Ministry for Primary Industries
Manatū Ahu Matua

Squid 6T Operational Plan

Decision document – submissions and appendices

December 2017

Contents

Dear Madam / Sir

Please help our unique Sea Lions this time round. We don't have another lifetime to do something....it's NOW.

I am writing this submission on the draft Squid 6T Operational Plan because I believe we should be giving New Zealand's native, endangered sea lions the best possible chance of recovery and survival.

New Zealand sea lions are the rarest sea lion in the world. As you know, the Department of Conservation lists NZ sea lions as nationally critical – the most endangered category of species in the country, with the highest risk of extinction.

It is good to see the draft plan recognising the scientific uncertainty over the impact of fishing. I understand that there have been big changes to squid trawling around the Auckland Islands in the last decade, including a doubling in trawl lengths and more turns. We need to know how these changes affect how many sea lions are accidentally killed in fishing nets.

Similarly, as the draft plan recognises, scientists have told the Ministry for Primary Industries (Ministry) that there just isn't any good New Zealand evidence about how well Sea Lion Exclusion Devices (SLEDs) work. It is critical that this research is done over the next two years, so that we can finally resolve this question, and be more certain about how many sea lions are dying because of fishing.

In the face of this real scientific uncertainty, the squid fishing plan should take a cautious approach to help ensure New Zealand sea lions survive into the future.

Under sections 8, 9 and 10 of the Fisheries Act 1996, the Minister is legally obliged to make decisions that will maintain the long-term viability of species such as sea lions, and take a precautionary approach when there is scientific uncertainty.

To meet these legal obligations and to save NZ sea lions, the plan must:

1. Reduce the sea lion kill limit (the Fishing-Related Mortality Limit) to 38 (Option 2) as the maximum, but preferably lower to reflect the need for precaution until scientific uncertainties have been addressed. The limit of 38 is better than the current 68 because it is lower. However, it is not yet a precautionary level because the model used to calculate the limit used the old untested assumptions that 82% of sea lions survive trawl nets because of SLEDs and the old strike rate that doesn't account for changes in fishing practices.

2. Increase the strike rate to 7.58 sea lions per 100 trawling tows (Option 5), because this represents the most precautionary strike rate. New science is needed to better model how the changes in fishing practices over the last 10 years (double tow length and more turns) have changed the strike rate. Until this science is completed, a precautionary approach is appropriate.

3. Set a discount rate for SLEDs of 50% (Option 3), because there have been no scientific studies about how many sea lions successfully escape through the SLEDs or drown in the nets and fall out through the SLEDs. A 50/50 probability would

appropriately reflect this lack of science. It is effectively a coin toss; and it is the most precautionary option provided which is appropriate in this case.

I want you to look after our precious NZ sea lions. That means committing to do the science to answer critical questions, and being careful and precautionary in the meantime. Thank you for considering my submission.

Yours faithfully
Ali Martin.

alison martin

Kia ora

The government must ensure that the squid fishing drastically reduce the fishing kill limit for sea lions. It is unacceptable for the current quota to remain in force when rapoka are being killed.

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Nga mihi
Amanda Bowen
New Zealander of Ngati Tuwharetoa descent

amanda bowen
█████████████

Dear Madam / Sir

I am writing this submission on the draft Squid 6T Operational Plan because I am a secondary school Science and Biolody teacher with a Bachelor of Science in Marine Biology and Environmental Studies. I believe e we should be giving New Zealand's native, endangered sea lions the best possible chance of recovery and survival. This year I taught my two Year 9 classes an Ecology unit and we looked a the impact of the squiffy fishing industry on our NZ fur seal populations. The students selected their own recommendations. If you would like to hear from those students please contact me on ███████████████████

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I want you to look after our precious NZ sea lions. That means committing to do the science to answer critical questions, and being careful and precautionary in the meantime. Thank you for considering my submission.

Yours faithfully

Amy McMullan

Dear Madam / Sir

This submission relates to the draft Squid 6T Operational Plan. Please protect the New Zealand sea lions in every way conceivable – by protecting its natural environment, and by removing hazards, including fishing nets. I believe all animals have the right to be protected. All over the world too many species of animals are becoming extinct. This is not only unethical, it is also robbing future generations of people from the enjoyment of the beauty of thriving ecological systems of plants and animals living in mutually beneficial patterns of living.

It is especially important for New Zealand to protect its unique natural environment, both on land and in the ocean. Eco-tourism will be growing in future as people want to see the beauty of unspoilt nature.

Eco-tourism can support New Zealand's economy in ways that are contributing to the protection of the unique New Zealand flora and fauna. Animals like sea lions form a very important part of the New Zealand natural world that tourists will want to see, or watch documentaries and know that the world is appreciating beautiful creatures like these very special, and very rare, New Zealand sea lion.

I am very concerned that NZ sea lions are listed as nationally critical by the Department of Conservation – I am alarmed that these wonderful animals are the most endangered category of species in the country, with the highest risk of extinction.

I beg you to impose rules on to the fishermen who are engaged in squid trawling around the Auckland Islands, rules that will prevent sea lions to become trapped in their fishing nets and die. Surely there must be ways to catch squid without endangering special species like our sea lions.

The survival of the sea lions, as well as any other marine animals that could get trapped in fishing nets of the squid trawlers, is of the utmost importance to future generations and part of our duty to protect the natural world.

I understand that scientists have told the Ministry for Primary Industries (Ministry) that there just isn't any good New Zealand evidence about how well Sea Lion Exclusion Devices (SLEDs) work. It is critical that this research is done as soon as possible. I believe no sea lions should die in the fishing nets at all

I understand that under sections 8, 9 and 10 of the Fisheries Act 1996, the Minister is legally obliged to make decisions that will maintain the long-term viability of species such as sea lions, and take a precautionary approach when there is scientific uncertainty.

I would like to think that as New Zealanders we can protect our special unique fauna and to make sure they thrive in a healthy, vibrant eco-system, both for their own sake, because they are created to be beautiful and have a right to live a life free of human created hazards, but also so that future generations of people will be able to enjoy the natural world in New Zealand and contribute to a healthy economy.

I believe that eco- tourism will not only attract people to enjoy New Zealand's forests and native birds and other unique fauna, but also life under the surface of the ocean covering the sunken continent of Zealandia.

Please look after our precious NZ sea lions.

Yours faithfully

Anita Kloezeman

Email ████████████████████

Anita Kloezeman

Dear Madam / Sir

I am writing this submission on the draft Squid 6T Operational Plan because I am from Finland and I am aghast with the image of a green country New Zealand portrays yet doing so little to protect the amazing wildlife and nature you have. I believe we should be giving New Zealand's native, endangered sea lions the best possible chance of recovery and survival.

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I want you to look after our precious NZ sea lions. That means committing to do the science to answer critical questions, and being careful and precautionary in the meantime. Thank you for considering my submission.

Yours faithfully

Annamaria Peltokangas

Dear Madam / Sir

I am writing this submission on the draft Squid 6T Operational Plan.

In my life time half of the species that were here when I was born are now extinct forever. That sixth great man made extinction happened on our watch and most of us were unaware it was even happening.

We need to be able to hold our heads up high to our descendants and say I did something about this. I prevented further species going under when I became aware of this.

Under sections 8, 9 and 10 of the Fisheries Act 1996, the Minister is legally obliged to make decisions that will maintain the long-term viability of species such as sea lions, and take a precautionary approach when there is scientific uncertainty.

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Yours faithfully

Anthea Grob

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Dear Madam / Sir

It is high time NZ stepped up to protect our endangered species - and sea lions are listed as being 'nationally critical'. Their population has decreased by 50% in less than two decades, so clearly something is not working.

I want you to look after our precious NZ sea lions. That means committing to do the science to answer critical questions, and being careful and precautionary in the meantime. Thank you for considering my submission.
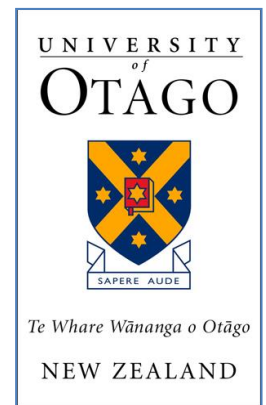
Yours faithfully

Briony Woodnorth

Briony Woodnorth

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Monday, 4 September 2017

Submission on MPI Consultation Paper No: 2017/28 Consultation on the Squid 6T Operational Plan

Please find my submission on MPI Consultation Paper No: 2017/28 Consultation on the Squid 6T Operational Plan.

My recommendations for management settings in SQU6T are:

1. a FRML of 38 (option 2)
2. a Strike Rate of 7.58 (option 5)
3. a Discount Rate of 50% (option 3)
4. a fishing effort limit in SQU6T of 1003 tows per annum, with any further fishing in years of high squid abundance to be done in SQU1T (i.e. on the Snares Shelf)

MPI will be well aware from my submissions on the 2011/2012 and 2016/2017 SQU6T operational plan consultations, as well my submission on the NZSL Threat Management Plan, that I have significant concerns with the management settings (e.g. FRML, Strike Rate, Discount Rate, etc). Only last year, my concerns were once again dismissed in the Decision Document ("Operational Plan to Manage the Incidental Capture of New Zealand Sea lions in the Southern Squid Trawl Fishery (SQU6T) for 2016-17") by the use of vague statements like "is not supported by recent performance in the fishery", so that MPI could steadfastly hold to its favoured management settings.

Given this, I am surprised to see a range of more precautionary options are presented as management settings in the current consultation document for the Operational Plan for SQU6T.

While this overdue acknowledgement of the significant uncertainty in the science behind sea lion management is most welcome (although I would argue it doesn't go far enough), it does reflect poorly on MPI's previous inflexible management of sea lion bycatch. In particular, how this management has ignored key uncertainties in the science.

For example, last year the Breen-Fu-Gilbert sea lion model was deemed "best available information" in sea lion management, despite being heavily criticised by an expert panel review in 2013 (Bradshaw et al 2013). The model was also labelled "badly dated" by the modellers themselves (Breen et al. 2016 AEBR-175). [Note: I did not make the claim of "badly dated", as MPI erroneously stated in the Decision Document ("...which he

considers "badly dated".), presumably to mislead readers regarding the modelers' concerns with the BFG model)].

Why a "badly dated" model was/is still being used in sea lion management is an important question. In the present consultation document, the BFG model suggests a FRML of 68 sea lions (FRML option 1), which has been the FRML used for the last 7 fishing years. However, a competing modelling approach (PST) indicates that a sustainable FRML should be only 38 sea lions. Both models cannot be correct, but if the PST approach is to be believed then the FRML has been set too high for many years.

The consultation document also highlights that MPI appear to be offering up a smorgasbord of management options to their Minister. There are 10 options for the minister to choose from when setting the FRML, Strike Rate and Discount Rate. These three parameters determine the level of fishing effort (number of tows) in any year. If all combinations of options are imputed into the fishing effort equation, then the fishing effort the Minister can agree to in SQU6T ranges from 1003 to 7903 tows.

The Minister appears to have remarkable control over management in SQU6T. In 2013, an expert panel review of sea lion management noted that this could compromise the integrity of the scientific process. They noted:

> "…ministerial involvement in deciding what strike and discount rates are best supported by the available scientific data could also be seen to compromise the integrity of the scientific process supporting the Minister's other decisions." (Bradshaw et al. 2013 pg30).

Seems that MPI are again providing their Minister with unfettered ability to potentially "compromise the integrity of the scientific process" in sea lion management. That is a regrettable situation for all involved.

I am hopeful that the new-found acceptance of the uncertainty in the science behind sea lion management will translate into a change from the status-quo for management settings. I note that the TAG highlighted the need for action on sea lion management:

> "The TAG recognised and supported the need for a multi-year plan but expressed some concern about maintaining the status quo for two years, as that could be viewed as delaying action." (2017 Consultation Document, pg.20)

However, when discussing setting of the FRML in the 2017 Consultation Document, MPI makes statements like:

> "The options proposed here may be considered conservative as they are based on a model which incorporates population trend information only for the Auckland Islands population." (2017 Consultation Document, pg.16),

which suggests MPI are cautioning their Minister about being conservative when setting a FRML or changing management settings in SQU6T. Incidentally, it should be noted that still the vast majority (73%; Figure 1 in Consultation Document) of pup production occurs at the Auckland Islands, hence the relevance of MPI's statement here is unclear, as the population trend information is for the majority of the population.

MPI should be encouraging their Minister to make his decisions based on the level of uncertainty in the science informing the management setting (e.g. SLED efficacy uncertainty's impact on the Discount Rate), not whether this is a conservative, or otherwise, decision with regards to balancing utilisation and sustainability of SQU6T. The final choice of management options (FRML, Strike Rate and Discount Rate) should not pay attention to the impact on fishing effort (utilisation). Decisions on these management options should be based on uncertainty in the setting of the FRML, Strike Rate and Discount Rate alone.

It is also concerning that the consultation document contains misleading statements about the certainty of the modelling used in sea lion management. With regards to the model used to conclude that fishing "is not a major impact on the sea lion population", MPI states:

> "The population model has been reviewed by the MPI Aquatic Environment Working Group, DOC Conservation Services Programme Technical Working Group, and by an independent expert panel at two NZSL TMP expert workshops."

This statement overlooks the fact that AEWG and CSP are not expert peer review processes, as the quality of the review depends on who can turn up on the day of the meeting. One only has to look at the expert panel's critical comments on the BFG model (Bradshaw et al. 2013) and the modellers own admissions of the shortcomings of the model (Breen et al. 2016 AEBR-175) to recognise that for years AEWG and CSP's "peer-review" did not pick up on these issues. To be fair, a range of scientists had been raising these issues about the BFG model for years, but they were falling on MPI's deaf ears.

Furthermore, the statement above, which is offered as support that fishing is not a major threat in the sea lion decline, overlooks the statement in the TAG recommendations that members of that group are calling for an "in-depth review" of the modelling (2017 Consultation Document, pg 29). Indeed, it was requested by TAG members that there be some clarity as to why the favoured model is at odds with another peer-reviewed model (by Dr Stefan Meyer) that concluded that fishing was a significant impact on the sea lion population.

In my submission on the sea lion TMP and 2016/2017 SQU6T operational plan, I noted concerns with the "independent expert panel" review of the sea lion population model. In particular, there was an undeclared conflict of interest, in that Professor Mark Hindell was involved with the "peer-review" of the model, as well as the development of the model. This concern has not been addressed by MPI.

Clearly, there is need for an "in-depth review" of the current modelling (along the lines of the Bradshaw et al. 2013 review of sea lion modelling), so that we can be certain of the claim that fishing is not a threat to the sea lion population.

Management settings

FRML

Recommendation: a FRML of 38 (option 2)

I recommend that sea lion management still use a FRML.

As I note above, the BFG model, on which a FRML of 68 (option 1) is based, is "badly dated" and has for years suggested biologically implausible outcomes (see my past TMP and SQU6T operational plan submissions for further details). This is clearly to do with the assumptions in the model, not the model structure per se (see Bradshaw et al. 2013 for further details). Given this, the BFG should not be used, hence Option 1 (a FRML of 68) should not be put forward to the Minister.

The PST model is new to sea lion management, although this approach has been around for a number of years in seabird bycatch management. As such, this model has not been appropriately peer-reviewed in the sea lion setting, beyond one recent meeting of AEWG in which stakeholders raised important concerns. I recommend that it be expertly peer-reviewed in-depth, along the lines of the Bradshaw et al. 2013 review of sea lion modelling.

Given the choice between the two modelling approaches, I recommend the FRML be set using the PST model. As such, a FRML of 38 (option 2) should be recommended to the Minister. A FRML of 38 makes allowances for sea lion mortalities in other fisheries, which is consistent with the intent of the FRML: "the FRML is intended to ensure that fishing does not have an adverse impact on the Auckland Islands sea lion population". (2017 Consultation Document, Pg 9).

A lower FRML is also consistent with the NZ public's expectation that commercial fishing will attempt to minimise environmental damage, which includes sea lion bycatch.

Strike Rate

Recommendation: a Strike Rate of 7.58 (option 5)

In recommending a Strike Rate of 7.58 (option 5), I am mindful that MPI likes to use the most recent data available to them (it is often considered the best available information).

For example, when presenting options for the Discount Rate in the consultation document, MPI have proposed a Discount Rate option of 75% (option 2), which is based on "incorporating an additional three years of data". Incidentally, these new data increase the exit probability from 85% to 86% (2017 Consultation Document, Pg 19), but there is no hard evidence that this has improvement has actually happened.

The strike rate of 7.58 (option 5) uses the last 10 years of data available to MPI – that is, the most recent data available for strike rate modelling. A strike rate of 7.58 also is a more precautionary estimate, and more consistent with the observation that in the only year of 100% observer coverage without SLEDs in use the strike rate was over 10 (2004 Court of Appeal Judgment).

As noted in the TAG meeting recommendations (2017 Consultation Document, Pg 28), members wanted the strike rate to reflect the uncertainty due to factors like changed fisher behaviour. For example, there are now more turns in tows, which might increase sea lion bycatch risk.

Discount Rate

Recommendation: a Discount Rate of 50% (option 3)

With regards to the setting of the Discount Rate, MPI shows a blatant disregard for expert advice (i.e. Bradshaw et al 2013). Contrast this will the acceptance of the conclusions of the expert panel that "reviewed" the population modelling during the NZ sea lion TMP workshops.

It is hard not to come to the conclusion that MPI are selectively choosing which expert advice it will accept based on whether that advice supports MPI's desired outcome. Science advice should not be treated in this way.

Two of the options presented by MPI suggest that the Discount Rate should remain high (82%, the status quo; and 75%). Both options rely on the assumption that 85% or 86% of sea lions that enter a net will pass out of the SLED. The 82% discount rate assumes that sea lions have a 3% chance of a mild traumatic brain injury (MTBI), but that all sea lions that do not receive a MTBI (i.e. 97%) will survive the encounter with a SLED. For the 75% discount rate, and "arbitrary" value of 10% cryptic mortality is added to the 3% chance of a MTBI.

The expert panel review of sea lion management (Bradshaw et al. 2013) deliberated at length on SLED efficacy and the setting of the Discount Rate. They stated the following:

> There are ongoing disagreements about their fates, and these feed discussions about the real rate of bycatch affecting the NZSL population. **The data on mild traumatic brain injury (MTBI, discussed in more detail below) is only relevant to part of this problem**. It is much harder to estimate how many other animals simply run out of air and drown outside the net as a result of the time they are detained within nets but were not recovered. (Bradshaw et al. 2013, Pg 17)

Clearly, it is expert opinion that the current Discount Rate is not adequately addressing cryptic mortality (i.e. "MTBI is only relevant to part of this problem"), yet 82% is still presented as a Discount Rate option in the current consultation document.

The expert panel went onto say this about the current 82% discount rate:

> Given the uncertainty associated with cryptic mortality and the intractability of its quantification, we consider that a value of 0.82 is more likely to be optimistic than pessimistic. (Bradshaw et al. 2013, Pg 24).

On the topic of quantifying cryptic mortality, the expert panel had this to say:

> "…in the absence of data, views on **how much cryptic mortality actually occurs are simply unsubstantiated opinions**." (Bradshaw et al. 2013, Pg 17)

In the current consultation document, MPI has expressed their own "unsubstantiated opinion" and incorporated the uncertainty associated with estimating cryptic mortality into a new Discount Rate by including (in their own words):

> "….a conservative and somewhat arbitrary assumption that an additional 10% of those that exit the SLED will not survive, potentially from running out of oxygen before they can return to the surface or from drowning in the net and falling out of the SLED." (2017 Consultation Document, Pg. 20).

The 2013 expert panel was quite clear that this approach (i.e. adding an "arbitrary" term) to setting the Discount Rate is not ideal, as it opens the process up to political manipulation:

> "An extra term or uncertainty could be added to the model to represent this, but it would be essentially arbitrary, and provide an additional opportunity for the subjective modification of results to fit preconceptions or political motives." (Bradshaw et al. 2013, Pg 17)

The 2013 expert panel provided 6 options that they consider were open to MPI. Importantly, none of them included the status quo of an 82% Discount Rate:

> "until real data become available, MPI's options regarding discount rate use in the model are:
>
> 1. Abandoning discount rates altogether (possibly politically unacceptable and implausibly assuming no animals that leave via the SLED survive);
> 2. Setting a coin toss discount rate of 0.5 (which would be arbitrary);
> 3. Sampling the rate from an uninformative (wide-interval) prior distribution (the result of which will depend entirely on the arbitrary centring of that prior);
> 4. Estimating it directly in the model as a parameter (although it might not be estimable and might bias other parameter estimates);
> 5. Making a subjective choice as to the most 'plausible' value (but perhaps deliberately 'low' to provide a precautionary approach); or

6. Examining current tagging and other data to determine whether there is any information on survival of vulnerable age classes already available (also unlikely to provide much useful information)." (Bradshaw et al. 2013, Pg 25)

In the TAG recommendations, it states that the members recommended that MPI consider the points above listed by Bradshaw et al. (2013), amongst other things. I note that Bradshaw et al (2013)'s point 2 is included as option 3 (50%) for setting of the Discount Rate.

The inclusion of option 3 (50%) is attributed to the environmental stakeholders at the TAG and that this option is somehow a request for a precautionary option. However, as noted by the expert panel above, a precautionary approach in their view would be a "low" Discount Rate, "to provide a precautionary approach".

MPI's managers seem to favour a high Discount Rate, ignoring the expert panel's advice. In the consultation document, MPI attempts to justify this position by stating:

> "MPI has invested considerable scientific resources to estimate sources of cryptic mortality. Extensive 'crash-test dummy' modelling suggests that mortality from mild traumatic brain injury will be very low (less than 3% of interactions). Anecdotal evidence from other jurisdictions suggests that body non-retention is likely to be negligible. Post-escape drowning is impossible to quantify but is judged unlikely to be high based on camera observations of sea lion behaviour in SLEDs, and known physiological characteristics."

Despite the "considerable scientific resources", the expert scientific advice (Bradshaw et al. 2013) demonstrates MPI's work is flawed and leads to "unsubstantiated opinion". Clearly not money well spent!

Even this strong statement by MPI has to rely on "anecdotal evidence" from overseas fisheries and single instances of sea lion behaviour in SLEDs here in New Zealand. This is because there is no hard evidence to support MPI's positon for a high Discount Rate.

There is camera footage of SLEDs in SQU6T, but the report on this footage only serves to raise more questions and concerns about SLED efficacy. The report on this video footage (i.e. frame captures from the video) indicates that "backwash" in the hood of the SLED results in catch and dead fish floating or being blasted out of the SLED opening.

Attempts to see the SLED footage have been repeatedly denied. Even when industry was asked to show the footage at the recent TAG meeting so that a better understanding of SLED function could be obtained, industry declined to show the footage. This is most concerning, especially as this footage is repeatedly cited as evidence for SLED efficacy.

Withholding the video footage also strikes a blow to openness and transparency in NZ fisheries management. This should sound warning bells, as industry will be overseeing the collection and analysis of VMS footage collected to determine fishing industry compliance.

Given the 2013 expert panel's advice on Discount Rate, I recommend the 50% Discount Rate (Option 3) should be recommended to the Minister.

Fishing effort resulting from recommended management settings

Using my recommended management settings (FRML of 38; Strike Rate of 7.58; Discount Rate of 50%) the maximum allowed fishing effort in SQU6T is 1003 tows per annum.

In the 5 years of the last operational plan, an average of 1008 tows were undertaken in SQU6T (range: 633-1364). Catches in that time (taken from MPI's website) indicate that up to 78% of the TACC was taken (average 39%).

I recommend that the Minister set a fishing effort limit of 1003 tows in SQU6T. Based on the last 5 years, this limit would only slightly impact utilisation in SQU6T, but this impact could be offset by allowing fishers to take squid elsewhere in the NZ EEZ.

In years of high squid abundance, fishing beyond the 1003 tows could occur outside of the SQU6T on the Snares Shelf (i.e. in in SQU1T). SQU1T has a TACC of 44,740 tonnes and, since 2011, an average of 31% of this TACC has been taken. This leave ample TACC to cover any overflow from SQU6T in the coming years. For example, in the 2016 fishing season, the 361 tows over my proposed 1003 tow limit in SQU6T could have been fished in SQU1T.

This approach to managing fishing effort in SQU6T would allow industry to continue to fish for squid, while putting in place some meaningful marine stewardship with regards to sea lion management.

Thank you for the opportunity to submit on the proposed operational plan. I hope that my submission will result in a revision of the current operational plan settings.

Yours sincerely

Associate Professor Bruce Robertson

Dear Madam / Sir

I am writing this submission on the draft Squid 6T Operational Plan because I have recently become aware of the threat to the survival of our rapoka that currently exists.

I want to support the WWF suggestion in taking a cautious approach in setting limits while there is a lack of good science about the success of current measures.

I fully understand that a balance is required between economic reality and managing risk to endangered species, however you have the opportunity at this point in time to take the time to make a rational and scientifically supported decision.

Please do this for our children and our children's children - they will thank you for it one day.

Thank you for considering my submission.

Regards
Claire Barlow

Claire Barlow
███████████████████
██████████

8 September 2017

Squid 6T Operational Plan Consultation
Fisheries Management
Ministry for Primary Industries
P O Box 2526
WELLINGTON 6140

By email to: FMsubmissions@mpi.govt.nz

INDUSTRY SUBMISSION ON PROPOSED SQU6T OPERATIONAL PLAN

The Deepwater Group Limited (DWG) appreciates this opportunity to provide a submission on your proposed Operational Plan for the SQU6T fishery (MPI Consultation Paper No: 2017/28).

DWG representatives participated in the SQU6T Operational Plan Advisory Group process which preceded the development of this plan. The SQU6T fishery is a major contributor to New Zealand export revenue, annually generating tens of millions of dollars ($68 m of export receipts in 2016).

SUMMARY

In summary, on behalf of SQU6T quota owners, DWG submits (with supporting information and rationales set out further in this paper) that:

- There is no apparent need for the continuation of a FRML. Effective mitigation measures have reduced the level of captures to well below the level of the FRML set for the SQU6T fishery. The NZSL TMP objectives do not require a FRML in this effectively managed and closely monitored fishery.

- However, should MPI decide that a FRML is required together with a continuation of the effort-based monitoring regime that has been used in recent years, then

  - DWG supports this being set at 60, which acknowledges the best available science, the objectives of the NZSL TMP, and the effects of other fisheries on this NZSL population; and

  - DWG supports the strike rate being set at 5.89, which encompasses the best available information and current fishery practices; and

  - DWG supports the discount factor being set at 82%, which is supported by a wide range of empirical data and science processes, and noting that any other potential fishing mortality has already been included within the FRML modelling

- DWG strongly supports the continuation of the other management measures: observers at not less than 50% of tows; a trigger process to take account of significant any unforeseen relevant change(s); notification and daily reporting; and the processes for closure of the fishery as these measures support the ongoing management of this fishery.

- DWG supports the proposed two year term for this plan with the expectation that in the intervening period work will occur to develop an approach beyond 2018-19 that ensures both the utilisation of SQU6T and the objectives of the NZSL TMP are met, which we support as both highly desirable and mutually inclusive goals.

Deepwater Group Ltd – PO Box 5872, Wellesley Street, Auckland 1141, New Zealand – +64 9 379 0556 – www.deepwatergroup.org

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BACKGROUND

Deepwater Group Limited

1. Deepwater Group Limited (DWG) is a non-profit organisation that works in partnership with the Ministry for Primary Industries (MPI), the Department of Conservation (DOC) and others to enable New Zealand to gain the maximum benefits from our deep water fisheries resources, managed within a long-term sustainable framework.

2. DWG's vision is to be trusted as the best managed deep water fisheries in the world.

3. DWG represents the owners of quota in New Zealand's major deep water commercial fisheries, including those for hake, hoki, jack mackerel, ling, orange roughy, oreos, scampi, southern blue whiting and squid. Shareholders of Deepwater Group collectively own around 91% of the quota for deep water fisheries in New Zealand and 92% of the quota for SQU6T.

4. Since its inception in 2006, DWG (and the Squid Fishery Management Company prior to this time) has worked assiduously with the fleet, with relevant scientific and management bodies, with MFish, MPI and DOC to minimise interactions between fishing activities and New Zealand sea lions (NZSL) and to support work that allows scientists and managers to better understand the changes in sea lion population sizes and the nature of the occasional interactions between adult sea lions and the trawl fisheries in their foraging range.

5. Over the past decade this has meant a range of actions and engagements including:

    5.1   Direct involvement in the MFish SLED Working Group (convened at the request of the Minister of Fisheries and independently chaired)

    5.2   Delivery of a comprehensive programme to ensure that Sea Lion Exclusion Devices (SLEDs) are used by all vessels in the SQU 6T fishery, and are indpendently certified as meeting the required design standards before each fishing season

    5.3   Engagement with and provision of data/laboratory samples to Massey University and to NIWA

    5.4   Support for MPI's SQU6T 2012-16 Operational Plan (and with MPI's SBW6I Operational Plan), including enhanced monitoring

    5.5   Resources for additional veterinary work, extended field seasons and pup counts at Campbell Islands

    5.6   Full, active and constructive participation in all relevant DOC and MPI technical and science working groups

    5.7   Support for the Pup Mortality Workshop and for disease research

    5.8   General support for the New Zealand Sea Lion Threat Management Plan and engagement in the processes to deliver the final version of the Plan.

6. DWG has liaised with Fisheries Inshore New Zealand Limited (FINZ) in the preparation of this submission. FINZ endorses this DWG submission.

7. Any queries in respect of this submission should be directed to Richard Wells in the first instance (richard@resourcewise.co.nz or Ph. 021 457 123).

Management to Date

8. The SQU6T Operational Plan is established under Section 15 of the Fisheries Act 1996 (the Act).

9. Section 8 of the Act sets out the purpose as: "*to provide for the utilisation of fisheries resources while ensuring sustainability*". Ensuring sustainability means:

    9.1 Maintaining the potential of fisheries resources to meet the reasonably foreseeable needs of future generations; and

    9.2 Avoiding, remedying or mitigating any adverse effects of fishing on the aquatic environment".

10. Section 9 of the Fisheries Act sets out the environmental principles which must be taken into account in respect of to any decision or activity undertaken under the Act. The principles are:

    10.1 Associated or dependent species should be maintained above a level that ensures their long term viability;

    10.2 Biological diversity of the aquatic environment should be maintained;

    10.3 Habitat of particular significance for fisheries management should be protected."

11. Decisions need to reflect the purpose of the Act and be balanced, not reflecting any unnecessary or inappropriate leanings towards either of the utilisation or sustainability objectives.

12. Section 10 of the Fisheries Act 1996 contains the following information principles:

    All persons exercising or performing functions, duties, or powers under this Act, in relation to the utilisation of fisheries resources or ensuring sustainability, shall take into account the following information principles:

    12.1 decisions should be based on the best available information:

    12.2 decision makers should consider any uncertainty in the information available in any case:

    12.3 decision makers should be cautious when information is uncertain, unreliable, or inadequate:

    12.4 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.

13. Decisions made in respect of the SQU6T Operational Plan need to be in accordance with the information principles, using the best available information but noting any uncertainties in that information.

14. Section 15 of the Act sets out the Minister's responsibilities and powers for managing the fishing related mortality of marine mammals and other wildlife. Section 15(2) states that:

    *"in the absence of a population management plan, the Minister may, after consultation with the Minister of Conservation, take such measures as he or she considers are **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."* (Emphasis added)

15. Section 15 requires the Minister to be satisfied that such measures are necessary. That involves a higher threshold than being appropriate or beneficial.

New Zealand Sea Lion Population at Auckland Islands

16. The sea lion population increased in size during the period 1992-97, in the face of high fishing effort, with limited mitigation measures available, and a subsequent decline in numbers commencing in 1998, largely due to the acute effects of disease. Since 2002 the decline has continued, driven by the ongoing chronic effects of *Klebsiella pneumoniae* in the population. Since 2008, pup production estimates indicate the sea lion population has likely stabilised and may again be increasing in size.

17. Estimates of the sea lion population at Auckland Islands of 11,800 (including pups, immediately after pupping) and 9,400 (excluding pups, immediately prior to pupping), have been provided by Roberts and Doonan[1] for the TMP.
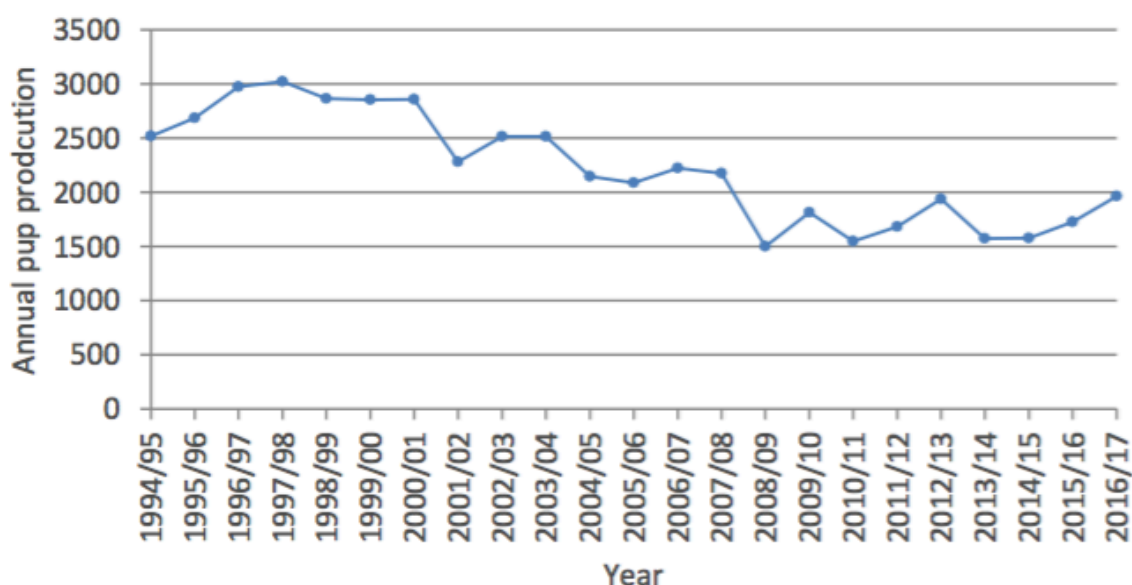
Annual pup production at the Auckland Islands [2]

Threat Management Plan

18. A sea lion recovery plan was established in 1995. A sea lion management plan was established in 2009 and a Threat Management Plan (TMP) commenced in 2014, having been approved by the Minister in 2017.

