



21 October 2019

Document Number: B19-0476

Decision on Squid 6T Operational Plan to Manage Incidental Interactions with New Zealand Sea Lions in the Southern Squid Trawl Fishery

Purpose:

This briefing provides advice for your decisions on the Squid 6T Operational Plan to manage incidental interactions with New Zealand sea lions in the southern squid trawl fishery.

Minister	Action Required:	Minister's Deadline
Minister of Fisheries	<p>Note that you must consult with the Minister of Conservation prior to making a decision on the fishing-related mortality limit under Section 15 of the Fisheries Act 1996.</p> <p>Agree to make decisions on settings for the Squid 6T Operational Plan as set out in this briefing.</p>	As soon as possible, but no later than 18 November to allow notification prior to the start of the squid fishing season.

Comment:

There is likely to be media interest in your decisions. Fisheries New Zealand will prepare a communications plan prior to the announcement of your decisions.

Contact for telephone discussion (if required)

Officials	Name	Position	Work	After Hours
Responsible Director	Emma Taylor	Acting Director Fisheries Management	Privacy	Privacy
Principal Author	Privacy	Team Manager Deepwater Fisheries	Privacy	Privacy

Key Messages

1. This briefing provides you with Fisheries New Zealand's advice on measures to manage incidental captures of New Zealand sea lions in the Squid 6T fishery. Captures are currently managed through the 'Operational Plan to Manage the Incidental Capture of New Zealand sea lions in the Southern Squid Trawl Fishery (Squid 6T),' (Squid 6T Operational Plan). The most recent Squid 6T Operational Plan (2017-2019) expired on 30 September 2019.
2. The primary measure in the Squid 6T Operational Plan is a fishing-related mortality limit, which you may set after consultation with the Minister of Conservation, under section 15 of the Fisheries Act 1996 (the Act).
3. Fisheries New Zealand consulted publically on your behalf from 7 August to 20 September 2019, on the three fishing-related mortality limit options in Table 1.

Table 1: Options for the annual fishing-related mortality limit and associated potential maximum impact on Auckland Island sea lion population

	Annual Fishing-related Mortality Limit	Equivalent Observed Sea Lion Captures	Maximum Impact on Sea Lion Population
Option 1	26	20	2.5%
Option 2	52	40	5%
Option 3	104	80	10%

4. A total of 15 submissions were received. Two alternative options were proposed by submitters. Forest & Bird proposed a spatial closure of part of the Squid 6T quota management area (SQU6T). Deepwater Group Limited proposed that a fishing-related mortality limit is no longer necessary. Fisheries New Zealand notes that you have broad discretion under the Act which encompasses the two alternative options.
5. The consultation document included a proposal for a new, more direct, approach to monitor the fishing-related mortality limit based on observed sea lion captures. This was made possible by new research that better quantifies and reflects the uncertainty in the level of interactions and deaths of sea lions in the Squid 6T fishery, and the effectiveness of Sea Lion Exclusion Devices (SLEDs).
6. Based on the updated analyses, the Squid 6T fishery is estimated to be having less than a 1.5% impact on the sea lion population in the long term. In the last ten fishing years the maximum number of estimated sea lion deaths in a fishing year has been nine.
7. Given the current low impact of the fishery, the three options to set a fishing-related mortality limit are unlikely to constrain the amount of fishing activity. However, we propose that Option 2 would serve as a backstop to ensure that fishing does not have an adverse effect on the sea lion population in the future should circumstances change. Option 2 is consistent with the sea lion population outcome in the most recent Operational Plan.
8. Based on submissions received and 100% deployment of SLEDs in the Squid 6T fishery over the last decade, we do not consider SLED use should be made compulsory through regulation at this time.

Next Steps

9. You must consult with the Minister of Conservation prior to making your decision on whether to set a fishing-related mortality limit.
10. Once you have made your decisions, a decision letter will be sent to stakeholders and published on the Fisheries New Zealand website. Fisheries New Zealand can also provide support for an item to Cabinet if required.
11. Fishing in the Squid 6T fishery usually begins in December or January each year. Management measures should be in place in advance of the commencement of fishing.
12. A proposed timeline for the Squid 6T Operational Plan decisions and announcement is below. Fisheries New Zealand will develop communication material to support announcement of your decisions.

Table 2: Proposed Timeline for Squid 6T Operational Plan Decisions

Key Milestone	Date
Fishing Year begins	1 October 2019
Final advice provided	22 October 2019
Consultation with the Minister of Conservation	4-8 November 2019
Decision on Squid 6T Operational Plan	18 November 2019
Decision letter to stakeholders, new Squid 6T Operational Plan comes into effect	25 November 2019
Fishing in the Squid 6T fishery expected to begin	December 2019

Recommendations

13. Fisheries New Zealand recommends that you:

- a) **Note** that you are required to consult with the Minister of Conservation before setting a fishing-related mortality limit under section 15(2) of the Fisheries Act 1996.

Noted

- b) **Note** that you have broad discretion under the Fisheries Act 1996 and could choose to not set a fisheries-related mortality limit for New Zealand sea lions in the Squid 6T fishery.

Noted

- c) **Note** that three options for a fisheries-related mortality limit were publically consulted on your behalf that would have an associated maximum potential long term impact on the Auckland Islands sea lion population of 2.5%, 5% or 10%.

Noted

AND

Option 1

- d) **Agree** for the purposes of section 15(2) of the Fisheries Act 1996, to set a fishing-related mortality limit of 26 sea lions, consistent with fishing-related mortality having no more than a 2.5% impact on the Auckland Islands sea lion population in the long term.

Agreed / Not Agreed

OR

Option 2 (Preferred option)

- e) **Agree** for the purposes of section 15(2) of the Fisheries Act 1996, to set a fishing-related mortality limit of 52 sea lions consistent with fishing-related mortality having no more than a 5% impact on the Auckland Islands sea lion population in the long term.

Agreed / Not Agreed

OR

Option 3

- f) **Agree** for the purposes of section 15(2) of the Fisheries Act 1996, to set a fishing-related mortality limit of 104 sea lions, consistent with fishing-related mortality having no more than a 10% impact on the Auckland Islands sea lion population in the long term.

Agreed / Not Agreed

Sea Lion Exclusion Devices

- g) **Agree** that the use of Sea Lion Exclusion Devices in the Squid 6T fishery should continue, but does not need to be made compulsory by regulation under the Fisheries Act 1996.

Agreed / Not Agreed

Duration of Operational Plan

- h) **Agree** that the Squid 6T Operational Plan should have a duration of four years and apply to the 2019/20 to 2022/23 fishing years (inclusive).

Agreed / Not Agreed

Observer coverage

- i) **Agree** that Fisheries New Zealand observer coverage will be at least 90% of tows in Squid 6T.

Agreed / Not Agreed

- j) **Agree** that spatial measures are not necessary at this time to avoid, remedy or mitigate the effect of fishing-related mortality on New Zealand sea lions but may be considered in future.

Agreed / Not Agreed

Trigger for Review

- k) **Note** the notification requirements, reporting requirements, process for fishery closure, and that Fisheries New Zealand will review the Squid 6T Operational Plan if:

'significant new information becomes available that indicates fisheries activities are having a different impact on the sea lion population than estimated in 2019, or there are changes in fishing operations/level of effort, or there are significant new concerns regarding the sea lion population.'

Noted

- l) **Agree** to sign and forward this briefing and the attached letter (Appendix One), to Hon Eugenie Sage, Minister of Conservation.

Agreed / Not Agreed

Stuart Anderson
Acting Deputy Director-General
Fisheries New Zealand

Hon Stuart Nash
Minister of Fisheries

/ / 2019

Background

New Zealand Sea Lion

14. The New Zealand sea lion/rāpoka is an endemic, protected species that is a taonga for tāngata whenua. New Zealand sea lion (sea lion) have been protected since 1894 when hunting was prohibited. As a result of intense hunting prior to 1894, the breeding population is now concentrated in the sub-Antarctic islands.
15. Abundance trends for each sea lion breeding population are monitored using sea lion pup counts to estimate pup production, which then provides an index of total population size. A total population of 11,800 sea lions (including pups) was estimated in 2015.
16. A total of 68% of annual sea lion pup production is from the Auckland Islands and 30% from Campbell Island. The Auckland Islands population declined significantly between 2000 and 2009, but appears to have stabilised in the last decade. At Campbell Island, the sea lion population increased rapidly between 2000 and 2010 and appears to have stabilised thereafter.
17. The population on Stewart Island appears to be increasing and was recognised as a breeding colony in 2018. The breeding population on the east coast of the South Island is increasing but is not yet large enough to be recognised as a breeding colony.
18. In 2017, the Department of Conservation and Fisheries New Zealand jointly developed the 'New Zealand sea lion/rāpoka Threat Management Plan 2017-2022'. The vision of the Threat Management Plan is to promote the recovery and ensure the long-term viability of the New Zealand sea lion, with the ultimate goal of achieving 'Not Threatened' status.
19. The current threat classification status of New Zealand sea lion improved in 2019 from 'Threatened – Nationally Critical' to 'Threatened – Nationally Vulnerable'¹ because the overall rate of population decline at the Auckland Islands has slowed, and sea lion numbers are stable or increasing at other breeding locations.

Sea Lion Population Modelling

20. The Squid 6T Operational Plan is based on estimates of abundance for the Auckland Islands female breeding population only (Figure 1). A high proportion of the Auckland Islands colony has been tagged to allow for annual re-sighting information to be collected. A statistical demographic population model has been developed which incorporates all available data including pup counts, age distribution data from lactating females, and tag re-sight data to inform estimates of critical demographic rates.

¹ Baker, C.S.; Boren, L.; Childerhouse, S.; Constantine, R.; van Helden, A.; Lundquist, D.; Rayment, W.; Rolfe, J.R. 2019: Conservation status of New Zealand marine mammals, 2019. New Zealand Threat Classification Series 29. Department of Conservation, Wellington. 18 p.

21. The model structure allows the underlying demographic rates responsible for the observed population changes (including the decline at the Auckland Islands colony between 2000 and 2009) to be identified. In this case, the model indicates that the observed Auckland Islands population decline was a consequence of both low pup survival and reduced adult survival. The importance of low pup survival, which has also been confirmed by direct observations, indicates that there was more than one cause of the population decline. This is because the fishery does not directly impact pups, and the apparent levels of pup mortality are far higher than could be explained as a consequence of fishing impacts on lactating mothers.
22. During the period of the population decline, the Auckland Islands sea lion population suffered from severe episodic disease outbreaks caused by the bacterial pathogen *Klebsiella pneumoniae*. This resulted in very high pup mortality in some years. Severe outbreaks have not been observed more recently, but *K. pneumoniae* is still observed to kill some sea lion pups every year.

