring during the feasibility study. The results, however, led to a lengthy debate with dichotomous views. The plans for and results of the ICE were regularly reviewed by DFFE's Small Pelagic Scientific Working Group, informed by the advice provided from an annual review, i.e., a DFFE review meeting of world-leading quantitative marine resource scientists on ten occasions since 2006. Most recently, the scientific results have been debated in the peer-reviewed literature (Sydeman et al. 2021, Butterworth and Ross-Gillespie 2022, Sydeman et al. 2022).

A Governance Forum (GF), comprising researchers and managers from the Branches: Oceans and Coasts and Fisheries Management as well as SANParks (South African National Parks), was established in 2021. The aim was to prepare a comprehensive Synthesis Report on the current state of knowledge relating to African Penguins, island closures, fisheries management relevant to African Penguins and the socioeconomics of island closures and penguin-related tourism. The Governance Forum compiled a report titled "A Synthesis of Current Scientific Information Relating to the Decline in the African Penguin Population, the Small Pelagic Fishery and Island Closures" (DFFE 2021) which collated science over the last decade on penguins, small pelagic fisheries and their interactions including the Island Closure Experiments. The Synthesis Report was further scrutinized by two independent reviewers who provided extensive comments; the Governance Forum's Extended Task Team (which added fishing industry and conservation NGO representation to the Governance Forum) and then the Minister's Consultative Advisory Forum for Marine Living Resources (CAFMLR). Comments on that Synthesis Report and recommendations produced by these groups remain contested.

The Department now seeks to establish an international Panel of Experts to—

a) review the interpretation of the ICE
b) explore the value of island closures in providing meaningful benefits to penguins
c) review the processes and outcomes completed through the GF and the CAFMLR process
d) make recommendations on the implementation of island closures, including spatial delineation, time frames and
e) advise on further science and monitoring methods.

2. OBJECTIVES

The International Review Panel will—

a) Review the quantitative scientific analyses of the Island Closure Experiment (ICE) and subsequent publications to evaluate whether the scientific evidence from ICE indicates that limiting small pelagic fishing around colonies provides a meaningful improvement to penguin parameters that have a known scientific link to population demography in the context of the present rate of population decline. Assess the cost-benefit trade-off of 1) costs to fisheries, versus 2) the proportion of penguin foraging range protected during the breeding season, for different fisheries exclusion scenarios. The losses to the fishery should be fleshed out using available economic information, such as was used in the GF and CAF processes. The panel may also comment on the limitations of available information and methods (data collection) to improve the assessment of positive penguin outcomes as well as fishery impact. Costs to fisheries must include an assessment of replacement costs accrued during periods closed to fishing during the ICE.
b) Within the context of an urgent need to implement timeous conservation actions for the African Penguin and considering the information and rationale of the various scientific reviews and associated documents of the Island Closure Experiment evaluate the evidence supporting the benefits of fishery restrictions around African Penguin colonies to adopt precautionary measures by implementing long-term fishery restrictions.
c) If closures or fishing limitations are viewed to contribute positively to the support of the African Penguin population, recommend a trade-off mechanism as a basis for setting fishing limitations and mapping. This mechanism must consider a potential positive return to penguins and the impact on fisheries. (As a basis for discussion the Governance Forum Approach and the CAF approach can be considered.) Consideration must also be given to the current state of observations, data and analyses (Penguin, Environmental and Fisheries Economic data). Recommendations on these can be included under future science considerations.

a. Delineation of fishery no-take areas around six African Penguin colonies (Dassen Island, Robben Island, Dyer Island, Stony Point, St Croix Island and Bird Island) and the duration of the closures, considering life history traits, e.g., age when most

birds start breeding, and associated duration required to signal potential population benefits.

d) Recommendations on the scientific work that is required to evaluate the effectiveness of such no-take areas.

e) Recommendations about what scientific work is appropriate in the short term to determine the dominant causes of the rapid and concerning rate of decline of the penguin population, including recommendations about the use of ecosystem model approaches such as MICE (models of intermediate complexity for ecosystem assessments).

3. PANEL PROCESS AND PROCEDURES

a) The panel should attempt to reach a consensus but if not achieved, names supporting each of the alternative views should be noted. There should be no voting.

b) Virtual and physical meetings are not prescribed at this stage. One option is to have one or two brief virtual meetings to familiarise the panel with the key issues, followed by a week-long physical meeting in Cape Town to wrap it up. Travel expenses will be covered by DFFE. [Panel members may opt to join the weekly session virtually if travelling is not preferred.]

c) Members of the Panel of Experts will be remunerated in accordance with the Republic's Public Finance Management Act, 1999 (Act No.1 of 1999) and the associated Treasury Regulations, and in particular, according to the remunerative structure for non-official members of Commissions and Committees of Inquiry in consultation with the Minister of Finance for this panel's proposed work.

d) Meetings may include closed meetings, meetings with protagonists separately and together.

e) DFFE will appoint the Chair of the Panel and the Chair will report directly to the Minister.

f) DFFE will provide secretarial services.

4. TASKS

The following tasks are required from the panel (administrative and secretarial functions will be supported by DFFE):

a) Panel Members must agree to being available and accepting these Terms of Reference and constitute themselves as a Panel with the Chair.

b) Notification of stakeholders about deadlines for their submissions.

c) Drawing up of a list of attendees at plenary meetings where submissions are heard, indicating who are key participants and who are observers (Sectors will be asked to submit names of observers to be invited).

d) The appointed Panel Members to meet with DFFE Senior Managers to clarify their tasks and outputs.

e) Review documents and information pertaining to proposed island closures for penguin population recovery support. While these will initially be composed of an agreed selection (by local scientists and stakeholders) from the extensive number of documents produced over the last 1.5 years, panel members may request any additional documents such as scientific working group documents. Documents to be categorised into (a) those relevant to the interpretation of the ICE results, (b) documents that propose island closures including stakeholder reports submitted during the ETT and CAFMLR processes and (c) other related documents. This is required to facilitate the panel dividing its focus between

   i. an initial assessment of whether the analysis of ICE supports the view that island closures will benefit penguins, and

   ii. if (i) suggests that island closures will benefit penguins, what closures should be implemented, or what are the trade-offs involved for such closures.

f) Meet with conservation and fisheries sector scientists and where each will be allowed to present their arguments/interpretation of information. (At panel discretion, other scientists, and experts may be invited to make presentations.)

g) Respond to objectives (a) to (e) above.

h) Prepare report on outcomes.

5. OUTCOMES AND RECOMMENDATIONS

a) Recommend whether, based on the results from ICE and other evidence-based information, island closures are likely to benefit penguins.

b) Describe the scientific and evidence-based rationale for recommending implementing/not implementing fishing limitations around penguin colonies

c) Make recommendations about whether a percentage (%) of penguin foraging range and other biological criteria (such as regional representation, population recovery potential, monitoring and evaluation potential) provide a basis for determining benefits from closures for penguins and assess the merits of different proposed methods to delineate important penguin foraging habitat.

d) Make specific recommendations on trade-off mechanisms for island closures in the event that the panel finds that the results of ICE and other evidence demonstrate that island closures are likely to benefit penguins, including specific areas and durations. In addition to recommendations on trade-off mechanisms, the panel must preferably advise on biologically meaningful penguin habitat extents for fishery limitations per island, recommendations must be spatially and temporally explicit, and provided on a map. [DFFE will provide mapping capacity.]

e) Provide advice and recommendations on best estimates and uncertainties of the ratio between penguins gained and losses sustained by the industry as a result of island closures for future suggested closure options.

f) Provide advice on a well-structured analyses framework to monitor the impact of island closures, including what penguin and fish data needs to be collected; how benefits to penguins are to be determined; and how these will be analysed.

g) To recommend scientific analyses, including but not limited to MICE, to determine the reasons for the decline in the penguin population.

APPENDIX C

DEPLOYMENT OF NEST BOXES FOR AFRICAN PENGUINS

At Bird Island in the 2000s, only about 1% of African penguins bred in natural burrows in the remaining patches of guano, so the majority of nests appear to be in suboptimal nesting habitat (Lei et al., 2014). In an effort to mitigate the impacts of guano removal, artificial nest sites (nest boxes) of a variety of designs and materials have been constructed for African penguins at a number of colonies, including Marcus Island (Saldanha Bay), Halifax Island (Namibia), Dyer Island, Boulders Beach, and Robben Island (Western Cape), Stony Point (Betty's Bay), and Bird Island (Algoa Bay) (Sherley et al., 2012; Espinaze et al., 2020). These were first developed in the 1980s by Wilson and Wilson (1989) at Marcus Island and had some success in improving African penguin breeding success. Penguin nest boxes have also been used successfully to increase breeding success of little penguins in New Zealand and Australia (Perriman and Steen, 2000; Sutherland et al., 2014). Sutherland et al. (2014) concluded that 92% of nest boxes installed for more than 6 years for little penguins at Phillip Island, Australia, were occupied, and that nest boxes increased survival of eggs to hatching by 8%, increased survival of chicks to fledging by 9%, and increased fledging weights of chicks (which is likely to increase post-fledging survival) by 11%, leading to a significant local increase in breeding numbers.

At Robben Island, penguin nest boxes were installed (22 triangular plywood boxes in 2001 and a further 37 in 2005 and 10 in 2010, plus 70 fibreglass curved boxes in 2007) and the breeding success of penguins in nest boxes and in other nest sites was monitored each year (Sherley et al. 2012). There was no difference in hatching or fledging success between wooden and fibre-glass nest boxes. Relative to pairs in nests under vegetation, birds nesting in the open had significantly lower egg survival during incubation, but egg survival was no different between birds under vegetation and birds in nest boxes. However, the chicks of birds occupying nest boxes and nests in abandoned buildings had higher survival than chicks in nests under vegetation, with about 10% more chicks fledging per egg laid from nests in nest boxes (Sherley et al., 2012). Chick survival was also higher in nest boxes than in surface nests and nests under shrubs during the chick-guarding stage on Halifax Island (Sherley et al., 2012). Sherley et al. (2012) concluded that "provision of artificial nests can improve breeding productivity for penguins nesting in temperate climes and could help stem the decline of the African penguin".

At Bird Island, some nest box designs provide protection from predators but trap heat and have adverse effects on penguin breeding success (Welman and Pichegru, 2023) and in some cases have now been removed and replaced with new designs intended to perform better. A double-layered ceramic nest chamber installed at Bird Island since 2018 appears to perform better than exposed surface nests, cement nest boxes, or natural nests, by overheating less and by maintaining higher humidity (Welman and Pichegru, 2023). However, penguin breeding success has not yet been compared between ceramic nests and other nests, so the gain in breeding output from such nests is uncertain.

At Stony Point, African penguin adults and chicks were on average heavier in artificial nest boxes than in open nests but for the sample nesting in nest boxes were less heavy in nest boxes with highest soil temperature (Espinaze et al., 2020). There is evidence that ectoparasite abundance can be higher in penguin nest boxes that are warmer and drier than other penguin nests (Espinaze et al., 2020). Fibreglass and cement-fibre nest boxes established at Stony Point in the 2010s had higher soil temperatures and lower relative humidity than did penguin nests under bushes, and held larger numbers of ticks and fleas (Espinaze et al. 2020) and so design of penguin nest boxes needs to consider not only the breeding success achieved by penguins in boxes compared to those in other nest types, but also how penguins might be affected by ectoparasites and stress in boxes that tend to overheat and dry out. Espinaze et al. (2020) suggest that glassfibre, concrete, and other non-porous material nest boxes for African penguins should be re-evaluated and that it may be better to construct nest boxes from much more porous material and with better ventilation designed into the structure.

Triangular nest boxes, Robben Island (photo BM Dyer)

Ceramic nest boxes, Boulders (photo BM Dyer)

APPENDIX D

TECHNICAL SPECIFICATIONS OF MODELS USED TO ANALYSE THE ICE DATA

1. Mixed-effect models used to estimate fishing impacts on penguin reproductive success

Two main classes of mixed-effect models were used, referred to as closure-based and catch-based. Technical specifications are provided below:

1.1 Closure-based models:

The model equation for the closure-based estimator applied to the aggregated data was:

$$f(F_{y,i}) = \propto_0 + \propto_1 I_i + \propto_2 X_{i,y} + \propto_3 I_i X_{i,y} + Y_y + \varepsilon_{i,y} \quad (1)$$

where $F_{y,i}$ is the average response variable for year y and island i, possibly log-transformed depending on the data source, i = 1,2 is the Island, y = 2008,...,2019 is the Year, $X_{i,y}$ is a binary for the treatment (open = 0, closed = 1) applied at island i during year y, I_i is a binary for the colony (Dassen = 0, Robben = 1 or Bird = 0, St Croix = 1), $\propto_0$, $\propto_1$, $\propto_2$, $\propto_3$ are fixed effects ($\propto_1$ is an island effect, $\propto_2$ is a fishing effect applied when the area around the colony is open, and $\propto_3$ is the treatment × Island interaction), Y_y is a year random effect, and $\varepsilon_{i,y}$ is the residual error.

Details about how the various response variables were pre-processed are provided in Ross-Gillespie and Butterworth (2021a) and Butterworth and Ross-Gillespie (2022).

Models applied to disaggregated data included the same fixed effects, but the random effects varied depending on the response variable.

For chick condition, the random structure requested by the Panel included a Year effect plus Month nested within Year, plus the Island nested within Month and Year.

$$y_{i,y,k,l} = \beta_0 + \beta_1 x_{i,y} + \beta_2 z_l + \beta_3 X_{i,y} z_l + b_y + b_{y,k} + b_{y,k,i} + \varepsilon_{y,k,i,l}$$

where $y_{i,y,k,l}$ is the condition of individual chick l in year y, island i and month k, i = 1,2 is the Island, y = 2008,..., 2019 is the Year, k = 1,...,K is the Month, $X_{i,y}$ is a binary for the closure treatment (open = 0, closed = 1) applied at island i during year y, z_l is a binary for the colony (Dassen = 0, Robben = 1) chick l belongs to, β_0, β_1, β_2, β_3 are fixed effects and b_y, $b_{y,k}$, $b_{y,k,i}$ are random effects, b_y ~Normal(0, σ_1^2), $b_{y,k}$ ~Normal(0, σ_2^2), $b_{y,k,i}$ ~Normal(0, σ_3^2), and $\varepsilon_{y,k,i,l}$ ~Normal(0, σ_ε^2) is the residual error.

In R lmer syntax:

Condition ~ Island/Closure+(1|Year)+(1|Year:Month) +(1|Year:Month:Island)

The significance of the Island × Closure interaction was evaluated by comparing the full model with one where β_3 = 0 using maximum likelihood (Sherley, 2023).

For chick survival, equation 2 in Shirley (2023) gives the mean hazard function as:

$$\Lambda_{y,i,n,l} = \beta_0 + \beta_1 x_y + \beta_2 z_i + \beta_3 x_y z_i + \omega_y + \omega_{y,i} + \omega_{y,i,n}$$

where n is nest ID, β_0, β_1, β_2, β_3 are fixed effect parameters, and ω_y ~Normal(0, σ_1^2), $\omega_{y,i}$ ~Normal(0, σ_2^2) and $\omega_{y,i,n}$ ~Normal(0, σ_3^2) are random effects for Year, Year × Island and Year × Island × NestID, respectively.

1.2 Catch-based models:

The model equation for the catch-based estimator applied to the aggregated data was:

$$f(F_{y,i}) = \beta_0 + \beta_1 I_i + \beta_2 C_{i,y} + \beta_3 I_i C_{i,y} + Y_y + \varepsilon_{i,y} \quad (2)$$

where $C_{i,y}$ is the catch (of anchovy and/or sardine) taken within the 20-km area around island i during year y and other variables are as defined for equation (1). Parameters β_0, β_1, β_2, β_3 are fixed effects, the last corresponding to the Catch × Island interaction. A simpler model with a common catch effect for the two paired islands (β_3 = 0) was suggested for the east colonies given the observed negligible catches around Bird Island except during the early years. For such a model, catches need to be either in absolute values (as in equation (2)), or normalised using a common average catch for the island pair.

Once the parameters are estimated, the effect of fishing around colony i on the response variable (to be translated into the effect of keeping island i open on the island's penguin population growth rate) is predicted using:

$$\Delta y_i = \beta_1 \bar{C}_i + \beta_3 I_i \bar{C}_i \quad (3)$$

where $\bar{C}_i$ is the average catch taken around island i during years when fishing around that island was allowed. Using as predictor the average catch over open years would afford consistency with the closure-based estimator.

The formulation above differs from the catch-based estimators used in the past (e.g., Ross-Gillespie and Butterworth, 2016b) where catches used as covariates were normalised with respect to the average catch taken within each island closure during the years when the island was open.

The effect predicted from equation (3) would be equivalent to the λ_i effect estimated in those previous catch-based analyses that used normalised catches only when a catch × Island interaction is included (i.e., $\beta_3 \neq 0$).

2. Subset of models selected to provide final estimates of fishing impacts on penguin population growth rate

Figures 2.2 and 2.3 show results for a subset of the models presented by Sherley (2023) and Ross-Gillespie and Butterworth (2023b). Tables D.1 and D2 provide a summary of the characteristics of those selected models. Further details about the data preprocessing and the estimation procedures are described in Sherley (2023) and Ross-Gillespie and Butterworth (2023b).

Table D.1: Details of the models applied to the ICE data from Dassen and Robben islands whose results are reported in Figure 2.2.

Model	Response variable	Data aggregation	Fixed effects	Random effects	Reference
W1	Chick condition	Disaggregated	Island+Closure	Year + Year:Month + Year:Month:Island	M6 in Sherley (2023)
W2	Chick condition	Disaggregated	Island×Closure	Year + Year:Month + Year:Month:Island	M5.1 in Sherley (2023)
W3	Chick condition	Aggregated	Island×Closure	Year	S1 in Ross-Gillespie & Butterworth (2023b)
W4	Chick survival	Disaggregated	Island+Closure	Year + Year:Island + Year:Island:Nest	M9 in Sherley (2023)
W5	Chick survival	Disaggregated	Island×Closure	Year + Year:Island + Year:Island:Nest	M8 in Sherley (2023)
W6	Chick survival	Aggregated	Island×Closure	Year	S1 in Ross-Gillespie & Butterworth (2023b)
W7	Fledging success	Aggregated	Island×Closure	Year	S1 in Ross-Gillespie & Butterworth (2023b)
W8	Chick growth	Aggregated	Island×Closure	Year	S1 in Ross-Gillespie & Butterworth (2023b)
W9	Maximum distance	Aggregated foraging	Island×Closure	Year	S1 in Ross-Gillespie & Butterworth (2023b)
W10	Path length	Aggregated	Island×Closure	Year	S1 in Ross-Gillespie & Butterworth (2023b)
W11	Trip duration	Aggregated	Island×Closure	Year	S1 in Ross-Gillespie & Butterworth (2023b)

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Table D.2: Details of the models applied to the ICE data from St Croix and Bird islands whose results are reported in Figure 2.3.

Model	Response variable	Data aggregation	Fixed effects	Random effects	Reference
E1	Chick condition	Disaggregated	Closure	Year + Year:Month + Year:Month:Island	M7E in Sherley (2023)
E2	Chick condition	Disaggregated	Island + Closure	Year + Year:Month + Year:Month:Island	M6E in Sherley (2023)
E3	Chick condition	Aggregated	Island × Closure	Year	S1 in Ross-Gillespie & Butterworth (2023b)
E9	Maximum foraging distance	Aggregated	Island × Closure	Year	S1 in Ross-Gillespie & Butterworth (2023b)
E10	Path length	Aggregated	Island × Closure	Year	S1 in Ross-Gillespie & Butterworth (2023b)
E11	Trip duration	Aggregated	Island × Closure	Year	S1 in Ross-Gillespie & Butterworth (2023b)

Penguin nest, Dassen Island (photo BM Dyer)

APPENDIX E

ADDITIONAL DETAILS ON THE OBM AND WHY ITS RESULTS ARE LIKELY OVERESTIMATES

The Panel concluded that the OBM likely overestimates the effects of closures on lost catches given the algorithms used to decide whether a catch in a proposed closure area can be replaced or not. The Panel was less concerned with the method used to replace a catch when it is replaceable (and endorsed the "random" approach).

For each set made in a closure area when the area was open the algorithm involves searching the areas within which it can replace the "lost set". If there were no sets outside the closure area made on the same day (and in the area considered to be where a replacement set can occur) the set is considered to be irreplaceable. An example of this case is given in Figure E.1. Note that the catches off Dassen Island in Figure E.1 might not be considered irreplaceable if a longer window of time was available (see, e.g., the discussion on the development of expected catches in the RUM subsection in Section 3), and sensitivity is shown in some OBM analyses to a 2-day window rather than only allowing sets on the same day to replace sets in a closure area. A second cause of irreplaceable catches arises when considering how to match the outside sets with the inside sets (with or without replacement). Specifically, even when there are sets outside of the closed area that could be matched with an inside set, it is possible that the inside set is irreplaceable because there is a limit (base case 5) on how often a set outside a closure can replace a set inside a closure area. An example of this case is given in Figure E.2.

The effects in Figures E.1 and E.2 would not be a concern if the proportion of the catch lost due to the set being irreplaceable (i.e., "irreplaceable catch") was small relative to the catch lost due to catch rates being lower in the alternative sets (i.e., "opportunity loss"), but this is not the case, particularly when the closure area is large (e.g., closures based on mIBA (7 km)). Figure E.3 and Table E.1 illustrate this for a selected set of OBM scenarios and closure proposals. Results correspond to estimated catch losses for anchovy and for directed sardine, summed over the six islands included in the analysis. Several features of the results in Table E.1 are pertinent to note:

- The catch in the closure area ("inside catch") varies substantially among the closure options (largest for mIBA (7 km) and least for "industry").
- The catch that is lost due to being unreplaceable ranges from 8.7% to 91.8% of the total lost catch among OBM scenarios and the closure size, and is larger than 50% for some of the closure options (mIBA (7km), mIBA (ARS), and DFFE).
- There is considerable sensitivity of the unreplaceable catch (particularly for the larger closure areas) depending on whether a set can be reused as many times as needed, 10 times. 5 times or only once.
- The irreplaceability percentage is lower when catches on one day can be replaced by catches on the next day (scenario "Plus1day" in Figure E.3), but the effect is smaller than the effect of the reuse value.

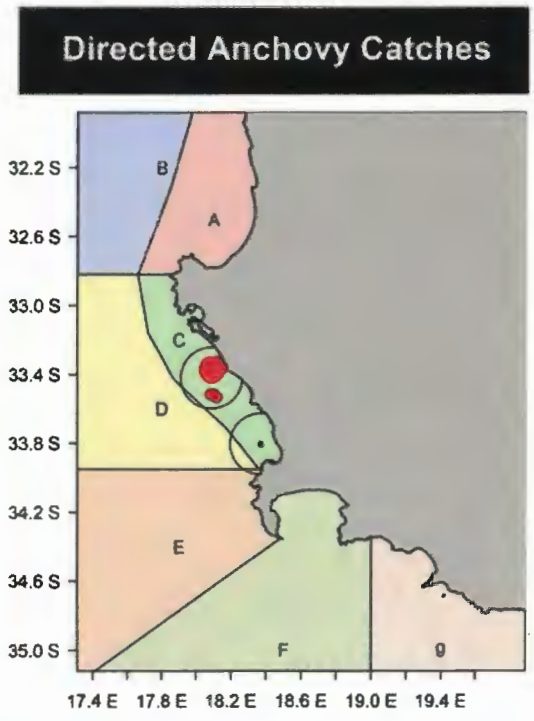

Figure E.1: A (hypothetical) example of catches off Dassen Island on a given day that would be "lost" owing to there being no sets outside the closure on that day.

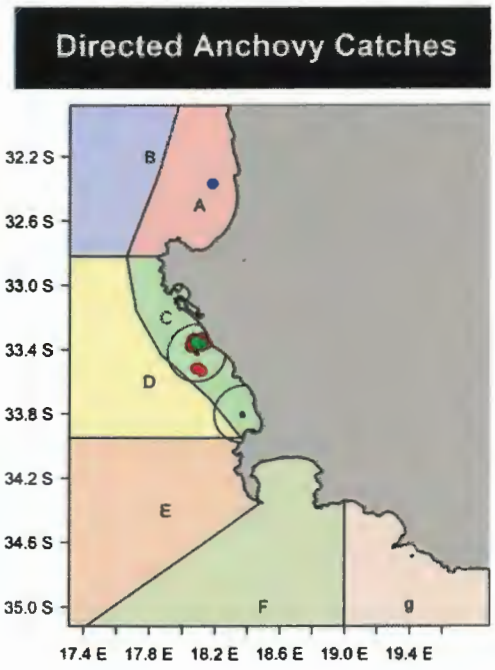

Figure E.2: A (hypothetical) example of catches off Dassen Island on a given day, some of which would be "lost" owing to there being sets outside the closure on that day, but the value of the "reuse" parameter does not allow all of the catches in the closure area to be replaced.

Table E.1: Example results from the OBM. Results are shown for several closure options and several ways to apply the OBM. Blank cells indicate the results concerned are not available.

ANCHOVY	Inside Catch				
Total catch	**MIBA (7 km)**	**MIBA (ARS)**	**DFFE**	**CAF**	**Industry**
206 695	65 081.3	44 061.3	20 444.6	12 941.0	2 312.7

	Irreplaceable Catch					Opportunity Loss					Irreplaceability %				
Model	**MIBA (7 km)**	**MIBA) (ARS)**	**DFFE**	**CAF**	**Industry**	**MIBA (7 km)**	**MIBA (ARS)**	**DFFE**	**CAF**	**Industry**	**MIBA (7 km)**	**MIBA (ARS)**	**DFFE**	**CAF**	**Industry**
BC(Random)	40 354.7		4 650.9	555.0	30.0	3 427.7		378.9	576.2	200.2	67.3%		24.6%	8.7%	10.0%
BC(median)	40 694.9	14 330.4	4 703.9			3 820.6	4 427.9	1 723.3			68.4%	42.6%	31.4%		
BC(median) Reuse = Inf	28 697.9	8 477.5	2 744.1	304.8	30.0	5 465.7	5 969.4	1 486.1	1 849.3	209.6	52.5%	32.8%	20.7%	16.6%	10.4%
BC(median) Reuse=1	52 683.6	25 699.3				1 911.6	2 064.4				83.9%	63.0%			
BC(median) Reuse = 10	36 349.9		3 648.2			3 889.8		1 900.0			61.8%		27.1%		
BC(median) + Next day	37 081.3		4 068.5			3 252.0		2 099.0			62.0%		30.2%		

SARDINE	Inside Catch				
Total catch	**MIBA (7 km)**	**MIBA (ARS)**	**DFFE**	**CAF**	**Industry**
61 985	33 413.5	17 554.1	7 539.0	2 058.7	436.5

	Irreplaceable Catch					Opportunity Loss					Irreplaceability %				
Model	**MIBA (7 km)**	**MIBA (ARS)**	**DFFE**	**CAF**	**Industry**	**MIBA (7 km)**	**MIBA (ARS)**	**DFFE**	**CAF**	**Industry**	**MIBA (7 km)**	**MIBA (ARS)**	**DFFE**	**CAF**	**Industry**
BC(Random)	26 989.1		3 002.6	463.4	436.5	950.5		493.8	223.5	13.6	83.6%		46.4%	33.4%	41.9%
BC(median)	27 013.1	6 837.6	3 085.4			1 234.9	1 074.1	733.0			84.5%	45.1%	50.6%		
BC(median) Reuse = Inf	25 122.8	5 832.4	2 645.7	463.4	436.5	1 730.0	1 462.2	808.7	319.1	42.1	80.4%	41.6%	45.8%	38.0%	48.5%
BC(median) Reuse=1	30 313.2	11 385.7				375.8	270.8				91.8%	66.4%			
BC(median) Reuse = 10	25 796.6		2 824.6			1 583.7		810.7			81.9%		48.2%		
BC(median) + Next day	25 796.6		2 343.4			1 529.4		942.1			81.9%		43.6%		

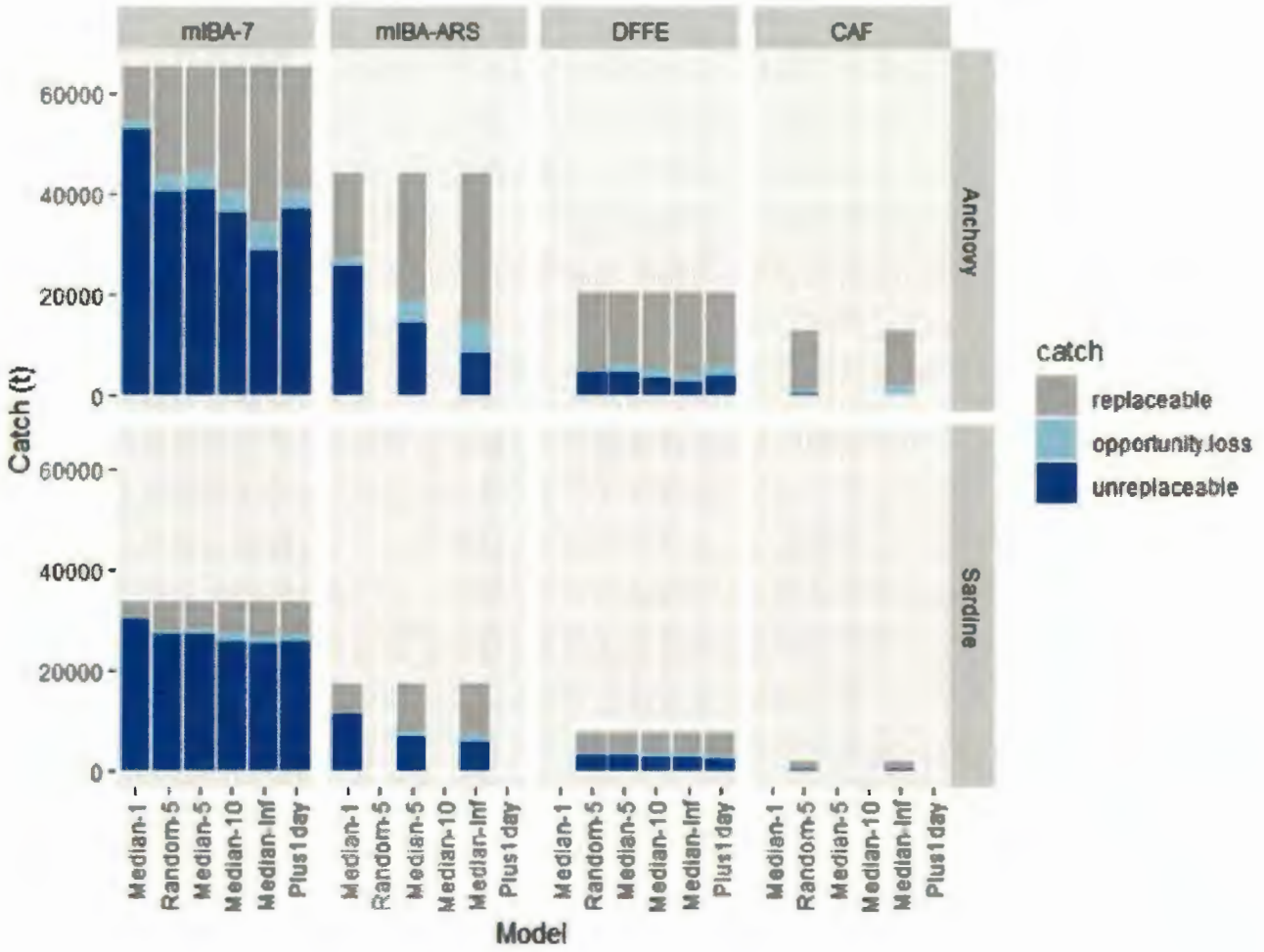

Figure E.3: Catch losses for anchovy and directed sardine estimated by the OBM for four closure proposals (mIBA (h = 7 km), mIBA-ARS, DFFE and CAF) using five model assumptions, four based on the median selection of alternative opportunities and one based on random selection, for Reuse = 1, 5, 10 and Inf (sampling with replacement) specifying the maximum number of times each alternative opportunity can be used as a replacement; the label "Plus1day" refers to the OBM scenario where a 2-day window is used instead of the same day to define the set of alternative fishing opportunities. The height of each stacked bar corresponds to the total annual catch taken inside each closure proposal ("inside catch" in Table E.1), a fraction of which (blue) is estimated to be unreplaceable, a small fraction (light blue) is lost due to lower average catch rates of the replacement sets, and the rest is replaceable (grey). Missing bars indicate the results concerned are not available.

APPENDIX F

OUTLINE OF MICE AND THEIR USE TO ASSESS DRIVERS OF THE DECLINE OF AFRICAN PENGUINS

F.1. Introduction

MICE (Models of Intermediate Complexity for Ecosystem assessments) are recognised as an appropriate tool to address complex science and management issues such as assessing the status of both fisheries and other non-targeted species, including those of high conservation concern, and evaluating the trade-offs among management plans aimed at addressing conflicting objectives (e.g., Tulloch et al., 2019; Goethel et al., 2022). MICE draw on the rigorous quantitative and statistical methodology of stock assessment approaches and extend this to representation of multiple co-existing species and stressors in an ecosystem. MICE have a tactical focus, are context- and question-driven and limit complexity by restricting the focus to those components of the ecosystem needed to address the main effects of the management question under consideration (Plagányi et al., 2014). Stakeholder participation and dialogue is an integral part of this process. MICE estimate parameters by fitting to data, use statistical diagnostic tools to evaluate model performance and account for a broad range of uncertainties. MICE aim to be based on the most appropriate balance between variance and complexity (Collie et al., 2014). These models therefore address many of the impediments to greater use of ecosystem models in strategic and particularly tactical decision-making for marine resource management and conservation.

F.2. A possible structure of an African penguin-centric MICE

The MICE should ideally include a regional sub-structure (i.e., separate western, eastern and southern regions) and be designed based on the data availability and being cognisant that a penguin-centric rather than fishery-centric approach is needed. If focused on a single region, based on data availability, the western region would be an ideal starting point with explicit representation of Dassen and Robben islands. Including paired islands would allow assumptions that some parameters are constant across islands thereby reducing confounding estimation of island-specific effects. Having smaller scale islands embedded in a larger scale model may also be helpful in analysing regional versus local impacts of changes in penguin prey availability, as well as the ability to explicitly model penguin inter-island movements. The key species that will need to be represented in the model include African penguins (age-structure formulation is needed – see Robinson et al. [2015] as an example), sardine, anchovy and Cape fur seals. Other species may be considered based on pre-agreed conceptual models describing plausible hypotheses as to their role as a competitor or predator. In general, it is recommended that MICE and similar ecosystem models be developed in a step-wise manner (Figure F.1) to ensure they remain tractable and only incorporate as much complexity as is needed to explain the available data.

Key processes to be investigated should similarly first be clearly identified via hypotheses and/or conceptual models of the system functioning. Using a structured, stepwise approach enables objective evaluation of the extent to which alternative hypotheses are consistent with, and able to explain, the available data. The model should be fitted to all available data to allow for consistency in assumptions whilst accounting for the uncertainty associated with different data sources and propagating this to the final outputs, as per accepted methods used in integrated analysis (Maunder and Punt, 2013).

In some cases, based on the overall system conceptual model, it may be helpful to develop complementary mechanistic models for more in-depth exploration of system functioning. The outputs of such a model can then be used to inform the functional relationships between different components in a MICE, with the latter being the integrated framework used to evaluate the plausibility of the interaction. For example, a bioenergetic model could be used to investigate how fishing around islands affects penguin foraging behaviour (including cooperative foraging in small groups), performance and travel distance (and hence net energetic budget) when compared with an equivalent no-fishing scenario, taking into account data such as foraging tracks, dive location, etc.

Additional modelling suggestions:

- Ultimately any model will only be as good as the underlying assumptions and the data available to inform them. The ICE has resulted in some very useful data, which needs to be integrated with data on penguin relative abundance as well as tagging and other data sources to inform on survival. Ideally a MICE should be constructed in an iterative fashion so that it is regularly updated with new data and information as these become available.
- A one-way interaction only between penguins and their prey needs to be assumed (i.e., penguin foraging will be assumed to have a negligible effect on their prey)
- As demonstrated in a number of existing MICE (e.g., Plagányi and Butterworth, 2012; Tulloch et al., 2019), it is not always essential to explicitly model the consumption of prey – rather the net effect of relative changes in available prey biomass can be tested as influencing breeding success and/or survival of different penguin stages.
- The relative abundance and energetic content of sardines and anchovy during different times of the year could be evaluated in relation to the peak timing of breeding and moulting of African penguins, as well as when fishing takes place. An annual time time-step may not provide sufficient resolution and it will likely be necessary to use a seasonal or monthly time time-step in the model, together with the role of environmental drivers, discussed below.

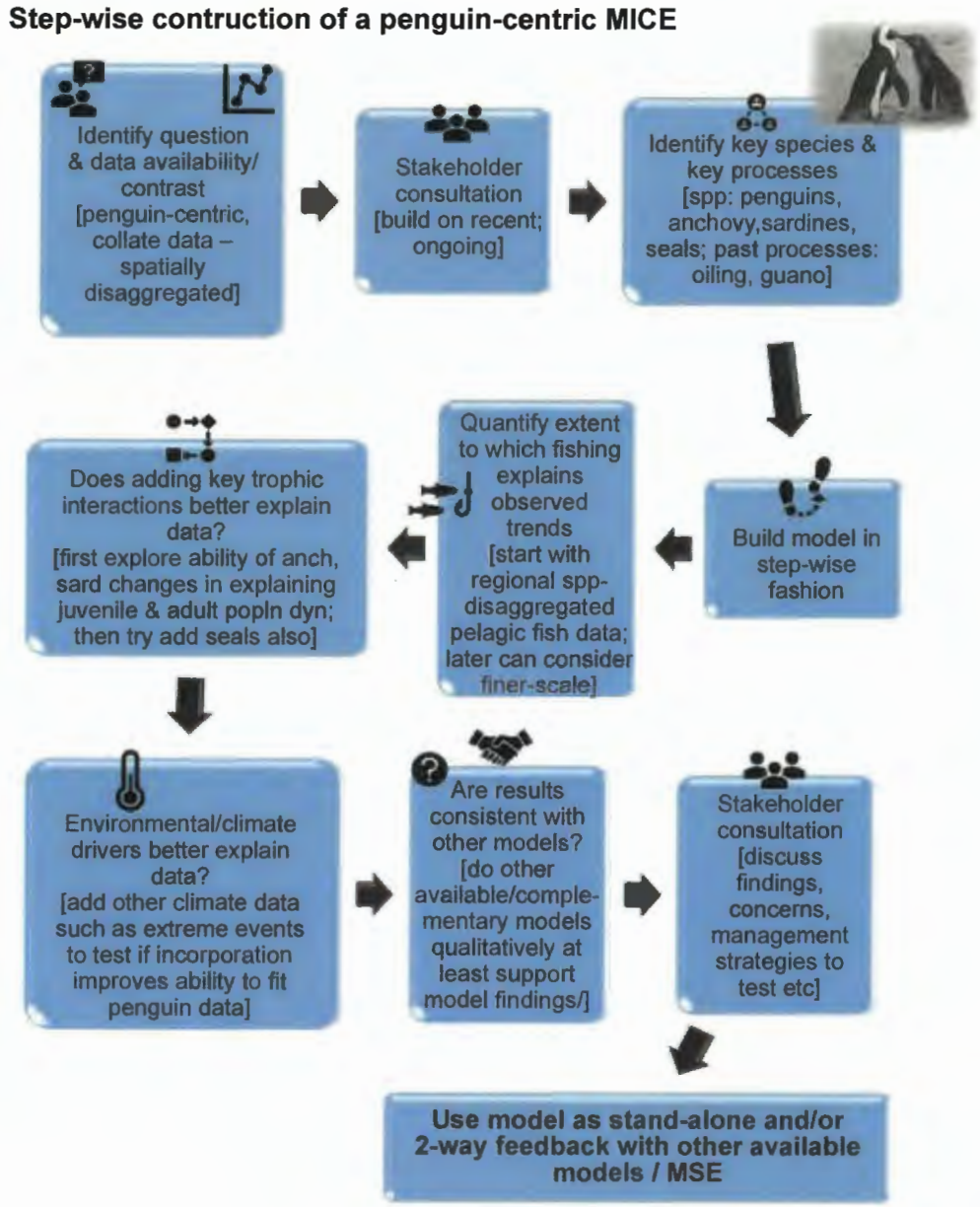

Figure F.1: Schematic summary of step-wise approach to building a MICE, modified from Plaganyi et al. (2022) with illustrative notes shown in square brackets

- Depending on the MICE structure, it would be helpful to distinguish between total regional prey abundance and local abundance (such as that which would theoretically be available within a mIBA(ARS) area), to evaluate match-mismatches between penguin foraging and prey availability, and how fishing might influence this. If there are insufficient data to fully inform explicit spatial modelling, a proxy such as an availability term (parameterised based on what is known) could be used instead (e.g., Tulloch et al., 2019), or a higher variance of prey availability could be used to model situations where foraging is more restricted (see, for example, Koehn et al., 2021).
- Using a fully integrated model and explicitly representing age and stage (e.g., breeding) structure will be important when trying to partition sources of mortality because these operate on different ages, stages and time time-periods, and hence attributing declines to a particular factor needs to involve demonstrating that the data are consistent with the proposed mechanism. Having two or more colonies explicitly represented will further assist with separating confounded sources of mortality and growth.
- A variety of approaches could be used to incorporate measures of foraging behaviour (maximum distance, path length and trip duration) and translate these into population growth in an integrated MICE, although this will likely be a secondary effect that is investigated/sequentially added after first incorporating more direct measures of prey abundance influencing vital rates. There are few studies where

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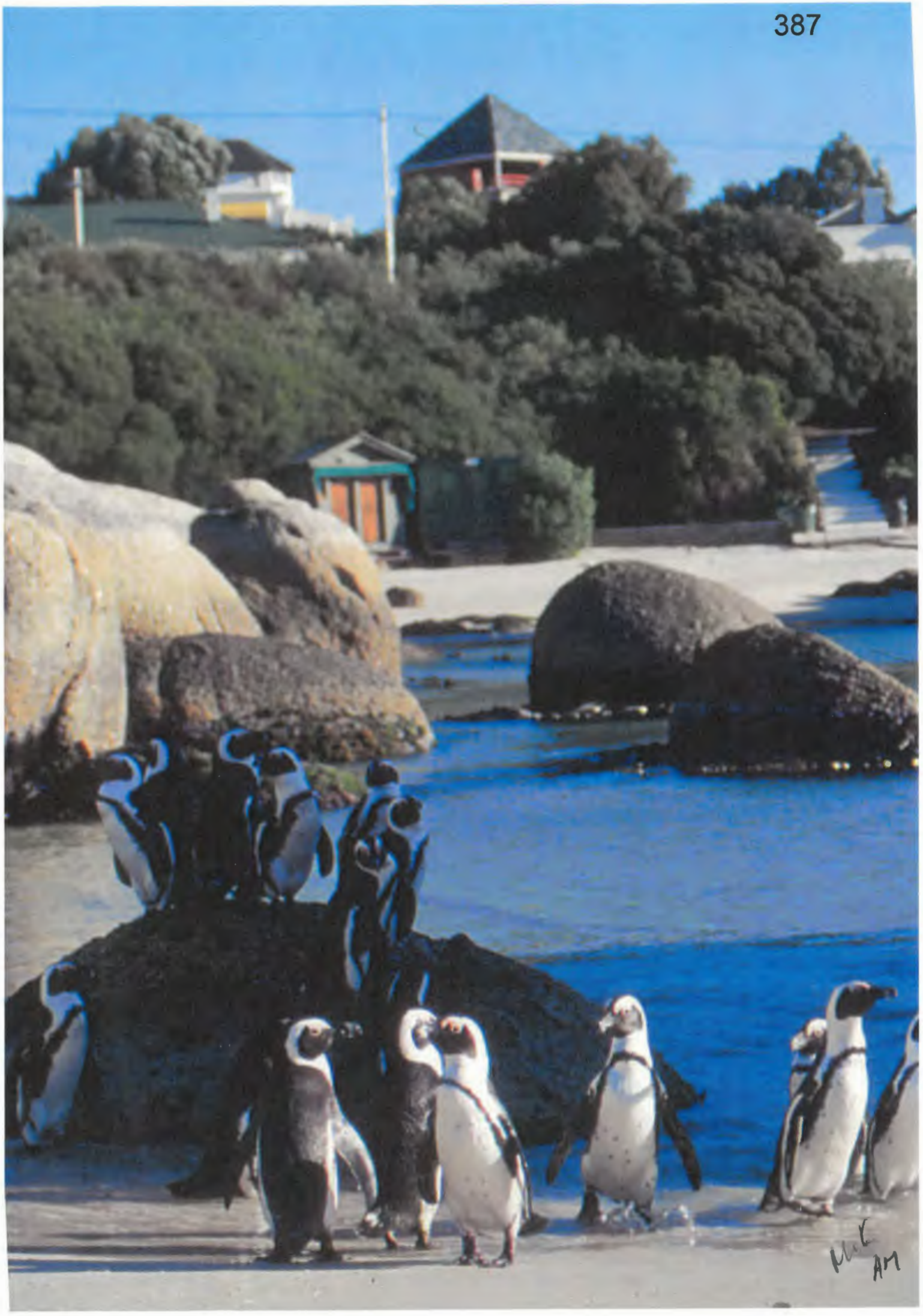
this has been done – for example, Sydeman et al. (2017) note that Robinson et al. (2015) provides one of the few models linking adult survival and prey availability. However, more recently, Koehn et al. (2021) developed a structured seabird model to test the impact of fishing forage fish prey on seabirds and they incorporated both seabird life history and seabird–forage-fish dynamics. Similar to Robinson et al. (2015), they found seabird sensitivity to fishing was mainly dependent on the relationship between adult survival and prey availability, rather than between reproductive success and prey availability. They used a simple equation with two alternative parameter settings to model scenarios of wide vs. limited foraging ranges during the breeding season. A literature search may yield further helpful studies – for example, Houston et al. (1996) developed a model to show the relationship between foraging distance and the maximum size of a chick, which could translate into differences in chick survival; Plagányi et al. (2000) modelled how temporal and spatial match/mismatches between anchovy and their copepod prey could influence anchovy growth rates – conceptually this is similar to how a more detailed penguin foraging model could be used to quantify implications for adult and juvenile energetic budgets and hence growth and survival, with the final relationships (i.e. not the entire sub-model) used as an input to a MICE.

- It may not be necessary to include a detailed representation of Cape fur seal population dynamics to explore the potential role of Cape fur seal predation and competition contributing to the past and current decline in penguin numbers. Rather, it is important to include available data on trends in abundance, especially at the regional scale, relative rates of growth of seal populations (and possibly other predators), diet data and other data to substantiate the intensity and types of competition posited.
- A variety of methods such as described in the literature (see, for example, Haltuch and Punt, 2011; Holsman et al., 2016; Adadi et al., 2017; Hollowed et al., 2020) and used in previous MICE (e.g., Tulloch et al., 2019; Plaganyi et al., 2021; Rogers and Plaganyi, 2022), are available for investigating the role of environmental drivers such as temperature (and extreme events in particular) as well as climate change.
- Once the MICE is adequately validated, it should be a useful tool for testing and quantifying the relative efficacy of alternative penguin conservation measures. Hence the suggested approach is to first develop and fit to data a MICE that includes trophic interactions and key environmental drivers. This will hopefully provide a rigorous framework for quantifying the relative roles of (cumulative) factors causing the decline. The fitted model could then be used to evaluate and compare the likely conservation benefits of a range of mitigation measures such as rehabilitation of adults, predator control, extreme weather risk mitigation and so forth.
- The MICE could also be used as an operating model in a MSE framework (see also Siple et al., 2021), noting that, if coupled with the current small pelagic Operational Management Procedure, consideration needs to be given to aligning in some way the spatial scales that are relevant for the fishery versus the smaller scales that are likely relevant for penguins. Nonetheless, as a first step, the current OMP could usefully be coupled with a penguin population dynamics model to update previous analyses given that sardine biomass is now at much lower levels than was the case during previous testing.

Penguin in full song (photo BM Dyer)

Photo credit: Dr. Éva Plagányi-L



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SCIENCE BASED MEASURES ARE NOW BEING IMPLEMENTED TO PROTECT THE CRITICALLY ENDANGERED AFRICAN PENGUINS, SAYS MINISTER OF FORESTRY FISHERIES AND ENVIRONMENT, MS BARBARA CREECY

MEDIA STATEMENT

4 AUGUST 2023

The African penguin is critically endangered. If this situation is not addressed, with current rates of population decline, science tells us these iconic creatures could be functionally extinct by 2035.

Competition for food is thought to be one among a set of pressures that are contributing to the decline of the African Penguin population. Other pressures include ship traffic together with their associated noise and vibrations, pollution and degradation of suitable nesting habitats.

The species, which is endemic to South Africa and Namibia, has decreased from more than a million breeding pairs to just about 10 000 pairs over the last century.

Today, following the report of the Export Review Panel I have taken a decision to implement fishing limitations in the waters around penguin colonies for a minimum of 10 years, with a review after 6 years of implementation and data collection.

Fishing limitations are established for the following penguin colonies: Dassen Island, Robben Island, Stony Point, Dyer Island, St. Croix Island and Bird Island. The transition to implementing fishing limitations will continue with the current interim closures, while both the fishing industry and the conservation sector study the Panel's Report.

If there is agreement on fishing limitations over the next few weeks or months across these sectors, these will be implemented as they are agreed upon. If no alternate fishing limitation proposals are concluded by the start of the 2024 Small Pelagic Fishing Season (January 15th, 2024) the current interim fishing limitations will continue until the end of the 2033 Fishing Season, with a review in 2030 after six years of implementation from the start of the 2024 fishing season.

Today marks the end of the complex and lengthy process of stakeholder consultations in the quest to find science-based measures to protect the critically endangered African penguin from extinction.

In December 2022, I appointed an Expert Review Panel, under Section 3A of the National Environmental Management Act, to assess the science related to managing the interactions between the small pelagic (anchovy and sardines) fishery and the conservation of African penguins.

The Panel is Chaired by Professor Andre Punt (USA), with members Dr Ana Parma (Argentina), Dr Eva Plaganyi (Australia), Professor Philip Trathan (UK), Professor Robert Furness (UK) and Professor James Sanchirico (USA). The Panel members all have several decades experience in science to policy matters in the marine ecosystems, with a combined science publication list of several hundreds.

The establishment of the Panel aimed to assess the appropriateness and value of fishing limitations for penguin success. These are key discussions as the sardine stock in South African waters continue to be at relatively low levels.

This included science outcomes and insights achieved during of the Island Closure Experiment undertaken by the Department over the preceding decade. This experiment aimed at understanding what, if any, benefits are derived from limiting fishing adjacent to penguin colonies.

The Terms of Reference for the science review and the panel members were established in consultation with the representatives from the fishing industry and bird conservation sectors.

While the Expert Review Panel undertook their work, the Department, in September 2022 declared some areas around the major penguin colonies closed to commercial fishing for anchovy and sardine. Although not representative on a consensus agreement, these fishing restrictions were established after much collaboration and negotiation with the seabird conservation groups and the small pelagic fishing industry representatives.

A stand-out feature of the process to achieve a decision on fishing limitations, over the last two years, has been the level of engagement from the conservation and fishing industry sectors.

I want to thank you for your cooperation and assistance in this process. I do know that some of you are already in discussions on reaching compromises and agreements and I ask that you continue to find each other on this. The Department and myself will be keen to implement any consensus you may reach – as first prize. The DDGs Fisheries and Oceans & Coasts will assist if you require some planned meeting time and space.

To continue the engagement, I have asked officials from the Fisheries and Oceans & Coasts Branches to report to you at least annually on the implementation of these closures, the expanded science plan and also progress on other non-fishery interventions in the Penguin Management Plan. Fishing limitations alone will not be sufficient to help the penguins recover.

In conclusion, I want to thank the Panel, Professors Punt, Furness, Trathan, Sanchirico and Drs Parma and Plaganyi. I appreciate that you reviewed more than 200 documents and that you undertook new analyses as well.

I believe that the Report and my policy decisions here start a new cycle of refinement and assessment for both fisheries and penguin management. It is a material step in implementing our ambition on an ecosystems approach to sustainable ocean management and dynamic marine spatial planning.

Link to the report: **https://bit.ly/3KpduCk**

For media enquiries, contact Peter Mbelengwa on 082 611 8197

ISSUED BY THE DEPARTMENT OF FORESTRY, FISHERIES AND THE ENVIRONMENT

Note to Editors:

Fishing limitations around breeding colonies only addresses one aspect to combat the high rate of penguin decline and it is no miracle intervention. It must be seen as contributing its share to the other interventions in the penguin management plan such as better managing land predators, habitat conservation and mitigating disease and pollution.

The limitation of small pelagic fishing adjacent to penguin colonies will be used by the Department as an intervention in the conservation and management of the African Penguin. It is acknowledged that small pelagic fishery limitations do have a benefit to penguins and that these benefits are small relative to the observed decreases in the penguin populations over recent decades. It is our hope that this intervention will lend its support to the other parallel interventions to give the penguins a better chance.

Other measures in the Penguin Management Plan include control of predation (domestic animals, feral cats, Kelp Gulls and seals), rehabilitating oiled birds, population reinforcement (removing abandoned eggs, chicks and emaciated adults for rehabilitation and return), piloting artificial nests, habitat restoration and implementing biosecurity measures to limit the spread of avian flu. Additionally, we are currently undertaking a risk assessment for oil bunkering activities in Algoa Bay. All these are undertaken by the DFFE and also with conservation partners.

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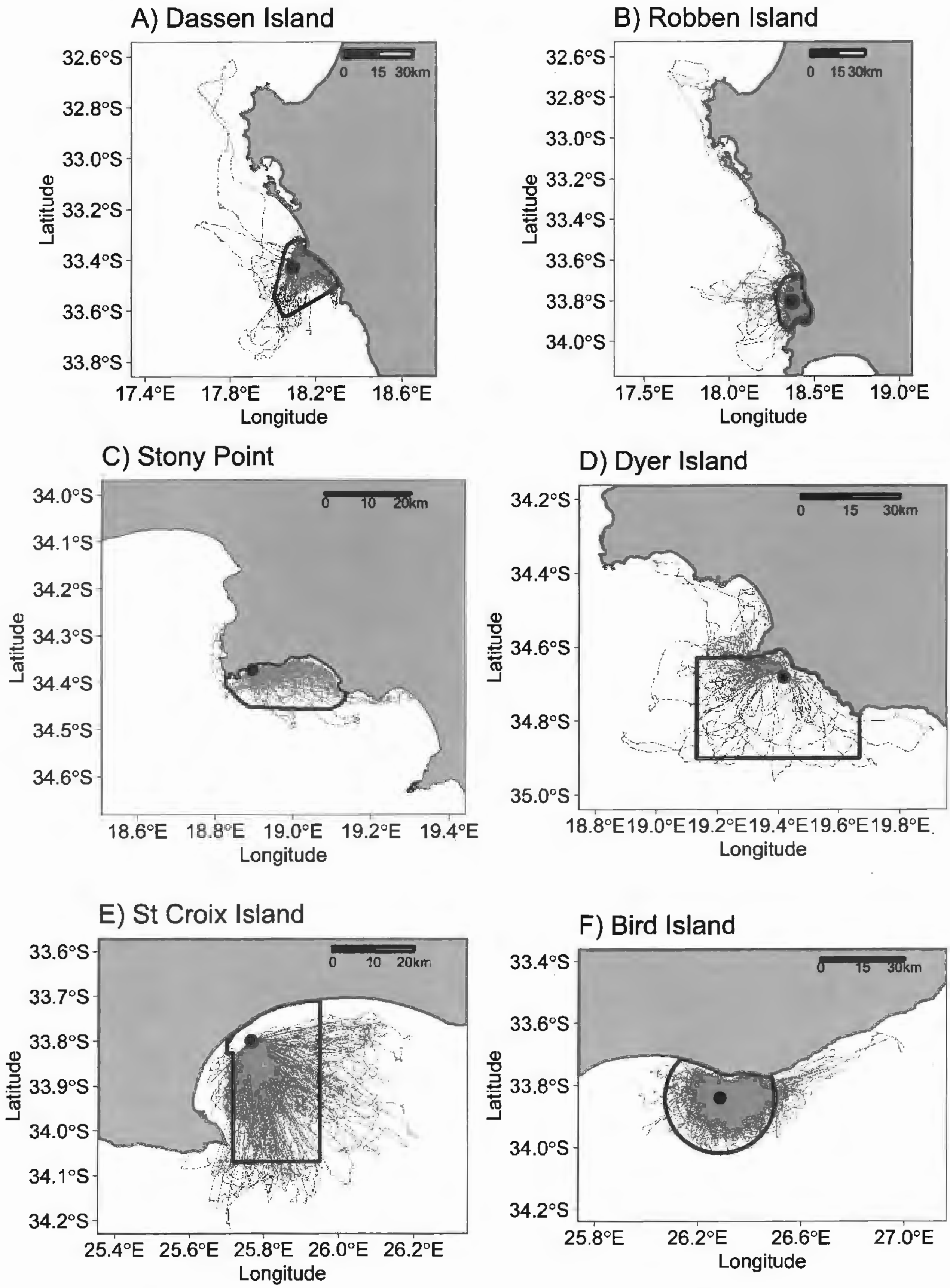
Closures resulting from application of Panel's recommended trade-off mechanism



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Industrial fishing, no-take zones and endangered penguins

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ABSTRACT

Industrial fishing can profoundly alter marine environments, and no-take zones are an important tool to achieve sustainable fishing and re-establish ecosystem integrity. However, the potential benefits for vagile species such as top predators are still questioned. The numbers of endangered African penguins *Spheniscus demersus* have halved since 2004. They depend on small pelagic fish, also targeted by a purse-seine industry in South Africa. We studied penguin foraging behaviour and breeding output at two colonies supporting 60% of the global population in relation to fishing activity by purse-seine vessels. In 2008, both sites were open to fishing, but in 2009 and 2010 waters within 20 km of the world's largest colony were closed to fishing, while waters around the neighbouring colony, 50 km away, remained open. Birds' foraging effort increased with the size of catches around their colonies and decreased with the implementation of a reserve. Total fishing catches in the bay remained constant, but shifted toward the boundaries of the reserve in 2010. While the no-take zone significantly reduced penguin foraging effort, intensified fishing pressure at the reserve boundaries ("fishing the line") in 2010 limited this benefit. The decrease over time of both adult body mass and chick growth rates from both colonies, suggested that the 20 km-closure is too small to reverse penguin population decreases. Therefore, stronger fishery management measures, such as larger no-take zones, buffer zones around reserves, or local reduction of fishing quotas, seem necessary to increase food availability for penguins around their colonies. The collapse of Africa's only breeding penguin species adds urgency to the wider implementation of such measures.

1. Introduction

The intensity of marine fishing has increased dramatically since the middle-ages, in response to pollution of freshwater ecosystems, cultural changes, human population increase and improved technologies (Roberts, 2007). Archaeological records show early signs of local depletion of marine resources by aboriginal tribes (Jackson et al., 2001), as is also apparent in European waters over the past millennium (Longhurst, 2010). The development of industrial fishing in the 20th century has reduced the biomass of predatory fish globally to <10% of pre-industrial levels (Myers and Worm, 2003) and profoundly altered marine environments (Boehlert, 1996). Marine Protected Areas (MPAs) are crucial to re-establish ecosystem integrity and to allow sustainable fishing (Roberts et al., 2005; Worm et al., 2009). To date however, less than 1.5% of the ocean is formally protected (Spalding et al., 2010), despite the Biodiversity Convention in Rio in 1992 calling for at least 10% of the oceans to be protected through a network of MPAs. Furthermore, there is little protection for marine top predators despite their pivotal role in the stability of marine food webs (Baum and Worm, 2009). Their populations are declining world-wide (BirdLife, 2010; Lotze and Worm, 2009) through a combination of direct exploitation, mortality from fishing gear and competition with fisheries (Tasker et al., 2000; Lotze and Worm, 2009). MPAs are increasingly promoted as beneficial for top predators (Hooker et al., 2011). Development in technologies facilitated the assessment of the use of marine ecosystems by threatened species (Ballard et al., this issue; Le Corre et al., this issue) as well as identifying threats specific to life stages or species (Montevecchi et al., this issue) to model the design of potential MPAs (Grecian et al., this issue; O'Brien et al., this issue). While it is necessary to work with governmental institutions for enforcement and compliance of such protected zones (Arcos et al., this issue; Lascelles et al., this issue), it is of crucial importance to assess the effectiveness of established MPAs to protect targeted species (Yorio, 2009; Ludynia et al., this issue; Garthe et al., this issue).

Numbers of African penguins (*Spheniscus demersus*), endemic to southern Africa, decreased by roughly 90% during the 20th century (Crawford, 1999). During the first decade of the 21st century, what was left of the population more than halved, with only 26,000 breeding pairs remaining in 2009 (Crawford et al., 2011). This recent decrease led to the species being down-listed from vulnerable to endangered in 2010 (BirdLife, 2010). African penguin survival

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and breeding success are closely tied to the availability of sardines (*Sardinops sagax*) and anchovies (*Engraulis encrasicolus*) within 20–30 km of their breeding sites (Crawford, 1999; Pichegru et al., 2009). These fish are also targeted by an important commercial purse-seine fishery in South Africa, which developed after World War II (Griffiths et al., 2004). Exploitation of the fishery remained relatively low and stable until the mid-1990s, but increased steadily post 2000 (Griffiths et al., 2004). Since the 1980s, this fishery has been regulated by a Total Allowable Catch (TAC) that is set annually by the Department of Agriculture, Forest and Fisheries (DAFF), to match *ca* 20% of the pelagic fish biomass estimated every year by fishery-independent acoustic surveys off the South African coast (Coetzee et al., 2008). Recently, small pelagic fish availability decreased off the west coast of South Africa, where most penguin colonies are situated, due to a south-eastward shift in their distribution (van der Lingen et al., 2005; Roy et al., 2007). This shift is probably linked to changing environmental conditions, but also to a lack of spatial management of the competing purse-seine fishery as heavy fishing pressure persists in areas with low fish abundance due to the location of ports and land-based processing plants (Coetzee et al., 2008). This spatial mismatch resulted in local competition between birds and fisheries (Okes et al., 2009; Pichegru et al., 2009).

To assess the potential effect of fishing exclusions (MPAs) on penguins, an area of 20 km-radius was experimentally closed to purse-seine fishing around the world's largest African penguin colony at St. Croix Island (7200 pairs, Crawford et al., 2011), Nelson Mandela Bay, South Africa, in January 2009. The waters around Bird Island, another penguin colony (2900 pairs, Crawford et al., 2011) 50 km away in the same bay, remained open to fishing. These two islands support >60% of the global population of African penguins, but their numbers also halved since 2001, following a decrease in small pelagic fish biomass (Crawford et al., 2011). Purse-seine fishing started in the Nelson Mandela Bay area in 1990s, and catches have increased fivefold since 2000 (Department of Agriculture, Forest and Fisheries, unpubl. data). Historically, most pelagic fish catches occurred around St. Croix Island, which is closer to Port Elizabeth harbour than Bird Island (Pichegru et al., 2009). In the first year after closure, the birds from St. Croix Island decreased their foraging effort, saving daily energy expenditure, while the birds from Bird Island increased their effort, probably in response to reduced food availability (Pichegru et al., 2010). The value of these preliminary results in suggesting potential benefits of small no-take zones for African penguins was, however, debated (Coetzee, 2010; Ryan et al., 2010). Here, we report the foraging behaviour of adult penguins raising chicks at both sites in the second year of fishing exclusion around St. Croix Island. We relate their at-sea behaviour in the year before closure and the two years after closure with the distribution and abundance of purse-seine fish catches. We also compared the penguins' breeding success and chick growth at the two colonies after the closure.

2. Materials and methods

2.1. Foraging parameters

The foraging behaviour of adult penguins raising chicks of 1–3 weeks old was studied at St. Croix Island (33°48′S, 25°46′E) and at Bird Island (33°50′S, 26°17′E), in May–June 2008 and April–May 2009 (see Pichegru et al., 2010), and April–June 2010. Most African penguins breed at the islands between March and August. Members of each breeding pair share the care of their brood of 1–2 chicks, with one adult attending the nest while the partner is at sea. Birds were equipped with GPS-TD loggers (a GPS recorder combined with a time-depth recorder; 96 × 39 × 26.5 mm; Earth&Ocean Technologies, Germany), that record latitude and longitude at 1 min-intervals to an accuracy of <10 m, and depth at 1 s intervals to the nearest 0.1 m. The devices weighed <2.5% of adult body mass and were housed in streamlined fibre-composite containers (~1.5% cross-sectional area of a penguin). They were attached to the penguins' lower back feathers with waterproof tape, causing no damage to the plumage. Handling lasted <6 min from capture to release, and these methods were approved by University of Cape Town's animal ethics committee. After deployment, nest sites were monitored until the instrumented birds returned, allowing them to be recaptured and the logger removed. Previous studies showed no significant difference in the trip duration of instrumented versus control African penguins (Petersen et al., 2006; Pichegru et al., 2010).

On retrieval of the devices, trip duration, path length at sea (at the surface), maximum distance from the colony and diving effort (total Vertical Travel Distance (VTD) defined as the sum of depth of all dives multiplied by two to obtain distance, *sensu* Horning and Trillmich, 1997) were calculated to estimate the birds' foraging effort. We also estimated the diving behaviour of the birds (diving rate, average dive depth and duration). Data were only recorded for a single foraging trip per bird to limit pseudo-replication. A GPS position was associated with each feeding dive (>3 m and diurnal, as defined by Wilson and Wilson (1990)). Adaptive kernel analyses were conducted on the entire GPS position dataset for each colony/year, using Arcview GIS 3.1 with the smoothing factor chosen according to the least-squares-cross-validation method (Worton, 1989) to estimate isolines incorporating 50%, 75% and 75–90% of foraging locations.

2.2. Diet

Diet samples from adult penguins were collected from random birds returning from the sea at dusk, so that the samples were likely to reflect the diet fed to chicks. The birds' stomachs were flushed with water poured down a tube into the stomach (Wilson, 1984) and birds were then released. To limit disturbance, we did not flush the entire stomach contents, so could not compare the mass of food between years as a proxy for prey capture per trip. Prey items were identified, usually to species level, weighed for each sample and pooled to estimate the contribution by mass of different species to the diet of penguins from each island. Logger birds were not sampled to reduce disturbance to these birds.

2.3. Purse-seine fishing catches

The positions of purse-seine vessels were monitored constantly via satellite telemetry, ensuring compliance within the experimental closure around St. Croix Island in 2009 and 2010. The weight (tonnes) of pelagic fish (anchovies and sardines) caught by the fishery between 2008 and 2010 was obtained from catch data recorded per 10 × 10 nautical mile (18.5 × 18.5 km) grid cell by the DAFF. Not all empty hauls are recorded, so we could only estimate total catches and catch per unit area rather than catch per unit effort (CPUE). The closed area around St. Croix Island overlaps with six reporting blocks (Fig. 1), but the core area falls within four blocks, with <10% of the two southernmost blocks closed to fishing. We compared the catches in the entire bay (Fig. 1) with catches occurring in these six blocks around St. Croix Island (i.e. block numbers 4600, 4605, 4650, 4655, 5610 and 5615, Fig. 1) and four blocks around Bird Island where the penguins from that island primarily forage (block numbers 4702, 4703, 4752 and 4753, Figs. 1 and 2). We chose these blocks as the area exploitable by fishing boats (>20 m deep, A. Badenhorst, pers. comm.) was equivalent between the two zones when St. Croix was closed to fishing (690 km^2 around St. Croix Island and 620 km^2 around Bird Island). When

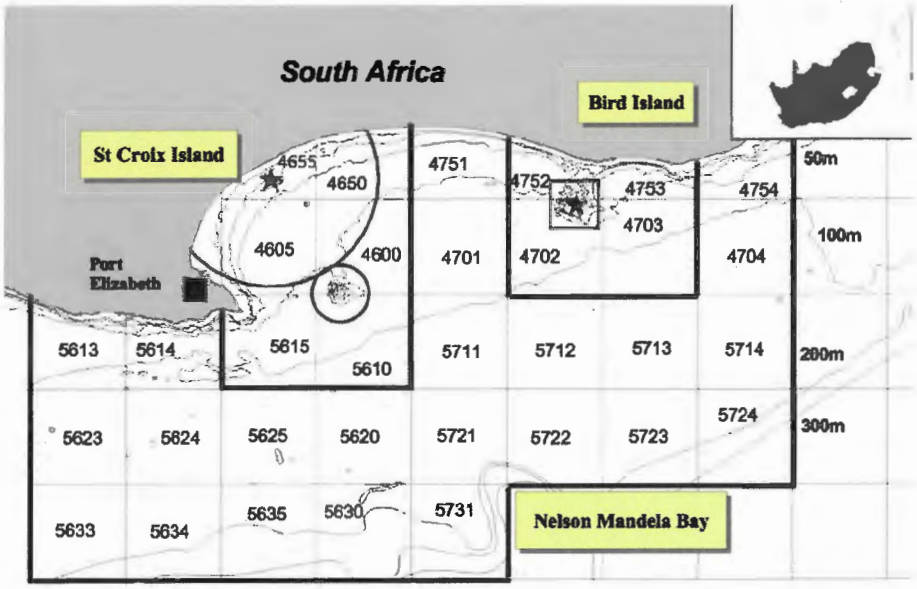

Fig. 1. Map of the study area showing the 10 × 10 nm fishing blocks and the areas considered in this study: "Nelson Mandela Bay" (all the numbered blocks), the area around St. Croix Island (block numbers 4600, 4605, 4650, 4655, 5610 and 5615) and around Bird Island (block numbers 4702, 4703, 4752 and 4753). The zone closed to purse-seine fishing from January 2009 within 20 km of St. Croix Island and an adjacent area surrounding an offshore bank (empty circle) is also shown, as well as a small Marine Protected Area around Bird Island (empty square).

open to fishing in 2008, the exploitable area around St. Croix was 1320 km^2. We also compared the density of catches (tons/km^2) around the two islands among years.

We used General Linear Models (GLMs) to estimate the potential effects of fishery catches and exclusion on foraging parameters of penguins and their adult body mass, using one model per response. Given that the two colonies are only 50 km apart, we assumed that environmental conditions were similar between islands and Bird Island provided a control for environmental effects between years. Therefore, variation in penguins' foraging effort between years at Bird Island would be expected to be matched at St. Croix Island, in the absence of fishing closure. This assumption was necessary to test for effects of the area closure, as significant interannual effects that differed between islands would confound the effect of area closures. Explanatory variables tested included the year (*Year*) and the colony (*Colony*) as well as the intensity of fishing catches in the area around each colony (*Ftonnes*, see Fig. 1) and the effect of the area closure around St. Croix Island (*Reserve*). All models were performed in R (version 2.12.0, R Development Core Team 2010) using a Gaussian distribution with an identity link.

2.4. Chick growth

The rate of mass gain by penguin (and other seabird) nestlings is retarded during period of malnutrition, as priority is given to structural growth rates (van Heezik and Seddon, 1991; Robinson et al., 2002). To determine variability in chick growth rates, the head length (the most repeatable measure of chick size) and mass of 76–115 marked chicks was measured every 5–10 days during the peak breeding season (March–June) in 2009 and 2010. We estimated a daily increase in mass per chick, including only one growth value per chick to avoid pseudo-replication. The median of the head sizes of the entire sample size of chicks we measured was 86.3 mm. Therefore, we selected the single growth value per chick which was associated with their head length closest to 86.3 mm. Also, to limit the effect of chick size on estimated growth rates (due to early or late periods of measurements), we removed the data in the first and fourth quartile of the distribution of the head length of the entire sample size (79.5 mm < head length > 99.1 mm). At that stage of growth, the growth rates of African penguin chick head and mass are linear (Lübbe, 2008). To compare chick growth between colonies and years, we used GLMs with growth rate as the dependent factor and year and colony as explanatory variables.

2.5. Breeding success

A sample of 90–220 nests other than nests monitored for the chick growth was marked with a unique number painted on a stone next to the nest on each island in 2009 and 2010. African penguins typically lay a clutch of two eggs (Hockey et al., 2005). Nest type is known to influence breeding success in these birds (Seddon and van Heezik, 1991), so only surface nests were selected (as opposed to natural burrows). Nest contents (number of adults, eggs, chicks and the size of the chicks) typically were monitored every 7–10 days, (occasionally up to 2–3 weeks, due to logistical difficulties). If the eggs disappeared between successive checks, we assumed that the nest failed at the incubation stage, prior to hatching. After 6–8 weeks, the chicks leave their nests to join crèches and are not reliably associated with individual nests. Hence, we assumed that a nest was successful if the chicks reached 8 weeks-old and it was found empty. Each breeding attempt in a marked nest was considered independently, as most adults were not individually marked and more than one pair may occupy a nest site in a given season (pers. obs. on some marked pairs). Breeding success was estimated using a modified Mayfield method (1975), with nest days calculated as the mid-point between nest visits, as the visits were usually <14 days (Johnson, 1979). Nest survival probabilities were compared using survival models specified with the "survreg" function in R v2.12.0 (R Development Core Team 2010). The maximum likelihood estimate of risk of failure (F) per sampling interval was defined following Sherley et al. (in press):

$$F = \exp(-\alpha - \beta x),$$

where α and β are intercept and coefficients from the regression and x is the explanatory variable ($x = 1$ for factorial variables). Nest survival (S) at time t was defined as:

$$S(t) = \exp(-\exp(Ft)),$$

with t the average time for incubation and fledging period (38 and 77 days respectively, Hockey et al., 2005). Hatching success was

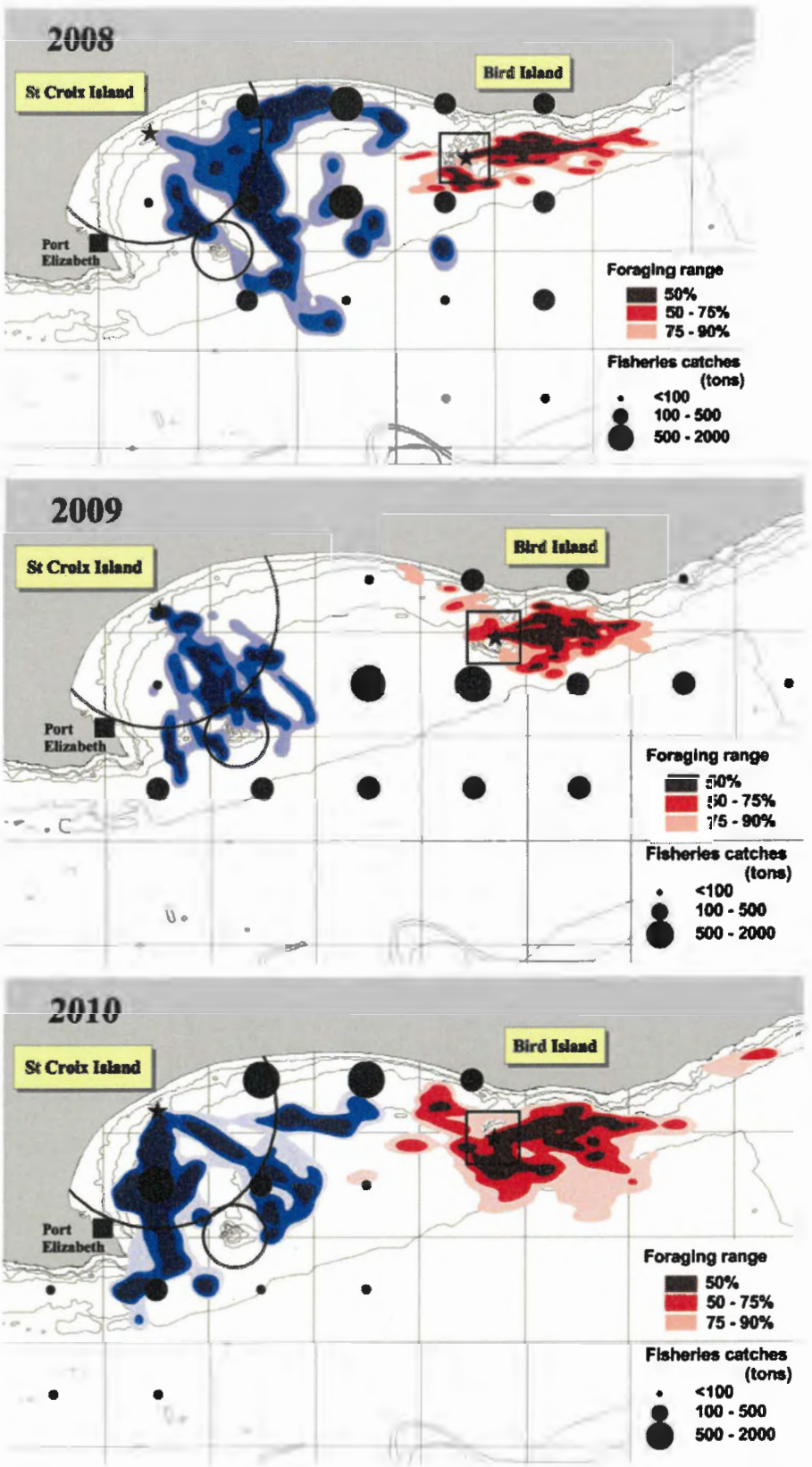

Fig. 2. Foraging areas (density of feeding dives) of African penguins breeding at St. Croix and Bird islands (stars), in South Africa, before (2008) and after (2009 and 2010) closure to purse-seine fishing within 20 km of St. Croix Island and an adjacent area surrounding an offshore bank (empty circle). The location and amount of catches by the purse-seine fleets between January and August each year (covering most of the penguins' breeding season) are shown by black circles.

defined as the probability of nests hatching at least one chick, fledging success as the probability of a nest that hatched chicks fledging at least one chick, and breeding success was the product of hatching and fledging success. Upper and lower 95% confidence intervals (CI) were calculated as:

Table 1
Foraging behaviour of African penguins from St. Croix and Bird islands, Nelson Mandela Bay, South Africa, before (2008) and after (2009–2010) closure to purse-seine industrial fishing around St. Croix Island. Values are mean ± SD (range).

	St. Croix Island			Bird Island		
	2008	2009	2010	2008	2009	2010
N (GPS tracks)	18	14	21	30	29	31
Body mass (g)	3500 ± 550 (1950–4250)	3300 ± 530 (2675–4750)	3000 ± 300 (2325–3525)	3780 ± 410 (2900–4400)	3230 ± 350 (2525–4000)	3080 ± 370 (2125–3875)
Trip duration (h)	22.5 ± 7.1 (13.9–47.8)	17.1 ± 4.0 (7.8–23)	27.1 ± 9.7 (14.7–51)	15.6 ± 4.0 (9.7–24)	18.0 ± 5.0 (7.2–30)	20.5 ± 6.9 (5.6–47.1)
Horizontal path length (km)	69.3 ± 28.6 (25.9–152.3)	50.2 ± 17.0 (11.2–77.5)	69.2 ± 26.0 (31.6–144)	39.2 ± 10.4 (25.6–66.7)	41.5 ± 11.9 (10.9–59.8)	52.1 ± 24.2 (19.4–143.6)
Max. distance from colony (km)	32.3 ± 8.0 (18.7–44.5)	19.7 ± 7.2 (4.7–30.7)	24.9 ± 7,8 (6.7–39.1)	14.5 ± 6.8 (6.3–30.3)	14.0 ± 4.9 (4.1–24.8)	15.1 ± 7.8 (6.0–43.2)
Average VTD (km)	17.5 ± 5.6 (7.5–31.2)	11.8 ± 3.2 (6.9–16.5)	22.6 ± 6.1 (13.8–37.9)	12.6 ± 4.6 (5.3–22.1)	18.2 ± 6.0 (9.3–40.2)	18.1 ± 4.7 (7.5–28.7)
Diving rate (dive h^{-1})	16.1 ± 4.6 (9.1–24.0)	14.5 ± 3.0 (8.9–20.7)	14.5 ± 3.9 (9.4–24.1)	17.9 ± 6.6 (7.8–37.1)	18.9 ± 5.2 (8.1–32.8)	16.5 ± 4.6 (10.2–28.5)
Average dive duration (s)	79.6 ± 12.1 (Max:163)	72.5 ± 27.0 (Max: 153)	86.8 ± 14.7 (Max: 122)	75.3 ± 11.7 (Max:154)	76.1 ± 12.8 (Max:275)	79.2 ± 14.4 (Max: 227)
Average dive depth (m)	26.4 ± 11.5 (Max:84.9)	23.0 ± 16.1 (Max:76.7)	32.1 ± 6.8 (Max: 76.1)	25.0 ± 10.9 (Max:77.2)	26.8 ± 6.8 (Max: 91.0)	28.6 ± 9.7 (Max: 92.7)

$\exp(-t(F - 1.96\,F/\sqrt{n}))$ and $\exp(-t(F + 1.96\,F/\sqrt{n}))$,

respectively, where n is the number of breeding attempt failures during incubation for the hatching success or during brooding for the fledging success. The nest survival was tested in relation with year, colony and fishing activities around the islands as explanatory variables in the survival models.

3. Results

3.1. Foraging behaviour

There were marked differences in the at-sea behaviour of the penguins between colonies and among years (Tables 1 and 2; Figs. 2 and 3). Birds from St. Croix Island generally travelled further from their colony, had longer trip durations, and greater horizontal and vertical path lengths (Table 2) than birds from Bird Island (Table 1, Fig. 3). Penguins breeding on Bird Island increased their foraging effort each year, suggesting an ongoing deterioration of their foraging environment. At the same time, birds from St. Croix decreased their foraging effort after the fishing ban was put into place in 2009, but increased it again in 2010, suggesting a short-term benefit from the fishing closure. The foraging effort of penguins from both colonies was related with fishing intensity in the vicinity of the island (*Ftons*); time spent foraging and Vertical Travel Distances both increased with increased fishing catches (Table 2). In parallel, the implementation of a fishing ban (*Reserve*) significantly reduced penguin foraging effort; trip duration, foraging path length, maximum distance from the colony and Vertical Travel Distances were all significantly negatively correlated with the fishing ban (Table 2). Finally, birds from St. Croix Island spent more time feeding within the boundaries of the closure after the ban (75% and 55% of their dives within the closure in 2009 and 2010, respectively) than when fishing was allowed in that area (25% of dives, Fig. 2).

Diving behaviour (dive depths, durations and rate) remained constant between years and between colonies (Tables 1 and 2). Birds from St. Croix Island were slightly lighter than birds from Bird Island (Table 2, $p = 0.03$), but the body mass of adults from both colonies decreased progressively during the study (Fig. 3, Table 2).

3.2. Diet

A total of 110 diet samples was collected (Bird Island: 40 in 2009, 19 in 2010; St. Croix Island: 23 in 2009, 28 in 2010). The diet of the birds did not differ between years and colonies, with >90% by mass being small pelagic fish in both years and on both islands. Most of the small pelagic fish found in the diet were anchovies (97% by mass, with the remaining 3% sardines). Other prey included halfbeaks (Hemiramphidae), Cape silverside (*Atherina breviceps*), longsnout pipefish (*Syngnathus acus*), small Cape snoek (*Thyrsites atun*) and squids (*Loligo* spp.).

3.3. Fishing activities

The total amount of fish caught in Nelson Mandela Bay each year remained roughly constant, between 3400 and 3900 tonnes for the three years of the study (Table 3). However, the distribution of catches varied (Fig. 2), leading to differences in fishing intensity. In 2008 and 2009, a substantial proportion of catches occurred around Bird Island (26.5% and 42.6% respectively), with relatively high catches per unit area (1.7–2.3 t km^{-2}, Table 3). In these years, the catches in the six blocks around St. Croix were constant (720 and 725 t, Table 3), although there was a spatial shift, with catches in 2009 occurring in the two southern blocks (Fig. 2). The closure of waters within 20 km of St. Croix Island reduced the size of the exploitable area, increasing fishing intensity in the area open to fishing (from 0.5 t km^{-2} in 2008 to 1.05 t km^{-2} in 2009, Table 3). In 2010, however, the catches in St. Croix Island area increased dramatically, with 1920 tonnes of fish removed from five of the six blocks covered by the closure (Fig. 2), suggesting that much of the fishing fleet's activity occurred within 5 km of the reserve boundaries. In 2010, fishing intensity around St. Croix was 2.8 t km^{-2}, with half of the total amount of fish removed from the bay caught in that zone, whereas only 320 t were caught around Bird Island (0.5 t km^{-2}).

3.4. Chick growth

Between March–June 2009 and March–June 2010, growth increments were analysed from 261 chicks. Chicks from both islands grew at the same rate ($F = 0.79$, $p = 0.375$), but growth rates decreased at both colonies by 6–11 g/day between 2009 and 2010, from 43.8 to 32.5 g/day for chicks from St. Croix and 44.7 to 38.7 g/day at Bird Island ($F = 7.04$, $p = 0.008$, Fig. 4).

3.5. Breeding success

From the 558 breeding attempts monitored on both islands, we observed 296 failures in 15,240 nest-days during incubation and 144 failures in 14,765.5 nest-days during chick-rearing (Table 4).

Table 2
Results of GLMs of breeding African penguins' foraging parameters and body mass against environmental and fishing variables. Colony Bird Island and Year 2008 are the references.

Coefficients	Estimate	Std error	t	p
Adult body mass				
Intercept	3824.26	107.94	35.43	<0.01
Colony St. Croix	−277.11	124.94	−2.22	0.03
Year 2009	−461.01	98.42	−4.68	<0.01
Year 2010	−672.72	100.45	−6.70	<0.01
Ftons	−0.09	0.07	−1.23	0.22
Reserve Yes	265.23	164.03	1.62	0.11
Trip duration				
Intercept	12.26	1.64	7.48	<0.01
Colony St. Croix	8.18	1.85	4.41	<0.01
Year 2009	1.50	1.51	0.99	0.32
Year 2010	7.28	1.55	4.71	<0.01
Ftons	2.88×10^{-3}	1.11×10^{-3}	2.59	0.01
Reserve Yes	−6.93	2.45	−2.84	0.01
Foraging trip length				
Intercept	34.60	5.34	6.48	<0.01
Colony St. Croix	32.61	6.02	5.42	<0.01
Year 2009	2.70	4.99	0.54	0.59
Year 2010	16.53	5.02	3.29	<0.01
Ftons	2.92×10^{-3}	3.64×10^{-3}	0.80	0.42
Reserve Yes	−21.87	7.99	−2.74	0.01
Vertical Travel Distance				
Intercept	8.71	1.22	7.14	<0.01
Colony St. Croix	5.95	1.53	3.89	<0.01
Year 2009	2.94	1.12	2.62	0.01
Year 2010	8.16	1.14	7.18	<0.01
Ftons	3.93×10^{-3}	0.84×10^{-3}	4.70	<0.01
Reserve Yes	−8.63	1.95	−4.42	<0.01
Diving rate				
Intercept	2.77	0.75	36.68	<0.001
Colony St. Croix	−0.06	0.09	−0.67	0.49
Year 2009	0.06	0.07	0.86	0.39
Year 2010	−0.02	0.07	−0.20	0.84
Ftons	0.000	0.000	0.907	0.37
Reserve Yes	−0.14	−0.12	−1.20	0.23
Maximum distance from colony				
Intercept	12.44	1.84	6.75	<0.01
Colony St. Croix	18.52	2.08	8.89	<0.01
Year 2009	−1.05	1.72	−0.61	0.54
Year 2010	2.10	1.73	1.21	0.23
Ftons	1.79×10^{-3}	1.25×10^{-3}	1.43	0.16
Reserve Yes	−11.54	2.76	−4.18	<0.01
Dive duration				
Intercept	71.532	3.6	19.87	<0.001
Colony St. Croix	5.36	4.54	1.18	0.24
Year 2009	−0.37	3.33	−.011	0.91
Year 2010	6.50	3.35	1.94	0.05
Ftons	0.003	0.002	1.54	0.13
Reserve Yes	−3.79	5.79	−0.66	0.51
Dive depth				
Intercept	23.71	2.33	10.16	<0.001
Colony St. Croix	1.06	2.92	0.37	0.72
Year 2009	−0.24	2.15	−0.11	0.91
Year 2010	4.18	2.16	1.93	0.05
Ftons	0.002	0.002	1.43	0.15
Reserve Yes	−1.23	3.76	−0.33	0.74

The survival models showed that hatching success was higher on Bird Island than St. Croix, but fledging success was higher on St. Croix. Between 2009 and 2010, hatching success remained similar on both islands, but fledging success increased in 2010. Neither hatching nor fledging success seemed to have been influenced by fishing activities around the islands (hatching success: $z = 0.17$, $p = 0.86$; fledging success: $z = -0.91$, $p = 0.36$). Birds from St. Croix Island showed a breeding success of 0.226 in 2009 and 0.296 in 2010, whereas birds from Bird Island had a breeding success of 0.111 in 2009 and 0.241 in 2010. Overall, breeding success was similar between the islands (Table 4), except for Bird Island in 2009. This was due to heavy predation on penguin eggs and chicks by kelp gulls (*Larus dominicanus*), which were removed by South African National Parks from February 2010 in an attempt to increase penguin breeding success (Pichegru, unpubl. data). Also, exceptionally high air temperatures (>45 °C locally) at the beginning of March 2010 greatly reduced hatching success on St. Croix Island (all of the 93 monitored pairs breeding at the time abandoned their eggs), but had no effect on Bird Island where penguins had not started breeding yet.

4. Discussion

Our results are consistent with a negative impact of purse-seine fishing on the foraging effort of breeding penguins. Indices of energy spent by adults in searching for food (Vertical Travel Distance, trip duration and maximum distance from the colony) increased with increased fishing catches within 20–30 km of colonies, and decreased when a no-take zone was implemented (Table 2). Marine upper-trophic level predators' population dynamics (breeding success, recruitment, survival) are affected by changes in prey availability (e.g. Oro et al., 2004; Davis et al., 2005) and fishing can modify prey availability for predators by reducing prey density or increasing prey recruitment variability (Furness, 2003). Long-term data series on both fish catches and predator population trends provide correlative support for the impact of fishing on predators (e.g. Crawford, 1999; Frederiksen et al., 2004; Jahnke et al., 2004; Ainley and Bright, 2009). However, there are few well-documented cases directly demonstrating the consequences of fishing on predator populations (e.g. Osterblöm et al., 2006), partly because consequences of fishing on marine ecosystems usually are lagged (Jackson et al., 2001). The penguins of Nelson Mandela Bay show a direct negative effect of fishing on their behaviour, as well as a rapid decrease in effort spent at sea when fishing within their foraging area ceases.

Displacing fishing effort around the St. Croix penguin colony between 2008 and 2009, as well as catches of lower levels than in 2010, probably increased food availability within the closure and influenced the foraging behaviour of the birds (Fig. 2). However, "fishing the line" in 2010 (increasing fishing intensity around the reserve boundary) appears to have compromised the benefit of the closure to penguins. This practise is a common response by fishermen to enhanced catch rates around reserve boundaries due to spill-over of stocks of territorial fish or shellfish stocks that have recovered inside the closure (Roberts et al., 2005). It has been shown to be positive for fisheries and harmless for the reserve when the targets are largely sedentary animals (Kellner et al., 2007). However, it could limit the benefit of fishing exclusion for more mobile fish (Roberts et al., 2005; Kellner et al., 2007) and their predators. It could be argued that a catch of 700–2000 tonnes would have a trivial ecological impact, especially when one considers that >25,000 tonnes of small pelagic fish are caught annually within the foraging range of African penguins breeding on Dyer Island on the south-west coast of South Africa (Pichegru et al., 2009). However, little is known about the spatio-temporal scale of the small pelagic fish movements or their availability for penguins during the birds' breeding cycle. Moreover, the increase in catches in the vicinity of St. Croix Island of 1200 tonnes from 2009 to 2010 has to be considered in the context of the penguins' energetic needs. The 7000 pairs of African penguins breeding on St. Croix Island in 2010 require roughly 1000 tonnes of fish to maintain themselves through the breeding season and each raise a brood of two chicks (Nagy et al., 1984), which would reverse the current population trends. The change in catches from 2009 to 2010 represents more than the total amount of food required by breeding

Table 3
Commercial catches in Nelson Mandela Bay in 2008, 2009 and 2010, and the total, proportion and catch per unit area of these catches (tons/km^2) in the areas around St. Croix and Bird Islands.

	Total catches in the bay (t)	Catches in St. Croix Island area			Catches in Bird Island area		
		Total catches (t)	Proportion of total in the bay (%)	Fishing intensity (t km^{-2})	Total catches (t)	Proportion of total in the bay (%)	Fishing intensity (t km^{-2})
2008	3960	720	18	0.5	1050	26.5	1.7
2009	3410	725	21	1.05	1465	42.6	2.3
2010	3780	1920	50	2.8	320	4	0.5

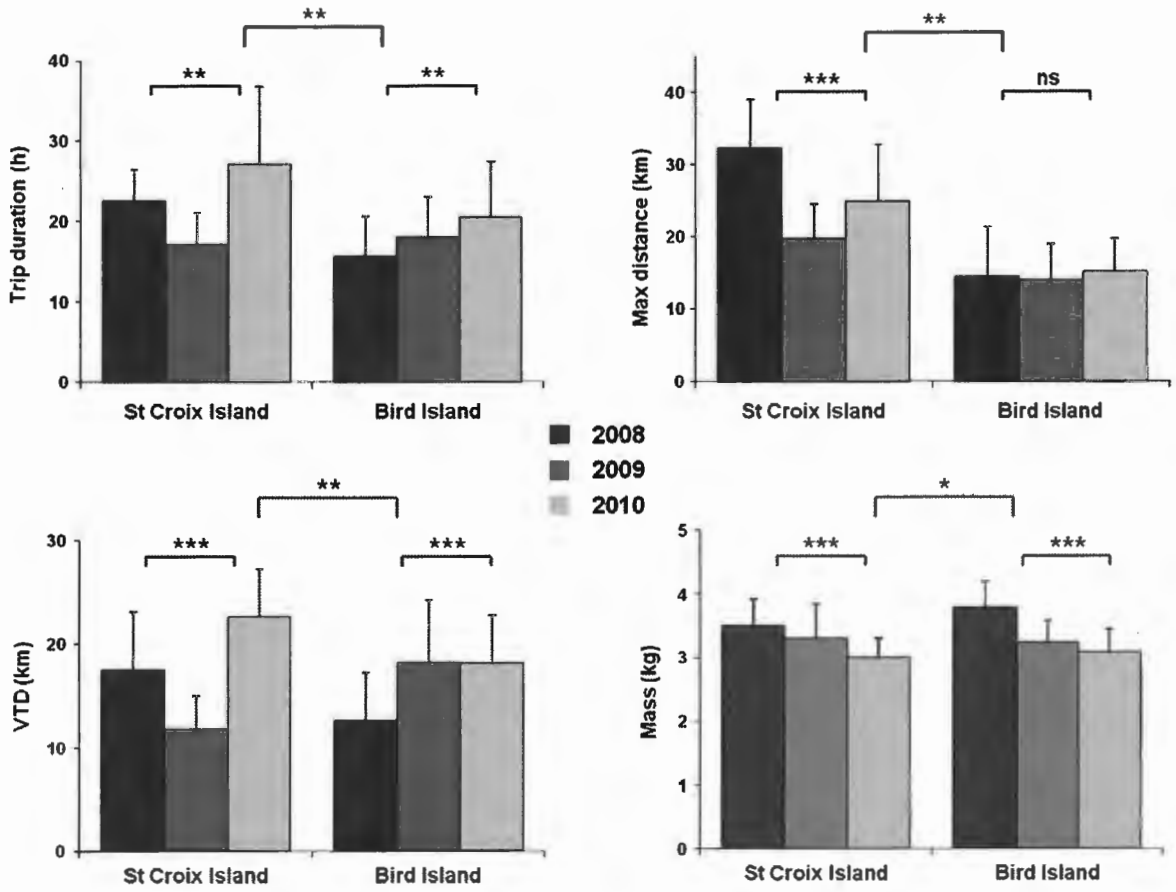

Fig. 3. Foraging parameters (trip duration, maximum distance from the colony, Vertical Travel Distance) and adult body mass of African penguins breeding on Bird and St. Croix Islands before (2008) and after (2009–2010) closure to fishing around St. Croix Island, South Africa. Values are mean ± SD. Level of significance of difference between years for each colony is noted as follows: ns, $p > 0.05$, $^{*}p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$.

penguins on St. Croix. The 20 km-radius closure seemingly was too small to offset the greater fishing pressure in 2010.

The small, 20 km radius fishing closure apparently provided short-term benefits to breeding penguins by reducing their foraging effort (Pichegru et al., 2010), but it was insufficient to increase penguin reproductive output and survival. Indeed, breeding adult body masses and chick growth rates, which are related to food availability (e.g. Hennicke and Cluick, 2005), decreased throughout our study. Small pelagic fish abundance can be highly variable between years (Cury and Shannon, 2003), as fish recruitment depends on physical parameters of the environment (Cury and Roy, 1989). Seabirds generally have life-history traits that allow them to buffer environmental variability, but anthropogenic influences such as fishing increase the amplitude of such natural variability (Hsieh et al., 2006). The rapid decline in African penguin adult survival on the west coast of South Africa (Crawford et al., 2011) and the extremely low breeding success estimated in our study (less than half the breeding success of penguins breeding on the west coast of

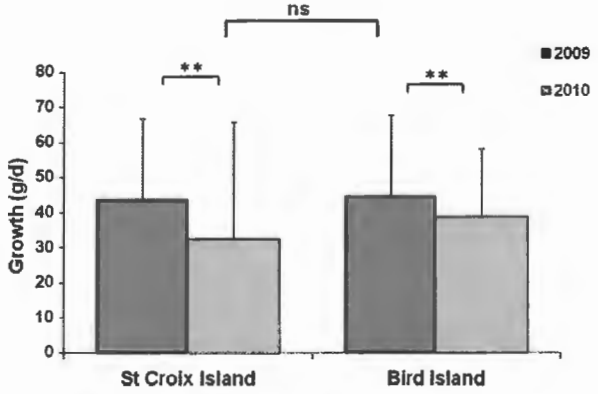

Fig. 4. Daily growth (g/d) of African penguin chicks from St. Croix and Bird islands, South Africa, in 2009 and 2010, with levels of significance ($^{**}p < 0.001$, ns not significant). Values are mean ± SD.

Table 4
Hatching, fledging and breeding success of African penguins breeding on St. Croix and Bird islands in 2009 and 2010.

		St. Croix		Bird		Colony		Year	
		2009	2010	2009	2010	*z*	*p*	*z*	*p*
Incubating period	*N* nests	137	215	125	81				
	Number of failures	88	120	55	33				
	Number of nest days	4227.5	5246	3789.2	1977.5	−2.6	<0.01	−0.89	0.37
	Survival probability	0.456	0.418	0.572	0.537				
	95% CI	0.387–0.538	0.357–0.488	0.493–0.663	0.435–0.664				
Chick rearing period	*N* nests	117	84	74	57				
	Number of failures	45	23	50	26				
	Number of nest days	5210	4576.5	2230	2749	5.1	<0.001	4.02	<0.001
	Survival probability	0.495	0.709	0.194	0.449				
	95% CI	0.403–0.608	0.616–0.816	0.123–0.306	0.330–0.611				
Breeding success	Survival probability	0.226	0.296	0.111	0.242	nd		nd	
	95% CI	0.156–0.327	0.220–0.398	0.061–0.203	0.144–0.406				

South Africa in the mid-1990s, 0.486, Wolfaardt et al., 2008) are unlikely to be sustainable. Indeed, breeding success on St. Croix at the beginning of the 1980s was comparable to our study (Randall, 1983), when the population decreased there by >70% between 1978 and 1993 (Crawford et al., 2011). Although a longer study period would be necessary to establish the effect of fishing intensity on breeding success, recruitment and adult survival, extensive conservation measures are needed urgently to effect a long-term change for the African penguin population. For example, removal of predatory gulls and providing artificial burrows that offer shelter against extreme weather events (likely to increase with climate changes; Parmesan et al., 2000) have been successfully implemented on Bird Island to increase penguin production (Pichegru, unpubl. data). Nevertheless, as reduced food availability is likely to be the major cause for the recent decline in African penguin populations (Crawford et al., 2011), local competition with industrial fisheries around breeding colonies cannot continue.

Large no-take zones are known to be more efficient than small reserves in increasing the density of fish stocks (Claudet et al., 2008). Buffer zones around reserves, where reduced catches are allowed can limit the impact of fishing at the boundary of the closure and increase the benefits for organisms inside the reserve (Harmelin-Vivien et al., 2008). Ultimately, regional quotas may be required to reduce competition between predators and fisheries, allocating catches proportional to independent stock estimates based on acoustic surveys, especially in areas with low fish abundance (Pichegru et al., 2009). The effectiveness of MPAs depends crucially on how well thought out their designation has been (Longhurst, 2010, and references therein). Marine reserves work best when implemented with other fishery management tools to avoid over-exploitation of stocks outside of the reserve (Gell and Roberts, 2003). Networks of protected areas also show promise in protecting species with large ranges (Roberts et al., 2001; Gaines et al., 2010; Hooker et al., 2011). The collapse of Africa's only breeding penguin species adds urgency to the wider implementation of such measures, which are likely to also benefit the important biomass of endemic predators of the Benguela upwelling ecosystem.

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Minister Barbara Creecy
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01 November 2019

"AM18"

By email and per fshaik@environment.gov.za

Dear Minister Creecy

RE: Fishing exclusions around African Penguin colonies – request for urgent appraisal of mitigation measures to avert current rapid population decline

The African Penguin *Spheniscus demersus* has been listed as Endangered by the IUCN since 2010 with the following justification: *"it is undergoing a very rapid population decline, probably as a result of commercial fisheries and shifts in prey populations. This trend currently shows no sign of reversing, and immediate conservation action is required to prevent further declines"*[1]. Since 1900 we have lost 96% of our African Penguin population and, since the turn of this century the population has decreased by 77%. **If current population trajectories persist then this species will become functionally extinct in the near future**[2]**.**

The African Penguin faces several threats, but the precipitous decline in its population is largely driven by a concomitant decline in its preferred prey, namely sardine and anchovy (Figure 1). Several conservation interventions are underway, as set out in the Biodiversity Management Plan for the species, including mitigating predation impact, improving breeding habitat on islands, the creation of new breeding colonies, plans to mitigate oil spills and disease monitoring. **Spatial protection of their foraging areas during the breeding season was identified as a critical intervention** which led to the initiation of an island closure experiment in 2008.

The experiment was launched by the then Marine and Coastal Management, Department of Environmental Affairs and Tourism to test if the exclusion of purse-seine fishing could benefit penguins. Two colonies each in the Western and Eastern Cape were paired with one being open and the other closed to fishing for 3-yearly cycles (Table 1). The current cycle is coming to an end this year, with a decision due to be made on the outcome of the experiment in December 2019.

Despite the inherent uncertainties in establishing cause and effect in marine ecosystems, **a large body of published scientific evidence demonstrates positive effects of fishing closures on both penguin adults and chicks** (see Addendum A). This is despite trade-offs in the experimental design leading to a suboptimal setup. Therefore, we believe that there is enough strong evidence for the South African government to responsibly close the areas around the six largest breeding colonies (Dassen Is., Robben Is., Stony Point, Dyer Is., St

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Croix Is. and Bird Is.), i.e. 90% of the South African breeding population, to purse-seine fishing for an extended period (minimum of 10 years), if not permanently. African Penguin generational periods are ~10 years, meaning that favourable conditions are needed for extended periods for the positive effects to be evident at a population level.

We acknowledge that the fishing industry will be affected by island closures: estimates of total allowable purse-seine catches that will be lost due to closures around Robben and Dassen islands range from 2% to 7%[3], although no associated economic costs are predicted in Algoa Bay[4]. However, this shortfall needs to be weighed up against the high socio-economic value of penguin-based ecotourism[5] and the potential public outcry if no action is taken, particularly when benefits to penguins have been scientifically demonstrated. A recent study for example indicated that total expenditure associated with the Simon's Town colony is approximately R311 million per annum, with the majority coming from international tourists (i.e. 88%), and estimated to be R 6.87 billion over the next 30 years[6].

The existing MPA network including the newly declared Marine Protected Areas, though laudable for other facets of marine conservation, is largely ineffective at protecting penguin habitat during the breeding season (Figure 2). We cannot over-emphasise the dire situation the African Penguin currently finds itself in and without urgent interventions around threats such as food availability, oil spills, and protection of breeding sites, there is a high probability that we may lose Africa's only penguin species. While we do not wish to bypass the current processes around the island closure experiment for the remainder of the year, we urge you to keep in mind the grave situation in which the penguin population finds itself when making the final decision on the experiment. We sincerely hope you will consider declaring permanent closure of areas around the six largest breeding colonies, preferably with a 40 km radius to reflect true penguin foraging ranges, but at least a minimum of 20 km in line with the experimental closure design.

If it would be helpful to meet with you, together with DEFF seabird scientists (with whom we have a wonderful working relationship) to discuss this further, we'd be happy to do so.

Dr Stephen van der Spuy
CEO, SANCCOB

Mark D. Anderson
CEO, BirdLife South Africa

Dr Morné du Plessis
CEO, WWF South Africa

Prof. Peter Ryan
Director, FitzPatrick Institute of African Ornithology

Prof. Astrid Jarre
SA Research Chair in Marine Ecology and Fisheries, University of Cape Town

Prof. Pierre Pistorius
Institute for Coastal and Marine Research, Nelson Mandela University

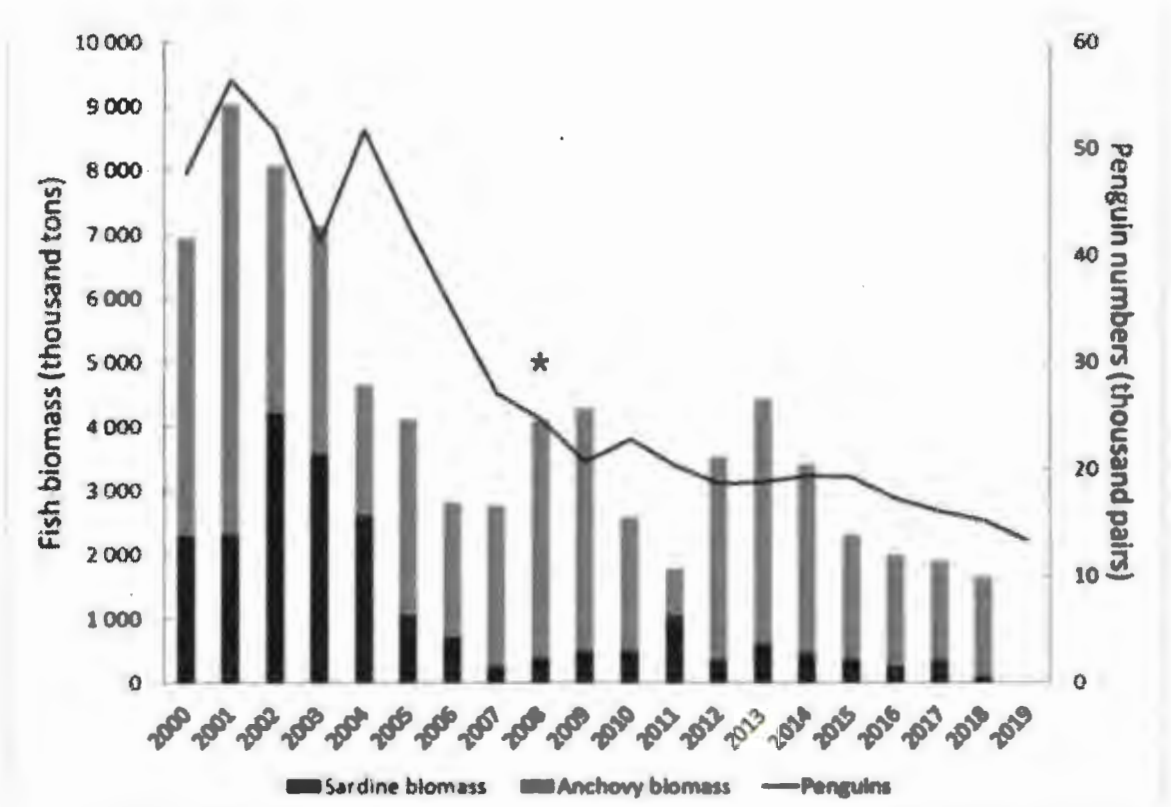

Figure 1. African Penguin breeding numbers plotted against stacked sardine and anchovy biomass in South Africa since 2000. The asterisk denotes the beginning of the closure experiment around the four major colonies.

Table 1. Island closure schedule until present year. Closure is denoted by "x". Key scientific publications shown in last row refer to numbered papers in the reference list.

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Dassen Island	x	x					x	x	x			
Robben Island				x	x	x				x	x	x
St Croix Island		x	x	x				x	x	x		
Bird Island					x	x	x				x	x
Key papers			10		11		12	9			2	

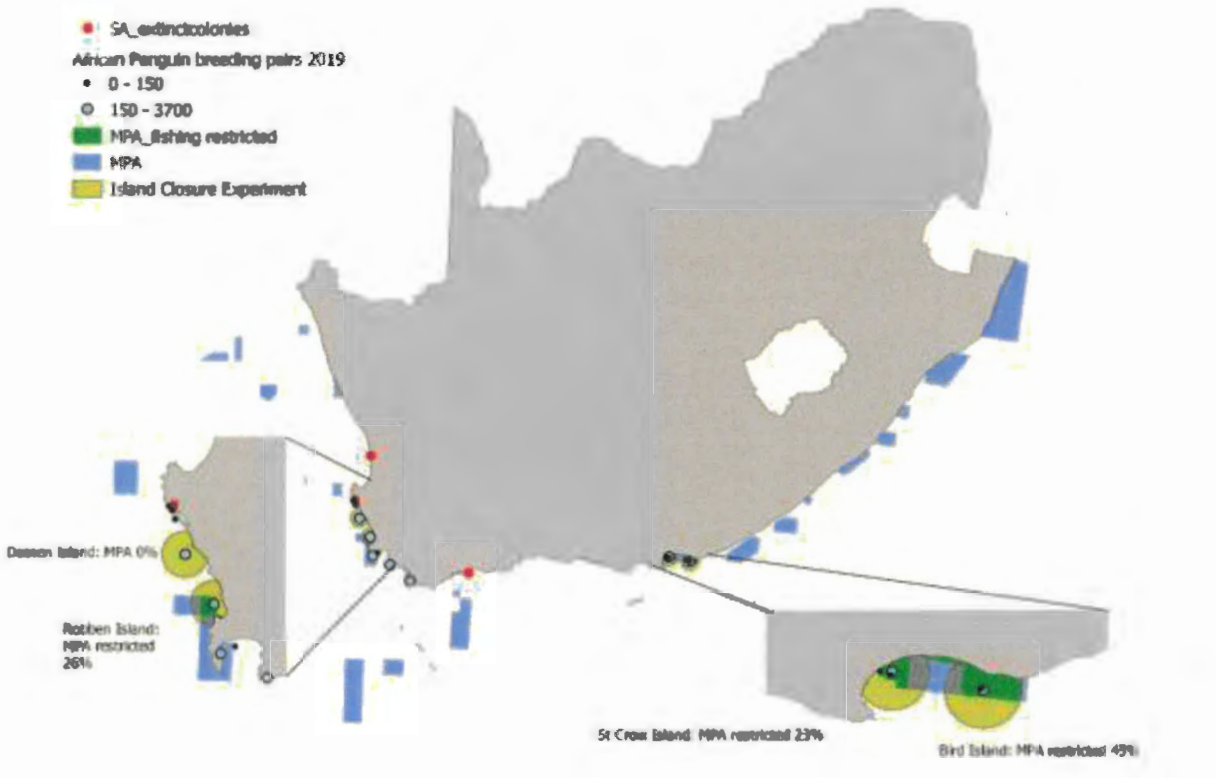

Figure 2. Location of Island Closure Experiment sites (yellow areas) in relation to areas restricted from fishing (green areas) in recently proclaimed Marine Protected Areas (blue areas). Proportion of experimental closures currently restricted from fishing activity within the new MPAs (green areas) are: Dassen Is. – 0 %; Robben Is. – 26 %; St Croix Is. – 23 %; and, Bird Is. – 45 %.

Addendum A

SCIENTIFIC EVIDENCE TO SUPPORT ISLAND CLOSURES

African Penguins are specialised foragers that predominantly feed on sardine and anchovy. The availability of this prey to African Penguins strongly influences the breeding population counts of these birds, the foraging performance of adult penguins, their breeding performance and their chicks' body condition[7-10].

In two regions in South Africa (Western and Eastern Cape), pairs of sites were selected in 2007 to investigate the impacts of purse-seine fishing near colonies on chick-rearing adults' foraging behaviour and their population dynamics[11,12]. While the experiment is still underway, closures to fishing have already resulted in decreased energy expended by breeding birds during foraging[12,13], increased breeding success[2,11] and increased chick condition[2]. These differences have been observed despite concerns with the experimental design including: i) lack of adequate controls - the islands being compared were not necessarily subject to the same environmental conditions[12–14], ii) lack of adequate temporal resolution - closures were short relative to the long lifespan and conservative life history characteristics of penguins, iii) the decline in penguin populations was related to changes in adult survival while the experiments targeted how potential fisheries competition affects breeding[2,11], iv) the spatial extent of the closures not adequately addressing impacts of fishing on the boundaries of the closures, so-called 'fishing the line'[13], and v) insufficient information on non-fishery related fish stock fluctuations. For example, observed positive correlations between catch and some penguin parameters was taken as evidence that fishing does not adversely affect penguins and alternatively may have a positive effect[15]. However, both predators and local fish catches are likely to respond positively to increased biomass of fish around colonies, leading to positive correlation between the two[16–18].

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Subject: FW: African Penguins

From: Mark Anderson <ceo@birdlife.org.za>
Sent: Wednesday, April 29, 2020 8:58 AM
To: fshaik@environment.gov.za; Minister@environment.gov.za; jbuitendag@environment.gov.za
Cc: Alistair McInnes <alistair.mcinnes@birdlife.org.za>; Hanneline Smit-Robinson <hanneline.smit-robinson@birdlife.org.za>
Subject: FW: African Penguins
Importance: High

Der Minister

Can you please confirm whether you have received our correspondence.

Will we receive a formal response to the matters we have raised in our letters?

Thank you
Mark

From: Mark Anderson
Sent: Friday, 03 April 2020 5:47 PM
To: fshaik@environment.gov.za; Minister@environment.gov.za; jbuitendag@environment.gov.za
Subject: African Penguins

Dear Minister Creecy

I trust that you and your family are well during these current difficult times.

I am writing to enquire when we can expect to receive replies to our two letters (both attached herewith):

1. Ship-to-ship bunkering in Algoa Bay: concerns from environmental stakeholders (dated 22 July 2019)
2. Fishing exclusions around African Penguin colonies – request for urgent appraisal of mitigation measures to avert current rapid population decline (dated 1 November 2019).

I look forward to hearing from you.

Regards
Mark

Mark D. Anderson
Chief Executive Officer

BirdLife
SOUTH AFRICA
Giving Conservation Wings

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Subject: FW: African Penguins and Island Closures

From: Mark Anderson <ceo@birdlife.org.za>
Sent: Wednesday, February 10, 2021 5:22 PM
To: Hanneline Smit-Robinson <hanneline.smit-robinson@birdlife.org.za>; Alistair McInnes <alistair.mcinnes@birdlife.org.za>
Subject: FW: African Penguins and Island Closures

FYI (she asked me to email it to her at this address, and not the private address that we have been using for comms the past week).

From: Mark Anderson <ceo@birdlife.org.za>
Sent: Wednesday, 10 February 2021 17:21
To: Minister@environment.gov.za
Cc: Feroze Shaik <fshaik@environment.gov.za>; Nicholas Leontsinis <nleontsinis@environment.gov.za>
Subject: African Penguins and Island Closures

Dear Minister Creecy,

Following our discussion last week and again on Monday, I am pleased to inform you that BirdLife South Africa's Seabird Conservation Programme has provided inputs into a detailed synopsis of all the scientific evidence to date that supports the significance of forage fish prey to penguins and the benefits of island closures from the results of the experiment run by your department. The evidence in favour of island closures is overwhelmingly clear and a strong case is made for the long-term management of these areas. In addition to this, our team has partnered with other NGOs and UCT to contract the services of Futureworks, who have drafted a proposal for a multi-sector socio-economic study in a transparent process that includes the needs of both fisheries and ecosystem beneficiaries. This was proposed today by Ashley Naidoo (O&C) and he will be taking this proposal to senior management in DEFF. BirdLife South Africa has offered to co-fund this project, so that it can be expedited to help inform a management decision by you later this year.

Regards
Mark

Mark D. Anderson
Chief Executive Officer

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Giving Conservation Wings

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The science-based rationale for closing purse-seine fishing around key African Penguin breeding localities

AB Makhado[1], BJ Barham[2], PJ Barham[2], T Carpenter-Kling[3], RJM Crawford[1a], C Hagen[3], A Kock[4], K Ludynia[5,8], M Makoala[1], M Masotla[1], AM McInnes[3], A Oosthuizen[4], L Pichegru[6], PG Ryan[7], LJ Shannon[8], K Shaw[9], RB Sherley[7, 10], M Stassen[12] and LJ Waller[5,11]

[1] Branch Oceans and Coasts, Department of Environment, Forestry and Fisheries, Cape Town, South Africa ([1a] formerly)
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[11] Department of Biodiversity and Conservation Biology, University of the Western Cape, Bellville, South Africa
[12] World Wide Fund for Nature, South Africa

Key Points on Scientific Evidence for Impacts of Food Availability on African penguins

- In South Africa, the African penguin population fell by c. 75% between 2004 and 2019 primarily due to food scarcity. At the colonies north of Cape Town, the rate of decline reached almost 10% per annum between 1999 and 2019.
- Peer-reviewed, published research has demonstrated significant relationships between demographic, condition and foraging parameters of seabirds of the Benguela ecosystem and the abundance or availability of their prey e.g.
    - African Penguins are susceptible to food scarcity during breeding and before and after moult, life-history stages that are occur throughout the year in many extant colonies.
    - Prey decreased and remained below thresholds required for African Penguins in the west of South Africa to have sufficient reproduction and survival to maintain their populations.
    - There was a sharp rise in the mortality of adults at Robben Island after the biomass of sardine off the west of South Africa fell below 25% of its maximum observed value.
    - A system dynamics model suggested that the penguin population at Robben Island was strongly driven by food availability, both near the island and farther afield.
    - Diminishing African Penguin colonies may suffer from Allee effects (inverse density dependence), reducing their chances of recovery and increasing their likelihood of extinction.
- Specifically with respect to island closures:
    - Predominately positive and clear overall benefits of year-round island closures for penguins have been demonstrated in several peer-reviewed scientific publications and requested follow-up analyses.
    - Population projection models indicate island closures will make meaningful contributions to reducing the extinction risk of the colonies around which they are implemented.

- Across the period of closures, the rate of decrease of African Penguins was reduced off the west of South Africa and in Algoa Bay (where the year-round closures were applied) and there was limited growth of colonies in the southwest.

Background

The African Penguin *Spheniscus demersus*, which breeds in Namibia and South Africa, is Africa's only penguin. In the 1920s, it was probably Africa's most abundant seabird having an estimated 0.5–1 million breeding pairs (Shannon and Crawford 1999, Crawford et al. 2007c). It subsequently decreased to c. 17,700 pairs in 2019, of which c. 25% were in Namibia and c. 75% in South Africa (Sherley et al. 2020). It was classified by the International Union for Conservation of Nature (IUCN) as Endangered in 2010 (IUCN 2020) after large decreases in numbers in Namibia in the latter part of the 20th century (Crawford 2007) and South Africa in the early 21st century (Crawford et al. 2011).

African Penguins feed mostly on small, shoaling pelagic fish species, especially anchovy *Engraulis encrasicolus* and sardine *Sardinops sagax*, which are also harvested by southern Africa's purse-seine fisheries (Crawford et al. 2011). The collapses of penguins in Namibia and South Africa followed large decreases in sardine biomass in those countries (Shelton et al. 1984, Crawford et al. 2011).

African Penguin Biodiversity Management Plan

Following the classification of the African Penguin as Endangered, the South African government published a *Biodiversity Management Plan for the African Penguin* (BMP-AP) in 2013, in terms of the National Environmental Management: Biodiversity Act (Act 10 of 2004). It aimed to halt the decline of the African Penguin population in South Africa within two years of its implementation and after that to achieve a population growth that would result in a down-listing of the species in terms of its IUCN Red List status. It failed in these objectives, with South Africa's penguin population falling by 30% between 2013 (c. 19,000 pairs) and 2019 (c. 13,200 pairs).

However, the BMP-AP achieved many of its subsidiary goals, including reducing losses to predation through the removal of damage-causing animals; rescuing, rehabilitating and returning to the wild oiled and injured birds and abandoned chicks; implementing measures to curtail the spread of pathogenic viruses; improving nesting habitat at several colonies through the deployment of specially-designed nest boxes and the provision of suitable vegetation under which to breed; investigating and taking steps to initiate a colony for African Penguins at De Hoop Nature Reserve, which is near to the present distributions of its primary forage resources and where penguins nested in the early 2000s; ensuring preparedness to cope with oil spills; implementing standards and protocols for seabird rehabilitation; making an inventory of all African Penguins held in captivity in South Africa; and determining the genetic suitability of their offspring for release to bolster diminishing colonies.

The main reason for the continuing decrease of African Penguins in South Africa, despite the above interventions, is food scarcity (e.g. Robinson et al. 2015, Crawford et al. 2018, 2019). Unlike flying birds, African Penguins must swim to find food, limiting their foraging range while breeding (e.g. Pichegru et al. 2010). Furthermore, when in the cold waters of the Benguela upwelling system they require insulation against low temperatures and, to achieve this, replace their full plumage annually when they fast ashore for about three weeks (Randall et al. 1986). To survive the fast, they need to fatten sufficiently before moult and rapidly to regain condition after growing their new feathers. Therefore, African Penguins are especially susceptible to food scarcity during breeding and before and after moult life-history stages that are undertaken throughout the year in many of the remaining colonies (Crawford et al. 1995, 2006).

Influence of food on African Penguins and other Benguela seabirds

A large body of published research has highlighted the strong influence of food on seabirds in the Benguela ecosystem (Appendix 1). Congruence has been shown between trends in prey abundance and

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the population sizes of African Penguins and two other endangered seabird species that are endemic to the Benguela ecosystem, and that feed primarily on anchovy and sardine, Cape Gannet *Morus capensis* and Cape Cormorant *Phalacrocorax capensis* (Crawford and Shelton 1978, Crawford 2007, Crawford et al. 2007a, 2007b, 2011, 2019).

In several instances, significant relationships have been demonstrated between demographic, condition, growth and foraging parameters of these seabirds and the abundance or availability of their prey (summarised in Crawford et al. 2018, 2019). Notably, fish stocks has decreased and remained below thresholds required for African Penguins in the west of South Africa to have sufficient reproduction and survival to maintain their populations (Cury et al. 2011, Crawford et al. 2011, Robinson et al. 2015, Sherley et al. 2017).

The recent decrease of African Penguins in South Africa

In South Africa, in 2004 African Penguins bred at 19 localities, of which three had >5,000 pairs. Together, these localities held c. 52,000 pairs of penguins. Dassen Island was the largest colony with c. 25,000 pairs; St Croix had c. 10,000 pairs and Robben Island almost 8,000 pairs. However, 15 years later, in 2019 (a complete survey was not possible in 2020), the South African population had fallen by 75% to c. 13,200 pairs, breeding had ceased at five of the localities (a rate of loss of one colony every three years), no remaining colonies had >5,000 pairs, and the largest colony was c. 3,650 pairs at St Croix Island.

In the mid-2000s, there were losses of c. 45,000 African Penguin breeding adults at Dassen and Robben islands off the west of South Africa (Crawford et al. 2011, 2018). The estimated annual survival rate of adult penguins at these colonies decreased markedly after 2001 and 2003, respectively (Sherley et al. 2014). There was a sharp rise in the mortality of adults at Robben Island after the biomass of sardine off west South Africa fell below 25% of its maximum observed value (Robinson et al. 2015). The estimates of adult survival rates come from resightings of individuals within breeding seasons – in other words, they represent mortality during the non-breeding period (Sherley et al. 2014). Moreover, no unusual mortality was observed ashore, indicating that most of the penguins died at sea as a result of food scarcity (Crawford et al. 2018). Large losses of adults during their pre-moult fattening period corroborated this (Waller et al. 2019).

Closures to fishing

When in 2006 it became apparent that South Africa's penguins were decreasing rapidly and that their prey had shifted southeast (Roy et al. 2017, Coetzee et al. 2018), long-term exclusion of purse-seine fishing around two key southern breeding localities, which were near to the altered distributions of the prey resources, was recommended. Instead, in 2008 an experiment of alternately opening and closing fishing around two pairs of islands (Dassen and Robben in the west, St Croix and Bird in Algoa Bay) was implemented to determine the effect of such closures on the penguins (e.g. Sherley et al. 2018). This experimental design was implemented despite arguments that had been submitted by seabird scientists for longer-term closures that would accord with the African Penguins' ecology and life history. For example, young African Penguins wander widely over periods of up to six years before settling at localities to breed. In contrast, breeders show strong fidelity to their mates and breeding colonies (e.g. Hockey et al. 2005, Crawford et al. 2013). Hence, frequent alternation of closures may influence recruitment to colonies and jeopardise the species' adaptation to ecosystem change. Additional arguments were made that the islands in the paired systems showed marked dissimilarities in terms of their exposure to relative fishing intensity.

The results of the closure experiment have been extensively debated and not fully agreed. Nonetheless, several peer-reviewed scientific publications and requested follow-up analyses demonstrated predominately positive and clear overall benefits of the year round closures for penguins

(Figure 1, Pichegru et al. 2010, 2012, Sherley et al. 2015, 2018, 2019, Sherley 2020a,b), even though the experiment was not well-matched to their biology. Furthermore, across the period of year round closures, the rate of decrease of African Penguins was reduced off the west of South Africa and in Algoa Bay, where the closures were applied, and there was limited growth of colonies in the southwest (Sherley et al. 2020c). Additional studies highlight the influence of food availability and localised fishing activity on seabird colonies. In South Africa, commercial fishing around Dyer Island decreased the numbers of penguins breeding there (Ludynia et al. 2014) and a system dynamics model suggested that the penguin population at Robben Island was strongly driven by food availability, both near the island and farther afield, and would be improved by fishing closures (Weller et al. 2014). In Scotland, black-legged kittiwakes *Rissa tridactyla* benefitted from the closure of fishing around breeding colonies (e.g. Daunt et al. 2008). In Peru, fishing for Peruvian anchovy *Engraulis ringens* close to a Peruvian booby *Sula variegata* colony increased the birds' foraging effort; the more the fishery reduced the quantity of prey fish in the area, the farther the breeding seabirds needed to forage from the colony to find food (Bertrand et al. 2012). And off the Antarctica Peninsula, the performance of three species of *Pygoscelis* penguins was reduced when local harvest rates of Antarctic krill *Euphausia superba*, on which they fed, were ≥ 10% of the estimated biomass (Watters et al. 2020). In comparison, off west South Africa, harvest rates of sardine often exceeded 20% in the early 2000s and reached 44% in 2006 (Coetzee et al. 2008).

Probability of colony extinctions

Probabilities of extinctions of different-sized colonies of African Penguins over 40 years were obtained from observations on the performance of 41 discrete colonies from 1956–1996 (Crawford et al. 2001). Only one (<4 %) of 28 colonies that in 1956 had ≤250 pairs was extant in 1996, compared to 26% of those having 251–1,000 pairs, 67% of those having 1,001–5,000 pairs and 100% of those with >5000 pairs (Figure 2).

In South Africa, Dassen, St Croix and Robben Islands all held >5,000 pairs in 2004and, in terms of the above probabilities, had no likelihood of extinction within 40 years. Conversely, in 2019 none of the 14 remaining colonies had >5,000 pairs so that all had some chance of extinction within 40 years; seven had <250 pairs and hence a 96% chance of extinction (Figure 2). In 2019, six colonies held >1,000 pairs and so had a 67% probability of surviving 40 years: Dassen and Robben Islands on the west coast, Stony Point and Dyer Island on the southwest coast and St Croix and Bird islands in Algoa Bay. Additionally, the Simon's Town colony had c. 930 pairs. In 2019, the only Namibian colony having >1,000 pairs was Mercury Island (c. 2,220 pairs), which falls within the Namibian Islands Marine Protected Area (Ludynia et al. 2012). Namibia's next largest colony was at Halifax Island (825 pairs).

Allee effects

Diminishing African Penguin colonies may suffer from Allee effects, or inverse density dependence, reducing their chances of recovery and increasing their likelihood of extinction (Ryan et al. 2012). For example, African Penguins that forage in groups have a higher catch of prey per unit effort than solitary birds (McInnes et al. 2017, Figure 3) but colonies may become too small for sufficient foraging groups to form (Ryan et al. 2012, Figure 4). Similarly, smaller group sizes at sea are likely to limit anti-predator benefits afforded to penguins preening at sea. Dwindling colonies also mean that more birds nest near colony edges, where eggs and chicks are at greater risk to predation (e.g. Cordes et al. 1999, Figure 5), and may reduce information acquisition that facilitates food-finding (van Vessem and Draulans 1986, Wakefield et al. 2013). Amongst penguins taken to a rescue centre, females had higher mortality rates than males (Pichegru and Parsons 2014). If similar sex-biased mortality exists in the wild, it may skew sex ratios at small colonies and decrease productivity.

To minimise Allee effects and looming extinction, South Africa must take every possible measure to ensure the continued existence of its larger colonies, viz. Dassen, Robben, Dyer, St Croix and Bird (Algoa Bay) islands, Simon's Town and Stony Point.

Recommendations from AEWA *Benguela Current Forage Fish Workshop*

In November 2020, a *Benguela Current Forage Fish (BCFF) Workshop*, organized by AEWA (African-Eurasian Migratory Waterbird Agreement, to which South Africa is a party) in collaboration with the Benguela Current Convention (BCC, to which South Africa is a party) and BirdLife South Africa (BLSA) and hosted by South Africa's Department of Environment, Forestry and Fisheries (DEFF), recommended actions to be undertaken as a matter of urgency under the auspices of BCC, AEWA and the AEWA Benguela Coastal Seabird International Working Group, as well as by the national governments of Angola, Namibia and South Africa. These included:

- developing tools to increase the availability of sufficient forage [fish] for threatened endemic Benguela seabird species, such as setting ecosystem thresholds (i.e. sizes of forage resource populations below which a range of precautionary measures relating to fishing would be implemented at various spatial scales) and closing key foraging areas to fishing, adjacent to major seabird colonies;
- and facilitating and prioritising the recovery of seabird colonies to sufficient size to minimise known and potential Allee effects, thus reducing the probability of colony extinctions (AEWA 2020).

Economic and ecosystem considerations

It is understood that closures may have economic implications for South Africa's purse-seine fishery, affecting an estimated 0.4–6.6% of their total catch annually (Turpie et al. 2012, Bergh et al. 2016), However, at present no reduction in allowable catches is being proposed, and it is noted that in the past the fishery has adjusted to altered distributions of its target species, e.g. moving the centre of sardine catches from north of Saldanha Bay in the west to Mossel Bay in the south (Fairweather et al. 2006). Further, more profitable, sustainable, alternative uses (e.g. for human consumption) of harvested forage fish currently used for fishmeal should be reviewed and promoted to encourage a more efficient and sustainable utilization of this resource (AEWA 2020). Moreover, unless decisive action is taken to save the African Penguin and other endemic seabirds that compete with the purse-seine fishery, their status is likely to deteriorate further with adverse implications for biodiversity conservation and South Africa's marine ecotourism industry – which expanded rapidly in the present century and had a value of > R2 billion in 2014 (WWF-SA 2016) – and associated communities (e.g. Saul and Fortuin 2015).

South Africa's seabirds provide several ecosystem benefits. When breeding, they are central-place foragers that transfer large quantities of nutrients from the ocean to their colonies. This influences the functioning of island and headland ecosystems and adjacent marine areas, e.g., increasing algal growth and changing the structure of intertidal communities, which augment populations of several shorebird species (Bosman and Hockey 1988). Inputs by seabirds of nitrogen (N) and phosphorus (P) are substantial, with concentrations per unit of surface area among the highest measured on the Earth's surface. Additionally, an essential fraction of the total excreted N and P is readily soluble, increasing the short-term bioavailability of these nutrients in coastal waters (Otero et al. 2018). Not only do seabirds have such beneficial bottom-up impacts, but they also exert valuable top-down control. For example, they may select prey that are small or in poor body condition and by removing substandard individuals may ensure the long-term survival of prey populations (Tucker et al. 2016). Seabirds facilitate feeding by other species; e.g. African Penguins herd prey shoals upwards, making them available to birds restricted to feeding near the surface (McInnes and Pistorius 2019).

Conclusions

IUCN classifies the African Penguin as Endangered. In South Africa, its population fell by 75% between 2004 and 2019 primarily due to food scarcity. Substantial efforts were made to minimise non-food threats to penguins. However, their numbers continued to decrease, five colonies went extinct, and seven others now have a high probability of extinction in the near future. It is critical to give South Africa's seven larger colonies the maximum possible protection and to do so all year in order to allow for sufficient food availability for all phases of their life cycle. These foraging grounds thus need to be closed to purse-seine fishing, as recommended by DEFF's Top Predator Working Group. This may have economic costs for the fishery but will benefit biodiversity conservation, ecotourism, and ecosystem functioning. It may prove necessary to implement other conservation measures recommended by the AEWA BCFF workshop, such as the introduction of ecosystem thresholds.

Recommendation

As soon as is practically possible, purse-seine fishing should be excluded year-round in areas within a 20-km radius of South Africa's seven most populous African Penguin colonies, viz. Dassen, Robben, Dyer, St Croix and Bird (Algoa Bay) islands, Simon's Town and Stony Point. (This is already the case for Simon's Town.)

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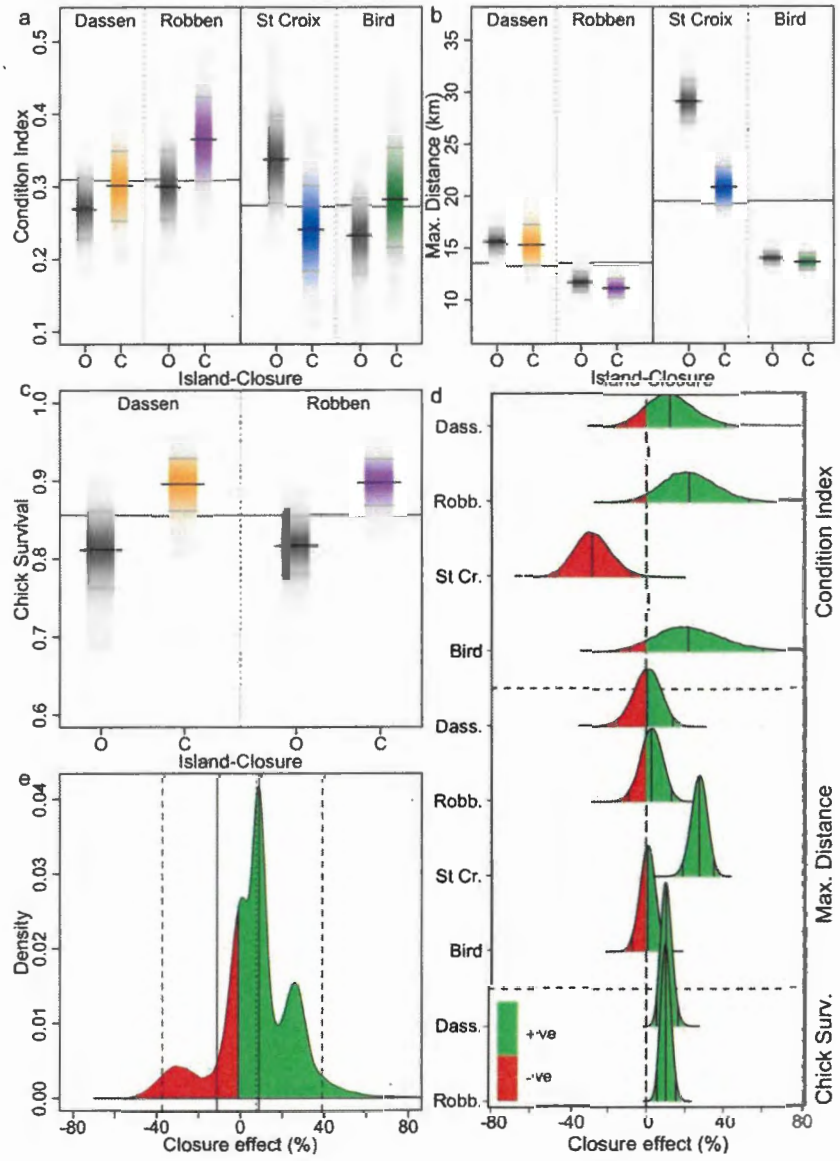

Figure 1 (from Sherley et al. 2019). Posterior distributions, means and 95% highest posterior density interval (HPDI) for (**A**) chick body condition index and (**B**) the maximum distance travelled by foraging penguins at Dassen, Robben, St Croix and Bird islands, and for (**C**) chick survival at Dassen and Robben islands for years when fishing was permitted ['O'] or not permitted ['C']. Open ['O'] results are shown in black, Closed ['C'] are in orange for Dassen, purple for Robben, blue for St Croix, dark green for Bird. The horizontal solid black lines show the overall mean at each island pair for chick condition (in **A**) or maximum distance (in **B**) across 11 years (2008–2018) and chick survival (in **C**) across 8 years (2008–2015), grey lines the 95% HPDI and grey polygons the range of the posterior distribution. (**D**) Posterior distributions for the percentage difference between 'Closed' years and 'Open' years for chick body condition [Condition Index], the maximum distance travelled from the island by foraging penguins [Max. Distance] and chick survival [Chick Surv.] at Dassen [Dass.], Robben [Robb.], Bird and St Croix [St Cr.] islands. The mean and 95% HPDI are shown on each posterior distribution as solid black lines. The zero axis (no effect of closure) is shown as a dashed black line. (**E**) Posterior distribution (polygon), median (dotted black line) and 95% HPDI (dashed black lines) for the Overall Closure Effect (%) based on combining the 10 individual posteriors in D. In (**D**) and (**E**), all samples yielding a positive % effect for penguins are shown in green and those yielding a negative % effect are shown in red.