19. In addition to the population estimate referred to above, the Sea Lion Threat Management Plan was also informed by modelling, which predicts an ongoing decline in the numbers of sea lions in this population. The TMP problem definition[3] stated:

> *"Annual sea lion pup counts at the main sea lion breeding sites are used to index trends in the total sea lion population. The Auckland Islands is the largest breeding site with 68% of all sea lion pups being born there. For this reason, pup counts have been undertaken at the four breeding colonies on the Auckland Islands since 1953. The number of sea lion pups born at the Auckland Islands in the 11 years between 1998 and 2009 declined by 50% (Figure 2).*
>
> *During the 2014 monitoring survey, 1,575 sea lion pups were estimated to have been born at the Auckland Islands. This was the third lowest pup count since 1995. In response to concern at this low pup count and the declining trend, the Minister of Conservation and the Minister for Primary Industries requested that the Department of Conservation (DOC) and the Ministry for Primary Industries (MPI) work to develop a New Zealand sea lion Threat Management Plan (TMP)."*

20. Results from modelling the Auckland Island population[1] estimate that it is only through the alleviation of *Klebsiella pneumoniae*-related mortality of pups that a positive population growth rate can be obtained. The modelling results demonstrate a decline in the projected population growth rate, even after removal

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[1] Roberts, J.; Doonan, I. (2016). Quantitative Risk Assessment of Threats to New Zealand Sea Lions. New Zealand Aquatic Environment and Biodiversity Report No. 166. 111 p

[2] Childerhouse, S. et al (March 2017). New Zealand Sea Lion Research Auckland Islands 2016/17. Presentation to DOC CSP meeting.

[3] Department of Conservation and Ministry for Primary Industries New Zealand Sea Lion/Rāpoka Threat Management Plan Consultation Paper 20 June 2016 http://www.doc.govt.nz/nature/native-animals/marine-mammals/seals/new-zealand-sea-lion/docswork/new-zealand-sea-lion-threat-management-plan/

of the estimated <u>maximum</u> level of fishing mortality. These results indicate that it is disease, not fishing related mortality, that is the key factor influencing the trajectory of this sea lion population.

21. The sea lion TMP, approved in July 2017, contains the following vision and objectives:

The vision is to:

> *"promote the recovery and ensure the long-term viability of New Zealand sea lions, with the ultimate goal of achieving 'Not Threatened' status*

The objectives are to:

> *"Halt the decline of the New Zealand sea lion population within 5 years"* and

> *"Ensure the New Zealand sea lion population is stable or increasing within 20 years, with the ultimate goal of achieving 'Not Threatened' status."*

SQU6T Operational Plans

22. Operational Plans for the SQU6T fishery were first implemented in 1990. These plans are based around operational procedures and a maximum allowable number of fishing induced mortalities.

23. From 1992, the plan was based on the concept of a Maximum Allowance for Fishing Related Incidental Mortality (MALFiRM). In 2004, the MALFiRM was replaced by a Fishing Related Mortality Limit (FRML) as the key component of the operational plan. This was essentially a change in terminology.

24. The use of a predetermined estimated strike rate to monitor the FRML was adopted in 2003.

25. The current Operational Plan consists of:

- the FRML,
- a strike rate and a discount rate (used to estimate total mortalities during the season),
- a number of operational requirements such as observer levels and use; and
- a number of triggers based on capture levels of NZSL as well as other significant factors that may evolve which would give rise to concerns that the operational plan required immediate review.

26. The table below provides two series of estimated mortality levels. The first is based on fishing effort and the assumed strike rate. The second is modelled from observed captures. The FRMLs are provided for each year during the past decade.

SQU6T – Mortality vs FRML										
	Year									
	2007	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**
Estimated mortality based on effort and assumed strike rate	56	46	72	44	58	47	11	8	7	14
FRML	93	81	113	76	68	68	68	68	68	68
% of FRML	60%	57%	64%[4]	57%	85%	69%	16%	12%	10%	21%
Estimated mortality based on observer data[5]	24	19	17	17	11	9	10	8	5	n/a

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[4] In January 2009 industry agreed to reduce fishing effort by approximately 16% in SQU6T as an interim measure for the 2009 season in response to pup numbers being lower than expected.

[5] https://psc.dragonfly.co.nz/2017v1/released/new-zealand-sea-lion/trawl/all-vessels/auckland-islands/2015-16/

27. The estimated numbers of NZSL captured annually by fishing has decreased from around 50 to less than 10 during the period between 2004 and 2015, as is shown in the following graph:
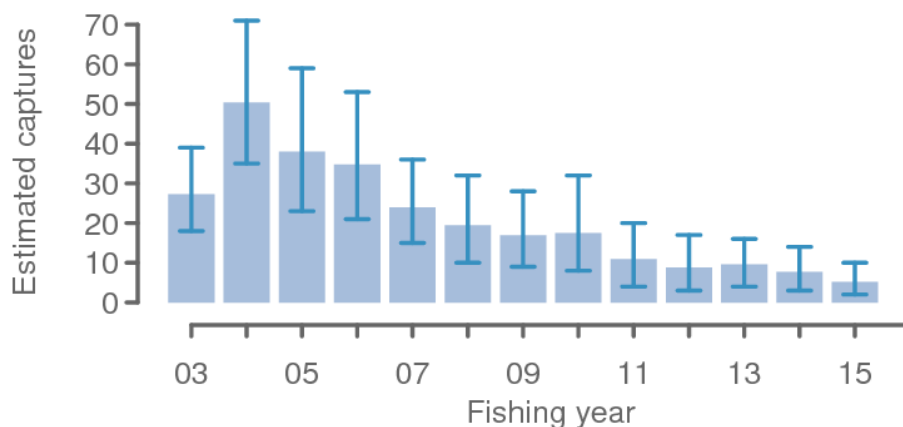
The Draft 2017-18 SQU6T Operational Plan

28. MPI is consulting on the parameters for the SQU6T Operational Plan for 2017-18. They propose the following options for the consideration of submitters:

Fishing-Related Mortality Limit		Strike Rate		Discount Rate	
Option	**Proposed setting**	**Option**	**Proposed setting**	**Option**	**Proposed setting**
1 Status quo	68	1 Status quo	5.89	1 Status quo	82%
2	38	2	4.78	2	75%
		3	6.34	3	50%
		4	5.89		
		5	7.58		

29. Other matters on which MPI requests views are:

- Duration of Plan – MPI is proposing a two year duration;

- Observer Notification - MPI is proposing 72 hours (status quo);

- Reporting Requirements – MPI is proposing the status quo;

- Trigger points for review – MPI is proposing to reduce the trigger points to one all-encompassing any new significant information;

- Observer Coverage– MPI is proposing a minimum observer coverage of 50% of tows;

- Fishery Closure Process– MPI is proposing the status quo.

DWG COMMENTS ON MPI's DRAFT OPERATIONAL PLAN

30. MPI have proposed two FRML options: the status quo of 68 and an alternative option of 38. Both options will allow for *"the achievement of the vision or objectives of the NZSL TMP"*.

31. The FRML of 68 is based on results from the Breen-Fu-Gilbert Model. A review of this model concluded that: *"the model was carefully and correctly implemented and appears to be an acceptable basis for continued development"* but that *"until the model has been modified, tested and re-run, it will be impossible to determine whether the current limits upon the SQU6T fishery will succeed in meeting the agreed management requirements"*.

32. MPI has recently commissioned research to establish a new model for the Operational Plan. This work is based on the population model used to inform the TMP.

33. MPI proposes a new Population Sustainability Threshold (PST) management criteria and an allowance for the estimated NZSL mortalities from the Auckland Islands population in other fisheries. This new modelling, in conjunction with significant changes in the management criteria, has led to MPI's proposal for an alternative FRML of 38 (MPI's Option 2). Issues with this modelling and processes surrounding it are discussed below.

No Need for an FRML within this Operational Plan

34. DWG considers that there is no need for a FRML within the new Operational Plan, as has been proposed by MPI.

35. Page 9 in MPI's draft Operational Plan indicates that fishing does not pose a significant threat to the long term viability of the NZSL population and that the removal of fishing would have only a negligible impact on the future growth rate:

    "Direct fishing-related mortality was only estimated to have changed the population growth rate by more than 1% when modelled using implausibly pessimistic estimates of cryptic mortality (e.g. assuming every interaction results in mortality even when the sea lion successfully exits the net). Projections using a more realistic estimate of cryptic mortality (e.g. assuming that 18% of interactions result in a mortality), indicate that eliminating direct fisheries mortality would result in less than half of one percentage improvement in the population growth rate".

36. Pup counts over the past 8 years indicate that the NZSL population at Auckland Islands has stabilised in size and may now be increasing.

37. The performance of the industry, particularly during the past 5 years, has significantly decreased any threat to this NZSL population from the squid fishery.

38. The MPI consultation documents on page 8 indicate that all of the options presented are consistent with meeting the objectives of the TMP::

    "The more conservative options in this paper will more significantly impact utilisation opportunities , however MPI considers that none of the options provided will prevent the achievement of the vision or objectives of the NZSL TMP."

39. On the basis of the negligible impact of fishing, the stabilisation of the population size, the reduction in mortalities, and MPI's conclusion that the Operational Plan as proposed will not impact adversely on the population, DWG suggests that the revised Operational Plan does not require a FRML as part of the settings and requirements.

The Fisheries Related Mortality Limit (FRML)

40. DWG notes that the Minister has the discretion to exercise his powers under section 15 of the Fisheries Act and we provide the following comments for consideration should the Minister consider it necessary to exercise their powers under section 15 to continue with an Operational Plan that includes a FRML.

41. DWG notes the move to a PST based methodology to estimate the impact of commercial fishing on the NZSL population. That appears consistent with MPI's policy to use a PST basis rather than the previous PBR basis, in assessing the impact of commercial fishing on a protected species.

42. DWG is of the view that such an approach is appropriate.

Proposal by MPI to Unilaterally Change the Management Criteria

43. The management criteria in place since 2004 were developed and approved in 2003 by a Technical Working Group comprised of representatives from the Ministry of Fisheries, DOC, seafood industry, and environmental groups. These criteria included:

    "The management settings must provide for an increase in the sea lion population to more than 90% of carrying capacity, or to within 10% of the population size that would have been attained in the absence of fishing, and that these levels must be attained with 90% certainty, over 20-year and 100-year projection", and

    "The management setting must attain a mean number of mature mammals that exceeded 90% of carrying capacity in the second 50 years of 100-year projection runs (to allow for build-up of numbers in hypothetical depleted populations over time)."

44. In obtaining a Population Sustainability Threshold (PST) for this proposed Operational Plan, MPI proposes to replace the above management criteria.

45. MPI's consultation document provides no information on their new modelling. However, DWG is aware of unpublished work in progress that has been presented to MPI's Aquatic Environment Working Group (AEWG). Given the Terms of Reference of the AEWG it is not appropriate for DWG to comment on the modelling or on the provisional results tabled in the AEWG, but not yet finalised or published..

46. In the research paper provided by J Roberts to the May 2017 AEWG, the work was presented in the context of a revised management criterion proposed by MPI. That changed the timeframe from 20 to 5 years, and removed the consideration of population carrying capacity which is not estimated in the model.

47. The provisional results from PST modelling were also presented to the Sea Lion Advisory Group meeting on 15 June 2017. The Advisory Group made no decision on the criteria. Some attendees requested that alternative options be provided at different certainty levels (i.e. 95% and 98%) to assess the sensitivity of the criteria and to provide projections at 5 yearly intervals to indicate the status of the population in relation to the desired level.

48. Subsequent to that meeting, MPI appears to have made a unilateral decision to further change the management criteria in the draft Operational Plan to be:

    "no more than 5% lower than the population size than it would be in the absence of human-caused mortality with 90% confidence over five years."

49. The basis for this change is unknown and it was neither consulted on nor discussed with stakeholders prior to its proposal for implementation. The Sea Lion Advisory Group did not agree on the 95% setting – they had simply asked for an indication of the sensitivity of this criterion.

50. MPI's consultation paper contains no indication of the impact of their unilateral decision to use 95% as the new criterion, although by comparison with the previous results presented to AEWG, the PST has reduced from 80 to 46 NZSL.

51. The latest modelling has not been provided to, nor has it been assessed by, the AEWG or stakeholders.

52. MPI's own policy is that any scientific information used to inform management decisions must first meet the requirements of MPI's "Research and Science Information Standard for New Zealand Fisheries". It is DWG's submission that the information MPI propose to use does not, at this time, meet their own requirements.

53. Further, the proposed management criteria are inconsistent with the NZSL TMP objectives which are to:

> *"Halt the decline of the New Zealand sea lion population within 5 years"*,

and to

> *"Ensure the New Zealand sea lion population is stable or increasing within 20 years, with the ultimate goal of achieving 'Not Threatened' status."*

54. There is evidence that the first TMP objective has already been achieved (based on pup count data). The modelling undertaken during the development of the TMP indicates that addressing disease, not fishing mortality, will be the key to achieving the second objective.

55. DWG is of the view that the new management criterion (95%) cannot be accepted until all stakeholders are:

- fully informed on the need for the changes; and
- on the impact of the changes;
- appropriately consulted on the new management criterion.

Population Model needs Ongoing Review

56. MPI's consultation document provides no information or details, on the results from the modelling used to determine a PST. It is assumed that these are similar to those presented to the AEWG on 12 May 2017. It is clearly unhelpful that MPI did not detail this unpublished modelling in their consultation document and has, instead, relied upon stakeholders' knowledge of "work in progress" as presented through the AEWG meetings and where such draft work remains confidential to the Working Group participants.

57. The modelling results presented in May 2017 since have been updated to include recent pup count data, but not the recent tag re-sight information. This is an important point. It was noted that the model's estimates of recent pupping rates are "implausibly high", potentially due to changes in demographic rates such as the age at first breeding or the breeding probability of early breeders which are fixed parameters in the model. Consequently, the model may be underestimating the numbers of mature females and the fecundity of early breeders (i.e.. 4-6 year olds). This may be the driver for the model's estimation of a continuing decline in the population, despite the fact that the pup counts have increased over the last 8 years by 31%.

58. It should be noted that the PST modelling results presented in 2017 are fundamentally different to the results from previous modelling, as have been used in assessing the FRMLs. In the past, modelling included consideration of both the sea lion population <u>and</u> the operation of the fishery (i.e. historical data on fishing effort etc.). The new model does not model the fishery - it simply assumes that the PST is caught in its entirety annually (i.e. in the case of a FRML of 38 the model assumes that this number of animals will die each and every year, which is a much higher cumulative impact than is occurring in the real world, as is evidenced by the history of the fishery). Thus, the current model takes no account of actual numbers of captures and the likely future numbers, nor does it take account of possible variations in fishing effort, the impacts of changes in numbers of foraging sea lions on the fishing grounds, or the numbers of expected captures. Rather, it simply accepts the upper management bound (the limit) as the annual constant mortality. This is pessimistic.

59. While the PST model may prove to be useful for assessing risks to the NZSL population it is both dated in the data it is using, not correctly tracking current increasing pup counts and unduly pessimistic in its projections

60. MPI's statement that:

> "The population model has been reviewed by the MPI Aquatic Environment Working Group, DOC Conservation Services Programme Technical Working Group, and by an independent expert panel at two NZSL TMP expert workshops."

applies only to the population modelling carried out for the TMP. With respect to the updated population modelling, and the extension of the modelling to estimate a PST, the AEWG got a presentation of provisional results which have not been finalised after AEWG feedback, or published.

61. DWG is of the view that:

61.1 the model needs to be updated to include all recent data, and to address implausible parameter estimates, before it can be usefully used for short term projections;

61.2 evaluation of a PST, if an FRML is required, must include a model of the fishery rather than assuming the full PST is taken annually, and

61.3 the final report, results and conclusions must meet the terms of MPI's "Research and Science Information Standards for New Zealand Fisheries" before being used as MPI propose.

DWG's Alternative Recommendation

62. In consideration of the points above, MPI's proposed unilateral introduction of new management criteria, and our concerns with the lack of update of the population modelling, DWG does not accept Option 2 for the FRML.

63. Additionally, we note that the existing FRML of 68 has provided for both utilisation opportunities for industry and has not detracted from the measured improvements in the long-term viability of the Auckland Islands NZSL population.

64. We consider that a pragmatic way forward would be to retain the existing FRML of 68. It appears to be well within the acceptable PST threshold (90% of the population within 5 years with 90% confidence). This number could then be reduced to 60 to account for mortalities in other fisheries, as has been proposed by eNGO representatives. This is a rational way to ensure that the total fisheries mortalities relevant to this NZSL population are accounted for in the revised management settings.

65. Before the next SQU6T operational plan, we submit that MPI must commission an update of the population model to incorporate all of the new information and undertakes a full consultation on the model, the results and on the management criteria that should apply for any future SQU6T Operational Plan.

DWG Recommendation: Support Option 1 but with an allowance for NZSL mortalities from this population by other fisheries (8) to provide a FRML of 60.

Monitoring the FRML

66. DWG considers that observer coverage is sufficiently high and SLED performance is sufficiently well understood that MPI can now directly monitor captures in the SQU6T fishery.

67. However, in the event that MPI chooses to remain with the status quo approach to monitoring the FRML, then we discuss the strike rate and discount rate choices below. We note in particular that the current parameters have led to in-season estimates that – in the last five years – have tended to be slightly above the eventual data based estimates of sea lion captures in all trawl fisheries around the Auckland Islands (see table at paragraph 26).

Strike Rate

68. MPI provides five options for consideration:

Option	Reference Period	Strike Rate	95% Confidence Range
1 Status quo	Mean from 2000-01 to 2009-10	5.89	
2	Mean from 1995-96 to 2004-05	4.78	3.64 – 6.34
3	Upper 95% CB 1995-96 to 2004-05	6.34	
4	Mean from 1995-96 to 2014-15	5.89	3.43 – 14.7
5	Mean from 2005-06 to 2014-15	7.58	2.14 – 29.6

69. DWG's preference is to use Option 4 as this is based on the most robust data set, both in terms of the time length of the series and the capacity of the estimated rate to reflect changes in sea lion numbers and in industry practices.

70. We are cognisant of the wider confidence level for this option and note the contribution of the regression based estimates to that variance. However, we note that the methodology has been peer-reviewed and the data are based on a high level of observation. Accordingly, we see no justification for any adjustment to the operational settings to account for any uncertainty in this factor.

71. We do not support the other options for the following reasons:

71.1 Option 1 uses only a subset of the available information to inform the choice of strike rate. In particular, the use of information only prior to 2010 will result in an estimate that is biased high given the lower population numbers that prevailed through the period from 2008 to today and that can reasonably be expected to prevail for duration of the operational plan. Furthermore, any shifts in fishing practice and behaviour since 2008 will not be recognised in this option.

71.2 Option 2 has the same problems as Option 1 but to a greater degree since the reference time period stops at 2005 and reflects a higher population of sea lions than currently prevails;

71.3 Option 3 has the same problems as Option 2 but incorporates caution into the component estimate. We would prefer caution be exercised at the aggregate level.

71.4 Option 5 uses only estimated interactions and to that extent fails to use the full information available to inform the output.

DWG Recommendation: Support Option 4 – the retention of a Strike Rate of 5.89

Discount Factor

72. MPI provides three options for consideration:

Option	Proposed setting	Considerations
1 Status quo	82%	1) exit probability of 85% using data to 2008-09 2) 3% allowance for MTBI
2	75%	1) Exit probability of 86% using data to 2011-12 2) Allowance for MTBI of 3% 3) Allowance of 10% for non-retention and post exit drowning
3	50%	Arbitrary – from Bradshaw *et al* 2013

73. DWG supports Option 1 with a discount factor of 82%. The estimates for both the exit probability and the potential for Mild Traumatic Brain Injury have resulted from high quality, peer-reviewed independent research.

74. However, DWG does note that the exit probability has been updated using information up to 2011-12 and DWG would not be averse to a decision for a strike rate of 86% and the allowance of 3% for Mild Traumatic Brain Injury, that is, to set the discount factor at 83%.

75. Option 2 includes the new information but also applies a "cryptic mortality" factor for the hypothesised non-retention of bodies and post exit drownings. DWG does not support Option 2 for the following reasons:

   75.1 The population survival estimates are based on mark-recapture data and, while an adjustment is made in the modelling to reflect estimated mortalities in nets, that adjustment does not include an allowance for cryptic mortalities. Thus the measured survival rates used in the population modelling are already <u>inclusive</u> of any and all cryptic mortalities. Any additional adjustment, such as the reduction proposed, would result in a double counting of any such possible mortalities in the projections.

   75.2 Furthermore, there is simply no evidence to support the contention that drowned sea lion bodies might be lost from the SLEDs as used in the New Zealand fleet, and such conjectures are not based on any real understanding of the configuration of these SLEDs nor of their performance when used in nets in the SQU6T fishery.

   75.3 New Zealand SLED escape holes are deliberately located in the top of the net and the hood is designed and prescribed to ensure it extends <u>ahead</u> of the apex of the escape hole with floats that close the hole if the net should invert. Much play has been made by those who misunderstand, or who deliberately misconstrue, reports from overseas, especially Lyle and Willcox 2008[6] and Lyle et al 2016[7]. A proper understanding of SEDs or SLEDs designed with a top opening escape hole and proper hood arrangement (i.e. <u>not</u> a flapper attached to the hole apex trailing back loosely of the hole as described in Wakefield et al 2016[8]) will provide the awareness that the SLED design used in the SQU6T fishery will ensure the retention inside the net of any drowned NZSLs.

   75.4 There have been some assertions that animals might "float" out of the escape hole. Empirical observations demonstrate that drowned sea lions are negatively buoyant, as evidenced that

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[6] Lyle, J.M., Willcox, S.T. (2008) Dolphin and seal interactions with mid-water trawling in the Small Pelagic Fishery, including an assessment of bycatch mitigation strategies. Final Report Project R05/0996 Tasmanian Aquaculture and Fisheries Institute and Australian Fisheries Management Authority

7 Lyle, J.M., Willcox, S.T., Hartmann, K. (2016) Underwater observations of seal-fishery interactions and the effectiveness of an exclusion device in reducing bycatch in a midwater trawl fishery. Canadian Journal of Fisheries and Aquatic Sciences 73, 436-444

8 Wakefield, C.B., Santana—Garcon, J., Dorman, S.R., Blight, S., Denham, A., Wakeford, J., Molony, B.W., and Newman, S.J. Performance of bycatch reduction devices varies for chondrichthyan, reptile and cetacean mitigation in demersal fish trawl: assimilating subsurface interactions and unaccounted mortality. – ICES Journal of Marine Science, 2016

dead and partly decomposing sea lions have been occasionally caught off the seabed. Information from observers, both in New Zealand and overseas, supports the observation that seals and sea lions are negatively buoyant (i.e. they sink when returned to the sea after being recently drowned). There is no information to support the conjecture that dead sea lions float. Cryptic losses are proposed to also potentially occur if a sea lion drowns after exiting the net but is unable to surface within a time to ensure survival.

75.5   Para 82 of the 2012 FAP for the SQU6T Operational Plan considered this matter and commented as follows:

> "The Ministry is not aware of any specific information that would inform an estimate of the likelihood of post-exit drowning of an animal that exits a SLED without injury. However, at a depth of 200 metres, the approximate depth at which the SQU6T fishery operates it would take 1-2 minutes for a sea lion to reach the surface. This is fairly short compared to the sea lion's average maximum voluntary dive time (10 mins) and a sea lion in a life threatening situation is likely to be able to hold its breath longer still".

75.6   DWG has referenced the report by Chilvers, Wilkinson, Duignan and Gemmell 2006 from which the estimate of 10 mins was extracted. The 10 minute average dive time was recorded under conditions of no stress. Table 1 of the report contains the details of the 18 sea lions and their 54,106 dives. We note that 8 of the animals had a maximum dive duration of more than 10 minutes, with the greatest being 14.5 minutes. Since such dives were made in normal circumstances, we consider a sea lion in a life-threatening circumstance would be able to hold its breath for longer than 15 minutes. Any allowance for a cryptic loss from post-exit drowning would need to be extremely small given the physiological capabilities of sea lions and the low prospects of a sea lion being caught in a net.

76.   Option 3 –This option is based on the report of the independent review undertaken by Bradshaw *et al* of the models and data underpinning the SQU6T Operational Plan[9]. In that report the authors express reservations as to the reliability of the discount rate used (82%) and recommend an alternative rate be used. Among 6 options they proposed was: "*Setting a coin toss discount rate of 0.5 (which would be arbitrary). The inclusion of such an arbitrary option in this proposal is tantamount to trivia.*

77.   However, the authors did not make that a specific recommendation in their report. They did recommend that:

77.1   *a means of investigating post-exit SLED mortality be investigated to assess the practicality of reducing this source of uncertainty in their real role in reducing NZSL deaths (Section 7.4.4.2).; and*

77.2   *a reasonably risk averse interim approach is adopted to the cryptic mortality and MTBI and that consideration be given to the resources that would be required for the investigation of these issues (Section 6.3.5).*

78.   Section 10 of the Fisheries Act requires that decisions should be made available on the best available information. The discussion above in relation to Option 1 and Option 2 contains the information available to inform the decision. There is no justification in using an arbitrary assumption, such as Option 3 is based upon, when information from quality peer-reviewed science exists to inform the decision, especially when the modelling explicitly accounts for all mortality via the mark recapture data.

DWG Recommendation: Support Option 1 – the retention of a Discount Factor of 82% noting that updated information is available

9 Corey J. A. Bradshaw, Malcolm Haddon, Mike Lonergan, 2013, Review of models and data underpinning the management of fishing-related mortality of New Zealand sea lions (Phocarctos hookeri), in the SQU6Ttrawl fishery
MPI, July 2013

Plan Duration

79. DWG supports a duration of two years.

80. A precursor to any consideration of future revisions (i.e. those beyond the term of this plan) is the need to update the population modelling for NZSL. As discussed previously, the model developed for the TMP process when completed should be used to inform revisions to the SQU6T Operational Plan including incorporation of the best available information (e.g. new re-sighting data). That modelling may confirm the stabilisation of the NZSL population at current levels.

Other settings

81. MPI has requested views on other settings as components of the SQU6T Operational Plan. These include the following proposals which DWG supports:

    81.1   Observer Notification - MPI is proposing 72 hours, the status quo

    81.2   Reporting Requirements – MPI is proposing the status quo

    81.3   Trigger points if new information is received– MPI is proposing the status quo

    81.4   Observer Coverage– MPI is proposing a minimum observer coverage of 50% of tows

    81.5   Fishery Closure Process– MPI is proposing the status quo

82. DWG notes that MPI is not proposing to set a prescriptive list of triggers for any possible review of the plan. Instead, MPI proposes to use one trigger relating to new significant information. We support this approach and we request that, should MPI seek to introduce more detailed trigger points in this Operational Plan, that MPI first advise DWG prior to any decision and provide the opportunity to allow DWG to submit on any such proposed triggers. It should be noted that DWG has agreed with the previous set of triggers in previous years and has itself taken voluntary action when significant issues of relevance have occurred (e.g. voluntary reduction to the FRML in 2009 in response to the very low pup count in that year (and now, in hindsight, a nadir in pup production). Providing any such triggers that might be proposed by MPI in addition to those in this consultation, are reasonable, appropriate and relevant, DWG would likely concur with them but we need to reserve the right to submit if any proposed triggers fall outside those conditions.

DWG's RECOMMENDATIONS

83. Given that the decline in pup production of the NZSL population at Auckland Islands has now stabilised (as is evidenced by a progressive 31% increase in pup production since 2008-09[10]); the very low level of observed and estimated NZSL mortalities in the SQU6T fishery; and the threat assessments carried out in support of the DOC/MPI Threat Management Plan for New Zealand sea lions, DWG questions the need for an operational plan for SQU6T that is based on a FRML.

84. DWG supports processes which ensure the ongoing use of certified SLEDs in the fishery and maintaining a high level of observer coverage. In the future we favour the development and implementation of a new trigger, based on the observed levels of sea lion mortalities.

85. If MPI considers that an FRML must remain a component of this proposed SQU6T Operational Plan, then DWG suggests that MPI should monitor performance against the FRML directly via observed mortality rather than indirectly via the use of a strike rate and discount rate.

86. DWG has concerns with:

    86.1   the lack of consultation and rigorous scientific consideration of new management criteria proposed by MPI; and

    86.2   the fact that the most recent mark-recapture data are absent from PST population modelling; and

    86.3   the fact that the PST modelling does not attempt to model the fishery but assumes that the full FRML is caught annually

87. Furthermore, DWG notes that, during the period of application of the existing FRML and management regime, the NZSL population of Auckland Islands has stabilised in size and that the Threat Management Plan clearly concludes that as the level of NZSL mortalities due to fishing is now so low, the reduction of other factors, disease in particular, will now be the key to the future population health.

88. In the event that MPI consider retaining the current methodology for monitoring the FRML is appropriate, then DWG:

    88.1   proposes that the current FRML should be retained with an appropriate reduction for NZSL caught in other fisheries as is proposed in the Draft Plan. That is a FRML of **60**, which will meet the objectives of the New Zealand sea lion TMP and the requirements of the Fisheries Act;

    88.2   supports Option 4 for the Strike Rate (**5.89**) on the basis that it utilises all of the best available information;

    88.3   supports Option 1 for the Discount Rate (**82%**) noting that updated information exists.

89. DWG supports the duration of the new Operational Plan of be **two years**.

90. DWG supports the other management settings as proposed by MPI, noting that the review triggers have been simplified.

Regards,

Richard Wells
Deepwater Group Ltd

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[10] http://www.doc.govt.nz/Documents/conservation/marine-and-coastal/marine-conservation-services/meetings/bpm-auckland-island-sealion-research2016-17.pdf

Dear Madam / Sir
I HAVE BEEN SO DISHEARTENED BY THE MINISTER OF CONSERVATION AND
HER USELESS WORK IN PROTECTING OUR CONTRY'S HERITAGE.
SHE SEEMS TO BE ON THE SIDE OF BUSINESS AND BIG CO-OPERATIONS
THAT DECIMATE MANY ASPECTS OF NZ ECOLOGY.
LIES GET TOLD AND MORE LIES ON TOP TO RUB SALT INTO THE
WOUNDS.LITTLE HAS BEEN DONE TO SAVE NZ'S FLORA AND FAUNA.
A LEGACY SHE WILL LEAVE OF DESTRUCTION.AND FOR SOME ONE WHO
ONCE LIKED NATURE IT IS A HUGE SLAP IN THE FACE FOR ALL NEW
ZEALANDERS.

I am writing this submission on the draft Squid 6T Operational Plan because I
believe we should be giving New Zealand's native, endangered sea lions the best
possible chance of recovery and survival.

New Zealand sea lions are the rarest sea lion in the world. As you know, the
Department of Conservation lists NZ sea lions as nationally critical – the most
endangered category of species in the country, with the highest risk of extinction.

It is good to see the draft plan recognising the scientific uncertainty over the impact
of fishing. I understand that there have been big changes to squid trawling around
the Auckland Islands in the last decade, including a doubling in trawl lengths and
more turns. We need to know how these changes affect how many sea lions are
accidentally killed in fishing nets.

Similarly, as the draft plan recognises, scientists have told the Ministry for Primary
Industries (Ministry) that there just isn't any good New Zealand evidence about how
well Sea Lion Exclusion Devices (SLEDs) work. It is critical that this research is done
over the next two years, so that we can finally resolve this question, and be more
certain about how many sea lions are dying because of fishing.

In the face of this real scientific uncertainty, the squid fishing plan should take a
cautious approach to help ensure New Zealand sea lions survive into the future.

Under sections 8, 9 and 10 of the Fisheries Act 1996, the Minister is legally obliged
to make decisions that will maintain the long-term viability of species such as sea
lions, and take a precautionary approach when there is scientific uncertainty.

To meet these legal obligations and to save NZ sea lions, the plan must:

1. Reduce the sea lion kill limit (the Fishing-Related Mortality Limit) to 38 (Option 2)
as the maximum, but preferably lower to reflect the need for precaution until scientific
uncertainties have been addressed. The limit of 38 is better than the current 68
because it is lower. However, it is not yet a precautionary level because the model
used to calculate the limit used the old untested assumptions that 82% of sea lions
survive trawl nets because of SLEDs and the old strike rate that doesn't account for
changes in fishing practices.

2. Increase the strike rate to 7.58 sea lions per 100 trawling tows (Option 5),

because this represents the most precautionary strike rate. New science is needed to better model how the changes in fishing practices over the last 10 years (double tow length and more turns) have changed the strike rate. Until this science is completed, a precautionary approach is appropriate.

3. Set a discount rate for SLEDs of 50% (Option 3), because there have been no scientific studies about how many sea lions successfully escape through the SLEDs or drown in the nets and fall out through the SLEDs. A 50/50 probability would appropriately reflect this lack of science. It is effectively a coin toss; and it is the most precautionary option provided which is appropriate in this case.

I want you to look after our precious NZ sea lions. That means committing to do the science to answer critical questions, and being careful and precautionary in the meantime. Thank you for considering my submission.

Yours faithfully

Elspeth abdine

Dear Madam / Sir

I have considerable knowledge of the NZ sealion having taken visitors to see them on the Catlins Coast over a 25 year period from 1990. I have also visited the Auckland Islands twice and Campbell Island once. These animals are special to me and very special to New Zealand as part of our biodiversity as well as a major tourist attraction on the South East coast of the South Island. The potential worth of these animals as a tourist resource is considerable and in terms of employment in our region their value for tourism would outweigh the value of the squid fishery many times.I am forwarding this submission on the draft Squid 6T Operational Plan because I believe we should be giving New Zealand's native, endangered sea lions the best possible chance of recovery and survival.

New Zealand sea lions are the rarest sea lion in the world. As you know, the Department of Conservation lists NZ sea lions as nationally critical – the most endangered category of species in the country, with the highest risk of extinction.

It is good to see the draft plan recognising the scientific uncertainty over the impact of fishing. I understand that there have been big changes to squid trawling around the Auckland Islands in the last decade, including a doubling in trawl lengths and more turns. We need to know how these changes affect how many sea lions are accidentally killed in fishing nets.

Similarly, as the draft plan recognises, scientists have told the Ministry for Primary Industries (Ministry) that there just isn't any good New Zealand evidence about how well Sea Lion Exclusion Devices (SLEDs) work. It is critical that this research is done over the next two years, so that we can finally resolve this question, and be more certain about how many sea lions are dying because of fishing.

In the face of this real scientific uncertainty, the squid fishing plan should take a cautious approach to help ensure New Zealand sea lions survive into the future.

Under sections 8, 9 and 10 of the Fisheries Act 1996, the Minister is legally obliged to make decisions that will maintain the long-term viability of species such as sea lions, and take a precautionary approach when there is scientific uncertainty.

To meet these legal obligations and to save NZ sea lions, the plan must:

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I want you to look after our precious NZ sea lions. That means committing to do the science to answer critical questions, and being careful and precautionary in the meantime. Thank you for considering my submission.

Yours faithfully

Fergus Sutherland

I am not a scientist, just a passionate lover of our wildlife. One of my favourite mammals in NZ is our sea lion. Please, please increase our protection of our precious sea lions.

Thank you.
Gail Powell

Dear Madam / Sir

Please give our native sea lions a chance or recovery and survival as a species.

New Zealand sea lions are the rarest sea lion in the world. DoC lists NZ sea lions as – the most endangered category of species in the country, with the highest risk of extinction. And, in the face of this real risk, the squid fishing plan needs to take a cautious approach to help ensure New Zealand sea lions survival.

Under sections 8, 9 and 10 of the Fisheries Act 1996, the Minister is legally obliged to make decisions that will maintain the long-term viability of species such as sea lions, and take a precautionary approach when there is scientific uncertainty.