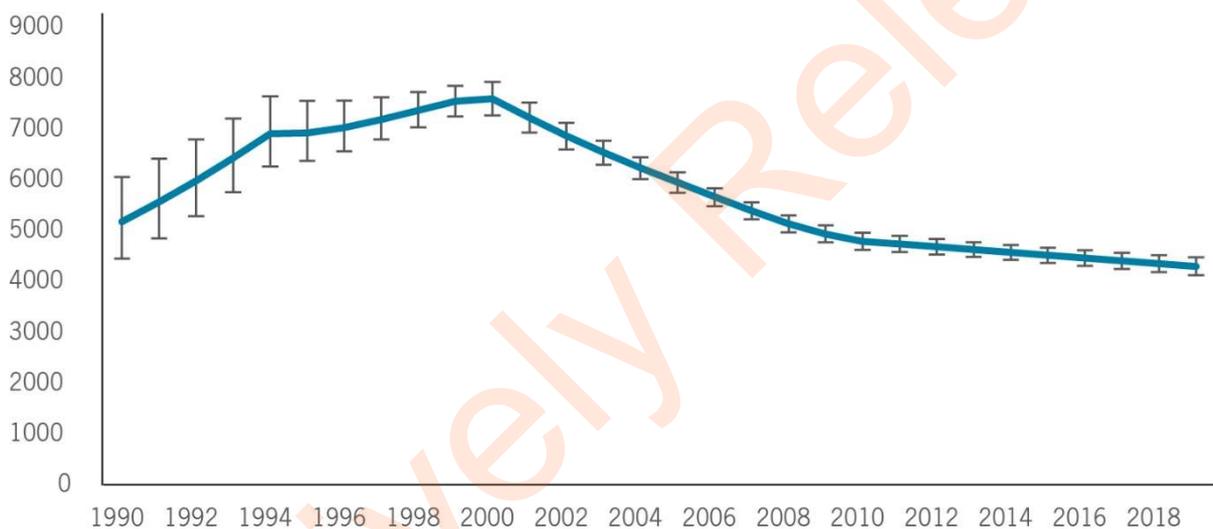


Figure 1. Auckland Islands' Female Sea Lion Population, 1990 to 2018

Commercial Fisheries

23. Commercial fishing was excluded from the Auckland Islands out to a distance of 12 nautical miles by the designation of the area as a Marine Mammal Sanctuary in 1993. The Auckland Islands - Motu Maha Marine Reserve was established in 2003. Because sea lions forage beyond 12 nautical miles from shore, they overlap with the commercial fisheries that operate near the Auckland Islands.
24. The southern squid trawl fishery (Quota Management Area SQU6T, Figure 2) began in the late 1970s. The fishery targets arrow squid on the Auckland Islands shelf, usually between December and June. Arrow squid are short lived and the biomass is highly variable between years. This drives the variation in the level of fishing effort in the Squid 6T fishery each year.

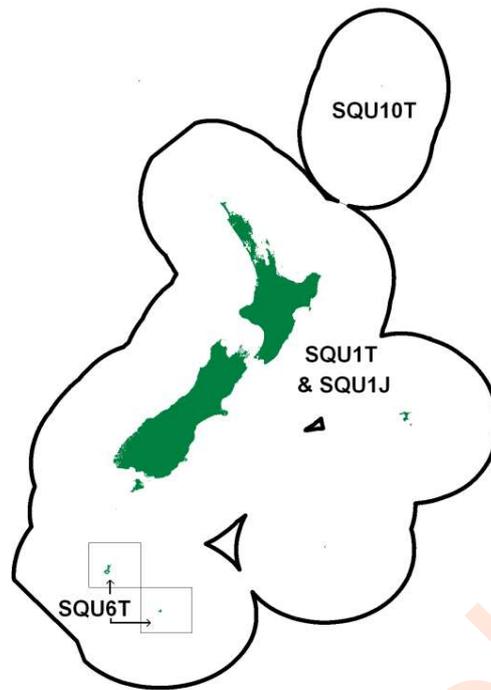


Figure 2. Quota Management Area SQU6T

25. The current Total Allowable Commercial Catch in SQU6T is 32,369 tonnes, although landings have not reached this level since 2004. In the last decade (2009/10 to 2018/19) the average annual catch has been 12,978 tonnes. Landings have ranged from 6,127 tonnes to 25,172 tonnes. The number of vessels participating in the Squid 6T fishery has declined over time, from 63 vessels operating in 1990, to 21 vessels in 2018/19.
26. The estimated export value of the Squid 6T fishery in the 2018 calendar year was around \$57M. In the current fishing year (2018/19), fishing had ended by 21 July 2019 with 95% of the 806 tows observed and around 9,178 tonnes of squid landed.

Sea Lion Captures in Squid 6T

27. The most important initiative to mitigate impacts of fishing on sea lions is the Sea Lion Exclusion Device (SLED). SLEDs began to be used in the Squid 6T fishery in 2000. The SLED is designed to guide actively swimming sea lions to exit the top of the trawl net through an opening. A standardised design - the Mark 3/13 SLED, was adopted and has been used on all observed tows since 2009/10.
28. The estimated number of annual fishing-related sea lion deaths has declined substantially from around 160 deaths in the early 1990s to fewer than 10 deaths per year in the last decade (Figure 3). Annual fishing effort has also declined over time from a high of just under 5,000 trawl tows in Squid 6T in the early 1990s, to an average of under 2,000 trawl tows per year since 2008/09.

29. In the last five fishing years, from 2014/15 up to and including 2018/19, observed captures of sea lions in the Squid 6T fishery ranged from 0 to 7, with an average of 87% of tows observed annually. The estimated average number of sea lion deaths² during this period is 3.4 per year.

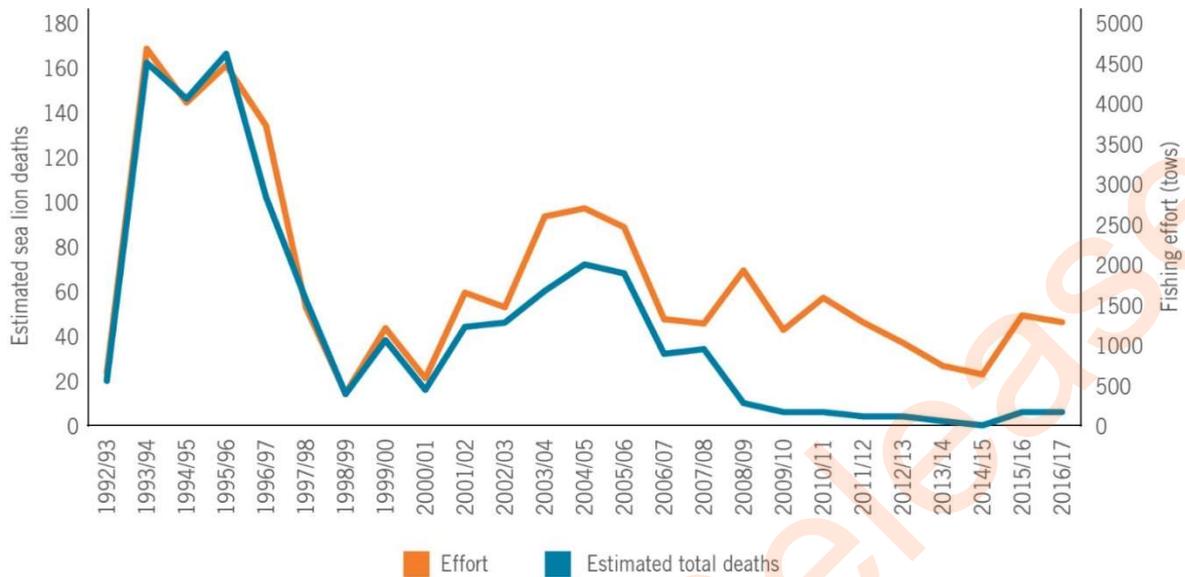


Figure 3. Estimated annual sea lion deaths and fishing effort from 1992/93 to 2016/17.

Other Fisheries

30. Sea lions from the Auckland Islands may be captured in other commercial fisheries including the scampi trawl fishery (SCI6A). This fishery operates approximately 20-60 nautical miles from the Auckland Islands. Other middle depth trawl fisheries, targeting species such as hoki, hake, ling or warehou species, can capture sea lions from the Auckland Islands. However captures in these fisheries are rare, given they operate more than 60 nautical miles away from the breeding colony.
31. Modelling estimates that six sea lions are killed annually in scampi and other trawl fisheries, excluding squid, around the Auckland Islands.³ This estimate is incorporated into the estimates of demographic rates in the sea lion population model, and is therefore taken into account when the Population Sustainability Threshold (PST) for the Squid 6T fishery is calculated (see below).

² Based on a cryptic mortality rate of 1.3 sea lion deaths per observed capture.

³ Large, K.; Roberts, J.; Francis, M.; Webber, D.N. (2019). Spatial assessment of fisheries risk for New Zealand sea lions at the Auckland Islands. *New Zealand Aquatic Environment and Biodiversity Report No. 224*. 85 p.

Management Settings

Fishing-related Mortality Limit

32. Setting an annual fishing-related mortality limit for sea lions is an option open to you under section 15(2) of the Act, following consultation with the Minister of Conservation.
33. The most recent Squid 6T Operational Plan (2017-2019) set an annual fishing-related mortality limit of 38 sea lions. This was the lowest number since fishing-related mortality limits were first set in 1991. The limit was based on outputs from the New Zealand sea lion demographic population model and a desired population objective of the Auckland Islands sea lion population being no more than 5% lower than it would be in the absence of human-caused mortality with 90% confidence, over five years, incorporating uncertainty.
34. The fishing-related mortality limit included an allowance for sea lion mortalities in fisheries other than Squid 6T that may have impacted on the Auckland Islands sea lion population. This was implemented by setting the fishing-related mortality limit at eight fewer sea lions than the estimate of the PST. Upon further consideration, this was found to be double-counting, as the population model already included and accounted for sea lion mortalities in other fisheries.

Sea Lion Exclusion Devices

35. Vessel operators agree under the Operational Plan to carry at least two SLEDs on all trips to Squid 6T. The SLEDs are audited by a registered net making company to make sure they meet the agreed (Mark 3/13) specifications. Fisheries New Zealand observers on vessels in the Squid 6T fishery also measure SLEDs before deployment to confirm they meet the specifications and are being used in the correct manner.
36. The use of SLEDs is not currently regulated, however, since the 2007/08 fishing year, all vessel operators that target squid in the Squid 6T fishery have deployed SLEDs on all tows. In 2008/09 observers noted that 95% of SLEDs met the Mark 3/13 specifications. Since 2009/10, 100% of SLEDs measured by observers in the Squid 6T fishery have met the specifications of the Mark 3/13 SLED design.