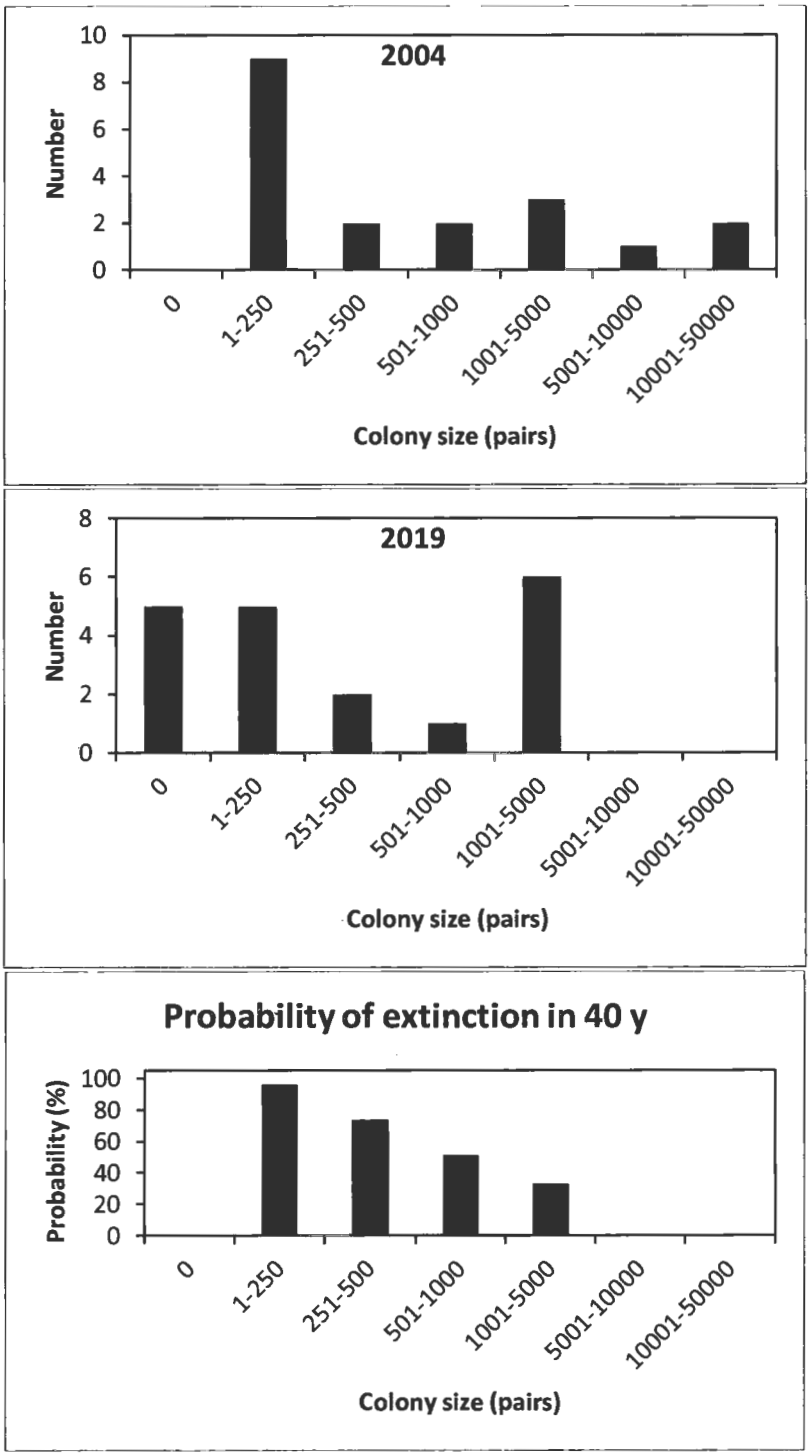

Figure 2. Top and centre: numbers of African Penguins colonies of different sizes in South Africa in 2004 and 2019, respectively. Also shown are numbers of colonies where breeding occurred since 1956 that were extinct in 2004 and 2019 (indicated by colony size = 0). Bottom: probabilities of extinction over a 40-y period of African Penguin colonies of different sizes derived from empirical information (Crawford et al. 2001).

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Figure 3. African Penguins surface after a foraging dive. All are circling in a clockwise direction, indicative that they have been feeding on a compressed prey shoal (Ryan et al. 2012, photo L Edwards).

Figure 4. A flock of African Penguins numbering at least 158 birds resting on the sea surface after a foraging dive (Ryan et al. 2012, photo L Edwards). In 2019, numbers of penguins breeding at four of South Africa's 14 extant colonies (Malgas, Seal in False Bay, Jahleel and Brenton islands) were less than this amount.

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Figure 5. Groups of African Penguins nesting at Bird (top) and St Croix (bottom) islands in Algoa Bay. The walls of buildings were used to minimize edge effects and provide shade (photos RJM Crawford).

Appendix 1. A preliminary list of peer-reviewed papers and book chapters demonstrating the strong influence of food on the distribution, abundance, demographic, condition and foraging parameters of seabirds of the Benguela ecosystem. Note that the publications are ordered first chronologically by year and then alphabetically by author.

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AM M.L

Subject: FW: SANParks_BirdLife South Africa meeting re African Penguins

From: Mark Anderson <ceo@birdlife.org.za>
Sent: Wednesday, March 24, 2021 10:19 AM
To: Luthando Dziba <Luthando.Dziba@sanparks.org>; Stef Freitag-ronaldson <stef.freitag@sanparks.org>; Hanneline Smit-Robinson <hanneline.smit-robinson@birdlife.org.za>; Christina Hagen <christina.hagen@birdlife.org.za>; Alistair McInnes <alistair.mcinnes@birdlife.org.za>; Tegan Carpenter-Kling <Tegan.Carpenter-Kling@birdlife.org.za>
Subject: FW: SANParks_BirdLife South Africa meeting re African Penguins

Dear colleagues

FYI, see attached letter.

Thanks Christina for your assistance with the drafting of the letter.

Regards
Mark

From: Mark Anderson <ceo@birdlife.org.za>
Sent: Wednesday, 24 March 2021 10:17
To: Feroze Shaik <fshaik@environment.gov.za>; Minister@environment.gov.za
Cc: Minister Creecy
Subject: SANParks_BirdLife South Africa meeting re African Penguins

Dear Minister Creecy

Please see attached letter.

We are getting increasingly concerned about the African Penguin which, very unfortunately, is edging closer and closer to the edge of the extinction precipice.

Regards
Mark

Mark D. Anderson
Chief Executive Officer

BirdLife SOUTH AFRICA
Giving Conservation Wings

Isdell House, 17 Hume Road (cnr Hume Road/Jan Smuts Drive), Dunkeld West 2196, Gauteng
Private Bag X16, Pinegowrie 2123, Johannesburg, Gauteng, South Africa
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Cell: +27 (0) 82 788 0961
E-mail: ceo@birdlife.org.za

AM

BirdLife South Africa is a partner of BirdLife International, a global partnership of nature conservation organisations.
Member of IUCN (International Union for Conservation of Nature).
Reg No: 001 – 298 NPO
PBO Exemption No: 930004518

24 March 2021

Minister Barbara Creecy
Department of Environment, Forestry and Fisheries
Private Bag X447
Pretoria
0001

By email minister@environment.gov.za
and per fshaik@environment.gov.za

Dear Minister Creecy

As you urged, BirdLife South Africa and SANParks met virtually on 24 February 2021. Luthando Dziba (Managing Executive of Conservation Services) co-chaired the meeting with me. Also in attendance were representatives from the SANPark's Parks Division and Scientific Services. Joining me from BirdLife South Africa were our Head of Conservation and members of our Seabird Conservation Programme. The aim of the meeting was to discuss how BirdLife South Africa and SANParks can more effectively collaborate, especially on African Penguin conservation. Both organisations are deeply concerned about the drastic decrease in penguin numbers and know that it will take all stakeholders working together to implement the necessary conservation measures.

At the meeting, BirdLife South Africa presented a summary of the status and threats to African Penguins in South Africa, highlighting a lack of prey as the most significant threat. However, there are also emerging threats in Algoa Bay, such as ship-to-ship bunkering and an associated increase in shipping traffic that are of concern especially regarding marine noise pollution. The key conservation actions in which BirdLife South Africa are involved include the island closure experiment, engagement with the Fisheries branch of DEFF around an Ecosystem Approach to Fisheries management, automated penguin monitoring and the creation of new penguin colonies. SANParks presented on the dramatic decreases in penguin numbers at the colonies which they manage, particularly St Croix Island in recent years. SANParks also gave a summary of the engagements that are happening within the Penguin Task Team, notably the drafting of a State of Knowledge report on penguins and the island closure experiment. Following the presentations, discussions were focused on four themes:

1. Current conservation actions: the current priority is the island closures initiative. While both organisations believe there is enough evidence to support precautionary closures, we understand the need for rigorous scientific debate in light of the socio-economic complexities of the situation. However, because of the nature of the disagreements

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between the different analyses, it may not be possible to provide enough scientific evidence to come to a consensus among all involved to reach an agreed decision. Considering the status of the penguin, taking a decision based on the precautionary principle is a justified, responsible choice and an adaptive management approach can be followed, allowing for changes to be made in future if data or analyses support this. SANParks is involved in the task team but will call on BirdLife South Africa where and when necessary for input. Since this meeting, members of our Seabird Conservation Programme have engaged with the SANParks scientists on the Task Team.

2. Coordinated influence and action: ideas on how to improve the messaging and raise awareness (of the general public as well as within various levels of government) about the plight of the African Penguin and their role as indicators of ocean health were discussed.
3. Collaborations: Further partnerships should be formalised with other organisations such as CapeNature and SANCCOB.
4. An MOU between BirdLife and SANParks: the areas of collaboration should be formalised in an MOU which covers African Penguin conservation but also other areas of conservation such as vultures and identifying important wetlands for the expansion of protected areas.

Yours sincerely

Mark D. Anderson
Chief Executive Officer

Isdell House, 17 Hume Road
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www.birdlife.org.za

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"AM22"

Subject: African Penguin meeting: 19 April 2021

From: Mark Anderson <ceo@birdlife.org.za>
Sent: Friday, May 7, 2021 2:33 PM
To: Minister@environment.gov.za
Cc: Ashley Naidoo <ashleynaidoo22@gmail.com>; Nicholas Leontsinis <nleontsinis@environment.gov.za>; Feroze Shaik <fshaik@environment.gov.za>; Du Plessis, Morne <mduplessis@wwf.org.za>; Lauren Waller <lauren@sanccob.co.za>; Alistair McInnes <alistair.mcinnes@birdlife.org.za>; stephen@sanccob.co.za; Kim Prochazka <KimP@daff.gov.za>
Subject: African Penguin meeting: 19 April 2021

Dear Minister

Please see attached letter and minutes.

Thanks again for the opportunity to meet with you, and for all you're doing to support the conservation efforts to save the embattled African Penguin.

Regards
Mark

Mark D. Anderson
Chief Executive Officer

BirdLife SOUTH AFRICA
Giving Conservation Wings

Isdell House, 17 Hume Road (cnr Hume Road/Jan Smuts Drive), Dunkeld West 2196, Gauteng
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SANCCOB saves seabirds

BirdLife SOUTH AFRICA Giving Conservation Wings

WWF

Ministerial Brief: African Penguins and Island Closures

Feedback and way forward following meeting on 19 April 2021

5 May 2021

Minister Barbara Creecy
Department of Forestry, Fisheries and the Environment
Private Bag X447
Pretoria
0001

Dear Minister Creecy

We would like to extend our appreciation to you for taking time to meet with us on 19 April 2021 to discuss the African Penguin crisis and broader marine ecosystem concerns. We feel that the meeting was fruitful.

We would like to use this opportunity to provide further details to the three proposed outcomes of the meeting (with reference to the proposed way forward in the attached minutes) and thus facilitate the implementation of these recommendations:

1. **Proposed socio-economic study**

   The socio-economic study was proposed to help inform the current Governance Forum on African Penguin Island Closures. Scientists from DFFE: O&C, SANCCOB, BirdLife South Africa, WWF-SA and UCT have solicited proposals from two consultants for a socio-economic study to help understand the relative contributions that small pelagic fish provide to different sectors, including the purse-seine and ecotourism sectors (as the key food source for several marine predators that have high ecotourism value). SANCCOB and BirdLife South Africa have raised funds for an initial assessment, but we would value insights into the following before we formerly appoint a suitable consultant:

   a. At what stage would such a study be crucial to informing outcomes of the Governance Forum and what are the expected timelines to ensure that such a study can contribute meaningfully to this process? We anticipate that the study will take a minimum of two months to be completed depending on the agreed upon scope of this study.

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b. In order to maintain transparency with the implementation of this study, please can you direct us to the appropriate senior managers or working groups within your department with whom we can discuss the proposed study.

2. Governance Forum peer-review process

We have provided, on request by the drafting team of the State of Knowledge report, nominations for the seabird-prey specialists who we believe should form part of the panel (i.e. in addition to the FAO member which you suggested). We would be more than happy to provide further nominations if required.

3. Proposal to develop an Ecosystem Approach to Fisheries (EAF) Management study

Within the next month, WWF-SA will be leading on the engagements between DFFE: O&C, DFFE: Fisheries Management, SANCCOB and BirdLife South Africa to determine the most suitable approach for the revitalizing of an EAF in DFFE and to identify how NGOs and experts who are external to the department could best support the implementation of this approach.

Yours sincerely

Dr Morné du Plessis
CEO: WWF South Africa

Dr Stephen vd Spuy
CEO: SANCCOB

Mark D. Anderson
CEO: BirdLife South Africa

Ministerial Brief: African Penguin Island Closures

19 April 2021

Attendance

Minister Barbara Creecy (BC, DFFE)
Mr Ashley Naidoo (AN, DFFE: Oceans and Coast)
Dr Kim Prochazka (KP, DFFE: Fisheries Research & Development)
Nicholas Leontsinis (NL - DFFE)
Feroze Shaik (FS - DFFE)
Mr Mark D. Anderson (MDA, BLSA CEO)
Dr Morne du Plessis (MdP, WWF-SA CEO)
Dr Lauren Waller (LW, SANCCOB)
Dr Alistair McInnes (AM, BLSA Seabird Conservation Programme)

Agenda

1. Introductions
2. Aims of meeting
3. NGO/Academic institutions concerns
4. Presentation
5. Proposed way forward (NGOs)
6. Status process of DFFE Governance Forum
7. Discussion
8. Proposed way forward (BC)

Aims of meeting (MDA)

1. Emphasise the scale of the African Penguin problem
2. Presentation of the scientific basis of the NGO/Academic sectors' case
3. Provide concrete suggestions on how to proceed

Presentation (LW):

Herewith pdf of presentation attached. The presentation was compiled by:
SANCCOB – Dr Lauren Waller
BirdLife South Africa – Dr Alistair McInnes, Christina Hagen, Dr Tegan Carpenter-Kling
WWF-SA – Craig Smith, Monica Stassen
University of Cape Town (Biological Sciences) – Dr Lynne Shannon
Nelson Mandela University – Dr Lorien Pichegru
With an important acknowledgement of the scientific inputs of Dr Richard Sherley from University of Exeter.

We wanted to achieve the following:
1. Re-emphasise the crisis facing the African penguin, the real extinction risk and the urgent need for a long-term management decision on island closures.
2. Highlight that our concern is not only about the African penguin but about the health of the marine ecosystem more broadly given the many negative signals that have been recorded in recent years.

3. Reflect on the substantial number of peer-reviewed scientific papers that provide extensive details of the African penguin decline and the role that reduced local food availability is having on this trend and the benefits of fishing closures around breeding colonies.
4. Indicate our support to the department and provide some suggested ways forward.

Proposed way forward (NGOs, MdP):

1. Clear and decisive interventions to address the precipitous decline in African Penguin numbers, including:
    a. Extended closure of small pelagic fishing around the six critical breeding colonies.
    b. An urgent plan to address sustainability challenges of the small pelagic fisheries in the interest of both people and related ecosystems (including penguins).
2. DFFE supports inclusive socio-economic study.
3. The DFFE report to be peer reviewed by a panel of three internationally recognised scientists representing all fields of science involved in the experiment.
4. The Small Pelagic Fisheries Scientific Working Group to include adequate representation of ecosystem scientists as members.
5. The Ecosystem Approach to Fisheries Working Group to be reinvigorated.

Status and process of DFFE Governance Forum (AN)

1. A report will be submitted to the DDGs on 30 April including a summary of available science, science gaps, suggestions and impacts of different island closure scenarios on the small pelagic fishery and penguins.
2. Update of progress to date and planned way forward before submission:
    a. Multiple Task Team meetings have been convened.
    b. Editor of African Journal of Marine Science will review the document.
    c. Document to be circulated to various working groups for review. Comments will be added to the document as an annex.
3. Processes post submission of document to Minister's office:
    a. Expert review.
    b. Scenario selection.
    c. Engagement with industry and conservation sectors.
    d. Development of legal framework on interpretation and implementation of the precautionary approach.

Discussion

<u>Scientific results and minimising litigation</u>
BC is mindful of the urgency of the African Penguin situation and emphasised the need to understand how best to manage competing stakeholder interests. BC highlighted the importance of having the scientific evidence to back up decisions and thus to resolve differences in scientific outputs to motivate for a management decision on island closures. BS further noted that this was important to minimise potential litigation from the fishing industry.
MdP noted that the potential for litigation from the fishing industry needed to be weighed up against socio-economic and environmental rights as enshrined in the constitution.
BC acknowledged the need for an external review process and indicated a desire to have the FAO as part of the review in order to get fisheries on board.

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Ecosystem Approach to Fisheries Management (EAF)
MDA and MdP reiterated recent negative ecosystem 'signals' and the implications of current and future management of the marine ecosystem.
BS noted that an Ecosystem Approach to Fisheries (EAF) management was crucial and acknowledged that an EAF had been abrogated through disuse in recent years within the DFFE and that there was a need to re-invigorate an EAF. BC indicated a need to go back to basics, getting agreement on what EAF means; level of compliance by DFFE in this regard and the broader benefits of and EAF?

Socio-economic study
AM expressed concern about the lack of adequate and current socio-economic information to inform the outcomes of the Governance Forum. AM enquired if NGO and academic support to a proposed study could inform the Governance Forum process and what the timelines would be.
AN affirmed that a study of this nature is warranted but that it would have to completed in the short-term (i.e. months). AN explained that a proposed socio-economic study should be inclusive of fishing communities that rely on healthy supplies of forage fish, e.g. various linefish fisheries. AN expressed the need for time-series data of socio-economic metrics so that this data can be compared to biodiversity monitoring data collected by the department.
KP was supportive of a balanced approach that includes multiple stakeholders and expressed concern for a lack of capacity within the department.
BC was supportive of a socio-economic study to inform the outcome of the Governance Forum.

Engaging with Media on this Sensitive Issue
LW indicated to BC that our sector is regularly approached by the public and media to comment on the island closure experiment. LW enquired as to how BC and her department can best be supported by the NGO/academic sector, while at the same time informing the public. BC confirmed that we are advising her department on matters related to seabird and fishery interactions; that we can/should express our views; highlighting that we are aware that DFFE staff are looking at all aspects of the science in order to make an informed decision; that we have a strong view of the relationship between penguins and prey biomass.

Proposed way forward (DFFE)

1. Non-government sector to provide support for a socio-economic study that will inform decisions coming from the Governance Forum. Proposed Action: NGOs to provide funds for such a study and to engage with DFFE in order to inform and leverage required support/collaboration.
2. A transparent, impartial, peer-reviewed process be initiated that includes FAO member and seabird-prey specialists.
3. DFFE's O&C and Fisheries branches, with the support of NGOs and academic institutions, conceptualise a proposal to develop an EAF management study to propose an effective way forward with addressing EAF concerns.

AM
M.F

Subject: FW: EDMS MCE203367 Letter to Mr Anderson

From: Mark Anderson <ceo@birdlife.org.za>
Sent: Friday, July 23, 2021 12:50 PM
To: Alistair McInnes <alistair.mcinnes@birdlife.org.za>
Cc: Hanneline Smit-Robinson <hanneline.smit-robinson@birdlife.org.za>
Subject: FW: EDMS MCE203367 Letter to Mr Anderson

Hi Alistair

See attached.

Please send to your relevant staff and colleagues at other organisations.

Thanks
Mark

From: Liesl Jacobs <lijacobs@environment.gov.za>
Sent: Friday, 23 July 2021 10:43
To: Mark Anderson <ceo@birdlife.org.za>
Cc: Janine Buitendag <jbuitendag@environment.gov.za>; Itebogeng Chiloane <ichiloane@environment.gov.za>
Subject: EDMS MCE203367 Letter to Mr Anderson

Dear Mr Anderson

Please receive the attached letter from Minister Creecy for your attention.
Kindly acknowledge receipt thereof.

Regards
Liesl Jacobs

AOT M.C.

MINISTER
FORESTRY, FISHERIES AND THE ENVIRONMENT
REPUBLIC OF SOUTH AFRICA

Private Bag X447, Pretoria, 0001, Environment House, 473 Steve Biko Road, Tel: (012) 399 8743
Private Bag X9052, Cape Town, 8000, Tel: (021) 469 1500, Fax: (021) 465 3362

Ref: EDMS MCE203367

Mr Anderson
CEO: BirdLife South Africa
Private Bag X16
PINEGOWRIE
2123
South Africa

Email: ceo@birdlife.org.za

Dear Mr Anderson

SOUTH AFRICAN NATIONAL PARKS – BIRDLIFE SOUTH AFRICA MEETING RE AFRICAN PENGUINS

I refer to your letter of 24 March 2021.

Concern regarding the decrease of African penguins led to publication in 2013 of the *"Biodiversity Management Plan for the African Penguin Spheniscus demersus"* (AP-BMP) in terms of the National Environmental Management: Biodiversity Act of 2004. The aim of the Management Plan was to halt the decline of the African penguin population in South Africa within two years of its implementation, and thereafter to achieve a population growth that would result in a down-listing of the species in terms of its International Union for the Conservation of Nature (IUCN) Red List status.

The AP-BMP addressed habitat loss, establishment of new colonies, predation pressure, avian disease, chick rescue and rehabilitation as well as rehabilitation of oiled birds. The AP-BMP was implemented through extensive collaboration between the department, provincial authorities and non-government organisations, such as Birdlife South Africa. The Management Plan did not achieve the key objectives, with South Africa's penguin population falling by 30% between 2013 and 2019. However, many of its subsidiary goals have been achieved, including:

- reducing losses to predation through the removal of damage-causing animals;
- rescuing, rehabilitating and returning to the wild, oiled and injured birds and abandoned chicks;
- implementing measures to curtail the spread of pathogenic viruses;
- improving nesting habitat at several islands through the deployment of specially-designed nest boxes; and
- taking steps to initiate a colony for African Penguins at De Hoop Nature Reserve amongst others.

To address the latest concerns by the public, I have requested relevant Branches of the Department of Forestry, Fisheries and the Environment (DFFE) as well as SANParks to establish a technical task team to evaluate available scientific information, identify information gaps and provide a set of management recommendations. This will assist me in making an informed decision. The document and its recommendations will require external review and stakeholder engagement. The subsequent decisions will be based on the principles of the National

FISHING EXCLUSION AROUND AFRICAN PENGUIN COLONIES

Environment Management Act, and in particular the principles of conservation, precautionary approach and sustainable utilisation of marine resources.

Although the African penguin population is exposed to a multitude of stressors, the technical task team has identified food availability, habitat degradation as a result of increased anthropogenic activity around breeding colonies and oil pollution as the main reasons for the continuing decline of African penguins. This will be a complex situation to resolve in a manner that is supported by all relevant internal and external stakeholders.

I want to ensure you that conservation of the African penguin is receiving priority attention by my office through the relevant department Branches in support of sustainable utilisation of South African marine resources. Therefore, the content of your letter is noted in a positive manner towards further collaboration between BirdLife South Africa and the agencies and branches within the department.

Yours sincerely

BBK

MS B D CREECY, MP
MINISTER OF FORESTRY, FISHERIES AND THE ENVIRONMENT

DATE: 22/7/2021

PS I am away for a week attending a climate ministers meeting but will touch base on this matter on my return

AOT
M.K

Subject: FW: Documents relating to Decline in the African Penguin Population, the Small Pelagic Fishery and Island Closures

From: Mark Anderson <ceo@birdlife.org.za>
Sent: Friday, August 13, 2021 9:08 PM
To: Alistair McInnes <alistair.mcinnes@birdlife.org.za>; Lauren Waller <lauren@sanccob.co.za>; Smith, Craig <csmith@wwf.org.za>; Du Plessis, Morne <mduplessis@wwf.org.za>; Stephen Spuy <Stephen@sanccob.co.za>
Cc: Pichegru, Lorien (Dr) (Summerstrand Campus South) <lorien.pichegru@mandela.ac.za>; Lynne Shannon <lynne.shannon@uct.ac.za>; pryan31@gmail.com; Richard Sherley <richard.sherley@gmail.com>
Subject: FW: Documents relating to Decline in the African Penguin Population, the Small Pelagic Fishery and Island Closures

Dear colleagues

See below and attached.

We need to nominate three people to represent "conservation organisations" (I am not sure whether these organisations include SANParks and CapeNature).

Any suggestions on how we determine who these three people will be, especially considering that they will need (a) knowledge of the African Penguin's biology and (b) expertise in modelling and other scientific methods (so that they can counter any of the fisheries' scientists arguments)?

My proposal is that our representatives are Alistair, Lauren and Craig?

Regards
Mark

From: Bukeka Bandezi <bbandezi@environment.gov.za>
Sent: *Friday, 13 August 2021 20:21*
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Subject: Re: Documents relating to Decline in the African Penguin Population, the Small Pelagic Fishery and Island Closures

Dear Stakeholders

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Following the meeting convened by Minister Creecy on 12 August to discuss proposals to address the decline in the breeding populations of the African Penguin, attached please find the following:

- Presentation made at the meeting
- Synthesis of Current Scientific Information Relating to the Decline in the African Penguin Population, the Small Pelagic Fishery and Island Closures

As agreed at the meeting, nominations are requested as follows: 3 representatives from the fishing industry; and 3 representatives from conservation organisations.

The first workshop is scheduled to take place on 31 August 2021. An agenda and invitation will follow.

Kind Regards
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ANNEXURE A

REPORT TO THE MINISTER,

Department of Forestry, Fisheries and the Environment

A Synthesis of Current Scientific Information Relating to the Decline in the African Penguin Population, the Small Pelagic Fishery and Island Closures

Contributors in alphabetical order:

Janet Coetzee (Fisheries Management), Alison Kock (SANParks), Cloverley Lawrence (SANParks), Azwianewi Makhado (Oceans & Coasts), Makhudu Masotla (Oceans & Coasts), Herman Oosthuizen (Oceans & Coasts), Fannie Shabangu (Fisheries Management) and Carl van der Lingen (Fisheries Management).

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Photo: Eduard Drost

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Executive Summary

"Penguins and fishermen have the same needs. They both want to fish as close to their shores/islands as possible with the least cost. For the fishermen their costs are monetary, for the penguins their costs are energetic".

A joint 'Governance Forum' (GF or Decision-making Forum), comprising DDGs and senior officials of Branch: Oceans and Coasts (B: O&C) and Branch: Fisheries Management (B: FM), as well as South African National Parks (SANParks), was established by the Department of Forestry, Fisheries and the Environment (DFFE) on 22 February 2021 to synthesise scientific information relating to the decline of the African penguin *Spheniscus demersus* and closures to fishing around their breeding colonies to enable the Minister to make decisions in this regard. The Minister advised that the GF should be guided by the National Environmental Management Act (NEMA, Act 107 of 1998) and its principles of (amongst others) conservation, sustainable use and the precautionary approach. This was in response to recommendations to the Minister by SANParks and the TP-SWG (B: O&C) that were supported by Birdlife SA, WWF-SA, SANCCOB and others to immediately implement long-term closures to purse-seine fishing around the six largest penguin breeding colonies. The GF established a Drafting Team (DT) comprised of DFFE and SANParks scientists to prepare a report on the current state of African penguins, relevant fisheries management and the socio-economics of island closures and penguin-related tourism. This report provides such a synthesis.

Status of the African penguin

The African penguin breeds only in Namibia and South Africa. In the 1920s, it was probably Africa's most abundant seabird, having an estimated 0.5–1 million breeding pairs. It subsequently decreased to ~17 700 pairs in 2019, of which ~25% were in Namibia and ~75% in South Africa. After large decreases in the Namibian population in the latter part of the 20th century and in the South African population in the early 21st century, the species was classified as Endangered on the Red List of the International Union for Conservation of Nature in 2010.

In 2004, ~52 000 pairs of African penguins bred at 19 localities in South Africa, but 15 years later, in 2019, the population had fallen by 75% to ~13 200 breeding pairs, and five colonies became extinct. Based on their sizes, all South Africa's colonies now have a substantial probability of extinction, particularly the smaller ones (<250 breeding pairs), and it is expected that South Africa will lose another seven colonies in the near future. Because larger colonies have a lower probability of extinction, it is imperative to save the seven South African colonies that at present have >900 breeding pairs: at Dassen and Robben islands on the west coast, Simon's Town, Stony Point and Dyer Island on the southwest coast, and St Croix and Bird islands in Algoa Bay. The recent estimates of the African penguin population in South Africa reflect the dire situation it is in: if current population trajectories continue, it could be functionally extinct by 2035.

Responses to the African penguin's decline

The listing of the African penguin as Endangered in 2010 triggered several initiatives to secure its future, including the development of an African Penguin Biodiversity Management Plan (BMP-AP) that was gazetted in 2013 in terms of the National Environmental Management: Biodiversity Act (NEMBA, Act 10 of 2004). The BMP-AP had a five-year timeframe and aimed to halt the decline of the African

penguin population in South Africa within two years of its implementation and after that to achieve a population growth that would result in a down-listing of the species in terms of its IUCN Red List status. It failed in these objectives. However, the BMP-AP achieved a number of its subsidiary goals and several management actions were implemented, including: (i) improved cooperative management; (ii) population reinforcement; (iii) improved breeding-habitat management; and (iv) improved management of the captive population.

In response to the reduction in numbers of African penguins, DFFE's Small Pelagics Scientific Working Group (SWG-PEL) developed a penguin-population model for use in conjunction with the operational management procedure (OMP) for small pelagic fish and experimentally closed purse-seine fishing around some key island breeding colonies on a short-term, rotational basis. However, these initiatives also failed to halt the decrease of penguins in South Africa.

Drivers of African penguin food availability and penguin-fish interactions

African penguins depend mainly on energy-rich sardine *Sardinops sagax* and anchovy *Engraulis encrasicolus* for food, although other small pelagic fishes and squid are also eaten. Both the abundance and quality of prey are important in influencing their population dynamics. Unlike flying seabirds, African penguins must swim to find food, which limits their foraging range particularly while breeding. Furthermore, they require insulation against low oceanic temperatures and, to achieve this, replace their full plumage annually by moulting, during which time they remain ashore for about three weeks without feeding. Therefore, they are especially susceptible to food scarcity during breeding and before and after moulting, activities which take place at colonies year-round.

Anchovy and sardine off South Africa have both shown marked changes in population size from 1984 to 2020. A 'pelagic boom' occurred in the early 2000s, with both anchovy and sardine biomasses being very high, but subsequently sardine biomass decreased rapidly and anchovy biomass declined gradually. Small pelagic fishes such as anchovy and sardine are typified by 'boom and bust' population dynamics arising from inherent variability in their recruitment strength and short lifespans. Present-day variations in small pelagic fish population sizes are a combined outcome of the interacting drivers of fishing, environmental changes and predation. The latter is often the largest contributor to their natural mortality and may increase at low population sizes, when management of forage resources should be particularly cautious. Changes in the relative distributions of anchovy and sardine off South Africa have been observed over the past few decades. Anchovy adults showed an abrupt shift from being located predominantly on the west coast from 1984 to 1995 to predominantly on the south coast from 1996 to present. Sardine also showed an eastward shift in relative distribution, but that occurred more gradually than was observed for anchovy and reached a maximum in 2005. These distribution changes have resulted in a mismatch in the location of penguins and small pelagic fish, particularly off the west coast.

Not only are seabirds influenced by the abundance but also by the availability and local exploitation rates of their prey, since seabirds have restricted diving depths and, while breeding, are central-place feeders with limited foraging ranges, and hence localised exploitation around their breeding colonies may reduce prey availability. Whereas there is general agreement that food abundance/availability is an important driver of African penguin population dynamics, there is disagreement on the relative

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importance of this driver compared to other drivers. Seabird scientists and marine ecologists suggest this as a primary driver, while fisheries scientists suggest a lower relative importance.

Effects on African penguin reproductive performance of fishery closures around island breeding colonies

South Africa's small pelagic purse-seine fishery and African penguins both target mainly sardine and anchovy. Sardine and anchovy occupy a key position in the marine food web, where they are the link that transfers energy produced by plankton to large-bodied predatory fish, seabirds and marine mammals. Because many animals and humans depend on forage fish, as these small pelagic species are collectively known, it is important to manage the fishery activities in a sustainable manner that considers and accounts for their high degree of variability and importance to the ecosystem.

In the 2000s, a substantial increase in mortality of adult penguins on the west coast was linked to a decrease in the biomass of sardine in that area to below a quarter of its maximum observed value. The increase in penguin mortality was hypothesised to be due to insufficient food during the pre-moult period. Significant relationships have been demonstrated between demographic, condition, growth and foraging parameters of African penguins (and other seabirds in the Benguela upwelling system that feed mainly on anchovy and sardine) and the abundance or availability of their prey. Given the fluctuating nature of small pelagic fish stock biomasses, these have at times been below thresholds that have been suggested as necessary to support sufficient reproduction and survival to maintain the populations of such seabirds.

Following the observed increases in mortality from 2006 and subsequent further reduction in the number of African penguins off South Africa, it became important to not only reduce mortality as far as possible, but to also ensure that penguin reproduction was sufficient to partially offset mortality. In response, a study to assess the effects of short-term closure to purse-seine fishing around penguin breeding colonies was initiated in 2008. That study comprised two parts: (i) a feasibility study (2008–2014) during which purse-seine fishing was prohibited around some colonies, and data on penguins and small pelagic fish were collected to determine whether an experiment would have adequate statistical power to detect a significant effect of closure, if such existed; and (ii) an experimental phase (2015–2020). In order to maximise contrast for more precise estimation, the study involved a three-year alternation of opening and closing to fishing around islands, although this was not well-matched to the biology of African penguins, which usually do not breed until aged 4–6 years but, once breeding, show high fidelity to mates and colonies. Conflicting results emerged from two groups (B: O&C and B: FM) who had applied different approaches to analysing the results of the experiment. Both sets of results were subjected to frequent review by the International Review Panels (IRPs) of several International Fisheries Stock Assessment Workshops (IFSAWs), who recommended improvements to the different approaches.

All scientists agree on the need for robust science and trade-offs between costs and benefits. Scientists from B: O&C and SANParks maintain that the results to date from the Island Closure Experiment show a positive effect on chick survival that has slowed the rate of population decline, and, given the Endangered status of the African penguin, they call for applying the precautionary approach and implementing closure around South Africa's six largest colonies without further delay. They emphasise that spatial management is crucially important for predators constrained to undertake central-place

foraging like African penguins, and hence the reason closures around key penguin colonies are being sought is to lessen the risk of colony extinctions. In contrast, scientists from B: FM consider that closure has only a relatively small positive effect, that there is substantial uncertainty regarding this effect, and that closure has an economic impact on the small pelagic fishing industry. They therefore recommend the implementation of further island closures (seasonal in some instances) in 2021 whilst analyses to address remaining uncertainties are conducted.

Sustainability, ecosystem, and socio-economic considerations

The small pelagic fishery is the country's largest and second-most valuable fishery, with an estimated 2014 wholesale catch value of R2.4 billion, and directly employs >5 000 staff in addition to thousands of seasonal workers. It makes an important socio-economic contribution to the well-being of coastal communities. Management of the South African small pelagic fishery is primarily via the setting of annual total allowable catches and bycatches which are set using an operational management procedure (OMP). The OMP uses data from research surveys and fishery and stock assessment models in an adaptive management system which includes consideration of ecosystem and fishery needs, and which is able to respond to major changes in resource abundance. Recent research has indicated the presence of multiple sardine stocks off the South African coast and the OMP therefore considers stock structure and consequently implements spatial management to limit exploitation rates on the more productive western sardine component that was previously subject to higher exploitation, although overall annual harvest rates of both sardine and anchovy are low. Overharvesting of small pelagic fish can have detrimental effects on upwelling ecosystems, particularly on marine top predator populations. However, the inherent variability in the population sizes of small pelagic fish is a strong challenge to sustainable management and higher harvest levels should be avoided when population sizes and/or productivity levels are low.

Closure of Dassen and Robben Islands to fishing was estimated to cost approximately R50 million per annum, and a loss of between 1.63% and 6.87% of the total annual catch. When using an economic multiplier this translates to R150 million per annum (2016 values) for those two islands, i.e. approximately 6% of the annual wholesale catch value of the small pelagic fishery. The potential loss of revenue of closure around breeding colonies in Algoa Bay was estimated at R17.5 million per annum (2011 values), i.e. 6.6% of the average south coast sardine catch.

African penguins are Africa's only penguin species and together with other seabirds have important social, economic, biodiversity and ecosystem values and benefits. The Simon's Town penguin colony presently attracts close to a million visitors a year and its economic value in 2017 was estimated at R311 million per annum, generating 885 jobs. The Stony Point colony presently attracts 77 500 visitors per year but economic evaluations of that and other colonies have not been conducted. South Africa's seabirds additionally provide several ecosystem benefits. They transfer large quantities of nutrients from the ocean to their colonies, which influences the functioning of island and headland ecosystems and adjacent marine areas which are important for many organisms, including migratory shorebirds. They also exert valuable top-down control; e.g. they may select prey that are small or in poor body condition and by removing substandard individuals ensure healthy prey populations. Seabirds also facilitate feeding by other species; e.g. African penguins herd prey shoals upwards, making them available to birds restricted to feeding near the surface.

Research gaps and responses

All stakeholders agree that urgent action is needed to reverse the decline in African penguin population size. But despite all the interventions implemented thus far, the decline continues. The programme of short-term (3 years) closures to fishing around islands has not reversed the decline but may increase breeding success by 1% (assuming that the effect estimated at Robben Island applies for all islands), which would reduce the present rate of decline by 10%. Even closure of the entire sardine fishery off the west coast was estimated to have a very small benefit to penguins. Although local fishing restrictions around breeding colonies have been suggested as more effective than population-wide regulations – e.g. limiting overall catches – the assumed benefits of longer-term closures around breeding colonies in South Africa remain untested.

Given that the implemented actions have not arrested or reversed the decline in the African penguin population, either there are unknown or unconsidered factor/s responsible, and/or not all actions have been sufficiently implemented or effective. Research needs to be directed at identifying those unknown or unconsidered factor/s and attributing relative importance to the drivers of the African penguin population decline, e.g. using models of intermediate complexity for ecosystems assessments (MICE) or other sufficiently quantitative ecosystem models. Such models need to account for appropriate temporal scales that accord to penguin life history stages. Additional research on penguins, small pelagic fishes and the fishery is also suggested but additional capacity and funding would be required to conduct this monitoring and research, particularly with regard to modelling.

Governance and policy imperatives

The Department of Forestry, Fisheries and the Environment (DFFE) has a suite of legislation to help manage the balance between conservation and sustainability, including the National Environmental Management Act (NEMA, Act 107 of 1998), the Marine Living Resources Act (MLRA, Act 18 of 1998), the National Environmental Management: Biodiversity Act (NEMBA, Act 10 of 2004), the Marine Spatial Planning Act (MSPA, Act 16 of 2018), National Environmental Management: Protected Areas Act (NEMPAA, Act 57 of 2003), as well as the National Environmental Management: Integrated Coastal Management Act (ICMA, Act 24 of 2008). NEMA highlights the need for cooperative governance and intergovernmental relations and a holistic approach to ensure environmental protection. The concomitant need to promote socio-economic development and the precautionary or cautious approach concerning management and development of marine living resources, in order to avert risk and account for the limits of current knowledge and consequences of decisions and actions, is mandated in the MLRA. Threatened or protected marine species (TOPS), such as the African penguin, are accorded protection under NEMBA.

In 2020, a Benguela Current Forage Fish Workshop (BCFFW), held under the auspices of the African Eurasian Migratory Waterbird Agreement (AEWA) and the Benguela Current Convention (BCC), both treaties to which South Africa is a party, recommended *inter alia* the development of tools to increase the availability of sufficient forage [fish] for threatened endemic Benguela seabird species, including consideration of applicable management and conservation options, such as setting ecosystem thresholds and/or closing key foraging areas to fishing, adjacent to major seabird colonies, in order to facilitate the recovery of seabird colonies to sufficient sizes to reduce the probability of colony extinctions.

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List and brief description of major role players

B: O&C – Branch: Oceans and Coasts of the Department of Forestry, Fisheries and the Environment.

B: FM – Branch: Fisheries Management of the Department of Forestry, Fisheries and the Environment

DFFE - Department of Forestry, Fisheries and the Environment, formed through the recent (2019) merger of components of the Department of Agriculture, Forestry and Fisheries (DAFF) with the Department of Environmental Affairs (DEA). Initially called the Department of Environment, Forestry and Fisheries (DEFF), in April 2021 the name was changed to DFFE. Until about 2009, the predecessors of B: O&C and B: FM were jointly contained within Marine and Coastal Management (MCM), which fell under the Department of Environment Affairs and Tourism (DEAT).

IFSAW - International Fisheries Stock Assessment Workshops at which a panel (IRP) of international scientists meet annually to review and advise on stock assessments and fisheries management approaches by the Branch: Fisheries Management.

IRP – International Review Panel of the annual IFSAWs

MARAM - Marine Resource Assessment and Management Group affiliated to University of Cape Town, and under contract to DFFE's Fisheries Management Branch to undertake stock assessments and provide fisheries management advice.

SANParks – South African National Parks is the national conservation management authority mandated by DFFE to undertake conservation management of the largest remaining African penguin colonies.

SWG-PEL – Small Pelagics Scientific Working Group, a scientific working group that advises on management of small pelagic (e.g. sardine, anchovy, round herring, etc.) fish stocks under B: FM and comprising internal and external fisheries scientists as members. Stakeholders including seabird scientists and industry representatives are observers in this working group.

TP-SWG – Top Predator Scientific Working Group, comprising internal and external seabird scientists, marine biologists, conservation biologists and management authorities and administered by B: O&C. Fisheries and other scientists are also members.

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1. Introduction

A joint 'Governance Forum' (GF or Decision-making Forum), comprising DDGs and senior officials of B: O&C and B: FM, as well as SANParks was established on the 22nd of February 2021. This followed a meeting of the officials from B: O&C and B: FM with the Minister of the Department of Environment, Forestry and Fisheries (now Forestry, Fisheries and the Environment) on the 19 of January 2021 where she requested the Department to provide her with a synthesis of the current scientific information relating to island closures and African penguin population declines. That meeting was in response to recommendations to the Minister by SANParks and the TP-SWG (B: O&C) supported by Birdlife SA, WWF-SA, SANCCOB and others to immediately implement long-term closures to purse-seine fishing around the six largest penguin breeding colonies.

The Minister advised that the GF should be guided by NEMA (the National Environmental Management Act, Act 107 of 1998). She further emphasised that NEMA is the overarching legislation applicable to both B: O&C and B: FM and as such the three principles, amongst others, of conservation, sustainable use and the precautionary approach should be applied by both Branches when dealing with this issue. The Minister acknowledged the differences in scientific views but she requested that a collective and responsible approach to avoid the extinction of the African penguin should be sought, based on credible science and after consultation with all relevant stakeholders.

The GF subsequently met and agreed as a first step to establish a Task Team, comprised of internal scientists of the Department and SANParks, to prepare a comprehensive synthesis report of the current state of knowledge relating to African penguins, island closures, fisheries management relevant to African penguins and the socio-economics of island closures and penguin-related tourism. Furthermore, several management scenarios are proposed based on the available science.

2. Status of the African penguin: declines regionally and nationally

The African penguin *Spheniscus demersus*, which breeds in Namibia and South Africa, is Africa's only penguin. In the 1920s, it was probably Africa's most abundant seabird, having an estimated 0.5–1 million breeding pairs (Shannon and Crawford 1999; Crawford et al. 2007c). It subsequently decreased to ~17 700 pairs in 2019, of which ~25% were in Namibia and ~75% in South Africa (Sherley et al. 2020a). The Namibian penguin population decreased by ~70% prior to 1986, coinciding with the collapse of Namibia's sardine stocks in the 1960s and 1970s (Crawford 2007). Penguin numbers fell to a worrying 3 800 pairs in 2006 before recovering slightly to 4 300 pairs by 2019 (Sherley et al. 2020a). The population in Namibia is likely now constrained at a low level by a scarcity of small pelagic fish (Watermeyer et al. 2008; Roux et al. 2013).

The South African penguin population recently declined at a faster rate than the earlier decrease in Namibia (Figure 1a). This resulted in a 61% reduction of the overall population over 28 years (BirdLife International 2010) and a global classification of the species as Endangered in 2010 by the International Union for Conservation of Nature (IUCN 2020). This was despite a small population recovery in the late 1990s and early 2000s, driven mostly by increases in colonies off the west coast of South Africa (Figure 1b). A subsequent population crash from the mid-2000s to an historical low in

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South Africa of ~13 600 pairs in 2019, reflected an ongoing population decline of nearly 5% per annum (Sherley et al. 2020a). On the west coast, the former stronghold of the species in South Africa, numbers have declined by 10% per annum over the last two decades (Figure 1b).

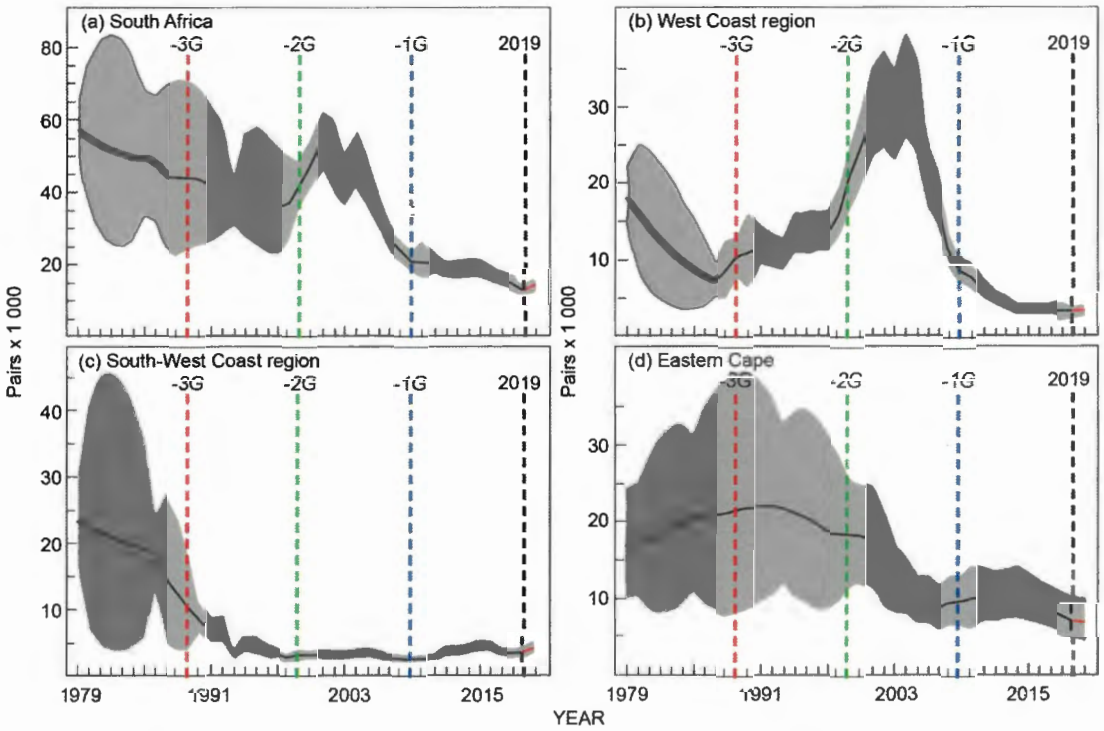

Figure 1: Changes in the African penguin breeding population collectively in South Africa (a) and within three regions since more than three generations (G) ago: (b) the west coast region (Western Cape colonies north of Cape Town), (c) the south-west coast region (Western Cape colonies south and east of Cape Town, and (d) the Eastern Cape (Sherley et al. 2020).

In 2004 in South Africa, African penguins bred at 19 localities, of which three had >5 000 pairs. Together, South African localities held ~52 000 pairs of penguins. Dassen Island held the largest colony with ~25 000 pairs; St Croix Island had ~10 000 pairs and Robben Island almost 8 000 pairs. However, 15 years later, in 2019 (a complete survey was not possible in 2020), the South African population had fallen by 75% to ~13 200 pairs. Breeding has ceased at five of the localities (a rate of loss of one colony every three years) and no remaining colonies have >5 000 pairs, with the largest colony consisting of only ~3 650 pairs, at St Croix Island.

Smaller sized colonies (<1 000 pairs) of African penguins have higher probabilities of extinction than larger colonies (>1 000 pairs; Crawford et al. 2001).

In 2004, Dassen, St Croix and Robben Islands all held >5 000 pairs and, in terms of the above probabilities, had no likelihood of extinction within 40 years. However, in 2019 none of the 14 remaining colonies had >5 000 pairs, implying that all have a chance of extinction within 40 years. Seven colonies had <250 pairs and hence a 96% chance of extinction. Six colonies held >1 000 pairs, indicating a 67% probability of survival in the next 40 years: Dassen and Robben islands on the west coast, Stony Point and Dyer Island on the southwest coast and St Croix and Bird islands in Algoa Bay. Additionally, the Simon's Town colony had ~930 pairs. In 2019, the only Namibian colony with >1 000

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pairs was at Mercury Island (~2 220 pairs), which falls within the Namibian Islands Marine Protected Area (Ludynia et al. 2012). Namibia's next largest colony was at Halifax Island (825 pairs).

Diminishing African penguin colonies may suffer from Allee effects, or inverse density dependence, reducing their chances of recovery and increasing their likelihood of extinction (Ryan et al. 2012). For example, penguins that forage in groups have higher prey catches per unit effort than solitary birds (McInnes et al. 2017) but colonies may become too small for sufficient foraging groups to form (Ryan et al. 2012). Similarly, smaller group sizes are likely to limit anti-predator benefits afforded to penguins preening at sea. Dwindling colonies also mean that more birds nest near colony edges, where eggs and chicks are at greater risk of predation (e.g. Cordes et al. 1999), and may reduce information acquisition that facilitates food-finding (van Vessem and Draulans 1986; Wakefield et al. 2013). Amongst penguins taken to a rescue centre, females had higher mortality rates than males (Pichegru and Parsons 2014). If similar sex-biased mortality exists in the wild, it may skew sex ratios at small colonies and decrease productivity.

The recent estimates of the African penguin population size in South Africa reflect the dire situation the population is in; and, if the current population trajectory continues, it could be functionally extinct by 2035 (Sherley et al. 2018). This highlights the imperative of adopting mitigation measures as a matter of urgency. To minimise Allee effects and looming extinction, South Africa must take every possible step to ensure the continued existence of its larger colonies, viz. those at Dassen, Robben, Dyer, St Croix and Bird (Algoa Bay) islands, Simon's Town and Stony Point. In addition, provisions should be made to not only secure the viability of current colonies but allow for and promote the establishment of new colonies to address the needs created by shifting food sources and climate change.

3. Responses to the African penguin decline

Concerted efforts to secure the future of the African penguin have been taken since its listing as Endangered on the IUCN Red List of Threatened Species in 2010. The listing triggered several initiatives, including a planning workshop towards drafting the first African Penguin Biodiversity Management Plan (BMP-AP) (Shaw et al. 2011). The approved BMP-AP was gazetted in 2013 in terms of the National Environmental Management: Biodiversity Act (NEMBA, Act 10 of 2004). It had a five-year timeframe and included establishing two working groups (i.e. African Penguin Habitat Working Group and Population Re-enforcement Working Group) focused on habitat improvement and population re-enforcement and the implementation of a range of management actions to address threats to the South African population of penguins (Table 1). The BMP-AP aimed to halt the decline of the African penguin population in South Africa within two years of its implementation and after that to achieve a population growth that would result in a down-listing of the species in terms of its IUCN Red List status. It failed in these ambitious objectives, with South Africa's penguin population falling by 30% between 2013 (~19 000 pairs) and 2019 (~13 200 pairs). An updated BMP-AP was gazetted for comment in November 2019, and the final version of the second BMP is in review. The validity period of five years to implement the BMP was challenging because it did not speak to the biological needs of the species, nor provide African penguins with sufficient time to respond to conservation actions.

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However, the BMP-AP achieved many of its subsidiary goals and implemented several management actions (DFFE in prep.). Some of these are listed in Table 1, with additional detail as follows:

(i) *Improved cooperative management*: establishment and implementation through interagency working groups which include DFFE, management authorities, conservation agencies, museums and zoos, NGOs, and research institutions. Examples include co-management of the Simon's Town penguin colony by SANParks and the City of Cape Town, and the management of the Stony Point penguin colony by CapeNature.

(ii) *Population reinforcement*: rescuing, rehabilitating and returning to the wild oiled and injured adult birds and abandoned chicks; chick and egg bolstering via hand-rearing and release; increased monitoring of demographic parameters through the deployment of passive integrated transponders; monitoring of mortality on beaches; guidelines to assess chick condition; and investigating and taking steps to initiate a colony for African penguins at De Hoop Nature Reserve, which is close to present distributions of the primary forage resources of the species and where penguins nested in the early 2000s.

(iii) *Improved breeding habitat management*: testing the suitability of artificial nest designs that decrease losses of eggs and chicks to aerial predators and inclement weather, e.g. heat stress; improved predator management guidelines to reduce the losses to predation; storm and severe-weather readiness interventions to temporarily move penguins at risk to areas of safety; implementing measures to monitor and curtail the spread of pathogenic viruses through the disease-surveillance programme; ensuring preparedness to cope with oil spills.

(iv) *Improved management of the captive population*: development of a studbook, including DNA and BioBanking, National Norms and Standards relating to Seabird Rehabilitation in South Africa in terms of NEMBA (Act 10 of 2004); translocation guidelines for African penguins that conform to IUCN criteria; and determining the genetic suitability of captive-born offspring for release to bolster diminishing colonies.

Table 1: A subset of relevant threats to wild African penguins and their colonies identified in the 1st African penguin BMP with the objectives, some actions and progress made in addressing those threats, as well as relevant publications. (Legislative, research, education, and rehabilitation objectives are excluded.) Adapted from the Final Implementation Report for the African penguin *Spheniscus demersus* Biodiversity Management Plan (DFFE in prep). Note: not all threats, objectives, actions and progress described in that document are reported below. Green font = actions achieved; orange font = partially achieved/ongoing; red font = not achieved

Threat: Fish and fishing **Objectives:** Ensure adequate prey for penguins:		
Actions • Attempt to ensure adequate prey for penguins: a) in areas close to their breeding localities and b) during non-breeding periods of their life cycle • Investigate and monitor the possible impact of fishing near penguin colonies on the biology of African penguins • Undertake small-boat surveys to measure local penguin prey abundance around selected localities throughout the year • Continue monitoring long-term distribution and abundance of pelagic fish • Investigate relationships between long-term abundance and distribution of pelagic fish and catches thereof on African penguin numbers and develop models and procedures to incorporate findings in management of small pelagic fish stocks • Investigate the possibility of implementing spatial fishery management strategies that address spatial mismatches between fish location and catches to the benefit of the African penguin	**Progress** Island Closure Experiment (this report); monitoring was intensified at various colonies at start of experiment; research on movement and foraging behaviour conducted; foraging areas identified; foraging depth identified; small-boat surveys conducted; bi-annual acoustic surveys to determine the biomass and distribution of pelagic fish have continued; a penguin population dynamics model was developed and coupled to OMP-14 and OMP-18	**Published research** Crawford and Dyer 1995 Crawford 1998; Crawford et al. 2006, 2007a, 2007b, 2007c, 2008a, 2008b, 2011, 2019; Cury et. al. 2011; Sherley et al. 2013, 2015, 2017, 2018; Connan et al. 2016; Campbell et al. 2019; Pichegru et al. 2009, 2010a; Robinson et al. 2015; McInnes 2015; McInnes and Pistorius 2019 **Recent Scientific Working Group documents** MCM 2010; Dunn et al. 2014, 2015, 2016; Coetzee et al. 2016, 2019; DAFF 2016; de Moor 2018; Die et al. 2019; Coetzee et al. 2020a, 2020b; DEFF 2020a; Haddon et al. 2020
Threat: Anthropogenic activities (poor breeding habitat and human disturbance) **Objectives:** To improve breeding habitat for African penguins and reduce human disturbance in and adjacent to breeding colonies		
Actions • Evaluate the design and construction of artificial nests and implement identified changes • Develop and implement guidelines to minimise disturbance	**Progress** ▪ Habitat Working Group established ▪ Artificial nests designed and implemented ▪ Habitat restoration ▪ Draft road disturbance guidelines in place ▪ Air restrictions	**Published research** Shelton et al. 1984; Crawford et al. 1989; Sherley et al. 2012; Pichegru 2013; Lei et al. 2014; Buckley et al. 2016; Pichegru et al. 2016; Espinaze et al. 2020

• Investigate the possibility of placing permanent or temporary exclusion/buffer zones around breeding localities and develop guidelines (e.g. routing of boats and ship traffic) • Investigate possible collaboration with fishing industry to provide pelagic fish for birds in care during large oil spills and to feed rescued chicks • (a) Appoint a Working Group to (b) formalise guidelines for rescuing, rearing and releasing chicks that are unlikely to survive without intervention and (c) advise on the suitability of bolstering existing colonies and the establishment of new colonies with orphaned and possible captive-bred penguins	▪ Investigated buffer zones ▪ Chick bolstering ▪ Implementation of a functional programme on rescuing, rearing and releasing chicks that are unlikely to survive ▪ Impact of seismic surveys on African penguins determined	**Scientific Working Group documents** Makhado et al. 2016; Waller et al. 2018
Threat: Catastrophic events **Objectives:** To minimise the impact of catastrophic events on African penguins: oil spills, disease outbreaks and extreme weather		
Actions • Identify bunkering activities and management processes impacting African penguins and advise appropriate authorities on mitigation interventions • Identify reasonable measures to be taken to prevent pollutants, especially oil, entering the water and impacting African penguins and their habitat • Advise on zonation of shipping lanes, bunkering operations, and shipping activities to minimise the risk of oil spills and pollution from emissions near seabird colonies • Assess the efficacy of the implementation of African Penguin Disease Surveillance and Diagnosis Programme • Ensure that provision is made for mitigating the effects of extreme weather and other natural disasters on the African penguin population	**Progress** ▪ A National Oiled Wildlife Preparedness Plan, SAMSA ▪ National Oil Spill Contingency and Response Plan has been drafted in line with international legislation including MARPOL ▪ Satellite radar imaging that detects oil at sea can be made available ▪ African Penguin Disease Surveillance and Diagnosis Programme Guidelines developed and implemented	**Published research** Randall and Bray 1983; Crawford et al. 1992, 2000; Jones 1999; Whittington 1999, 2002; Grim et al. 2003; Parsons and Underhill 2005; Parsons et al. 2016; Barham et al. 2007, 2008; Wolfaardt 2007; Wolfaardt et al. 2008; Horne et al. 2011; Naude 2014; Weller et al. 2016; Espinaze et al. 2019 **Scientific Working Group documents** Parsons 2015; Roberts 2018

Threat: Predation **Objectives:** To reduce predation mortality of African penguins		
Actions: • Develop and implement guidelines around the management of natural predators in relation to African penguins (e.g. Cape fur seals and kelp gulls) • Develop and implement a program for the control of introduced alien predators at colonies that have harmful impacts on African penguins • Develop and implement guidelines to prevent introduction of alien predators to islands • Develop monitoring and research guidelines and programmes to evaluate the impact that any predation has on the African penguin and the effectiveness of any mitigation measures implemented	**Progress:** ▪ The draft predator guidelines are currently in place ▪ Protected area management plans in place ▪ Implementation and monitoring of predator management at all African penguin colonies; quantifying predator impacts (kelp gulls) at some colonies; predator management workshop held with all management agencies; adaptive management intervention applied on most colonies (damage-causing seals and gulls are euthanised, non-lethal interventions for land-based colonies [e.g. fences] and humane euthanasia where needed) ▪ Artificial nests in most colonies to protect from predation	**Published research** Crawford et al. 2001; David et al. 2003; Johnson et al. 2006; Underhill et al. 2009; Makhado et al. 2009, 2013; Pichegru 2013; Weller et al. 2016 **Scientific Working Group documents** Makhado et al. 2018
Threat: Research **Objectives:** To coordinate, prioritise, and evaluate monitoring and research on African penguins		
Actions Appoint a Working Group to achieve the objective.	**Progress** Seabird Technical Team formed	

A draft 2nd BMP-AP is currently being developed with a primary focus on the new and old actions that were not fully achieved in the first BMP. That draft was circulated for public comment in November 2019 and feedback was received from a wide range of stakeholders, amongst them the Small Pelagics Scientific Working Group (SWG-PEL). Key concerns with the draft 2nd BMP-AP listed by the SWG-PEL included: (i) the need for a systematic review of the results from actions implemented as part of the first BMP-AP; (ii) insufficient evidence that prey scarcity is by far the largest driver of the recent decline in penguin numbers and the need for a quantitative assessment of the proportional contribution of all drivers of the African penguin population decline in order to understand their relative importance and develop appropriate plans to mitigate against them; (iii) insufficient evidence that precluding fishing around penguin colonies during breeding and on feeding grounds during the pre- and post-moult periods will result in an appreciable improvement in the availability of prey and hence also in the conservation status of African penguins; and (iv) failure to acknowledge numerous reviews by International Fisheries Stock Assessment Workshop panels of the Island Closure Experiment (see below) and that "cessation of fishing around the islands by itself is unlikely to be sufficient for the penguin population to recover" (Die et al. 2019). The draft 2nd BMP-AP is presently being revised following consideration of these and other comments, and will be finalised in 2021.

An additional response to the reductions in numbers of African penguins at their major breeding colonies around South Africa has been the development by the SWG-PEL of two processes to account for the dependence of this species on small pelagic fishes as forage. The first is the development of a penguin population dynamics model for use in conjunction with the small pelagic fish operational management procedure (OMP; see 'Sustainability, socio-economics and ecosystem considerations' section, below) so that the impact on penguins of predicted future pelagic fish biomass trajectories under alternative harvest strategies can be evaluated (Robinson et al. 2015; de Moor 2018). The second has been the experimental closure to purse-seine fishing around islands with key penguin breeding colonies so as to investigate whether fishing near these islands impacts penguin population growth rate negatively. This intervention was initiated more than a decade ago and required substantial buy-in from the pelagic fishing industry, and is described in the 'Interactions between African penguins and the small pelagic fishery' section, below).

4. Drivers of African penguin food availability and penguin-fish interactions

4.1. Small pelagic fishes as forage of African penguins and other predators

African penguins depend largely on sardine *Sardinops sagax* and anchovy *Engraulis encrasicolus* for food (Crawford 1998, 2007; Crawford et al. 2011, 2014; Sherley et al. 2013, McInnes and Pistorius 2019), although other small pelagic fishes such as round herring *Etrumeus whiteheadi* are also consumed (Randall and Randall 1986) and at times juvenile horse mackerel *Trachurus capensis* are important forage on the west coast (Campbell 2016). Chokka squid *Loligo reynaudi* have also been identified as important prey of African penguins in Algoa Bay (Connan et al. 2016), with adult penguins there targeting squid for self-provisioning whilst concurrently feeding their chicks small pelagics. In Namibia, where the biomass of small pelagic fishes (in particular sardine, which historically dominated this group) have been low for some decades (Roux et al. 2013), African penguins now feed heavily on the abundant pelagic goby *Sufflogobius bibartus* (Ludynia et al. 2010). Goby is prey of low nutritional

quality as they have a low energy content, and Ludynia et al. (2010) suggest that prey quality rather than prey abundance is more important in influencing population dynamics of African penguins off Namibia. Seabird scientists, marine ecologists and fisheries scientists agree that African penguins are specialist predators of sardine and anchovy, but that other prey can occasionally be important.

Unlike flying birds, African penguins must swim to find food, limiting their foraging range while breeding (e.g. Pichegru et al. 2010a). Furthermore, when in the cold waters of the Benguela upwelling system they require insulation against low temperatures and, to achieve this, replace their full plumage annually, during which time they remain ashore for about three weeks without feeding (Randall et al. 1986). To survive the fast, they need to fatten sufficiently before moulting and then rapidly regain condition after growing their new feathers. Therefore, African penguins are especially susceptible to food scarcity both during breeding and before and after moulting, activities which take place year-round.

In addition to the African penguin, sardine and anchovy are also important forage for many other predators, including fishes, sharks, marine mammals and other seabirds, the dynamics of some of which are strongly dependent on small pelagic fish dynamics (e.g. geelbek and sardine; see Parker et al. 2020). In particular, congruence has been shown between trends in prey abundance and the population sizes of African penguins and two other endangered seabird species, Cape gannet *Morus capensis* and Cape cormorant *Phalacrocorax capensis*, that are endemic to the Benguela ecosystem, and that feed primarily on anchovy and sardine (Crawford and Shelton 1978; Crawford 2007; Crawford et al. 2007a, 2007b, 2011, 2019).

Whereas there is general agreement that food abundance/scarcity is an important driver of African penguin population dynamics, there is disagreement on the relative importance of this driver compared to other drivers. Seabird scientists and marine ecologists suggest this as a primary driver, while fisheries scientists suggest a lower relative importance.

4.2. Status of South African sardine and anchovy stocks

Anchovy and sardine off South Africa have both shown marked changes in recruitment and population size over the period 1984–2020, during which scientific surveys have been used to estimate these metrics (Figure 2). Before the turn of the century, anchovy biomass varied between 0.2 and 2 million tonnes (Mt), with occasional marked interannual variations due to recruitment variability. Sardine biomass was mostly <1 Mt, and recruitment variability did not translate into biomass variability (as seen for anchovy) because the contribution to biomass of incoming recruits was dampened by several age classes (as opposed to fewer age classes in anchovy). A 'pelagic boom' occurred in the early 2000s, with anchovy biomass recorded between 2 and 4 Mt for the next decade and sardine biomass >2 Mt from 2000 to 2004. The biomasses of both species declined thereafter. Anchovy recruitment and biomass mostly declined gradually, albeit with some large interannual variability, and was most recently (end 2020) estimated at 2.6 Mt. Sardine biomass declined rapidly to levels similar to those before the boom, and with the exception of a single year (2010) recruitment has been low for the past 17 years and the population was most recently (end 2020) in a depleted state at around 0.3 Mt.

Recent research has provided convincing evidence for two sardine components (or stocks), one off the west and one off the south coast, which mix to a degree and which are both harvested by South Africa's small pelagic fishery (van der Lingen et al. 2015; Sakamoto et al. 2020). A two-mixing-stock

assessment model for sardine has been developed (de Moor et al. 2017), which is used for management (see 'Sustainability, socio-economics and ecosystem considerations' section, below) and which indicates that the western component is appreciably more productive (in terms of the numbers of recruits produced per unit spawner biomass) than the southern component.

South African sardine is not the only population of this globally-distributed genus (*Sardinops*) that is presently at low abundance. Recent catches of *Sardinops* spp. in the four regions where it supports or supported industrial-scale fisheries (the Benguela, California and Humboldt Current upwelling ecosystems and off the coasts of Japan) have been low, with catches since 2015 <20% of maximum recorded catches over the past 70 years in all regions (FAO Global Capture Production 1950–2018). The fishery for Pacific sardine *Sardinops sagax* along the west coast of the USA has been closed since 2015 because of low population size (Kuriyama et al. 2020), and the Namibian fishery for this species was closed in 2018 (P Kainge, Ministry of Fisheries and Marine Resources, Namibia, pers. comm.) for the same reason and has remained closed since.

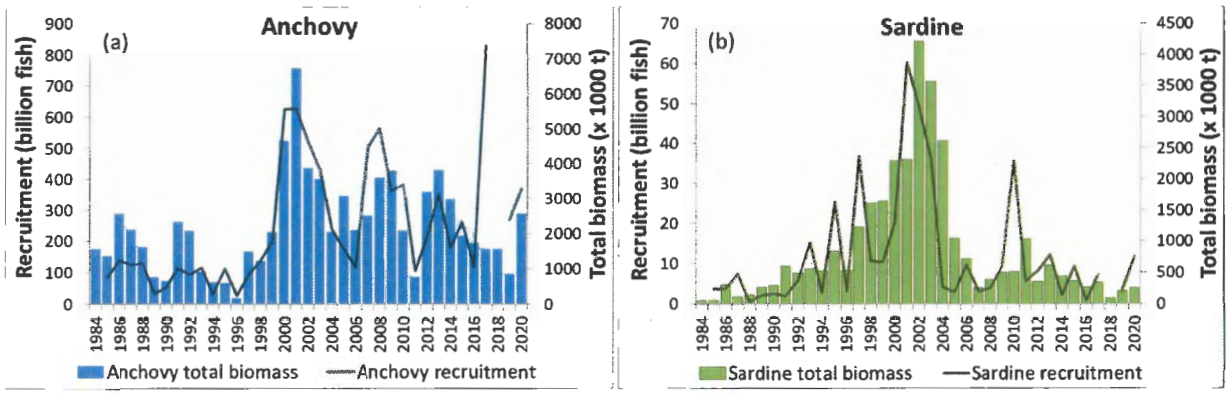

Figure 2: Time-series of acoustically-estimated anchovy (a) sardine (b) recruitment strength (lines) and total biomass (histograms) off South Africa, 1984–2020

4.3. Population fluctuations and drivers of South African sardine and anchovy

Small pelagic fishes such as anchovy and sardine are typified by 'boom and bust' population dynamics arising from inherent variability in their recruitment strength and their short life-spans (Katara 2014; Peck et al. 2021), with studies on fossil scales of these fish preserved in ocean sediments showing that these fluctuations occurred before the advent of industrial-scale fishing and over inter-annual, decadal, multi-decadal and millennial time-scales (Alheit et al. 2009; Field et al. 2009; Peck et al. 2021 and references therein). The likely causes of these natural fluctuations in the population sizes of small pelagic fishes are environmental drivers that act from the bottom up either directly by physical forcing (such as temperature, upwelling, etc.) or indirectly through the food web (via changes in their prey compositions), top-down processes such as predation, or through a combination of these. Present-day variations in population sizes of small pelagic fishes are therefore a combined outcome of interacting drivers of fishing and the environmental drivers mentioned above (Checkley et al. 2009; Peck et al. 2021).

4.3.1. Environmental drivers

Because the South African anchovy fishery harvests mainly recruits, several studies have examined drivers of recruitment variability in this species (e.g. Hutchings et al. 1998), with the most recent of

these documenting strong, positive correlations between winds that drive upwelling and recruitment strength, as well as a positive effect of anchovy spawner biomass on recruitment (van der Sleen et al. 2018). Less attention has been given to sardine and important drivers of sardine recruitment have yet to be identified, although studies are currently underway investigating correlations between environmental time-series data (e.g. sea surface temperature [SST] and wind/upwelling) and recruitment strength. However, the anomalous and spatially and temporally extensive harmful algal blooms (HABs) that have occurred off the South African south coast over the past decade (Pitcher et al. 2014; Smith and Bernard 2020) may have negatively impacted sardine recruitment. This is because sardine (but not anchovy or round herring) within the HAB area were in substantially reduced condition (i.e. lower weight-at-length and a lower index of energetic reserves and also of nutritional quality as prey) compared to those not in the bloom area (van der Lingen et al. 2016). Given the importance of energetic reserves to subsequent reproduction for sardine (Ganias 2009), fish in reduced condition were considered unlikely to spawn in the near future (van der Lingen et al. 2016).

4.3.2. Predation

Predation mortality is often the largest contributor to the natural mortality of forage fish (Tyrrell et al. 2011; Engelhard et al. 2014; McClatchie et al. 2018; Shannon et al. 2020). Predation pressure is typically variable, depending on the number of predators and biomass available to prey on (Tyrrell et al. 2011), and may increase at low prey population sizes (Saraux et al. 2021). Given the dependence on forage fish and preference in many cases for sardine and anchovy, predation pressure on sardine is currently presumed to be high, with estimates from the most recent sardine stock assessment models suggesting a higher natural mortality since about 2003–2005 (1.05 to 1.45 $year^{-1}$) compared to earlier years (0.85 to 1.0 $year^{-1}$; de Moor 2020a). No long-term trend has been observed in the estimates of anchovy natural mortality, though they are highly variable, fluctuating about a value of 1.2 $year^{-1}$, from a minimum of 1.0 to a maximum of 1.6 (de Moor 2020b). For both species, estimates of the amounts consumed by predators far exceed the quantities taken by the fishery (Figure 3); on average the commercial catch of anchovy over the last six years has been 7% of the amount lost to natural predation (de Moor 2016, 2020c; Bergh 2020a). This is not unexpected as these species are key forage species in the Benguela ecosystem. This is the case for both the west and south sardine components too (Figure 3), where the ratio of total sardine catch to estimated consumption by predators has generally been low (<0.2), apart from the years immediately following the peak sardine biomass on the west coast, which coincided with exceptionally high mortality of adult African penguins there.

A simulation study, based on the Atlantis modelling framework to evaluate the effects of climate change and fishing on South African marine species, found that releasing predation pressure (as a result of fishing-induced reductions of piscivorous fish) on forage fish outweighed the direct impacts of fishing on these species (Ortega-Cisneros et al. 2018). This study also noted forage species experienced marked biomass reductions under warming despite the simultaneous decrease in predators. Results are consistent with earlier work (Shannon et al. 2004a, 2004b; Travers-Trolet et al. 2014) which found that environmental effects affecting recruitment, and predation, rather than fishing, were the primary drivers of changes in anchovy and sardine biomass. In this regard the authors of the 'Little Fish – Big Impact' study (Pikitch et al. 2012) state the following: "Acknowledging that M [natural mortality] is variable (and scaled to predator abundances) — and considering it in estimating fishing mortality and stock biomass targets and thresholds — provides the basis for a precautionary,

ecosystem-based approach to maintain adequate forage fish biomasses." The sensitivity of stock assessment models and OMP performance to estimates of natural mortality is evaluated during the development of OMPs for anchovy and sardine in South Africa.

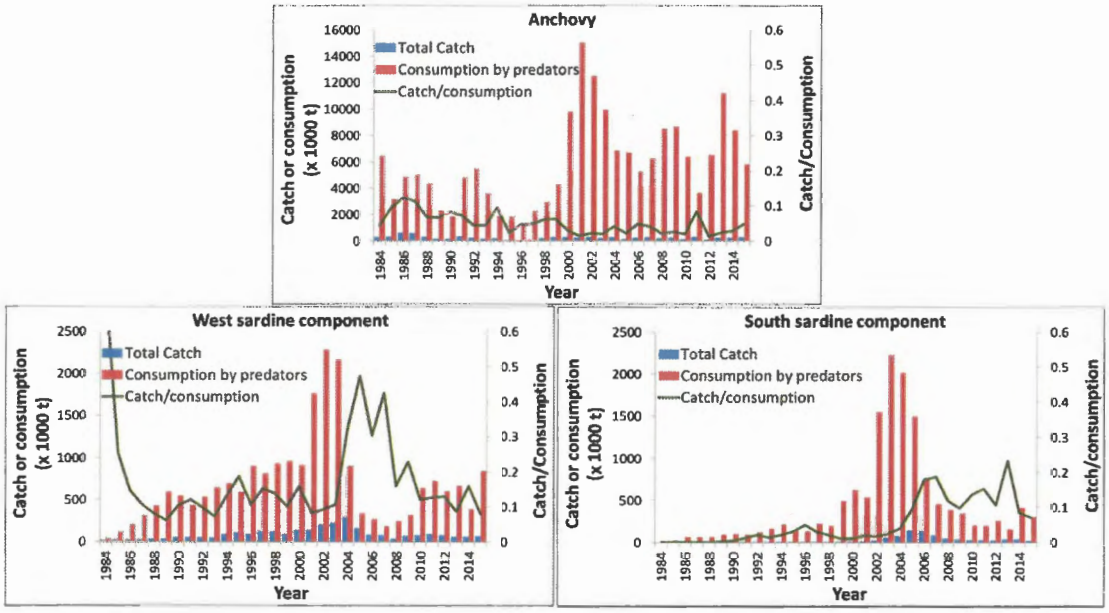

Figure 3: Time-series of model-estimated annual consumption by predators (red histograms), annual total catches (blue histograms) of anchovy (top) and sardine (directed- and bycatch combined and shown separately for the western and southern components), and the ratio of total catch to estimated consumption by predators (green line) for each (from de Moor 2016)

4.3.3. Fishing

Population-assessment models of anchovy and sardine used for management indicate that fishing has a relatively small impact in relation to predation (as described above), and also that fishing has a relatively small impact in relation to recruitment variability in driving the population dynamics of these species (Hilborn et al. 2017). There is strong evidence that recruitment of Pacific sardine is largely independent of fishing pressure (Punt et al. 2016), and this is particularly important for the South African anchovy fishery where the bulk (>70%) of the catch consists of recruit fish of <1 year old. Simulated population trajectories with and without fishing (the so-called dynamic biomass reference point or B_0) indicate that, since 2000, the biomasses of both anchovy and sardine have been 70–80% of what they would have been without fishing (Figure 4). The Marine Stewardship Council recommendation for a target reference point for low trophic level stocks such as anchovy and sardine is 0.75 of B_0 (MSC 2018). More information on the impact of fishing and exploitation rates is contained in the 'Sustainability, socio-economics and ecosystem considerations' section.

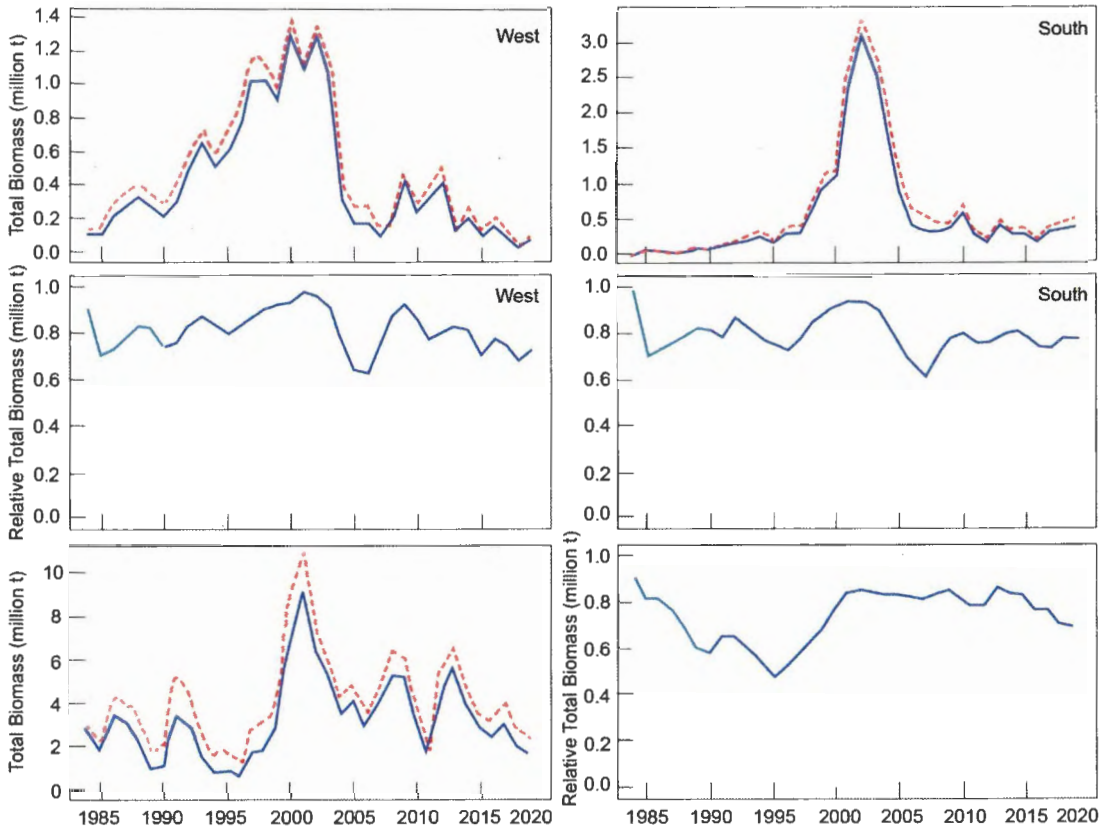

Figure 4: Time-series of modelled biomass WITH (solid blue lines) and WITHOUT (dashed red lines; the so-called dynamic B_0 trajectory) fishing for western and southern sardine stocks (upper panel) and anchovy (left plot in lower panel); and the ratio of the two indicating the proportion of the population remaining after fishing for western and southern sardine stocks (middle panel) and anchovy (right plot in lower panel). From de Moor (2020c; sardine) and Bergh (2020a; anchovy).

4.4. Changed distributions and drivers of South African sardine and anchovy

Composite distribution maps of anchovy and sardine densities observed during annual biomass surveys (conducted in spring/early summer) for the period 2011–2019 are shown in Figure 5. At that time of the year the anchovy population (comprising mostly spawning adults as this species matures at around 1 year old) is distributed over the entire continental shelf between Cape Columbine and Port Alfred. Highest anchovy densities are observed on the entire western Agulhas Bank between Cape Point and Cape Agulhas, along inshore and shelf-edge regions east of Cape Agulhas, and in Algoa Bay (Figure 5a). Sardine (both juvenile and adult) are found in dispersed clusters on the western Agulhas Bank, and on the central and eastern Agulhas Bank between Mossel Bay and Port Alfred (Figure 5b). Anchovy recruits are found predominantly off the west coast, particularly in St Helena Bay, during autumn and winter, whereas sardine recruits are observed off both the west and south coasts at that time (not shown).

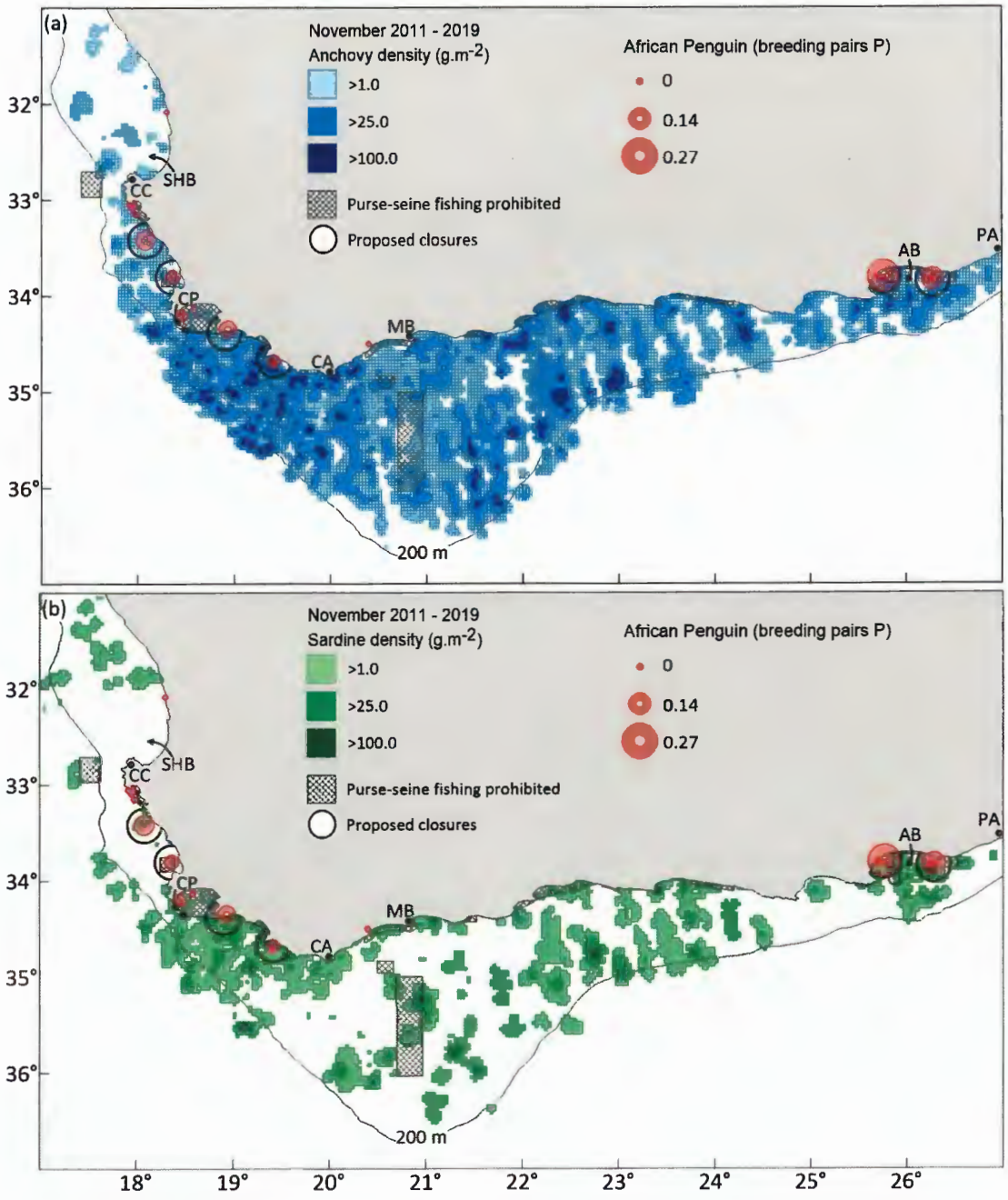

Figure 5: Composite distribution maps of (a) anchovy and (b) sardine density as observed during pelagic biomass surveys conducted in spring/summer, 2011–2019. The locations of African penguin breeding colonies in South Africa are shown as red circles with white centres, and the circles are scaled so as to represent the proportional contribution to the total SA penguin population (in 2019) made by that colony. Abbreviations: SHB-St Helena Bay, CC-Cape Columbine, CP-Cape Point, CA- Cape Agulhas, MB-Mossel Bay, AB- Algoa Bay, PA-Port Alfred.

Changing distributions as a response to climate change have been predicted for many marine species including small pelagic fishes (Fréon et al. 2009), and many anchovy and sardine species and stocks have shown or are predicted to show poleward shifts in their distributions (Liu et al. 2020; Peck et al.

2021). Changed distributions of anchovy and sardine off South Africa have been observed over the past few decades, with both species showing changes in their relative distributions (i.e. percentage of total biomass off the west and south coasts). Anchovy adults showed an abrupt shift from being located predominantly (>50% of observed biomass) to the west of Cape Agulhas (WoCA) from 1984 to 1995 to being located predominantly east of Cape Agulhas (EoCA) in 1996, and this shift has mostly persisted since (Figure 6). Roy et al. (2007) hypothesised that the shift was environmentally mediated because of coastal cooling EoCA in 1996 and a significant positive correlation between the cross-shelf sea surface temperature (SST) gradient and the percentage of anchovy spawner biomass there over the period 1984–2005. Updating this analysis to cover the period 1984–2011 supported that hypothesis (Augustyn et al. 2018a).

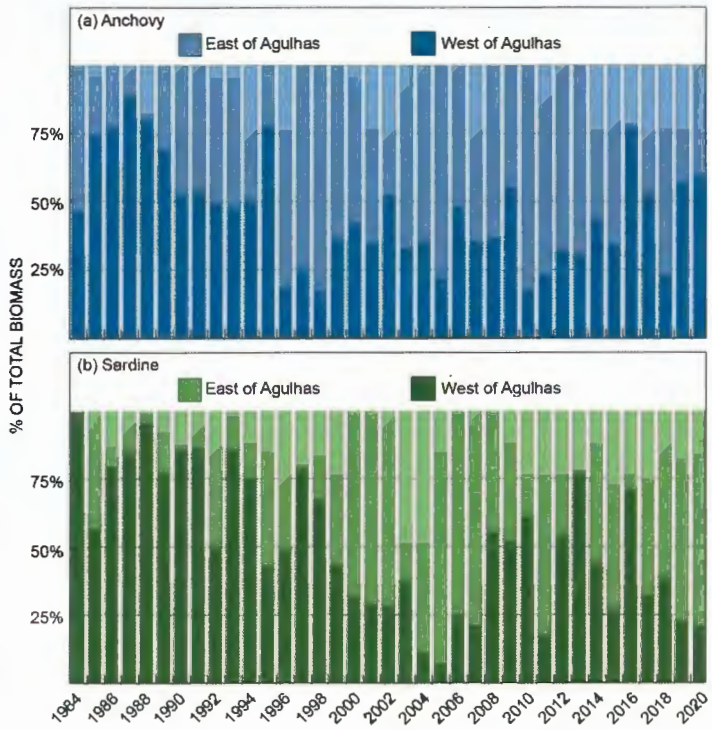

Figure 6: Time-series of relative distributions (% west of Cape Agulhas and % east of Cape Agulhas) of anchovy and sardine observed during annual total biomass surveys, 1984–2020

Sardine have also shown an eastward shift in their relative distribution (Figure 6), but that occurred more gradually than was observed for anchovy and was at its maximum (93% of sardine biomass EoCA) in 2005 before reversing to variable but mostly higher values thereafter. In 2020, 79% of the total sardine biomass was estimated to be EoCA. Whereas the cross-shelf SST gradient EoCA and the percentage of sardine biomass there for the period 1984–2011 were significantly correlated (Augustyn et al. 2018a), the relationship was weaker than that for anchovy. The changed sardine relative distribution may also have been driven by fishing pressure which has historically been higher for sardine off the west compared to the south coasts due to the greater processing infrastructure on the former (Coetzee et al. 2008; Augustyn et al. 2018b). The shift in relative biomass of adult anchovy had little impact on the small pelagic fishery because it targets primarily juvenile anchovy off the west coast (see below), whereas the sardine shift had substantial impacts, in particular during the peak sardine biomass years of the early-2000s. The average position of directed sardine catches showed a

progressive eastward movement from the mid-1990s to the mid-2000s, with >50% of the total directed sardine catch being taken off the south coast in 2005 and much of that having to be trucked to the processing facilities on the west coast, which increased transport costs (Augustyn et al. 2018a).

4.5. Small pelagic fish abundance and availability to penguins

Seabird scientists and marine ecologists argue that the main reason for the continuing decrease of African penguins in South Africa is food scarcity (e.g. Robinson et al. 2015; Crawford et al. 2018, 2019). However, a meta-analysis that used prey-linked population models of 32 marine predator species (including 9 seabirds) to measure the influence of forage fish abundance on their population growth rates found that prey abundance rarely impacted predator productivity, even in species with a high dependence on forage fish (Free et al. 2021). That said, those authors also note that, in the context of seabirds, which are limited in their foraging range during breeding periods, there seems to be support for restricting fishing around such breeding colonies to increase prey availability and that this is deemed more effective than population-wide precautionary management, because local abundance is not necessarily correlated with total abundance (Kuhn et al. 2014).

Seabird scientists and marine ecologists maintain that overfishing (especially in Namibia) and a shift in the geographic distribution of the two main prey species (sardine and anchovy) (especially in South Africa) that led to a mismatch in the location of prey in relation to penguin breeding locations, are considered key factors in the decline of African penguin numbers at regional scales in recent decades (Crawford 1998; Crawford et al. 2001, 2008a, b; Durant et al. 2010, Sherley et al. 2020a). Dispersing juvenile penguins from the west and southwest coasts tend to migrate to the northern Benguela ecosystem i.e. north of the Lüderitz upwelling cell, following intrinsic cues to historically high prey abundances (Sherley et al. 2017). However, doing so induces a high mortality due to a lack of prey because fishing and environmental effects have degraded fish stocks there, and the resultant population-level impact offers the first evidence that forage fish depletion can drive marine ecological traps (Sherley et al. 2017). Seabird and fisheries scientists and marine ecologists agree that the decline in sardine abundance off Namibia and the South African west coast has likely been an important driver of reduced African penguin numbers there, and that other factors (e.g. predation, inadequate breeding habitat, and anthropogenic factors such as oil spills and disturbance related to the Coega harbour development in Algoa Bay (see Crawford et al. 2009 for the last)) may have been or be important drivers of the continuing observed penguin declines regionally or locally around South Africa (see examples in Table 2). However, fisheries scientists argue that there are not strong relationships between forage fish abundance and African penguin population size, particularly on the south coast.

The recent changes in anchovy and sardine biomass levels and distribution patterns (using data collected during annual surveys over the period 1984–2020) off South Africa, as well as an indicator (number of breeding pairs) of the South African penguin population status over the period 1979–2019/20, are synthesised in Figure 7. The normalised (as a proportion of the observed maximum) biomass of anchovy and sardine separately (and the two combined) observed off the west and south coasts (and off both coasts combined) are shown, together with average levels for the first (1984–1995) and last (2009–2020) 12-year portions (one third) of the 37-year fish time-series. Similarly, the normalised number of African penguin breeding pairs (extracted from Sherley et al. 2020a) off the west and south coasts (and off both coasts combined) is shown. The biomass of sardine off the west

coast has been very low during the past few years and the average sardine biomass during the last ⅓ of the time-series has decreased by 29% compared to the average during the first ⅓. Anchovy biomass off the west coast has remained similar between the first and last ⅓ of the time-series, with the latter being only 1% higher than the former. The shift in relative distribution of anchovy has resulted in a substantially increased (by 166%) biomass off the south coast during the last ⅓ of the time-series compared to the first ⅓, and sardine biomass off the south coast has similarly increased by 131%.

Table 2: A summary of the estimated annual percent change in population growth rate of African penguins (at the specified location) attributed to various threats or actions. Modified from Sherley et al. 2020b.

Threat/ Action	Percent change in growth rate	Penguin demographic parameter affected	Location of study	References
Food abundance/ availability ▪ with fishing ▪ without fishing	8% reduction 6.1% reduction	Adult survival	Robben Island	Robinson et al. 2015
Food abundance/ availability	6% reduction	Juvenile survival	Western Cape	Sherley et al. 2017
Chronic oiling	1.3% reduction	Reproductive output	Dassen Island	Weller et al. 2014
Catastrophic oiling^	2% reduction	Adult mortality	Dassen Island	Weller et al. 2014
Seal predation	2.7% reduction	Adult mortality	Dyer Island	Weller et al. 2016
Gull predation	0.2% reduction	Breeding success	Dyer Island	Weller et al. 2016
Disease outbreaks^	3.2% reduction	Adult mortality	Halifax Island (Namibia)	OIE 2019
Fishery closure*	3.1% increase	Adult survival	Robben Island	Robinson et al. 2015
Artificial nests	1% increase	Fledging success	South Africa	Sherley et al. 2012
Island closure†	~1% increase	Chick and juvenile survival	Robben and Dassen islands	Sherley et al. 2018

~This study considered the relative change in sardine biomass before and after 1984–1998 and 1999–2012

* This study considered the closure of the sardine fishery west of Cape Agulhas under 1999–2012 distributions

†This study considered the closure to fishing around island colonies

^ These threats do not act on the population continuously

Overall, the combined abundance of anchovy and sardine off the South African coast has been higher by almost 50%, on average, during the last 12 years than during the mid-1980s to the mid-1990s, yet fisheries scientists point out that the African penguin population has declined substantially between those two periods on both coasts, although the rate of decline did decrease somewhat. Therefore, fisheries scientists maintain that this lack of coherence between prey (anchovy and sardine) and predator (African penguin) abundance trajectories strongly suggests that there are significant drivers impacting African penguin population dynamics other than prey abundance. Whereas there has been a large body of published research that highlights the strong influence of food abundance on seabirds in the Benguela ecosystem (Crawford et al. 2011), seabird scientists and marine ecologists maintain that comparing the overall sardine and anchovy biomass to African penguin population trends does not take into account the importance of localised availability of those prey to African penguins near their colonies, as they are constrained by swimming distance especially during their breeding season (Pichegru et al. 2009, 2010a).

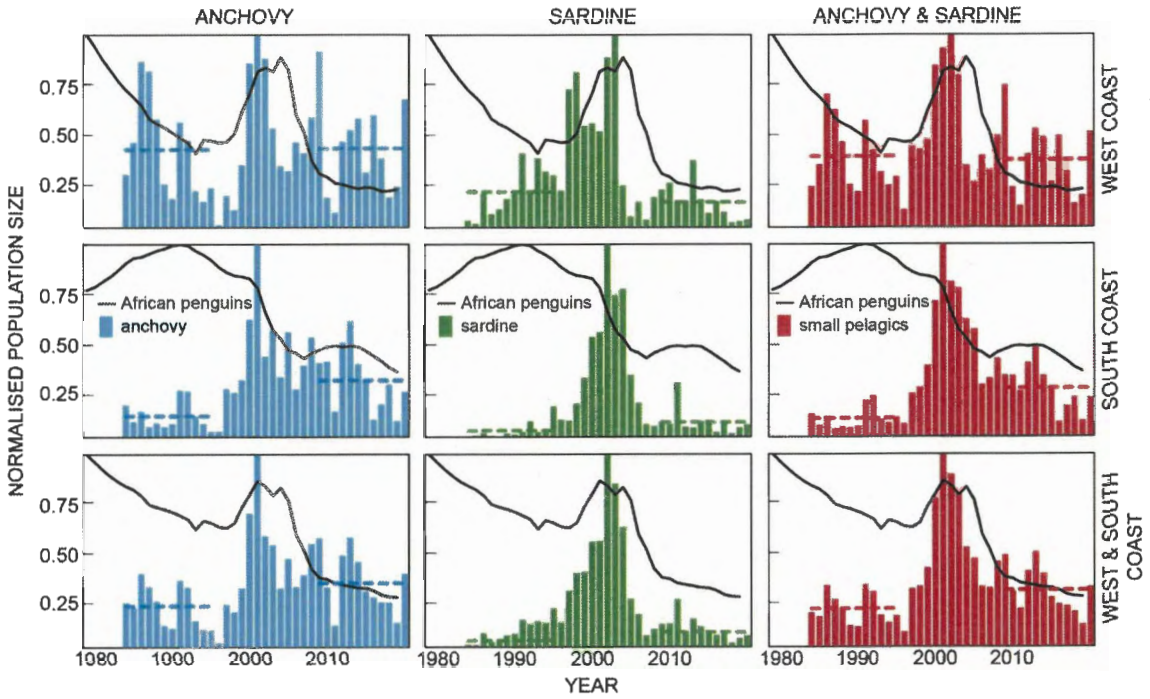

Figure 7: Time-series of annual normalised (as a proportion of observed maximum) biomass (histograms) of anchovy and sardine off the South African west coast (i.e. west of Cape Agulhas [WoCA]), south coast (i.e. east of Cape Agulhas [EoCA]), and both coasts combined, observed during annual total pelagic biomass surveys, 1984–2020 (DFFE 2020; the dashed lines show average levels during the first and last 12-year periods of the time-series); and annual normalised (as a proportion of observed maximum) number of African penguin breeding pairs off the west, south and both coasts combined as observed from annual censuses, 1979–2019 (from Sherley et al. 2020a).

Crawford et al. (2019) developed a 'food availability index' (FAI) for seabirds off South Africa's west coast based on an analysis of temporal variability in the diet of Cape gannet *Morus capensis* (another seabird with a high dependency on sardine and anchovy) that was positively related to annual numbers of Cape gannet and Cape cormorant *Phalacrocorax capensis* breeders and to annual estimates of survival of adult penguins at their two largest colonies off the west coast. Those authors reported a change in the relationship between the FAI and the combined biomass of anchovy and sardine WoCA over the period 1984 to 2015, with results indicating high food availability up to 1999 but an abrupt switch to low availability from 2000 onwards, leading them to suggest that it is not overall abundance of forage that impacts African penguin population dynamics but the local availability thereof. Crawford et al. (2019) identified the small pelagic fish distribution shifts (mentioned above), a movement of fish to a deeper position in the water column, or a combination of the two as possible causes of the decrease in local prey availability. Those authors also noted that the anchovy total allowable catch (TAC) had been under-caught since 2001 and that the extent of the under-catch had increased in recent years, indicating a reduced availability to the small pelagic fishery as well as to seabirds.

A comparison of annual FAI values with the proportion of the anchovy TAC caught for the period 1987–2015 shows the two are significantly and positively correlated, suggesting that both were similarly impacted. However the under-catch of the anchovy TAC has been attributed to a wide variety of factors including reduced processing capacity in the light of increasingly stringent environmental

regulations governing factory emissions and effluent discharge; severe winter weather and sea conditions; disruptions caused by high bycatches of juvenile horse mackerel and sardine at times, along with the industry's resultant attempts to minimise these by temporarily stopping fishing in such areas; and factors relating to the profitability of the sardine fishery relative to that of the anchovy fishery (DAFF 2016). Except in recent years the sardine TAC has seldom not been filled, and the proportion of the TAC caught is not correlated with the FAI. It is worth noting that, despite the high prey availability between the mid-1980s and 2000 indicated by Crawford et al. (2019), the African penguin population continued to decline over that period, although the rate of decline did decrease somewhat. This suggests that pressures other than food availability (and as distinct from prey abundance) likely have significant impacts on the African penguin population in South Africa.

Additional studies highlight the influence of food availability and localised fishing activity on seabird colonies elsewhere. In Scotland, black-legged kittiwakes *Rissa tridactyla* benefitted from the closure of fishing around breeding colonies (e.g. Daunt et al. 2008). In Peru, fishing for Peruvian anchovy *Engraulis ringens* close to a Peruvian booby *Sula variegata* colony increased the birds' foraging effort; the more the fishery reduced the quantity of prey fish in the area, the farther the breeding seabirds needed to forage from the colony to find food (Bertrand et al. 2012). Off the Antarctica Peninsula, the performance of three species of *Pygoscelis* penguins was reduced when local harvest rates of Antarctic krill *Euphausia superba*, on which they fed, were ≥10% of the estimated biomass (Watters et al. 2020). These and local studies have indicated that local availability of prey around seabird breeding colonies is critical, which led to the Island Closure Experiment described below.

5. Effects on African penguin reproductive performance of fishery closures around island breeding colonies

South Africa's small pelagic purse-seine fishery targets mainly sardine *Sardinops sagax* and anchovy *Engraulis encrasicolus*. Sardine and anchovy represent what are known as forage fish, occupying a key position in the marine food web where they are the link that transfers energy produced by plankton to large-bodied predatory fish, seabirds (including African penguins, e.g. Crawford et al. 2011; Sherley et al. 2013) and marine mammals (Smith et al. 2011). Because many animals and humans depend on forage fish, it is important to manage the fishery activities in a sustainable manner that considers and accounts for their high degree of variability in population size and importance to the ecosystem (Ecosystem Approach to Fisheries [EAF]; see 'Sustainability, ecosystem, and socio-economic considerations' section).

Distributional shifts in the availability of forage fish resources and the inability of penguins to adapt to large-scale changes in prey distribution resulted in a period of poor and declining adult survival and variable juvenile survival (Sherley et al. 2014). The increased adult mortality of penguins at Robben Island on the west coast was linked to a decrease in the biomass of sardine to the west of Cape Agulhas, with mortality increasing markedly when that biomass dropped below a quarter of the maximum observed (Robinson et al. 2015). At Dassen and Robben islands in the 2000s, large losses of adult penguins during their pre-moult fattening period (Waller et al. 2019) suggested that these birds died as a result of being unable to obtain enough food to attain a condition sufficient to undertake a successful moult (Waller et al. 2019). Moreover, because no unusual mortality was observed ashore,

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and after accounting for at-sea predation by seals and losses to oiling, it was assumed that most other mortality of the penguins resulted from food scarcity (Crawford et al. 2018). In addition, more than 60% of adult and 92% of juvenile African penguin mortalities of birds admitted to the Southern African Foundation for the Conservation of Coastal Birds (SANCCOB) between 2004 and 2012 were attributed to starvation (Pichegru and Parsons 2014). Several other factors including oiling, predation by seals and disease, however, may also have contributed significantly to adult and juvenile mortality (Crawford et al. 2006).

In several instances, significant relationships have also been demonstrated between demographic, condition, growth and foraging parameters of these seabirds and the abundance or availability of their prey (summarised in Crawford et al. 2018, 2019). Given the fluctuating nature of small pelagic fish stock biomasses, these have at times been below thresholds that have been suggested to be required for African penguins in the west of South Africa to support sufficient reproduction and survival to maintain their populations (Cury et al. 2011; Crawford et al. 2011, 2019; Robinson et al. 2015; Sherley et al. 2017).

Furthermore, a system dynamics model (penguin pressure model) suggested that the penguin population at Robben Island was strongly driven by food availability, both near the island and farther afield, and would be improved by fishing closures (Weller et al. 2014). Those results suggested that a 20-year period of closure to fishing around Robben Island would result in an average 8% increase in the size of the penguin population there, although variability about that average was large, with an appreciable number of estimates indicating a decrease in the original size of the penguin population after 20 years of no fishing. The 2016 IFSAW panel (see below; Dunn et al. 2016) noted, however, that the overall trend in penguin abundance indices was not adequately fitted by that model and recommended that it not be used for tactical management advice for small pelagic fish. For the same island, a different model by Robinson et al. (2015) projected a 3% increase in penguin numbers over a 20-year closure period of a much larger area, compared to when fishing was allowed (the percentage proportional change per year as a result of decreased mortality in the absence of fishing was –10% compared to –7% when fishing was allowed).

Extension of the penguin pressure model to Dyer Island off the southwest coast (Weller et al. 2016) suggested that the penguin population decline there was strongly influenced by the effects of predation by Cape fur seal *Arctocephalus pusillus pusillus* and the emigration of immature birds. Those authors concluded that at the current low population size, impacts from seal predation or immature emigration were sufficient to mask any beneficial effects to penguins from possible improvements in available food biomass (e.g. from fishery restrictions).

Following the observed increases in mortality from 2006 and subsequent further reduction in the number of African penguins off South Africa, it became important to not only reduce mortality as far as possible, but to also ensure that reproduction by penguins was sufficient to partially offset mortality (Crawford et al. 2006). Long-term exclusion of purse-seine fishing around two key southern breeding localities was recommended as a precautionary measure in 2006 (Crawford 2006). This intervention was suggested because of the limited foraging range (20–40 km) of African penguins during breeding and the idea that shifts in the distribution of anchovy and sardine had placed much of the prey biomass beyond this foraging range. Whereas first-time breeders are able to move to non-natal colonies

(Whittington et al. 2005), established breeders of long-lived seabirds, including African penguins, are also often faithful to mates and breeding colonies, and are therefore unlikely to relocate to more favourable breeding locations when prey distributions change (Pichegru et al. 2010b). Furthermore, previous analyses had found that the breeding success of African penguins and the proportion of birds breeding were related to food abundance and availability (Crawford et al. 1999, 2006).

The response from the SWG-PEL to the appreciable reductions in numbers of penguins at the major breeding colonies and the call for purse-seine fishing exclusion zones was to embark on two processes to address the dependence of African penguins on forage fish:

i. Development of a penguin population model for use in conjunction with the small pelagic fish operational management procedure (OMP) so that the impact on penguins of predicted future pelagic fish trajectories under alternative harvest strategies can be evaluated (Robinson et al. 2015; de Moor 2018).
ii. Initiation of experimental closure to purse-seine fishing around two pairs of islands with key penguin breeding colonies to investigate whether fishing near these islands impacts penguin population growth rate negatively.

The coupling of the penguin population model with the OMP is described in the 'Sustainability, ecosystem, and socio-economic considerations' section, and the experimental closure to pelagic fishing is detailed below.

5.1. Experimental closure to purse-seine fishing

Penguins may be especially sensitive to changes in pelagic fish abundance and distribution as a consequence of their land-based breeding sites and their limited foraging range (20–30 km) during breeding (e.g. Pichegru et al. 2012; Sherley et al. 2013; Crawford et al. 2019). For this reason, a study to assess the effects of closure to purse-seine fishing around penguin breeding colonies was initiated in 2008. This study comprised two parts: (i) a feasibility study during which purse-seine fishing was prohibited around some island breeding colonies and data on penguins and small pelagic fish were collected to determine whether an experiment would have adequate statistical power, within a reasonable time-period, to detect a statistically significant effect (a so-called 'power analysis') of closure, if such existed; and (ii) an Island Closure Experiment, during which sufficient data were to be collected to enable rigorous scientific evaluation of whether closures are beneficial to penguin breeding success.

Data collected and models used to analyse those have been extensively debated and regularly reviewed by panels (international review panels [IRPs]) of international fisheries and ecosystem scientists at annual IFSAWs.

Several peer-reviewed scientific publications reported benefits of closure to fishing for penguins early on (Pichegru et al. 2010a, 2012; Sherley et al. 2015), despite caution from the IRPs against drawing premature conclusions about the benefit of island closures because of insufficient power in the data to draw such conclusions. More-recent studies (e.g. Sherley et al. 2018, 2019; Sherley 2020a, b) continue to affirm biologically meaningful effects of those closures to fishing around African penguin breeding colonies even though the experiment was not well-matched to the biology of the birds (see below). Nonetheless, these positive benefits of short-term closures were insufficient to reverse the

rate of decline, with IRPs reiterating that cessation of fishing around the islands by itself is unlikely to be sufficient for the penguin population to recover and that several simultaneous conservation interventions will be needed (Dunn et al. 2014, 2016). Such interventions are discussed later. By 2019 the IRP confirmed that the available scientific information was now sufficient for making management decisions but encouraged further analysis to investigate some of the remaining uncertainties.

This body of evidence, together with other peer-reviewed publications and a recent recommendation of the African Eurasian Migratory Waterbird Agreement–Benguela Current Convention (AEWA–BCC) Benguela Current Forage Fish (BCFF) Workshop, as well as the ongoing rate of decline in numbers of African penguins and other seabirds, prompted SANParks and the TP-SWG (B: O&C) to recommend immediate implementation of long-term closures around the six largest African penguin breeding colonies (see, for example, Makhado et al. 2020a, 2020b). Some of the findings of those publications have, however, been disputed by the SWG-PEL, which pointed out several issues regarding the results (see 'Remaining uncertainty' below). Given the need to base management decisions on robust scientific results, and the fact that island closures incur an economic cost to the fishing industry (see 'Sustainability, ecosystem, and socio-economic considerations' section), the SWG-PEL has continued implementing short-term closures on a rotational basis while analyses are refined and sufficient information is collected to reduce uncertainty. A detailed description of the feasibility study and the Island Closure Experiment is given below.

5.1.1. Feasibility study

In 2007, the SWG-PEL recommended that a two-year feasibility study be conducted to assist the design of an experiment which could have the potential to achieve adequate statistical power within a realistic time-period to confirm the effects of closure (to purse-seine fishing in areas near to colonies) on African penguins. The rationale for this approach was that it was not clear whether, and in particular to what extent, suspension of purse-seine fishing in the vicinity of breeding colonies of African penguins might impact penguin breeding performance. It was proposed that an experimental programme of closures might allow this extent to be estimated reliably.

The feasibility study was initiated in 2008. An area around Dassen Island (Figure 8; a circle of 20 km radius around the island) was closed to purse-seine fishing during 2008 and 2009, and an area around St Croix Island (a circle of 20 km radius around the island in addition to a circle of 5 km radius around the nearby Riy Banks) was closed to purse-seine fishing during 2009 and 2010.

Penguin monitoring was intensified, and data were collected on the numbers of breeding pairs and moulters, adult survival, breeding success, chick condition, the foraging effort of adults and the diets of adults feeding chicks. In addition, small-scale acoustic surveys using an inflatable vessel were conducted to provide a direct estimate of the biomass of small pelagic fish available to penguins around some of the islands. Those surveys were initially around Robben Island (six surveys were conducted in 2009) but in later years were extended to around Dassen, St Croix and Bird Islands (Coetzee et al. 2016). Fine-scale surveys were also conducted by non-governmental researchers around St Croix and Bird islands from 2014 to 2018 (McInnes et al. 2017). The small-scale surveys were subsequently abandoned at the end of 2018 given their relatively low precision, staff shortages and lack of funding.

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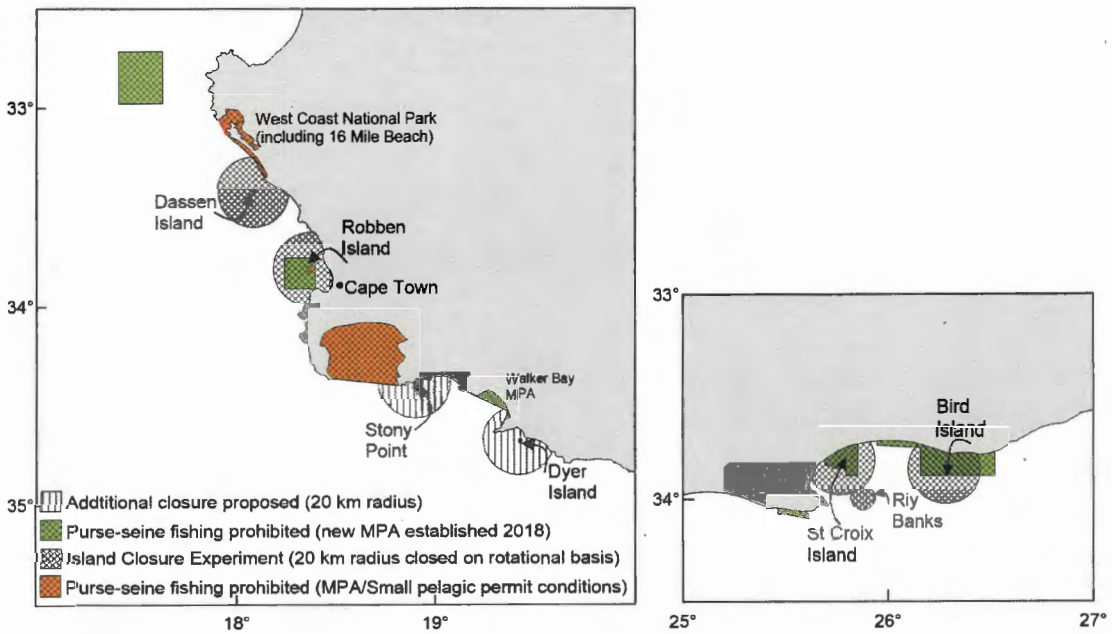

Figure 8: The location of the islands on the west coast (left) and south coast (right) of South Africa around which purse-seine fishing was closed on an experimental basis. Circles indicate the extent of the 20 km closure

Although a two-year period was initially intended for the feasibility study, that proved to be insufficient time to allow experimental power to be estimated for all the penguin parameters monitored, and analyses of the impacts of purse-seine fishing in the vicinities of breeding islands failed to produce clear-cut results. Following deliberations of the SWG-PEL and inputs from the 2010 IRP (Parma et al. 2010), it was agreed that the feasibility study be extended for an additional four years (until the end of 2014). It was further recommended that alternation between islands open and closed to fishing (where Robben and Bird islands were paired with Dassen and St Croix islands, respectively) be implemented to optimise the outcome of the study. This decision took account of the sometimes-conflicting study objectives of: (i) rapid alternation to maximise contrast in the data to enable more precise estimation; (ii) a slower alternation to take account of possible autocorrelation in the penguin indices being monitored; and (iii) the desirability to integrate the feasibility study into a possible future experiment to lead to earlier answers. Seabird scientists, however, suggested longer-term (more than four years) closures that would accord with the African penguins' ecology and life history. For example, young African penguins wander widely for periods of up to six years before settling at localities to breed. In contrast, breeders show strong fidelity to their mates and breeding colonies (e.g. Hockey et al. 2005; Crawford et al. 2013). Hence, frequent alternation of short-term closures may mask important effects on demographic parameters, including recruitment to colonies (Crawford 2010). Whereas seabird scientists acknowledged the statistical merit of alternation, they also pointed out the dissimilarity of paired island ecosystems, and that island-specific differences may create a large amount of noise in the data and obscure closure effects (Pichegru et al. 2010c; Wanless and Moseley 2010).

By the end of 2014, two groups of analyses had emerged (Hagen et al. 2014; Robinson et al. 2014). The first was by scientists on behalf of the SWG-PEL (i.e. UCT's Marine Resource Assessment and Management Group [MARAM]), who focused primarily on the estimation of residual variance

(unexplained or error variance in a model) using annually aggregated results of the feasibility study in a generalised linear-mixed effects model (GLMM) and estimated the impacts of catches on penguin biological parameters. The second, led by independent seabird scientists but in collaboration with the B: O&C, used individual penguin data (disaggregated data) and focused on the impact of closures on penguin biological parameters.

Both groups reported inconsistent findings regarding the impact of closures or reduced catches on penguin biological parameters within and between analyses. A plausible explanation offered by the 2014 IRP was that there may have been at least one unidentified factor which drives penguin dynamics that had not been included in any of the models, but which was confounded with the closure periods. That IRP also noted that statistically significant effects are not necessarily biologically important, and made recommendations for estimating the relative magnitude of any such effects and how they impact the penguin population. They further stated that cessation of fishing around the islands by itself is unlikely to be sufficient for the penguin population to recover (Dunn et al. 2014). It should be noted that in 2013, B: O&C (then a branch of DEA) gazetted the first African Penguin Biodiversity Management Plan (BMP-AP), which attempted to manage all threats to African penguins.

By the end of 2014 both sets of analyses supported the notion that the feasibility study had been successfully conducted (i.e. that the data collected for some of the variables were already sufficient to detect a statistically significant effect or to indicate the number of additional years of data collection that would be required to detect a statistically significant effect) and the IRP concurred (Dunn et al. 2014). The IRP recommended that a full-scale experiment be conducted by continuing the programme of closures that had been implemented during the feasibility study, and set clear guidelines for refining the power analysis to include new information.

5.1.2. Island Closure Experiment

The experiment has since continued (Table 3) and analyses in respect thereof have been subjected to periodic review by several IRPs. The following summarises the outcomes of those reviews and the steps taken by both groups to further the analyses of the experiment. A timeline describing major events and decisions during the island closure feasibility study and experiment is shown in Figure 9.

Table 3: Schedule of closures around islands with African penguin breeding colonies (x = closed; for 2021, seasonal closures have been introduced whereby Dassen Island is closed in the first and fourth quarters [x- -x] and St Croix Island is closed in the second and third quarters [-xx-])

Island	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
	Feasibility study							Island Closure Experiment						
Dassen	x	x					x	x	x				x	x--x
Robben				x	x	x				x	x	x		
St Croix		x	x	x				x	x	x				-xx-
Bird					x	x	x				x	x	x	

A technical task team, comprising members from each of the two groups of analysts and reporting to the SWG-PEL, was formed in 2015 to implement the 2014 IRP recommendations. By August 2015 that task team presented an agreed set of specifications to the SWG-PEL for operating models to evaluate the various biases in methods of estimation of the effect of closure (Penguin Island Closure Task Team

2015a). Having conducted that evaluation, consolidated analyses (Penguin Island Closure Task Team 2015b) were presented for review at the 2015 IFSAW. That IRP provided revised specifications for the power analyses, focusing on the key considerations likely to impact the power to detect biologically meaningful impacts caused by the fishery (Dunn et al. 2015). It also identified a reference set of specifications for the operating model and estimation methods that should form the basis for final conclusions.

Based on a Robben Island penguin population model (Robinson 2013), Robinson et al. (2014) provided a rationale for selecting a biologically meaningful fishing-effect size for a response variable that is directly linked to penguin reproductive success. From this, the agreed fishing-effect threshold for a biologically meaningful effect was chosen to be –0.1, equivalent to a 1% increase in the penguin population growth rate in the absence of fishing. The 2015 IRP advised that similar quantitative thresholds for the fishing-effect/closure-effect parameter should be selected for each response variable. They further recommended that a response variable should not be considered further if there is no objective way to determine a threshold for it because it may be unclear how to quantify how changes in such a variable impacts biological processes and hence population growth rate. The IRP also cautioned against premature attempts to draw conclusions on the effects of fishing near islands and on the statistical power to detect such effects (Dunn et al. 2015).

In December 2016 the IRP reviewed further progress made by the Task Team in implementing their 2015 recommendations. The IRP noted that sufficient progress had been made so that it should be possible to identify for which combinations of response variables and islands it is possible to conclude there is a fishery effect, for which there is no fishery effect, and for which neither conclusion can, as yet, be reached. They further noted that the power analysis should assist management to identify the response variable and island combinations for which no conclusions could be drawn even given continued collection of the data concerned over a further 20 years. In addition, the IRP developed an algorithm for synthesising the results of the analyses conducted to date (Dunn et al. 2016).

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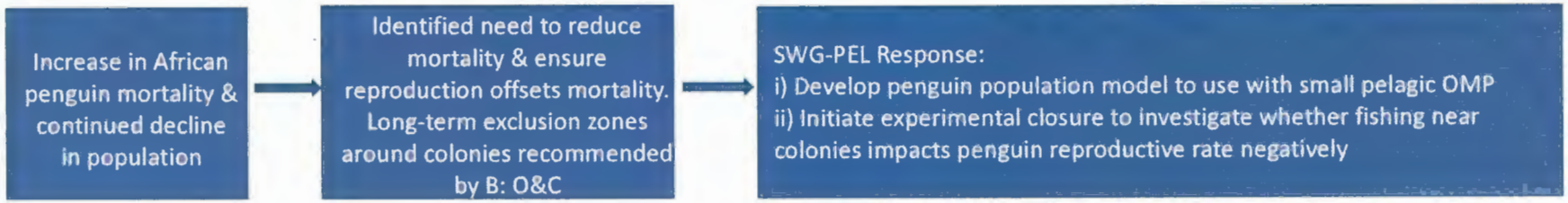
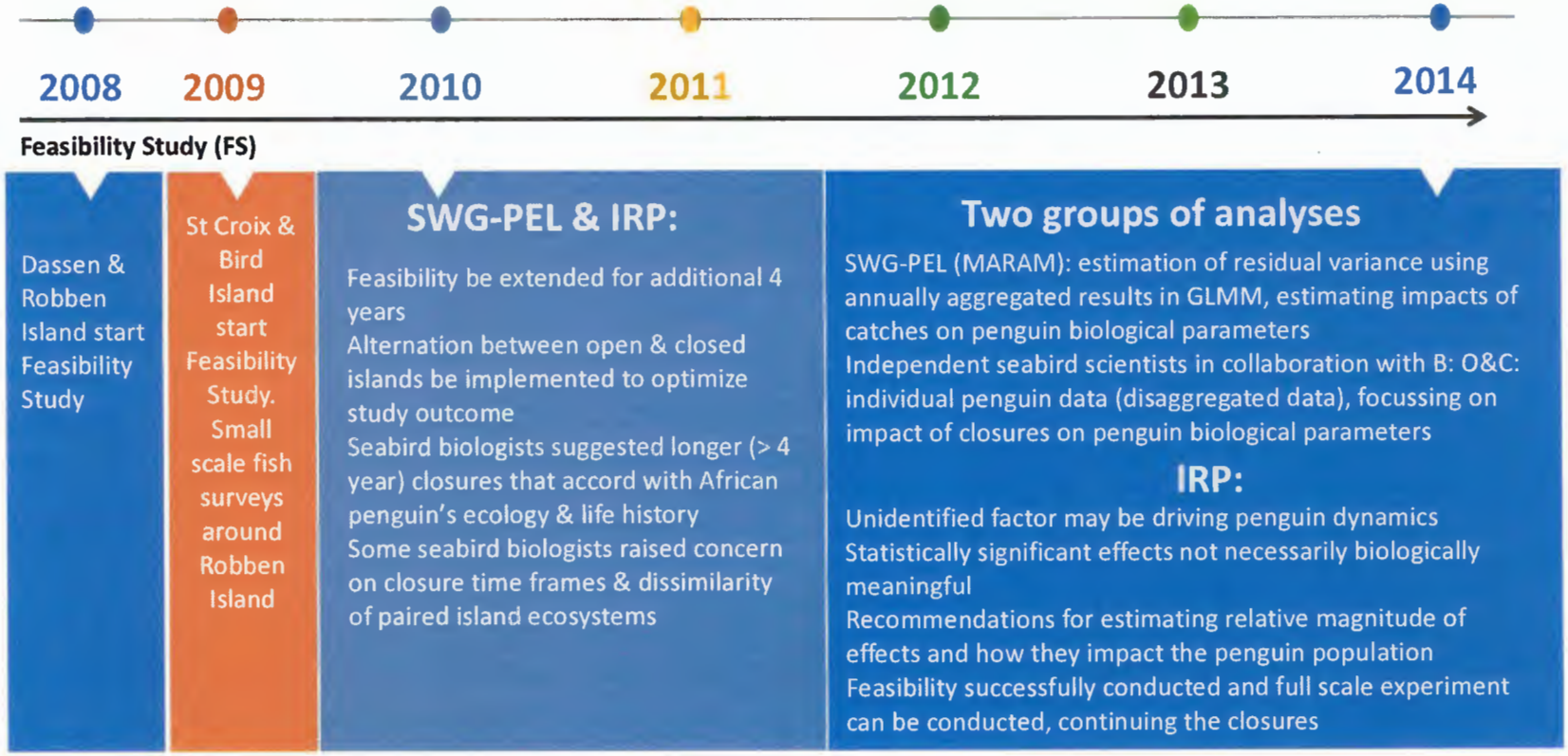
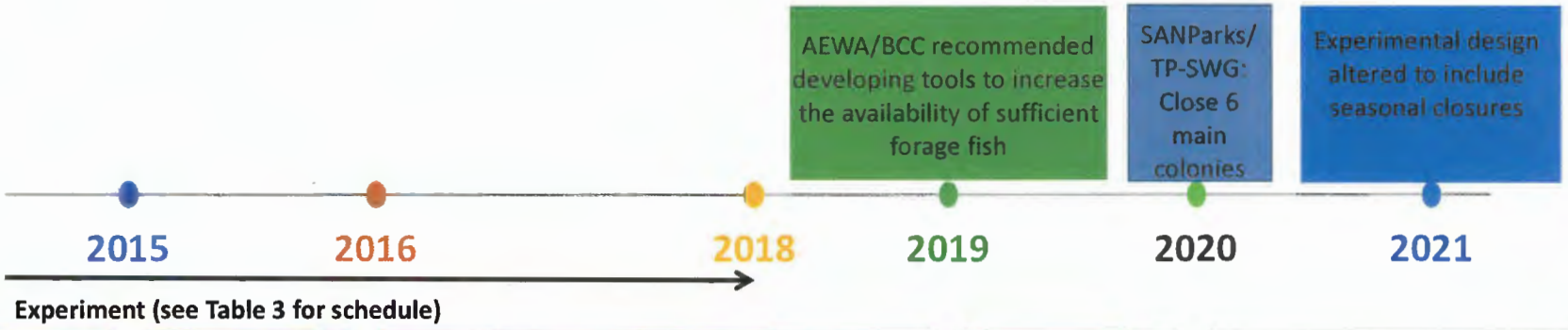
Figure 9: Timeline describing major events, decisions etc. during the island closure feasibility study and experiment







Technical Task Team formed to implement 2014 IRP recommendations
Agreed specifications for operating models
Fishing effect threshold for biologically meaningful effect chosen at -0.1 (1% increase in penguin population in absence of fishing)

IRP:

Revised specifications for power analyses
Identified reference specifications for operating model & estimation methods to form basis for final conclusions
Quantitative thresholds for fishing/closure effect be identified for each response variable

IRP:

Reviewed progress implementing 2015 recommendations
Possible to identify for which combinations of response variables & islands there is a fishery effect; no fishery effect; or inconclusive
Power analysis assisted in identifying response variable and island combinations for which conclusions unlikely ever to be made
Developed algorithm for synthesizing results conducted to date
Reviewed additional analyses by Sherley based on alternative Bayesian framework
SWG-PEL agreed to continue experiment for 3 more years (2017-2019); analysing available data to make long-term recommendations

SWG-PEL

Disputed Sherley et al. 2018 approach
Requested IRP to advise on appropriateness of this approach

IRP:

Confirmed Sherley approach can be used & their use of individual data is preferred if appropriate random effects structure chosen
Recommended simulation study
SWG-PEL: continue experiment to 2020 to address 2019 IRP recommendations.

COVID-19 halted collection of most biological data
Both sets of analyses extended to include updated information (although time-series not aligned)
Concerns raised on validity of both approaches

IRP:

Suggested use of common data sets and model structures to determine sensitivities
Confirmed both approaches suitable (if appropriately structured) and available scientific information sufficient for making management decisions
Chick survival analyses could be used when drawing conclusions regarding fishing effects if immediate decisions required
Model improvement recommendations were made

At that time the IRP also reviewed additional analyses (Sherley [2016], later published after modification as Sherley et al. [2018]) based on an alternative Bayesian framework rather than the previously used maximum likelihood estimation (MLE) framework and using disaggregated penguin data in the GLMM structure as recommended by Dunn et al. (2015). The 2016 IRP noted that this approach (i.e. the Bayesian framework) could form the basis for evaluating power but that it, too, would be required to implement the steps as outlined for the power analyses by the 2015 IRP, and made additional recommendations for improvement. The SWG-PEL agreed to continue the experiment for a further three years (2017–2019), and to conduct comprehensive analyses of available data by the end of 2019 with a view to making future longer-term recommendations at that time.

In 2019, two separate sets of analyses were again presented to the SWG-PEL and subsequently to the IFSAW at the end of the year. The first set continued and updated the GLMM analyses for the south coast islands (Ross-Gillespie and Butterworth 2019a, 2019b). The second set extended the Sherley et al. (2018) Bayesian approach based on fits to responses for individual penguins (Sherley et al. 2019), which seabird scientists supported and considered as evidence for the benefit of closure. However, given criticism by members of the SWG-PEL (Butterworth 2016; Ross-Gillespie and Butterworth 2019c) of the implementation of some aspects of the latter approach and hence also by implication the work published by Sherley et al. (2018), the 2019 IRP was requested to provide advice on whether this approach possibly produced negatively biased estimates of the standard error of the parameters and whether adequate adjustment had been made for the non-independence of data. The IRP confirmed that such approaches (i.e. Sherley et al. 2019) are capable of providing estimates of precision that are negatively biased if covariates common to individuals are ignored (i.e. pseudo-replication) but that random-effects models are used to account for such 'latent' covariates in designed experiments (Die et al. 2019). They stated: "Given the nature of the experiment, use of individual data is to be preferred. However, this is only the case if an appropriate random effects structure is chosen". Die et al. (2019) also noted that it is a working hypothesis that including random effects chosen using model-selection methods will appropriately account for the pseudo-replication in natural experiments such as this closure experiment. They recommended that this should be explored further by constructing a simulation experiment with multiple possible random effects and including testing of the model-selection process and that the simulation study should also further examine the lack of balance (e.g. effect sizes that match those in the data; sample sizes that match those in the data; appropriate error variances, etc.) that could impact the performance of both approaches. The SWG-PEL, after consideration of the review, agreed to continue the experiment in 2020 by maintaining the established sequence of closures so that the 2019 IRP recommendations could be properly addressed through updated and improved analyses before a long-term decision on island closures was taken. However, biological data on the penguins could not be collected in 2020 due to the COVID-19 pandemic.

During the course of 2020 both analyses were further extended (Ross-Gillespie and Butterworth 2020; Sherley 2020a) to include updated information (although the extent of inclusion of recent information differed between the two sets of analyses, given the timing of some of the data becoming available and other constraints on analysts' time). In this regard, it is important to note that there are still some response variables included by one group but not by the other and differences in the length of the time-series included in each analysis, in addition to the differences in model structure and the use of aggregated vs disaggregated data between them.

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Concerns were again raised during SWG-PEL discussions about the validity of both approaches (see summarised comments and responses in DEFF 2020b, c, d). On the one side, some fisheries scientists argued that updated results from the Bayesian approach showed that estimates of the precision of effect size are not robust to decisions made about which factors to include in the random effects. Hence the random-effects models used (e.g. Sherley et al. 2018) had failed to account adequately for the effects of pseudo-replication, resulting in overestimation of the estimates of precision. Concern was also raised about the validity of the methods used to estimate penguin survival estimates. On the other side, proponents (i.e. seabird scientists and marine ecologists) of the disaggregated data approach argued that the aggregated approach is hampered by a low number of degrees of freedom and potential lack of statistical power, and therefore should not be considered for making management decisions with respect to the effect of fishing closures on penguin reproductive success.

In December 2020 the IRP was requested to review both sets of analyses and to comment on their appropriateness for informing management decisions. In addition, they were asked to comment on the suitability of the penguin chick survival estimates for use as inputs to estimators of the island closure effects. The 2020 IRP noted the lack of like-vs-like comparisons between the two sets of analyses and suggested the use of common datasets and common model structures for some of the response variables to determine the sensitivity of the results to the use of aggregated vs disaggregated data (Haddon et al. 2020). They further advised that both approaches are suitable for informing management decisions, provided that they are appropriately structured – failing which both approaches can lead to biased estimates of closure effects and the standard errors of the estimates of these effects (i.e. the precision with which effects are estimated). The IRP pointed out that there are many differences between the implementations of the two approaches and that whereas some are likely to be relatively inconsequential (e.g. Bayesian vs MLE), others, such as how data are weighted, may be critical for both the estimated precision of the closure effect size and for the estimated effect size, given that the datasets are unbalanced in terms of sample size. In this regard they recommended that strata (e.g. year-island-month combinations) with more observations and/or lower among-individual variation should be given more weight during model fitting.

The 2020 IRP also recommended that the model-selection process recommended by the 2019 IRP should continue to be applied but a final test should also be conducted to determine if the variance of the residuals is similar to the variance of the observations at the level of island/year/month (or the strata that are retained in the model selected). Furthermore, they noted the need for careful consideration of how the variance that is not attributable to closure, such as year and month effects, is modelled. Concerning this issue, they pointed out that the current Bayesian approach (Figure 10) does not in fact implement a nested hierarchical random effects structure, and recommended that additional models with island nested within year be included in the model selection process as previously recommended (Haddon et al. 2020). In respect of the survival estimates, the 2020 IRP suggested that the existing analyses based on chick survival rate could be used when drawing conclusions regarding the effects of fishing on penguin populations if decisions are required immediately, but that additional work is necessary. Modified closures were recommended by the SWG-PEL and have been implemented in 2021 whilst the further required analyses (see section on 'Remaining uncertainty') are being conducted.

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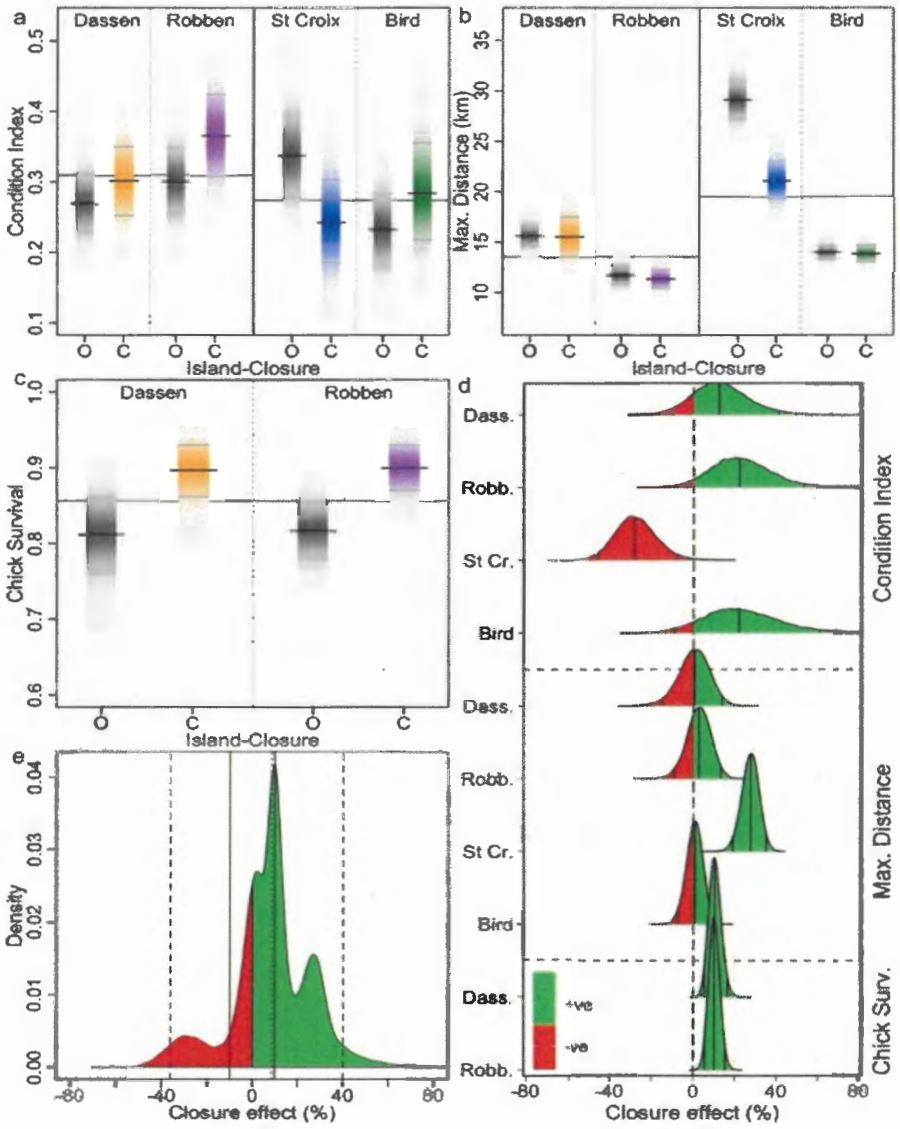

Figure 10: Posterior distributions, means and 95% highest posterior density interval (HPDI) for (a) chick body condition index and (b) the maximum distance travelled by foraging penguins at Dassen, Robben, St Croix and Bird islands, and for (c) chick survival at Dassen and Robben islands for years when fishing was permitted ('O') or not permitted ('C'). (d) Posterior distributions for the percentage difference between 'Closed' years and 'Open' years for chick body condition, the maximum distance travelled from the island by foraging penguins ('Max. Distance') and chick survival at Dassen, Robben, Bird and St Croix islands. (e) Posterior distribution (polygon), median (dotted black line) and 95% HPDI (dashed black lines) for the overall closure effect (%) based on combining the 10 individual posteriors in (d). In (d) and (e), all samples yielding a positive % effect for penguins are shown in green and those yielding a negative % effect are shown in red. From Sherley et al. (2019)

5.1.3. Summary of results

Analyses by Sherley et al. (2019) indicated that closures improved the index of chick body condition at Dassen, Robben and Bird islands but not at St Croix Island (Figure 10a). Closures decreased the maximum distance travelled by adults on foraging trips from St Croix Island but had no effect on this parameter at the other three islands (Figure 10b). Closures improved chick survival, which directly

impacts population trends, at both Robben and Dassen islands (Figure 10c), but this variable was not studied at St Croix and Bird islands. In seven of the 10 possible pairwise comparisons there was a benefit of closures for penguins, in two no effect was apparent and in one a negative effect was observed (Figure 10d). When chick condition, chick survival, and maximum foraging distance from islands where these data were collected were grouped into a single index, there was a clear positive benefit for penguins of the closures (Figure 10e).