To meet these legal obligations and to save NZ sea lions, the plan must:

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I want you to look after our precious NZ sea lions. That means committing to do the science to answer critical questions, and being careful and precautionary in the meantime. Thank you for considering my submission.

Yours faithfully
H Hayhurst

Helen Hayhurst

Tena koe,

Nga mihi mahana ki a koe,

I am a Ngai Tahu woman concerned about our statutorily protected Taonga species (Ngai Tahu Settlement Act (NZ)).

I am writing this submission on the draft Squid 6T Operational Plan because I believe we should be giving New Zealand's native, endangered sea lions the best possible chance of recovery and survival.

New Zealand sea lions are the rarest sea lion in the world. As you know, the Department of Conservation lists NZ sea lions as nationally critical – the most endangered category of species in the country, with the highest risk of extinction.

It is good to see the draft plan recognising the scientific uncertainty over the impact of fishing. I understand that there have been big changes to squid trawling around the Auckland Islands in the last decade, including a doubling in trawl lengths and more turns. We need to know how these changes affect how many sea lions are accidentally killed in fishing nets.

Similarly, as the draft plan recognises, scientists have told the Ministry for Primary Industries (Ministry) that there just isn't any good New Zealand evidence about how well Sea Lion Exclusion Devices (SLEDs) work. It is critical that this research is done over the next two years, so that we can finally resolve this question, and be more certain about how many sea lions are dying because of fishing.

In the face of this real scientific uncertainty, the squid fishing plan should take a cautious approach to help ensure New Zealand sea lions survive into the future.

Under sections 8, 9 and 10 of the Fisheries Act 1996, the Minister is legally obliged to make decisions that will maintain the long-term viability of species such as sea lions, and take a precautionary approach when there is scientific uncertainty.

To meet these legal obligations and to save NZ sea lions, the plan must:

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I EXPECT you to look after our precious NZ sea lions. That means committing to do the science to answer critical questions, and being careful and precautionary. You MUST exercise the PRECAUTIONARY PRINCIPLE! Or else!

Kia tupato!

Heoi ano, na

Iri Sharon Rose Sinclair nee Barber BA LLB
He wahinetoa no oku iwi Kai Tahu, Kati Mamoe, Waitaha hoki!

nb I understand you are related to me? If what I am told is the case, you are Ngati Maniapoto? Therefore I invoke our historic allegiance and alliance against the Crown. Please do the right thing Minister, your ancestors would rightfully expect that youi ACT given the authority and power you hold/have attained.
Best wishes with your election campaign. I fear that the National coalition Govt's POOR record in terms of Conservation funding etc may influence the result, and you may find yourself back in Parliament with many of your former colleagues absent (I hope my whanauka Nuk Korako is not among the missing).

Iri Sinclair

Dear Madam / Sir

Too many of our protected species are dying because we as humans, feel we have more rights than they do, to providing ourselves with food from the sea.
I grew up in a time when sealife was abundant and full of biodiversity. The next generations are losing access to this at a rapid rate and will never know what it was like when people spoke of a richness beyond compare. The oceans are a life force that can add to our existence....remove all the biodiversity and what hope is there for future generations.
Sea lions deserve better protection in order to grow their numbers once more.

am writing this submission on the draft Squid 6T Operational Plan because I believe we should be giving New Zealand's native, endangered sea lions the best possible chance of recovery and survival.

New Zealand sea lions are the rarest sea lion in the world. As you know, the Department of Conservation lists NZ sea lions as nationally critical – the most endangered category of species in the country, with the highest risk of extinction.

It is good to see the draft plan recognising the scientific uncertainty over the impact of fishing. I understand that there have been big changes to squid trawling around the Auckland Islands in the last decade, including a doubling in trawl lengths and more turns. We need to know how these changes affect how many sea lions are accidentally killed in fishing nets.

Similarly, as the draft plan recognises, scientists have told the Ministry for Primary Industries (Ministry) that there just isn't any good New Zealand evidence about how well Sea Lion Exclusion Devices (SLEDs) work. It is critical that this research is done over the next two years, so that we can finally resolve this question, and be more certain about how many sea lions are dying because of fishing.

In the face of this real scientific uncertainty, the squid fishing plan should take a cautious approach to help ensure New Zealand sea lions survive into the future.

Under sections 8, 9 and 10 of the Fisheries Act 1996, the Minister is legally obliged to make decisions that will maintain the long-term viability of species such as sea lions, and take a precautionary approach when there is scientific uncertainty.

To meet these legal obligations and to save NZ sea lions, the plan must:

1. Reduce the sea lion kill limit (the Fishing-Related Mortality Limit) to 38 (Option 2) as the maximum, but preferably lower to reflect the need for precaution until scientific uncertainties have been addressed. The limit of 38 is better than the current 68 because it is lower. However, it is not yet a precautionary level because the model used to calculate the limit used the old untested assumptions that 82% of sea lions survive trawl nets because of SLEDs and the old strike rate that doesn't account for changes in fishing practices.

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I want you to look after our precious NZ sea lions. That means committing to do the science to answer critical questions, and being careful and precautionary in the meantime. Thank you for considering my submission.

Yours faithfully

Jenny Brown
███████████████████

Dear Madam / Sir,

I have deep concerns about the impact of squid fishing on our sea lions and expect that you will use your influence to ensure these special mammals have the chance to recover from their disastrous 'nationally critical' status.

I am writing this submission on the draft Squid 6T Operational Plan because I believe we should be giving New Zealand's native, endangered sea lions the best possible chance of recovery and survival.

New Zealand sea lions are the rarest sea lion in the world. As you know, the Department of Conservation lists NZ sea lions as nationally critical – the most endangered category of species in the country, with the highest risk of extinction.

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In the face of this real scientific uncertainty, the squid fishing plan should take a cautious approach to help ensure New Zealand sea lions survive into the future.

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To meet these legal obligations and to save NZ sea lions, the plan must:

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scientific studies about how many sea lions successfully escape through the SLEDs or drown in the nets and fall out through the SLEDs. A 50/50 probability would appropriately reflect this lack of science. It is effectively a coin toss; and it is the most precautionary option provided which is appropriate in this case.

I want you to look after our precious NZ sea lions. That means committing to do the science to answer critical questions, and being careful and precautionary in the meantime. A suggestion is the setting up of a moratorium on squid fishing so the scientific research can be done and the sea lions protected until a more humane plan for squid fishing can be set up - drowning sea lions in squid nets is inhumane and a terrible indictment on this industry.

I urge yuo to take immediate action to protect this endangered species- on the brink of extinction.

He iti, he pounamu. it may be small but it is very precious.

Yours in conservation

Jenny Campbell

Dear Madam / Sir

We are living in an age of massive species extinction. The fact that NZ doesn't protect one of it's main endemic species is outrageous. I am writing this submission on the draft Squid 6T Operational Plan because I believe we should be giving New Zealand's native, endangered sea lions the best possible chance of recovery and survival.

New Zealand sea lions are the rarest sea lion in the world. As you know, the Department of Conservation lists NZ sea lions as nationally critical – the most endangered category of species in the country, with the highest risk of extinction.

It is good to see the draft plan recognising the scientific uncertainty over the impact of fishing. I understand that there have been big changes to squid trawling around the Auckland Islands in the last decade, including a doubling in trawl lengths and more turns. We need to know how these changes affect how many sea lions are accidentally killed in fishing nets.

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In the face of this real scientific uncertainty, the squid fishing plan should take a cautious approach to help ensure New Zealand sea lions survive into the future.

Under sections 8, 9 and 10 of the Fisheries Act 1996, the Minister is legally obliged to make decisions that will maintain the long-term viability of species such as sea lions, and take a precautionary approach when there is scientific uncertainty.

To meet these legal obligations and to save NZ sea lions, the plan must:

1. Reduce the sea lion kill limit (the Fishing-Related Mortality Limit) to 38 (Option 2) as the maximum, but preferably lower to reflect the need for precaution until scientific uncertainties have been addressed. The limit of 38 is better than the current 68 because it is lower. However, it is not yet a precautionary level because the model used to calculate the limit used the old untested assumptions that 82% of sea lions survive trawl nets because of SLEDs and the old strike rate that doesn't account for changes in fishing practices.

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appropriately reflect this lack of science. It is effectively a coin toss; and it is the most precautionary option provided which is appropriate in this case.

I want you to look after our precious NZ sea lions. That means committing to do the science to answer critical questions, and being careful and precautionary in the meantime. Thank you for considering my submission.

Yours faithfully

Jill Cooper
███████████

Dear Madam / Sir

Please...I want you to look after our precious NZ sea lions. That means committing to do the science to answer critical questions, and being careful and precautionary in the meantime. Thank you.

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Yours faithfully

k newton

Dear Madam / Sir

I am writing this submission on the draft Squid 6T Operational Plan. As the oceans are increasingly over fished, humans go further down the marine food chain exploiting species such as squid that were previously ignored by fishermen.

Unfortunately, the species that relied on these species for their food are finding it increasingly difficult to hunt enough food to sustain themselves and raise healthy pups. Whales that feed on squid are starving in the oceans. At our current rate of fishing oceans are predicted to be empty of marine mammals by 2050.

We need to act to protect marine mammals. By creating marine reserves around their breeding grounds, and by any means available to decrease the loss of life as by catch.

The window of opportunity for the NZ Sea lions is closing. Their population has been reduced by 50% in the last fifteen years, they are now highly endangered.

We have learned from kiwi, black robins and other native species that coming back from a population bottleneck creates ongoing genetic problems for the population, often reducing their ability to reproduce and raise healthy offspring, as well as reducing genetic diversity.

Please act now to take whatever measures possible to stop the loss of life of sea lions due to current fishing practices. We have a duty of care to all sentient animals who share the planet.

Yours faithfully
Karen McMorran

Karen McMorran

Dear Madam / Sir

I am supporting the WWF and others on their stance re the draft Squid 6T Operational Plan because I have been involved in Conservation work (paid and volunteer) for decades, and understand first hand the effects - for good and bad - human impact on the natural order has.

I have personally been involved in recovery work for endangered NZ wildlife, and have experienced the devastation when a population has been decimated, but also the highs of successes when they occur.

I have read the draft notes prepared by WWF & cannot improve on their knowledge base, so quote them where appropriate.

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I want you to look after our precious NZ sea lions. That means committing to do the science to answer critical questions, and being careful and precautionary in the meantime. "

Thank you for considering my submission.

Yours faithfully
Linda Cook

Linda Cook
█████████████

Dear Madam / Sir

Humans do NOT have exclusive rights to this planet Earth and we now have a responsibility to protect & include our fellow earthlings in important decisions which will affect them & their habitat, especially considering the damaging impact humans have had.

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Yours faithfully

Linda Cottle

Dear Madam / Sir

Please help the sea lions , they are dwindling at an alarming rate.
Thank you
Lynn

lynn whiting
██████████████████
██████

Dear Madam / Sir

It is so important that we do more to protect our precious sea lions from the fishing industry.
I am writing this submission on the draft Squid 6T Operational Plan because I believe we should be giving New Zealand's native, endangered sea lions the best possible chance of recovery and survival.

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I want you to look after our precious NZ sea lions. That means committing to do the science to answer critical questions, and being careful and precautionary in the meantime. Thank you for considering my submission.

Yours faithfully, Madeleine Child

madeleine child

Dear Madam / Sir

I doubt that you will hear this because the voice of the sea lions have not been heard hence this petition. My plea is that the humans we put in charge to lead us will include the voice of other species when making decisions that effect them.

I am writing this submission on the draft Squid 6T Operational Plan because I believe we should be giving New Zealand's native, endangered sea lions the best possible chance of recovery and survival.

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I want you to look after our precious NZ sea lions. That means committing to do the science to answer critical questions, and being careful and precautionary in the meantime. Thank you for considering my submission.

Yours faithfully

Nikki Sturrock

SQU6T must either be kept the same if not improved for the benefit of the sea lions.

Paige H.

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The plan must meet these legal obligations and save NZ sea lions.

I want you to look after our precious NZ sea lions. That means committing to do the science to answer critical questions, and being careful and precautionary in the meantime. Thank you for considering my submission.

Yours faithfully

Patricia Hannah

Dear Madam / Sir

I would also like to add my bit on this submission. It is important that we decrease the number of sea lion deaths in squid trawling nets. We need to make every effort to ensure that the sea lions are not trapped in these nets and further research needs to be done to work out the best way of doing this. The research needs to be now instead of always putting these things off.

I am writing this submission on the draft Squid 6T Operational Plan because I believe we should be giving New Zealand's native, endangered sea lions the best possible chance of recovery and survival.

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Yours faithfully
Patricia McNaughton (Tricia)

Patricia McNaughton
███████████████████████

Dear Madam / Sir

I am writing this submission on the draft Squid 6T Operational Plan because I believe it is our obligation to save these beautiful creatures.

I find it hard to believe no legal action has been taken already to protect a native species that is listed as 'nationally critical' by he Department of Conservation.

It is good to see the draft plan recognising the scientific uncertainty over the impact of fishing. I understand that there have been big changes to squid trawling around the Auckland Islands in the last decade, including a doubling in trawl lengths and more turns. We need to know how these changes affect how many sea lions are accidentally killed in fishing nets.

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Yours faithfully

Phoebe Botica
█████████████████

PROJECT JONAH
NEW ZEALAND

6 September 2017

Submission to the Ministry for Primary Industries on the Consultation

on the Squid 6T Operational Plan, regarding New Zealand Sea Lion bycatch in the Southern Squid Trawl Fishery

(MPI Discussion paper no. 2017/28)August 2017

PROJECT JONAH
NEW ZEALAND

Contents

Introduction

This submission is made by Project Jonah New Zealand Incorporated (Project Jonah), a registered charity (CC38959) and marine mammal welfare organization, focusing on marine mammals in New Zealand. Formed in 1974, Project Jonah played a critical role in bringing the Marine Mammal Protection Act (1978) into place, and continues to work closely with the Department of Conservation, primarily by responding to marine mammal emergencies throughout mainland New Zealand.

Project Jonah was and continues to be a voice for greater protection of marine mammals. Marine mammals face a range of threats, both natural and anthropogenic. Project Jonah is a strong advocate in employing the precautionary principle in any planned activity, and would like to go further and any anthropogenic activity that has a negative effect on the survival of species (and individuals within a species) halted in its entirety. However, we understand the harsh realities of imposing our will on nature. So we ask that the strongest possible measures be put in place to minimize the negative impacts on species and individuals.

Project Jonah also works closely with other animal welfare groups in New Zealand. We have taken the opportunity to discuss this submission with the Royal New Zealand Society for the Prevention of Cruelty to Animals (SPCA). We thank them for advising us of and sharing this opportunity.

As a result, we welcome the opportunity to make a submission on the Consultation on the Squid 6T Operational Plan, regarding New Zealand sea lion bycatch in the Southern Squid Trawl Fishery.

Submission

Fishing-related Mortality Limit (FRML)

Project Jonah requests the FRML to be set at 38 (Option 2).

The New Zealand sea lion (Sea Lion) is categorised as a threatened species under section 2(3) of the Marine Mammals Protection Act 1978. It is the world's rarest sea lion species and has the highest possible threat status listing in New Zealand of 'Nationally Critical'.

The Fisheries Act 1996 (Section 15(2)) states that the Minister may "*…take such measures as he or she considers are 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*". In making his/her decision on management measures for the SQU6T fishery, the Minister is required to consider those measures that are 'necessary' to avoid, remedy or mitigate the effects of fishing-related mortality on the Sea Lion population.

Since 2010, the FRML has been set at 68. This FRML has not been associated with any significant positive effect on the Sea Lion population, as is evidenced by the population statistics since the implementation of this figure, showing that the current number is ineffective in protecting sea lions from fisheries activities. Project Jonah disagrees that Option 1 – the status quo, (68 sea lions) should remain as the FRML figure until 2019.

Project Jonah has no doubt that current fishery methods used in the SQU6T fishery threaten the sustainability of the Sea Lion population. Project Jonah believes that s.15 (2) compels the Minister to reduce the FRML to avoid, remedy and mitigate the effects of fishing-related mortality on the Sea Lion population.

PROJECT JONAH
NEW ZEALAND

The New Zealand Sea lion/Rāpoka Threat Management Plan for 2017-2022 (NZSL-TMP) should be aiming to recover the Sea Lion population to non-threatened status. The only way to ensure the significant increase of the Sea Lion population over the next period is for the government to focus on seeking to remove or at the very minimum, reduce all anthropogenic threats to the sea lion population.

As stated on page 14, paragraph 8 of the proposed Operational Plan, "…*The FRML is intended to ensure that fishing does not have an adverse impact on the Auckland Islands sea lion population. Since 2003, an adverse impact, for the purposes of setting the FRML, has been defined as fishing having more than a 10% impact on the Auckland Islands sea lion population*". Project Jonah questions the accuracy of the 90% population sustainability threshold (PST) and contends that fishing can have an adverse impact on sea lion populations at a lower figure.

Project Jonah takes the position that The Court of Appeal was incorrect in 2004 when it stated in relation to the Fisheries Act that "…"*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*"[1]. Project Jonah supports the position that any deaths caused as an **indirect or direct** impact of fishing activities is by definition "fishing related mortality". Project Jonah strongly believes that deaths to pups which occur as a result of their mother being killed, as well as deaths caused from starvation or as a result of Sea Lions being forced to extend their feeding area due to increased competition for squid are and must be included as "fishing related mortality". Due to the deliberate exclusion of these indirect deaths, Project Jonah proposes that the figures upon which the Operational Plan bases itself are fundamentally flawed and that deaths caused as a result of fisheries activities are grossly understated. Project Jonah submits that measures aimed at eliminating or reducing individual Sea Lion deaths are just as important as the impact of fishing on the Sea Lion population as a whole. Considering the Sea Lion is a threatened species, the concept of a "sustainable" number of Sea Lions that can be

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

considered to be 'expendable' is repugnant to Project Jonah. Furthermore, the welfare of the individual animals and their dependent pups must be considered, and action must be taken to prevent nursing and/or pregnant females from being killed or injured in trawl nets.

Bruce Robertson, Associate Professor of Otago University, conducted an analysis of the demographic rate scenario projections in Roberts and Doonan (2016) which has highlighted the importance of ensuring the survival of particular individuals, namely adult female Sea Lions.[2] His modelling predicts that, by saving just 34 female Sea Lions each year, there would be an immediate halt to population decline and the population would stabilise within the next five years; in comparison, 347 pups would need to be saved to stabilise the population which would not take place until after 2020.

Project Jonah requests the Operational Plan be extended to include activities that limit the impact of fisheries on adult female Sea Lions. The current period that the SQU6T fishery is currently permitted to target arrow squid (January to June) is when pups and their nursing and pregnant mothers are also in the same location.

Page 8, paragraph 5 of the Operational Plan states "…*The importance of low pup survival, which has also been confirmed by direct observations, indicates that direct fishing-related mortality is not the only cause of the population decline, 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 impacts on lactating mothers*". Project Jonah disagrees with the apparent dismissal of fisheries activities as a significant impact on pup mortality. The must be a greater emphasis on ensuring the survival of adult female Sea Lions. This will assist the pups left behind on shore to survive and also the unborn Sea Lions that the pregnant females are carrying. It is essential that the Operational Plan and the NZSL-TMP better acknowledge the risk of indirect mortality, rather than focusing on "*direct fishing-related mortality*", which will not assist in significantly increasing the population of this endangered species.

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[2] Bruce Robertson, Submission on the Draft New Zealand sea lion Threat Management Plan, 19 August 2016, page 11
Project Jonah submission to MPI Discussion Paper No: 2017/28

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Project Jonah acknowledges that trawl fishing within the range of the Sea Lion population is not the only factor affecting the mortality of the population, research does indicate that this is a significant factor in the decline of the species (Chilvers, 2011; Robertson & Chilvers, 2011; Bradshaw et al, 2013; Roberts, 2015; Roberts & Doonan, 2016). Project Jonah disputes the estimates of direct fishing related mortality and cryptic mortality outlined on page 9 paragraph 3 of the Operational Plan. Project Jonah also disputes the conclusion that "..*eliminating direct fisheries mortality would result in less than half of one percentage improvement in the population growth rate*."

Project Jonah understands that natural issues such as the spread of disease impact the survival of some Sea Lions. However, these factors are often used as an excuse not to take sufficient action to avoid the preventable negative anthropogenic impacts on the species, in particular those resulting from the activities of fisheries. Project Jonah advocates that, rather than selecting a procrustean approach, **all** research and knowledge of Sea Lion populations across New Zealand should be used to inform decision making around the permissibility of fisheries in and around Sea Lion habitats.

Project Jonah agrees with the adjustment of the proposed FRML to accommodate, to some extent, for Sea Lion mortalities in fisheries other than SQU6T which will impact on the Auckland Islands population. As the rates of observance are lower in the trawl fisheries adjacent (SC167A), Project Jonah recommends the precautionary approach, as it is concerned about the impacts of the adjacent scampi, southern blue whiting and hoki fisheries.

Project Jonah considers the current definition of 'adverse impact' which is "fishing having more than a 10% impact on the Auckland Islands sea lion population" is set too high and questions the accuracy of the 90% population sustainability threshold (PST). Project Jonah is frustrated that the NZSL-TMP and the Operational Plan do not have the long-term objective of recovering the Sea Lion population to a non-threatened status, which is essential to ensure the survival of the species. Whilst humanity is unable to significantly impact the natural causes of Sea Lion mortality, we are able to take action regarding the most significant anthropogenic cause of mortality, trawl fishing. 'Adverse impact' should

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be set no higher than "fishing having more than a **5%** impact on the Auckland Islands sea lion population". By amending the percentage impact to 5% *at the most* would see the FRML fulfil its intended purpose of ensuring fishing does not have an adverse impact on the Sea Lion population.

Strike Rate

Project Jonah requests the Strike Rate be set at 7.58 (Option 5).

Project Jonah requests the Strike Rate be set at 7.58 (Option 5). Whilst this is the most conservative option proposed in the Operational Plan, this is not low enough in predicting actual strike rates, given the uncertain factors listed below and due to the lack of significant population increase of the Sea Lion population over previous years.

The Strike Rate must be set higher for these reasons:

❖ The Strike Rate was previously set at 5.89 based on statistics and circumstances relevant at the time. These statistics are now outdated and changes to fisheries practices over the years has resulted in vessels trawling for longer periods than was previously common. This significantly increased trawl time means that an increased number of Sea Lions are likely to be killed or injured by fisheries activities, and the Strike Rate should therefore increase.

❖ Since the use of SLEDs, it is not possible to directly count Sea Lion mortalities in the fishery. As the statistics are based on an approximation of fatal interactions between squid fishing and Sea Lions, and studies have shown that fishing activities are the most significant anthropogenic driver of population decline, Project Jonah states again that a precautionary approach must be taken when determining the Strike Rate. This is especially necessary because of the serious and very real consequence that a further decline in the Sea Lion population could lead to extinction of the species.

❖ Project Jonah is concerned that the monitoring of the Strike Rate is not carried out incorrectly. This is due to uncertainties around the efficacy of SLEDs in terms of the post-exit survival of those Sea Lions caught in trawl nets and the lack of accountability for cryptic mortality.

❖ The indirect effects of fishing on Sea Lion must be included in Strike Rate estimates, including pups that die when a nursing mother is killed or injured by a trawl net and decrease in food availability (resource competition). Project Jonah is under no illusion that for a return to a non-threatened status and no longer be under threat of extinction, significant steps should be taken to account for, and limit, all the impacts of trawler fishing on the species.

❖ Project Jonah stands strongly against lowering of the Strike Rate. Selecting Option 2 would be a terrible mistake that would have a devastating impact on the currently threatened Sea Lion population. The figures selected as part of the Operational Plan should not be based upon the oldest data, especially as there are likely to have been changes in the behaviour and abundance of Sea Lions and their prey. Option 3 is preferable to all but Option 5, in that it accounts for the definite and probable changes that have taken place since the data was collated, which are factors that will affect the interaction rate.

❖ Option 5 Strike Rate of 7.58 is the most reliable, given that it is based on the most recent 10 years of data where estimates of interaction rate are available. Project Jonah insist that, given the valid concerns that some Sea Lions will be ejected dead from the SLEDS after drowning in the nets (yet not be noticed and accounted for within the statistics), the lack of certainty for the survival of those Sea Lions who manage to exit SLEDs alive, and the well-documented concern for indirect fishing related mortality, the Strike Rate selected must be much higher than the current level.

Discount Rate

Project Jonah requests the Discount Rate be set at 50% (Option 3).

It appears form the Operational Plan that the reported success of SLEDs (without sufficient evidence) has been questioned by many sources. Project Jonah's concerns regarding the level of exit probability and cryptic mortality are so strong that the first two options for the Discount Rate must be dismissed and the most realistic choice of 50% (Option 3) selected. Furthermore, Project Jonah does not believe that the use of SLEDs fully mitigates the interactions of trawlers with Sea Lions, and certainly not to

the extent claimed in the Operational Plan. To Project Jonah, it appears there are still many unknown factors associated with the use of SLEDs, meaning that their effectiveness cannot be assumed and the discount rate not accurately stated. As a result, the Discount Rate must be set at 50% to reflect the lack of real data to set the rate at any other level. Bradshaw et al (2013) and the sub-set of TAG members propose this as the only viable option due to the uncertainties associated with the calculations of the Strike Rate and Discount Rate.

Project Jonah acknowledges that there is a lack of accurate, recent research to inform the setting of these figures and to assist in the assumptions made when reaching such conclusions. No reliable new data is available to show the exit probability and cryptic mortality. In addition, it is of great concern that the current figure of 82% (Option 1) relies on the oldest data and does not acknowledge the likelihood of deaths that are caused by hypoxia and/or drowning as Sea Lions run out of oxygen before they can surface, or from drowning in the net and falling out of the SLED.

Project Jonah has significant concerns around the level of fishing related mortality of Sea Lions in the SQU6T fishery and the number of deaths caused by injuries or drowning sustained through interactions with SLEDs. In particular, there are valid concerns raised around the likely survival of Sea Lions who exit a SLED alive: firstly, Sea Lions may sustain injuries due to their interactions with SLEDs that jeopardise their survival once they are ejected from the device; and secondly, it is possible that many Sea Lions survive encounters with SLEDs, but still run out of air when attempting to get back to the surface. As mammals, sea lions hold their breath while diving. The Auckland Island population of Sea Lions are known to be foraging and diving at the extremes of their physiological limits (Chilvers et al., 2006), making them potentially more vulnerable in interactions with nets and SLEDs. In addition, the potential for the bodies of dead Sea Lions (that have been killed by the trawl net) to be ejected via the SLED is also likely while the trawl nets are towed and turned on their long (and increasingly longer) journeys. Therefore, without these bodies noted as proof of SLED ineffectiveness, the statistics are probably inaccurate. The figures assumed in the rationale for Option 2 likely underestimate the impact of SLED interactions on Sea Lion survivability.

Given the lack of suitable data surrounding current fisheries activities and the significant concerns regarding the Sea Lion population, Project Jonah reiterates the need for a precautionary approach to the assessment of SLED efficacy. The Strike Rates and Discount Rates selected should be conservative, assuming higher interactions and greater mortality than currently suggested. Ensuring that the Discount Rate is significantly reduced as advised would reflect the valid concerns raised about the effectiveness of SLEDs in Sea Lion encounters and ensure more robust steps are taken to alleviate the significant impact that the fisheries industry has on the Sea Lion population.

Duration of Operational Plan

It is Project Jonah's position that the government should look to encourage the SQU6T fishery to adopt alternative fishing methods that do not have such a devastating impact on marine mammals and sea birds. For example, a trial of jigging as an alternative fishing method that still allows for the harvest of squid but with less devastating impacts (it has been claimed that jigging cannot be carried out our southern ocean conditions, but this is disproven by the fact that jigging is successfully utilised in similar environments around the world). Project Jonah asserts that it is incumbent on the government to require the SQU6T fishery to adopt this alternative fishing method as current trawling methods are unsustainable, both environmentally and economically.

For this reason, Project Jonah would like the duration of the Operational Plan to be as short as possible, given that the current impact of fisheries activities on Sea Lion populations is unsustainable and irresponsible. However, Project Jonah appreciates that it will take a time for the fisheries industry to transition to alternative, more sustainable methods of fishing and accepts that the Operational Plan would need to be in place during such a transition. Therefore, Project Jonah is prepared to accept a slightly longer Operational Plan while action is underway that leads to a complete end to trawl fishing in and around Sea Lion habitats.

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If no adjustments are made to the Operational Plan, or if the Strike Rate is reduced, Project Jonah insists that the Operational Plan must not last longer than one year. Whereas, if the FRML is reduced, the Strike Rate set at 7.58 and the Discount Rate set at 50%, Project Jonah s prepared to accept a longer duration for the Operational Plan.

In the meantime, the TAG must take action to encourage an end the use of trawl fishing around Sea Lion habitats and that trigger points should be put in place to allow for the Operational Plan to be reviewed sooner if new research or information becomes available that indicates fisheries activities are having a greater impact on Sea Lion survival than previously thought.

Notification Requirements

It is Project Jonah's position that the current notification requirements for vessel operators are insufficient to protect Sea Lion populations and to ensure that adequate reporting is undertaken of Sea Lion interactions. Vessel operators should not be allowed to operate in or enter SQU6T without an MPI Observer. Failure to abide by this requirement should lead to significant and serious consequences. It is unacceptable that vessels might be conducting their own reporting and that any vessel is able to enter or trawl in SQU6T without an independent MPI Observer present. Given that the continuation of the current activities of fisheries operators depends upon a reportedly low interaction rate and death rate of Sea Lions, a reliance on self-reporting is improper and unacceptable. The potential for disastrous consequences for this already endangered species means that boundaries must be firm and rules must be strictly enforced in order that accurate data is collated on interaction and death rates.

Project Jonah agrees that vessel operators must give 72 hours' notice prior to a vessel entering or operating in SQU6T so that an MPI Observer can be deployed onto each vessel in time. However, Project Jonah asserts that no vessels should be allowed to enter or operate in SQU6T without such an Observer present on board, and believes that this should be given highest priority at MPI to ensure

that sufficient Observers are available for each vessel during the trawling season. The current attempt at discouraging insufficient notice period whereby vessels are not eligible for the Discount Rate makes a mockery of the effectiveness of the Operational Plan and the statistics upon which it relies and gathers.

Reporting Requirements

Project Jonah agrees that vessel operators should report weekly regarding the number of tows, whether a SLED was deployed, if each tow was observed and if any Sea Lions were captured. Project Jonah also agrees that if 80% of the FRML is reached the above information must be reported daily. However, as Project Jonah's position is that no vessel should enter or operate in SQU6T without an MPI Observer present on board, this reporting requirement should only exist for fisheries activities that take place outside SQU6T where an MPI Observer is not present on the vessel (the MPI Observer will be collating and reporting on the activity that takes place within SQU6T for the purposes of the Operational Plan). This way, all data collected by MPI Observers on board vessels will be independently obtained and can be relied upon to inform future decision making. Project Jonah does not believe that the current attempt at discouraging non-reporting, where vessels are not eligible for the Discount Rate, is insufficient and that stricter penalties must be put in place. This is of particular importance given that these figures are essential to the effective management of the Sea Lion population and that it is not an onerous requirement upon vessel operators.

Trigger Points

Project Jonah advocates that the trigger point for the Operational Plan to be reviewed in advance of its scheduled expiry should be phrased as: "if new research or information becomes available that indicates fisheries activities are having a greater impact on Sea Lion survival than previously thought, if there are changes in fishing operations or level of effort, or if there are concerns regarding Sea Lion populations". Project Jonah is concerned that the current proposal for the trigger point to be reached when "significant" new information becomes available leaves an unclear boundary, requiring a subjective assessment.

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Observer Coverage

It is Project Jonah's position that no vessel should be allowed to enter or operate in SQU6T without an MPI Observer present on board. Although Project Jonah acknowledges that MPI has thus far exceeded their 50% minimum observer coverage target (with 84% of tows observed over the last five years), Project Jonah requests that all vessels entering or operating in SQU6T must have an MPI Observer present on board. It is unacceptable for vessels to conduct their own reporting and no vessels should be able to enter or trawl in SQU6T without an independent MPI Observer present. Given that the continuation of the current activities of fisheries industries depends upon a reportedly low interaction rate and death rate of Sea Lions, a reliance on self-reporting is improper and unacceptable. The potential for disastrous consequences for this already endangered species means that notification requirements must be amended and observer coverage be 100%, so that accurate data is collated on interaction and death rates of Sea Lions.

Project Jonah considers that ensuring all vessels entering or operating in SQU6T have an Observer on board should be given highest priority at MPI. With an amendment to the notification requirements for all vessel operators to give 72 hours' notice prior to a vessel entering or operating in SQU6T (and for no vessels should be allowed to enter or operate in SQU6T without having given 72 hours' notice and with such an Observer present on board) it will be easier for MPI to ensure that sufficient Observers are available for each vessel during the trawling season. Whilst Project Jonah appreciates that a commitment to 100% observer coverage is a significant step up from the present MPI activity, there cannot be an adequate reliance on the statistics gathered when vessel operators are self-reporting and are able to operate without having given sufficient notice, with only an adjustment to the Discount Rate. It is essential for the effectiveness of the Operational Plan and the statistics upon which it relies that all vessels are observed and reliable data is gathered regarding Sea Lion interaction rates.

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Fisheries Closure Process

Project Jonah supports the Fisheries Closure Process and agrees that strong deterrents should be in place to discourage any vessel from entering or trawling in the SQU6T fishery after closure.

Summary

Project Jonah supports the:

- • Fishing-Related Mortality Limit to be set at 38 (Option 2)

- • Strike Rate to be set at 7.58 (Option 5)

- • Discount Rate to be set at 50% (Option 3)

Project Jonah stresses the need of the NZSL-TMP to focus on the long-term objective of recovering the New Zealand Sea Lion to non-threatened status. This should include reaching specific demographic targets to ensure the significant increase of the Sea Lion population over the coming decades. The proposed Operational Plan should assist in setting more stringent limits to reduce these anthropogenic threats to the species.

As the current Operational Plan has not had a positive impact on the Sea Lion population, Project Jonah encourages, in the strongest terms, that the precautionary approach be implemented at this time. This can only mean the setting of the lowest possible threshold for the FRML to limit interactions between fisheries and sea lions. Research suggests that direct and indirect deaths as a result of fisheries related activities are far higher than represented in the Operational Plan. As a result, and in line with the concerns regarding the efficiency of the SLED, Project Jonah advocates for a significantly increased strike rate, and a reduction in the discount rate to the minimum proposed.

On a broader scale, it is Project Jonah's position that the TMP should be addressing the indirect effects of fisheries on Sea Lions, such as resource competition. Also, safeguards for protection of the species and the establishment of thorough research must be extended to Campbell Island (the species' second largest breeding site) in order for Sea Lion populations and impacts to be properly

assessed, protected and accounted for. In addition, the TMP should include management actions to address other fisheries that operate in the sub-Antarctic waters and are known to kill these Sea Lions, such as southern blue whiting, scampi and hoki fisheries. Notification and observer requirements for these other commercial trawl fisheries should also be strengthened, with a view to transitioning away from the use of trawl fisheries towards more environmentally and commercially sustainable practices. Project Jonah observes that the Operational Plan is seeking only to reduce some of the impacts of fisheries activities on Sea Lions, and has concerns over the current notification and observance requirements of vessels that are entering or operating in the SQU6T fishery. The requirement for continual independent monitoring of any vessel that are enters or operates in the SQU6T fishery must be established and rolled out at the earliest opportunity.