Observer Coverage

37. The most recent Operational Plan (2017-2019) included a commitment for a minimum observer coverage of 70% of Squid 6T tows. Actual observer coverage in the last five years has averaged 84% annually. In the most recent fishing year (2018/19), 95% of Squid 6T tows were observed.

Squid 6T Operational Plan Technical Advisory Group

38. To better engage on the review of the previous Squid 6T Operational Plan (2017-19), a multi-stakeholder Technical Advisory Group was set up in 2017 to provide advice and recommendations to Fisheries New Zealand on:
 - management settings and content of the Operational Plan; and
 - updated 'sea lion population objective' criteria.
39. The membership of the Squid 6T Operational Plan Technical Advisory Group (TAG) includes representatives from Fisheries New Zealand, the Department of Conservation, Te Ohu Kaimoana, environmental non-governmental organisations, the commercial fishing industry, and four independent experts invited by Fisheries New Zealand. The TAG has met a total of four times in 2018 and 2019. The recommendations of the TAG are reflected in the following sections.
40. Fisheries New Zealand will review the Terms of Reference and membership of the TAG with a view to engaging the group on development and reviews of future Squid 6T Operational Plans, and possibly wider management of sea lion interactions with fisheries.

New Information

Population Sustainability Threshold

41. Fisheries New Zealand implements a risk-based framework to manage the impacts of fisheries on the aquatic environment. This framework includes calculating a 'Population Sustainability Threshold' (PST) to identify where fishing may be having an adverse effect on a non-target population. The PST is an estimate of the maximum number of annual human-induced mortalities that can occur, while still allowing a population to achieve a defined population outcome.
42. For the Auckland Islands sea lion population, the population outcome is defined in terms of how much impact the Squid 6T fishery can have over a defined time period, relative to the un-impacted population, to ensure the long-term viability of the New Zealand sea lion population.
43. Models used to estimate the PST for the Auckland Islands sea lion population are for female sea lions only. The use of the female-only PST to inform a fishing-related mortality limit was discussed by the TAG, and it was agreed that the female-only PST should be doubled to account for both sexes in the fishing-related mortality limit.

Cryptic Mortality Multiplier

44. The unobserved death of a sea lion that exits a trawl net via a SLED but does not survive is termed 'cryptic mortality.' Fisheries New Zealand contracted a research programme in 2018 to better estimate cryptic mortality for sea lions. A statistical model was constructed to estimate levels of cryptic mortality with explicit consideration of uncertainty. All inputs and outputs of this work were reviewed by both the Fisheries New Zealand Aquatic Environment Working Group and the TAG.

45. The treatment of uncertainty and incorporation of expert judgement significantly increases confidence in the estimates of how effective SLEDs are at allowing sea lions to survive encounters with trawl gear. The outcomes are expressed as a 'cryptic mortality multiplier,' i.e. the ratio of sea lion captures that can be observed to total sea lion deaths.
46. The scientific models estimate that a sea lion that encounters a fishing vessel is more likely to enter a midwater trawl net than a bottom trawl net, and that once a sea lion enters a net it is more likely to exit a midwater net (88%) than a bottom trawl net (57%). The estimated effectiveness of the SLED is higher for midwater nets, but the overall risk to sea lions is almost equal between the two fishing methods. Overall it was estimated that, of the sea lions that exited the net, 93-95% will subsequently survive.
47. The TAG agreed that total sea lion deaths for the Squid 6T fishery can be estimated as a cryptic multiplier of 1.3 on the number of observed captures.⁴ The research estimates that for every three sea lions that are observed captured, a fourth sea lion died that was not observed. The estimate of the number of sea lion deaths that occur per Squid 6T tow is 2.3 sea lion fatalities per 1,000 tows.

Legal Context

48. The New Zealand sea lion is a marine mammal under section 2(1), and declared a threatened species under section 2(3) of the Marine Mammals Protection Act 1978. It is therefore a protected species under section 2 of the Fisheries Act 1996 (the Act).
49. The purpose of the Act (section 8) is to provide for the utilisation of fisheries resources while ensuring sustainability. For the purpose of the Act, ensuring sustainability means:
 - Maintaining the potential of fisheries resources to meet the reasonably foreseeable needs of future generations; and
 - Avoiding, remedying, or mitigating any adverse effects of fishing on the aquatic environment.Utilisation means conserving, using, enhancing, and developing fisheries resources to enable people to provide for their social, economic, and cultural well-being.
50. Section 9 of the Act sets out environmental principles that any person exercising or performing function, duties, or powers under the Act, in relation to the utilisation of fisheries resources or ensuring sustainability, shall take into account. The principles are:
 - a) Associated or dependent species should be maintained above a level that ensures their long-term viability;
 - b) Biological diversity of the aquatic environment should be maintained; and
 - c) Habitats of particular significance for fisheries management should be protected.

⁴ This is based on the weighted average of effort composition (ratio of midwater to bottom trawls) for the three fishing years (2015/16 to 2017/18).

51. The primary relevant principle is the maintenance of associated or dependent species above a level that ensures their long-term viability. Long-term viability means there is a low risk of collapse of the species, and the species has the potential to recover to a higher biomass level. For New Zealand sea lions, because of the dependence of the population on environmental factors, it is difficult to estimate the current status of the population.
52. Section 10 of the Act sets out the information principles that any person exercising or performing functions, duties or powers under the Act, in relation to the utilisation of fisheries resources or ensuring sustainability, shall take into account. The principles are:
- Decisions should be based on the best available information;
 - Decision makers should consider any uncertainty in the information available in any case;
 - Decision makers should be cautious when information is uncertain, unreliable, or inadequate; and
 - The absence of, or any uncertainty in, any information should not be used as a reason for postponing or failing to take any measure to achieve the purpose of this Act.
53. Specifically, you should be mindful of the best available information and associated uncertainties that surround the information that supports key management settings, including the fishing-related mortality limit. The information provided in this advice paper has been reviewed through Fisheries New Zealand's Aquatic Environment Working Group and the Technical Advisory Group and is therefore considered to represent the best available information.
54. Section 11 of the Act stipulates a number of matters you must take into account when making decisions on sustainability measures (including decisions under section 15 of the Act). Section 11(1) of the Act states that you may, from time to time, set or vary any sustainability measures after taking into account:
- a) Any effects of fishing on the stock and the aquatic environment; and
 - b) Any existing controls under the Act that apply to the stock or area concerned; and
 - c) The natural variability of the stock concerned.
- These matters are discussed in the analysis of options below.
55. You must also take into account any relevant and approved fisheries plans when making sustainability decisions under Section 11(2A) of the Act. The most relevant management objectives in the National Deepwater Fisheries Plan are:
- *Objective 8* – Manage deepwater and middle-depth fisheries to avoid, remedy or mitigate the adverse effects of these fisheries on the long-term viability of endangered, threatened and protected species populations.
 - *Objective 10* – Ensure there is consistency and certainty of management measures and processes in the deepwater and middle-depth fisheries.

56. Section 12 sets out consultation requirements before you make any decisions under section 15(1) or 15(2) of the Act. This requires you to consult with such persons or organisations you consider are representative of those having an interest in the stock or the effects of fishing on the aquatic environment in the area concerned, including Māori, commercial, and recreational interests, and also to provide for the input and participation of tangata whenua and have particular regard to kaitiakitanga. This is discussed under 'Public Consultation' below.
57. Section 15 of the Act sets out options for you to manage the fishing-related mortality of marine mammals or other wildlife. Section 15(2) says that, in the absence of a Population Management Plan⁵, you may, after consultation with the Minister of Conservation, take such measures as you consider necessary to avoid, remedy, or mitigate the effect of fishing-related mortality on any protected species, and such measures may include setting a limit on fishing-related mortality.
58. Section 15(5) says that you may, by notice in the *Gazette*, prohibit all or any fishing or fishing methods in an area for the purpose of ensuring that any limit on fishing-related mortality is not exceeded.

Case Law relating to setting a fishing-related mortality limit

59. In 2004, the fishing industry sought judicial review of the Minister's decision to set a fishing-related mortality limit of 62 sea lions.⁶ The Court Of Appeal set aside the 2003-2004 Operational Plan, and the fishing-related mortality limit was increased to 124 for that season. In doing so, the Court emphasised that section 15(2) of the Act only authorises measures that are "necessary" to avoid, remedy or mitigate the effect of fishing-related mortality on the sea lion population and stated:

[7] "Fishing related mortality" refers only to the death of sea lions in the course of fishing activity. It does not extend to impacts on the sea lion population associated with, for instance, competition for squid. Further, what is important is the impact of fishing on the sea lion population as a whole and the section does not provide for measures aimed simply at eliminating or reducing individual deaths."

60. Further, this assessment should be guided by the purpose and principles of the Fisheries Act and the Court commented that the Minister was required to balance utilisation objectives and conservation values, in the context of a harvestable species. This requires utilisation to the extent that it is sustainable.⁷
61. In recognising this the Court stated:
[77] "The point of the exercise is not to arrive at a number of sea lions which can be harvested sustainably, and thinking associated with sustainability of a harvestable species is not appropriate."

⁵ There is no Population Management Plan for New Zealand sea lion

⁶ Squid Fishery Management Company Limited v Minister Of Fisheries and Chief Executive of Ministry Of Fisheries, CA 39/04

⁷ Ibid

62. Given the underlying uncertainties involved, the Court noted that any fishing-related mortality limit chosen is likely to carry some degree of risk to sea lions and that optimum usage does not equate to maximum usage. There is no simple method by which risk can be balanced against utilisation advantages, and a precautionary approach to the required balancing exercise is open to the Minister.

Public Consultation/Kaitiakitanga

63. Consultation with iwi and stakeholders on options for management settings for the Squid 6T Operational Plan took place between 7 August 2019 and 20 September 2019. A consultation document setting out options for management measures was posted on the Fisheries New Zealand website. Fisheries New Zealand directly contacted members of the TAG, New Zealand sea lion/rāpoka Threat Management Plan Advisory Group and Forum members, Squid 6T quota owners (which include commercial iwi interests) and environmental groups, to notify them of the consultation. There was also a press release about the consultation.
64. Fisheries New Zealand also sought information and views from tangata whenua through Te Waka a Māui. Te Waka a Māui is the Iwi Fishery Forum which represents the nine tangata whenua iwi of Te Waipounamu (South Island).
65. A total of 15 submissions were received from the following individuals or organisations (Table 3) and are discussed below. Full copies of submissions can be provided to your office if required.