Using observed effect sizes and population-projection modelling, Sherley et al. (2018) estimated that year-round closure to fishing at both Robben and Dassen islands would increase the penguin population growth rate (lambda - λ) at those islands by 0.64% (i.e. reduce the present rate of decline by ~1%). Across the period of the experiment (2008–2019), which has seen effective year-round closures at 50% of four of the six largest colonies (so essentially 50% of the effect modelled in Sherley et al. 2018), λ in the South African penguin population has improved (the decline has slowed) by almost 2% (Sherley et al. 2020a). This is composed of the improvement of 0.64% off west South Africa (where Robben and Dassen islands dominate population numbers), an improvement of 1% within Algoa Bay (where St Croix and Bird islands dominate population numbers), all of which are areas where closures were applied, as well as limited colony growth (an improvement of 2.3% in λ) in the southwest where no closures around Stony Point and Dyer Island were imposed (Sherley et al. 2020a). The extent to which these improvements in the population trajectory are a consequence of fisheries closures, increased biomass of small pelagic fish in those areas, other interventions such as the introduction of artificial nests and removal of predatory gulls and seals, or a combination of these, has not yet been quantified

Figure 11 provides a comparison of results (both point estimates and precision) from the two different approaches, necessarily standardised given different model specifications, for each island included in the experiment. A negative point estimate indicates a negative impact of fishing and a positive impact of closure, whereas a positive point estimate indicates the opposite. The biologically meaningful threshold of –0.1 is equivalent to a 1% per annum increase in the penguin population growth rate for response variables that can be directly linked to penguin demographics, but see section on 'Remaining uncertainty' with respect to the choice of biologically meaningful thresholds for some variables. Details of the results are available in Ross-Gillespie and Butterworth (2019a, 2019b, 2020), de Moor (2020a) and Sherley (2020a). In general, these do not suggest a clear and consistent negative impact due to fishing (Bergh 2020b). Point estimates on either side of zero and/or the biologically meaningful threshold are obtained and the confidence intervals are very broad and in most cases span both 0 (no discernible effect of closure) and the threshold level.

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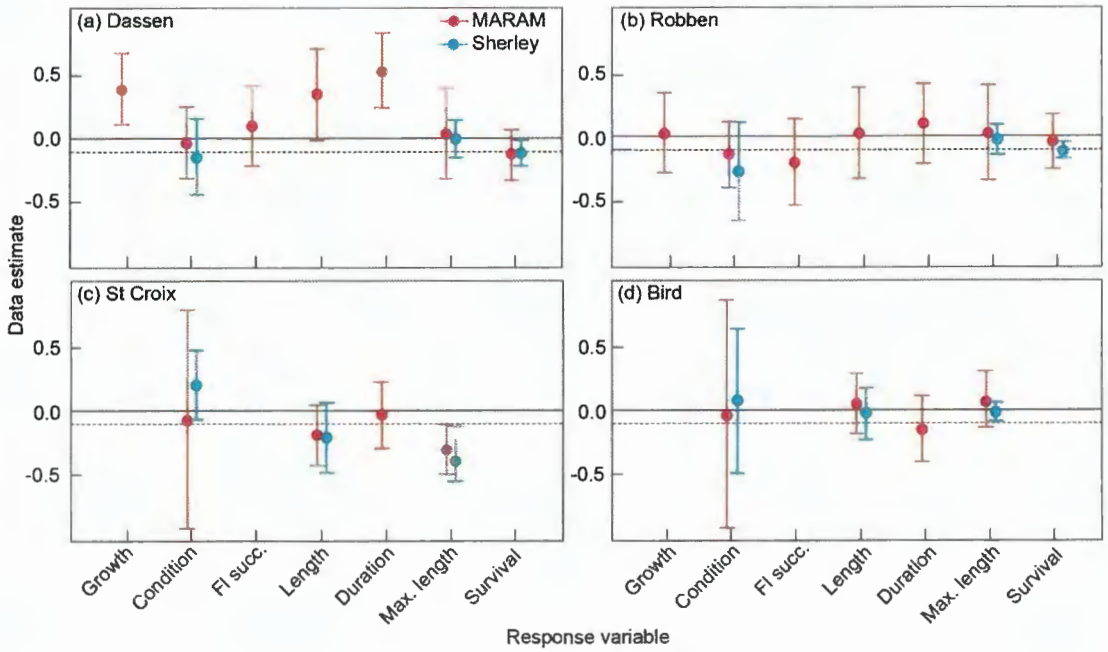

Figure 11: Zeh plots of the closure effect estimates and rough 95% confidence intervals are shown for the MARAM (aggregated data-based) and Sherley (individual data-based) models. The horizontal black line marks zero, and the horizontal dashed line marks the biologically meaningful threshold of –0.1. The values for the Sherley models have been derived from the last table of de Moor (2020) by use of the following formula: $\delta = \ln(1 - p/100)$ where the p values are those reported in that last table as a simple approach to transform from normal to log-space to achieve improved comparability. The confidence intervals have been converted in a similar manner, and a rough standard error may be calculated as (max(CI)–min(CI))/4. Fl succ. = fledging success, Length = foraging path length, Duration = forage trip duration, Max. length = Maximum foraging distance. Figure from Butterworth (2020).

A broad summary of the results for each island included in the Island Closure Experiment is given below:

- Dassen Island: Both approaches suggest a biologically meaningful positive effect of closure on chick survival only, though the 95% confidence intervals of the aggregated approach (MARAM) are wider than those of the disaggregated approach (Sherley) and include positive values, i.e. which indicate a negative impact of closure (Figure 11a). There may be some support for a positive impact of closure on chick condition based on the disaggregated (Sherley) approach, but this effect was also not statistically different from zero. There are no other conclusive effects of closure, and four of the seven response variables analysed by the MARAM group suggested negative impacts of closure.
- Robben Island: The MARAM analyses of chick survival, chick condition and fledging success provide some indication of a possible positive impact of closure on the penguin population there, though this does not meet the –0.1 threshold for chick survival and in all cases the confidence intervals include positive values (Figure 11b). The remainder of the penguin datasets give little indication of a biologically meaningful impact of closure. The Sherley analysis indicates a positive impact of closure on chick survival and chick condition, although only the chick-survival effect is conclusive.

- St Croix Island: Both approaches provide evidence for a positive impact of closure on foraging path length and maximum foraging distance, but not for chick condition for which the Sherley result suggests a reverse (negative) impact of closure (Figure 11c).
- Bird Island: A possible positive, though not conclusive, impact of closure was indicated for forage trip duration by the MARAM analysis, but not for any of the other variables by either analysis (Figure 11d).

All scientists agree on the need for robust science and trade-offs between cost and benefits. Scientists from B: O&C and SANParks maintain that the results to date from the Island Closure Experiment show a positive effect of closure on African penguins which, since implementation, have slowed their rate of population decline. They further add that, given: (i) the Endangered status of the African penguin; (ii) ongoing population declines; (iii) extinctions of five out of 19 of South Africa's colonies; (iv) the high likelihood of extinction of a further six colonies in the medium term; (v) increased Allee effects as colony sizes decrease; and (vi) that key population and demographic parameters will continue to be monitored at colonies around which closures will be implemented; together with (vii) the existing body of literature showing the dependency of African penguins on small pelagic fish, necessitate that substantive measures are taken to maintain South Africa's six largest African penguin colonies without further delay. Thus they call for applying the precautionary approach to facilitate management decisions.

However, the SWG-PEL has considered: (i) both sets of results, as well as the estimates of relatively small positive effects of closure (see 'Summary of results' section, above); (ii) the remaining uncertainty in both approaches (see 'Remaining uncertainty', below); (iii) other information pertaining to the economic impact on the fishing industry of further island closures (see 'Sustainability, ecosystem, and socio-economic considerations' section); and (iv) the seasonality of both fishing and penguin reproduction. Following these considerations, the SWG-PEL has recommended the implementation of further island closures in 2021 whilst further required analyses are completed. However, the experimental design was changed by incorporating seasonal closure on some islands to take account of the trade-off between losses to industry versus possible benefit to penguins. This decision was taken despite the objection to seasonal closure by seabird biologists and concerns over how this might impact future analyses.

5.1.4. Remaining uncertainty

The 2020 IRP made several recommendations for further work which may assist with understanding the differences being reported by the two groups of analysts and improve the scientific basis for decision making. In addition, several other questions have remained unanswered and require further discussion and investigation. These include:

- Dassen Island: Possible improvements in chick survival during closed years take place despite opposite changes in foraging metrics (birds are foraging farther during closed periods). Despite being highly correlated (DEFF 2020a; Sherley 2020a), impacts of closure on fledging success and chick survival are in different directions. Similarly, improvements (not declines) in chick growth rates with increases in chick survival during closed periods is expected but was not observed.
- Robben Island: The analyses estimated improvements from closure to fishing in terms of chick survival and potentially chick condition and fledging success, but the reverse for foraging

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metrics. The reliability of foraging metrics as indicators of the impact of fishing on the breeding success of penguins is therefore questionable, particularly in light of the opposite (improved) estimates for penguins on St Croix Island during closed years.

- St Croix Island: Despite a positive effect of closure for some foraging response variables, closure to fishing had little or no impact on chick condition. The extent to which increased foraging ranges and duration negatively impact breeding success therefore remains unclear.
- No biologically meaningful threshold has been established for foraging response variables. For west coast islands, estimates of the effects of closure on foraging tend to be negative. Benefits of closure on foraging parameters are expected to translate into similar improvements in chick condition, fledging success and chick survival, but in most cases this is not evident and may be dependent on other factors such as prey type and quality.
- Biologically meaningful thresholds are also lacking for chick condition and chick growth response variables and hence instances of positive effects of closure reported above may in fact not be biologically meaningful. For example, it is unclear whether a bird needs to forage 10% or 100% farther before it starts to impact its ability to provision chicks or is detrimental to its own wellbeing, with Boersma and Rebstock (2009) predicting non-linear responses in the probability of Magellanic penguin fledging success for increases in foraging range. Recent analyses are making progress on developing a threshold for chick condition based on results for Macaroni penguins.
- The extent to which the aggregated approach may be improved with the inclusion of additional covariates such as month and brood mass.
- The extent to which the estimates of precision, and hence the conclusions which may be drawn, from the disaggregated approach may be modified by the inclusion of a hierarchical model structure that includes 'island' nested within 'year', for example, is under investigation. Recent progress in this regard suggests that this is an important consideration and that appropriately chosen model structures for the disaggregated approach lead to less-precise estimates (i.e. that are similar to those obtained from the aggregated approach) (Ross-Gillespie and Butterworth 2021).
- The sensitivity of the results to the inclusion/exclusion of data collected during open years, prior to the experiment.
- There are still questions regarding the calculation of chick-survival estimates that need to be properly understood.

6. Sustainability, ecosystem, and socio-economic considerations

6.1. The South African small pelagic fishery

South Africa's fishery for small pelagic fishes is industrial-scale and has been operational for the past 70 years. It uses purse-seine nets to target sardine, anchovy and round herring *Etrumeus whiteheadi*, principally off the west coast but with sardine also caught off the south coast (Figures 12 and 13). The fleet presently consists of around 75 vessels ranging in size from 14 to 39 m in length and with four categories: (i) small sardine-only vessels; (ii) medium dual-purpose vessels targeting sardine and anchovy; (iii) medium anchovy-only vessels; and (iv) large dual-purpose vessels targeting sardine, round herring and anchovy (Cochrane et al. 2020). Around 85% of the sardine catch is canned for human consumption (both locally and for export) and pet food whilst the remainder is frozen for bait

(Coetzee et al. 2019), whereas anchovy and round herring are processed into fish meal and fish oil. Because of this different processing, sardine have a landed value per tonne of around five times that of the other two species.

The small pelagic fishery is the country's largest with average annual landings (1950–2020) of 376 000 tonnes, >80% of which is anchovy and sardine, and is the second-most valuable (after that for Cape hakes), with an estimated wholesale catch value of R2.4 billion in 2014, and with the wholesale value including about R650 to R730 million in export revenue each year between 2012 and 2015 (Brick and Hasson 2016). The present R/US$ exchange rate is now about 10% higher and, given increases in the global fishmeal price since 2014 of about 35%, the wholesale value at present is likely closer to R5 billion per annum. Additionally, the small pelagic fishing industry has multiple forward and backward linkages with other sectors of the economy and an economic multiplier analysis conducted for South Africa's entire marine fishing industry showed that for every R1 spent in exogenous demand for fishery products an additional R1.60 was generated in output through those linkages (Brick and Hasson 2016). The small pelagic fishery directly employs >5 000 staff in addition to seasonal workers (Cochrane et al. 2020; van der Lingen 2021). An increase in overall fishery output of R1 million would be associated with an extra 10.7 jobs in the country's fishery sector and in the wider economy, and a loss in fishery production would be associated with a decline in employment (Brick and Hasson 2016). Fishmeal and canning facilities, as well as the vessels that supply these facilities, are all located in areas outside of the major metropoles of Cape Town and Port Elizabeth, and income from these activities (either through direct salaries, associated service businesses or social spend) therefore make an important socio-economic contribution to the well-being of these smaller communities, particularly on the west coast (Hutchings et al. 2012; Brick and Hasson 2016).

6.1.1. Current management

Management of the South African small pelagic fishery is primarily via the setting of annual total allowable catches (TACs), total allowable bycatches (TABs) and precautionary upper catch limit (PUCLs). The higher landed value for sardine means that TACs for this species are typically filled, whereas that for anchovy and the PUCL for round herring are typically not filled, sometimes by a large margin (as described above; DAFF 2016). The TACs and TABs are set using an operational management procedure (OMP; presently OMP-18; de Moor 2018) which is an adaptive management system that is able to respond, without increasing risk, to major changes in resource abundance (Coetzee et al. 2019). The OMP uses an agreed-upon set of harvest-control rules and pre-specified data and stock assessment models that incorporate survey-derived estimates of recruitment and total biomass as well as catch data. OMP formulae were selected with the objectives of maximising average directed sardine and anchovy catches in the medium term, subject to constraints on the extent to which TACs can vary from year to year in order to enhance industrial stability. The formulae were conditioned on low probabilities (i.e. an acceptable level of risk given the inherent variability in population sizes of these species referred to above) that the abundances of these resources drop below agreed threshold levels below which successful future recruitment might be compromised.

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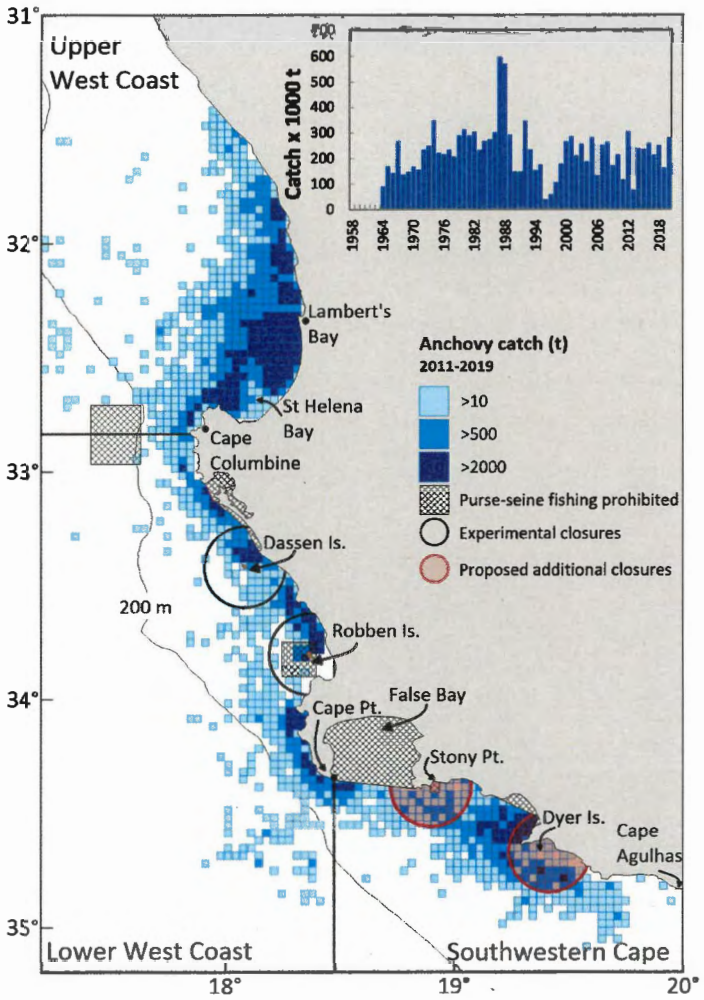

Figure 12: Map showing the cumulative catch of anchovy by 2-nautical-mile block over the period 2011–2019, with darker shading indicating higher catches (note that 'catch' is not an accurate depicter of fish biomass). Marine protected areas (MPAs) and areas presently closed to purse-seine fishing, and areas around African penguin mainland and island breeding colonies for which long-term closure has been proposed (Dassen, Robben and Dyer islands and Stony Point), are indicated. The graph shows a time-series of annual anchovy catches, 1958–2020.

6.1.2. Recent operational management procedure (OMP) developments

Simulations of anchovy and sardine population trajectories under a range of harvest-control strategies are conducted during OMP development, with the final OMP used for making management recommendations (TACs and TABs) selected following consideration of a variety of so-called 'performance statistics', including those pertinent to the risk to the resource, biomass and critical biomass levels, catches and catch variability, and indicators of the population dynamics of African penguins that are used as proxies for predator (i.e. trophic ecosystem) needs. Under OMP-18, selected risk thresholds are: (i) a 16% probability of the sardine west component (see below) effective spawner biomass being below the 2007 level (the lowest observed during the past 30 years) over the projection period and compared to a 7% probability under no fishing; and (ii) a 13% probability of the anchovy spawner biomass being below the 1996 level (the lowest observed during the past 30 years) over the projection period and compared to a 3% probability under no fishing (de Moor 2018).

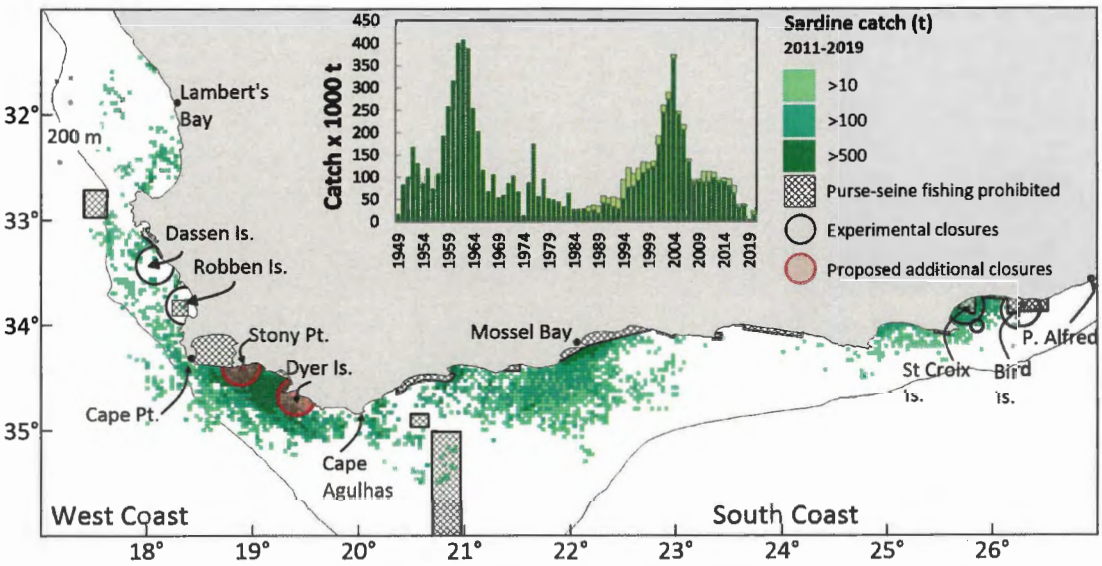

Figure 13: Map showing the cumulative catch of sardine (directed catch only) by 2-nautical-mile block over the period 2011–2019, with darker shading indicating higher catches (note that 'catch' is not an accurate depicter of fish biomass). Marine protected areas (MPAs) and areas presently closed to purse-seine fishing, and areas around African penguin mainland and island breeding colonies for which long-term closure has been proposed (Dassen, Robben, Dyer, St Croix and Bird Islands and Stony Point) are indicated. The graph shows a time-series of annual directed sardine catch and sardine bycatch (mostly juveniles taken in anchovy-directed fishing), 1949–2020

Because recent research has indicated the presence of multiple sardine stocks off the South African coast (van der Lingen et al. 2015; Coetzee et al. 2019), OMP-18 uses a two-mixing-stock assessment model for sardine, modelling western and southern sardine stocks targeted by the purse-seine fishery (de Moor et al. 2017). The western stock is considerably more productive than the southern stock and produces a substantially higher number of recruits per unit spawner biomass (de Moor et al. 2017), and hence recovery of the South African sardine population from its present depleted state depends to a high degree on the recovery of the western stock. Given this, and the fact that fishing pressure has historically been higher (see below) off the west coast compared to the south coast because of the concentration of processing infrastructure there, OMP-18 biomass and critical biomass statistics focus on the sardine west component and include threshold levels for western stock biomass (one of the performance statistics) and the spatial distribution of directed sardine catches. Passing these thresholds triggers explicit spatial management measures aimed at maintaining a relatively low exploitation rate of sardine off the west coast (de Moor 2018). The decline in the sardine population and its present depleted status have had substantial impacts on the small pelagic fishery, and adaptation measures that have been implemented include importing frozen sardines from a variety of countries over the past decade in order to keep factories operational and meet local demand (van der Lingen 2021). Whereas this has avoided the socio-economic costs of shutting down some factories, it has also raised the risk of importation of a pathogen, pilchard herpesvirus (PHV), the introduction of which into Australia was responsible for dramatic reductions in the population size of *Sardinops sagax* there (Whittington et al. 2008). South African sardine have been shown to be naïve to this pathogen (Macey et al. 2016), and hence introduction of PHV here remains a potential threat and would likely have serious impacts, as observed off Australia (Crockford et al. 2005).

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6.1.3. Sustainability and harvest rates

Annual harvest rates (where the harvest rate is the proportion of the population caught in a given year; also known as the exploitation rate) for South African sardine are shown in Figure 14. These were initially low (<0.2) for the sardine population overall but increased to close to 0.3 in 2007 before declining thereafter. That was not considered to be too high a harvest proportion at that time, when the sardine population was considered to be panmictic (i.e. one completely mixed population) (Augustyn et al. 2018b). When examined for the western and southern components separately, however, it is clear that the harvest proportion has been higher for the western component in all years but one, and that it increased for both components from around 2005 but has declined subsequently, albeit with occasional high (>0.3) values and substantial interannual variability for the western component. The high harvest rates for the western component were masked by the calculation of relatively low harvest proportions for the population as a whole, which are lower than or similar to most other industrial-scale fisheries for small pelagic fish species (Barange et al. 2009; Bergh 2020c). These different harvest rates for western and southern components demonstrate why spatial management, as has been introduced for the sardine fishery, is important for this species. However, the harvest rate of sardine off the south coast has typically been low and averaged just below 8% from 2000 to 2009, the decade when sardine biomass there declined from 2.5 Mt to 0.2 Mt, indicating that low fishing mortality cannot be guaranteed to result in sustained large populations for small pelagic fish like sardine (Augustyn et al. 2018b). Exploitation rates have typically been below 0.15 for anchovy (de Moor 2020c).

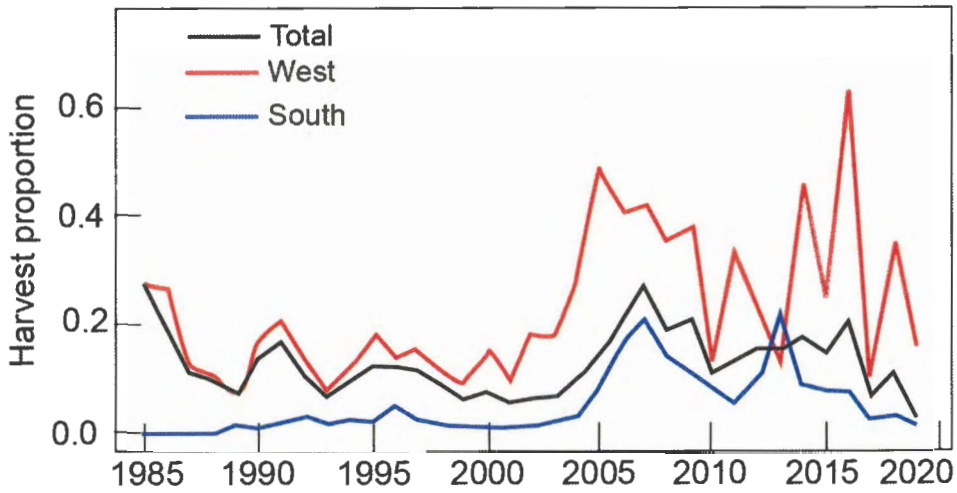

Figure 14: Exploitation rate (harvest proportion; calculated as the observed annual [from 01 November in $year_n$ to 31 October in $year_{n+1}$] catch tonnage as a proportion of the model-predicted total biomass at the time of the pelagic biomass survey [November in $year_n$]) of South African sardine shown for the total population (black line) and western (red line) and southern (blue line) components for the period 1985 to 2019. (Note that this plot excludes small sardine bycatch taken with anchovy, the inclusion of which increases exploitation rates slightly). From de Moor (2020b).

In a review of sustainable fishing, Hilborn et al. (2015) highlighted the existing large differences in perception and definition of the concept of sustainable fisheries that lead to the same fishery or product being deemed sustainable by some groups but unsustainable by others. Those authors argued that social and economic factors need to be considered, along with ecological impacts, for future long-

term sustainability to be achieved, and that "...the sustainability of seafood production depends not on the abundance of a fish stock but on the ability of the fishery management system to adjust fishing pressure to appropriate levels" (Hilborn et al. 2015).

6.1.4. Ecosystem considerations

In addition to simulation-testing of the OMPs to ensure acceptable risk levels of anchovy and sardine and anchovy abundances dropping below specified thresholds, the OMP was also simulation-tested using parameters denoting risk to the African penguin population as part of an ecosystem approach to management (EAF) of the small pelagic fishery. Penguins were chosen as a representative predator species for consideration because they feed predominantly on anchovy and sardine and because of their conservation status which had been of concern due to appreciable reductions in numbers at the major breeding colonies on Robben and Dassen Islands. A model of the population dynamics of African penguins on Robben Island that incorporated estimates of anchovy and sardine abundances off the west coast (Robinson et al. 2015) showed a significant relationship between adult mortality rate and the biomass of sardine west of Cape Agulhas, with mortality increasing rapidly when biomass dropped below around 330 000 t. That model was linked to future sardine abundances simulated under candidate management procedures (including a no fishing scenario) assessed during OMP development so that the impact on penguins on Robben Island of predicted future pelagic fish trajectories under alternative harvest strategies could be evaluated.

The analysis of Robinson et al. (2015) indicated that fishing is likely to have a relatively small impact on penguins, especially when compared with uncertainties that arise from the variable spatial distribution of the sardine population. Similarly, OMP-18 ecosystem performance statistics (the rate of increase [ROI] of penguins on Robben Island over various time-periods) indicate that, even with large reductions in pelagic catches, there would be little benefit for penguins; under the baseline sardine operating model, the rate of decline in the number of African penguin moulters at Robben Island would be an annual 6% over the next 15 years, compared to 5.7% if there was no sardine fishing (de Moor 2018). That Robben Island penguin model requires updating given collection of further data.

6.2. Effects of overharvesting of small pelagic fishes

Overharvesting of small pelagic fishes can have detrimental effects on upwelling ecosystems. For example, overfishing of sardine in Namibia during the 1960s and 1970s affected ecosystem functioning, with jellyfish and gobies replacing sardine in that system (Roux et al. 2013). This had a significant effect on marine top predator populations, especially piscivorous seabirds such as African penguins and Cape gannets, whose populations remain a fraction of what they were before overharvesting occurred in this region (Roux et al. 2013). In the Antarctic, local forage (Antarctic krill) exploitation rates of as low as 0.1 can negatively affect the performance (in a variety of metrics including foraging-trip duration, post-hatch breeding success, relative cohort strength, and fledging mass) of three species of Antarctic penguin (Watters et al. 2020).

In South Africa, Coetzee et al. (2008) suggested that overfishing resulted in a collapse of sardine in the 1960s, and exploitation rates of sardine off the South African west coast during the mid-2000s were often high (>0.4; de Moor 2020b), which may have contributed to the decline in the western stock (Augustyn et al. 2018a). However, another analysis that quantified how different the trajectory of the sardine resource would have been in the absence of directed fishing for this species suggested that

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the recent (post-2000) collapse could not be attributed to a large extent to fishing (Bergh 2017, 2020c). This highlights the difficulty in managing small pelagic fish populations (Barange et al. 2009) because of their inherent variability in population size, and how avoiding collapses and/or ensuring recovery cannot be guaranteed by conservative management (Augustyn et al. 2018a). However, higher harvest levels should be avoided when population sizes and/or productivity levels are low (Essington et al. 2015), and management measures should aim to prevent fishing mortality from rising as biomass declines and should actively attempt to minimise the risk that the population size decreases to low levels at which recruitment is impaired, or predators are adversely affected (Augustyn et al. 2018a).

6.3. Economic evaluation of the relative cost of closures

The 2014 IRP recommended that an economic evaluation of the relative cost of closures to the fishery be carried out (Dunn et al. 2014). An opportunity-based model, which considers the unique characteristics of the fishery and quantifies the percentage of the catch (17.8%) within the closure area of Dassen and Robben islands which cannot be replaced by fishing outside the closure area, was developed in consultation with the SWG-PEL and the fishing industry (Bergh et al. 2016). The results from that analysis indicated the total annual economic loss due to both forfeited anchovy (and associated bycatch) catches and additional fuel costs, were of the order of R27 and R22 million for Dassen and Robben Islands, respectively. Closure of both therefore translates to a negative economic impact of approximately R50 million per annum, and a loss of between 1.63% and 6.87% of the total annual catch. These estimates, however, were calculated using an exchange rate of R15 to the USD (the present exchange rate is about 10% higher), and did not use an economic multiplier, for which a value of 3 is not unreasonable (Brick and Hasson 2016). A present economic impact of R150 million per annum (i.e. approximately 6% of the annual wholesale catch value of the small pelagic fishery) is therefore feasible as a result of the closure of both Robben and Dassen Islands (Bergh 2020b).

This estimate is similar to that from an economic impact study commissioned by SANParks of the closure to fishing around St Croix and Bird Islands in the Addo Elephant National Park Marine Protected Area (Turpie et al. 2012). That study estimated that the industry could potentially lose approximately 6.6% of the catches in the southern part of the Eastern Cape (Mossel Bay and Port Elizabeth) (Turpie et al. 2012). Given that only sardine is caught on the south coast, where it is processed for both bait and canning, and assuming an average processed value of R18 000 per tonne, and multiplying by 6.6% of the average south-coast sardine catch since 2011 in the years when St Croix was open to fishing (14 700 tonnes), the potential loss of revenue is ~R17.5 million per annum. Note that this estimate assumes that those fish could not be caught elsewhere outside of the closed area. However, some fishers in the Eastern Cape indicated that, despite overlap between their fishing and penguin foraging activities, they actually found better fishing grounds and losses were minimal during the Island Closure Experiment (Ginsburg 2019). That study also analysed sardine catches and fishing-vessel travel-time (as a proxy for fuel costs) when fishing exclusion zones were implemented around St Croix Island and reported no significant differences in average catches per trip or average time travelled to fishing grounds. Ginsburg (2019) concluded that the exclusion zones did not significantly impact these variables and in addition noted that catches were slightly higher when the fishing exclusion zone was in place. However, this approach was criticised for its simplicity and lack of sufficient detail on methods provided to allow for defensible conclusions to be drawn (Bergh 2020a). In addition, Coetzee and Merkle (2020) reported that 68% of catches in Algoa Bay occurred within the St Croix closure area during years in which fishing was permitted there, illustrating its importance to the local fishery.

At present no reduction in allowable catches is being proposed in order to benefit the African penguin; rather, the SANParks and the TP-SWG (B: O&C) recommendations are to close important penguin foraging areas to fishing. It is noted that in the past the fishery has adjusted to altered distributions of its target species, e.g. the average location of sardine catches moved from north of Saldanha Bay in the west to Mossel Bay in the south (Fairweather et al. 2006), but that adjustment increased costs. Further, more profitable, alternative uses (e.g. for human consumption) of harvested forage fish currently used for fishmeal should be reviewed and promoted to encourage a more efficient utilisation of this resource (AEWA 2020). Some steps in this regard have been taken, e.g. canning of round herring and investigations into using anchovy for human consumption (van der Lingen 2021), but these have not had large-scale uptake as yet.

6.4. The social, economic, biodiversity and ecosystem value of African penguins

African penguins are Africa's only penguin species and, together with other seabirds, have important social, economic, biodiversity and ecosystem value and benefits. When breeding, they are central-place foragers that transfer large quantities of nutrients from the ocean to their colonies. This influences the functioning of island and headland ecosystems and adjacent marine areas, e.g. increasing algal growth and changing the structure of intertidal communities, which augment populations of several shorebird species (Bosman and Hockey 1988). Inputs by seabirds of nitrogen (N) and phosphorus (P) into surrounding coastal waters are substantial, with concentrations per unit of surface area among the highest measured on the Earth's surface. Additionally, an essential fraction of the total excreted N and P is readily soluble, increasing the short-term bioavailability of these nutrients in coastal waters (Otero et al. 2018). Not only do seabirds have such beneficial bottom-up impacts, but they also exert valuable top-down control. For example, auklets *Cerorhinca monocerata*, another pursuit-diving seabird species, were reported to select prey that are small or in poor body condition and, by removing substandard individuals, may ensure the long-term survival of prey populations (Tucker et al. 2016). Additionally, seabirds can facilitate feeding by other species; for example, African penguins herd prey shoals upwards, making them available to birds restricted to feeding near the surface (McInnes and Pistorius 2019).

South Africa's marine ecotourism industry has expanded rapidly in the present century and had a value of >R2 billion in 2014 (WWF-SA 2016). The African penguin is an iconic bird and a major tourist attraction in the Western and Eastern Cape, specifically the Simon's Town colony (inclusive of Boulders in Table Mountain National Park), Cape Town, and increasingly the Stony Point colony in Betty's Bay, and St Croix Island in Algoa Bay. The City of Cape Town recognised the importance of this resource and solicited an assessment into the economic value and contribution of the Simon's Town penguin colony (van Zyl and Kinghorn 2018). SANParks has invested significant infrastructure and human capacity in the development of the Boulders colony as a tourism attraction, with annual visitor numbers growing from about 580 000 in 2006 to 930 000 in 2017. van Zyl and Kinghorn (2018) found that the total expenditure associated with the Simon's Town colony in 2017 was approximately R311 million per annum and generated 885 jobs. This was broken down into transport expenditure of tourists (R37 million), and other expenses such as accommodation, food, fees, and curios (R255 million), as well as another R19 million from local Cape Town residents. The projected future income from tourism at the Boulders colony over the next 30 years was estimated at approximately R6.8

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billion. The Stony Point colony presently attracts 77 500 visitors per year (CapeNature, unpublished data) but economic evaluations of that and other colonies have not been conducted.

Besides the direct income derived from the African penguin colony at Simon's Town, other benefits include the branding of the City of Cape Town as an ecotourism and leisure hub, the enhancements of property values throughout Simon's Town via the significant amenity values, as well as deriving direct benefit from visitor expenditure. The colony combines the presence of a highly charismatic, endangered species, with a picturesque and historical setting resulting in high heritage and socio-cultural value. This is the contribution of only one colony, albeit the one with highest value, and does not include other regions or any ecological value of the species, but it illustrates the potentially important economic value of African penguins, particularly at a local scale. In the Californian upwelling ecosystem, where sardine and anchovy are also key forage-fish species, it was suggested that consideration of nonmarket predators (i.e. with non-consumptive economic value) such as penguins could tip the balance of trade-offs toward conservation of forage fish and away from their harvest (Koehn et al. 2017).

7. Research gaps and responses

All stakeholders agree that urgent action is needed to reverse the decline in African penguin population size. But despite all the interventions implemented thus far, the decline continues. The programme of short-term closures to fishing around islands has not reversed the decline but may increase breeding success by 1% (assuming that the effect estimated at Robben Island applies for all islands), which would reduce the present rate of decline by 10%. Even closure of the entire sardine fishery off the west coast was estimated to have a very small benefit to penguins. Although local fishing restrictions around breeding colonies have been suggested to be more effective than population-wide regulations, e.g. limiting overall catches (Free et al. 2021), the assumed benefits of longer-term closures around breeding colonies in South Africa remain untested.

Given that the implemented actions have not arrested or reversed the decline in the African penguin population, either there are unknown or unconsidered factor/s responsible, and/or not all actions have been sufficiently implemented or effective. Research needs to be directed at identifying those unknown or unconsidered factor/s and attributing relative importance to the drivers of the African penguin population decline, e.g. using models of intermediate complexity for ecosystems assessments (MICE) (e.g. Plagányi et al. 2014) or other sufficiently quantitative ecosystem models. Such models need to account for appropriate temporal scales that accord to penguin life history stages.

While some research has been done or is underway, suggested research topics include *inter alia*:

- Assess the efficacy of current management interventions on African penguins.
- Develop a toolbox of interventions to ensure adequate forage resource availability (as suggested by AEWA [2020]).
- Develop robust penguin population models for each colony.
- Conduct socio-economic studies on the projected economic value of top predators, including penguins, at each colony.
- Assess synergistic effects of multiple threats to African penguins.
- Quantify the effects of climate change on African penguin eggs, adults and chicks.
- Identify factors affecting, and key requirements of, the establishment of new penguin colonies.

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- Determine the long-term effects of disease and pathogens (including parasites) on population health status, including dynamics of spread and recovery, etc. (e.g. Espinaze et al. 2019), and assess the potential for development of vaccines for key diseases.
- Investigate interactions between penguins and small pelagic fishes during pre- and post-moult periods.
- Expand investigations into penguin foraging ecology, i.e. consider other colonies, and assess potential overlap with competing predators.
- Test the effectiveness and feasibility of using remote technologies and automated systems to increase frequency of population monitoring and data collection and reduce disturbance.
- Investigate the effects of anthropogenic pollutants such as microplastics, microfibres and persistent organic pollutants and heavy metals such as mercury, etc., on African penguin survival and breeding success.
- Examine the effects of ship traffic and noise on penguin foraging behaviour.
    - Assess the impacts of natural/anomalous catastrophic events, e.g. marine heatwaves, cold spells, harmful algal blooms, etc., on the biology and ecology of African penguins and small pelagic fishes.
    - Conduct further rigorous economic studies of the costs of closure to the small pelagic fishery.
    - Develop economic scenarios for the small pelagic fishery that include product beneficiation, e.g. using catches for human consumption rather than as fish meal.
    - Attain greater understanding of synergistic effects of multiple drivers (e.g. fishing, climate change, recruitment variability) on small pelagic fishes (e.g. Ortega-Cisneros et al. 2018 and other research in progress).
    - Improve understanding of seasonal and spatial dynamics of small pelagic fish stocks, which will require an increase in monitoring effort.
    - Investigate implementation of remote technologies and automated systems to increase frequency and accuracy of monitoring fish stocks (e.g. Swart et al. 2016), including exploring the use of drones for continuous fish stock monitoring around seabird colonies with the potential to improve regulation of fishing effort in real time, based on the status of prey resources (e.g. Mordy et al. 2017).
    - Expand consideration of spatial management in OMPs for the small pelagic fishery to account for the needs of dependant predators at appropriate spatio-temporal scales.

Additional capacity and funding would be required to conduct this monitoring and research, particularly with regard to modelling, but in other fields as well.

8. Governance and policy imperatives

The Department of Forestry, Fisheries and the Environment (DFFE) has a suite of legislation to help manage the balance between the conservation of the African penguin and sustain the economic benefit of fisheries. This legislation includes, among others, the National Environmental Management Act (NEMA, Act 107 of 1998), the Marine Living Resources Act (MLRA, Act 18 of 1998), the National Environmental Management: Biodiversity Act (NEMBA, Act 10 of 2004), the Marine Spatial Planning Act (MSPA, Act 16 of 2018), the National Environmental Management: Protected Areas Act (NEMPAA, Act 57 of 2003), as well as the National Environmental Management: Integrated Coastal Management Act (ICMA, Act 24 of 2008). These Acts provide objectives and principles as introductory provisions under which they can operate. These include, but are not limited to: (i) the conservation of ecosystems; (ii) utilisation of the environment for economic growth; and (iii) sound decisions based

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on the consideration of the social, economic and environmental impacts. NEMA highlights the need for cooperative governance and intergovernmental relations and a holistic approach to ensure environmental protection, and the concomitant need to promote social-economic development. These structures of cooperative governance and integrated environmental management (IEM) provide for a participatory approach to environmental management through extensive stakeholder engagement and inclusivity, with an appropriate capacity building that guarantees equitable participation.

The Minister requested that the recommendations of management interventions to conserve the African penguin population be grounded in NEMA, particularly the environmental management principles of promotion of conservation, sustainable use of natural resources, and the precautionary principle echoed in the Bill of Rights (Chapter 2:24, Box 1; see below). NEMA is the overarching legislation applicable to biodiversity and fisheries management and imposes a general duty of care for the environment that requires, whenever possible, that actions are put in place to ensure the prevention of environmental degradation (in this case, the loss of the African penguin). The precautionary principle recognises that harm to the environment can be irreversible. A risk-averse and cautious approach needs to be applied, which considers the limits of current knowledge about the consequences of decisions and actions (NEMA, Act 107 of 1998) although there are as yet no guidelines as to how such principles are to be operationalised. The precautionary or cautious approach concerning management and development of marine living resources is mandated in the Marine Living Resources Act (MLRA, Act 18 of 1998) to avert risk accounting for the limits of current knowledge and consequences of decisions and actions.

Box 1: Bill of Rights (Chapter 2:24)

Environment

"Everyone has the right—

(a) to an environment that is not harmful to their health or wellbeing; and

(b) to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that—

(i) prevent pollution and ecological degradation;

(ii) promote conservation; and

(iii) secure ecologically sustainable development and use of natural resources while

As a signatory to the Rio Declaration on Environment and Development, United Nations Conference on Environment and Development, Rio de Janeiro, Brazil in 1992, South Africa has committed to sustainable development and environmental conservation as adopted in our regulatory instruments. Principle 15 of the Rio Declaration states: *"To protect the environment, the Precautionary Approach shall be widely applied by States according to their capabilities. Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation"* (IUCN 2007). The precautionary approach is often deferred due to the lack of compelling evidence and socio-economic pressures. However, this delay could lead to potential long-term harm to the resource and environment, often resulting in greater cost to reverse the threat. The Precautionary Approach is established on *"the recognition that a false prediction that a human activity will not result in significant environmental harm will typically be more harmful to society than a false prediction that it will result in significant environmental harm"* (IUCN 2007).

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In November 2020, the African-Eurasian Migratory Waterbird Agreement (AEWA), to which South Africa is a party, in collaboration with the Benguela Current Convention (BCC), to which South Africa is also a party, and BirdLife South Africa (BLSA) organised the Benguela Current Forage Fish (BCFF) Workshop. The Department of Environment, Forestry and Fisheries (DEFF; now DFFE) hosted the workshop. The workshop's outcome was that targeted actions need to be considered as a matter of urgency by the national governments of Angola, Namibia and South Africa. These actions included:

- developing tools to increase the availability of sufficient forage [fish] for threatened endemic Benguela seabird species, including consideration of applicable management and conservation options, such as setting ecosystem thresholds (i.e. sizes of forage resource populations below which a range of precautionary measures relating to fishing would be implemented at various spatial scales) and closing key foraging areas to fishing, adjacent to major seabird colonies,
- and facilitating and prioritising the recovery of seabird colonies to sufficient sizes to minimise known and potential Allee effects, thus reducing the probability of colony extinctions (AEWA 2020).

8.1. Threatened or Protected Marine Species (TOPS)

In terms of regulations and of specific pertinence to the African penguin is the TOPS regulation of 2007, published and enacted in 2007. The purpose of this regulation emanates from Chapter 4 of NEMBA, which aims to: (i) provide for the protection of ecosystems that are threatened or in need of protection to ensure the maintenance of their ecological integrity; (ii) provide protection of species that are threatened or in need of protection to ensure their survival in the wild ; (iii) give effect to the Republic's obligation under international agreements regulating international trade in specimens of endangered species; and (iv) ensure that the utilisation of biodiversity is managed in an ecologically sustainable way.

The TOPS also aims to further regulate the permit system set out in Chapter 7 of NEMBA that relates to restricted activities involving specimens of listed threatened or protected species. This regulation includes: (i) registration of captive breeding operations, commercial exhibition facilities, game farm nurseries, scientific institutions, sanctuaries and rehabilitation facilities and wildlife traders; (ii) prohibition of specific restricted activities involving specific listed threatened or protected species; and (iii) protection of wild populations of listed threatened species.

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MK RM

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The Penguin Island Colonies and Small Pelagic Fishing Industry Interactions

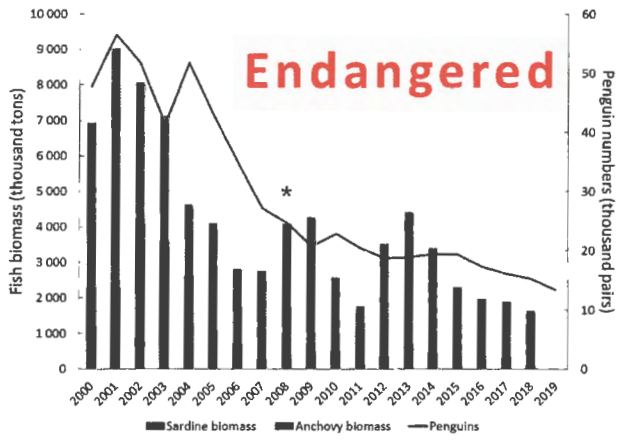
Proposed fishing limitations and penguins forage area conservation.

[CONSERVATION I SUSTAINABLE USE I PRECAUTIONARY APPROACH]

12 August 2021

forestry, fisheries & the environment
Department:
Forestry, Fisheries and the Environment
REPUBLIC OF SOUTH AFRICA

1



Off South Africa, African Penguin declined by ~ 61 % decrease in their overall population over the preceding 28 years (BirdLife International 2010).

2

MC AM

Key Issues and guiding principles

- The African penguin population is in a critical situation and urgent action is needed.
- Principles of Conservation, Sustainable Use and the Precautionary Approach have informed the proposals below.
- Define limitations/ closures of small pelagic commercial fishing around penguin colonies. Colonies identified for closure were selected based on conservation and economic criteria.
- The effects of long-term closures on the penguin population are unknown but the effect is assumed to be larger than that observed during the short-term closures.
- Closures will have an economic cost on the small pelagic fishery that will vary from colony to colony. The Small Pelagic Fisheries Sector is an important sector regionally and locally within the industrial fisheries sector.
- Closures proposed around 3 colonies as a precautionary approach with some restrictions around the other 3 colonies within the limits of existing Marine Protected Areas.
- The boundaries of closed areas for the 3 selected colonies have been modified/adjusted to maximise benefit to African Penguins and minimise cost to the fishery based on penguin foraging and fisheries catch data around each colony.

3

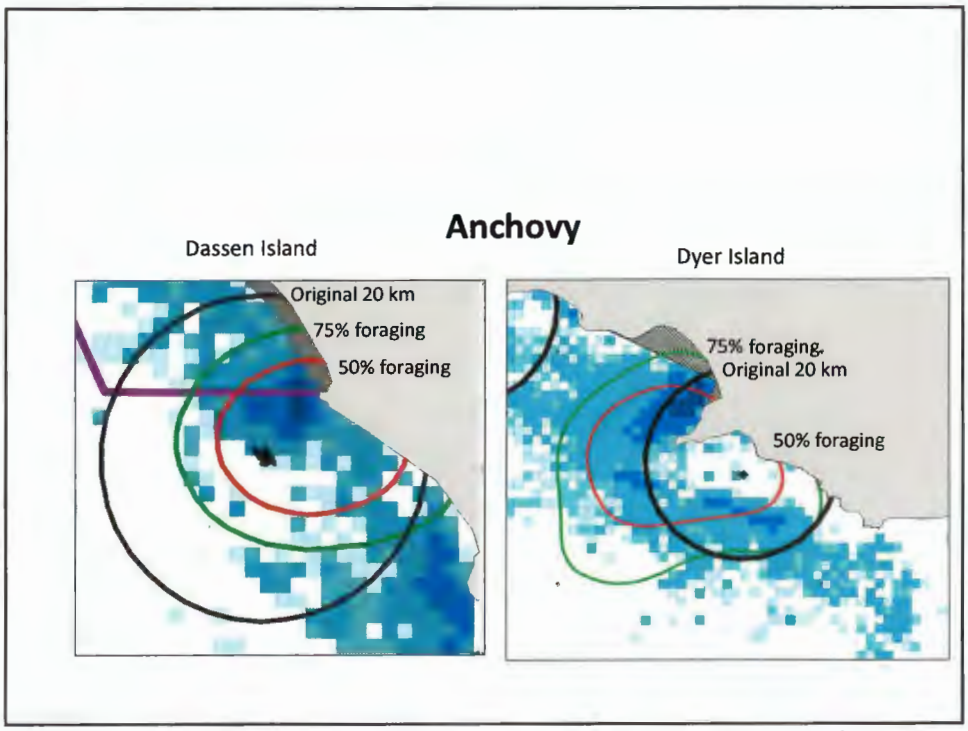
Colonies	Number of African penguin breeding pairs as of 2021 (% of population)	2021 closure status as presently implemented	Medium Term 2022 – 2025 (4yrs), Reviewed annually and for Longer Term 2025-2032
Dassen Island	1806 (18%)	Closed 6 months (2 x 3-month periods: Jan-Mar & Oct-Dec) – 20kms	Closed as per proposed boundaries (Target 75% and 50%) – see map % Proportion of the 75% core penguin foraging area conserved: 57.99 % Penguin tracking points included: 90.00 % Anchovy Fishery Impact as a percentage of regional catch (): 4.36 (7.51) ~~[% Sardine Fishery Impact as a percentage of regional catch (): 0.38 (0.46)]~~
Robben Island	1007 (10%)	Closed to fishing as per 20km for 12 months	Open with fishing closed within the limits of the Robben island MPA restricted zones
Stony Point	1623 (16%)	Open, noting that fishing restrictions are currently in place for the Betty's Bay MPA and will continue to apply	Open with fishing closed within the limits of the Betty's Bay MPA

4

MK

Colonies	Number of African penguin breeding pairs as of 2021 (% of population)	2021 closure status as presently implemented	Medium Term 2022 – 2025 (4yrs), Reviewed annually and for Longer Term 2025-2032
Dyer Island	1069 (11%)	Open	Closed as per proposed boundaries – see map % Proportion of the 75% core penguin foraging area conserved: 68.82 % Penguin tracking points included: 67.38 % Anchovy Fishery Impact as a percentage of regional catch (): 3.94 (10.05) % Sardine Fishery Impact as a percentage of regional catch (): 11.97 (16.14)
St. Croix	1543 (15%)	Closed as per agreed zoning – 20km for 6 months (Apr-Sep)	Closed as per proposed boundaries – see map % Proportion of the 75% core penguin foraging area conserved: 59.07 % Penguin tracking points included: 83.37 ~~[% Anchovy Fishery Impact as a percentage of regional catch(): 30.67 (25.56)]~~ % Sardine Fishery Impact as a percentage of regional catch (): 32.86 (42.12)
Bird Island	1853 (18%)	Open, noting that fishing restrictions are currently in place for the AENP MPA and will continue to apply	Open with fishing closed within the limits of the Addo Elephant National Park restricted zones

5



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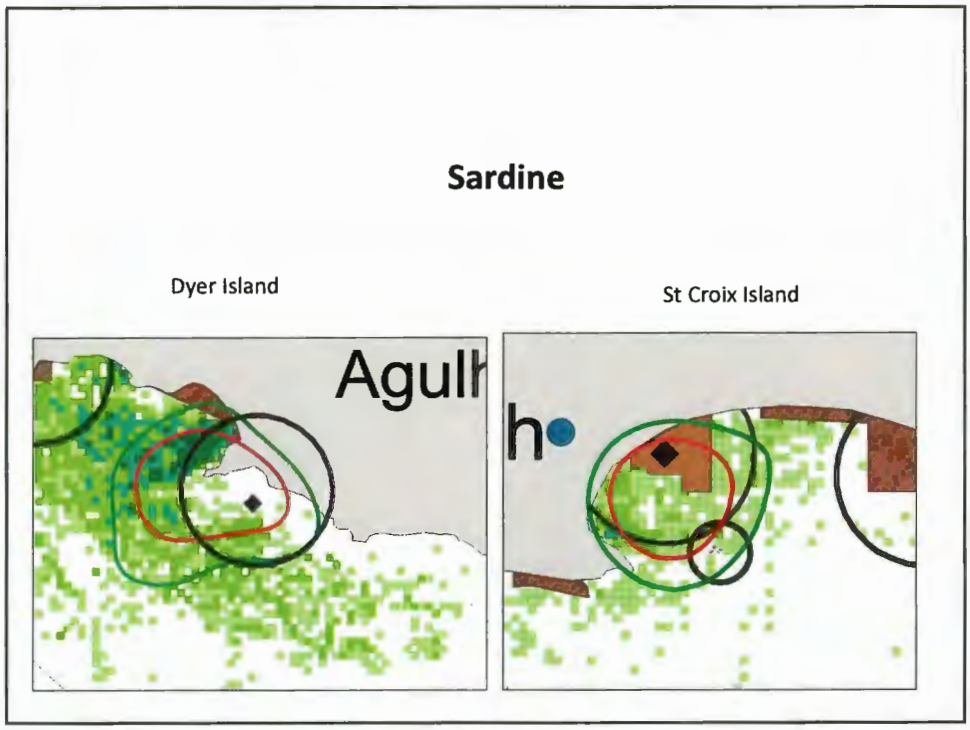

7

Dassen island information Location: West Coast, north of Table Bay		Area, cut at continental landmass + (the total area/scale that the 50% and 75% kernel calculations are significant for... As the algorithms ignores landmass) + [Cartesian geometry of a whole circle].		Σ of Anchovy data per nm²	Σ of Sardine data per nm²	Proportion of penguins' tracking points in an area A poor proxy for penguin foraging
Context / reference information	Within 20 km of two adjacent isl.	Ocean around 2 isl: 901+750 = ~1651 km² [2ΠR² = 2513.27 km²] i.e. Around Dassen + Robben Islands respectively		11.17% (n=762)	0.73% (n=762)	
	Within the 50% kernel	~235 km² (280.9 km²)		6.28% (n=85)	0.089% (n=85)	83.71% n=646889
	Within the 75% kernel	~461 km² (604.2 km²)	Proportion of kernel's oceanic area in each draft. A good proxy for foraging	6.90% (n=159)	0.096% (n=159)	87.36%
	Draft 1 r=20km	~901 km² [ΠR² = 1256.6 km²]	0.9718 of 75% = 72.88%	7.51% (n=386)	0.46% (n=386)	88.41%
Draft 2		~988 km²	0.9296 of 75% = 69.72%	8.42% (n=346)	0.54% (n=346)	90.53%
Draft 3		~946 km²	0.7647 of 75% = 57.35%	4.46% (n=330)	0.37% (n=330)	89.75%
Draft 4		~1040 km²	0.7647 of 75% = 57.35%	4.63% (n=363)	0.38% (n=363)	89.75%
Draft 5		~842 km²	0.7647 of 75% = 57.35%	4.44% (n=294)	0.33% (n=294)	89.72%
Draft 6		~946 km²	0.7732 of 75% = 57.99	4.36% (n=330)	0.38% (n=330)	90.00%

8

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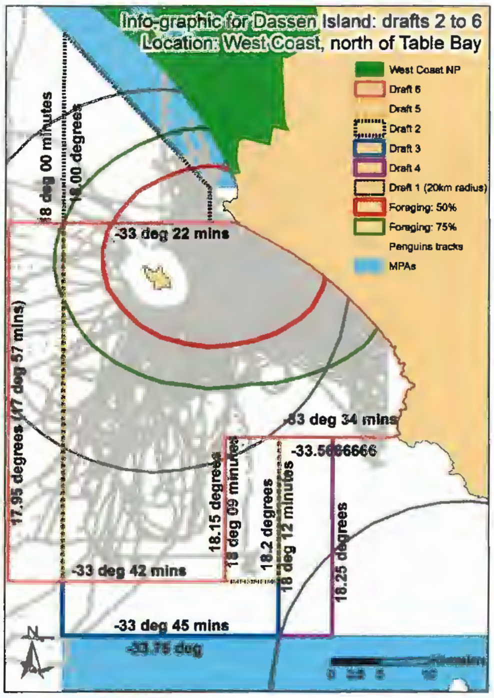
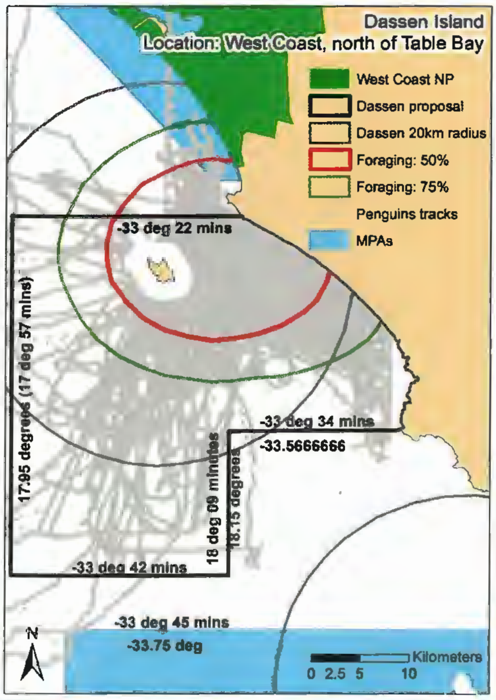
Penguin colonies: Closure area drafts

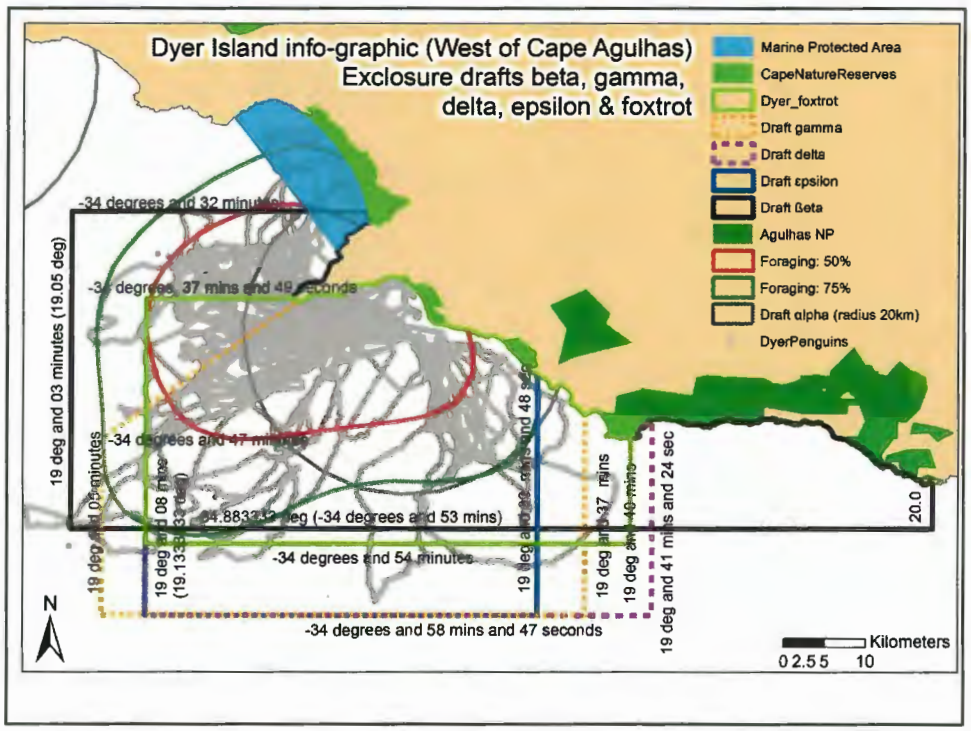
1. Dassen
2. Dyer
3. St. Croix





Dyer information Location: West of Cape Agulhas		Area, cut at continental landmass + (the total area/scale that the radial buffer 20km and kernel calculations are significant for... As the algorithms ignores landmass) + [Cartesian/planar geometry of a whole circle].		Σ of Anchovy data per nm²	Σ of Sardine data per nm²	Proportion of penguins' tracking points in an area [redacted] for penguin foraging n=57242
Context / reference information	Within 20km of two adjacent ils.	Ocean around 2 ils: 657+688 = 1345 km² [2πr² = 2513.27 km²] i.e. Around Dyer Island + Stony Point respectively		11.19% (n=757	25.37% (n=757)	
	Within the 50% kernel	~ 659 km² (725.7 km²)		10.01% (n=257)	22.75% (n=257)	62.34%
	Within the 75% kernel	~ 1373 km² (1538.5 km²)	Proportion of kernel's oceanic area in each draft. [redacted] for foraging	13.4% (n=546)	41.17% (n=546)	86.14%
	Draft alpha Within r=20km	~657 km² [πr² = 1256.6 km²]	0.4645 of 75% = 34.84%	10.05% (n=381)	16.14% (n=381)	52.65%
Draft beta		~ 2061 km²	0.9177 of 75% = 68.82%	13.03% (n=728)	44.03% (n=728)	86.65%
[redacted]		~ 1625 km²	0.6256 of 75% = 46.92%	3.42% (n=582)	13.26% (n=582)	64.77%
Draft delta		~ 1780 km²	0.9177 of 75% = 68.82%	4.18% (n=630)	14.83% (n=630)	71.14%
Draft epsilon		~ 1492 km²	66.71% of 75% = 50.04%	3.83% (n=533)	13.89% (n=533)	69.04%
Draft foxtrot		~ 1303 km²	0.9177 of 75% = 68.82%	3.94 (n=457)	11.97 n=457)	67.38%

11



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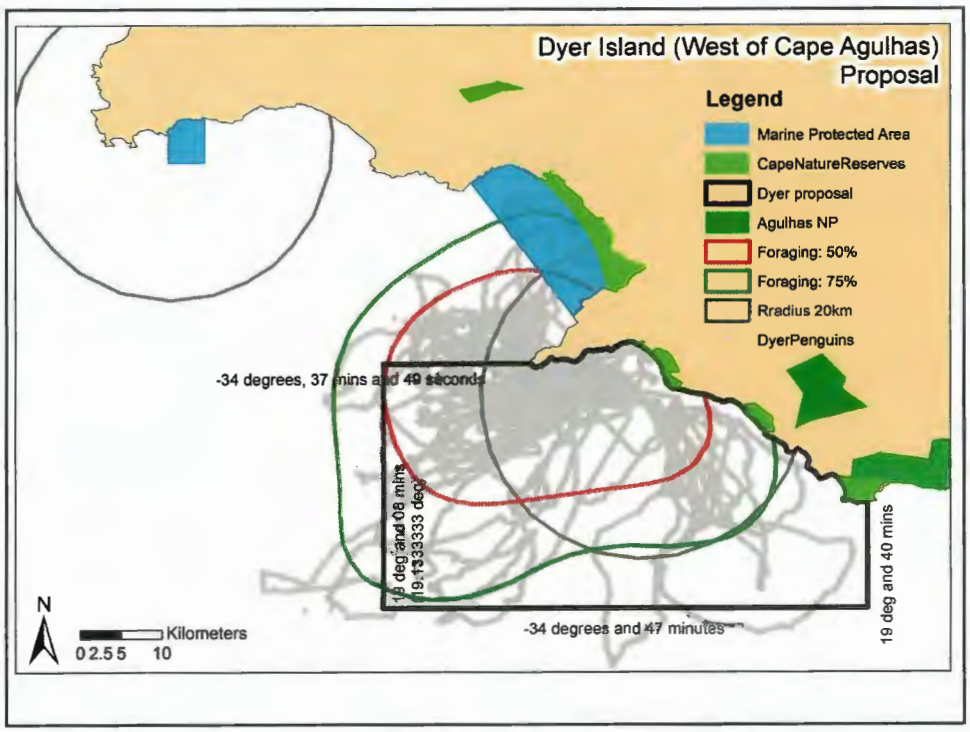
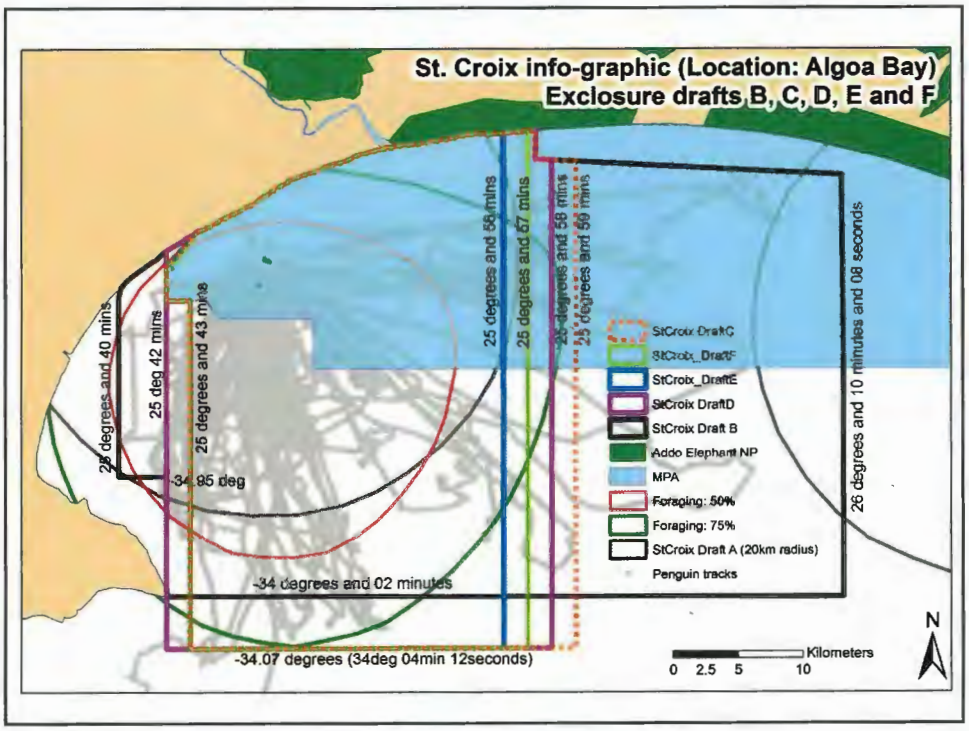


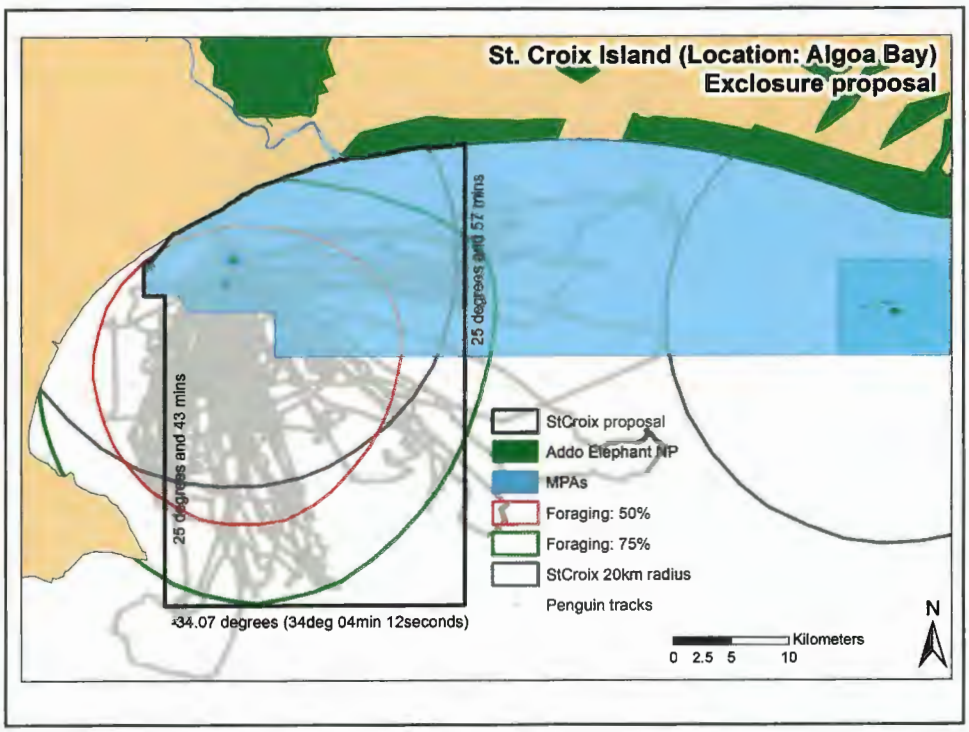
13

St. Croix information Location: Algoa Bay and the MPA of Addo Elephant N.P.		Area, cut at continental landmass + (the total area/scale that the radial buffer 20km and kernel calculations are significant for... As the algorithms ignores landmass) + [Cartesian geometry of a whole circle].		Σ of Anchovy data per nm²	Σ of Sardine data per nm²	Proportion of penguins' tracking points in an area [redacted] for penguin foraging n=56057
Context / reference information	Within 20km of two adjacent ils.	Ocean around 2 ils: 613+842= 1455 km² [2Πr^2 = 2513.27 km²] i.e. Around St. Croix + Bird Islands respectively		25.56% (n=757)	**48.64%** (n=757)	
	Within the 50% kernel	~449 km² (448.6 km²) i.e totally offshore		17.24% n=156	29.72% n=156	73.81%
	Within the 75% kernel	~871 km² (941.5 km²)	Proportion of kernel's oceanic area in each draft. [redacted] for foraging	32.39% n=304	51.16% n=304	**90.77%**
	Draft A r=20km	~613 km² [Πr^2 = 1256.6 km²]	0.6538 of 75% = **49.03%**	25.56% n=375	**42.12%** n=375	76.37%
Draft B		~1481 km²	0.8679 of 75% = **65.1%**	52.22% n=517	56.07% n=517	95.94%
Draft C		~ 927 km²	0.8174 of 75% = **61.31%**	31.19% (n=321)	36.26% (n=321)	86.78%
Draft D		~911 km²	0.8553 of 75% = **64.15%**	30.67% (n=316)	36.32% (n=316)	90.32%
Draft E		~748 km²	0.7520 of 75% = **56.40%**	30.67 (n=260)	29.85 (n=260)	80.63%
Draft F		~809 km²	0.7876 of 75% = **59.07%**	30.67 (n=281)	**32.86** (n=281)	83.37%

14


St. Croix info-graphic (Location: Algoa Bay)
Exclosure drafts B, C, D, E and F
25 degrees and 40 mins
25 deg 42 mins
25 degrees and 43 mins
-34.95 deg
25 degrees and 58 mins
25 degrees and 57 mins
25 degrees and 58 mins
25 degrees and 50 mins
26 degrees and 10 minutes and 08 seconds
-34 degrees and 02 minutes
-34.07 degrees (34deg 04min 12seconds)
StCroix DraftC
StCroix_DraftF
StCroix_DraftE
StCroix DraftD
StCroix Draft B
Addo Elephant NP
MPA
Foraging: 50%
Foraging: 75%
StCroix Draft A (20km radius)
Penguin tracks
N
0 2.5 5 10
Kilometers

15


St. Croix Island (Location: Algoa Bay)
Exclosure proposal
25 degrees and 57 mins
25 degrees and 43 mins
-34.07 degrees (34deg 04min 12seconds)
StCroix proposal
Addo Elephant NP
MPAs
Foraging: 50%
Foraging: 75%
StCroix 20km radius
Penguin tracks
N
0 2.5 5 10
Kilometers

16

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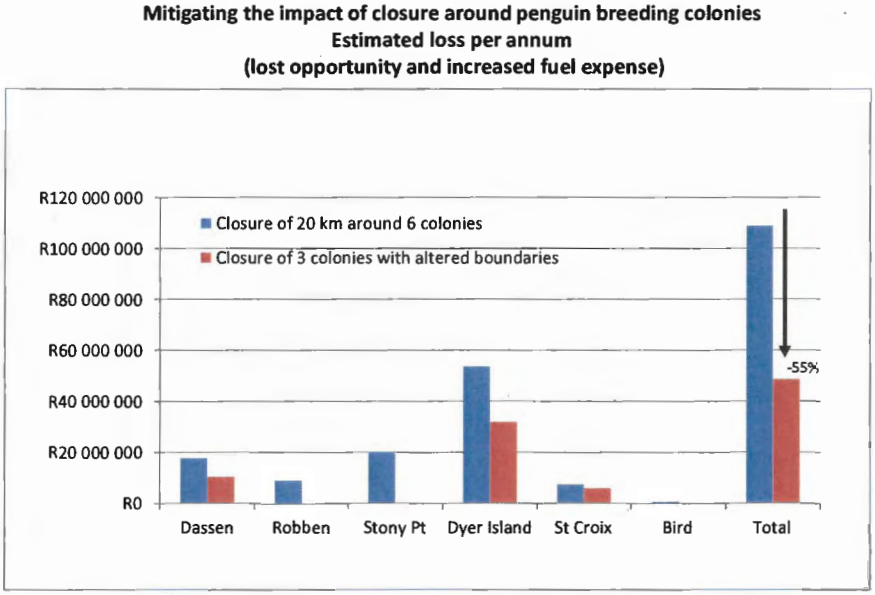

17

Way Forward

- Feedback on proposals
- Additional Science Areas
  - Quantitative Assessment inclusive of all pressures
  - Cost-benefit analyses of interventions
  - Social & Economic data and knowledge
- Thank you

18

Subject: RE: Documents relating to Decline in the African Penguin Population, the Small Pelagic Fishery and Island Closures

From: Mark Anderson <ceo@birdlife.org.za>
Sent: Monday, August 23, 2021 6:43 AM
To: Bukeka Bandezi <bbandezi@environment.gov.za>
Cc: Du Plessis, Morne <mduplessis@wwf.org.za>; Stephen Spuy <Stephen@sanccob.co.za>; Lauren Waller <lauren@sanccob.co.za>; Alistair McInnes <alistair.mcinnes@birdlife.org.za>; Smith, Craig <csmith@wwf.org.za>
Subject: RE: Documents relating to Decline in the African Penguin Population, the Small Pelagic Fishery and Island Closures

Dear Bandezi

BirdLife South Africa would like to nominate the following three people to serve on the working group:

Alistair McInnes, BirdLife South Africa, alistair.mcinnes@birdlife.org.za
Lauren Waller, SANCCOB, lauren@sanccob.co.za
Craig Smith, WWF-SA, csmith@wwf.org.za

We look forward to receiving the invitation and agenda for the meeting that will take place on 31 August 2021.

Regards
Mark

Mark D. Anderson
Chief Executive Officer
BirdLife South Africa

From: Bukeka Bandezi <bbandezi@environment.gov.za>
Sent: *Friday, 13 August 2021 20:21*
To: loyiso@fishsa.org; copeland.fishconsult@gmail.com; redah@rialfishing.co.za; Stephen@sanccob.co.za; romar@capenature.co.za; Du Plessis, Morne <mduplessis@wwf.org.za>; Mark Anderson <ceo@birdlife.org.za>; wilfred@marinedynamicstravel.com; Gregg.Oelofse <Gregg.Oelofse@capetown.gov.za>; Sabelom@robben-island.org.za; MM@overstrand.gov.za; melvynrichter@gmail.com; Josephfletcher21@gmail.com; Pichegru, Lorien (Dr) (Summerstrand Campus South) <lorien.pichegru@mandela.ac.za>; pryan31@gmail.com; Peter Ryan <peter.ryan@uct.ac.za>; michellejoshua@masifundise.org.za; naseegh@masifundise.org.za; hildadms3@gmail.com; sassfcinfo@gmail.com; natashac.visagie@gmail.com; sauff@yahoo.com; davidcharlesjordaan@gmail.com; f.p.poggenpoel@gmail.com
Cc: Judy Beaumont <Jbeaumont@environment.gov.za>; Sue Middleton <SMiddleton@environment.gov.za>; Ashley Naidoo <Anaidoo@environment.gov.za>; Lisolomzi Fikizolo <LFikizolo@environment.gov.za>; Luthando Dziba <Luthando.Dziba@sanparks.org>; Nosiseko Mhlahlo <NMhlahlo@environment.gov.za>
Subject: Re: Documents relating to Decline in the African Penguin Population, the Small Pelagic Fishery and Island Closures

Dear Stakeholders

MK AM

Following the meeting convened by Minister Creecy on 12 August to discuss proposals to address the decline in the breeding populations of the African Penguin, attached please find the following:

- Presentation made at the meeting
- Synthesis of Current Scientific Information Relating to the Decline in the African Penguin Population, the Small Pelagic Fishery and Island Closures

As agreed at the meeting, nominations are requested as follows: 3 representatives from the fishing industry; and 3 representatives from conservation organisations.

The first workshop is scheduled to take place on 31 August 2021. An agenda and invitation will follow.

Kind Regards
Bukeka Bandezi
DFFE – Cape Town Branch
East Pier Road
Waterfront
021 819 2610

==========

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E: bbandezi@environment.gov.za
W:

MK
Ad

A: 2nd Floor ,Foretrust Building 1 Martin Hammerschlag Way

MC
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EXTENDED TASK TEAM: AFRICAN PENGUIN ISLAND CLOSURES

Conservation Stakeholder Synthesis Report

2 November 2021

EXECUTIVE SUMMARY

- To gauge the efficacy of different proposed boundaries in terms of their potential to alleviate fishing pressure within critical African penguin habitat around their breeding colonies, the Conservation Stakeholder Group has assessed the different proposals against an internationally recognised scientific methodology, marine Important Bird Areas (mIBAs).
- In order for the African penguin population to have the best chance of recovery we strongly recommend that the last remaining six major colonies in South Africa (i.e. > 1000 pairs), Dassen Island, Robben Island, Stony Point, Dyer Island, St Croix Island and Bird Island be afforded no-take fishery closures within 100% of their mIBAs and, for Dassen and Dyer islands, where edge or 'fishing-the-line" effects are likely, that further precautionary management measures be implemented in buffer zones on the affected boundaries of these mIBAs.
- The mIBA extents do not represent the entire foraging ranges of African Penguins and are considered a compromise position in terms of allocating the smallest area necessary for African penguins, i.e. their core habitat utilisation while breeding.
- Although catches of sardine and anchovy vary inside mIBAs from as little as 0,5% (sardine caught around Dassen Island) to 53,6% (sardine catches around St Croix) of the regional catch it is argued that industry would still not be prevented from catching their allocations if the mIBAs were closed to fishing as demonstrated by the Island Closure Experiment. It is agreed that actual catching costs would increase, but some of these additional costs, if not all, are expected to be passed on in the value chain. The actual economic impact to fisheries was not possible to assess as economic data were not made available for assessment.
- The recommended closures need to be in place year-round for a minimum of five years before the efficacy of these closures can be adequately assessed.
- If the full mIBAs around the six islands are not implemented, we have submitted alternative (although sub-optimal) proposals with associated conditions that **may** reduce adverse impacts to African penguins subject to a review of the efficacy of these delineations and potential extension of these closures after five years. Since the CSG has been requested to participate in the ETT process, these alternative proposals and associated conditions are viewed by the CSG as being a minimum set of criteria that cannot be compromised on.
- The proposed Joint Scientific Task Team (STT) needs to be more inclusive of a broad range of scientific skills that can ensure that any hypotheses of drivers of African penguin population declines can be optimally formulated. Future research needs to be informed by a structured process, e.g. a decision support framework, that assesses the current critical gaps in African penguin conservation science, identifies the feasibility of undertaking proposed research options, and prioritises research needs based on the potential for these outcomes to inform practical management solutions.
- Deliberations processes and concerns – The CSG notes that no consensus was reached nor was the ETT able to table a compromised position on island closures. The CSG further feels the impasse is due to different perceptions of the primary objectives of

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the ETT engagement process. The fishing industry perceives that they have no significant impact on African penguins and that other drivers are far more important and hence adopted a stance to reduce costs to industry as their primary objective for engagement. The CSG perceives that reduced food availability is the one threat that has not been effectively dealt with, with fishing the one driver that has not been adequately managed and is likely to have a significant impact on African penguins through competition for food, which is becoming more scarce, due to reduced small pelagic biomass and distributional shifts linked to climate change. Consequently, the CSG engaged with the objective to reduce fishing impacts to endangered African penguins and as a secondary objective consider options that would reduce costs to the fishing industry. A further observation noted by the CSG is that the original proposal tabled by the Department is a compromise on a compromised position. The fact that only 3 of the 6 largest penguin colonies are afforded increased protection is a concern given the conservation status and high risk of colony extinctions. Secondly, none of the 3 colonies that is afforded increased protection under the original proposal covers 100% of the penguin's core habitat utilization. Adopting closures as they currently stand will once again compromise the ability to assess the success of these closure measures in arresting the decline of African penguins. Lastly, the CSG strongly urges the Department to implement stringent measures to urgently rebuild the west coast sardine stock and to ensure that adequate environmental reserves are included for top predators that are highly dependent on forage fish as a source of food.

INTRODUCTION

The Conservation Stakeholder Group (CSG), comprised of representatives of BirdLife South Africa, the Southern African Foundation for the Conservation of Coastal Birds (SANCCOB) and the World Wide Fund for Nature – South Africa (WWF-SA), welcomes the process initiated by the Department of Forestry, Fisheries and Environment to explore different delineations of island closures to ameliorate resource competition around major African penguin colonies. The potential impacts of resource competition for forage fish on African penguins was realised as early as the 1970s (Frost et al. 1976) and proposals for fisheries exclusions around sensitive penguin habitat were recommended by government seabird scientists in 2006 (Crawford 2006). A multitude of subsequent peer reviewed published studies, and more recently, during the Island Closure Experiment (ICE), have reinforced the need to implement island closures as a matter of urgency around the last remaining colonies that have the greatest chance of contributing to an improvement in the conservation status of this endangered species.

The CSG participated in five Extended Task Team (ETT) meetings subsequent to Minister Creecy's presentation on proposed closure delineations around six major African penguin colonies on 12th August 2021. The following is a synopsis of the CSG's rationale for recommended fisheries closures including our position on what is required in terms of boundary extents for fishing exclusions to arrest the decline of African penguins. We also provide feedback of our perception of the ETT deliberation process.

A) CONTEXT AND RATIONALE FOR CSG CLOSURE DELINEATIONS

Forage fish fisheries are known to cause local scale competition, reducing prey availability to predators. This is of particular concern for many seabirds like African penguins that are range restricted when breeding and whose energy requirements during breeding are considerable. Insufficient access to food reduces adult condition and survival, reduces chick condition and survival and negatively impacts population growth. Several peer reviewed scientific manuscripts highlight the significance of local food availability to various penguin demographics, some of which are key in promoting population recovery. Time-area closures are an effective fisheries management technique (Dunn et al. 2011) and are deemed appropriate to alleviate resource competition around African penguin colonies. The sardine stock on the west coast is now depleted. Since 2014, the annual November biomass estimates have been consistently less than both the long-term average as well as the 5 year average. This depleted state further increases the competition for scarce resources, further highlighting the urgency for fishing restrictions around the major African penguin colonies.

Marine Important Bird Areas (mIBAs)

To gauge the efficacy of different proposed boundaries in terms of their potential to alleviate fishing pressure within critical penguin habitat around their breeding colonies, we have assessed the different proposals against an internationally recognised scientific methodology, marine Important Bird Areas (mIBAs); details of this methodology are expanded upon in Appendix 1. We have also noted key concerns for potential edge and displacement effects that may compromise the ability of these no-take areas in mitigating resource competition. This approach is scientifically defensible, appropriate for the crisis in which the African penguin is in in terms of identifying critical areas, and pragmatic in terms of fishing industry requirements. The mIBA method uses the tracking data available from birds at each colony and is representative of the populations' core marine habitat use requirements for each site. It is thus using far superior empirical evidence for how the birds are utilising the marine environment as opposed to the previous method which approximated their foraging range, i.e. the method used to delineate ICE boundaries when insufficient data on their foraging movements for each individual colony were known. It does not reflect the entire area that the penguins use but calculates the core utilisation area for breeding foraging birds. The proposed mIBAs have also been shown to be utilised by pre- and post-moult African penguins highlighting the need to implement these closures throughout the year. Any small pelagic fishing inside the mIBAs will increase competition for food, particularly in years when forage fish populations are low. A precautionary approach is therefore needed to ensure the integrity of theses sensitive areas (mIBAs) are protected given the high risk of African penguin colony extinctions.

B) CSG RECOMMENDED CLOSURE DELINEATIONS

- **all six islands require the full mIBA** to be protected from resource competition (see Figs 1,2 and 3 for mIBAs relative to other proposals, and Appendix 1 for mIBA technical detail). The 6 islands are those that comprise the last remaining African penguin colonies in South Africa that have the lowest extinction probability, i.e. > 1000 Pairs (Crawford et al. 2001). The mIBAs are areas that represent the critical and core habitat usage areas of African penguins.

- In addition to these mIBAs, **additional fishing management conditions need to be implemented on the boundaries** of these mIBAs in regions where depletion of fish biomass is likely to have impacts on the availability of prey in the adjacent mIBAs, i.e. edge effects or "fishing-the-line". These areas have been highlighted in the ETT meetings, and include the area north of the mIBA for Dassen Island and north of the mIBA for Dyer Island. Displacement effects of fishing pressure to nearby colonies should also be considered and mitigated against when decisions around closures are finalised. An example here is the closure of Dyer Island which is likely to result in displaced fishing effort towards the Stony Point colony, which under the current DFFE proposal only affords 5% mIBA protection for the latter colony.
- A review of the efficacy of the proposed closures should be aligned to biologically meaningful intervals, notably age to first breeding (~5 years) to allow the closures to demonstrate their full potential in terms of recruitment benefits.

C) FURTHER COMPROMISE RECOMMENDATIONS

If the Department decides not to implement these mIBAs, and compromises further on the above recommendations, we provide specific conditions that should be incorporated into the management decisions that result from these ETT proceedings. We acknowledge that further detail on the practical implementation of these management conditions will require further engagement with the managing authorities.

Note that the mIBAs are already a compromise, since they identify the absolute core utilisation area of the birds. Given their endangered status, and the depleted sardine stock, the Department really should be providing this species with every opportunity possible for population recovery.

a) <u>Dassen Island</u>

1. Draft proposals d6, d7, d8, d9 and d10 incorporate between 33% and 89% of the mIBA (Figure 1).
2. Counter proposal d7 has the least coverage of the mIBA (33%) but only potentially reduces the proportion of anchovy catch by 1.3% when compared to d10 which incorporates the greatest amount of the mIBA (89%, Table 1).
3. If the full mIBA is not considered as an option for implementation, then we recommend the following conditions:
    a. Option d10 be implemented (See Figure 1).
    b. Spatial and temporal management of the fleet is required to reduce the fishing pressure at the boundary of the mIBA, and 100% observer coverage must be included. In addition, the number of vessels fishing in this area should be limited on any given day and should be authorized by the department. **Rationale:** The proposed closure lies within an area that is used by anchovy recruits that move southward through the system. Intensive fishing at the northern part of the closure is likely to have downstream effects on prey availability to penguins within the mIBA.
    c. An incentive scheme should be introduced in FRAP policy to reward applicants that voluntarily commit to not fish in mIBA areas open to fishing.
    d. The opening of 16-mile beach MPA was discussed as part of the deliberations for extensive closure of Dassen Island, but on further engagements outside of the ETT this option should be avoided as the 16-mile beach MPA is an important foraging area for non-breeding African penguins and endangered Cape cormorants.

e. Assessment after 5 years with provisions to extend boundary to full mIBA should the d10 extent be shown to be ineffective in mitigating resource competition.

b) Dyer Island

1. Draft proposals d6, d7, and golf incorporate between 20% (d7) and 76% (golf) of the mIBA (Table 1).
2. If the full mIBA is not considered as an option for implementation, then we recommend the following conditions:
    a. Option golf be implemented (See Figure 2).
    b. Spatial and temporal management of the fleet is required to reduce the fishing pressure at the boundary of the mIBA, particularly in the north and 100% observer coverage must be included. In addition, the number of vessels fishing in this area should be limited on any given day and should be authorized by the department. Priority should be considered for right holders with small vessels operating from Gansbaai to access these areas. **Rationale:** The proposed closure lies within an area that is intensively fished for sardine which is currently a depleted stock. We reiterate our concern for the concentration of fishing pressure in this area. We did request specific information that would have assisted in discussing spatial and temporal management options of the fleet, but this was not provided.
    c. Incentive scheme should be introduced in the FRAP policy to reward applicants that voluntarily commits to not fish in mIBA areas open to fishing.
    d. Assessment after 5 years with provisions to extend boundary to full mIBA should the golf extent be shown to be ineffective in mitigating resource competition.

c) St Croix Island

1. Draft proposals d6, d7, and golf incorporate between 49% (d7) and 75% (d6) of the mIBA (Table 1).
2. If the full mIBA is not considered as an option for implementation, then we recommend the following conditions:
    a. Option d6 be implemented (See Figure 3).
    b. Incentive scheme should be introduced in the FRAP policy to reward applicants that voluntarily commit to not fish mIBA areas open to fishing.
    c. Assessment after 5 years with provisions to extend boundary to full mIBA should the d6 extent be shown to be ineffective in mitigating resource competition.

d) The MPAs of Robben Island, Stony Point and Bird Island

Three of the proposed colonies were proposed with their current MPA restrictions so these are the status quo in terms of fishing restrictions and maintaining current fishing pressure. These MPAs were delineated for the protection of biodiversity features and ecological processes more generally, and do not adequately protect the foraging areas required by African penguins. We also assessed these current MPA restrictions around Robben Island, Stony Point and Bird Island against the mIBA standard.

1. Robben Island

- Restricted fishing areas include 41% of the mIBA which is the current condition under the MPA restrictions (Figure 4).
- Should the Department decide not to close the full mIBA to fishing, to alleviate fishing pressure in non-protected mIBAs we recommend incentivising rights holders to avoid these areas.

2. Stony Point

- This site has the least protection, only 5% in the existing MPA at Bettys Bay (Figure 4).
- We are concerned that fishing effort, excluded in new restrictions around Dyer Island, may be displaced to this area thereby intensifying resource competition for penguins from this colony.
- Stony Point penguin colony has significant socio-economic benefits as it is a mainland colony and therefore gets a substantial number of visitors, including tourists and school children.
- A larger portion of the mIBA **must** be included in the closure proposals.
- To alleviate fishing pressure in non-protected mIBAs, incentivising rights holders to avoid these areas should be implemented.

3. Bird Island

- This site has 45% of its mIBA protected currently in an MPA (Figure 4).
- Although there is currently little fishing around this island we are concerned about displacement of fishing effort to this region in the future.
- Recommend that offshore waters of the island be included in the proposed closure.
- To alleviate fishing pressure in non-protected mIBAs recommend incentivising rights holders to avoid these areas.

C) CONSERVATION SECTOR VIEW OF THE ETT PROCESS TO DATE

Here we note some of our key concerns regarding the proceedings in the spirit of reaching a meaningful compromise both in terms of a sensible outcome that is informed by the best available science in protecting critical habitat for African penguins and minimising the cost to the fishing industry.

- **Perceptions that island closures will have a negligible effect on penguins.**
  We are seriously concerned about this false perception that has been propagated through the fishing industry community. There is no published, peer-reviewed evidence that demonstrated this – nor has the International Stock Assessment Review Panel expressed such a view.

- **Lack of engagement on discussing closure boundary options.**
  Much of the time has been spent discussing the merit of closures and the additional science programme that was stated as a condition of further engagement. Despite our request to keep the ETT focus on the task at hand as requested by Minister Creecy – to discuss the boundaries proposed by DFFE and come to an agreement, real, practical discussions on

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boundaries and exploring various management options were obstructed as industry believes they are not having a significant impact on the African penguin population.

- **Lack of engagement on the possibility of other spatial management measures.**
  The conservation reps provided their inputs via the marine IBAs during the 2nd ETT meeting, and made requests for further information such as: how the fleet could be spatially managed to ensure limited impact to smaller vessels/fishing companies; what management interventions could be discussed to mitigate 'fishing the line' where fishing pressure could reduce the movement of fish into the closed area and so limit the benefit of the marine IBA; reducing fleet sizes in the Dyer Island region which is the focus of the sardine fishery on the west coast. These discussions were not fruitfully and meaningfully had with data not being provided on fishing activity to aid the discussion.

- **Lack of real compromised proposals with quantitative socio-economic assessment to justify acceptable closure extents.**
  Proposals submitted by fisheries representatives are motivated by *ad hoc* skippers' perceived favourable fishing areas and the areas previously utilised by industry provided by fisheries department with no motivation as to why other areas in the DFFE's proposals cannot be mitigated. No quantitative economic assessment to motivate for these preferred delineations were given; ideally we would like to see a spatially explicit, sardine and anchovy specific representations of replacement costs for the industry based on an assessment of the proportion of the TACs lost during years when fishing was restricted around islands in the ICE.

  Data was requested on the actual costs of the closures (given the 13 years of alternated closures to date); when were TACs not met as a result of closures; what were profits vs losses in open/closed years.

  The proposals received to date (for Dassen and Dyer) by the purse-seine fisheries sectors cannot be seen as a compromise as they essentially include areas that are unfavourable for fishing, or cannot be accessed for fishing, with no consideration given to penguin foraging needs. Looking at only the sardine catch 0,4% and 0.2% of the historical catch is impacted by the Dassen Island and Dyer Island proposals with only 33 and 20% of the MIBA included for these islands respectively.

- **The economic cost of the depleted sardine stock on the west coast to industry**
  The decoupling of the costs of the depleted west coast sardine stock, relative to the costs associated with closures is absolutely essential in order to obtain the real cost to industry of any fishing closures.

- **16 Mile Beach MPA**
  We are concerned that 16 Mile Beach MPA is being put on the table as a condition of participation. This area has been shown to be important for endangered African penguins and Cape cormorants. Furthermore, we are concerned about the precedent set to bypass MPA processes if the opening up of this MPA to fishing is supported by government.

- **Seasonal closures**
  We have objected to seasonal closures in a previous submission to DFFE's SWG-PEL (Makhado et al. 2021) as there is substantial scientific evidence to demonstrate that African Penguins

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utilise the marine habitat around their colonies during different life history stages throughout the year (Carpenter-Kling et al. 2021, Makhado et al. 2021 and references therein).

- **Diurnal closures**
  This should not be entertained as the closures are being implemented to reduce resource competition, i.e. depletion of fish stocks around penguin colonies. Depletion can be cumulative over timescales beyond the diurnal cycle so cannot be considered to ameliorate this effect. It must be noted that this proposal was for the sardine fishery which mostly operates at night in any event, i.e. proposal of this nature are not much different from the status quo, i.e. the same magnitude of fishing that the island closure proposals are trying to mitigate against.

- **Need for fisheries management representation on the task team**
  Having fisheries management represented on the task team will greatly assist in discussing real, practical options for fleet management and finding solutions to limit resource competition.

- **Intensity of sardine fishing between Dyer Island and Stony Point**
  We are extremely concerned about the intensity of sardine catches between Stony Point and Dyer Island. That ~80% of the sardine catch west of Cape Agulhas is caught in this area indicates the level of competition that the seabirds face. Fishing restrictions around Dyer Island are likely to have displacement effects for Stony Point, and practical spatial fleet management options urgently need to be discussed.

- **The elephant in the room- low sardine biomass**
  This issue was not discussed directly in the ETT, but the declining sardine biomass as a forage fish is likely to play a key role in the declining numbers of many top predators in the Southern Benguela ecosystem. An EAF in the small pelagic fishery needs to be adopted that would urgently seek to rebuild the sardine resource while simultaneously providing sufficient environmental reserve, not just for African penguins but for all top predators that are highly dependent on small pelagic species as a food resource.

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Figures and Table 1.

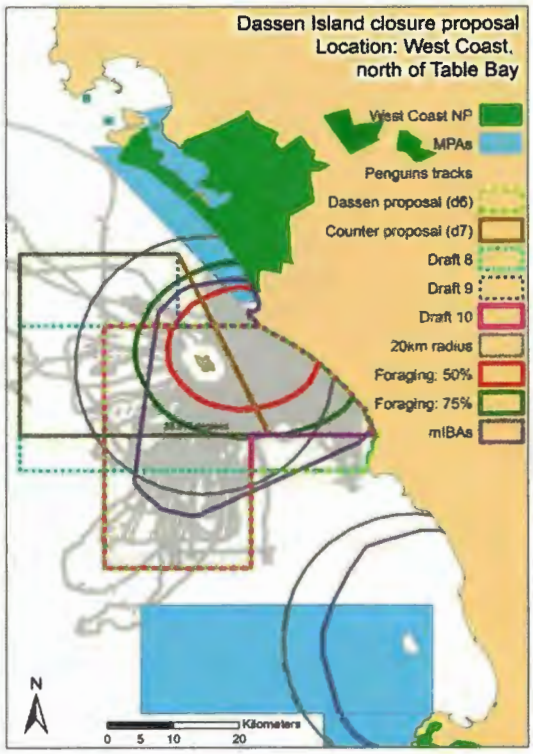

Figure 1. PETT draft closure proposals for Dassen Island (Source: PETT_10_Penguin_colony_closure proposals_for_informatiuon_20211021).

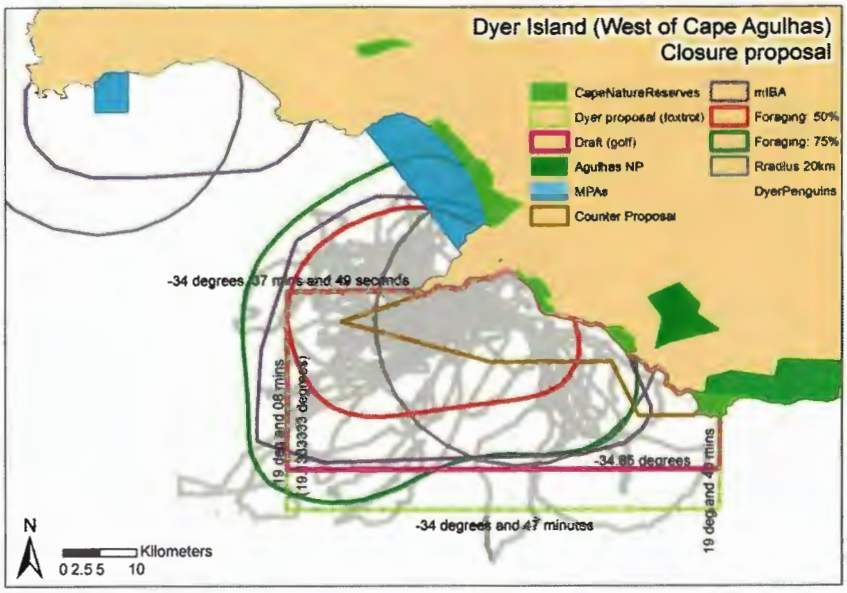

Figure 2. PETT draft closure proposals for Dyer Island (Source: PETT_10_Penguin_colony_closure proposals_for_informatiuon_20211021)

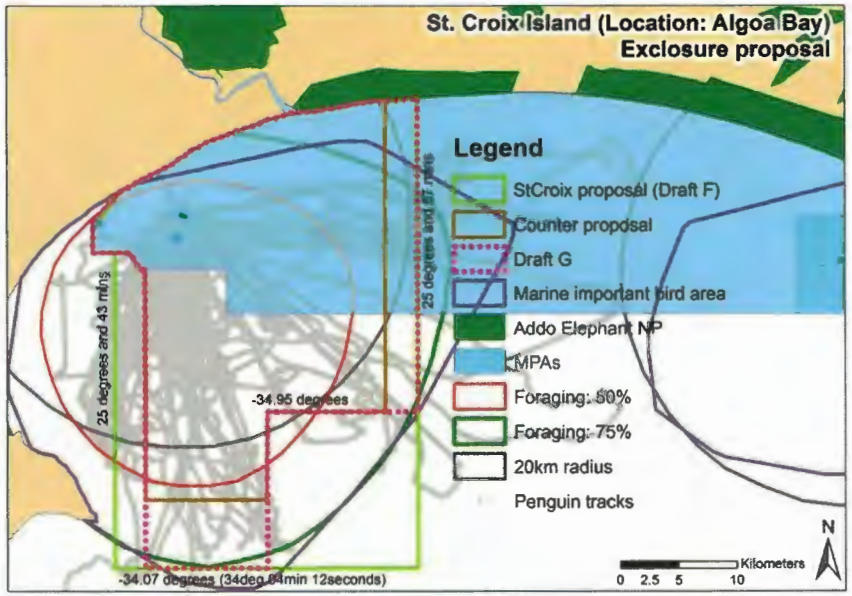

Figure 3. PETT draft closure proposals for St Croix Island (PETT_10_Penguin_colony_closure proposals_for_informatiuon_20211021).

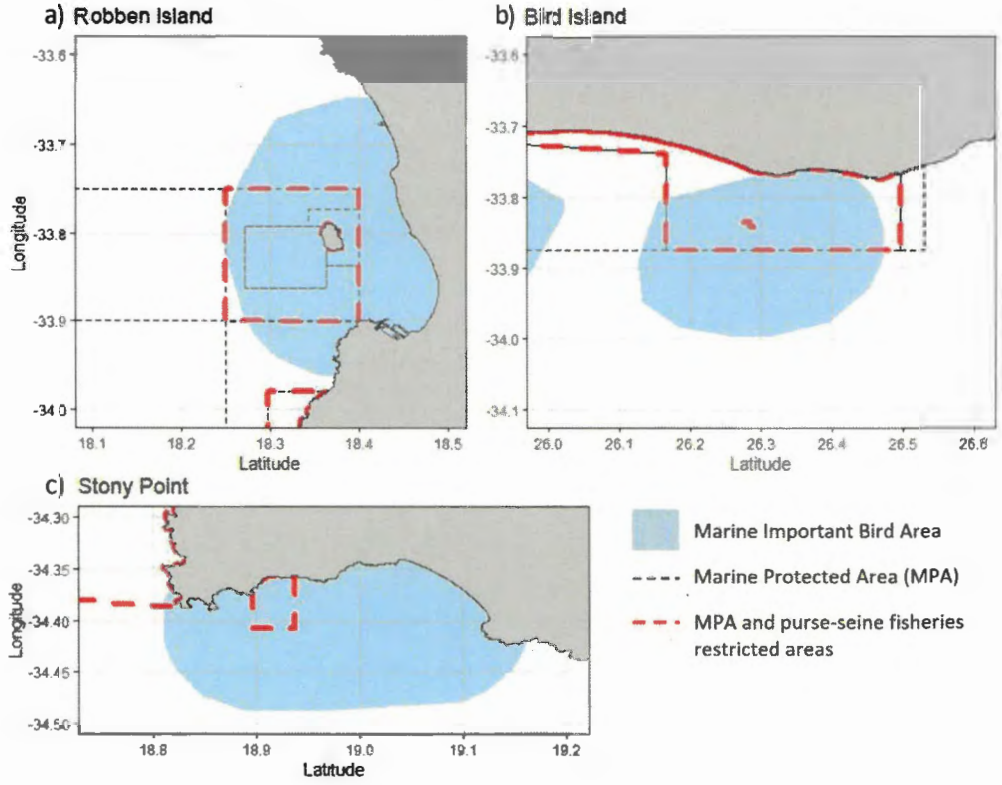

Figure 4. mIBA and MPA extents around Robben Island, Stony Point and Bird Island.

Table 1. Areas and proportional impacts on African Penguins (mIBAs) and fisheries catches for different ETT proposed fishery closure delineations.

	Dassen Island				Dyer Island				St Croix Island		
Proposals	Area (km^2)	% mIBA incorp.	%anchovy catch	%sardine catch	Area (km^2)	% mIBA incorp.	%anchovy catch	%sardine catch	Area (km^2)	% mIBA incorp.	%sardine catch
mIBA	688	100	7.47	0.46	1137	100	12.36	32.65	938	100	53.63
20km	901*	65	7.51	0.46	657*	56	10.05	16.14	613*	60	42.12
Original DFFE proposal (d6)	946	88	4.36	0.38	1303	76	3.94	11.97	809	75	32.86
Industry counter proposal (d7)	720	33	2.27	0.4	260	20	0.12	0.22	497	49	24.16
Counter - draft 8 (d8)	907	77	4.31	0.27	-	-	-	-	-	-	-
Counter - draft 9 (d9)	889	58	3.69	0.34	-	-	-	-	-	-	-
Counter - draft 10 (d10)	864	89	3.57	0.34	-	-	-	-	-	-	-
Counter - draft golf	-	-	-	-	1032	76	3.65	9.34	609	60	28.95

Appendix 1. Marine Important Bird and Biodiversity Area (mIBA) method.

Following the methods of Lascelles et al. (2016) and Dias et al. (2018) and using the R package track2KBA (Beal et al. 2021), marine Important Bird Areas (mIBAs) were identified separately for each African Penguin colony. The method follows four steps:

1. **Identify core area usage of individuals:** The core area of each individual is estimated using kernel density analysis. Kernel density analysis calculates the density of locations by fitting a bivariate normal function with a pre-defined radius (smoothing parameter; h) around each location and summing up the values to create a smooth density surface. The kernel utilization distribution (UD) is the isotopleth that contains a certain percentage of the density distribution. The UD that estimated the core area of each species during a particular life-history stage was estimated based on optimal isopleth value selection (OIVS), following Vander Wal and Rogers. The OIVS method uses the exponential relationship between the proportion of home range area used by an individual and the isopleth volume to identify thresholds (slope = 1) delineating areas of maximum use. OIVS was applied to each individual and the mean optimal isopleth value of all individuals of a species within a specific life-history stage (e.g. breeding or post-moult) and was taken to represent the core range of the birds. The h-value was based the scale of each datagroup's area restricted search. For flying seabirds, it was determined using first passage time analysis and for penguins, a h- value of 7 km was used following Dias et al. (2018).
2. **Assess the representativeness of the sampled data:** The representiveness of the tracking dataset from a sub-sample of the population is assessed by iteratively randomly selecting individuals tracks 100 times and pooling the data to estimate a UD using the isopleth estimated in the previous step. The proportion of non-sampled tracking locations within the resulting area is calculated (i.e. the 'inclusion rate'). A non-linear least square regression is fitted to the relationship between sample size and inclusion rate to project this rate until its asymptote (that is the sample size which fully represent the source population distribution) and calculates the degree to which the tracked sample represents the space use of the population. The inclusion rate at the maximum sample size should approximate the specified UD when the tracked sample is fully representative.
3. **Identification of shared areas of high intensity use:** Boundary of sites which are used by different birds is identified. That is, areas that are used by ≥ 10%, ≥12.5% or ≥ 20% of the tracked individuals, depending on whether the sample had representativeness values of > 90%, 80%–90% or 70%–80%, respectively.
4. Final delineation of marine IBAs: To enhance practicability of management zones, spatial polygons are aggregated to minimize the boundary-to-area ratio. Specifically, any isolated polygon or hole within a larger polygon, which is smaller than 5% of the total area identified, is removed or filled, respectively, using the R package *smoothr*. Polygons are further merged if the great circle distance between their centroids was < 5% of the greatest distance between any two polygon centroids. The final boundaries of sites identified for each data group are delimited by a minimum convex polygon R package *adehabitat* (Calenge 2006).

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Subject: CAFMLR Approved Terms of Reference

From: Alieya Haider <AHaider@dffe.gov.za>
Sent: Monday, March 14, 2022 2:13 PM
To: T.Frantz <T.Frantz@sanbi.org.za>; Kerry Sink <K.Sink@sanbi.org.za>; kevern.cochrane <kevern.cochrane@gmail.com>; aneshgovender <aneshgovender@gmail.com>; liaison <liaison@fishsa.org>; 'Stacey Williams' <stacey@fishsa.org>; Jeppe Kolding <Jeppe.Kolding@uib.no>; Welly Qwabe <wellyq@wildtrust.co.za>; zolani.mbanjwa <zolani.mbanjwa@fawu.org.za>; Cheslyn Liebenberg <CELiebenberg@dffe.gov.za>; Janet Claire Coetzee <JCoetzee@dffe.gov.za>; Azwianewi Makhado <AMakhado@dffe.gov.za>; Herman Oosthuizen <Oosthuiz@dffe.gov.za>; georgieoosthuizen <georgieoosthuizen@gmail.com>; Gerhard Cilliers <GCilliers@dffe.gov.za>; Asanda Njobeni <anjobeni@dffe.gov.za>; Lauren Waller <LaurenW@ewt.org.za>; Alistair McInnes <alistair.mcinnes@birdlife.org.za>; Smith, Craig <csmith@wwf.org.za>; Dr Mike Bergh <mike@olsps.com>; copeland.fishconsult@gmail.com; redah@oceangrow.co.za; Redah De Maine <redah@rialfishing.co.za>; Alison.Kock <Alison.Kock@sanparks.org>; Cloverley Lawrence <cloverley.lawrence@sanparks.org>; Zishan Ebrahim <Zishan.Ebrahim@sanparks.org>; Pierre de Villiers <estuaries@capenature.co.za>; Makhudu J. Masotla <MMasotla@dffe.gov.za>
Subject: CAFMLR Approved Terms of Reference

Dear Colleagues

I hope you are well.

Please find a copy of the approved Terms of Reference as signed by Minister in the attachment.

Kind regards

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FORESTRY, FISHERIES AND THE ENVIRONMENT
REPUBLIC OF SOUTH AFRICA

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TERMS OF REFERENCE FOR THE CONSULTATIVE ADVISORY FORUM FOR MARINE LIVING RESOURCES - SPECIAL PROJECT TO REVIEW PENGUIN CONSERVATION AND SMALL PELAGIC FISHERIES INERACTIONS

1. **Forum's Official Designation.** Consultative Advisory Forum for Marine Living Resources (the "**Forum**")). The Forum is established by the Minister responsible for fisheries in terms of section 5 of the Marine Living Resources Act, 1998 (Act No.18 of 1998) (the "**MLRA**")

2. **Authority.** Section 5 of the MLRA requires the Minister responsible for fisheries to establish the Forum, which the Minister established on 21 June 2021.

3. **Objectives and Scope of Activities.** Section 6 of the MLRA sets out the functions of the Forum. The Forum must advise the Minister on any matter referred to the Forum by the Minister. Specifically, the Minister is requesting the Forum to advise her on the following:

3.1 Consider outputs from the Extended Task Team on Penguin Conservation and make agreed upon recommendations to the Minister on the limiting of Small Pelagic Fishing Activities adjacent to penguin colonies. The following documents must be considered.

1. Penguin Conservation Task Team Activities Summary for the CAF
2. Penguins and Small Pelagic Fisheries Interactions Synthesis Report
3. Synthesis Report Review 1

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4. Synthesis Report Review 2
5. Summary Report and Preferred Options from the Conservation Sector Group
6. Summary Report and Fishing Limitations Proposal from the Small Pelagic Fishing Industry for the West Coast (Dassen, Robben, Stony Point and Dyer Islands). Note there is no separate document on the South Coast Small Pelagic Fishery as these were communicated directly to the Department. This is included as the St. Croix map and Summary Table as Industry Counter Proposal (I) in the collated options Annexure 1.4.
7. Collated options of fishing limitation with estimated loss percentages and percentages of Marine Important Bird Areas conserved around the major penguin islands.

3.2 Make additional agreed upon recommendations on other conservation measures that may be adopted by the Minister.

4. **Industrial bodies and interest groups.** The Forum may consider other relevant information from stakeholders which the Forum believes should be brought to the attention of the Minister as part of the Forum's advisory role.

5. **Appointment of Observers.** The Minister may appoint persons with observer status for the duration of the deliberation. These observers will have speaking rights; the right to cross-examine expert witnesses and the right to present their own evidence. The Chairperson may decide to include observers in the final deliberations and formulation of recommendations by the CAFMLR to the Minister. The observers will be paid at the same rates as ordinary members for the period of their appointment.

The Minister appoints the following observers for this special project:
Dr Lauren Waller – SANCCOB (Conservation sector)
Dr Alistair McInnes – Birdlife SA (Conservation sector)
Mr. Craig Smith – WWF (Conservation sector)
Mr. Mike Copeland – West Coast (Fisheries sector)
Dr Mike Bergh – West Coast (Fisheries sector)
Mr. Redah De Maine – South Coast (Fisheries sector)

TERMS OF REFERENCE FOR THE CONSULTATIVE ADVISORY FORUM FOR MARINE LIVING RESOURCES - SPECIAL PROJECT TO REVIEW PENGUIN CONSERVATION AND SMALL PELAGIC FISHERIES INTERACTIONS

6. **Description of Duties.** The Forum will be required to submit written reports and written recommendations to the Minister on the special project commencing from 24 of January 2022. The final report with recommendations must be submitted to the Minister by no later than 14 March 2022. The Forum will function solely as an advisory body and will comply fully with the MLRA and its regulations, and in particular, these TORs.

7. **Office or Official to Whom the Forum Reports.** The Forum shall report to the Minister responsible for fisheries through the Office of the Minister.

8. **Support.** The Branch: Fisheries Management of the Department responsible for fisheries will provide administrative support for the Forum.

9. **Estimated Annual Operating Costs.** The duration of this project is for five weeks. This includes fees for members' attendance at Forum meetings, preparation and research as approved by the Chairperson, travelling time to Forum-meetings as well as travel and subsistence allowances, as necessary. These costs will be covered and paid for by the Marine Living Resources Fund.

10. **Disclosure.** The CAFMLR members and members with observer status shall annually disclose all fisheries related interests to the Minister and at every CAFMLR meeting and/or sub-committee meeting, per item discussed, to be so reflected in the Aide memoir.

11. **Duration.** The duration of the Penguin Conservation - Small Pelagic Fisheries Review is for a period of seven (7) weeks, commencing 24 January 2022 and ending on 14 March 2022. CAFMLR members and observers shall sign and adhere to the Code of Conduct and Ethics Agreement and Confidentiality and Non-Disclosure Agreement, attached as Annexures A and B to this Terms of Reference.

12. **Remuneration.** Membership to the CAFMLR shall be remunerated in accordance with the determined remuneration of Category B, sub-category B2 of the National Treasury published remuneration levels: Service benefit packages for office-bearers of certain statutory and other institutions (as amended from time to time).

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TERMS OF REFERENCE FOR THE CONSULTATIVE ADVISORY FORUM FOR MARINE LIVING RESOURCES - SPECIAL PROJECT TO REVIEW PENGUIN CONSERVATION AND SMALL PELAGIC FISHERIES INTERACTIONS

Category Classification B2 (Part-time Members)		
Remuneration	2021Rates	
Position	Meeting rate	
	Per day	Per hour
Chairperson	R 3 888	R 486
Members	R 2 382	R 298

Remuneration shall include attendance at Forum meetings, preparation and research as approved by the Chairperson, travelling time to Forum-meetings (up to a maximum of 7 days per meeting) as well as travel and subsistence allowances. The following shall be applicable to all remuneration matters concerning the CAFMLR members:

i. Members shall register as Services Providers with National Treasury and shall submit invoices in lieu of payment for all remuneration accrued and expenses incurred in serving on the CAFMLR;

ii. Members shall register as provisional Tax Payers with the South African Revenue Services (SARS) and in addition shall register for Value Added Tax (VAT) (should they be earning above the SARS threshold), such proof shall be submitted to the Chief Directorate: Fisheries Operations Support (or any such name the post may operate under at some point in future) on an annual basis, or as and when requested.

iii. Members shall be remunerated for each hour served up to a daily rate maximum of 7 days per meeting (as published by National Treasury for office bearers of certain statutory and other institutions), applicable to sitting fees, research and travelling time.

iv. Members shall in addition to the daily rate above, receive Travel and subsistence allowances in line with the Department of Forestry, Fisheries and the Environment (DFFE) Policy and rates.

v. Flights, accommodation, car hire, transfers, conference registration and attendance fees, venue fees, catering etc. shall be arranged by the Chief Directorate: Fisheries Operations Support to be paid for by the DFFE in line with DFFE Policy and rates.

vi. Members utilising their private vehicles for official travel related to the CAFMLR shall maintain a travel log and submit claims on a monthly basis *via* the Chief Directorate:

MC AM

Fisheries Operations Support for payment. Mileage claims shall be paid line with DFFE Policy and rates.

vii. Employees of National, Provincial and Local Government or Agencies and Entities of Government serving as Members on the CAFMLR are not entitled to additional remuneration.

13. **Recordkeeping.** The records of the CAFMLR shall be handled in accordance with the Protection of Personal Information Act, 2013 (Act No. 4 of 2013), and the Minimum Information Security Standards for the State as approved by Cabinet on 04 December 1996.
All meetings shall have Aide memoirs and any recommendations provided to the Minister shall be compiled in a report and shall include any dissenting views from members.

14. **Communication.** All communication related to the CAFMLR shall be exclusively limited to the Minister of Forestry, Fisheries and the Environment through the Office of the Minister.

In this Terms of Reference, the "Minister" shall mean the Minister of Forestry, Fisheries and the Environment or such other Ministry under whose ambit the CAFMLR may operate at some point in future.

MS B D CREECY, MP
MINISTER OF FORESTRY, FISHERIES AND THE ENVIRONMENT

DATE: 8/3/2022

MINISTER
FORESTRY, FISHERIES AND THE ENVIRONMENT
REPUBLIC OF SOUTH AFRICA

Private Bag X447, Pretoria, 0001, Environment House, 473 Steve Biko Road, Tel: (012) 399 8743
Private Bag X9052, Cape Town, 8000, Tel: (021) 469 1500, Fax: (021) 465 3362

Dr Alistair McInnes
Birdlife SA

Per Email: Laurenewt.org.za

Dear Dr McInnes

APPOINTMENT AS AN OBSERVER ON THE CONSULTATIVE ADVISORY FORUM IN TERMS OF SECTION 5 OF THE MARINE LIVING RESOURCES ACT, 1998, ACT NO. 18 OF 1998 ON A SHORT-TERM BASIS FOR THE SPECIAL PROJECT TO THE REVIEW PENGUIN CONSERVATION AND SMALL PELAGIC FISHERIES INTERACTIONS

In terms of section 7(1) of the Marine Living Resources Act, 1998 (Act No. 18 of 1998) (MLRA) and Treasury Regulations 3.1.2 (issued in terms of Section 76(4)(d) of the Public Finance Management Act, 1999 (Act No. 1 of 1999), you are hereby appointed to serve as an Observer on the Consultative Advisory Forum (CAF) on a short-term basis for the special project to review the penguin conservation and small pelagic fisheries interactions.

The purpose of your appointment to the Consultative Advisory Forum, as set out in section 6 of the MLRA, is to advise the Minister on the following:

1.1 Consider outputs from the Extended Task Team on Penguin Conservation and make recommendations on the limiting of Small Pelagic Fishing Activities adjacent to penguin colonies. The following documents must be considered.
   1. Penguin Conservation Task Team Activities Summary for the CAF
   2. Penguins and Small Pelagic Fisheries Interactions Synthesis Report
   3. Synthesis Report Review 1
   4. Synthesis Report Review 2
   5. Summary Report and Preferred Options from the Conservation Sector Group
   6. Summary Report and Fishing Limitations Proposal from the Small Pelagic Fishing Industry for the West Coast (Dassen, Robben, Stony Point and Dyer Islands). Note there is no separate document on the South Coast Small Pelagic Fishery as these were communicated directly to the Department. This is included as the St. Croix map and Summary Table as Industry Counter Proposal (I) in the collated options Annexure 1.4.
   7. Collated options of fishing limitation with estimated loss percentages and percentages of Marine Important Bird Areas conserved around the major penguin islands.

APPOINTMENT AS AN OBSERVER ON THE CONSULTATIVE ADVISORY FORUM IN TERMS OF SECTION 5 OF THE MARINE LIVING RESOURCES ACT, 1998, ACT NO. 18 OF 1998 ON A SHORT-TERM BASIS FOR THE SPECIAL PROJECT TO THE REVIEW PENGUIN CONSERVATION AND SMALL PELAGIC FISHERIES INTERACTIONS

1.2 To provide the Minister with agreed upon recommendations on the approach to possible island closures.

1.3 Make additional recommendations on other conservation measures that may be adopted by the Minister.

As an interested and affected party with observer status, you will have speaking rights; the right to cross-examine expert witnesses and the right to present their own evidence but will not be party to the final deliberations and formulation of recommendations by the CAF to the Minister. You will be paid at the same rates as ordinary members for the six weeks of your appointment.

This appointment is valid for a seven-week period from 24 January 2022 and expiring on 14 March 2022. You will be reimbursed in terms of the National Treasury tariffs (as amended annually). The current rates are as follows:

- An hourly rate of R298.00 will be paid for the duration of each meeting with four-hour preparation time being allowed.
- A daily rate of R2 382.00.

You and other members of the Consultative Advisory Forum have an important task to fulfil, and I wish you every success in this regard. Attached to this letter, please find the Term of Reference for the Consultative Advisory Forum for Marine Living Resources and the Acceptance Form. Please sign the Acceptance Form and email back a copy to: CELiebenberg@environment.gov.za

Yours sincerely

MS B D CREECY, MP
MINISTER OF FORESTRY, FISHERIES AND THE ENVIRONMENT

DATE: 11/3/2022

APPOINTMENT TO SERVE AS A MEMBER OF THE CONSULTATIVE ADVISORY FORUM

I, ALISTAIR MCINNES hereby **accept/~~do not accept~~** the appointment to serve as a member of the Consultative Advisory Forum on a short-term basis for Marine Living Resources. I also **agree/~~do not agree~~** that my appointment is subject to the provisions of the Marine Living Resources Act, 1998 (Act No. 18 of 1998) (MLRA) and in particular, sections 6 and 7 of the MLRA. In accepting my appointment, I agree to adhere to the proedures of the Consultative Advisory Forum contained in the Terms of Reference approved by the Minister.

SIGNATURE: .....

DATE: 2022/05/19

Subject: FW: RE: Failed CAFMLR consultation process regarding African Penguin conservation and Small Pelagic Fisheries interactions

From: Mark Anderson <ceo@birdlife.org.za>
Sent: Wednesday, March 16, 2022 9:42 PM
To: Du Plessis, Morne <mduplessis@wwf.org.za>; Natalie Maskell <Natalie@sanccob.co.za>; Yolan Friedmann <yolanf@ewt.org.za>; Alistair McInnes <alistair.mcinnes@birdlife.org.za>; Smith, Craig <csmith@wwf.org.za>; Harriet T. Davies-Mostert <harrietd@ewt.org.za>; Nicky Stander <nicky@sanccob.co.za>; Silandela, Mkhululi <msilandela@wwf.org.za>; Hanneline Smit-Robinson <hanneline.smit-robinson@birdlife.org.za>; Lauren Waller <LaurenW@ewt.org.za>
Subject: FW: RE: Failed CAFMLR consultation process regarding African Penguin conservation and Small Pelagic Fisheries interactions

Dear colleagues

Minister Creecy asked me this afternoon to send her our report/arguments, and I have done so. I have also just WhatsApped her to say that the report has been sent to her.

I have purposefully deleted her email address below, as she asked me to send it to her home email address (and I am not sure whether she wants this email address to be widely known).

It will be interesting to see how things pan out during the next few days.

Regards
Mark

From: Mark Anderson <ceo@birdlife.org.za>
Sent: Wednesday, 16 March 2022 21:27
To: Minister Creecy
Subject: RE: Failed CAFMLR consultation process regarding African Penguin conservation and Small Pelagic Fisheries interactions

Dear Minister

I refer to our telephone conversation this afternoon.

To date, we have not received and had an opportunity to review the report stemming from the Consultative Advisory Forum for Marine Living Resources (CAFMLR). This is despite compromised island closure delineations having been presented to the stakeholders at the final CAFMLR meeting on 8 March 2022. We have also not received confirmation that we will be afforded a chance to do so. We note that we similarly had no opportunity to review the report presented from the Extended Task Team (ETT) of Penguin Conservation, and that our submissions were, unfortunately, misrepresented therein.

The Conservation Sector Group views the CAFMLR final recommendation as insufficient to make a meaningful difference to alleviate resource competition around important African Penguin colonies. We are strongly of the opinion that the process was procedurally flawed on multiple accounts.

MK AM

As discussed this afternoon, and to ensure that your consideration of this matter is informed by a full and accurate understanding of our submissions, I am sending you our recommendations in the accompanying report.

We'd like to note that this report has not had the attention to detail that we would have wished for, particularly as we are shooting a little in the dark since we have not had sight of what has been submitted to you by the CAFMLR.

The attached report is detailed and long, but you will understand the just of our concerns in the Executive Summary.

I am sending you this email and the report on behalf of the Conservation Sector Group (CSG) on which BirdLife South Africa, SANCCOB and WWF-SA (and now also the Endangered Wildlife Trust) is represented.

Please do not hesitate to let me know if you need any further information or clarification.

Regards
Mark

Mark D. Anderson
Chief Executive Officer

BirdLife SOUTH AFRICA
Giving Conservation Wings

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Failed Consultative Process - Conservation Sector Group position and proposed way forward on recommended island closure delineations as deliberated on during the Consultative Advisory Forum for Marine Living Resources – Special Project to Review Penguin Conservation and Small Pelagic Fisheries Interactions (CAFMLR)

Date: 16 March 2022

Submitted by representatives of the Conservation Sector Group: Dr Alistair McInnes (BirdLife South Africa), Dr Lauren Waller (formerly: Southern African Foundation for the Conservation of Coastal Seabirds; currently: Endangered Wildlife Trust), Craig Smith (World-Wide Fund for Nature - South Africa)

Executive summary

1. African Penguins are currently listed as globally Endangered by the International Union for Conservation of Nature (IUCN) with their populations currently decreasing by 5-10% per annum. Regionally, in 2021, the east coast population in Algoa Bay met the IUCN Red Listing criteria for Critically Endangered status and the population on the west coast is predicted to be functionally extinct by 2030. Urgent conservation action is required to stem this decline. This conservation action must take the form of addressing the primary threats to the species, of which reduced availability of food ranks as number 1.
2. The final CAFMLR compromise proposal does not address the Minister's concerns about arresting the decline of African Penguins. It does not meet any of the criteria (see Appendix 1 for more details) stipulated by the Conservation Sector Group (CSG) for a biologically sensible compromise and, as such, the final recommendation is viewed as insufficient to make a meaningful difference to alleviate resource competition around important African Penguin colonies.
3. The CAFMLR process was flawed on several accounts (see Appendix 2 for more details) including the following weaknesses:
    a. The final recommendation submitted to the Minister was developed based on a lack of transparent socio-economic data on the actual replacement costs to the fisheries sector resulting from fishing closure periods during the Island Closure Experiment (this despite numerous requests for the submission of this information by the CSG).
    b. The CAFMLR proposal was informed by a compromise metric initially proposed by the Fisheries Sector Group (FSG), and not agreed to by the CSG. This shifted the decision space in favour of lower perceived costs to the fishing industry while preventing the CSG from achieving important biological considerations set out to guide a meaningful outcome for African Penguins.
    c. The constitution of the CAFMLR membership, while including fisheries scientist expertise, did not include seabird scientists which resulted in an unbalanced assessment of both the merits of the science of the Island Closure Experiment and the subsequent adjudication of a balanced compromise position.
4. The CSG recognises that the most recent updated peer-reviewed science on the results of the Island Closure Experiment demonstrates a biologically meaningful effect of island closures on population level impacts of African Penguins which will reduce the current population decline by up to 20% per annum.
5. **Proposed way forward:** to the extent that there remains dispute between the scientists from the FSG and the CSG, we would like to emphasise that, where there are threats of serious or irreversible damage (as there clearly are in this instance), lack of scientific certainty by all parties should not be used to delay conservation action. South African law stipulates the application of the Precautionary Principle in these instances and to this end, considering the dire and declining

status of the African Penguin, we recommend that all six colonies be afforded 100% marine Important Bird Area (mIBA) protection consistent with our original position at the end of the Extended Task Team process.

6. We recommend that the appropriate mechanism be activated through DFFE to source the actual socioeconomic costs from industry of the closures that took place over the 13 year period from 2008-2020 so that a clearer understanding of the real (not modelled) economic cost of closures be calculated so that a real compromise can be found.

Background on processes to date

The Extended Task Team (ETT) was commissioned by the Department of Forestry, Fisheries and the Environment (DFFE) to engage two stakeholder groups, the Conservation Sector Group (CSG) and the Fisheries Sector Group (FSG), to identify suitable fishing closure areas for African Penguins while minimising costs to industry. This process concluded in 2021 with no consensus and different recommendations from both the CSG and FSG. This was followed by the initiation by DFFE of a Consultative Advisory Forum for Marine Living Resources (CAFMLR) process with the aim of finding an agreement on island closure delineations by the two sectors. The CAFMLR process concluded in March 2022 with no consensus position on island closures. The CAFMLR submitted a report to the Minister without affording stakeholders in the CSG the opportunity to review the content of the final report, including their interpretations of the proceedings and their recommendations. This is not in the spirit of the CAFMLR and its purpose.

Outcome of ETT

This process was limited by different perceptions of the primary objectives of the ETT engagement process. The CSG recommended the closure of mIBAs around the last remaining large and mostly unprotected African Penguin colonies at six sites. The CSG stipulated that, if this recommendation was not accepted by government, the most representative delineation proposals by DFFE, i.e. those with the greatest mIBA coverage could potentially be used, but with several associated conditions to alleviate fishing in the unprotected mIBA extents. The CSG made it clear that this was sub-optimal to full mIBA protection and may not adequately address the decline in African Penguin colonies. Requests were made by the CSG for access to the data on the socio-economic costs of island closure to fishing during the Island Closure Experiment to assess the realistic replacement cost potential due to proposed closure extents. This was not provided. The CSG requested that innovative and proactive solutions to reduce resource competition around Stony Point and Dyer Island, a region that absorbs ~80% of sardine catch west of Cape Agulhas, be discussed, such as vessel size specific spatial management of catches and the implementation of buffer areas to reduce fishing pressure on the boundaries of the closed area, i.e. to minimise fishing the line effects and to ensure minimum impact of closures to the local fishing industry located at Gansbaai. These potential solutions were not discussed and not included in the final presentation to the Minister.

Outcome of CAFMLR

The final CAFMLR compromise proposal (Appendix 1) did not meet any of the criteria stipulated by the CSG to guide a biologically sensible compromise and, as such, the final recommendation is viewed as insufficient to make a meaningful difference to alleviate resource competition around important African Penguin colonies. During the CAFMLR proceedings various compromise proposals were explored by both the CSG and FSG but were subsequently not considered and/or

mis-represented by the CAFMLR under new disputed rules governing a compromise position and the use of a 'fair metric'. A formal objection to this decision was submitted to the CAFMLR (Appendix 3); the CSG subsequently stated in the final CAFMLR meeting that perceived CSG compromise positions were not an accurate reflection of our position. Given the aforesaid limitations and procedural flaws, the CSG position remains consistent with our proposal at the end of the ETT process, i.e. that 100% mIBA protection be implemented around the last remaining unprotected African Penguin colonies with > 1000 breeding pairs (Dassen, Robben, Dyer, St Croix and Bird islands and Stony Point) for a minimum of five years before being reviewed.

Proposed way forward

1. Recognising that the African Penguin is in crisis and that the results of the Island Closure Experiment demonstrate significant benefits of island closures to African Penguin populations, urgent action is required to reduce resource competition around the last remaining large colonies that have the lowest extinction probabilities.
2. Emphasising that to the extent that there remains dispute amongst scientists, where there are threats of serious or irreversible damage (as there clearly are in this instance), lack of scientific certainty should not be used to delay conservation action. This Precautionary Principle is well-recognised in South Africa's international commitments, and is embedded in the national environmental management principles articulated by section 2 of the National Environmental Management Act and sections 2 a,b,c and f of the Marine Living Resources Act.
3. Considering the above and the procedural flaws with the CAFMLR process, the CSG recommends that 100% mIBA protection be implemented around the last remaining unprotected African Penguin colonies.
4. In order to facilitate a robust and balanced evaluation of the impacts of longer-term island closures on African Penguin population performance and, in order to avoid unnecessary and protracted scientific discourse as was the case with the Island Closure Experiment, an agreed analysis framework should be developed and implemented. Experience to-date should guide the necessary framework and sample sizes. The analysis framework should be internationally peer-reviewed prior to implementation and all data must be made available to all stakeholders.
5. As a Contracting Party to the Agreement on the Conservation of African-Eurasian Migratory Waterbirds (AEWA), South Africa has committed internationally to conserving the African Penguin. We draw your attention to the Implementation Review Process (IRP) established by this treaty's Meeting of the Parties to address incidents of adverse (or potentially adverse) effects on AEWA species as a result of human activities (https://www.unep-aewa.org/en/activities/irp). The IRP is a process to assist states' implementation of AEWA and may include an advisory mission to (i) assess the impacts of an activity on AEWA species and (ii) make recommendations about how to prevent or mitigate these impacts. Given the disputes between stakeholders regarding island closures, we urge you to consider approaching the AEWA Secretariat with a view to using this mechanism to elicit objective, expert advice on how to proceed in a manner that ensures South Africa's compliance with this Agreement and prevents the potential extinction of the African Penguin.
6. Mechanisms exist within DFFE to access the required socioeconomic costs from industry of the closures that took place over the 13-year period from 2008-2020. These should be followed so that a clearer understanding of the real (not modelled) economic cost of closures be calculated.

Appendix 1. Biological criteria and colony specific delineation assessments

CSG recommended criteria and information needed to guide compromise decisions

During the ETT process the CSG proposed the use of an internationally recognised scientific methodology to identify the core utilisation areas of African Penguins, marine Important Bird Areas (mIBAs). The mIBA extents do not represent the entire foraging ranges of African Penguins and are considered a compromise position in terms of allocating the smallest area necessary for African penguins, i.e. their core habitat utilisation while breeding. To facilitate a mutually beneficial compromise during the CAFMLR process both in terms of identifying a biologically meaningful outcome for African Penguins while minimising the costs to the fishing industry, during the deliberations the CSG submitted guiding principles and information needed to help achieve this aim, notably:

1. Emphasising meaningful representation of the mIBA extents in each of the three regions: (a) West Coast (Dassen and Robben islands), (b) South Coast (Dyer Island and Stony Point), and (c) East Coast (St Croix and Bird islands).
2. Prioritising colonies with the highest population recovery potential using historical population numbers and current nest carrying capacities.
3. To facilitate monitoring and evaluation potential, ensuring that full mIBA coverage is realised in at least one colony that has been subject to appreciable fishing pressure, i.e. to gauge the full longer term recovery potential of closures to fishing.
4. The submission of socio-economic costs to industry during closed periods to fishing during the Island Closure Experiment to assess replacement costs potential of island closures.

Colony-specific comments on CAFMLR proposal

With reference to the maps herewith, we have the following comments on each proposed closure delineation:

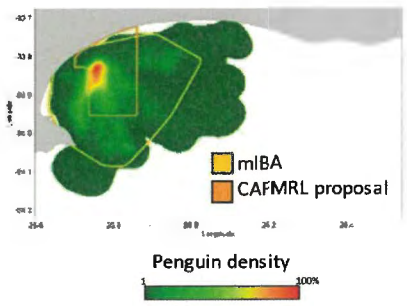
1. Bird Island – this proposed closure extent has the largest proportion (93%) of mIBA coverage but has experienced very low levels of fishing to date affording it little value for evaluation of the impacts of closures on reducing resource competition.
2. St Croix Island, Stony Point, Dyer Island and Robben Island – these colonies have < 42% mIBA coverage affording them little protection against resource competition and providing very little value in terms of evaluating the impacts of closures on benefits to penguins.
3. Dassen Island – this proposed closure covers 84% of the mIBA but with a significant portion to the north of the mIBA that is open to fishing. Given that breeding African Penguins forage on anchovy recruits that migrate southwards during the chick-rearing period, intensive fishing in the northern zone will likely have negative downstream effects providing little alleviation of resource competition for these birds during the breeding season. As with all the other site proposals, this delineation will have very little evaluation potential.

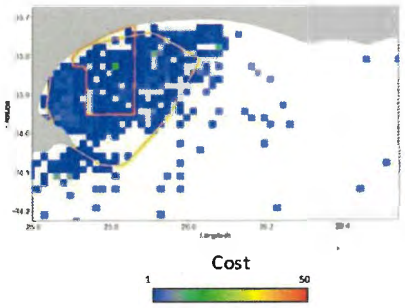
MK Apl

Maps: The following maps include the foraging ranges of breeding African Penguins (full coloured polygons), the marine Important Bird Area (mIBA) extents (yellow outline), the CAFMLR proposed closure extents (orange outline) and the corresponding fisheries cost layer.

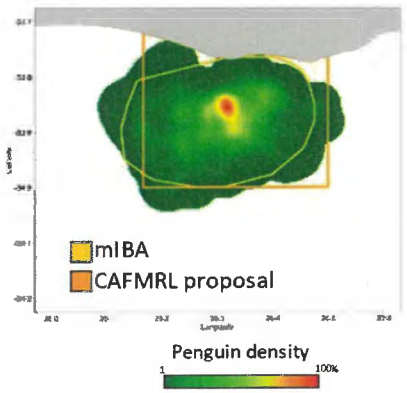
The latter represents the distribution of anchovy and sardine catches during years open to fishing between 2011 and 2020 and do not reflect replacement catch potential during closed years. The cost layer was used to represent the cost to the small pelagic fishing industry if a planning unit is selected as a closed area for penguins (Fig. 1). The costs layer was based on the on the percentage contributions to regional weighted catch (i.e. the fleet was split into western, southern and eastern sections) for the period 2011 to 2019. The values used were the average values for fished years in each region (to avoid the impacts of closed periods). Sardine catches were weighted 5x that of anchovy. The coloured squares indicate where fishing has taken place during this time period, the white areas are where no fishing activity has been recorded during this time frame.