Project Jonah believes that the government must to take practical action which aims for SQU6T fisheries activities to result in the zero mortality of sea lions. This could be achieved by ending the use of trawling in these sensitive wildlife areas, and the use of alternative, less devastating, fishing methods. It is Project Jonah's position that the population of Sea Lions will only significantly increase, and the species recovered to a non-threatened status, when their main breeding populations are fully protected. On an individual level, deaths caused as a direct or indirect result of trawling cause suffering to the individual animal, and on a broader level, these activities have had a devastating impact on the population of this endangered species. For these reasons, Project Jonah encourages the government to do as much as it can to ensure the welfare of New Zealand sea lions, while seeking to transition to and establish more environmentally sustainable methods and locations of fishing.

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Dear Madam / Sir

New Zealand sea lions are the rarest sea lion in the world. As you know, the Department of Conservation lists NZ sea lions as nationally critical – the most endangered category of species in the country, with the highest risk of extinction. The population in the Auckland Islands has declined by 50% in the past 15 years and there is no record of other diminishing numbers without fishing accountability in all its facets. .

The research and the adoption of the draft plan needs to be immediate so we can ascertain soonest how many sea lions are dying.

Under sections 8, 9 and 10 of the Fisheries Act 1996, the Minister is legally obliged to make decisions that will maintain the long-term viability of species such as sea lions, and take a precautionary approach when there is scientific uncertainty. This action is needed now, New science is needed to better model changes in strike rates and the reasons for any failures.

Millions of dollars have gone in so-called kaitiaki in other fields and the risk of extinction of NZ sea lions or rapoka could well be given a high precedence.

Rayna Stephens

Dear Madam / Sir

This submission on the draft Squid 6T Operational Plan is motivated by the need to protect endangered NZ sea lions.

New Zealand sea lions are the rarest sea lion in the world. DOC lists NZ sea lions as nationally critical – the most endangered category of species in the country, with the highest risk of extinction.

Please look into reducing the fishing related mortality rate of NZ sea lions. They need a chance for their numbers to recover.

Yours faithfully

Rebecca Clare Pearce

Dear Madam / Sir

Fishing is the biggest human threat to our Sea Lions, I hope you will consider them a priority when planning for fishing in around the Auckland Islands.

This submission is on the draft Squid 6T Operational Plan because I believe we should be giving New Zealand's native, endangered sea lions the best possible chance of recovery and survival.

New Zealand sea lions are the rarest sea lion in the world. As you know, the Department of Conservation lists NZ sea lions as nationally critical – the most endangered category of species in the country, with the highest risk of extinction.

It is good to see the draft plan recognising the scientific uncertainty over the impact of fishing. I understand that there have been big changes to squid trawling around the Auckland Islands in the last decade, including a doubling in trawl lengths and more turns. We need to know how these changes affect how many sea lions are accidentally killed in fishing nets.

Similarly, as the draft plan recognises, scientists have told the Ministry for Primary Industries (Ministry) that there just isn't any good New Zealand evidence about how well Sea Lion Exclusion Devices (SLEDs) work. It is critical that this research is done over the next two years, so that we can finally resolve this question, and be more certain about how many sea lions are dying because of fishing.

In the face of this real scientific uncertainty, the squid fishing plan should take a cautious approach to help ensure New Zealand sea lions survive into the future.

Under sections 8, 9 and 10 of the Fisheries Act 1996, the Minister is legally obliged to make decisions that will maintain the long-term viability of species such as sea lions, and take a precautionary approach when there is scientific uncertainty.

To meet these legal obligations and to save NZ sea lions, the plan must:

1. Reduce the sea lion kill limit (the Fishing-Related Mortality Limit) to 38 (Option 2) as the maximum, but preferably lower to reflect the need for precaution until scientific uncertainties have been addressed. The limit of 38 is better than the current 68 because it is lower. However, it is not yet a precautionary level because the model used to calculate the limit used the old untested assumptions that 82% of sea lions survive trawl nets because of SLEDs and the old strike rate that doesn't account for changes in fishing practices.

2. Increase the strike rate to 7.58 sea lions per 100 trawling tows (Option 5), because this represents the most precautionary strike rate. New science is needed to better model how the changes in fishing practices over the last 10 years (double tow length and more turns) have changed the strike rate. Until this science is completed, a precautionary approach is appropriate.

3. Set a discount rate for SLEDs of 50% (Option 3), because there have been no scientific studies about how many sea lions successfully escape through the SLEDs

or drown in the nets and fall out through the SLEDs. A 50/50 probability would appropriately reflect this lack of science. It is effectively a coin toss; and it is the most precautionary option provided which is appropriate in this case.

I want you to look after our precious NZ sea lions. That means committing to do the science to answer critical questions, and being careful and precautionary in the meantime. Thank you for considering my submission.

Yours faithfully

Ren C

Dear Madam / Sir

I am writing this submission on the draft Squid 6T Operational Plan because I am concerned about the future of New Zealand's native, endangered sea lions and believe we have a responsibility to protect it.

In order to do so we must:

1. Reduce the sea lion kill limit (the Fishing-Related Mortality Limit) to 38 (Option 2) as the maximum, but preferably lower.

2. Increase the strike rate to 7.58 sea lions per 100 trawling tows (Option 5), because this represents the most precautionary strike rate.

3. Set a discount rate for SLEDs of 50% (Option 3), because there have been no scientific studies about how many sea lions successfully escape through the SLEDs or drown in the nets and fall out through the SLEDs.

Protecting our precious wildlife means committing to do the science to answer critical questions, and being careful and precautionary in the meantime. Thank you for considering my submission.

Yours faithfully

Renee Pearson

Dear Sir

I am very concerned about New Zealand's native sea lions which are at risk of extinction due to fishing fatalities, as well as any effects of global warming.

Please reduce the sea lion kill limit to 38 in the draft Squid 6T Operational Plan.

Many thanks

Robert Smith

Robert Smith

Dear Madam / Sir

I would like to see you take a precautionary approach with regard to sea lions
because there are some scientific uncertainties about how well the sea lion exclusion
devices work. It is appreciated that what is being proposed is better than the past but
sea lions are declining in numbers and we need to enable the population recover.

Yours sincerely
Rod Brown

Rod Brown

Dear Madam / Sir

I believe there is a draft proposal regarding Squid and the inadvertent catching of sea lions. These are amazing creatures facing a very real danger of becoming extinct if the bycatch continues. Please address this problem. I do not know the way squid is caught but processes MUST be put in place to reduce the killing of these sea lions. I understand that there is not enough research to enable a definitive decision to be made as to how well SLEDs work and this must be done with a high priority. Until this is done there must be a very conservative approach to squid fishing and the effect on these mammals.

It is good to see the draft plan recognising the scientific uncertainty over the impact of fishing. I understand that there have been big changes to squid trawling around the Auckland Islands in the last decade, including a doubling in trawl lengths and more turns. We need to know how these changes affect how many sea lions are accidentally killed in fishing nets.

In the face of this real scientific uncertainty, the squid fishing plan should take a cautious approach to help ensure New Zealand sea lions survive into the future.

Under sections 8, 9 and 10 of the Fisheries Act 1996, the Minister is legally obliged to make decisions that will maintain the long-term viability of species such as sea lions, and take a precautionary approach when there is scientific uncertainty.

To meet these legal obligations and to save NZ sea lions, the plan must:

1. Reduce the sea lion kill limit (the Fishing-Related Mortality Limit) to 38 (Option 2) as the maximum, but preferably lower to reflect the need for precaution until scientific uncertainties have been addressed. The limit of 38 is better than the current 68 because it is lower. However, it is not yet a precautionary level because the model used to calculate the limit used the old untested assumptions that 82% of sea lions survive trawl nets because of SLEDs and the old strike rate that doesn't account for changes in fishing practices.

2. Increase the strike rate to 7.58 sea lions per 100 trawling tows (Option 5), because this represents the most precautionary strike rate. New science is needed to better model how the changes in fishing practices over the last 10 years (double tow length and more turns) have changed the strike rate. Until this science is completed, a precautionary approach is appropriate.

3. Set a discount rate for SLEDs of 50% (Option 3), because there have been no scientific studies about how many sea lions successfully escape through the SLEDs or drown in the nets and fall out through the SLEDs. A 50/50 probability would appropriately reflect this lack of science. It is effectively a coin toss; and it is the most precautionary option provided which is appropriate in this case.

I want you to look after our precious NZ sea lions. That means committing to do the science to answer critical questions, and being careful and precautionary in the meantime. Thank you for considering my submission.

Your truly

Rosemary Gear

rosemary gear

6/9/2017

Please find my submission on MPI Consultation Paper No: 2017/28 Consultation on the Squid 6T Operational Plan.

Overall, it is pleasing to finally see a clear acknowledgement that there is a high level of uncertainty around both the strike rate and the cryptic mortality. I have been disappointed, however, by the clear bias towards a low estimate of cryptic mortality based upon no or anecdotal evidence. These estimates are often claimed to be conservative, perhaps simply because they are more conservative than the current estimates. I am also disappointed that there has been no attempt to reduce these levels of uncertainty in the last 6 years and there is no timeline for attempting to reduce them in the future.

1) Firstly, I have some comments on the way some things have been presented in the Consultation Paper. If the minister or submitters are not familiar with the background of this issue I believe the way some things are presented will lead to a biased view of the evidence and the levels of uncertainty.

MPI considers that none of the options provided will prevent the achievement of the vision or objectives of the NZSL TMP
In the past MPI has considered that the options provided should lead to an increase in the sea lion population while the reality has been a dramatic decrease and a reassignment of NZ sea lions into the "nationally critical" threat status.

Risk Assessment
To say that Klebsiella is the only threat that when removed will lead to population growth is potentially misleading. If removal of Klebsiella leads to a 1% population growth but removal of another threat leads to only a 1% decline then the statement is correct but there is very little difference between them. It would be very easy to present some of this data graphically.

Projections using a more realistic estimate of cryptic mortality (e.g. assuming that 18% of interactions result in a mortality)
Why is 18% more realistic? It has finally been admitted in both the TMP and this Paper that there is a lot of uncertainty around strike rate and cryptic mortality. Therefore stating that 18% is more realistic without any evidence or reasoning suggests MPI has still not accepted the statement about the level of uncertainty.

Population Sustainability Threshold
I don't think this concept is explained very well, particularly for a layperson and I feel once again graphics would have helped.

Commercial Fisheries
Once again an economic value for the SQU6T fishery has been presented without a corresponding value for sea lions (ie tourism - $100 million for wildlife tourism for Dunedin alone)

2) Secondly, I would like to make some comments about the management plan options specifically.

FRML
no less than 10% lower than the population size that would have been attained in the absence of fishing
I think this definition of an adverse affect of fishing is unreasonable if the sea lion population is already in decline before the impact of fishing is taken into account. To allow a further 10% decline is unacceptable.

Strike rate
The uncertainty around strike rates has been a problem since the implementation of SLEDs and was highly variable before this, in part because of low observer rates. What has been done about this in the last 10 years and what are the plans to reduce this uncertainty in the future?

Discount rate
MPI has invested considerable scientific resources to estimate sources of cryptic mortality
What science other than crash-test dummy modelling?

Anecdotal evidence from other jurisdictions suggests that body non-retention is likely to be negligible
Anecdotal evidence is not scientific evidence. To present this without stating who it has come from and what form it takes is unreasonable and biased.

Post-escape drowning is impossible to quantify but is judged unlikely to be high based on camera observations of sea lion behaviour in SLEDs, and known physiological characteristics.
Why is post-escape drowning impossible to quantify? This suggests that MPI have already closed their minds to any suggestions for collecting this data. To refer to the camera observations, which have been previously ruled out as unusable, once again demonstrates a biased outlook. What behaviour and physiological characteristics is MPI referring to? This gives the impression of evidence without allowing anyone the chance to examine the evidence or refute it. It is vague while giving the impression of being authoritative.

and secondly by including a conservative and somewhat arbitrary assumption that an additional 10% of those that exit the SLED will not survive
Why is this 10% estimate conservative? What evidence or data is there to back this up? Twice, independent reviewers have expressed concern over the uncertainty in cryptic mortality estimates. It could be anywhere from 0-100% which is why Bradshaw suggested 50%. In light of this 10% is not conservative at all.

3) Thirdly, I have some recommendations.
Given the high levels of uncertainty I would recommend the most conservative options for all management settings. That is an FRML of 38; a strike rate of 7.58 and a discount rate of 50%.

The best way to reduce the disagreement around SQU6T management and the bycatch of sea lions is to reduce the current high levels of uncertainty. So, as part of SQU6T management I would also like to see some proposals for ways to reduce the uncertainty in the cryptic mortality estimates. A couple of proposals have been made at the SqOPTAG meeting but there is no timeline and the fishing industry is already against sea lion dummy tests. If pit tags could be read at the entrance to the net it would give a better estimate of strike rate, reading pit tags at the SLED exit hole and hood would give a better measure of strike rate and may also give an indication of non-body retention. Reading of pit tags post exit may give a measure of cryptic mortality or at least survival.

Shaun McConkey
MSc (Marine Science)

07/09/2017

Submission on the Consultation on the Squid 6T Operational Plan

Please find my submission on the Squid 6T (SQU6T) Operational Plan, as outlined in the MPI Discussion Paper No: 2017/28 (further referred to as the discussion paper). I acknowledge MPI's commitment to mitigate fishery bycatch of New Zealand sea lions (NZSLs) in SQU6T. However, empirical evidence to support the provided options for key management settings are lacking (as I will outline in this submission). Consequently, there exists the risk that even the most conservative combination of the provided management settings (i.e. FRML set to 38 sea lions, strike rate assumed to be 7.58 sea lions per 100 tows, and an assumed 50% discount rate) can render the NZSL population vulnerable to continued decline via unanticipated impacts of bycatch.

Discount rate. Whilst evidence exist that SLEDs (sea lion exclusion devices) have reduced observable bycatch (Hamilton & Baker 2015) it remains unknown as to whether or not sea lions are able to escape trawl nets and subsequently survive (Robertson 2015). First, actual data to estimate post-SLED survival do not exist. It remains therefore uncertain whether existing methods for estimating post-SLED survival (i.e. human crash test studies and Australian sea lion studies; Hamilton & Baker 2015) are representative of NZSL demographics (Robertson 2015, Ministry for Primary Industries 2017). Furthermore, the discount rate is not comprehensive re the possible delayed effects of sea lion-fishery interactions. As per discussion paper, the possible causes of cryptic mortality include *(i)* mild traumatic injuries with lethal effects, *(ii)* body non-retention, and *(iii)* post-escape drowning. They do not, however, include reproductive failure (i.e. abortion) of NZSLs that were pregnant at the time of fishery interactions (mainly occurring between February to April; Chilvers 2008), which would result in lowered pup production in the subsequent birth season (December).

The degree of accepted uncertainty re NZSL bycatch and discount rate is at odds with the general approach of assessing other threats to the NZSL population. The discussion paper refers to the current NZSL Threat Management plan by stating:

"For the Auckland Islands population, threat evaluations were completed for Klebsiella pneumoniae-related mortality of pups (disease), trophic effects (food or nutritional limitation), direct fishing-related mortality, pups drowning in holes, male aggression, and hookworm mortality. When mortality from each threat was individually removed and the resulting population trajectory was compared with baseline projections with all threats included, only three threats were estimated to change the expected population growth rate by more than 1 percentage point in 20 years time. Of those three, there was only one threat, Klebsiella pneumoniae, for which elimination of the threat in isolation resulted in a positive population growth rate."

However, note that the study used to assess threats to the Auckland Islands population of NZSLs (i.e. Roberts and Doonan (2016)) represents a simulation study with hypothetical levels of mortality due to proposed threats (i.e. actual data on potential threats were not used). For example, existing information on *Klebsiella pneumoniae*-related mortality of pups (disease) is based on field studies that were conducted each year commencing around pup birth and were carried on for another two months. That means only the mortality (disease-related and/or due to other factors) of newborn to 2-month old NZSL pups is currently known. Roberts and Doonan (2016), however, assume that disease-related mortality carried on or reoccurred throughout the year and was identical for all

Auckland Islands sub-populations. For example, they use a "best estimate" of *Klebsiella pneumoniae-*related pup mortality of 605 individuals in 2003 (Table 17 in Roberts and Doonan (2016)) although only 108 total pup deaths (489 born and not all deaths are necessarily attributed to disease; Castinel et al. 2007) from Sandy Bay (the second largest sub-population at the Auckland Islands) are documented in that year; and the same extrapolations of pup mortality were done in all other years. Recent studies suggest that the proportion of neonatal NZSL mortality (note, this does not necessarily reflect annual pup mortality) has been underestimated (Roe et al. 2015), but the actual extent of this is unknown and reflects considerable uncertainty re disease-related pup mortality in NZSLs. While I acknowledge that this warrants concern and further research it is however at odds with the significant uncertainty re the discount rate of NZSL bycatch in SQU6T. Stating that "*The information supporting the development of the NZSL TMP […] indicates that the direct impacts of fishing are not the major factor of the observed population change*" is therefore misleading.

Strike rate. The strike rate (i.e. the number of NZSL interactions per 100 tows) as used in SQU6T management and population modelling (e.g. Breen, Fu & Gilbert 2016; Roberts and Doonan 2016, and this discussion paper) implies a constant impact of NZSLs across years unless revised and changed (Ministry for Primary Industries 2017). However, the actual strike rate (based on analysis of bycatch data by Abraham et al. 2016) has varied considerably since first estimates have been reported and was often different from the strike rate assumed in each year (Fig. 1). For example, in the years 2001, 2008, and 2010, the strike rate was 10.6, 9.4, and 10.8 sea lions per 100 tows (Fig. 1). This implies that the dynamics which determine the actual or realised rate of interactions in SQU6T are not well understood and thus assuming a constant strike rate prior to each fishing season can mislead SQU6T management re its impact on the NZSL population.
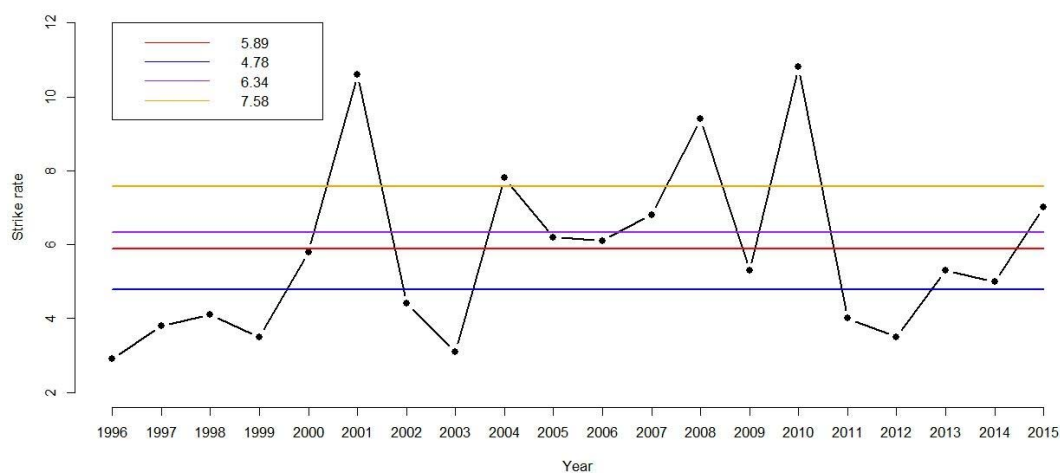
Figure 1 Strike rate (NZSL interactions per 100 tows) between the years 1996 and 2015 as per Abraham et al. (2016), Ministry for Primary Industries (2016), and Ministry for Primary Industries (2017); horizontal lines reflect the suggested strike rates in the discussion paper (see legend).

FRML (Fishery-related mortality limit). The FRML determines the fishery-related mortality of NZSLs that may occur without resulting in adverse effects on the NZSL population at the Auckland Islands. As for the discount rate, the strike rate is a pre-set value and was obtained from demographic modelling studies by Breen, Fu & Gilbert (2016) and more recently Roberts and Doonan (2016).

However, the FRML is only counted against the actual bycatch (i.e. sea lions that were observed or estimated being landed on deck), and thus it is unlikely that the FRML, even if set to 38 sea lion deaths, will be met if the discount of sea lion bycatch remains high based on current assumptions about SLED efficacy. This is a major concern, because there exists no empirical evidence that supports the efficacy of SLEDs or any of the suggested discount rates that could be associated with it (Robertson, 2015).

Recommendations

Major uncertainties (e.g. post-SLED survival) are likely to compromise the performance and reliability of the proposed management settings outlined in the discussion paper. Any management based on current strategies, and models that underlie these, are therefore not credible and likely pose a risk to the extant population of NZSLs. Given a lack of choice for alternative options provided in the discussion paper I recommend managing SQU6T by using the following options: FRML set to 38 sea lions, strike rate assumed to be 7.58 sea lions per 100 tows, and an assumed 50% discount rate. Nonetheless, I again emphasize that these numbers are unlikely to reflect the actual effects of fishery bycatch on NZSLs.

Yours sincerely,

Dr. Stefan Meyer (PhD Ecology)

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Dear Madam / Sir

We must protect our wonderful wild life, NZ is not just for humans, but the nature here makes it the place where we love to live and where others love to visit. Nature has its own balance and is clever at adjusting to change, but humans are selfishly destroying this without thought to the long term outcomes, which will be a world without our fabulous wildlife. Please listen to us and take action. Money is not the be all and end all, all has a future if we care enough to protect it.

I am writing this submission on the draft Squid 6T Operational Plan because I believe we should be giving New Zealand's native, endangered sea lions the best possible chance of recovery and survival.

New Zealand sea lions are the rarest sea lion in the world. As you know, the Department of Conservation lists NZ sea lions as nationally critical – the most endangered category of species in the country, with the highest risk of extinction.

It is good to see the draft plan recognising the scientific uncertainty over the impact of fishing. I understand that there have been big changes to squid trawling around the Auckland Islands in the last decade, including a doubling in trawl lengths and more turns. We need to know how these changes affect how many sea lions are accidentally killed in fishing nets.

Similarly, as the draft plan recognises, scientists have told the Ministry for Primary Industries (Ministry) that there just isn't any good New Zealand evidence about how well Sea Lion Exclusion Devices (SLEDs) work. It is critical that this research is done over the next two years, so that we can finally resolve this question, and be more certain about how many sea lions are dying because of fishing.

In the face of this real scientific uncertainty, the squid fishing plan should take a cautious approach to help ensure New Zealand sea lions survive into the future.

Under sections 8, 9 and 10 of the Fisheries Act 1996, the Minister is legally obliged to make decisions that will maintain the long-term viability of species such as sea lions, and take a precautionary approach when there is scientific uncertainty.

To meet these legal obligations and to save NZ sea lions, the plan must:

1. Reduce the sea lion kill limit (the Fishing-Related Mortality Limit) to 38 (Option 2) as the maximum, but preferably lower to reflect the need for precaution until scientific uncertainties have been addressed. The limit of 38 is better than the current 68 because it is lower. However, it is not yet a precautionary level because the model used to calculate the limit used the old untested assumptions that 82% of sea lions survive trawl nets because of SLEDs and the old strike rate that doesn't account for changes in fishing practices.

2. Increase the strike rate to 7.58 sea lions per 100 trawling tows (Option 5), because this represents the most precautionary strike rate. New science is needed to better model how the changes in fishing practices over the last 10 years (double tow length and more turns) have changed the strike rate. Until this science is

completed, a precautionary approach is appropriate.

3. Set a discount rate for SLEDs of 50% (Option 3), because there have been no scientific studies about how many sea lions successfully escape through the SLEDs or drown in the nets and fall out through the SLEDs. A 50/50 probability would appropriately reflect this lack of science. It is effectively a coin toss; and it is the most precautionary option provided which is appropriate in this case.

I want you to look after our precious NZ sea lions. That means committing to do the science to answer critical questions, and being careful and precautionary in the meantime. Thank you for considering my submission.

Yours faithfully Suzie ilina

Suzie Ilina

11 September 2017

Ministry for Primary Industries
FMSubmissions@mpi.govt.nz

SQU6T Operational Plan

Introduction
1. Thank you for providing the opportunity to comment on management options for the SQU6T Operational Plan for 2017-18.

2. Te Ohu Kaimoana is the trustee for Te Ohu Kai Moana Trust, established under s 32 of the Maori Fisheries Act to:

    advance the interests of iwi individually and collectively, primarily in the development of fisheries, fishing and fisheries-related activities in order to:
    a. *ultimately benefit the members of iwi and Maori generally; and*
    b. *further the agreements made in the Deed of Settlement; and*
    c. *assist the Crown to discharge its obligations under the Deed of Settlement and the Treaty of Waitangi; and*
    d. *contribute to the achievement of an enduring settlement of the claims and grievances referred to in the Deed of Settlement.*

3. As part of the Fisheries Settlement, ten percent of the quota shares in SQU6T has been allocated to 58 iwi as settlement quota under the Maori Fisheries Act 2004. We note that MPI considers that none of the options put forward in their consultation paper – including those above - will prevent the achievement of the vision or objectives of *New Zealand sea lion/rāpoka Threat management plan 2017 – 2022*.

Summary
4. The key issue to be resolved is the set of rules that should apply to the SQU 6T fishery to limit the number of sea lion deaths caused by the interaction of SQU6T trawlers and sea lions. MPI has put forward several options, and notes that none of the options will prevent the achievement of the vision or objectives of the Threat Management Plan for sea lions.

5. Te Ohu canvassed iwi on their views about the plan. Specifically we sought their views on the options put forward by the Deepwater Group, and/or any additional information or alternative views they may have on the options.

6. We have received feedback from several iwi supporting the Deepwater Group submission, and a response from one iwi who supports a more conservative approach and who will make their own submission.

7. For your information, we summarise the information we forwarded to iwi and to which we received responses.

The SQU6T fishery
8. MPI notes that the SQU6T fishery started in the late 1970s and targets arrow squid on the Auckland Islands shelf from January to June each year.   The Total Allowable Commercial Catch (TACC) is 32,369 tonnes but landings have not reached this level since 2004. In the last 10 years catches have ranged from 6,127 tonnes to 28,872 tonnes. The number of vessels has declined since 1990 from 63 to 17. These vessels carried out 1,294 tows targeting squid in 2016/17. The estimated export value of SQU6T in the 2016 calendar year was $68M.

The New Zealand Sea lion/Rāpoka
9. New Zealand Sea lion/Rāpoka is an endemic, protected species. It is included in Ngai Tahu's settlement legislation as a taonga species.

10. Intense hunting prior to 1894 (when hunting was prohibited) reduced the breeding distribution of sea lions to the subantarctic islands.   98% of pup production comes from the Auckland and Campbell Islands. The species is currently categorised as threatened under the Marine Mammals Act 1978.

Sea lion Threat Management Plan
11. In 2010 it was classified as "Nationally Critical" under the Department of Conservation's "New Zealand Threat Classification system" based on the decline of the population prior to 2010 and the restricted range of the population.

12. The *New Zealand sea lion/rāpoka Threat management plan 2017 – 2022* was released in July.   Its vision is "to promote the recovery and ensure the long-term viability of New Zealand sea lions, with the ultimate goal of achieving "Not Threatened"[1] status." Its objectives to:
   - halt the decline of the NZ sealion population within 5 years
   - ensure the NZ sealion population is stable or increasing within 20 years, with the ultimate goal of achieving "not threatened" status.

13. The Plan identifies specific measures of success for Auckland Islands Sea lions as:
   a. Adult female survival rate and pup survival rate improve
   b. Pup numbers are consistently above 1,575 (2014 pup count) and ideally over 1,965 (2017 pup count).

14. The population is monitored using pup counts to estimate pup production. Pup counts at the main breeding site at the Auckland Islands have been completed annually for over 20 years. Pup production declined by 50% between 1998 and 2009 but appears to have stabilised in the last eight years.

Managing the interaction between SQU6T vessels and New Zealand Sea lions
15. Fishing for arrow squid in the SQU6T fishery results in interaction with sea lions. Since 2000, Sea lion excluder devices (SLEDs) have been used in the fishery to reduce fatal

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[1] The Sealion TMP defines the threshold for this as the overall population trend must be stable to 10%, the number of mature individuals over 20,000 and there must be more than two breeding colonies

interactions with sea lions. Their design and implementation continues to improve. The use of SLEDs is reflected in the management regime for the fishery.

16. At present, the effects of the SQU 6T on sealions are managed in the following way:
    a. existing modelling of the sealion population sets a "Fishing Related Mortality Limit" (FRML) that is an estimate of the maximum annual number of sealion deaths that can occur <u>without</u> adversely affecting the sealion population. The FRML is currently set at 68 sea lions.
    b. a "strike rate" is used to approximate the rate of sea lion interactions that would be fatal in the absence of SLEDS. It represents the numbers of sea lion mortalities per 100 tows if no SLEDs are deployed. This is currently set at 5.89 (and is based on much earlier data in the fishery).[2]
    c. a "discount rate" which is used to discount the assumed number of deaths where vessels use Sealion Excluder Devices (SLEDS) on their nets. This is currently 82%.

17. On the basis of the above, a maximum number of tows is set each year for the SQU6T fishery for safe operation within the FRML. The maximum number of tows is currently 4700 per year. We are advised the actual number of tows over the last 8 years is between 700 – 1400 per year.

Options being consulted on by MPI

18. MPI is proposing several options in relation to the Fishing-related Mortality Limit, strike rate and discount rate, including the status quo (see Table 1).

Table 1: proposed options for key management settings

Option	Proposed setting
Fishing-related Mortality Limit	
1. Status Quo	68
2.	38

Option	Proposed setting
Strike Rate	
1. Status Quo	5.89
2.	4.78
3.	6.34
4.	5.89[3]
5.	7.58

Option	Proposed setting
Discount Rate	
1. Status Quo	82%
2.	75%
3.	50%

19. Other proposed management settings, include:
    a. Duration of the operational plan – proposed to be for the next two years
    b. Notification requirements – vessel operators must provide MPIs observer programme with 72 hours' notice prior to the vessel leaving port for each fishing trip for SQU6T. This is to provide the Observer Programme with time to organise and deploy observers as required. Tows undertaken by any vessel for which a full 72 hours' notice was not received are not eligible for the discount rate.
    c. Reporting requirements – all vessel operators must report weekly to MPI, including the number of tows, whether a SLED was deployed, if each tow was observed and if any sea lions were captured. If 80% of the FRML is reached this information must be

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[2] It should be noted that MPI uses this strike rate on any boat that does not notify MPI more than 72 hours before it will depart for a trip – this applies irrespective of whether the vessel deploys the SLED and has a MPI observer on board to assess the reliability of the vessel's reports.
[3] Option 4 for Strike Rate would result in the same Strike Rate as the status quo however it is based on a distinct rationale and is therefore proposed as a separate option.

reported daily. Tows that are not reported in this way are not eligible for the discount rate.

    d. Trigger points – these set out when the operational plan will be reviewed in advance of the scheduled expiry of the plan. It is proposed the trigger will operate if significant new information becomes available (e.g. significantly low pup count; major changes in fishing operations or effort)

    e. Observer coverage – MPI commits to a minimum observer coverage of 50% of tows observed. MPI observers will continue to audit SLED measurements and ensure they observe all hauls in SQU6T.   Note in recent years this coverage has been exceeded with average observer coverage over the most recent five years of 84% of tows observed.

    f. Fishery closure process – If the FRML is reached the fishery will be closed. MPI will work with DWG to ensure all fishers are aware of levels of fishing activity against the FRML throughout the season and are informed in advance of any impending closure.

20. MPI notes the objectives of the Threat Management Plan need to be considered in the context of the need to balance sustainability with utilisation in the Fisheries Act 1996. They comment the more conservative options (relating to the FRML, Strike Rate and Discount Rate) will more significantly impact utilisation opportunities however none of the options will prevent the achievement of the vision and objectives of the Threat Management Plan. This raises questions about how far it is necessary to move from the current settings.

Is there a need for a change to the status quo?

21. The number of sea lion captures has decreased since 2007. Table 2 illustrates the estimated mortality compared to the FRML (see Table 2, supplied by DWG).

Table 2

SQU6T – Mortality vs FRML										
	Year									
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Estimated mortality based on effort	56	46	72	44	58	47	11	8	7	14
FRML	93	81	113	76	68	68	68	68	68	68
% of FRML	60%	57%	64%[4]	57%	85%	69%	16%	12%	10%	21%
Estimated mortality based on observer data[5]	24	19	17	17	11	9	10	8	5	tbc

22. The "estimated mortality based on effort" applies the strike rate and discount rate to the number of actual tows in each year. The "estimated mortality based on observer data" is the number of actual captures that have been observed, and then extrapolated across the total number of tows for each year.

23. The likely level of cryptic mortality is a key area of debate. Cryptic mortality relates to those sea lions that escape from nets through the SLEDs but may die as a result of this

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[4] In January 2009 industry agreed to reduce fishing effort by approximately 16% in SQU6T as an interim measure for the 2009 season in response to pup numbers being lower than expected.
[5] https://psc.dragonfly.co.nz/2017v1/released/new-zealand-sea-lion/trawl/all-vessels/auckland-islands/2015-16/

interaction and are not observed.   Debate surrounds whether, and if so how many sea lions die in this way.

24. MPI comments they have invested considerable scientific resources to estimate sources of cryptic mortality, and suggest the number of deaths due to interactions with SLEDs is likely to be low.   To add to this, we understand that every year, individual adults are tagged and subsequently accounted for in following years. Those that are "lost" are assumed to have died. Any sea lions lost as a result of interactions with SLEDs would be accounted for in this way. Recapture data generated through the tagging is factored into the modelling that generates the FRML.

25. The sea lion population appears to be stabilising. The increased pup count, low sea lion captures and likely low cryptic mortality suggest the fishery is not having an adverse effect on the sea lion population. Modelling has shown that if all fishing was stopped, it would only improve the population growth rate by less than 0.5%.

26. The Deepwater Group (DWG) is suggesting that given these factors a simpler approach should be taken to managing the fishery that does not rely on an FRML, strike rate or discount rate.   It would include ongoing use of certified SLEDS, a high level of observer coverage and development of a new trigger for management action (including reviewing the operational plan and reducing effort) based on observed levels of sea lion mortality. This would simplify the regime, particularly as over time, a strike rate becomes more and more difficult to specify. The strike rate is based on data on sea lion mortalities in the fishery before the use of SLEDS. However, given the more recent use of SLEDS and low number of observed mortalities, this data is becoming increasingly out of date.

Fisheries-related Mortality Limit

27. Option 1 proposes the current FRML of 68. The objective that underpins the current figure is "the population should be more than 90% of carrying capacity or no less than 10% lower than the population size that would have been attained in the absence of fishing, with 90% certainty over 20 years".

28. MPI notes that the existing FRML is based on a model which was reviewed in 2013. While considered to be correctly implemented, the review recommended other modelling options be explored as some aspects of the existing model were unclear.