Table 3. Name of Organisation/submitter

	Organisation/Submitter
1	Auckland Zoo
2	Aurora Fisheries Limited
3	Bruce Robertson, Associate Professor University of Otago
4	Deb Butterfield
5	Deepwater Group Limited
6	Environment and Conservation Organisations of NZ Inc.
7	Forest & Bird
8	Kevin Collins
9	NZ Sea Lion Trust
10	Otago Conservation Board
11	Our Seas Our Future
12	Sealord Group Ltd
13	Shaun McConkey, Science Advisor NZ Sea Lion Trust
14	Te Ohu Kaimoana
15	WWF New Zealand

Analysis of Options

General issues

66. Submissions were all in favour of the proposed new approach to monitoring of the fishery against the fishing-related mortality limit using a cryptic mortality multiplier, and using a 'fatal interaction rate' to calculate potential sea lion mortalities on unobserved tows in the Squid 6T fishery.
67. A number of submissions, particularly from environmental groups, identified that they would like to see the adoption of an ambitious zero bycatch policy or objective for New Zealand fisheries. Fisheries New Zealand considers all fishers should be aiming for no bycatch of protected species, but recognises the practical difficulties, and the need for this to be achieved through a mixture of regulatory and non-regulatory means in the context of your legal obligations under the Act. Additional information on zero bycatch objectives in relation to your obligations was provided to you in B19-0407.
68. The fishing industry submitters noted that section 15(2) of the Act is not a power to enable you to arbitrarily impose unreasonably low limits for a protected species, or to progressively lower bycatch levels to achieve a 'zero bycatch' outcome. In that light, they consider that the fishing-related mortality limit options based on 2.5% and 5% cannot reasonably be considered necessary to mitigate the effect of fishing-related mortality on the sea lion population. In their view, there should be either no fishing-related mortality limit, or one that is set to allow for a maximum population impact of 20%, which they consider to be consistent with international guidance on maintaining long-term population viability for marine mammals.
69. Sealord Group Ltd did not support the proposal from Fisheries New Zealand that on the rare occasion that a live sea lion is caught in the Squid 6T fishery, it should also count against the annual fishing-related mortality limit. Fisheries New Zealand notes our view represents a precautionary approach, because sea lions are generally thought to survive when released uninjured. However we consider it is important to also count live sea lion captures as this will provide clarity on the treatment of any live captures for the purposes of a fishing-related mortality limit given the uncertainty associated with post-release survival of captured animals.
70. 'Our Seas Our Future' commented that they did not consider setting the fishing-related mortality limit for both sexes appropriate, as they believe that female sea lions are more likely to be captured than male sea lions. Fisheries New Zealand notes that the approach of doubling the estimate of the Population Sustainability Threshold to set the fishing-related mortality limit was agreed by the TAG as an appropriate way to account for the model being only for female sea lions.
71. Associate Professor of Zoology at the University of Otago, Bruce Robertson, expressed a lack of trust in Fisheries New Zealand's science peer review process and therefore any management options proposed. In his view, there is not sufficient expertise at Fisheries New Zealand working group meetings to provide robust peer review. Fisheries New Zealand notes that working group meetings are open to the public, and independent scientists are invited, as appropriate, to provide independent peer review whenever possible.

72. Nine submissions did not support any of the three options consulted on for the fishing-related mortality limit. Six of these submissions supported an alternative proposal by Forest & Bird for a spatial closure. Four submissions considered that a fishing-related mortality limit is no longer required. Additional analysis on these two alternative proposals is provided below.

Fishing-related Mortality Limit

73. The options for the fishing-related mortality limit for the Squid 6T fishery are based on an estimate of the maximum number of annual sea lion mortalities that will allow the Auckland Islands sea lion population to achieve a defined population outcome (Table 4).

Table 4. Options for the Fishing-related Mortality Limit for the Squid 6T Fishery, including proposals received during consultation

	Annual Fishing-related Mortality Limit	Equivalent Observed Sea Lion Captures	Maximum Impact on Sea Lion Population	Note
Option 1	26	20	2.5%	
Option 2	52	40	5%	
Option 3	104	80	10%	
'No FRML'	N/A	N/A	N/A	No limit

74. The options are expressed in terms of allowable fisheries impact relative to what the sea lion population would have been in the absence of fishing. Specifically, with 95% certainty, impacts are at or below a level that will allow the Auckland Islands sea lion population to recover to, and/or stabilise at, an equilibrium size that is at or above a proportion of the un-impacted population size.
75. The proportions used to define the options came from the outcomes of discussion with the TAG. They are equivalent to a maximum potential impact of 2.5%, 5%, and 10% relative to the un-impacted New Zealand sea lion population. Note that this does not mean that 2.5%, 5%, or 10% of the population will be impacted each year, it means that the maximum long term impact would be no more than the given percentage.
76. It is important to note that these projections and fishing-related mortality limit options assume that the fishing-related mortality limit is fully taken every year and therefore represent the 'worst case' scenario.
77. As proposed in the consultation document, the fishery will be monitored against the fishing-related mortality limit by applying the cryptic mortality multiplier of 1.3 to any observed sea lion capture. For unobserved tows the fatal interaction rate of 2.3 sea lion fatalities per 1,000 tows will be applied. As has been done in recent years, the total estimated number of sea lion mortalities will be monitored in near real-time and will be reported to you, stakeholders and iwi, on a weekly basis.

Option 1

78. This option would set the fishing-related mortality limit to ensure that the maximum impact of the Squid 6T fishery on the recovery or stabilisation outcome of the Auckland Islands sea lion population is no more than 2.5% in the long term (Figure 4). This would result in an annual fishing-related mortality limit of 26 sea lions (both sexes combined).
79. Figure 4 shows the projected trajectory of the sea lion population assuming 26 annual sea lion deaths per year and two different environmental condition assumptions. This highlights the reliance of the sea lion population trend on environmental conditions, and provides a visual interpretation of the resulting maximum impact from a fishing-related mortality limit of 26 sea lions.

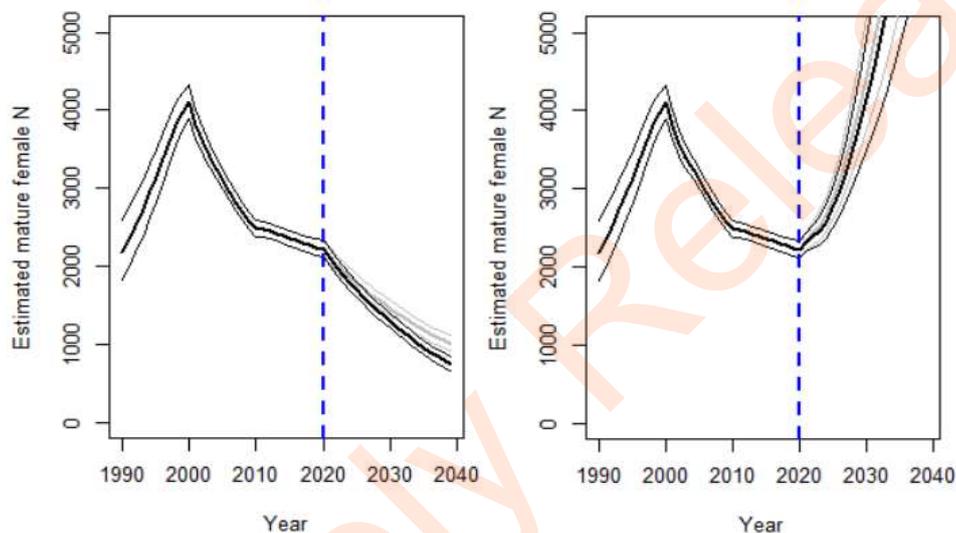


Figure 4. Auckland Islands female sea lion population projections assuming no squid fishery-related deaths (grey lines) and a maximum of 26 squid fishery-related deaths annually (black lines) assuming either poor environmental conditions (left) or positive environmental conditions (right).⁸

80. This option was supported by four submitters, the Auckland Zoo, Kevin Collins, the Otago Conservation Board, and Our Seas Our Future. Primary rationale for this support was the view that it is the most precautionary option, and therefore best supports achievement of the objectives of the Sea Lion Threat Management Plan.
81. It was also identified that this option is unlikely to impact on fishing and therefore, many submitters considered that it allows for utilisation while serving as a backstop to ensure that fishing does not have an effect on the sea lion population, in particular if fishing effort were to increase during the term of the Operational Plan.
82. Submitters who supported this option also commented on the need to support the increase of the sea lion population, not just its stabilisation, and therefore considered that management should be precautionary and the current work to support the recovery of the population should continue.

⁸ Roberts J. (2019) Population effects of New Zealand sea lion mortality scenarios relating to the southern arrow squid fishery at the Auckland Islands. NZ AEBR No. 223, 35p.

Analysis

83. Setting the fishing-related mortality limit at 26 would be unlikely to impact effort in the Squid 6T fishery given the current number of vessels active in the fleet. The maximum estimated number of sea lion deaths in the Squid 6T fishery in any fishing year since standardised SLEDs have been deployed is nine.
84. Option 1 would serve as a backstop to ensure that fishing does not have an adverse effect on the sea lion population in the future should circumstances change.
85. The defined sea lion population outcome of being “no more than 2.5% lower than it would be without sea lion deaths in the Squid 6T fishery” would represent the most precautionary defined population outcome used to inform management of the impacts of fishing on any protected species in New Zealand.

Option 2 (Preferred Option)

86. This option would set the fishing-related mortality limit to ensure that the maximum impact of the Squid 6T fishery on the recovery or stabilisation outcome of the sea lion population is no more than 5% in the long term (Figure 5). This is consistent with the population outcome used in the most recent Squid 6T Operational Plan (2017-2019). Using the updated population model, this would result in an annual fishing-related mortality limit of 52 sea lions (both sexes combined).

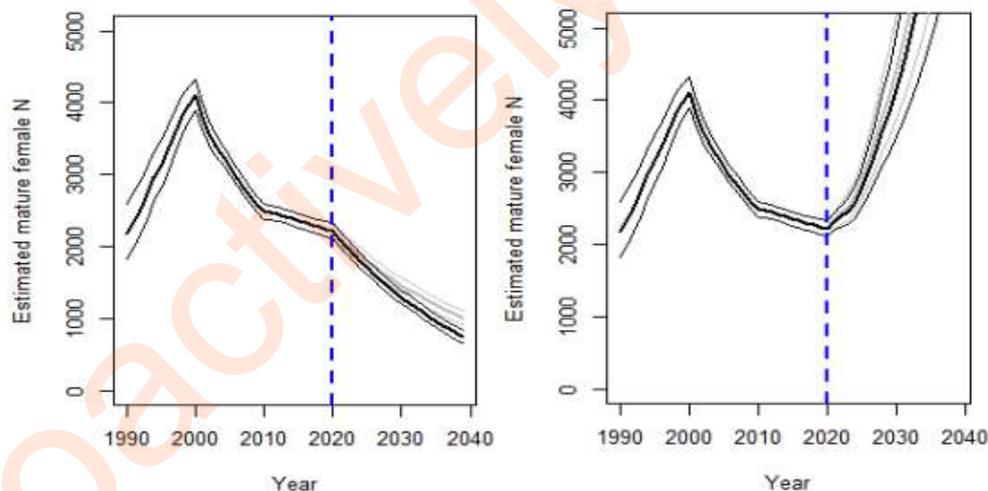


Figure 5. Auckland Islands female sea lion population projections assuming no squid fishery-related deaths (grey lines) and a maximum of 52 squid fishery-related deaths annually (black lines) assuming either poor environmental conditions (left) or positive environmental conditions (right).⁹

87. No submissions were received in support of this option.

⁹ Roberts J. (2019) Population effects of New Zealand sea lion mortality scenarios relating to the southern arrow squid fishery at the Auckland Islands. NZ AEBR No. 223, 35p.