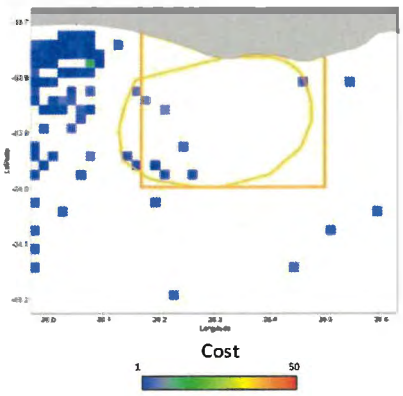
St Croix Island



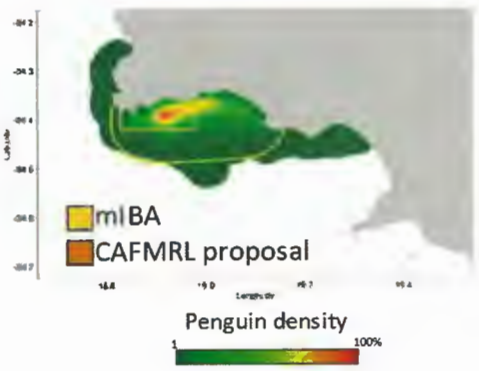


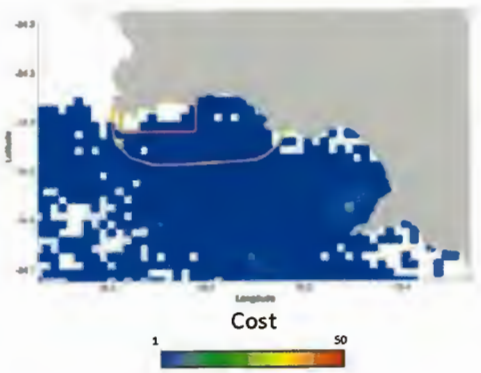
Bird Island



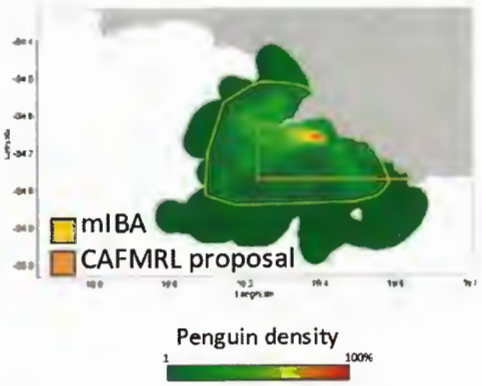


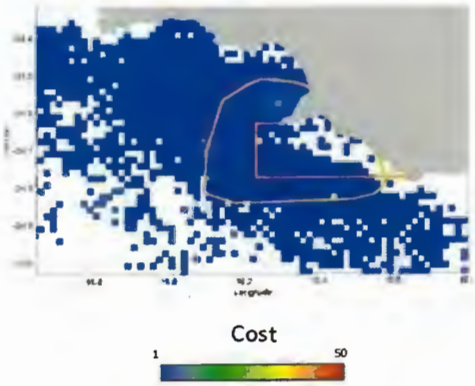
Stony Point



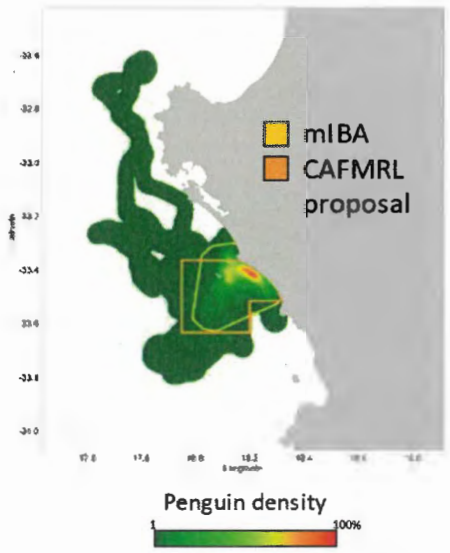


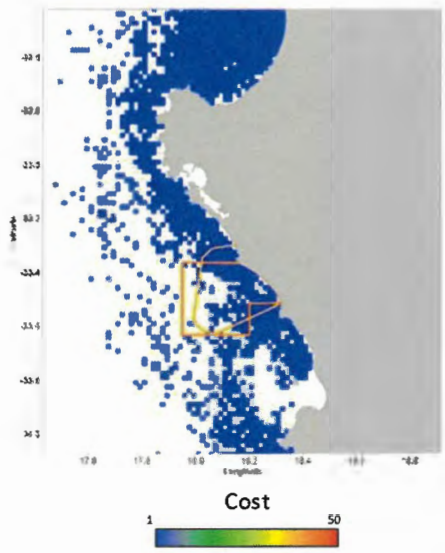
Dyer Island



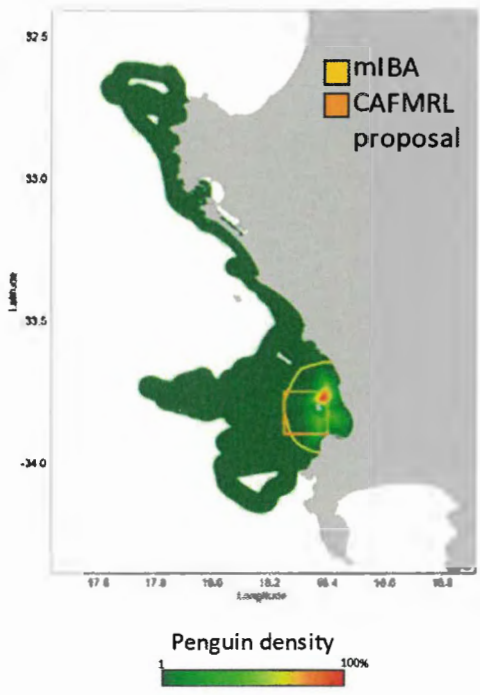


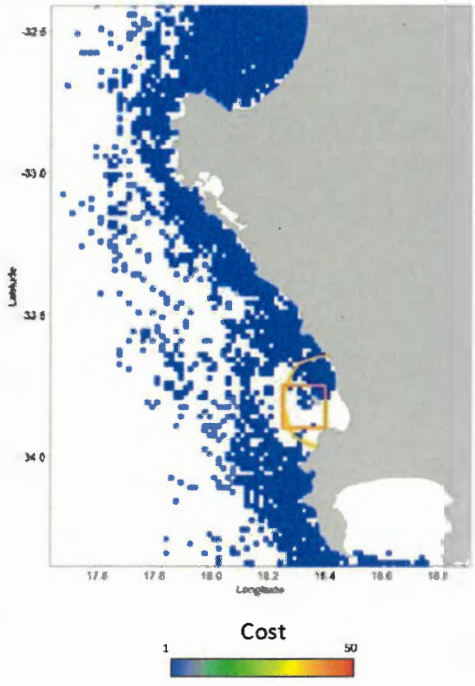
Dassen Island





Robben Island





Appendix 2: Process concerns.

1. The CAF's recommendation is a compromise submitted based on a lack of representative socio-economic information on actual replacement costs to the fisheries sector determined from closed periods to fishing during the Island Closure Experiment – this despite numerous requests for the submission of this information by the CSG.
    a. Had descriptive statistics by company per year (at sea and land) in terms of the cost/profit per year, as well as job losses per year been provided, we could have evaluated the real cost to industry of closures.
    b. In the absence of this information, and in an attempt to understand the industry concerns more, the CSG conducted a desktop study of one of the biggest companies operating on the west coast, Oceana. A review of their integrated reports from 2008 – 2020 did not mention any risks attributed to island closures, nor of profit or job losses as a result of closures (See Appendix 3 Figure 1 and Table 2).
    c. Decoupling the economic cost to industry of the depleted sardine stock on the west coast versus the cost of closures is critical. It is essential that closures be placed in context in terms of the economic impact of the collapse of the sardine stock on the west coast during years of closures.
    d. Industry has presented to CAF that there has been a reduction of about 30 vessels in the fleet since 2008 and that there has been a total of four processing plants that have been closed that has resulted in a loss of almost 1000 seagoing and land-based jobs. We don't dispute these figures but would add that the context of these figures should be considered. Sardine TAC has reduced during this time period from about 100,000 t to a low of 12,000 t which would likely be the main reason for the vessel reduction. Furthermore, if the processing plants were canneries then the depleted sardine resource would also have a major impact. Despite these reductions provided by industry it cannot be argued to be mainly attributed to island closures but should be considered in terms of the depleted state of the sardine resource. These trends were also observed in the Namibian small pelagic fishery which after much calling by scientists for the fishery to close over a period of 20 years it was only closed in 2018 and still remains closed to this day. Penguins and other seabirds are telling us there is something very wrong with the southern Benguela ecosystem and if we don't act decisively we too will follow the fate of the Namibian fishery with devastating consequences to the ecosystem and industry.
2. The CAFMLR proposal was informed by a compromise metric initially proposed by the Fisheries Sector Group (FSG) that shifted the decision space in favour of lower perceived costs to the fishing industry while preventing the CSG from achieving important biological considerations set out to guide a meaningful outcome for African Penguins.
    a. The introduction of MARXAN as a decision support tool was extremely valuable in this process. It was however, not used to its full potential. Given that the CAF imposed the 300% metric, MARXAN was limited in its use as evidenced by the trade-off curve below (Figure 1) where the restricted decision space was shifted to the left of the plot, favouring one stakeholder inputs over the other.
    b. The CSG repeatedly stated that this metric was not a fair compromise in terms of evaluating closure cost to industry versus benefit to penguins and adequate protection for penguins could not be made within these imposed limitations. Suggestions were submitted to address this (See Appendix 2), but not taken into account in the final delineation compromise.

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c. Four of the colonies have MPAs adjacent to them of various sizes. The CAF requested that the CSG provide a proposal that included the MPA extent contained in the MIBAs in their 300% calculation. These MPAs accounted for 105% of the 300% mIBA metric that the CSG had to work with, further limiting the CSG in terms of the mIBA proportions they could allocate to different islands and ensuring adequate protection. In order to do this, the CSG had no choice but to effectively withdraw from St Croix, Stony Point and Robben Island, in order to give meaningful protection to Dassen and some to Dyer Islands (See Appendix 3, Table 1, Column '300mIBA - incl. MPAs'). Despite having stated that the CSG did not agree with the metric, the design space has been deliniated by CAF within the blue circle in Figure 1. It implies support by the CSG of this metric through including the 'Conservation Z' proposal (300mIBA - incl. MPAs), but the CSG do not support this metric as a fair compromise.

d. The cost layer used in the trad-off curve (Figure 1) does not take into account the replacement costs, averaging the cost over the whole ICE period. It thus does not differentiate the cost between open and closed years, the analyses of which is needed to assess the real cost. If we had more time, this process could have been improved on as we built on our learning and the process would have reflected rea costs more accurately.

3. The constitution of the CAFMLR membership, while including fisheries scientist expertise, did not include seabird scientists which resulted in an unbalanced assessment of both the merits of the science of the Island Closure Experiment and the subsequent adjudication of a balanced compromise position. Some examples of this lack of representivity influenced the process and subsequent recommendations from the CAF include the following:

   a. With no formal ToR adopted and circulated, a substantial amount of time was spent discussing the merit of closures, as opposed to the actual boundaries themselves. While the CAF stated a number of times that they were not a scientific forum and did not have the expertise to evaluate the merit of closures or the ICE results, much time was in fact spent discussing the merits of closures and ICE results.

   b. The CSG requested on numerous occasions to focus discussion on closure boundaries, as well as innovative and proactive mechanisms to reduce resource competition, including (but not limited to) buffers to mediate against fishing the line on closure boundaries and spatial management of the fleet to reduce closure impact to the local fishing industry at Gansbaai. These were never discussed in practical detail.

   c. During numerous meetings, some CAF members repeatedly stated that closures have negligible to little benefit for penguins based on the science available. There is no published, peer-reviewed work that provides evidence that demonstrates negligible impact of closures on penguins, only to the contrary. The constant reference to ICE results in reinforcing this belief was/is a concern. This is an incorrect biological interpretation of the published results and has influenced the CAF recommendation.

   d. There is intense academic debate on ICE analyses, and it was confirmed at the very last CAF meeting held on 8th March 2022 that some CAF members had access to a currently embargoed opinion piece which is a rebuttal against the latest published work by that confirms the biological meaningful benefit of closures. The editor is giving the authors to which this rebuttal is aimed the opportunity to reply and both pieces will be published together. That CAF had access to the embargoed piece should have been disclosed by CAF members at the outset of this process. CAF denied that access to this unpublished piece, or the published document to which it refers had had influence on their decision, yet they made reference to it during proceedings and continued to verbalise that closures do not have significant benefit to penguins. It

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was also confirmed during the SWG-PEL on 16 March 2022 that a CAF member had approached an author of this rebuttal paper, on behalf of the CAF, for this paper to be sent to them.

e. While the CSG highlighted other published work that indicated benefit of closures, only the ICE results were discussed in detail (despite the confirmation from the CAF that they were not there to adjudicate the science). CAF members indicated that they had read wider and consulted seabird expert friends, but it was not made clear if these consulted experts were familiar with life-history traits of the African Penguin, and how this influences closure design and longevity required.

f. CAF displayed a population trend graph placing the benefit of closures, in their opinion, in the 'bigger picture,' indicating that they provide marginal benefits to benefits to penguins. This was clear bias demonstrated by CAF clearly indicating that they are of the opinion that the benefit of closures are negligible. This is important since ICE results have shown that closures have contributed to arresting the population decline by 20% annually - a hugely significant number in biological terms.

g. Penguin biological considerations not taken into account

    i. The CSG also constantly reminded the CAF that the original ICE design was flawed, in both extent, longevity and population parameters assessed. Recommendations made by Dr Rob Crawford of the Department were not taken on board to the detriment of the ICE experiment. This included his recommendations on the size of closures required as well as penguin biological parameters that needed to be assessed. The impact of this poor closure design was confirmed by an international external reviewer with 30 years expertise in penguin and other top predator foraging behaviour and predator-prey interactions. Evidence was also provided by BirdLife South Africa on the use of the mIBAs by non-breeding penguins during the period of pre and post moult – periods in their life history where they are energetically vulnerable and need readily available access to fish. Thus the actual benefit of closures is likely to be far greater than that currently reported. The CSG emphasised that the CAF take these recommendations into account, that seabird biological advice not be ignored again, and that it was critical that lessons learnt from ICE be taken on board going forward.

h. The calculation of the Marine Important Bird Areas (MIBAs) is a scientific method that has been calculated to identify the minimum core areas utlised by foraging seabirds. CAF do not recognise that this is a minimum core area stating that "they do not accept 100% is meaningful and that anything else is less" (CAF member 8 March 2022). The recommendations of CAF are reflective of this belief. Furthermore, the CS repeatedly requested that 100% MIBA be given to Dassen Island as it is essential that a baseline be provided to monitor this. The recommendations have denied the opportunity to test the 100% MIBA as a baseline or provide meaningful benefits to the other colonies at Robben Island, Stony Point, Dyer Island and St Croix Island.

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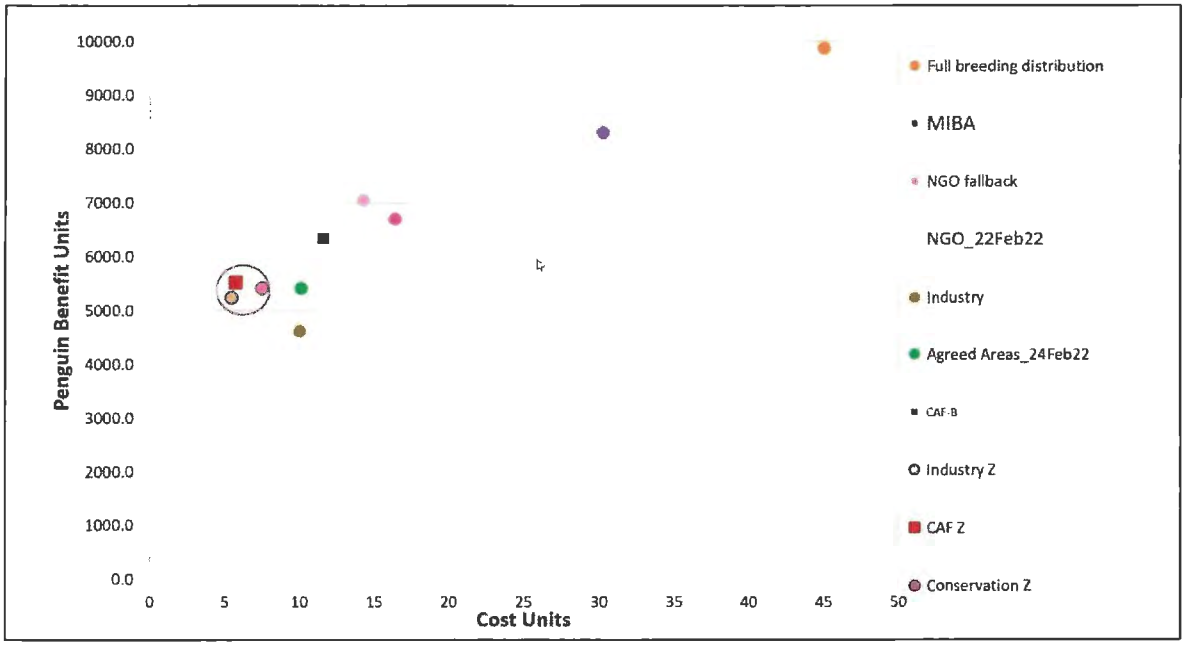

Figure 1: Trade off Curve used by CAF to make their recommendation. The blue circle indicates the decision space that CAF deliniated using the metric imposed by them onto the observers

Some other concerns to note:

1. No Terms of Reference – The CSG was led to believe that both the ETT and CAF were tasked by the Minister to deal with trying to get consensus on boundaries of closures around the islands. For both processes, no formal ToR was circulated or adopted, so substantial time was spent during both processes discussing the African Penguin BMP; other threats as well as debating the science on the merit of closures (but limited only to ICE results).
2. Rushed process
    a. The ETT never came to a conclusion, and stakeholders were not informed as to where this process was at. Much time was spent discussing the merit of closures, ICE results and other conservation actions required. Very early on in CAF it was clear that boundaries proposed by Industry and CSG were not aligned. One CAF member made a proactive recommendation to use MARXAN as a decision support tool. This was a valuable process. However, the full benefit of this process was rushed due to time constraints and there was little time for recourse and engaging for a mutually beneficial outcome. Had this process been given more time, possibly another month where the cost layer refined, the results and recommendation by CAF may have been different.
3. No fisheries management representative in this process
    a. During the ETT and again at CAF, the CSG requested that fisheries management representation be, included, as this would have added valuable fishery management advice and expertise into practical management options that could be explored with industry. This was not taken up during both processes.
4. Stakeholder Engagement
    a. Both the ETT and the CAF have reinforced an "us vs them approach", with industry and the NGO representatives of the Conservation Sector pitted against each other. The CSG includes SANParks and CapeNature, and seabird scientists from Oceans and Coasts. who

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all share the same view. Furthermore, stakeholders from the tourism sector have been excluded from these deliberations, and this is most certainly a flaw in this process.

Appendix 3. Report submitted to the CAFMR members on 7 March 2022 in response to the adoption of the 300% mIBA compromise metric.

Conservation Sector Group (CSG) concerns regarding recent developments in the CAFMLR deliberations on proposed island closures compromise metrics and recommendations for a more balanced approach.

7 March 2022

Dear CAFMLR members

We would like to reflect on decisions taken at the CAFMLR meeting held on 3 March 2022 which will have a considerable bearing on an imminent compromise position on the delineation of no-take areas to fishing around important African Penguin colonies:

The CAFMLR presented a metric to limit the compromise extent of closure delineations to 50% of the six marine Important Bird Area (mIBA) extents, i.e. 300% of the 600% mIBA spatial extents around the last remaining six African Penguin colonies with > 1000 pairs. This metric was initially proposed by the Fishing Industry sector in their bilateral meeting with the CSG on 22 February 2022 and was subsequently disputed by CSG representatives at that meeting and in subsequent email correspondence with CAFMLR members. The CSG has the following concerns regarding this compromise method:

1. **The metric relies on a scale (or currency) determined by the mIBA extents.** The mIBA extents do not represent the entire foraging ranges of African Penguins and are considered a compromise position in terms of allocating the smallest area necessary for African Penguins, i.e. their core habitat utilisation while breeding (ETT-CSG, 20211102). By setting the compromise limit to half of this area without any substantive rationale for this approach is unreasonable given that this area is already a compromise position.
2. **Costs of proposed closure extents to the purse-seine fishery not factored into compromise metric.** This is a crucial aspect that should be included in the compromise method used to assess and compare different cost-benefit scenarios to penguins and fisheries. The cost-benefit trade-off curve which utilised indices extracted from the MARXAN approach to guide a more balanced compromise was not considered for evaluation of proposals during the CAFMLR proceedings on 3 March 2022 – this despite numerous requests by participants to assess these. Although this trade-off curve is useful in principle, we note that the costs to fishing reflect the distribution of catches during years open to fishing during the Island Closure Experiment (ICE) but do not represent the replacement cost potential during closed years. Despite having requested information on company performance and employment numbers during open and closed years to fishing during the ICE from the Fishing Industry sector on numerous occasions during both this process and the Extended Task Team process, this data is still not forthcoming. To date, including the recent submission by SAPFIA (SAPFIA 2022), submissions of these perceived costs rely heavily on an opportunity model developed by Bergh et al. (2016). In the absence of this information, and in a genuine attempt to understand the real costs of closures to industry, we have assessed the annual financial and performance of the relevant small pelagic fisheries sector of Oceana (Oceana 2022) - one of the largest rights holders of small pelagic fish in South Africa - during the ICE period which show a general increase in revenue and operating profit over this period with no indication of losses to profits and employment numbers accredited to closed periods of fishing (Table 2, Figure 1). We do acknowledge that industry was, in good faith, participating in the Island Closure Experiment.

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There is, however, no mention of potential or real impacts of island closures to their performance in their risk profiles in any of the integrated reports that we have assessed (2004 – 2020). While we acknowledge that these results are a sample of the fishing sector, they are nonetheless indicative of performance that is incongruous with the costs that have been perceived to be attributed to closures by the Fishing Industry sector to date.

3. **Inclusion of MPAs into 300% mIBA tally limits ability for seabird scientists to meet their criteria for a biologically sensible option.** The choice to include MPA extents into the 300% cap on the compromise extent further places significant limits on the conservation sector's ability to achieve a meaningful compromise aligned to the biological criteria guiding their selection (Table 1). Portions of MPAs are found at 4 of the 6 islands under consideration for closure with a range of mIBA overlaps: Robben Island (41% of mIBA), Stony Point (5% of mIBA), St Croix Island (15% of mIBA) and Bird Island (44% of mIBA). To consolidate our 300% mIBA allocation to optimise greater coverage at certain localities we would be forced to allocate these to islands with appreciable MPA coverage. While this can meet our criteria for greater mIBA coverage it prevents us from achieving other important biological criteria, e.g. regional representation, population recovery potential and evaluation and monitoring potential (Table 1).

Proposed way forward

The Conservation sector strongly urges the CAFMLR members to build and reflect on the experiences gained during the CAFMLR processes to date which will allow the CAFMLR members to adopt a more balanced approach to guide compromised positions for penguins and fisheries. The following are some recommendations that can help the CAFMLR achieve this:

1. Development of a mutually acceptable compromise method that clearly articulates factors that need to be considered in development of compromise positions.
2. This method should include representative costs layers including replacement fishing cost potential which can be achieved by:
    a. Sourcing information from the fishing industry on costs and employment numbers affected during the ICE and using these figures to inform relative costs to each island closure.
    b. Replacing the existing MARXAN cost layer (which excludes replacement cost potential by only using open years to fishing) with all years used in this assessment, i.e. averaging the costs over open and closed years.
3. Provide updated cost information including spatial layers to stakeholders to inform revised compromise positions.
4. Plot these new positions on the trade-off curve for further discussion and hopefully consensus. If a consensus cannot be achieved then the CAFML members can propose a position utilising the trade-off curve to rationalise their decision.

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Table 1. Comparison of different island closure compromise scenarios to achieve biological and fisheries cost criteria used by the CSG. The scenarios are ranked by their potential (low – high) of achieving these criteria. Scenarios: 600mIBA – original CSG sector proposal; CSG_20220220 – compromise proposal submitted during CAFMLR process; 300% mIBA incl. MPAs - method stipulated by CAFMLR which includes extents of MPAs into the 300% mIBA tally; 300% mIBA excl. MPAs - method stipulated by CAFMLR but excluding extents of MPAs into the 300% mIBA tally; Proposed new method with updated costs – mutually accepted method.

Criteria to evaluate compromise	600mIBA	CSG_20220220	300mIBA - incl. MPAs	300mIBA excl. MPAs	Proposed new method with updated costs
Dassen	100	89	100	100	?
Robben	100	41	41	41	
Stony Point	100	5	5	5	
Dyer Island	100	55 + 38*	46	80	
St Croix	100	55	15	15	
Bird	100	100	93	93	
Regional representation	high	med-high	Low	med-high	?
Population recovery potential	high	medium	Low	low-med	?
Evaluation and monitoring potential	high	medium	Medium	medium	?
Inclusion of relevant fisheries costs in assessment	low	low	Low	low	high
Relative mIBA coverage potential	high	low	Low	low	?

*split zone with 55% mIBA no-take and 38% mIBA reduced fishing

We note that extensive deliberations in both the ETT and CAFMLR processes to date have brought to light hitherto important considerations for assessing and deliberating on optimal solutions to achieve

our ultimate objective of providing suitable benefits to penguins while minimising costs to industry. We hope that the CAFMLR members acknowledge our concerns regarding this pivotal stage in the process and seriously consider our proposed way forward to achieve our ultimate objective.

Your sincerely

Dr Alistair McInnes, BirdLife South Africa
Dr Lauren Waller, SANCCOB/EWT
Craig Smith, WWF-SA

References

Bergh Mike, Philippe Lallemand, Tyler Donaldson and Kobus Leach. 2016. The economic impact of West Coast penguin island closures on the pelagic fishing industry.

ETT-CSG, 20211102 – Extended Task Team: African Penguin Island Closures – Conservation Stakeholder Synthesis Report. 2 November 2021.

Oceana 2022. Data extracted from 2007 – 2020 reports from https://oceana.co.za/investors/

SAPFIA 2022 – Estimated socio-economic impact of island closures. SAPFIA report submitted to CAFMLR on 2 March 2022.

Table 2. Synthesis of profits and employment numbers (where available) from annual financial statements from Oceana: extracted from financial statements in https://oceana.co.za/investors/.

Year	Revenue inshore fishing	Operating profit before abnormal items (inshore fishing)	Direct employees
2007	R 1 409 041 000	R 105 862 000	
2008	R 1 879 711 000	R 164 345 000	
2009	R 2 142 497 000	R 165 451 000	
2010	R 2 280 069 000	R 211 060 000	
2011	R 2 268 296 000	R 185 160 000	
2012	R 2 582 636 000	R 318 941 000	1342
2013	R 2 657 106 000	R 219 646 000	1446
2014	R 3 086 476 000	R 380 931 000	1420
2015	R 3 408 988 000	R 452 504 000	
2016	R 4 275 576 000	R 528 464 000	
2017	R 3 768 707 000	R 288 223 000	
2018	R 4 054 601 000	R 436 710 000	
2019	R 4 038 540 000	R 436 298 000	
2020	R 4 471 836 000	R 536 130 000	

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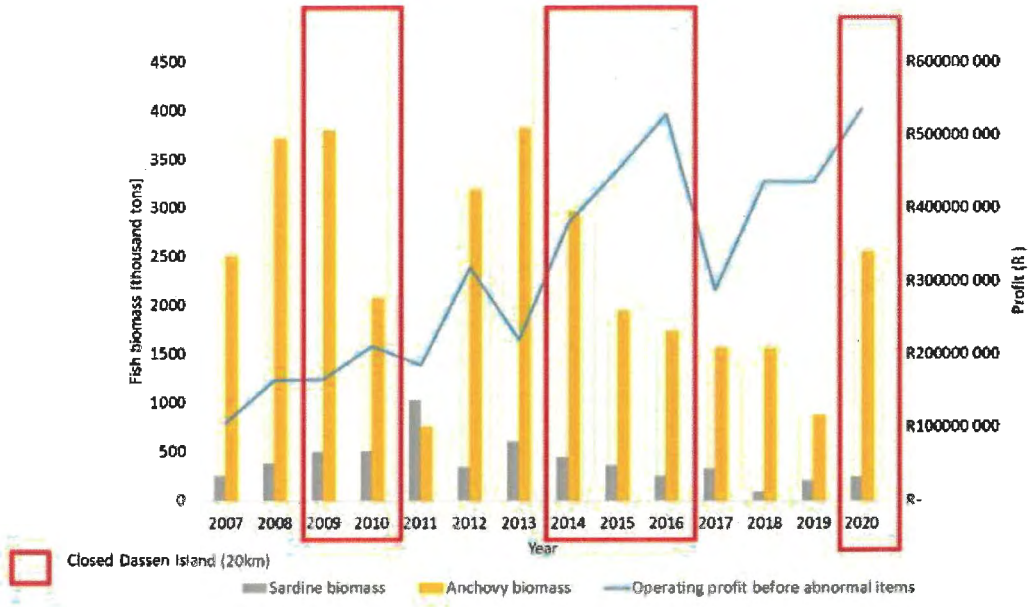
Figure 1. Operating profit of Oceana in the context of sardine and anchovy biomass variability and Dassen Island closed periods during ICE.



"AM30"

Subject: Island closures

From: Mark Anderson <ceo@birdlife.org.za>
Sent: Wednesday, April 6, 2022 8:04 AM
To: Du Plessis, Morne <mduplessis@wwf.org.za>; Yolan Friedmann <yolanf@ewt.org.za>; Natalie Maskell <Natalie@sanccob.co.za>; Alistair McInnes <alistair.mcinnes@birdlife.org.za>; Lauren Waller <LaurenW@ewt.org.za>; Smith, Craig <csmith@wwf.org.za>
Subject: Island closures

Dear colleagues

I met with Minister Creecy for 2 h 35 min yesterday! We chatted at length about the island closures, as well a range of other topics. In very brief summary:

- The fisheries sector is unlikely to accept the CAF recommendations. They will apparently not respond formally to the Minister, but they have requested to the Minister that there's an international review of the CAF recommendations.
- The Minister suggested that Morné and I have a face-to-face meeting with Mike Copeland asap, and that we try and find a compromised way forward. In her words, "we should try and find each other".
- She warned about us continuing to use the science "argument", as the dispute between our scientists and the fisheries scientists will not be easily resolved.
- She will release the CAP recommendations (together with the Penguin Biodiversity Management Plan, which she says still needs work) for public comments after Easter.
- Minister Creecy is very concerned, in particular, about "small-scale fishers" (is this what they are called?) in the Eastern Cape and them potentially being impacted by a larger closure around St Croix. She said that, for example, the fishers (and their families) could have "mass demonstrations" and this would not be good for our cause. She said that there are at least 1000 jobs at stake and that this is at a time, post COVID, where jobs cannot be sacrificed.
- I am not sure whether she has her information correct about small-scale fishers around St Croix, and maybe Craig, Lauren and Alistair can advise. She said that they fish there because it is safe (calm seas) and that it is a rich fishing area.
- She also spoke about us considering more flexibility in terms of opening/closing the areas around the colonies to fishing (i.e. seasonal closures).
- I mentioned to her that WWF-SA is engaging with retailers, and it was clearly something she did not know they were doing. It seemed to catch her by surprise and she seemed concerned that this was something that was being discussed. Later in our discussion she said that there could be benefits of a "penguin-friendly logo" on Lucky Star pilchards.
- She's clearly in a very difficult predicament, and she'd like to avoid the matter going to court. She says that the fishing industry has deep pockets and that a legal process could delay the closures by years.
- There's concern that if (a) we return to negotiations and/or (b) we go to the courts, we will not have fishing closures for several years (and that would not be good for penguins)

As per Minister Creecy's request, I reached out to Mike Copeland (Chairman of the South African Pelagic Fishing Industry Association) and had a 30 min telephone discussion with him on Monday night. In summary:

- He did not attend the Fisheries meeting with the Minister last Friday, as he was out of the country.
- The Fisheries sector is not happy with the CAF recommendations and will not accept them.
- I asked him "how 'we' can help penguins?" and he said (a) the fishing effect is small and (b) we have not explored other reasons for the decline (such as predators, competition for food, and "habitat" issues). I did not debate this with him.

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- When I asked him about the socio-economic impacts of the previous closures, he said that the information had been provided to the processes (I assume he meant both ETT and CAF). I did not debate this with him.
- He believes that the data and analyses of the data show that the previous island closures show that there's only a small benefit to the penguins. Again, I did not debate this with him.
- He likes the idea of an international review, which I assume means reviewing more than the CAF recommendations (but also the results of the island closure experiment).
- One of his main concerns is the SSMEs in Algoa Bay who would been impacted by island closures (around St Croix). He said that they are only involved in catching fish, have small rights and are not involved in the entire value chain (as are large companies).

Minister Creecy recommended that Morné and I have a meeting with Mike Copeland, and this will now happen (over lunch in Cape Town) on Wednesday 13 April. A fourth person, Rideau DeMaine, who apparently represents the SSMEs in the Eastern Cape, will attend this meeting.

Ultimately, it is my opinion that we will not win our argument using science (i.e. the results of the island closure experiments). It is also my concern that further extended negotiations and/or litigation will only stall the process, perhaps by years. The penguins can ill afford several years without island closures. This may mean:

- Finding a resolution/compromise (percentage island closures) with Fisheries and their scientists. Probably unlikely?
- Meeting with the CEOs of the major fishing companies, so that they can understand our position/concern.
- Using the retailers to put pressure on the fishing companies. WWF-SA has been doing this and will further expedite the work. I am however concerned that only 10% of the sardines that are canned in SA are locally caught (the rest are imported) and that more than 90% of the anchovy/red eye catch us turned into fish meal and exported. So, it is my understanding that very little of the fish that end up in cans on the shelves of supermarkets in South Africa are locally caught.
- Initiating a massive international awareness campaign (website, petition, etc.)

In preparation for our meeting with Mike Copeland and Rideau DeMaine on Wednesday, can I please request the following (from Alistair, Craig and Lauren):

- Questions that Morné and I could/should ask Mike and Rideau.
- Information about the SSMEs in Algoa Bay (what's the concern, do they have a legitimate argument, etc.).
- What socio-economic data have we been provided with, and why this is inadequate.
- Exactly what socio-economic data we require.
- What we are doing to determine other factors that may be responsible for the decline, papers published on this subject, why we rule out other factors, etc. I know that we are investigating noise, ship traffic, and bunkering in Algoa Bay, but this work is recent and it is confined to the "eastern colonies".

Sorry for the long email, and apologies for my tardy replies/summaries, but this is only one of dozens of things currently on my plate.

Regards
Mark

Mark D. Anderson

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MK

Chief Executive Officer

BirdLife SOUTH AFRICA

Giving Conservation Wings

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Subject: FW: CONSULTATIVE ADVISORY FORUM ON MARINE LIVING RESOURCES (CAFMLR) RECOMMENDATIONS ON THE AFRICAN PENGUIN CRISIS

From: Mark Anderson <ceo@birdlife.org.za>
Sent: Thursday, April 28, 2022 6:46 AM
To: Smith, Craig <csmith@wwf.org.za>; Lauren Waller <LaurenW@ewt.org.za>; Alistair McInnes <alistair.mcinnes@birdlife.org.za>
Subject: FW: CONSULTATIVE ADVISORY FORUM ON MARINE LIVING RESOURCES (CAFMLR) RECOMMENDATIONS ON THE AFRICAN PENGUIN CRISIS

FYI

From: Mark Anderson <ceo@birdlife.org.za>
Sent: Wednesday, 27 April 2022 13:17
To: minister@dffe.gov.za
Cc: fshaik@dffe.gov.za; Du Plessis, Morne <mduplessis@wwf.org.za>; Natalie Maskell <Natalie@sanccob.co.za>; Yolan Friedmann <yolanf@ewt.org.za>
Subject: CONSULTATIVE ADVISORY FORUM ON MARINE LIVING RESOURCES (CAFMLR) RECOMMENDATIONS ON THE AFRICAN PENGUIN CRISIS

Dear Minister Creecy

Please see attached letter for your attention.

Regards
Mark

Mark D. Anderson
Chief Executive Officer

BirdLife SOUTH AFRICA
Giving Conservation Wings

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27 April 2022

Minister Barbara Creecy
Minister of Forestry, Fisheries and the Environment
Private Bag X447
Pretoria
0001

Per e-mail: minister@dffe.gov.za; fshaik@dffe.gov.za

Dear Minister Creecy

CONSULTATIVE ADVISORY FORUM ON MARINE LIVING RESOURCES (CAFMLR) RECOMMENDATIONS ON THE AFRICAN PENGUIN CRISIS

We refer to our meeting with you on 28 March 2022, as well as our letter dated 5 April 2022.

Two of us, Morné du Plessis and Mark Anderson, met with Mike Copeland (Chairman, South African Pelagic Fishing Industry Association) and Redah de Maine (Chairman, Eastern Cape Small Pelagic Association) on 13 April 2022. It was a useful meeting, as it provided an opportunity to further interrogate the fisheries' perspective of the African Penguin crisis.

In essence, they agree that food availability is a critical factor in the precipitous decline of the African Penguin, but dispute that their fishing activities are responsible for any part of this.

The Conservation Sector Group (CSG) has subsequently convened a meeting and proposes the following:

1. As the African Penguin is in a dire position, with its population declining at between 5-10% per annum, we believe that urgent measures are needed to support this embattled species. Therefore, and as the precautionary approach forms a key principle of the Marine Living Resources Act of South Africa (MLRA; Section 2c), we

recommend that you implement interim closures to fishing around all six colonies that support more than 1000 breeding pairs, i.e. Dassen Island, Robben Island, Dyer Island, Stony Point, St Croix Island and Bird Island. These interim closures should be implemented as soon as possible and then revised or reinforced based on the recommendations of an international review by an Independent Panel (see below).

2. As the Fisheries Sector and the Conservation Sector are unable to reach agreement on the way forward, we propose that an independent international review of the CAFMLR's recommendations (and the subsidiary reports that were provided to the CAFMLR proceedings) be undertaken. The panel that undertakes the review can, after evaluating the relevant information, make a recommendation on the future of the island closures. It would be essential for both groups to reach agreement on the Terms of Reference (ToR) for this review, as well as the scientists who will undertake the review, in advance of this work taking place, and to commit (in advance) to abide by the outcome of this process. The ToR should be explicitly framed around the clear objective of implementing meaningful benefits for African Penguins through island closures, while minimising costs to the fishing industry.

As always, we stand ready to provide any further information that might assist you in taking this important matter forward.

Yours sincerely

Mr Mark D. Anderson
Chief Executive Officer
BirdLife South Africa

Mrs Yolan Friedmann
Chief Executive Officer
Endangered Wildlife Trust

Mrs Natalie Maskell
Chief Executive Officer
SANCCOB

Dr Morné du Plessis
Chief Executive Officer
WWF-SA

Subject: Island closures: meeting with Minister Barbara Creecy on 6 May 2022

From: Mark Anderson <ceo@birdlife.org.za>
Sent: Sunday, May 8, 2022 4:36 PM
To: Du Plessis, Morne <mduplessis@wwf.org.za>; Natalie Maskell <Natalie@sanccob.co.za>; Yolan Friedmann <yolanf@ewt.org.za>; Alistair McInnes <alistair.mcinnes@birdlife.org.za>; Smith, Craig <csmith@wwf.org.za>; Lauren Waller <LaurenW@ewt.org.za>
Cc: Driesen, Emelda <edriesen@wwf.org.za>
Subject: Island closures: meeting with Minister Barbara Creecy on 6 May 2022
Importance: High

Dear colleagues

Minister Creecy invited Morné, Natalie, Yolan and me to meet with her on Friday afternoon but, as Morné and Natalie were unavailable, Yolan and I represented the four of us. The meeting was also attended by Shonisani Munzhedzi (CEO of SANBI) and Luthando Dziba (SANParks).

Here follows a brief summary of the meeting (especially see the Minister's request and an urgent meeting request):

Minister Creecy said:

- An immediate (and temporary, i.e. until a longer-term way forward has been determined) closure to fishing around the key colonies is necessary to deal with the rapid decline in the African Penguin population.
- There's concern that the breeding season is already underway.
- The ETT and CAF processes have not delivered recommendations that the two parties find acceptable.
- Fisheries can be litigious, which is not useful.
- The small-scale fishers may demonstrate if closures are implemented which impact on their operations.
- MdP and MDA's meeting with Mike Copeland and Redah de Maine seems to have been useful, as fisheries are more amendable to find a compromise way forward.
- She phoned Mike Copeland and he reiterated his disagreement with our scientific evidence, but indicated that he'd be happy with an international review. He however said that he'd like the Island Closure Experiments and not the CAF recommendations reviewed.
- Mike Copeland expressed concern about limitations on fishing around Dyer Island.
- He stated that they may be happy with a 312/600 way forward (i.e. and not the CAF-recommended 300/600)
- He is happy to discuss the "geography" of closures.
- She's happy to wait a few weeks before putting out the CAF report/recommendations and African Penguin BMP for comment.
- She said that there's a "window of opportunity" to reach an agreement.
- She stated several times that the key words for the closures were "immediate" and "temporary"

We indicated to the meeting that:

- An international, independent panel must be established to review the CAF reports (and the supporting documents that were provided to CAF).
- The precautionary principle needs to be invoked and there needs to be a closure to fishing around the important colonies.
- In terms of the colonies:
    - We are happy for the closures proposed for Robben Island and Bird Island.

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- We can negotiate the area of closure around Stony Point and Dyer Island, especially as these two colonies were not part of the original experiment. We'd also be amendable to negotiate "adaptive management" around these two colonies to give benefit to the local fleet.
- We are concerned about the CAF's recommendations for Dassen and St Croix Islands.
  - Dassen was the biggest colony.
  - The most crucial area has been excluded (i.e. where anchovy recruits move through).

- I reiterated that the MIBAs was already a compromise, as these areas were smaller than 50% of the penguins foraging range.
- I reminded the Minister that St Croix and Dassen should have been closed this year, as part of the Island Closure Experiment).
- We need fisheries to disclose their socio-economic information, and Yolan mentioned that there's a PAIA request.
- Urgent short-term solutions are required, and longer-term, perhaps creative solutions, would be useful.
- We are sympathetic with the small-scale fishers, and that engagement with them is required.

Luthando said:

- There's a window of opportunity to find a compromise.
- "Internal" discussions are needed to determine what trade-off we can accept and take to the fishing industry.
- We need to avoid litigation, as that takes time and uses limited resources.
- We may not end up with an ideal outcome, but one that is "best for conservation and the fishing industry".

Shoni said there's no debate about whether island closures are needed, but there's just debate required about the extent of the boundaries.

On the way forward Minister Creecy asked for the following:

1. Engagement at the "leadership level", i.e. and not between scientists.
2. Shoni Munzhedzi must draft Terms of Reference (and suggested composition) for the independent, international review. I suggested that we only need a small panel, and suggested Prof. Andre Punt (University of Washington) and Dr Phil Trathan (British Antarctic Survey). Andre is a fisheries scientist and Phil is a penguin scientist. Both are familiar with the Island Closure Experiments, the processes to date, ad they reviewed DFFE's "synthesis report". I understand that both the fisheries and conservation sectors had previously been happy with them being reviewers. She said that the panel should also "guide where we want to go in future". Shoni will also need to determine Treasury processes and restrictions for appointing international reviewers. Yolan suggested that we need someone who is a "skilled political negotiator" to facilitate the process.
3. The Conservation Sector Group (and she indicated that we now also need to engage formally with SANBI and SANParks) must meet and come up with a compromise (i.e. minimum closure areas around the colonies that we are prepared to accept). We will need to bear in mind that fisheries will try and negotiate down whatever we put on the table.
4. She wants a solution that she can defend which I believe indicated that she's on our side.

Minister Creecy stated that if there's no alternative on the table (and one that both parties agree on) her only option is to implement the CAF recommendations.

We need to urgently (in the next week) come up with a proposal for 3 (above). Alistair is on leave on Tue, Wed, Thu and Fri, so I suggest that we meet on Mon afternoon/evening. As it is short notice, it may not be possible for all of us to attend. I will send out a Doodle Poll, so please indicate the times that you're available.

Regards
Mark

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Mark D. Anderson
Chief Executive Officer

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From: Mark Anderson
Sent: Friday, 27 May 2022 07:58
To: Yolan Friedmann; Natalie Maskell; Lauren Waller; Smith, Craig; Alistair McInnes
Cc: Du Plessis, Morne; Luthando Dziba
Subject: FW: African Penguins/Island Closures
Attachments: African Penguins_Island Closures_Governance Forum recommendations.docx

Good morning, colleagues

See below, FYI.

I will let you know when we receive a response, which I hope will be favourable.

Regards
Mark

From: Mark Anderson <ceo@birdlife.org.za>
Sent: Friday, 27 May 2022 07:54
To: Mike Copeland <copeland.fishconsult@gmail.com>; Mike van den Heever <mvdh@pioneerfishing.co.za>
Cc: Du Plessis, Morne <mduplessis@wwf.org.za>; Luthando Dziba <Luthando.Dziba@sanparks.org>
Subject: African Penguins/Island Closures

Dear Mike and Mike

Thanks very much for meeting with us on 25 May 2022 to discuss the African Penguin crisis. We found the meeting constructive and cordial as we believe you did too.

While there remains differences of opinion as a result of our differing perspectives, we herewith wish to capture the essence of our discussion in order to obtain your support.

1. We all agree that the African Penguin numbers reflect a crisis which requires urgent attention, despite retaining our right to differ in our interpretation of the primary drivers thereof.
2. The CAF process has produced proposals that do not satisfy either the conservation or fisheries sectors, despite its intention to strike a compromise position acceptable to both.
3. We broadly agree on an independent expert panel/process to be put in place as soon as possible by Minister Barbara Creecy, the details of which are yet to be determined. Both sectors foresee that a reasonable process can be designed that is mutually acceptable and binding in its conclusions. This independent process will play itself out over the medium term, but should ideally be concluded by the end of 2022.
4. In the interim, we seek to provide Minister Creecy with measures that are both urgent and temporary until the recommendations of the process outlined in 3. can be implemented beyond the current penguin breeding season.
5. In the spirit of urgent compromise, and given our inability to find a mutually acceptable way forward, the conservation sector and SAPFIA support the proposal that was developed jointly by state fisheries and conservation entities under the banner of the Governance Forum late in 2021 as an interim

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measure. This is not a proposal that fully satisfies the conservation sector, and neither do we expect that it will satisfy the fishing industry.

6. The specifics of this proposal were submitted by the Department of Forestry, Fisheries and the Environment (DFFE) to the fisheries and conservation sectors prior to the stakeholder engagements in 2021 (I attach the document herewith). The proposals (blue lines) represent a compromise initially established between the fisheries and biodiversity sectors of DFFE for three islands: Dassen, Dyer and St Croix.

If we can agree to the above as an acceptable way forward, we would be delighted to draft a joint letter to the Minister.

We understand that you have to further explore the level of support from other members of SAPFIA, and that this may not be broadly supported. In that instance, we would have to separately propose our respective suggestions to the Minister on how to move this process forward.

We look forward to your earliest response.

Your sincerely
Mark

Mark D. Anderson
Chief Executive Officer
BirdLife South Africa

CC: Dr Morné du Plessis and Dr Luthando Dziba

A01

O&C/2021/SEP/Extended Penguin TT/01

African penguin colony closures: Finding a balance between minimizing costs to the small pelagic fishing industry while maximizing coverage of foraging area for breeding African penguins

Janet C Coetzee, Azwianewi Makhado, Carl D van der Lingen, Zishan Ebrahim, Alison Kock, Cloverley Lawrence, Fannie W Shabangu.

Background

The African penguin/Fisheries Synthesis Report Drafting Team met in July 2021 to consider two scientific recommendations regarding closures around penguin breeding colonies and to develop a Departmental compromise position in this regard. The proposals were for (i) closure of small pelagic fishing within a 20 km radius around six penguin breeding colonies for ten years, made by the Top Predator SWG (Scientific Working Group) of the Branch: Oceans and Coasts and SANParks (South African National Parks); and (ii) continuation of the current (in 2021) implemented 20 km seasonal closure around two islands in 2022 pending conclusion of further quantitative assessments to estimate the impact of the various drivers of the penguin population decline, made by the Small Pelagic SWG of the Branch: Fisheries Management.

Given the contrasting recommendations and that conflict management requires parties to recognize problems as shared ones and engage with clear goals and an awareness of trade-offs, the Drafting Team first attempted to find common ground and develop guiding principles to move the discussion forward. These guiding principles were:

- The African penguin population is in a critical state of decline, and urgent action is needed
- NEMA (National Environmental Management Act) principles of conservation, sustainable use and the precautionary approach need to inform the proposals
- Penguin colonies identified for closure were selected based on conservation and economic criteria
- The effects of long-term closures on the penguin population are unknown but are assumed to be larger than that observed during the short-term closures
- The small pelagic fishery is an important industry regionally and locally within the industrial fisheries sector. Closures will have an economic cost on the small pelagic fishery that will vary from colony to colony

At subsequent meetings, and using the guiding principles, the Drafting Team sought compromise through the (i) prioritization of the penguin colonies in terms of their importance for penguin conservation (e.g. carrying capacity, current status, rate of recent decline and regional representation) and (ii) in terms of the cost of closing areas around those colonies on the small pelagic fishery at a regional level. Following this process, agreement was reached on short, medium and long-term actions.

In the *short-term* (2021), there was agreement that closures as recommended and implemented by Branch: Fisheries Management in 2021 should be continued for the remainder of 2021, i.e. Dassen and St Croix islands are closed for six month periods, and Robben Island is closed for the whole year.

In the *medium-term* (2022 – 2025), there was agreement that three of the six colonies should remain open to small pelagic fishing, namely, Robben and Bird Islands and Stony Point, noting that restrictions that are currently in place for MPAs around those three colonies, will continue to apply. Agreement was also reached on the three colonies that should be closed to small pelagic fishing in the medium-term (2022 – 2025), namely Dassen, Dyer and St Croix Islands. However, the extent, i.e. boundaries of those closures, would be adjusted to try and minimize the cost of closures on the small pelagic fishery while attempting to maximize the coverage of African penguin foraging area.

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In the *long-term* (2022 – 2032), the extent of the closures could be modified based on further research and evaluation. This research would run parallel to the medium term proposals and comprises three components. These are:

1. A quantitative assessment of the proportional contribution of all plausible major drivers (e.g., food availability, predation, climate change, disease, disturbance such as seismic surveys, vessel activity, and research and tourism, and competition with other predators for food as well as the availability and quality of breeding habitat) of the African penguin population decline at relevant spatial scales. This is required to understand their relative importance better and further develop or initiate plans where appropriate to mitigate against them if possible. That assessment should be conducted urgently. A joint Task Team (Oceans and Coasts, SANParks, Fisheries and other stakeholders) should oversee this assessment from the start and specify, depending on data available, analyses methods. Given a lack of internal capacity, this should be outsourced to an entity with no previous close involvement in this process. No cost estimates are available at this time.
2. Rigorous cost/benefit analyses are essential and should be urgently developed to improve the estimation of costs and benefits of closure around individual colonies through an agreed framework. This should be expanded to include socio-economic information related to penguin-directed tourism and other biodiversity considerations. A joint Task Team (Oceans and Coasts, SANParks, Fisheries and other stakeholders, including appropriate economists) should oversee these analyses from the start and specify, depending on data available, analyses methods. Given a lack of internal capacity, this should be outsourced to an independent and objective entity, preferably with no previous close involvement in this process. No cost estimates are available at this time.
3. A quantitative assessment (to the extent possible) of the efficacy of current management interventions conducted to date under the APBMP (African Penguin Biodiversity Management Plan) should be conducted. It should be a priority action of the second APBMP. Given a lack of internal capacity, this should be budgeted for and outsourced under the APBMP to an entity with no previous close involvement in this process. This assessment will be essential for informing adaptive management measures to mitigate against all threats to penguins.

Determining the extent of island closures in the medium term for three of the colonies

Determining the extent of island closures for Dassen, Dyer and St Croix colonies was achieved by using available data on catches of sardine and anchovy around the colony and African penguin foraging positions.

The Drafting Team compared penguin foraging and small pelagic catch data around Dassen, Dyer and St Croix islands and evaluated multiple closure variants. Those variants attempted to limit small pelagic fishing within the 75% kernel penguin FA (foraging area) and cover as many tracked GPS positions as possible. We also sought to reduce the estimated cost to the small pelagic fishing industry to 50% of what it would have been under a circular closure area of a 20 km radius. Shapes other than circles for closure areas were considered to provide more flexibility and increase the chances of meeting cost and benefit targets. Attempts were made to position the closure boundaries to increase navigational ease and for compliance reasons.

Although simultaneously meeting both targets (closure covers the 75% FA and reduces estimated costs by 50%) could not be attained for any of the three islands, the Drafting Team developed compromise positions on the extent and boundaries of the closures areas around these three islands. This document describes the data used to estimate the cost to the small pelagic fishery and the benefit to the African penguin (in terms of their foraging characteristics), and on which the compromise (trade-off) closure boundaries were selected.

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Determining the average cost of closure

The cost of closure to the small pelagic fishing industry was measured based on the average annual percentage of the catch within the proposed closure area between 2011 and 2019. This can be scaled up to an economic cost, but that requires assumptions about how much of the catch within a proposed closure area is lost (lost opportunity cost) and the increased fuel cost of catching that fish elsewhere. For evaluating trade-offs, we, therefore, calculated the percentage of catch (a proxy for cost) that occurred within the proposed 20 km radius closed area around penguin breeding colonies and sought to reduce that by approximately 50% by adjusting the boundaries of the closure area. This was done separately for anchovy and sardine. However, around Dassen Island, the catch is dominated by anchovy and around St Croix Island, it is dominated by sardine hence catches were prioritized accordingly.

The average annual percentage of the catch occurring within the proposed closure area was determined as follows:

Reported catch positions, to the nearest nm (nautical mile), between 2011 and 2019 were assigned to a 1x1 nm grid cell. The annual proportion of the regional catch (west of Cape Agulhas and east of 24°E) of each species for each year within each grid cell was averaged over years in which that grid cell was open to fishing (fishing around colonies was prohibited in some years as part of the island closure experiment). The average proportion per grid cell was renormalized so that the proportions at a regional scale summed to one and were expressed as a percentage. Summing the percentages of catch per grid cell for those cells that are contained within the proposed closure area derives the cost of closure to the fishing industry. The percentage of the catch per grid cell for the regional catch is presented in Figures 1 and 2 for sardine and anchovy, respectively.

Determination of core foraging areas

Data collection

During the breeding (or chick-rearing period) between 2008 and 2019, one adult from pairs of African penguins rearing small chicks was equipped with a GPS logger for one foraging trip at six of the species major South African breeding colonies. Loggers were attached to the feathers on the dorsal midline of the bird's lower back using TESA® tape (Beiersdorf AG, Germany) following recommended methods for deployment on diving birds (Bannasch et al. 1994). No bird was tracked more than once per season. The GPS loggers were programmed to acquire a position at one-minute intervals. Tags were removed ~1–4 days after deployment, depending on the presence of the birds in the colonies.

Data analysis

Location data on land were removed, and tracks were split into trips between land-based events. Only complete trips (i.e. evidence of the bird leaving and returning to the colony) were retained for further analyses. Possible erroneous GPS locations, based on a transit speed of greater than 12.4 km h^{-1} (Wilson 1985), were filtered from the data and locations were linearly interpolated at one-minute intervals. For each colony (Table 1-3), the marine habitat use of the penguins was estimated using kernel utilization distributions (UD; Worton 1989) using the R package adehabitatHR (Calenge 2006). A smoothing factor of 7 km was used, following the methods of Dias et al. (2018), and the 50% and 75% UD contours were estimated for each colony to represent the penguins' core and home range, respectively. Figures 3, 4 and 5 show the individual foraging tracks and resultant foraging areas for Dassen, Dyer and St Croix Islands, respectively.

Finding a balance

The drawing of draft boundaries took into account four spatial data inputs:

1. A grid of data-points of the percentage of the catches per one square minute (= 1 nm)

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2. The initial draft closure, a circle of 20 km radius around the island
3. The area that represents the core 75% (and 50%) penguin foraging kernels
4. Penguin tracking points (GPS tag-data)

The first draft boundary was a circular 20 km radius around the island (excluding landmass). This formed the basis of the initial cost calculation to fisheries (see above). Circular boundaries are harder to navigate and enforce than north-south and east-west lines, and thus the Team decided to use straight-line boundaries. Initially, draft boundaries attempted to include the entire 75% foraging kernel, using landmarks and existing MPA latitudes or longitudes as markers. However, the cost (i.e. the sum of catch percentage per one square nm for the closure area) to fisheries was similar to the original 20 km radius closure cost or sometimes higher. To reduce the cost to the fishery, the Drafting Team moved the boundary away from the 75% kernels and adjacent MPAs, but towards areas used by penguins foraging away from their core. If the cost to fisheries was still too high, further edits moved the boundary by one nm at a time to re-calculate the sum of costs captured under a draft area.
The proportion of the tracking points covered and the proportion of area (Albers Equal Area conical) of the 75% kernel covered by each draft was calculated. All data were tabulated for the initial circular draft and five additional (box/square) draft closures (Table 1-3).

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AOI

Table 1. Closure iterations for Dassen Island

Dassen island information Location: West Coast, north of Table Bay		Area, cut at continental landmass + (the total area/scale that the 50% and 75% kernel calculations are significant for... As the algorithms ignores landmass) + [Cartesian geometry of a whole circle].		Σ of Anchovy data per nm^2	Σ of Sardine data per nm^2	Proportion of penguins' tracking points in an area A poor proxy for penguin foraging
Context / reference information	Within 20 km of two adjacent isl.	Ocean around 2 isl: 901+750 = ~1651 km^2 [$2\Pi r^2$ = 2513.27 km^2] i.e. Around Dassen + Robben Islands respectively		11.17% (n=762)	0.73% (n=762)	
	Within the 50% kernel	~235 km^2 (280.9 km^2)		6.28% (n=85)	0.089% (n=85)	83.71% n=646889
	Within the 75% kernel	~461 km^2 (604.2 km^2)	Proportion of kernel's oceanic area in each draft. A good proxy for foraging	6.90% (n=159)	0.096% (n=159)	87.36%
	Draft 1 r=20km	~901 km^2 [Πr^2 = 1256.6 km^2]	0.9718 of 75% = **72.88%**	7.51% (n=386)	0.46% (n=386)	88.41%
Draft 2		~988 km^2	0.9296 of 75% = **69.72%**	8.42% (n=346)	0.54% (n=346)	90.53%
Draft 3		~946 km^2	0.7647 of 75% = **57.35%**	4.46% (n=330)	0.37% (n=330)	89.75%
Draft 4		~1040 km^2	0.7647 of 75% = **57.35%**	4.63% (n=363)	0.38% (n=363)	89.75%
Draft 5		~842 km^2	0.7647 of 75% = **57.35%**	4.44% (n=294)	0.33% (n=294)	89.72%
Draft 6		~946 km^2	0.7732 of 75% = **57.99**	4.36% (n=330)	0.38% (n=330)	90.00%

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Table 2. Closure iterations for Dyer Island

Dyer information Location: West of Cape Agulhas	Area, cut at continental landmass + [the total area/scale that the radial buffer 20km and kernel calculations are significant for. As the algorithms ignores landmass] + [Cartesian/plane geometry of a whole circle]		Σ of Anchovy data per nm²	Σ of Sardine data per nm²	Proportion of penguins' tracking points in an area [illegible] for penguin foraging n=[illegible]
Context / reference information: Within 20km of two adjacent ils.	Ocean around 2 ils: 657+688 = 1345 km² [2Πr² = 2513.27 km²] i.e. Around Dyer Island + Stony Point respectively		**11.19%** (n=757)	**25.37%** (n=757)	
Within the 50% kernel	~ 659 km² [725.7 km²]		10.01% (n=257)	22.75% (n=257)	62.34%
Within the 75% kernel	~ 1373 km² [1538.5 km²]	Proportion of kernel's oceanic area in each draft [illegible] for foraging	13.4% (n=546)	41.17% (n=546)	**86.14%**
Draft alpha Within r=20km	~657 km² [Πr² = 1256.6 km²]	0.4645 of 75% = **34.84%**	**10.05%** (n=381)	**16.14%** (n=381)	52.65%
Draft beta	~ 2061 km²	0.9177 of 75% = **68.82%**	13.03% (n=728)	44.03% (n=728)	86.65%
Draft gamma	~ 1625 km²	0.6256 of 75% = **46.92%**	3.42% (n=582)	13.26% (n=582)	64.77%
Draft delta	~ 1780 km²	0.9177 of 75% = **68.82%**	4.18% (n=630)	14.83% (n=630)	71.14%
Draft epsilon	~ 1492 km²	66.71% of 75% = **50.04%**	3.83% (n=633)	13.89% (n=633)	69.04%
Draft foxtrot	~ 1303 km²	0.9177 of 75% = **68.82%**	**3.94** (n=457)	**11.97** (n=457)	67.38%

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Table 3. Closure iterations for St Croix

St. Croix information Location: Algoa Bay and the MPA of Addo Elephant N.P.	Area, cut at continental landmass + (the total area/scale that the radial buffer 20km and kernel calculations are significant for... As the algorithms ignores landmass) + [Cartesian geometry of a whole circle].		Σ of Anchovy data per nm^2	Σ of Sardine data per nm^2	Proportion of penguins' tracking points in an area A poor proxy for penguin foraging n=56057
Context / reference information Within 20km of two adjacent ils.	Ocean around 2 ils: 613+842= 1455 km^2 [$2\Pi r^2$ = 2513.27 km^2] i.e. Around St. Croix + Bird Islands respectively		25.56% (n=757)	**48.64%** (n=757)	
Within the 50% kernel	~449 km^2 (448.6 km^2) i.e totally offshore		17.24% n=156	29.72% n=156	73.81%
Within the 75% kernel	~871 km^2 (941.5 km^2)	Proportion of kernel's oceanic area in each draft. A good proxy for foraging	32.39% n=304	51.16% n=304	**90.77%**
Draft A r=20km	~613 km^2 [Πr^2 = 1256.6 km^2]	0.6538 of 75% = **49.03%**	25.56% n=375	**42.12%** n=375	76.37%
Draft B	~1481 km^2	0.8679 of 75% = **65.1%**	52.22% n=517	56.07% n=517	95.94%
Draft C	~ 927 km^2	0.8174 of 75% = **61.31%**	31.19% (n=321)	36.26% (n=321)	86.78%
Draft D	~911 km^2	0.8553 of 75% = **64.15%**	30.67% (n=316)	36.32% (n=316)	90.32%
Draft E	~748 km^2	0.7520 of 75% = **56.40%**	30.67 (n=260)	29.85 (n=260)	80.63%
Draft F	~809 km^2	0.7876 of 75% = **59.07%**	30.67 (n=281)	**32.86** (n=281)	83.37%

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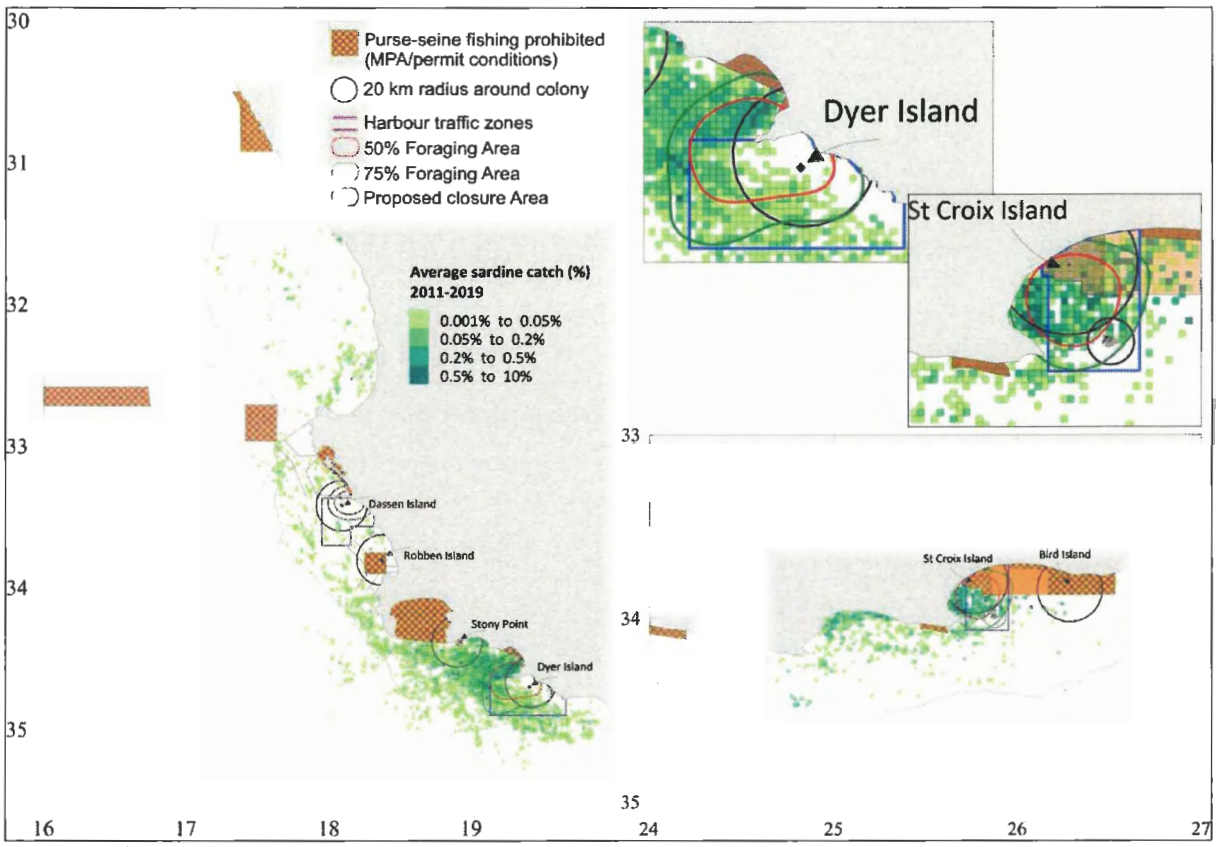

Figure 1. The average annual proportion of regional sardine catches (2011 – 2019 when fishing was allowed during the Island Closure Experiment) by 1 nm square block for the west coast (west of 20°E; left panel) and the south coast (east of 24°E; lower right panel), and zoomed views (upper right panels) around Dyer and St Croix islands. For all maps, the proposed closure of a circle of 20 km radius (black line), the 75% (green line) and 50% (red line) penguin foraging areas, and the proposed compromise closure area (blue line) are shown.

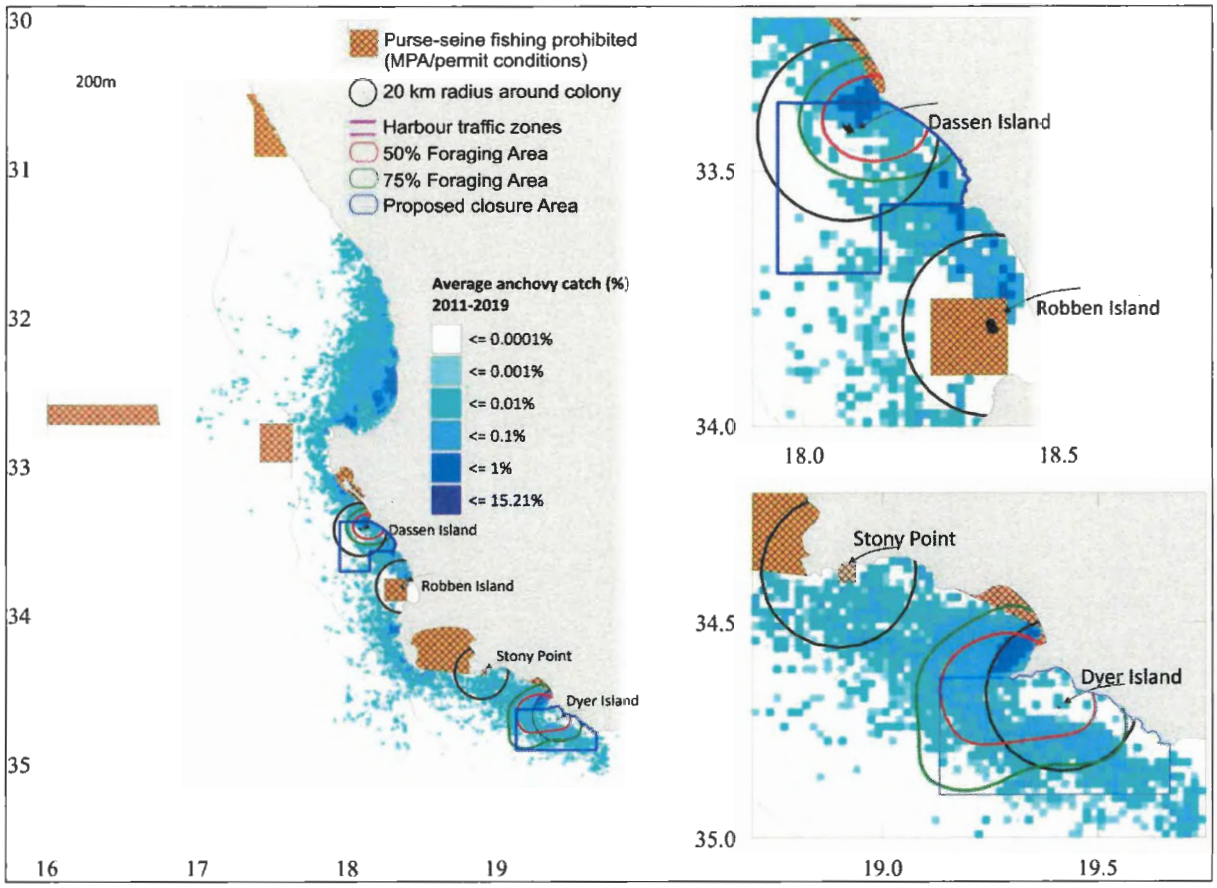

Figure 2. The average annual proportion of regional anchovy catches (- 2011 – 2019 when fishing was allowed during the Island Closure Experiment) by 1 nm square block for the west coast (west of 20°E; left panel; note that negligible quantities of anchovy are taken east of Cape Agulhas), and zoomed views (right panels) around Dassen and Dyer islands. For all maps, the proposed closure of a circle of 20 km radius (black line), the 75% (green line) and 50% (red line) penguin foraging areas (FAs), and the proposed compromise closure area (blue line), are shown.

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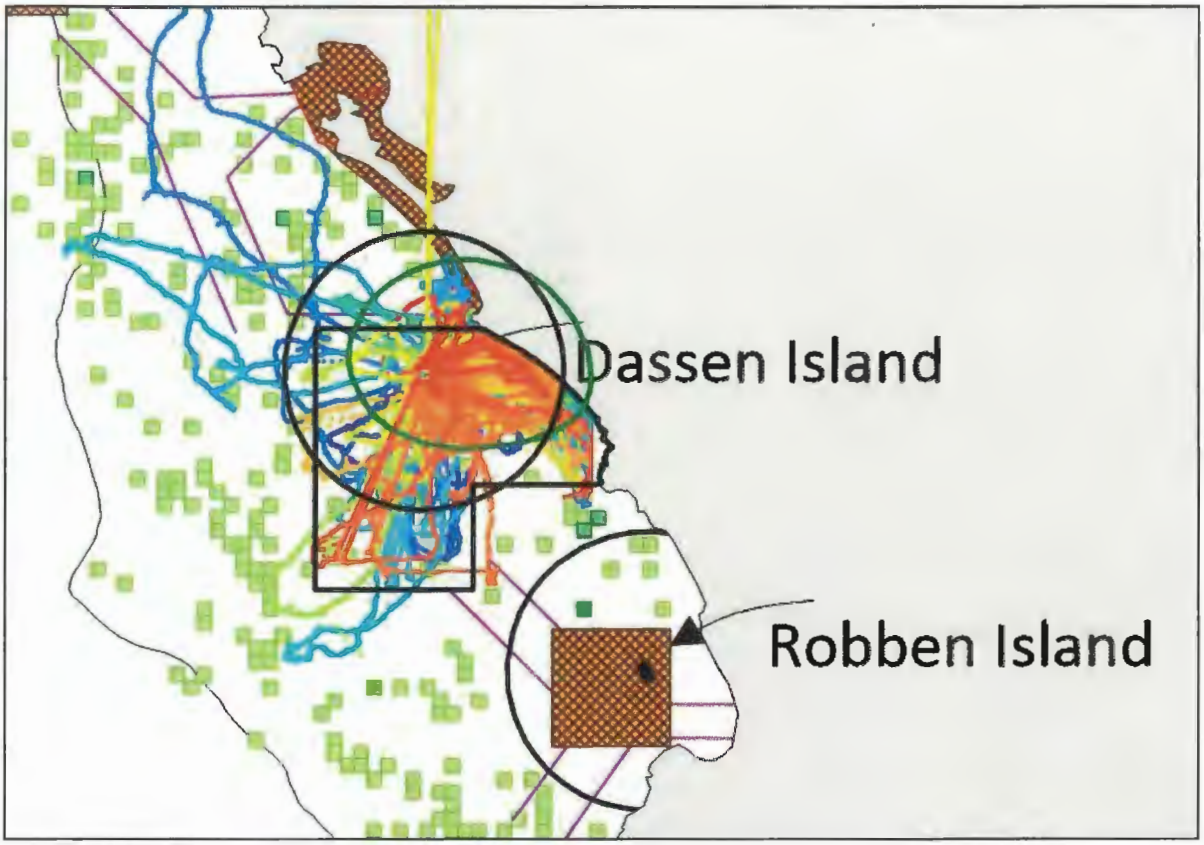

Figure 3. Individual tracks (different colours) and 75% foraging area (green ellipse) of African penguins breeding on Dassen Island from satellite-tracking data from 2008-2019, superimposed on the sardine catch map shown in Figure 1. The proposed closure of a circle of 20 km radius (black circle) and the now proposed compromise closure area (black polygon) are shown.

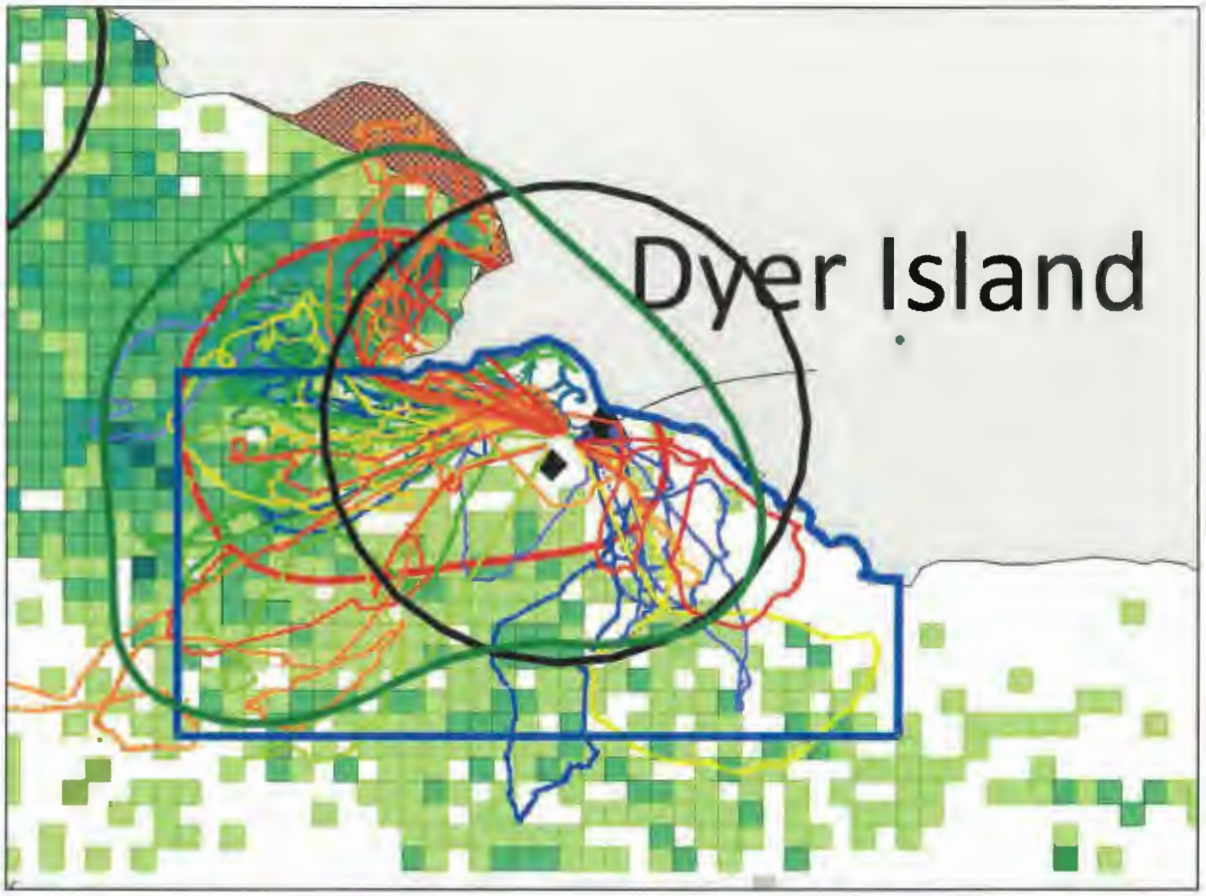

Figure 4. Individual tracks (different colours) and 75% (green ellipse) and 50% (red ellipse) foraging areas (FAs) of African penguins breeding on Dyer Island from satellite-tracking data collected over the period 2008-2019, superimposed on the sardine catch map shown in Figure 1. The proposed closure of a circle of 20 km radius (black circle) and the now proposed compromise closure area (blue polygon) are shown.

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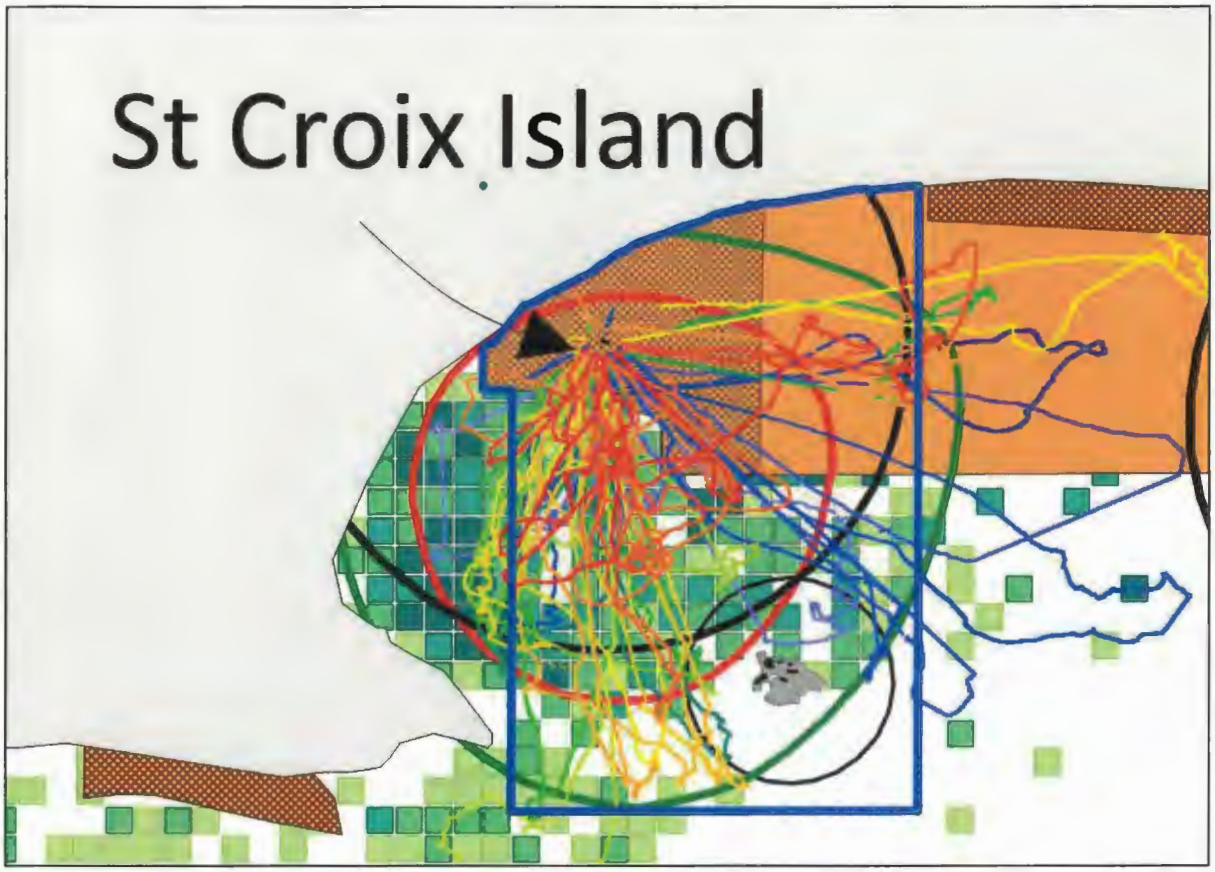

Figure 5. Individual tracks (different colours) and 75% and 50% foraging areas of African penguins breeding on St Croix Island from satellite-tracking data collected over the period 2008-2019, superimposed on the sardine catch map shown in Figure 1. The proposed closure of a circle of 20 km radius (black circle) and the now proposed compromise closure area (blue polygon) are shown.

From: Lauren Waller <LaurenW@ewt.org.za>
Sent: Monday, 30 May 2022 15:29
To: Mark Anderson; Yolan Friedmann; Natalie Maskell; Du Plessis, Morne; Dr Luthando Dziba; Alistair McInnes; Smith, Craig
Subject: RE: African Penguins/Island Closures

Importance: High

Dear CEOs and Technical Team
Andre Coetzee, the MD of Gansbaai Marine called me this morning. As expected, he is not happy about the Dyer Island proposal that we are considering for the island closures. He had much to say, including the following:

- If that proposal goes forward, it will sink their business, livelihoods will be lost and children will starve
- With the science that clearly proves no impact of closures on penguins and that we are not looking into the real causes of the decline and other threats, he has no choice but to sue the government if this goes forward
- Mike C and Mike B cannot be responsible for deciding his business' future
- That both industry and NGOs are not budging and not genuinely trying to find a compromised way forward
- That they will go under if all their fishing grounds are closed
- That he will agree to a closure where they can fish but larger vessels from the west coast are excluded, particularly since
    - They have their own fishing grounds up the west coast
    - They are catching good fish now, whereas Gansbaai Marine has only had 27 fishing days this year apparently
    - One of their vessels sunk a few weeks ago, and they will not be replacing it, and so their fishing effort is reduced from 8 vessels to 7

Andre and I know each other from my days at CapeNature, and we have also chatted during the ETT and CAF. There is thus an existing relationship, and we are able to be completely blunt and open with each other, so keep that in mind as you read my response below:

- Re-iterated that he and I disagree on what the science is saying, and that I believe he is being misled and misinformed regarding the science on a number of fronts (ICE and wrt other threats)
- That we were the ones that requested during the ETT *and* CAF to have practical innovative discussions around Dyer Island and Stony Point, but that was disregarded by industry
- That we do indeed care very much about livelihoods (as South Africans, we are aware of the current economic climate; and are not environmental activists who have no regard for livelihoods as we seem to have been labelled in this process) hence our repeated requests that the real (not modelled) costs of closures be provided; reiterating that it is astonishing that after 13 years, with a sound financial system in place, that industry is not able to provide this information (acknowledging that this relates to industry on west and east coast since Dyer and Stony were not part of the ICE). Our efforts however, to genuinely understand the socio-economic impacts of closures have been thwarted by industry who have not provided this information.
- Regarding the compromise, it does not sound like he is aware of the compromise of the MIBAs relative to the full breeding foraging range; and that the government proposal is a further compromise on top of that. The compromise of loss of foraging areas vs fishing grounds is not equal
- That closures around seabird breeding colonies do not constitute a closure of all the fishing grounds

I told him that these discussions are now at our CEO level and that they are engaging with industry and the Minister. He's asked me to convey this discussion to you, and to see if there is a way that we can work around this, hence this email to you.
He did mention that they are meeting tomorrow with SAPFIA to discuss the island closure proposal.
Warm Regards
Lauren

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"AM35"

Subject: FW: African Penguin conservation - request for meeting with Minister Creecy to discuss "island closures"

Importance: High

From: Mark Anderson <ceo@birdlife.org.za>
Sent: Sunday, June 5, 2022 6:13 PM
To: Alistair McInnes <alistair.mcinnes@birdlife.org.za>
Subject: FW: African Penguin conservation - request for meeting with Minister Creecy to discuss "island closures"
Importance: High

FYI

From: Mark Anderson
Sent: Sunday, 05 June 2022 18:11
To: Feroze Shaik <fshaik@environment.gov.za>; minister@dffe.gov.za
Cc: Du Plessis, Morne <mduplessis@wwf.org.za>; Luthando Dziba <Luthando.Dziba@sanparks.org>
Subject: African Penguin conservation - request for meeting with Minister Creecy to discuss "island closures"
Importance: High

Dear Feroze

As requested by Minister Creecy, we are engaging with the Fisheries sector about island closures.

Dr Morné du Plessis and I met with Mike Copeland and Redah du Maine in Cape Town on 13 April 2022, and Morné, Dr Luthando Dziba and I met with Mike Copeland and Mike van den Heever in Cape Town on 25 May 2022. We have subsequently been in email correspondence with the Fisheries sector in order to find a compromise way forward because both the Conservation and Fisheries Sectors are not supportive of CAF's recommendations.

We would like to request a meeting with the Minister to discuss the way forward for (a) the island closures and (b) the international review. As we're largely unavailable from Monday-Wednesday, it would be preferential for us to meet with the Minister on Thursday or Friday (or perhaps even during the coming weekend).

Initially, we'd propose that the Conservation Sector representatives meet with Minister Creecy but, alternatively if the Minister would prefer, it could be a joint meeting with the Conservation and Fisheries sectors.

We appreciate your assistance.

Regards
Mark

Mark D. Anderson
Chief Executive Officer

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SAPFIA
South African Pelagic Fishing Industry Association

1st FLOOR, HARBOUR PLACE, 7 MARTIN HAMMERSCHLAG WAY, FORESHORE, CAPE TOWN, 8001
P.O. BOX 2066, CAPE TOWN, 8000
TEL: +27 21 425 2727 • FAX: +27 21 425 4734 EMAIL: sapfia@inshore.co.za

29 June 2022

Dear Ashley

Re: Penguin science review panel suggestions

In response to your email of the 28 June please see below our suggestions relating to above matter.

On 25 March SAPFIA (together with ESCPA) wrote to the Honourable Minister Creecy with suggestions regarding an international penguin science review panel. In our recent letter to the Minister dated 20 June we mentioned that we would be updating our views on this matter, as we now do in this letter.

The need for this international penguin science review panel has become the more necessary given that the CAF did not evaluate the quantitative scientific analyses of the Island Closure Experiment (ICE), relating to the key aspect of the need, if any, to implement closures to pelagic fishing around some penguin breeding colonies. Our suggestions concern the core issues of:

(i) Panel membership,
(ii) Chair and procedures
and
(iii) Terms of reference (ToRs).

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Since that time, we have benefitted from consultation internationally with scientists who have been involved in similar processes in other countries. They have emphasised to us the importance that such ToRs clearly distinguish issues related to science and those related to policy choices. Accordingly in the attachment to this email, we have slightly modified our earlier suggestions from 25 March.

With regard to (i) panel membership, the basic rule we have applied in making our suggestions is that all candidate members must have the technical/scientific competence to evaluate the quantitative aspects of analyses of the Island Closure Experiment (ICE) results, around which the debate and core differences on this matter revolve. Internationally, this matter falls within the general scientific field of marine multi-species and ecosystem modelling and management, which is complex and mainly mathematical-statistical in its nature. It is therefore essential that panel members have some demonstrable and established track record in this field. Note that we have not yet checked the availability of any of our proposed panel members, but we could do so and advise further once you hopefully decide to progress this suggestion.

We trust also that there would be continued consultation with ourselves as the arrangements for this review panel are developed. We consider such iterative consultation to be absolutely essential.

Yours sincerely

For SAPFIA and ESCPA

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Annexure: Proposals for the appointment of an international scientific panel to review the science surrounding the ICE and related aspects of African penguin conservation

i) Panel Membership

The following is a list of scientists who have the necessary quantitative scientific competence for inclusion in this panel. We would envisage that a panel of 8 persons be formed (excluding a DFFE co-chair).

Sir John Beddington	Former Chief Scientific Adviser to the UK Government; played an important role in the initial development of the ecosystem modelling field in the 1970s
Prof Tom Carruthers	Arguably the leading young scientist in the world in the ecosystem modelling field
Dr Alistair Dunn	Panel member in past penguin deliberations
Dr Malcolm Haddon	Panel member in past penguin deliberations
Dr Ana Parma	Panel member in past penguin deliberations
Dr Eva Plaganyi	Recognised as leading international authority on the MICE approach to ecosystem modelling
Prof Andre Punt	Panel member in past penguin deliberations
Dr Michael Sissenwine	Former Chief Science Advisor at US NOAA Fisheries and President of ICES
Dr Michael Wilberg	Panel member in past penguin deliberations

More details on these scientists can be provided should you require.

ii) Chair and Procedures

The Chair for the panel proposed here must have a reasonably full technical understanding of the subject matter to be discussed (as international experience has shown to be essential for such meetings if efficient progress is to be made). In South Africa, the only persons who might

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qualify would be presenting material to the panel, so would not be in contention. Hence the Chair would have to be drawn from amongst the panel members.

However, DFFE would clearly still need to have some "control" at that level, to ensure that the panel discussions focus on DFFE's main concerns. This can be achieved by appointing a co-chair from DFFE's scientific staff. Two possibilities for this role are Dr Kim Prochazka and Dr Janet Coetzee – these two handled the organisation and running of a similar international panel virtual meeting on penguin issues in December 2000 very well. This co-chair representative from DFFE would add better value to the process if they have experience with ICE (and some knowledge of the associated quantitative analyses) as well as with the history of this issue.

The panel should meet virtually (all that would seem practical for reasons of time and cost) at appointed times and with a clear agenda. The schedule for this virtual meeting needs to include possibilities for Panel-only meetings, private meetings between the Panel and protagonists of different standpoints, and "public" meetings where protagonists present their standpoints and can be questioned by both Panel members and other members of the "public" present. All participants (including CAF members and DFFE scientists) must be allowed to speak freely.

iii) Terms of Reference

Ultimately decisions in this matter come down to trade-off selections, which involve policy matters, and the Minister must select amongst the trade-off options available. This requires that the pros and cons for each option are quantified, based on the best scientific evidence. Thus, for example, island closure proposals involve a trade-off between the benefits in terms of the likely change to the penguin population growth rate, against the cost in terms of loss of revenue and jobs to the pelagic fishing industry. The Panel is responsible for scientifically evaluating the various estimates of such quantities, and to then recommend which are best, and their reliability. Comments on policy choices, if any, should focus on clarification aspects only.

In that context, we propose that the panel be given the task of answering the following questions:

1) Do the estimates of closure effects provided in Butterworth and Ross-Gillespie (2021b) and associated documents[1] provide an acceptable basis for quantifying the potential benefit, if any, of closures to penguin colony growth rates.

2) Do the estimates of closure effects provided in Sydeman et al (2021) and other related documents provide an acceptable basis for advising quantification of the potential benefit, if any, of closures to penguin colony growth rates[2]. These estimates have been argued by, *inter alia*, Butterworth and Ross-Gillespie (2022) to be incorrect in particular because of their failure to take due account of pseudoreplication; are those arguments correct?

3) Trathan (2021) argues that the experimental design for the ICE is flawed, and SAPFIA (2021) responds to the contrary. Have these alleged design concerns any merit, and even if so, do they invalidate conclusions drawn by existing analyses of the ICE such as in Butterworth and Ross-Gillespie (2022)?

4) What are the best estimates of the island closure effects in terms of their likely quantitative impacts on penguin colony growth rates, and how do these estimates compare with estimates of recent decline rates for penguin populations?

5) Advise on estimates of the costs in terms of revenue and jobs to the fishing industry of island closures: which of these estimates are likely the most reliable.

6) What research should be undertaken, and with what urgency, to try to identify other possible causes of the penguin decline?

Also provide brief remarks (only if the panel so wishes) of a clarification nature on the following policy-related aspects

A) What are the implications of the results of the ICE for possible future island closures?

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[1] The associated documents should inter alia include Ross-Gillespie and Butterworth (2021), Butterworth and Ross-Gillespie (2021a) and Butterworth and Ross-Gillespie (2022).

[2] [2] The associated documents include Sherley et al (2018) and Sherley et al (2021).

B) Should these closures continue, and if so, how widely spread and for how long? What analyses should be undertaken to provide the scientific basis to underly the fine spatial and temporal details of such closures?

References

Butterworth, D.S. and Ross-Gillespie, A. 2021a. A revised summary of results for the island closure experiment. Department of Forestry, Fisheries and the Environment report FISHERIES/2021/JUN/SWG-PEL/41. 5pp.

Butterworth, D.S. and Ross-Gillespie, A. 2021b. A response to some queries concerning the revised summary of results for the island closure experiment provided in FISHERIES/2021/JUN/SWG-PEL/41. Department of Forestry, Fisheries and the Environment report FISHERIES/2021/SEP/SWG-PEL/59. 6pp.

Butterworth, D.S. and Ross-Gillespie, A. 2022. Comment on "South Africa's experimental fisheries closures and recovery of the endangered African penguin" by Sydeman et al. (2021). ICES Journal of Marine Science. In press.

Ross-Gillespie, A. and Butterworth, D. S. 2021. Updated analysis of results from data arising from the Island Closure Experiment. Department of Forestry, Fisheries and the Environment report FISHERIES/2021/JUN/SWG-PEL/39rev.

SAPFIA, 2021. Letter to Deputy Director-General: Oceans and Coasts Ms J Beaumont dated 5 November 2021, "Re: REVIEW OF THE SYNTHESIS OF CURRENT SCIENTIFIC INFORMATION RELATING TO THE DECLINE IN THE AFRICAN PENGUIN POPULATION, THE SMALL PELAGIC FISHERY AND ISLAND CLOSURES, by Philip N. Trathan". 2 pp.

Sherley, R. B., Barham, B. J., Barham, P. J., Campbell, K. J., Crawford, R. J. M., Grigg, J., Horswill, C., McInnes, A., Morris, T. L., Pichegru, L., Steinfurth, A., Weller, F., Winker, H. and Votier, S.C. 2018. Bayesian inference reveals positive but subtle effects of experimental fishery closures on marine predator demographics. Proceedings of the Royal Society B: Biological Sciences, 285: 20172443.

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fishery closures on marine predator demographics'. Proceedings of the Royal Society B: Biological Sciences, 288: 20212129.

Sydeman, W. J., Hunt, G. L., Pikitch, E. K., Parrish, J. K., Piatt, J. F., Boersma, P. D., Kaufman, L., Anderson, D. W., Thompson, S. A. and Sherley, R. B. 2021. South Africa's experimental fisheries closures and recovery of the endangered African penguin. ICES Journal of Marine Science. https://doi.org/10.1093/icesjms/fsab231.

Trathan, P.N. 2021.Review of the Synthesis of Current Scientific Information Relating to the Decline in the African Penguin Population, the Small Pelagic Fishery and Island Closures. 20 September 2021, 12 pp.

"AM37"

Subject: FW: Conservation Sector Report on African Penguin Conservation
Attachments: Conservation Sector Report on African Penguin conservation for the attention of Minister Barbara Creecy_4 July 2022..pdf

From: Mark Anderson <ceo@birdlife.org.za>
Sent: Monday, July 4, 2022 10:57 AM
To: Du Plessis, Morne <mduplessis@wwf.org.za>; Luthando Dziba <Luthando.Dziba@sanparks.org>; Yolan Friedmann <yolanf@ewt.org.za>; Natalie Maskell <Natalie@sanccob.co.za>; Alistair McInnes <alistair.mcinnes@birdlife.org.za>; Lauren Waller <LaurenW@ewt.org.za>; Smith, Craig <csmith@wwf.org.za>; Alison Kock <Alison.Kock@sanparks.org>
Subject: FW: Conservation Sector Report on African Penguin Conservation

Dear colleagues

See attached FYI.

Luthando will contact Feroze Shaik to schedule an opportunity for us to meet with Minister Creecy.

Regards
Mark

From: Mark Anderson <ceo@birdlife.org.za>
Sent: Monday, 04 July 2022 10:26
To: minister@dffe.gov.za
Cc: Feroze Shaik <fshaik@environment.gov.za>
Subject: Conservation Sector Report on African Penguin Conservation

Dear Minister Creecy

Please see attached report, which is a summary of recommendations on Island Closures (to benefit African Penguin conservation) from BirdLife South Africa, WWF-SA, SANCCOB, Endangered Wildlife Trust, and SANParks.

Do not hesitate to contact me if you require further information and/or if you have any queries.

Regards
Mark

Mark D. Anderson
Chief Executive Officer

BirdLife SOUTH AFRICA
Giving Conservation Wings

Isdell House, 17 Hume Road (cnr Hume Road/Jan Smuts Drive), Dunkeld West 2196, Gauteng
Private Bag X16, Pinegowrie 2123, Johannesburg, Gauteng, South Africa
Tel: +27 (0)11 789 1122
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Report to Minister Barbara Creecy on the outcomes of the consultations between the Conservation Sector and the Fishing Industry on Island Closures and the conservation of the "Endangered" African Penguin

Mark D. Anderson (BirdLife South Africa), Morné du Plessis (WWF-SA), Luthando Dziba (SANParks), Yolan Friedmann (Endangered Wildlife Trust), and Natalie Maskell (SANCCOB)

Introduction

The Conservation Sector NGOs, namely BirdLife South Africa, WWF-SA, Endangered Wildlife Trust, and SANCCOB, wrote a letter to the Minister requesting her intervention to implement island closures in light of the dire conservation state of the African Penguin. The Minister indicated that she had received similar correspondence from the Fishing Industry expressing their concerns about the proposed island closures. The Minister encouraged the CEOs of the Conservation Sector and SANParks to engage with the CEOs of the Fishing Industry and find common ground and report back to her.

Mark Anderson, Luthando Dziba and Morné du Plessis (representing the Conservation Sector) and Mike Copeland and Mike van den Heever (representing the Fishing Industry) met at WWF-SA's offices in Cape Town on 25 May 2022. This follows the meeting that Mark Anderson and Morné du Plessis had with Mike Copeland and Redah Maine in Cape Town on 13 April 2022. Subsequent to the latter meeting, the Conservation Sector (coordinated by Mark Anderson) engaged by email with Mr Copeland and his colleagues (correspondence which is dated 27 May 2022, 13 June 2022, and 23 June 2022 is included as Appendix 2).

Discussion

This report is a summary of our engagements and provides feedback to the Minister from the perspective of the Conservation Sector. At one point after the second meeting, it was hoped that the Conservation Sector and the Fishing Industry would write a joint letter to the Minister reflecting what then appeared to be areas of convergence between the Fishing Industry and the Conservation Sector. Unfortunately, this has not materialised and the correspondence below reflects that representatives of the Fishing Industry did not get support for the areas that were initially felt to be a reasonable comprise.

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These included the following:

a. The Conservation Sector recommended immediate implementation of interim island closures but cutting down the number of penguin colonies for island closure to three (Dassen, Dyer and St Croix Islands) as opposed to the original six islands.
b. The Conservation Sector also recommended 75% closure of the African Penguin foraging areas in the affected islands but recommended that there should be no reduction in Total Allowable Catch for the Fishing Industry.
c. The Conservation Sector also recommend to the Minister the urgent appointment of an independent international panel to review the recommendations of both the Extended Penguin TT Forum and the CAF and recommend an evidence-based way forward to the Minister.
d. During the meeting, the representatives of the Fishing Industry recommended the opening of a part of Sixteen Mile Beach to fishing. The representatives of the Conservation Sector indicated that this was outside their mandate/authority, but that they would share the request with the Department.

In several email correspondences with the Fishing Industry, the Conservation Sector offered several compromises in an effort to find common ground. Unfortunately, none of these were deemed adequate by the Fishing Industry. In summary,

a. On 27 May 2022 the Conservation Sector proposed that both the Conservation Sector and Fishing Industry support the proposal that was developed jointly by state fisheries and conservation entities under the banner of the Governance Forum in late-2021 (see Appendix 3). The proposals represented a compromise initially established between the fisheries and biodiversity sectors of the Department of Forestry, Fisheries, and the Environment for three islands: Dassen, Dyer and St Croix. Our proposal was initially considered by the representatives of the Fishing Industry, only to be rejected later after their consultation with the industry. Their primary reason for rejection was related to their contention that the small-scale fishers around Dyer and St Croix would be disproportionately negatively affected by this proposal.
b. The Conservation Sector then, on 13 June 2022, proposed a concession. Correspondence to Mr Copeland and his colleagues stated that "In the interest of progressing this matter and finding a resolution, we are prepared to make a further concession. This concession would be to allow smaller vessels (i.e. Gansbaai Marine vessels, and not larger vessels from the west coast) to fish in the proposed Department of Forestry, Fisheries, and Environment closure area. As you will know, Dassen and St Croix islands were scheduled (according to the Island Closure Experiment) to be closed to fishing this year, and there have been no effective closures in place around any colonies since 2020. We believe that the demarcated areas (as proposed by the Department of Forestry, Fisheries, and the Environment) around Dassen and St Croix islands should remain closed to all purse-seine

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fishing until such time as an international review process has finalised allocation and delineations of long-term closures around the important African Penguin colonies." This proposal, which was intended for this season (i.e. until the international review had been concluded) was also rejected by the Fishing Industry.

At the request of the Minister and with the investment of considerable further effort and time, the Conservation Sector sought to find a compromise solution that would take into account both the plight of the African Penguin and of small-scale fishers. Despite the meeting and correspondence with the Fishing Industry, a solution has not been found.

In Appendix 1, the Conservation Sector puts forward recommendations for consideration by the Minister as part of the proposed way forward.

Conclusion

The situation in which the African Penguin finds itself is dire, as a number of factors, in addition to declining food availability, are almost certainly responsible for its demise (these include ship-to-ship bunkering and ship traffic/noise in Algoa Bay). The Conservation Sector, therefore, urges the Honourable Minister to (a) urgently implement the island closures as per the Governance Forum's recommendations (Appendix 3) and (b) establish the international review panel so that longer-term measures can be implemented to benefit the endangered African Penguin.

AM
MK

Appendix 1. Recommendations

The Conservation Sector recommends the following:

a. The Minister implements interim island closures as per the recommendations originally provided by the Department of Forestry, Fisheries, and the Environment through the Governance Forum. This forum included scientists and managers from both the Oceans & Coasts and Fisheries Branches of Department of Forestry, Fisheries, and the Environment and SANParks and the recommendations were presented to stakeholders on 12 August 2021. Although the Governance Forum's recommended closures already representing a significant compromise and which are not optimal for African Penguins, they offer some degree of protection during the current breeding season and include crucial elements of regional representation and population recovery potential. This is therefore not a long-term solution for the African Penguin, but is, we believe, a defensible short-term option.
b. The Minister establishes an international review panel to review the CAF recommendations and all information submitted by the Conservation Sector and the Fishing Industry to the CAF deliberations (our summary on the CAF process is included as Appendix 4). The Terms of Reference for this review panel should have specific objectives, viz. to recommend delineations of closures that provide a meaningful benefit to African Penguins while reducing actual, tangible costs to the industry. The Conservation Sector prepared suggestions for the Terms of Reference and these were emailed to the Minister's office on 13 June 2022.
c. The Conservation Sector implores the Minister to invoke a precautionary approach (a key principle of the Marine Living Resources Act of South Africa (MLRA; Section 2c), and to initiate closures with immediate effect.

AM
MK

Appendix 2: Correspondence with the Fishing Industry

From: Mark Anderson
Sent: Friday, 27 May 2022 07:54
To: Mike Copeland <copeland.fishconsult@gmail.com>; Mike van den Heever <mvdh@pioneerfishing.co.za>
Cc: Du Plessis, Morne <mduplessis@wwf.org.za>; Luthando Dziba <Luthando.Dziba@sanparks.org>
Subject: African Penguins/Island Closures

Dear Mike and Mike

Thanks very much for meeting with us on 25 May 2022 to discuss the African Penguin crisis. We found the meeting constructive and cordial as we believe you did too.

While there remains differences of opinion as a result of our differing perspectives, we herewith wish to capture the essence of our discussion in order to obtain your support.

1. We all agree that the African Penguin numbers reflect a crisis which requires urgent attention, despite retaining our right to differ in our interpretation of the primary drivers thereof.
2. The CAF process has produced proposals that do not satisfy either the conservation or fisheries sectors, despite its intention to strike a compromise position acceptable to both.
3. We broadly agree on an independent expert panel/process to be put in place as soon as possible by Minister Barbara Creecy, the details of which are yet to be determined. Both sectors foresee that a reasonable process can be designed that is mutually acceptable and binding in its conclusions. This independent process will play itself out over the medium term, but should ideally be concluded by the end of 2022.
4. In the interim, we seek to provide Minister Creecy with measures that are both urgent and temporary until the recommendations of the process outlined in 3. can be implemented beyond the current penguin breeding season.
5. In the spirit of urgent compromise, and given our inability to find a mutually acceptable way forward, the conservation sector and SAPFIA support the proposal that was developed jointly by state fisheries and conservation entities under the banner of the Governance Forum late in 2021 as an interim measure. This is not a proposal that fully satisfies the conservation sector, and neither do we expect that it will satisfy the fishing industry.
6. The specifics of this proposal were submitted by the Department of Forestry, Fisheries and the Environment (DFFE) to the fisheries and conservation sectors prior to the stakeholder engagements in 2021 (I attach the document herewith). The proposals (blue lines) represent a compromise initially established between the fisheries and biodiversity sectors of DFFE for three islands: Dassen, Dyer and St Croix.

If we can agree to the above as an acceptable way forward, we would be delighted to draft a joint letter to the Minister.

AM
MVL

We understand that you have to further explore the level of support from other members of SAPFIA, and that this may not be broadly supported. In that instance, we would have to separately propose our respective suggestions to the Minister on how to move this process forward.

We look forward to your earliest response.

Your sincerely
Mark

Mark D. Anderson
Chief Executive Officer
BirdLife South Africa

CC: Dr Morné du Plessis and Dr Luthando Dziba

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From: Mark Anderson
Sent: Monday, 13 June 2022 07:39
To: Mike Copeland <copeland.fishconsult@gmail.com>
Cc: Redah De Maine <redah@rialfishing.co.za>; SAPFIA <sapfia@inshore.co.za>; Mike van den Heever <mvdh@pioneerfishing.co.za>; mduplessis@wwf.org.za; Luthando.Dziba@sanparks.org
Subject: RE: African Penguins/Island Closures

Dear Mike

Our responses to the points raised in your email of 3 June 2022 are below:

1. Your motivation for reverting back to the first document tabled at the Extended Penguin TT forum is understood. Our concern, however relates to the extent of area closures around Dyer Island and St Croix. Both of these islands are extremely important to the fishing industry.

In the interest of progressing this matter and finding a resolution, we are prepared to make a concession. This concession would be to allow smaller vessels (i.e. Gansbaai Marine vessels, and not larger vessels from the west coast) to fish in the proposed Department of Forestry, Fisheries, and Environment closure area. As you will know, Dassen and St Croix islands were scheduled (according to the Island Closure Experiment) to be closed to fishing this year, and there have been no effective closures in place around any colonies since 2020. We believe that the demarcated areas (as proposed by the Department of Forestry, Fisheries, and the Environment) around Dassen and St Croix islands should remain closed to all purse-seine fishing until such time as an international review process has finalised allocation and delineations of long-term closures around the important African Penguin colonies.

AM
MK

2. We are concerned that the recommendations from the International Scientific Review Panel will not be available to inform new decisions for 2023. Should this transpire we would need clear rules for action proposed, until such time as a recommendation is available from the panel to inform new area closures.

We are of the opinion that the review should be expedited as a matter of urgency and should be finalised for management implementation in 2023, i.e. the process needs to be concluded by the end of this year. The main objective of the review, which should be reflected in the ToR, should be limited to propose management measures pertaining to fishing exclusion zones by reviewing the CAFMLR findings and documents submitted to this forum by both the fisheries and conservation sectors. The international panel, in making its recommendations, could of course request any further information from parties to improve their understanding of the current situation.

3. We are concerned that the composition and TOR of this panel will not be agreed and thus propose that these first be agreed to by all before there are any further island closures.

Minister Creecy has tasked Mr Shonisani Munzhedzi, Chief Executive Officer of SANBI, to draft the Terms of Reference for the international, independent review, and we assume that both the Conservation and Fisheries Sectors will be given an opportunity to comment on the ToR and the composition of the panel.

4. We wish that the data required to initiate MICE immediately be made available. We can provide a list of what data is required. Hopefully we can have some results available for the panel, should the data be provided.

This is something you need to take up with the Department of Forestry, Fisheries, and the Environment.

5. The importance of the 16 Mile Beach MPA to the fishing industry is not recognised.

We understand that the fishing industry's proposal to lift fishing restrictions around the 16 Mile Beach Marine Protected Area was submitted to the Extended Task Team and CAF and that the proposal was not supported.

Regards

Mark

Mark D. Anderson, Chief Executive Officer

BirdLife South Africa

AM
MK

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From: Mark Anderson
Sent: Thursday, 23 June 2022 11:56
To: Mike Copeland <copeland.fishconsult@gmail.com>
Cc: Redah De Maine <redah@rialfishing.co.za>; SAPFIA <sapfia@inshore.co.za>; Mike van den Heever <mvdh@pioneerfishing.co.za>; Du Plessis, Morne <mduplessis@wwf.org.za>; Luthando Dziba <Luthando.Dziba@sanparks.org>
Subject: RE: African Penguins/Island Closures

Dear Mike

Our responses are included below in blue.

Regards

Mark

Mark D. Anderson
Chief Executive Officer
BirdLife South Africa

From: Mike Copeland <copeland.fishconsult@gmail.com>
Sent: Monday, 20 June 2022 10:25
To: Mark Anderson <ceo@birdlife.org.za>
Cc: Redah De Maine <redah@rialfishing.co.za>; SAPFIA <sapfia@inshore.co.za>; Mike van den Heever <mvdh@pioneerfishing.co.za>; mduplessis@wwf.org.za; Luthando.Dziba@sanparks.org
Subject: RE: African Penguins/Island Closures

Dear Mark/Morne/Luthando,

Both SAPFIA and the ESCPA have discussed your latest proposal detailed below. Please find our response in green.

Simultaneous with this email, we have written to the Minister to summarise the current stage of our deliberations, but recording a willingness to continue talking, if necessary.

Sincerely
SAPFIA/ESCPA
Mike Copeland (+27 82 572 1852)

Sent from Mail for Windows 10

From: Mark Anderson
Sent: Monday, 13 June 2022 07:39
To: Mike Copeland
Cc: Redah De Maine; SAPFIA; Mike van den Heever; mduplessis@wwf.org.za; Luthando.Dziba@sanparks.org
Subject: RE: African Penguins/Island Closures

Dear Mike

AM
MC

Our responses to the points raised in your email of 3 June 2022 are below:

1. Your motivation for reverting back to the first document tabled at the Extended Penguin TT forum is understood. Our concern, however relates to the extent of area closures around Dyer Island and St Croix. Both of these islands are extremely important to the fishing industry.

In the interest of progressing this matter and finding a resolution, we are prepared to make a concession. This concession would be to allow smaller vessels (i.e. Gansbaai Marine vessels, and not larger vessels from the west coast) to fish in the proposed Department of Forestry, Fisheries, and Environment closure area. As you will know, Dassen and St Croix islands were scheduled (according to the Island Closure Experiment) to be closed to fishing this year, and there have been no effective closures in place around any colonies since 2020. We believe that the demarcated areas (as proposed by the Department of Forestry, Fisheries, and the Environment) around Dassen and St Croix islands should remain closed to all purse-seine fishing until such time as an international review process has finalised allocation and delineations of long-term closures around the important African Penguin colonies.

It is factually incorrect to say that there were no closures in 2021 – there were. Perhaps more important, your proposal and the concession it offers remains very far away from our position (it effectively closes St Croix to fishing which is unacceptable to the Eastern Cape fishers, and has a similar impact at Dyer Island), and we are therefore concerned that a compromise is not achievable. Nevertheless, we can report that after consultation with our members, we are able to make the new proposal set out in the table below.

We stated that there were no **effective** closures, i.e. the closures around St Croix and Dassen islands were only seasonal in 2021. This is despite written objections to this decision submitted by seabird scientists, including scientists at Oceans & Coasts. The closures need to be throughout the year in order for them to protect the penguins' foraging habitat during different life-history stages: breeding, pre- and post-moult (see Carpenter-Kling et al. 2022 which shows that waters around the island are important outside the breeding season). St Croix Island was scheduled to be closed this year in the ICE but there have been no closures in place this year.

2. We are concerned that the recommendations from the International Scientific Review Panel will not be available to inform new decisions for 2023. Should this transpire we would need clear rules for action proposed, until such time as a recommendation is available from the panel to inform new area closures.

We are of the opinion that the review should be expedited as a matter of urgency and should be finalised for management implementation in 2023, i.e. the process needs to be concluded by the end of this year. The main objective of the review, which should be reflected in the ToR, should

be limited to propose management measures pertaining to fishing exclusion zones by reviewing the CAFMLR findings and documents submitted to this forum by both the fisheries and conservation sectors. The international panel, in making its recommendations, could of course request any further information from parties to improve their understanding of the current situation.

The best scientific evidence that can inform a management measure on the extent, if any, of island closures around penguin breeding sites, is that to be obtained from ICE. This should be key to the deliberations of the International Scientific Review.

We are not asking for a review of the science, as there have been numerous scientific reviews since 2017 when the results were very similar to the current updated results and we feel there is enough evidence to implement closures now. We agree that the latest and 'best' available science can be used by the reviewers as background information, but the ultimate purpose of the ETT and CAF processes was to find a meaningful compromise on island closure extents. We would like the review to assess the merits of both arguments during CAF to formulate a sensible compromise.

3. We are concerned that the composition and TOR of this panel will not be agreed and thus propose that these first be agreed to by all before there are any further island closures.

Minister Creecy has tasked Mr Shonisani Munzhedzi, Chief Executive Officer of SANBI, to draft the Terms of Reference for the international, independent review, and we assume that both the Conservation and Fisheries Sectors will be given an opportunity to comment on the ToR and the composition of the panel.

We have not been officially informed of this but this is noted. We have written to the Minister with proposals for ToRs and the composition of the international panel, requesting that we are consulted in this regard.

4. We wish that the data required to initiate MICE immediately be made available. We can provide a list of what data is required. Hopefully we can have some results available for the panel, should the data be provided.

This is something you need to take up with the Department of Forestry, Fisheries, and the Environment.

We are surprised by your response. Any intervention that could possibly point to the main drivers in causing the decline in the penguin population, should surely be actively and immediately supported by conservationists.

This process was agreed at the ETT to be run as a separate process under a special task team led by DFFE.

MK AM

This has apparently not been initiated yet and shouldn't be a pre-requisite or condition for initiating processes for long-term closures.

5. The importance of the 16 Mile Beach MPA to the fishing industry is not recognised.

We understand that the fishing industry's proposal to lift fishing restrictions around the 16 Mile Beach Marine Protected Area was submitted to the Extended Task Team and CAF and that the proposal was not supported.

This is factually incorrect. What CAFMLR said was that this matter was not within their remit. It is however in the remit of the Minister and therefore part of the package of agreements we propose.

Table 1. Industry proposal at the end of the CAFMLR process on 8 March 2022, and a new proposal for consideration, dated 17 June 2022.

This was officially rejected by the National Marine Biodiversity Scientific Working Group's 'MPA-Island Closure Issues' Task Group after the request was raised by the industry during the ETT process. These were several reasons for the rejection, including impacts on other species.

	Dassen	Robben	Stoney	Dyer	St Croix	Bird	CAFMLR Compromise Guideline (300%)
CSG (circa 27 May 2022, Drs Morne du Plessis, Mark Anderson and Luthando Dziba)	87.9	41	5	75.8	75.0	44	329
Industry at end of CAFMLR (8 March 2022)	54	95	23	20	27	93	312
Industry new proposal (17 June 2022)	60	100	23	20	27	93	323

Your latest proposal gives very little protection to penguins around islands where there is significant fishing pressure, i.e. Dassen, Dyer and St Croix (and note that these are proportions of an already compromised extent; i.e. the core areas which are mIBAs).

Regards
Mark

Mark D. Anderson, Chief Executive Officer, BirdLife South Africa

Appendix 3: Governance Forum recommendations

O&C/2021/SEP/Extended Penguin TT/01

African penguin colony closures: Finding a balance between minimizing costs to the small pelagic fishing industry while maximizing coverage of foraging area for breeding African penguins

Janet C Coetzee, Azwianewi Makhado, Carl D van der Lingen, Zishan Ebrahim, Alison Kock, Cloverley Lawrence, Fannie W Shabangu.

Background

The African penguin/Fisheries Synthesis Report Drafting Team met in July 2021 to consider two scientific recommendations regarding closures around penguin breeding colonies and to develop a Departmental compromise position in this regard. The proposals were for (i) closure of small pelagic fishing within a 20 km radius around six penguin breeding colonies for ten years, made by the Top Predator SWG (Scientific Working Group) of the Branch: Oceans and Coasts and SANParks (South African National Parks); and (ii) continuation of the current (in 2021) implemented 20 km seasonal closure around two islands in 2022 pending conclusion of further quantitative assessments to estimate the impact of the various drivers of the penguin population decline, made by the Small Pelagic SWG of the Branch: Fisheries Management.

Given the contrasting recommendations and that conflict management requires parties to recognize problems as shared ones and engage with clear goals and an awareness of trade-offs, the Drafting Team first attempted to find common ground and develop guiding principles to move the discussion forward. These guiding principles were:

- The African penguin population is in a critical state of decline, and urgent action is needed
- NEMA (National Environmental Management Act) principles of conservation, sustainable use and the precautionary approach need to inform the proposals
- Penguin colonies identified for closure were selected based on conservation and economic criteria
- The effects of long-term closures on the penguin population are unknown but are assumed to be larger than that observed during the short-term closures
- The small pelagic fishery is an important industry regionally and locally within the industrial fisheries sector. Closures will have an economic cost on the small pelagic fishery that will vary from colony to colony

At subsequent meetings, and using the guiding principles, the Drafting Team sought compromise through the (i) prioritization of the penguin colonies in terms of their importance for penguin conservation (e.g. carrying capacity, current status, rate of recent decline and regional representation) and (ii) in terms of the cost of closing areas around those colonies on the small pelagic fishery at a regional level. Following this process, agreement was reached on short, medium and long-term actions.

In the *short-term* (2021), there was agreement that closures as recommended and implemented by Branch: Fisheries Management in 2021 should be continued for the remainder of 2021, i.e. Dassen and St Croix islands are closed for six month periods, and Robben Island is closed for the whole year.

In the *medium-term* (2022 – 2025), there was agreement that three of the six colonies should remain open to small pelagic fishing, namely, Robben and Bird Islands and Stony Point, noting that restrictions that are currently in place for MPAs around those three colonies, will continue to apply. Agreement was also reached on the three colonies that should be closed to small pelagic fishing in the medium-term (2022 – 2025), namely Dassen, Dyer and St Croix Islands. However, the extent, i.e. boundaries of those closures, would be adjusted to try and minimize the cost of closures on the small pelagic fishery while attempting to maximize the coverage of African penguin foraging area.

In the *long-term* (2022 – 2032), the extent of the closures could be modified based on further research and evaluation. This research would run parallel to the medium term proposals and comprises three components. These are:

1. A quantitative assessment of the proportional contribution of all plausible major drivers (e.g., food availability, predation, climate change, disease, disturbance such as seismic surveys, vessel activity, and

research and tourism, and competition with other predators for food as well as the availability and quality of breeding habitat) of the African penguin population decline at relevant spatial scales. This is required to understand their relative importance better and further develop or initiate plans where appropriate to mitigate against them if possible. That assessment should be conducted urgently. A joint Task Team (Oceans and Coasts, SANParks, Fisheries and other stakeholders) should oversee this assessment from the start and specify, depending on data available, analyses methods. Given a lack of internal capacity, this should be outsourced to an entity with no previous close involvement in this process. No cost estimates are available at this time.

2. Rigorous cost/benefit analyses are essential and should be urgently developed to improve the estimation of costs and benefits of closure around individual colonies through an agreed framework. This should be expanded to include socio-economic information related to penguin-directed tourism and other biodiversity considerations. A joint Task Team (Oceans and Coasts, SANParks, Fisheries and other stakeholders, including appropriate economists) should oversee these analyses from the start and specify, depending on data available, analyses methods. Given a lack of internal capacity, this should be outsourced to an independent and objective entity, preferably with no previous close involvement in this process. No cost estimates are available at this time.

3. A quantitative assessment (to the extent possible) of the efficacy of current management interventions conducted to date under the APBMP (African Penguin Biodiversity Management Plan) should be conducted. It should be a priority action of the second APBMP. Given a lack of internal capacity, this should be budgeted for and outsourced under the APBMP to an entity with no previous close involvement in this process. This assessment will be essential for informing adaptive management measures to mitigate against all threats to penguins.

Determining the extent of island closures in the medium term for three of the colonies

Determining the extent of island closures for Dassen, Dyer and St Croix colonies was achieved by using available data on catches of sardine and anchovy around the colony and African penguin foraging positions. The Drafting Team compared penguin foraging and small pelagic catch data around Dassen, Dyer and St Croix islands and evaluated multiple closure variants. Those variants attempted to limit small pelagic fishing within the 75% kernel penguin FA (foraging area) and cover as many tracked GPS positions as possible. We also sought to reduce the estimated cost to the small pelagic fishing industry to 50% of what it would have been under a circular closure area of a 20 km radius. Shapes other than circles for closure areas were considered to provide more flexibility and increase the chances of meeting cost and benefit targets. Attempts were made to position the closure boundaries to increase navigational ease and for compliance reasons.

Although simultaneously meeting both targets (closure covers the 75% FA and reduces estimated costs by 50%) could not be attained for any of the three islands, the Drafting Team developed compromise positions on the extent and boundaries of the closures areas around these three islands. This document describes the data used to estimate the cost to the small pelagic fishery and the benefit to the African penguin (in terms of their foraging characteristics), and on which the compromise (trade-off) closure boundaries were selected.

Determining the average cost of closure

The cost of closure to the small pelagic fishing industry was measured based on the average annual percentage of the catch within the proposed closure area between 2011 and 2019. This can be scaled up to an economic cost, but that requires assumptions about how much of the catch within a proposed closure area is lost (lost opportunity cost) and the increased fuel cost of catching that fish elsewhere. For evaluating trade-offs, we, therefore, calculated the percentage of catch (a proxy for cost) that occurred within the proposed 20 km radius closed area around penguin breeding colonies and sought to reduce that by approximately 50% by adjusting the boundaries of the closure area. This was done separately for anchovy and sardine. However, around Dassen Island, the catch is dominated by anchovy and around St Croix Island, it is dominated by sardine hence catches were prioritized accordingly.

The average annual percentage of the catch occurring within the proposed closure area was determined as follows:

Reported catch positions, to the nearest nm (nautical mile), between 2011 and 2019 were assigned to a 1x1 nm grid cell. The annual proportion of the regional catch (west of Cape Agulhas and east of 24°E) of each species for each year within each grid cell was averaged over years in which that grid cell was open to fishing (fishing around colonies was prohibited in some years as part of the island closure experiment). The average proportion per grid cell was renormalized so that the proportions at a regional scale summed to one and were expressed as a percentage. Summing the percentages of catch per grid cell for those cells that are contained within the proposed closure area derives the cost of closure to the fishing industry. The percentage of the catch per grid cell for the regional catch is presented in Figures 1 and 2 for sardine and anchovy, respectively.

Determination of core foraging areas

Data collection

During the breeding (or chick-rearing period) between 2008 and 2019, one adult from pairs of African penguins rearing small chicks was equipped with a GPS logger for one foraging trip at six of the species major South African breeding colonies. Loggers were attached to the feathers on the dorsal midline of the bird's lower back using TESA® tape (Beiersdorf AG, Germany) following recommended methods for deployment on diving birds (Bannasch et al. 1994). No bird was tracked more than once per season. The GPS loggers were programmed to acquire a position at one-minute intervals. Tags were removed ~1–4 days after deployment, depending on the presence of the birds in the colonies.

Data analysis

Location data on land were removed, and tracks were split into trips between land-based events. Only complete trips (i.e. evidence of the bird leaving and returning to the colony) were retained for further analyses. Possible erroneous GPS locations, based on a transit speed of greater than 12.4 km h^{-1} (Wilson 1985), were filtered from the data and locations were linearly interpolated at one-minute intervals. For each colony (Table 1-3), the marine habitat use of the penguins was estimated using kernel utilization distributions (UD; Worton 1989) using the R package adehabitatHR (Calenge 2006). A smoothing factor of 7 km was used, following the methods of Dias et al. (2018), and the 50% and 75% UD contours were estimated for each colony to represent the penguins' core and home range, respectively. Figures 3, 4 and 5 show the individual foraging tracks and resultant foraging areas for Dassen, Dyer and St Croix Islands, respectively.

Finding a balance

The drawing of draft boundaries took into account four spatial data inputs:

1. A grid of data-points of the percentage of the catches per one square minute (= 1 nm)
2. The initial draft closure, a circle of 20 km radius around the island
3. The area that represents the core 75% (and 50%) penguin foraging kernels
4. Penguin tracking points (GPS tag-data)

The first draft boundary was a circular 20 km radius around the island (excluding landmass). This formed the basis of the initial cost calculation to fisheries (see above). Circular boundaries are harder to navigate and enforce than north-south and east-west lines, and thus the Team decided to use straight-line boundaries. Initially, draft boundaries attempted to include the entire 75% foraging kernel, using landmarks and existing MPA latitudes or longitudes as markers. However, the cost (i.e. the sum of catch percentage per one square nm for the closure area) to fisheries was similar to the original 20 km radius closure cost or sometimes higher. To reduce the cost to the fishery, the Drafting Team moved the boundary away from the 75% kernels and adjacent MPAs, but towards areas used by penguins foraging away from their core. If the cost to fisheries was still too high, further edits moved the boundary by one nm at a time to re-calculate the sum of costs captured under a draft area.

The proportion of the tracking points covered and the proportion of area (Albers Equal Area conical) of the 75% kernel covered by each draft was calculated. All data were tabulated for the initial circular draft and five additional (box/square) draft closures (Table 1-3).

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Calenge C (2006) The package "adehabitat" for the R software: A tool for the analysis of space and habitat use by animals. Ecol Modell 197:516–519.

Dias MP, Carneiro APB, Warwick-Evans V, Harris C, Lorenz K, Lascelles B, Clewlow HL, Dunn MJ, Hinke JT, Kim JH, Kokubun N, Manco F, Ratcliffe N, Santos M, Takahashi A, Trivelpiece W, Trathan PN (2018) Identification of marine Important Bird and Biodiversity Areas for penguins around the South Shetland Islands and South Orkney Islands. Ecol Evol 8:10520–10529.

Wilson RP (1985) The Jackass Penguin (Spheniscus demersus) as a pelagic predator. Mar Ecol Prog Ser 25:219–227.

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AM
MK

Appendix 4. Conservation Sector's comments on the CAFMLR process

Failed Consultative Process - Conservation Sector Group position and proposed way forward on recommended island closure delineations as deliberated on during the Consultative Advisory Forum for Marine Living Resources – Special Project to Review Penguin Conservation and Small Pelagic Fisheries Interactions (CAFMLR)

Date: 16 March 2022

Submitted by representatives of the Conservation Sector Group: Dr Alistair McInnes (BirdLife South Africa), Dr Lauren Waller (formerly: Southern African Foundation for the Conservation of Coastal Seabirds; currently: Endangered Wildlife Trust), Craig Smith (World-Wide Fund for Nature - South Africa)

Executive summary

1. African Penguins are currently listed as globally Endangered by the International Union for Conservation of Nature (IUCN) with their populations currently decreasing by 5-10% per annum. Regionally, in 2021, the east coast population in Algoa Bay met the IUCN Red Listing criteria for Critically Endangered status and the population on the west coast is predicted to be functionally extinct by 2030. Urgent conservation action is required to stem this decline. This conservation action must take the form of addressing the primary threats to the species, of which reduced availability of food ranks as number 1.
2. The final CAFMLR compromise proposal does not address the Minister's concerns about arresting the decline of African Penguins. It does not meet any of the criteria (see Appendix 1 for more details) stipulated by the Conservation Sector Group (CSG) for a biologically sensible compromise and, as such, the final recommendation is viewed as insufficient to make a meaningful difference to alleviate resource competition around important African Penguin colonies.
3. The CAFMLR process was flawed on several accounts (see Appendix 2 for more details) including the following weaknesses:
    a. The final recommendation submitted to the Minister was developed based on a lack of transparent socio-economic data on the actual replacement costs to the fisheries sector resulting from fishing closure periods during the Island Closure Experiment (this despite numerous requests for the submission of this information by the CSG).
    b. The CAFMLR proposal was informed by a compromise metric initially proposed by the Fisheries Sector Group (FSG), and not agreed to by the CSG. This shifted the decision space in favour of lower perceived costs to the fishing industry while preventing the CSG from achieving important biological considerations set out to guide a meaningful outcome for African Penguins.
    c. The constitution of the CAFMLR membership, while including fisheries scientist expertise, did not include seabird scientists which resulted in an unbalanced assessment of both the merits of the science of the Island Closure Experiment and the subsequent adjudication of a balanced compromise position.
4. The CSG recognises that the most recent updated peer-reviewed science on the results of the Island Closure Experiment demonstrates a biologically meaningful effect of island closures on population level impacts of African Penguins which will reduce the current population decline by up to 20% per annum.
5. **Proposed way forward:** to the extent that there remains dispute between the scientists from the FSG and the CSG, we would like to emphasise that, where there are threats of serious or irreversible damage (as there clearly are in this instance), lack of scientific certainty by all parties should not be used to delay conservation action. South African law stipulates the application of the Precautionary Principle in these instances and to this end, considering the dire and declining

status of the African Penguin, we recommend that all six colonies be afforded 100% marine Important Bird Area (mIBA) protection consistent with our original position at the end of the Extended Task Team process.

6. We recommend that the appropriate mechanism be activated through DFFE to source the actual socioeconomic costs from industry of the closures that took place over the 13 year period from 2008-2020 so that a clearer understanding of the real (not modelled) economic cost of closures be calculated so that a real compromise can be found.

Subject: FW: African Penguin conservation/island closures
Attachments: Engagement between Conservation Sector and Gansbaai Marine regarding Dyer Island closure to fishing.docx; Island closure proposals from Conservation Sector_ 20220710.pdf

Importance: High

From: Mark Anderson <ceo@birdlife.org.za>
Sent: Sunday, July 10, 2022 12:29 PM
To: Du Plessis, Morne <mduplessis@wwf.org.za>; Yolan Friedmann <yolanf@ewt.org.za>; Natalie Maskell <Natalie@sanccob.co.za>; Luthando Dziba <Luthando.Dziba@sanparks.org>; Alistair McInnes <alistair.mcinnes@birdlife.org.za>; Lauren Waller <LaurenW@ewt.org.za>; Tegan Carpenter-Kling <Tegan.Carpenter-Kling@birdlife.org.za>; Smith, Craig <csmith@wwf.org.za>; Alison Kock <Alison.Kock@sanparks.org>
Subject: FW: African Penguin conservation/island closures
Importance: High

Dear colleagues

See below and attached for your information.

Thanks to our scientists (Alistair and Tegan worked on the maps, and Lauren on the Gansbaai document, and I know that the rest of the team provided inputs) for their work, some of which was done during the weekend.

I will WhatsApp Minister Creecy and tell her that I have emailed the documents to her.

Regards
Mark

From: Mark Anderson <ceo@birdlife.org.za>
Sent: Sunday, 10 July 2022 12:20
To: minister@dffe.gov.za
Cc: Feroze Shaik <fshaik@environment.gov.za>
Subject: African Penguin conservation/island closures
Importance: High

Dear Minister Creecy

As requested by you when we met on 6 July 2022, please see the various Island Closure proposals (and notes to clarify the context under which the proposals were negotiated) and a document about our engagement with Gansbaai Marine.

Please note that these maps have been produced by Dr Alistair McInnes (BirdLife South Africa) and Dr Tegan Carpenter-Kling (BirdLife South Africa), with inputs from Dr Lauren Waller (Endangered Wildlife Trust, previously SANCCOB), Dr Alison Kock (SANParks) and Craig Smith (WWF-SA).

One of our biggest concerns we had during both the ETT and CAF processes was that the fishing industry did not provide information about the real replacement costs of the island closures. It is therefore important to note that the percentage catches for sardine and anchovy reflect catches when these islands were open to fishing, and therefore we do not know what happened to their effort and return during closed years.

MK AM

It is also worth noting that the Conservation Sector's fallback proposals during the ETT processes reflect suboptimal closures that were subject to certain conditions (this was not reflected in the report submitted to the Minister at the end of this process).

Finally, the CAF report also reflects a suboptimal Conservation Sector proposal, as we made it explicitly clear (both during the proceedings, which were recorded, and in our report) that the metric used in the calculations was flawed. This is one of the reasons why we reverted back to 100% mIBAs for all six islands in our CAF report.

The report summarises the engagements that Dr Lauren Waller had with Gansbaai Marine, the recommendations coming from those discussions and what we recently agreed as a reasonable concession around Dyer Island.

Please let me know if you need further clarification and, if necessary, I will involve one of our scientist during that discussion (to help clarify the detail on the maps).

Regards
Mark
(the attached documents are submitted on behalf of the Conservation Sector: BirdLife South Africa, Endangered Wildlife Trust, SANCCOB, SANParks and WWF-SA).

Mark D. Anderson
Chief Executive Officer

BirdLife SOUTH AFRICA
Giving Conservation Wings

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Engagement between Conservation Sector and Gansbaai Marine regarding Dyer Island closure to fishing

Background

The four islands of Dassen, Robben, St Croix and Bird were part of the Island Closure Experiment for 13 years. Given the African Penguin crisis and scientific evidence of closure benefits, the Conservation Sector recommended that all six colonies that have >1000 breeding pairs should be closed to small pelagic fishing to the full mIBA extent. However, the fishing company at Dyer Island (Gansbaai Marine) has indicated that if the full mIBA closures (or DFFE Governance Forum proposal) are implemented, they would need to close their doors. In a bilateral between Gansbaai Marine and the Conservation Sector representative (Dr Lauren Waller), and subsequent follow-up phone calls, the Managing Director indicated to us that he would support a complete closure (extent shown on map = CAF and ETT industry proposals) with an additional modified closure that only allowed his vessels, excluding the larger vessels from the west coast. He confirmed that the west coast vessels had extensive alternative fishing grounds, while the area that his vessels could operate in was smaller (given the smaller size of his vessels and that they are more restricted in terms of fishing days due to the weather). He further indicated that he would be happy to participate in a formal review of the socio-economic costs of closures and the impact on African Penguins. This closed area was proposed by Gansbaai Marine and formed part of the Industry proposal submitted by SAPFIA during the ETT and CAF processes (refer to maps).

The real costs of closures remain unknown. Costs to industry have not been decoupled from the collapse of the sardine stock, and actual socio-economic losses as a result of closures have not been supplied by the companies involved in the previous ICE spanning 13 years of data. Given the proximity of the Dyer Island colony to Stony Point, any management intervention in the proximity of Dyer Island is likely to have an impact on the Stony Point colony and the Conservation Sector is also concerned about the intensity of the sardine fishery that is focused in this area.

Recommendations

- Closure to all purse-seine fishing in the area which Gansbaai Marine agreed to be closed.
- The remaining extent of the DFFE original proposal be closed to the larger west coast fishing vessels.
- These restrictions should remain in place until new measures are adopted after the international review.
- The socio-economic costs for both Gansbaai Marine and the remaining small pelagic fleet, the change in fishing fleet behaviour and performance, and African Penguin demographics as a result of closures be investigated both at Dyer Island and Stony Point.