29. Option 2 is based on new modelling but this modelling has not been subject to the normal science processes and the objectives used to underpin the proposed FRML have not been agreed. MPI's paper notes that Option 2 is modelled on a "desired population objective for the Auckland Islands population being no more than 5% lower than it would be in the absence of human-caused mortality with 90% confidence, over 5 years, also incorporating uncertainty". They comment "it represents the "mid-point" of the range of desired population objectives proposed by the Technical Advisory Group (TAG)". No other basis for the objective used to generate Option 2 has been provided, and MPI invites submissions on how "adverse effects" should be defined.

30. Option 2 would result in an initial limit of 46 sea lions. However MPI notes advice from the TAG was to adjust the limit to allow for mortalities in other fisheries which may impact the Auckland Islands population. They have established an allowance of 8 based on estimated captures from the scampi and other trawl fisheries. An initial figure of 46 is thus adjusted to 38. If this threshold had been used over the last 10 years, it would have

resulted in closing the fishery in 6 out of the 10 years - even though all the signs are the population is stabilising or recovering.

31. The submission from DWG sets out a number of concerns with the modelling and use of an arbitrary objective including the absence of a clear rationale for a new population objective and lack of information on the new modelling.

32. DWG proposes the current FRML of 68 should be used as a starting point (as under Option 1) but with a reduction of 8 to reflect the fact that sea lions are caught in other fisheries, resulting in a new FRML of 60.

Strike Rate

33. DWG supports Option 4 for the strike rate (5.89) on the basis it uses best available information in terms of the length of the series and the capacity of the estimated rate to reflect changes in both sea lion numbers and industry practices.

Discount Rate

34. The options presented take into account a number of factors including the probability that sea lions exit the SLEDs and that they survive the encounter. DWG supports Option 1 for the discount rate (82%) noting that updated information exists. We note that Option 2: 75% is based on inclusion of an additional 10% of those that exist the SLED not surviving. MPI notes this figure is somewhat arbitrary. Option 3 – 50% was proposed by environmental stakeholders at the TAG to reflect uncertainties which it can be argued are already factored into the FRML.

Concluding Comments

35. We note MPIs comments that:
    a. none of the options will prevent the achievement of the vision or objectives of the Threat Management Plan for sea lions
    b. there is a need to balance sustainability with utilisation in the Fisheries Act
    c. the more conservative options will more significantly impact utilisation opportunities.

36. We have received feedback from several iwi supporting the Deepwater Group submission, and a response from one iwi who supports a more conservative approach and who will make their own submission.

37. Please don't hesitate to contact me should you have any questions.

Kirsty Woods
Tai Moana -Senior Analyst

11 September 2017

Squid 6T Operational Plan Consultation
Fisheries Management
Ministry for Primary Industries
 PO Box 2526
Wellington 6011

Tēnā koutou,

RE: Squid 6T Operational Plan Consultation

I refer to the consultation document received in August 2017 regarding the Ministry for Primary Industries consultation on the Squid 6T Operational Plan.

The response of Te Rūnanga o Ngāi Tahu ("**Te Rūnanga**") is that the Squid 6T Operational Plan must be utilised to provide the needed protection for New Zealand sea lions/Rāpoka as taonga species to Ngāi Tahu and as a nationally critical species. The management options that are recommended by Te Rūnanga are precautionary until such a time that the threat status of this species is no longer nationally critical and that management tools have been researched in a robust and transparent manner to provide more certainty around their effectiveness in not adversely affecting the Auckland Island population of Rāpoka.

It is important to note Ngāi Tahu have interests in this Operational Plan other than Rāpoka being a taonga species, Ngāi Tahu Fisheries Settlement own quota in SQU6T. Management measures within SQU6T and the Rāpoka should be formed so that they recognise and provide for environmental and cultural values in the context of a true treaty partnership - *Mō tātou, ā, mō kā uri, ā muri ake nei – for us and our children after us*.

Background

Te Rūnanga is statutorily recognised as the representative tribal body of Ngāi Tahu Whānui. The Ngāi Tahu takiwā (region) covers the largest geographic area of any tribal authority in New Zealand. The takiwā includes all of the South Island (with exception to the northern end of the island) and extends to the Auckland Islands (Appendix Three). Therefore, the current habitat distribution of the Rāpoka is completely within the Ngāi Tahu takiwā.

Rāpoka/whakahau is a taonga species to Ngāi Tahu Whānui. A taonga species is a native bird, plant, or animal of special cultural significance and importance to Ngāi Tahu. In the Ngāi Tahu Claims Settlement Act 1998, the Crown recognised the special traditional relationship we have with these species. This is further explained below.

Although Rāpoka are now only found within the Ngāi Tahu takiwā, they were once common throughout Aotearoa when our Polynesian tūpuna first settled. They were hunted in both the North and South Islands, with middens (historical deposits predominately containing food remains) having been found predominantly in the south of the South Island but extending all the way to the North Cape.

Traditionally both male and female Rāpoka were hunted by Ngāi Tahu for food, bone and other products. Ngāi Tahu utilised this resource until the arrival of the European sealers.

Treaty of Waitangi Obligations

I
n the SQU6T Operational Plan there is no acknowledgement of the Treaty of Waitangi, or the legal obligations that the Crown has to Ngāi Tahu in this regard.

One of the outcomes of the Ngāi Tahu Claim was the inclusion of a list of taonga species in the *Ngāi Tahu Claims Settlement Act 1987* ("**NTCSA**") because of the special relationship Ngāi Tahu has with these species. There are also several key sections of the NTCSA that relate to how the *special relationship* is to be recognised in practice in accordance with the law. These relationships are not just passive they reflect the long history of interaction, management and use. By exercising our role as rangatira across these ancestral lands and waters, and as active tangata tiaki, the traditions that support what it is to be Ngāi Tahu can be maintained.

It is essential that Ngāi Tahu are recognised and acknowledge as partners in the Treaty of Waitangi and that the Crown ensures the kaitiaki responsibilities are fulfilled through active engagement with Ngāi Tahu.

- *Te Rūnanga recommends the Operational Plan is amended to reflect the unique relationship Ngāi Tahu have to this taonga species, and the obligations the Crown has as Treaty Partners.*

Management Options
Fishing Related Mortality

Te Rūnanga is supportive of the option that supports the greatest reduction in human impacts, which in this case is Option 2 that limits fishing-related mortalities of Rāpoka to 38 individuals for the SQU6T. However, Te Rūnanga would be more supportive of an

option which minimised the potential 5% decrease over 5 years in the Auckland Island population due to human induced mortalities, to a lower percentage.

Te Rūnanga supports the vision and goals of the Threat Management Plan for Sea lion/Rāpoka for Rāpoka to prevent population decline and strive towards a stable/increasing population. The fishing related mortalities do not align with these overarching goals and visions, and it is important that the Auckland Island population is not significantly impacted by human induced threats such as bycatch.

- ***Te Rūnanga recommends setting the Fishing Related Mortalities to 38 Rāpoka per year, to reduce the human impact on the Auckland Island population as much as possible.***

Strike Rate

Te Rūnanga supports Option 5 which proposes a strike rate of 7.58 Rāpoka per 100 tows, as based on the most recent 10 years of interactions. In recent years, the tow lengths have become longer and the number of turns increased. With these uncertainties, it is important that the most precautionary approach is utilised until further research is undertaken to determine the effect of tow composition on Rāpoka strike rate.

- ***Te Rūnanga recommends setting the strike rate of 7.58 Rāpoka per 100 tows and recommends further investigations into how the changes in tow composition will affect strike rate.***

Discount rate

Te Rūnanga support Option 3 which provides a discount rate of 50%, due to the uncertainties surrounding the cryptic mortalities of Rāpoka in their interactions with Sea Lion Exclusion Devices ("**SLEDs**"). The current estimate of 82% survival rate is not based on robust research and further investigations are required to estimate the actual mortality rate due to fisheries, which will allow for stronger data collection and more informed research decisions to be made, as the discount rate is a key tool in the management measures.

- ***Te Rūnanga recommends that robust and transparent research is undertaken to determine what the cryptic mortality of Rāpoka is through interactions with SLEDs to allow more informed decision making. Until further research is undertaken, Te Runanga supports the most conservative approach of 50%.***

It is important to note that this Operation Plan is to manage the key human induced threat to the Rāpoka which are nationally critical and a taonga species for Ngāi Tahu whānui and for all New Zealanders. Due to the significance of Rāpoka it is important that careful management decisions are made and precaution is utilised until further research has been undertaken into some of the uncertainties in the management measures.

We trust that these comments will be helpful in the development of the SQU6T Operational Plan. If you have any questions or require further clarification, please do not hesitate to contact Rata Pryor Rodgers in the first instance on (03) 9740021 or Rata.Rodgers@ngaitahu.iwi.nz Alternatively, I am available to discuss this further at your convenience.

Nāku noa, nā

Rakihia Tau
GENERAL MANAGER, STRATEGY AND INFLUENCE

APPENDIX ONE: TE RŪNANGA INTERESTS IN CONSULTATION DOCUMENT: SQU6T OPERATIONAL PLAN

TE RŪNANGA O NGĀI TAHU

- This response is made on behalf of Te Rūnanga o Ngāi Tahu ("**Te Rūnanga**"). Te Rūnanga is statutorily recognised as the representative tribal body of Ngāi Tahu Whānui and was established as a body corporate on 24th April 1996 under section 6 of Te Rūnanga o Ngāi Tahu Act 1996 (the Act). We note for the Department the following relevant provisions of our constitutional documents:

  Section 3 of the Act States:

  "This Act binds the Crown and every person (including any body politic or corporate) whose rights are affected by any provisions of this Act."

  Section 15(1) of the Act states:

  "Te Rūnanga o Ngāi Tahu shall be recognised for all purposes as the representative of Ngāi Tahu Whānui."

- The Charter of Te Rūnanga o Ngāi Tahu constitutes Te Rūnanga as the kaitiaki of the tribal interest.
- Te Rūnanga respectfully requests that the Department accord this response the status and weight due to the tribal collective, Ngāi Tahu Whānui, currently comprising over 55,000 members, registered in accordance with section 8 of the Act.
- Notwithstanding its statutory status as the represensive voice of Ngāi Tahu Whānui "for all purposes", Te Rūnanga accepts and respects the right of individuals and Papatipu Rūnanga to make their own responses in relation to this matter.

TREATY RELATIONSHIP

- Te Rūnanga o Ngāi Tahu have an expectation that the Crown will honour Te Tiriti o Waitangi (the Treaty) and the principles upon which the Treaty is founded.
- The management of the environment and resources within the takiwā of Ngāi Tahu Whānui, including the natural environment, for which Ngāi Tahu Whānui have kaitiaki responsibilities and over which Ngāi Tahu Whānui maintain rangatiratanga status, must take into account the principles of the Treaty of Waitangi.

KAITIAKITANGA

- In keeping with the kaitiaki responsibilities of Ngāi Tahu whānui, Te Rūnanga has an interest in ensuring sustainable management of natural resources, protecting taonga species and mahinga kai resources for future generations.

- Ngāi Tahu whānui are both users of natural resources, and stewards of those resources. At all times, Te Rūnanga is guided by the tribal whakataukī: "mō tātou, ā, mō kā uri ā muri ake nei" (for us and our descendants after us).

WHANAUNGATANGA
- Te Rūnanga has a responsibility to promote the wellbeing of Ngāi Tahu whānui and ensure that the management of Ngāi Tahu assets and the wider management of natural resources supports the development of iwi members.

APPENDIX TWO: TEXT OF CROWN APOLOGY

The following is text of the Crown apology contained in the Ngāi Tahu Claims Settlement Act 1998.

Part One – Apology by the Crown to Ngāi Tahu

Section 6   Text in English

The text of the apology in English is as follows:

- The Crown recognises the protracted labours of the Ngāi Tahu ancestors in pursuit of their claims for redress and compensation against the Crown for nearly 150 years, as alluded to in the Ngāi Tahu proverb 'He mahi kai takata, he mahi kai hoaka' ('It is work that consumes people, as greenstone consumes sandstone'). The Ngāi Tahu understanding of the Crown's responsibilities conveyed to Queen Victoria by Matiaha Tiramorehu in a petition in 1857, guided the Ngāi Tahu ancestors. Tiramorehu wrote:

  "This was the command thy love laid upon these Governors … that the law be made one, that the commandments be made one, that the nation be made one, that the white skin be made just equal with the dark skin, and to lay down the love of thy graciousness to the Māori that they dwell happily … and remember the power of thy name."

- The Crown hereby acknowledges the work of the Ngāi Tahu ancestors and makes this apology to them and to their descendants.

- The Crown acknowledges that it acted unconscionably and in repeated breach of the principles of the Treaty of Waitangi in its dealings with Ngāi Tahu in the purchases of Ngāi Tahu land. The Crown further acknowledges that in relation to the deeds of purchase it has failed in most material respects to honour its obligations to Ngāi Tahu as its Treaty partner, while it also failed to set aside adequate lands for Ngāi Tahu's use, and to provide adequate economic and social resources for Ngāi Tahu.

- The Crown acknowledges that, in breach of Article Two of the Treaty, it failed to preserve and protect Ngāi Tahu's use and ownership of such of their land and valued possessions as they wished to retain.

- The Crown recognises that it has failed to act towards Ngāi Tahu reasonably and with the utmost good faith in a manner consistent with the honour of the Crown. That failure is referred to in the Ngāi Tahu saying 'Te Hapa o Niu Tireni!' ('The unfulfilled promise of New Zealand'). The Crown further recognises that its failure always to act in good faith deprived Ngāi Tahu of the opportunity to develop and kept the tribe for several generations in a state of poverty, a state referred to in the proverb 'Te mate o te iwi' ('The malaise of the tribe').

- The Crown recognises that Ngāi Tahu has been consistently loyal to the Crown, and that the tribe has honoured its obligations and responsibilities under the Treaty of Waitangi and duties as citizens of the nation, especially, but not exclusively, in their

active service in all of the major conflicts up to the present time to which New Zealand has sent troops. The Crown pays tribute to Ngāi Tahu's loyalty and to the contribution made by the tribe to the nation.

- The Crown expresses its profound regret and apologises unreservedly to all members of Ngāi Tahu Whānui for the suffering and hardship caused to Ngāi Tahu, and for the harmful effects which resulted to the welfare, economy and development of Ngāi Tahu as a tribe. The Crown acknowledges that such suffering, hardship and harmful effects resulted from its failures to honour its obligations to Ngāi Tahu under the deeds of purchase whereby it acquired Ngāi Tahu lands, to set aside adequate lands for the tribe's use, to allow reasonable access to traditional sources of food, to protect Ngāi Tahu's rights to pounamu and such other valued possessions as the tribe wished to retain, or to remedy effectually Ngāi Tahu's grievances.

- The Crown apologises to Ngāi Tahu for its past failures to acknowledge Ngāi Tahu rangatiratanga and mana over the South Island lands within its boundaries, and, in fulfilment of its Treaty obligations, the Crown recognises Ngāi Tahu as the tangata whenua of, and as holding rangatiratanga within, the Takiwā of Ngāi Tahu Whānui.

- Accordingly, the Crown seeks on behalf of all New Zealanders to atone for these acknowledged injustices, so far as that is now possible, and, with the historical grievances finally settled as to matters set out in the Deed of Settlement signed on 21 November 1997, to begin the process of healing and to enter a new age of co-operation with Ngāi Tahu."

APPENDIX THREE: NGĀI TAHU TAKIWĀ
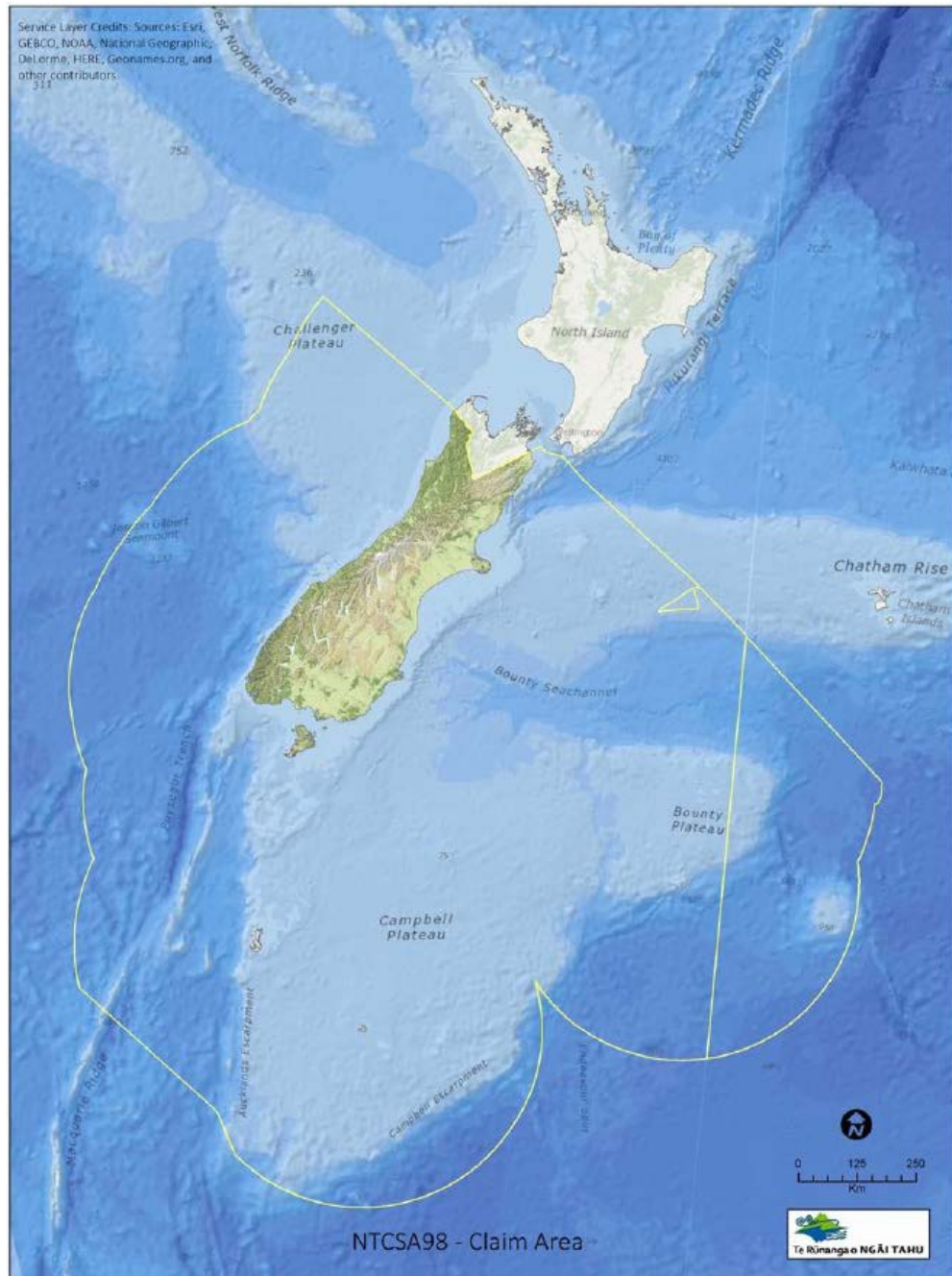
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8 September 2017

Squid 6T Operational Plan Consultation
Fisheries Management
Ministry for Primary Industries
PO Box 2526
Wellington 6011

Email: FMsubmission@mpi.govt.nz

Dear Madam/Sir

Submission on Consultation on the Squid 6T Operational Plan

Introduction

The Environment and Conservation Organisations of NZ (ECO) is the national alliance of about 50 groups with a concern for the environment and conservation. Some of these member bodies are themselves federations or multiple groups.

ECO has followed issues of conservation and environmental management and practice, law and policy since its formation in 1971-2 and we have member groups from all around New Zealand.

We have a number of well-qualified and experienced policy and resource management specialists in our Environmental Law and Management Group.

Key Points

ECO welcomes the wider range of options included in this operational plan but is still concerned that it does not include all the potential options available to the Minister.

The operational plan should:
- Include all fisheries that impact on the sea lions and not just the squid fishery;
- Be precautionary in it management approach;
- Only apply for one year as there is too much uncertainty in the results of modelling, especially as not all new information was used;

- Acknowledge that there is been change in fishing practices that could exacerbate bycatch eg longer tows and turns;
- Recognize the uncertainty in the assessment of strike rate and discount rate;
- Acknowledge that all the discount rate are arbitrary, depending on assumptions, and the status quo if badly wrong could result in hundreds of sea lions being killed and not reported.
- Research needs should be a requirement of an operational plan.
- Research using cameras should be used to estimate actual strike rate and level of sea lion survival in SLEDs.

Issues in Proposal Document

Executive Summary

2.   Purpose

Any operational plans purpose should consider all fisheries and direct and indirect effects of fishing on sea lions.

3.   Background

3.1 NZ Sealion

The background section should note:
- that the IUCN international experts group has assessed the NZ sea lion as a threatened species with a global ranking of endangered.
- That the Minister of Conservation has listed the sea lion as a threatened species under the Marine Mammals Protection Act.
- The Auckland Islands is a designated World Heritage Area and New Zealand sea lions were part of the reason for that status being granted. Ongoing threats to world heritage values can be raised with the World Heritage Bureau in Paris and any site can be added to the World Heritage in danger listing.

3.2   NZ Sealion Threat Management Plan

The sea lion threat management plan is a step forward in the protection of NZ Sea Lion. The more important goal is the move towards a non-threatened status. It is a pity that MPI seems to have little commitment to them in this plan.

Given the assumptions made by MPI it is conjecture that fisheries is not having a "major factor of the observed population change".

The so-called "status quo options" will have no impact on the fishery and the so-called "more conservative options" will have little impact on the fisheries especially if alternative fishing methods are used eg jigging.

Long ago New Zealand banned dynamite fishing and the use of cyanide to catch fish, in the same way we need to use much more sensitive fishing methods with a lower environmental footprint.

MPI needs to be more pro-active in considering and reducing the environmental footprint of fisheries. The impact of fisheries on threatened species is an important global consideration.

3.3   NZ Sealion Risk Assessment and Demographic Population Model

ECO welcomes the development of a new sea lion model - PST. The BFG model was overdue for replacement as it had never

This commentary on the risk assessment and the demographic model does not acknowledge the uncertainties in the data used and the outputs.

The commentary here should:
- Acknowledge that not all available information was used in the model update due to the limited time provided by MPI and the limited time available to the NIWA modellers.
- That the constraints on the model is partly due to assumptions about strike rate and survivability. If other less conservative assumptions were used then different consequences are possible.
- Levels of cryptic mortality could be far higher than currently estimated due to the non-survivability of sea lions in SLEDs.
- Other fisheries also catch sealions.

ECO would welcome a review of the modelling in a similar process to the Bradshaw et al 2013 review. The current review undertaken by AEWG was inadequate as there was limited time to review the proposal and important documents were not circulated prior to the meeting to allow for adequate consideration and review.

3.4   Squid 6T Operational Plan Technical Advisory Group

ECO welcomes the establishment of the Squid 6T operational plan Technical Advisory Group but considered it should be extended to include all fisheries that impact on the sea lions and their recovery.

3.5   Commercial Fisheries

This section should also note for accuracy that the 12 nautical miles surrounding the Auckland Islands is a marine reserve.

3.5.1   Squid

This section should note that:
- The TACC for this fishery is ad hoc and has no relationship to whether it is sustainable or not, or whether it meets the purposes and principles of the Fisheries Act 1996.
- That the squid fishery is highly variable;

Estimates of any economic loss will always be highly speculative. They ignore the facts that:
- The squid fishery is highly variable and that there is no guarantee of catches over 950 tonnes (the lowest catch of record);
- The fishing industry has known about the conflict with sea lions since the fishing squid fishing occurred around the Auckland Island and have taken that risk into account in there decision making;
- The assessment needs to consider the impact of fishing on economic values other than direct financial values to the industry eg aesthetic, tourism, and intrinsic values. The Ministry has to consider the reasonable foreseeable needs of future generations to have a recovering sea lion population and wider economic values when considering utilisation.
- That there are alternative fishing methods that could be used to catch this quota and gain and economic return. The fishery is only closed to trawling and not to jigging.

Economic considerations cannot be only focused on the losses to industry. Economic considerations must consider the annual loss in natural capital and other values including option value and bequest value.

3.5.2   Scampi and other fisheries

This section is the only consideration of other fisheries that are known to impact on the sea lions. Observer coverage is low and patchy in the scampi fishery. It is time that MPI and DOC required all vessels fishing in the equivalent of the 6T area to have MPI observers.

3.6 Sea lion Exclusion Devices (SLEDS)

As SLEDs are used in several fisheries (eg squid and southern blue whiting) that impact on the sea lions, there should a more transparent regulatory approach to their use.

4. Management Context

4.1 Statutory Considerations

Statutory considerations include international obligations as well as NZ domestic law.

Marine Mammal Protection Act

This section should acknowledge that:
- There is a marine mammal sanctuary around the Auckland Islands that covers the territorial sea (out to 12 nautical miles).

Fisheries Act

Section 5 requires the Minister to consider international obligations. The Auckland Islands and the surrounding 12 nautical miles is a designated World Heritage Area and that the sea lions were a key reason for that status being granted. Ongoing threats to world heritage values can be raised with the World Heritage Bureau in Paris and any site can be added to the World Heritage in danger listing.

Other international obligations relevant include the Biodiversity Convention provisions and the UN Convention of the Law of Sea including article 192 obligations to preserve and protect the marine environment.

Amongst these obligations is the United Nations Food and Agriculture Organisation (FAO) Code of Conduct on Responsible Fisheries (1995) which states that:

> *"6.5 States and subregional and regional fisheries management organizations should apply a precautionary approach widely to conservation, management and exploitation of living aquatic resources in order to protect them and preserve the aquatic environment, taking account of the best scientific evidence available. The absence of adequate scientific information should not be used as a reason for postponing or failing to take measures to conserve target species, associated or dependent species and non-target species and their environment."*

Article 7.5 of the Code of Conduct further set out what constitutes precautionary management in fisheries.[1]

The United Nations Implementing Agreement on High Seas Fisheries and Straddling Stocks[2] includes a requirement on *"coastal States and States fishing on the high seas [to] apply the precautionary approach in accordance with article 6."* Article 6 includes requirements for:

"1. States shall apply the precautionary approach widely to conservation, management and exploitation of straddling fishstocks and highly migratory fishstocks in order to protect the living marine resources and preserve the marine environment.

2. States shall be more cautious when information is uncertain, unreliable or inadequate. The absence of adequate scientific information shall not be used as a reason for postponing or failing to take conservation and management measures."

Therefore, where information is uncertain or unknown about the state of a stock or biological information, the decision should favour lower catch limits or more environmentally stringent regulations.

A recent review of application of the FAO Code of Practice[3] indicates that New Zealand needs to do a lot more to implement the code, particularly in the area of stock management, impacts of fishing, and bycatch and habitat effects.

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[1] **7.5 Precautionary approach**
7.5.1 States should apply the precautionary approach widely to conservation, management and exploitation of living aquatic resources in order to protect them and preserve the aquatic environment. The absence of adequate scientific information should not be used as a reason for postponing or failing to take conservation and management measures.
7.5.2 In implementing the precautionary approach, States should take into account, inter alia, uncertainties relating to the size and productivity of the stocks, reference points, stock condition in relation to such reference points, levels and distribution of fishing mortality and the impact of fishing activities, including discards, on non-target and associated or dependent species, as well as environmental and socio-economic conditions.
7.5.3 States and subregional or regional fisheries management organizations and arrangements should, on the basis of the best scientific evidence available, inter alia, determine:
stock specific target reference points, and, at the same time, the action to be taken if they are exceeded; and stock-specific limit reference points, and, at the same time, the action to be taken if they are exceeded; when a limit reference point is approached, measures should be taken to ensure that it will not be exceeded.
7.5.4 In the case of new or exploratory fisheries, States should adopt as soon as possible cautious conservation and management measures, including, inter alia, catch limits and effort limits. Such measures should remain in force until there are sufficient data to allow assessment of the impact of the fisheries on the long-term sustainability of the stocks, whereupon conservation and management measures based on that assessment should be implemented. The latter measures should, if appropriate, allow for the gradual development of the fisheries.
7.5.5 If a natural phenomenon has a significant adverse impact on the status of living aquatic resources, States should adopt conservation and management measures on an emergency basis to ensure that fishing activity does not exacerbate such adverse impact. States should also adopt such measures on an emergency basis where fishing activity presents a serious threat to the sustainability of such resources. Measures taken on an emergency basis should be temporary and should be based on the best scientific evidence available.
[2] The United Nations Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea of 10 December 1982 relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks (in force as from 11 December 2001).
3 Pitcher T, D. Kalikoski, G. Pramod and K.Short (2009) Not honouring the code *Nature* **457**, 658-659 (5 February 2009) | doi:10.1038/457658a; Published online 4 February 2009

Case Law

Section 10 obligations are to apply the best available information but that the absence or uncertainty in information is not to take a measure to achieve the purpose of the Act. The Court of Appeal recognised that section 10(d) "emphasises the need for caution". The uncertainty over the bykill rate, the threat to the protection sea lion means that caution should err on side of a higher underlying kill rate per 100 tows.

As France J (2004)[4] stated "The Act does emphasise that 'Fisheries are to be used' (Westhaven Shellfish Ltd v Chief Executive of the Ministry of Fisheries [2002] 2 NZLR 158 at para [46]. However there is a balance to be struck between that objective and 'the need for caution' (Westhaven ibid) reflected by the sustainability objective."

The Court of Appeal has also commented: "The purpose of the Act, in terms of s 8(1), is to provide for the utilisation of fisheries resources while ensuring sustainability; most of the Act is directed to that purpose… Those provisions reflect the obligations in articles 61 and 62 of the UN Convention on the Law of the Sea to promote optimum utilise of fishing resources of the EEZ without prejudice to their conservation (see also s 5 of the Act)."[5]

Further the provisions of section 15 make it clear that need to take measures necessary "to avoid, remedy or mitigate the effects of fishing related mortality on any protected species". A limit of 115 would not "avoid, remedy or mitigate the effects of fishing" on sea lions in seven out of ten years and would not be a precautionary measure.

Squid fishery catch limits (TACC) is ad hoc and there is "no proven method to estimate yields from the squid fishery before a fishing season begins". Given this, and the variability in the squid fishery, failure to reach to the TACC should not be seen as the requirement to meet the utilisation purpose of the Act. Squid fishers can use other recognised methods of catching squid ie jigging.

The balance between utilisation of the squid and the conservation of the sea lion needs to be put in the light of alternative methods, the variability of the squid fishery and the conservation status of the sea lions.

Management Approach – Operational Plan

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and
Pitcher T, D. Kalikoski, G. Pramod and K.Short (2009) Safe Conduct? Twelve years fishing under the UN Code (WWF) Available at: http://assets.panda.org/downloads/un.code.pdf

[4]   *Squid Fishery Management Company Limited v The Minister of Fisheries* (High Court, Wellington, CIV-2003-485-2706, 27 February 2004, France J)

[5]   *Kellian v Minister of Fisheries (Court of Appeal, CA 150/02, 26 September 2002).*

The management approach continues using FRML and does not consider area closures, apart from when FRML are reached. Spatial closure to trawling could be made to part of the 6T fishery.

Fisheries Related Mortality Limit

Any FRML set should ensure that the sea lion returns to a non-threatened status and that there is no further decline in the sea lion population.

Of the two options, only the second option uses the updated model and information.

ECO consider the FRML of 38 (Option2) is the closest to a precautionary limit for sea lions. ECO view is that for an endangered species, which the sea lion is internationally recognized as one, the FRML of zero would be more appropriate.

Strike Rate

The strike rate is a key part of the calculation of the FRML. ECO is concerned that MPI has failed to refine the real strike rate.

We note that in the year when there was 100 percent observer focused coverage (2001) the strike rate was significantly higher at 9.8 percent. There is also some suggestion that there is an increasing trend in strike rate and that strike rates may increase with higher levels of observer coverage.

The use of longer tows means that the risk of a sea lion being caught in each tow has increased assuming that the risk of a sea lion being caught is a factor of the area swept by the trawl net and thus any strike rate per tow is likely to under-estimate the number of sea lions caught.

The improvement in camera technology is one area that needs to be explored further to investigate the real strike rate.

ECO recommends a strike Rate of 7.58 (option 5) as it uses the most recent years and has a value closest to that estimated when 100% observer coverage was applied in the fishery.

Discount Rate

The estimates of discount rates are all based on assumptions of the impact. Of the three possible causes of cryptic mortality only one (brain injury) has been seriously investigated by MPI. The other causes – loss of dead sea lions from the net or post escape drowning – has not been investigated.

Given the impacts of longer tows, turns in tows, and the assumption that sea lions do not escape from the net – the discussion paper claims much greater certainty than is real.

As noted by the report of the expert panel review of sea lion management (Bradshaw et al 2013):

"There are ongoing disagreements about their fates, and these feed discussions about the real rate of bycatch affecting the NZSL population. The data on mild traumatic brain injury (MTBI, discussed in more detail below) is only relevant to part of this problem. It is much harder to estimate how many other animals simply run out of air and drown outside the net as a result of the time they are detained within nets but were not recovered." (Bradshaw et al. 2013, Pg 17)

Futher, the 2013 panel provided 6 options:
"until real data become available, MPI's options regarding discount rate use in the model are:
1. Abandoning discount rates altogether (possibly politically unacceptable and implausibly assuming no animals that leave via the SLED survive);
2. Setting a coin toss discount rate of 0.5 (which would be arbitrary);
3. Sampling the rate from an uninformative (wide-interval) prior distribution (the result of which will depend entirely on the arbitrary centring of that prior);
4. Estimating it directly in the model as a parameter (although it might not be estimable and might bias other parameter estimates);
5. Making a subjective choice as to the most 'plausible' value (but perhaps deliberately 'low' to provide a precautionary approach); or
6. Examining current tagging and other data to determine whether there is any information on survival of vulnerable age classes already available (also unlikely to provide much useful information)." (Bradshaw et al. 2013, Pg 25)

We note that none of the proposed options includes 82% Discount Rate (Status quo).

The improvement in camera technology is one area that needs to be explored further to investigate the other options.

Given the expert panel's advice on Discount Rate, ECO recommends a 50% Discount Rate (Option 3) should be recommended to the Minister."

5. Options

5.1 Fishing Related Mortality Limit

Any FRML set should ensure that the sea lion returns to a non-threatened status and that there is no further decline in the sea lion population.

ECO consider the FRML of 38 (Option2) is the closest to a precautionary limit for sea lions. ECO view is that for an endangered species, which the sea lion is internationally recognized as one, the FRML of zero would be more appropriate.

5.2 Strike Rate

ECO recommends a strike Rate of 7.58 (option 5) as it uses the most recent years and has a value closest to that estimated when 100% observer coverage was applied in the fishery.

5.3 Discount Rate

As indicated earlier there is little justification for the MPI earlier approach to discount rates.

Given the expert panel's advice on Discount Rate, ECO recommends a 50% Discount Rate (Option 3) should be recommended to the Minister."