88. The Deepwater Group Ltd submission noted that they consider that the 2017-2019 setting of the fishing-related mortality limit based on a 5% impact of fishing was based on erroneous advice, failed to take into account the best available information, and went far beyond what could be considered reasonably necessary to prevent adverse effects on the sea lion population.

Analysis

89. This option is highly unlikely to impact on fishing effort in the Squid 6T fishery, given the current number of vessels active in the fleet.
90. This option is consistent with the maximum impact on the sea lion population used to derive the mortality limit used in the most recent Squid 6T Operational Plan (2017-2019). It is also consistent with the maximum population impact proposed for Māui dolphin in the current review of the Hector's and Māui dolphins Threat Management Plan.
91. The fishing-related mortality limit is equivalent to a maximum potential impact of 5%, relative to the un-impacted New Zealand sea lion population. This does not mean that 5% of the sea lion population will be impacted each year, it means that the maximum long term impact would be no more than 5%.
92. Option 2 would serve as a backstop to ensure that fishing does not have an adverse effect on the sea lion population in the future should circumstances change.

Option 3

93. This option would set the fishing-related mortality limit to ensure that the maximum impact of the Squid 6T fishery on the recovery or stabilisation outcome of the sea lion population is no more than 10% in the long term (Figure 6). This would result in a fishing-related mortality limit of 104 sea lions.

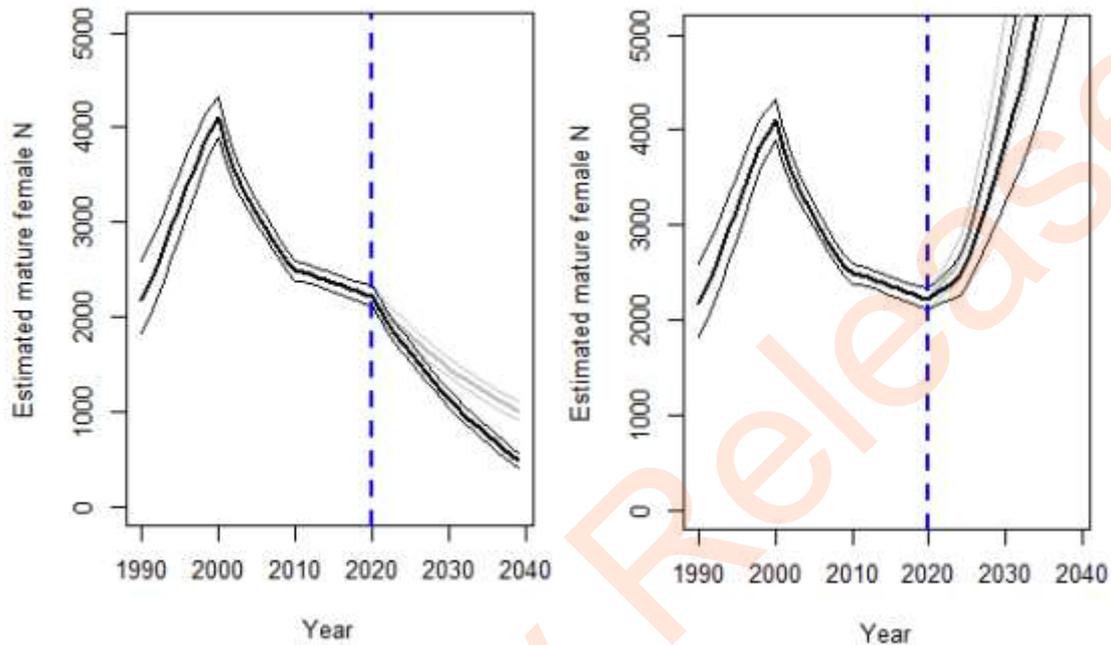


Figure 6. Auckland Islands female sea lion population projections assuming no squid fishery-related deaths (grey lines) and a maximum of 104 squid fishery-related deaths annually (black lines) assuming either poor environmental conditions (left) or positive environmental conditions (right).¹⁰

94. Although Sealord Group Ltd, Aurora Fisheries Ltd, and Te Ohu Kaimoana primarily supported the Deepwater Group Ltd. submission that a fishing-related mortality limit is no longer necessary, they also support Option 3 should you decide that a fishing-related mortality limit is necessary. Te Ohu Kaimoana note that if it is considered necessary to impose a fishing-related mortality limit as an “insurance policy”, then Option 3 is conservative by international standards. However they “*remain uncomfortable setting a limit that so poorly reflects the state of current sea lion mortalities.*”
95. The Deepwater Group Ltd. submission does not explicitly mention this option, however they submit that if you feel that a fishing-related mortality limit is required, they recommend that the fishing-related mortality limit be set in accordance with your powers to only take those actions necessary to mitigate the effect of fishing-related mortality on the sea lion population, recognising that:
- International settings and guidelines to achieve an equilibrium (optimum sustainable) marine mammal population would be within the range of 50-70% of carrying capacity (or the level otherwise achieved by the population in the absence of fishing). This would exceed the level required to ensure the long term viability of the sea lion population; and

¹⁰ Roberts J. (2019) Population effects of New Zealand sea lion mortality scenarios relating to the southern arrow squid fishery at the Auckland Islands. NZ AEBR No. 223, 35p.

- The population size and threat status of sea lion, the stabilisation in the population after a previous decline (reflected by the reduction in the threat status), and the prospect of an increasing population arising from improved pup breeding and survival levels, a more conservative setting of 80% of capacity (i.e. a 20% maximum impact by fishing) may be more appropriate than the international guidelines.
96. Fisheries New Zealand notes that a maximum impact of 20% would result in an annual fishing-related mortality limit of 208 sea lions.

Analysis

97. Prior to the 2017-2019 Squid 6T Operational Plan, fishing-related mortality limits were set based on outputs from a model intended to ensure fishing had no more than a 10% impact on the sea lion population with 90% confidence. However the modelling approach taken was significantly different from the approach supporting the options in this paper, and the resulting fishing-related mortality limits ranged from 63 to around 150 sea lion mortalities per year.

Alternative Proposal "No FRML"

98. Four submitters (Aurora Fisheries Ltd, Deepwater Group Ltd, Sealord, and Te Ohu Kaimoana), propose that a fishing-related mortality limit is not required to meet your obligations under the Act to avoid, remedy or mitigate any adverse effects of fishing on the sea lion population.
99. In the view of the submitters, the use of SLEDs in the Squid 6T fishery has sufficiently reduced the number of sea lion captures and subsequent impact on the sea lion population to a low level that is estimated to have a less than 0.5% long term impact on the Auckland Islands sea lion population. They submit that this will not impact the long term viability of the species, and it is therefore not necessary for you to impose a fishing-related mortality limit.
100. Te Ohu Kaimoana notes that having a fishing-related mortality limit far higher than actual sea lion mortalities generates a misconstrued view of the fishery for the public.

Analysis

101. The estimated long term impact of the current estimated deaths of sea lions from the Squid 6T fishery is between 0.4% and 1.2% (Figure 7).
102. Figure 7 shows the projected trajectory of the Auckland Islands sea lion population assuming the current average number of annual sea lion mortalities under two different environmental condition assumptions. This highlights the reliance of the Auckland Islands sea lion population trend on environmental conditions, and provides a visual interpretation of the current impact on the sea lion population from the squid fishery.

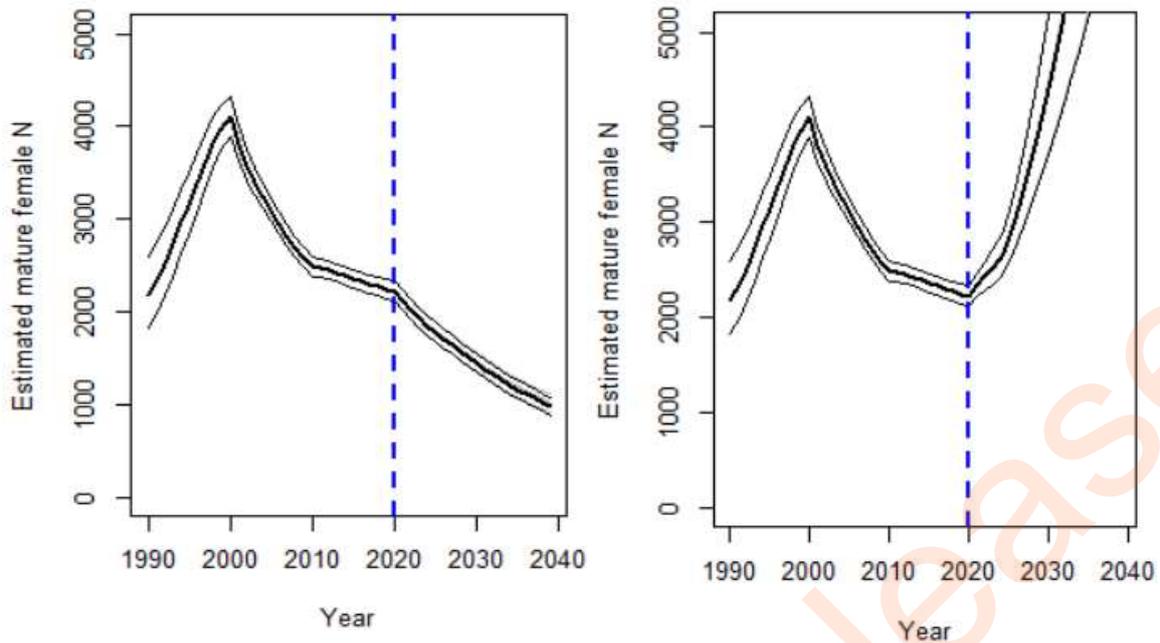


Figure 7. Auckland Islands female sea lion population projections assuming no squid fishery-related deaths (grey lines) and the average squid fishery-related deaths (black lines) assuming either poor environmental conditions (left) or positive environmental conditions (right).¹¹ Note the black and grey lines are heavily overlapped as there is little difference in the population trajectory.