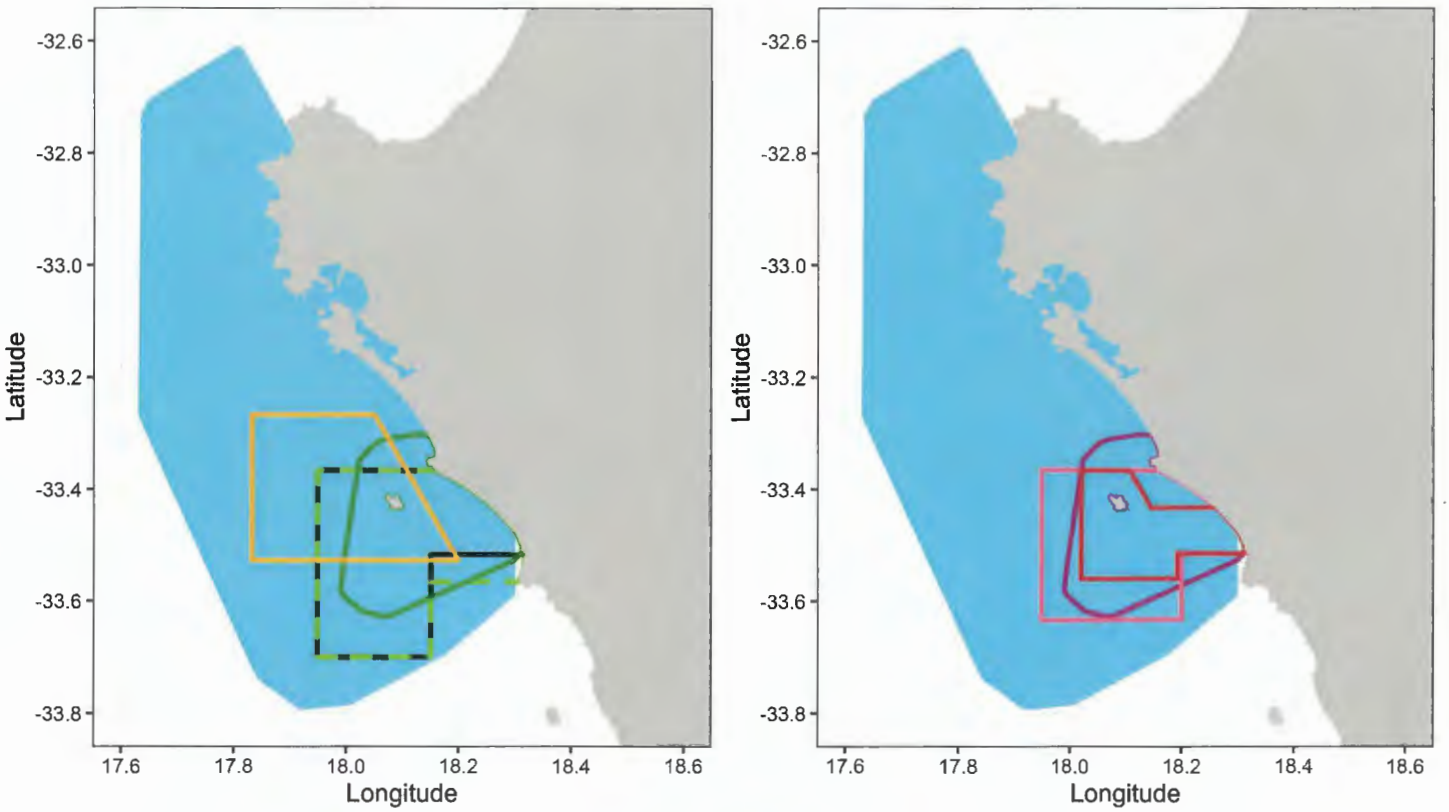
Conservation Sector
10 July 2022

MLC AM

African Penguin Island Closure Proposals: August 2021 – March 2022

Produced by Conservation Sector Group with layers provided by SANParks and BirdLife South Africa
10 July 2022

Dassen Island

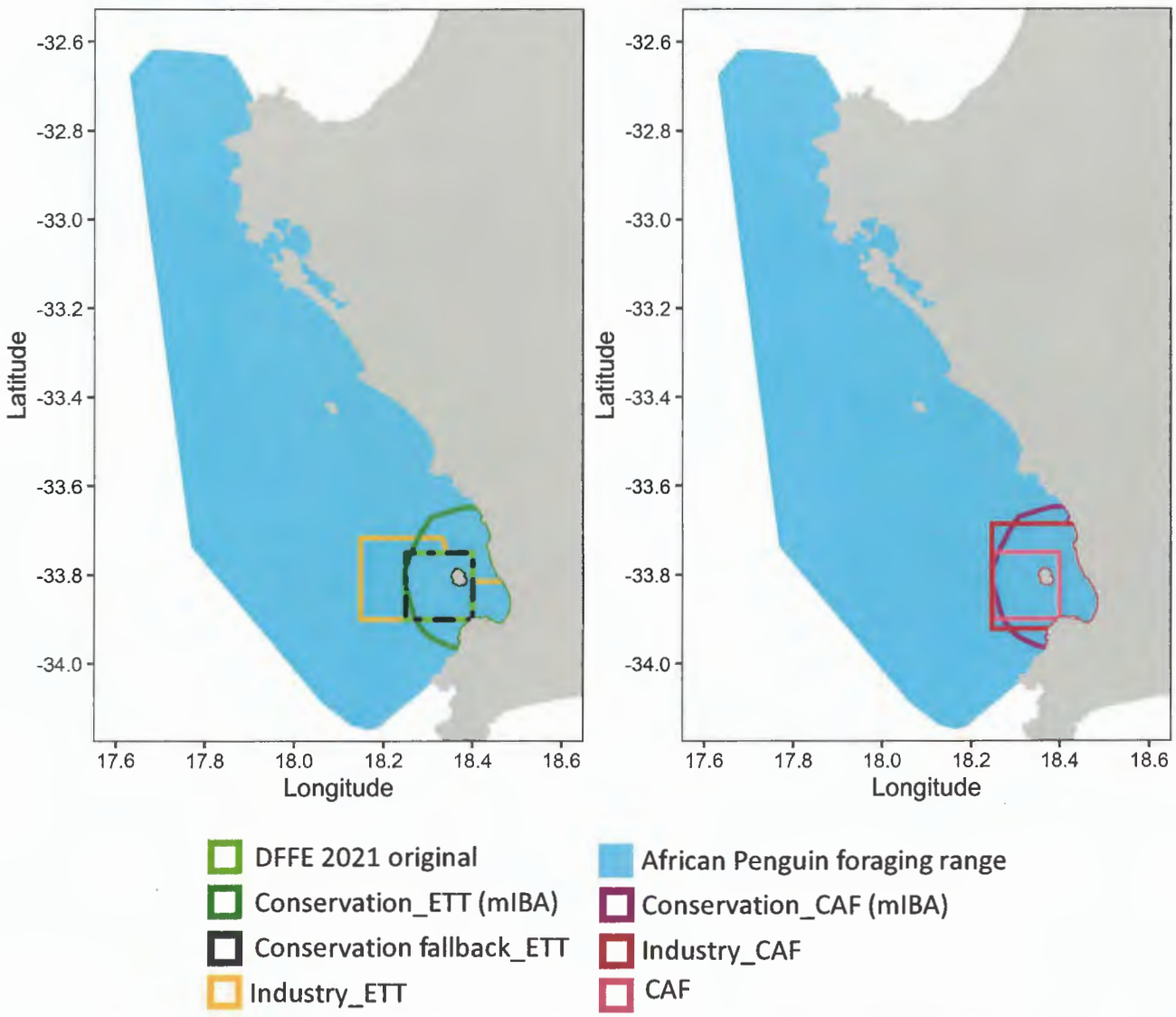


Colony	Date	Proposal	Conditions	% Foraging Range	% mIBA	% regional catch during open years	
						anchovy	sardine
Dassen Island	Aug-21	DFFE 2021 original	no	21.0	87.9	4.36	0.38
Dassen Island	Nov-21	Conservation_ETT	no	15.3	100.0	7.46	0.31
Dassen Island	Nov-21	Conservation fallback_ETT	management of fishing effort on boundary, 100% observer coverage	19.3	79.3	3.57	0.34
Dassen Island	Nov-21	Industry_ETT	no	17.6	39.5	2.64	0.41
Dassen Island	Mar-22	Conservation_CAF	no	15.3	100.0	7.46	0.31
Dassen Island	Mar-22	Industry_CAF	no	8.5	55.8	1.98	0.15

NOTE: the fallback options submitted by the Conservation Sector during the ETT were subject to certain conditions (in table). Anchovy and sardine catches reflect catches during open years to fishing during Island Closure Experiment.
Conservation ETT and CAF submissions based on following reports:

- Extended Task Team: African Penguin Island Closures. Conservation Stakeholder Synthesis Report. 2 November 2021
- Failed Consultative Process - Conservation Sector Group position and proposed way forward on recommended island closure delineations as deliberated on during the Consultative Advisory Forum for Marine Living Resources – Special Project to Review Penguin Conservation and Small Pelagic Fisheries Interactions (CAFMLR). Conservation Stakeholder Synthesis Report. 16 March 2022.

Robben Island



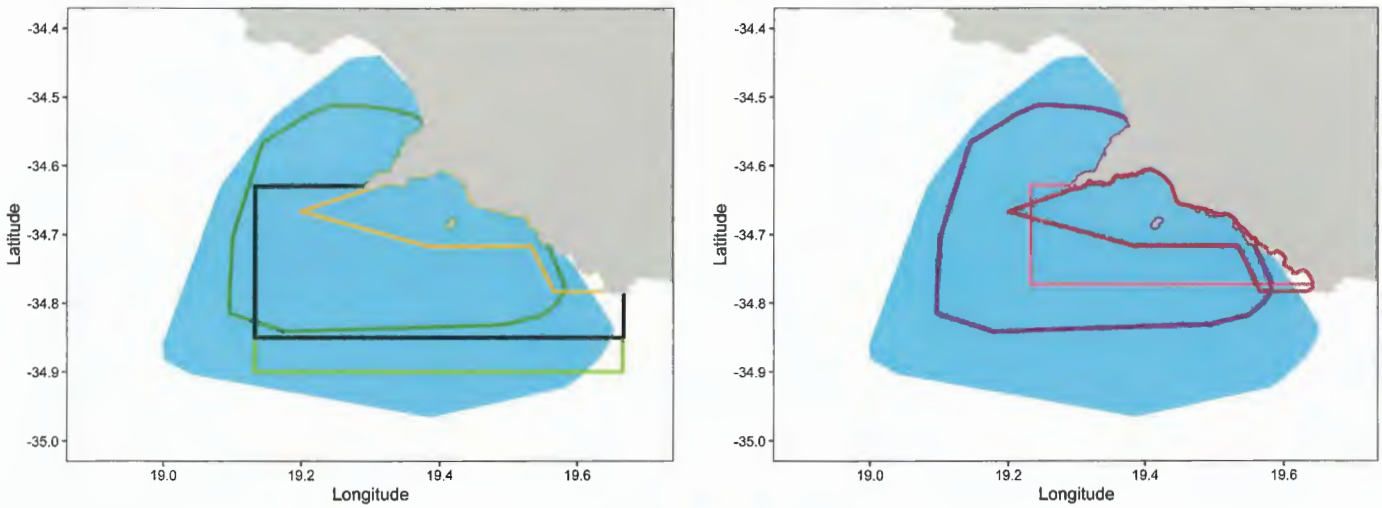
Colony	Date	Proposal	Conditions	% Foraging Range	% mIBA	% regional catch during open years	
						anchovy	sardine
Robben Island	Aug-21	DFFE 2021 original	no	3.6	41.3	0.00	0.00
Robben Island	Nov-21	Conservation_ETT	no	8.3	100.0	3.10	0.21
Robben Island	Nov-21	Conservation fallback_ETT	incentive for avoiding fishing in MIBA	3.6	41.3	0.00	0.00
Robben Island	Nov-21	Industry_ETT	no	8.3	60.8	0.68	0.14
Robben Island	Mar-22	Conservation_CAF	no	8.3	100.0	3.10	0.21
Robben Island	Mar-22	Industry_CAF	no	8.0	88.1	2.82	0.17
Robben Island	Mar-22	CAF	no	3.6	41.1	0.63	0.06

NOTE: the fallback options submitted by the Conservation Sector during the ETT were subject to certain conditions (in table). Anchovy and sardine catches reflect catches during open years to fishing during Island Closure Experiment.

Conservation ETT and CAF submissions based on following reports:

- Extended Task Team: African Penguin Island Closures. Conservation Stakeholder Synthesis Report. 2 November 2021
- Failed Consultative Process - Conservation Sector Group position and proposed way forward on recommended island closure delineations as deliberated on during the Consultative Advisory Forum for Marine Living Resources – Special Project to Review Penguin Conservation and Small Pelagic Fisheries Interactions (CAFMLR). Conservation Stakeholder Synthesis Report. 16 March 2022.

Dyer Island



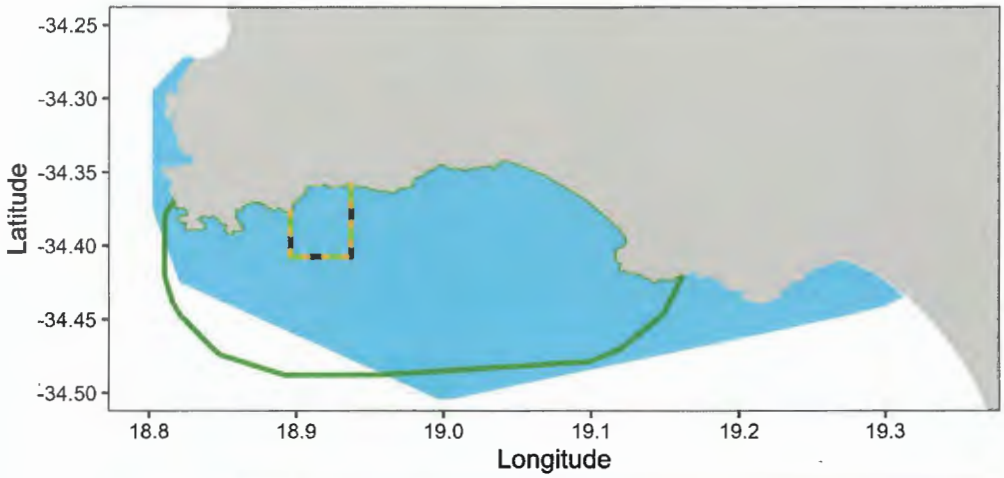
Colony	Date	Proposal	Conditions	% Foraging Range	% mIBA	% regional catch during open years	
						anchovy	sardine
Dyer Island	Aug-21	DFFE 2021 original	no	60.5	75.8	3.94	11.97
Dyer Island	Nov-21	Conservation_ETT	no	54.8	100.0	12.28	32.37
Dyer Island	Nov-21	Conservation fallback_ETT	management of fishing effort on bounday, 100% observer coverage	48.2	75.8	3.65	9.34
Dyer Island	Nov-21	Industry_ETT	no	11.8	20.1	0.12	0.22
Dyer Island	Mar-22	Conservation_CAF	no	54.8	100.0	12.28	32.37
Dyer Island	Mar-22	Industry_CAF	no	11.8	20.1	0.12	0.22
Dyer Island	Mar-22	CAF	no	22.1	39.2	1.28	1.26

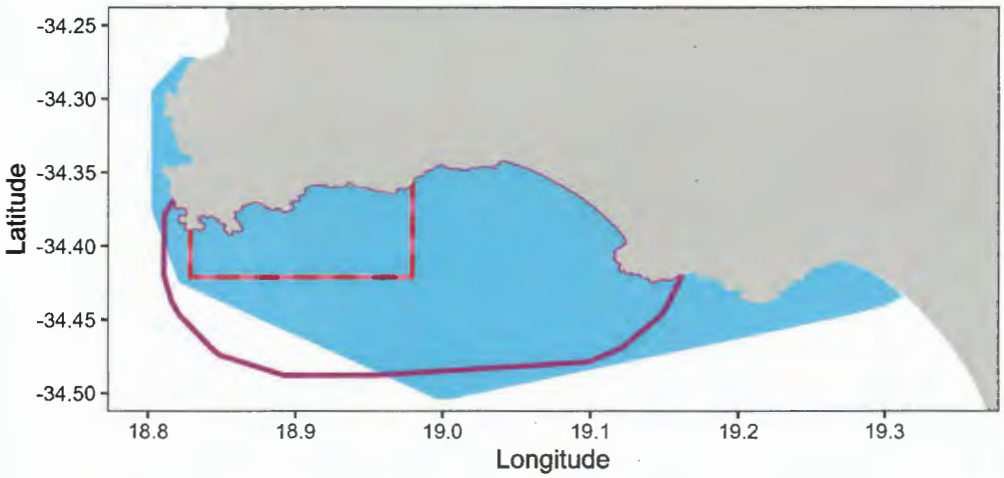
NOTE: the fallback options submitted by the Conservation Sector during the ETT were subject to certain conditions (in table). Concession for Gansbaai Marine negotiated with Conservation Sector during CAF.

Conservation ETT and CAF submissions based on following reports:

- Extended Task Team: African Penguin Island Closures. Conservation Stakeholder Synthesis Report. 2 November 2021
- Failed Consultative Process - Conservation Sector Group position and proposed way forward on recommended island closure delineations as deliberated on during the Consultative Advisory Forum for Marine Living Resources – Special Project to Review Penguin Conservation and Small Pelagic Fisheries Interactions (CAFMLR). Conservation Stakeholder Synthesis Report. 16 March 2022.

Stony Point





DFFE 2021 original
Conservation_ETT (mIBA)
Conservation fallback_ETT
Industry_ETT
African Penguin foraging range
Conservation_CAF (mIBA)
Industry_CAF
CAF

Colony	Date	Proposal	Conditions	% Foraging Range	% mIBA	% regional catch during open years	
						anchovy	sardine
Stony Point	Aug-21	DFFE 2021 original	no	4.6	5.2	0.00	0.00
Stony Point	Nov-21	Conservation_ETT	no	79.1	100.0	0.71	6.26
Stony Point	Nov-21	Conservation fallback_ETT	larger MIBA coverage, incentive for avoiding fishing in MIBA	4.6	5.2	0.00	0.00
Stony Point	Nov-21	Industry_ETT	no	4.6	5.2	0.00	0.00
Stony Point	Mar-22	Conservation_CAF	no	79.1	100.0	0.71	6.26
Stony Point	Mar-22	Industry_CAF	no	18.8	21.4	0.04	0.13
Stony Point	Mar-22	CAF	no	18.8	21.4	0.04	0.13

NOTE: the fallback options submitted by the Conservation Sector during the ETT were subject to certain conditions (in table).

Conservation ETT and CAF submissions based on following reports:

- Extended Task Team: African Penguin Island Closures. Conservation Stakeholder Synthesis Report. 2 November 2021
- Failed Consultative Process - Conservation Sector Group position and proposed way forward on recommended island closure delineations as deliberated on during the Consultative Advisory Forum for Marine Living Resources – Special Project to Review Penguin Conservation and Small Pelagic Fisheries Interactions (CAFMLR). Conservation Stakeholder Synthesis Report. 16 March 2022.

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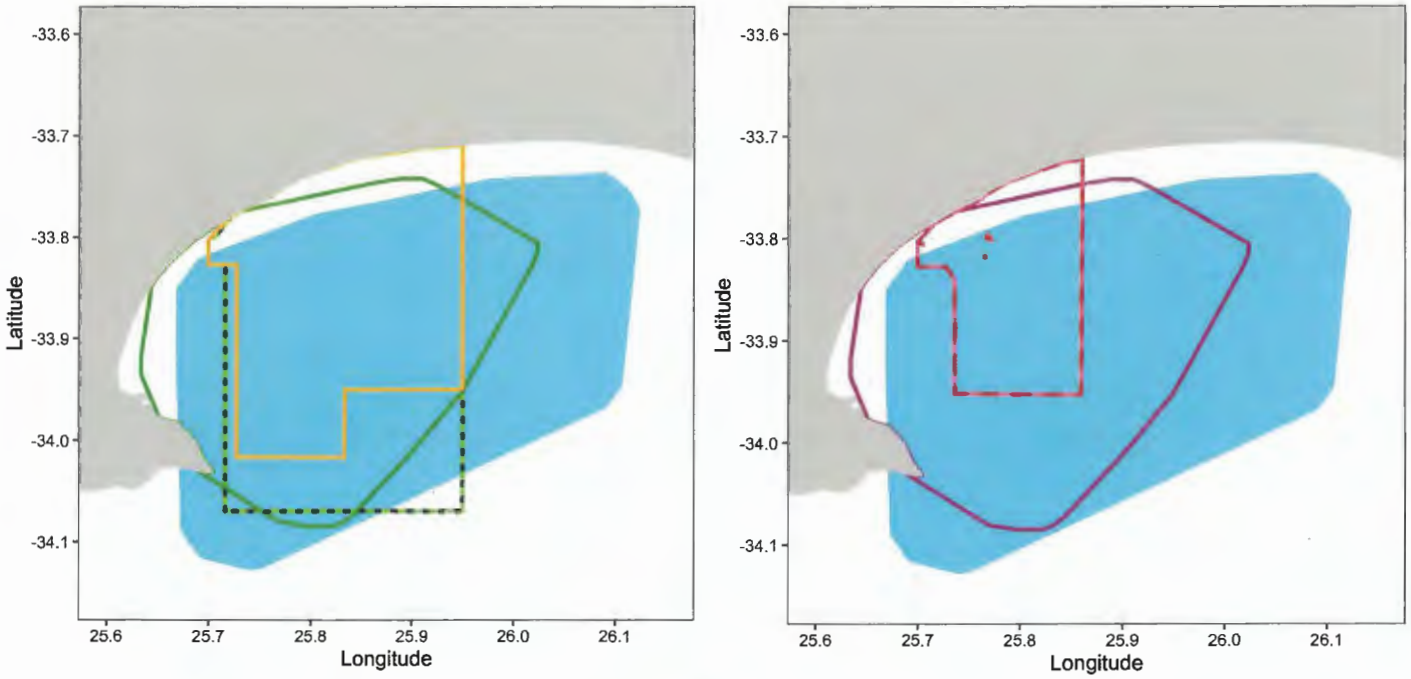
St Croix Island

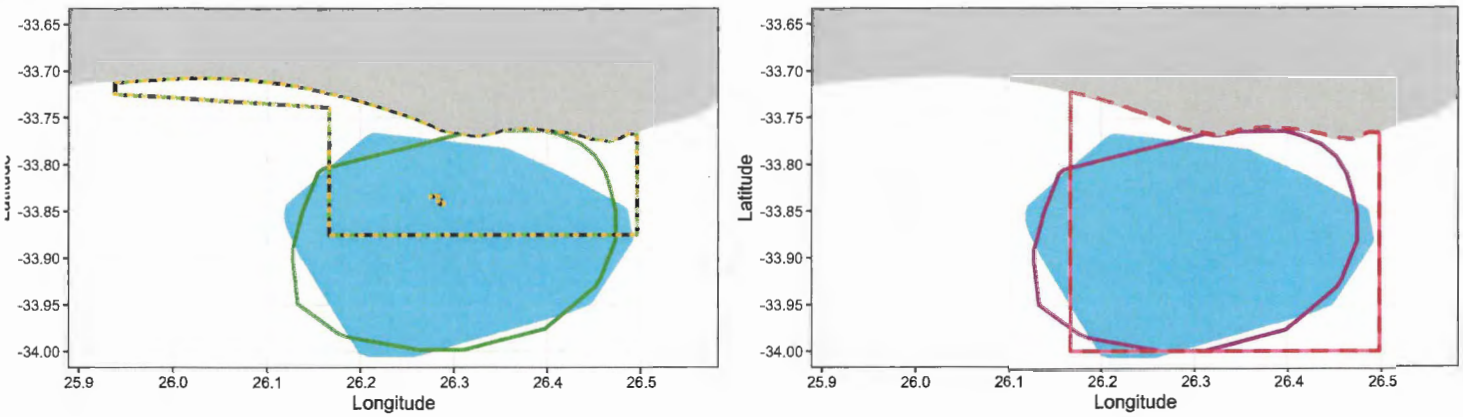


Colony	Date	Proposal	Conditions	% Foraging Range	% mIBA	% regional catch during open years	
						anchovy	sardine
St Croix Island	Aug-21	DFFE 2021 original	no	53.4	75.0	30.67	32.86
St Croix Island	Nov-21	Conservation_ETT	no	62.9	100.0	33.81	53.63
St Croix Island	Nov-21	Conservation fallback_ETT	incentive for avoiding fishing in MIBA, possibility of expansion after 5 year review	53.4	75.0	30.67	32.86
St Croix Island	Nov-21	Industry_ETT	no	36.9	57.3	30.66	28.55
St Croix Island	Mar-22	Conservation_CAF	no	62.9	100.0	33.81	53.63
St Croix Island	Mar-22	Industry_CAF	no	17.2	28.3	15.38	11.82
St Croix Island	Mar-22	CAF	no	17.2	28.3	15.38	11.82

NOTE: the fallback options submitted by the Conservation Sector during the ETT were subject to certain conditions (in table). Anchovy and sardine catches reflect catches during open years to fishing during Island Closure Experiment.
Conservation ETT and CAF submissions based on following reports:

- Extended Task Team: African Penguin Island Closures. Conservation Stakeholder Synthesis Report. 2 November 2021
- Failed Consultative Process - Conservation Sector Group position and proposed way forward on recommended island closure delineations as deliberated on during the Consultative Advisory Forum for Marine Living Resources – Special Project to Review Penguin Conservation and Small Pelagic Fisheries Interactions (CAFMLR). Conservation Stakeholder Synthesis Report. 16 March 2022.

Bird Island



Colony	Date	Proposal	Conditions	% Foraging Range	% mIBA	% regional catch during open years	
						anchovy	sardine
Bird Island	Aug-21	DFFE 2021 original	no	42.6	44.7	0.00	0.00
Bird Island	Nov-21	Conservation_ETT	no	92.7	100.0	0.00	4.52
Bird Island	Nov-21	Conservation fallback_ETT	expand MPA offshore, incentivise for avoiding fishing in MIBA	42.6	44.7	0.00	0.00
Bird Island	Nov-21	Industry_ETT	no	42.6	44.7	0.00	0.00
Bird Island	Mar-22	Conservation_CAF	no	92.7	100.0	0.00	4.52
Bird Island	Mar-22	Industry_CAF	no	93.0	92.6	0.00	3.02
Bird Island	Mar-22	CAF	no	93.0	92.6	0.00	3.02

NOTE: the fallback options submitted by the Conservation Sector during the ETT were subject to certain conditions (in table). Anchovy and sardine catches reflect catches during open years to fishing during Island Closure Experiment.

Conservation ETT and CAF submissions based on following reports:

- Extended Task Team: African Penguin Island Closures. Conservation Stakeholder Synthesis Report. 2 November 2021
- Failed Consultative Process - Conservation Sector Group position and proposed way forward on recommended island closure delineations as deliberated on during the Consultative Advisory Forum for Marine Living Resources – Special Project to Review Penguin Conservation and Small Pelagic Fisheries Interactions (CAFMLR). Conservation Stakeholder Synthesis Report. 16 March 2022.

"AM39"

From: Ashley Naidoo <ANaidoo@dffe.gov.za>
Sent: Friday, 12 August 2022 15:59
To: Mark Anderson; copeland.fishconsult; Dr Mike Bergh; Riedau; Lauren Waller; Alistair McInnes; Lisolomzi Fikizolo
Subject: Small Pelagic_Penguins_12 August meeting_outcomes
Attachments: V4_Final_ToRs_Fishing_Closures_Penguin_Review_12_August_2022.docx; PANEL_MEMBER_LIST_THE INTERNATIONAL REVIEW PANEL_Small Pelagic_Penguins.docx

Dear Mark, Mike, Riedau, Alistair, Lauren and Lisolomzi

Thank you for inputs today, and for making the meeting on short notice.

Please find attached the final version of the ToRs. Please accept that it may not have every input reflected as you constructed. I do however think that all of your inputs are covered in this version. I do still need to give it a language review. The Panel may also review.

I also attach the list of the agreed panel members as I removed this from the ToRs document for now. If will check with contact details for the panel nominees from Newi, Janet and Carl, but if you do have them ready at hand – please send to me.

Lisolomzi and myself will be following up with some bilateral calls on Monday and Tuesday to get to a conclusion on the interim closure following our discussion today.

Thank you and have a great weekend.
ashley

Ashley Naidoo. Ph.D. | Chief Director: Ocean & Coasts Research
Find Annual Ocean & Coasts Science Report at:
https://www.dffe.gov.za/documents/research#oceans
+27827847131

From: ANaidoo@dffe.gov.za
When: 11:00 - 13:30 12 August 2022
Subject: Small Pelagic_Penguins
Location: MS Teams

Microsoft Teams meeting

AM MK

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AM MK

forestry, fisheries
& the environment

Department:
Forestry, Fisheries and the Environment
REPUBLIC OF SOUTH AFRICA

PROPOSED TERMS OF REFERENCE FOR THE INTERNATIONAL REVIEW PANEL REGARDING FISHING CLOSURES ADJACENT TO SOUTH AFRICA'S AFRICAN PENGUIN BREEDING COLONIES AND DECLINES IN THE PENGUIN POPULATION *[INCLUDING REVIEWING THE RECOMMENDATIONS FROM THE GOVERNANCE FORUM AND THE MARINE LIVING RESOURCES CONSULTATIVE ADVISORY FORUM]*

CONTENTS

1. BACKGROUND

In the mid-2000s, a substantial decrease in numbers of adult African Penguins was observed off western South Africa. In response to this observed decrease from 2006 and the potential impact of food competition between penguins and fishers in the vicinity of breeding islands, a study to assess the effects of closure to purse-seine fishing around penguin breeding colonies was initiated in 2008. Since the study required income sacrifice from the industry, this study, the Island Closure Experiment (ICE), comprised of two parts: (i) a feasibility study (2008– 2014) during which purse-seine fishing was prohibited in an alternating pattern around two pairs of nearby colonies and data on penguins (as well as on small pelagic fish from the routine pelagic fish management process) were collected to determine whether an experiment would have adequate statistical power to detect a significant effect of closure if such existed; and (ii) an

experimental phase (2015–2019) where these alternating island closures were continued with associated continuation of the monitoring during the feasibility study. The results, however, led to a lengthy debate with dichotomous views. The plans for and results of the ICE were regularly reviewed by DFFE's Small Pelagic Scientific Working Group, informed by the advice provided from an annual review, i.e. a DFFE review meeting of world leading quantitative marine resource scientists on ten occasions since 2006. Most recently, the scientific results have been debated in the peer-reviewed literature (Sydeman et al. 2021, Butterworth and Ross-Gillespie 2022, Sydeman et al. 2022).

A Governance Forum (GF), comprising researchers and managers from the Branches: Oceans and Coasts and Fisheries Management as well as SANParks (South African National Parks), was established in 2021. The aim was to prepare a comprehensive Synthesis Report on the current state of knowledge relating to African Penguins, island closures, fisheries management relevant to African Penguins and the socioeconomics of island closures and penguin-related tourism. The Governance Forum compiled a report titled "A Synthesis of Current Scientific Information Relating to the Decline in the African Penguin Population, the Small Pelagic Fishery and Island Closures" (DFFE 2021) which collated science over the last decade on penguins, small pelagic fisheries and their interactions including the Island Closure Experiments. The Synthesis Report was further scrutinized by two independent, international reviewers who provided extensive comments; the Governance Forum's Extended Task Team (which added fishing industry and conservation NGO representation to the Governance Forum) and then by the Minister's Consultative Advisory Forum for Marine Living Resources (CAFMLR). Comments on that Synthesis Report and recommendations produced by these groups remain contested.

The Department now seeks to establish an International Panel of Experts to

(i) Review the interpretation of the ICE

(ii) explore the value of island closures in providing meaningful benefits to penguins

(iii) review the processes and outcomes completed through the GF and the CAFMLR process

(iv) make recommendations on the implementation of island closures, including spatial delineation, time frames and

(v) advise on further science and monitoring methods.

2. OBJECTIVES

The International Review Panel will:

a) Review the quantitative scientific analyses of the Island Closure Experiment (ICE) and subsequent publications to evaluate whether the scientific evidence from ICE indicates that limiting small pelagic fishing around colonies provides a meaningful improvement to penguin parameters that have a known scientific link to population demography in the context of the present rate of population decline. Assess cost-benefit trade-off of 1) costs to fisheries, versus 2) proportion of penguin foraging range protected during the breeding season, for different fisheries exclusion scenarios. The losses to the fishery should be fleshed out using available economic information, such as was used in the GF and CAF processes. The panel may also comment on the limitations of available

information and methods (data collection) to improve assessment of positive penguin outcomes as well as fishery impact. Costs to fisheries must include an assessment of replacement costs accrued during periods closed to fishing during the ICE.

b) Within the context of an urgent need to implement timeous conservation actions for the African Penguin and considering the information and rationale of the various scientific reviews and associated documents of the Island Closure Experiment evaluate the evidence supporting benefits of fishery restrictions around African Penguin colonies to adopt precautionary measures by implementing long-term fishery restrictions.

c) If closures or fishing limitations are viewed to contribute positively to the support of the African Penguin population, recommend a trade-off mechanism as a basis for setting fishing limitations and mapping. This mechanism must consider potential positive return to penguins and impact on fisheries. (As a basis for discussion the Governance Forum Approach and the CAF approach can be considered.) Consideration must also be given to current state of observations, data and analyses (Penguin, Environmental and Fisheries Economic data). Recommendations on these can be included under future science considerations.

    a. Delineation of fishery no-take areas around six African Penguin colonies (Dassen Island, Robben Island, Dyer Island, Stony Point, St Croix Island and Bird Island) and the duration of the closures, considering life history traits, e.g. age when most birds start breeding, and associated duration required to signal potential population benefits.

d) Recommendations on the scientific work that is required to evaluate the effectiveness of such no-take areas.

e) Recommendations about what scientific work is appropriate in the short-term to determine the dominant causes of the rapid and concerning rate of decline of the penguin population, including recommendations about the use of ecosystem model approaches such as MICE (models of intermediate complexity for ecosystem assessments).

3. PANEL PROCESS AND PROCEDURES

a. The panel should attempt to reach consensus but if not achieved, names supporting each of the alternative views should be noted. There should be no voting.

b. Virtual and physical meetings are not be prescribed at this stage. One option is to have one or two brief virtual meetings to familiarise the panel with the key issues, followed by a week-long physical meeting in Cape Town to wrap it up. Travel expenses covered by DFFE. [Panel members may opt to join the week session virtually as well.]

c. Panel members will not be paid for their time but consideration can be given to pay an honorarium.

d. Meetings may include closed meetings, meetings with protagonists separately and together.

e. DFFE will appoint Chair and Rapporteur may be elected by the panel, with support from DFFE.

f. DFFE will provide secretarial services.

4. TASKS

The following tasks are required from the panel (administrative and secretarial functions will be supported by DFFE):

a. Panel Members must agree to being available and accepting the draft Terms of Reference, and constitute themselves as a Panel with the Chair.

b. Notification of stakeholders about deadlines for their submissions.

c. Drawing up of a list of attendees at plenary meetings where submissions are heard, indicating who are key participants and who are observers (Sectors will be asked to submit names of observers to be invited.).

d. The appointed Panel Members to meet with DFFE Senior Managers to clarify their task and output.

e. Review the Terms of References and amend where required.

f. Review documents and information pertaining to proposed island closures for penguin population recovery support. While these will initially be composed of an agreed selection (by local scientists and stakeholders) from the extensive number of documents produced over the last 1.5 years, panel members may request any additional documents such as scientific working group documents. Documents to be categorised into (a) those relevant to the interpretation of the ICE results, (b) documents that propose island closures including stakeholder reports submitted during the ETT and CAFMLR processes and (c) other related documents. This is required to facilitate the panel dividing its focus between (i) an initial assessment of whether the analysis of ICE supports the view that island closures will benefit penguins, and (ii) if (i) suggests that island closures will benefit penguins, what closures should be implemented, or what are the trade-offs involved for such closures.

g. Meet with conservation and fisheries sector scientists and where each will be allowed to present their arguments / interpretations of information. (At panel discretion, other scientists, experts may be invited to make presentations.)

h. Respond to objectives (a) to (e) above.

i. Prepare report on outcomes.

5. OUTCOMES AND RECOMMENDATIONS

a) Recommend whether, based on the results from ICE and other evidence-based information, island closures are likely to benefit penguins.

b) Describe scientific and evidence-based rationale for recommending implementing/not implementing fishing limitation around penguin colonies

c) Make recommendations about whether % of penguin foraging range and other biological criteria (such as regional representation, population recovery potential, monitoring and evaluation potential) provide a basis for determining benefits from closures for penguins, and assess the merits of different proposed methods to delineate important penguin foraging habitat.

d) Make specific recommendations on trade-off mechanism for island closures in the event that the panel finds that the results of ICE and other evidence demonstrate that island closure are likely to benefit penguins, including specific areas and durations. In addition to recommendations on trade-off mechanism, panel must preferably

MK

ROM

advise on biologically meaningful penguin habitat extents for fishery limitations per island, recommendations must be spatially and temporally explicit, and provided on a map. [DFFE will provide mapping capacity.]

e) Provide advice and recommendations on best estimates and uncertainties of the ratio between penguins gained and losses sustained by industry as a result of island closures for future suggested closure options.

f) Provide advice on a well-structured analyses framework to monitor the impact of island closures, including what penguin and fish data needs to be collected; how benefits to penguins are to be determined; and how these will be analysed

g) To recommend scientific analyses, including but not limited to MICE, to determine the reasons for the decline in the penguin population.

6. DOCUMENTS

The Department will provide the Panel Members with all the required documents. Sector representatives and panel members may request additional documents to be included. These initially will include:

1. Key documents detailing the ICE and the recent relevant analyses of the results of the ICE.
2. Key scientific peer-reviewed publications on the results of the ICE
3. DFFE Scientific Summary Report – Coetzee et al 2021. "A Synthesis of Current Scientific Information Relating to the Decline in the African Penguin Population, the Small Pelagic Fishery and Island Closures". To include all comments requested and provided on this document by stakeholders including seabird conservationists and SAPFIA and other fishing industry representatives.
4. Governance Forum Recommendations (and including Discussions Maps of Extended Task Team – these were not finalised as formal recommendations but did move the discussion from the GF which used percentage forage areas to percentage of Marine Important Bird Areas) and stakeholder reports.
5. CAF Recommendations and stakeholder reports.

7. DURATION AND WORK PLAN

It is envisaged that the work of the panel should be completed by the end of 2022. Potential panellists will have to be approached and determine if this fits into their work schedule for the year, with the one-week meeting tentatively scheduled for end of November. .

(Assuming a 1 week working session in Cape Town without virtual working meetings except for one or two online introductory pre-meetings which may allow some time-saving for the in-person week schedule.)

Document Distribution as early as possible before meeting but not less than 2 weeks before meeting.

Sector representatives will be informed as early as possible on meeting schedule with panel, including timelines for submission of any documentation (such as presentations) that may need distribution to the panel. Ideally documents should also be submitted to Panel at least two weeks before meeting.

DFFE (including SANParks) staff (Seabird scientists, Fisheries Scientists, GIS expert practitioners will be on standby during Panel Deliberations.)

Invited attendees lists will be finalised a week before the meeting.

Tentative Schedule

DAY 1

1.1 Opening and brief description
1.2 Clarify ToRs and expected outcomes
1.3 Presentation by Conservation Sector
1.4 Presentation by Fishing Sector
1.5 [Other expert presentations, as may be requested by panel. Panel may determine if some questions from observers may be heard.]

(Sector presentations will cover perceptions and interpretation of fishing limitations and penguin population success; ICE; GF; CAF and Future Science. Sector representations can included comment on existing/published interpretations.)

DAY 2

2.1 Panel Deliberations: fishing limitations and penguin population success
2.2 Panel Deliberations: ICE

DAY 3

3.1 Panel Deliberations: GF and CAF

DAY 4

4.1 Panel Deliberations: GF and CAF

(Possible time allocation for further engagement with Conservation/Fishing Sector reps)

DAY 5

5.1 Formulate Recommendations & Report Compilation (Contents of report must include Items in Section 6 above - OUTCOMES AND RECOMMENDATIONS, Report Drafting can occur throughout the week.)

8. ADDITIONAL DOCUMENTS TO BE SUBMITTED TO THE INTERNATIONAL PANEL

I. Butterworth, D.S. and Ross-Gillespie, A. 2021a. A revised summary of results for the island closure experiment. Department of Forestry, Fisheries and the Environment report FISHERIES/2021/JUN/SWG-PEL/41. 5pp.

II. Butterworth, D.S. and Ross-Gillespie, A. 2021b. A response to some queries concerning the revised summary of results for the island closure experiment provided in FISHERIES/2021/JUN/SWG-PEL/41. Department of Forestry, Fisheries and the Environment report FISHERIES/2021/SEP/SWG-PEL/59. 6pp.

III. Butterworth, D.S. and Ross-Gillespie, A. 2022. Comment on "South Africa's experimental fisheries closures and recovery of the endangered_ African penguin" by Sydeman et al. (2021). ICES Journal of Marine Science. DOI: 10.1093/icesjms/fsac113. Supplementary material to this publication to be included.

IV. Makhado AB, McInnes AM, Hagen C, Ludynia K, Masotla M, Pichegru L et al. 2020a. Motivation for urgent need to implement closures to purse-seine fishing around South Africa's six largest African Penguin colonies.

AM MK

Report No. FISHERIES/2020/DEC/SWG-PEL/126. Cape Town, South Africa: Department of Environment, Forestry and Fisheries.

V. Makhado A, McInnes A, Hagen C, Sherley R, Waller L, Pichegru L et al. 2020b. Recommendations for island closures around African Penguin colonies. Report No. FISHERIES/2020/OCT/SWGPEL/ 105REV. Cape Town, South Africa: Department of Environment, Forestry and Fisheries.

VI. Ross-Gillespie, A. and Butterworth, D. S. 2021. Updated analysis of results from data arising from the Island Closure Experiment. Department of Forestry, Fisheries and the Environment report FISHERIES/2021/JUN/SWG-PEL/39rev.

VII. SAPFIA, 2021. Letter to Deputy Director-General: Oceans and Coasts Ms J Beaumont dated 5 November 2021, "Re: Review of The Synthesis of Current Scientific Information Relating to The Decline in The African Penguin Population, The Small Pelagic Fishery and Island Closures, by Philip N. Trathan". 2pp.

VIII. Sherley, R. B., Barham, B. J., Barham, P. J., Campbell, K. J., Crawford, R. J. M., Grigg, J., Horswill, C., McInnes, A., Morris, T. L., Pichegru, L., Steinfurth, A., Weller, F., Winker, H. and Votier, S.C. 2018. Bayesian inference reveals positive but subtle effects of experimental fishery closures on marine predator demographics. Proceedings of the Royal Society B: Biological Sciences, 285: 20172443.

IX. Sherley, R. B., Barham, B. J., Barham, P. J., Campbell, K. J., Crawford, R. J. M., Grigg, J., Horswill, C., McInnes, A., Morris, T. L., Pichegru, L., Steinfurth, A., Weller, F., Winker, H. and Votier, S.C. 2021. Correction to Bayesian inference reveals positive but subtle effects of experimental fishery closures on marine predator demographics. Proceedings of the Royal Society B: Biological Sciences, 288: 20212129.

X. Sydeman, W. J., Hunt, G. L., Pikitch, E. K., Parrish, J. K., Piatt, J. F., Boersma, P. D., Kaufman, L., Anderson, D.W., Thompson, S.A. and Sherley, R.B. 2021. South Africa's experimental fisheries closures and recovery of the endangered African penguin. ICES Journal of Marine Science. https://doi.org/10.1093/icesjms/fsab231. Supplementary information to made available

XI. Sydeman, W. J., Hunt, G. L., Pikitch, E. K., Parrish, J. K., Piatt, J. F., Boersma, P. D., Kaufman, L., Anderson, D.W., Thompson, S.A. and Sherley, R.B. 2022. African Penguins and Localized Fisheries Management: Response to Butterworth and Ross-Gillespie. ICES Journal of Marine Science, 2022, 0, 1–7. DOI: 10.1093/icesjms/fsac116. Supplementary information to be made available.

XII. Trathan, P.N. 2021.Review of the Synthesis of Current Scientific Information Relating to the Decline in the African Penguin Population, the Small Pelagic Fishery and Island Closures. 20 September 2021, 12 pp.

XIII. Punt, A.E. 2021.Review of the Synthesis of Current Scientific Information Relating to the Decline in the African Penguin Population, the Small Pelagic Fishery and Island Closures. September 2021.

XIV. Coetzee et 2021. Synthesis of Current Scientific Information Relating to the Decline in the African Penguin Population, the Small Pelagic Fishery and Island Closures.

XV. Comments by SAPFIA on "Synthesis of Current Scientific Information Relating to the Decline in the African Penguin Population, the Small Pelagic Fishery and Island Closures"

XVI. Extended Task Team: African Penguin Island Closures. Conservation Stakeholder Synthesis Report. 2 November 2021

AM MK

XVII. Failed Consultative Process - Conservation Sector Group position and proposed way forward on recommended island closure delineations as deliberated on during the Consultative Advisory Forum for Marine Living Resources – Special Project to Review Penguin Conservation and Small Pelagic Fisheries Interactions (CAFMLR). Conservation Stakeholder Synthesis Report. 16 March 2022.

XVIII. Carpenter-Kling, T., de Blocq, A., Hagen, C. et al. Important marine areas for endangered African penguins before and after the crucial stage of moulting. Sci Rep 12, 9489 (2022). https://doi.org/10.1038/s41598-022-12969-w

XIX. National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) Draft African Penguin Biodiversity Management Plan [G7061-GoN2032]

XX. Sectors will be allowed to add to documents list.

AOI MIC

THE INTERNATIONAL REVIEW PANEL REGARDING FISHING CLOSURES ADJACENT TO SOUTH AFRICA'S AFRICAN PENGUIN BREEDING COLONIES AND DECLINES IN THE PENGUIN POPULATION *[INCLUDING REVIEWING THE RECOMMENDATIONS FROM THE GOVERNANCE FORUM AND THE MARINE LIVING RESOURCES CONSULTATIVE ADVISORY FORUM]*

AGREED PANEL MEMBERS – 12 August 2022

Professor Bob Furness
Dr Malcolm Haddon
Dr Ana Parma
Prof Andre Punt
Dr Phil Trathan

Reserves

Conservation

Dr Claire Saraux
Jefferson Hinke
Ellen Pikitch

Fisheries

Dr Eva Plaganyi
Dr Tom Curruthers

DFFE Chair Suggestion

Prof Jesper Raakjaer

AM
MK

Subject: RE: African Penguin conservation/island closures

From: Mark Anderson <ceo@birdlife.org.za>
Sent: Monday, August 15, 2022 7:03 PM
To: Lauren Waller <LaurenW@ewt.org.za>; Yolan Friedmann <yolanf@ewt.org.za>; mduplessis@wwf.org.za; Natalie Maskell <Natalie@sanccob.co.za>; Dr Luthando Dziba <Luthando.Dziba@sanparks.org>; Alistair McInnes <alistair.mcinnes@birdlife.org.za>; Smith, Craig <csmith@wwf.org.za>; Alison.Kock <Alison.Kock@sanparks.org>
Subject: RE: African Penguin conservation/island closures

Thanks, Lauren

We appreciate your assistance with this important matter.

Regards
Mark

From: Lauren Waller <LaurenW@ewt.org.za>
Sent: Monday, 15 August 2022 16:17
To: Mark Anderson <ceo@birdlife.org.za>; Yolan Friedmann <yolanf@ewt.org.za>; mduplessis@wwf.org.za; Natalie Maskell <Natalie@sanccob.co.za>; Dr Luthando Dziba <Luthando.Dziba@sanparks.org>; Alistair McInnes <alistair.mcinnes@birdlife.org.za>; Smith, Craig <csmith@wwf.org.za>; Alison.Kock <Alison.Kock@sanparks.org>
Subject: FW: African Penguin conservation/island closures
Importance: High

Dear Colleagues

Please see below the request from Ashley this morning, and our response. He is currently sitting with Lisolomzi and they are going to chat to Mike after having read the Dyer one-pager. He is going to request to Redah that St Croix be closed given that they have already achieved their quota.....

Warm regards
Lauren

From: Lauren Waller
Sent: Monday, August 15, 2022 4:03 PM
To: Ashley Naidoo <ANaidoo@dffe.gov.za>; Lisolomzi Fikizolo <LFikizolo@dffe.gov.za>
Cc: Alistair McInnes <alistair.mcinnes@birdlife.org.za>
Subject: FW: African Penguin conservation/island closures
Importance: High

Dear Ashley and Lisolomzi

Thanks so much for the email and the opportunity to engage further.

In response to your query below, we thought it might be helpful for you to see the attached two documents in case you have not received them already. These explain our rationale for the spatial management in terms of the different size vessels as you requested.

AM M.E

The Word document is a one-pager that summarises the recommendation for Dyer Island. You can read that together with the Dyer Island map on page 3 of the pdf. Essentially, the Red area on the right map is to be closed completely, and the remaining area of the GF proposal for Dyer be excluded only for the larger west coast vessels (i.e. only Gansbaai Marine are to be allowed to fish). This goes with the agreement that it is reviewed on completion of the International Review and that "The socio-economic costs for both Gansbaai Marine and the remaining small pelagic fleet, the change in fishing fleet behaviour and performance, and African Penguin demographics as a result of closures be investigated both at Dyer Island and Stony Point." In my engagement with Gansbaai Marine, they made it clear that they would be prepared to open their books and engage in a study that looked at costs of closures to them and the benefit to penguins (they of course also want to know impact of other threats).

Ashley, I cannot in all good conscience however, not point out the tables that accompany these maps. Here we have worked out for all the various proposals, what % of the full penguin foraging range is protected; the % of the MIBA that is covered, as well as what % of the catch this means for industry. The imbalance is just so very clear.

Hope this helps, and do let us know if you need anything clarified. Just to note that I did clear it with Mark that I could forward his email on before sending this on to you.

Warm regards
Lauren

From: Mark Anderson <ceo@birdlife.org.za>
Sent: Sunday, 10 July 2022 12:20
To: minister@dffe.gov.za
Cc: Feroze Shaik <fshaik@environment.gov.za>
Subject: African Penguin conservation/island closures
Importance: High

Dear Minister Creecy

As requested by you when we met on 6 July 2022, please see the various Island Closure proposals (and notes to clarify the context under which the proposals were negotiated) and a document about our engagement with Gansbaai Marine.

Please note that these maps have been produced by Dr Alistair McInnes (BirdLife South Africa) and Dr Tegan Carpenter-Kling (BirdLife South Africa), with inputs from Dr Lauren Waller (Endangered Wildlife Trust, previously SANCCOB), Dr Alison Kock (SANParks) and Craig Smith (WWF-SA).

One of our biggest concerns we had during both the ETT and CAF processes was that the fishing industry did not provide information about the real replacement costs of the island closures. It is therefore important to note that the percentage catches for sardine and anchovy reflect catches when these islands were open to fishing, and therefore we do not know what happened to their effort and return during closed years.

It is also worth noting that the Conservation Sector's fallback proposals during the ETT processes reflect suboptimal closures that were subject to certain conditions (this was not reflected in the report submitted to the Minister at the end of this process).

Finally, the CAF report also reflects a suboptimal Conservation Sector proposal, as we made it explicitly clear (both during the proceedings, which were recorded, and in our report) that the metric used in the calculations was flawed. This is one of the reasons why we reverted back to 100% mIBAs for all six islands in our CAF report.

The report summarises the engagements that Dr Lauren Waller had with Gansbaai Marine, the recommendations coming from those discussions and what we recently agreed as a reasonable concession around Dyer Island.

Please let me know if you need further clarification and, if necessary, I will involve one of our scientist during that discussion (to help clarify the detail on the maps).

Regards
Mark
(the attached documents are submitted on behalf of the Conservation Sector: BirdLife South Africa, Endangered Wildlife Trust, SANCCOB, SANParks and WWF-SA).

Mark D. Anderson
Chief Executive Officer

From: Ashley Naidoo ANaidoo@dffe.gov.za
Sent: Monday, August 15, 2022 9:57 AM
To: Lauren Waller LaurenW@ewt.org.za; Alistair McInnes alistair.mcinnes@birdlife.org.za
Cc: Lisolomzi Fikizolo LFikizolo@dffe.gov.za
Subject: Dyer island compromise

Dear Lauren and Alistair (Lisolomzi copied)

Hope you had some beak over the weekend. From our last week's discussion, I am pursuing the Dyer Island and St. Croix interim closure.

Lauren, last week you mentioned that there could some allowance for smaller vessel in and around Dyer, could you expand on this. In this option are you suggesting that smaller vessels are allowed to fish unrestricted in and around Dyer or with some restriction?

[My assumption is that Dassen, Robben, Stony and Bird as per GF – with the last three as per the MPA borders, and Dassen as per draft 6 on slide 8 (table), mapped on slide 10 separately?]

(Hoping for a reply today – but let me know what is possible.)

Thank you
ashley

AoL
M.K

Subject: RE: Negotaitons thus far

From: Ashley Naidoo <ANaidoo@dffe.gov.za>
Sent: Wednesday, August 17, 2022 8:55 AM
To: Mark Anderson <ceo@birdlife.org.za>
Cc: Lisolomzi Fikizolo <LFikizolo@dffe.gov.za>; Lauren Waller <laurenw@ewt.org.za>; Alistair McInnes <alistair.mcinnes@birdlife.org.za>
Subject: Re: Negotaitons thus far

Dear Mark, Lauren, Alistair and Lisolomzi

Thank you for this. While I do take your messages below, I think I will take you up on the offer of a meeting - maybe to clarify some points below and also raise some other thoughts - as we will not be able to meet later today. I can set up an MS teams meet from 1100 to 1200.

Thank you
ashley

Ashley Naidoo. Ph.D. | Chief Director: Ocean & Coasts Research
Find Annual Ocean & Coasts Science Report at:
https://www.dffe.gov.za/documents/research#oceans
+27827847131

From: Mark Anderson <ceo@birdlife.org.za>
Date: Tuesday, 16 August 2022 at 20:10
To: Ashley Naidoo <ANaidoo@dffe.gov.za>
Cc: Lisolomzi Fikizolo <LFikizolo@dffe.gov.za>, Lauren Waller <laurenw@ewt.org.za>, Alistair McInnes <alistair.mcinnes@birdlife.org.za>
Subject: RE: Negotaitons thus far

Dear Ashley

Thank you for your email, for the various discussions we have had with you, and for seeking our input on the proposals you are negotiating for the interim closures. Our team has considered the latest submissions from the industry and our comments are below:

In summary, the latest industry proposals concede little catches for penguins. The proposals equate roughly to the following:

- Dassen: <2% of catch – but anchovy (main fishery here) already mainly fished
- Robben: 3% catch – but anchovy (main fishery here) already mostly fished

AM
M.F

- Dyer: 0.1 and 0.2% for anchovy and sardine, respectively – this is where most of the available catch will be caught during the interim closures
- Stony: 0% -- this area is also going to be fished more than colonies in other regions
- St Croix: 12% sardine – this is the regional proportion, and they have already caught their quota for the year. However, we are concerned that the SPSWG is requesting an additional 3000 tons here. Anchovy is not caught in this region – an anomaly in DFFE data as it is a regional proportion of hardly anything taken here.

Given the dire situation for the African Penguins, the proposals do not meet the minimum requirement of an adequate response to this crisis. The Eastern Cape penguin population is Critically Endangered, yet the closure extent in this proposal is less than that of the closure experiment, which was already insufficient. Furthermore, St Croix was closed for three consecutive years on two different occasions during ICE. The industry did not provide any real-time evidence for socio-economic costs due to closures during this time. There is no justification for a 27% closure.

Furthermore, industry, on the whole, has provided no evidence for actual socio-economic costs. This continues to limit a transparent negotiation based on the best available data to weigh up costs to industry and benefits to penguins.

Another breeding season with no closures has gone by and this is the second year that the breeding foraging areas have not been protected. We are now moving into the moult period, and a recent study has shown that closures will benefit the non-breeding birds. Since no closures have been implemented for the last 1 ½ years, with seasonal closures the year before, and most of the TAC already caught, implementing the Governance Forum proposals for the remainder of the year has the most support. The Governance Forum proposals were also supported by both DFFE's Oceans & Coasts and Fisheries branches.

The industry's concern that they don't want to support the Governance Forum closures in the interim because they believe they may become permanent is unfounded, given that DFFE has agreed that these measures are temporary.

Given the rationale, we maintain that the strongest defensible position for interim closures is to implement the recommendations from the Governance Forum with proposed adjustments for the Dyer and Stony colonies.

Please let us know if you want to meet tomorrow (Wed 16 August), and note that we're available between 09h00 and 12h00.

Regards
Mark

Mark D. Anderson
Chief Executive Officer, BirdLife South Africa
(on behalf of the Conservation Sector: BirdLife South Africa, Endangered Wildlife Trust, SANCCOB, SANParks and WWF-SA)

From: Ashley Naidoo <ANaidoo@dffe.gov.za>
Sent: Tuesday, 16 August 2022 12:17
To: Mark Anderson <ceo@birdlife.org.za>; Lauren Waller <laurenw@ewt.org.za>; Alistair McInnes <alistair.mcinnes@birdlife.org.za>
Cc: Lisolomzi Fikizolo <LFikizolo@dffe.gov.za>
Subject: Negotaitons thus far

Dear Mark, Lauren and Alistair and Lisolomzi copied.

This is what industry is willing to agree to for interim closure from 1/09/2022 to 14/01/2023. Lisolomzi and I have been in discussions over the last 2 hours.

1. Dassen - 60 %
2. Robben - 100%
3. Stony – as per MPA
4. Dyer – 40% as per CAF, but allowing vessel less than 24m in the areas between this and the red no go area – need to confirm this with their stakeholders – so a variation of the GF limits – you proposed
5. St Croix – 27% – as per CAF
6. Bird – 93 % as per CAF

So quiet departure from the GF and more closely now with the CAF. Conditions, closures for version 2 after Jan 15 must be negotiated by end November, in parallel to Review, just in case this is not concluded.

Lisolomzi, and myself will try to call Lauren on this, or we could set up a quick MS TEAMS meeting on this.

Thank you
Ashley
0827847131

AM
M.K

"AM42"

From: Lisolomzi Fikizolo <LFikizolo@dffe.gov.za>
Sent: Thursday, 18 August 2022 15:04
To: Mark Anderson
Cc: Ashley Naidoo; Lauren Waller; Alistair McInnes
Subject: RE: Recommendations to the DG and Minister

Dear Mark

Thank you for your response to my earlier email, but above all thank you for your support and guidance on this process.

I would like confirm that the proposed interim closure measures are not intended to be conveyed to the DG and the Minister as consensus, i.e. between the Small Pelagic Fishery Group and the Conservation Group. These are simply interim closure proposals that we could formulate based on the discussions we have had, particularly during the past couple of days. You will kindly recall that we went further to indicate that they may not necessarily have the desired result of making everyone happy, but still they are worthy of being considered in the interim as work in progress for better things to come. Also, and worth mentioning is that during this proposed closure period, which we have all agreed on, an International Review Panel (IRP) will be appointed and we have all agreed on that, there is also an agreement on the composition of the IRP; the Terms of Reference (TOR) for their work has been concluded, and all parties involved agreed on it. Therefore, work towards finding a lasting solution that hopefully would be acceptable to everyone concerned will be undertaken and concluded.

With regards to the sizes of vessels, you will also recall that there was an indication that Gansbaai Marine is but one of the companies participating in the small pelagic fishery sector (SPFS), and as such Mr Copeland indicated that in the small vessels category of the SPFS he will give us a typical overall length (LOA) of small vessels. What he provided us with was the <26 m, and my thoughts were that 23m also falls into that category. However, all these can be validated during the development of the next suite of closures, i.e. beyond the 14th January 2023 if that is acceptable.

Please accept my sincere apologies if there are details that came out the wrong way in my earlier email as we always strive for a record that gives a true reflection of the discussions we hold with our stakeholders.

I would like to once again thank you immensely for your commitment, contribution, guidance and wise counsel to this very complex process.

Kind regards,
Lisolomzi

From: Mark Anderson <ceo@birdlife.org.za>
Sent: Thursday, 18 August 2022 14:00
To: Lisolomzi Fikizolo <LFikizolo@dffe.gov.za>
Cc: Ashley Naidoo <ANaidoo@dffe.gov.za>; Lauren Waller <laurenw@ewt.org.za>; Alistair McInnes <alistair.mcinnes@birdlife.org.za>
Subject: RE: Recommendations to the DG and Minister

Dear Lisolomzi

AM

Thank you for your email and for informing us about the final proposal for interim island closures that you will make to Minister Barbara Creecy.

Please could you let us know how many vessels would meet the <26 m caveat specified for Dyer? The size limit for Gansbaai Marine is 23 m, and so we would like to know how the stipulation of <26 m translates into potential fishing effort for Dyer Island and Stony Point.

Please also note that we do not view the proposal as a consensus (given the extensive rationale conveyed during our meeting with you and Ashley yesterday) and, as such, ask that you do not convey it as a consensus to the Minister.

Regards
Mark

Mark D. Anderson
Chief Executive Officer
BirdLife South Africa

From: Lisolomzi Fikizolo <LFikizolo@dffe.gov.za>
Sent: Thursday, 18 August 2022 09:34
To: Mark Anderson <ceo@birdlife.org.za>; copeland.fishconsult <copeland.fishconsult@gmail.com>; Riedau <redah@rialfishing.co.za>; Lauren Waller <laurenw@ewt.org.za>; Alistair McInnes <alistair.mcinnes@birdlife.org.za>
Cc: Ashley Naidoo <ANaidoo@dffe.gov.za>
Subject: Recommendations to the DG and Minister

Dear Mark, Mike, Riedau, Alistair, and Lauren

Thank you for your time and inputs over the last week, which I have been part of, not to mention the last two years. Myself and Ashley have listened and learnt a lot from our discussions. Continuing with the spirit of open engagement, we thought that we should share our recommendations to the Minister for the interim closures. We understand that this will not meet with your expressed preferences but hope you will receive this within the context of it being an interim decision. Also, it is late in the fishing season, the International Review Panel (IRP) will be pursued and that we are committed to continue listening and engaging towards finding better solutions.

It our hope that we can convey to the DG and Minister that there is a consensus, albeit - an uneasy one on this.

1. The Interim Fishing closures will be in place from the 1st of September 2022 to the 14th of January 2023. We would also like to further emphasize that this only but an interim measure and together with all the parties concerned, as we have done thus far, a new decision will be developed for the period starting from the 15th January 2023 onwards.

Colony	Proposal	Proposal Date	Additional Measures	% Foraging Range	% mIBA	% Regional Catch during open years	
						Anchovy	Sardine
Dassen	DFFE 2021 original	August 2021		21.0	87.9	4.36	0.38
Robben	DFFE 2021 original	August 2021		3.6	41.3	0.00	0.00
Stony Point	Industry_CAF; CAF	March 2022		18.8	21.4	0.04	0.13

AM
MK

Dyer	DFFE 2021 original	August 2021	SP Vessels less than 26m registered length can fish within this boundary up until the inshore marked area as Industry_ETT	60.5*	75.8*	3.94*	11.97* *Calculations made without <26m vessel allowance
St. Croix	Industry_ETT	November 2021		36.9	57.3	30.66	28.55
Bird	Industry CAF; CAF	March 2022		93.0	92.6	0.00	3.02

Thank you once again, and wishing you a great day further.

Kind regards,

Lisolomzi

Lisolomzi A. Fikizolo, PhD
Chief Director: Specialist Monitoring Services
Department of Forestry, Fisheries and the Environment
Branch: Ocean and Coasts
1 East Pier Building, East Pier Road
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Telephone: +27 21 819 2608
Mobile: ~~+27 84 625 1333~~
E-mail: lfikizolo@environment.gov.za

AM
MK

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Forestry, Fisheries and the Environment "AM43" on interim fishing closures and limitations around key penguin colonies

16 Sep 2022

The Department of Forestry, Fisheries and the Environment has, from 1 September, declared some areas around the major penguin colonies as closed to commercial fishing for anchovy and sardine.

These restrictions follow prolonged negotiations with the seabird conservation groups and the pelagic fishing industry representatives. While these closures do not represent a consensus position between the two sectors, the Department is of the view that this is the best decision we can take at this stage to support penguin populations.

During the negotiations, both sectors were committed to discussions and offered meaningful contributions from insights into the fishing industry and conservation science. The Department has thanked the Pelagic Fishing Industry and Conservation organisations and their representatives for contributing to these discussions.

The closures will be temporary to allow for an international scientific panel to be set up to review all related science output over recent years. The review will advise the Department on the value of fishing limitations for penguins' success, as well as the impacts such limitations will have on the fishing industry. Both sectors have committed to abiding by the recommendations of the international panel. The Minister will shortly release a gazette calling for nominations to serve on the international review panel.

The sardine stock in South African waters continues to be at historically low levels. Competition for food is thought to be one among a set of pressures that are contributing to the decline of the African penguin population.

Other pressures include shipping traffic and the associated noise and vibrations, pollution and degradation of suitable nesting habitats through historic removal of guano and coastal commercial and residential developments.

The species which is endemic to South Africa and Namibia has decreased from more than a million breeding pairs to just about ten thousand pairs over the last century. The Terms of Reference for the science review and the panel members were established in consultation with the representatives from the fishing and bird conservation sectors.

for MC

The interim fishing limitations came into effect from the 1st of September 2022 to the 14th of January 2023 and include defined areas around Dassen Island, Robben Island, Stony Point, Dyer Island, St. Croix Island and Bird Island. These represent the remaining locations of the larger penguin colonies. Purse seine fishing is also not permitted in False Bay which hosts the resident Boulders Beach penguin population.

For media enquiries contact:
Albi Modise
083 490 2871

Issued by Department of Forestry, Fisheries and Environment
More from Department of Forestry, Fisheries and the Environment
More on Environment

"AM44"

Subject: RE: Meeting to confirm the maps of closures in the Eastern Cape

From: Redah De Maine <redah@rialfishing.co.za>
Sent: Friday, 09 June 2023 15:52
To: 'Lauren Waller' <LaurenW@ewt.org.za>; Rial Fishing Pty Ltd <twesley@rialfishing.co.za>; deon@afrofishing.co.za
Cc: Alistair McInnes <alistair.mcinnes@birdlife.org.za>; Pichegru, Lorien (Prof) (Summerstrand Campus South) <Lorien.Pichegru@mandela.ac.za>; 'Alison.Kock' <Alison.Kock@sanparks.org>
Subject: RE: Meeting to confirm the maps of closures in the Eastern Cape

Hello Lauren,

Yes I agree fully with you that it was very good to meet with you, Alistair, Neuie and Alison and the engagement with you concerning especially St Croix was the most positive and productive interaction we had for quite some time now, while I certainly look forward to more positive interaction of this nature in the future.

As discussed in our meeting Lorien being based in our area should become a more regular conduit between our Association and your entities in the interest of building a more transparent and sustainable environment not only for birds but all the creatures in our Oceans.

I certainly feel there is much to learn from each other while such unity will only be of great benefit to our ECO system.

I need to consult to Deon and Tasneem about a day and time and get back to your soonest.

Kind Regards,
Mohammed Riedau De Maine
Chairperson
ESCPA

131 Albert Road , Walmer, Port Elizabeth / PO Box 22650, Central, 6001
Telephone: *041- 581 0459 / 041- 581 0458* ***Cell:*** *082 855 1457* ***Email:****redah@rialfishing.co.za*

From: Lauren Waller <LaurenW@ewt.org.za>
Sent: Thursday, June 8, 2023 12:49 PM
To: Redah De Maine <redah@rialfishing.co.za>
Cc: Alistair McInnes <alistair.mcinnes@birdlife.org.za>; Lorien Pichegru <Lorien.Pichegru@mandela.ac.za>; Alison.Kock <Alison.Kock@sanparks.org>
Subject: Meeting to confirm the maps of closures in the Eastern Cape

AOL
MK

Dear Redah

It was really good to see you at the Panel Meetings this week, it's been far too long since we were able to all see each other in person!

We're also enormously grateful for the manner in which you engaged with us regarding the closures at St Croix and Bird Island. We are definitely looking forward to working more closely with you and building a positive working relationship based on trust.

We are busy preparing the maps of the closures around St Croix and Bird Island that we agreed to on Tuesday this week. Before we send them to you, we would like to meet with you online just to make sure that you are comfortable that the boundaries accurately reflect what we agreed on. We thought this might be helpful to make sure that when you present this to your constituents, you are 100% comfortable with the proposal that you have all agreed to. Your trust is critical to us.

Could you give us some options of when you could meet up with us in the next days? We wouldn't need longer than an hour. You mentioned that your daughter is also getting more involved in the business, and if she is available and interested to join, she would be most welcome too!

Looking forward to hearing from you, and have a lovely weekend

With warm regards
Lauren

Dr Lauren Waller
IUCN SSC CPSG Regional Planning Coordinator
Department
C + 27 71 689 6910
E laurenw@ewt.org.za

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From: Pichegru, Lorien (Prof) (Summerstrand Campus South) <Lorien.Pichegru@mandela.ac.za>
Sent: Friday, 21 July 2023 11:31
To: redah@rialfishing.co.za; Rial Fishing Pty Ltd
Cc: Alistair McInnes; Lauren Waller
Subject: maps closure proposals
Attachments: Overlap of 2023 proposed closures_202306.pdf; StCroix_closure_withFishCatches_20July2023.jpeg

Dear Redah and Tasneem,

Thanks for coming over yesterday morning and for your effort and willingness to find a way forward together.
Attached is the presentation given by the conservation sector to the Panel a few weeks ago, with the various closure proposals. The 41% of the UD90 (UD90 being 90% of the foraging habitat of the penguins) represent the DFFE original proposal.
I also attach a map showing all the small pelagic catches in relation with the closure proposals.
We'd be happy to meet again should you need further information or to discuss a proposal to submit to Ashley.

Kind regards,
Lorien

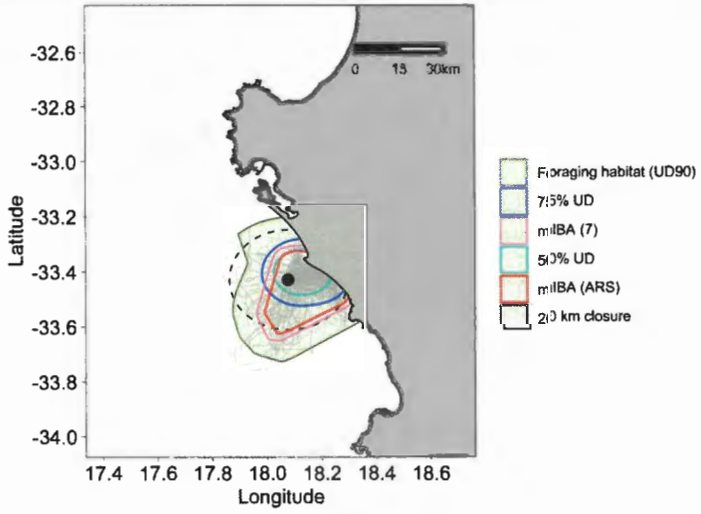
Adj. Prof. Lorien Pichegru,
Institute for Coastal and Marine Research,
Ocean Sciences Campus,
Nelson Mandela University,
Gqeberha, South Africa.
Honorary consul for France in Gqeberha.
Email: lorien.pichegru@mandela.ac.za
cell: +27 (0) 834 878 574

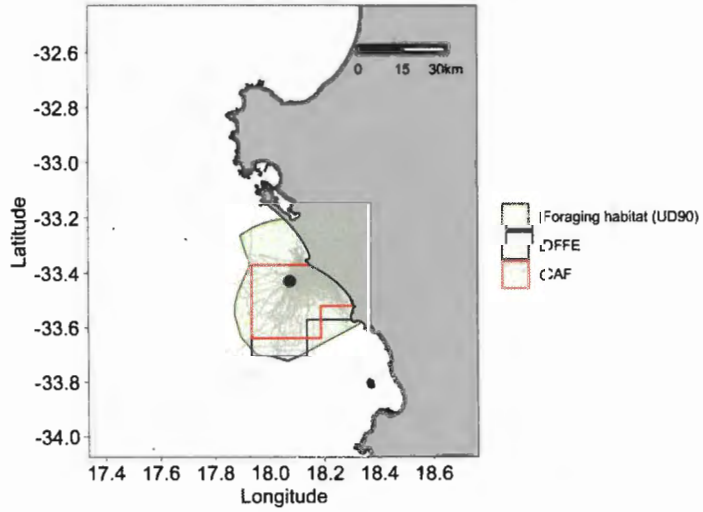
MC AM

Conservation Sector: closure options – overlap calculations

Eleanor Weideman, Alistair McInnes, Lauren Waller, Richard Sherley, Lorien Pichegru, Katta Ludynia, Christina Hagen, Craig Smith, Peter Barham, Tegan Carpenter-Kling

Dassen Island





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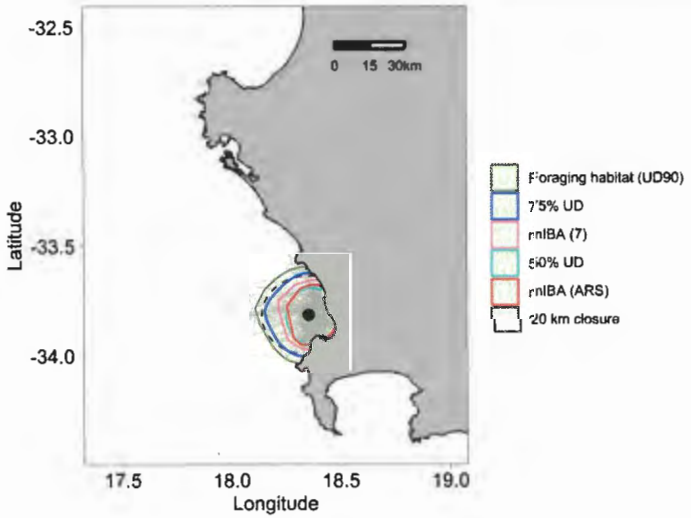
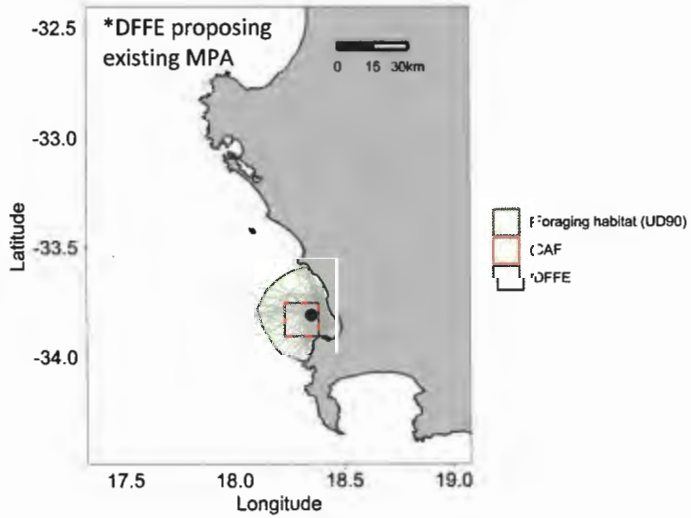
Robben Island





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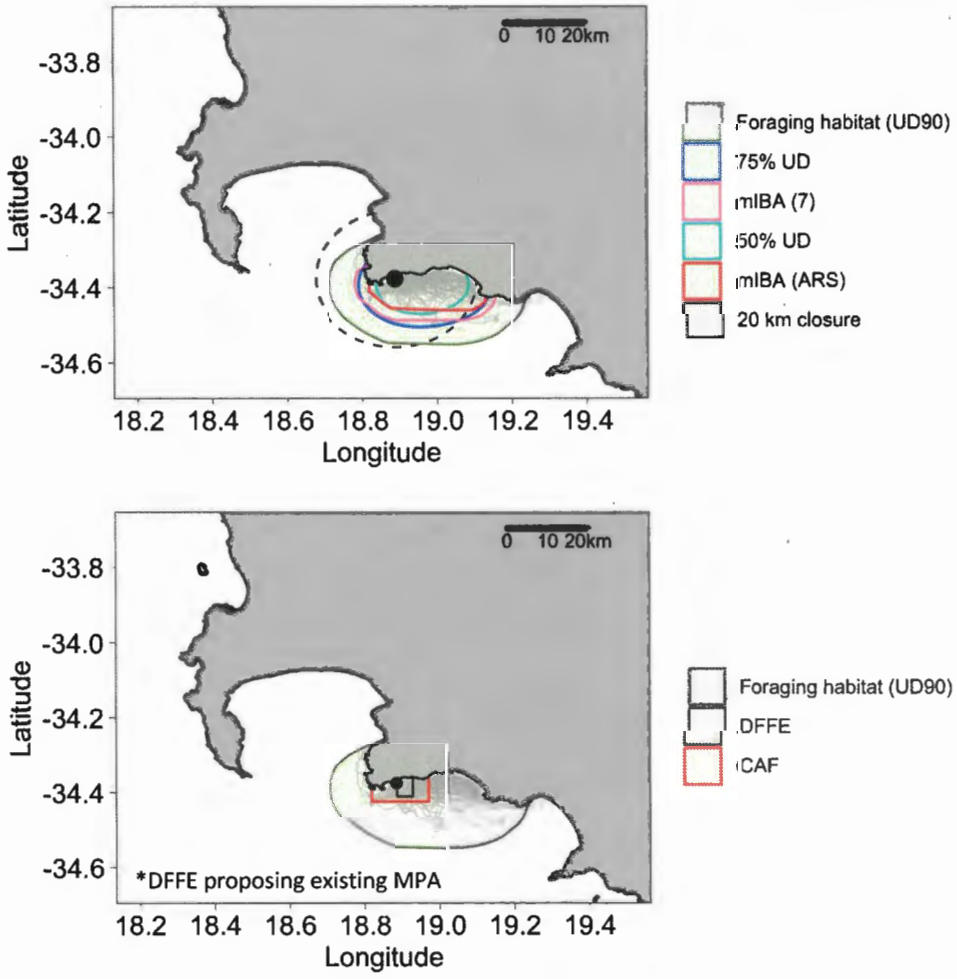
MLC Ap1

Stony Point



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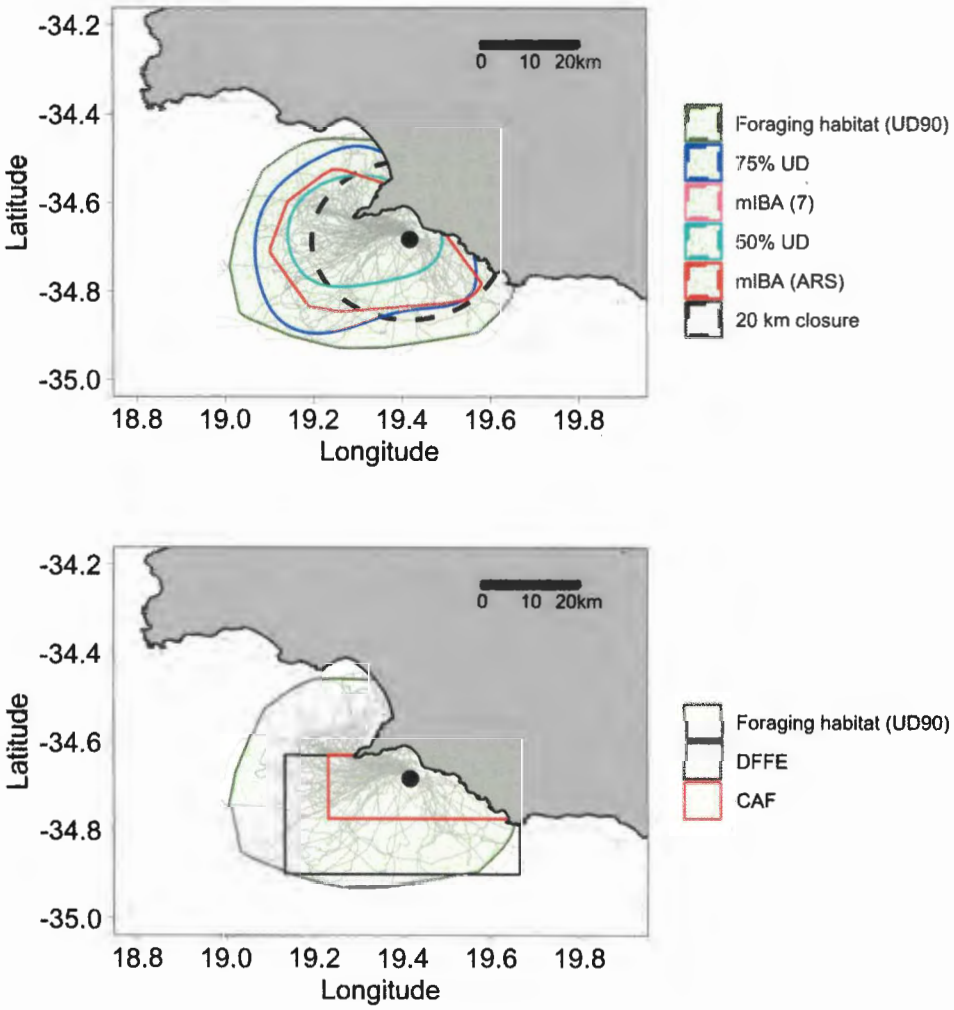

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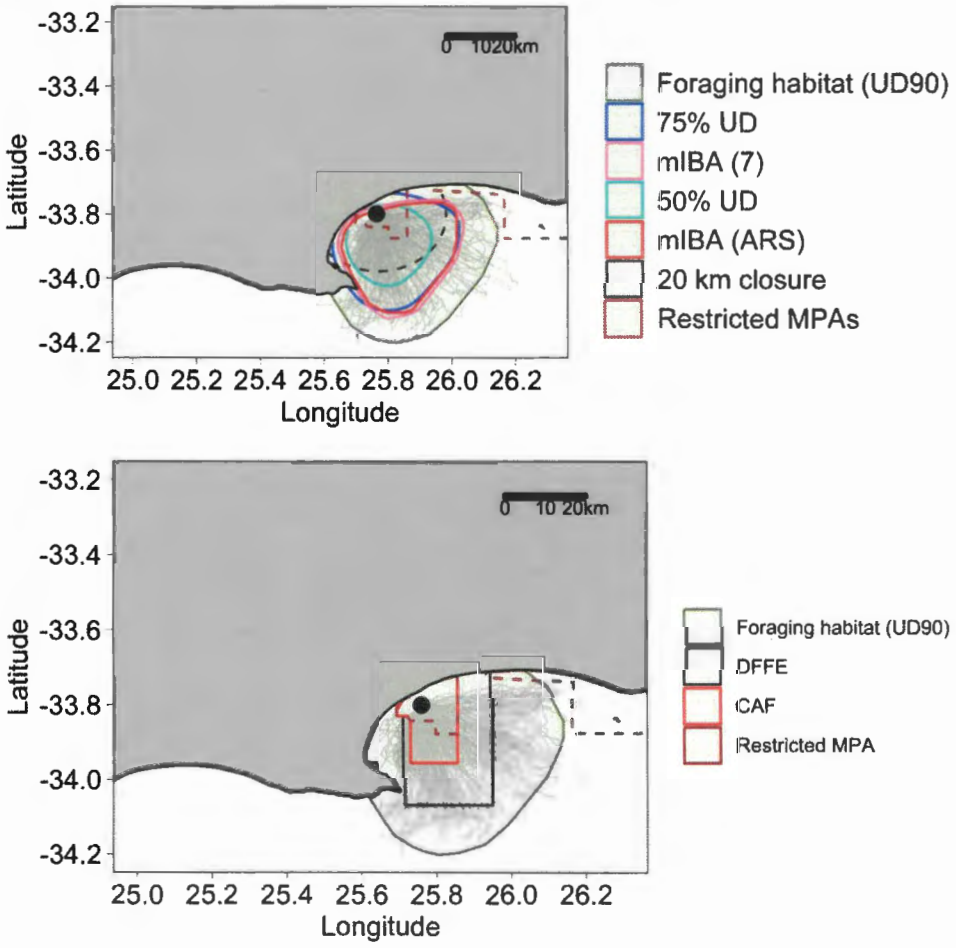
MK AM

St Croix Island



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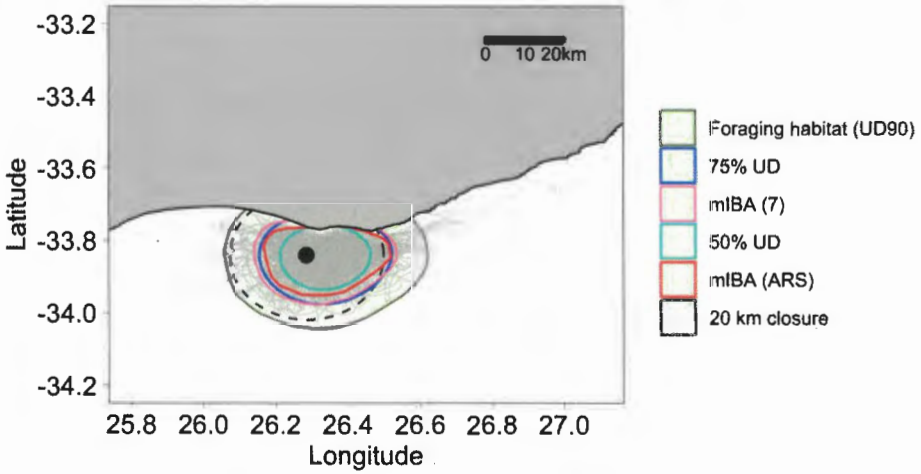
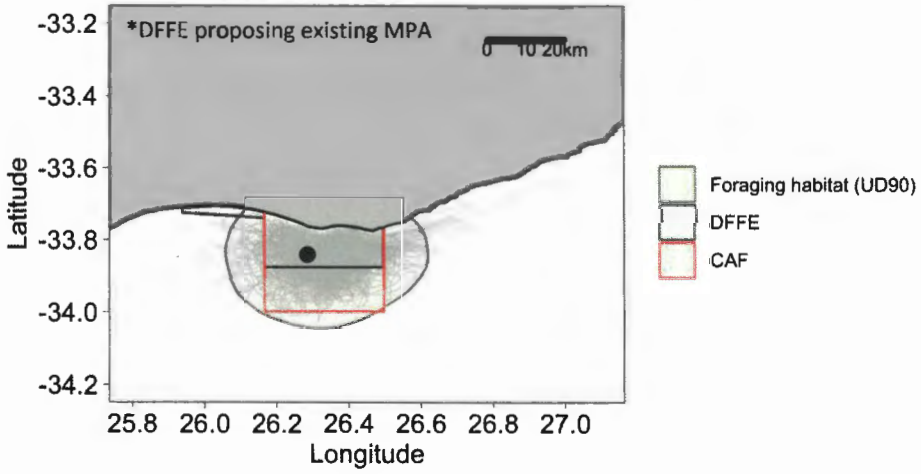
Bird Island





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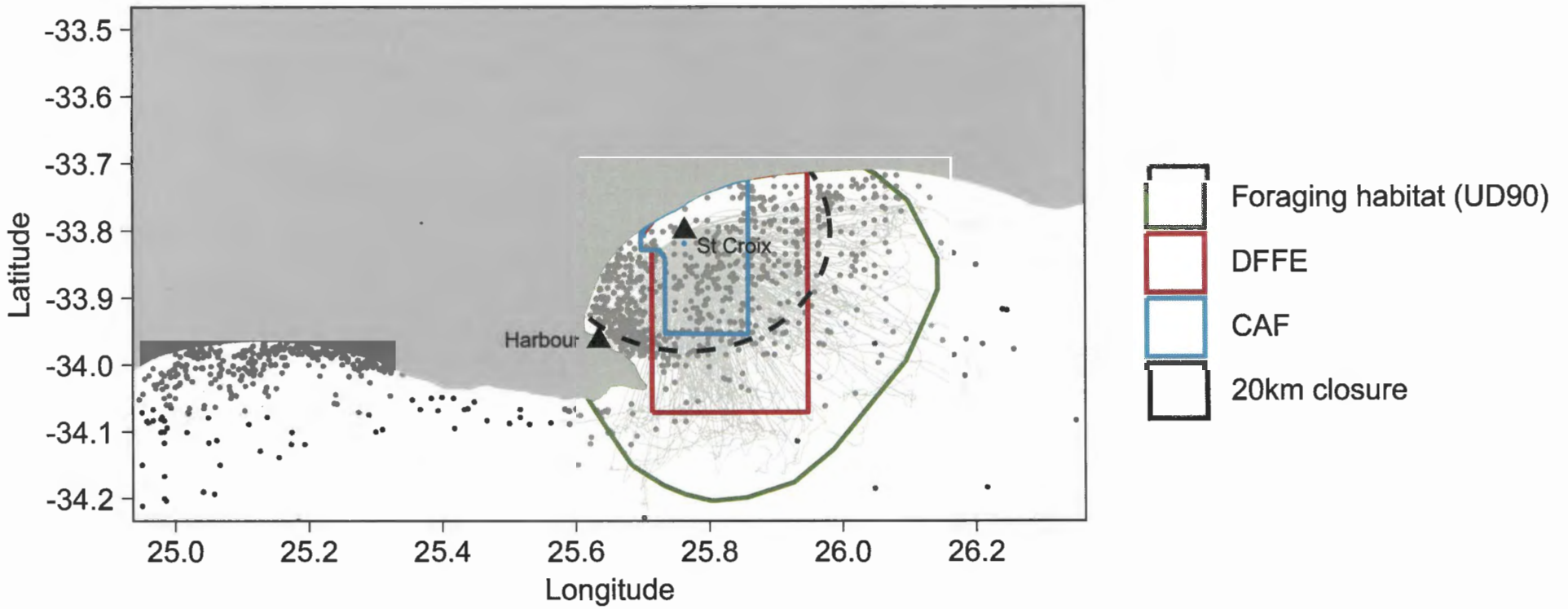
mIBA (7)	734	734	51
mIBA (ARS)	551	551	38

Closure delineations in relation to fishing catches (2016-2019, grey dots)



From: Redah De Maine <redah@rialfishing.co.za>
Sent: Wednesday, 02 August 2023 11:04
To: Alistair McInnes; 'Ashley Naidoo'; 'Lauren Waller'; deon@afrofishing.co.za
Cc: 'Janet Claire Coetzee'
Subject: RE: Update and requesting information on potential agreement for St Croix & Bird Islands

Good Morning everybody,

My apologies for dragging this a bit but I have been having a medical problem with a sore foot that is currently being attend to slowing down my work pace quite a bit.

For your ease of reference ESCPA has agreed to implement the 40 percent closure but we needed Zeshan to finalise that map for us to conclude everything and my condition did not help me very much in terms of moving forward.

In our endeavour to positively ensure that the Minister is informed about our agreement we propose that the original map of DEFFE 41% that was done between Janet and ourselves should be utilised as an interim measure until we get Zeshan to the table between all parties involved to finalise the Maps which we would like to be implemented from the 1st September onwards.

Currently we only need Alistair, Lauren and Lorien has to concur with this email for Ashley to convey this message to the Minister enabling her to table our agreement in the meeting on Friday.

Ashley please be so kind as to forward Zeshan's contact details in your response.

Kind Regards,
Mohammed Riedau De Maine
Chairperson
ESCPA

131 Albert Road , Walmer, Port Elizabeth / PO Box 22650, Central, 6001
Telephone: *041- 581 0459 / 041- 581 0458* ***Cell:*** *082 855 1457* ***Email:****redah@rialfishing.co.za*

From: Alistair McInnes <alistair.mcinnes@birdlife.org.za>
Sent: Wednesday, August 2, 2023 8:56 AM
To: Ashley Naidoo <ANaidoo@dffe.gov.za>; Lauren Waller <laurenw@ewt.org.za>; Riedau <redah@rialfishing.co.za>
Subject: RE: Update and requesting information on potential agreement for St Croix & Bird Islands

Hi Ashley

MK AM

Lorien is going to try and meet with Redah today to see if we can come to an agreement – will revert back later today.

Regards

Alistair

From: Ashley Naidoo <ANaidoo@dffe.gov.za>
Sent: Tuesday, August 1, 2023 1:47 PM
To: Alistair McInnes <alistair.mcinnes@birdlife.org.za>; Lauren Waller <laurenw@ewt.org.za>; Riedau <redah@rialfishing.co.za>
Subject: Re: Update and requesting information on potential agreement for St Croix & Bird Islands

Hi Alistair, Lauren and Riedau

Alistair, just had confirmation that the early meeting is a small courtesy meeting just with CEOs and 2 Industry Reps (Mike/Riedau) where Minister will announce her decisions and Panel Chair will do a brief summary of findings.

The later media briefing at 100 will be open to all – although at this one only journalists will be able to ask questions.

A another point – is there any progress on finding agreement on the closed area around St. Croix? I will really like to suggest this inclusion in Minister's announcement if possible?

Thank you
Ashley

From: Ashley Naidoo <ANaidoo@dffe.gov.za>
Date: Monday, 31 July 2023 at 18:40
To: Alistair McInnes <alistair.mcinnes@birdlife.org.za>, Lauren Waller <laurenw@ewt.org.za>, Riedau <redah@rialfishing.co.za>
Subject: Re: Update and requesting information on potential agreement for St Croix & Bird Islands

Hi Alistair and colleagues

I am desperately trying to get confirmation of who is invited to these online meetings and will keep you updated.

Thank you
Ashley

From: Alistair McInnes <alistair.mcinnes@birdlife.org.za>
Date: Monday, 31 July 2023 at 16:28

MK AM

To: Ashley Naidoo <ANaidoo@dffe.gov.za>, Lauren Waller <laurenw@ewt.org.za>, Riedau <redah@rialfishing.co.za>
Subject: RE: Update and requesting information on potential agreement for St Croix & Bird Islands

Hi Ashley

Thanks for the update. Please can you confirm if all the stakeholders represented at the panel review will be included on the invite list for the Minister's meeting.

Many thanks and regards

Alistair

From: Ashley Naidoo <ANaidoo@dffe.gov.za>
Sent: Monday, July 31, 2023 3:03 PM
To: Lauren Waller <laurenw@ewt.org.za>; Alistair McInnes <alistair.mcinnes@birdlife.org.za>; Riedau <redah@rialfishing.co.za>
Subject: Re: Update and requesting information on potential agreement for St Croix & Bird Islands

Hi Lauren, Alistair and Riedau

The Minister is releasing the report this Friday – smaller meeting with stakeholders at 0830 and then media at 1000 – I am waiting on final invite list -which will come from her office, but they asked me last week to alert Mark Anderson, Mike and Riedau as well.

Thank you
Ashley

Ashley Naidoo. Ph.D. | Chief Director: Ocean & Coasts Research (he/him)
Find Annual Ocean & Coasts Science Report at:
https://www.dffe.gov.za/documents/research/oceansandcoasts
+2721 493 7300
+2782 784 7131

From: Lauren Waller <LaurenW@ewt.org.za>
Date: Monday, 31 July 2023 at 14:49
To: Ashley Naidoo <ANaidoo@dffe.gov.za>, Alistair McInnes <alistair.mcinnes@birdlife.org.za>, Riedau <redah@rialfishing.co.za>
Subject: RE: Update and requesting information on potential agreement for St Croix & Bird Islands

Dear Ashley

Just following up on your email below. You mentioned there may be a meeting this Friday or early next week. Do you have any idea yet when this meeting will be?

Things are filling up this week, and I need to know if I need to cancel meetings on Friday morning.

Thanks and Regards

MK
AM

Lauren

From: Ashley Naidoo <ANaidoo@dffe.gov.za>
Sent: Tuesday, July 25, 2023 10:54 AM
To: Alistair McInnes <alistair.mcinnes@birdlife.org.za>; Lauren Waller <LaurenW@ewt.org.za>; Riedau <redah@rialfishing.co.za>
Subject: Update and requesting information on potential agreement for St Croix & Bird Islands

Dear Riedau, Lauren and Alistair

The Panel report is been through 2 edits and is currently in its final layout. The draft report has been submitted to Minister, who received this late last week.

Minister is also away this week and early next week, so the earliest that she will be able to meet (online) and make the report available, is late next week (possibly Friday) or very early the following week.

Once I have this date, we will send out a meeting request.

Then the interim fishing closures will continue for August. In this matter I understand that all of you have been discussing your (potential) agreement on the 40 or 41% for St. Croix, please can I ask that you finalise this and also share the map so that I can include this in my recommendation. I will need this by Wednesday next week, now that we have the additional week.
I think such an agreement will be an excellent achievement, and from my side I will commit to find (reasonable) additional funding for penguin observations for St. Croix and Bird Island to assess benefits.

Thank you
Ashley

MK
AM

From: Pichegru, Lorien (Prof) (Summerstrand Campus South) <Lorien.Pichegru@mandela.ac.za>
Sent: Thursday, 03 August 2023 09:14
To: redah@rialfishing.co.za
Cc: Lauren Waller; Alistair McInnes
Subject: Closure St Croix
Attachments: Overlap of 2023 proposed closures_202306.pdf

Dear Redah,

I hope your surgery went well yesterday and that you'll get well soon.

As per our telephonic conversation yesterday, can you kindly confirm that the small pelagic fishing industry in the Eastern Cape agreed to the DFFE proposal of fishing closure around St Croix Island (in black in the map attached), representing 41% of the foraging habitat of African penguins breeding on St Croix?
We can discuss the western boundary of the closure being moved slightly eastward (reaching the boundary of the CAF proposal (in red in the map attached)),and move the eastern boundary also slightly eastward to regain the lost area. Is that right?

Thanks in advance for your answer.

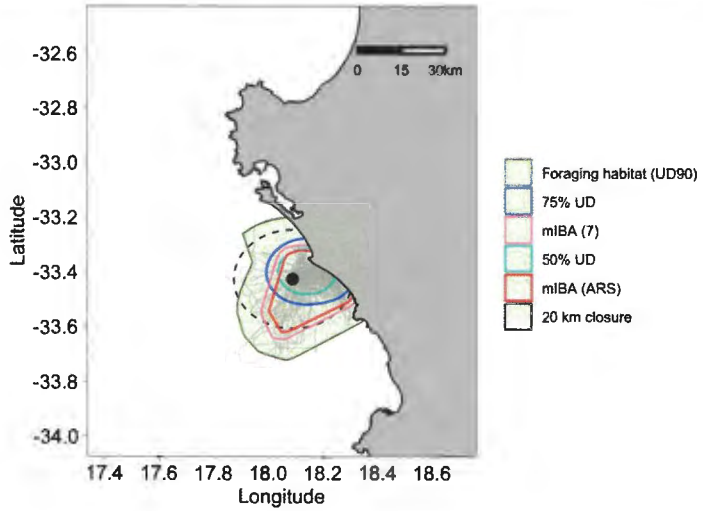
All the best,
Lorien

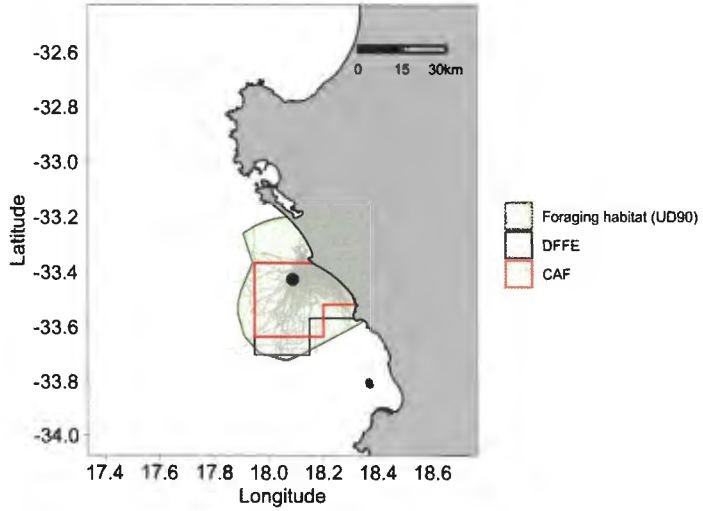
MK
AM

Conservation Sector: closure options – overlap calculations

Eleanor Weideman, Alistair McInnes, Lauren Waller, Richard Sherley, Lorien Pichegru, Katta Ludynia, Christina Hagen, Craig Smith, Peter Barham, Tegan Carpenter-Kling

Dassen Island





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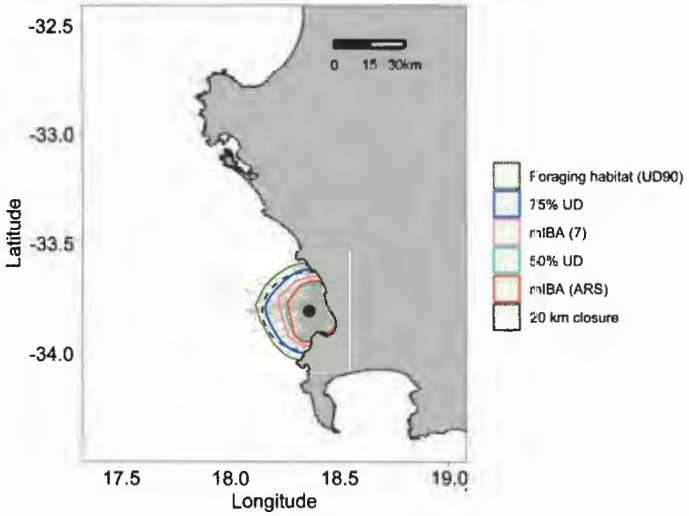
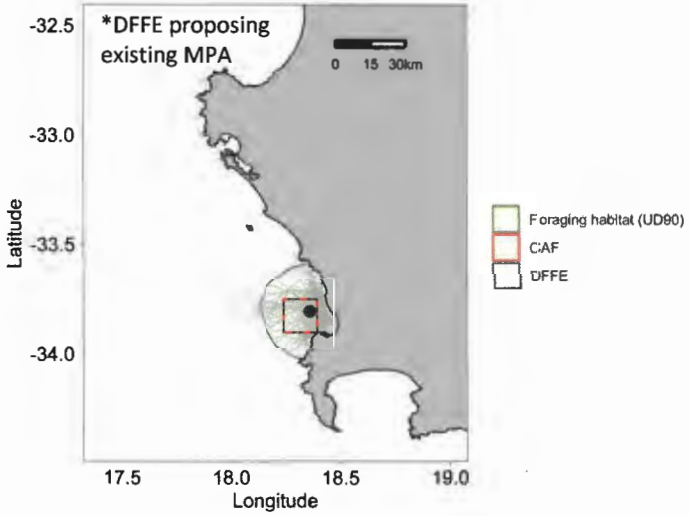
Robben Island





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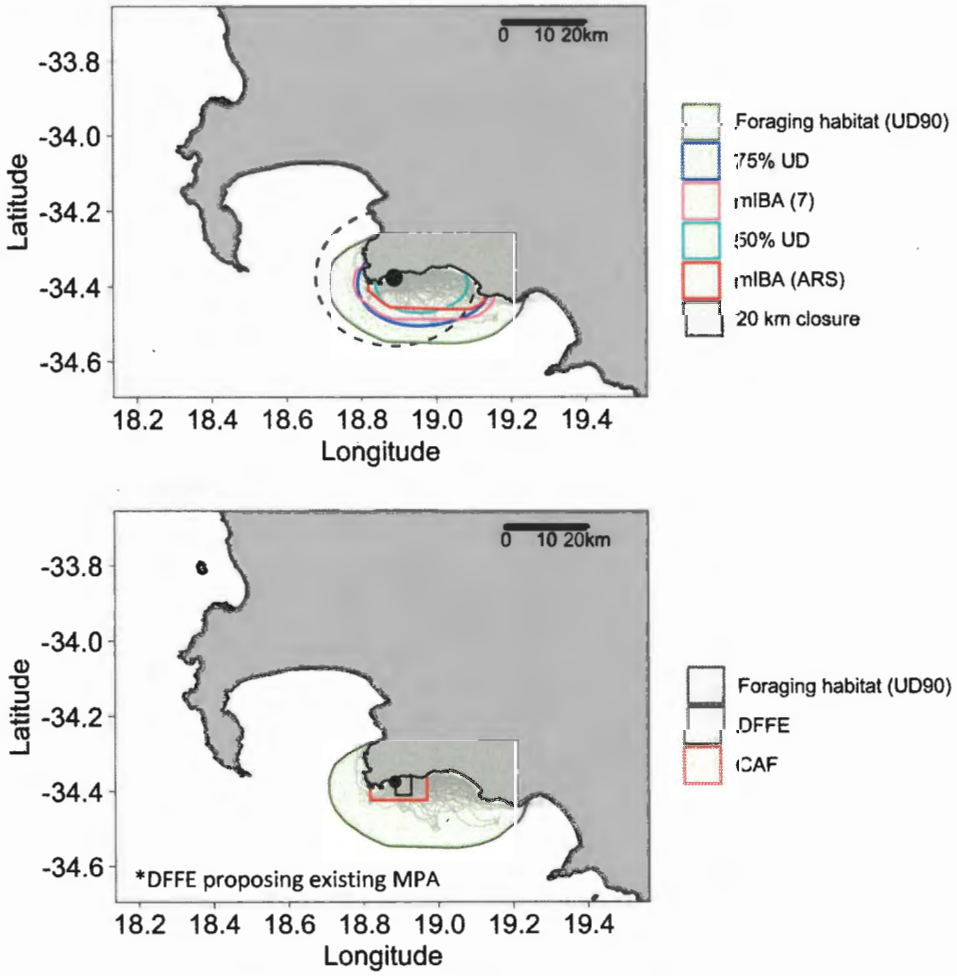

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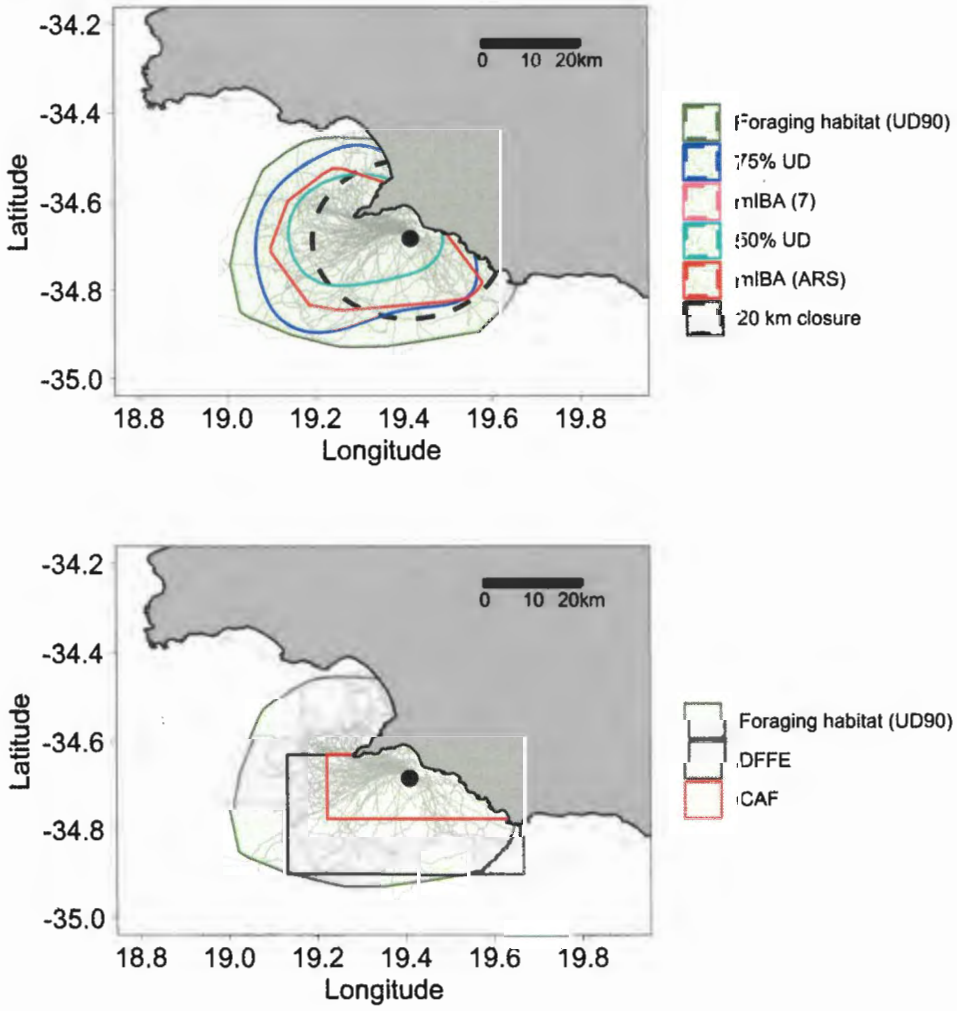

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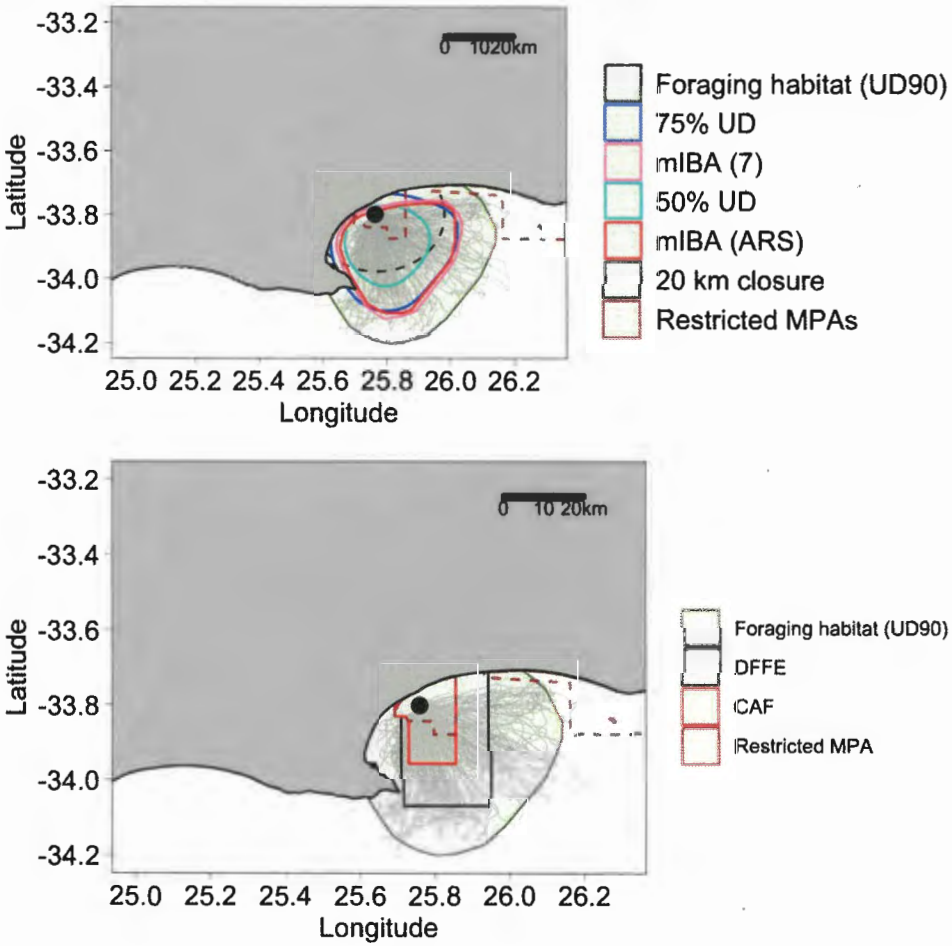
St Croix Island



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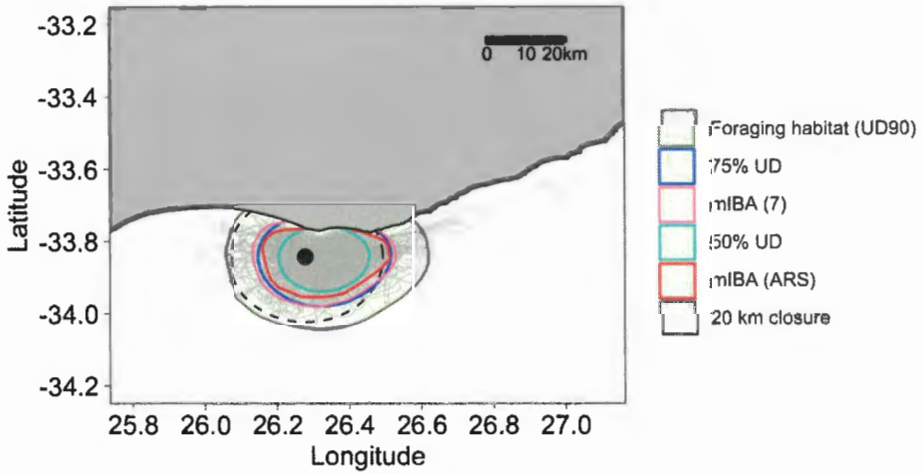
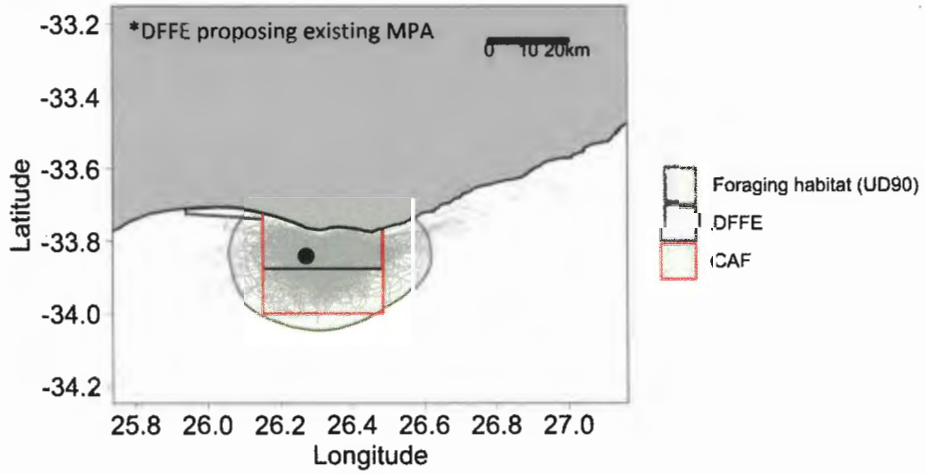
Bird Island





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"AM48"

Subject: RE: Map on Closed Area for St. Croix

From: Redah De Maine <redah@rialfishing.co.za>
Sent: Monday, 28 August 2023 12:16
To: 'Ashley Naidoo' <ANaidoo@dffe.gov.za>; Rial Fishing Pty Ltd <twesley@rialfishing.co.za>; 'Deon Van Zyl' <Deon@afrofishing.co.za>; Pichegru, Lorien (Prof) (Summerstrand Campus South) <Lorien.Pichegru@mandela.ac.za>; 'Lauren Waller' <laurenw@ewt.org.za>; 'Lauren Waller' <lauren@sanccob.co.za>; Alistair McInnes <alistair.mcinnes@birdlife.org.za>
Cc: 'Cloverley Lawrence' <cloverley.lawrence@sanparks.org>; 'Zishan Ebrahim' <Zishan.Ebrahim@sanparks.org>; 'Alison Kock' <Alison.Kock@sanparks.org>; 'Gerhard Cilliers' <GCilliers@dffe.gov.za>; 'Gcobani Popose' <GPopose@dffe.gov.za>; 'Millicent Makoala' <MMakoala@dffe.gov.za>; 'Smith, Craig' <csmith@wwf.org.za>
Subject: RE: Map on Closed Area for St. Croix

Gooday Everybody,

We had insight into the MAP and discussed same having come to the conclusion that we are happy with the new Yellow boundaries that concludes our agreement at 42.17 % .

Kind Regards,
Mohammed Riedau De Maine
Chairperson
ESCPA

131 Albert Road , Walmer, Port Elizabeth / PO Box 22650, Central, 6001
Telephone: *041- 581 0459 / 041- 581 0458* ***Cell:*** *082 855 1457* ***Email:****redah@rialfishing.co.za*

From: Ashley Naidoo <ANaidoo@dffe.gov.za>
Sent: Monday, August 28, 2023 11:42 AM
To: 'Tasneem Wesley' <twesley@rialfishing.co.za>; Deon Van Zyl <Deon@afrofishing.co.za>; 'Pichegru, Lorien (Prof) (Summerstrand Campus South)' <Lorien.Pichegru@mandela.ac.za>; Lauren Waller <laurenw@ewt.org.za>; 'Lauren Waller' <lauren@sanccob.co.za>; Riedau <redah@rialfishing.co.za>; Alistair McInnes <alistair.mcinnes@birdlife.org.za>
Cc: Cloverley Lawrence <cloverley.lawrence@sanparks.org>; Zishan Ebrahim <Zishan.Ebrahim@sanparks.org>; Alison Kock <Alison.Kock@sanparks.org>; Gerhard Cilliers <GCilliers@dffe.gov.za>; Gcobani Popose <GPopose@dffe.gov.za>; Millicent Makoala <MMakoala@dffe.gov.za>; Smith, Craig <csmith@wwf.org.za>
Subject: Map on Closed Area for St. Croix

Dear Colleagues

MK AM

Zishan, has kindly worked up the latest map for the agreed closed area – taking the boundaries to the nearest minute for ease of navigation. The is now the area marked by the yellow boundary. The total area now enclosed is 42,17%. This is a slight increase from the 41%.

Please can I have confirmation that the all of you can live with the new yellow bordered area, or your comments by 1200 tomorrow, so that I can have this implemented through our Fisheries Branch by Friday – 1st September 2023.

Thank you
Ashley N

Ashley Naidoo. Ph.D. | Chief Director: Ocean & Coasts Research (he/him)
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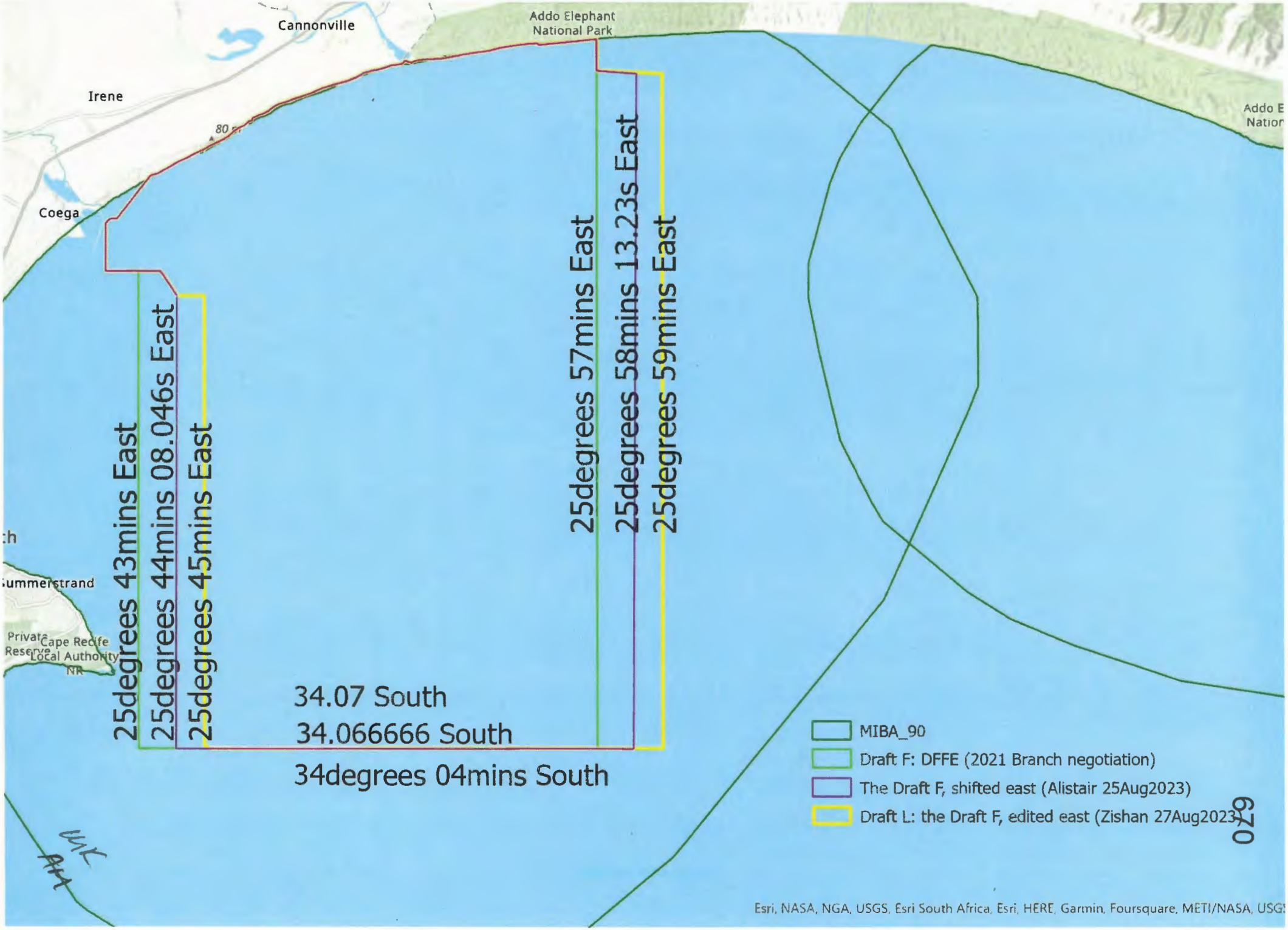
Cannonville
Addo Elephant National Park
Irene
Coega
Addo E
Nation
25degrees 43mins East
25degrees 44mins 08.046s East
25degrees 45mins East
25degrees 57mins East
25degrees 58mins 13.23s East
25degrees 59mins East
34.07 South
34.066666 South
34degrees 04mins South
Summerstrand
Private Reserve
Cape Recife Local Authority NR
MIBA_90
Draft F: DFFE (2021 Branch negotiation)
The Draft F, shifted east (Alistair 25Aug2023)
Draft L: the Draft F, edited east (Zishan 27Aug2023)
Esri, NASA, NGA, USGS, Esri South Africa, Esri, HERE, Garmin, Foursquare, METI/NASA, USGS

Subject: RE: Map on Closed Area for St. Croix

From: Ashley Naidoo <ANaidoo@dffe.gov.za>
Sent: Monday, 28 August 2023 14:32
To: Lauren Waller <laurenw@ewt.org.za>; Pichegru, Lorien (Prof) (Summerstrand Campus South) <Lorien.Pichegru@mandela.ac.za>; Rial Fishing Pty Ltd <twesley@rialfishing.co.za>; Deon Van Zyl <Deon@afrofishing.co.za>; Lauren Waller <lauren@sanccob.co.za>; Riedau <redah@rialfishing.co.za>; Alistair McInnes <alistair.mcinnes@birdlife.org.za>
Cc: Cloverley Lawrence <cloverley.lawrence@sanparks.org>; Zishan Ebrahim <Zishan.Ebrahim@sanparks.org>; Alison Kock <Alison.Kock@sanparks.org>; Gerhard Cilliers <GCilliers@dffe.gov.za>; Gcobani Popose <GPopose@dffe.gov.za>; Millicent Makoala <MMakoala@dffe.gov.za>; csmith <csmith@wwf.org.za>
Subject: Re: Map on Closed Area for St. Croix

Dear Colleagues

Thank you to all of your for cooperation on this. I think we now have agreement on the St. Croix (42,17% to accommodate the easier navigation) and the Bird Island which remains as is at 93%.

I will work with the my colleagues in Fisheries management to have this implement by Friday and will update you.

Thank you
Ashley N

Ashley Naidoo. Ph.D. | Chief Director: Ocean & Coasts Research (he/him)
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https://www.dffe.gov.za/documents/research/oceansandcoasts
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From: Lauren Waller <LaurenW@ewt.org.za>
Date: Monday, 28 August 2023 at 14:01
To: Pichegru, Lorien (Prof) (Summerstrand Campus South) <Lorien.Pichegru@mandela.ac.za>, Ashley Naidoo <ANaidoo@dffe.gov.za>, Rial Fishing Pty Ltd <twesley@rialfishing.co.za>, Deon Van Zyl <Deon@afrofishing.co.za>, Lauren Waller <lauren@sanccob.co.za>, Riedau <redah@rialfishing.co.za>, Alistair McInnes <alistair.mcinnes@birdlife.org.za>
Cc: Cloverley Lawrence <cloverley.lawrence@sanparks.org>, Zishan Ebrahim <Zishan.Ebrahim@sanparks.org>, Alison Kock <Alison.Kock@sanparks.org>, Gerhard Cilliers <GCilliers@dffe.gov.za>, Gcobani Popose <GPopose@dffe.gov.za>, Millicent Makoala <MMakoala@dffe.gov.za>, csmith <csmith@wwf.org.za>
Subject: RE: Map on Closed Area for St. Croix

Dear Ashley

Yes, I can live with this proposal.

MC AM

Thanks so much Zishan, and also to all involved that enabled us to get to this point.

Warm regards
Lauren

From: Pichegru, Lorien (Prof) (Summerstrand Campus South) <Lorien.Pichegru@mandela.ac.za>
Sent: Monday, August 28, 2023 1:26 PM
To: Ashley Naidoo <ANaidoo@dffe.gov.za>; Rial Fishing Pty Ltd <twesley@rialfishing.co.za>; Deon Van Zyl <Deon@afrofishing.co.za>; Lauren Waller <LaurenW@ewt.org.za>; Lauren Waller <lauren@sanccob.co.za>; Riedau <redah@rialfishing.co.za>; Alistair McInnes <alistair.mcinnes@birdlife.org.za>
Cc: Cloverley Lawrence <cloverley.lawrence@sanparks.org>; Zishan Ebrahim <Zishan.Ebrahim@sanparks.org>; Alison Kock <Alison.Kock@sanparks.org>; Gerhard Cilliers <GCilliers@dffe.gov.za>; Gcobani Popose <GPopose@dffe.gov.za>; Millicent Makoala <MMakoala@dffe.gov.za>; csmith <csmith@wwf.org.za>
Subject: RE: Map on Closed Area for St. Croix

Dear Ashley,

Thanks to Zishan for his work.
We are happy with this new proposal.

All the best,
Lorien

From: Ashley Naidoo <ANaidoo@dffe.gov.za>
Sent: Monday, 28 August 2023 11:42
To: Rial Fishing Pty Ltd <twesley@rialfishing.co.za>; Deon Van Zyl <Deon@afrofishing.co.za>; Pichegru, Lorien (Prof) (Summerstrand Campus South) <Lorien.Pichegru@mandela.ac.za>; Lauren Waller <laurenw@ewt.org.za>; 'Lauren Waller' <lauren@sanccob.co.za>; Riedau <redah@rialfishing.co.za>; Alistair McInnes <alistair.mcinnes@birdlife.org.za>
Cc: Cloverley Lawrence <cloverley.lawrence@sanparks.org>; Zishan Ebrahim <Zishan.Ebrahim@sanparks.org>; Alison Kock <Alison.Kock@sanparks.org>; Gerhard Cilliers <GCilliers@dffe.gov.za>; Gcobani Popose <GPopose@dffe.gov.za>; Millicent Makoala <MMakoala@dffe.gov.za>; Smith, Craig <csmith@wwf.org.za>
Subject: Map on Closed Area for St. Croix

Dear Colleagues

Zishan, has kindly worked up the latest map for the agreed closed area – taking the boundaries to the nearest minute for ease of navigation. The is now the area marked by the yellow boundary. The total area now enclosed is 42,17%. This is a slight increase from the 41%.

Please can I have confirmation that the all of you can live with the new yellow bordered area, or your comments by 1200 tomorrow, so that I can have this implemented through our Fisheries Branch by Friday – 1st September 2023.

MIL AM

Thank you
Ashley N

Ashley Naidoo. Ph.D. | Chief Director: Ocean & Coasts Research (he/him)
Find Annual Ocean & Coasts Science Report at:
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http://www.mandela.ac.za/disclaimer/email.htm

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AM

"AM50"

Subject: RE: Map on Closed Area for St. Croix

From: Alistair McInnes
Sent: Monday, August 28, 2023 2:33 PM
To: Ashley Naidoo <ANaidoo@dffe.gov.za>; Lauren Waller <laurenw@ewt.org.za>; Smith, Craig <csmith@wwf.org.za>
Subject: RE: Map on Closed Area for St. Croix

Hi Ashley

Just to confirm that I am happy with this arrangement.

Regards

Alistair

From: Ashley Naidoo <ANaidoo@dffe.gov.za>
Sent: Monday, August 28, 2023 1:37 PM
To: Lauren Waller <laurenw@ewt.org.za>; Alistair McInnes <alistair.mcinnes@birdlife.org.za>; Smith, Craig <csmith@wwf.org.za>
Subject: FW: Map on Closed Area for St. Croix

Hi Lauren, Alistair and Craig

I would need your approval as well, as in the beginning you are recognized as the representatives of the Conservation Sector.

Thank you
Ashley N

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From: Pichegru, Lorien (Prof) (Summerstrand Campus South) <Lorien.Pichegru@mandela.ac.za>
Date: Monday, 28 August 2023 at 13:26
To: Ashley Naidoo <ANaidoo@dffe.gov.za>, Rial Fishing Pty Ltd <twesley@rialfishing.co.za>, Deon Van Zyl <Deon@afrofishing.co.za>, Lauren Waller <laurenw@ewt.org.za>, 'Lauren Waller' <lauren@sanccob.co.za>, Riedau <redah@rialfishing.co.za>, Alistair McInnes <alistair.mcinnes@birdlife.org.za>
Cc: Cloverley Lawrence <cloverley.lawrence@sanparks.org>, Zishan Ebrahim <Zishan.Ebrahim@sanparks.org>, Alison Kock <Alison.Kock@sanparks.org>, Gerhard Cilliers <GCilliers@dffe.gov.za>, Gcobani Popose <GPopose@dffe.gov.za>, Millicent Makoala <MMakoala@dffe.gov.za>, Smith, Craig <csmith@wwf.org.za>
Subject: RE: Map on Closed Area for St. Croix

MMC AM

Dear Ashley,

Thanks to Zishan for his work.
We are happy with this new proposal.

All the best,
Lorien

From: Ashley Naidoo <ANaidoo@dffe.gov.za>
Sent: Monday, 28 August 2023 11:42
To: Rial Fishing Pty Ltd <twesley@rialfishing.co.za>; Deon Van Zyl <Deon@afrofishing.co.za>; Pichegru, Lorien (Prof) (Summerstrand Campus South) <Lorien.Pichegru@mandela.ac.za>; Lauren Waller <laurenw@ewt.org.za>; 'Lauren Waller' <lauren@sanccob.co.za>; Riedau <redah@rialfishing.co.za>; Alistair McInnes <alistair.mcinnes@birdlife.org.za>
Cc: Cloverley Lawrence <cloverley.lawrence@sanparks.org>; Zishan Ebrahim <Zishan.Ebrahim@sanparks.org>; Alison Kock <Alison.Kock@sanparks.org>; Gerhard Cilliers <GCilliers@dffe.gov.za>; Gcobani Popose <GPopose@dffe.gov.za>; Millicent Makoala <MMakoala@dffe.gov.za>; Smith, Craig <csmith@wwf.org.za>
Subject: Map on Closed Area for St. Croix

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Subject: RE: Map on Closed Area for St. Croix

From: Smith, Craig <csmith@wwf.org.za>
Sent: Monday, August 28, 2023 3:24 PM
To: Ashley Naidoo <ANaidoo@dffe.gov.za>; Lauren Waller <laurenw@ewt.org.za>; Pichegru, Lorien (Dr) (Summerstrand Campus South) <lorien.pichegru@mandela.ac.za>; Rial Fishing Pty Ltd <twesley@rialfishing.co.za>; Deon Van Zyl <Deon@afrofishing.co.za>; Lauren Waller <lauren@sanccob.co.za>; Riedau <redah@rialfishing.co.za>; Alistair McInnes <alistair.mcinnes@birdlife.org.za>
Cc: Cloverley Lawrence <cloverley.lawrence@sanparks.org>; Zishan Ebrahim <Zishan.Ebrahim@sanparks.org>; Alison Kock <Alison.Kock@sanparks.org>; Gerhard Cilliers <GCilliers@dffe.gov.za>; Gcobani Popose <GPopose@dffe.gov.za>; Millicent Makoala <MMakoala@dffe.gov.za>
Subject: RE: Map on Closed Area for St. Croix

Hi Ashley

Island closure proposal supported for St. Croix.

Regards

Craig Smith
::Senior Manager: Marine Portfolio, WWF-SA::
1st Floor, Bridge House
Boundary Terraces
Mariendahl Lane, Newlands
P.O.Box23273
Claremont 7735
Tel: +27 (21) 657 6600 Direct: +27 (21) 657 6670 Mobile: +27 (82) 481 8600
Fax: +27 86 535 9433
Email: csmith@wwf.org.za
Web: http://www.wwf.org.za

From: Ashley Naidoo <ANaidoo@dffe.gov.za>
Sent: Monday, August 28, 2023 2:32 PM
To: Lauren Waller <laurenw@ewt.org.za>; Pichegru, Lorien (Prof) (Summerstrand Campus South) <Lorien.Pichegru@mandela.ac.za>; Rial Fishing Pty Ltd <twesley@rialfishing.co.za>; Deon Van Zyl <Deon@afrofishing.co.za>; Lauren Waller <lauren@sanccob.co.za>; Riedau <redah@rialfishing.co.za>; Alistair McInnes <alistair.mcinnes@birdlife.org.za>
Cc: Cloverley Lawrence <cloverley.lawrence@sanparks.org>; Zishan Ebrahim <Zishan.Ebrahim@sanparks.org>; Alison

MK AM

Kock <Alison.Kock@sanparks.org>; Gerhard Cilliers <GCilliers@dffe.gov.za>; Gcobani Popose <GPopose@dffe.gov.za>; Millicent Makoala <MMakoala@dffe.gov.za>; Smith, Craig <csmith@wwf.org.za>
Subject: Re: Map on Closed Area for St. Croix

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Ashley Naidoo. Ph.D. | Chief Director: Ocean & Coasts Research (he/him)
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From: Lauren Waller <LaurenW@ewt.org.za>
Date: Monday, 28 August 2023 at 14:01
To: Pichegru, Lorien (Prof) (Summerstrand Campus South) <Lorien.Pichegru@mandela.ac.za>, Ashley Naidoo <ANaidoo@dffe.gov.za>, Rial Fishing Pty Ltd <twesley@rialfishing.co.za>, Deon Van Zyl <Deon@afrofishing.co.za>, Lauren Waller <lauren@sanccob.co.za>, Riedau <redah@rialfishing.co.za>, Alistair McInnes <alistair.mcinnes@birdlife.org.za>
Cc: Cloverley Lawrence <cloverley.lawrence@sanparks.org>, Zishan Ebrahim <Zishan.Ebrahim@sanparks.org>, Alison Kock <Alison.Kock@sanparks.org>, Gerhard Cilliers <GCilliers@dffe.gov.za>, Gcobani Popose <GPopose@dffe.gov.za>, Millicent Makoala <MMakoala@dffe.gov.za>, csmith <csmith@wwf.org.za>
Subject: RE: Map on Closed Area for St. Croix

Dear Ashley

Yes, I can live with this proposal.

Thanks so much Zishan, and also to all involved that enabled us to get to this point.

Warm regards
Lauren

From: Pichegru, Lorien (Prof) (Summerstrand Campus South) <Lorien.Pichegru@mandela.ac.za>
Sent: Monday, August 28, 2023 1:26 PM
To: Ashley Naidoo <ANaidoo@dffe.gov.za>; Rial Fishing Pty Ltd <twesley@rialfishing.co.za>; Deon Van Zyl <Deon@afrofishing.co.za>; Lauren Waller <LaurenW@ewt.org.za>; Lauren Waller <lauren@sanccob.co.za>; Riedau <redah@rialfishing.co.za>; Alistair McInnes <alistair.mcinnes@birdlife.org.za>
Cc: Cloverley Lawrence <cloverley.lawrence@sanparks.org>; Zishan Ebrahim <Zishan.Ebrahim@sanparks.org>; Alison Kock <Alison.Kock@sanparks.org>; Gerhard Cilliers <GCilliers@dffe.gov.za>; Gcobani Popose <GPopose@dffe.gov.za>;

MIC 901

Millicent Makoala <MMakoala@dffe.gov.za>; csmith <csmith@wwf.org.za>
Subject: RE: Map on Closed Area for St. Croix

Dear Ashley,

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All the best,
Lorien

From: Ashley Naidoo <ANaidoo@dffe.gov.za>
Sent: Monday, 28 August 2023 11:42
To: Rial Fishing Pty Ltd <twesley@rialfishing.co.za>; Deon Van Zyl <Deon@afrofishing.co.za>; Pichegru, Lorien (Prof) (Summerstrand Campus South) <Lorien.Pichegru@mandela.ac.za>; Lauren Waller <laurenw@ewt.org.za>; 'Lauren Waller' <lauren@sanccob.co.za>; Riedau <redah@rialfishing.co.za>; Alistair McInnes <alistair.mcinnes@birdlife.org.za>
Cc: Cloverley Lawrence <cloverley.lawrence@sanparks.org>; Zishan Ebrahim <Zishan.Ebrahim@sanparks.org>; Alison Kock <Alison.Kock@sanparks.org>; Gerhard Cilliers <GCilliers@dffe.gov.za>; Gcobani Popose <GPopose@dffe.gov.za>; Millicent Makoala <MMakoala@dffe.gov.za>; Smith, Craig <csmith@wwf.org.za>
Subject: Map on Closed Area for St. Croix

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Thank you
Ashley N

Ashley Naidoo. Ph.D. | Chief Director: Ocean & Coasts Research (he/him)
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Forestry, Fisheries and the Environment on agreement prioritising foraging grounds for African penguins through limiting fishing in Algoa Bay

01 Sep 2023

Agreement on prioritising foraging grounds for African penguins through limiting fishing in Algoa Bay

"The conservation sector and the fishery industry representatives for the east coast small pelagic fisheries have reached an agreement on prioritising areas for penguin conservation around St. Croix Island and Bird Island in Algoa Bay," says the Minister of Forestry, Fisheries and the Environment, Ms Barbara Creecy.

Conservation organisations represented by BirdlifeSA, WWF, the Endangered Wildlife Trust and scientists from Nelson Mandela University, together with lead representatives from the Eastern and Southern Cape Pelagic Association (ESCPA) have agreed to exclude fishing in 42,17% and 93% of core penguin foraging areas around St. Croix and Bird Islands respectively. These agreed areas will be implemented from September 1, 2023.

The penguin foraging areas in Algoa are characterised by relatively large ocean spaces. The report of the Expert Review Panel on fishing closures and limitations around key penguin colonies noted that the scientific evidence suggests that fish catches in closed areas will be more difficult to replace around the St. Croix and Dyer islands. These are some of the local characteristics that had to be taken into consideration during these negotiations.

"The representatives from the various organisations are congratulated and thanked for their investment in offering compromise and reaching consensus. All representatives found common ground in prioritising a healthy and sustainably-used Algoa Bay ecosystem. Such stakeholder-owned decisions are a first prize in environmental management and is welcomed," said Minister Creecy.

On 4 August, the Minister released the Report from the Science Review on information relating to the Small Pelagic Fishery and the African Penguin. The Report recommended that penguin colony-specific discussions take place as each colony has unique fishery and ecological dynamics, including that fish catch dynamics and replaceability vary at different colonies.

Fishing limitations have been established for the following penguin colonies: Dassen Island, Robben Island, Stoney Point, Dyer Island, St. Croix Island and Bird Island. These are to be implemented for a minimum of 10 years with a review after six years of implementation and data collection. The transition

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to implementing fishing limitations started with continuing with the interim closures established in September 2022, while both the fishing industry and the conservation sector studied the Panel's Report.

"As announced upon the release of the Panel's Report, any consensus on fishing limitations, will be implemented as they are agreed. This agreement for St. Croix and Bird Islands is such an agreement," said Minister Creecy.

For media enquiries, contact Peter Mbelengwa on 082 611 8197

Regards,

Enquiries:
Noma Bolani
Deputy-Director: Media Liaison, Communications & Advocacy
Tel: +2712 399 9975
Cell: +2766 112 3746
E-mail: nbolani@dffe.gov.za

Issued by Department of Forestry, Fisheries and Environment
More from Department of Forestry, Fisheries and the Environment

From: Ashley Naidoo <ANaidoo@dffe.gov.za>
Sent: Monday, 11 September 2023 15:47
To: Alistair McInnes; Smith, Craig; Pichegru, Lorien (Dr) (Summerstrand Campus South)
Cc: Lauren Waller
Subject: Re: EC closures

Hi Alistair, Craig, Lorien and Lauren

Let me confirm with Johan De Goede if these are in place already, my request to him was that these were to be implement from September 1, after I received confirmation from all that the map was acceptable, but I need to confirm with him.

I did manage to chat briefly with Riedau this afternoon, he is working on the updated map, and will get that to me late today. I will ask for permission to share with all of you. I will also arrange a discussion with Riedau later this week to try to understand where he is coming from. Then I will engage with all of you again.