5.4 Other Settings

5.4.1 Duration of Operational Plan

ECO only supports a one year plan given:
- Modelling work did not include all up to date information;
- The operational plan only includes squid and not other fisheries that impact on sealions;
- Further research needs to be carried out to better estimate strike rate and survivability.
-

5.4.2 Notification requirements

The notification requirements seem reasonable. Any vessel not meeting these requirements should have to return to port to explain its failure to notify.

5.4.3 Reporting Requirements

Given the current technology we cannot see why reporting by all vessels should not be daily. Any failure to report should require the vessel to return to port to explain its failure to report.

5.4.4 Trigger Points

More clear trigger points need to be established for the review of the plan. This is another reason why the plan should be for only one year.

Firstly, given that there is information on the sea lions that hasn't been used in this assessment as the current modellers had insufficient time to complete the model assessment, then this should be completed in the coming year and a review undertaken.

Second, further research needs to be carried out into the strike rate and survivability of the SLEDs.

5.4.5   Observer Coverage

ECO supports 100% observer coverage in all fisheries that impact on the sealions including squid, southern blue whiting, scampi. This should be a mandatory requirement.

5.4.6   Fishery Closure Process

ECO supports a transparent closure process with reporting to all stakeholders equally.

6   Next Steps

The next steps must include adding all fisheries that impact on the sea lions into the operational plan.

7.   Conclusion

If you require any clarification on this submission and our proposals please contact the ECO office or myself (021-738-807).

Yours sincerely,

Barry Weeber
Co-Chairperson

New Zealand Sea Lion Trust Submission
on
MPI Discussion Paper No: 2017/28 Consultation on Squid 6T Operational Plan

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About the New Zealand Sea Lion Trust

Established in 2003 in Dunedin, the New Zealand Sea Lion Trust ("the Trust") is the country's only organisation with a mission and activities focused solely on the conservation of the New Zealand Sea Lion. The Trust was formed to support ongoing research of and education around this endangered taonga species, triggered by the return of breeding females to the Otago coastline.

The Trust is one of DOC's key partners in carrying out sea lion conservation activities, including but not limited to: monitoring of females and pups along the Otago coastline; community engagement both structured and informal; delivery of education programmes to Otago schools; and direct support of DOC rangers such as assisting with annual pup tagging/microchipping/satellite tagging. Much of the ongoing monitoring and tag resighting is carried out by Trustees and volunteers.

Additionally, the Trust has a collaborative relationship with researchers at Otago University and Massey University, and has been an active contributor to many research initiatives since its inception, including studies on female foraging and diet off the Otago Coast, genetics, pinniped tuberculosis and others. Researchers are encouraged to make contact and seek logistical and local knowledge support from the Trust. Indeed, the Trust has close relationships with many of the researchers whose papers contributed to the discussion and background papers that informed the Threat Management Plan, including Shaun McConkey, Dr. Louise Chilvers, Dr. Bruce Robertson, Dr. Amelie Auge and Dr. Stefan Meyer. Mr. McConkey and Dr. Robertson are the Trust's Scientific Advisors.

The Trust is led by an all-volunteer group of individuals with a range of professional backgrounds necessary to make the organisation effective and relevant, including marine scientists specialising in pinnipeds, educators and experienced public speakers, business owners, eco-tourism operators, community development professionals and fundraisers.

Recommendations & General Comments

From the options provided in the consultation paper, the Trust has the following recommendations:

1. **A FRML of 38 (option 2)**
2. **A Strike Rate of 7.58 (option 5)**
3. **A Discount Rate of 50% (option 3)**
4. **Greater observer coverage of the Scampi (SCI6A) and other trawl fisheries**

The Trust does not agree with MPI's position that direct fishing impacts are not a major factor in the decline of the New Zealand Sea Lion population. While the Trust acknowledges MPI's admission that there is a high level of uncertainty around Strike Rate and cryptic mortality, the fact that, in the 21st century, the management plan for a commercial fishery interacting with a "Nationally Critical" species is based upon models with significant uncertainties is incredible and reckless. Despite the admission around data uncertainty, disappointingly low estimates are still being used that are not based on any empirical data, instead relying upon no, or anecdotal evidence that may or may not be seated anywhere near reality. Furthermore, there does not appear to be any attempt to reduce this uncertainty in the future.

Regarding the model on which the FRML, Strike Rate, Sled Discount Rate and Maximum allowable number of tows is based; Breen, Fu & Gilbert in their sea lion population modelling and management procedure evaluations New Zealand Aquatic Environment and Biodiversity Report No. 175 state both that "There are <u>many potential uncertainties</u>" and "Although it is the basis for MPI's bycatch management, <u>this work is now badly flawed</u>". [Emphasis added]

The Trust therefore strongly supports the recommendations of the TAG for an "in-depth" review of the modelling used and requests further clarity from MPI explaining their current choice in model and its difference with the peer-reviewed model developed by Dr Stefan Meyer which drew the conclusion that fishing <u>does</u> have a significant impact on the New Zealand sea lion population.

Risk Assessment

With regards to the Risk Assessment on page 9 of the consultation document, this section is quite misleading.
- It does not explicitly detail what the three threats estimated to change expected population growth are, nor does it provide graphical representation which would help make this information easier to digest.
- While elimination of Klebsiella in isolation was the only scenario that resulted in a positive growth rate, it was stated in "A Summary of the Risk Assessment of Threats to the New Zealand Sea Lions" (MPI Information Paper No: 2016/03) that "Results from the risk assessment suggest that alleviation of any one threat will not result in population increasing … Clearly multiple factors were acting on the population, and for management to recover the species a holistic view must be adopted."
- The statement "Direct fishing-related mortality was only estimated to have changed the population growth rate by more than 1% when modelled using implausibly pessimistic estimates of cryptic mortality" is misleading, firstly, because (as iterated above) current estimates of cryptic mortality are not based on empirical evidence so what is "implausible" cannot be judged. Secondly, where multiple factors are acting on a population, the effect of an individually isolated factor is not representative of its effect when taken into account as part of a holistic approach targeting multiple factors, as recommended. I.e. the importance of reducing direct fishing-related mortality is being understated.
- Again, given the lack of any empirical evidence or reasoning, a "more realistic estimate of cryptic mortality" is misleading, as it is not based on reality and is being used to understate the importance of fishing-related mortality. Furthermore, it suggests that despite admitting that there is uncertainty in these figures earlier in the document, MPI is determined to not rectify this issue.

Population Sustainability Threshold

The Population Sustainability Threshold (PST) could have been better explained and would have been easier to understand with graphics/ a worked example using the PST estimates generated for the range of population outcomes. MPI should have also disclosed that while the PST model has been used in relation to seabird bycatch management, it has not previously been used to model sea lion data and it is not peer reviewed. It should therefore also be subject to review, along with the Demographic Population Model.

Commercial Fisheries/SQU6T

It is disappointing to see that a value is placed upon the commercial fishery but a corresponding value for sea lions is not mentioned. For example wildlife tourism in Dunedin alone was estimated to be approximately $100 million per annum and generate 800-1000 full time jobs (Tisdell 2008)[1].

TAG Recommendations - Scampi/SCI6a

The Trust recommends greater observer coverage of the Scampi (SCI6A) and other trawl fisheries.

The scampi fishery information is new to the Trust and given the low observer rate, the Trust is concerned about the modelling estimates and impact on the sea lion population. We request further information on the scampi fishery be relayed to the Trust as soon as practicable.

Sea Lion Exclusion Devices

The efficacy of SLEDs is overemphasised and not supported by empirical evidence. Uncertainty around their efficacy was highlighted by independent scientific experts undertaking the review of the previous Breen/Kim statistical model back in 2012, and was again mentioned during consultation over the range of threats to New Zealand sea lions during the TMP process. Because it is unknown how many sea lions are drowning in nets and then being lost through the escape hatch (could range from 1-100) this uncertainty could have a large effect on management measures. Further, the Trust was very concerned to hear that a request to see the SLED video footage at the TAG meeting was denied. What is in the footage that MPI do not want anyone to see? If the footage supports MPI's entrenched position that SLEDs are an effective solution, why the secrecy around it? This is nothing less than hypocritical given that there is allegedly openness and transparency in NZ Fisheries Management. The NZ Sea Lion Trust requests the footage be shared with both the TAG and the Trust without delay.

Management Approach - Operational Plan

The precautionary approach should be guiding all commercial fishery activity in New Zealand as stipulated in the relevant legal acts providing context around management.

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[1] Wildlife Conservation and the Value of New Zealand's Otago Peninsula: Economic Impacts and Other Considerations; Tisdell, Clement A. (2008)   http://ageconsearch.umn.edu/record/55108

Fishing Related Mortality Rate

The Trust recommends Option 2: an FRML of 38.

A modern commercial fishery should not have a population effect on a Nationally Critical species. And for a species with less than 12,000 individuals remaining, the Trust finds it inconceivable that fishing can have up to a 10% impact on the Auckland Islands population before being defined as having an "adverse effect".

While the Trust welcomes lowering the FRML we suggest that it should also take into account the gender of sea lions killed. The loss of a single female sea lion can result in the loss of two more (the pup left on shore and the unborn pup she is carrying), in addition to the long term population effects due to loss of any pups in future years. There should therefore be a lower limit for the number of females caught i.e. the total number of sea lions caught cannot exceed 38 however of that no more than X females can be caught, where `X' is determined by rigorous analysis of peer-reviewed population biology.

Strike Rate and Discount Rate

The Trust recommends Option 5: A Strike Rate of 7.58;
The Trust recommends Option 3: A Discount Rate of 50%

As per our comments above regarding SLEDs, without empirical evidence upon which to base estimates, this figure should be very conservative. While it is sensible to base these estimates upon early observation data (prior to SLED implementation), it is important to note that observer coverage prior from 1992 to 2000 varied from 7-39% (mean 19%). Also, with other effects such as climate change and overfishing, it is likely that sea lion behaviour has changed in addition to fishery behaviour. It is therefore important to gain more realistic information.

As iterated time and again, the uncertainty regarding all of these figures is such that any estimates are somewhat meaningless. The Trust expects to see MPI working to base these figures on empirical evidence.

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Operational Plan to Manage the Incidental Capture of the New Zealand Sea lion in the Southern Squid Trawl Fishery (SQU6T) for 2017/18 and 2018/19

The Otago Conservation Board (OCB) wishes to submit on the Consultation Document addressing the Incidental Capture of New Zealand Sea Lions in the Southern Squid Trawl Fishery (SQU6T)
The New Zealand Sea Lion Threat Management Plan (NZSLTMP) proposals drew up a management and research strategy in response to concerns about the future of this rare species.

The Otago Conservation Board submitted to the Threat Management Plan, not only because the species is the rarest sea lion in the world and is listed as 'Endangered' on the International Union for the Conservation of Nature (IUCN) Red List, but the NZ Sea Lion is particularly important to Otago as one of its few breeding sites for this endangered species is on the Otago coast. Human interaction along local beaches, the impact of the bacterial disease Klebsiella pneumoniae, natural hazards, male sea lion aggression and fishery–related mortality were factors believed to be contributing to the declining survival of pups.
While the NZSLTMP stated that fishery-related mortality is not high and is not a primary reason for the drastic drop in pup population, it is vital that incidental capture of sea lions through fishery activities is minimised in parallel with the work being done on reducing pup mortality.

The Otago Conservation Board notes:
- Given the issues raised above in connection with pup mortality, the setting of 10% adverse impact on sea lion population, is arguably too high.
- The average catch for the last ten years of 16,464 tonnes is just over half the Total Allowable Catch of 32,369 tonnes. The decline in the number of tows is not identified but with the number of operating vessels reducing from 63 in 1990 to 17 in 2017, clearly, fishing activity has significantly diminished.
- **The 2017/2018 Operational Plan should reflect that reality and set the Fishing-Related Mortality Limit (FRML) at 38 (Option 2)**
- The lack of data and the introduction of the SLED has confused determination of the optimal Strike Rate and Discount Rate.
- **Without more accurate data the precautionary approach of using a Discount Rate of 50% is preferred.**
- **Duration of Operational Plan is for a maximum of two years, but if Sea Lion populations are not stabilising, the Plan should be reviewed.**
- **The triggers listed in the Consultation Plan be adopted.**
- **The goal is not to stabilise the NZ Sea Lion population at its current threatened status but for the population to increase beyond that status. Impacts from fishing activity need to be assessed in those terms.**

Yours sincerely

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Squid 6T Operational Plan Consultation
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Submission: Consultation on the Squid 6T Operational Plan (MPI Consultation Paper No: 2017/28)

Introduction

Forest & Bird appreciates the opportunity to comment on the proposed operational plan to manage the incidental capture of New Zealand sea lions in the Southern squid trawl fishery (SQU6T) for the 2017/18 and 2018/19 fishing seasons.

Forest & Bird has a long history of advocacy for the protection of New Zealand's marine mammals and has been at the forefront of efforts to protect the New Zealand sea lion/ rāpoka *Phocarctos hookeri.*

Context for decisions on the Operational Plan

New Zealand sea lions remain the most endangered species of Otariid seal in the world. It continues to be exposed to anthropogenic threats from fishing, through fisheries by-catch and other possible impacts of the fishery on the environment in which they live, including the squid that form part of the sea lion's diet.

The interaction with fisheries is compounded by the overlap of the timing of this fishery with the breeding and pupping season of the specie's core area for the population of the species at the Auckland

Islands. New Zealand sea lions/ rāpoka are rated "Nationally Critical" in the Department of Conservation Threat Classification System – the category with the highest risk of extinction.

The National Threat Management Plan for New Zealand sea lions (the TMP) has a vision to recover the species to a "Non-Threatened" status. The Squid Operational Plan must be consistent with the aim of the TMP and reduce the most significant human induced threat to NZ sea lions by setting management options that actively reduce the impact of the accidental capture of sea lions in trawl nets.

The importance of a precautionary approach

New Zealand has been committed to the Precautionary Principle since the Rio Earth Summit in 1992. Decisions made in relation to New Zealand sea lions need to reflect this commitment. This is especially the case given that New Zealand sea lions are critically endangered.

Forest & Bird was pleased to have been invited to participate in a review of the operational plan, and are pleased that some precautionary options are now offered as part of this consultation. It is commendable that MPI have established a Technical Advisory Group (TAG) for the Squid Operational Plan.

Forest & Bird is pleased to see that the options laid out in the consultation document acknowledge that there is uncertainty around the strike rate and efficacy of the Sea Lion Exclusion Device (SLED).

The SLEDs that were seen as an innovative method of reducing by-catch, have created uncertainty around the impact the SQU6T fishery has on the sea lion population. Sea lions that enter the nets are expelled through the SLED, with uncertainty around health status of animals that pass out of the net, and uncertainty of animals that have died in the net being retained within a design feature of the SLED called the hood. This means that sea lions that pass through the nets, either dead or alive, cannot be counted by onboard observers. MPI have said that following the introduction of SLEDs, the number of sea lions interacting with trawls and the proportion of those surviving are considerably more difficult to estimate. This difficulty of estimation is exacerbated by changes in the behavior of the fishery over the last ten years, with longer tows (a doubling in length) that involve turns. Turns may well change the likelihood of capture and retention of animals in the hood. It is currently not possible to be certain about the numbers of animals that get caught or die as consequence of interaction with the SQU 6T fishery.

To allow for robust consultation and informed decision making MPI needs to be clear and transparent with regard to the limitations and uncertainties associated with the science and models they have used to progress the plan to this point, and also ensure that the best available science is used.

Given these uncertainties the Government needs to take a precautionary approach on each decision on the draft Operational Plan and actively pursue methods that work towards reducing by-catch to zero.

We must minimize those threats to the populations of New Zealand sea lion over which we have control and so must ensure that by-catch associated with the SQU 6T fishery does not negatively impact the recovery of this population.

Ultimately the squid fishery should transition to a sea lion friendly method of fishing such as jigging.

Summary of key recommendations

1. **This Draft Operational Plan makes some misleading statements and uses language that is heavily value laden, we recommend that this language is either removed or amended.**

2. **Forest & Bird recommends that MPI acknowledge the scientific uncertainties that have been used in the demographic and PST models and quantitative risk assessment, and what these issues mean for management**

3. **We recommend a precautionary management approach, and as fishing related mortality is the top human threat to sea lions, management options that have an active reduction in fishing related mortality and that enable the vision of the New Zealand Sea Lion Threat Management Plan (TMP) for sea lions to recover to "non-threatened status".**

    Key Management Settings:

Fisheries Related Mortality Limit (FRML):	**Forest & Bird does not support either of the two options. We recommend the FRML be set using the PST with a population objective of 2% decline over five years (with 90% confidence)**
Strike rate:	**Forest & Bird recommends a strike rate of 10. In the absence of this option we recommend MPI choose the option which is most precautionary Option 5 – a strike rate of 7.58**
Discount rate:	**Forest & Bird recommends returning as a minimum to the discount rate of 35% that was used during the 2010-11 fishing season. In the absence of this the most precautionary option (Option 3) of 50% should be applied.**
Duration of operational plan:	**Forest & Bird support this plan being for a one year interim period instead of two. And a commitment to SLED efficacy research to be conducted.**

1. Misleading statements and use of heavily value laden language

MPI's assertion that "the more conservative options in this paper will more significantly impact utilization opportunities", suggests that we should value the use of a fishing resource over the value of a nationally critical species. A Colmar Brunton poll commissioned by WWF-NZ in June 2017 shows that an overwhelming number of New Zealanders support further reduction in the by-catch of New Zealand sea lions.

Utilization comes at a cost to New Zealand sea lions, and this operational plan should reflect a balanced analysis of all options. The conservative options offer a better chance for the sea lion population to stabilize and recover sooner. No discussion is offered in the plan about possible future direction to move to alternative methods of fishing that would avoid the capture of sea lions, e.g. jigging, despite such suggestions being tabled in both the sea lion TMP process and the review of the operational plan. Therefore the more conservative options it would be hoped, would encourage the use of such methods that can also produce higher quality and valued product. Further information on Forest & Bird's proposal fisheries transitions can be found in our submission on the New Zealand Sea Lion Threat Management Plan available on our website (www.forestandbird.org.nz/saveoursealions see pages 14-17 of the submission).

New Zealand's "Clean Green" image is becoming increasingly important internationally and the New Zealand fishing industry is increasingly trading on sustainable fishery labelling. The conservative options within the proposed plan, along with further moves towards a zero-bycatch goal, would help demonstrate internationally that New Zealand takes its responsibility for managing the fisheries impacts on protected species seriously, and would support New Zealand's international brand.

The Population Sustainability Threshold (PST), is described by MPI has being "to identify where fishing may be having an adverse impact on a non-target population." This suggests that the PST is a scientific and objective assessment of whether there is an adverse impact. However the PST will only give us the level of mortality that will allow the achievement of a particular population objective. This is a management objective of some "acceptable" loss which is not in this case related to the science that would enable stability of the population, recovery, and long-term viability of the sea lion population. The PST model that was used has used the status quo assumptions that are now acknowledged to be non-precautionary and very uncertain (a strike rate of 5.89 and a discount rate of 82%).

MPI have stated that of none of the provided options will prevent the vision or objectives of the NZSL TMP from being achieved, and yet the proposed PST for sea lions has a population objective that would allow for up to a 5% decline in the sea lion population over five years (with 90% certainty). Both of the options for proposed key management settings for Fisheries-Related Mortality Limit (FRML) that are the status-quo of 68 animals and the option of 38 allow fishing to reduce the sea lion population. This is at odds with the objectives of the TMP.

Investigation of post SLED mortality was recommended by the 2013 expert panel: "We recommend that means of investigating post-exit SLED mortality be investigated to assess the practicality of reducing this

source of uncertainty in their real role in reducing NZSL deaths" (Bradshaw et al., 2013). Despite recommendations from this expert panel in 2013 no robust studies have been done to understand the relationship between tow length and sea lion capture rates. Investigation into post SLED

In short it is not known what the rate of survival is once a sea lion leaves the SLED or net (Bradshaw et al. 2013, Robertson & Chilvers 2011). Whether an animal suffers significant trauma or not, it is possible that some sea lions will exceed their dive limit and drown before reaching the surface after escaping from either the SLED or the front of the net.   Such sources of 'cryptic mortality' are presently "unquantified and are not reflected in the estimated overall survival rate of encounters with trawls" (MPI, 2015, p43).

Since it is not known what the survival of an animal that interacts with a SLED is, particularly as issues around 'body non-retention' and 'post-escape drowning' are unresolved, language like "***implausibly pessimistic*** estimates of cryptic mortality" for an assumed mortality for animals that are caught in nets and "***more realistic estimate***" that assumes that 82% of animals survive the experience is disturbingly misleading and emotive. It would be better for MPI to present the Minister with the range of possible fisheries impacts on demographic trends. Keep in mind that that this should support the TMP to a recovery of NZ sea lions to non-threatened status.

Some of the language that has been used in describing the role of the Technical Advisory Group (TAG) misrepresents the recommendations of this group. In section 5 that deals with management options, under the 'Fishing Related Mortality Limit' the phrase "***desired population outcomes*** *as per recommendations of the TAG*" is used. The TAG discussed the need to test a range of population outcomes to see the demographic effects over time e.g. 5% decline over 5 years and 2% decline over five years, as well as a need to consider longer time frames. At the time of the Technical Advisory Group meeting MPI had only looked at demographic effects of 10% decline over 5 years. The TAG did not decide nor discuss which population outcomes would be "*desired*" nor "*a desired population objective*", as the description of 'Option 2' refers to on the following page. No conclusion was reached by the TAG as to what objective was most appropriate, but rather asked for MPI to provide further analysis to assist further discussion.

Given the uncertainties described in the draft plan about strike rate and discount rate, MPI dismisses these in the following paragraph without providing evidence or research citations to support these assertions: "*MPI has invested considerable scientific resources to estimate sources of cryptic mortality. Extensive 'crash-test dummy' modelling suggests that mortality from mild traumatic brain injury will be very low (less than 3% of interactions). Anecdotal evidence from other jurisdictions suggests that body non-retention is likely to be negligible. Post-escape drowning is impossible to quantify but is judged unlikely to be high based on camera observations of sea lion behavior in SLEDs, and known physiological characteristics.*"

MPI have only invested in research into the likelihood of what proportion of sea lions would suffer Mild Traumatic Brain Injury (MTBI) as a result of collisions with the SLEDs. No research has been done on the effectiveness of the Hood in retaining dead animals (body non-retention) (Hamilton & Baker 2015), or

post SLED exit mortality (Bradshaw *et al.* 2013). If Anecdotal evidence from other jurisdictions is available, it should be made clear what this evidence is as none is offered. The camera observations of sea lion behavior in SLEDs, if such is available as alluded to, should be made available for independent review. Equally no discussion here is given to which physiological characteristics of sea lions that MPI believe contribute to their likelihood of survival. It is impossible to make any robust decisions on such speculative statements.

MPI makes the claim that pup production "***may be stabilising***", they then go on to say that a further two years of study will be required to give greater certainty around this trend. The risk assessment has shown that multiple threats are affecting both pup and adult survival, so population is not likely to be growing according to normal density dependent assumptions. There is uncertainty associated with pinniped population estimates based on pup counts when pup production is changing, as there are a number of factors that can impact pup production (changes in adult numbers, changes in fecundity, or age at maturity). Unpredictable spatiotemporal fluctuations in environmental conditions may be considerable in places like the sub-Antarctic islands so trends in population should be considered over a long term.

2. MPI acknowledgement of the scientific uncertainties

Forest & Bird applauds MPI for the establishment of the Squid Operational Plan Technical Advisory Group (TAG) and their commitment to investigating and addressing the uncertainties around the estimate of the threat from fisheries, including the strike rate and the efficacy of the SLEDs. It is important to resolve these issues for the effective management of both the fishery and the recovery of New Zealand sea lion populations.

We are pleased that the draft acknowledges some of the key uncertainties associated with the fishing threat. However limitations in the best available science, including the quantitative risk assessment, the demographic model, the PST, and issues that have arisen in reviews through AEWG processes, including the international review of the SEFRA and PST, have not been clearly articulated.

The quantitative risk assessment highlighted (Roberts & Doonan 2016) that the exact mechanisms driving the decline in the sea lion population is unknown. There are multiple human and natural threats impacting on these populations. Knowledge is lacking on changes in food availability for sea lions and the subsequent effect this may have on nutritional health and the role that fisheries may play in this. This possibly large effect is currently not adequately described or accounted for. This should be acknowledged in reflected in taking a precautionary management approach. MPI should commit to research to address the questions of uncertainty of human induced threats from food limitation.

Uncertainties that are accepted in the draft are not reflected in the risk ratio component of the PST model, where the status quo for strike rate of 5.89 and a discount rate of 82% has been applied. This needs to be made clear and transparent.

The demographic model and the PST use an assumption that sea lions exhibit a log uniform density dependent demographic response, such that the expectation is that because of low numbers in the

population there is less resource competition (for food) and so the population will grow quickly. As described earlier, due to the multiplicity of threats we do not have an adequate understanding of how the population will respond to the different threats and the impact each will have on the speed or capacity for the population to rebound.

Further research is required on the PST to test the assumption of 0.2 environmental stochasticity. The validity of the application of this level needs to be tested through a sensitivity analysis of how important this input is to the resulting PST, and ensure that this accurately reflects reality.

Key pieces of research and work that need to be addressed to reduce the uncertainties associated with SLED efficacy and interaction rate include:

a. Research into how changes in fishing practice affect strike rate, particularly from changes in tow length and the impact of turns.
b. Better data estimates of fisheries overlap with spatial distribution of sea lions.
c. Research into body non-retention.

Forest & Bird recommends a one year interim period for the operational plan to encourage this work and research to be conducted promptly.

3. Key management settings

Fishing related mortality limit (FRML)

Only one population objective is provided as an option in the draft plan, and there is no analysis about what effect this objective would have on the population over time (beyond 5 years). It is good that the objective is 5% rather than MPI's original proposal of 10%; however it is disappointing that the 2% population objective that was discussed in the TAG has not been included as an option for consultation.

Option 1 – 68 Status Quo DO NOT SUPPORT

While the PST is not perfect, it is a step up from the Breen-Fu-Gilbert Model which is now outdated, therefore we do not support option 1.

Option 2 – 38 DO NOT SUPPORT

We are pleased that MPI recognises the need to incorporate bycatch mortality from all fisheries that affect the Auckland Island population, and has adjusted the option 2 FRML to reflect this. Setting a FRML of 38 based on the PST would be a step in the right direction as it is a significant reduction from the status quo of 68.

However, due to the significant uncertainties and issues with the demographic and PST model inputs outlined previously, a more precautionary FRML option is warranted. A population objective of allowing up to 5% reduction over 5 years (with 90% confidence) for a 'nationally critical' species, and in the context of significant scientific uncertainty is not an acceptable level of precaution.

We recommend the FRML be set using the PST with a population objective of 2% decline over five years (with 90% confidence) and then work towards further reducing bycatch as much as possible, towards zero-by catch.

Strike Rate

Over the last 10 years, fishing practices have changed in ways that mean that old estimates of strike rate are no longer accurate. Average tow duration in the SQU6T fishery has doubled since the introduction of SLEDs, and the number of turns has also increased along with tow length with increasing uncertainty around catch rates (catchability of sea lions) and observable by-catch through uncertainty of the impacts turns may have on SLED efficacy.

We recommend that research be prioritized by MPI to improve and update the estimate of interaction rate with particular focus on finding out how changes in fishing practices influence interaction rate and catchability. Until this research is completed the strike rate remains unknown. On the basis of the uncertainty Forest & Bird has consistently recommended a strike rate of 10. In the absence of this option we recommend MPI choose the option which is most precautionary.

Option 5 – a strike rate of 7.58 SUPPORT

Discount Rate

The current discount rate only takes into account one of the three sources of cryptic mortality – MTBI. Body non-retention or post-escape drowning has not been taken into account at all, and there is no science about the probability of these events. A discount rate of 35% was used during the 2010-11 fishing season, Forest & Bird recommends returning to this level as a minimum as a precautionary approach. Of the available options we consider the 50% discount rate should be adopted, as it is the most conservative option available here. This supports the view of the expert panel Bradshaw, Haddon, & Lonergan (2013) who judged that due to the significant uncertainty around the discount rate "*it might as well be set at 50% to reflect that it is essentially a coin toss scenario – we just don't know.*" We therefore recommend MPI choose option three: 50%, the most precautionary option proposed, which is the most appropriate of the available options when the science is so uncertain.

Option 3 – 50% SUPPORT

Summary of Key Management settings:

We recommend a precautionary management approach, and as fishing related mortality is the top human threat to sea lions, management options that have an active reduction in fishing related mortality and that enable the vision of the New Zealand Sea Lion Threat Management Plan (TMP) for sea lions to recover to "non-threatened status".

      Key Management Settings:

Fisheries Related Mortality Limit (FRML):	**Forest & Bird does not support either of the two options. We recommend the FRML be set using the PST with a population objective of 2% decline over five years (with 90% confidence)**
Strike rate:	**Forest & Bird recommends a strike rate of 10. In the absence of this option we recommend MPI choose the option which is most precautionary Option 5 – a strike rate of 7.58**
Discount rate:	**Forest & Bird recommends returning as a minimum to the discount rate of 35% that was used during the 2010-11 fishing season. In the absence of this the most precautionary option (Option 3) of 50% should be applied.**
Duration of operational plan:	**Forest & Bird support this plan being for a one year interim period instead of two. And a commitment to SLED efficacy research to be conducted.**

Thank you for taking the time to read Forest & Bird's submission. Should you have any queries regarding our comments, please do not hesitate to contact me.

Regards,

Anton van Helden

Marine Advocate

Forest & Bird

205 Victoria Street

Wellington 6011

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References:

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SPCA NEW ZEALAND

SUBMISSION

BY THE

Royal New Zealand Society for the

Prevention of Cruelty to Animals Inc.

ON

The Operational Plan to Manage the

Incidental Capture of New Zealand Sea

lions in the Southern Squid Trawl

Fishery (SQU6T) for 2017/18 and

2018/19

7th September 2017

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Introduction

The following submission is made on behalf of the Royal New Zealand Society for the Prevention of Cruelty to Animals (RNZSPCA).

The RNZSPCA is the preeminent animal welfare and advocacy organisation in New Zealand. We have been in existence for over 130 years with a supporter base representing many tens of thousands of New Zealanders across the nation.

The organisation includes 46 Animal Welfare Centres across New Zealand and over 80 inspectors appointed under the Animal Welfare Act 1999.

The RNZSPCA welcomes the opportunity to make a submission on the Operational Plan to Manage the Incidental Capture of New Zealand Sea lions in the Southern Squid Trawl Fishery (SQU6T) for 2017/18 and 2018/19.

SPCA Position

Fishing Related Mortality Limit (FRML)

The RNZSPCA strongly advocates for the Fishing-Related Mortality Limit to be set at 38 (Option 2).

The New Zealand sea lion is categorised as a threatened species under section 2(3) of the Marine Mammals Protection Act 1978. It is the world's rarest sea lion species and has the highest possible threat status listing in New Zealand of 'Nationally Critical'.

Section 15(2) of the Fisheries Act 1996 states that the Minister may take such measures as he or she considers are necessary to avoid, remedy or mitigate the effect of fishing-related mortality on any protected species, and such measures may include setting a FRML. In making his/her decision on management measures for the SQU6T fishery, the Minister is required to

consider those measures that are 'necessary' to avoid, remedy or mitigate the effects of fishing-related mortality on the New Zealand sea lion.

The current FRML of 68 sea lions has been in place since October 2010. This FRML has not been associated with any significant positive effect on New Zealand sea lion populations, as is evidenced by the sea lion population statistics since the implementation of this figure, showing that the current number is ineffective in protecting sea lions from fisheries activities. The RNZSPCA strongly disagrees that Option 1 (68 sea lions) should remain as the FRML figure until 2019.

The RNZSPCA has no doubt that current fishery methods utilising the squid SQU6T resource threaten the sustainability of the New Zealand sea lion population. The Society believes that under s.15(2) the Minister is compelled to reduce the FRML as a necessary measure to avoid, remedy and mitigate the effects of fishing-related mortality on this endangered species.

The RNZPSCA strongly advocates that the New Zealand Sea lion/Rāpoka Threat Management Plan (NZSL TMP) should be aiming to recover the NZ sea lion population to non-threatened status. The only way to ensure the significant increase of the sea lion population over the coming decades is for the government to focus on seeking to reduce all threats to sea lions resulting from human activity.

As stated on page 14 of the proposed Operational Plan, "The FRML is intended to ensure that fishing does not have an adverse impact on the Auckland Islands sea lion population. Since 2003, an adverse impact, for the purposes of setting the FRML, has been defined as fishing having more than a 10% impact on the Auckland Islands sea lion population." The RNZSPCA questions the accuracy of the 90% population sustainability threshold (PST) and contends that fishing can have an adverse impact on sea lion populations at a lower figure.

The RNZSPCA respectfully submits that the Court of Appeal was wrong in 2004 when it stated in relation to the Fisheries Act that ""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"[1]. The RNZSPCA advocates that any deaths caused as an **indirect or direct** impact of fishing activities is by definition "fishing related mortality". The Society strongly believes that deaths to pups which occur as a result of their mother being killed, and deaths caused from starvation or as a result of sea lions being forced to extend their feeding area due to increased competition for squid are and must be included as "fishing related mortality" (after all, extensive trawling is permitted to take place in established breeding and feeding areas of Auckland sea lions). It is due to the deliberate exclusion of these indirect deaths, that the RNZSPCA proposes that the figures upon which the Operational Plan bases itself are fundamentally flawed and that deaths caused as a result of fisheries activities are grossly understated.

The Society submits that measures aimed at eliminating or reducing individual sea lion deaths are just as important as the impact of fishing on the sea lion population as a whole. The concept of a "sustainable" number of sea lions that can be considered to be 'expendable' is not supported by the RNZSPCA, especially considering that this is a significantly threatened species. In addition, the individual welfare of these animals and their dependant pups is an important consideration. In particular, the Society maintains that action must be taken to prevent nursing and/or pregnant females from being killed or injured in trawl nets.

Associate Professor Bruce Robertson of Otago University, conducted an analysis of the demographic rate scenario projections in Roberts and Doonan (2016) which has highlighted the importance of ensuring the survival of particular individuals, namely adult female sea lions.[2] His modelling predicts that, by saving just 34 female sea lions each year, there would be an immediate halt to population decline and the population would stabilise within the next five years; in comparison, 347 pups would need to be saved to stabilise the population which would not take place until after 2020. Therefore, the RNZSPCA insists that the Operational

[1] Squid Fishery Management Company Limited v Minister Of Fisheries and Chief Executive of Ministry Of Fisheries, CA 39/04
[2] Bruce Robertson, Submission on the Draft New Zealand sea lion Threat Management Plan, 19 August 2016, page 11

Plan include activities that limit the impact of fisheries on adult female sea lions. Given that the southern squid trawl fishery (SQU6T) is currently permitted to target arrow squid on the Auckland Islands shelf from January to June each year – when pups and their nursing and pregnant mothers are also in the same location – these limits clearly need to be strengthened.