103. Section 15 of the Act says that you may take such measures as you consider necessary to avoid, remedy or mitigate the effect of fishing-related mortality on any protected species.
104. If you consider that the current effect of fishing-related mortality (between 0.5% and 1.5% depending on environmental assumptions) is not sufficient for you to consider it necessary to act, and that the risk to sea lions has been mitigated by SLED use such that the effect is unlikely to increase significantly, it may be appropriate to not set a fishing-related mortality limit at this time.
105. However, imposing an upper limit on the number of sea lion mortalities in a year reflects a more cautious approach to managing the effects of fishing-related mortality than not doing so. It would not be possible to set a limit during the course of the year and have it apply retrospectively in the case that something changes significantly.
106. Fisheries New Zealand notes that fishing effort in the Squid 6T fishery has been consistently lower than in the early years of the fishery (Figure 3). In the last decade, 12 to 21 vessels have completed 616 to 1,916 tows annually.
107. Fisheries New Zealand does not expect any significant increase in fishing effort in Squid 6T, noting that during the 2018/19 fishing year export prices for squid were very high, however only 806 tows occurred in the Squid 6T fishery.

¹¹ Roberts J. (2019) Population effects of New Zealand sea lion mortality scenarios relating to the southern arrow squid fishery at the Auckland Islands. NZ AEBR No. 223, 35p.

Alternative Proposal Spatial Closure

108. Forest & Bird proposed 'Option 4', which is to implement a seasonal spatial closure in the SQU6T quota management area that would apply until the Sea Lion Threat Management Plan is reviewed in 2022. The submission did not provide exact details of the proposed closure area, however Fisheries New Zealand was able to recreate the proposed closure based on geo-referencing the images provided in the Forest & Bird submission.
109. In their submission, Forest & Bird assert that the proposed closure would restrict trawling from 17% of the Squid 6T fishing area and that it would not impact on the overall commercial catch of squid from within the Squid 6T fishing area. Fisheries New Zealand notes that the proposed closure would not necessarily replace the setting of a fishing-related mortality limit, and is therefore considered separately to the three options that were publically consulted on for the fishing-related mortality limit.
110. Fisheries New Zealand also met with Forest & Bird on 16 October 2019 to better understand the rationale and intent of the proposal. Forest & Bird clarified that they are proposing that the spatial closure be implemented as an interim measure and a working group be formed to further develop this option.

Information

111. There are two primary fishing areas in Squid 6T, a 'northern' ground, which is directly north of the Auckland Islands, and a 'southern' ground, which is to the southeast of the Auckland Islands.
112. Squid live for less than two years and their abundance and spatial distribution appears to be highly dependent on environmental factors such as temperature and prey availability. This means that in some years in the Squid 6T fishery there is high abundance of squid in one ground but not the other, or high/low abundance in both areas. In general, fishing activity in Squid 6T is determined by the economics of fishing at the northern or southern ground based on catch rates, and the additional steaming time required to access the southern ground.
113. Squid fishing also takes place outside of the SQU6T quota management area, in SQU1T. This fishery is primarily focused on the Stewart-Snares shelf. This fishery has a TACC of 44,741 tonnes but is generally significantly under-caught (between 17-38% caught in the last five years). Catch rates are often lower and squid are generally smaller in SQU1T, making it more economical for fishers to target squid in SQU6T.
114. If the northern grounds in Squid 6T are closed, the fishing effort is likely to shift depending on a number of economic factors. Effort could shift entirely into the southern grounds or entirely into SQU1T. However, some operators may shift effort into fisheries for other species including fishing for middle depth species such as hoki or warehou on the Stewart-Snares shelf or the Chatham Rise.
115. Observed sea lion captures in the Squid 6T fishery have been spread across the two grounds, however, overall captures have been higher in the southern ground in the last decade (17 of 21 observed captures). This is likely due to there being more fishing effort on the southern grounds.

116. Figure 8 shows the Forest & Bird proposed spatial closure, overlaid with a 'heatmap' of squid catch in Squid 6T. The location of the 21 observed sea lion captures in the Squid 6T fishery in the last 10 years (up to and including 2018/19) are also shown.

Economic sensitivity - see appendix two



Figure 8. Squid catch and observed sea lion captures for the 10 year period 2009/10 to 2018/19

Impacts on squid catch

117. Analysing the impacts of the proposed closure is not straightforward. The closure of the northern ground would likely shift fishing effort, either to SQU1T or to the southern ground within Squid 6T. Predicting this shift in effort and potential economic impacts is problematic given the high variation in catch rates and the number of factors that would contribute to the decision about where fishing effort would eventually take place.
118. A very simple analysis based on the last ten years of catch and effort data indicates that on average, 35% of Squid 6T catch would be impacted by the closure (ranges from 6% - 53% annually). This is estimated to comprise around \$14 million in annual export earnings potentially impacted by the closure.
119. A more detailed analysis based on an analysis of catch rates and an assumption that all effort from the northern grounds shifts to the southern ground indicates that more squid catch might be taken as a result of the closure. However, this analysis does not account for the likely possibility that increasing effort in the southern grounds would result in a more rapid depletion of squid biomass resulting in lower overall catch rates and no additional squid catch.

Impact on sea lion captures

120. Assessing the impact of the proposed closure on risk to sea lions is more straightforward than assessing the impact on squid catch, although it remains dependent on where the fishing effort displaced by the proposed closure is assumed to shift.
121. Fisheries New Zealand updated the spatial analysis of the risk of sea lion captures using the sea lion distribution information (Figure 9), and assumed that all effort from the northern ground shifted onto the southern ground. The analysis also assumed no changes in the proportion of effort using bottom trawl or midwater trawl gear. This analysis provides additional spatial resolution on the expected overlap of the fishing effort with sea lion foraging activities.
122. Outputs from this analysis estimate that total sea lion captures would be reduced by around 25%, or roughly one sea lion per year, if the proposed spatial closure was implemented, but there is considerable uncertainty around this estimate.
123. Key areas of uncertainty in the analysis of the impact on sea lion captures include the limited data available to estimate the spatial distribution of foraging sea lions from colonies in the southern parts of the Auckland Islands. The data from these southern colonies indicate that these sea lions may forage further south and east than those from the northern colony, where the majority of the tracked animals are from. If this is the case, then the analysis may underestimate the density of sea lions in the southern ground, and thereby overestimate the benefit (i.e. the expected reduction in sea lion captures) resulting from this proposal.

Economic sensitivity - see appendix two



Figure 9. Estimated distribution of foraging by Auckland Islands sea lions, fishing effort from 2009/10 to 2018/19, and the Forest & Bird proposed spatial closure.

124. A separate, more simplistic, analysis using observed sea lion capture rates in the two areas indicates that fishing on the southern grounds may be three times more likely to capture a sea lion (0.003 observed captures per tow) compared to fishing on the northern grounds (0.001 observed captures per tow). If this is the case, shifting the effort from the northern area could result in an increase in sea lion captures.

Analysis and Next Steps

125. The proposed spatial closure was not included in the consultation run by Fisheries New Zealand, and given the potential impact on quota owners and interest of stakeholders, we strongly recommend that another consultation process would be necessary to implement the proposed spatial closure, or any other spatial closures, in SQU6T.
126. If you consider that additional management measures are required to avoid, remedy, or mitigate the effects of fishing on the sea lion population, including consideration of spatial closures, Fisheries New Zealand can progress with a working group, as suggested by Forest & Bird, to further develop this or other options for spatial closures prior to any public consultation.
127. Fisheries New Zealand notes that there is likely to be a high level of attention on any proposals for spatial restrictions in SQU6T, and that the scale of any potential benefit to the sea lion population should be considered in the context of the associated impacts on utilisation and your obligations under the Act.
128. Fisheries New Zealand does not consider that spatial closures are necessary at this time and that the potential effects of any closures are not fully understood. Fisheries New Zealand will work with the Department of Conservation to undertake research to investigate additional satellite tagging of sea lions at the Auckland Islands to address the uncertainty in sea lion foraging distribution. This work will likely be dependent on logistics of the Auckland Islands field season, and available capacity, and is unlikely to occur earlier than summer 2021.

Potential Regulation of Sea Lion Exclusion Device use under Section 11

129. Fisheries New Zealand consulted on whether the use of SLEDs in the Squid 6T fishery should be required by regulation under section 11(3) of the Act.
130. The use of SLEDs in the Squid 6T fishery is the primary mitigation measure for sea lion mortalities, as research shows they are effective at allowing sea lions that enter a trawl net to escape. Recent research estimates that they have reduced the likelihood of sea lions dying in squid trawl nets by around 70%. The research also suggests that without SLEDs, sea lion mortalities in the current Squid 6T fishery would average around 12-13 per year.
131. All proposed management settings in the consultation paper were based on parameters for trawl gear where there is a SLED deployed that meets the Mark 3/13 specifications as set out in the Squid 6T Operational Plan (2017-2019).

132. Under the Squid 6T Operational Plan (2017-2019), the use of SLEDs is not regulated, however each year, SQU6T quota owners agree to:
- Have all SLEDs audited before the season starts by an authorised trawl net maker;
 - Provide audited SLED details, including an audit form, to Deepwater Group Ltd, which makes this information available to Fisheries New Zealand;
 - Individually label each audited SLED (stamped number is on SLED grid metal bars) for transparency;
 - Carry a minimum of two audited SLEDs on each vessel fishing in Squid 6T;
 - In the case of any damage to a SLED, immediately cease use of that SLED and notify Deepwater Group Ltd; and
 - In the case of any change to, or transfer of a SLED, notify Deepwater Group Ltd. immediately.
133. SLEDs are also measured and checked by Fisheries New Zealand observers before fishing commences in Squid 6T to confirm SLEDs meet the Mark 3/13 specifications.
134. Submissions were evenly divided between supporting regulation of SLEDs, not supporting regulation, and making no comment on the regulation of SLED use.
135. In general, submitters who supported the regulation of the use of SLEDs, primarily environmental NGOs, considered that they were important for the mitigation of sea lion mortalities, and provided a tool for the government to ensure that SLEDs would continue to be used. A few supporters of the regulation of SLED use also commented that they considered there to be a lack of evidence that SLEDs were effective.
136. Submitters who did not support the regulation of SLEDs, primarily fishing industry submitters, noted it would be short-sighted to impose a mandatory requirement in a fully compliant fishery, i.e. it was not necessary as all fishing effort in Squid 6T in the last ten years has had SLEDs deployed and SLED use is reported each week by Fisheries New Zealand to all stakeholders. Submissions also noted that once the regulation of SLEDs is imposed it would not be dynamic, i.e. responsive to change or design innovation.
137. The Deepwater Group submission set out the details of the current SLED auditing and deployment process at present, and noted the general principles of government regulation that suggest regulation is not required where a tool is already in widespread use. Deepwater Group Ltd also identified that the nature of the Fisheries Act means that any offence would result in a fine of up to \$100,000 but would also result in the automatic forfeiture of the fishing vessel, gear, fish caught, and proceeds of any fish sold, which they view as being draconian consequences.
138. The majority of submissions made no comment on whether the fine of \$100,000 was appropriate or noted that because they opposed regulating SLEDs a fine was not applicable. Three submissions supported the size of the fine and one submission said the fine should be increased to \$500,000.