Thank you
Ashley N

From: Alistair McInnes <alistair.mcinnes@birdlife.org.za>
Date: Monday, 11 September 2023 at 14:29
To: Smith, Craig <csmith@wwf.org.za>, lorien.pichegru@mandela.ac.za <lorien.pichegru@mandela.ac.za>, Ashley Naidoo <ANaidoo@dffe.gov.za>
Cc: Lauren Waller <laurenw@ewt.org.za>
Subject: RE: EC closures

Hi Ashley

I agree with Lorien and Craig. Please can you confirm if the permit has already gone out for the agreed closures in Algoa Bay.

Many thanks and regards

Alistair

From: Smith, Craig <csmith@wwf.org.za>
Sent: Monday, September 11, 2023 2:22 PM
To: Pichegru, Lorien (Dr) (Summerstrand Campus South) <lorien.pichegru@mandela.ac.za>; Ashley Naidoo <ANaidoo@dffe.gov.za>

MIC AM

Cc: Alistair McInnes <alistair.mcinnes@birdlife.org.za>; Lauren Waller <laurenw@ewt.org.za>
Subject: RE: EC closures

Dear Ashley

I would tend to agree with Lorien that if the engagement with the fishing industry was transparent and if there was no mistake on what was agreed upon then it cannot simply be withdrawn as this will make a mockery of any further engagement processes, which implies that the fishing industry is not engaging in good faith. If the closed area is to be withdrawn it now needs to be agreed upon by all parties as there are implications of going back on this decision. Also industry would need to provide a motivation of why they want this withdrawn.

Regards

Craig Smith
::Senior Manager: Marine Portfolio, WWF-SA::
1st Floor, Bridge House
Boundary Terraces
Mariendahl Lane, Newlands
P.O.Box23273
Claremont 7735
Tel: +27 (21) 657 6600 Direct: +27 (21) 657 6670 Mobile: +27 (82) 481 8600
Fax: +27 86 535 9433
Email: csmith@wwf.org.za
Web: http://www.wwf.org.za

From: Pichegru, Lorien (Prof) (Summerstrand Campus South) <Lorien.Pichegru@mandela.ac.za>
Sent: Monday, September 11, 2023 11:01 AM
To: Ashley Naidoo <ANaidoo@dffe.gov.za>
Cc: Alistair McInnes <alistair.mcinnes@birdlife.org.za>; Lauren Waller <laurenw@ewt.org.za>; Smith, Craig <csmith@wwf.org.za>
Subject: RE: EC closures

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Thanks for understanding.

Kind regards
Lorien

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Honorary consul for France in Gqeberha.
Email: lorien.pichegru@mandela.ac.za
cell: +27 (0) 834 878 574

From: Ashley Naidoo <ANaidoo@dffe.gov.za>
Sent: Monday, 11 September 2023 08:53
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Thank you
Ashley N

Ashley Naidoo. Ph.D. | Chief Director: Ocean & Coasts Research (he/him)
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Can you kindly update us on the situation?

Thank you very much in advance.
Lorien

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From: Lauren Waller <LaurenW@ewt.org.za>
Sent: Wednesday, 13 September 2023 15:45
To: Ashley Naidoo
Cc: Alistair McInnes; Smith, Craig; Pichegru, Lorien (Dr) (Summerstrand Campus South)
Subject: RE: EC closures
Attachments: Gifford-et-al_2023_JCC_NoCostClosureToFisheriesEC.pdf

Dear Ashley

Apologies for my silence on this matter, I have been attending the International Penguin Congress.

I have to communicate my utter dismay at this turn of events from Redah. Surely the department cannot be held ransom like this? There were multiple witnesses to many of these meetings with Redah (and an official media release about the agreement by the minister herself) – surely DFFE cannot go back on this now?

I've been meaning to ask you to clarify something regarding the interim closures decided on by the Minister, and am hoping you can shed some light on the matter. I'll put it in bullet points to be as succinct as I can.
- The panel pointed out that the ARS MIBAs were the most scientifically defensible areas and recommended their use and that the costs estimated by industry were overexaggerated (although by an unknown amount)
- We have followed the panel recommendation and plotted the ARS mIBA against area and costs to the fishing industry. We'd assume that DFFE, particularly those advising the Minister, would have done the same mapping exercise in July, between the submission of the Panel report in June and the media statement in August, in order to provide the most defensible advice to the Minister. We have found that the ARS MIBA extents bear low cost to industry (with Dyer and St Croix exceptions), and that the interim closure extents have extremely low cost to industry (0% catch lost in some instances!)

- As such, can you explain the process that led to that decision of retaining the interim closures? They are in no way aligned to the Panel report recommendations (apart from non-seasonal and longer closures – although these are meaningless without meaningful closure extents), and have very little benefit (if any) for the penguins (bar Dassen Island). On what basis are these interim closures justifiable?

Lastly, has the department seen the latest paper regarding costs to eastern cape fishing industry as a result of closures? As you know we have repeatedly through GF, ETT, CAF asked for socio-economic costs from industry, with nothing forthcoming. The industry model has also been questioned by the panel, while the study in the document attached received positive comments from Andre Punt when he reviewed the Synthesis Report. This paper, using fishery catch data provided by DFFE, shows that "neither their catch sizes nor travel times varied significantly with fishing exclusion measures."
Thus, if the Department backs down on what was agreed to (i.e. following the Panel recommendations), again, on what basis and evidence will this decision be made on?

Please help me/us understand the DFFE processes Ashley.

Warm regards
Lauren

From: Ashley Naidoo <ANaidoo@dffe.gov.za>
Sent: Monday, September 11, 2023 3:47 PM
To: Alistair McInnes <alistair.mcinnes@birdlife.org.za>; csmith <csmith@wwf.org.za>; lorien.pichegru@mandela.ac.za
Cc: Lauren Waller <LaurenW@ewt.org.za>
Subject: Re: EC closures

Hi Alistair, Craig, Lorien and Lauren

Let me confirm with Johan De Goede if these are in place already, my request to him was that these were to be implement from September 1, after I received confirmation from all that the map was acceptable, but I need to confirm with him.

I did manage to chat briefly with Riedau this afternoon, he is working on the updated map, and will get that to me late today. I will ask for permission to share with all of you. I will also arrange a discussion with Riedau later this week to try to understand where he is coming from. Then I will engage with all of you again.

Thank you
Ashley N

From: Alistair McInnes <alistair.mcinnes@birdlife.org.za>
Date: Monday, 11 September 2023 at 14:29
To: Smith, Craig <csmith@wwf.org.za>, lorien.pichegru@mandela.ac.za <lorien.pichegru@mandela.ac.za>, Ashley Naidoo <ANaidoo@dffe.gov.za>
Cc: Lauren Waller <laurenw@ewt.org.za>
Subject: RE: EC closures

Hi Ashley

I agree with Lorien and Craig. Please can you confirm if the permit has already gone out for the agreed closures in Algoa Bay.

Many thanks and regards

Alistair

From: Smith, Craig <csmith@wwf.org.za>
Sent: Monday, September 11, 2023 2:22 PM
To: Pichegru, Lorien (Dr) (Summerstrand Campus South) <lorien.pichegru@mandela.ac.za>; Ashley Naidoo <ANaidoo@dffe.gov.za>
Cc: Alistair McInnes <alistair.mcinnes@birdlife.org.za>; Lauren Waller <laurenw@ewt.org.za>
Subject: RE: EC closures

Dear Ashley

I would tend to agree with Lorien that if the engagement with the fishing industry was transparent and if there was no mistake on what was agreed upon then it cannot simply be withdrawn as this will make a mockery of any further engagement processes, which implies that the fishing industry is not engaging in good faith. If the closed area is to be withdrawn it now needs to be agreed upon by all parties as there are implications of going back on this decision. Also industry would need to provide a motivation of why they want this withdrawn.

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Regards

Craig Smith
::Senior Manager: Marine Portfolio, WWF-SA::
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Fax: +27 86 535 9433
Email: csmith@wwf.org.za
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Local purse-seine fishers' economic losses owing to endangered seabird conservation measures – perceptions and reality

T. Gifford[1,2] · Amanda T. Lombard[1] · B. Snow[1,3] · V. Goodall[1,4] · Lorien Pichegru[1]

Received: 2 March 2023 / Revised: 5 July 2023 / Accepted: 21 August 2023

Abstract

The likelihood of success of a marine protected area (MPA) is strongly dependent on stakeholders' support. A concern often raised by local fishers is their lack of involvement in the design or management of a MPA and their loss of income owing to lost fishing grounds. We used Algoa Bay, South Africa, as a case study to analyse fisher's and fish-processing factory managers' concerns and perceived economic losses from fishing closures using structured interviews. Since 2009, a 20 km-radius purse-seine fishing-exclusion zone has been tested in Algoa Bay to assess the benefit to population recovery of the endangered African penguin *Spheniscus demersus*. Costs to the industry were estimated in terms of loss of catches and additional travel time to fishing grounds with and without closures. Fisher responses to interviews revealed general support for conservation and MPAs, but individuals interviewed did not feel that the 20 km fishing exclusion zones in Algoa Bay would aid African penguin conservation. While they systematically raised concerns about potential economic costs to their industry from closures, neither their catch sizes nor travel times varied significantly with fishing exclusion measures. Acknowledgement and assessment of the economic concerns may aid in initiating an informed dialogue amongst the various stakeholders in Algoa Bay, which may increase compliance and success of the newly proclaimed Addo elephant National Park MPA. Continued dialogue may also act as a catalyst for more integrated ocean management of biodiversity and human uses in the bay.

Keywords Fisher perceptions · Fisheries · Marine protected area · African penguin · Endangered species · Conservation

Introduction

As the number of threatened marine species increases (Worm et al. 2013; McCauley et al. 2015), urgent action is required to assess and limit anthropogenic drivers of species' declines and prevent extinctions (Davidson and Dulvy 2017; Duarte et al. 2020). Fully-protected and well-managed marine protected areas (MPAs) can provide a refuge for species and ecosystems (Grorud-Colvert et al. 2021; Roberts et al. 2017) and can contribute to food security and carbon storage (Sala et al. 2021). In the absence of MPAs, fishing-exclusion zones can protect harvested species and support ecosystem-based management of coastal and marine environments (Sardá et al. 2017). Historically, MPAs and other spatial conservation measures (such as fishing-exclusion zones) have been implemented to improve the conservation status of ecological system components (such as species or habitats), with less attention paid to the socio-economic costs of the intervention (Dehens and Fanning 2018; Brander et al. 2020, although see Smith et al. 2010). Prior analyses of MPAs have identified stakeholder engagement as a major factor in influencing the success or failure of an MPA (Giakoumia et al. 2018), and South Africa is no exception (Mann-Lang et al. 2021).

In 2014, the South African government initiated Operation Phakisa, an initiative to develop the South African oceans economy by growing various ocean-based industry sectors, including offshore oil and gas exploration, fisheries

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Published online: 29 August 2023

and aquaculture, marine transport and manufacturing, and marine protection. Four years later, the 2018 National Biodiversity Assessment for South Africa identified commercial fishing as a major threat to marine biodiversity and ecosystems in South Africa, owing to overexploitation of target species, high bycatch rates, habitat destruction, and competition for food resources with other marine species, as well as incidental seabird deaths (Majiedt et al. 2019). In 2019, twenty new MPAs were approved by the South African cabinet as part of Operation Phakisa. One of the new MPAs is the Addo Elephant National Park MPA located in Algoa Bay (Fig. 1) on the south coast of South Africa with a primary objective to protect the habitats of two Endangered seabird species: the African penguin *Spheniscus demersus* and the Cape gannet *Morus capensis* breeding on St Croix and Bird Islands (SANBI and South African Department of Environmental Affairs, 2018). Algoa Bay used to host 50% and 70% of the world African penguin and Cape gannet populations respectively on St Croix and Bird islands (Sherley et al. 2019, 2020, Fig. 1). Both species are endemic to Southern Africa and feed primarily on sardine (also referred to as pilchard) *Sardinops sagax* and anchovy *Engraulis encrasicolus* (Crawford 2007), which are targeted by the purse-seine fishery. This fishery contributes to the highest tonnage landed by fisheries in South Africa (Shannon and Waller 2021), with annual tonnage averaging around 391 000 tons between 2008 and 2012, including catches of sardine, anchovy, horse mackerel *Trachurus trachurus* and round herring *Spratelloides gracilis* (Wilkinson and Japp 2018). Catches from Algoa Bay represented 40 to 70% of national landings of sardines during our study (Coetzee et al. 2019), and are used primarily for the bait industry. Given the potential conflict for food resources, the competition between seabird species and the commercial fishing industry have been the focus of ongoing studies (Crawford 2007; Pichegru et al. 2009, 2010, 2012; McInnes et al. 2017; Sherley et al. 2018). For example, spatial analyses revealed that a significant proportion of the catches from the purse-seine fishing is located in the core foraging habitats of penguins and gannets (Pichegru et al. 2009).

As early as 2009, as part of a national experiment designed by a group of stakeholders including scientists and the fishing industry, 20 km experimental purse-seine fishing-exclusion zones were implemented around key penguin colonies in Algoa Bay (around St Croix and Bird Islands), and on the West Coast of South Africa (around Dassen and Robben Islands, to assess the potential benefits of exclusion zones for African penguins (see Pichegru et al. 2010, 2012; Sherley et al. 2018; Sydeman et al. 2021). Part of the experimental design involved swapping the fishing exclusion every three years within pairs of colonies: in Algoa Bay, the area surrounding St Croix Island was closed to fishing

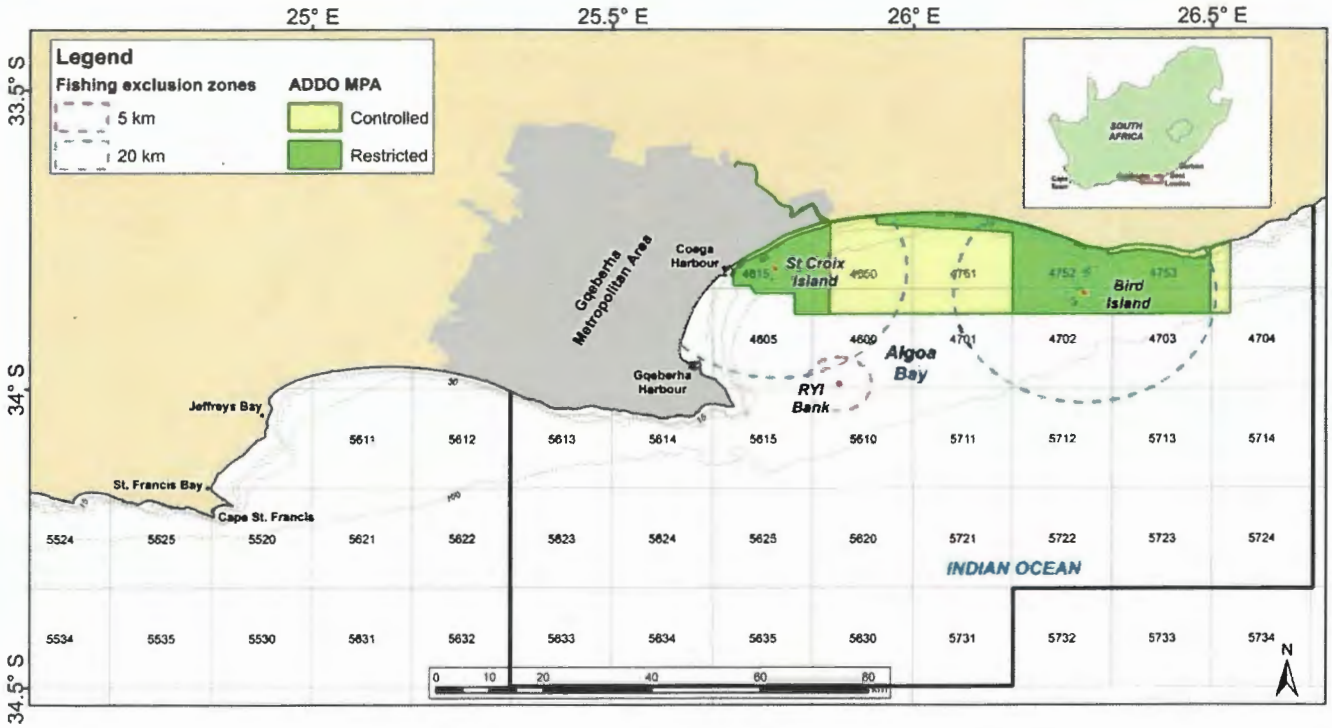

Fig. 1 Map of study area, showing the seabird colonies (St Croix and Bird islands) in Algoa Bay, the Addo Elephant National Park Marine Protected Area zonation (controlled and restricted, and the 20 km radius experimental purse-seine fishing exclusion zones around the islands, including 5 km around Ryi Bank. The map also shows (surrounded in black) the extent of the 'Algoa Bay' area where fishing catches and travel times were considered in this study (following Pichegru et al. 2012)

from 2009 to 2011, and again in 2015–2017, while allowed around Bird Island. Bird Island area was closed to fishing 2012–2014, and again from 2018 onward. Various parameters of African penguins' responses to changes in the fishing exclusion regime were monitored (see Pichegru et al. 2012; Sherley et al. 2018). Historical fishing pressure was much higher around St Croix Island than Bird Island, due to St Croix's proximity to the harbour (Pichegru et al. 2012), thus penguins from St Croix rapidly restricted their foraging range to mostly within the fishing-exclusion zone, reducing their energy expenditure during periods when the exclusion zone was in effect around that colony (Pichegru et al. 2010). However, evidence was provided that a larger fishing exclusion was needed in Algoa Bay to support the declining African penguin population and prevent the concentration of fishing activities at the exclusion zone boundary (i.e., 'fishing the line', Pichegru et al. 2012; Sherley et al. 2018).

The proclamation of the Addo Elephant National Park MPA in 2019 was a step towards potential improved penguin conservation, but the restricted zone of the MPA (where fishing is not permitted) offers poor coverage of foraging habitat for African penguins, especially those breeding on St Croix Island, and did not include most of the historical and current fishing grounds of the small pelagic industry (Pichegru et al. 2012). Nevertheless, commercial fishers who target small pelagic fish remain concerned about the loss of fishing grounds following any form of fishing exclusion, and fear decreases in catch and loss of income, especially in the light of possible additional exclusions to assist the recovery of African penguins. These concerns need to be addressed if more permanent and larger fishery exclusion zones to benefit penguins are to have any chance of success.

This research aimed to first understand the purse-seine fishers' perceptions of fishing exclusion zones (be they temporary **or** implemented as zones in MPAs) and their perceived impacts of these measures on their fishery. We then compared these perceptions with estimates of the impacts of fishing exclusions on **costs to** the purse-seine fishing industry **(i.e. decrease of catches, increase of travel times)**. Using structured interviews, we assessed local fisher's views on marine top predator conservation status, the use of MPAs and the sustainability of fishing industries in general. In parallel, we quantified the effect that the fishing-exclusion zone around St Croix Island had on catch size and travel time of the local purse-seine fishery. This study is a first step towards reconciling conservation and fishery goals in area-based conservation measures for endangered marine top predators in Algoa Bay. It provides insights into stakeholders' perceptions and how these may be addressed to promote the sustainability of both the fishery and the foraging needs of penguins, and to enable a more integrated ocean management approach that considers both biodiversity and human uses **of** the bay (Vermeulen et al. 2022).

Materials and methods

Structured interviews

Nine individuals were interviewed (structured interview in Supplementary material) for their opinions on fishing-exclusion zones. These interviews aimed to collect insights of pelagic fishers from a "realist perspective" (Crouch and McKenzie 2006), not relying on a large sample size of a subgroup (Daniel 2012). Through these interviews, we collected perceptions of a group with common interests and active in the pelagic fisheries in Algoa Bay. We used a snowball sampling (also known as purposive sampling), whereby an initial participant was identified and with their help, the interviewer was introduced to additional potential participants (Bernard 2017). Five individuals were fishers on purse-seine vessels operating from Port Elizabeth harbour and four were managers of factories (floor managers and operations managers) that process sardine in the city. While the sample size was small, it did represent most of the "top-tier" individuals in the small local purse-seine fishing community. Involvement in the study was voluntary, answers were kept anonymous, and participants were assigned a random number from 1 to 9. Interviews were conducted face-to-face and at various locations where the participants felt comfortable. Answers were scribed by the interviewer and no voice recording devices were used. Human ethics (H18-SCI-ZOO-004) approval was granted by the Nelson Mandela University human ethics committee.

The structured interviews consisted of three main themes: marine predators, fishery-exclusion zones (and MPAs more broadly), and the sustainability of the purse-seine fishery. The questions (see Supplementary material) were open-ended and designed to ensure that the questions flowed well, were phrased suitably, and did not lead participants to a particular response. An attempt was made to structure the interviews according to position in the fishery, and some questions when not applicable were omitted (e.g. PS5, PS6, PS7 for managers, see Suppl. Mat.). **Responses of the participants were analysed in view of their position in the fishery**, fishers (n = 5, four skippers and one first mate) or managers (n = 4), and age class: "younger" (age 18–40 years old, n = 3) and "older" (41 + years, n = 6).

Fishery exclusion and catches

Catch data of the Eastern Cape pelagic purse-seine fishery (2007–2017) were obtained from the Department of

Forestry, Fisheries and the Environment (DFFE). Data are reported by the fishing industry to the Department in tonnes of catches per species per trip for each vessel, with spatial coordinates of the area of the catch, **as well as time of departure from and return to the harbour, and vessel ID**. We quantified the effects of the exclusion zone around St Croix Island alone (in effect in 2009–2011 and then again in 2015–2017), given that the Bird Island area was seldom fished by purse-seiners (Pichegru et al. 2012; McInnes 2016) and St Croix Island was the closest to the Port Elizabeth harbour and the largest local African penguin breeding population at the time (Sherley et al. 2020). In this study, we considered catches in tonnes of small pelagic fish in Algoa Bay, as the area defined by Pichegru et al. (2012) (Fig. 1). While movement of fishing vessels to the neighbouring harbour of Cape St Francis (80 km west) can occur, most (> 80%) of the catches from the Eastern Cape small pelagic fishing industry take place in Algoa Bay, in relatively close proximity of the Port Elizabeth harbour (Pichegru et al. 2012).

The effect of the fishing-exclusion regime around St Croix Island was tested on catch sizes (as a proxy for revenue) and travel time (i.e., difference between vessel departure time from the port and arrival time back at port, as a proxy for costs both in terms of fuel costs and time spent searching for fish) for each fishing trip in Algoa Bay. A log transformation was used for travel time in order to improve the symmetry of the distribution of the variable to meet the assumption of normality. Exclusion regimes were designated as Open 1: 2007–2008, Closed 1: 2009–2011, Open 2: 2012–2014 and Closed 2: 2015–2017). Catch size or log travel time were set as the response variables in an Analysis of Variance (ANOVA), with combinations of exclusion regime, year and vessel ID as explanatory factors. Assumptions of normality and homogeneity of variance were checked using residuals.

In addition, because vessels are limited by their hull capacity in the tonnage of fish they can catch per trip (ca. 40 tons for vessels in Algoa Bay, but vessels can do additional trips), effect of fishing exclusions was also tested on the total annual catch of the fishery with a one-way ANOVA, and a Tukey post-hoc test. Statistical tests were conducted in R 4.2.0 (R Core Team, 2022).

Results

Perception of fishers: marine life

Participants' responses regarding interactions with marine life are presented in Table 1. Marine predators like sharks or seals can conflict with fishers when they intercept catches or damage equipment. Penguins were not considered a nuisance because they did not steal the catch. Predators could, however, be perceived in a good light as they can be used to locate productive fishing grounds.

Bycatch (catch of non-targeted species) had both positive and negative aspects according to the purse-seine fishers. Some bycatch species may provide supplemental income to fishers if it can be sold (e.g. mackerel *Scomber scombrus)*, with this being especially important during periods of low targeted fish catch. Alternatively, bycatch of species such as barbels or sharks may damage nets or take up valuable space in the net and thus reduce income for fishers.

Opinions about the conservation status of marine predators and the sustainability of fishing world-wide are presented in Table 2. Opinions differed between age groups, with an apparent division among older individuals. Most participants felt that the loss of predators would negatively affect the environment because marine predators are "part of the ecosystem" and the "natural balance of the sea". But when examining the differences in opinions based on job position or age, one older fisher stated that the loss of predators would allow for "more fish for the fishermen" while one older manager said that "the workings of the sea would balance things out".

When asked about the sustainability of fishing world-wide and locally, all participants recognised that overfishing was a serious global threat (Table 3). However, when asked specifically about the sustainability of the purse-seine fishery, responses were more varied. Most managers viewed

Table 1 Responses of participants regarding interactions with marine life

Negative interactions	Positive interactions
Sharks (particularly Bronze whaler sharks *Carcharhinus brachyurus*) can tear nets multiple times per year. Damaged nets are costly to repair.	Four of the five fishers have made use of marine predators to help them find fish, while one older fisher has not. Marine life, used to find fish, included marine mammals (whales, dolphins, finless porpoises *Neophocaena phocaenoides* or Cape fur seals *Arctocephalus pusillus*) and seabirds (Cape gannets *Morus capensis* and petrels).
Seals steal fish from the nets, although there were different opinions on how often and how much fish is stolen. While most participants (three managers and two fishers) thought that seals steal minimal catch, three believed that seals have stolen large amounts of the catch, with two fishers voicing the need for "seal culling".	Common bycatch includes: mackerel *Scomber scombrus*, redeye *Etrumeus whiteheadi*, maasbanker *Trachurus capensis*, small sharks and rays and barbels. The bycatch is sold in some cases, but participants stated that "it's not enough fish to make money". When the bycatch is too damaged to sell, it is used as "chum" or "given to workers in the processing factories, they take it home to eat".

Table 2 Opinions of participants on whether marine predators should be protected

Should marine predators be protected?	
Older (n = 6)	n = 3: No n = 3: Yes. Two believe that we should only "protect what we can utilise, not what is overpopulated".
Younger (n = 3)	n = 3: Yes
Fisher (n = 5)	n = 3: Yes n = 1: "but we need to consider fishermen"
Manager (n = 4)	n = 3: Yes n = 1: "Cape fur seal numbers are too high and don't need protection, but African penguins are under big pressure and need protection". n = 1: some marine predators not impacting fisheries should be protected, such as the African penguin, but sharks, whales, dolphins and seals should not be protected as "their numbers are out of control".
Is commercial fishing (world-wide and locally) sustainable?	
Fisher	Concerned over the Western Cape purse-seine fishery, with "vessels that are too big" and "big nets", thus a greater impact. Overfishing is "definitely a worldwide" threat. "Fishing allocations need to be done properly. People in charge must decide how much we take out, we just go ahead". "Overfishing is a serious threat, YES".
Manager	"First world countries with their better technology have more of an effect" because the technology has made fishing for species easier and thus aggravated overfishing. "Illegal fishing [causing overfishing] is the biggest threat [to the oceans] in my opinion". "Overfishing is absolutely a threat [to the ocean globally]".

Table 3 Individual opinions of Algoa Bay purse-seine fishers and factory managers regarding the impacts of the Addo Elephant National Park Marine Protected Area (MPA) on the environment and on the fishery

	MPA and environment: Positives	MPA and environment: Negatives	MPA and fishery: Positives	MPA and fishery: Negatives
Fishers	• "Helps the environment" • "Helps reef fish" • "Helps whales and dolphins"	• "[Addo MPA] not helping anything where it is, better somewhere else" • "[Addo MPA] is not properly policed"	• "If properly enforced the sardine can spawn" • "No [won't affect job]"	• "MPAs destroy the fishing industry" • "[MPA in Algoa Bay] would threaten my job" • "[MPAs] increase the fuel we have to use"
Managers	• "Helps the environment" • "Reduces destruction" • "Helps islands and reefs" • "Refuge for species"	• "Feeds criminal element, no public eye to stop poaching"	• "[MPAs] help in the long run but not right now"	• "Doesn't help pelagics" • "[MPA] around Coega harbour would affect us for sure, 30–40% of sardine caught in Algoa Bay is from near St Croix Island" [the loss of this fishing area would result in lower catches and increased fuel costs] and "the flatter waters [around St Croix Island] keep the quality of fish good, if we go further out to sea or near Schoenies [Schoenmakerskop], the rough sea damages the fish" • "[MPA in Algoa Bay] would threaten my job"

the fishery as unsustainable, while fishers were not in agreement. When discussing their fishing activity around Algoa Bay's islands, all nine participants stated that the purse-seine fishing activity did not impact species present on Bird or St Croix Islands, explaining that the boats and nets used were "too small to have a large impact", perhaps even "give easy meals to animals".

Nevertheless, the majority of the participants agreed that top predators needed conservation measures. Interestingly, when discussing how to conserve marine predators, multiple methods were suggested, including "MPAs and more control of the fisheries" and "helping pelagic stock recovery", "using research and educational programs for people in the fishing industry and get all role-players together", as well as "identify what is causing the decline and control that".

Perception of fishers: MPAs

Opinions regarding the impact of MPAs on the environment and the fishing industry are summarised in Table 4 They differed among the participants, with both positive and negative comments. Positive views of MPAs were predominantly about the environment as a whole, such as helping reefs or acting as a refuge for fish, or for certain species, like whales and dolphins or spawning sardines. However, very few positives for the fishery were listed by participants. Rather, all participants (except for one young fisher) felt

Table 4 Results of the two-way ANOVAs testing the effect of a 20 km radius fishing-exclusion zone, year and boat ID around St Croix Island on purse-seine fishing vessel catch size and travel time (log-transformed) in Algoa Bay, South Africa. Significance was indicated as: ns (not significant), $p<0.05$ *, $p<0.01$ **, $p<0.001$ ***

Response	Fixed effect	df	F value	p-value	Sig
Catch size (tonnes) per trip	**Exclusion regime: Closure 2**	3	25.70	P<0.001	***
	Boat ID	19	36.4	P<0.001	***
	Year	6	6.06	P<0.001	***
	Closure 2 * Boat ID	18	1.70	0.033	*
Travel time (hours) per trip	**Exclusion regime: Closure 2**	3	57.73	P<0.001	***
	Boat ID	19	10.97	P<0.001	***
	Year	6	12.86	P<0.001	***
	Closure 2 * Boat ID	18	5.00	P<0.001	***
	Boat * Year	32	1.66	0.011	*
Annual Catch	**Closure 2**	3	7.23	0.015	*

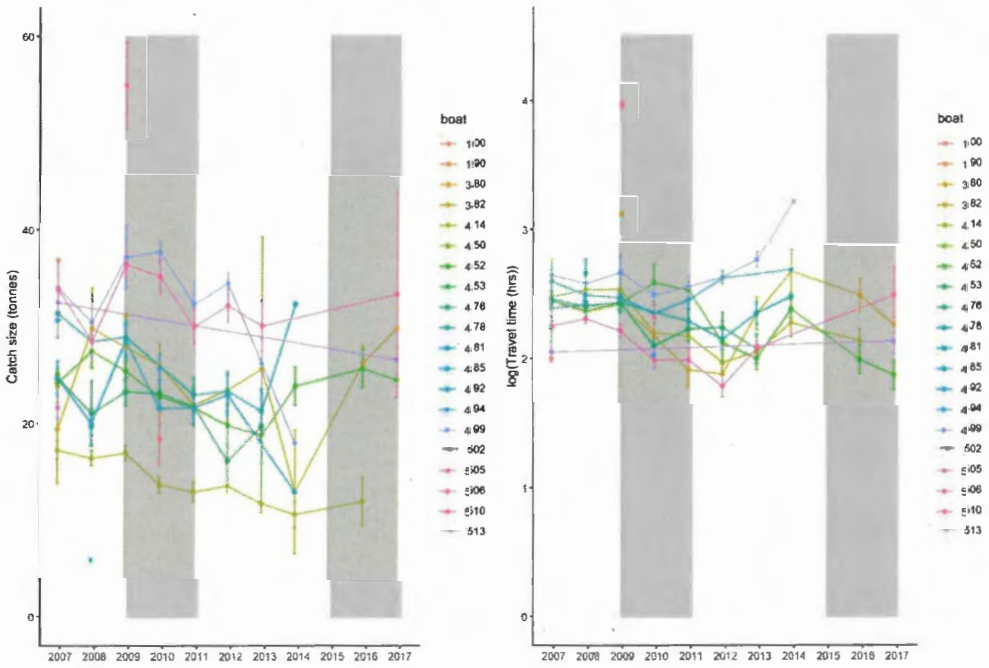

Fig. 2 Average (±SD) of (**a**) catch size (tonnes) and (**b**) travel time (log transformed) of small pelagic fish per individual purse-seine fishing vessels operating in Algoa Bay between 2007 and 2017. Shaded areas represent years with a fishing exclusion around St Croix Island, Algoa Bay, South Africa. Note: no fishing took place in Algoa Bay in 2015

that an MPA in Algoa Bay would threaten their jobs. The concern of increased fuel costs was voiced by three of the five fishers. Impact on catch size was voiced by a manager. **Three** participants mentioned the issue of lack of enforcement of the MPA.

Estimates of fishing exclusion impacts on fisheries' economic cost

A total of 2007 purse-seine fishing trips took place in Algoa Bay between 2007 and 2017, 828 of these when the fishing exclusion was in place around St Croix Island and 1179 when it was not. The number of vessels operating in the region varied between years with a maximum of 14 boats operating per year. Boats differed in their hull capacity and catches, as well as travel times (Figure S1). Some vessels (N = 5) conducted only one or two fishing trips in the bay during our study period. Another seven vessels conducted between 11 and 34 trips, whereas eight conducted between 122 and 396 trips.

Average catches per trip were slightly higher when the exclusion was in place, with 25.33 ± 11.97 tonnes per trip, compared to 23.75 ± 12.22 tonnes when it was not. The results of the ANOVA showed a significant interaction effect between closure regime and vessel ($F = 1.7$; $p = 0.033$). This interaction effect is illustrated in Fig. 2a, showing how the different vessels showed a different response to the closure regimes. For example, vessels 499 and 506 had their largest catches during 2010 when the island was closed to fishing, while other vessel's catches were lower during this period. A model including the interaction between vessel and year was not significant and hence the interaction was removed from the final model.

Similarly, average (±SD) travel time of fishing trips in Algoa Bay tended to be slightly lower when the St Croix fishing-exclusion zone was in effect (11.15 ± 5.71 h) than

when it was not (11.33 ± 5.45 h) (Fig. 2b). The results of the ANOVA for the travel time showed a significant interaction effect between closure regime and boat ($F = 5.00; p < 0.001$), as well as between boat and year ($F = 1.66; p = 0.011$). Again, different vessels experienced different responses to the closure regime, with some vessels (e.g., 499 and 485) having their longest travel times in 2014 when the island area was open to fishing.

However, the overall annual catches by the industry in the area decreased over time, regardless of the fishing exclusion regime (Fig. 3 and Figure S2), and the one-way ANOVA showed no significant difference in annual total catch during open and closed periods overall ($F = 1.174, p = 0.307$). However, if the four levels of the closure regime were used, which is associated with the time sequence of the closures, a significant difference in annual catch became apparent ($F = 7.23, p = 0.015$). Catches were highest in 2007, with a total of ca. 10 400 tonnes of small pelagic fish caught in Algoa Bay, and lowest during the last four years of our study (1100 tonnes in 2014 and 2016, 2900 tonnes in 2017 and 0 in 2015, Fig. 3). A Tukey post-hoc test showed that Open2 and Closed2 both significantly differed to Open1 (Figure S2) suggesting an overall decline in the annual catch rather than an effect of the closures on catch size.

Discussion

Although considerable research exists on fishers' support of conservation globally (e.g., Dimech et al. 2009; Leleu et al. 2012), the South African fishing community's perceptions on marine conservation methods have not been well-studied. This study is the first to explore the perception of Eastern Cape purse-seine **fishers** in top-tier positions **on** marine conservation and the impacts of MPAs on the environment and on their industry. While the sample size of participants was small, interviews in this study aimed to explore perceptions and insights of pelagic fishers rather than 'objective facts' (Crouch and Mckenzie 2006). The perceptions and views are not generalised but remain the views of the participants. Therefore, the final sample size addressed the objectives of the study (see Daniel 2012). Interviews revealed that participants from the top-tier management of the small Algoa Bay purse-seine fishing industry tend to support conservation, although their views on which species should be protected and how, varied considerably with both age and position in the fishery. Their perception of potential impacts of fishing exclusion on their livelihoods was nonetheless mostly negative. There was, however, no evidence from their catch data or travelling time per fishing trip of any measurable impact, of a 20 km fishing exclusion around St Croix Island, on their industry. Rather, variability was apparent between vessels and the overall decline in annual catch sizes observed here follows the recent decrease in small pelagic fish stocks in South African waters, with the sardine stock now considered as depleted (van der Lingen 2021).

Most participants felt that marine predators play an important role in the ecosystem, a perception often observed in the fishing community worldwide (Drymon and Scyphers 2017). However, they disagreed on the need for protection for predators, with younger participants supporting marine predators' conservation while older participants nuancing their statements by suggesting that only some should be protected. In the United States, older individuals were also less inclined to aid conservation of sharks (well-known marine predators) (Myrick and Evans 2014). The cause for this disparity of opinion with younger individuals was not clear, but it is possible that younger people have been taught more about fisheries decline through schooling as awareness of ocean conservation has developed over time (e.g., Lucrezi et al. 2019). It is unclear if that might be the case in the

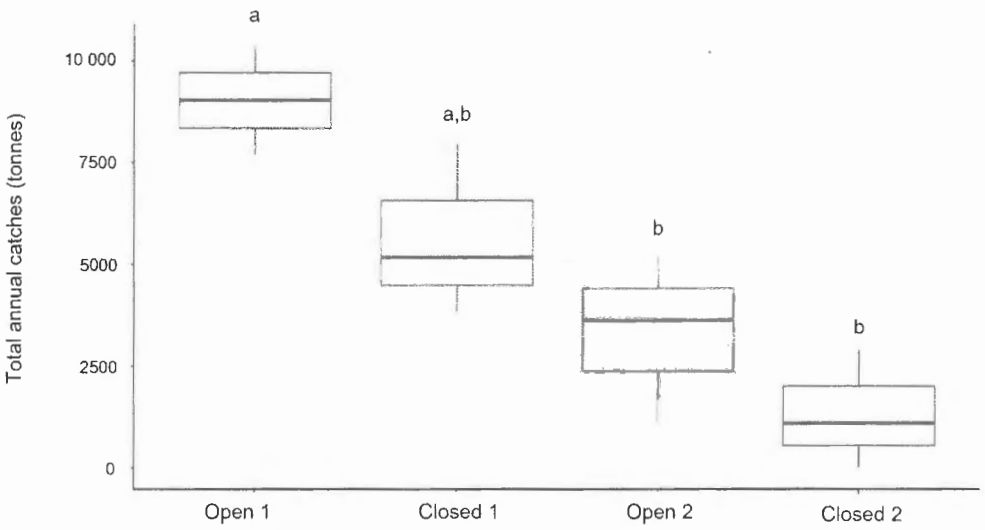

Fig. 3 Total annual catches (tonnes) of small pelagic fish by the purse-seine fishing industry in Algoa Bay, South Africa, during the various fishing exclusion regimes around St Croix Island between 2007 and 2017 (Open 1: 2007–2008, Closed 1: 2009–2011, Open 2: 2012–2014, Closed 2: 2015–2017). Different letters above box plots denote significant differences between periods

purse-seine fishing community in South Africa, but worth noting that it is a community dominated by older individuals (Sauer et al. 2003), which may affect how likely they may accept or be willing to be involved in conservation efforts. Regardless, further studies on the causes driving different views of the younger and older generations are needed to improve integrated ocean management efforts that aim to measure the impacts of sectoral management interventions on other sectors (for example, fishery closures on conservation and vice versa).

It is important to note that although participants recognised that overfishing was a serious issue globally and acknowledged that some fisheries were harmful to marine life, they did not feel that their fishery was a contributor. Rather, the responsibility of overfishing threatening marine ecosystems was systematically transferred onto other parties. This may be an example of Hardin's Tragedy of the Commons (Hardin 1968), a phenomenon in which an open resource leads to a lack of accountability and self-preservation trumps the needs of others. The issue of overfishing is complex, and no single party is entirely responsible, but the complexity of actors involved in overfishing makes it difficult to identify leverage points and responsible parties. This results in finger pointing and an absence of accountability across all parties. Hardin proposed that this "Tragedy of the Commons" can be avoided through greater state governance or private control of the resource. Ostrom (1990), instead, proposed that a shared resource can be responsibly managed by its users. Either way, the inclusion of all stakeholders for resource management and governance decisions is crucial to ensure that affected parties' concerns are respectfully addressed, thus enabling a greater chance of success for the proposed management approach.

Participants were aware of the various benefits that MPAs and fishing-exclusion zones can provide, including benefits that did not directly influence the fishers or managers themselves (e.g., eco-tourism). This understanding suggests that close collaborations between MPA managers and fishers could be successful in improving MPA management and compliance (e.g., Russ and Alcala 2004; Leleu et al. 2012). However, factory managers tend to be more cognisant of MPA-related benefits than fishers, which may be partly explained by the differing reliance on sardine for an income. Fishers interviewed in this study had permits for small pelagic fish only, while managers were able to process a larger variety of fish at their factories. Fishers thus had fewer alternatives to withstand lower fish hauls, and this could reduce their willingness to support an MPA owing to its perceived impact on catches. While all nine participants agreed that MPAs have multiple environmental benefits, they all felt that they, as individuals, would be negatively impacted by the loss of fishing areas and income, potentially threatening their job security, a concern largely shared by fishers globally, especially if they have limited alternative fishing grounds (Rees et al. 2013; McClanahan et al. 2005). Algoa Bay is a relatively small area in which multiple industries (long-liners, trawlers, purse-seiners, shipping, aquaculture, etc., see Holness et al. 2022) are active, which may account for some of the perceived negative views of fishing-exclusion zones. Other studies have also shown that even in cases where fishers are supportive of MPAs, many do not want the MPA in their fishing areas – referred to as the 'Not in my Backyard' problem (Bohnsack 1993), as shown in this study. However, this response can also change with time by implementing awareness campaigns and educating stakeholders on the benefits of the MPA (Bohnsack 1993; Lucrezi et al. 2019), as mentioned by a participant in this study.

The negative perception of the impacts of MPAs on fishing catches could also be addressed if information and data can respectfully demonstrate the difference between perceived concerns and reality (e.g., Anderson and Nichols 2007; although see Nyhan and Reifler 2010). This study had access to the size and location of catches from the purse-seine fishing industry in Algoa Bay during various regimes of fishing exclusion around St Croix Island, which encompassed traditional fishing grounds (Pichegru et al. 2012) and is in close proximity to the Port Elizabeth harbour (Fig. 1). The exclusion was thus expected to negatively affect the travelling time of vessels operating from them harbour, forcing them to fish further from the harbour, and the restriction of the size of the fishing grounds accessible was also expected to affect overall catch sizes as strongly voiced in this study. None of these impacts were, however, apparent in our results. Similarly, other studies found no impact of even the world largest MPAs on the catches of the fishing fleets (e.g., Lynham et al. 2020, Favoretto et al. 2023). By contrast, spill-over effects of even mobile species have been repeatedly shown to increase catches of near-by fisheries (e.g., Medoff et al. 2022). Our results therefore suggest that a fishing-exclusion zone around one of the largest remaining African penguin colonies is unlikely to negatively affect the industry, while likely being beneficial towards the recovery of the African penguin population (Pichegru et al. 2010, 2012; Sherley et al. 2018). Fishing exclusions have been identified as a "recovery wedge" in strategies to rebuilding marine life for a sustainable future (Duarte et al. 2020). Given the uncertainty surrounding future climate scenarios and the environment (and human-use) responses to a changing environment, the precautionary principle (enshrined in South African environmental law) seems prudent.

An open dialogue and shift towards mutual trust between fishery and environmental authorities are necessary to allow for concerns to be voiced and respectfully assessed. In the

present case, an open dialogue has been initiated to assist in easing concerns regarding income loss from an MPA, by first demonstrating that such loss was not supported by objective data. While fishers may benefit from a closer relationship with scientists and managers by being re-assured of the limited impacts of fishing exclusion on their livelihoods, scientists could also benefit from the wealth of knowledge held by fishers (Rochet et al. 2008). Fishers are inherently adaptable owing to the ever-changing nature of the environment in which they work. Given ever-changing oceanic conditions, and regular adjustments of fishing locations and allowed catches, some fishers have developed a profound understanding of their environment, allowing them to respond to change. Fishers' knowledge of the ocean's ecology, referred to as Local Ecological Knowledge (LEK) is an important key to better understanding how marine ecological communities function (Silvano and Valbo-Jorgensen 2008; Hallwass et al. 2013; Sowman and Raemaekers 2015; Lima et al. 2017). Research on LEK is just emerging in Algoa Bay (Strand et al. 2022), but remains nearly untapped globally within small pelagic fisheries (Uprety et al. 2012). This study may provide a foundation from which to build dialogue that will hopefully assist in MPA management and marine spatial planning efforts in the future. Successful MPAs and more integrated ocean management approaches require local involvement and input of stakeholders right at the start, as well as education actions, support from government agencies, and active monitoring and management (Pita et al. 2011; Boswell and Thornton 2021).

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Data Availability The data presented in this study are available on request from the corresponding author. The data are not publicly available due to being part of a long-term monitoring project involving several researchers.

Declarations

Competing interests The authors declare no competing interest, either financial, nor non-financial.

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"AM55"

From: Ashley Naidoo <ANaidoo@dffe.gov.za>
Sent: Friday, 15 September 2023 15:29
To: Lauren Waller
Cc: Alistair McInnes; Smith, Craig; Pichegru, Lorien (Dr) (Summerstrand Campus South); Gerhard Cilliers; Gcobani Popose
Subject: Re: EC closures

Dear Lauren, Lorien ,Craig and Alistair (I am now including Gerhard and Gcobani who be increasingly more involved in this process as the Science and Policy Directors respectively - for marine species management.)

I trust all of you are well and looking forward to good weekend.

Thank you for the extra time to get back to you – all of us are in a bit of a rush to complete several processes today before some new Treasury rules kick in. To get to your question below Lauren, I do not have insights into the Minister's processes.

However, I can offer a view from my lower (and narrower) perspective. The Panel Report pointed to a few key aspects/recommendations like the ARS for MIBAS, or different ways to calculate fishery impact. These recommended actions are to occur within the two key conclusions. One: the ICE can be regarded as concluded and two: that closures or limitations of fishing adjacent to penguin colonies does have a positive effect for penguins. This then required a policy decision: The use of fishing limitations as an intervention in penguin conservation. From this policy decision there needed to be implementation, preferably rapid policy implementation in this case – and here there are two broad implementation avenues: 1. Interim fishing limitations continue; unless replaced by a consensus agreement (per colony) and/or in 6 years when a review has taken place and 2. The Panel recommendations on the science will be implemented (within finances).

I want to talk to the second avenue. This for me is key: it will allow for the all of the various actions to explored: including ARS for MIBAS, fishing costs estimates etc – and in my thinking we have six years, including with incrementally growing observations and analyses. After six years there will be an opening to review the extent of fishing limitations. Here the policy decision is important: fishing limitations will be used. After 6 years with all of the updates and new analyses we may argue for more limitations (and the fishing sector may argue for less) but not the use or usefulness of fishing limitations. If we started refining calculations immediately after the Panel Report (in my view again) this will have led to a number of iterations, checks and counter checks of calculations (H factors and kernels etc). While the science has progressed over the last decade, it is these iterations that prevented a policy

conclusion and implementation. There are strong arguments that the fishing limitations extents are too narrow (or too wide) but there is no quick way, in a matter of weeks, to resolve these. Additionally, there would have been the discussion of can the science recommendations be implemented individually or sequentially, or must some, at least, be done simultaneously – either way – all adding time to the process.

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I hopes this helps with describing my thinking at least, and a happy to hear your thoughts.

Separately, Riedau, has sent me some maps earlier today, and said that he will send some notes later, I have asked that he includes permission for me to share with all of you - towards setting up the next round of discussions if this is necessary.

Thank you
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Cc: Alistair McInnes <alistair.mcinnes@birdlife.org.za>, csmith <csmith@wwf.org.za>, lorien.pichegru@mandela.ac.za <lorien.pichegru@mandela.ac.za>
Subject: Re: EC closures

Hi Lauren and colleagues

Please give me until end of the week to get back to you. I am acting DDG this week, so much of the week is taken up with admin meetings. I have not heard from Riedau since Monday when I called and have not received updated map as yet.

Thank you
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From: Lauren Waller <LaurenW@ewt.org.za>
Date: Wednesday, 13 September 2023 at 15:46
To: Ashley Naidoo <ANaidoo@dffe.gov.za>

Cc: Alistair McInnes <alistair.mcinnes@birdlife.org.za>, csmith <csmith@wwf.org.za>, lorien.pichegru@mandela.ac.za <lorien.pichegru@mandela.ac.za>
Subject: RE: EC closures

Dear Ashley

Apologies for my silence on this matter, I have been attending the International Penguin Congress.

I have to communicate my utter dismay at this turn of events from Redah. Surely the department cannot be held ransom like this? There were multiple witnesses to many of these meetings with Redah (and an official media release about the agreement by the minister herself) – surely DFFE cannot go back on this now?

I've been meaning to ask you to clarify something regarding the interim closures decided on by the Minister, and am hoping you can shed some light on the matter. I'll put it in bullet points to be as succinct as I can.
- The panel pointed out that the ARS MIBAs were the most scientifically defensible areas and recommended their use and that the costs estimated by industry were overexaggerated (although by an unknown amount)
- We have followed the panel recommendation and plotted the ARS mIBA against area and costs to the fishing industry. We'd assume that DFFE, particularly those advising the Minister, would have done the same mapping exercise in July, between the submission of the Panel report in June and the media statement in August, in order to provide the most defensible advice to the Minister. We have found that the ARS MIBA extents bear low cost to industry (with Dyer and St Croix exceptions), and that the interim closure extents have extremely low cost to industry (0% catch lost in some instances!)

- As such, can you explain the process that led to that decision of retaining the interim closures? They are in no way aligned to the Panel report recommendations (apart from non-seasonal and longer closures – although these are meaningless without meaningful closure extents), and have very little benefit (if any) for the penguins (bar Dassen Island). On what basis are these interim closures justifiable?

Lastly, has the department seen the latest paper regarding costs to eastern cape fishing industry as a result of closures? As you know we have repeatedly through GF, ETT, CAF asked for socio-economic costs from industry, with nothing forthcoming. The industry model has also been questioned by the panel, while the study in the document attached received positive comments from Andre Punt when he reviewed the Synthesis Report. This paper, using fishery catch data provided by DFFE, shows that "neither their catch sizes nor travel times varied significantly with fishing exclusion measures."
Thus, if the Department backs down on what was agreed to (i.e. following the Panel recommendations), again, on what basis and evidence will this decision be made on?

Please help me/us understand the DFFE processes Ashley.

Warm regards
Lauren

From: Ashley Naidoo <ANaidoo@dffe.gov.za>
Sent: Monday, September 11, 2023 3:47 PM
To: Alistair McInnes <alistair.mcinnes@birdlife.org.za>; csmith <csmith@wwf.org.za>; lorien.pichegru@mandela.ac.za
Cc: Lauren Waller <LaurenW@ewt.org.za>
Subject: Re: EC closures

Hi Alistair, Craig, Lorien and Lauren

Let me confirm with Johan De Goede if these are in place already, my request to him was that these were to be implement from September 1, after I received confirmation from all that the map was acceptable, but I need to confirm with him.

I did manage to chat briefly with Riedau this afternoon, he is working on the updated map, and will get that to me late today. I will ask for permission to share with all of you. I will also arrange a discussion with Riedau later this week to try to understand where he is coming from. Then I will engage with all of you again.

Thank you
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From: Alistair McInnes <alistair.mcinnes@birdlife.org.za>
Date: Monday, 11 September 2023 at 14:29
To: Smith, Craig <csmith@wwf.org.za>, lorien.pichegru@mandela.ac.za <lorien.pichegru@mandela.ac.za>, Ashley Naidoo <ANaidoo@dffe.gov.za>
Cc: Lauren Waller <laurenw@ewt.org.za>
Subject: RE: EC closures

Hi Ashley

I agree with Lorien and Craig. Please can you confirm if the permit has already gone out for the agreed closures in Algoa Bay.

Many thanks and regards

Alistair

From: Smith, Craig <csmith@wwf.org.za>
Sent: Monday, September 11, 2023 2:22 PM
To: Pichegru, Lorien (Dr) (Summerstrand Campus South) <lorien.pichegru@mandela.ac.za>; Ashley Naidoo <ANaidoo@dffe.gov.za>
Cc: Alistair McInnes <alistair.mcinnes@birdlife.org.za>; Lauren Waller <laurenw@ewt.org.za>
Subject: RE: EC closures

Dear Ashley

I would tend to agree with Lorien that if the engagement with the fishing industry was transparent and if there was no mistake on what was agreed upon then it cannot simply be withdrawn as this will make a mockery of any further engagement processes, which implies that the fishing industry is not engaging in good faith. If the closed area is to be withdrawn it now needs to be agreed upon by all parties as there are implications of going back on this decision. Also industry would need to provide a motivation of why they want this withdrawn.

Regards

Craig Smith
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From: Pichegru, Lorien (Prof) (Summerstrand Campus South) <Lorien.Pichegru@mandela.ac.za>
Sent: Monday, September 11, 2023 11:01 AM
To: Ashley Naidoo <ANaidoo@dffe.gov.za>
Cc: Alistair McInnes <alistair.mcinnes@birdlife.org.za>; Lauren Waller <laurenw@ewt.org.za>; Smith, Craig <csmith@wwf.org.za>
Subject: RE: EC closures

Dear Ashley,

Thank you for your response.
I am a bit surprised that there is consideration to go back on the agreement. I understood that there was a media statement from the Minister herself about this agreement and the fishing permits were updated as of 1st of September.

https://www.fishingindustrynewssa.com/2023/08/31/african-penguin-foraging-grounds-agreement-for-algoa-bay/

There was thorough engagement between us and Redah since June, and maps were shown 3 times at different meetings, all including the CAF proposal, the DFFE proposal and the interim closure. He even sent himself the map where he agreed to close to fishing, and there were other members of the fishing association present at our meeting on the 25th of August that supported the agreement.

I hope these are enough evidence of a fair and honest engagement process and a clear agreement between the two parties that cannot be withdrawn that easily.

It is also important to highlight that the expert panel's report stressed that closures should encompass the birds' mIBAs. The interim closures would therefore be biologically meaningless.

Thanks for understanding.

Kind regards
Lorien

Adj. Prof. Lorien Pichegru,
Institute for Coastal and Marine Research,
Ocean Sciences Campus,
Nelson Mandela University,

Gqeberha, South Africa.
Honorary consul for France in Gqeberha.
Email: lorien.pichegru@mandela.ac.za
cell: +27 (0) 834 878 574

From: Ashley Naidoo <ANaidoo@dffe.gov.za>
Sent: Monday, 11 September 2023 08:53
To: Pichegru, Lorien (Prof) (Summerstrand Campus South) <Lorien.Pichegru@mandela.ac.za>
Cc: Alistair McInnes <alistair.mcinnes@birdlife.org.za>; Lauren Waller <laurenw@ewt.org.za>; Smith, Craig <csmith@wwf.org.za>
Subject: Re: EC closures

Dear Lorien and Alistair, Lauren and Craig copied

Yes Riedau, did call me late on Friday the 1st of September. I was also surprised as everybody confirmed their agreement. I am also not sure of what he meant by the 73% - which he raised before. He asked me to send him previous maps showing the various options including the CAF option - which I did. I also asked him to send me a map or sketch of what his "correct" understanding is … so that I my share this with all of you and get a conversation going again. I did not get an updated map from him last week, and followed up on Friday with an email. I plan to call him this week as well.

The options from here are not easy but my understanding from the Minister's decision, is that the interim closures will be put in place if there is no agreement. While there is no explicit direction on what is to happen in this situation where an agreement collapses – my thinking is that the interim will return.

Thank you
Ashley N

Ashley Naidoo. Ph.D. | Chief Director: Ocean & Coasts Research (he/him)
Find Annual Ocean & Coasts Science Report at:
https://www.dffe.gov.za/documents/research/oceansandcoasts
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+2782 784 7131

From: Pichegru, Lorien (Prof) (Summerstrand Campus South) <Lorien.Pichegru@mandela.ac.za>
Date: Friday, 08 September 2023 at 15:00
To: Ashley Naidoo <ANaidoo@dffe.gov.za>
Cc: Alistair McInnes <alistair.mcinnes@birdlife.org.za>, Lauren Waller<laurenw@ewt.org.za>, Smith, Craig <csmith@wwf.org.za>
Subject: EC closures

Dear Ashley,

I hope you are well.

A few days ago, Redah phoned me concerned about the size of the closure around St Croix, surprised that the 42% agreed upon was larger than the 73% he was unsatisfied with, which was the interim closure. I do not know which 73% he is referring to and he is also unsure himself, but he told me he'd discuss the matter with you. We can understand his confusion, the penguin metric changed a few times over the course of the analyses. However, the map we agreed on showed both the interim closure and the proposal he sent us, which was larger than the interim closure.

With my colleagues copied here, we are slightly worried about his misunderstanding and voicing his unhappiness to DFFE. We assume, however, that the agreement has been settled, from the map he sent himself, from the productive meeting we had together, also attended to by Deon and Tasneem, and from the media statement from DFFE on the 31st of July.

Can you kindly update us on the situation?

Thank you very much in advance.
Lorien

Adj. Prof. Lorien Pichegru,
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NOTICE: Please note that this eMail, and the contents thereof, is subject to the standard Nelson Mandela University eMail disclaimer which may be found at: http://www.mandela.ac.za/disclaimer/email.htm

From: Pichegru, Lorien (Prof) (Summerstrand Campus South) <Lorien.Pichegru@mandela.ac.za>
Sent: Thursday, 21 September 2023 11:01
To: Ashley Naidoo; Lauren Waller
Cc: Alistair McInnes; Smith, Craig; Gerhard Cilliers; Gcobani Popose
Subject: RE: EC closures

Dear Ashley,

Thanks for your considered response. However, you are focusing on Point 2, when the discussion in our emails has been about Point 1.
The questions were:

1- How did the department come to the decision to keep the status quo of the Interim Closures, when the recommendations made in the Panel Report in terms of what was most scientifically defensible (also with minimal cost to industry) were completely different? This is in fact questioning the whole process of appointing an International Panel to conduct a review in the first place.
2- But regarding the Eastern Cape, the question is: how can an agreement reached in good faith on the 25th of August, with witnesses, after repeatedly sharing very clear maps, be reconsidered? While you may have no insights into the Minister's process on the first question, you are the one allowing Redah to think we can renegotiate on a matter that Minister has already publicly commented on. This does not seem like a fair and balanced process.

Regarding your Point 2, you state that: "there are strong arguments that the fishing limitations extents are too narrow (or too wide)", but the Panel reported over-estimates of costs to the industry and my recent publication showed no cost of the ICE to the industry in the EC. So, there are no strong argument that closures are too wide.
Importantly, you state that "we have six years, including with incrementally growing observations and analyses". Sadly, over the past 6 years (between 2018 and 2023), we lost **40%** of the South African penguin populations. The report clearly points out the scientific limitations of ICE, which limited our capacity to scientifically determine their impact, and the Interim Closures would just be repeating the shortfalls of the ICE that the panel identified.
We, therefore, **absolutely cannot afford** another 6 years of scientific debate with biologically meaningless closures for African penguins. The species is on the verge of being critically endangered. Urgent meaningful actions are required to prevent its extinction.

I hope you understand.

Regards
Lorien

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However, I can offer a view from my lower (and narrower) perspective. The Panel Report pointed to a few key aspects/recommendations like the ARS for MIBAS, or different ways to calculate fishery impact. These recommended actions are to occur within the two key conclusions. One: the ICE can be regarded as concluded and two: that closures or limitations of fishing adjacent to penguin colonies does have a positive effect for penguins. This then required a policy decision: The use of fishing limitations as an intervention in penguin conservation. From this policy decision there needed to be implementation, preferably rapid policy implementation in this case – and here there are two broad implementation avenues: 1. Interim fishing limitations continue; unless replaced by a consensus agreement (per colony) and/or in 6 years when a review has taken place and 2. The Panel recommendations on the science will be implemented (within finances).

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Hi Ashley

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Many thanks and regards

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Regards

Craig Smith
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Web: http://www.wwf.org.za

MC AM

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Dear Ashley,

Thank you for your response.
I am a bit surprised that there is consideration to go back on the agreement. I understood that there was a media statement from the Minister herself about this agreement and the fishing permits were updated as of 1st of September.

https://www.fishingindustrynewssa.com/2023/08/31/african-penguin-foraging-grounds-agreement-for-algoa-bay/

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I hope these are enough evidence of a fair and honest engagement process and a clear agreement between the two parties that cannot be withdrawn that easily.

It is also important to highlight that the expert panel's report stressed that closures should encompass the birds' mIBAs. The interim closures would therefore be biologically meaningless.

Thanks for understanding.

Kind regards
Lorien

Adj. Prof. Lorien Pichegru,
Institute for Coastal and Marine Research,
Ocean Sciences Campus,
Nelson Mandela University,
Gqeberha, South Africa.
Honorary consul for France in Gqeberha.
Email: lorien.pichegru@mandela.ac.za
cell: +27 (0) 834 878 574

From: Ashley Naidoo <ANaidoo@dffe.gov.za>
Sent: Monday, 11 September 2023 08:53
To: Pichegru, Lorien (Prof) (Summerstrand Campus South) <Lorien.Pichegru@mandela.ac.za>
Cc: Alistair McInnes <alistair.mcinnes@birdlife.org.za>; Lauren Waller <laurenw@ewt.org.za>; Smith, Craig <csmith@wwf.org.za>
Subject: Re: EC closures

Dear Lorien and Alistair, Lauren and Craig copied

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The options from here are not easy but my understanding from the Minister's decision, is that the interim closures will be put in place if there is no agreement. While there is no explicit direction on what is to happen in this situation where an agreement collapses – my thinking is that the interim will return.

Thank you
Ashley N

Ashley Naidoo. Ph.D. | Chief Director: Ocean & Coasts Research (he/him)
Find Annual Ocean & Coasts Science Report at:
https://www.dffe.gov.za/documents/research/oceansandcoasts
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+2782 784 7131

From: Pichegru, Lorien (Prof) (Summerstrand Campus South) <Lorien.Pichegru@mandela.ac.za>
Date: Friday, 08 September 2023 at 15:00
To: Ashley Naidoo <ANaidoo@dffe.gov.za>
Cc: Alistair McInnes <alistair.mcinnes@birdlife.org.za>, Lauren Waller <laurenw@ewt.org.za>, Smith, Craig <csmith@wwf.org.za>
Subject: EC closures

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With my colleagues copied here, we are slightly worried about his misunderstanding and voicing his unhappiness to DFFE. We assume, however, that the agreement has been settled, from the map he sent himself, from the productive meeting we had together, also attended to by Deon and Tasneem, and from the media statement from DFFE on the 31st of July.

Can you kindly update us on the situation?

Thank you very much in advance.
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"AM57"

From: Ashley Naidoo <ANaidoo@dffe.gov.za>
Sent: Friday, 22 September 2023 10:48
To: Pichegru, Lorien (Dr) (Summerstrand Campus South)
Cc: Alistair McInnes; Smith, Craig; Gerhard Cilliers; Gcobani Popose; Lauren Waller
Subject: Re: EC closures

Dear Lorien and colleagues copied

Thank you for the response. My apologies for not getting back to you earlier and if I did not address the concerns more clearly.

On the points 1 and 2:

1. How did the Department come to decision on interim extension.
   There was a submission to Minister, as is usually the case. This one was initially drafted by myself, this follows the hierarchy for comment / amendments the DDG (Deputy-Director General), DG (Director General) and then to the Minister. On extending the interim closures, I did not see that the Panel made recommendations on limitations (maps) in the Report, but offered a process and mechanisms to look at trade-offs. Here, I will appreciate a discussion with you and others copied if you feel that an argument can be made for other exact maps – in the short term these could be one of the options the Panel plotted or in the longer term these can be newly determined options. If you agree with this suggestion I can set this up.
   I thought extending the interim closures for the remainder of this year will allow some time for all involved to look at the report. I was hoping that before January 15th next year there could be more and better agreements based on the Panel Report, while the other work is set in motion and was trying to avoid a break in fishing limitations while these discussions took place. This plan has been impacted by the "re-negotiation", as the Eastern Cape Agreement will have been a good base to encourage negotiations on the other colonies.

2. Allowing Riedau to renegotiate – this is certainly not for me to allow or not allow, this is an initiative among yourselves as conservation representatives and the fishing industry. I did try to help this along with the preparation of maps and confirming agreement before implementation. I and I am sure my colleagues in the Department will continue to assist with this where we can. The optimism here is that both sectors can agree on some reasonable limitations for each colony, and in parallel agree on then implementing (as per priority ranking) the science recommendations.

Regarding point two above, Riedau has sent me (late Wednesday this week) a shape file of their "corrected' offer which I have sent to Zishan to replot using three denominators; MIBA as at 2021, MIBA 2023 and UD90. Riedau's issue seems to be a changing / evolving MIBA. I will the pass this onto Riedau to preview (to avoid any errors again) and ask his permission to distribute this to all of you as a basis to restart your discussion which you may choose to do or not do.

Over the last three years I have tried to avoid partisan coordination of this process towards keeping all representatives in the discussion, and am grateful to all of you for your contributed time and efforts. I cannot assume malice by any contributor. If the Industry claims that an unintended error has been made, I have no option but to look into it. This, and with the time taken to be inclusive, of course and unfortunately, does give the very real impression of me not being aware of the 40% decline in penguin numbers or the urgency of the matter.

Please let me know if you are keen on an exploratory discussion of the Panel Report – I would find this helpful.

Thank you
Ashley N

From: Pichegru, Lorien (Prof) (Summerstrand Campus South) <Lorien.Pichegru@mandela.ac.za>
Date: Thursday, 21 September 2023 at 11:01
To: Ashley Naidoo <ANaidoo@dffe.gov.za>, Lauren Waller <laurenw@ewt.org.za>
Cc: Alistair McInnes <alistair.mcinnes@birdlife.org.za>, csmith <csmith@wwf.org.za>, Gerhard Cilliers <GCilliers@dffe.gov.za>, Gcobani Popose <GPopose@dffe.gov.za>
Subject: RE: EC closures

Dear Ashley,

Thanks for your considered response. However, you are focusing on Point 2, when the discussion in our emails has been about Point 1.
The questions were:

1- How did the department come to the decision to keep the status quo of the Interim Closures, when the recommendations made in the Panel Report in terms of what was most scientifically defensible (also with minimal cost to industry) were completely different? This is in fact questioning the whole process of appointing an International Panel to conduct a review in the first place.
2- But regarding the Eastern Cape, the question is: how can an agreement reached in good faith on the 25th of August, with witnesses, after repeatedly sharing very clear maps, be reconsidered? While you may have no insights into the Minister's process on the first question, you are the one allowing Redah to think we can renegotiate on a matter that Minister has already publicly commented on. This does not seem like a fair and balanced process.

MK
ADM

Regarding your Point 2, you state that: "there are strong arguments that the fishing limitations extents are too narrow (or too wide)", but the Panel reported over-estimates of costs to the industry and my recent publication showed no cost of the ICE to the industry in the EC. So, there are no strong argument that closures are too wide.
Importantly, you state that "we have six years, including with incrementally growing observations and analyses". Sadly, over the past 6 years (between 2018 and 2023), we lost **40%** of the South African penguin populations. The report clearly points out the scientific limitations of ICE, which limited our capacity to scientifically determine their impact, and the Interim Closures would just be repeating the shortfalls of the ICE that the panel identified.
We, therefore, **absolutely cannot afford** another 6 years of scientific debate with biologically meaningless closures for African penguins. The species is on the verge of being critically endangered. Urgent meaningful actions are required to prevent its extinction.

I hope you understand.

Regards
Lorien

From: Ashley Naidoo <ANaidoo@dffe.gov.za>
Sent: Friday, 15 September 2023 15:29
To: Lauren Waller <laurenw@ewt.org.za>
Cc: Alistair McInnes <alistair.mcinnes@birdlife.org.za>; csmith <csmith@wwf.org.za>; Pichegru, Lorien (Prof) (Summerstrand Campus South) <Lorien.Pichegru@mandela.ac.za>; Gerhard Cilliers <GCilliers@dffe.gov.za>; Gcobani Popose <GPopose@dffe.gov.za>
Subject: Re: EC closures

Dear Lauren, Lorien ,Craig and Alistair (I am now including Gerhard and Gcobani who be increasingly more involved in this process as the Science and Policy Directors respectively - for marine species management.)

I trust all of you are well and looking forward to good weekend.

Thank you for the extra time to get back to you – all of us are in a bit of a rush to complete several processes today before some new Treasury rules kick in. To get to your question below Lauren, I do not have insights into the Minister's processes.

However, I can offer a view from my lower (and narrower) perspective. The Panel Report pointed to a few key aspects/recommendations like the ARS for MIBAS, or different ways to calculate fishery impact. These recommended actions are to occur within the two key conclusions. One: the ICE can be regarded as concluded and two: that closures or limitations of fishing adjacent to penguin colonies does have a positive effect for penguins. This then required a policy decision: The use of fishing limitations as an intervention in penguin conservation. From this policy decision there needed to be implementation, preferably rapid policy implementation in this case – and here there are two broad implementation avenues: 1. Interim fishing limitations continue; unless replaced by a consensus agreement (per colony) and/or in 6 years when a

MC
AN

review has taken place and 2. The Panel recommendations on the science will be implemented (within finances).

I want to talk to the second avenue. This for me is key: it will allow for the all of the various actions to explored: including ARS for MIBAS, fishing costs estimates etc – and in my thinking we have six years, including with incrementally growing observations and analyses. After six years there will be an opening to review the extent of fishing limitations. Here the policy decision is important: fishing limitations will be used. After 6 years with all of the updates and new analyses we may argue for more limitations (and the fishing sector may argue for less) but not the use or usefulness of fishing limitations. If we started refining calculations immediately after the Panel Report (in my view again) this will have led to a number of iterations, checks and counter checks of calculations (H factors and kernels etc). While the science has progressed over the last decade, it is these iterations that prevented a policy conclusion and implementation. There are strong arguments that the fishing limitations extents are too narrow (or too wide) but there is no quick way, in a matter of weeks, to resolve these. Additionally, there would have been the discussion of can the science recommendations be implemented individually or sequentially, or must some, at least, be done simultaneously – either way – all adding time to the process.

My focus now is to get as complete as possible set of observations and plan the analyses among the DFFE researchers and with partners like yourselves (and the fishing industry) so that we can take the next step from here i.e policy decision and first policy implementation. (The reality here is that we will have to write some joint funding proposals over the next few months.)

I hopes this helps with describing my thinking at least, and a happy to hear your thoughts.

Separately, Riedau, has sent me some maps earlier today, and said that he will send some notes later, I have asked that he includes permission for me to share with all of you - towards setting up the next round of discussions if this is necessary.

Thank you
Ashley N

From: Ashley Naidoo <ANaidoo@dffe.gov.za>
Date: Wednesday, 13 September 2023 at 16:43
To: Lauren Waller <laurenw@ewt.org.za>
Cc: Alistair McInnes <alistair.mcinnes@birdlife.org.za>, csmith <csmith@wwf.org.za>, lorien.pichegru@mandela.ac.za <lorien.pichegru@mandela.ac.za>
Subject: Re: EC closures

Hi Lauren and colleagues

Please give me until end of the week to get back to you. I am acting DDG this week, so much of the week is taken up with admin meetings. I have not heard from Riedau since Monday when I called and have not received updated map as yet.

Thank you
Ashley

From: Lauren Waller <LaurenW@ewt.org.za>
Date: Wednesday, 13 September 2023 at 15:46
To: Ashley Naidoo <ANaidoo@dffe.gov.za>
Cc: Alistair McInnes <alistair.mcinnes@birdlife.org.za>, csmith <csmith@wwf.org.za>, lorien.pichegru@mandela.ac.za <lorien.pichegru@mandela.ac.za>
Subject: RE: EC closures

Dear Ashley

Apologies for my silence on this matter, I have been attending the International Penguin Congress.

I have to communicate my utter dismay at this turn of events from Redah. Surely the department cannot be held ransom like this? There were multiple witnesses to many of these meetings with Redah (and an official media release about the agreement by the minister herself) – surely DFFE cannot go back on this now?

I've been meaning to ask you to clarify something regarding the interim closures decided on by the Minister, and am hoping you can shed some light on the matter. I'll put it in bullet points to be as succinct as I can.
- The panel pointed out that the ARS MIBAs were the most scientifically defensible areas and recommended their use and that the costs estimated by industry were overexaggerated (although by an unknown amount)
- We have followed the panel recommendation and plotted the ARS mIBA against area and costs to the fishing industry. We'd assume that DFFE, particularly those advising the Minister, would have done the same mapping exercise in July, between the submission of the Panel report in June and the media statement in August, in order to provide the most defensible advice to the Minister. We have found that the ARS MIBA extents bear low cost to industry (with Dyer and St Croix exceptions), and that the interim closure extents have extremely low cost to industry (0% catch lost in some instances!)

- As such, can you explain the process that led to that decision of retaining the interim closures? They are in no way aligned to the Panel report recommendations (apart from non-seasonal and longer closures – although these are meaningless without meaningful closure extents), and have very little benefit (if any) for the penguins (bar Dassen Island). On what basis are these interim closures justifiable?

Lastly, has the department seen the latest paper regarding costs to eastern cape fishing industry as a result of closures? As you know we have repeatedly through GF, ETT, CAF asked for socio-economic costs from industry, with nothing forthcoming. The industry model has also been questioned by the panel, while the study in the document attached received positive comments from Andre Punt when he reviewed the Synthesis Report. This paper, using fishery catch data provided by DFFE, shows that "neither their catch sizes nor travel times varied significantly with fishing exclusion measures."
Thus, if the Department backs down on what was agreed to (i.e. following the Panel recommendations), again, on what basis and evidence will this decision be made on?

Please help me/us understand the DFFE processes Ashley.

Warm regards
Lauren

MK
AM

From: Ashley Naidoo <ANaidoo@dffe.gov.za>
Sent: Monday, September 11, 2023 3:47 PM
To: Alistair McInnes <alistair.mcinnes@birdlife.org.za>; csmith <csmith@wwf.org.za>; lorien.pichegru@mandela.ac.za
Cc: Lauren Waller <LaurenW@ewt.org.za>
Subject: Re: EC closures

Hi Alistair, Craig, Lorien and Lauren

Let me confirm with Johan De Goede if these are in place already, my request to him was that these were to be implement from September 1, after I received confirmation from all that the map was acceptable, but I need to confirm with him.

I did manage to chat briefly with Riedau this afternoon, he is working on the updated map, and will get that to me late today. I will ask for permission to share with all of you. I will also arrange a discussion with Riedau later this week to try to understand where he is coming from. Then I will engage with all of you again.

Thank you
Ashley N

From: Alistair McInnes <alistair.mcinnes@birdlife.org.za>
Date: Monday, 11 September 2023 at 14:29
To: Smith, Craig <csmith@wwf.org.za>, lorien.pichegru@mandela.ac.za <lorien.pichegru@mandela.ac.za>, Ashley Naidoo <ANaidoo@dffe.gov.za>
Cc: Lauren Waller <laurenw@ewt.org.za>
Subject: RE: EC closures

Hi Ashley

I agree with Lorien and Craig. Please can you confirm if the permit has already gone out for the agreed closures in Algoa Bay.

Many thanks and regards

Alistair

From: Smith, Craig <csmith@wwf.org.za>
Sent: Monday, September 11, 2023 2:22 PM
To: Pichegru, Lorien (Dr) (Summerstrand Campus South) <lorien.pichegru@mandela.ac.za>; Ashley Naidoo <ANaidoo@dffe.gov.za>
Cc: Alistair McInnes <alistair.mcinnes@birdlife.org.za>; Lauren Waller <laurenw@ewt.org.za>
Subject: RE: EC closures

Dear Ashley

I would tend to agree with Lorien that if the engagement with the fishing industry was transparent and if there was no mistake on what was agreed upon then it cannot simply be withdrawn as this will make a mockery of any further engagement processes, which implies that the fishing industry is not engaging in good faith. If the closed area is to be withdrawn it now needs to be agreed upon by all parties as there are implications of going back on this decision. Also industry would need to provide a motivation of why they want this withdrawn.

Regards

Craig Smith
::Senior Manager: Marine Portfolio, WWF-SA::
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Boundary Terraces
Mariendahl Lane, Newlands
P.O.Box23273
Claremont 7735
Tel: +27 (21) 657 6600 Direct: +27 (21) 657 6670 Mobile: +27 (82) 481 8600
Fax: +27 86 535 9433
Email: csmith@wwf.org.za
Web: http://www.wwf.org.za

From: Pichegru, Lorien (Prof) (Summerstrand Campus South) <Lorien.Pichegru@mandela.ac.za>
Sent: Monday, September 11, 2023 11:01 AM
To: Ashley Naidoo <ANaidoo@dffe.gov.za>
Cc: Alistair McInnes <alistair.mcinnes@birdlife.org.za>; Lauren Waller <laurenw@ewt.org.za>; Smith, Craig <csmith@wwf.org.za>
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Thanks for understanding.

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Thank you

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Ashley Naidoo. Ph.D. | Chief Director: Ocean & Coasts Research (he/him)
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Can you kindly update us on the situation?

Thank you very much in advance.
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MK AM

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"AM58"

From: Alistair McInnes
Sent: Friday, 22 September 2023 12:15
To: Ashley Naidoo; Pichegru, Lorien (Dr) (Summerstrand Campus South)
Cc: Smith, Craig; Gerhard Cilliers; Gcobani Popose; Lauren Waller
Subject: RE: EC closures

Hi Ashley

Thanks for this feedback and think we should definitely have a dedicated meeting wrt point 1.

All the best

Alistair

From: Ashley Naidoo <ANaidoo@dffe.gov.za>
Sent: Friday, September 22, 2023 10:48 AM
To: Pichegru, Lorien (Dr) (Summerstrand Campus South) <lorien.pichegru@mandela.ac.za>
Cc: Alistair McInnes <alistair.mcinnes@birdlife.org.za>; Smith, Craig <csmith@wwf.org.za>; Gerhard Cilliers <GCilliers@dffe.gov.za>; Gcobani Popose <GPopose@dffe.gov.za>; Lauren Waller <laurenw@ewt.org.za>
Subject: Re: EC closures

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   There was a submission to Minister, as is usually the case. This one was initially drafted by myself, this follows the hierarchy for comment / amendments the DDG (Deputy-Director General), DG (Director General) and then to the Minister. On extending the interim closures, I did not see that the Panel made recommendations on limitations (maps) in the Report, but offered a process and mechanisms to look at trade-offs. Here, I will appreciate a discussion with you and others copied if you feel that an argument can be made for other exact maps – in the short term these could be one of the options the Panel plotted or in the longer term these can be newly determined options. If you agree with this suggestion I can set this up.
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MC AM

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Please let me know if you are keen on an exploratory discussion of the Panel Report – I would find this helpful.

Thank you
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Date: Thursday, 21 September 2023 at 11:01
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Cc: Alistair McInnes <alistair.mcinnes@birdlife.org.za>, csmith <csmith@wwf.org.za>, Gerhard Cilliers <GCilliers@dffe.gov.za>, Gcobani Popose <GPopose@dffe.gov.za>
Subject: RE: EC closures

Dear Ashley,

MK
AO1

Thanks for your considered response. However, you are focusing on Point 2, when the discussion in our emails has been about Point 1.
The questions were:

1- How did the department come to the decision to keep the status quo of the Interim Closures, when the recommendations made in the Panel Report in terms of what was most scientifically defensible (also with minimal cost to industry) were completely different? This is in fact questioning the whole process of appointing an International Panel to conduct a review in the first place.
2- But regarding the Eastern Cape, the question is: how can an agreement reached in good faith on the 25th of August, with witnesses, after repeatedly sharing very clear maps, be reconsidered? While you may have no insights into the Minister's process on the first question, you are the one allowing Redah to think we can renegotiate on a matter that Minister has already publicly commented on. This does not seem like a fair and balanced process.

Regarding your Point 2, you state that: "there are strong arguments that the fishing limitations extents are too narrow (or too wide)", but the Panel reported over-estimates of costs to the industry and my recent publication showed no cost of the ICE to the industry in the EC. So, there are no strong argument that closures are too wide.
Importantly, you state that "we have six years, including with incrementally growing observations and analyses". Sadly, over the past 6 years (between 2018 and 2023), we lost **40%** of the South African penguin populations. The report clearly points out the scientific limitations of ICE, which limited our capacity to scientifically determine their impact, and the Interim Closures would just be repeating the shortfalls of the ICE that the panel identified.
We, therefore, **absolutely cannot afford** another 6 years of scientific debate with biologically meaningless closures for African penguins. The species is on the verge of being critically endangered. Urgent meaningful actions are required to prevent its extinction.

I hope you understand.

Regards
Lorien

From: Ashley Naidoo <ANaidoo@dffe.gov.za>
Sent: Friday, 15 September 2023 15:29
To: Lauren Waller <laurenw@ewt.org.za>
Cc: Alistair McInnes <alistair.mcinnes@birdlife.org.za>; csmith <csmith@wwf.org.za>; Pichegru, Lorien (Prof) (Summerstrand Campus South) <Lorien.Pichegru@mandela.ac.za>; Gerhard Cilliers <GCilliers@dffe.gov.za>; Gcobani Popose <GPopose@dffe.gov.za>
Subject: Re: EC closures

Dear Lauren, Lorien ,Craig and Alistair (I am now including Gerhard and Gcobani who be increasingly more involved in this process as the Science and Policy Directors respectively - for marine species management.)

I trust all of you are well and looking forward to good weekend.

Thank you for the extra time to get back to you – all of us are in a bit of a rush to complete several processes today before some new Treasury rules kick in. To get to your question below Lauren, I do not have insights into the Minister's processes.

However, I can offer a view from my lower (and narrower) perspective. The Panel Report pointed to a few key aspects/recommendations like the ARS for MIBAS, or different ways to calculate fishery impact. These recommended actions are to occur within the two key conclusions. One: the ICE can be regarded as concluded and two: that closures or limitations of fishing adjacent to penguin colonies does have a positive effect for penguins. This then required a policy decision: The use of fishing limitations as an intervention in penguin conservation. From this policy decision there needed to be implementation, preferably rapid policy implementation in this case – and here there are two broad implementation avenues: 1. Interim fishing limitations continue; unless replaced by a consensus agreement (per colony) and/or in 6 years when a review has taken place and 2. The Panel recommendations on the science will be implemented (within finances).

I want to talk to the second avenue. This for me is key: it will allow for the all of the various actions to explored: including ARS for MIBAS, fishing costs estimates etc – and in my thinking we have six years, including with incrementally growing observations and analyses. After six years there will be an opening to review the extent of fishing limitations. Here the policy decision is important: fishing limitations will be used. After 6 years with all of the updates and new analyses we may argue for more limitations (and the fishing sector may argue for less) but not the use or usefulness of fishing limitations. If we started refining calculations immediately after the Panel Report (in my view again) this will have led to a number of iterations, checks and counter checks of calculations (H factors and kernels etc). While the science has progressed over the last decade, it is these iterations that prevented a policy conclusion and implementation. There are strong arguments that the fishing limitations extents are too narrow (or too wide) but there is no quick way, in a matter of weeks, to resolve these. Additionally, there would have been the discussion of can the science recommendations be implemented individually or sequentially, or must some, at least, be done simultaneously – either way – all adding time to the process.

My focus now is to get as complete as possible set of observations and plan the analyses among the DFFE researchers and with partners like yourselves (and the fishing industry) so that we can take the next step from here i.e policy decision and first policy implementation. (The reality here is that we will have to write some joint funding proposals over the next few months.)

I hopes this helps with describing my thinking at least, and a happy to hear your thoughts.

Separately, Riedau, has sent me some maps earlier today, and said that he will send some notes later, I have asked that he includes permission for me to share with all of you - towards setting up the next round of discussions if this is necessary.

Thank you
Ashley N

From: Ashley Naidoo <ANaidoo@dffe.gov.za>
Date: Wednesday, 13 September 2023 at 16:43
To: Lauren Waller <laurenw@ewt.org.za>
Cc: Alistair McInnes <alistair.mcinnes@birdlife.org.za>, csmith <csmith@wwf.org.za>, lorien.pichegru@mandela.ac.za <lorien.pichegru@mandela.ac.za>
Subject: Re: EC closures

Hi Lauren and colleagues

Please give me until end of the week to get back to you. I am acting DDG this week, so much of the week is taken up with admin meetings. I have not heard from Riedau since Monday when I called and have not received updated map as yet.

Thank you
Ashley

From: Lauren Waller <LaurenW@ewt.org.za>
Date: Wednesday, 13 September 2023 at 15:46
To: Ashley Naidoo <ANaidoo@dffe.gov.za>
Cc: Alistair McInnes <alistair.mcinnes@birdlife.org.za>, csmith <csmith@wwf.org.za>, lorien.pichegru@mandela.ac.za <lorien.pichegru@mandela.ac.za>
Subject: RE: EC closures

Dear Ashley

Apologies for my silence on this matter, I have been attending the International Penguin Congress.

I have to communicate my utter dismay at this turn of events from Redah. Surely the department cannot be held ransom like this? There were multiple witnesses to many of these meetings with Redah (and an official media release about the agreement by the minister herself) – surely DFFE cannot go back on this now?

I've been meaning to ask you to clarify something regarding the interim closures decided on by the Minister, and am hoping you can shed some light on the matter. I'll put it in bullet points to be as succinct as I can.
- The panel pointed out that the ARS MIBAs were the most scientifically defensible areas and recommended their use and that the costs estimated by industry were overexaggerated (although by an unknown amount)
- We have followed the panel recommendation and plotted the ARS mIBA against area and costs to the fishing industry. We'd assume that DFFE, particularly those advising the Minister, would have done the same mapping exercise in July, between the submission of the Panel report in June and the media statement in August, in order to provide the most defensible advice to the

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Minister. We have found that the ARS MIBA extents bear low cost to industry (with Dyer and St Croix exceptions), and that the interim closure extents have extremely low cost to industry (0% catch lost in some instances!)

- As such, can you explain the process that led to that decision of retaining the interim closures? They are in no way aligned to the Panel report recommendations (apart from non-seasonal and longer closures – although these are meaningless without meaningful closure extents), and have very little benefit (if any) for the penguins (bar Dassen Island). On what basis are these interim closures justifiable?

Lastly, has the department seen the latest paper regarding costs to eastern cape fishing industry as a result of closures? As you know we have repeatedly through GF, ETT, CAF asked for socio-economic costs from industry, with nothing forthcoming. The industry model has also been questioned by the panel, while the study in the document attached received positive comments from Andre Punt when he reviewed the Synthesis Report. This paper, using fishery catch data provided by DFFE, shows that "neither their catch sizes nor travel times varied significantly with fishing exclusion measures."
Thus, if the Department backs down on what was agreed to (i.e. following the Panel recommendations), again, on what basis and evidence will this decision be made on?

Please help me/us understand the DFFE processes Ashley.

Warm regards
Lauren

From: Ashley Naidoo <ANaidoo@dffe.gov.za>
Sent: Monday, September 11, 2023 3:47 PM
To: Alistair McInnes <alistair.mcinnes@birdlife.org.za>; csmith <csmith@wwf.org.za>; lorien.pichegru@mandela.ac.za
Cc: Lauren Waller <LaurenW@ewt.org.za>
Subject: Re: EC closures

Hi Alistair, Craig, Lorien and Lauren

Let me confirm with Johan De Goede if these are in place already, my request to him was that these were to be implement from September 1, after I received confirmation from all that the map was acceptable, but I need to confirm with him.

I did manage to chat briefly with Riedau this afternoon, he is working on the updated map, and will get that to me late today. I will ask for permission to share with all of you. I will also arrange a discussion with Riedau later this week to try to understand where he is coming from. Then I will engage with all of you again.

Thank you
Ashley N

From: Alistair McInnes <alistair.mcinnes@birdlife.org.za>
Date: Monday, 11 September 2023 at 14:29
To: Smith, Craig <csmith@wwf.org.za>, lorien.pichegru@mandela.ac.za <lorien.pichegru@mandela.ac.za>, Ashley Naidoo <ANaidoo@dffe.gov.za>
Cc: Lauren Waller <laurenw@ewt.org.za>
Subject: RE: EC closures

AM

Hi Ashley

I agree with Lorien and Craig. Please can you confirm if the permit has already gone out for the agreed closures in Algoa Bay.

Many thanks and regards

Alistair

From: Smith, Craig <csmith@wwf.org.za>
Sent: Monday, September 11, 2023 2:22 PM
To: Pichegru, Lorien (Dr) (Summerstrand Campus South) <lorien.pichegru@mandela.ac.za>; Ashley Naidoo <ANaidoo@dffe.gov.za>
Cc: Alistair McInnes <alistair.mcinnes@birdlife.org.za>; Lauren Waller <laurenw@ewt.org.za>
Subject: RE: EC closures

Dear Ashley

I would tend to agree with Lorien that if the engagement with the fishing industry was transparent and if there was no mistake on what was agreed upon then it cannot simply be withdrawn as this will make a mockery of any further engagement processes, which implies that the fishing industry is not engaging in good faith. If the closed area is to be withdrawn it now needs to be agreed upon by all parties as there are implications of going back on this decision. Also industry would need to provide a motivation of why they want this withdrawn.

Regards

Craig Smith
::Senior Manager: Marine Portfolio, WWF-SA::
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Tel: +27 (21) 657 6600 Direct: +27 (21) 657 6670 Mobile: +27 (82) 481 8600
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Email: csmith@wwf.org.za
Web: http://www.wwf.org.za

From: Pichegru, Lorien (Prof) (Summerstrand Campus South) <Lorien.Pichegru@mandela.ac.za>
Sent: Monday, September 11, 2023 11:01 AM

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WC

To: Ashley Naidoo <ANaidoo@dffe.gov.za>
Cc: Alistair McInnes <alistair.mcinnes@birdlife.org.za>; Lauren Waller <laurenw@ewt.org.za>; Smith, Craig <csmith@wwf.org.za>
Subject: RE: EC closures

Dear Ashley,

Thank you for your response.
I am a bit surprised that there is consideration to go back on the agreement. I understood that there was a media statement from the Minister herself about this agreement and the fishing permits were updated as of 1st of September.

https://www.fishingindustrynewssa.com/2023/08/31/african-penguin-foraging-grounds-agreement-for-algoa-bay/

There was thorough engagement between us and Redah since June, and maps were shown 3 times at different meetings, all including the CAF proposal, the DFFE proposal and the interim closure. He even sent himself the map where he agreed to close to fishing, and there were other members of the fishing association present at our meeting on the 25th of August that supported the agreement.

I hope these are enough evidence of a fair and honest engagement process and a clear agreement between the two parties that cannot be withdrawn that easily.

It is also important to highlight that the expert panel's report stressed that closures should encompass the birds' mIBAs. The interim closures would therefore be biologically meaningless.

Thanks for understanding.

Kind regards
Lorien

Adj. Prof. Lorien Pichegru,
Institute for Coastal and Marine Research,
Ocean Sciences Campus,
Nelson Mandela University,
Gqeberha, South Africa.
Honorary consul for France in Gqeberha.
Email: lorien.pichegru@mandela.ac.za
cell: +27 (0) 834 878 574

From: Ashley Naidoo <ANaidoo@dffe.gov.za>
Sent: Monday, 11 September 2023 08:53
To: Pichegru, Lorien (Prof) (Summerstrand Campus South) <Lorien.Pichegru@mandela.ac.za>
Cc: Alistair McInnes <alistair.mcinnes@birdlife.org.za>; Lauren Waller <laurenw@ewt.org.za>; Smith, Craig <csmith@wwf.org.za>
Subject: Re: EC closures

Dear Lorien and Alistair, Lauren and Craig copied

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Yes Riedau, did call me late on Friday the 1st of September. I was also surprised as everybody confirmed their agreement. I am also not sure of what he meant by the 73% - which he raised before. He asked me to send him previous maps showing the various options including the CAF option - which I did. I also asked him to send me a map or sketch of what his "correct" understanding is … so that I my share this with all of you and get a conversation going again. I did not get an updated map from him last week, and followed up on Friday with an email. I plan to call him this week as well.

The options from here are not easy but my understanding from the Minister's decision, is that the interim closures will be put in place if there is no agreement. While there is no explicit direction on what is to happen in this situation where an agreement collapses – my thinking is that the interim will return.

Thank you
Ashley N

Ashley Naidoo. Ph.D. | Chief Director: Ocean & Coasts Research (he/him)
Find Annual Ocean & Coasts Science Report at:
https://www.dffe.gov.za/documents/research/oceansandcoasts
+2721 493 7300
+2782 784 7131

From: Pichegru, Lorien (Prof) (Summerstrand Campus South) <Lorien.Pichegru@mandela.ac.za>
Date: Friday, 08 September 2023 at 15:00
To: Ashley Naidoo <ANaidoo@dffe.gov.za>
Cc: Alistair McInnes <alistair.mcinnes@birdlife.org.za>, Lauren Waller <laurenw@ewt.org.za>, Smith, Craig <csmith@wwf.org.za>
Subject: EC closures

Dear Ashley,

I hope you are well.

A few days ago, Redah phoned me concerned about the size of the closure around St Croix, surprised that the 42% agreed upon was larger than the 73% he was unsatisfied with, which was the interim closure. I do not know which 73% he is referring to and he is also unsure himself, but he told me he'd discuss the matter with you. We can understand his confusion, the penguin metric changed a few times over the course of the analyses. However, the map we agreed on showed both the interim closure and the proposal he sent us, which was larger than the interim closure.

With my colleagues copied here, we are slightly worried about his misunderstanding and voicing his unhappiness to DFFE. We assume, however, that the agreement has been settled, from the map he sent himself, from the productive meeting we had together, also attended to by Deon and Tasneem, and from the media statement from DFFE on the 31st of July.

Can you kindly update us on the situation?

Thank you very much in advance.

Lorien

Adj. Prof. Lorien Pichegru,
Institute for Coastal and Marine Research,
Ocean Sciences Campus,
Nelson Mandela University,
Gqeberha, South Africa.
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PBO Exemption No: 930004518

2 October 2023

Minister of Forestry, Fisheries and the Environment
Honourable Barbara Creecy

By email: minister@dffe.gov.za

Cc'd: Ms Lee-Anne Levendal
Chief of Staff: Office of the Minister
Department of Forestry, Fisheries and the Environment
llevendal@dffe.gov.za

Dr Ashley Naidoo
Chief Director: Oceans and Coasts
Department of Forestry, Fisheries and the Environment
anaidoo@dffe.gov.za

Dear Minister Creecy,

RE: REQUEST FOR INFORMATION REGARDING HOLDERS OF SMALL PELAGIC FISHING RIGHTS FOR PURPOSES OF ENGAGING IN NEGOTIATIONS REGARDING ISLAND CLOSURES

1. I write on behalf of the Conservation Sector Group, which is convened to address the issue of Island Closures in the interest of ensuring the survival of African Penguin populations. The members of the group have been integrally involved in the process undertaken by the Expert Panel to Advise on the Proposed Fishing-Area Closures Adjacent to South Africa's Penguin Breeding Colonies and the Decline in the Penguin Population (**Expert Review Panel**).

2. On 4 August 2023, you convened a meeting at which you announced the publication of the Expert Review Panel's Report as well as your decision regarding Island Closures (**Closure Decision**). The Closure Decision contemplated, *inter alia*, the "fishing industry" and "conservation sector" studying the Expert Panel's Report and seeking "agreement on fishing limitations".

3. Our understanding of this aspect of the Closure Decision was that it contemplated further negotiations between the "fishing industry" and "conservation sector" to reach agreement on the nature and extent of Island Closures, failing which the existing, interim closures would remain in place for the next ten years (subject to a six-year review).

4. The Conservation Sector Group (including those seabird scientists engaged in the process to date) has now had an opportunity to study the Expert Review Panel Report. We have also, in the period since 4 August 2023, attempted to

engage with those stakeholders in the fishing industry in respect of whom we are to seek discussion and agreement on Island Closures in light of the findings and recommendations of the Expert Review Panel.

5. While the Conservation Sector Group includes all key stakeholders from the conservation sector which have been engaged with issues regarding African Penguin population survival, the identity of all relevant stakeholders in the "fishing industry" is not apparent – although it is clear that not all holders of small pelagic fishing rights have been involved in discussions to date. This information is, further, not available to the Conservation Sector Group.

6. Accordingly on 19 September 2023, Craig Smith of the Conservation Sector Group reached out to DDG: Fisheries Management in the Department of Forestry, Fisheries and the Environment (**Department**) to obtain the information necessary to ensure that engagements with the fishing industry are inclusive and that any "agreement" reached is transparent and reflective of the interests of all small pelagic rights holders. Our request was, unfortunately, refused and the Conservation Sector Group was directed to file a request in terms of the Promotion of Access to Information Act, 2 of 2000 (**PAIA**) to obtain this information.

7. Thus, in this circumstance, we find ourselves in the peculiar position that we are faced with a process of negotiation or "reaching agreement" which has been contemplated by the Closure Decision, but which has not been clearly structured or facilitated by your Department and where we are unable to obtain the minimum information required to identify the full range of parties with whom we are to engage. We will address further correspondence to you on this regard in due course.

8. In the interim, and in the interests of continuing to engage in good faith with yourself, the Department and all stakeholders interested in small pelagic fisheries and African Penguin conservation, we kindly ask that you provide the following minimum information required to give meaningful effect to this particular aspect of the Closure Decision:

a. A list of all vessels in the small pelagic industry fleet including reflecting the following in respect of each vessel:
    i. Length and holding capacity;
    ii. Maritime Mobile Service Identity (**MMSI**) number;
    iii. Owner/s and contact details;
    iv. Rights holder/s;
    v. Authorized vessels to be used per right holder
    vi. The proportion of the sardine and anchovy quota per rights holder;
    vii. Industry association membership;
    viii. The landing sites per vessel;
    ix. Factories supplied; and

b. A list of all vessels excluded from the Dyer Island Partial Closure as at the date on which interim closures were first designated (1 September 2022) as well as the date of the Closure Decision (4th August 2023) reflecting the following in respect of each vessel:
    i. Length and holding capacity;
    ii. Maritime Mobile Service Identity (**MMSI**) number;
    iii. Owner/s and contact details;

iv. Rights holder/s;
v. Industry association membership; and
vi. Factories serviced.

9. We would appreciate receiving the above information by no later than 9 October 2023, mindful of the short time period contemplated by the Closure Decision for the conservation sector and fishing industry to reach agreement on fishing limitations.

Yours sincerely,

Mark D. Anderson
Chief Executive Officer
BirdLife South Africa

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Dunkeld West, Gauteng 2196
Private Bag X16, Pinegowrie
2123, South Africa
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Fax: +27 (0)11 789 5188
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www.birdlife.org.za

Subject: RE: REQUEST FOR INFORMATION REGARDING HOLDERS OF SMALL PELAGIC FISHING RIGHTS FOR PURPOSES OF ENGAGING IN NEGOTIATIONS REGARDING ISLAND CLOSURES

From: Sylvester Pandelane <spandelane@dffe.gov.za>
Sent: Tuesday, October 17, 2023 12:21 PM
To: Mark Anderson <ceo@birdlife.org.za>
Cc: Janine Buitendag <jbuitendag@dffe.gov.za>; Liesl Jacobs <lijacobs@dffe.gov.za>; Itebogeng Chiloane <ichiloane@dffe.gov.za>; Buchule Mbuli <BMbuli@dffe.gov.za>; Nomonde Magagula <NMAGAGULA@dffe.gov.za>; Lee-Anne Levendal <llevendal@dffe.gov.za>
Subject: FW: REQUEST FOR INFORMATION REGARDING HOLDERS OF SMALL PELAGIC FISHING RIGHTS FOR PURPOSES OF ENGAGING IN NEGOTIATIONS REGARDING ISLAND CLOSURES

Good day

On behalf of the Minister of Forestry, Fisheries and the Environment, Ms B D Creecy, MP, I acknowledge with thanks receipt of your correspondence, in the above regard.

Regards

Liesl Jacobs
Assistant Appointment Secretary and Administration Department of Forestry, Fisheries and the Environment
012 399 8515
066 143 8859

From: Mark Anderson <ceo@birdlife.org.za>
Sent: Monday, October 16, 2023 2:17 PM
To: Barbara Creecy <Minister@dffe.gov.za>
Cc: Lee-Anne Leverdal <llevendal@dffe.gov.za>; Ashley Naidoo <ANaidoo@dffe.gov.za>
Subject: REQUEST FOR INFORMATION REGARDING HOLDERS OF SMALL PELAGIC FISHING RIGHTS FOR PURPOSES OF ENGAGING IN NEGOTIATIONS REGARDING ISLAND CLOSURES

Dear Minister

Please see attached correspondence regarding BirdLife South Africa's request for information regarding holders of small pelagic fishing rights for purposes of engaging in negotiations regarding island closures.

I also attach herewith our previous letter, dated 2 October 2023.

Please acknowledge receipt.

Regards
Mark

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MK

Mark D. Anderson
Chief Executive Officer

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Reg No: 001 – 298 NPO
PBO Exemption No: 930004518

16 October 2023

Honourable Barbara Creecy
Minister of Forestry, Fisheries and the Environment

By email: minister@dffe.gov.za

CCd: Ms Lee-Anne Levendal
Chief of Staff: Office of the Minister
Department of Forestry, Fisheries and the Environment
llevendal@dffe.gov.za

Dr Ashley Naidoo
Chief Director: Oceans and Coasts
Department of Forestry, Fisheries and the Environment
anaidoo@dffe.gov.za

Dear Minister Creecy,

RE: REQUEST FOR INFORMATION REGARDING HOLDERS OF SMALL PELAGIC FISHING RIGHTS FOR PURPOSES OF ENGAGING IN NEGOTIATIONS REGARDING ISLAND CLOSURES

1. We refer to our letter dated 2 October 2023 in which we requested that you provide information regarding the small pelagic rights holders for the purposes of facilitating the Conservation Sector Group's continued good faith engagement with the 'fishing sector'. We understand this to have been contemplated in your announcement of 4 August 2023 regarding next steps pursuant to the Expert Review Panel's findings in respect of appropriate island closure design in the interests of ensuring maximum benefit to African Penguin survival.

2. In our letter (attached for ease of reference, marked "**A**") we noted that we were grappling with the difficulty of engaging in a process of "reaching agreement" with counterparties who are not clearly known to ourselves – and through a process which has not been clearly structured or facilitated by your Department.

3. Noting that we have not yet received a response (despite noting the short period permitted for "reaching agreement"), we would appreciate your intervention in facilitating the

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Email: info@birdlife.org.za
www.birdlife.org.za

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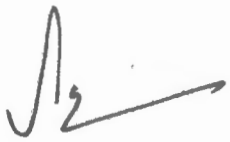
agreement process both in terms of providing the necessary clarity and structure, and in terms of providing the information sought.

Yours sincerely,



Mark D. Anderson
Chief Executive Officer

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2 October 2023

Minister of Forestry, Fisheries and the Environment
Honourable Barbara Creecy

By email: minister@dffe.gov.za

Cc'd: Ms Lee-Anne Levendal
Chief of Staff: Office of the Minister
Department of Forestry, Fisheries and the Environment
llevendal@dffe.gov.za

Dr Ashley Naidoo
Chief Director: Oceans and Coasts
Department of Forestry, Fisheries and the Environment
anaidoo@dffe.gov.za

Dear Minister Creecy,

RE: REQUEST FOR INFORMATION REGARDING HOLDERS OF SMALL PELAGIC FISHING RIGHTS FOR PURPOSES OF ENGAGING IN NEGOTIATIONS REGARDING ISLAND CLOSURES

1. I write on behalf of the Conservation Sector Group, which is convened to address the issue of Island Closures in the interest of ensuring the survival of African Penguin populations. The members of the group have been integrally involved in the process undertaken by the Expert Panel to Advise on the Proposed Fishing-Area Closures Adjacent to South Africa's Penguin Breeding Colonies and the Decline in the Penguin Population (**Expert Review Panel**).

2. On 4 August 2023, you convened a meeting at which you announced the publication of the Expert Review Panel's Report as well as your decision regarding Island Closures (**Closure Decision**). The Closure Decision contemplated, *inter alia*, the "fishing industry" and "conservation sector" studying the Expert Panel's Report and seeking "agreement on fishing limitations".

3. Our understanding of this aspect of the Closure Decision was that it contemplated further negotiations between the "fishing industry" and "conservation sector" to reach agreement on the nature and extent of Island Closures, failing which the existing, interim closures would remain in place for the next ten years (subject to a six-year review).

4. The Conservation Sector Group (including those seabird scientists engaged in the process to date) has now had an opportunity to study the Expert Review Panel Report. We have also, in the period since 4 August 2023, attempted to

engage with those stakeholders in the fishing industry in respect of whom we are to seek discussion and agreement on Island Closures in light of the findings and recommendations of the Expert Review Panel.

5. While the Conservation Sector Group includes all key stakeholders from the conservation sector which have been engaged with issues regarding African Penguin population survival, the identity of all relevant stakeholders in the "fishing industry" is not apparent – although it is clear that not all holders of small pelagic fishing rights have been involved in discussions to date. This information is, further, not available to the Conservation Sector Group.

6. Accordingly on 19 September 2023, Craig Smith of the Conservation Sector Group reached out to DDG: Fisheries Management in the Department of Forestry, Fisheries and the Environment (**Department**) to obtain the information necessary to ensure that engagements with the fishing industry are inclusive and that any "agreement" reached is transparent and reflective of the interests of all small pelagic rights holders. Our request was, unfortunately, refused and the Conservation Sector Group was directed to file a request in terms of the Promotion of Access to Information Act, 2 of 2000 (**PAIA**) to obtain this information.

7. Thus, in this circumstance, we find ourselves in the peculiar position that we are faced with a process of negotiation or "reaching agreement" which has been contemplated by the Closure Decision, but which has not been clearly structured or facilitated by your Department and where we are unable to obtain the minimum information required to identify the full range of parties with whom we are to engage. We will address further correspondence to you on this regard in due course.

8. In the interim, and in the interests of continuing to engage in good faith with yourself, the Department and all stakeholders interested in small pelagic fisheries and African Penguin conservation, we kindly ask that you provide the following minimum information required to give meaningful effect to this particular aspect of the Closure Decision:

a. A list of all vessels in the small pelagic industry fleet including reflecting the following in respect of each vessel:
    i. Length and holding capacity;
    ii. Maritime Mobile Service Identity (**MMSI**) number;
    iii. Owner/s and contact details;
    iv. Rights holder/s;
    v. Authorized vessels to be used per right holder
    vi. The proportion of the sardine and anchovy quota per rights holder;
    vii. Industry association membership;
    viii. The landing sites per vessel;
    ix. Factories supplied; and

b. A list of all vessels excluded from the Dyer Island Partial Closure as at the date on which interim closures were first designated (1 September 2022) as well as the date of the Closure Decision (4th August 2023) reflecting the following in respect of each vessel:
    i. Length and holding capacity;
    ii. Maritime Mobile Service Identity (**MMSI**) number;
    iii. Owner/s and contact details;

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iv. Rights holder/s;
v. Industry association membership; and
vi. Factories serviced.

9. We would appreciate receiving the above information by no later than 9 October 2023, mindful of the short time period contemplated by the Closure Decision for the conservation sector and fishing industry to reach agreement on fishing limitations.

Yours sincerely,

Mark D. Anderson
Chief Executive Officer
BirdLife South Africa

Isdell House, 17 Hume Road
Dunkeld West, Gauteng 2196
Private Bag X16, Pinegowrie
2123, South Africa
Tel: +27 (0)11 789 1122
Fax: +27 (0)11 789 5188
Email: info@birdlife.org.za
www.birdlife.org.za

AM
MC

Subject: MCE236902 - Letter to Mr Anderson

From: Itebogeng Chiloane <ichiloane@dffe.gov.za>
Sent: Friday, November 24, 2023 10:10 AM
To: Mark Anderson <ceo@birdlife.org.za>
Cc: Janine Buitendag <jbuitendag@dffe.gov.za>; Liesl Jacobs <lijacobs@dffe.gov.za>; Saasa Pheeha <spheeha@dffe.gov.za>; Ashley Naidoo <ANaidoo@dffe.gov.za>
Subject: MCE236902 - Letter to Mr Anderson

Dear Mr Anderson

Please receive the attached letter from Minister Creecy for your attention.
Kindly acknowledge receipt thereof.

Regards

Itebogeng Chiloane
Ministry
Department of Forestry, Fisheries and the Environment
473 Steve Biko, Arcadia
Pretoria
0083
Tel: 012 399 9142
Cell: *071 507 1467*
Email: ichiloane@dffe.gov.za
Website: www.environment.gov.za

forestry, fisheries & the environment
Department:
Forestry, Fisheries and the Environment
REPUBLIC OF SOUTH AFRICA

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MINISTER
FORESTRY, FISHERIES AND THE ENVIRONMENT
REPUBLIC OF SOUTH AFRICA

Private Bag X447, Pretoria, 0001, Environment House, 473 Steve Biko Road, Tel: (012) 399 8743
Private Bag X9052, Cape Town, 8000, Tel: (021) 469 1500, Fax: (021) 465 3362

Ref: MCE236902

Mark Anderson
Chief Executive Officer: BirdLife SA
Private Bag X16
Pinegowrie
2123

By email: ceo@birdlife.org.za

Dear Sir

RE: REQUEST FOR INFORMATION REGARDING HOLDERS OF SMALL PELAGIC FISHING RIGHTS FOR PURPOSES OF ENGAGING IN NEGOTIATIONS REGARDING ISLAND CLOSURE.

Your email correspondence dated 02 October 2023 refers.

The Department of Forestry, Fisheries and the Environment appreciates the role that BirdLife SA has played together with other members of the Conservation Sector Group in the development of various conservation and management measures aimed at protecting the vulnerable seabirds. Most importantly, all the efforts that have culminated in the process that led to the decision to implement fishing limitations in the waters around penguin colonies for the benefit of the African penguin. With the review that has been set to be undertaken in six years, the Department acknowledges that there is mammoth task ahead that requires further engagements between all affected stakeholders to ensure that compromises and agreements are reached. You will recall that the Department has made some undertakings that they will continue to support this process of consultation.

In responding to your correspondence, the request for information as was submitted to the Department by Mr. Craig Smith, could not be acceded to as there are requirements in terms of the law where it pertains to the sharing of third-party information that is in possession of the State. The Protection of Personal Information Act 4 of 2013 (POPIA) which came into effect on July 1, 2021 is a data protection and privacy law in South Africa that governs the processing of personal information and places restrictions on the sharing and handling of personal information. One of the fundamental principles of POPIA is that personal information may only be processed with the consent of the data subject (the person to whom the information pertains) and when sharing such information that is considered to be

DELEGATION OF POWERS IN TERMS OF SECTION 79 OF THE MARINE LIVING RESOURCES ACT, 1998 (ACT NO. 18 OF 1998)

personal information, the Department must process it in a lawfully and reasonable manner that does not infringe on the privacy of individuals. This includes obtaining the explicit consent of the data subject, unless another legal basis for processing applies. Sharing of this personal information, especially sensitive personal information, should be done in accordance with the conditions set out in POPIA, ensuring that the rights and privacy of individuals are protected. Under POPIA, personal information is defined broadly and includes any information that can identify an individual, such as names, ID numbers, contact information, medical records, and more. Promotion of Access to Information Act (PAIA) should also be taken into consideration when accessing and releasing this information.

Failure to comply with the requirements of the law by the Department may result in penalties, fines, and legal consequences. Taking into consideration the relevant provisions of PAIA, as well as the POPIA, it is for this reason that the same advice is given to Birdlife SA that the request for information should be submitted to the Department in terms of PAIA so as the request can be processed in line with the provisions of the Act. BirdLifeSA is advised to contact the Department's Customer Service Centre for the necessary required Application forms so as you can be able to request the required information. The Department's Customer Service Centre can be contacted on Tel: 086 000 3474 or email: cscapplications@dffe.gov.za

Alternatively, the industry can also be engage through the South African Pelagic Fishing Industry Association (SAPFIA), which is a legally recognised industrial body which represents a large number of Rights Holder in the small pelagic sector. SAPFIA can be contacted on: Tel: +27 21 425 2727 or email: sapfia@inshore.co.za

Yours sincerely,

MS B D CREECY, MP
MINISTER OF FORESTRY, FISHERIES AND THE ENVIRONMENT
DATE: 23/11/2023

AM
MLL

"AM62"

From: Pichegru, Lorien (Prof) (Summerstrand Campus South) <Lorien.Pichegru@mandela.ac.za>
Sent: Tuesday, 17 October 2023 10:23
To: Ashley Naidoo
Cc: Alistair McInnes; Lauren Waller; Smith, Craig
Subject: RE: Planning for tehe meeting on teh 24th
Attachments: Assessment of interim closures for African Penguins_20231017 (final clean).pdf

Dear Ashley,

Thank you for your email below.
We will revert regarding next week's meeting once everyone is back from leave.

As mentioned on the phone, attached is our assessment on the closures for African penguins using the International Panel Review Report recommended methodology, that we will send this afternoon to Minister Creecy.
Thanks again for your continued assistance in the process.

Kind regards,
Lorien

From: Ashley Naidoo <ANaidoo@dffe.gov.za>
Sent: Tuesday, 17 October 2023 09:07
To: Lauren Waller <laurenw@ewt.org.za>; Pichegru, Lorien (Prof) (Summerstrand Campus South) <Lorien.Pichegru@mandela.ac.za>; Alistair McInnes <alistair.mcinnes@birdlife.org.za>; csmith <csmith@wwf.org.za>; Riedau <redah@rialfishing.co.za>
Cc: Gerhard Cilliers <GCilliers@dffe.gov.za>; Gcobani Popose <GPopose@dffe.gov.za>
Subject: Planning for tehe meeting on teh 24th

Dear Lauren, Lorien, Alistair, Craig and Riedau (Gcobani and Gerhard copied)

Riedau before continuing, I should explain what this planned meeting is. After some emails from the conservation representatives querying the interpretation and implementation of the Panel Report, I offered an exploratory discussion so that all of us are on the same page. From my side you are certainly welcome to join this planned session on the 24th. (Suggested timing from 1000 to 1300?)

Then for the Conservation reps in particular my offer for agenda items are below. Please can I ask you to edit/add to these by Friday morning when I will finalise the agenda and send out the invite.

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1. The Operations of roles of DFFE
    a. DFFE (AN)
2. Interpretation of the Report – key points
    a. Conservation Reps (combined or individually)
    b. DFFE
3. Implementation of the Minister's Decision
    a. Representation – Decision maker
4. Other
    a. Engaging the DFFE and expectations

Thank you
Ashley

Ashley Naidoo. Ph.D. | Chief Director: Ocean & Coasts Research (he/him)
Find Annual Ocean & Coasts Science Report at:
https://www.dffe.gov.za/documents/research/oceansandcoasts
+2721 493 7300
+2782 784 7131

From: Lauren Waller <LaurenW@ewt.org.za>
Date: Thursday, 12 October 2023 at 09:20
To: Ashley Naidoo <ANaidoo@dffe.gov.za>, lorien.pichegru@mandela.ac.za <lorien.pichegru@mandela.ac.za>, Alistair McInnes <alistair.mcinnes@birdlife.org.za>, csmith <csmith@wwf.org.za>, Riedau <redah@rialfishing.co.za>
Cc: Gerhard Cilliers <GCilliers@dffe.gov.za>, Gcobani Popose <GPopose@dffe.gov.za>
Subject: RE: EC closures

HI Ashley

Many thanks for your email.

Just to note that I now have a commitment on 24th October from 10:00 – 11:00 that I cannot shift, so if we could meet before or after that I'd greatly appreciate it.

Key on the Agenda would be for the Department to provide the rationale and process followed for the decision made on interim closures unless the stakeholders can come to an alternative agreement. This in the context of the recommendations of the panel report that the department had available to inform its decision making and our uncertainty as to why another process is needed.

With grateful thanks
Lauren

From: Ashley Naidoo <ANaidoo@dffe.gov.za>
Sent: Wednesday, October 11, 2023 9:47 AM
To: lorien.pichegru@mandela.ac.za; Alistair McInnes <alistair.mcinnes@birdlife.org.za>; csmith <csmith@wwf.org.za>; Lauren Waller <LaurenW@ewt.org.za>; Riedau <redah@rialfishing.co.za>

Cc: Gerhard Cilliers <GCilliers@dffe.gov.za>; Gcobani Popose <GPopose@dffe.gov.za>
Subject: Re: EC closures

Dear Riedau, Alistair, Craig, Lauren and Lorien (Gerhard and Gcobani copied)

Over the last week while I was away I received emails from some of you. Now that I am back, I want to acknowledge and appreciate those emails. Please give a me a few days to plan our engagements over the next weeks. I am hoping that these engagements will answer/clarify the issues that some of you raised in your recent emails.

Thank you
Ashley N

AM
MK

The potential for interim purse-seine fisheries restrictions to alleviate resource competition around African Penguin colonies: assessment based on International Review Panel Report recommendations

Alistair McInnes,[1,2] Eleanor A Weideman,[1] Lauren Waller,[3,4] Lorien Pichegru,[2] Richard Sherley,[5] Craig Smith,[6] Katrin Ludynia,[4,7] Tegan Carpenter-Kling,[2] Christina Hagen,[1] Peter Barham,[4,9] Nicky Stander,[7] Lynne Shannon[10]

[1] Seabird Conservation Programme, BirdLife South Africa
[2] Institute for Coastal and Marine Research, Nelson Mandela University
[3] Endangered Wildlife Trust
[4] Department of Biodiversity & Conservation Biology, University of the Western Cape,
[5] Centre for Ecology and Conservation and Environment and Sustainability Institute, University of Exeter, UK
[6] World-Wide Fund for Nature, South Africa
[7] Southern African Foundation for the Conservation of Coastal Birds
[9] School of Physics, University of Bristol
[10] Department of Biological Sciences, University of Cape Town

17 October 2023

1. Executive Summary

1.1. In this analysis, we use the guidelines in terms of a trade-off mechanism provided by the International Review Panel Report (**IRPR**)[1] to compare the benefits to African Penguins and costs to the fishing industry for: (a) penguin foraging ranges; (b) core penguin foraging areas; (c) the 20 km closures implemented during the Island Closure Experiment (**ICE**); and (d) the interim closures that are currently in place.

1.2. The core African Penguin foraging area was defined using the "marine Important Bird Area method using Area Restricted Search" (**mIBA-ARS**). This methodology was recognised by the IRPR as representing the best scientific basis for delineating preferred foraging areas of African Penguins during breeding.

1.3. Following IRPR recommendations, trade-off analyses were assessed for three colonies: Dassen Island, Robben Island and Stony Point. We have not included trade-off analyses for St Croix and Bird Islands as permit conditions have already been amended pursuant to the IRPR process. In addition, the split-zone configuration of the interim closure around Dyer Island precluded us from assessing trade-offs for this colony due to a lack of fishery cost data.

1.4. In the case of Robben Island and Stony Point, interim closures protect only 43% and 30% of African Penguins' core foraging areas respectively. The interim closure in place around Dassen Island excludes a critical portion of this breeding colony's northern core foraging area. Therefore, these interim closures are highly unlikely to mitigate resource competition between African Penguins and purse-seine fisheries.

[1] Punt, A.E., Furness, R.W., Parma, A.M., Plagányi-Lloyd, E., Sanchirico, J.N., Trathan, P.N. (2023) Report of the international review panel regarding fishing closures adjacent to South Africa's African Penguin breeding colonies and declines in the penguin population. Department of Forestry, Fisheries and the Environment (DFFE). ISBN: 978-0-621-51331-8.

1.5. By contrast, results of the trade-off analyses recommended by the IRPR and illustrated below show that implementing closures around core African Penguin foraging areas (i.e. using the mIBA-ARS approach)[2] will incur very little, and in some instances negligible, costs to the fishing industry.

1.6. Closures need to incorporate more representative portions of the African Penguins' core foraging areas to be biologically meaningful. This document makes proposals to this effect and illustrates that, in most instances, following the IRPR's recommended methodology results in closing more representative African Penguin foraging areas with little cost to the fishing industry.

2. Introduction and Background

2.1. On 4 August 2023, the Minister of Forestry, Fisheries and the Environment (**Minister**) announced the publication of the *Report of the international review panel regarding [purse-seine] fishing closures adjacent to South Africa's African Penguin breeding colonies and declines in the penguin population* (**IRPR**).[3] In the same announcement, she stated that "*If there is agreement on fishing limitations over the next few weeks or months across these sectors, these will be implemented as they are agreed upon. If no alternate fishing limitation proposals are concluded by the start of the 2024 Small Pelagic Fishing Season (January 15th 2024) the current interim fishing limitations will continue until the end of the 2033 Fishing Season, with a review in 2030 after six years of implementation from the start of the 2024 fishing season*".[4]

2.2. The interim closures were originally implemented in September 2022 around six African Penguin colonies as a temporary measure pending the conclusion and release of the IRPR.[5] The scientific basis for defining these areas has not been published or otherwise communicated by the Minister or the Department of Forestry, Fisheries and the Environment (**DFFE**).

2.3. The IRPR provided recommendations for a trade-off mechanism to help identify closure extents that would maximise benefits to African Penguins while minimising costs to the purse-seine fishing industry.

2.4. In this document, we provide the results of an assessment of different proposals, using the trade-off methodology that was recommended by the IRPR. We apply this trade-off methodology to three colonies (Dassen Island, Robben Island and Stony Point) which comprise three of the remaining six large African Penguin breeding colonies in South Africa that were assessed in the IRPR. St Croix Island and Bird Island colonies have amended permits in place with effect from 1 September 2023 pursuant to the IRPR process. They have therefore not been included in the trade-off assessments. The split-zone configuration[6] currently in place as the interim closure around Dyer Island requires updated fisheries cost data. Dyer Island has, thus, also been omitted from the trade-off analysis.

2.5. We compare the potential for alleviating resource competition between African Penguins and purse-seine fishing between: (a) penguin foraging ranges (see further 4.1.6 below); (b) core penguin foraging areas using the mIBA-ARS methodology (see further 4.1.7 below); (c) the 20 km

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[2] *Ibid.*

[3] DFFE (4 August 2023) Media Statement: Science Based Measures are now being implemented to protect the critically endangered African Penguins, says Minister of Forestry, Fisheries and Environment, Ms Barbara Creecy, available online < https://www.dffe.gov.za/node/2001> (last accessed 5 October 2023).

[4] *Ibid.*

[5] DFFE (2022) Media Statement: Interim Fishing Closures and Limitations around Key Penguin Colonies, available online <https://www.dffe.gov.za/Interim-fishing-closures-and-limitations-around-key-penguin-colonies> (last accessed 5 October 2023).

[6] i.e two zones, one that restricts all purse-seine fishing and one that restricts fishing to vessels ≥ 26m in length.

closures implemented during the Island Closure Experiment; and (d) the interim closures that are currently in place.

2.6. For each colony we provide maps of the different closure extents in relation to African Penguin foraging tracks (from GPS devices attached on chick-rearing African Penguins) and the foraging range (UD90, i.e. see 4.1.6 below); calculate the proportion of the core African Penguin foraging areas (i.e. the mIBA-ARS) within the current interim closure extents; and provide trade-off curves which show the area of each closure versus the estimated cost to industry, following methods recommended by the IRPR.

2.7. The decline by approximately 40% of the South African African Penguin population over the past six years (2018 to 2023)[7] highlights the urgency of implementing effective conservation measures which maximise benefits to the African Penguin.

3. Key findings of the International Review Panel Report (IRPR)

The following key findings of the IRPR are relevant to the selection of optimal closure designs:

3.1. Decisions on closure designs should be colony-specific given the differences in African Penguin foraging areas and costs to fisheries around each colony.[8]

3.2. The Opportunity-based Model (**OBM**) and Social Accounting Matrix (**SAM**) used by consultants commissioned by the South African Pelagic Fishing Industrial Association to estimate the costs to the fishing industry of different closure delineations, likely overestimate the actual costs but can be used in a relative sense to rank different closure options.[9]

3.3. Conservation actions should be spread throughout the range of the species.[10]

3.4. Closures should be in place throughout the year and should be implemented for a period that can adequately assess the impacts of fisheries restrictions on survival and recruitment.[11]

3.5. Closures that reflect valuable African Penguin foraging areas will have greater benefits than those that close less valuable foraging areas.[12]

3.6. Closures based on the mIBA-ARS methodology represent the best scientific basis for delineating preferred foraging areas during breeding.[13]

3.7. Closure areas should be selected based on the suitability of these delineations to evaluate the effectiveness of alleviating resource competition on African Penguins.[14]

3.8. It is desirable to identify a solution that minimizes societal costs and maximizes benefits to African Penguins; however, an optimal solution between competing objectives is not simply obtained by closing 50 percent of any given area.[15]

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[7] We note that the monitoring and evaluation review period for the closures to be put in place is six years. It is striking that within the last six-year period, population decline has been dramatic.
[8] IRPR, Sec. 4.4., pg. 36.
[9] IRPR, Sec. 3.3, pg. 31; Sec. 4.4., pg. 36.
[10] IRPR, Sec. 4.4. pg. 36.
[11] IRPR. Sec. 4.1. pg. 33.
[12] IRPR, Sec. 4.4., pg. 36.
[13] IRPR, Sec. 4.3., pg. 34.
[14] IRPR, Sec. 4.1., pg. 33.
[15] IRPR, Sec. 4.4., pg. 36.

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4. Applying the trade-off mechanism recommended by the IRPR to African Penguin colonies and assessing the suitability of current interim closures in light of the IRPR's findings

4.1. Methods

4.1.1. The IRPR outlines a trade-off mechanism, i.e. using a trade-off curve, to select closures that minimise societal costs and maximise benefits to African Penguins. The point at which the change in African Penguin benefits matches the change in costs to society (based on the OBM model) is recommended as a potential reference point to guide the selection of optimal closures.

4.1.2. The IRPR provides examples of these trade-off curves for six of the largest penguin colonies.[16] These include various closure options proposed since 2021 and their corresponding estimated costs to fisheries for each small pelagic fish stock relevant to each specific colony.

4.1.3. As referenced above, the IRPR notes that the OBM and SAM (which were used to estimate the above-mentioned costs) likely overestimate costs to fishery, by an unknown magnitude.

4.1.4. The interim closures implemented by DFFE in 2022 include a mix of closures proposed by DFFE during 2021[17] and those selected by the Consultative Advisory Forum for Marine Living Resources (**CAF**) in 2022.[18]

4.1.5. In the following analysis, we have adopted the trade-off mechanism, recommended in the IRPR, i.e. measuring benefits to African Penguins versus relative costs to fisheries.

4.1.6. For each colony, we have compared the relative costs to fisheries against: (a) African Penguins' full foraging range without outliers (i.e. UD90);[19] (b) African Penguins' core foraging area (i.e. mIBA-ARS, see further below); (c) the interim closures; and (d) 20km closures used during the ICE.[20]

4.1.7. Core African Penguin foraging areas were estimated using methods to determine marine Important Bird Areas (**mIBA**)[21] using the Area Restricted Search (**ARS**) methodology to align the delineations of closures to the foraging behaviour of the penguins.[22] The mIBA-ARS

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[16] IRPR, Sec. 4.4., pg. 37.

[17] Coetzee, J.C., Makhado, A., van der Lingen, C.D., Ebrahim, Z., Kock, A., Lawrence, C., and Shabangu, F.W. (2021) African Penguin colony closures: Finding a balance between minimizing costs to the small pelagic fishing industry while maximizing coverage of foraging area for breeding African Penguins. DFFE Document O&C/2021/SEP/Extended Penguin TT/01.

[18] Consultative Advisory Forum (CAF) (2022) Special Project Report on Penguin and Small Pelagic Fishery Interactions by the Consultative Advisory Forum for Marine Living Resources.

[19] UD90 refers to mIBA using a 90% kernel utilisation distribution (see McInnes, A.M., Weideman, E., Waller, L., Sherley, R., Pichegru, L., Ludynia, K., Hagen, C., Barham, P., Smith, C., Kock, A., and Carpenter-Kling, T. (2023) Purse-seine fisheries closure configurations for African Penguin conservation: methods and considerations for optimal closure designs. Document FP/PANEL/WP/09 presented to the Panel in June 2023).

[20] Punt et al. *supra*.

[21] Lascelles, B. G., Taylor, P. R., Miller, M. G. R., Dias, M. P., Oppel, S., Torres, L., Hedd, A., Le Corre, M., Phillips, R. A., Shaffer, S. A., Weimerskirch, H., & Small, C. (2016) Applying global criteria to tracking data to define important areas for marine conservation. Diversity and Distributions, 22(4), 422–431. https://doi.org/10.1111/ddi.12411; Dias, M. P., Carneiro, A. P. B., Warwick-Evans, V., Harris, C., Lorenz, K., Lascelles, B., Clewlow, H. L., Dunn, M. J., Hinke, J. T., Kim, J. H., Kokubun, N., Manco, F., Ratcliffe, N., Santos, M., Takahashi, A., Trivelpiece, W., & Trathan, P. N. (2018) Identification of marine Important Bird and Biodiversity Areas for penguins around the South Shetland Islands and South Orkney Islands. Ecology and Evolution, 8(21), 10520–10529.

[22] Lascelles et al. *supra*; McInnes et al. *supra*

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method was recommended by the IRPR as the preferred methodology for delineating important African Penguin foraging areas (see 3.6 above).

4.1.8. We have used the median cost from the OBM model (i.e. where each set could be reused five times – refer to section 3 of the IRPR for details) to assess the relative impact of different closure options for each colony and catch-type (see 4.1.9 below).[23]

4.1.9. For each colony we provide trade-off curves for four types of catch: (a) directed anchovy; (b) directed sardine; (c) sardine bycatch; and (d) redeye. Sardine and anchovy are the principal prey of African Penguins, although redeye is also targeted to a lesser degree.[24]

4.1.10. Identification of the point at which the change in African Penguin benefits matches the change in costs to society could not be assessed quantitatively due to a lack of corresponding fisheries cost data which could facilitate fitting a curve to different closure options related to penguin tracking data.

4.1.11. We note that in respect of Dyer Island, the lack of fishery cost data for the split-zone scenario for the interim closure around this colony prevents us from assessing trade-offs at this stage. In respect of St Croix and Bird islands, fishing permits have been amended (pursuant to the IRPR process).[25] Therefore, these fishing closures are reflected below without additional analysis for the sake of completeness.

4.2. Colony assessments

4.2.1. <u>Dassen Island</u>

a) The existing interim closure around Dassen Island (shown as the red line in Figure 1A) omits a significant area in the northern portion of the African Penguins' core foraging area i.e. the mIBA-ARS (shown as the dark green line).

b) This northern area is critical to African Penguins from this colony. First, it forms part of their core foraging area proximate to the Dassen Island breeding grounds. Second, small-pelagic fishing within this northern portion of the mIBA-ARS is likely to have downstream effects on prey availability for African Penguins in the remainder of their core foraging area due to the southward movement of anchovy recruits between May and August which also corresponds to the core breeding season for penguins from this colony.

c) The interim closure is therefore assessed as not being adequately representative of important African Penguin foraging area for this colony, as per the recommendation of the IRPR.

d) By contrast, the relative regional cost to fisheries for anchovy, sardine and redeye is low for both the mIBA-ARS and the interim closure options (see Figure 1B below).

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[23] The IRPR states that the OBM overestimates costs to the industry by an unknown amount, and that the results of the OBM should be used to compare different closure options in a relative sense. We have used the middle ground point estimate as reflected in the IRPR (see IRPR, Figs 4.4 & 4.5, pg. 37).

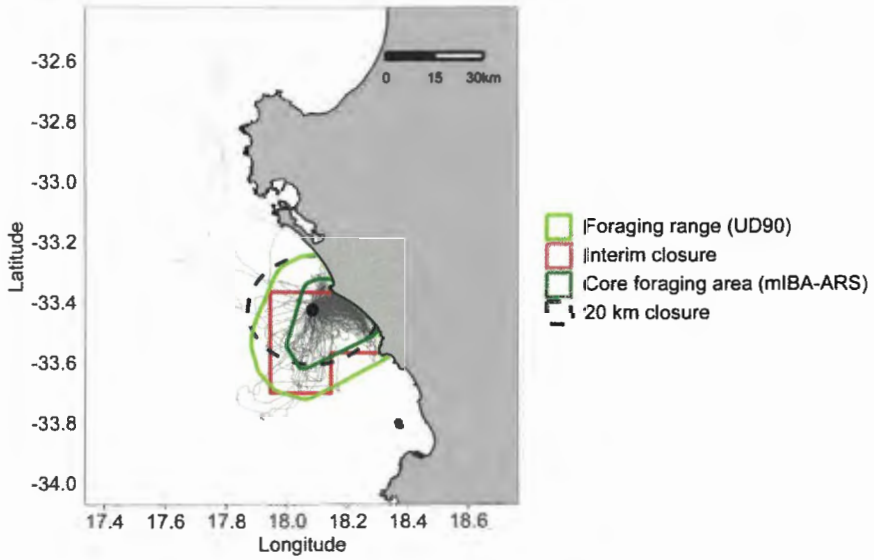
[24] Crawford, R. J. M., Altwegg, R., Barham, B. J., Barham, P. J., Durant, J. M., Dyer, B. M., Geldenhuys, D., Makhado, A. B., Pichegru, L., Ryan, P. G., Underhill, L. G., Upfold, L., Visagie, J., Waller, L. J., & Whittington, P. A. (2011) Collapse of South Africa's penguins in the early 21st century. African Journal of Marine Science, 33(1), 139–156. https://doi.org/10.2989/1814232X.2011.572377.

[25] Permit Conditions: Pelagic Fish Anchovy and Sardine Fisheries: 2023. Fishing Season 2023. Date of Approval: 31 August 2023. Issued in terms of section 13 of thee Marine Living Resources Act, 1998 (Act No. 18 of 1998) by the Department of Forestry, Fisheries and the Environment.

AOM MK

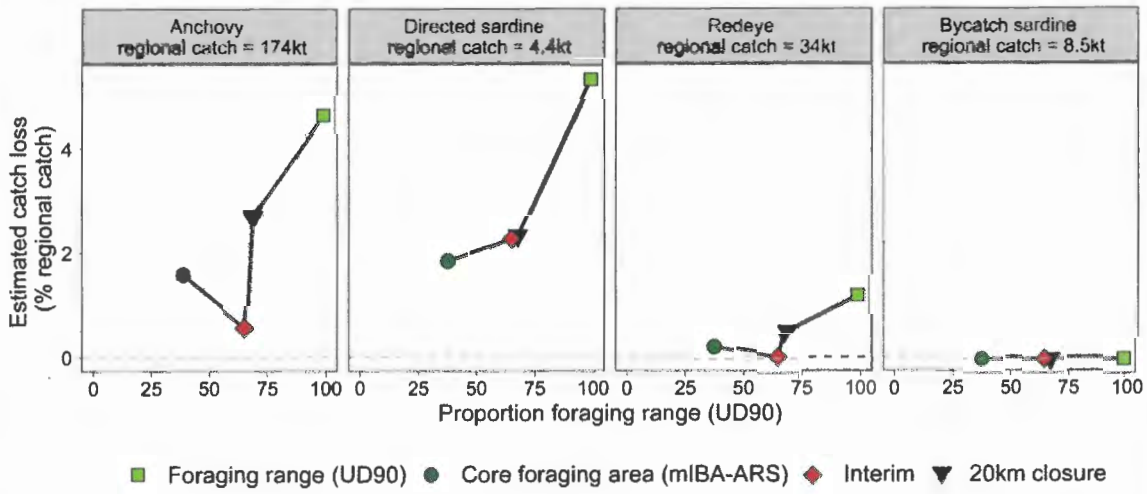
e) As a consequence, and following the IRPR recommendations set out in paragraphs 3.5-3.8 above, it is recommended that the mIBA-ARS closure option be used.

Figure 1A



Map showing closure options around Dassen Island in relation to African Penguin foraging tracks (thin grey lines).

Figure 1B



Trade-off curve for Dassen Island showing the proportion of penguin foraging range covered by each closure option and the associated catch loss for four different stocks as estimated by the OBM using data for 2011-2020. Catch loss is shown as a percentage of the regional catch (west of Cape Point). Note that the IRPR states that the OBM overestimates the catch loss and can thus only be used to rank closure options in a relative sense.

4.2.2. **Robben Island**

a) The existing interim closure surrounding Robben Island (shown as the red line in Figure 2A) is the existing portion of the fully restricted Marine Protected Area which already excludes fishing for sardine, anchovy and red-eye.[26]

b) The interim closure includes only 43% of the penguins' core foraging area (mIBA-ARS, shown as the dark green line in Figure 2A).

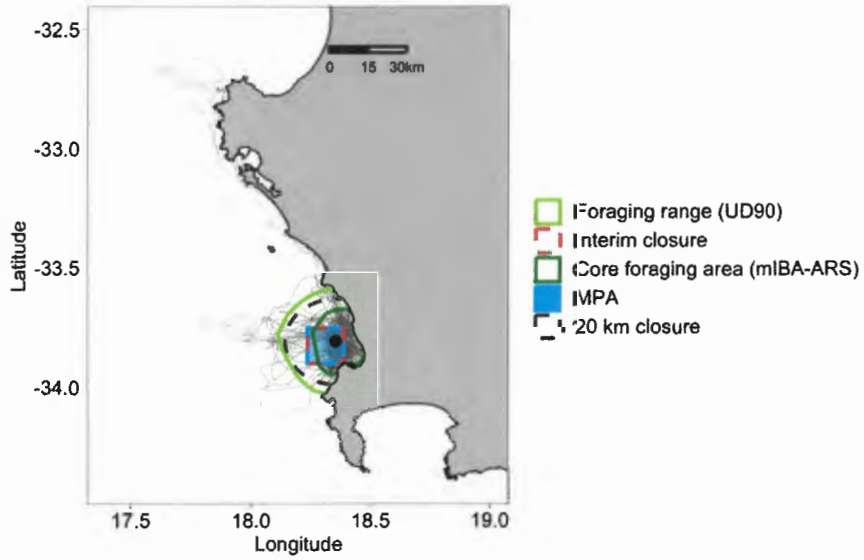
c) The interim closure is therefore assessed as not being adequately representative of important penguin foraging area for this colony, as per the recommendation of the IRPR.

d) By contrast, the relative regional cost for anchovy, sardine and redeye is low for both the mIBA-ARS closure option and the 20 km closure option (shown as the hatched black line in Figure 2A). The comparison of the relative costs is shown in Figure 2B below.

e) The 20 km closure option includes 100% of the mIBA-ARS closure but also includes a greater proportion (83%) of the African Penguins' foraging range which is shown as the light green line around this colony in Figure 2A. See the comparative areas set out in Figure 2B below.

f) Although the 20 km closure option affords African Penguins greater foraging area benefits, it incurs a slightly greater cost to fisheries. As a consequence, and following the IRPR recommendations set out in paragraphs 3.5-3.8 above, it is recommended that the mIBA-ARS closure option be used.