Page 8 of the Operational Plan states: "The importance of low pup survival, which has also been confirmed by direct observations, indicates that direct fishing-related mortality is not the only cause of the population decline, 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 impacts on lactating mothers." The Society strongly disagrees with the apparent dismissal of fisheries activities as a significant impact on pup mortality. The RNZSPCA would like to see a greater emphasis on ensuring the survival of adult female sea lions. This will assist the pups left behind on shore to survive and also the unborn sea lions that the pregnant females are carrying. It is essential that the Operational Plan and the TMP better acknowledges the risk of indirect mortality, rather than focusing on "direct fishing-related mortality", which will not assist in significantly increasing the population of this endangered species.

While the RNZSPCA appreciates that direct fishing related mortality is not the only cause of the sea lion population decline, the Society maintains that much research has shown that fishing mortality is either the primary factor or a significant contributing factor to the population decline of the New Zealand sea lions (Chilvers, 2011; Robertson & Chilvers, 2011; Bradshaw et al, 2013; Roberts, 2015; Roberts & Doonan, 2016). The RNZSPCA disputes the estimates of direct fishing related mortality and cryptic mortality outlined on page 9 of the Operational Plan, and the conclusion that "eliminating direct fisheries mortality would result in less than half of one percentage improvement in the population growth rate."

The RNZSPCA appreciates that natural issues such as the spread of disease impact the survival of some sea lions. However, the Society feels that these factors are often used as an excuse not to take sufficient action to avoid the preventable detrimental human impacts on the species, in particular those resulting from the activities of fisheries. The RNZSPCA advocates

that all research and knowledge of sea lion populations across New Zealand should be used to inform decision making around the permissibility of fisheries in and around sea lion habitats. Our organisation would like to see more comprehensiveness in the government material which seems to seek to justify and maintain current fisheries policy.

The Society does not believe that the current FRML of 68 (Option 1) is sufficient to support an increase in the population of sea lions; currently, the FRML is set too high. A significant reduction in this figure would see a step towards alleviating the significant impact of the fisheries industry on the New Zealand sea lion. Therefore, the RNZSPCA advocates for a reduction in the FRML to 38 *at the most* (Option 2).

The Society agrees with the adjustment of the proposed FRML to accommodate to some extent for sea lion mortalities in fisheries other than SQU6T which will impact on the Auckland Islands sea lion population. The RNZSPCA maintains its concern about the impact that the trawl fishery for scampi around the Auckland Islands (SCI6A) and other commercial trawl fisheries have on sea lions and, given that rates of observance for these industries are low, the Society advocates that a precautionary approach must be taken when determining risk to sea lions from other fisheries operating in the sub-Antarctic waters known to kill sea lions, such as southern blue whiting, scampi and hoki fisheries.

As mentioned previously, the RNZSPCA believes that the current definition of 'adverse impact' which is "fishing having more than a 10% impact on the Auckland Islands sea lion population" is set too high. The Society questions the accuracy of the 90% population sustainability threshold (PST) and believes that fishing can have an adverse impact on sea lion populations at a much lower figure. The RNZSPCA is disappointed that the TMP and the Operational Plan do not have the long-term objective of recovering the New Zealand seal lion to non-threatened status, which is essential to ensure the survival of the species. Humans are unable to significantly impact the natural causes of sea lion deaths, but we are able to take action regarding the most significant anthropogenic driver of population decline - fisheries activities (as has been highlighted by numerous studies and reviews). The Society believes that the definition of 'adverse impact' should be set no higher than "fishing having more than a 5%

impact on the Auckland Islands sea lion population". Amending the percentage impact to 5% *at the most* would mean that the FRML is more likely to fulfil its intended purpose: to ensure that fishing does not have an adverse impact on the Auckland Islands sea lion population.

The current utilisation of fisheries resources has a significant detrimental impact on sea lion populations. The RNZSPCA believes that the government is being negligent in their obligation to ensure the conservation of a protected species and enable long-term business sustainability by continuing to allow trawl fishing in and around sea lion habitats. The Society advocates that the only acceptable way that commercial squid fishing can be continued, while ensuring the sustainability of sea lion populations, is through the use of alternative, less devastating fishing methods such as jigging. The RNZSPCA believes that the government should look to encourage the SQU6T fishery to adopt the more sustainable and suitable fishing method of jigging which is successfully utilised in similar environments around the world.

Strike Rate (SR)

The RNZSPCA strongly advocates for the Strike Rate to be set at 7.58 (Option 5).

The RNZSPCA strongly advocates that the Strike Rate to be set at 7.58 (Option 5). In fact, our organisation feels that this may still be too low in predicting actual strike rates, given the uncertain factors listed below and due to the lack of significant population increase of sea lions over previous years.

The Society feels that the Strike Rate must be set much higher than the current level due to several factors:

- The Strike Rate was previously set at 5.89 based on statistics and circumstances relevant at the time. These statistics are now outdated and changes to fisheries practices over the years has resulted in vessels trawling for longer periods than was previously common. This significantly increased trawl time means that an increased number of sea lions are likely to be impacted by fisheries activities, and the Strike Rate should accordingly increase.

- Since the use of sea lion exclusion devices (SLEDs), it is not possible to directly count sea lion mortalities in the fishery. As the statistics are based on an approximation of fatal interactions between squid fishing and sea lions, and studies have shown that fishing activities are the most significant anthropogenic driver of population decline, the RNZSPCA considers that a precautionary approach must be taken when determining the Strike Rate; this is especially necessary because of the serious and very real consequence that a further decline in the sea lion population could lead to extinction of the species.

- The Society is concerned that the monitoring of the Strike Rate is being carried out incorrectly, especially due to the uncertainties around the efficacy of SLEDs in terms of the post-exit survival of those sea lions that are caught by trawl nets and the lack of accountability for cryptic mortality.

- The RNZSPCA believes that the direct and indirect effects of fishing on sea lions should be included in Strike Rate estimates, including pups that die when a nursing mother is killed or injured by a trawl net and decrease in food availability (resource competition). The Society has no doubt that, for these rare sea lions to return to non-threatened status and no longer be under threat of extinction, significant steps should be taken to account for, and limit, all the impacts of trawler fishing on the species.

- The RNZSPCA is vehemently opposed to the lowering of the Strike Rate. Selecting Option 2 would be a terrible mistake that would have a devastating impact on the sea lion population. The figures selected as part of the Operational Plan should not be based upon the oldest data, especially as there are likely to have been changes in the behaviour and abundance of sea lions and their prey; certainly changes in fishing operations have taken place. Option 3 is preferable to all but Option 5, in that it accounts for the definite and probable changes that have taken place since the data was collated, which are factors that will affect the interaction rate.

- The RNZSPCA advocates that the Option 5 Strike Rate of 7.58 is the most reliable, especially given that it is based on the most recent 10 years of data where estimates of interaction rate are available. The Society insists that given the valid concerns that

some sea lions will be ejected dead from the SLEDS after drowning in the nets (yet not be noticed and accounted for within the statistics), the lack of certainty for the survival of those sea lions who manage to exit SLEDs alive, and the well-documented concern for indirect fishing related mortality, the Strike Rate selected must be much higher than presently designated.

Discount Rate (DR)

The RNZSPCA strongly advocates for the Discount Rate to be set at 50% (Option 3).

It has been pointed out many times that there are on-going concerns with the efficacy of sea lion exclusion devices (SLEDs). The RNZSPCA joins these voices in questioning the reported success of SLEDs which have been stated in these documents without sufficient evidence. The Society believes the concerns regarding the level of exit probability and cryptic mortality are so strong that the first two options for the Discount Rate must be dismissed and the most realistic choice of 50% (Option 3) selected.

The RNZSPCA does not believe that the use of SLEDs necessarily mitigates the interactions of trawlers with sea lions, and certainly not to the extent claimed in the Operational Plan.

The Society strongly asserts that there are still many unknown factors associated with the use of SLEDs. This means that their effectiveness cannot be assumed and the discount rate not accurately stated. Due to this, the RNZSPCA strongly advocates that the Discount Rate is set at 50% to reflect the lack of real data to set the rate at any other level. The Society agrees with Bradshaw et al (2013) and the sub-set of TAG members who propose this as the only viable option due to the uncertainties associated with the calculations of the Strike Rate and Discount Rate.

The RNZSPCA acknowledges that there is a lack of accurate, recent research to inform the setting of these figures and to assist in the assumptions made when reaching such conclusions. No reliable new data is available to show the exit probability and cryptic mortality. In addition,

it is of great concern that the current figure of 82% (Option 1) relies on the oldest data and does not acknowledge the likelihood of deaths that are caused by sea lions becoming hypoxic and/or drowning as they run out of oxygen before they can return to the surface, or from drowning in the net and falling out of the SLED.

The Society has significant concerns around the level of fishing related mortality of New Zealand sea lions in the SQU6T fishery and the number of deaths caused by injuries or drowning sustained through interactions with SLEDs. In particular, the RNZSPCA notes that there are valid concerns raised around the likely survival of sea lions who exit an SLED alive: firstly, sea lions may sustain injuries due to their interactions with SLEDs that jeopardise their survival once they are ejected from the device; and secondly, it is possible that many sea lions survive encounters with SLEDs, but still run out of air when attempting to get back to the surface. As mammals, sea lions are breath hold divers. The Auckland Island population of sea lions are known to be foraging and diving at the extremes of their physiological limits (Chilvers et al., 2006) making them potentially more vulnerable to interactions with nets and SLEDs. In addition, the potential for the bodies of dead sea lions (that have been killed by the trawl net) to be ejected via the SLED is also likely while the trawl nets are towed and turned on their long (and increasingly longer) journeys. Therefore, without these bodies noted as proof of SLED ineffectiveness, the statistics are likely be hugely inaccurate. The RNZSPCA believes that the figures assumed in the rationale for Option 2 probably underestimate the likely impact of SLED interactions on sea lion survivability.

Given the lack of suitable data surrounding current fisheries activities and the significant concerns regarding the New Zealand sea lion population, the RNZSPCA asserts that it is essential for a precautionary approach to be taken in the assessment of SLED efficacy. The Strike and Discount Rates selected should err on the side of assuming higher interactions and greater mortality than currently suggested. Ensuring that the Discount Rate is significantly reduced as advised would reflect the valid concerns raised about the effectiveness of SLEDs in sea lion encounters, and ensure that more robust steps are taken to alleviate the significant impact that the fisheries industry has on the New Zealand sea lion.

Duration of Operational Plan

The RNZSPCA advocates that the government should look to encourage the SQU6T fishery to adopt alternative fishing methods that do not have such a devastating impact on marine mammals and sea birds. For example, the Society would like to see the trialled uptake of jigging as an alternative fishing method that still allows for the utilisation of squid but with less devastating impacts (although it has been claimed that jigging cannot be carried out our southern ocean conditions, this is disproven by the fact that jigging is successfully utilised in similar environments around the world). The RNZSPCA believes that it is incumbent on the government to require the SQU6T fishery to adopt this alternative fishing method as current trawling methods are unsustainable, both environmentally and economically.

For this reason, the RNZSPCA would like the duration of the Operational Plan to be as short as possible, given that the current impact of fisheries activities on sea lion populations is unsustainable and irresponsible. However, the Society appreciates that it will take a short time for the fisheries industry to transition to alternative, more sustainable methods of fishing, and accepts that the Operational Plan would need to be in place during such a transition. Therefore, the RNZSPCA is prepared to accept a slightly longer duration for the Operational Plan if action is underway in the meantime that leads to a complete end to trawl fishing in and around sea lion habitats.

If no adjustments are made to the Operational Plan, or if the Strike Rate is reduced, the Society insists that the Operational Plan must not last longer than one year. Whereas, if the FRML is reduced, the Strike Rate set at 7.58 and the Discount Rate set at 50%, the RNZSPCA is prepared to accept a longer duration for the Operational Plan.

In the meantime, the RNZSPCA would like to see the TAG taking action to encourage an end the use of trawl fishing around sea lion habitats, and believes that trigger points should be put in place to allow for the Operational Plan to be reviewed sooner if new research or information becomes available that indicates fisheries activities are having a greater impact on sea lion survival than previously thought, if there are changes in fishing operations or level of effort, or if there are concerns regarding sea lion populations.

Notification Requirements

The RNZSPCA believes that the current notification requirements for vessel operators are insufficient to protect sea lion populations and to ensure that adequate reporting is undertaken of sea lion interactions. Vessel operators should not be allowed to operate in or enter SQU6T without an MPI Observer. Failure to abide by this requirement should lead to significant and serious consequences.

It is unacceptable that vessels might be conducting their own reporting and that any vessel is able to enter or trawl in SQU6T without an independent MPI Observer present. Given that the continuation of the current activities of fisheries industries depends upon a reportedly low interaction rate and death rate of sea lions, a reliance on self-reporting is improper and unacceptable. The potential for disastrous consequences for this already endangered species means that boundaries must be firm and rules must be strictly enforced in order that accurate data is collated on interaction and death rates.

The Society agrees that vessel operators must give 72 hours' notice prior to a vessel entering or operating in SQU6T so that an MPI Observer can be deployed onto each vessel in time. However, the RNZSPCA strongly asserts that no vessels should be allowed to enter or operate in SQU6T without such an Observer present on board, and believes that this should be given highest priority at MPI to ensure that sufficient Observers are available for each vessel during the trawling season. The current attempt at discouraging insufficient notice period whereby vessels are not eligible for the Discount Rate makes a mockery of the effectiveness of the Operational Plan and the statistics upon which it relies and gathers.

Reporting Requirements

The RNZSPCA agrees that vessel operators should report weekly regarding the number of tows, whether a SLED was deployed, if each tow was observed and if any sea lions were captured. The Society also agrees that if 80% of the FRML is reached the above information must be reported daily. However, as the RNZSPCA advocates that no vessels should be allowed to enter or operate in SQU6T without an MPI Observer present on board, this reporting

requirement should only exist for fisheries activities that take place outside SQU6T where an MPI Observer is not present on the vessel (the MPI Observer will be collating and reporting on the activity that takes place within SQU6T for the purposes of the Operational Plan). This way, all data collected by MPI Observers on board vessels will be independently obtained and can be relied upon to inform future decision making.

The RNZSPCA does not believe that the current attempt at discouraging non-reporting whereby vessels are not eligible for the Discount Rate is insufficient, and that stricter penalties must be put in place. This is of particular importance given that these figures are essential to the effective management of the sea lion population and that it is not an onerous requirement upon vessel operators.

Trigger Points

The RNZSPCA advocates that the trigger point for the Operational Plan to be reviewed in advance of its scheduled expiry should be phrased as: "if new research or information becomes available that indicates fisheries activities are having a greater impact on sea lion survival than previously thought, if there are changes in fishing operations or level of effort, or if there are concerns regarding sea lion populations". The Society is concerned that the current proposal for the trigger point to be reached when "significant" new information becomes available leaves an unclear boundary, requiring a subjective assessment.

Observer Coverage

The RNZSPCA advocates that no vessels should be allowed to enter or operate in SQU6T without such an MPI Observer present on board. Although the Society acknowledges that MPI has thus far exceeded their 50% minimum observer coverage target (with 84% of tows observed over the last five years), the RNZSPCA believes that all vessels entering or operating in SQU6T must have an MPI Observer present on board.

The Society believes that it is unacceptable for vessels to conduct their own reporting and that no vessels should be able to enter or trawl in SQU6T without an independent MPI Observer present. Given that the continuation of the current activities of fisheries industries depends upon a reportedly low interaction rate and death rate of sea lions, a reliance on self-reporting is improper and unacceptable. The potential for disastrous consequences for this already endangered species means that notification requirements must be amended and observer coverage be 100%, so that accurate data is collated on interaction and death rates of sea lions.

The Society believes that ensuring that all vessel entering or operating in SQU6T have an Observer on board should be given highest priority at MPI. With an amendment to the notification requirements for all vessel operators to give 72 hours' notice prior to a vessel entering or operating in SQU6T (and for no vessels should be allowed to enter or operate in SQU6T without having given 72 hours' notice and with such an Observer present on board) it will be easier for MPI to ensure that sufficient Observers are available for each vessel during the trawling season. Whilst the RNZSPCA appreciates that a commitment to 100% observer coverage is a significant step up from the present MPI activity, the Society believes that there cannot be an adequate reliance on the statistics gathered when vessel operators are self-reporting and are able to operate without having given sufficient notice, with only an adjustment to the Discount Rate. It is essential for the effectiveness of the Operational Plan and the statistics upon which it relies that all vessels are observed and reliable data is gathered regarding sea lion interaction rates.

Fisheries Closure Process

The RNZSPCA agrees with the Fisheries Closure Process and believes that strong deterrents should be in place to discourage any vessel from entering or trawling in the SQU6T fishery after closure.

Summary

In summary, the RNZSPCA supports the proposal for the:

- Fishing-Related Mortality Limit to be set at 38 (Option 2)
- Strike Rate to be set at 7.58 (Option 5)
- Discount Rate to be set at 50% (Option 3)

The RNZSPCA urges the TMP to focus on the long-term objective of recovering the New Zealand seal lion to non-threatened status, which should include periodically reaching specific demographic targets to ensure the significant increase of the sea lion population over the coming decades, and believes that the Operational Plan should assist in setting more stringent boundaries to seek to reduce all threats to sea lions resulting from human activity.

Due to the lack of notable positive impact that the current Operational Plan has had on the sea lion population, the RNZSPCA strongly advocates that a precautionary approach must be taken which sets the lowest threshold for the FRML that seeks for the most limited interactions between fisheries and sea lions. As the Society believes that the instances of indirect and direct sea lion deaths through fisheries related mortalities is actually higher than suggested in the material, and because there are significant concerns with the assessment of SLED efficacy, the RNZSPCA believes that the Strike Rate should be significantly increased and the Discount Rate should be significantly reduced.

On a broader scale, the RNZSPCA advocates that the TMP should be addressing the indirect effects of fisheries on sea lions, such as resource competition. Also, safeguards for protection of the species and the establishment of thorough research must be extended to Campbell Island (the animals' second largest breeding site) in order for the sea lion populations and impacts properly assessed, protected and accounted for. In addition, the TMP should include management actions to address other fisheries that operate in the sub-Antarctic waters and are known to kill these sea lions, such as southern blue whiting, scampi and hoki fisheries. Notification and observer requirements for these other commercial trawl fisheries should also

be strengthened, with a view to transitioning away from the use of trawl fisheries towards more environmentally and commercially sustainable practices.

The Society notes that the Operational Plan is seeking only to reduce some of the impacts of fisheries activities on sea lions, and has concerns over the current notification and observance requirements of vessels that are entering or operating in the SQU6T fishery. The requirement for continual independent monitoring of any vessel that are enters or operates in the SQU6T fishery must be established and rolled out at the earliest opportunity.

The Society believes that the government must to take practical action which eventually aims for SQU6T fisheries activities to result in the zero mortality of sea lions. This could be achieved by ending the use of trawling in these sensitive wildlife areas, and the use of alternative, less devastating, fishing methods. The RNZSPCA believes that the population of New Zealand sea lions will only significantly increase, and the species recovered to a non-threatened status, when their main breeding populations are fully protected. On an individual level, deaths caused as a direct or indirect result of trawling cause suffering to the individual animal, and on a broader level, these activities have had a devastating impact on the population of this endangered species. For these reasons, the RNZSPA urges the government to do as much as it can to ensure the welfare of New Zealand sea lions, while seeking to transition to and establish more environmentally sustainable methods and locations of fishing.

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7 September 2017

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To whom it may concern:

Re: Submission on Operational Plan to Manage the Incidental Capture of New Zealand Sea lions in the Southern Squid Trawl Fishery (SQU6T) for 2017/18 and 2018/19

The Southland Conservation Board (SCB) is a statutory body appointed by the Minister of Conservation and established under the Conservation act 1987. Its functions are set out in section 6 of that Act and in the National Parks Act 1980. The Board's jurisdiction is Southland and its functions include advocacy in regard to all Conservation matters at any public forum or in any statutory planning process.

The Southland Conservation Board's area of jurisdiction includes New Zealand's Subantarctic Islands accordingly; we are interested in the fate of the New Zealand Sea Lion and have for many years been concerned about the declining Auckland Island Sea Lion population. Hence the SCB submitted on the New Zealand Sea Lion/rāpoka Threat Management Plan (TMP) and in this submission we expressed our ongoing concerns on the effects of the fishing on the NZ Sea Lion population.

We continue to advocate for a precautionary approach be adopted with respect to the incidental capture of sea lions in fishing gear; because majority of the World's population of NZ Sea Lions breed on the Auckland Islands immediately adjacent the Southern Squid Trawl Fishery and Auckland Island pup numbers declined by 50% between 1998 and 2009 making sea lions a nationally critical species. The SCB contends that the goal should not be to just stabilise the NZ Sea Lion population at its current threatened status levels but for the population to increase beyond this status; consequently the impacts from fishing activity need to be factored into this goal.

The average catch for the last ten years of 16,464 tonnes is just over half the Total Allowable Commercial Catch of 32,369 tonnes. The decline in the number of tows is not identified but with the number of operating vessels reducing from 63 in 1990 to 17 in 2017, clearly, fishing activity has significantly diminished. However we understand the quota limit has not changed meaningfully; accordingly the fishing effort could be increased at anytime, consequently the fishing impacts on sea lions could escalate at anytime. Nevertheless the potential for these changing impacts has not been considered in the consultation document.

We are very concerned about the continued reliance on sea lion exclusion devices (SLEDS) which, in theory, allow sea lions to escape and avoid drowning to reduce sea lion deaths. However there remains considerable uncertainty about the condition of sea lions once they escape via SLEDs and whether sea lions truly survive their interactions with SLEDs. International scientific experts and NZ fishing industry-hired consultants agree that there is little information to reliably inform post-SLED exit survival of sea lions that have interacted with a SLED in the nets of the SQU6T trawl fishery around the Auckland Island.

Nevertheless, MPI continue to contend that SLEDs greatly increase the survival probability of sea lions that enter a trawl net and the consultation document on the Squid 6T Operational Plan 2017-19 also claims sea lions will survive interaction with SLED devices. Dr Bruce Robertson has stated that "Unfortunately, there is no evidence to support this optimistic assumption. We know very little about the state of NZ sea lions leaving SLEDs. Only one sea lion has ever been seen to leave a net alive. Plus, it is important to note that MAF's new evidence is not based on sea lions escaping SLEDs, instead it is based on Australian fur seals escaping trawl nets via a similar device."[1]

Hence the lack of data and the introduction of the SLEDs has confused determination of the optimal Strike Rate and Discount Rate proposals in the consultation document. **Moreover** many of the key assumptions in the consultation document are arbitrary when setting discount rates for sea lion deaths.

The 2017/2018 Operational Plan should reflect that reality and set the Fishing-Related Mortality Limit (FRML) as low as possible i.e. at 38 (Option 2) and given the issues raised above in connection with pup mortality, the setting of 10% adverse impact on sea lion population, is arguably too high. Further, without more accurate data the SCB advocates for a precautionary approach of using a Discount Rate of 50% - Option 3.

The SCB asserts the duration of Operational Plan should be for a maximum of two years, and if Auckland Island NZ Sea Lion population is not stabilising, the Plan should be reviewed and in addition the triggers listed in the Consultation Document should be adopted.

Yours sincerely

John Whitehead
Chairman

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[1] http://www.otago.ac.nz/news/news/otago028986.html

Dear Sir/Madam

I am writing this SUBMISSION on the DRAFT SQUID 6T OPERATIONAL PLAN - because I believe we need to give NZ's NATIVE ENDANGERED SEA LIONS our best possible, well-considered, chance of recovery and survival.

I understand, from information advised to me by World Wildlife Fund, that NZ sea lions are THE RAREST SEA LION IN THE WORLD !

I also understand that The Department of Conservation lists NZ sea lions as "NATIONALLY CRITICAL" . . and "THE MOST ENDANGERED CATEGORY of SPECIES IN OUR COUNTRY" - with - "THE HIGHEST RISK of EXTINCTION" !

It seems that the draft plan recognises there IS SCIENTIFIC UNCERTAINTY over the impact of fishing on our seals.

I understand there's been BIG CHANGES to SQUID TRAWLING around the AUCKLAND ISLANDS in the last decade; including a DOUBLING in trawl lengths.

WE NEED TO KNOW HOW THESE CHANGES HAVE AFFECTED SEA LIONS, which apparently are GETTING ACCIDENTALLY CAUGHT UP & KILLED IN FISHING NETS.

Additionally, as the Draft Plan recognises, scientists have told the Ministry for Primary Industries that there just ISN'T ANY GOOD NZ EVIDENCE about HOW WELL SEA LION EXCLUSION DEVICES (SLEDs) - ACTUALLY WORK.

It seems to me that it's MOST CRITICAL there's a CLEARER CERTAINTY about how many sea lions are actually dying because of fishing.

In the face of this REAL SCIENTIFIC UNCERTAINTY, the squid fishing plan needs to take a very cautious approach - as it may help to ensure New Zealand sea lions' survival into the future.

Under sections 8, 9 and 10 of the Fisheries Act 1996, the Minister (MPI) is LEGALLY OBLIGED to make DECISIONS THAT WILL MAINTAIN the LONG-TERM VIABILITY of SPECIES - such as our NZ sea lions - and as they cannot speak up for themselves it would be advisable - and I beseech you - to take a "precautionary" approach with ALL the issues in this Plan - ESPECIALLY when there is scientific uncertainty, which MUST be up-to-date for such critical decision-making.

I want you to look after our precious NZ sea lions. THAT MEANS COMMITTING TO DO THE SCIENCE REQUIRED, TO ANSWER CRITICAL QUESTIONS, and being soberly CAREFUL and PRECAUTIONARY, in the meantime, in your vital role.

Thank you for considering my submission.

Yours faithfully
Wendy Devon

Wendy Devon

███████████████

Name-First	Name-Last	Name-First	Name-Last
Adam	Sheehan	Amy	Loiacono
Adam	Meme	Amy	Dove
Addy	Gray	Amy	Waddell
Adelle	Hilton	Ananya	Boonyarattaphun
adrian	hall	ANASTASIA	Neil
Adrian	FAULKNER	Andre	van Niekerk
Adrienne	Cummins	Andre	van Niekerk
Ailie	Suzuki	Andre	Maasjosthusmann
Aimée	Eaton	Andrea	Campbell
Alan	Reid	Andrea	Howey
Alan	Brennock	Andrew	Carman
Alan	Thatcher	Andrew	Rose
Alanah	Brabham	Andrew	Penniket
Alastair	Murray	Andrew	Stanaway
Alex	Wansink	Andrew	Crottyman
Alex	Reid	Andrew Lee	Bolesworth
Alexis	Azcárate	Andy	Morgan
Ali	Foster	Andy	Facer
Ali	Teo	Ange	Martinson
Alice	Weemes	Angela	Thompson
Alicia	del Barrio	Angela	Lyon
Alison	Gaudion	Angela	Bradley
alison	martin	Angela	Armiger
Alison	Dyer	angela	paul
Alison	Hedges	angela	Warren
Alison	Lewis	Anika	Maikoo
Alison	McLeish	Anika	Maikoo
Alison	Yates	Anita	Dempsey
Alison	Ritchie	Anita	Kloezeman
Alison	Loughrey	Anja	Schoenborn
Alison	Chambers	Ann	Wise
Alison	Latham	ANN	HEAPS
alistair	mcdonald	Ann	Olsen
alistair	mcdonald	Ann	Rafealov
Alistair	Browning	Ann	Rafealov
Allan	Dombang	Ann	Dennison
Allan	Martinson	Ann	Rawson
Allana	Norman	Anna	Caithness
Allen	Snowsill	Anna	Brand
Allison	Mawer	Anna	Dahlberg
Allister	Sheppard	Anna	Fay
Alyson	Scott	Anna	Schimmel
amanda	bowen	Anna	Smith
Amanda	Sammut	Anna	Brand
Amanda	Nally	Anna	Solano
amber	mcewan	Annamaria	Peltokangas
Amber	Corney	Anne	Armstrong
Amber	Jackson	Anne	Larkin
Amelia	Saxby	Anne	Scott
Amelia	Rogers	anne	gough
Amelia	Opie	Anne	Hunt
Amelia	Williams	Anne	Larkin
Amii	Merriman	Anne	Hastie
Amy	Glover	Anne	Hunt
Amy	Crichton	Anne	Hunt
Amy	Neal-Duffill	Anne	Moeller
Amy	McMullan	Anne	Johnston
Anne	ODONNELL	Betty	Pearson

Anne	Clark	Bev	Williamson
Annette	van Zeist	Bev	Sullivan
Annette	Barry	Bev	Dowling
Annette	van Zeist	Bev	Sullivan
Annichje	Riemersma	Bev	Musella
annick	louvet	Bev	Sullivan
Annie	wei	Beverley	Parton
Annie	Hill	Beverley	Short
annie	jefferson	Bill	Kirby
annika	bruna	bindy	bonnette
annika	bruna	Blair	Browne
Anthea	Grob	Blu Belle	Collins
Anthea	Brown	Bob	Morgan
Anthony	Opie	Bob	Simpson
Antoinette	Gonzales	Boullet	France
Anton	Devarajah	Brenda	Lawson
Arava	Mcnally	Brenda	Lawson
Ari	Lewis	Brenda	Lourens
Ari	Lewis	Brenda	Scott-Smith
Ashley	Gruebner	Brenda	Walker
Ashvini	Kahawatta	Brendan	Moore
Athena	Macmillan	Brendon	Smale
Averil	Head	Brendon	Gush
Axel	Mariño Méndez	Brendon	Martin
bal	madan	Brent	cain
Barb	Higson	Brent	cain
Barb	Clarke	Brian	Mckay
barbara	bishop	briar	elliot
Barbara	Reynolds	briar	elliot
Barbara	Henry	Bridget	Hall
barbara	blyth	Brigid	Philpott
Barbara	Duff	brigitta	wenzel
Barbara	Jones	Briony	Woodnorth
Barry	Thomson	Britney J	Johansen
Barry	Williams	Brodie	McIntosh
Barun	Saha	Bronwyn	Lewis
Basil	Hammerton	Bronwyn	Chandler
Beate	j	Brooke	Thodey
Becky	Taylor	Brooke	Steff
Belinda	Liley	Bruce	Ashton
Belinda	Sharp	Bruce	Philpott
Belinda	Drake	Bruce	Clark
Belinda	Kitchingman	Bryan	Harvey
ben	wolf	Bunty	Condon
Ben	Wootten	Bunty	Condon
ben	Sutherland	Bunty	Condon
Ben	Burridge	C	Mallows
Ben	Simpson	Camryn	Stent
Benjamin	Plummer	Cara	Dunnett
Benjamin	Sutherland	Carl	Harding
bernadette	Cuellar	Carla	Smith
Beryl	Maglis	Carla	Read
Beth	Lenihan	Carla	Henderson
Beth	Carbery	Carly	Milburn
Beth	Coleman	Carol	Lightfoot
Betty	Kowall	Carol	Hegarty
Betty	Collins	Carol	Cannell
Carol	Bannock	Chrissie	Dowdell
Carol	Hegarty	Chrissy	Blundell

Carol	Fulton	Christina	Hoey
Carola	Hehewerth	Christine	Rushton
Carole	Kelly	christine	Grove
Carole	Long	Christine	Beker
Caroline	Brown	Christine	Coley
Carolyn	Aim	Christine	Tustain
carolyn	russell	christine	machanek
Carolyn	Russell	Christine	Rushton
Carolyn	Swift	christine	mcalpine
Carolyn	Young	Christine	Partridge
carolyn	geary	Christine	Beker
Carolyn	Smith	Chun Hsia	Tang
Carolyn	Aim	Cindy	Yi
Cassandra	Prado	Cindy	Hoskins
Cassidy	Broughton-Hooper	Cindy	Hall
Catharine	Herbison	Cinzah	Merkens
Catherine	Rannard	claire	coveney
catherine	heaps	Claire	McMeeking
Catherine	Bolly	Claire	Michael
Catherine	Beattie	Claire	Barlow
catherine	heaps	Claire	Daines
Catherine	Young	Clare	Williamson
Catherine	Lawn	Claudette	Eskrick
Cathy	Jordan	Claudia	Thompson
Cathy	Rogers	Clem	Gardner
Cécile	Pélardy	Cliff	Wilton
celine	hyrien	Clio	Reid
chanel	scarrott	Colleen	Adam
Channa	Knuckey	Colleen	Lobel
Chantel	Heaven	corine	cathala
Chantelle	De Beer	Courtney	Willett
Chantelle	de Beer	Craig	Keen
Chantelle	de Beer	Craig	Keen
Charissa	Snijders	Craig	Hines
Charlotte	Crocker	Cris	Fulton
Chelsea	Myers	Crystal	TeKira
Chelsea	Duck	Crystal	TeKira
Cherie	Crisp	cynthia	Tucker
Cheryl	Lewis	Cynthia	McConville
cheyanne	carey	Dagmar	Anders
Chinta	Tambunan	Damian	Sole
Chloe	Lomey	Dan	Eaton
Chris	Mulvey	Dana	Sheehan
Chris	Sloper	Daniel	Taylor
Chris	Henderson	Daniel	Andrewes
Chris	Rose	Daniel Jason	Wagner
chris	seals	Daphne	Davies
Chris	Corser	Darren	Skelton
Chris	Harkess	Darreol	Laird
Chris	McCormack	Dave	Watson
Chris	Mallows	David	Cunneen
Chris	Chambers	David	Ronald
Chris	Jackson	David	Famularo
Chris	Chambers	David	Brightley
Chris	Harris	David	Howard
chris	Wood	David	Tong
Dawn	Shearer	Dr. Maria	Walls
Dean	Baker	Dylan Wade	Lajunen
Deanna	Thomson	Edwin	Mares

Debbie	Noon	Eeva-Katri	Kumpula
Debbie	Maher	Elaine	Lian
Debby	Snape	Elaine	Ritchie
Deborah	Henriksen	Elaine	Hampton
Deborah	Crossan	Eleanor	Rogers
Deborah	East	Eleanor	Bakker
Deborah	Quilter	Elena	Tarnova
Deborah	Bonneveld	Elinor	Anderson
Deborah	Newman	Elinor	Anderson
Debra	Peterson	Elizabeth	Grubb
Dee	Austring	Elizabeth	Trickett
Deirdre	Main	Elizabeth	McFarlane
Delight	Gartlein	Elizabeth	McGowan
Delilah	Frost	Elizabeth	Leach
Delilah	Frost	Elizabeth	Shennen
Dell	McLeod	Elizabeth	Jarvis
Delphi	Locey	Elizabeth	Devine
Denis	Fernandes	Elizabeth	Purves
Denise	Kirby	Elizabeth	Fagan
Denise	Porter	Elizabeth	Hopley
Denise	Keepa	elizabeth	gaskin
Désirée	Thum-Spickerhoff	Elizabeth	Fahy
desmond wayne	knapping	Ella	Peoples
Diana	Stiven	Ella	McDowall
Diana	Moore	Ellen	Rykers
Diana	Moore	Ellery	Daines
Diane	Davis	Elma	Tassi
Diane	Burns	Elspeth	abdine
Diane	Cowan	Emiko	Cowell
Diane	Davis	Emily	Adamson
Diane	O'Connor	Emily	Toomath
Diane	Selwyn	Emily	Toomath
Dick	Downing	Emily	Harrison
Dinah	Morris	Emily	Toomath
Dominic	Ferretti	Emma	Young
Dominique	Le Sellin	Emma	Blunt
Dominique	LANG	emma	kelly
Dominique	LANG	Emma	Dickey
Dominique	Blatti	Emma	Parker
Dominique	Le sellin	Emma	Tennent
Don	McInnes	Emma	Thatcher
Donna	Mccartie	Emma	Woods
Donna	Slade	Erana	Rameka
Donna	Mills	Erena	Hill
Donna	Mummery	Eric	Freeman
Donna	Jack	Erika	Galpin
Donogh	Rees	Erika	Sullivan
Dorina	Jotyi	Erin	Metcalf
Dorina	Jotti	Erin	Batley
Dorina	Jotti	Ernst	Mecke
dorinda	kelley	Estelle	Botha
Dorothy	Williams	Eva	Mundprecht
Doug	Ashby	Eva	Woodbury
Dr Janet	Downs	Evan	Jamieson
Dr Mike	Paterson	Evelyn	Boon
Everard	Aspell	Glenda	Stone
Fabian	Mendes	Glenice	Renaud
Fabio	Falter	Glenn	McKinly
Fay & Kevin	May	Glenn	Linton