139. Deepwater Group Ltd and other industry submissions also consider that section 11 of the Act should not be used to make SLEDs mandatory or to impose a fine because this section is concerned with the sustainability of fish stocks.

Analysis

140. Requiring the use of SLEDs by regulation would create clearer accountability on fishers to use SLEDs, possibly increasing public confidence that they are being used.
141. However, under current non-regulatory settings, Fisheries New Zealand has confidence that SLEDs will continue to be used on all tows in the Squid 6T fishery and has worked closely with the Deepwater Group Ltd to ensure that details of SLED audits are available for review.
142. There are some risks associated with the regulation of SLEDs, including the potential for future innovation of mitigation devices to be impeded. It would also be very important to consider the details of the regulation to ensure that enforcement action is not required or taken for insignificant inconsistencies, given the current level of detail in the SLED specifications.
143. Getting SLED regulation in place will take about six months. This timeframe would prevent the regulation of SLED use for the 2019/20 Squid 6T season (usually begins in December or January). Regulation of SLEDs could be done in time for the 2020/21 season.
144. In Fisheries New Zealand's view, the regulation of SLEDs in the Squid 6T fishery is not required at this time. However it could be introduced in future as a mechanism to enforce SLED use if the current 100% compliance with SLED deployment in the Squid 6T fishery did not continue.

Duration of Operational Plan

145. It was proposed that the new Squid 6T Operational Plan apply for either four or six fishing years.
146. The New Zealand sea lion/rāpoka Threat Management Plan is scheduled for review in 2022, and a four-year Squid 6T Operational Plan would lead to review of the Operational Plan in 2023. This would allow for any updated objectives or settings in the Threat Management Plan to be incorporated into the next Operational Plan.
147. A four-year Squid 6T Operational Plan would also provide stakeholders with more confidence that the management settings are updated regularly and remain appropriate given the changing nature of the sea lion population.
148. However, there is a risk that the review of the New Zealand sea lion/rāpoka Threat Management Plan will not be complete in time for full consideration to be given to its objectives and settings in the science underpinning the Operational Plan, given that consultation would need to occur in early-mid 2023.

149. The Otago Conservation Board supported a four-year Squid 6T Operational Plan to line up with the planned review of the New Zealand Sea Lion Threat Management Plan.
150. A six-year timeframe, with appropriate triggers for early review, would provide stability for the fishing industry and reduce resourcing required to support future reviews.
151. Three submitters (Deepwater Group, Te Ohu Kaimoana, and Aurora Fisheries) supported a six-year Squid 6T Operational Plan with appropriate triggers for early review, agreeing with the rationale provided in the consultation paper that this would provide stability for the fishing industry and reduce resourcing required to support future reviews.
152. Environment and Conservation Organisations of NZ Inc. supported a one or two year Operational Plan, as they consider additional research is needed to estimate sea lion survivability, to understand cryptic mortality, to research effects of an area closure, and to include other fisheries in the Operational Plan.

Analysis

153. Fisheries New Zealand recommends a four-year term. This timeframe would result in a new Operational Plan being put in place for the 2023/24 fishing year. This would line up with the planned review of the 'New Zealand sea lion/rāpoka Threat Management Plan 2017-2022', which is scheduled to begin in 2022 and planned to be completed in 2023.
154. Fisheries New Zealand does not support a shorter duration of the Operational Plan, noting that we intend to focus on improving understanding of and developing management approaches for sea lion captures in other fisheries (e.g. Auckland Islands scampi) in the next 2-3 years. The outputs from this work will be taken into account when developing future approaches to managing interactions of sea lions with fisheries.

Observer coverage

155. A key consideration in the new approach is the level of monitoring required to provide confidence that all sea lion captures are accounted for. In recognition of the recent high levels of observer coverage (95% in 2019), and the importance of verifying reporting of observed sea lion captures under the proposed monitoring approach, it was proposed that a minimum of 90% of tows be observed.
156. Submissions were generally supportive of a 90% minimum observer coverage target for the Squid 6T fishery. Some submitters commented that 100% monitoring would be better or more appropriate given the importance of New Zealand sea lions, and to ensure that SLEDs were used and all mortalities accounted for.
157. Committing to 100% observer coverage for the Squid 6T fishery is difficult, as it is estimated that delivery would require over 2,500 observer days, which would comprise nearly 25% of the total Fisheries New Zealand observer programme capacity and may impede our ability to deliver on other observer coverage commitments.

158. Fisheries New Zealand supports a minimum observer coverage of 90% of tows, and considers that it will provide sufficient information to understand the number of sea lion mortalities in the Squid 6T fishery. Fisheries New Zealand notes that a minimum observer coverage target of 90% is likely to result in an actual coverage level of 95-98%.

Fishery Closure

159. If you decide to set a fishing-related mortality limit and it is reached during the course of the year, the Squid 6T fishery will be closed without consultation via notice in the Gazette. Fisheries New Zealand will work with vessel operators via the Deepwater Group to ensure that fishers are aware of estimated mortalities compared to the fishing-related mortality limit throughout the season, and are informed in advance of any impending closure.

Trigger for Early Review of the Squid 6T Operational Plan

160. It was proposed that the Squid 6T Operational Plan will be reviewed within the duration of its term if:
- 'significant new information becomes available that indicates fisheries activities are having a different impact on the sea lion population than estimated in 2019, if there are changes in fishing operations or level of effort, or if there are significant new concerns regarding the sea lion population.'*
161. Some examples of what might trigger an early review of the Squid 6T Operational Plan include an Auckland Islands sea lion pup count that is less than 1,575 or an unusual mortality/disease event affecting large numbers of sea lion pups and/or adults.
162. No submissions were received that opposed the trigger or proposed an alternative trigger for review of the Operational Plan. Fisheries New Zealand proposes that the wording of the trigger for review of the Squid 6T Operational Plan be as outlined in italics above.

Conclusion

163. The key decisions on the Squid 6T Operational Plan to manage incidental interactions with New Zealand sea lions in the southern squid trawl fishery, concern:
- whether to set a fishing-related mortality limit;
 - whether to regulate the use of SLEDs;
 - the level of observer coverage;
 - the duration of the Operational Plan; and
 - the trigger for early review of the Operational Plan.

164. You have broad discretion for setting a fishing-related mortality limit under section 15 of the Act. Fisheries New Zealand recommends Option 2, which sets a fishing-related mortality limit based on 5% maximum impact on the sea lion population in the long term. This is consistent with the population outcome used in the most recent Squid 6T Operational Plan (2017-2019). It sets an annual fishing-related mortality limit of 52 sea lions, which is equivalent to 40 observed sea lion captures (including live captures).
165. Fisheries New Zealand does not consider it necessary to regulate the use of SLEDs at this time. However, regulation could be enacted in future if vessels did not continue to use SLEDs on all tows in the Squid 6T fishery.
166. We propose that the minimum level of observer coverage in the Squid 6T fishery be 90% of all tows, and that the duration of the Operational Plan is for four years (2019/20 to 2022/23).
167. Finally, the trigger for review of the Operational Plan will be if significant new information becomes available that indicates fisheries activities are having a different impact on the sea lion population than estimated in 2019, if there are changes in fishing operations or level of effort, or if there are significant new concerns regarding the sea lion population.

Appendix One: Letter to Hon Eugenie Sage, Minister of Conservation

Proactively Released

B19-0476

Hon Eugenie Sage
Minister of Conservation
PARLIAMENT BUILDINGS

Dear Hon Eugenie Sage

Please find attached for your consideration a Briefing recommending an option to manage interactions between the Squid 6T fishery (Quota Management Area SQU6T) and New Zealand sea lions for the 2019/20 to 2023/24 fishing years (four-year term). The Briefing Note has been prepared by Fisheries New Zealand and I am required to consult with you on this matter under section 15(2) of the Fisheries Act 1996.

Background

Section 15(2) of the Fisheries Act sets out my obligations, in the absence of a New Zealand sea lion Population Management Plan, to avoid, remedy, or mitigate the effect of fishing-related mortality on sea lions. Based on updated analyses, the Squid 6T fishery is estimated to be having less than a 1.5% impact on the sea lion population in the long term. I note that in the last ten fishing years the maximum number of estimated sea lion deaths in a fishing year has been nine. Given the current low impact of the fishery, the fishing-related mortality limit is unlikely to constrain the amount of fishing activity. However, I propose that it is necessary as a backstop to ensure that fishing does not have an adverse effect on the sea lion population in the future should circumstances change.

Consultation

Consultation on options for management settings for the Squid 6T Operational Plan took place between 7 August 2019 and 20 September 2019. A consultation document setting out options for management measures was posted on the Fisheries New Zealand website. There was also a press release about the consultation, and Fisheries New Zealand directly contacted members of the Squid 6T Operational Plan Technical Advisory Group, all SQU6T quota owners, commercial iwi interests, and environmental groups to notify them of the consultation. A total of 15 submissions were received and these are summarised within the Briefing Note.

Proposed Management Settings

The Briefing Note contains the rationale for the proposed management options; an assessment of these options, and Fisheries New Zealand advice and recommendations. The Department of Conservation was also given a draft of the Briefing Note in order to provide you with advice on this matter.

I propose that the Squid 6T Operational Plan has the following management settings:

- Fishing-related mortality limit of 52 sea lions, consistent with fishing-related mortality having no more than a 5% impact on the Auckland Islands sea lion population. Of the three options consulted, I have chosen Option 2 which is consistent with the sea lion population outcome in the most recent Squid 6T Operational Plan (2017-2019). The equivalent observed number of sea lion captures would be 40 which, if reached, would result in the closure of the Squid 6T fishery.
- Fisheries New Zealand to provide a minimum of 90% observer coverage across all tows in the Squid 6T fishery.
- 100% use of Sea Lion Exclusion Devices (SLEDs) in all tows in Squid 6T. This is a non-regulatory requirement, agreed to by all Squid 6T quota holders. I note that compliant SLEDs have been used in all Squid 6T tows in the last decade, so I will not require their use by regulation at this time.
- Requirement under section 15(3) for 72 hour notice of any trip intending to operate in Squid 6T.
- Fisheries New Zealand will review the Squid 6T Operational Plan if significant new information becomes available that indicates fisheries activities are having a different impact on the sea lion population than estimated in 2019, or there are changes in fishing operations/level of effort, or there are significant new concerns regarding the sea lion population.