Figure 2A



Map showing closure options around Robben Island in relation to African Penguin foraging tracks (thin grey lines).

[26] See National Environmental Management: Protected Areas Act (57/2003): Notice declaring the Robben Island Marine Protected Area in terms of section 22A of the Act (GN774 in GG42478 of 23 May 2019).

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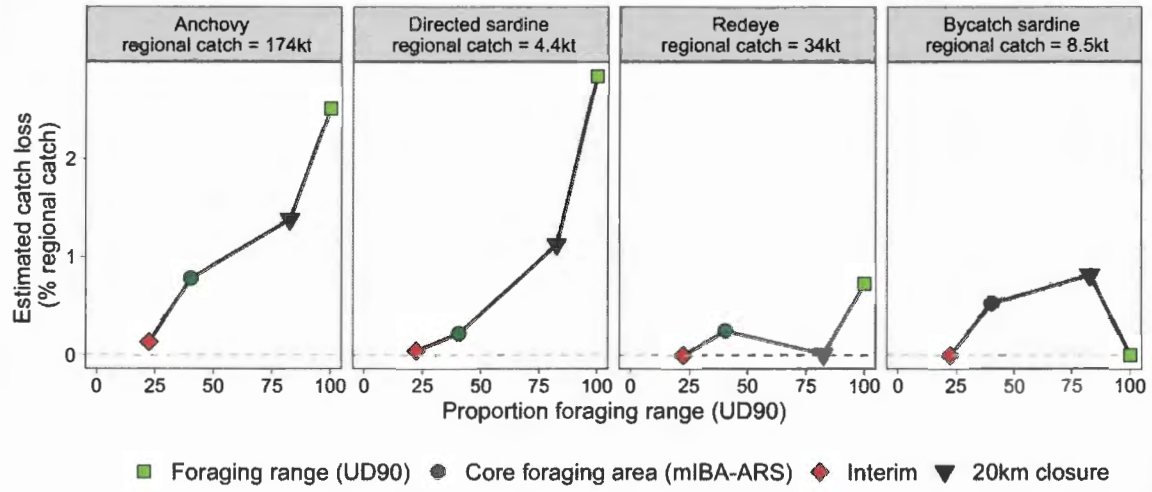
Figure 2B



Trade-off curve for Robben Island showing the proportion of penguin foraging range covered by each closure option and the associated catch loss for four different stocks as estimated by the OBM using data for 2011-2020. Catch loss is shown as a percentage of the regional catch (west of Cape Point). Note that the IRPR states that the OBM overestimates the catch loss and can thus only be used to rank closure options in a relative sense.

4.2.3. **Stony Point**

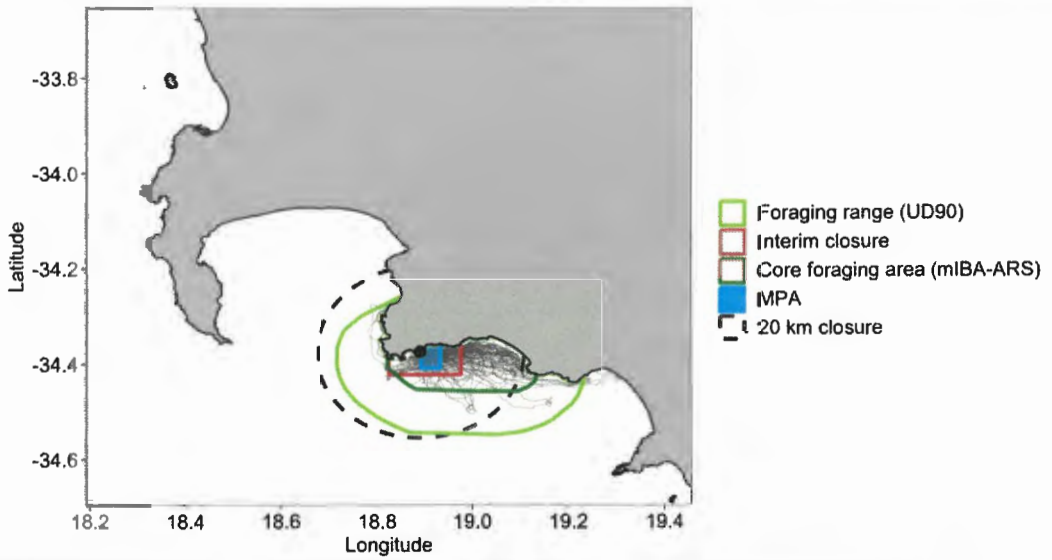
a) The interim closure around Stony Point (shown as the red line in Figure 3A) includes only 30% of the African Penguins' core foraging area (mIBA-ARS, shown as the dark green line in Figure 3A). The interim closure therefore does not provide adequate protection of important penguin foraging area for this colony. In addition, it does not accord with the IRPR recommendations reflected in paragraph 3.8 above.

b) By contrast, the relative regional cost for anchovy, sardine and redeye is negligible to low for both the interim and mIBA-ARS closure options as illustrated in Figure 3B below.

c) As a consequence, and following the IRPR recommendations set out in paragraphs 3.5-3.8 above, it is recommended that the mIBA-ARS closure option be used. This approach, based on best-available science, would support the objective of population recovery at this colony which is well-situated for enhanced conservation measures as well as providing economic benefits through tourism.[27]

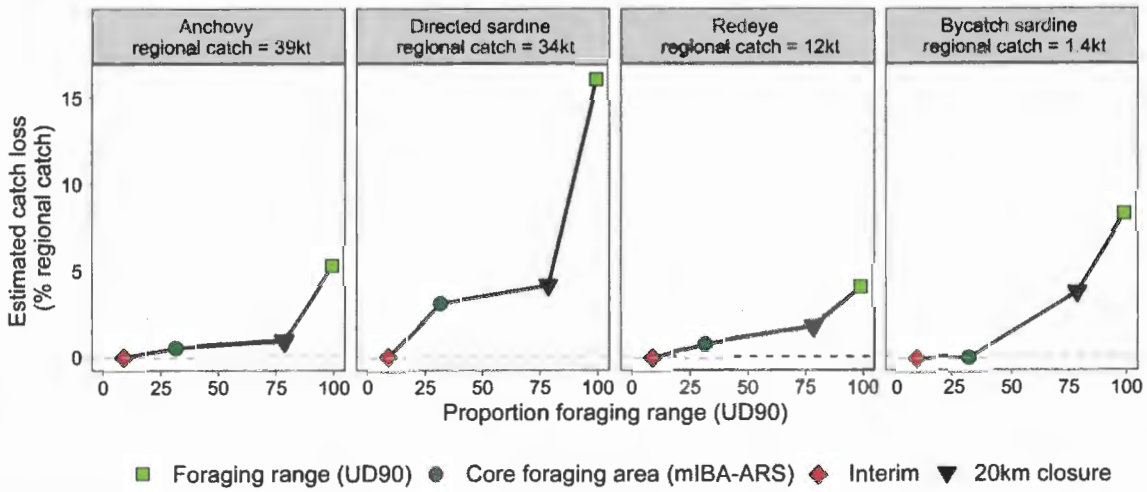
[27] IRPR, Sec. 4.5, pg. 38.

Figure 3A



Map showing closure options around Stony Point in relation to African Penguin foraging tracks (thin grey lines).

Figure 3B



Trade-off curve for Stony Point showing the area of each closure option and the associated catch loss for four different stocks as estimated by the OBM using data for 2011-2020. Catch loss is shown as a percentage of the regional catch (Cape Point to Agulhas). Note that the IRPR states that the OBM overestimates the catch loss and can thus only be used to rank closure options in a relative sense.

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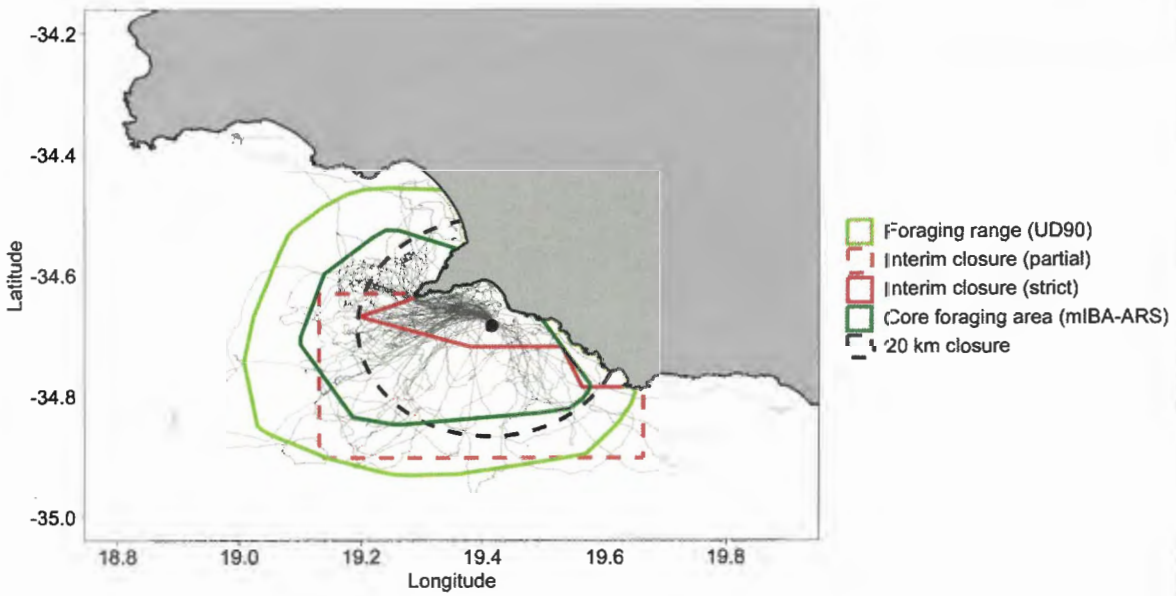
4.2.4. **Dyer Island**

a) The existing interim closure around Dyer Island includes two zones: (i) an inshore zone which is completely restricted to all purse-seine fishing (shown as the solid red line in Figure 4); and (ii) an offshore zone that only excludes purse-seine vessels ≥ 26m in length (shown as the hatched red line in Figure 4).

b) The costs to fisheries have not been estimated for the split-zone interim closure scenario for this colony. It is therefore recommended that the relative costs to industry be calculated on the basis of this scenario before assessing the relative trade-offs.

Figure 4



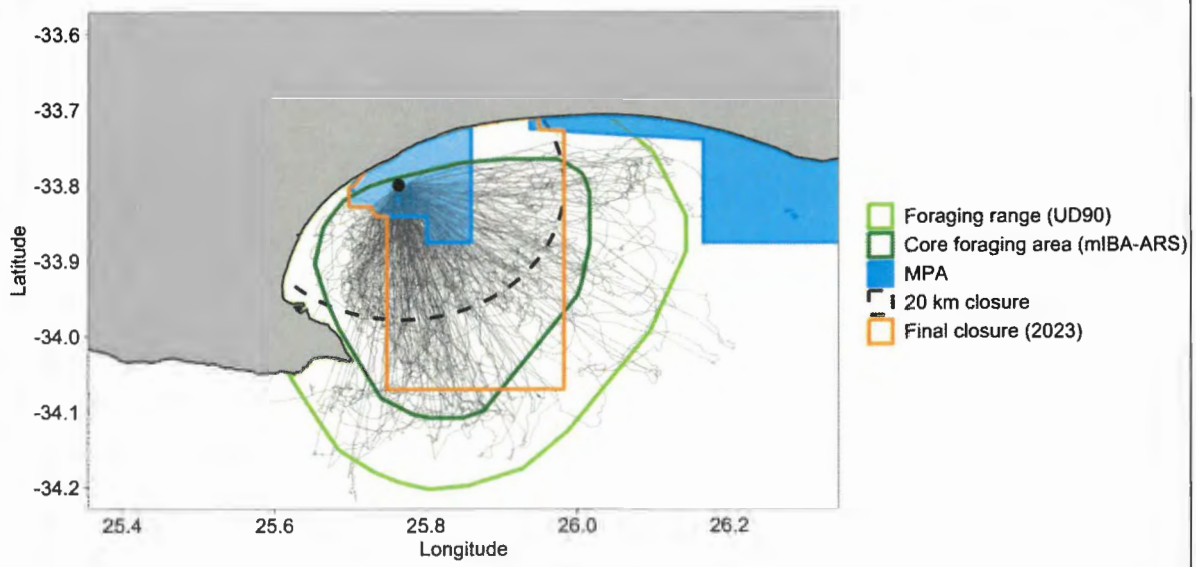
Map showing closure options around Dyer Island in relation to African Penguin foraging tracks (thin grey lines). The dashed red line indicates the partial interim closure that is open to vessels <26m, while the area inside the solid red line is closed to all vessels.

4.2.5. **St Croix Island**

a) The conditions of the small pelagic fishing permits for this colony have been amended by the DFFE with effect from 1 September 2023.

b) The amended closure extent is depicted as the orange line in Figure 5.

Figure 5



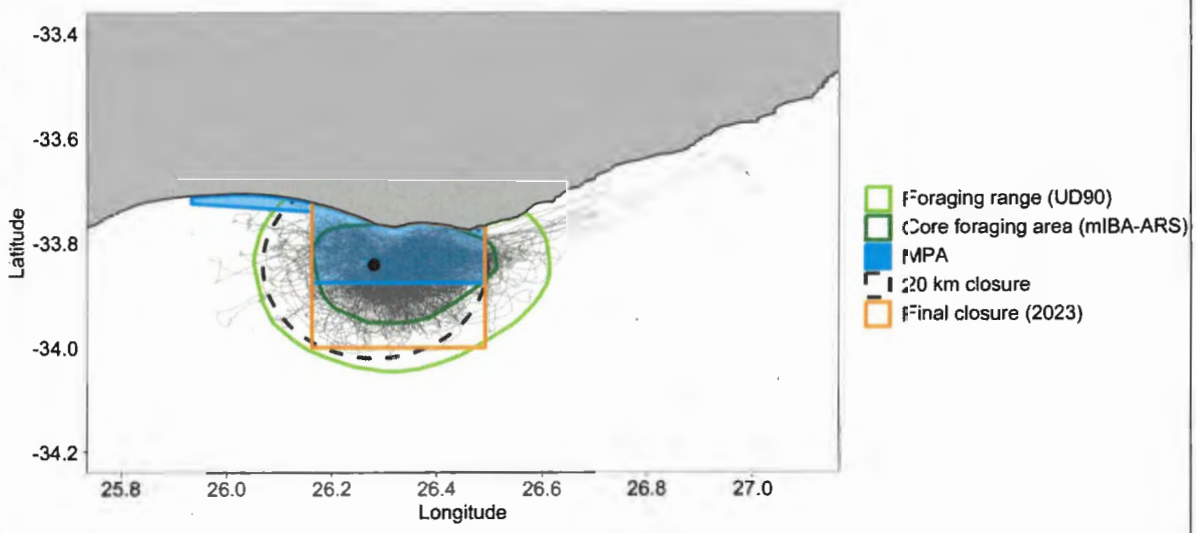
Map showing the closure (orange line) around St Croix Island (as reflected in the permits) in relation to African Penguin foraging tracks (thin grey lines).

4.2.6. **Bird Island**

a) The conditions of the small pelagic fishing permits for this colony have been amended by the DFFE with effect from 1 September 2023.

b) The amended closure extent is depicted as the orange line in Figure 6.

Figure 6



Map showing the closure (orange line) around Bird Island (as reflected in the permits) in relation to African Penguin foraging tracks (thin grey lines.

5. Conclusion

5.1. The interim closures currently in place have little to no benefit for African Penguins in terms of reducing current resource pressure. By contrast, the interim closures incur low to negligible costs to the fishing industry at the expense of protecting African Penguin populations. This is contrary

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to the recommendations of the IRPR and an inappropriate trade-off to maximise benefits to penguins while minimising societal costs.

5.2. It is clear that interim closures do not follow IRPR recommendations, given that they have been shown in this report to be inadequate in their capacity to mitigate resource competition to African Penguin survival and recruitment. As a consequence, the proposed six-year review (which is intended to enable assessment of the efficacy of biologically meaningful closures) will not achieve its objective. Further, this approach would be contrary to the best-available scientific methodology and data currently available and as identified by the IRPR.

5.3. We propose a scenario for each of the three colonies assessed here that would be suitable to evaluate the benefits of closures to mitigate resource competition to African Penguins within the next six to ten years.

To: Mark Anderson
Subject: RE: POTENTIAL FOR INTERIM PURSE-SEINE FISHERIES RESTRICTIONS TO ALLEVIATE RESOURCE COMPETITION AROUND PENGUIN COLONIES

From: Sylvester Pandelane <spandelane@dffe.gov.za>
Sent: Friday, October 20, 2023 2:10 PM
To: Mark Anderson <ceo@birdlife.org.za>
Cc: Janine Buitendag <jbuitendag@dffe.gov.za>; Liesl Jacobs <lijacobs@dffe.gov.za>; Itebogeng Chiloane <ichiloane@dffe.gov.za>; Buchule Mbuli <BMbuli@dffe.gov.za>; Nomonde Magagula <NMAGAGULA@dffe.gov.za>; Lee-Anne Levendal <llevendal@dffe.gov.za>
Subject: FW: POTENTIAL FOR INTERIM PURSE-SEINE FISHERIES RESTRICTIONS TO ALLEVIATE RESOURCE COMPETITION AROUND PENGUIN COLONIES

Good day

On behalf of the Minister of Forestry, Fisheries and the Environment, Ms B D Creecy, MP, I acknowledge with thanks receipt of your correspondence, in the above regard.

Regards

Liesl Jacobs
Assistant Appointment Secretary and Administration Department of Forestry, Fisheries and the Environment
012 399 8515
066 143 8859

From: Mark Anderson <ceo@birdlife.org.za>
Sent: Tuesday, October 17, 2023 3:49 PM
To: Barbara Creecy <Minister@dffe.gov.za>
Cc: Ashley Naidoo <ANaidoo@dffe.gov.za>; Lee-Anne Levendal <llevendal@dffe.gov.za>; Du Plessis, Morne <mduplessis@wwf.org.za>; Natalie Maskell <Natalie@sanccob.co.za>; lorien.pichegru@mandela.ac.za; Yolan Friedmann <yolanf@ewt.org.za>
Subject: POTENTIAL FOR INTERIM PURSE-SEINE FISHERIES RESTRICTIONS TO ALLEVIATE RESOURCE COMPETITION AROUND PENGUIN COLONIES

Dear Minister Creecy

Please see the attached letter and Assessment for your attention.

Regards
Mark

Mark D. Anderson
Chief Executive Officer

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BirdLife SOUTH AFRICA

Giving Conservation Wings

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Donations to BirdLife South Africa may contribute to your B-BBEE scorecard as we are fully SED compliant in terms of the B-BBEE Act. We are also a registered Public Benefit Organisation (No. 930004518) and authorised to issue 18A tax certificates where applicable.

BirdLife South Africa head office is supported by many generous donors, including the Royal Society for the Protection of Birds, F.H. Chamberlain, Toyota, AVIS, ZEISS, Nedbank and Sappi, as well as a number of Corporate Members and Golden Bird Patrons.

17 October 2023

Honourable Barbara Creecy
Minister of Forestry, Fisheries and the Environment

By email: minister@dffe.gov.za

CCd: Ms Lee-Anne Levendal
Chief of Staff: Office of the Minister
Department of Forestry, Fisheries and the Environment
llevendal@dffe.gov.za

Dr Ashley Naidoo
Chief Director: Oceans and Coasts
Department of Forestry, Fisheries and the Environment
anaidoo@dffe.gov.za

Dear Minister Creecy,

RE: POTENTIAL FOR INTERIM PURSE-SEINE FISHERIES RESTRICTIONS TO ALLEVIATE RESOURCE COMPETITION AROUND PENGUIN COLONIES

1. We write to you on behalf of the Conservation Sector Group, represented by BirdLife South Africa, the Endangered Wildlife Trust, SANCCOB, WWF South Africa, and Professor Lorien Pichegru (Institute for Coastal and Marine Research, Nelson Mandela University). The purpose of this correspondence is to share the attached assessment of the potential for interim purse-seine fisheries restrictions to alleviate resource competition around African Penguin colonies (**Assessment**).

2. In the period since your announcement regarding Island Closures on 4 August 2023, the Conservation Sector Group has carefully studied the Expert Review Panel's Report as contemplated in your announcement. We consider this Report to be scientifically robust and well balanced, and we support its key findings of relevance to the selection of optimal closure designs and the methodology to be employed.

3. The attached Assessment was undertaken in light of the Expert Review Panel's recommendations and demonstrates the relative costs and benefits of the interim closures and Expert Review Panel's recommended methodology. We share the Assessment with you in the interest of taking pro-active steps and maintaining the spirit of cooperation with which we have engaged with your Department and industry to date. We trust that your Department will share it with the relevant stakeholders in the fishing industry (as well as others in respect of which the island closures have an impact).

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4. We flag that seabird scientists have relied on the Expert Review Panel's findings, and its recommended approach to analysing trade-offs, to assess the suitability of three of the current interim closures relative to the Expert Review Panel's recommended methodology. The resulting analysis demonstrates that the interim closures (which are not based on the Expert Review Panel's recommended methodology for closure design) do not maximise positive outcomes for African Penguins or represent an appropriate trade-off between benefits to African Penguins and costs to the fishing industry. By contrast, the methodology recommended by the Expert Review Panel, when used to design closures in the specific context of each island, is shown to result in closures which, in most instances, would have little cost to the commercial fishing industry.

5. Given the novel approach taken by the Department in determining the best methodology for maximum species survival and its potential to set a scientifically-robust precent world-wide, we also aim to expand this analysis for purposes of submission to a peer reviewed publication (potentially including a wider range of scientific collaborators).

6. We look forward to engaging further with you and your Department.

Yours sincerely,

Mark D. Anderson
Chief Executive Officer, BirdLife South Africa

Yolan Friedmann
Chief Executive Officer, Endangered Wildlife Trust

Prof. Lorien Pichegru
Institute for Coastal and Marine Research, Nelson Mandela University

Natalie Maskell
Chief Executive Officer, SANCCOB

Dr Morné du Plessis
Chief Executive Officer, WWF-SA

The potential for interim purse-seine fisheries restrictions to alleviate resource competition around African Penguin colonies: assessment based on International Review Panel Report recommendations

Alistair McInnes,[1,2] Eleanor A Weideman,[1] Lauren Waller,[3,4] Lorien Pichegru,[2] Richard Sherley,[5] Craig Smith,[6] Katrin Ludynia,[4,7] Tegan Carpenter-Kling,[2] Christina Hagen,[1] Peter Barham,[4,9] Nicky Stander,[7] Lynne Shannon[10]

[1] Seabird Conservation Programme, BirdLife South Africa
[2] Institute for Coastal and Marine Research, Nelson Mandela University
[3] Endangered Wildlife Trust
[4] Department of Biodiversity & Conservation Biology, University of the Western Cape,
[5] Centre for Ecology and Conservation and Environment and Sustainability Institute, University of Exeter, UK
[6] World-Wide Fund for Nature, South Africa
[7] Southern African Foundation for the Conservation of Coastal Birds
[9] School of Physics, University of Bristol
[10] Department of Biological Sciences, University of Cape Town

17 October 2023

1. Executive Summary

1.1. In this analysis, we use the guidelines in terms of a trade-off mechanism provided by the International Review Panel Report (**IRPR**)[1] to compare the benefits to African Penguins and costs to the fishing industry for: (a) penguin foraging ranges; (b) core penguin foraging areas; (c) the 20 km closures implemented during the Island Closure Experiment (**ICE**); and (d) the interim closures that are currently in place.

1.2. The core African Penguin foraging area was defined using the "marine Important Bird Area method using Area Restricted Search" (**mIBA-ARS**). This methodology was recognised by the IRPR as representing the best scientific basis for delineating preferred foraging areas of African Penguins during breeding.

1.3. Following IRPR recommendations, trade-off analyses were assessed for three colonies: Dassen Island, Robben Island and Stony Point. We have not included trade-off analyses for St Croix and Bird Islands as permit conditions have already been amended pursuant to the IRPR process. In addition, the split-zone configuration of the interim closure around Dyer Island precluded us from assessing trade-offs for this colony due to a lack of fishery cost data.

1.4. In the case of Robben Island and Stony Point, interim closures protect only 43% and 30% of African Penguins' core foraging areas respectively. The interim closure in place around Dassen Island excludes a critical portion of this breeding colony's northern core foraging area. Therefore, these interim closures are highly unlikely to mitigate resource competition between African Penguins and purse-seine fisheries.

[1] Punt, A.E., Furness, R.W., Parma, A.M., Plagányi-Lloyd, E., Sanchirico, J.N., Trathan, P.N. (2023) Report of the international review panel regarding fishing closures adjacent to South Africa's African Penguin breeding colonies and declines in the penguin population. Department of Forestry, Fisheries and the Environment (DFFE). ISBN: 978-0-621-51331-8.

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1.5. By contrast, results of the trade-off analyses recommended by the IRPR and illustrated below show that implementing closures around core African Penguin foraging areas (i.e. using the mIBA-ARS approach)[2] will incur very little, and in some instances negligible, costs to the fishing industry.

1.6. Closures need to incorporate more representative portions of the African Penguins' core foraging areas to be biologically meaningful. This document makes proposals to this effect and illustrates that, in most instances, following the IRPR's recommended methodology results in closing more representative African Penguin foraging areas with little cost to the fishing industry.

2. Introduction and Background

2.1. On 4 August 2023, the Minister of Forestry, Fisheries and the Environment (**Minister**) announced the publication of the *Report of the international review panel regarding [purse-seine] fishing closures adjacent to South Africa's African Penguin breeding colonies and declines in the penguin population* (**IRPR**).[3] In the same announcement, she stated that "*If there is agreement on fishing limitations over the next few weeks or months across these sectors, these will be implemented as they are agreed upon. If no alternate fishing limitation proposals are concluded by the start of the 2024 Small Pelagic Fishing Season (January 15th 2024) the current interim fishing limitations will continue until the end of the 2033 Fishing Season, with a review in 2030 after six years of implementation from the start of the 2024 fishing season*".[4]

2.2. The interim closures were originally implemented in September 2022 around six African Penguin colonies as a temporary measure pending the conclusion and release of the IRPR.[5] The scientific basis for defining these areas has not been published or otherwise communicated by the Minister or the Department of Forestry, Fisheries and the Environment (**DFFE**).

2.3. The IRPR provided recommendations for a trade-off mechanism to help identify closure extents that would maximise benefits to African Penguins while minimising costs to the purse-seine fishing industry.

2.4. In this document, we provide the results of an assessment of different proposals, using the trade-off methodology that was recommended by the IRPR. We apply this trade-off methodology to three colonies (Dassen Island, Robben Island and Stony Point) which comprise three of the remaining six large African Penguin breeding colonies in South Africa that were assessed in the IRPR. St Croix Island and Bird Island colonies have amended permits in place with effect from 1 September 2023 pursuant to the IRPR process. They have therefore not been included in the trade-off assessments. The split-zone configuration[6] currently in place as the interim closure around Dyer Island requires updated fisheries cost data. Dyer Island has, thus, also been omitted from the trade-off analysis.

2.5. We compare the potential for alleviating resource competition between African Penguins and purse-seine fishing between: (a) penguin foraging ranges (see further 4.1.6 below); (b) core penguin foraging areas using the mIBA-ARS methodology (see further 4.1.7 below); (c) the 20 km

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[2] *Ibid.*

[3] DFFE (4 August 2023) Media Statement: Science Based Measures are now being implemented to protect the critically endangered African Penguins, says Minister of Forestry, Fisheries and Environment, Ms Barbara Creecy, available online < https://www.dffe.gov.za/node/2001> (last accessed 5 October 2023).

[4] *Ibid.*

[5] DFFE (2022) Media Statement: Interim Fishing Closures and Limitations around Key Penguin Colonies, available online <https://www.dffe.gov.za/Interim-fishing-closures-and-limitations-around-key-penguin-colonies> (last accessed 5 October 2023).

[6] i.e two zones, one that restricts all purse-seine fishing and one that restricts fishing to vessels ≥ 26m in length.

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closures implemented during the Island Closure Experiment; and (d) the interim closures that are currently in place.

2.6. For each colony we provide maps of the different closure extents in relation to African Penguin foraging tracks (from GPS devices attached on chick-rearing African Penguins) and the foraging range (UD90, i.e. see 4.1.6 below); calculate the proportion of the core African Penguin foraging areas (i.e. the mIBA-ARS) within the current interim closure extents; and provide trade-off curves which show the area of each closure versus the estimated cost to industry, following methods recommended by the IRPR.

2.7. The decline by approximately 40% of the South African African Penguin population over the past six years (2018 to 2023)[7] highlights the urgency of implementing effective conservation measures which maximise benefits to the African Penguin.

3. Key findings of the International Review Panel Report (IRPR)

The following key findings of the IRPR are relevant to the selection of optimal closure designs:

3.1. Decisions on closure designs should be colony-specific given the differences in African Penguin foraging areas and costs to fisheries around each colony.[8]

3.2. The Opportunity-based Model (**OBM**) and Social Accounting Matrix (**SAM**) used by consultants commissioned by the South African Pelagic Fishing Industrial Association to estimate the costs to the fishing industry of different closure delineations, likely overestimate the actual costs but can be used in a relative sense to rank different closure options.[9]

3.3. Conservation actions should be spread throughout the range of the species.[10]

3.4. Closures should be in place throughout the year and should be implemented for a period that can adequately assess the impacts of fisheries restrictions on survival and recruitment.[11]

3.5. Closures that reflect valuable African Penguin foraging areas will have greater benefits than those that close less valuable foraging areas.[12]

3.6. Closures based on the mIBA-ARS methodology represent the best scientific basis for delineating preferred foraging areas during breeding.[13]

3.7. Closure areas should be selected based on the suitability of these delineations to evaluate the effectiveness of alleviating resource competition on African Penguins.[14]

3.8. It is desirable to identify a solution that minimizes societal costs and maximizes benefits to African Penguins; however, an optimal solution between competing objectives is not simply obtained by closing 50 percent of any given area.[15]

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[7] We note that the monitoring and evaluation review period for the closures to be put in place is six years. It is striking that within the last six-year period, population decline has been dramatic.
[8] IRPR, Sec. 4.4., pg. 36.
[9] IRPR, Sec. 3.3, pg. 31; Sec. 4.4., pg. 36.
[10] IRPR, Sec. 4.4. pg. 36.
[11] IRPR. Sec. 4.1. pg. 33.
[12] IRPR, Sec. 4.4., pg. 36.
[13] IRPR, Sec. 4.3., pg. 34.
[14] IRPR, Sec. 4.1., pg. 33.
[15] IRPR, Sec. 4.4., pg. 36.

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4. Applying the trade-off mechanism recommended by the IRPR to African Penguin colonies and assessing the suitability of current interim closures in light of the IRPR's findings

4.1. Methods

4.1.1. The IRPR outlines a trade-off mechanism, i.e. using a trade-off curve, to select closures that minimise societal costs and maximise benefits to African Penguins. The point at which the change in African Penguin benefits matches the change in costs to society (based on the OBM model) is recommended as a potential reference point to guide the selection of optimal closures.

4.1.2. The IRPR provides examples of these trade-off curves for six of the largest penguin colonies.[16] These include various closure options proposed since 2021 and their corresponding estimated costs to fisheries for each small pelagic fish stock relevant to each specific colony.

4.1.3. As referenced above, the IRPR notes that the OBM and SAM (which were used to estimate the above-mentioned costs) likely overestimate costs to fishery, by an unknown magnitude.

4.1.4. The interim closures implemented by DFFE in 2022 include a mix of closures proposed by DFFE during 2021[17] and those selected by the Consultative Advisory Forum for Marine Living Resources (**CAF**) in 2022.[18]

4.1.5. In the following analysis, we have adopted the trade-off mechanism, recommended in the IRPR, i.e. measuring benefits to African Penguins versus relative costs to fisheries.

4.1.6. For each colony, we have compared the relative costs to fisheries against: (a) African Penguins' full foraging range without outliers (i.e. UD90);[19] (b) African Penguins' core foraging area (i.e. mIBA-ARS, see further below); (c) the interim closures; and (d) 20km closures used during the ICE.[20]

4.1.7. Core African Penguin foraging areas were estimated using methods to determine marine Important Bird Areas (**mIBA**)[21] using the Area Restricted Search (**ARS**) methodology to align the delineations of closures to the foraging behaviour of the penguins.[22] The mIBA-ARS

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[16] IRPR, Sec. 4.4., pg. 37.

[17] Coetzee, J.C., Makhado, A., van der Lingen, C.D., Ebrahim, Z., Kock, A., Lawrence, C., and Shabangu, F.W. (2021) African Penguin colony closures: Finding a balance between minimizing costs to the small pelagic fishing industry while maximizing coverage of foraging area for breeding African Penguins. DFFE Document O&C/2021/SEP/Extended Penguin TT/01.

[18] Consultative Advisory Forum (CAF) (2022) Special Project Report on Penguin and Small Pelagic Fishery Interactions by the Consultative Advisory Forum for Marine Living Resources.

[19] UD90 refers to mIBA using a 90% kernel utilisation distribution (see McInnes, A.M., Weideman, E., Waller, L., Sherley, R., Pichegru, L., Ludynia, K., Hagen, C., Barham, P., Smith, C., Kock, A., and Carpenter-Kling, T. (2023) Purse-seine fisheries closure configurations for African Penguin conservation: methods and considerations for optimal closure designs. Document FP/PANEL/WP/09 presented to the Panel in June 2023).

[20] Punt et al. *supra*.

[21] Lascelles, B. G., Taylor, P. R., Miller, M. G. R., Dias, M. P., Oppel, S., Torres, L., Hedd, A., Le Corre, M., Phillips, R. A., Shaffer, S. A., Weimerskirch, H., & Small, C. (2016) Applying global criteria to tracking data to define important areas for marine conservation. Diversity and Distributions, 22(4), 422–431. https://doi.org/10.1111/ddi.12411; Dias, M. P., Carneiro, A. P. B., Warwick-Evans, V., Harris, C., Lorenz, K., Lascelles, B., Clewlow, H. L., Dunn, M. J., Hinke, J. T., Kim, J. H., Kokubun, N., Manco, F., Ratcliffe, N., Santos, M., Takahashi, A., Trivelpiece, W., & Trathan, P. N. (2018) Identification of marine Important Bird and Biodiversity Areas for penguins around the South Shetland Islands and South Orkney Islands. Ecology and Evolution, 8(21), 10520–10529.

[22] Lascelles et al. *supra*; McInnes et al. *supra*

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method was recommended by the IRPR as the preferred methodology for delineating important African Penguin foraging areas (see 3.6 above).

4.1.8. We have used the median cost from the OBM model (i.e. where each set could be reused five times – refer to section 3 of the IRPR for details) to assess the relative impact of different closure options for each colony and catch-type (see 4.1.9 below).[23]

4.1.9. For each colony we provide trade-off curves for four types of catch: (a) directed anchovy; (b) directed sardine; (c) sardine bycatch; and (d) redeye. Sardine and anchovy are the principal prey of African Penguins, although redeye is also targeted to a lesser degree.[24]

4.1.10. Identification of the point at which the change in African Penguin benefits matches the change in costs to society could not be assessed quantitatively due to a lack of corresponding fisheries cost data which could facilitate fitting a curve to different closure options related to penguin tracking data.

4.1.11. We note that in respect of Dyer Island, the lack of fishery cost data for the split-zone scenario for the interim closure around this colony prevents us from assessing trade-offs at this stage. In respect of St Croix and Bird islands, fishing permits have been amended (pursuant to the IRPR process).[25] Therefore, these fishing closures are reflected below without additional analysis for the sake of completeness.

4.2. Colony assessments

4.2.1. **Dassen Island**

a) The existing interim closure around Dassen Island (shown as the red line in Figure 1A) omits a significant area in the northern portion of the African Penguins' core foraging area i.e. the mIBA-ARS (shown as the dark green line).

b) This northern area is critical to African Penguins from this colony. First, it forms part of their core foraging area proximate to the Dassen Island breeding grounds. Second, small-pelagic fishing within this northern portion of the mIBA-ARS is likely to have downstream effects on prey availability for African Penguins in the remainder of their core foraging area due to the southward movement of anchovy recruits between May and August which also corresponds to the core breeding season for penguins from this colony.

c) The interim closure is therefore assessed as not being adequately representative of important African Penguin foraging area for this colony, as per the recommendation of the IRPR.

d) By contrast, the relative regional cost to fisheries for anchovy, sardine and redeye is low for both the mIBA-ARS and the interim closure options (see Figure 1B below).

---

[23] The IRPR states that the OBM overestimates costs to the industry by an unknown amount, and that the results of the OBM should be used to compare different closure options in a relative sense. We have used the middle ground point estimate as reflected in the IRPR (see IRPR, Figs 4.4 & 4.5, pg. 37).

[24] Crawford, R. J. M., Altwegg, R., Barham, B. J., Barham, P. J., Durant, J. M., Dyer, B. M., Geldenhuys, D., Makhado, A. B., Pichegru, L., Ryan, P. G., Underhill, L. G., Upfold, L., Visagie, J., Waller, L. J., & Whittington, P. A. (2011) Collapse of South Africa's penguins in the early 21st century. African Journal of Marine Science, 33(1), 139–156. https://doi.org/10.2989/1814232X.2011.572377.

[25] Permit Conditions: Pelagic Fish Anchovy and Sardine Fisheries: 2023. Fishing Season 2023. Date of Approval: 31 August 2023. Issued in terms of section 13 of thee Marine Living Resources Act, 1998 (Act No. 18 of 1998) by the Department of Forestry, Fisheries and the Environment.

AOM
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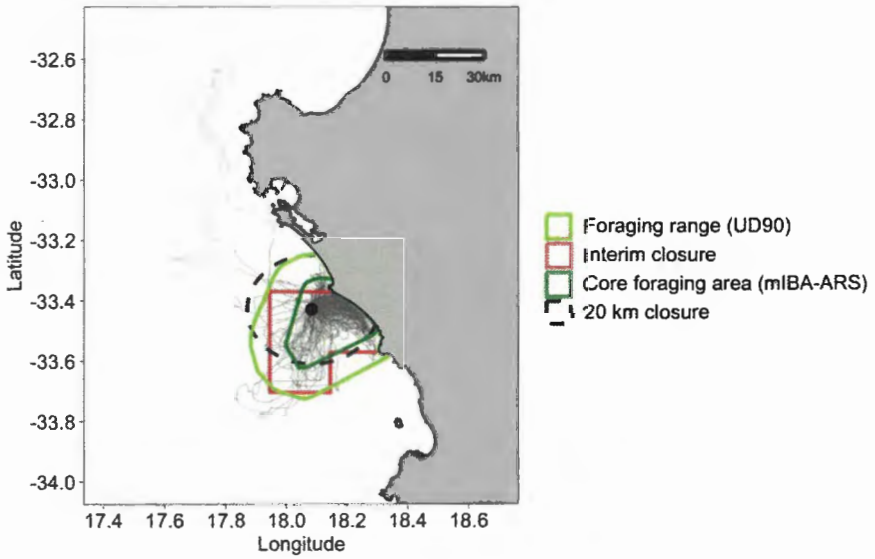
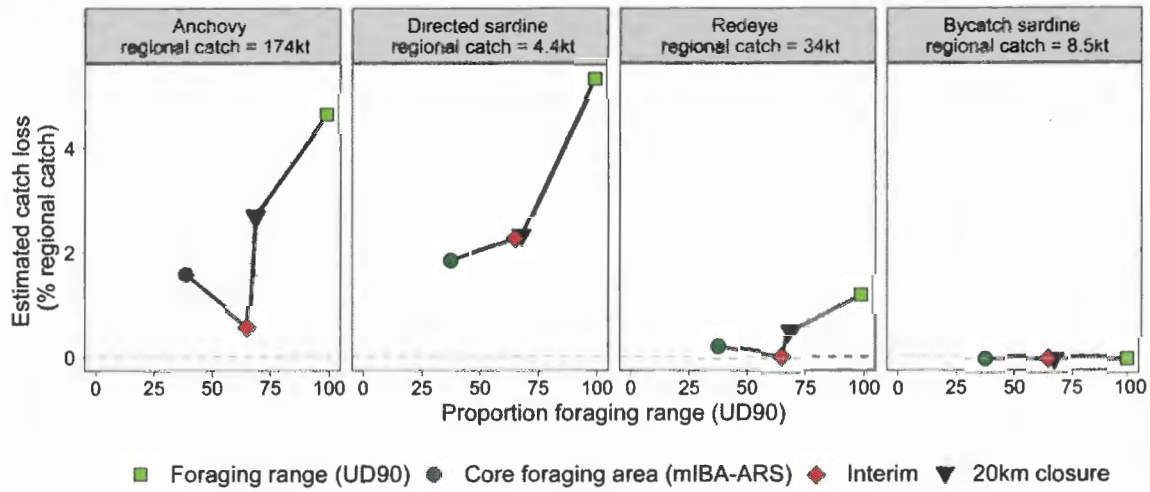
e) As a consequence, and following the IRPR recommendations set out in paragraphs 3.5-3.8 above, it is recommended that the mIBA-ARS closure option be used.

Figure 1A



Map showing closure options around Dassen Island in relation to African Penguin foraging tracks (thin grey lines).

Figure 1B



Trade-off curve for Dassen Island showing the proportion of penguin foraging range covered by each closure option and the associated catch loss for four different stocks as estimated by the OBM using data for 2011-2020. Catch loss is shown as a percentage of the regional catch (west of Cape Point). Note that the IRPR states that the OBM overestimates the catch loss and can thus only be used to rank closure options in a relative sense.

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4.2.2. **Robben Island**

a) The existing interim closure surrounding Robben Island (shown as the red line in Figure 2A) is the existing portion of the fully restricted Marine Protected Area which already excludes fishing for sardine, anchovy and red-eye.[26]

b) The interim closure includes only 43% of the penguins' core foraging area (mIBA-ARS, shown as the dark green line in Figure 2A).

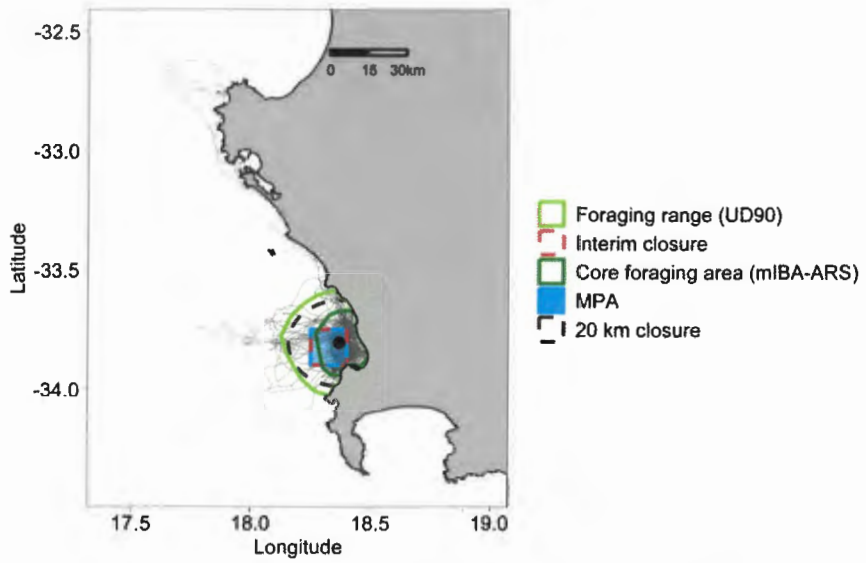
c) The interim closure is therefore assessed as not being adequately representative of important penguin foraging area for this colony, as per the recommendation of the IRPR.

d) By contrast, the relative regional cost for anchovy, sardine and redeye is low for both the mIBA-ARS closure option and the 20 km closure option (shown as the hatched black line in Figure 2A). The comparison of the relative costs is shown in Figure 2B below.

e) The 20 km closure option includes 100% of the mIBA-ARS closure but also includes a greater proportion (83%) of the African Penguins' foraging range which is shown as the light green line around this colony in Figure 2A. See the comparative areas set out in Figure 2B below.

f) Although the 20 km closure option affords African Penguins greater foraging area benefits, it incurs a slightly greater cost to fisheries. As a consequence, and following the IRPR recommendations set out in paragraphs 3.5-3.8 above, it is recommended that the mIBA-ARS closure option be used.

Figure 2A



Map showing closure options around Robben Island in relation to African Penguin foraging tracks (thin grey lines).

[26] See National Environmental Management: Protected Areas Act (57/2003): Notice declaring the Robben Island Marine Protected Area in terms of section 22A of the Act (GN774 in GG42478 of 23 May 2019).

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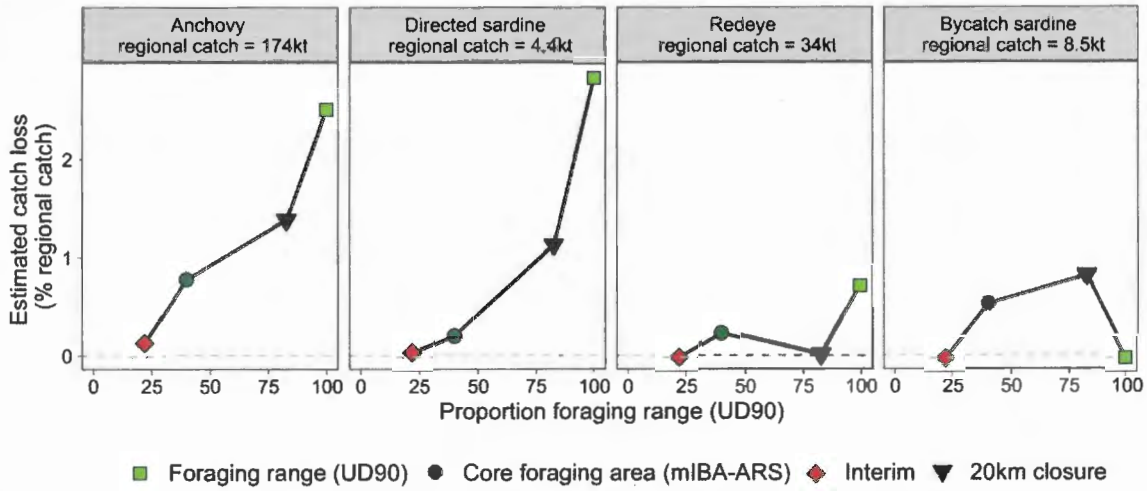
Figure 2B



Trade-off curve for Robben Island showing the proportion of penguin foraging range covered by each closure option and the associated catch loss for four different stocks as estimated by the OBM using data for 2011-2020. Catch loss is shown as a percentage of the regional catch (west of Cape Point). Note that the IRPR states that the OBM overestimates the catch loss and can thus only be used to rank closure options in a relative sense.

4.2.3. **Stony Point**

a) The interim closure around Stony Point (shown as the red line in Figure 3A) includes only 30% of the African Penguins' core foraging area (mIBA-ARS, shown as the dark green line in Figure 3A). The interim closure therefore does not provide adequate protection of important penguin foraging area for this colony. In addition, it does not accord with the IRPR recommendations reflected in paragraph 3.8 above.

b) By contrast, the relative regional cost for anchovy, sardine and redeye is negligible to low for both the interim and mIBA-ARS closure options as illustrated in Figure 3B below.

c) As a consequence, and following the IRPR recommendations set out in paragraphs 3.5-3.8 above, it is recommended that the mIBA-ARS closure option be used. This approach, based on best-available science, would support the objective of population recovery at this colony which is well-situated for enhanced conservation measures as well as providing economic benefits through tourism.[27]

[27] IRPR, Sec. 4.5, pg. 38.

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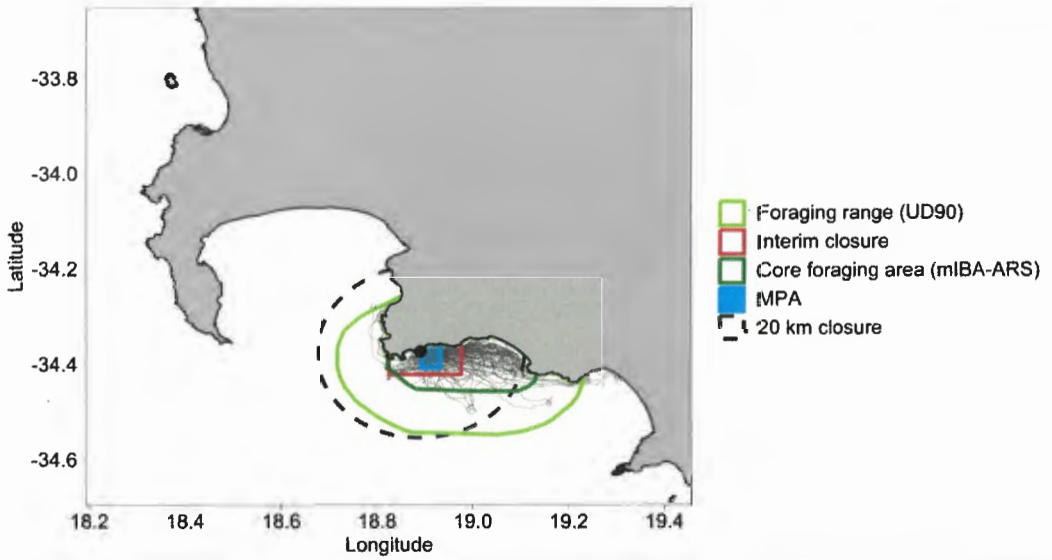
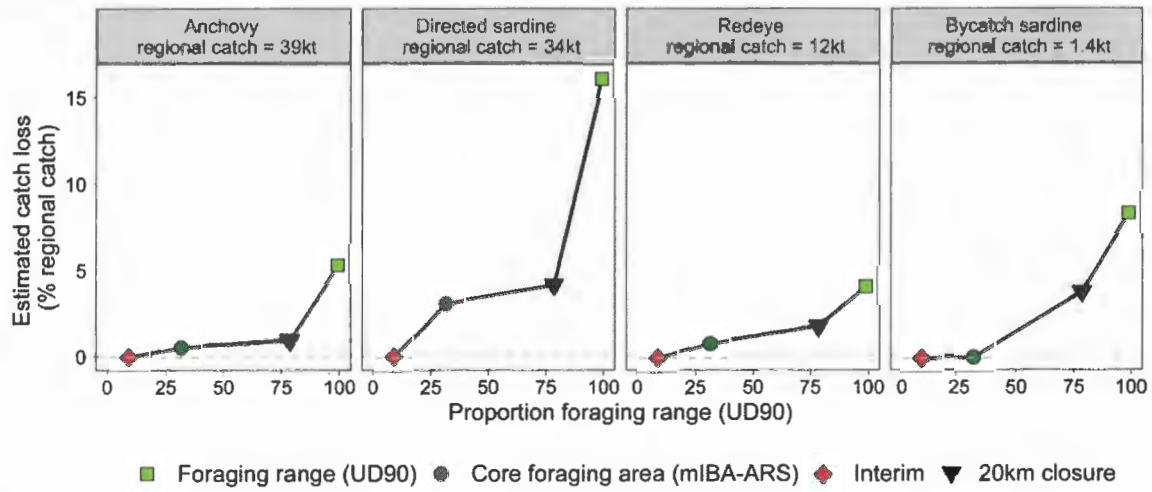
Figure 3A



Map showing closure options around Stony Point in relation to African Penguin foraging tracks (thin grey lines).

Figure 3B



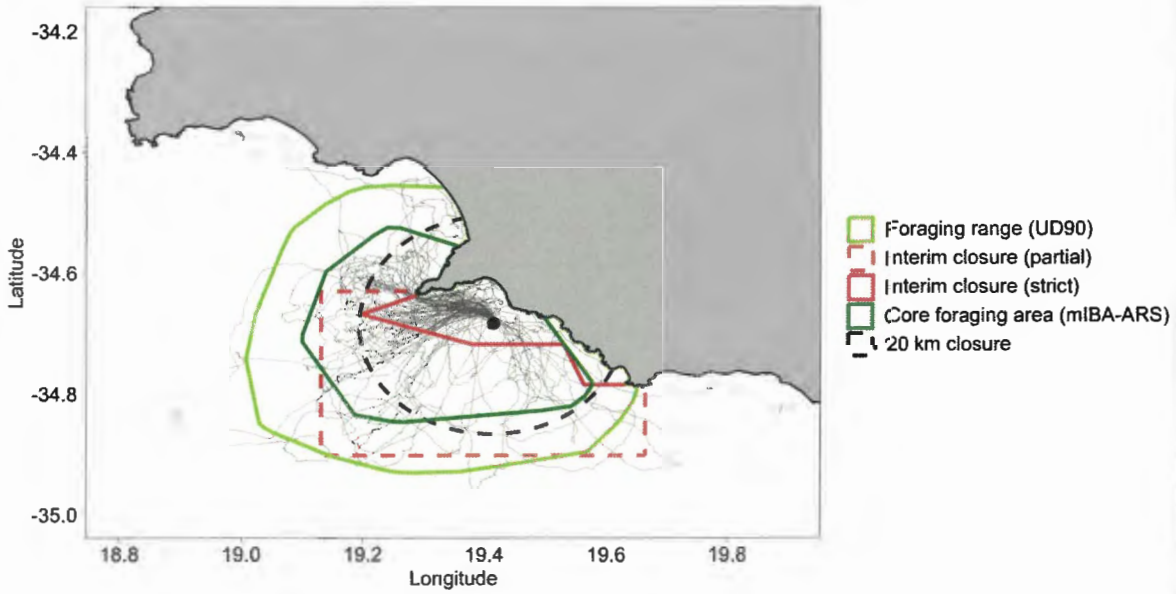
Trade-off curve for Stony Point showing the area of each closure option and the associated catch loss for four different stocks as estimated by the OBM using data for 2011-2020. Catch loss is shown as a percentage of the regional catch (Cape Point to Agulhas). Note that the IRPR states that the OBM overestimates the catch loss and can thus only be used to rank closure options in a relative sense.

4.2.4. **Dyer Island**

a) The existing interim closure around Dyer Island includes two zones: (i) an inshore zone which is completely restricted to all purse-seine fishing (shown as the solid red line in Figure 4); and (ii) an offshore zone that only excludes purse-seine vessels ≥ 26m in length (shown as the hatched red line in Figure 4).

b) The costs to fisheries have not been estimated for the split-zone interim closure scenario for this colony. It is therefore recommended that the relative costs to industry be calculated on the basis of this scenario before assessing the relative trade-offs.

Figure 4



Map showing closure options around Dyer Island in relation to African Penguin foraging tracks (thin grey lines). The dashed red line indicates the partial interim closure that is open to vessels <26m, while the area inside the solid red line is closed to all vessels.

4.2.5. **St Croix Island**

a) The conditions of the small pelagic fishing permits for this colony have been amended by the DFFE with effect from 1 September 2023.

b) The amended closure extent is depicted as the orange line in Figure 5.

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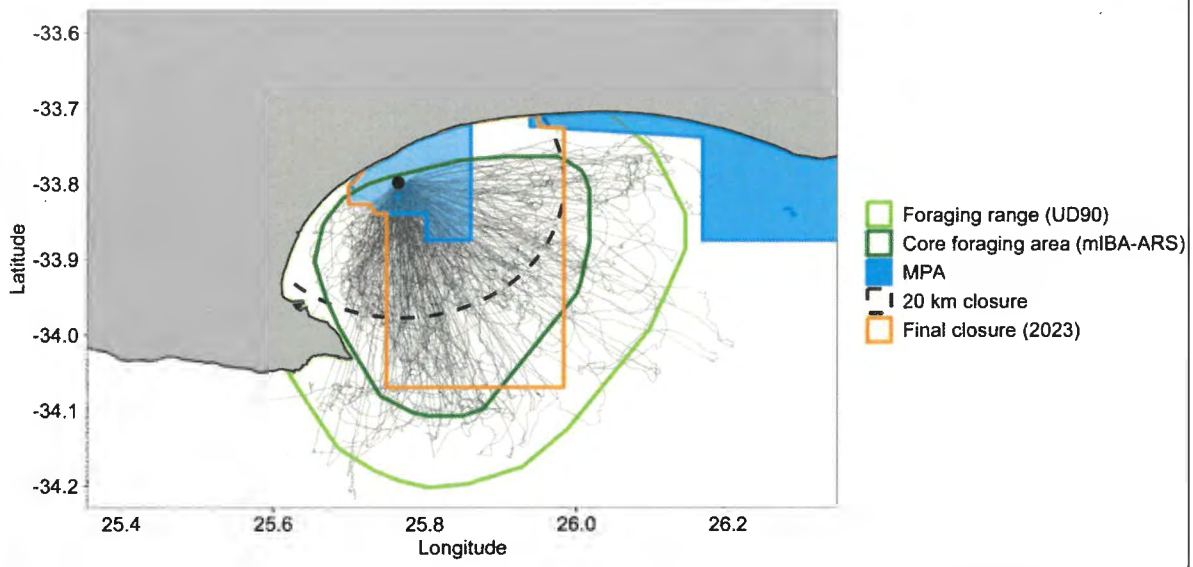
Figure 5



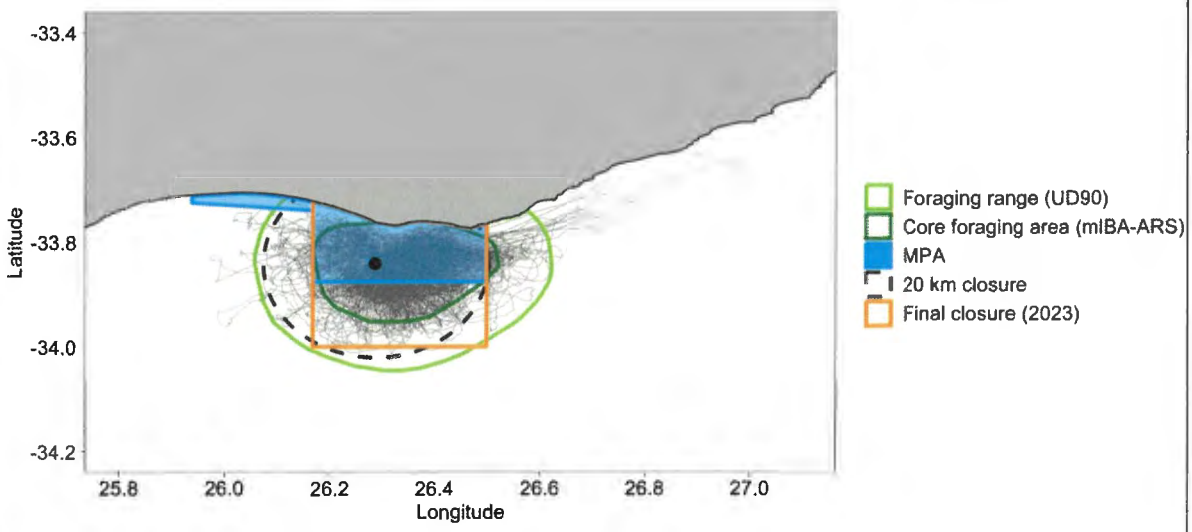
Map showing the closure (orange line) around St Croix Island (as reflected in the permits) in relation to African Penguin foraging tracks (thin grey lines).

4.2.6. **Bird Island**

a) The conditions of the small pelagic fishing permits for this colony have been amended by the DFFE with effect from 1 September 2023.

b) The amended closure extent is depicted as the orange line in Figure 6.

Figure 6



Map showing the closure (orange line) around Bird Island (as reflected in the permits) in relation to African Penguin foraging tracks (thin grey lines.

5. Conclusion

5.1. The interim closures currently in place have little to no benefit for African Penguins in terms of reducing current resource pressure. By contrast, the interim closures incur low to negligible costs to the fishing industry at the expense of protecting African Penguin populations. This is contrary

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to the recommendations of the IRPR and an inappropriate trade-off to maximise benefits to penguins while minimising societal costs.

5.2. It is clear that interim closures do not follow IRPR recommendations, given that they have been shown in this report to be inadequate in their capacity to mitigate resource competition to African Penguin survival and recruitment. As a consequence, the proposed six-year review (which is intended to enable assessment of the efficacy of biologically meaningful closures) will not achieve its objective. Further, this approach would be contrary to the best-available scientific methodology and data currently available and as identified by the IRPR.

5.3. We propose a scenario for each of the three colonies assessed here that would be suitable to evaluate the benefits of closures to mitigate resource competition to African Penguins within the next six to ten years.

AM

"AM64"

Subject: RE: Planning for tehe meeting on teh 24th

From: Alistair McInnes
Sent: Monday, October 30, 2023 1:09 PM
To: Ashley Naidoo <ANaidoo@dffe.gov.za>
Cc: Lauren Waller <laurenw@ewt.org.za>; Pichegru, Lorien (Dr) (Summerstrand Campus South) <lorien.pichegru@mandela.ac.za>; Smith, Craig <csmith@wwf.org.za>; Katta Ludynia <katta@sanccob.co.za>
Subject: RE: Planning for tehe meeting on teh 24th

Dear Ashley

Further to the meeting hosted by the DFFE on 24 October, we thought it would be helpful to summarise the next steps suggested by yourself and Alison Kock to give effect to the announcement by the Minister made on 4 August 2023. These steps are rooted in the Minister stating that interim closures would continue while "*both the fishing industry and the conservation sector study the Panel's Report*" and that "*If there is agreement on fishing limitations over the next few weeks or months across these sectors, these will be implemented as they are agreed upon*". While we are happy to support the DFFE in respect of the steps below, we note that there are no formal guidelines governing this process. We are therefore of the view that it is essential that the DFFE provide the necessary direction and guidance in light of the purpose of the Minister convening the International Panel.

The steps are as follows:

1) The Governance Forum will be reconstituted to consider the merits of the analyses of the Panel's Report by the "conservation sector" (already provided to you) and the "fishing industry". As we understand it, Alison's suggestion allows for an existing forum to consider the merits of both analyses and to then provide an updated memorandum to the Minister which applies the recommended methodology from the Panel Report. This would build on the study of the Panel Report by ourselves and fisheries which the Minister contemplated.
2) To facilitate this process, you will circulate our Assessment to Fisheries and invite them to submit their own assessment of the Panel Report to the DFFE;
3) If helpful to DFFE, a presentation of both assessments would be arranged (along the lines of the presentation we gave on 24 October) to ensure the Governance Forum is fully appraised of both assessments.
4) The Governance Forum will then consider both assessments and draft a memorandum of their recommendations to the Minister.

We appreciate your arranging last week's meeting and will await your further engagements regarding implementation of the Panel's recommendations.

Regards

Alistair

From: Ashley Naidoo <ANaidoo@dffe.gov.za>
Sent: Tuesday, October 17, 2023 9:07 AM
To: Lauren Waller <laurenw@ewt.org.za>; Pichegru, Lorien (Dr) (Summerstrand Campus South) <lorien.pichegru@mandela.ac.za>; Alistair McInnes <alistair.mcinnes@birdlife.org.za>; Smith, Craig <csmith@wwf.org.za>; Riedau <redah@rialfishing.co.za>
Cc: Gerhard Cilliers <GCilliers@dffe.gov.za>; Gcobani Popose <GPopose@dffe.gov.za>
Subject: Planning for tehe meeting on teh 24th

AM MK

Dear Lauren, Lorien, Alistair, Craig and Riedau (Gcobani and Gerhard copied)

Riedau before continuing, I should explain what this planned meeting is. After some emails from the conservation representatives querying the interpretation and implementation of the Panel Report, I offered an exploratory discussion so that all of us are on the same page. From my side you are certainly welcome to join this planned session on the 24th. (Suggested timing from 1000 to 1300?)

Then for the Conservation reps in particular my offer for agenda items are below. Please can I ask you to edit/add to these by Friday morning when I will finalise the agenda and send out the invite.

1. The Operations of roles of DFFE
    a. DFFE (AN)
2. Interpretation of the Report – key points
    a. Conservation Reps (combined or individually)
    b. DFFE
3. Implementation of the Minister's Decision
    a. Representation – Decision maker
4. Other
    a. Engaging the DFFE and expectations

Thank you
Ashley

Ashley Naidoo. Ph.D. | Chief Director: Ocean & Coasts Research (he/him)
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https://www.dffe.gov.za/documents/research/oceansandcoasts
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+2782 784 7131

From: Lauren Waller <LaurenW@ewt.org.za>
Date: Thursday, 12 October 2023 at 09:20
To: Ashley Naidoo <ANaidoo@dffe.gov.za>, lorien.pichegru@mandela.ac.za <lorien.pichegru@mandela.ac.za>, Alistair McInnes <alistair.mcinnes@birdlife.org.za>, csmith <csmith@wwf.org.za>, Riedau <redah@rialfishing.co.za>
Cc: Gerhard Cilliers <GCilliers@dffe.gov.za>, Gcobani Popose <GPopose@dffe.gov.za>
Subject: RE: EC closures

HI Ashley

Many thanks for your email.

Just to note that I now have a commitment on 24th October from 10:00 – 11:00 that I cannot shift, so if we could meet before or after that I'd greatly appreciate it.

Key on the Agenda would be for the Department to provide the rationale and process followed for the decision made on interim closures unless the stakeholders can come to an alternative agreement. This in the context of the recommendations of the panel report that the department had available to inform its decision making and our uncertainty as to why another process is needed.

With grateful thanks
Lauren

From: Ashley Naidoo <ANaidoo@dffe.gov.za>
Sent: Wednesday, October 11, 2023 9:47 AM
To: lorien.pichegru@mandela.ac.za; Alistair McInnes <alistair.mcinnes@birdlife.org.za>; csmith <csmith@wwf.org.za>; Lauren Waller <LaurenW@ewt.org.za>; Riedau <redah@rialfishing.co.za>
Cc: Gerhard Cilliers <GCilliers@dffe.gov.za>; Gcobani Popose <GPopose@dffe.gov.za>
Subject: Re: EC closures

Dear Riedau, Alistair, Craig, Lauren and Lorien (Gerhard and Gcobani copied)

Over the last week while I was away I received emails from some of you. Now that I am back, I want to acknowledge and appreciate those emails. Please give a me a few days to plan our engagements over the next weeks. I am hoping that these engagements will answer/clarify the issues that some of you raised in your recent emails.

Thank you
Ashley N

MK A01

Subject: RE: Planning for tehe meeting on teh 24th

From: Ashley Naidoo <ANaidoo@dffe.gov.za>
Sent: Tuesday, October 31, 2023 8:52 AM
To: Alistair McInnes <alistair.mcinnes@birdlife.org.za>
Cc: Lauren Waller <laurenw@ewt.org.za>; Pichegru, Lorien (Dr) (Summerstrand Campus South) <lorien.pichegru@mandela.ac.za>; Smith, Craig <csmith@wwf.org.za>; Katta Ludynia <katta@sanccob.co.za>
Subject: Re: Planning for tehe meeting on teh 24th

Dear Alistair, Lauren, Lorien, Craig and Katta

Thank you for this. I am having the same meeting as last week, with the Fisheries Reps this afternoon. Thereafter I will get back to you with some next steps. I will also confirm whether my reading of the next steps are identical to your summary below. I must admit that I did not read into the Minister's decision that DFFE will try to find the common ground here. Optimistically, I was thinking that the sectors will be able to undertake their own discussions, much like what was attempted by the CEOs of WWF, Birdlife and SAPFIA last year, but with a more positive outcome.

Having said that I am happy facilitate or at least clarify the Branches role and actions. I think keeping the discussion going is important. It allows the policy actions to progress incrementally (albeit slowly) and also keeps the urgent need to act on the boil.

Thank you
Ashley

Ashley Naidoo. Ph.D. | Chief Director: Ocean & Coasts Research (he/him)
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From: Alistair McInnes <alistair.mcinnes@birdlife.org.za>
Date: Monday, 30 October 2023 at 13:08
To: Ashley Naidoo <ANaidoo@dffe.gov.za>
Cc: Lauren Waller <laurenw@ewt.org.za>, lorien.pichegru@mandela.ac.za <lorien.pichegru@mandela.ac.za>, csmith@wwf.org.za <csmith@wwf.org.za>, Katta Ludynia <katta@sanccob.co.za>
Subject: RE: Planning for tehe meeting on teh 24th

MK KO

Dear Ashley

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Cc: Gerhard Cilliers <GCilliers@dffe.gov.za>; Gcobani Popose <GPopose@dffe.gov.za>
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MK AO7

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4. Other
    a. Engaging the DFFE and expectations

Thank you
Ashley

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From: Lauren Waller <LaurenW@ewt.org.za>
Date: Thursday, 12 October 2023 at 09:20
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Cc: Gerhard Cilliers <GCilliers@dffe.gov.za>, Gcobani Popose <GPopose@dffe.gov.za>
Subject: RE: EC closures

HI Ashley

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With grateful thanks
Lauren

MC 801

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To: lorien.pichegru@mandela.ac.za; Alistair McInnes <alistair.mcinnes@birdlife.org.za>; csmith <csmith@wwf.org.za>; Lauren Waller <LaurenW@ewt.org.za>; Riedau <redah@rialfishing.co.za>
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Dear Riedau, Alistair, Craig, Lauren and Lorien (Gerhard and Gcobani copied)

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Thank you
Ashley N

MC 1007

"AM66"

From: Ashley Naidoo <ANaidoo@dffe.gov.za>
Sent: Wednesday, 08 November 2023 17:41
To: Alistair McInnes
Cc: Lauren Waller; Pichegru, Lorien (Dr) (Summerstrand Campus South); Smith, Craig; Katta Ludynia; Gerhard Cilliers; Gcobani Popose; Millicent Makoala
Subject: Re: Joint Meeting on Furtherng Discussions on Small Pelagic and Penguin Interactions

Hi Alistair and colleagues (also added some DFFE colleagues now)

On point three: our discussion at the last meeting was on setting up a joint forum to take on the work around the Panel's recommendations / the Science Plan emanating from the Panel report. I suggested that we could use an expanded version of the current Seabird Task Team, this will now reflect very much the previous Extended Task Team – to avoid separate discussions at the Small Pelagic Fisheries Working Group and the Top Predator Working Group – very happy to have further suggestions on this.

On the doubts in point 4: my interpretation is that a suggestion could be that a new recommendation be drafted to the Minister, this is what I am not sure about. It could be that from the next combined discussion there are some consensus (or disputed) points that could be raised with the Minister. The timing of this will need to be considered, these discussions will have to reach an end by the mid – December if there is to be implantation in Jan next year. (Janet and team are on a small pelagic assessment cruise and Newi and Team are about to head out this week on decommissioning of the old Marion Base and also the Prince Edward Island long-overdue summer survey – although there are few emergencies on these that may cause some delays.)

Then on postponing the meeting, I do see your point. In the meeting that I held last week with the Mike C, Riedau and Mike B - they did not think that a document will be ready by this Friday – hence I proposed they describe what they are doing/planning. I can check with Mike C tomorrow - if a document is being prepared and if there is timeline.

Alistair – which email have I not responded to – I may have missed one (or more) – apologies for this.

Thank you
Ashley

From: Alistair McInnes <alistair.mcinnes@birdlife.org.za>
Date: Wednesday, 08 November 2023 at 11:58
To: Ashley Naidoo <ANaidoo@dffe.gov.za>
Cc: Lauren Waller <laurenw@ewt.org.za>, lorien.pichegru@mandela.ac.za <lorien.pichegru@mandela.ac.za>, csmith@wwf.org.za <csmith@wwf.org.za>, Katta Ludynia <katta@sanccob.co.za>
Subject: RE: Joint Meeting on Furtherng Discussions on Small Pelagic and Penguin Interactions

Hi Ashley

We have considered your proposed meeting and think that given the intention by the fishing sector to produce their own assessment we feel that the proposed meeting on Friday will be premature until such time as the fishing sector have circulated their report (I presume you have circulated our report to them – please can you confirm if this is the case?). This will allow for a balanced engagement whereby both sectors can share their interpretation of the review. It would be helpful to set a deadline for the fishing sector to send out this report given that the year is closing in and permit conditions will need to be set by DFFE soon.

We are also confused about point 3 – please can you elaborate on what you mean by the Seabird Task Team? Further could you please clarify the doubts expressed in point 4 – we note that you have not yet responded to our previous email.

Regards

Alistair

From: Ashley Naidoo <ANaidoo@dffe.gov.za>
Sent: Monday, November 6, 2023 4:05 PM
To: Alistair McInnes <alistair.mcinnes@birdlife.org.za>
Cc: Lauren Waller <laurenw@ewt.org.za>; Pichegru, Lorien (Dr) (Summerstrand Campus South) <lorien.pichegru@mandela.ac.za>; Smith, Craig <csmith@wwf.org.za>; Katta Ludynia <katta@sanccob.co.za>
Subject: Re: Joint Meeting on Furtherng Discussions on Small Pelagic and Penguin Interactions

Hi Alistair and colleagues

Tentative agenda items for your comment/review:

1. Overview of the document prepared by Conservation Sector
2. Comments on the Panel Report and outlined of planned work (and timing) on interpreting/using the trade-off mechanism suggested – Fisheries Sector (Fisheries sector will not have a document ready by Friday but have been undertaking and planning some work)
3. Working arrangements – combined Seabird task Team and Membership
4. Steps from her to the of the year (i.e. Alison's suggestion does the DFFE task team prepare summary / recommendation (not sure if this is possible) to the Minister on the current submissions by the Conservation and Fisheries Sector. Presumably this will by to be done by end November.

Thank you
Ashley

AM

From: Alistair McInnes <alistair.mcinnes@birdlife.org.za>
Date: Monday, 06 November 2023 at 14:11
To: Ashley Naidoo <ANaidoo@dffe.gov.za>
Cc: Lauren Waller <laurenw@ewt.org.za>, lorien.pichegru@mandela.ac.za <lorien.pichegru@mandela.ac.za>, csmith@wwf.org.za <csmith@wwf.org.za>, Katta Ludynia <katta@sanccob.co.za>
Subject: RE: Joint Meeting on Furtherng Discussions on Small Pelagic and Penguin Interactions

Hi Ashley

Please can you clarify:

- If the process will follow our interpretation of the next steps as discussed in our previous email we sent you following the 24 November meeting
- What DFFE's role will be in this process

It is not clear from the below email/meeting invite what the actual process is and we would appreciate it if you could clarify this. Please can you also provide an agenda for this meeting.

Many thanks and regards

Alistair

-----Original Appointment-----
From: Ashley Naidoo <ANaidoo@dffe.gov.za>
Sent: Friday, November 3, 2023 8:25 AM
To: Lauren Waller; Pichegru, Lorien (Dr) (Summerstrand Campus South); Alistair McInnes; Smith, Craig; Katta Ludynia; Dr Mike Bergh; copeland.fishconsult; Matt Horton; Riedau; Alison Kock; Zishan Ebrahim; Cloverley Lawrence; Gerhard Cilliers; Gcobani Popose; Zimasa Jika; Carl David Van Der Lingen; Fannie Welcome Shabangu; Janet Claire Coetzee; Makhudu J. Masotla; Azwianewi Makhado
Subject: Joint Meeting on Furtherng Discussions on Small Pelagic and Penguin Interactions
When: Friday, 10 November 2023 09:30-11:30 (UTC+02:00) Harare, Pretoria.
Where: MS TEAMS

Dear Colleagues

This is a first attempt at setting a date for the planned joint meeting where each sector will provide some thoughts on the Panel Report and possibly offer some recommendations on future work and policy considerations.

The DFFE will provide options for discussions on working arrangements for implementation of the Panel recommendations.

Please reply to this invitation for next Friday morning so that I can determine if we have sufficient participation to continue. (Riedau, I do recall that Fridays are not as convenient for you and hence if you cannot have representation I can have a bilateral with you.)

MK AM

Thank you
Ashley

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MC AM


15:01
Redah Purse Seine
08 November 2023
Hello Lorien, I tried calling but you were obviously busy and could not respond but we now need to discuss that mistake tah took place with the St Croix closure as a matter of urgency.
Please revert to me at your earliest convenience.
Riedau.
17:51
I am sorry i am on Malgas island at the moment working on Cape gannets
18:21
I am not sure why you think it is a mistake? We accepted the map that you sent
18 24
Oki Doke 18:24
You
I am not sure why you think it is a mistake? We accepted the map that you sent
Read my email than you will understand please.
18:25
I think we can with all honesty resolve this amicably in the fashoin that we went into our discussion about the settlement.
Message
I think we can with all honesty resolve this amicably in the fashoin that we went into our discussion about the settlement.
18:26
Ok i will check my email 18 27
Message

MC AD1

From: Ashley Naidoo <ANaidoo@dffe.gov.za>
Sent: Thursday, 09 November 2023 10:13
To: Riedau; Alistair McInnes; mike.copeland@fishconsult.co.za
Cc: Deon Van Zyl; 'Tasneem Wesley'; Pichegru, Lorien (Dr) (Summerstrand Campus South); Gcobani Popose; Gerhard Cilliers; Dr Mike Bergh
Subject: Planning for the combined meeting and the mIBA 90 shapefiles

Dear Colleagues (now including Mike B, as Mike C does not seem to getting these emails.)

I have just had a chat to Mike C. He confirmed that the Fisheries Reps are collating a document that he can distribute within a day.

Based on this I suggest that the we postpone tomorrow's meeting to next week. This will allow some time for reading of the document. I am available on Thursday or Friday morning.

Noting Riedau's Friday commitment, I will reschedule tomorrow's meeting for Thursday morning 0930 to 1130.

I also suggest then that we add Riedau's item on "correcting" the agreed map.
Riedau, I appreciate your urgency, and I will make some enquiries, in preparation for next week, offline with you and others involved.

Thank you to all of you for your patience and contributions thus far.
Ashley

From: Ashley Naidoo <ANaidoo@dffe.gov.za>
Date: Thursday, 09 November 2023 at 08:01
To: Riedau <redah@rialfishing.co.za>, Alistair McInnes <alistair.mcinnes@birdlife.org.za>, mike.copeland@fishconsult.co.za <mike.copeland@fishconsult.co.za>
Cc: Deon Van Zyl <Deon@afrofishing.co.za>, 'Tasneem Wesley' <twesley@rialfishing.co.za>, lorien.pichegru@mandela.ac.za <lorien.pichegru@mandela.ac.za>, Gcobani Popose <GPopose@dffe.gov.za>, Gerhard Cilliers <GCilliers@dffe.gov.za>
Subject: Re: mIBA 90 shapefiles

Dear Riedau, Alistair, Mike, Tasneem, Deon and Lorien (Gerhard and Gcobani included as well.)

I will attempt now to add this "correction" to the agenda for Friday.

However Alistair, now included in this email, has yesterday suggested a postponement of the Friday's meeting. **Alistair** to para-phrase and please correct me if I got you wrong: you and the conservation representatives would prefer responding to a document from the fisheries representatives. Preferably this document should be circulated a few days before the meeting to allow for some time for reviewing.

Today, I was going to check with Mike C if such a document is possible. **Mike** please let us know if a document is being contemplated and if yes when will this be ready.

Then we could re-schedule the meeting around that. Alternatively we could go-ahead with tomorrow's meeting to try to resolve Riedau's urgent issue, and then talk to the documents and their reviews at a later date. Or we could attempt to just add Riedau's issue to the existing draft agenda that I have previously sent to you separately for comment.

Please let me know your preferences today. I will then try to consolidate discussion and meeting arrangements.

Thank you
Ashley N

From: Redah De Maine <redah@rialfishing.co.za>
Date: Wednesday, 08 November 2023 at 18:12
To: Ashley Naidoo <ANaidoo@dffe.gov.za>
Cc: Deon Van Zyl <Deon@afrofishing.co.za>, 'Tasneem Wesley' <twesley@rialfishing.co.za>, mike.copeland@fishconsult.co.za <mike.copeland@fishconsult.co.za>, lorien.pichegru@mandela.ac.za <lorien.pichegru@mandela.ac.za>
Subject: RE: mIBA 90 shapefiles

Hello Ashley,

Thank you for your response which once again appears to be dodging the real purpose of our settlement agreement that was to settle on an agreement that was acceptable to both parties.

The interim closure was not acceptable to our Industry and we had not attempted to propose a settlement agreement at the review meetings while the proposal for a settlement agreement came from conservation with a proposal that we close only 40% of the existing MIBA 21 that was close at 73% at the time that was not acceptable to us.

At that discussion we agreed to the 40% closure of MIBA 21 decreasing from 73% to 40% and all we were left to do was agree on the shape of the MAPS not the size of the area with clear agreement that we should discuss same and finalise with Lorien.

All that had to happen was that conservation had to send us shapes of the MAPS and we had to finalise these shapes not the area or size.

Area and size was slightly shifted and increased to 42.17% for navigation purposes and no reference to any other MIBA other than MIBA 21 that was the MIBA utilised for the interim closure.

Yes we discussed the closure shape with Lorien according to our agreement with the decreased size of 40% s after which only discussed this further in a meeting in your presence that resulted in us increasing that to 42.17% for practical navigation purposes due to shifting the shape and conservation making the kind gesture that they would like to give us the benefit of utilising our productive area in the West resulting in shifting the MAP slightly towards the East.

When the MAP was presented to us we were under the impression that this MAP relates to MIBA 21 and represents 42.17% of MIBA 21 that was the MIBA used for the interim closure not being aware of the vast movement of the South line that drastically increased the area to more than 73%.

The MAP we proposed said 40% and Zishan proceeded with drawing the MAP and forwarded it to us but with no clear references of what percentage closure we are looking at of what MIBA while it was kept from us that the MAP does not fit the description of our agreement ourselves being under that impression that it refers to MIBA 21.

This only came to our attention when our members brought it to our notice that the closed area had increased instead of having decreased to 42.17% hence our reason for bringing it to your attention but we have not made any progress ever since.

Introducing the different other MIBA designs created all the confusion while we were specifically dealing with MIBA 21 this in our opinion is simple error that could have been rectified with all honesty and sincerity relating to our core agreement of decreasing the closed area from 73% of MIBA 21 to 42.17% by now.

We are not satisfied with your response that appears to be side stepping the fact that the confusions was caused by introducing MIBA that had no relation to our settlement agreement and has resulted in an area of closure that is by far greater than the interim closure of 73% while we agreed to decreasing that closed area to 42.17%.

I am including Lorien in this email to start of our discussion about rectifying all the confusion but I certainly feel that we cannot delay this matter any longer and it should be part of Fridays meeting Agenda.

Kind Regards,
Mohammed Riedau De Maine
CEO
Rial Fishing Group

131 Albert Road , Walmer, Port Elizabeth / PO Box 22650, Central, 6001
Telephone: *041- 581 0459 / 041- 581 0458* ***Cell:*** *082 855 1457* ***Email:****redah@rialfishing.co.za*

From: Ashley Naidoo <ANaidoo@dffe.gov.za>
Sent: Wednesday, November 8, 2023 4:28 PM
To: Riedau <redah@rialfishing.co.za>

Cc: Deon Van Zyl <Deon@afrofishing.co.za>; Tasneem Wesley <twesley@rialfishing.co.za>
Subject: Re: mIBA 90 shapefiles

Dear Riedau, Deon and Tasneem copied

I have had another read through the summary. I must add that in my attempt to send avoid confusion I had sent out the "agreed map" before implementation in September to make sure everybody was on the same page. I do take your point that the many maps may have been confusing. While I sympathise with you, I do not think that I have the authority to change the current decision on my own.

At the very least this map was agreed at the start between you and Lorien discussing options, and then by the wider group, Deon, Tasneem, Alistair, Lauren and Craig. This was developed outside the Department, with myself (with the help of Zishan) helping with the maps and checking if there was agreement.

I am thinking of ways to assist the process from here. The Conservation Reps (Alistair, Craig, Lauren (and Lorien now included as your initial discussion was with Lorien on this matter)) will have to be consulted on your new preferred closure map. They could agree to your map or offer a counter that could be discussed.

Somebody will need to start this discussion. This could be you, as you initiated the discussion with Lorien initially, or I could start this with an email that includes yourselves in this email and the conservation representatives. Let me know if you wish to start this discussion with the conservation representatives or do you need the DFFE (me for now) to start this.

I am also meeting with our legal policy advisor tomorrow afternoon to understand what we as officials can do. I have presented this case to our other senior managers and Dr Lisolomzi Fikizolo, who also advised that I check what possibilities do exist for us here to act.

Finally I see this as a slightly separate process to the meeting planned for Friday which is looking specifically what can be done using the Expert Panel Report in this year and then from the start of the 2024 fishing season. (It may however offer an opportunity to discuss the interim closures but there will need to be some give and take on both sides.)

Thank you
Ashley N

From: Ashley Naidoo <ANaidoo@dffe.gov.za>
Date: Tuesday, 07 November 2023 at 16:02

MC
AM

To: Riedau <redah@rialfishing.co.za>
Cc: Deon Van Zyl <Deon@afrofishing.co.za>, Tasneem Wesley <twesley@rialfishing.co.za>
Subject: Re: mIBA 90 shapefiles

Dear Riedau, Deon and Tasneem

Riedau, apologies for getting back to you late in the day. I have been through your email below, but need a little more time to go through some of the history you summarized below. I seem to understand your issue essentially being the extent of the interim closure extent. I need to find a way to match this with the initial 42% percent that there seemed to some agreement on.

I will need another read through this and will get back to you tomorrow.

Thank you
Ashley

Ashley Naidoo. Ph.D. | Chief Director: Ocean & Coasts Research (he/him)
Find Annual Ocean & Coasts Science Report at:
http://dx.doi.org/10.13140/RG.2.2.19915.77601
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From: Redah De Maine <redah@rialfishing.co.za>
Date: Tuesday, 07 November 2023 at 08:31
To: Ashley Naidoo <ANaidoo@dffe.gov.za>
Cc: Deon Van Zyl <Deon@afrofishing.co.za>, Tasneem Wesley <twesley@rialfishing.co.za>
Subject: RE: mIBA 90 shapefiles

Hello Ashley,

Thank you for your response to which I cud not react having had another small procedure since the email but recovering quite well back at home.

What I referred to in terms of confusion of the different MAPS was that our core focus was based on an agreement that related to MIBA 21 upon which you increased interim closed area of 73% was based and our total objection was to have a smaller closed area since the 73% closure really hampered and severely impacted on our fishing.

The purpose of the settlement was a have a win win situation where both parties benefit from a closure that is acceptable to both industry and conservation that was discussed at our meeting at the review and all our views were tabled while we objected to the current 73% interim closure having been to large and impacted negatively on our industry.

We discussed this same area in the settlement meeting proposed by the Chairperson at the review for a settlement where conservation downscaled their proposal to 40% closure of the existing area instead of the 73% as a settlement upon which we deliberated and came to an agreement of 42.17%.

This 42.17% was supposed to be implemented in a map based on your 73% Map that was based on MIBA 21 no other MAPS or MIBA's were discussed our available and relevant at the time.

MIC AM

But when you sent us the MAPS it created total confusion ourselves being under the impression that all the MAPS were the same size and utilised the idea of the shape of the MAP which Zishan utilised.

I requested if the map size was the same as the 73% interim MAP utilised and Zishan replied with a yes but mentioned another name with no clarity or explanation as if it all is the same ourselves being led to believe that we are on the right road.

We are not sure why the other MAPS were introduced when we were suppose to have been purely focused on the 73% MAP of MIBA 2021 that is the main cause of all the confusion.

We certainly believe that every body was aware that there was an agenda on the table which was to get a settlement on decreasing the current interim closure of MIBA 21 form 73% down to 42.17% but nobody stopped for one second to inform us that the draft of Zishan is much larger and does not fit the description of our agreement for a smaller closed are.

Ashley all the confusion was created by introducing three different MIBA and MAPS in the finality of our agreement by yourself and Zishan and we certainly failed it was a major error on your side that should be rectified by your team as having utilised a different MAP from MIBA 21 which should not have been the case.

I do not see why we have to go back to a negotiation table for this purpose since all we have to do is rectify the error in terms of MIBA utilise by your department erroneously.

The delay and timing of this matter is once again impacting on our fishing season with our sardine having arrived on our coast and once again we can get to it because the fish is sitting in an even larger enclosed area.

We kindly request that you speed this matter up as matter of urgency to allow an honest and sincere settlement agreement to take its course.

Kind Regards,
Mohammed Riedau De Maine
Chairperson
ESCPA

131 Albert Road , Walmer, Port Elizabeth / PO Box 22650, Central, 6001
Telephone: *041- 581 0459 / 041- 581 0458* ***Cell:*** *082 855 1457* ***Email:****redah@rialfishing.co.za*

From: Ashley Naidoo<ANaidoo@dffe.gov.za>
Sent: Thursday, November 2, 2023 9:14 AM
To: Riedau <redah@rialfishing.co.za>; Tasneem Wesley<twesley@rialfishing.co.za>; Deon Van Zyl <Deon@afrofishing.co.za>
Cc: mike.copeland@fishconsult.co.za
Subject: Re: MIBA 90 shapefiles

MC
AM

Thank you Riedau, Deon, Tasneem and Mike

I was hoping to touch on this at our meeting on Tuesday. From your previous message you were suggesting some alternate names for the different map options to avoid further misreading. Do you have any suggestions on this. I could also look at some naming options and get back to you early next week.

From here I think the path will be to ask the Conservation groups formally if they will consider your revised map for consensus. It will be great if there is agreement then the "new agreement" can be implemented. I am at a bit of a crossroads if there is no agreement – and will have to check internally with some of my colleagues.

Thank you
Ashley

From: Redah De Maine <redah@rialfishing.co.za>
Date: Wednesday, 01 November 2023 at 12:59
To: Ashley Naidoo <ANaidoo@dffe.gov.za>, Tasneem Wesley <twesley@rialfishing.co.za>, Deon Van Zyl <Deon@afrofishing.co.za>
Cc: mike.copeland@fishconsult.co.za <mike.copeland@fishconsult.co.za>
Subject: RE: mIBA 90 shapefiles

Hello Ashley,

Apologies for not attending the meeting with industry yesterday but I could not make it to attend due to unforeseen circumstances.

I refer that we responded to your drawings by Zishan on the 23rd October and has not had any response to date or information as to how we and when we will be taking this matter forward with today being the 8th day that has passed since our response.

Please be so kind as to inform us as to how and when we will proceed with this matter since our fishing season has started and we certainly wish to have the area rectified as a matter of urgency our outlook having been to benefit from the smaller closure than the interim closure still this year.

We look forward to your response .

Kind Regards,
Mohammed Riedau De Maine
Chairperson
ESCPA

131 Albert Road , Walmer, Port Elizabeth / PO Box 22650, Central, 6001
Telephone: *041- 581 0459 / 041- 581 0458* ***Cell:*** *082 855 1457* ***Email:****redah@rialfishing.co.za*

From: Redah De Maine <redah@rialfishing.co.za>
Sent: Monday, October 23, 2023 9:47 AM
To: 'Ashley Naidoo' <ANaidoo@dffe.gov.za>; Tasneem Wesley <twesley@rialfishing.co.za>; deon@afrofishing.co.za
Cc: 'mike.copeland@fishconsult.co.za' <mike.copeland@fishconsult.co.za>
Subject: RE: mIBA 90 shapefiles

Hello Ashley,

Thank you for the new drawing done by Zishan in brown that appears to be inline with what we proposed.

I am confused though where the new heading of MIBA 90 shapefiles comes into the discussion because everything negotiated and discussed was based on MIBA 2021 upon which your interim closure was based.

Maybe it will help if we get some clarity on this new phrasing that is being applied because it certainly is creatin confusion.

Kind Regards,
Mohammed Riedau De Maine
CEO
Rial Fishing Group

131 Albert Road , Walmer, Port Elizabeth / PO Box 22650, Central, 6001
Telephone: *041- 581 0459 / 041- 581 0458* ***Cell:*** *082 855 1457* ***Email:****redah@rialfishing.co.za*

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From: Ashley Naidoo <ANaidoo@dffe.gov.za>
Sent: Friday, October 20, 2023 10:14 AM
To: Riedau <redah@rialfishing.co.za>; mike.copeland@fishconsult.co.za; Dr Mike Bergh <mike@olsps.com>; Matt Horton <Matt@olsps.com>
Cc: Gerhard Cilliers <GCilliers@dffe.gov.za>; Gcobani Popose <GPopose@dffe.gov.za>
Subject: FW: mIBA 90 shapefiles

Dear Redah, Mike C, Mike B and Matt (Gerhard and Gcobani copied)

Zishan has kindly compiled a set maps, now including an option taking into your comment below.
I have included notes from Zishan below as well.

Riedau please have a look at the these maps and confirm that we are on the right track.

MC
AM

If the most recent option is correct the next step will be to take this to the Conservation representatives and also Lorien (as you have been engaging with Lorien) to seek agreement – if at possible.

Thank you
Ashley N

Notes from Zishan

Re: The southern extent of closure proposed by ESCPA

A reminder of confusion that not using Whole Minutes may cause

The southern boundary:
- position as mapped and calculated for: 33°58' (that's with zero seconds)
- position quoted below: **33°57'500"** (that seems to be with 500 seconds, if one didn't know better)

If I trusted a calculator output, 500 seconds would take the reading to over 34 degrees (since 500 seconds = 8 mins and 20 seconds).
- I have not made calculations based on **33°57'500" (3 units: DDMMSSS)**, as this equates to **34°05'020"**)
- If the position is **33°57.500' (2 units: Degrees and Minutes only)**, then the area-change **from above 50% to below 50%** (~49.85 % of the MIBA of 2023)

Note the spatial difference (between the grey dashed line and the brown line) is about 307 meters

I notice that the **40-43% range** is being referred to... I see this range being about Draft L relative to an area which is Not-MIBA
- Draft L is the closure implemented 01 September 2023, and is 71.8% of the 2023_MIBA_ARS
- Therefore the 40-43% range should not be referred to, and I do not know the origin of the 40% concept.

From: Redah De Maine <redah@rialfishing.co.za>
Date: Thursday, 05 October 2023 at 15:28
To: Ashley Naidoo <ANaidoo@dffe.gov.za>, copeland.fishconsult <copeland.fishconsult@gmail.com>
Cc: Dr Mike Bergh <mike@olsps.com>, 'Matt Horton' <matt@olsps.com>, Gerhard Cilliers <GCilliers@dffe.gov.za>, Gcobani Popose <GPopose@dffe.gov.za>
Subject: RE: MIBA 90 shapefiles

Hello Ashley,

Thank you for your telecommunication and understating my situation undergoing treatment in the Hyperbaric chamber as explained that does not leave much of the afternoon for me to try and achieve some work.

The drawing is about right on both the West and East Lines but Zishan's Southern line extends beyond our Southern line whereas our Southern number's were based on our revised proposal as agreed on at 42.17 % of the 2021 MIBA as 33°57'500", but it appears that Zishan has applied 33 58 000 in his drawing since it definitely extend further Southward than our proposed drawing.

I do acknowledge that we agreed to try and keep the numbers simple for navigation purposes but having increased from 40% to 42.17% has already extended our area of closure and certainly feel that instead of going to 33 58'00 it would in this case be more acceptable to go with 33. 57'00 giving that little bit of tolerance due to our earlier acceptance having increased from 40 % to 42.17% .

Kindly bear in mind that our proposal was purely based on the 73% implemented by yourself as the interim closure that was based on the 2021 MIBA there not having been a 2023 MIBA at the time or even at the time when we agreed at the review to close 40% of the St Croix area as a settlement.

Please revert to me soonest and a date when we can finalise same.

Kind Regards,
Mohammed Riedau De Maine
CEO
Rial Fishing Group

131 Albert Road , Walmer, Port Elizabeth / PO Box 22650, Central, 6001
Telephone: *041- 581 0459 / 041- 581 0458* ***Cell:*** *082 855 1457* ***Email:****redah@rialfishing.co.za*

From: Ashley Naidoo <ANaidoo@dffe.gov.za>
Sent: Tuesday, September 26, 2023 2:16 PM
To: copeland.fishconsult <copeland.fishconsult@gmail.com>; Riedau <redah@rialfishing.co.za>
Cc: Dr Mike Bergh <mike@olsps.com>; Matt Horton <matt@olsps.com>; Gerhard Cilliers <GCilliers@dffe.gov.za>; Gcobani Popose<GPopose@dffe.gov.za>
Subject: FW: mIBA 90 shapefiles

Dear Riedau, Mike and Mike and Matt (Gerhard and Gcobani now included as well.)

Please see attached new mapping from Zishan where we tried to consolidate the various closure options and also the various MIBAs areas (i.e the denominators that may the issue when calculating the percentages).

I have also included the Notes from Zishan below.

Riedau, (and colleagues copied), can I please ask that you review this mapping to check for correctness. If you agree that these are correct, we can then discuss how to proceed. Please can I have some feedback by the end of the week. If you do need more time to check this mapping – please let me know.

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The attachment is the same as the map below which is included in the email for easy viewing.

Thank you
Ashley

Notes from Zishan

The maps and calculations of 21 September (2023) relate to the area with a southern boundary defined as exactly 33Degrees and 58Mins South.

- I made the assumption that the ESCPA team intended to draw their southern boundary (of what iv named Draft N) at the exact minute-line.
- I notice that the file provided by ESCPA might have been estimated when it was created/drawn, as it is slightly north of the exact minute-line.
- The East and West extents are the same

Area proportion calculations for Drafts F and H and I and L and N

- For mIBA original 2021
- For mIBA ARS 2023

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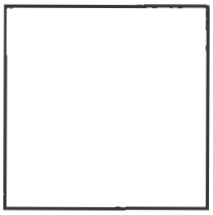
- For UD 90%

Where:
F = DFFE proposal 2021
H = interim closure of 2022
I = the industry's proposal during 2021
L = current closure of 202[3], effective 01st September 2023
N = ESCPA proposal of 15th September 2023

PS. Note that the industry's calculations for St Croix are based on the mIBA of 2021
How to differentiate:

- mIBA 2021 touches Cape Recife and other shorelines
- mIBA ARS 2023 does not touch Cape Recife at all



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"AM69"

From: Ashley Naidoo <ANaidoo@dffe.gov.za>
Sent: Tuesday, 14 November 2023 08:30
To: Lauren Waller; Pichegru, Lorien (Dr) (Summerstrand Campus South); Alistair McInnes; Smith, Craig; Katta Ludynia; Dr Mike Bergh; copeland.fishconsult; Matt Horton; Riedau; Alison Kock; Zishan Ebrahim; Cloverley Lawrence; Gerhard Cilliers; Gcobani Popose; Zimasa Jika; Carl David Van Der Lingen; Fannie Welcome Shabangu; Janet Claire Coetzee; Makhudu J. Masotla; Azwianewi Makhado
Cc: Redah De Maine; Millicent Makoala; carl.vanderlingen
Subject: Re: Joint Meeting on Furtherng Discussions on Small Pelagic and Penguin Interactions
Attachments: SAPFIA Response 13 November 2023.pdf

Dear Colleagues

I attach the document prepared by our Fisheries sector colleagues.

Tentative agenda (for comment) for the meeting is as follows:

1. Overview of the Conservation Rep document (Alistair and co-authors – 30 mins? With questions)
2. Overview of the Fisheries Rep document (Mike B and co-authors – 30 mins? With questions)
3. Way forward from this meeting and the role of DFFE. (DFFE)
4. Future planned joint working group on the implementation of the Panel Recommendations (DFFE)
5. Resolving the St. Croix agreement / non agreement and next steps (DFFE)

Thank you
Ashley N

From: ANaidoo@dffe.gov.za
When: 09:30 - 11:30 16 November 2023
Subject: Joint Meeting on Furtherng Discussions on Small Pelagic and Penguin Interactions
Location: MS TEAMS

Dear Colleagues.

Following a few discussion threads that included some of you since yesterday – I do need to postpone this meeting to next Thursday.

I will send out a draft agenda early next week, but this will be similar to the one sent out for comment earlier this week.

Thank you
Ashley

Dear Colleagues

This is a first attempt at setting a date for the planned joint meeting where each sector will provide some thoughts on the Panel Report and possibly offer some recommendations on future work and policy considerations.

The DFFE will provide options for discussions on working arrangements for implementation of the Panel recommendations.

Please reply to this invitation for next Friday morning so that I can determine if we have sufficient participation to continue. (Riedau, I do recall that Fridays are not as convenient for you and hence if you cannot have representation I can have a bilateral with you.)

Thank you
Ashley

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SAPFIA's initial comments and view on the International Review Panel report and on the trade-off between the costs and benefits of island closures.

13 November 2023

1 Summary

SAPFIA has read and taken note of the International Review Panel's report (Punt et al, 2023), and intends to submit a more detailed written response at a later date. We note that the International Review Panel (IRP) is critical of the basis for calculating mIBAs and also of the economic cost estimates provided by ourselves. Both require further work and improvements. SAPFIA are of the view that the Minister's decision on interim closures (Appendix B here) is the definitive position of the government on closures possible with the current state of knowledge about the trade-off between economic impacts and benefits for penguins. **In SAPFIA's view, given its knowledge and opinion of the economic impacts, and the benefits reported by Punt et al (2023) there should be no closures.**

SAPFIA's view is that the trade-off should be revisited once further work informing the nature of the trade-off has been completed. This includes further work on the OBM and the SAM models, as well as more work on defining mIBAs, along the lines suggested by the IRP. This cannot be achieved in the short term and is only feasible in the medium term.

SAPFIA's view is also that given that the IRP has confirmed that the impact of fishing around breeding islands is small, attention should focus on determining the real reasons for the decline of the penguin population. Indeed the IRP report (Punt et al, 2023) makes repeated recommendations for the development of MICE models to explore the possible causes for the decline in the penguin population. To date two versions of MICE models have been developed (Butterworth and Ross-Gillespie, 2023a,b). The first considers the possible role of guano harvests in the decline of the penguin population. It concludes that guano harvesting cannot be responsible for declines in the African penguin population over the last two decades. The second shows that changes in food abundance cannot explain two key features in penguin population abundance (i) elevated mortalities in the years following the MV Treasure oil spill and (ii) low adult survivorship in the recent period compared to the 1980s and early 1990s. The relevant document suggests for (i) that the mortalities due to the MV Treasure oil spill may have been much larger than were reported, and may have lasted over a longer period of time. For (ii) it notes that if this is due to direct predation of penguins by seals it would require only 0.01 penguins per seal per annum to be predated and so this possibility cannot easily be discounted. These two documents are publicly available documents and are out for comment.

2 Key pertinent conclusions of the International Review Panel

In its reading of the report from the IRP, SAPFIA notes the following four areas of import regarding the merits and extent of island closures, viz.

1. Benefits of island closures to penguins
2. The economic costs of island closures on the small pelagic fishery
3. The trade-off between benefits to penguins and economic cost to the small pelagic fishing industry
4. Recommendations for further research

Within these four categories, the following four sections highlight excerpts from the IRP's report that have most relevance to SAPFIA's position on the interim closures and on the preferred trade-off point:

2.1 Benefits of island closures to penguins

"Overall, the results of the ICE for Dassen and Robben islands indicate that fishing closures around the breeding colonies are likely to have a positive impact on population growth rates, but that the impacts may be small, in the range 0.71—1.51 % (expressed in units of annual population growth rate). These impacts are small relative to the estimated rates of reduction in penguin abundance for these two colonies over recent years (section 2.3.2)."

Comments:

- SAPFIA notes that use of these results to infer the benefits at Stony Point and Dyer, St Croix and Bird Island (Algoa Bay) would require extrapolation of results from only two West Coast islands to the other four breeding sites which is unsatisfactory particularly given the IRP's recommendations to make trade-off decisions specific to each breeding site/island.
- In reaching its estimates of benefits, the IRP effectively disregards the entire body of foraging data collected during ICE and recommends that future improvements be made when collecting and or interpreting such data.
- The IRP made recommendations to improve the foraging data so that these would in future be admissible for considering the benefits for penguins. While the mIBA-ARS methodology is the preferred option of the IRP to inform area closures, it is clear from the report that the foraging data informing the area closures in the report as it stands now is not in the desired format and thus new data going forward will need to be collected accordingly.

2.2 The economic costs of island closures on the small pelagic fishery

"Care should be taken when interpreting the estimated impacts to the fishing industry given the OBM likely provides an over-estimate of uncertain magnitude of the loss in catch (see Section 3.2) so the results of the OBM and hence the SAM model should be considered primarily in a relative sense and hence used for ranking closure options. The relative ranking of a closure may, however, be sensitive to how catches are allocated to local communities."

Comments:

- SAPFIA notes the comments in the IRP's report about the OBM methodology used by OLSPS Marine to estimate the catches that are likely to be lost due to island closures.

- The report contains implicit and explicit suggestions for improving the OBM estimates, specifically addressing the question of irreplaceability.
- SAPFIA, together with OLSPS Marine are engaged in further work to investigate and improve the OBM and to comment further on the search behaviour of the pelagic fleet and the likely extent of irreplaceability. To this end OLSPS Marine have sourced all available AIS data for the pelagic fleet as well as other relevant fleets in South African waters who communicate with pelagic vessels and provide information about the presence of schooling bait fish. These data are being analysed to further illuminate the extent of irreplaceability and lost catches.
- OLSPS Marine are also investigating the spatio-temporal statistical properties of the location of small pelagic shoals, including the total number of fishing days per year and per year area, as well as weather impacts on the ability to fish.
- This work will provide greater insight into the extent of the irreplaceability of catches in response to area closures.

2.3 The trade-off between benefits to penguins and economic cost to the small pelagic fishing industry

"The panel recommended that analyses delineating mIBAs using ARS methods represent the best scientific basis for delineating the preferred foraging habitats during breeding. In the future, additional analyses would further improve understanding, especially with respect to how the spatial scale of any given mIBA might vary by year. The panel concluded that such between-year variation is likely to be important, as the years of the ICE, during which most telemetry data have been collected, have been years of relatively low prey resource abundance."

"There is a trade-off amongst maximising benefits to penguins, minimising the costs to the fishing industry, and having a reliable basis to quantify the effects of closures (including no closures) on the penguin recovery rate. The trade-off among closure options is a policy decision related to conservation, economic and social goals and objectives for South Africa. This report outlines some aspects that could form part of a decision-making framework to identify the closure options that will provide the best outcomes for penguins given some level of cost to the fishing industry."

"There are three primary trade-off axes to consider when selecting closures: (a) the benefit to penguins of the closure; (b) the cost (economic and social) to the fishing industry and the communities where fishing and processing operations are based; and (c) the ability to evaluate the effectiveness of the closures (section 4.1)."

Comments:

- SAPFIA notes the IRP's comment about mIBA-ARS but since the IRP also recommended determining an appropriate balance between the extent of closures, the benefit to penguins and the cost to the industry, they cannot have recommended only one closure option (as seems to be suggest in McInnes et al.2023). Our view is that the mIBA-ARS methodology could provide a framework for a continuum of different possible levels of closure to form one axis of the trade-off relationship.
- SAPFIA is also of the view that along the continuum referred to above (still to be defined), the benefits to penguins must be defined, if necessary on an island by island basis. The basis

for calculating these benefits has not been specified and there is thus additional work that needs to be done before one can consider trade-offs from an improved informed position.

- The IRP states that the trade-off decision is a policy decision. By recommending the existing interim closures the Minister has effectively made a trade-off decision based on the current state of knowledge. SAPFIA's view is that this policy decision should be reviewed when substantial improvements to the reliability of the trade-off calculations supporting such a decision have been made. This is only likely to be possible in the medium term and not in the immediate short term.

- From the results of ICE at Dassen and Robben Islands the report noted that the benefit to the penguins is in the range 0,71 – 1,51% (expressed in units of annual population growth). Given that these two islands have already been closed 50% of the time during ICE, to interpret the effect on the entire population, the additional benefit relative to trends since 2008 benefit will be in the range 0,36 – 0,76% per annum. This equates to an increase in the number of penguin breeding pairs (about 10 000) of between 36 and 76 breeding pairs per annum of a population that is declining at a rate of 800 penguin breeding pairs per annum.

2.4 Recommendations for further research

"The panel recommended that further validation of mIBAs should occur, in particular using dive data that provide objective identification of foraging locations, rather than commuting (or travelling) locations (see also section 5.9). Such analyses could be included in species distribution models (e.g., Warwick-Evans et al., 2018) that could be used to identify areas of key importance. However, important uncertainties remain, particularly if mIBAs are determined (as they have been) using telemetry data predominantly limited to early chick rearing when breeding adults are most constrained; further, that mIBAs may differ in the future, should prey resource abundance increase."

"If designated, closed areas to protect penguins should be reviewed at a time when results are available to investigate life-history processes such as juvenile recruitment, and adult survival, and hence population growth rates. This may be at a time between 6 and 10 years after designation."

"Monitoring should take place irrespective of whether there is an experimental (alternating open and closed) component to the closure program (section 4.2)."

The IRP makes repeated recommendations for the development of MICE models to explore the possible causes for the decline in the penguin population.

Comments:

- There has been no experimental design work carried out to validate the feasibility of detecting a meaningful benefit for penguins at the population level at the 6 – 10 year time frame. This is concerning since it may be that very little new information can be expected, and at this stage this is an unknown.

- To date two versions of MICE models have already been developed. The first considers mainly the role of guano harvests in the decline of the penguin population. It concludes that guano harvesting cannot be responsible for declines in the African penguin population over the last two decades. The second looks more closely at the role of pelagic fish abundance in determining trends in the penguin population and concludes that changes in food abundance cannot explain two key features in penguin population abundance (i) elevated mortalities in the years following the MV Treasure oil spill and (ii) low adult survivorship in

the recent period compared to the 1980s and early 1990s. The relevant document suggests for (i) that the mortalities due to the MV Treasure oil spill may have been much larger than were reported, and may have lasted over a longer period of time. For (ii) it notes that if this is due to direct predation of penguins by seals it would require only 0.01 penguins per seal per annum to be predated and so this possibility cannot easily be discounted.

3 Discussion and Conclusions

Appendix A summarises SAPFIA's estimates of the cost of closures to the fishing industry and to the economy, based on Bergh et al (2016) and Bergh and Horton (2023), and further information provided to Punt et al (2023) as requested. The range for the former is between R 30 million and R 356 million per annum, while for the latter it is between R 85 million and R 1 017 million per annum.

Based on Punt et al (2023), the benefits for penguins from ICE closures is about 56 breeding pairs per annum for the ICE (average their upper and lower values). No estimates are available for the other three closure options mentioned in Appendix A.

The implications for employment are in the 100s of or perhaps even more than 1000 jobs, depending on the closure options chosen.

Even given the IRP's view that the estimates by SAPFIA of the economic impact of these closures are over-estimates of an unspecified extent (a position which is the subject of further research by SAPFIA), SAPFIA's view is that a worst case/lowest economic impact analysis would likely still suggest that there are 100s of jobs under threat due to such closures.

The Minister made a policy decision about closures in response to the IRP's report, i.e. the existing interim closures (see Appendix B). SAPFIA's view is that this is the most definitive policy position by government under circumstances of the current state of knowledge about the trade-offs.

SAPFIA's view about revisiting this trade-off decision is that this should only be revisited once there has been a material improvement in the knowledge base informing the nature of the trade-off, including (a) some estimates of benefits to penguins at different closure options and (b) improved estimates of economic impacts.

SAPFIA's view is also that given that the IRP has confirmed that the impact of fishing around breeding islands is small, attention should focus on determining the real reasons for the decline of the penguin population. In this effort the MICE work seems critical and recent work in this regard needs to be used to refocus attention, which has been unduly focussed on the role of fishing near to penguin breeding sites.

Based on Urban Econ (2023), the number of jobs lost associated with this range of options varies from 130 to 1557 (or a range of about 2 jobs per penguin breeding pair to 27 jobs per penguin breeding pair) – see Appendix A. The range depicted by these options should be viewed in a relative sense. Nevertheless, the importance of choosing areas to close that will lessen the impact on the fishing industry is clear.

4 References

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Butterworth, D.S. and Ross-Gillespie, A. 2023a. A MICE approach to scoping the possible impact of guano harvests on trends in penguin abundance. Fisheries document FISHERIES/2023/JAN/PWG-SWG/01rev.

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CAFMLR, 2022. Special Project Report on Penguin and Small Pelagic Fishery Interactions by the Consultative Advisory Forum for Marine Living Resources

Minister B Creecy. 2023. Science based measures are now being implemented to protect the critically endangered African penguins. 04 August 2023. https://www.gov.za/speeches/minister-b-creecy-science-based-measures-are-now-being-implemented-protect-critically.

Punt, A.E., Furness, R.W., Parma, A.M., Plagányi-Lloyd, E., Sanchirico, J.N., Trathan, P.N. July 2023. Report of the International Review Panel regarding fishing closures adjacent to South Africa's African Penguin breeding colonies and declines in the penguin population. Department of Forestry, Fisheries and the Environment (DFFE). ISBN: 978-0-621-51331-8.

Urban Econ, 2023. The Pelagic Fishing Industry: Socio-Economic Impact Assessment May 2023. Urban-Econ Development Economists.

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5 Appendix A. Benefits to penguins and the economic costs of island closures.

The panel report recommended that a final decision on closures is a policy decision but recommended that this policy decision be based on a trade-off between the benefit to penguins and the economic costs of closures.

5.1 Benefit to penguins

From the results of ICE at Dassen and Robben Islands, the report noted that the benefit to the penguins is in the range 0.71 – 1.51% of the population. Given that these two islands have already been closed 50% of the time during ICE, the additional benefit relative to trends since 2008 is in the range 0.36 – 0.76% per annum. This equates to a relative increase in the number of penguin breeding pairs (at a total population size of about 10 000) of between 36 and 76 breeding pairs per annum of a population that is declining at a rate of 800 penguin breeding pairs per annum.

5.2 The economic costs to the fishing industry and to the economy

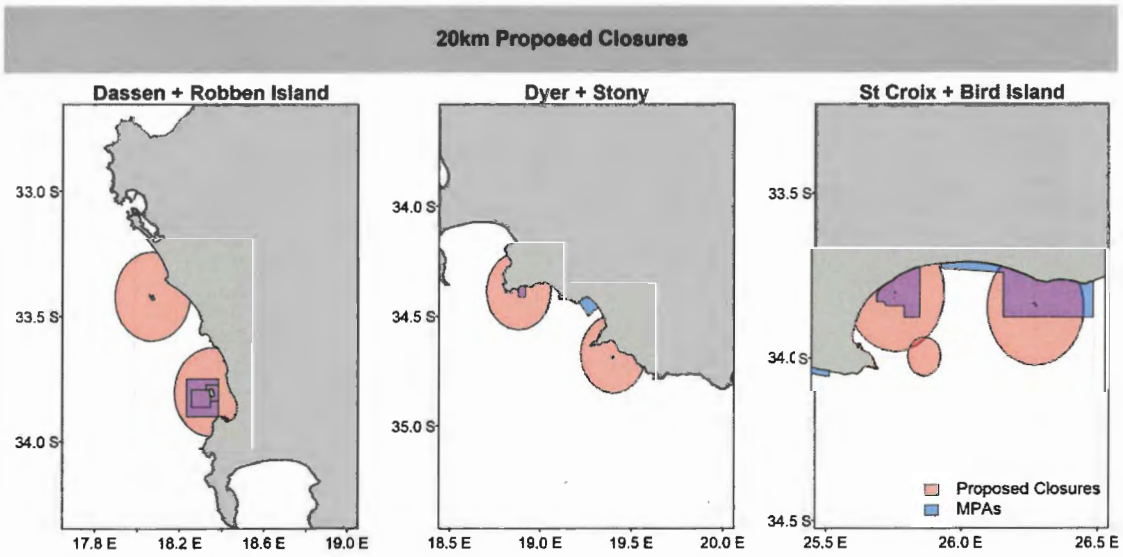
For the purposes of this report, we compare the loss from the OBM for 4 options namely **ICE, CAF (see CAF, 2022), mIBA-ARS and the Interim Closures**.

5.2.1 Maps of closure options

These are as given below.

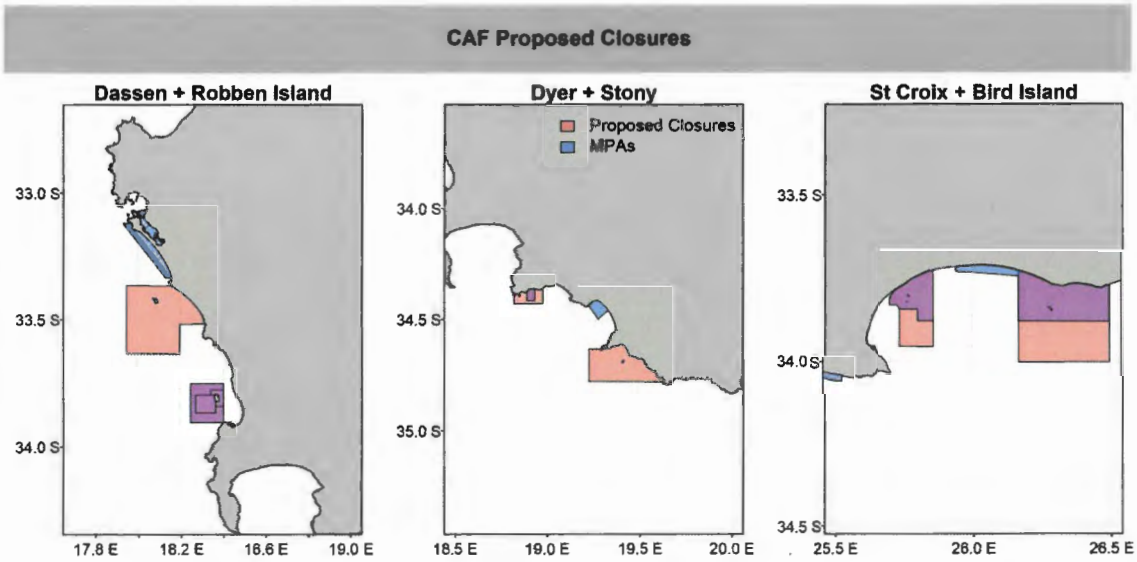
ICE

For the two western islands and the two islands in Algoa Bay, this shows the extent of the 20km closure areas, plus the closure around Riy Bank that was in place during ICE. For completeness this has been extended to include Stony Point and Dyer Island as well

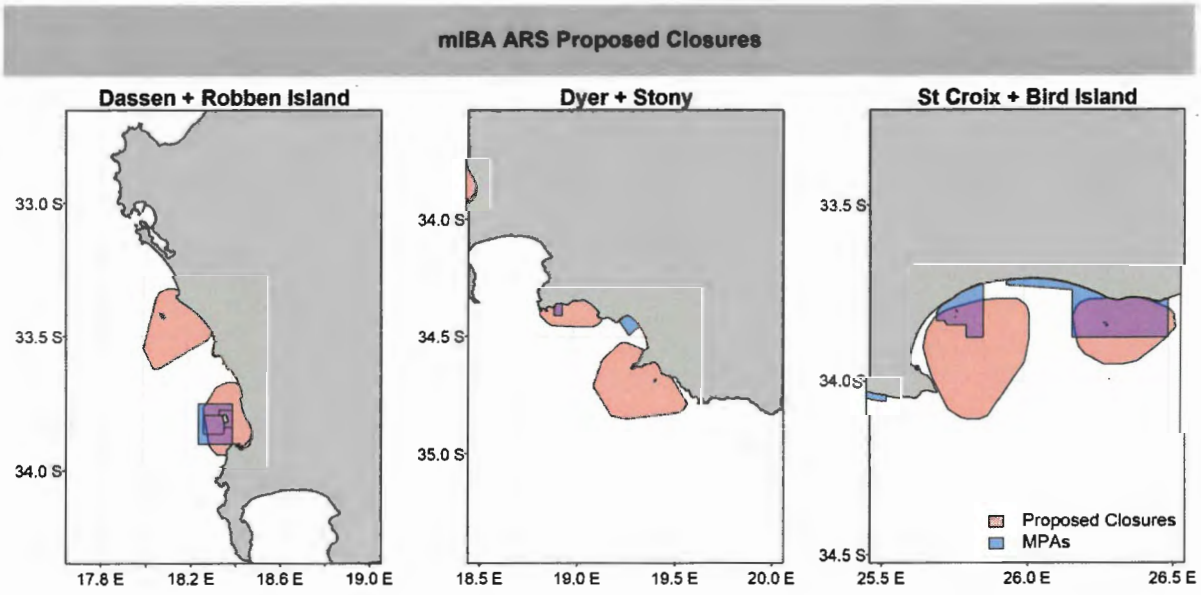


CAF

CAF recommendations on closure options that were sent to the Minister at the conclusion of the CAF process (see CAF, 2022).

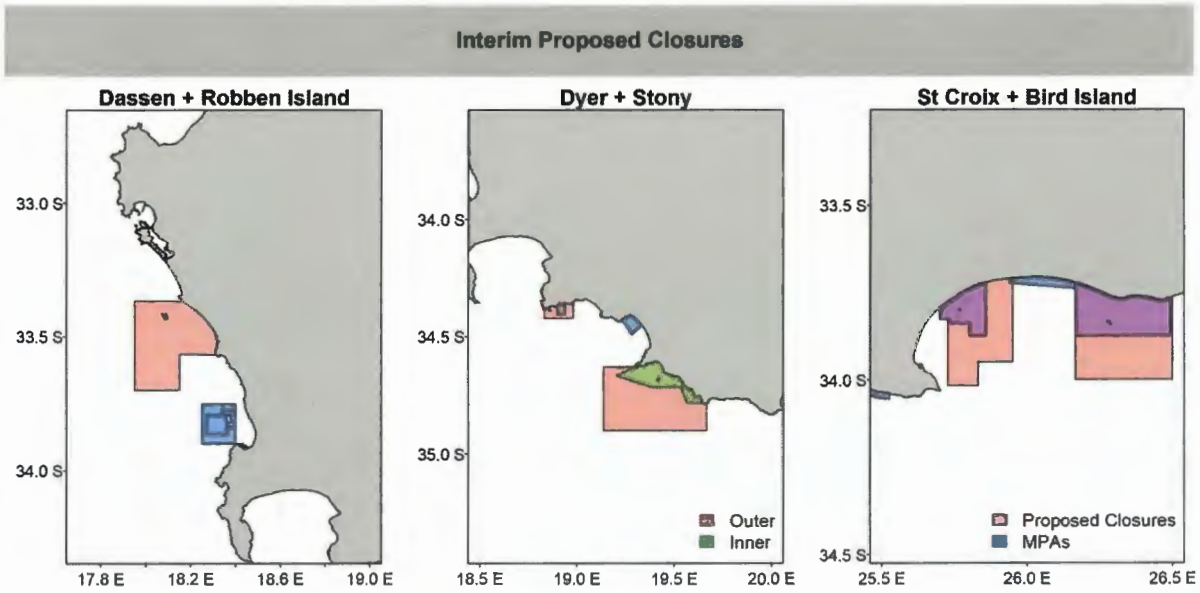


mIBA-ARS (see MacInnes et al, 2023)

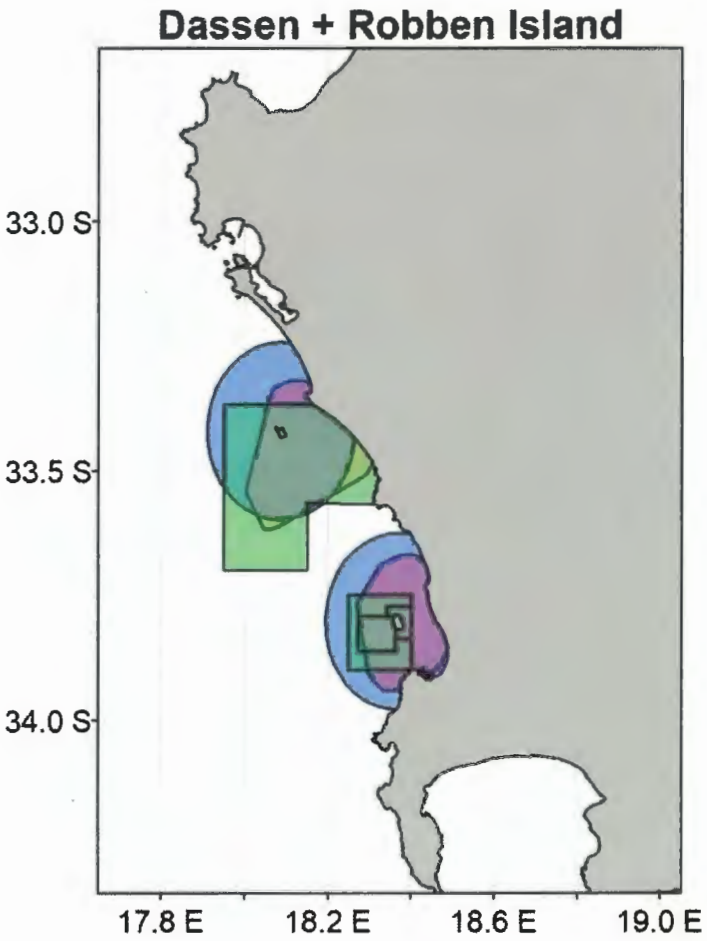


Interim Closures

Note that these were the Interim Closure areas as per the revised Permit Conditions approved 26 July 2023. There have subsequently been some changes to the area around St Croix and this is still subject to discussion.



5.2.2 Overlap between ICE, Interim and mIBA-ARS closure options at Dassen and Robben Islands



5.2.3 Catch losses associated with different closure options (metric tons per annum)

These are based on the OBM as reflected in various submissions made to the international panel and as refined at their request and also subsequently calculated where necessary.

ICE

	Dassen	Robben	Dyer		Stony	St Croix	Bird	Riy	Total
ANCHOVY	3216,7	1133,7	8604,5		310,6	18,2	0,0	3,1	13286,9
BYPIL	108,2	60,1	209,6		49,8	0,3	0,0	0,1	428,1
DIRPIL	89,3	37,9	1062,8		1049,6	1756,4	19,0	45,1	4060,1
REDEYE	169,1	44,2	829,3		162,4	2,7	0,0	0,2	1207,9
Total	3583,3	1276,0	10706,2		1572,4	1777,6	19,1	48,5	19031,5

CAF

	Dassen	Robben	Dyer		Stony	St Croix	Bird		Total
ANCHOVY	370,8	-61,0	855,1		-33,8	0,2	0,0		1131,2
BYPIL	47,7	-16,5	14,7		-0,3	0,1	0,0		45,7
DIRPIL	87,9	-3,5	137,8		8,8	421,1	34,8		686,9
REDEYE	69,3	23,6	55,7		-0,2	-0,2	0,0		148,3
Total	575,6	-57,3	1063,3		-25,6	421,3	34,9		2012,1

mIBA-ARS

	Dassen	Robben	Dyer		Stony	St Croix	Bird		Total
ANCHOVY	2013,7	808,6	13628,7		284,0	1,4	0,0		16736,4
BYPIL	70,7	55,2	341,8		19,5	3,2	0,0		490,4
DIRPIL	78,7	4,8	4604,6		952,6	1708,9	32,5		7382,2
REDEYE	155,3	88,8	1213,7		88,8	3,1	0,0		1549,7
Total	2318,5	957,4	19788,8		1344,9	1716,6	32,5		26158,6

INTERIM CLOSURES

	Dassen	Robben	Dyer (outside)	Dyer (inside)	Stony	St Croix	Bird		Total
ANCHOVY	49,8	-21,5	1311,7	84,8	-26,9	1,2	0,0		1399,2
BYPIL	39,8	-13,8	70,9	0,1	-0,5	0,1	0,0		96,6
DIRPIL	114,1	-4,6	1476,9	38,5	8,6	976,7	35,1		2645,4
REDEYE	75,9	42,5	103,3	6,5	-0,1	0,8	0,0		229,0
Total	279,6	2,7	2962,8	129,9	-18,8	978,9	35,1		4370,1

5.2.4 The economic value of catch losses to the fishing industry and to the economy as a whole

The ex-store income of the lost catch estimates outlined in the previous section to the fishing industry can be quantified using a value per ton for sardine at R28 566 (human consumption and bait) and R7 706 for industrial fish reduced to fish meal and oil. This reflects the "direct" lost value per annum and is given in the table below. Application of a multiplier effect of 2,86 (see Urban-Econ, 2023) gives an estimate of the total lost revenue to the economy (direct, indirect and induced), also included in the table below:

Closure Option	Annual Economic Losses to the Small Pelagic Fishing Industry	Annual Losses to the economy (Multiplier = 2.86)
ICE	ZAR 230,975,913	ZAR 660,591,111
CAF	ZAR 29,834,753	ZAR 85,327,394
mIBA-ARS	ZAR 355,570,625	ZAR 1,016,931,988
Interim Closures	ZAR 88,859,113	ZAR 254,137,063

6 Appendix B. Policy statement by Minister, DFFE of South Africa (https://www.gov.za/speeches/minister-b-creecy-science-based-measures-are-now-being-implemented-protect-critically)

Minister Barbara Creecy on science based measures being implemented to protect critically endangered African penguins

4 Aug 2023

The African penguin is critically endangered. If this situation is not addressed, with current rates of population decline, science tells us these iconic creatures could be functionally extinct by 2035.

Competition for food is thought to be one among a set of pressures that are contributing to the decline of the African Penguin population. Other pressures include ship traffic together with their associated noise and vibrations, pollution and degradation of suitable nesting habitats.

The species, which is endemic to South Africa and Namibia, has decreased from more than a million breeding pairs to just about 10 000 pairs over the last century.

Today, following the report of the Export Review Panel, I have taken a decision to implement fishing limitations in the waters around penguin colonies for a minimum of 10 years, with a review after 6 years of implementation and data collection.

Fishing limitations are established for the following penguin colonies: Dassen Island, Robben Island, Stony Point, Dyer Island, St. Croix Island and Bird Island. The transition to implementing fishing limitations will continue with the current interim closures, while both the fishing industry and the conservation sector study the Panel's Report.

If there is agreement on fishing limitations over the next few weeks or months across these sectors, these will be implemented as they are agreed upon. If no alternate fishing limitation proposals are concluded by the start of the 2024 Small Pelagic Fishing Season (January 15th, 2024) the current interim fishing limitations will continue until the end of the 2033 Fishing Season, with a review in 2030 after six years of implementation from the start of the 2024 fishing season.

Today marks the end of the complex and lengthy process of stakeholder consultations in the quest to find science-based measures to protect the critically endangered African penguin from extinction.

In December 2022, I appointed an Expert Review Panel, under Section 3A of the National Environmental Management Act, to assess the science related to managing the interactions between the small pelagic (anchovy and sardines) fishery and the conservation of African penguins.

AM MC

The Panel is Chaired by Professor Andre Punt (USA), with members Dr Ana Parma (Argentina), Dr Eva Plaganyi (Australia), Professor Philip Trathan (UK), Professor Robert Furness (UK) and Professor James Sanchirico (USA). The Panel members all have several decades experience in science to policy matters in the marine ecosystems, with a combined science publication list of several hundreds.

The establishment of the Panel aimed to assess the appropriateness and value of fishing limitations for penguin success. These are key discussions as the sardine stock in South African waters continue to be at relatively low levels.

This included science outcomes and insights achieved during of the Island Closure Experiment undertaken by the Department over the preceding decade. This experiment aimed at understanding what, if any, benefits are derived from limiting fishing adjacent to penguin colonies.

The Terms of Reference for the science review and the panel members were established in consultation with the representatives from the fishing industry and bird conservation sectors.

While the Expert Review Panel undertook their work, the Department, in September 2022 declared some areas around the major penguin colonies closed to commercial fishing for anchovy and sardine. Although not representative on a consensus agreement, these fishing restrictions were established after much collaboration and negotiation with the seabird conservation groups and the small pelagic fishing industry representatives.

A stand-out feature of the process to achieve a decision on fishing limitations, over the last two years, has been the level of engagement from the conservation and fishing industry sectors.

I want to thank you for your cooperation and assistance in this process. I do know that some of you are already in discussions on reaching compromises and agreements and I ask that you continue to find each other on this. The Department and myself will be keen to implement any consensus you may reach – as first prize. The DDGs Fisheries and Oceans & Coasts will assist if you require some planned meeting time and space.

To continue the engagement, I have asked officials from the Fisheries and Oceans and Coasts Branches to report to you at least annually on the implementation of these closures, the expanded science plan and also progress on other non-fishery interventions in the Penguin Management Plan. Fishing limitations alone will not be sufficient to help the penguins recover.

In conclusion, I want to thank the Panel, Professors Punt, Furness, Trathan, Sanchirico and Drs Parma and Plaganyi. I appreciate that you reviewed more than 200 documents and that you undertook new analyses as well.

I believe that the Report and my policy decisions here start a new cycle of refinement and assessment for both fisheries and penguin management. It is a material step in

AM

13 MC

implementing our ambition on an ecosystems approach to sustainable ocean management and dynamic marine spatial planning.

Download:

- Report of the Export Review Panel [PDF – 11.6 mb]
- Summary report in presentation format [PDF - 2.89 mb]

Media enquiries:
Peter Mbelengwa
Cell: 082 611 8197

Issued by:

Department of Forestry, Fisheries and Environment

"AM70"

From: Alistair McInnes
Sent: Wednesday, 15 November 2023 14:12
To: Ashley Naidoo; Lauren Waller; Pichegru, Lorien (Dr) (Summerstrand Campus South); Smith, Craig; Katta Ludynia; Dr Mike Bergh; copeland.fishconsult; Matt Horton; Riedau; Alison Kock; Zishan Ebrahim; Cloverley Lawrence; Gerhard Cilliers; Gcobani Popose; Zimasa Jika; Carl David Van Der Lingen; Fannie Welcome Shabangu; Janet Claire Coetzee; Makhudu J. Masotla; Azwianewi Makhado
Cc: Redah De Maine; Millicent Makoala; carl.vanderlingen
Subject: RE: Joint Meeting on Furtherng Discussions on Small Pelagic and Penguin Interactions

Dear Ashley

Thank you for circulating SAPFIA's document (Initial Comments) as well as an updated agenda. The Conservation Sector Group have considered both carefully and are puzzled by the approach reflected in SAPFIA's document as well as by the scope of the agenda which seems to include matters beyond the narrow question of closure design to persist during the review period and which we understood would be the purpose of any follow-up discussions with yourselves and fisheries. We also note the absence of clarity regarding immediate next steps, and an apparent focus in the agenda on future research (which is premised on appropriate closures being in place to assess their effectiveness).

When discussing next steps at our last meeting, we understood that any meeting with ourselves, fisheries and DFFE's would address the application of the Expert Panel's recommended closure methodology in relation to the design of the interim closures (or alternatives). This would respond to the Minister's 4 August 2023 announcement relating to no-take fishing zones for the period required to further assess the full extent of pressures on penguin population decline and relative costs to industry. We provided our interpretation to yourself as well as the Minister on 17 October 2023 (our Assessment). In our covering letter to the Minister we requested that the DFFE circulate our Assessment to fisheries. We confirmed this with you at our meeting on 24 October 2023 and also confirmed that you should circulate the Assessment internally to relevant DFFE officials. We understood that you would invite fisheries to prepare a similar analysis of closure extents (or a comment on our own Assessment) and that this would be the focus of any subsequent combined meeting.

We remain willing to present our Assessment along with that of fisheries to the DFFE following the Minister's 4 August 2023 announcement. However, the SAPFIA's document appear to focus on issues subsequent to determination of such closure design i.e. the research actions to be undertaken during the review period when these closures are in place. In addition, the SAPFIA's document present the position that no closures should be implemented (which is puzzling, given what we understand to be the purpose of providing assessments of the Panel recommendations on closure design). We note that SAPFIA's document indicate that a more detailed response will follow. As this is the case, it again seems premature to meet to present our respective analyses.

Regards

Alistair

From: Ashley Naidoo <ANaidoo@dffe.gov.za>
Sent: Tuesday, November 14, 2023 8:30 AM
To: Lauren Waller <laurenw@ewt.org.za>; Pichegru, Lorien (Dr) (Summerstrand Campus South) <lorien.pichegru@mandela.ac.za>; Alistair McInnes <alistair.mcinnes@birdlife.org.za>; Smith, Craig <csmith@wwf.org.za>; Katta Ludynia <katta@sanccob.co.za>; Dr Mike Bergh <mike@olsps.com>; copeland.fishconsult

AM

MK

<copeland.fishconsult@gmail.com>; Matt Horton <Matt@olsps.com>; Riedau <redah@rialfishing.co.za>; Alison Kock <Alison.Kock@sanparks.org>; Zishan Ebrahim <Zishan.Ebrahim@sanparks.org>; Cloverley Lawrence <cloverley.lawrence@sanparks.org>; Gerhard Cilliers <GCilliers@dffe.gov.za>; Gcobani Popose <GPopose@dffe.gov.za>; Zimasa Jika <ZJika@dffe.gov.za>; Carl David Van Der Lingen <CVDLingen@dffe.gov.za>; Fannie Welcome Shabangu <FShabangu@dffe.gov.za>; Janet Claire Coetzee <JCoetzee@dffe.gov.za>; Makhudu J. Masotla <MMasotla@dffe.gov.za>; Azwianewi Makhado <AMakhado@dffe.gov.za>
Cc: Redah De Maine <redah@oceangrow.co.za>; Millicent Makoala <MMakoala@dffe.gov.za>; carl.vanderlingen <carl.vanderlingen@gmail.com>
Subject: Re: Joint Meeting on Furtherng Discussions on Small Pelagic and Penguin Interactions

Dear Colleagues

I attach the document prepared by our Fisheries sector colleagues.

Tentative agenda (for comment) for the meeting is as follows:

1. Overview of the Conservation Rep document (Alistair and co-authors – 30 mins? With questions)
2. Overview of the Fisheries Rep document (Mike B and co-authors – 30 mins? With questions)
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4. Future planned joint working group on the implementation of the Panel Recommendations (DFFE)
5. Resolving the St. Croix agreement / non agreement and next steps (DFFE)

Thank you
Ashley N

From: ANaidoo@dffe.gov.za
When: 09:30 - 11:30 16 November 2023
Subject: Joint Meeting on Furtherng Discussions on Small Pelagic and Penguin Interactions
Location: MS TEAMS

Dear Colleagues.

Following a few discussion threads that included some of you since yesterday – I do need to postpone this meeting to next Thursday.

I will send out a draft agenda early next week, but this will be similar to the one sent out for comment earlier this week.

Thank you
Ashley

Dear Colleagues

This is a first attempt at setting a date for the planned joint meeting where each sector will provide some thoughts on the Panel Report and possibly offer some recommendations on future work and policy considerations.

The DFFE will provide options for discussions on working arrangements for implementation of the Panel recommendations.

Please reply to this invitation for next Friday morning so that I can determine if we have sufficient participation to continue. (Riedau, I do recall that Fridays are not as convenient for you and hence if you cannot have representation I can have a bilateral with you.)