Based on the advice provided to me by Fisheries New Zealand, I have formed the view that a four year Operational Plan is consistent with my obligations under sections 8, 9, 10, and 15 of the Fisheries Act 1996 to ensure that fishing activity does not adversely affect the New Zealand sea lion population.

I look forward to any feedback you may have.

Yours sincerely

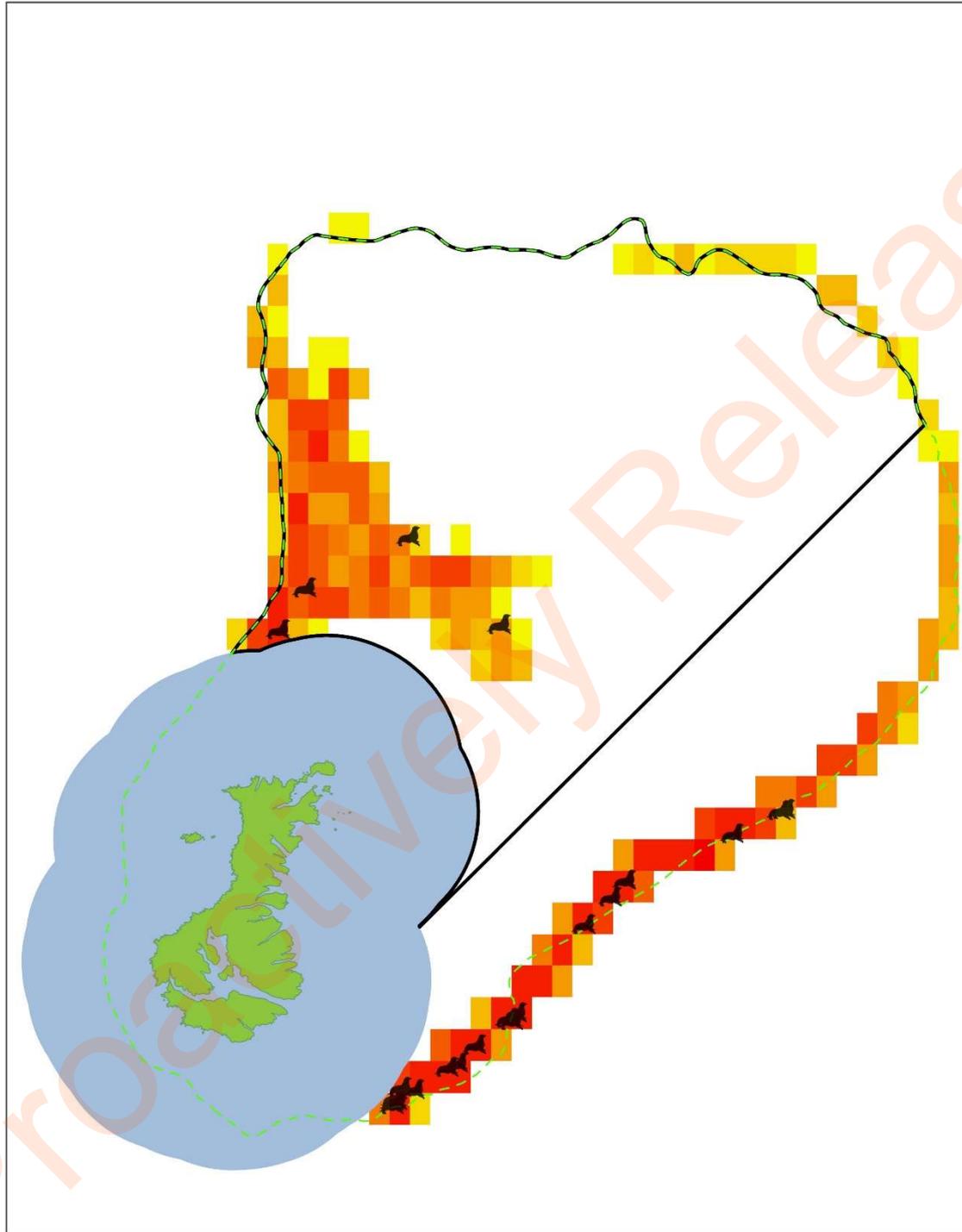
Hon Stuart Nash
Minister of Fisheries

Appendix Two: Replacements Maps for Figures 8 & 9

Figure 8. Squid Catch Heatmap



Disclaimer: This map and all information appearing on it is the "Map" is intended to be used as a guide only, in conjunction with other data sources and methods, and should not be used for the purposes for which it was developed. The information shown in this Map is based on a summary of data obtained from various sources. While all reasonable measures have been taken to ensure the accuracy of the Map, the Crown does not accept any liability whatsoever in relation to any loss, damage or other costs resulting from any use of the Map, including but not limited to any compilations, derivatives or modifications of the Map, Crown copyright ©. This map is subject to Crown copyright administered by Ministry for Primary Industries (MPI).

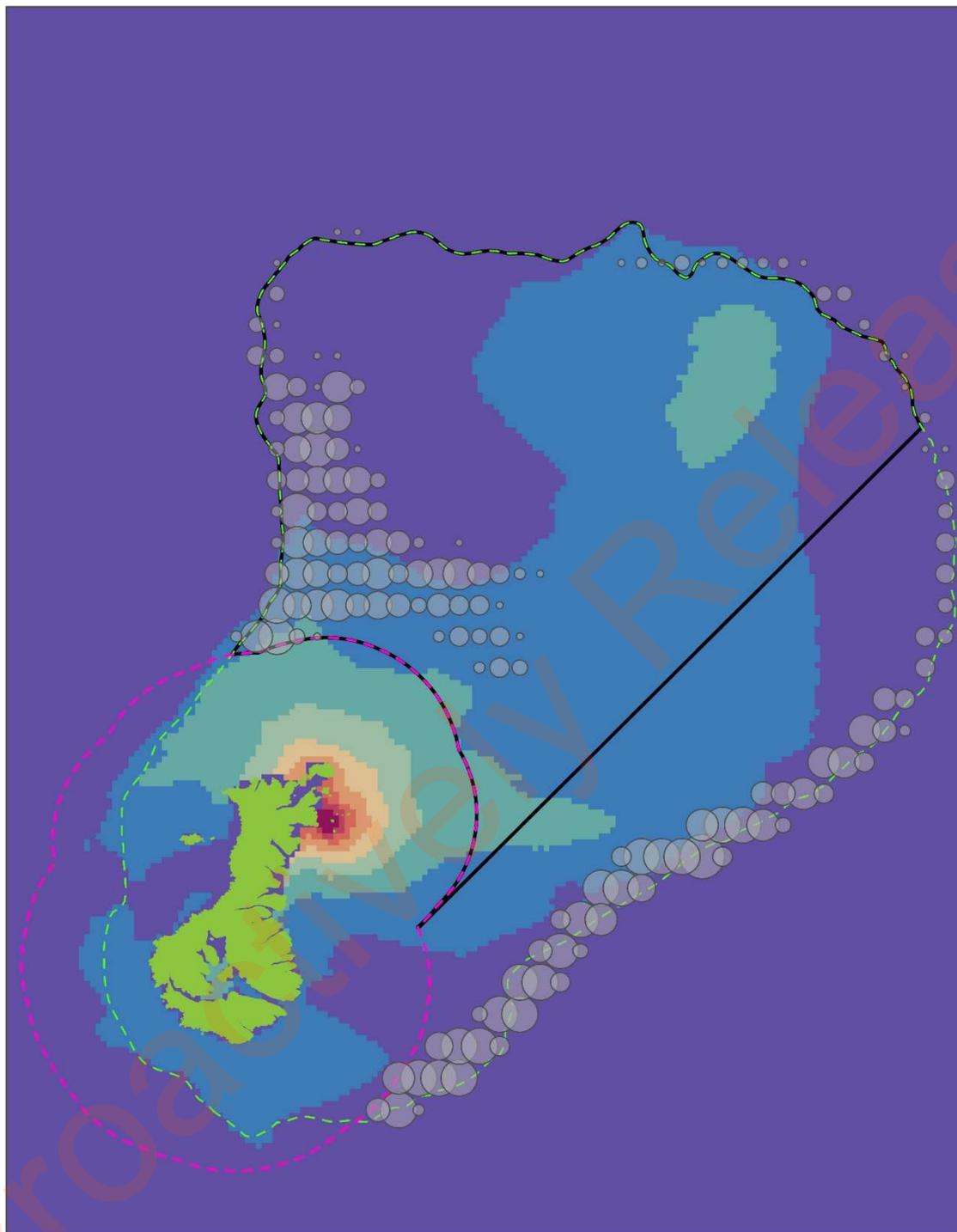


<p>Auckland Islands Proposed Temporary Trawl Exclusion Zone: Squid Catch 2009-2019</p> <p>Date: 13/11/2019 Produced by: Spatial Intelligence Reference: r190307 Coordinate System: WGS 1984 Mercator 41</p>	<p>--- 250m Depth Contour</p> <p>■ Marine Reserve</p> <p>▭ Proposed Temporary Trawl Exclusion Zone</p> <p>🐾 Sea Lion Captures</p>	<p>Squid Catch</p> <p>Low</p> <p>High</p>	<p>0 5 10 nm</p> <p>0 15 30 km</p> <p>1:1,050,000</p> <p>N</p>	<p>Data Attribution: This map uses data sourced from LINZ under CC-BY</p>
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Figure 9. Fishing Events and Sea Lion Distribution



Disclaimer: This map and all information contained therein is intended to be used as a guide only, in conjunction with other data sources and methods, and should only be used for the purposes for which it was developed. The information shown in this Map is based on a summary of data obtained from various sources. While all reasonable measures have been taken to ensure the accuracy of the Map, the Map does not constitute a warranty or representation of any kind, and the user of the Map, including but not limited to any consultants, derivative works or modifications of the Map, Crown copyright ©. This map is subject to Crown copyright administered by Ministry for Primary Industries (MPI).



**Auckland Islands
Proposed Temporary Trawl Exclusion Zone:
Sea Lion Distribution and
Fishing Events
2009 - 2019**

Date: 13/11/2019
Produced by: Spatial Intelligence
Reference: r190307
Coordinate System: WGS 1984 Mercator 41

- 250m Depth Contour
- Marine Reserve
- Proposed Temporary Trawl Exclusion Zone

Sea Lion Distribution

Fishing Events

0 5 10 nm
0 15 30 km
1:1,050,000

N

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