Thank you
Ashley

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MIC AOT

From: Ashley Naidoo <ANaidoo@dffe.gov.za>
Sent: Wednesday, 15 November 2023 15:27
To: Alistair McInnes; Lauren Waller; Pichegru, Lorien (Dr) (Summerstrand Campus South); Smith, Craig; Katta Ludynia; Dr Mike Bergh; copeland.fishconsult; Matt Horton; Riedau; Alison Kock; Zishan Ebrahim; Cloverley Lawrence; Gerhard Cilliers; Gcobani Popose; Zimasa Jika; Carl David Van Der Lingen; Fannie Welcome Shabangu; Janet Claire Coetzee; Makhudu J. Masotla; Azwianewi Makhado
Cc: Redah De Maine; Millicent Makoala; carl.vanderlingen
Subject: Re: Joint Meeting on Furtherng Discussions on Small Pelagic and Penguin Interactions

Thank you for comments Alistair and to colleagues included

I will cancel tomorrow's meeting, as per your conclusion in the email below. I am not sure how to proceed if the Conservation Reps are only willing to meet if there is a comparable document prepared by the Fisheries Sector.

I think the opportunity missed here is that the Fisheries Sector Reps or ourselves at DFFE were not on the same work schedule as the Conservations Reps in assessing use of the Panel Report – trade-off method. This makes some assumptions on the availability of resources.

Alistair, I do have the correspondence to the Minister (from the 17th of October) on the document prepared, and asked for an extension from the Minister's office for the preparation of a draft response – in the hope that we could together formulate options on a way forward at tomorrow's meeting. (The next steps part of the agenda was to focus on this, and then on process for future science work.)

(Riedau, I will contact you separately on trying to find some options on how to proceed on your matter. First option being another agreement across the sectors.)

Thank you again to all of you for your contributions this far.

Ashley N

From: Alistair McInnes <alistair.mcinnes@birdlife.org.za>
Date: Wednesday, 15 November 2023 at 14:12
To: Ashley Naidoo <ANaidoo@dffe.gov.za>, Lauren Waller <laurenw@ewt.org.za>, lorien.pichegru@mandela.ac.za <lorien.pichegru@mandela.ac.za>, csmith@wwf.org.za <csmith@wwf.org.za>, Katta Ludynia <katta@sanccob.co.za>, Dr Mike Bergh <mike@olsps.com>,

copeland.fishconsult <copeland.fishconsult@gmail.com>, Matt Horton <Matt@olsps.com>, Riedau <redah@rialfishing.co.za>, Alison Kock <Alison.Kock@sanparks.org>, Zishan Ebrahim <Zishan.Ebrahim@sanparks.org>, Cloverley Lawrence <cloverley.lawrence@sanparks.org>, Gerhard Cilliers <GCilliers@dffe.gov.za>, Gcobani Popose <GPopose@dffe.gov.za>, Zimasa Jika <ZJika@dffe.gov.za>, Carl David Van Der Lingen <CVDLingen@dffe.gov.za>, Fannie Welcome Shabangu <FShabangu@dffe.gov.za>, Janet Claire Coetzee <JCoetzee@dffe.gov.za>, Makhudu J. Masotla <MMasotla@dffe.gov.za>, Azwianewi Makhado <AMakhado@dffe.gov.za>
Cc: Redah De Maine <redah@oceangrow.co.za>, Millicent Makoala <MMakoala@dffe.gov.za>, carl.vanderlingen <carl.vanderlingen@gmail.com>
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To: Lauren Waller <laurenw@ewt.org.za>; Pichegru, Lorien (Dr) (Summerstrand Campus South) <lorien.pichegru@mandela.ac.za>; Alistair McInnes <alistair.mcinnes@birdlife.org.za>; Smith, Craig <csmith@wwf.org.za>; Katta Ludynia <katta@sanccob.co.za>; Dr Mike Bergh <mike@olsps.com>; copeland.fishconsult <copeland.fishconsult@gmail.com>; Matt Horton <Matt@olsps.com>; Riedau <redah@rialfishing.co.za>; Alison Kock <Alison.Kock@sanparks.org>; Zishan Ebrahim <Zishan.Ebrahim@sanparks.org>; Cloverley Lawrence

<cloverley.lawrence@sanparks.org>; Gerhard Cilliers <GCilliers@dffe.gov.za>; Gcobani Popose <GPopose@dffe.gov.za>; Zimasa Jika <ZJika@dffe.gov.za>; Carl David Van Der Lingen <CVDLingen@dffe.gov.za>; Fannie Welcome Shabangu <FShabangu@dffe.gov.za>; Janet Claire Coetzee <JCoetzee@dffe.gov.za>; Makhudu J. Masotla <MMasotla@dffe.gov.za>; Azwianewi Makhado <AMakhado@dffe.gov.za>
Cc: Redah De Maine <redah@oceangrow.co.za>; Millicent Makoala <MMakoala@dffe.gov.za>; carl.vanderlingen <carl.vanderlingen@gmail.com>
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Thank you
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From: ANaidoo@dffe.gov.za
When: 09:30 - 11:30 16 November 2023
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Location: MS TEAMS

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Ashley

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Ashley

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"AM72"

Subject: RE: Request from ESCPA to correct closure map at St Croix

From: Ashley Naidoo <ANaidoo@dffe.gov.za>
Sent: Monday, December 11, 2023 2:28 PM
To: Alistair McInnes <alistair.mcinnes@birdlife.org.za>; Lauren Waller <laurenw@ewt.org.za>; Pichegru, Lorien (Dr) (Summerstrand Campus South) <lorien.pichegru@mandela.ac.za>; Smith, Craig <csmith@wwf.org.za>; Katta Ludynia <katta@sanccob.co.za>; Riedau <redah@rialfishing.co.za>; mike.copeland@fishconsult.co.za
Cc: Gerhard Cilliers <GCilliers@dffe.gov.za>; Kim Prochazka <KProchazka@dffe.gov.za>; Zimasa Jika <ZJika@dffe.gov.za>; Gcobani Popose <GPopose@dffe.gov.za>
Subject: Re: Request from ESCPA to correct closure map at St Croix

Dear Alistair, Mike C and colleagues included. (Underlining only denotes person/s to whom specific questions are addressed.)

Alistair (and conservation representatives), have you had an opportunity to consider this request from the ESCPA?
The letter presents two options and I am hoping that as conservation representatives – you will be able to select one.

Mike C – please can you provide an update on additional work that you will be undertaking – you alluded to this previously and Alistair requests, below in his email, updates on this planned work. (I have underlined this request so it is easy to find below.)

Thank you
Ashley

Ashley Naidoo, Ph.D. | Chief Director: Ocean & Coasts Research (he/him)
Find Annual Ocean & Coasts Science Report at:
http://dx.doi.org/10.13140/RG.2.2.19915.77601
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+2782 784 7131

From: Alistair McInnes <alistair.mcinnes@birdlife.org.za>
Date: Tuesday, 05 December 2023 at 17:19
To: Ashley Naidoo <ANaidoo@dffe.gov.za>, Lauren Waller <laurenw@ewt.org.za>, lorien.pichegru@mandela.ac.za <lorien.pichegru@mandela.ac.za>, csmith@wwf.org.za <csmith@wwf.org.za>, Katta Ludynia <katta@sanccob.co.za>
Cc: Gerhard Cilliers <GCilliers@dffe.gov.za>, Kim Prochazka <KProchazka@dffe.gov.za>, Zimasa Jika <ZJika@dffe.gov.za>, Gcobani Popose <GPopose@dffe.gov.za>
Subject: RE: Request from ESCPA to correct closure map at St Croix

AM
MC

Hi Ashley

We have no problem with forwarding our email to the Fishing Representatives.

Regards

Alistair

From: Ashley Naidoo <ANaidoo@dffe.gov.za>
Sent: Monday, December 4, 2023 8:53 AM
To: Alistair McInnes <alistair.mcinnes@birdlife.org.za>; Lauren Waller <laurenw@ewt.org.za>; Pichegru, Lorien (Dr) (Summerstrand Campus South) <lorien.pichegru@mandela.ac.za>; Smith, Craig <csmith@wwf.org.za>; Katta Ludynia <katta@sanccob.co.za>
Cc: Gerhard Cilliers <GCilliers@dffe.gov.za>; Kim Prochazka <KProchazka@dffe.gov.za>; Zimasa Jika <ZJika@dffe.gov.za>; Gcobani Popose <GPopose@dffe.gov.za>
Subject: Re: Request from ESCPA to correct closure map at St Croix

Thank you Alistair and colleagues copied – for getting back to me on this.

Then on other matters raised below -

Alistair - in order to avoid additional miscommunication – could I send your email to the Fisheries Representatives on their planned work? I am not sure if the interpretation of the work needed and its timing is the same across all those involved. (I will copy you in.)

(In the interim both sets of stakeholders have written to the Minister (copied me and other managers), so our planning will also need to be aligned to these responses.)

Thank you
Ashley

From: Alistair McInnes <alistair.mcinnes@birdlife.org.za>
Date: Friday, 01 December 2023 at 16:16
To: Ashley Naidoo <ANaidoo@dffe.gov.za>, Lauren Waller <laurenw@ewt.org.za>, lorien.pichegru@mandela.ac.za <lorien.pichegru@mandela.ac.za>, csmith@wwf.org.za <csmith@wwf.org.za>, Katta Ludynia <katta@sanccob.co.za>
Cc: Gerhard Cilliers <GCilliers@dffe.gov.za>, Kim Prochazka <KProchazka@dffe.gov.za>, Zimasa Jika <ZJika@dffe.gov.za>, Gcobani Popose <GPopose@dffe.gov.za>
Subject: RE: Request from ESCPA to correct closure map at St Croix

Dear Ashley

We acknowledge your email sent earlier today. We will be in touch once we have had an opportunity to consider it properly – but will likely need time beyond Tuesday. We will revert as soon as we can with our timing on this.

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In the interim, we note that we have not heard further from you regarding the position of the closures more generally, since our last correspondence on 15 November 2023 when you conceded that the meeting scheduled for 16 November 2023 should not proceed. We had hoped for an indication from you by now as to when both the conservation sector group and Fisheries Sector would have the opportunity to present their analyses to the DFFE.

We have also had no indication as to when the Fisheries Sector Representatives will provide the full assessment as anticipated SAPFIA's Comments.

We reiterate our understanding that the immediate focus needs to be on implementing the Panel's recommended closure design methodology for the purposes of commencing the closure period during which the future monitoring/evaluation/research work is to take place. Planning future work is naturally important, however, it is not feasible to implement the Panel's recommendations for such monitoring/evaluation/research, if the island closures which are to be the basis for these investigations are not ecologically meaningful for penguins. As a result, we ask that you kindly follow-up with the Fisheries Sector representatives to establish when their analyses will be concluded, mindful of the self-evident urgency of the issue, and that you update us the moment you receive any feedback in that regard.

Regards

Alistair

From: Ashley Naidoo <ANaidoo@dffe.gov.za>
Sent: *Friday, December 1, 2023 12:44 PM*
To: Alistair McInnes <alistair.mcinnes@birdlife.org.za>; Lauren Waller <laurenw@ewt.org.za>; Pichegru, Lorien (Dr) (Summerstrand Campus South) <lorien.pichegru@mandela.ac.za>; Smith, Craig <csmith@wwf.org.za>; Katta Ludynia <katta@sanccob.co.za>
Cc: Gerhard Cilliers <GCilliers@dffe.gov.za>; Kim Prochazka <KProchazka@dffe.gov.za>; Zimasa Jika <ZJika@dffe.gov.za>; Gcobani Popose <GPopose@dffe.gov.za>
Subject: Request from ESCPA to correct closure map at St Croix

Dear Alistair, Lauren, Craig and now including Katta and Lorien as previously requested. (Copied Kim, Zimasa, Gerhard and Gcobani)

The DFFE has received this week, a formal request from Riedau on behalf of the ESCPA, to correct the closure area and map.

As this is an agreement among all of you, I suggested to the Heads of Branches Fisheries & Oceans & Coasts that I need to consult with all of you. Please may I have your thoughts by next Tuesday. If you need more time please let me know.

I have Riedau's and associates permission to share this information with you. In addition to the letter, I also attached recent consolidated maps and media statement as suggested by Riedau.

Once I have your initial response, I will seek to consolidate communications so that all are on the same page.

MC AM

I am including Kim, Gerhard, Zimasa and Gcobani as managers within DFFE who may have a role to play in this discussion as well.

Thank you
Ashley

Ashley Naidoo. Ph.D. | Chief Director: Ocean & Coasts Research (he/him)
Find Annual Ocean & Coasts Science Report at:
http://dx.doi.org/10.13140/RG.2.2.19915.77601
+2721 493 7300
+2782 784 7131

Eastern and Southern Cape Pelagic Association

131 albert Road

Walmer

Port Elizabeth

6070

Telephone 041 5810458

Email; Twesley@rialfishing.co.za

To: Department of Environment Forestry and Fishering

Att: Sue Middelton, Kim Prochazk, Ashley Naidoo, Lisolomzi Fikizolo

Re: Rectifying the permit conditions with correct MAP implemented in error or alternatively cancellation of Agreement.

Date: 27th November 2023

Dear Colleagues,

The Eastern and Southern Cape Pelagic Association hereby wish to bring to your attention our request to rectify the permit condition with the proper MAP attached marked **Negotiation October 2023** alternatively if the permit condition is not rectified than our intention is to withdraw from the agreement of the St Croix Island Closure in the interest of our positive and honest contribution to the African Penguin Colony survival.

We do have an agreement in place with reference to closure of 42.17% of MIBA 21 that we agreed upon due to its smaller enclosed area which was the core purpose of our negotiation but the MAP that was utilised and implemented in the permit conditions were erroneous having utilised the UD 90 MAP design and values instead of only having utilised the UD 90 MAP design based on the MIBA 21 values which was agreed upon.

ESCPA only selected the MAP design of UD 90 not its size or values but somehow the entire maps design and values was utilised of UD 90 and implemented erroneously closing a larger area than what was agreed upon currently having a major negative impact on our fishing.

Confusion was created by introducing MIBA 23 and UD 90 into the equation and that was never part of the agreement concerning the closure.

Upon investigation we discovered that the MAP utilised was the entire area and value of UD 90 and not the shape of UD 90 as proposed to be applied to MIBA 21 based on the 73% interim closure.

ESCPA agreed to close an area of 42.17% of MIBA 21 that is much smaller than the interim closure of 73% that would have related to a total closure of 93% around Bird Island and 42.17% at St Croix both based on MIBA 21 equating to a total closure of 135.17% which already is way beyond the envisaged 50% closure for both Islands.

ESCPA are happy to proceed with the agreed closure as per the Minister's press release, **attached for your ease of reference** but the closure implemented and MAP design in the permit condition are significantly larger that what was agreed upon or that of the interim 73% closure.

We conclude that the agreement was based on closing 42.17% MIBA 21 and the Minister's statement was based on what we had agreed upon, while the current MAP utilised in the permit conditions does not reflect what we had agreed upon and actually increased the area way beyond the interim 73% closure that was all based on MIBA 21.

ESCPA therefore propose that one of two actions take place with immediate effect as listed below.

1) that the Proper MAP attached marked Negotiation 2023 based on MIBA 21 be utilised and that the permit conditions be rectified accordingly.

2) If this rectification is not implemented than we hereby withdraw from the agreement and request that the interim closure of 73% be implemented as a matter of urgency as an interim measure until we finalise a smaller enclosed area.

Kindly note that when ESCPA realised that the wrong MAP size was implemented we immediately informed Ashley Naidoo about it, and he assured us that he would get the parties together to rectify the situation.

For some reason or the other Ashley battled to get the Conservation Group into a meeting, with them technically informing him that they were not prepared to open the matter for rectification purpose, which we fail to understand.

We furthermore are not closed to open discussions around a settlement and attached our MAP for the actual closure relating to the original agreed 42.17% for your ease of reference that we had found upon actual calculations that it is in-fact 54-55% of MIBA 21 and not 42.17% as agreed.

We also bring to your attention that we are still prepared to contribute sardine as feed for rehabilitation of the penguins whenever require.

Our feeling is that the dynamics of St Croix being in close proximity to the Coega Harbour has a major impact on the penguins' demise in this area.

Our Ports are performing very poorly in South Africa and multiple vessels are anchored in Algoa Bay close to St Croix for up to three weeks at a time and are causing a significant amount of noise pollution while at the anchorage with the added poor water quality emanating from the Coega Port being the main factors for penguins decreasing at St Croix.

Penguins are migrating to Bird Island where the habitat is more environmentally friendly and acceptable to the animals hence the increase in population on Bird Island.

We kindly request that this matter be regarded as urgent since our December sardine season is in full force with the current closure hampering our catches while the new season will be starting as early as 15th January 2024.

Warm Regards

Mohammed Riedau DeMaine

"AM73"

Subject: RE: Request from ESCPA to correct closure map at St Croix

From: Ashley Naidoo <ANaidoo@dffe.gov.za>
Sent: Wednesday, December 13, 2023 11:49 AM
To: Riedau <redah@rialfishing.co.za>; Alistair McInnes <alistair.mcinnes@birdlife.org.za>; Lauren Waller <laurenw@ewt.org.za>; Pichegru, Lorien (Dr) (Summerstrand Campus South) <lorien.pichegru@mandela.ac.za>; Smith, Craig <csmith@wwf.org.za>; Katta Ludynia <katta@sanccob.co.za>; mike.copeland@fishconsult.co.za
Cc: Gerhard Cilliers <GCilliers@dffe.gov.za>; Kim Prochazka <KProchazka@dffe.gov.za>; Zimasa Jika <ZJika@dffe.gov.za>; Gcobani Popose <GPopose@dffe.gov.za>; Deon Van Zyl <Deon@afrofishing.co.za>; Tasneem Wesley <twesley@rialfishing.co.za>
Subject: Re: Request from ESCPA to correct closure map at St Croix

Dear Riedau and Alistair and colleagues.

Thank you for your responses, especially so late in the year when all of us are considering some time away from work. Please give me a day to get back to you on a proposed way forward.

Thank you
Ashley

Ashley Naidoo. Ph.D. | Chief Director: Ocean & Coasts Research (he/him)
Find Annual Ocean & Coasts Science Report at:
http://dx.doi.org/10.13140/RG.2.2.19915.77601
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From: Redah De Maine <redah@rialfishing.co.za>
Date: Wednesday, 13 December 2023 at 11:11
To: Alistair McInnes <alistair.mcinnes@birdlife.org.za>, Ashley Naidoo <ANaidoo@dffe.gov.za>, Lauren Waller <laurenw@ewt.org.za>, lorien.pichegru@mandela.ac.za <lorien.pichegru@mandela.ac.za>, csmith@wwf.org.za <csmith@wwf.org.za>, 'Katta Ludynia' <katta@sanccob.co.za>, mike.copeland@fishconsult.co.za <mike.copeland@fishconsult.co.za>
Cc: Gerhard Cilliers <GCilliers@dffe.gov.za>, Kim Prochazka <KProchazka@dffe.gov.za>, Zimasa Jika <ZJika@dffe.gov.za>, Gcobani Popose <GPopose@dffe.gov.za>, Deon Van Zyl <Deon@afrofishing.co.za>, Tasneem Wesley <twesley@rialfishing.co.za>
Subject: RE: Request from ESCPA to correct closure map at St Croix

Dear Alister,

Our agreement proposed by yourself was 40% of MIBA 2021 as explained in my previous email but the map utilised was erroneous having not only utilised the MAP of UD 90 as proposed by ESCPA entailed the value of UD 90 and not that of MIBA 21 upon which we agreed.

The subsequent proposal by the Panel does not feature in our agreement that materialised before that Panel had made their final decisions that does not bear any relevance on what we are currently appealing for.

Environment proposed a settlement and we agreed to such settlement of closing 40 % of MIBA 21 but the erroneous map area of UD 90 utilised resulted in a far greater area being closed that is not fair to ESCPA industry operators.

Agreements are based on honesty and honour and we both went into this agreement in an honourable manner to close 42.175 of MIBA 21 but now all honour appears to have flown out by the window due to an error that favours your original sentiment of closing 100% of the islands.

Why is there suddenly a problem to rectify the MAP when there was an agreement thereon and we were all happy and contented with our agreement.

I still feel that we should stop avoiding each other by having a meeting and look each other in the eye and resolve this matter in an amicable fashion in the interest of both parties.

Kind Regards,
Mohammed Riedau De Maine
CEO
Rial Fishing Group

131 Albert Road , Walmer, Port Elizabeth / PO Box 22650, Central, 6001
Telephone: *041- 581 0459 / 041- 581 0458* ***Cell:*** *082 855 1457* ***Email:****redah@rialfishing.co.za*

From: Alistair McInnes <alistair.mcinnes@birdlife.org.za>
Sent: *Wednesday, December 13, 2023 10:40 AM*
To: Ashley Naidoo <ANaidoo@dffe.gov.za>; Lauren Waller <laurenw@ewt.org.za>; Pichegru, Lorien (Dr) (Summerstrand Campus South) <lorien.pichegru@mandela.ac.za>; Smith, Craig <csmith@wwf.org.za>; Katta Ludynia <katta@sanccob.co.za>; Riedau <redah@rialfishing.co.za>; mike.copeland@fishconsult.co.za
Cc: Gerhard Cilliers <GCilliers@dffe.gov.za>; Kim Prochazka <KProchazka@dffe.gov.za>; Zimasa Jika <ZJika@dffe.gov.za>; Gcobani Popose <GPopose@dffe.gov.za>
Subject: RE: Request from ESCPA to correct closure map at St Croix

Dear Ashley

Thank you for your e-mail. We have considered the two options put forward by ESCPA in the attached letter. Unfortunately, neither is acceptable, particularly as the permits (as amended) already reflect a closure extent committed to by Fisheries which is less than that which would be in place if the method subsequently recommended by the Panel were to be used.

Kind regards

Alistair

From: Ashley Naidoo <ANaidoo@dffe.gov.za>
Sent: Monday, December 11, 2023 2:28 PM
To: Alistair McInnes <alistair.mcinnes@birdlife.org.za>; Lauren Waller <laurenw@ewt.org.za>; Pichegru, Lorien (Dr) (Summerstrand Campus South) <lorien.pichegru@mandela.ac.za>; Smith, Craig <csmith@wwf.org.za>; Katta Ludynia <katta@sanccob.co.za>; Riedau <redah@rialfishing.co.za>; mike.copeland@fishconsult.co.za
Cc: Gerhard Cilliers <GCilliers@dffe.gov.za>; Kim Prochazka <KProchazka@dffe.gov.za>; Zimasa Jika <ZJika@dffe.gov.za>; Gcobani Popose <GPopose@dffe.gov.za>
Subject: Re: Request from ESCPA to correct closure map at St Croix

Dear Alistair, Mike C and colleagues included. (Underlining only denotes person/s to whom specific questions are addressed.)

Alistair (and conservation representatives), have you had an opportunity to consider this request from the ESCPA?
The letter presents two options and I am hoping that as conservation representatives – you will be able to select one.

Mike C – please can you provide an update on additional work that you will be undertaking – you alluded to this previously and Alistair requests, below in his email, updates on this planned work. (I have underlined this request so it is easy to find below.)

Thank you
Ashley

Ashley Naidoo. Ph.D. | Chief Director: Ocean & Coasts Research (he/him)
Find Annual Ocean & Coasts Science Report at:
http://dx.doi.org/10.13140/RG.2.2.19915.77601
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From: Alistair McInnes <alistair.mcinnes@birdlife.org.za>
Date: Tuesday, 05 December 2023 at 17:19
To: Ashley Naidoo <ANaidoo@dffe.gov.za>, Lauren Waller <laurenw@ewt.org.za>, lorien.pichegru@mandela.ac.za <lorien.pichegru@mandela.ac.za>, csmith@wwf.org.za <csmith@wwf.org.za>, Katta Ludynia <katta@sanccob.co.za>
Cc: Gerhard Cilliers <GCilliers@dffe.gov.za>, Kim Prochazka <KProchazka@dffe.gov.za>, Zimasa Jika <ZJika@dffe.gov.za>, Gcobani Popose <GPopose@dffe.gov.za>
Subject: RE: Request from ESCPA to correct closure map at St Croix

Hi Ashley

We have no problem with forwarding our email to the Fishing Representatives.

Regards

Alistair

From: Ashley Naidoo <ANaidoo@dffe.gov.za>
Sent: Monday, December 4, 2023 8:53 AM
To: Alistair McInnes <alistair.mcinnes@birdlife.org.za>; Lauren Waller <laurenw@ewt.org.za>; Pichegru, Lorien (Dr) (Summerstrand Campus South) <lorien.pichegru@mandela.ac.za>; Smith, Craig <csmith@wwf.org.za>; Katta Ludynia <katta@sanccob.co.za>
Cc: Gerhard Cilliers <GCilliers@dffe.gov.za>; Kim Prochazka <KProchazka@dffe.gov.za>; Zimasa Jika <ZJika@dffe.gov.za>; Gcobani Popose <GPopose@dffe.gov.za>
Subject: Re: Request from ESCPA to correct closure map at St Croix

Thank you Alistair and colleagues copied – for getting back to me on this.

Then on other matters raised below -

Alistair - in order to avoid additional miscommunication – could I send your email to the Fisheries Representatives on their planned work? I am not sure if the interpretation of the work needed and its timing is the same across all those involved. (I will copy you in.)

(In the interim both sets of stakeholders have written to the Minister (copied me and other managers), so our planning will also need to be aligned to these responses.)

Thank you
Ashley

From: Alistair McInnes <alistair.mcinnes@birdlife.org.za>
Date: Friday, 01 December 2023 at 16:16
To: Ashley Naidoo <ANaidoo@dffe.gov.za>, Lauren Waller <laurenw@ewt.org.za>, lorien.pichegru@mandela.ac.za <lorien.pichegru@mandela.ac.za>, csmith@wwf.org.za <csmith@wwf.org.za>, Katta Ludynia <katta@sanccob.co.za>
Cc: Gerhard Cilliers <GCilliers@dffe.gov.za>, Kim Prochazka <KProchazka@dffe.gov.za>, Zimasa Jika <ZJika@dffe.gov.za>, Gcobani Popose <GPopose@dffe.gov.za>
Subject: RE: Request from ESCPA to correct closure map at St Croix

Dear Ashley

We acknowledge your email sent earlier today. We will be in touch once we have had an opportunity to consider it properly – but will likely need time beyond Tuesday. We will revert as soon as we can with our timing on this.

In the interim, we note that we have not heard further from you regarding the position of the closures more generally, since our last correspondence on 15 November 2023 when you conceded that the meeting scheduled for 16 November 2023 should not proceed. We had hoped for an indication from you by now as to when both the conservation sector group and Fisheries Sector would have the opportunity to present their analyses to the DFFE.

We have also had no indication as to when the Fisheries Sector Representatives will provide the full assessment as anticipated SAPFIA's Comments.

We reiterate our understanding that the immediate focus needs to be on implementing the Panel's recommended closure design methodology for the purposes of commencing the closure period during which the future monitoring/evaluation/research work is to take place. Planning future work is naturally important, however, it is not feasible to implement the Panel's recommendations for such monitoring/evaluation/research, if the island closures which are to be the basis for these investigations are not ecologically meaningful for penguins. As a result, we ask that you kindly follow-up with the Fisheries Sector representatives to establish when their analyses will be concluded, mindful of the self-evident urgency of the issue, and that you update us the moment you receive any feedback in that regard.

Regards

Alistair

From: Ashley Naidoo <ANaidoo@dffe.gov.za>
Sent: Friday, December 1, 2023 12:44 PM
To: Alistair McInnes <alistair.mcinnes@birdlife.org.za>; Lauren Waller <laurenw@ewt.org.za>; Pichegru, Lorien (Dr) (Summerstrand Campus South) <lorien.pichegru@mandela.ac.za>; Smith, Craig <csmith@wwf.org.za>; Katta Ludynia <katta@sanccob.co.za>
Cc: Gerhard Cilliers <GCilliers@dffe.gov.za>; Kim Prochazka <KProchazka@dffe.gov.za>; Zimasa Jika <ZJika@dffe.gov.za>; Gcobani Popose <GPopose@dffe.gov.za>
Subject: Request from ESCPA to correct closure map at St Croix

Dear Alistair, Lauren, Craig and now including Katta and Lorien as previously requested. (Copied Kim, Zimasa, Gerhard and Gcobani)

The DFFE has received this week, a formal request from Riedau on behalf of the ESCPA, to correct the closure area and map.

As this is an agreement among all of you, I suggested to the Heads of Branches Fisheries & Oceans & Coasts that I need to consult with all of you. Please may I have your thoughts by next Tuesday. If you need more time please let me know.

I have Riedau's and associates permission to share this information with you. In addition to the letter, I also attached recent consolidated maps and media statement as suggested by Riedau.

Once I have your initial response, I will seek to consolidate communications so that all are on the same page.

I am including Kim, Gerhard, Zimasa and Gcobani as managers within DFFE who may have a role to play in this discussion as well.

Thank you

Ashley

Ashley Naidoo. Ph.D. | Chief Director: Ocean & Coasts Research (he/him)
Find Annual Ocean & Coasts Science Report at:
http://dx.doi.org/10.13140/RG.2.2.19915.77601
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+2782 784 7131

MC AM

Subject: African Penguin conservation/Island Closures - letter from Conservation Sector Group to Minister Barbara Creecy

From: Mark Anderson <ceo@birdlife.org.za>
Sent: Wednesday, December 13, 2023 1:18 PM
To: minister@dffe.gov.za
Cc: Lee-Anne Levendal <llevendal@dffe.gov.za>; Ashley Naidoo <ANaidoo@dffe.gov.za>
Subject: African Penguin conservation/Island Closures - letter from Conservation Sector Group to Minister Barbara Creecy

Dear Minister Creecy

Please see attached correspondence for your attention.

Thanks
Mark

Mark D. Anderson
Chief Executive Officer

BirdLife SOUTH AFRICA
Giving Conservation Wings

Isdell House, 17 Hume Road (cnr Hume Road/Jan Smuts Drive), Dunkeld West 2196, Gauteng
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http://www.birdlife.org.za

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13 December 2023

Honourable Barbara Creecy
Minister of Forestry, Fisheries and the Environment

By email: minister@dffe.gov.za

CCd: Ms Lee-Anne Levendal
Chief of Staff: Office of the Minister
Department of Forestry, Fisheries and the Environment
llevendal@dffe.gov.za

Dr Ashley Naidoo
Chief Director: Oceans and Coasts
Department of Forestry, Fisheries and the Environment
anaidoo@dffe.gov.za

Dear Minister Creecy,

1. We refer to the "Report of the International Review Panel Regarding Fishing Closures Adjacent to South Africa's African Penguin Breeding Colonies and Declines in the Penguin Population" (**Report**) and your announcement on 4 August 2023 of the publication of the Report and approach to implementing "island closures" (**Announcement**). We also refer to:
    a. Subsequent engagements by the Conservation Sector Group representatives with members of your Department (**DFFE**) as well as representatives of the Fisheries Sector.
    b. The Conservation Sector Group's assessment of the Report recommendations and their application to meaningful island closure design forwarded to your office on 17 October 2023 (**Assessment**).
    c. Correspondence from BirdLife South Africa (**BLSA**) addressed to your office on 2 October 2023 and 16 October 2023, in which BLSA requested that you provide information regarding the holders of small pelagic fishing rights.
    d. Your office's response to that correspondence, received by BLSA on 24 November 2023.

2. At the outset, we again emphasise that the conservation sector has sought to engage with the DFFE and the Fisheries Sector in good faith over the past fifteen years for the purposes of providing best available scientific input to the DFFE to ensure the conservation of South Africa's African Penguin population and to prevent this population from declining to levels approaching functional extinction in the near future. Concerningly, the most recent census, which is currently being collated, and which has been carried out in collaboration with the DFFE and its Namibian counterpart, demonstrates that African Penguin numbers have declined to levels at which this species is likely to fulfil the IUCN criteria for its red listing to globally Critically Endangered. Working with the DFFE, the census figures will be finalised in the new year and we will keep your office updated as to developments, including those relevant to the IUCN red listing process. We

emphasise that the best available scientific data indicate that small pelagic prey availability remains key to halting population declines in South Africa.

3. Against this scientific background, the need for the DFFE to take decisive and meaningful action to halt the African Penguin's population decline is self-evident. Consequently, we welcomed your convening of the International Panel (**Panel**) to resolve the impasse that had emerged between representatives of the Fisheries Sector and conservation scientists regarding the necessity and delineation of island closures as a key conservation measure. However, for reasons we elaborate below, we are concerned that the Report's findings and recommendations are not adequately catered for by the approach to implementing island closures conveyed in the Announcement.

4. The Report has confirmed the scientific value of island closures and presented a clear recommendation on an appropriate trade-off methodology to design island closures that uses the best available scientific data to ensure (a) the best possible conservation outcomes for the African Penguin in the short-term, which is critical in terms of its threatened status, and (b) the best possible basis for future scientific enquiry in accordance with the Report's recommendations. This recommended closure and trade-off methodology is an important pre-requisite for enabling all parties to implement the Report's recommendations relating to future programmes of study over a longer period than was provided by the "Island Closure Experiment". As shown in the Conservation Sector Group's carefully reasoned Assessment (re-attached for ease of reference), the interim closures which are currently in place cannot achieve their intended objectives. In contrast, a transition to closures determined according to the marine Important Bird and Biodiversity Area method using Area Restricted Search (**mIBA-ARS**), as recommended by the Report, will better achieve the Report's recommendations and come at a low to negligible cost to the fishing industry.

5. The Conservation Sector Group has communicated its concerns regarding the interim closure design to the DFFE representatives, as well as to those representatives of the Fisheries Sector of which it is aware. We have done so mindful that the "agreement" which the Announcement contemplates being reached over the fishing limitations would almost certainly not be achieved given (a) the impasse over closures which gave rise to the Panel's appointment in the first place and (b) the lack of incentives for the Fisheries Sector to make island closures more representative of African Penguin core foraging areas than the interim closures. Our subsequent engagements with the Fisheries Sector have proven these concerns to be well founded:

    a. The South African Pelagic Fishing Association (**SAPFIA**), with whom the DFFE suggested we engage, has adopted the starting position that there should be no island closures at all. It is difficult to understand how the Conservation Sector Group is to engage further with SAPFIA given this standpoint, not to mention SAPFIA'a failure to provide any meaningful engagement with the closure methodology in favour of future research. As stated above, it is not possible to carry out meaningful monitoring and evaluation and assessment of the role and effectiveness of island closures if the baseline closures implemented for the period of the 6-year review are known to be outside the parameters of ecologically meaningful closure designs.
    b. In addition to engagements with SAPFIA, the Conservation Sector Group has also attempted to reach out directly to the Oceana Group, which is the sole listed company of which we are aware in the small-pelagic fishing space. It is clear from these engagements too that consensus on the fishing limitations is not going to be reached between the conservation and fisheries sectors.
    c. Finally, while our engagements with the Eastern and Southern Cape Pelagic Association (**ESCPA**), which in fact commenced prior to the Announcement, have resulted in

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meaningful permit amendments from September 2023, these amendments have since been undermined and reneged by the ESCPA representatives.

6. At all times, we have endeavoured to give effect to the Panel's recommendations. We have done so by analysing the Report, preparing our Assessment (anticipating that the Fisheries Sector would do the same), requesting that your office circulate our Assessment to the Fisheries Sector, and repeatedly seeking the Fisheries Sector's assessment of application of the Panel's recommended closure and trade-off methodology to island closures. To date, no such assessment has been forthcoming.

7. In addition to asking the DFFE to circulate the Assessment to the Fisheries Sector and requesting a comparable assessment from it, the Conservation Sector Group has made additional attempts to engage with those rights holders who may be directly affected by island closures. It is to this end that Mr Craig Smith of WWF South Africa attempted to procure the list of small pelagic rights holders and BLSA addressed its letters of 2 October 2023 and 16 October 2023 to your offices. The approach taken in the DFFE's response, which insists that the identities of small pelagic fishing rights holders may only be obtained via a request lodged in terms of the Promotion of Access to Information Act, 2 of 2000 (**PAIA**), is very unfortunate. This prevents the Conservation Sector Group from taking proactive steps to identify the relevant stakeholders. The DFFE's response suggests that it has overlooked its critical role in ensuring that steps are taken to protect a species which is recognised and listed as threatened.

8. In these circumstances, it is apparent that meaningful conservation interventions for African Penguins cannot be achieved without the DFFE's intervention and a clear indication that all of the Panel's recommendations are to be implemented – including, most importantly, the recommended closure design methodology. In the circumstances, we urge the DFFE and your office to ensure that the recommendations expressed in the Report are properly considered and implemented through the decisive imposition of redefined island closures determined in accordance with the recommended closure design methodology. Nothing short of such measures will ensure ecologically meaningful outcomes for this highly threatened species.

Yours sincerely,

Mark D. Anderson
Chief Executive Officer, BirdLife South Africa

Yolan Friedmann
Chief Executive Officer, Endangered Wildlife Trust

Prof. Lorien Pichegru
Institute for Coastal and Marine Research, Nelson Mandela University

Maskell.

Natalie Maskell
Chief Executive Officer, SANCCOB

Morné du Plessis

Dr Morné du Plessis
Chief Executive Officer, WWF-SA

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MLC

The potential for interim purse-seine fisheries restrictions to alleviate resource competition around African Penguin colonies: assessment based on International Review Panel Report recommendations

Alistair McInnes,[1,2] Eleanor A Weideman,[1] Lauren Waller,[3,4] Lorien Pichegru,[2] Richard Sherley,[5] Craig Smith,[6] Katrin Ludynia,[4,7] Tegan Carpenter-Kling,[2] Christina Hagen,[1] Peter Barham,[4,9] Nicky Stander,[7] Lynne Shannon[10]

[1] Seabird Conservation Programme, BirdLife South Africa
[2] Institute for Coastal and Marine Research, Nelson Mandela University
[3] Endangered Wildlife Trust
[4] Department of Biodiversity & Conservation Biology, University of the Western Cape,
[5] Centre for Ecology and Conservation and Environment and Sustainability Institute, University of Exeter, UK
[6] World-Wide Fund for Nature, South Africa
[7] Southern African Foundation for the Conservation of Coastal Birds
[9] School of Physics, University of Bristol
[10] Department of Biological Sciences, University of Cape Town

17 October 2023

1. Executive Summary

1.1. In this analysis, we use the guidelines in terms of a trade-off mechanism provided by the International Review Panel Report (**IRPR**)[1] to compare the benefits to African Penguins and costs to the fishing industry for: (a) penguin foraging ranges; (b) core penguin foraging areas; (c) the 20 km closures implemented during the Island Closure Experiment (**ICE**); and (d) the interim closures that are currently in place.

1.2. The core African Penguin foraging area was defined using the "marine Important Bird Area method using Area Restricted Search" (**mIBA-ARS**). This methodology was recognised by the IRPR as representing the best scientific basis for delineating preferred foraging areas of African Penguins during breeding.

1.3. Following IRPR recommendations, trade-off analyses were assessed for three colonies: Dassen Island, Robben Island and Stony Point. We have not included trade-off analyses for St Croix and Bird Islands as permit conditions have already been amended pursuant to the IRPR process. In addition, the split-zone configuration of the interim closure around Dyer Island precluded us from assessing trade-offs for this colony due to a lack of fishery cost data.

1.4. In the case of Robben Island and Stony Point, interim closures protect only 43% and 30% of African Penguins' core foraging areas respectively. The interim closure in place around Dassen Island excludes a critical portion of this breeding colony's northern core foraging area. Therefore, these interim closures are highly unlikely to mitigate resource competition between African Penguins and purse-seine fisheries.

[1] Punt, A.E., Furness, R.W., Parma, A.M., Plagányi-Lloyd, E., Sanchirico, J.N., Trathan, P.N. (2023) Report of the international review panel regarding fishing closures adjacent to South Africa's African Penguin breeding colonies and declines in the penguin population. Department of Forestry, Fisheries and the Environment (DFFE). ISBN: 978-0-621-51331-8.

1.5. By contrast, results of the trade-off analyses recommended by the IRPR and illustrated below show that implementing closures around core African Penguin foraging areas (i.e. using the mIBA-ARS approach)[2] will incur very little, and in some instances negligible, costs to the fishing industry.

1.6. Closures need to incorporate more representative portions of the African Penguins' core foraging areas to be biologically meaningful. This document makes proposals to this effect and illustrates that, in most instances, following the IRPR's recommended methodology results in closing more representative African Penguin foraging areas with little cost to the fishing industry.

2. Introduction and Background

2.1. On 4 August 2023, the Minister of Forestry, Fisheries and the Environment (**Minister**) announced the publication of the *Report of the international review panel regarding [purse-seine] fishing closures adjacent to South Africa's African Penguin breeding colonies and declines in the penguin population* (**IRPR**).[3] In the same announcement, she stated that "*If there is agreement on fishing limitations over the next few weeks or months across these sectors, these will be implemented as they are agreed upon. If no alternate fishing limitation proposals are concluded by the start of the 2024 Small Pelagic Fishing Season (January 15th 2024) the current interim fishing limitations will continue until the end of the 2033 Fishing Season, with a review in 2030 after six years of implementation from the start of the 2024 fishing season*".[4]

2.2. The interim closures were originally implemented in September 2022 around six African Penguin colonies as a temporary measure pending the conclusion and release of the IRPR.[5] The scientific basis for defining these areas has not been published or otherwise communicated by the Minister or the Department of Forestry, Fisheries and the Environment (**DFFE**).

2.3. The IRPR provided recommendations for a trade-off mechanism to help identify closure extents that would maximise benefits to African Penguins while minimising costs to the purse-seine fishing industry.

2.4. In this document, we provide the results of an assessment of different proposals, using the trade-off methodology that was recommended by the IRPR. We apply this trade-off methodology to three colonies (Dassen Island, Robben Island and Stony Point) which comprise three of the remaining six large African Penguin breeding colonies in South Africa that were assessed in the IRPR. St Croix Island and Bird Island colonies have amended permits in place with effect from 1 September 2023 pursuant to the IRPR process. They have therefore not been included in the trade-off assessments. The split-zone configuration[6] currently in place as the interim closure around Dyer Island requires updated fisheries cost data. Dyer Island has, thus, also been omitted from the trade-off analysis.

2.5. We compare the potential for alleviating resource competition between African Penguins and purse-seine fishing between: (a) penguin foraging ranges (see further 4.1.6 below); (b) core penguin foraging areas using the mIBA-ARS methodology (see further 4.1.7 below); (c) the 20 km

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[2] *Ibid.*

[3] DFFE (4 August 2023) Media Statement: Science Based Measures are now being implemented to protect the critically endangered African Penguins, says Minister of Forestry, Fisheries and Environment, Ms Barbara Creecy, available online < https://www.dffe.gov.za/node/2001> (last accessed 5 October 2023).

[4] *Ibid.*

[5] DFFE (2022) Media Statement: Interim Fishing Closures and Limitations around Key Penguin Colonies, available online <https://www.dffe.gov.za/Interim-fishing-closures-and-limitations-around-key-penguin-colonies> (last accessed 5 October 2023).

[6] i.e two zones, one that restricts all purse-seine fishing and one that restricts fishing to vessels ≥ 26m in length.

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closures implemented during the Island Closure Experiment; and (d) the interim closures that are currently in place.

2.6. For each colony we provide maps of the different closure extents in relation to African Penguin foraging tracks (from GPS devices attached on chick-rearing African Penguins) and the foraging range (UD90, i.e. see 4.1.6 below); calculate the proportion of the core African Penguin foraging areas (i.e. the mIBA-ARS) within the current interim closure extents; and provide trade-off curves which show the area of each closure versus the estimated cost to industry, following methods recommended by the IRPR.

2.7. The decline by approximately 40% of the South African African Penguin population over the past six years (2018 to 2023)[7] highlights the urgency of implementing effective conservation measures which maximise benefits to the African Penguin.

3. Key findings of the International Review Panel Report (IRPR)

The following key findings of the IRPR are relevant to the selection of optimal closure designs:

3.1. Decisions on closure designs should be colony-specific given the differences in African Penguin foraging areas and costs to fisheries around each colony.[8]

3.2. The Opportunity-based Model (**OBM**) and Social Accounting Matrix (**SAM**) used by consultants commissioned by the South African Pelagic Fishing Industrial Association to estimate the costs to the fishing industry of different closure delineations, likely overestimate the actual costs but can be used in a relative sense to rank different closure options.[9]

3.3. Conservation actions should be spread throughout the range of the species.[10]

3.4. Closures should be in place throughout the year and should be implemented for a period that can adequately assess the impacts of fisheries restrictions on survival and recruitment.[11]

3.5. Closures that reflect valuable African Penguin foraging areas will have greater benefits than those that close less valuable foraging areas.[12]

3.6. Closures based on the mIBA-ARS methodology represent the best scientific basis for delineating preferred foraging areas during breeding.[13]

3.7. Closure areas should be selected based on the suitability of these delineations to evaluate the effectiveness of alleviating resource competition on African Penguins.[14]

3.8. It is desirable to identify a solution that minimizes societal costs and maximizes benefits to African Penguins; however, an optimal solution between competing objectives is not simply obtained by closing 50 percent of any given area.[15]

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[7] We note that the monitoring and evaluation review period for the closures to be put in place is six years. It is striking that within the last six-year period, population decline has been dramatic.
[8] IRPR, Sec. 4.4., pg. 36.
[9] IRPR, Sec. 3.3, pg. 31; Sec. 4.4., pg. 36.
[10] IRPR, Sec. 4.4. pg. 36.
[11] IRPR. Sec. 4.1. pg. 33.
[12] IRPR, Sec. 4.4., pg. 36.
[13] IRPR, Sec. 4.3., pg. 34.
[14] IRPR, Sec. 4.1., pg. 33.
[15] IRPR, Sec. 4.4., pg. 36.

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4. Applying the trade-off mechanism recommended by the IRPR to African Penguin colonies and assessing the suitability of current interim closures in light of the IRPR's findings

4.1. Methods

4.1.1. The IRPR outlines a trade-off mechanism, i.e. using a trade-off curve, to select closures that minimise societal costs and maximise benefits to African Penguins. The point at which the change in African Penguin benefits matches the change in costs to society (based on the OBM model) is recommended as a potential reference point to guide the selection of optimal closures.

4.1.2. The IRPR provides examples of these trade-off curves for six of the largest penguin colonies.[16] These include various closure options proposed since 2021 and their corresponding estimated costs to fisheries for each small pelagic fish stock relevant to each specific colony.

4.1.3. As referenced above, the IRPR notes that the OBM and SAM (which were used to estimate the above-mentioned costs) likely overestimate costs to fishery, by an unknown magnitude.

4.1.4. The interim closures implemented by DFFE in 2022 include a mix of closures proposed by DFFE during 2021[17] and those selected by the Consultative Advisory Forum for Marine Living Resources (**CAF**) in 2022.[18]

4.1.5. In the following analysis, we have adopted the trade-off mechanism, recommended in the IRPR, i.e. measuring benefits to African Penguins versus relative costs to fisheries.

4.1.6. For each colony, we have compared the relative costs to fisheries against: (a) African Penguins' full foraging range without outliers (i.e. UD90);[19] (b) African Penguins' core foraging area (i.e. mIBA-ARS, see further below); (c) the interim closures; and (d) 20km closures used during the ICE.[20]

4.1.7. Core African Penguin foraging areas were estimated using methods to determine marine Important Bird Areas (**mIBA**)[21] using the Area Restricted Search (**ARS**) methodology to align the delineations of closures to the foraging behaviour of the penguins.[22] The mIBA-ARS

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[16] IRPR, Sec. 4.4., pg. 37.

[17] Coetzee, J.C., Makhado, A., van der Lingen, C.D., Ebrahim, Z., Kock, A., Lawrence, C., and Shabangu, F.W. (2021) African Penguin colony closures: Finding a balance between minimizing costs to the small pelagic fishing industry while maximizing coverage of foraging area for breeding African Penguins. DFFE Document O&C/2021/SEP/Extended Penguin TT/01.

[18] Consultative Advisory Forum (CAF) (2022) Special Project Report on Penguin and Small Pelagic Fishery Interactions by the Consultative Advisory Forum for Marine Living Resources.

[19] UD90 refers to mIBA using a 90% kernel utilisation distribution (see McInnes, A.M., Weideman, E., Waller, L., Sherley, R., Pichegru, L., Ludynia, K., Hagen, C., Barham, P., Smith, C., Kock, A., and Carpenter-Kling, T. (2023) Purse-seine fisheries closure configurations for African Penguin conservation: methods and considerations for optimal closure designs. Document FP/PANEL/WP/09 presented to the Panel in June 2023).

[20] Punt et al. *supra*.

[21] Lascelles, B. G., Taylor, P. R., Miller, M. G. R., Dias, M. P., Oppel, S., Torres, L., Hedd, A., Le Corre, M., Phillips, R. A., Shaffer, S. A., Weimerskirch, H., & Small, C. (2016) Applying global criteria to tracking data to define important areas for marine conservation. Diversity and Distributions, 22(4), 422–431. https://doi.org/10.1111/ddi.12411; Dias, M. P., Carneiro, A. P. B., Warwick-Evans, V., Harris, C., Lorenz, K., Lascelles, B., Clewlow, H. L., Dunn, M. J., Hinke, J. T., Kim, J. H., Kokubun, N., Manco, F., Ratcliffe, N., Santos, M., Takahashi, A., Trivelpiece, W., & Trathan, P. N. (2018) Identification of marine Important Bird and Biodiversity Areas for penguins around the South Shetland Islands and South Orkney Islands. Ecology and Evolution, 8(21), 10520–10529.

[22] Lascelles et al. *supra*; McInnes et al. *supra*

method was recommended by the IRPR as the preferred methodology for delineating important African Penguin foraging areas (see 3.6 above).

4.1.8. We have used the median cost from the OBM model (i.e. where each set could be reused five times – refer to section 3 of the IRPR for details) to assess the relative impact of different closure options for each colony and catch-type (see 4.1.9 below).[23]

4.1.9. For each colony we provide trade-off curves for four types of catch: (a) directed anchovy; (b) directed sardine; (c) sardine bycatch; and (d) redeye. Sardine and anchovy are the principal prey of African Penguins, although redeye is also targeted to a lesser degree.[24]

4.1.10. Identification of the point at which the change in African Penguin benefits matches the change in costs to society could not be assessed quantitatively due to a lack of corresponding fisheries cost data which could facilitate fitting a curve to different closure options related to penguin tracking data.

4.1.11. We note that in respect of Dyer Island, the lack of fishery cost data for the split-zone scenario for the interim closure around this colony prevents us from assessing trade-offs at this stage. In respect of St Croix and Bird islands, fishing permits have been amended (pursuant to the IRPR process).[25] Therefore, these fishing closures are reflected below without additional analysis for the sake of completeness.

4.2. Colony assessments

4.2.1. **Dassen Island**

a) The existing interim closure around Dassen Island (shown as the red line in Figure 1A) omits a significant area in the northern portion of the African Penguins' core foraging area i.e. the mIBA-ARS (shown as the dark green line).

b) This northern area is critical to African Penguins from this colony. First, it forms part of their core foraging area proximate to the Dassen Island breeding grounds. Second, small-pelagic fishing within this northern portion of the mIBA-ARS is likely to have downstream effects on prey availability for African Penguins in the remainder of their core foraging area due to the southward movement of anchovy recruits between May and August which also corresponds to the core breeding season for penguins from this colony.

c) The interim closure is therefore assessed as not being adequately representative of important African Penguin foraging area for this colony, as per the recommendation of the IRPR.

d) By contrast, the relative regional cost to fisheries for anchovy, sardine and redeye is low for both the mIBA-ARS and the interim closure options (see Figure 1B below).

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[23] The IRPR states that the OBM overestimates costs to the industry by an unknown amount, and that the results of the OBM should be used to compare different closure options in a relative sense. We have used the middle ground point estimate as reflected in the IRPR (see IRPR, Figs 4.4 & 4.5, pg. 37).

[24] Crawford, R. J. M., Altwegg, R., Barham, B. J., Barham, P. J., Durant, J. M., Dyer, B. M., Geldenhuys, D., Makhado, A. B., Pichegru, L., Ryan, P. G., Underhill, L. G., Upfold, L., Visagie, J., Waller, L. J., & Whittington, P. A. (2011) Collapse of South Africa's penguins in the early 21st century. African Journal of Marine Science, 33(1), 139–156. https://doi.org/10.2989/1814232X.2011.572377.

[25] Permit Conditions: Pelagic Fish Anchovy and Sardine Fisheries: 2023. Fishing Season 2023. Date of Approval: 31 August 2023. Issued in terms of section 13 of thee Marine Living Resources Act, 1998 (Act No. 18 of 1998) by the Department of Forestry, Fisheries and the Environment.

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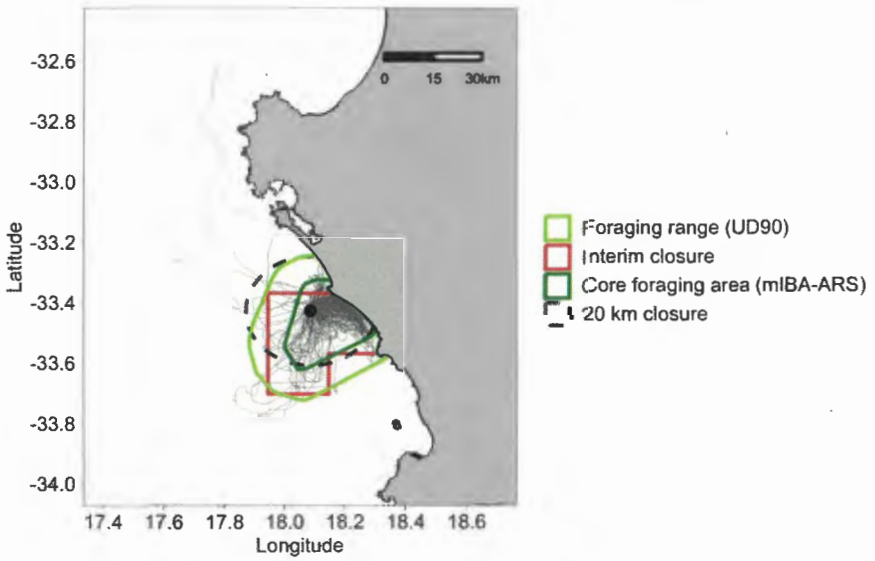
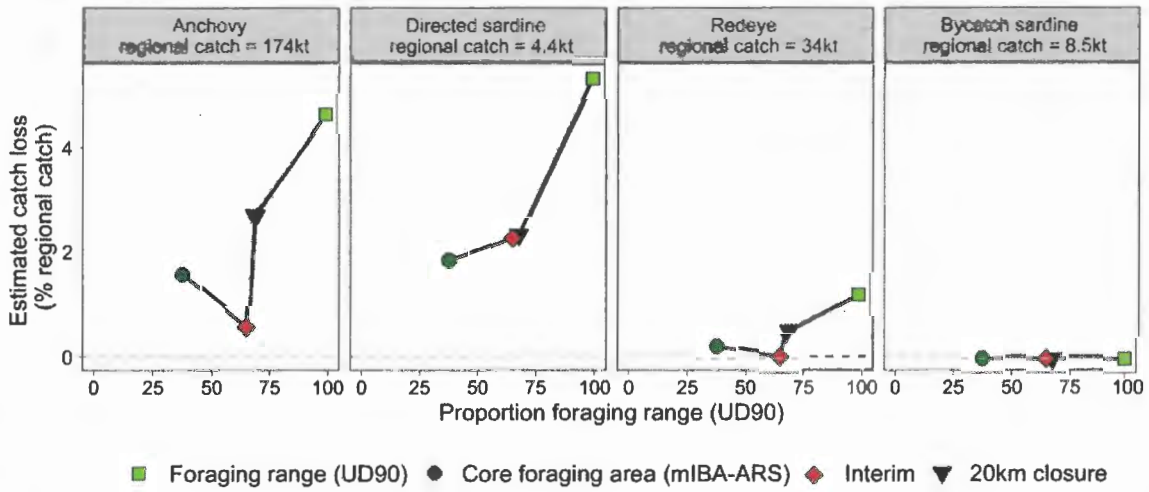
e) As a consequence, and following the IRPR recommendations set out in paragraphs 3.5-3.8 above, it is recommended that the mIBA-ARS closure option be used.

Figure 1A



Map showing closure options around Dassen Island in relation to African Penguin foraging tracks (thin grey lines).

Figure 1B



Trade-off curve for Dassen Island showing the proportion of penguin foraging range covered by each closure option and the associated catch loss for four different stocks as estimated by the OBM using data for 2011-2020. Catch loss is shown as a percentage of the regional catch (west of Cape Point). Note that the IRPR states that the OBM overestimates the catch loss and can thus only be used to rank closure options in a relative sense.

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4.2.2. **Robben Island**

a) The existing interim closure surrounding Robben Island (shown as the red line in Figure 2A) is the existing portion of the fully restricted Marine Protected Area which already excludes fishing for sardine, anchovy and red-eye.[26]

b) The interim closure includes only 43% of the penguins' core foraging area (mIBA-ARS, shown as the dark green line in Figure 2A).

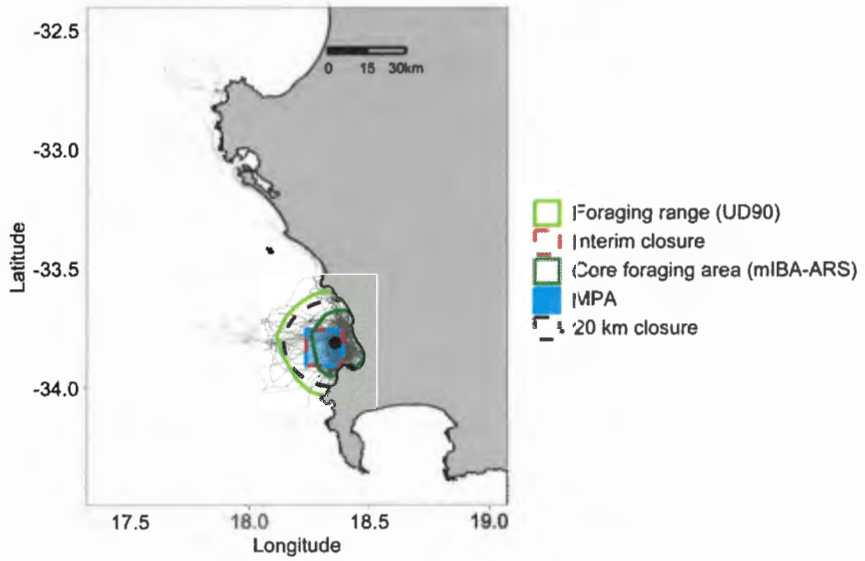
c) The interim closure is therefore assessed as not being adequately representative of important penguin foraging area for this colony, as per the recommendation of the IRPR.

d) By contrast, the relative regional cost for anchovy, sardine and redeye is low for both the mIBA-ARS closure option and the 20 km closure option (shown as the hatched black line in Figure 2A). The comparison of the relative costs is shown in Figure 2B below.

e) The 20 km closure option includes 100% of the mIBA-ARS closure but also includes a greater proportion (83%) of the African Penguins' foraging range which is shown as the light green line around this colony in Figure 2A. See the comparative areas set out in Figure 2B below.

f) Although the 20 km closure option affords African Penguins greater foraging area benefits, it incurs a slightly greater cost to fisheries. As a consequence, and following the IRPR recommendations set out in paragraphs 3.5-3.8 above, it is recommended that the mIBA-ARS closure option be used.

Figure 2A



Map showing closure options around Robben Island in relation to African Penguin foraging tracks (thin grey lines).

[26] See National Environmental Management: Protected Areas Act (57/2003): Notice declaring the Robben Island Marine Protected Area in terms of section 22A of the Act (GN774 in GG42478 of 23 May 2019).

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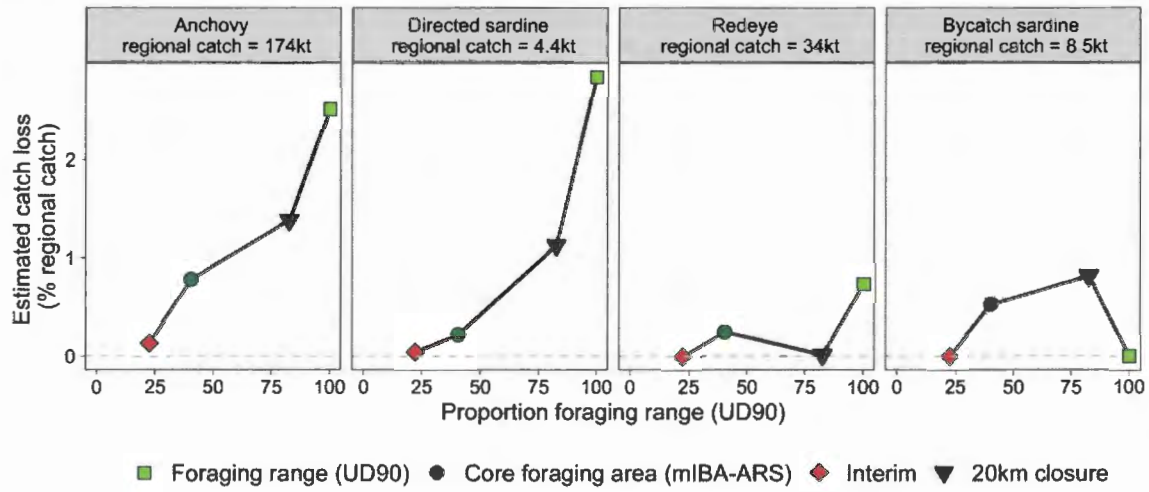
Figure 2B



Trade-off curve for Robben Island showing the proportion of penguin foraging range covered by each closure option and the associated catch loss for four different stocks as estimated by the OBM using data for 2011-2020. Catch loss is shown as a percentage of the regional catch (west of Cape Point). Note that the IRPR states that the OBM overestimates the catch loss and can thus only be used to rank closure options in a relative sense.

4.2.3. **Stony Point**

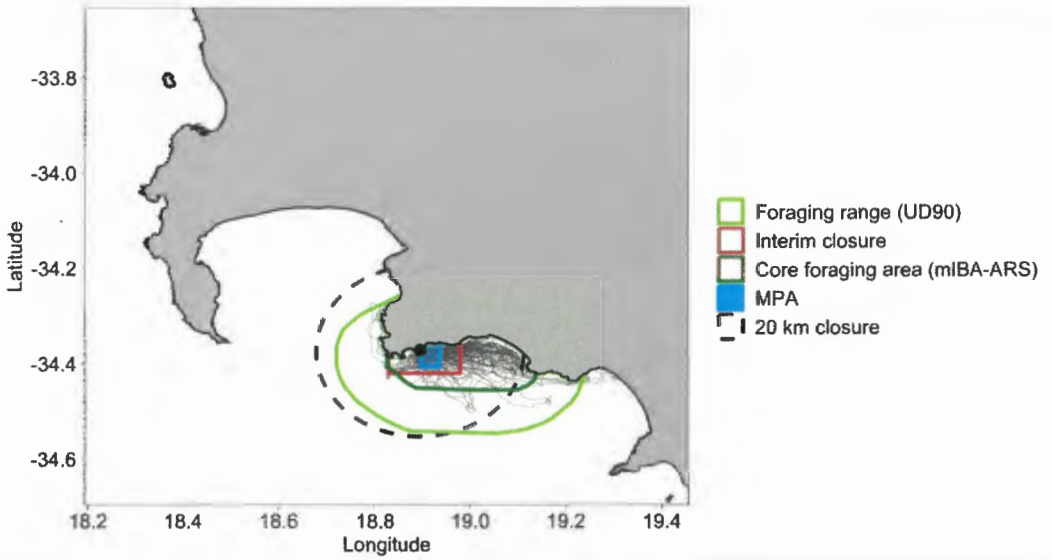
a) The interim closure around Stony Point (shown as the red line in Figure 3A) includes only 30% of the African Penguins' core foraging area (mIBA-ARS, shown as the dark green line in Figure 3A). The interim closure therefore does not provide adequate protection of important penguin foraging area for this colony. In addition, it does not accord with the IRPR recommendations reflected in paragraph 3.8 above.

b) By contrast, the relative regional cost for anchovy, sardine and redeye is negligible to low for both the interim and mIBA-ARS closure options as illustrated in Figure 3B below.

c) As a consequence, and following the IRPR recommendations set out in paragraphs 3.5-3.8 above, it is recommended that the mIBA-ARS closure option be used. This approach, based on best-available science, would support the objective of population recovery at this colony which is well-situated for enhanced conservation measures as well as providing economic benefits through tourism.[27]

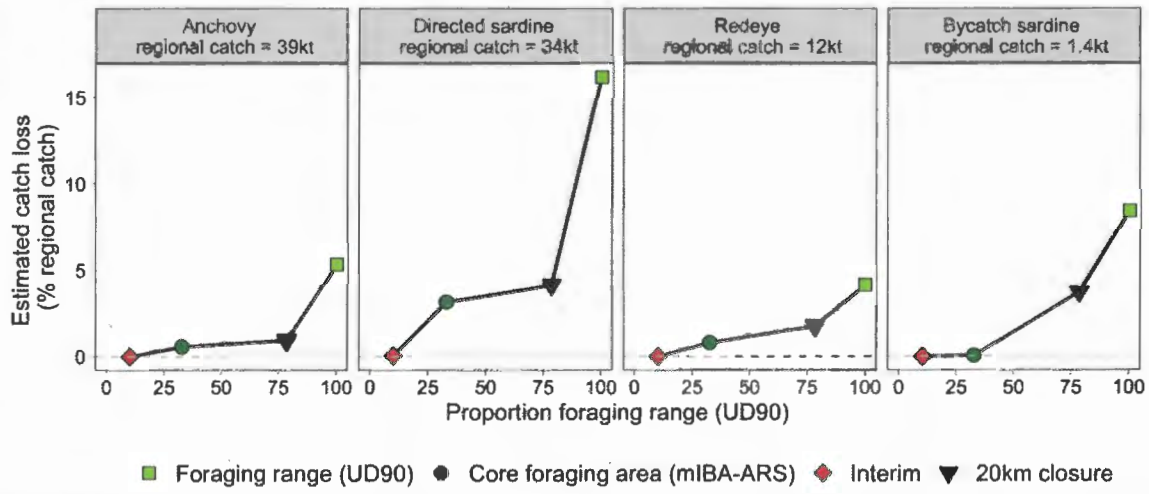
[27] IRPR, Sec. 4.5, pg. 38.

Figure 3A



Map showing closure options around Stony Point in relation to African Penguin foraging tracks (thin grey lines).

Figure 3B



Trade-off curve for Stony Point showing the area of each closure option and the associated catch loss for four different stocks as estimated by the OBM using data for 2011-2020. Catch loss is shown as a percentage of the regional catch (Cape Point to Agulhas). Note that the IRPR states that the OBM overestimates the catch loss and can thus only be used to rank closure options in a relative sense.

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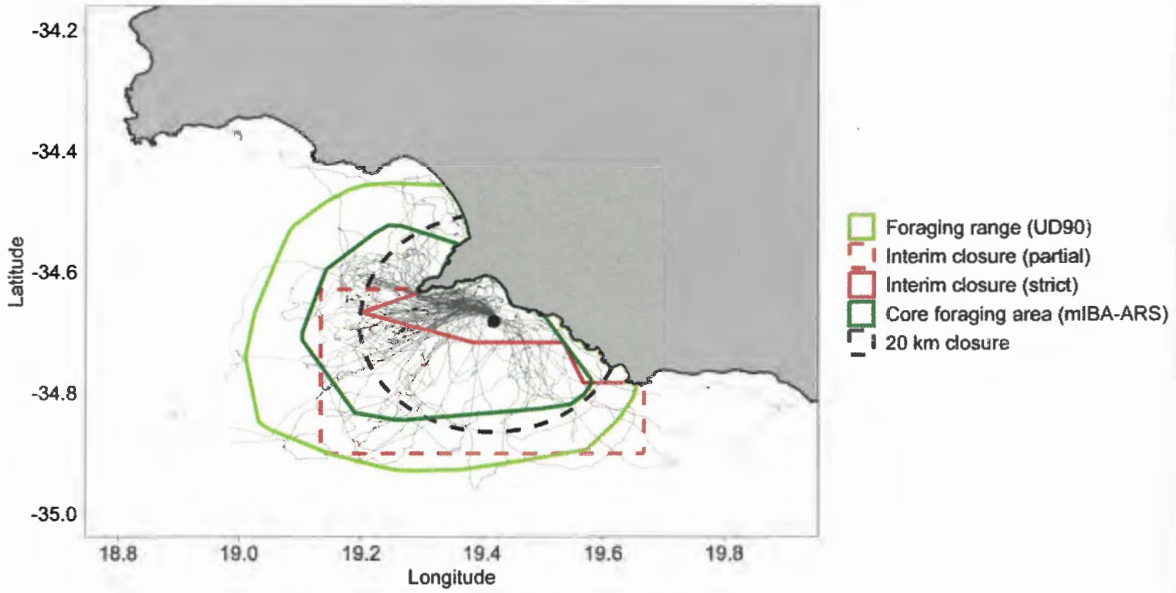
4.2.4. **Dyer Island**

a) The existing interim closure around Dyer Island includes two zones: (i) an inshore zone which is completely restricted to all purse-seine fishing (shown as the solid red line in Figure 4); and (ii) an offshore zone that only excludes purse-seine vessels ≥ 26m in length (shown as the hatched red line in Figure 4).

b) The costs to fisheries have not been estimated for the split-zone interim closure scenario for this colony. It is therefore recommended that the relative costs to industry be calculated on the basis of this scenario before assessing the relative trade-offs.

Figure 4



Map showing closure options around Dyer Island in relation to African Penguin foraging tracks (thin grey lines). The dashed red line indicates the partial interim closure that is open to vessels <26m, while the area inside the solid red line is closed to all vessels.

4.2.5. **St Croix Island**

a) The conditions of the small pelagic fishing permits for this colony have been amended by the DFFE with effect from 1 September 2023.

b) The amended closure extent is depicted as the orange line in Figure 5.

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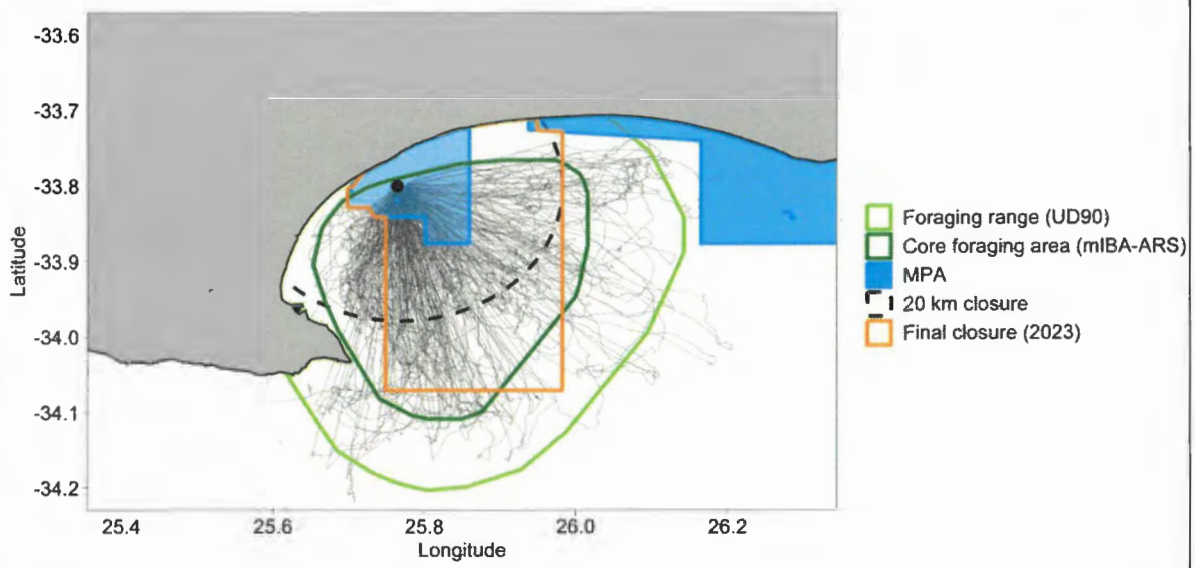
Figure 5



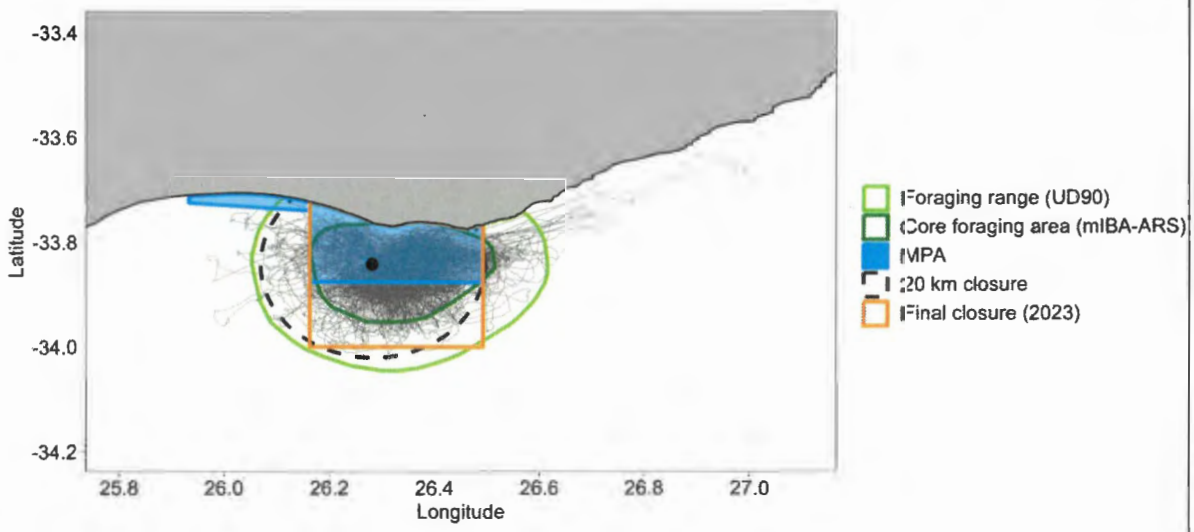
Map showing the closure (orange line) around St Croix Island (as reflected in the permits) in relation to African Penguin foraging tracks (thin grey lines).

4.2.6. **Bird Island**

a) The conditions of the small pelagic fishing permits for this colony have been amended by the DFFE with effect from 1 September 2023.

b) The amended closure extent is depicted as the orange line in Figure 6.

Figure 6



Map showing the closure (orange line) around Bird Island (as reflected in the permits) in relation to African Penguin foraging tracks (thin grey lines.

5. Conclusion

5.1. The interim closures currently in place have little to no benefit for African Penguins in terms of reducing current resource pressure. By contrast, the interim closures incur low to negligible costs to the fishing industry at the expense of protecting African Penguin populations. This is contrary

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to the recommendations of the IRPR and an inappropriate trade-off to maximise benefits to penguins while minimising societal costs.

5.2. It is clear that interim closures do not follow IRPR recommendations, given that they have been shown in this report to be inadequate in their capacity to mitigate resource competition to African Penguin survival and recruitment. As a consequence, the proposed six-year review (which is intended to enable assessment of the efficacy of biologically meaningful closures) will not achieve its objective. Further, this approach would be contrary to the best-available scientific methodology and data currently available and as identified by the IRPR.

5.3. We propose a scenario for each of the three colonies assessed here that would be suitable to evaluate the benefits of closures to mitigate resource competition to African Penguins within the next six to ten years.

AOI

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"AM75"

Subject: RE: Request from ESCPA to correct closure map at St Croix

From: Ashley Naidoo <ANaidoo@dffe.gov.za>
Sent: Tuesday, 19 December 2023 13:08
To: Riedau <redah@rialfishing.co.za>; Alistair McInnes <alistair.mcinnes@birdlife.org.za>; Lauren Waller <laurenw@ewt.org.za>; Pichegru, Lorien (Prof) (Summerstrand Campus South) <Lorien.Pichegru@mandela.ac.za>; csmith@wwf.org.za; Katta Ludynia <katta@sanccob.co.za>; mike.copeland@fishconsult.co.za; copeland.fishconsult <copeland.fishconsult@gmail.com>
Cc: Gerhard Cilliers <GCilliers@dffe.gov.za>; Kim Prochazka <KProchazka@dffe.gov.za>; Zimasa Jika <ZJika@dffe.gov.za>; Gcobani Popose <GPopose@dffe.gov.za>; Deon Van Zyl <Deon@afrofishing.co.za>; Rial Fishing Pty Ltd <twesley@rialfishing.co.za>; Johannes De Goede <JDeGoede@dffe.gov.za>; Janet Claire Coetzee <JCoetzee@dffe.gov.za>; Saasa Pheeha <spheeha@dffe.gov.za>
Subject: Re: Request from ESCPA to correct closure map at St Croix

Dear Colleagues

After careful consideration and some internal discussion, our thinking is as follows:

1. The Minister's Decision was that the interim closures will be put in place, unless there is agreement between the stakeholders (fisheries and conservation) to replace this agreement with a different closure arrangement. This was announced by Minister on 4 August 2023.
2. Subsequent to this announcement, the Stakeholders approached the Department with a different proposed closure agreement adjacent to St. Croix Island – this was checked with the stakeholders who agreed with the map and this was implemented on 1 September 2023.
3. The ESCPFA now claim that an error was made and wish for the map to be corrected and has provided 2 options in their letter of 27 November 2023. The letter was emailed to the DFFE, and was then emailed to the Conservation Representatives on 1 December 2023, with permission from ESCPFA. (This correspondence was acknowledged on 1 December 2023, with an indication that a response will be forthcoming . A follow-up was made on 11 December. A response from the Conservation Representatives rejecting both options was received on the 14th of December.)
4. The suggested way forward is as follows: As this was an agreement between the two stakeholders and one stakeholder now claims that there was no valid agreement because it acted under a mistake, there appears not to have been a meeting of the minds as to what was agreed. Given that the agreement is now in dispute and / or that the one stakeholder has decided to withdraw from it, the interim closures will take effect as per the Minister's decision.

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5. While the interim closure will run from 15 January 2024, the Department urges the stakeholders to continue to engage with each other; and if a new agreement is reached on specific closed areas, taking into account the Expert Panel Report, this may be presented to the Minister with a request that the Minister grants this indulgence so that that new agreement may be implemented in place of the interim agreement going forward. (The current closure will remain in place until the 14th of January as time does not allow for the permit conditions to be changed between now and the start of the new season.)
6. Lessons learned in this process.
    a. All such future agreements must be carefully reviewed by all stakeholders before implementation so that unintended errors or consequences are detected.
    b. In future, such fishing closure agreements must be confirmed in writing by both parties as binding through the signature of a short and simple written agreement. In addition, this agreement may be implemented through inclusion in the permit conditions, which will include conditions that stipulate that such an agreement may not be withdrawn/varied by either party. A review date may be included as to when agreements may be adjusted / withdrawn from, for example on an annual basis.

I wish you well over the festive season. For queries on this in the new year please engage with Mr Gcobani Popose and DDG Oceans & Coasts, Dr Fikizolo. (I am moving on from the DFFE at the end of the month, and will like to thank all of you for your many contributions to this process.)

Thank you
Ashley

Ashley Naidoo. Ph.D. | Chief Director: Ocean & Coasts Research (he/him)
Find Annual Ocean & Coasts Science Report at:
http://dx.doi.org/10.13140/RG.2.2.19915.77601
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From: Ashley Naidoo <ANaidoo@dffe.gov.za>
Date: Thursday, 14 December 2023 at 12:30
To: Riedau <redah@rialfishing.co.za>, Alistair McInnes <alistair.mcinnes@birdlife.org.za>, Lauren Waller <laurenw@ewt.org.za>, lorien.pichegru@mandela.ac.za <lorien.pichegru@mandela.ac.za>, csmith@wwf.org.za <csmith@wwf.org.za>, 'Katta Ludynia' <katta@sanccob.co.za>, mike.copeland@fishconsult.co.za <mike.copeland@fishconsult.co.za>
Cc: Gerhard Cilliers <GCilliers@dffe.gov.za>, Kim Prochazka <KProchazka@dffe.gov.za>, Zimasa Jika <ZJika@dffe.gov.za>, Gcobani Popose <GPopose@dffe.gov.za>, Deon Van Zyl

<Deon@afrofishing.co.za>, Tasneem Wesley <twesley@rialfishing.co.za>
Subject: Re: Request from ESCPA to correct closure map at St Croix

Dear Colleagues

We have an in internal discussion, and have proposed a way forward to our Heads of Branches (the DDGs). I will engage with them and get back to you early next week. I apologize for the added days here, however our internal processes must be followed.

Thank you
Ashley N

From: Ashley Naidoo <ANaidoo@dffe.gov.za>
Date: Wednesday, 13 December 2023 at 11:48
To: Riedau <redah@rialfishing.co.za>, Alistair McInnes <alistair.mcinnes@birdlife.org.za>, Lauren Waller <laurenw@ewt.org.za>, lorien.pichegru@mandela.ac.za <lorien.pichegru@mandela.ac.za>, csmith@wwf.org.za <csmith@wwf.org.za>, 'Katta Ludynia' <katta@sanccob.co.za>, mike.copeland@fishconsult.co.za <mike.copeland@fishconsult.co.za>
Cc: Gerhard Cilliers <GCilliers@dffe.gov.za>, Kim Prochazka <KProchazka@dffe.gov.za>, Zimasa Jika <ZJika@dffe.gov.za>, Gcobani Popose <GPopose@dffe.gov.za>, Deon Van Zyl <Deon@afrofishing.co.za>, Tasneem Wesley <twesley@rialfishing.co.za>
Subject: Re: Request from ESCPA to correct closure map at St Croix

Dear Riedau and Alistair and colleagues.

Thank you for your responses, especially so late in the year when all of us are considering some time away from work. Please give me a day to get back to you on a proposed way forward.

Thank you
Ashley

Ashley Naidoo. Ph.D. | Chief Director: Ocean & Coasts Research (he/him)
Find Annual Ocean & Coasts Science Report at:
http://dx.doi.org/10.13140/RG.2.2.19915.77601
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+2782 784 7131

From: Redah De Maine <redah@rialfishing.co.za>
Date: Wednesday, 13 December 2023 at 11:11
To: Alistair McInnes <alistair.mcinnes@birdlife.org.za>, Ashley Naidoo <ANaidoo@dffe.gov.za>, Lauren Waller <laurenw@ewt.org.za>, lorien.pichegru@mandela.ac.za <lorien.pichegru@mandela.ac.za>, csmith@wwf.org.za <csmith@wwf.org.za>, 'Katta Ludynia' <katta@sanccob.co.za>, mike.copeland@fishconsult.co.za <mike.copeland@fishconsult.co.za>
Cc: Gerhard Cilliers <GCilliers@dffe.gov.za>, Kim Prochazka <KProchazka@dffe.gov.za>, Zimasa Jika <ZJika@dffe.gov.za>, Gcobani Popose <GPopose@dffe.gov.za>, Deon Van Zyl

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<Deon@afrofishing.co.za>, Tasneem Wesley <twesley@rialfishing.co.za>
Subject: RE: Request from ESCPA to correct closure map at St Croix

Dear Alister,

Our agreement proposed by yourself was 40% of MIBA 2021 as explained in my previous email but the map utilised was erroneous having not only utilised the MAP of UD 90 as proposed by ESCPA entailed the value of UD 90 and not that of MIBA 21 upon which we agreed.

The subsequent proposal by the Panel does not feature in our agreement that materialised before that Panel had made their final decisions that does not bear any relevance on what we are currently appealing for.

Environment proposed a settlement and we agreed to such settlement of closing 40 % of MIBA 21 but the erroneous map area of UD 90 utilised resulted in a far greater area being closed that is not fair to ESCPA industry operators.

Agreements are based on honesty and honour and we both went into this agreement in an honourable manner to close 42.175 of MIBA 21 but now all honour appears to have flown out by the window due to an error that favours your original sentiment of closing 100% of the islands.

Why is there suddenly a problem to rectify the MAP when there was an agreement thereon and we were all happy and contented with our agreement.

I still feel that we should stop avoiding each other by having a meeting and look each other in the eye and resolve this matter in an amicable fashion in the interest of both parties.

Kind Regards,
Mohammed Riedau De Maine
CEO
Rial Fishing Group

131 Albert Road , Walmer, Port Elizabeth / PO Box 22650, Central, 6001
Telephone: *041- 581 0459 / 041- 581 0458* ***Cell:*** *082 855 1457* ***Email:****redah@rialfishing.co.za*

From: Alistair McInnes<alistair.mcinnes@birdlife.org.za>
Sent: Wednesday, December 13, 2023 10:40 AM
To: Ashley Naidoo <ANaidoo@dffe.gov.za>; Lauren Waller <laurenw@ewt.org.za>; Pichegru, Lorien (Dr) (Summerstrand Campus South) <lorien.pichegru@mandela.ac.za>; Smith, Craig <csmith@wwf.org.za>; Katta Ludynia <katta@sanccob.co.za>; Riedau <redah@rialfishing.co.za>; mike.copeland@fishconsult.co.za
Cc: Gerhard Cilliers <GCilliers@dffe.gov.za>; Kim Prochazka <KProchazka@dffe.gov.za>; Zimasa Jika <ZJika@dffe.gov.za>; Gcobani Popose <GPopose@dffe.gov.za>
Subject: RE: Request from ESCPA to correct closure map at St Croix

Dear Ashley

Thank you for your e-mail. We have considered the two options put forward by ESCPA in the attached letter. Unfortunately, neither is acceptable, particularly as the permits (as amended) already reflect a closure extent committed to by Fisheries which is less than that which would be in place if the method subsequently recommended by the Panel were to be used.

Kind regards

Alistair

From: Ashley Naidoo <ANaidoo@dffe.gov.za>
Sent: Monday, December 11, 2023 2:28 PM
To: Alistair McInnes <alistair.mcinnes@birdlife.org.za>; Lauren Waller <laurenw@ewt.org.za>; Pichegru, Lorien (Dr) (Summerstrand Campus South) <lorien.pichegru@mandela.ac.za>; Smith, Craig <csmith@wwf.org.za>; Katta Ludynia <katta@sanccob.co.za>; Riedau <redah@rialfishing.co.za>; mike.copeland@fishconsult.co.za
Cc: Gerhard Cilliers <GCilliers@dffe.gov.za>; Kim Prochazka <KProchazka@dffe.gov.za>; Zimasa Jika <ZJika@dffe.gov.za>; Gcobani Popose <GPopose@dffe.gov.za>
Subject: Re: Request from ESCPA to correct closure map at St Croix

Dear Alistair, Mike C and colleagues included. (Underlining only denotes person/s to whom specific questions are addressed.)

Alistair (and conservation representatives), have you had an opportunity to consider this request from the ESCPA?
The letter presents two options and I am hoping that as conservation representatives – you will be able to select one.

Mike C – please can you provide an update on additional work that you will be undertaking – you alluded to this previously and Alistair requests, below in his email, updates on this planned work. (I have underlined this request so it is easy to find below.)

Thank you
Ashley

Ashley Naidoo. Ph.D. | Chief Director: Ocean & Coasts Research (he/him)
Find Annual Ocean & Coasts Science Report at:
http://dx.doi.org/10.13140/RG.2.2.19915.77601
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From: Alistair McInnes <alistair.mcinnes@birdlife.org.za>
Date: Tuesday, 05 December 2023 at 17:19
To: Ashley Naidoo <ANaidoo@dffe.gov.za>, Lauren Waller <laurenw@ewt.org.za>, lorien.pichegru@mandela.ac.za <lorien.pichegru@mandela.ac.za>, csmith@wwf.org.za <csmith@wwf.org.za>, Katta Ludynia <katta@sanccob.co.za>
Cc: Gerhard Cilliers <GCilliers@dffe.gov.za>, Kim Prochazka <KProchazka@dffe.gov.za>, Zimasa Jika

<ZJika@dffe.gov.za>, Gcobani Popose <GPopose@dffe.gov.za>
Subject: RE: Request from ESCPA to correct closure map at St Croix

Hi Ashley

We have no problem with forwarding our email to the Fishing Representatives.

Regards

Alistair

From: Ashley Naidoo <ANaidoo@dffe.gov.za>
Sent: Monday, December 4, 2023 8:53 AM
To: Alistair McInnes <alistair.mcinnes@birdlife.org.za>; Lauren Waller <laurenw@ewt.org.za>; Pichegru, Lorien (Dr) (Summerstrand Campus South) <lorien.pichegru@mandela.ac.za>; Smith, Craig <csmith@wwf.org.za>; Katta Ludynia <katta@sanccob.co.za>
Cc: Gerhard Cilliers <GCilliers@dffe.gov.za>; Kim Prochazka <KProchazka@dffe.gov.za>; Zimasa Jika <ZJika@dffe.gov.za>; Gcobani Popose <GPopose@dffe.gov.za>
Subject: Re: Request from ESCPA to correct closure map at St Croix

Thank you Alistair and colleagues copied – for getting back to me on this.

Then on other matters raised below -

Alistair - in order to avoid additional miscommunication – could I send your email to the Fisheries Representatives on their planned work? I am not sure if the interpretation of the work needed and its timing is the same across all those involved. (I will copy you in.)

(In the interim both sets of stakeholders have written to the Minister (copied me and other managers), so our planning will also need to be aligned to these responses.)

Thank you
Ashley

From: Alistair McInnes <alistair.mcinnes@birdlife.org.za>
Date: Friday, 01 December 2023 at 16:16
To: Ashley Naidoo <ANaidoo@dffe.gov.za>, Lauren Waller <laurenw@ewt.org.za>, lorien.pichegru@mandela.ac.za <lorien.pichegru@mandela.ac.za>, csmith@wwf.org.za <csmith@wwf.org.za>, Katta Ludynia <katta@sanccob.co.za>
Cc: Gerhard Cilliers <GCilliers@dffe.gov.za>, Kim Prochazka <KProchazka@dffe.gov.za>, Zimasa Jika <ZJika@dffe.gov.za>, Gcobani Popose <GPopose@dffe.gov.za>
Subject: RE: Request from ESCPA to correct closure map at St Croix

Dear Ashley

MK AO

We acknowledge your email sent earlier today. We will be in touch once we have had an opportunity to consider it properly – but will likely need time beyond Tuesday. We will revert as soon as we can with our timing on this.

In the interim, we note that we have not heard further from you regarding the position of the closures more generally, since our last correspondence on 15 November 2023 when you conceded that the meeting scheduled for 16 November 2023 should not proceed. We had hoped for an indication from you by now as to when both the conservation sector group and Fisheries Sector would have the opportunity to present their analyses to the DFFE.

We have also had no indication as to when the Fisheries Sector Representatives will provide the full assessment as anticipated SAPFIA's Comments.

We reiterate our understanding that the immediate focus needs to be on implementing the Panel's recommended closure design methodology for the purposes of commencing the closure period during which the future monitoring/evaluation/research work is to take place. Planning future work is naturally important, however, it is not feasible to implement the Panel's recommendations for such monitoring/evaluation/research, if the island closures which are to be the basis for these investigations are not ecologically meaningful for penguins. As a result, we ask that you kindly follow-up with the Fisheries Sector representatives to establish when their analyses will be concluded, mindful of the self-evident urgency of the issue, and that you update us the moment you receive any feedback in that regard.

Regards

Alistair

From: Ashley Naidoo <ANaidoo@dffe.gov.za>
Sent: Friday, December 1, 2023 12:44 PM
To: Alistair McInnes <alistair.mcinnes@birdlife.org.za>; Lauren Waller <laurenw@ewt.org.za>; Pichegru, Lorien (Dr) (Summerstrand Campus South) <lorien.pichegru@mandela.ac.za>; Smith, Craig <csmith@wwf.org.za>; Katta Ludynia <katta@sanccob.co.za>
Cc: Gerhard Cilliers <GCilliers@dffe.gov.za>; Kim Prochazka <KProchazka@dffe.gov.za>; Zimasa Jika <ZJika@dffe.gov.za>; Gcobani Popose <GPopose@dffe.gov.za>
Subject: Request from ESCPA to correct closure map at St Croix

Dear Alistair, Lauren, Craig and now including Katta and Lorien as previously requested. (Copied Kim, Zimasa, Gerhard and Gcobani)

The DFFE has received this week, a formal request from Riedau on behalf of the ESCPA, to correct the closure area and map.

As this is an agreement among all of you, I suggested to the Heads of Branches Fisheries & Oceans & Coasts that I need to consult with all of you. Please may I have your thoughts by next Tuesday. If you need more time please let me know.

I have Riedau's and associates permission to share this information with you. In addition to the letter, I also attached recent consolidated maps and media statement as suggested by Riedau.

Once I have your initial response, I will seek to consolidate communications so that all are on the same page.

I am including Kim, Gerhard, Zimasa and Gcobani as managers within DFFE who may have a role to play in this discussion as well.

Thank you
Ashley

Ashley Naidoo. Ph.D. | Chief Director: Ocean & Coasts Research (he/him)
Find Annual Ocean & Coasts Science Report at:
http://dx.doi.org/10.13140/RG.2.2.19915.77601
+2721 493 7300
+2782 784 7131

Subject: Response to requests

From: Mike Copeland <copeland.fishconsult@gmail.com>
Sent: Tuesday, December 19, 2023 3:07 PM
To: Alistair McInnes <alistair.mcinnes@birdlife.org.za>
Cc: Ashley Naidoo <ANaidoo@dffe.gov.za>; SAPFIA <sapfia@inshore.co.za>; Dr Mike Bergh <mike@olsps.com>
Subject: Response to requests

Good afternoon Alistair,

In response to your requests in italics below, we provide some feedback.

"We have also had no indication as to when the Fisheries Sector Representatives will provide the full assessment as anticipated SAPFIA's Comments."

We believe that the attached document provides our current thinking in terms of an assessment of the International Review Panel Report.

"As a result, we ask that you kindly follow-up with the Fisheries Sector representatives to establish when their analyses will be concluded, mindful of the self-evident urgency of the issue, and that you update us the moment you receive any feedback in that regard."

As also mentioned in the attached we are busy refining the OBM which underpins the socio-economic impact. This is a massive undertaking involving AIS data as well as environmental data and we hope to have it concluded by the third quarter of 2024.

We trust that this provides sufficient information and answers your questions.

BR

Mike

Mike Copeland (0027 82 572 1852)
Copeland Consulting

MK AM

SAPFIA's initial comments and view on the International Review Panel report and on the trade-off between the costs and benefits of island closures.

24 November 2023

1 Summary

The International Review Panel report (IRPR) pointed out that a final decision on closures is a policy matter and recommended that this policy decision be based on a trade-off between the benefit to penguins and the economic costs of closures.

The International Review Panel (IRP) is critical of SAPFIA's economic cost estimates. They conclude that SAPFIA's estimate are likely overestimates. They give no estimate or indication of the extent of this overestimation. Also, the benefits to penguins of closures have been estimated only for the ICE closures, and not for other closure options. The question of how to estimate the benefit for penguins across a range of closure options is not addressed in the IRPR. McInnes et al (2023) offer no prescription for addressing these issues, which are vital for determining the cost impacts and the benefits for penguins along an axis of increasing extent of areas closed, essential information for conducting a trade-off analysis.

The Panel **recommended** that further validation of mIBAs should occur, but generally offered limited comments regarding specifying mIBAs. The proposal in McInnes et al (2023) for the specific mIBA-ARS closures they report at 3 breeding sites is motivated by qualitative arguments that do not quantitatively trade-off costs and benefits. McInnes et al's proposed island closures are therefore not the output of a quantitative trade-off exercise but involve mainly restating previous positions which have lacked quantitative backing. Their recommendations are therefore not based on the IRP's recommendations. Furthermore, the IRP supported mIBA-ARS as a concept, not the specific implementation of it in McInnes et al (2023).

Since the completion of the IRP deliberations earlier this year, SAPFIA has carried out further work into the question of irreplaceability of catch which is at the core of the IRP's view that the OBM estimates of economic costs are likely overestimated. Since the concept of irreplaceability is closely linked to the search pattern and behaviour by purse seine vessels to locate fishable shoals, this work has involved gathering AIS data for the small pelagic fleet and other fleets with which purse seiners communicate while searching for commercially viable shoals on which to set their nets. These data, not available to SAPFIA at the June panel deliberations, show a larger effective daily search area than was previously considered. While further analyses of these data are needed and will be carried out, this new evidence of a larger scale of the search area strengthens the original OBM calculations of irreplaceability.

At this stage therefore, SAPFIA strongly hold the view that the extent of any 'likely overestimates' in their cost estimate is small, and that even a worst case lower economic impact estimate would still reflect the loss of 100's of jobs. The negative socio-economic impact of closures would therefore clearly outweigh any positive benefits of closures to penguins.

SAPFIA also understand the Minister's decision on closures (Appendix B here) to be the definitive position of the government on closures as guided by the current state of knowledge, and that a formal decision based on a quantitative trade-off decision (as recommended by the IRP) is not possible at this time given lack of finality on the cost estimate. Considerable further work informing the quantitative estimates of some of the key inputs into trade-off calculations is required. This includes further work on the OBM model, as well as more work on specifying mIBAs, including along the lines suggested by the IRP. This cannot be achieved in the short (next few months) term and is only feasible in the medium term.

SAPFIA's strongly held view includes that given that the IRP has confirmed that the impact of fishing around breeding islands is small, attention should now rather focus on determining the real reasons for the decline of the penguin population. Indeed, the IRPR (Punt et al, 2023) makes repeated recommendations for the development of MICE approaches to explore the possible causes of the decline in the penguin population (see Appendix C). To date two versions of MICE approaches have been developed (Butterworth and Ross-Gillespie, 2023a, b). The first considers the possible role of guano harvests in the decline of the penguin population. It concludes that guano harvesting cannot be responsible for declines in the African penguin population over the last two decades. The second shows that changes in food abundance cannot alone explain two key features in penguin population abundance: (i) elevated mortalities during the first decade of this century (which may be linked to the MV Treasure oil spill) and (ii) sufficiently low adult survivorship in the recent period compared to the late 1980s and early 1990s to cause the penguin population to decline over those periods. The relevant document suggests for (i) that the mortalities due to the MV Treasure oil spill may have been much larger than were reported, with some of the consequences of the oiling of penguins manifesting themselves only after a delay. For (ii) it notes that if this is due to direct predation of penguins by seals, it would require only 0.01 penguins per seal per annum to be predated, so that this possibility cannot easily be discounted. These two documents are publicly available and are out for comment.

In essence then:

1) A policy decision ultimately requires consideration of the quantitative trade-off between penguin benefits and industry costs. This is a recommendation from the IRPR (Punt et al, 2023).

2) The panel provided a "decision" on the penguin benefits, but not on the costs. It said only that those presented were likely overestimates, and suggested ways to improve them.

3) This improvement is therefore essential before cost estimates can be tabled as the basis for the trade-off evaluation required for a policy decision.

4) In the meantime, SAPFIA accepts the Minister's decision on closures (as per Appendix B) given the considerable work that is required to inform any trade-off decision. This additional work will only be able to be completed in the medium term, and certainly not by the start of the 2024 season. We note that discussions relating to the closure area around St Croix are still taking place.

5) Having carried out some further research subsequent to the IRP meeting, SAPFIA considers the revised cost estimates (especially when expressed in terms of job losses) to be such as to

substantially outweigh the small benefits of closures to the penguins (as was acknowledged by the IRP). On this basis SAPFIA does not consider that closures are justifiable.

6) The priority for further research is to determine the main reasons for the penguin decline – this matter has been addressed in part by two recent MICE analyses. Further research such as this needs to be prioritised over research such as monitoring and possibly modifying island closure arrangements (which for the moment can continue on the basis of the Minister's default decision), because the former clearly has a much larger potential benefit for penguins in a situation where resources for research are limited. Furthermore, the ENGOs' proposal for future closures remains incomplete in a number of respects (see section 2.3 below)

2 Key pertinent conclusions of the International Review Panel

In its reading of the report from the IRP, SAPFIA notes the following four areas of import regarding the merits and extent of island closures, viz.

1. Benefits of island closures to penguins
2. The economic costs of island closures to the small pelagic fishery
3. The trade-off between benefits to penguins and economic cost to the small pelagic fishing industry
4. Recommendations for further research

Within these four categories, the following four sections highlight excerpts from the IRPR that have most relevance to SAPFIA's position on the interim closures and on the preferred trade-off decision:

2.1 Benefits of island closures to penguins

"Overall, the results of the ICE for Dassen and Robben islands indicate that fishing closures around the breeding colonies are likely to have a positive impact on population growth rates, but that the impacts may be small, in the range 0.71–1.51 % (expressed in units of annual population growth rate). These impacts are small relative to the estimated rates of reduction in penguin abundance for these two colonies over recent years (section 2.3.2)."

Comments:

- The IRP's rationale for and conclusions about the benefits for penguins from ICE are noted. SAPFIA notes that the use of these results to infer the benefits at Stony Point and Dyer, St Croix and Bird Island (Algoa Bay) would require extrapolation of results from only two West Coast islands to the other four breeding sites. This is less than satisfactory, particularly given the IRP's recommendations that trade-off decisions should be specific to each breeding site/island.

- In reaching its estimates of benefits, the IRP effectively disregards the entire body of foraging data collected during ICE and recommends that future improvements be made when collecting and or interpreting such data. These omitted foraging data suggest that the estimates of penguin benefits reported by the IRP for Dassen and Robben Islands are too large.

2.2 The economic costs of island closures on the small pelagic fishery

"Care should be taken when interpreting the estimated impacts to the fishing industry given the OBM likely provides an over-estimate of uncertain magnitude of the loss in catch (see Section 3.2) so the results of the OBM and hence the SAM model should be considered primarily in a relative sense and hence used for ranking closure options. The relative ranking of a closure may, however, be sensitive to how catches are allocated to local communities."

Comments:

- SAPFIA notes the comments in the IRPR about the OBM methodology used by OLSPS Marine to estimate the catches that are likely to be lost due to island closures.
- The IRPR contains implicit and explicit suggestions for improving the OBM estimates, specifically addressing the question of irreplaceability.
- SAPFIA have been engaged (subsequent to the IRP) in further work to investigate and improve the OBM and to comment further on the search behaviour of the pelagic fleet and the likely extent of catch irreplaceability. To this end OLSPS Marine have sourced all available AIS data for the pelagic fleet as well as other relevant fleets in South African waters which communicate with pelagic vessels and provide information about the presence of schooling bait fish. SAPFIA considers that these data have a bearing on the scale of the search area of the pelagic fleet, and that they strengthen the basis for the estimates of catch irreplaceability and hence of the economic cost estimates based on the OBM (Opportunity Based Model).

2.3 The trade-off between benefits to penguins and economic cost to the small pelagic fishing industry

1. "The panel recommended that analyses delineating mIBAs using ARS methods represent the best scientific basis for delineating the preferred foraging habitats during breeding. In the future, additional analyses would further improve understanding, especially with respect to how the spatial scale of any given mIBA might vary by year. The panel concluded that such between-year variation is likely to be important, as the years of the ICE, during which most telemetry data have been collected, have been years of relatively low prey resource abundance."
2. Addressing the question of an optimal trade-off the IRP suggests that "One approach (if curves such as those in Figure 4.6 can be created) is to find the point at which the change in penguin benefits (by increasing closures) matches the change in costs to society".
3. "There is a trade-off amongst maximising benefits to penguins, minimising the costs to the fishing industry, and having a reliable basis to quantify the effects of closures (including no closures) on the penguin recovery rate. The trade-off among closure options is a policy decision related to conservation, economic and social goals and objectives for South Africa. This report outlines some aspects that could form part of a decision-making framework to identify the closure options that will provide the best outcomes for penguins given some level of cost to the fishing industry."
4. "There are three primary trade-off axes to consider when selecting closures: (a) the benefit to penguins of the closure; (b) the cost (economic and social) to the fishing industry and the communities where fishing and processing operations are based; and (c) the ability to evaluate the effectiveness of the closures (section 4.1)."

5. Numerous comments are made that support the application of MICE to determine the reasons for the sharp decline in penguin population numbers – see Appendix C here for a summary of these comments. In particular, Table 7.1 of the IRP rates the priority for MICE work as 'High', the highest priority which they accord to future work.

6. Island specific trade-offs: "The trade-offs between costs to the fishery and benefits to penguins in terms of the size of an area closed will differ among islands and among sectors within the fishery. Consequently, the benefits to penguins and costs to industry should be considered by island (or region) and not simply at the national level (see section 4.5 for aspects of each major breeding colony that are relevant for decision making). In addition, given the heterogeneity within the industry, expressing costs and job losses by sector (e.g., for small scale operators) would also seem appropriate."

Comments:

- SAPFIA notes the IRP's comment about mIBA-ARS. mIBA-ARS is a concept, which provides an improved basis for specifying closure areas based on separating transiting and food-searching behaviour. The IRP's comments in this regard also need to be understood in combination with their recommendations for improving the telemetry data and its analysis. However, regarding trade-offs, since the IRP also recommended determining an appropriate balance between the extent of closures, the benefit to penguins and the cost to the industry, their endorsement of the mIBA-ARS concept does not constitute endorsement of the **specific** mIBA-ARS shape files tabled in June 2023 during IRP deliberations which appears to be the interpretation offered by McInnes et al (2023). SAPFIA's interpretation of the IRP statements about mIBA-ARS is that this could provide an approach for determining a continuum of different possible levels of best closures for each of a range of area levels that are closed.

- SAPFIA also considers that along the continuum referred to above (still to be specified), the benefits to penguins must be evaluated, if necessary, on an island-by-island basis (point 3 above). The basis for calculating these benefits has not been specified, and this needs to be done before one can consider trade-offs.

- The IRP states that the trade-off decision is a policy decision (point (3) above). By recommending the existing closures the Minister has effectively made a policy decision but has not and could not have been able to carry out the necessary (as recommended also by the IRP) formal trade-off evaluation between costs and benefits. Such a trade-off calculation is not presently possible for reasons given elsewhere in this document. SAPFIA's considers that this (i.e., Appendix B) is a policy decision that should be reviewed when appreciable improvements to the estimates of costs and benefits have been made. This is likely to be possible only in the medium term and certainly not by the start of the 2024 year.

- From the results of ICE at Dassen and Robben Islands, the IRPR noted that the benefit to the penguins is in the range 0,71 – 1,51% (expressed in units of annual population growth). Given that these two islands have already been closed 50% of the time during ICE, to interpret the effect on the entire population, the additional benefit relative to trends since 2008 will be in the range 0,36 – 0,76% per annum. This equates to an increase in the number of penguin breeding pairs (currently about 10 000) of between 36 and 76 breeding pairs per annum in a population that is declining at a rate of 800 penguin breeding pairs per annum.

- SAPFIA is in agreement that the pursuance of MICE approaches to try to determine the main factors driving the decline in the penguin population is long overdue and needs to be taken up urgently (point 5 above).

- Regarding point (6) above, SAPFIA considers that it may not prove possible to express economic costs at an island level, but that 'regional' disaggregation may be a more realistic target. This issue needs further deliberation.

2.4 Recommendations for further research

1. "The panel recommended that further validation of mIBAs should occur, in particular using dive data that provide objective identification of foraging locations, rather than commuting (or travelling) locations (see also section 5.9). Such analyses could be included in species distribution models (e.g., Warwick-Evans et al., 2018) that could be used to identify areas of key importance. However, important uncertainties remain, particularly if mIBAs are determined (as they have been) using telemetry data predominantly limited to early chick rearing when breeding adults are most constrained; further, that mIBAs may differ in the future, should prey resource abundance increase."

2. In Table 7.1 "Prioritised summary of research and other tasks. Short-term tasks pertain to the next 1-2 years, medium-term tasks to the next 2-5 years and long-term tasks the next 6+ years. The relative priorities and timings reflect an integrated outcome of the Panel, which assigned priorities and timings to each task", the IRPR makes the following research recommendation:

    - 2. Supporting evaluation of trade-offs, including refining estimates of foraging areas, a. Validate the mIBAs given information on foraging locations, relative priority = High, timing = Medium

    - 2. Supporting evaluation of trade-offs, including refining estimates of foraging areas, b. Summarise between-year variation in mIBAs, Relative priority = Medium-High, Timing = Short

3. "If designated, closed areas to protect penguins should be reviewed at a time when results are available to investigate life-history processes such as juvenile recruitment, and adult survival, and hence population growth rates. This may be at a time between 6 and 10 years after designation."

4. "Monitoring should take place irrespective of whether there is an experimental (alternating open and closed) component to the closure program (section 4.2)."

5. The IRP makes repeated recommendations for the development of MICE approaches to further explore the possible causes for the decline in the penguin population (see Appendix C here).

Comments:

- With regard to point (1) above, the IRP supported mIBA-ARS as a concept, not the specific implementation of it in McInnes et al (2023).
- In (1) above the IRP are recommending that improvements need to be made to the foraging data used in the specification of mIBAs. In (2) above they recommend that that work is a High priority, only possible in the medium term.

- While the mIBA-ARS methodology is the preferred option of the IRP to specify area closures, it is clear from the comment, and points (1) and (2) from the IRP report referred to above, that the foraging data informing the mIBA-ARS area closures requires further refinements which can only be achieved in the medium term.
- There has been no experimental design work carried out to validate the feasibility of detecting a meaningful benefit for penguins at the population level at the 6 – 10 year time frame suggested. This is concerning since it may be that very little new information can be expected, and at this stage this is an unknown. That experimental design work, together with specification of the details of any monitoring data collection, is a prerequisite to any defensible further closure arrangement.
- To date two versions of MICE approaches have been developed (Butterworth and Ross-Gillespie, 2023a, b). The first considers the possible role of guano harvests in the decline of the penguin population. It concludes that guano harvesting cannot be responsible for declines in the African penguin population over the last two decades. The second shows that changes in food abundance cannot alone explain two key features in penguin population abundance (i) elevated mortalities during the first decade of this century (which may be linked to the MV Treasure oil spill) and (ii) sufficiently low adult survivorship in the recent period compared to the late 1980s and early 1990s to cause the penguin population to decline over those periods. The relevant document suggests for (i) that the mortalities due to the MV Treasure oil spill may have been much larger than were reported, with some of the consequences of the oiling of penguins manifesting themselves only after a delay. For (ii) it notes that if this is due to direct predation of penguins by seals, it would require only 0.01 penguins per seal per annum to be predated so that this possibility cannot easily be discounted. These two documents are publicly available and are out for comment.

3 McInnes et al (2023), some comments

While McInnes et al (2023) notes the recommendations in the IRP for trade-off calculations to be carried out to arrive at a preferred balance point in terms of area closed, they acknowledge that they do not have sufficient information to do this:

"4.1.10 Identification of the point at which the change in African Penguin benefits matches the change in costs to society could not be assessed quantitatively due to a lack of corresponding fisheries cost data which could facilitate fitting a curve to different closure options related to penguin tracking data."

SAPFIA would add that McInnes et al. have also not updated the mIBA-ARS estimates based on the recommendations of the IRP, nor do they propose any relationship linking benefits to penguins to the area closed. Rather they rely on qualitative arguments such as:

"Dassen: This northern area is critical to African Penguins from this colony. First, it forms part of their core foraging area proximate to the Dassen Island breeding grounds. Second, small-pelagic fishing within this northern portion of the mIBA-ARS is likely to have downstream effects on prey availability for African Penguins in the remainder of their core foraging area due to the southward movement of anchovy recruits between May and August which also corresponds to the core breeding season for penguins from this colony. The interim closure is therefore assessed as not being adequately representative of important African Penguin foraging area for this colony".

This is contrary to the recommendations of the IRP and an inappropriate trade-off to maximise benefits to penguins while minimising societal costs. SAPFIA's considers that more formal and data

driven trade-off calculations need to be carried out. None of the key quantitative estimates for carrying out such an exercise are presently available, other than the estimate of the benefit of closures for penguins for ICE area levels.

McInnes et al (2023) state that

"**4.1.9** For each colony we provide trade-off curves for four types of catch: (a) directed anchovy; (b) directed sardine; (c) sardine bycatch; and (d) redeye. Sardine and anchovy are the principal prey of African Penguins, although redeye is also targeted to a lesser degree."

The plots referred to as trade-off curves in 4.1.9 of McInnes et al (2023) are not trade-off curves. The IRP suggests considering not 'cost impact vs area closed', but rather 'cost impact vs benefit to penguins'.

With respect to the comment 4.1.11 in McInnes et al (2023):

"4.1.11 We note that in respect of Dyer Island, the lack of fishery cost data for the split-zone scenario for the interim closure around this colony prevents us from assessing trade-offs at this stage. In respect of St Croix and Bird islands, fishing permits have been amended (pursuant to the IRP process).[25] Therefore, these fishing closures are reflected below without additional analysis for the sake of completeness".

These estimates are now provided here in Appendix A but note that they do require further work to address the panels comments on potential bias in the OBM based estimates.

The statement in McInnes et al (2023, Section 5) that "The interim closures currently in place have little to no benefit for African Penguins in terms of reducing current resource pressure" is not substantiated by estimates of the benefit due to these closures. Nor is the claimed increase in these benefits for the proposed mIBA-ARS closures substantiated. Ultimately a trade-off calculation requires some quantification of these amounts as well as the associated cost estimates.

4 Discussion and Conclusions

Appendix A summarises SAPFIA's estimates of the cost of closures to the fishing industry and to the economy, based on Bergh et al (2016) and Bergh and Horton (2023), and further information provided to Punt et al (2023) as requested. Appendix A considers the ICE, Interim, CAF and mIBA-ARS closures. The range for the direct cost of closures to the fishing industry is between R 30 million and R 356 million per annum, while for the economy at large the estimates range between R 85 million and R 1 017 million per annum. Based on Punt et al (2023), the benefits for penguins from ICE closures is about 56 breeding pairs per annum for the ICE (average their upper and lower values). No estimates are available for the other three closure options mentioned in Appendix A. Based on Urban Econ (2023), the number of jobs lost associated with this range of options varies from 130 to 1557 (or a range of about 2 jobs per penguin breeding pair to 27 jobs per penguin breeding pair) – see Appendix A.

Even given the IRP's view that the estimates by SAPFIA of the economic impact of these closures are over-estimates of an unspecified extent (a position which is the subject of further research by SAPFIA), SAPFIA notes that a worst case/lowest economic impact analysis would likely still suggest that there are 100s of jobs under threat due to such closures. This position is strengthened by recent work using AIS data which shows a large effective search area in operation for the location of catches which strengthens the OBM's estimates of catch irreplaceability.

The Minister made a policy decision about closures in response to the IRP's report, i.e., the existing closures (see Appendix B). SAPFIA accepts the Minister's decision as a basis for moving forward

pending the ability to make a defensible trade-off decision, which first requires cost estimates. SAPFIA's view is that such a trade-off decision should be considered only once there has been, at a minimum, a material improvement in the estimates of economic impacts.

SAPFIA also considers that given that the IRP has confirmed that the impact of fishing around breeding islands is small, attention should focus instead on determining the real reasons for the decline of the penguin population. In this effort the MICE approach seems critical and recent work in this regard needs to be used to refocus attention which has been unduly directed at the role of fishing near to penguin breeding sites.

SAPFIA also consider that data on penguin breeding levels per month at each colony should be made available, since it may be possible to mitigate the economic impact of closures by focussing closures on periods of high breeding intensity only.

5 References

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6 Appendix A. Benefits to penguins and the economic costs of island closures.

The IRPR pointed out that a final decision on closures is a policy matter but recommended that this policy decision be based on a trade-off between the benefit to penguins and the economic costs of closures.

6.1 Benefit to penguins

From the results of ICE at Dassen and Robben Islands, the report noted that the benefit to the penguins is in the range 0.71 – 1.51% of the population. Given that these two islands have already been closed 50% of the time during ICE, the additional benefit relative to trends since 2008 is in the range 0.36 – 0.76% per annum. This equates to a relative increase in the number of penguin breeding pairs (for a total current population size of about 10 000 breeding pairs) of between 36 and 76 breeding pairs per annum of a population that is declining at a rate of 800 penguin breeding pairs per annum.

6.2 The economic costs to the fishing industry and to the economy

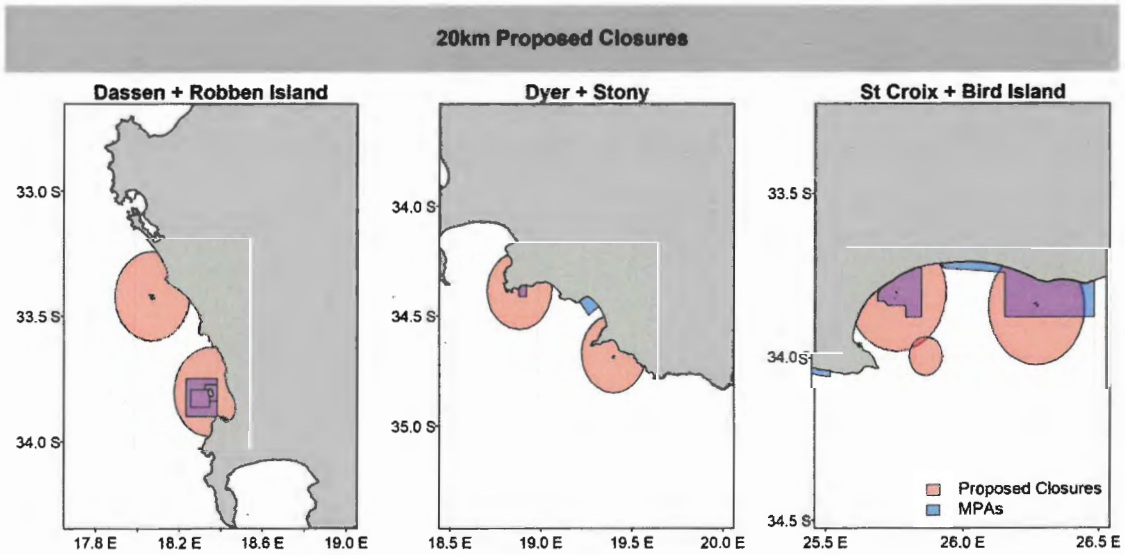
For the purposes of this report, we compare the loss from the OBM for 4 options namely **ICE, CAF (see CAF, 2022), mIBA-ARS and the Interim Closures**.

6.2.1 Maps of closure options

These are as given below.

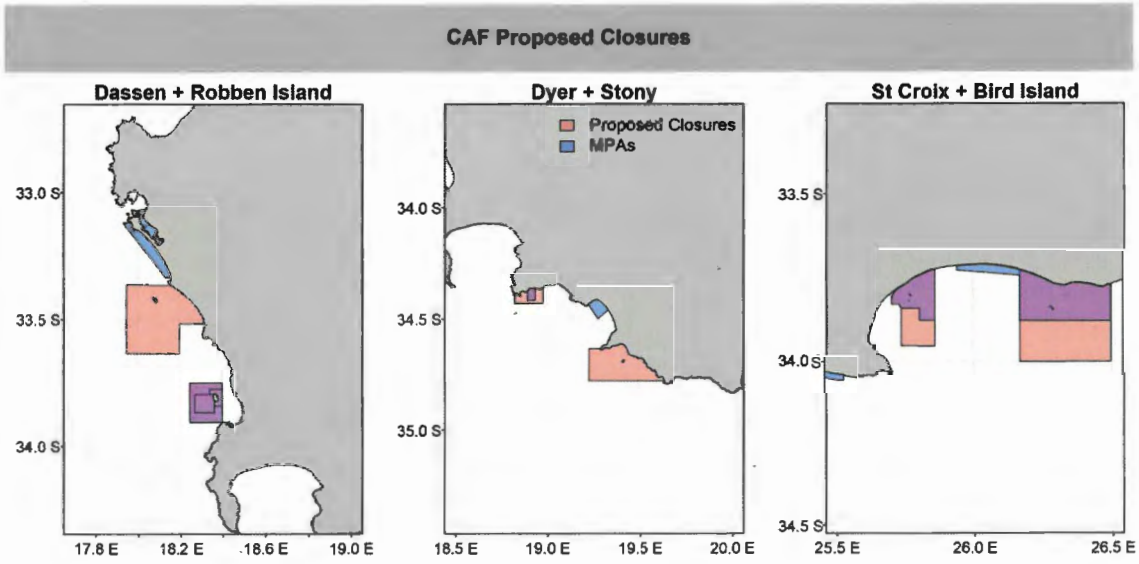
ICE

For the two western islands and the two islands in Algoa Bay, this shows the extent of the 20km closure areas, plus the closure around Riy Bank that was in place during ICE. For completeness this has been extended to include Stony Point and Dyer Island as well

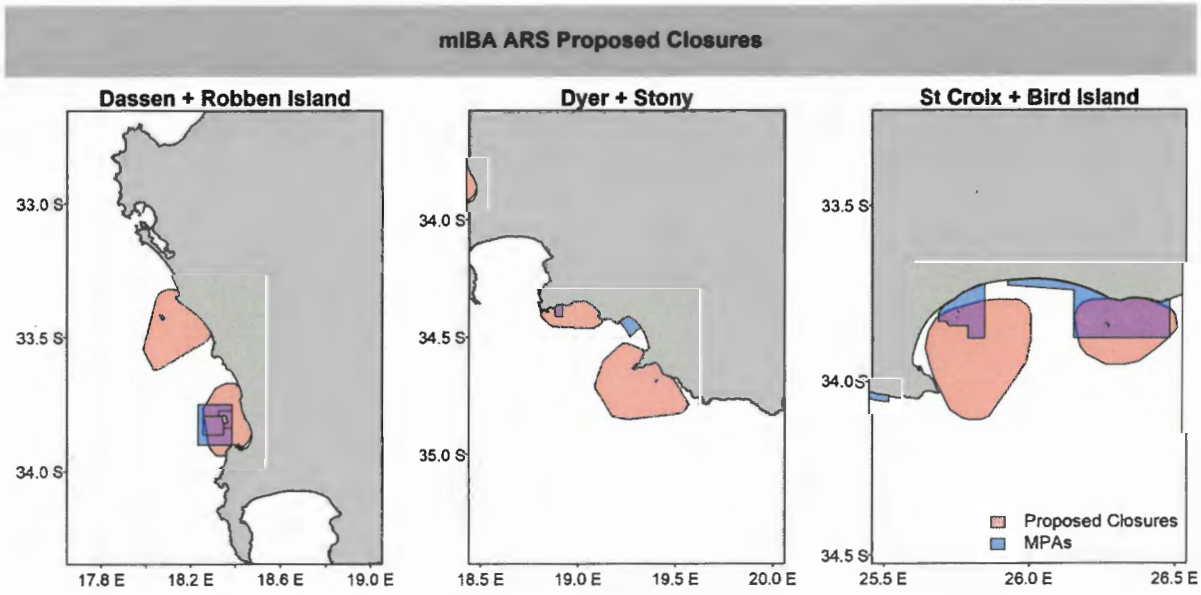


CAF

CAF recommendations on closure options that were sent to the Minister at the conclusion of the CAF process (see CAF, 2022).

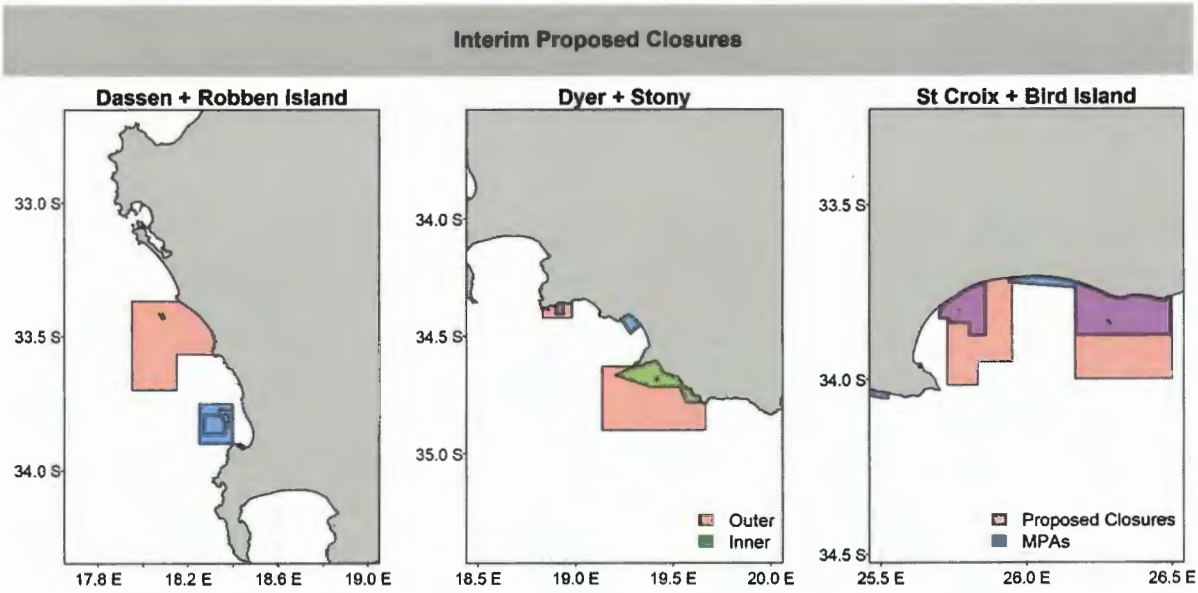


mIBA-ARS (see MacInnes et al, 2023)

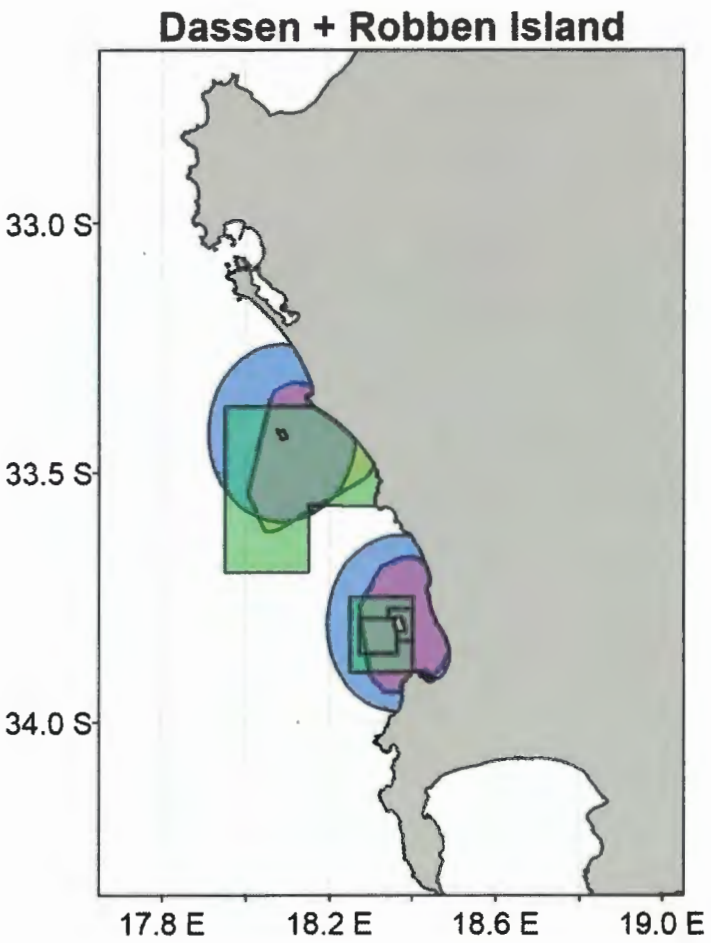


Interim Closures

Note that these were the Interim Closure areas as per the revised Permit Conditions approved 26 July 2023. There have subsequently been some changes to the area around St Croix and this is still subject to discussion.



6.2.2 Overlap between ICE, Interim and mIBA-ARS closure options at Dassen and Robben Islands



6.2.3 Catch losses associated with different closure options (metric tons per annum)

These are based on the OBM as reflected in various submissions made to the international panel and as refined at their request and subsequently calculated where necessary.

ICE

	Dassen	Robben	Dyer		Stony	St Croix	Bird	Riy	Total
ANCHOVY	3216,7	1133,7	8604,5		310,6	18,2	0,0	3,1	13286,9
BYPIL	108,2	60,1	209,6		49,8	0,3	0,0	0,1	428,1
DIRPIL	89,3	37,9	1062,8		1049,6	1756,4	19,0	45,1	4060,1
REDEYE	169,1	44,2	829,3		162,4	2,7	0,0	0,2	1207,9
Total	3583,3	1276,0	10706,2		1572,4	1777,6	19,1	48,5	19031,5

CAF

	Dassen	Robben	Dyer		Stony	St Croix	Bird		Total
ANCHOVY	370,8	-61,0	855,1		-33,8	0,2	0,0		1131,2
BYPIL	47,7	-16,5	14,7		-0,3	0,1	0,0		45,7
DIRPIL	87,9	-3,5	137,8		8,8	421,1	34,8		686,9
REDEYE	69,3	23,6	55,7		-0,2	-0,2	0,0		148,3
Total	575,6	-57,3	1063,3		-25,6	421,3	34,9		2012,1

mIBA-ARS

	Dassen	Robben	Dyer		Stony	St Croix	Bird		Total
ANCHOVY	2013,7	808,6	13628,7		284,0	1,4	0,0		16736,4
BYPIL	70,7	55,2	341,8		19,5	3,2	0,0		490,4
DIRPIL	78,7	4,8	4604,6		952,6	1708,9	32,5		7382,2
REDEYE	155,3	88,8	1213,7		88,8	3,1	0,0		1549,7
Total	2318,5	957,4	19788,8		1344,9	1716,6	32,5		26158,6

INTERIM CLOSURES

	Dassen	Robben	Dyer (outside)	Dyer (inside)	Stony	St Croix	Bird		Total
ANCHOVY	49,8	-21,5	1311,7	84,8	-26,9	1,2	0,0		1399,2
BYPIL	39,8	-13,8	70,9	0,1	-0,5	0,1	0,0		96,6
DIRPIL	114,1	-4,6	1476,9	38,5	8,6	976,7	35,1		2645,4
REDEYE	75,9	42,5	103,3	6,5	-0,1	0,8	0,0		229,0
Total	279,6	2,7	2962,8	129,9	-18,8	978,9	35,1		4370,1

6.2.4 The economic value of catch losses to the fishing industry and to the economy as a whole

The ex-store income of the lost catch to the fishing industry outlined in the previous section can be quantified using a value per ton for sardine at R28 566 (human consumption and bait) and R7 706 for industrial fish reduced to fish meal and oil. This reflects the "direct" lost value per annum and is given in the table below. Application of a multiplier effect of 2,86 (see Urban-Econ, 2023) gives an estimate of the total lost revenue to the economy (direct, indirect and induced), also included in the table below:

Closure Option	Annual Economic Losses to the Small Pelagic Fishing Industry	Annual Losses to the economy (Multiplier = 2.86)
ICE	ZAR 230,975,913	ZAR 660,591,111
CAF	ZAR 29,834,753	ZAR 85,327,394
mIBA-ARS	ZAR 355,570,625	ZAR 1,016,931,988
Interim Closures	ZAR 88,859,113	ZAR 254,137,063

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7 Appendix B. Policy statement by Minister, DFFE of South Africa (https://www.gov.za/speeches/minister-b-creecy-science-based-measures-are-now-being-implemented-protect-critically)

Minister Barbara Creecy on science-based measures being implemented to protect critically endangered African penguins

4 Aug 2023

The African penguin is critically endangered. If this situation is not addressed, with current rates of population decline, science tells us these iconic creatures could be functionally extinct by 2035.

Competition for food is thought to be one among a set of pressures that are contributing to the decline of the African Penguin population. Other pressures include ship traffic together with their associated noise and vibrations, pollution and degradation of suitable nesting habitats.

The species, which is endemic to South Africa and Namibia, has decreased from more than a million breeding pairs to just about 10 000 pairs over the last century.

Today, following the report of the Export Review Panel, I have taken a decision to implement fishing limitations in the waters around penguin colonies for a minimum of 10 years, with a review after 6 years of implementation and data collection.

Fishing limitations are established for the following penguin colonies: Dassen Island, Robben Island, Stony Point, Dyer Island, St. Croix Island and Bird Island. The transition to implementing fishing limitations will continue with the current interim closures, while both the fishing industry and the conservation sector study the Panel's Report.

If there is agreement on fishing limitations over the next few weeks or months across these sectors, these will be implemented as they are agreed upon. If no alternate fishing limitation proposals are concluded by the start of the 2024 Small Pelagic Fishing Season (January 15th, 2024) the current interim fishing limitations will continue until the end of the 2033 Fishing Season, with a review in 2030 after six years of implementation from the start of the 2024 fishing season.

Today marks the end of the complex and lengthy process of stakeholder consultations in the quest to find science-based measures to protect the critically endangered African penguin from extinction.

In December 2022, I appointed an Expert Review Panel, under Section 3A of the National Environmental Management Act, to assess the science related to managing the interactions between the small pelagic (anchovy and sardines) fishery and the conservation of African penguins.

The Panel is Chaired by Professor Andre Punt (USA), with members Dr Ana Parma (Argentina), Dr Eva Plaganyi (Australia), Professor Philip Trathan (UK), Professor Robert Furness (UK) and Professor James Sanchirico (USA). The Panel members all have

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several decades experience in science to policy matters in the marine ecosystems, with a combined science publication list of several hundreds.

The establishment of the Panel aimed to assess the appropriateness and value of fishing limitations for penguin success. These are key discussions as the sardine stock in South African waters continue to be at relatively low levels.

This included science outcomes and insights achieved during of the Island Closure Experiment undertaken by the Department over the preceding decade. This experiment aimed at understanding what, if any, benefits are derived from limiting fishing adjacent to penguin colonies.

The Terms of Reference for the science review and the panel members were established in consultation with the representatives from the fishing industry and bird conservation sectors.

While the Expert Review Panel undertook their work, the Department, in September 2022 declared some areas around the major penguin colonies closed to commercial fishing for anchovy and sardine. Although not representative on a consensus agreement, these fishing restrictions were established after much collaboration and negotiation with the seabird conservation groups and the small pelagic fishing industry representatives.

A stand-out feature of the process to achieve a decision on fishing limitations, over the last two years, has been the level of engagement from the conservation and fishing industry sectors.

I want to thank you for your cooperation and assistance in this process. I do know that some of you are already in discussions on reaching compromises and agreements and I ask that you continue to find each other on this. The Department and myself will be keen to implement any consensus you may reach – as first prize. The DDGs Fisheries and Oceans & Coasts will assist if you require some planned meeting time and space.

To continue the engagement, I have asked officials from the Fisheries and Oceans and Coasts Branches to report to you at least annually on the implementation of these closures, the expanded science plan and also progress on other non-fishery interventions in the Penguin Management Plan. Fishing limitations alone will not be sufficient to help the penguins recover.

In conclusion, I want to thank the Panel, Professors Punt, Furness, Trathan, Sanchirico and Drs Parma and Plaganyi. I appreciate that you reviewed more than 200 documents and that you undertook new analyses as well.

I believe that the Report and my policy decisions here start a new cycle of refinement and assessment for both fisheries and penguin management. It is a material step in implementing our ambition on an ecosystems approach to sustainable ocean management and dynamic marine spatial planning.

Download:

- Report of the Export Review Panel [PDF – 11.6 mb]
- Summary report in presentation format [PDF - 2.89 mb]

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8 Appendix C. A summary of references to MICE in the IRP, and support for their application to determine the drivers of penguin population declines.

1. Section 6.3 "Understanding and mitigating reasons for the decline in African penguins due to factors other than fishing near breeding colonies: The effects of several drivers could be explored by developing an integrated ecosystem model, such as a ***MICE*** (Model of Intermediate Complexity for Ecosystem assessments) (Plagányi et al., 2014; Collie et al., 2016), or so-called MRMs (Minimum Realistic Models – Punt and Butterworth, 1995)[1]".
2. Page 42: "Section 1.3.2.1 summarises information related to the potential for changes in the biomass of prey species to affect population parameters, in particular the effect of sardine biomass on penguin adult survival. Further evaluation of such relationships could involve (a) the development of a new ***MICE*** that addresses all the major penguin colonies off South Africa, and (b) exploration of the consequences of using the current OMP to set catch limits for anchovy, sardine and round herring".
3. Section 6.3.2: "Past guano harvesting is recognised as an important possible contributory cause to the penguin decline because of its impact on optimal breeding habitat (see section 1.3.2.2). The impact of reductions in guano as nesting habitat is confounded to some extent with other changes in the system, but could be incorporated in a ***MICE***, expanding on local efforts currently underway."
4. Section 6.3.3: "This is an impact that could usefully be investigated using a ***MICE*** both in terms of direct and indirect predation effects, but also to compare the responses of other predators in the system to changes in pelagic fish abundance. Though known to occur, the incidence of predation of penguins by Cape fur seals, is unlikely to have led to the penguin population changes observed. Data on seal diet and changes in regional seal abundance would be particularly informative as inputs to models to quantify the relative contribution of seal predation (and possibly competition) to penguin mortality".
5. Section 6.3.6: Given recognition of the impact on African penguins of a continued eastward shift (i.e., from the west to the south coast) in the distribution of anchovy and especially sardine (van der Lingen, 2023), this is an important factor to include in a ***MICE***.
6. Section 6.3.6: "A ***MICE*** should ideally use and fit to all available penguin survival data. By explicitly representing the ages of tagged penguins as well as other confounding sources of mortality, such as due to oiling events and predation, an integrated ***MICE*** could assist in separating the alternative sources of mortality. This then provides an objective integrated framework for quantifying and correctly attributing the relative role of different drivers in causing the decline of the penguins. Given an improved understanding – validated to the extent possible - of the relative contributions of each driver to the penguin decline, a ***MICE*** is then a useful tool for testing the efficacy of alternative management strategies through forward projecting the effect of future mitigation measures, either on their own or in combination".
7. Section 7.5. "Sections 1, 4 and 6 summarise hypotheses related to aspects other than fishing near island breeding colonies leading to resource competition, that could explain past and ongoing declines in African penguin populations. Section 6 identifies data sources and analysis methods (including the use of Models of Intermediate Complexity for Ecosystem Assessment – ***MICE)*** that could assist in understanding the effect of these aspects and how they can be mitigated".
8. "Table 7.1. Prioritised summary of research and other tasks. Short-term tasks pertain to the next 1-2 years, medium-term tasks to the next 2-5 years and long-term tasks the next 6+

years. The relative priorities and timings reflect an integrated outcome of the Panel, which assigned priorities and timings to each task. Understanding and mitigating reasons for the decline in African penguins due to factors other than fishing near breeding colonies. a. Develop a ***MICE***/integrated ecosystem model High Medium".

9. "APPENDIX F: OUTLINE OF ***MICE*** AND THEIR USE TO ASSESS DRIVERS OF THE DECLINE OF AFRICAN PENGUINS" – extensive references to MICE.

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