Faye	Crawford	Glynis	Jennings
Faye	Goggin	Grabiel	Ng
Fenton	Peterken	Grace	Ryan
Fergus	Sutherland	Grace	Te Whatu
Fidelma	Berkery	graciela	somma
Fiona	Bennetts	Grae	Hunter
Fiona	Lyttle	Graham	Shaw
Fiona	Rountree	Graham	Townsend
Fiona	Dean	Graham & Sally	McInnes
Fiona	Rossen	Grant	Cleary
Fleur-Alice	Bolton	Greg	Skinner
Fran	Rutledge	Greg	Millar
Fran	Lowery	Grizelad	XXX
Frances	Clark	Gwyneth	Parallag
Frances	Kelly	Hadee	Thompson
Frances	Clark	Hannah	Smith-Frank
Frances	Palmer	Hannes	Gouws
Francine	Smith	Harold	Price
Francine	Smith	Harriet	Preddey
Freya	van Os	Harrison	Fisher
Frida	Tengvar	Harry	Truman
Gabriel	Roberts	hazel	elliot
Gabrielle	Bisschops	Hazel Ann	Cross
Gail	Flavell	Heather	Sanders
Gail	Flavell	Heather	Minnis
Gareth	Taylor	Heather	Cave
Gareth	Taylor	Heather	Hay
GARTH	SPOONER	Heather	Birnie
Gary	Benbow	Heather	Walls
Gavin	Tamblyn	Heather	Hine
Gay	Burman	Heather	Madsen
Gaylene	Harvey	Heather	Rhind
Gemma	Anderton	Hector	Mallet
gemma	thomas	Hedley	timbs
Gene Izzabelle	Flores	Helen	Robertshaw
geoff	hocking	Helen	Morgan
Geoff	Croker	Helen	Hayhurst
George	Preddey	Helen	Noble
George	Santorik	Helen	Black
Georgina	O'Connor	Helen	Smith
Gerald	Hargreaves	Helen	Kay
Gerard	Wech	Helen	Morgan
Gerri	McFadden	Heli	Perala
Gill	Higgs	Hetty	Nobel
GILL	STRINGER	Hilary	Bisschops
Gillian	Murray	Hilary	Diack
Gillian	Clover	Hilary	Broughton
Gilly	Jackson	Hilary	Phillips
Gina	Watts	Hope	McNabb
Gina	Sanders	Hugh	Tomlinson
Gina	Mitchell	Hugh Beveridge	Beveridge
Gina	Matete	Iain	Tetley
Giverny	Forbes	Ian	Stewart
Giverny	Forbes	Ian	Lightbody
ilia	wehman	Janette	Kear
ilia	wehman	Janette	Bradshaw
Imogen	Foote	Janette	Wallace Gedge
Imogen	Grant	Janice	Brush
Imogen	Bunting	Janice	Baardman

Ingrid	Schoenfeld	Janine	Raison
Ingrid	Sundqvist	Janine	Vinton
Ingrid	Perols	janine	ketting
Irene	Cross	Janine	Clement
Iri	Sinclair	Janine	Raison
Isa	Lüerssen	Janis	Charman
isabella	L'Estrange-Corbet	Janis	Charman
isabelle	FERNANDES	Janis	Barnard
Ismene Gemsjaeger	Gemsjaeger	Janis	Markie
Ismene Gemsjaeger	Gemsjaeger	Jaroslaw	Jurasz
Ismene Gemsjaeger	Gemsjaeger	Jaroslaw	Jurasz
Jackie Powell	Powell	Jasmin	J
Jackie Powell	Powell	Jason	Morgan
Jacky	Ancliffe	Javier	Rivera
Jacky	Ancliffe	Jean	Goodbrand
Jacqueline	Hemmingson	Jean	Bishop
Jacquie	Mardon	jean-claude	louvet
Jacquie	Rodewald	Jeanette	Trewin
Jade	Hudson	Jeanine	Langvik
jade	penn	Jeannie	Preddey
James	Fromont	Jeff	Wong
James	Mulcare	Jeffery	Wells
Jamie	G	JENIKA	SMITH
Jan	Conway	Jenni	Porter
Jan	Watson	Jennifer	Woodman
Jan	Grover	Jennifer	Hughes
Jan	Fogg	Jennifer	cotter
Jan	Richardson	Jennifer	Ma'u
jan	magee	Jennifer	cotter
Jan	Stobie	Jenny	Matthews
Jan	Holdom	Jenny	Campbell
janara	allen	Jenny	Brown
Jane	Day	Jenny	Jackson
Jane	Carter	Jenny	Matthews
Jane	Scoular	Jeremy	Stead
Jane	Bramwell	Jeremy	Stead
Jane	Sinclair	JESS	W-H
Jane	McMurray	Jess	Senior
Jane	Kippenberger	Jess	Keast
Jane	Burgess	Jesse	Mills
Jane	Hanley	Jessica	Wood
Jane	Moodie	Jessica	Rix
Jane	Gregory	Jessica	Murphy
Janet	Stevenson	Jessie	Balding
Janet	Mayes	Jessie	Hunt
Janet	Russell	JET	Sarich
Janet	Ledingham	JET	SARICH
Janet	Crawford	Jill	Ford
Janet	Hall	Jill	Cooper
Janet	Henry	Jill	West
Janet	Crawford	Jill	Fisher
Janet	Mayes	Jill	Irwin
Janette	-Miller	Jill	Harland
Jillian	South	Julie	Jeans
Jo	Ellis	Julie	Coulson
Jo	Wilcox	Julie	Wilson
Jo	Coffey	julie	Rigney
Joan	Oxlee	Juliet	Cooke
Joan	Oxlee	Juliet	Adams

Joan	Pow	Juliet	Kim
Joan Dutton	Dutton	Juliette	Lee
Joanna	Kuta	Julliet	Krag
Joanna	Lee	Julliet	Krag
Joanna	Santa Barbara	Julliet	Krag
Joanne	Peace	June	Herbert
Joanne	Brennan	June	Penn
Joanne	Radford	Justin	Marler
Joanne	Smith	Justine	Newnham
Jocelyn	Harris	Justine	Dallimore
Jodi	Young	Justine	Farquharson
Joe	Godliman	K	Matthews
John	Wishart	k	newton
John	Nisbett	Ka	Newton
John	Faulding	Kai	Mundprecht
John	Doe	Kara	Paaka
John	Horwood	karen	moncur
John	Wilson	Karen	Williamson
John	Chang	Karen	Paton
John	Topliff	Karen	McMorran
John	Quirke	Karen	Lloyd
John	Howes	Karen	Harcombe
JOHN	pasqua	Karen	Edney
John	Chapman	Karen	Weston
Jonathon	Small	Karen Dianne	Brookes
Jonna	Nimot	Karin	Kronenburg
jordan	hall	Karin	Johansson
Joseph	Steff	Karin	Johansson
Josephine	Sutton	Karn	Bahrami
Josh	Goodman	Kat	Dawson
Josh	Cole	Katarina	Porter
Joshua	Salter	Kate	Bourke
Juan	Parada	Kate	Verpoorten
Juanita	Mackie	Kate	Stalker
Jude	Pemberton	Kate	Nankivell
Jude	Kelly	Kate	Pickard
Jude	Lambert	Kate	Lang
Judi	Soutar	Kate	Williams
Judi	Soutar	Katerina	Roti
Judi Lapsley Miller	Miller	Katerina	Mitchell
Judy	Vernon	Katherine	Bazarnaya
Judy	Simms	katherine	Sampson
Juerg	Tschumperlin	Kathryn	Barnes
Juita	Tambunan	Kathryn	Kelly
Juita	Tambunan	Kathy	Bartlett
jules	taylor	Kathy	Wright
Julia	Newall	Kathy	Player
Julia	Church	Kathy	Stewart
juliana	jasni	Kathy	Player
Julie	Woodruffe	Katie	Martin
Julie	Kidd	Katrina	Stewart
Julie	Cartwright	Katrina	Osgood
Katrina	Schrafft	Laurence	Pridmore
Kay	Jenkins	Laurie	Foon
Kay	Irwin	Layla	Gruebner
Kay	Marsh	Layling	Stanbury
Kaylene	Worrall	Leah	Baddeley
Kc	Meneses	Leah	Howell
Keith	Armstrong	Leanne	Finn

Keith	Winteringham	Leanne	Berry
Kelly	Bliss	Leanne	Finn
Kelly	Grandiek	Leanne	Smith
kelly	spencer	Lee	Johnson
Ken	Hume	Leela	Menon
Ken	Hansen	Leesa	Chawner
Keri	Molloy	Lei-Anne	Bashir-Elahi
Kerry	Jimson	Leigh	Law
Kevan	Wilde	Leigh	Penman
Kevan	Wilde	Leigh	Saunders
Kevin	Sargent	Leise	Cochrane
Kevin	Donaldson	Lenka	Blaß
Kiera	Baker	Leon	Pienaar
Kieran	Young	Leone	Shaw
Kieran	Young	Leone	Gruebner
Kim	Wealleans	Leonie	Rousselot
Kim	Thwaites	les	maiden
Kim	Hove	Les	Robinson
Kingsley	Tobin	Leslene	Dunn
Kirsten	Hough	Lesley	Lord
Kirsten	Hough	Lesley	Minogue
Kirsten	McLaren	Lesley	Anderson
Kirsten	Hough	Lesley	Rainbow
Kirsty	Parr	Lesley	Mochan
Kirsty	Chalmers	Lester	Miller
Kirsty	Irvine	lewis	surgenor
Koha Mason	Mason	Liam	Sullivan
Kristen	Meads	Liana	Poole
Krys	Marchelak	Libby	Muir
Krysta	Hoani	libby	christophers
Kylie	Foster	Linda	Thorne
Kym	Kempen	Linda	Rawlinson
lace	bell	Linda	Cottle
Laetitia	Grall	Linda	Cottle
Laetitia	Grall	Linda	Hodson
Laetitia	Grall	Linda	Webster
lance	shaw	Linda	Tocker
LANTHIA	STEWART	Linda	Cook
Lara	Coxhead	Linda	Cottle
Lara	Brosnahan	Linde	Rosenberg
Lara	Teodorescu	Linderose	Rosenberg
Lara	Tekmen	Lindi	Engelbrecht
Larissa	Hartigan	Lindsay	Butler
Larissa	Wildsmith	Lindsay	Eaton
Larraine	Talbot	Lindsay	Butler
Larry	Phillips	Lisa	Maloney
Larry	Tasker	Lisa	Stone
Lasse	Pedersen	Lisa	Browne
Laura	Foy	Lisa	Johnston
Laurel	Croft	Lisa	James
Lauren	McInteer	Lisa	Schultz
Lisa	Bourgogne	Marcita	Uy
lisa	zhong	Marcita	Uy
Lisa	Hall	Marco	Groot
Lisa	Mazzola	Marek	Kozub
Lisa	Fitzgibbon	Marga	Gili
Lisa	Scholz	Margaret	Hazelton
Lisa	Neste	Margaret	Dawson
Lissa	Weight	Margaret	Knights

Livia	Esterházy	Margaret	Parkinson
Livvy	Cosh	Margaret	Colway
Liz	Hammond	Margaret	Becker
Liz	Drain	Margaret	Hazelton
Liz	Henderson	Margaret-Ann	Campbell
Liz	Henderson	Margarita	Depain
Liz	Sutherland	Margie	Luby
Lizzy	Gayfer	Marharett	Jones
Logan	Fraser	Mari	Gordon
Lolita	Vallyon	Mari	Dominguez
Lori	Dungey	Mari	Dominguez
Lorna	van der Lijn	Mari	Gordon
Lorna Wootton	Wootton	Maria	Valkenburg
Lorraine	Gardner	maria	angelica
Lorraine	Cook	maria	angelica
Louisa	Staemmler	Maria Ling	Ling
Louise	MacKenzie	marian	milne
Louise	Harris	marianne	louvet
Lucie	Williams	Marianne	Aschenbrenner
lucinda	Blackley	Marie	Spencer
Lucy	Butcher	Marie	LeBlanc
Lucy	Gray	Marie	LeBlanc
Lucy	Hollings	Marie-France	Boudreault
Lucy	Butcher	Marie-France	Boudreault
ludo	stassijns	Marilyn	Slater
Lukas	Schramm	Marilyn	Blackburn
Luke	Christiansen	Marion	Towns
Lyn	Walker	Marion	Abadie
Lyn	Jarman	marion	kempen
Lynda	Arona	Marion	Wilson
Lyndal	MacBride	Marion	Greene
Lynn	Mortlock	mark	stewart
lynn	taylor	Mark	Worth
lynn	whiting	Mark	Goodwin
Lynne	Anderson	Mark	McNeilage
Lynne	Cooper	Mark	Bloxham
madeleine	child	Mark	Hollinrake
Maelie	bugat	Marly	Doyle
Maggie	Evans	Martin	Rigby
Maggie	Evans	Martin	Junek
Maia	Cooper	Martin	Rigby
Mairi	Law	Martina Behla	Behla
Malcolm	Yeates	Martyn	Pitcher
Malcolm	Yeates	Mary	Laurent
malibu	hamilton	Mary	Sunderhauf
Manon	Hellin	Mary	Wilson
Mara	Davison	Mary	Macnaughtan
Mara	Davison	Mary	Kirkman
Marcel	Kerrigan	Mary	McLean
Marcia	Crossland	Mary Claire	Fisher
Maryann	Darmody	Monique	Heyneke
Maryann	Darmody	Morag	Cunningham
Mary-Anne	Cameron	Muriel	Moran
mathew	shaw	Murray	Hunt
Matina	Sohos	Murray	Hunt
Matina	Sohos	Myra	Larcombe
Matt	Evans	Mzia	Khmaladze
Matthew	Mair	Nadia	Gibbs
Matthew	Mair	Nadia	Gibbs

Maureen	Wade	Nadine	Nichols
mauricio	carvajal	Nadine	Fathers
mauricio	carvajal	Nadj	hasenauer
Max	Williams	Nadjet	Zaidi
Max	Howe	Naomi	Rowley
Meg	Gordon	Nardene	Berry
Megan	Sargent	nareeta	martin
Megan	Wraight	Natalie	Blasco
Megan	Mickelsen	Natalie	Sisson
Mel	Lewis	Natalie	Moreno
Melanie	Quintal	Natasha	Grondin
Melanie	Remy	Nathalie	Boltt
Melissa	Hunter	Neal	Brown
Melissa	Gilbertson	Ngaire	Ryan
meredith	knight	Nic	Rout
meredith	knight	Nicholas	Drake
Merren	Grigg	Nicholas	Drake
Merren	Tait	Nicholas	Drake
Merrin	Pearse	Nick	Boyd
Merv.	Smith	Nick	Ward
Meryl	Pinque	Nick	Storey
Meunier	Laurence	Nick	Dye
Miah	Baker	Nick	Moyle
Miakyla	Nills	Nicola	Smitb
Michael	Hegarty	Nicolas	Mortier
Michael	Chew	Nicole	Johnson
Michael	Davis	Nicole	Davidson
Michael	Trevelyan	Nicole	Bautista
Michael	Hartley	Nicole	Edwards
micheal	mac	Nicole	Fowler
Michele	Norton	Nicole	Johnstone
Michelle	Mathis	Nicoletta	Buttignon
Michelle	de Bruyn	Nigel	Thorpe
michelle	Leuthart	Niharika	Giri
Michelle	Boulle	Nikki	Sturrock
Mike	Jackson	Nikki	Peterson
Mike	Kelly	Nina	Rivers
mike	conboy	Nina	Bisley
Mike	Currie	Nirico	Mambo
Mike	Kelly	Nola	Hall
Mike	Todd	Nora	Shayeb
Milika	Nederlof	Norm	Murray
Miranda	Gray	Norma	Hudson
Miranda Jane	Caird	Norton Snr.	Norton Snr.
Mirella	Simons	Olive	Gardner
Miriam	Bell	Oliver	Hoffmann
Moana	Va	Olivia	Kaeppeli
Moira	Parker	Olwen	Mason
Mona	Schmidt	Owen	Hill
Paige	Cooper	Phillip	de Bruyn
Pam	Ryan	Phillipa	Buchanan
Pamela	Belsham	Phoebe	Botica
Pamela	Stainton	Phoebe	Donovan
Pamela	Belsham	Priscilla	Gallou
Pamela	Absolum	Pua	Luatua
Pania	Newman	Rachael	van Niekerk
Paola	Moretti	Rachel	McLaren
Pat	Hoffmann	Rachel	Moss
Pat	Kennedy	Rachel	Gibb

Pat	Gibbs	Rachel	Taylor
Pat	Baskett	Rachel	Du VAl
patreena	bryan	Rachel	McLaren
Patricia	McNaughton	Rachel	Dobric
Patricia	Hannah	Rachel	Gollop
Patricia	Villaverde	Rachel	McGregor
Patricia	Kane	Raewyn	Callaghan
Patricia	Masters	Raewyn	Chamberlain
Patricia	Vazquez	Raewyn	Callaghan
Patricia	FitzGerald	Ralph	Wallace
Patricia	FitzGerald	Rata	Gordon
Patrick	Kelly	Raymond	Mainprize
Patrick	Medlicott	Rayna	Stephens
Patte and Roger	Williams	Rebecca	Stringer
Paul	Jones	Rebecca	MacKay
Paul	Gains	rebecca	evans
Paul	Jacobson	Rebecca	MacKay
Paul	Dietsche	Rebecca Clare	Pearce
Paul	Gains	Rebekah	Reardon
Paul	Bryant	Regan	Flanigan
paul	cole	Regan	Flanigan
Paul	Judge	regula	hess
Paul	Bohmer	Ren	C
Paul	Thompson	Rene	de Vries
Paula	Cross	Renee	Pearson
Paula	Rowell	Renee	Harvey
Paula	Bol	Reuben	Cohen
Paulette	Carpenter	Rhona	Daysh
Paulette	D'Amico	Rhonda	Hogan
Pauline	Keast	Riah	King-Wall
Penelope	Trevathan	Richard	Petty
Penny	Owen	Richard	Starr
Perry	King	Richard	van Dijk
Peta	Roberts	Richard	Charlewood
Peta	Hudson	richard	miller
Peta	Hudson	Richelle	Edwards
Peter	Karl	Rick	Bazeley
Peter	Thompson	Rick	Mansell
Peter	Harris	Rika	Louw
Peter	Galbraith	Riz	Khan
peter	napier	Roanne	4
Peter	Hodge	Robbie	Newbold
Peter	Bielawski	Robert	Smith
Petronella	Lazet-Polman	Robert	Russell
Petula	Jefferies	Robin	Williamson
Philip	Dashfield	Robin	Williamson
Philip	Musther	robin	elder
Philip	Griffin	Robyn	Pengelly
Robyn	Pengelly	Sandra	Maca
Robyn	Fond	sara	matheson-Taylor
Robyn	Tucker	Sara	de Jong
Robyn	Begley	Sara	Ninbar
Robyn	Bailey	sarah	bett
Robyn	Begley	Sarah	O'Malley
Rod	Brown	Sarah	Godliman
rod	vergara	Sarah	Ayres
Rod	Hall	Sarah	Solaris
Roddys	Gil	Sarah	Jack
Roena	Walker	Sarah	Duckworth

Roger	McNeill	Sarah	Lightbody
Rohit	Vig	Sarah	Campbell
rolf	mueller-glodde	Sarah	Down
Ron	Liindsay	Sarah	O'Malley
Rondi	Teisen	Sarah	Lamont
Ros	Preston	Sarah Rose	Brown
Rosalie	Goldsworthy	Scarlett	Bodnar
Rosalind	Paris	Scott James	Miers
Rosa-Mari	Niskanen	Sean	Corrigan
rose	jamieson	Sebastian	van der Zwan
Rose	Cron	Sequoia	Scriven
Rose	Goodliffe	Sequoia	Scriven
Rose	Mackinnon	Sereena	Burton
Rose	G	Shae	Fischer
Roseanne	Burleigh	Shane	Hooper
Roseanne	Burleigh	Shannon	McNatty
Roseina	Shield	Shannon	Hanrahan
Rosemary	Banks	Shannon COOPER	COOPER
rosemary	gear	Sharee	Bentley
Rosie	McMenamin	Sharif	Nadaf
Ross	Stringer	Sharon	Pilcher
Ruben	Blok	sharon	kitching
Russell	Trotter	Sharon	Daly
Ruth	Lewis	sharon	o'callaghan
Ruth	James	sharon	o'callaghan
Ruth	Tschümperlin	Sharyn	Barclay
Ruth	Tschümperlin	Shaun Norman	Norman
Ruth	Tschümperlin	Shaymas	Carroll
Ruth	Sandiford Phelan	shelley	monk
ruth	Whittome	Shelley	Heiss-Dunlop
Ryan	Huriwaka	Shelley	Duffin
S.	Cooksley	Shelley	Higgins
Sabien	Van Riessen	Shelley	Myers
Sabien	Van Riessen	Sheree	Cavanagh
Sally	Garner	Sheri	Burrow
Sally	Wilson	Sheryl	Gledhill
Sally	Cleaver	Sheryl	McCauley
Sam	Chapman	sheryn kirk	kirk
Sam	Haultain	Sid	Becker
Sam	Norton	simon	kelly
Samantha	Lucas	Simon	Williams
Samantha	Ford	Simon	Henshaw
Sandi	Wilson	Sophie	Bock
Sandi	Wilson	Sophie	Craig
Sandra	Mooney	Sophie	Faber
Sandra	Becconsall	Sophie	Bond
Sandra	Fogliani	Sophie	hall
Sophie Perkins	Perkins	tamsin	hanly
Stacey	Wilson	Tamsyn	Flint
Stefan	Hadfield	Tamsyn	Downes
Stella	Nicolson	Tanya	Caccioppoli
Stella	Gambardella	Teagan	Frazer-Bristow
STEPH	LIEBERT	Teanau	Tuiono
Stephanie	Larkin	Teresa	Healey
Stephanie	Wilkin	Terri	Gordon-Davis
Stephanie	Larkin	Terri	Walsh
Stephanie	Lukey	Terri	Gordon-Davis
Stephanie	Schellingerhout	Terri	Walsh
Stephanie	Coker	Terry	Parkin

STEPHANIE	JOHANSEN	Terry	Parkin
stephanie	parnell	Terry	Davies
Stephanie J	Ferris	terry	quin
stephen	mcburney	Tessa	Commins
Stephen	Jarvis	Theo	Klee
Stephen	Jarvis	Thérèse	Fromaigeat
Steve	Piner	Tilo	Spalke
Steven	Kennedy	Tim	Hay
Stuart	Moulding	Tim	Nelson
Sue	Stroud	Tim	Euinton
Sue	Wilton	Tim	Laing
Sue	Mason	Timothy	Reece
Sue	Smith	Timothy	Bollard
Sue	Marsh	Tina	Jackson
Sue	Pate	Tina	Stanton
Sue	Atkinson	Tine	Reymen
Susan	Brutscher	Tobias	Alexander
Susan	Robinson	Todd	Landers
Susan	Nelson	Tony	Wilson
Susan	Waller	Tony and Christina	Baker
Susan	Turner	Tracey	Channon
susan	walker	Tracey	Hodge
Susan	Buckland	Tracey	Barnier-Willis
Susan	Kerr	Tracey	Winiata
Susanne	James	Tracy	Samuels
Susanne	James	Travis	Sayring
Susi	Kahn	Trev	Margolin
Susi	Kahn	Tricia	Wood
Suzanne	Campbell	Tricia	Pitcher
Suzanne	Benham	Trish	O'Callaghan
Suzanne	Caron	trisha	hartley
suzanne	Andrews	Trudy	Ballantine
suzanne	duncan	Tsana	Plessius
Suzie	Boyd	Uta	Bleidistel
Suzie	Ilina	V	Jones
Suzy	Monds	V	Rentsch
Swenny	van Endhoven	V	Jones
Sylvana	Whyborn	Vaana	Langdon
Sylvia	Searle	Val	Hepenstall
Sylvia	Morgan	Val	Deakin
Sylvie	BRANDT	Valerie	Spies
Tahlia	Curnow	Valerie	Tasker
Talise	Habib	Valerie	Davidsn
Tam	Eaton	Vanessa	Moon
Tami	Evans	Vanessa	Harrison
tamsin	hanly	Vasiliki	Vaiese
vera	lukacic	Wendy	Devon
Vicki	Wogan	Wendy	Richards
vicki	smith	Wendy	Travis
Vicki	Hilliam	Wesley	Lawrence
Vicki	Morris	Will	Barber
Vicky	Pope	William	Walmsley
víctor	fuster lópez	William	Walmsley
víctor	fuster lópez	William	Friend
Victoria	Alba	Wim	Vrenegoor
Victoria	King	Wynn	Davies
Virginia	Watson	xavier	petit
Virginia	Nicol	Yoli	Perring
Virginia	Nicol	Yvonne	Amery

Vivien	Barnes	Yvonne	Curtis
Vivienne	Couper	Yvonne	Fast
wade	shotter	Yvonne	Barton
wade	shotter	Zalikha	Misari
Waka	Miller	Zane	Currie
Wayne	Stocks	Zascha	Mann
Wayne	Trow	zelda	Chapman
Wendy	Kempsell	Zephanie	Locker-Lampson
Wendy	Bailey	Zephanie	Locker-Lampson
wendy	hodder	Zilda	Williams
Wendy	Dawson		

Dear Madam / Sir

I am writing this submission on the draft Squid 6T Operational Plan because I believe we should be giving New Zealand's native, endangered sea lions the best possible chance of recovery and survival.

New Zealand sea lions are the rarest sea lion in the world. As you know, the Department of Conservation lists NZ sea lions as nationally critical – the most endangered category of species in the country, with the highest risk of extinction.

It is good to see the draft plan recognising the scientific uncertainty over the impact of fishing. I understand that there have been big changes to squid trawling around the Auckland Islands in the last decade, including a doubling in trawl lengths and more turns. We need to know how these changes affect how many sea lions are accidentally killed in fishing nets.

Similarly, as the draft plan recognises, scientists have told the Ministry for Primary Industries (Ministry) that there just isn't any good New Zealand evidence about how well Sea Lion Exclusion Devices (SLEDs) work. It is critical that this research is done over the next two years, so that we can finally resolve this question, and be more certain about how many sea lions are dying because of fishing.

In the face of this real scientific uncertainty, the squid fishing plan should take a cautious approach to help ensure New Zealand sea lions survive into the future.

Under sections 8, 9 and 10 of the Fisheries Act 1996, the Minister is legally obliged to make decisions that will maintain the long-term viability of species such as sea lions, and take a precautionary approach when there is scientific uncertainty.

To meet these legal obligations and to save NZ sea lions, the plan must:

1.   Reduce the sea lion kill limit (the Fishing-Related Mortality Limit) to 38 (Option 2) as the maximum, but preferably lower to reflect the need for precaution until scientific uncertainties have been addressed. The limit of 38 is better than the current 68 because it is lower. However, it is not yet a precautionary level because the model used to calculate the

limit used the old untested assumptions that 82% of sea lions survive trawl nets because of SLEDs and the old strike rate that doesn't account for changes in fishing practices.

2.   Increase the strike rate to 7.58 sea lions per 100 trawling tows (Option 5), because this represents the most precautionary strike rate. New science is needed to better model how the changes in fishing practices over the last 10 years (double tow length and more turns) have changed the strike rate. Until this science is completed, a precautionary approach is appropriate.

3.   Set a discount rate for SLEDs of 50% (Option 3), because there have been no scientific studies about how many sea lions successfully escape through the SLEDs or drown in the nets and fall out through the SLEDs. A 50/50 probability would appropriately reflect this lack of science. It is effectively a coin toss; and it is the most precautionary option provided which is appropriate in this case.

I want you to look after our precious NZ sea lions. That means committing to do the science to answer critical questions, and being careful and precautionary in the meantime. Thank you for considering my submission.

Yours faithfully

WWF-New Zealand submission on the Squid Operational Plan, MPI Discussion Paper No: 2017/28

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31 August 2017

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WWF-New Zealand submission on the 2017 Squid Operational Plan

WWF-New Zealand is grateful for the opportunity to comment on the 2017 draft Squid Operational Plan (the plan).

New Zealand sea lions/ rāpoka are rated "Nationally Critical" in the Department of Conservation Threat Classification System – the category with the highest risk of extinction.[1] A National Threat Management Plan for New Zealand sea lions/ rāpoka (the TMP) has been developed with a vision to recover the species to a "Non-Threatened" status. The Squid Operational Plan must align to the TMP in its management of accidental capture of sea lions in trawl nets (bycatch) – which is the most significant human threat to sea lions.

The central theme of this submission is that a careful and precautionary management approach is required due to the significant uncertainty in the best available science developed to inform management. Clear and transparent acknowledgement of the uncertainties and limitations associated with the science about sea lions and fisheries threats is essential to enable informed participation, consultation and decision making for the Squid Operational Plan. Providing a clear picture of the uncertainty around the best available science is particularly important in this case, where the uncertainty is significant, because it means that under section 10 of the Fisheries Act (1996) the Minister should take a precautionary approach.

This submission is structured into three parts, with three key recommendations:

- First we recommend MPI remove biases, inaccuracies, and misleading language in the draft plan
- Second, we recommend MPI clearly acknowledge the scientific uncertainties. We identify the limitations and issues with the sea lion demographic model, quantitative risk assessment, and PST model; and highlight what these issues mean for management.
- Thirdly, we outline the management approach that we recommend MPI takes, including the appropriate management settings for the new operational plan.

A summary of recommendation is provided at the end.

1   Remove biases, inaccuracies, and misleading language in the draft plan

MPI is at risk of misleading the public and Ministers unless biases, inaccuracies, and misleading language in the draft plan are removed. The issues that need addressing are described below.

1.1   The plan is biased against the conservative options

MPI highlights that "*The more conservative options in this paper will more significantly impact utilization opportunities*." However no positive aspects of being conservative are identified. MPI

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[1] http://www.doc.govt.nz/nature/conservation-status/

should provide some balance in their analysis by outlining some of the benefits of taking conservative options:

- Better chance of reaching sea lion population stabilsation and recovery sooner.
- Constraining the number of sea lions that can be killed can encourage more sustainable and low impact utilisation options to be explored – gear switching to jigging which poses no risk to sea lions and can produce higher quality and value product.[2]
- International reputation – active reduction of threats to sea lions will help demonstrate to the world and the international market that New Zealand takes management of fishing threats to protected species seriously.

1.2   The PST is not an objective assessment of whether there is an adverse impact

MPI is being misleading about what the PST is, and does. MPI states that "*One aspect of this framework includes calculating a 'population sustainability threshold' (PST) to identify where fishing may be having an adverse impact on a non-target population.*" This statement implies that the PST is a scientific and objective assessment of whether there is an adverse impact. This is not factual. The PST will only tell us what level of mortality will achieve a population objective, which is a management decision about what is "acceptable"; and in the case of the PST for sea lions, the population objective is not related to science about what level will enable population stabilisation, recovery and long-term viability.

1.3   The estimate of 82% survival can no longer be judged as "more realistic"

While key uncertainties about the fishing threats are now largely officially acknowledged, MPI needs to update their language and how they talk about fishing threat. Inaccurate statements need amending. For example, the plan states: "[demographic trend] *Projections using a more realistic estimate of cryptic mortality (e.g. assuming that 18% of interactions result in a mortality), indicate that eliminating direct fisheries mortality would result in less than half of one percentage improvement on the population growth rate.*"

It is misleading to judge the assumption (that 18% of interactions result in mortality as "more realistic" because the demographic model, risk assessment and PST do not account for the uncertainty in the interaction rate (of which the confidence intervals are "effectively unbounded"[3]) and makes no allowance for 'body non-retention' and 'post-escape drowning'.[4] The scientific uncertainties are such that we don't know how "realistic" an assumption of 18% rate of mortality is. Under the risk assessment section, it would be more accurate to provide the Minister the range of possible fisheries impacts on demographic trends, as well as the range of positive change in demographic trends if the fishing threat was eliminated i.e. from <0.5% to 1%.

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[2] For more information about the transitioning to jigging, see section 4.3.3 of WWF-New Zealand submission on the Threat Management Plan at
http://awsassets.wwfnz.panda.org/downloads/wwf_new_zealand_submission_on_the_draft_sea_lion_threat_management_plan_15_aug_2016_fina.pdf
[3] Ministry of Primary Industries, Aquatic Environment Biodiversity Annual Report, (2015). P30.
[4] The definitions of 'body non-retention' and 'post-escape drowning' are on page 15 of the draft plan.

1.4 The PST will not "recover" or "stabilise" the population

This following statement is also inaccurate and misleading: "*In every instance, the PST reflects recovery to or stabilisation of the population at a defined proportion of what the population would otherwise be (in the absence of human-caused mortality), with 90% certainty.*" [Emphasis added)]. In fact, the proposed PST for sea lions has a population objective that would allow a decline in sea lion population – up to 5% over five years (with 90% certainty). This would **reduce** the population, which is opposite to "recovery". According to the Department of Conservation Threat Classification, a 'Recovering population' must be "increasing."[5]

We can see how the PST could work for a population that is not declining and threatened. For a healthy population, a small "take" due to accidental bycatch may be sustainable if the affected population can remain stable at a high enough level that it's long-term viability is not under threat. However, the PST simply does not work as it has been described by MPI in the plan (with the use of the terms 'recovery' and 'stabilisation') for populations such as sea lions which are in long-term decline as shown by the NIWA demographic Model,[6] and have the status of 'nationally critical'.

1.5 The PST will not enable the achievment of the TMP vision and objectives

MPI assessment of how management options relate to the TMP is flawed and illogical. Page 8 of the draft plan states "*MPI considers that none of the options provided will prevent the achievement of the vision or objectives of the NZSL TMP.*" The two FRML management options (status quo – 68, and PST – 38) would allow fishing to continue to reduce the sea lion population. Increasing population decline can not logically be seen as a way to achieve population stabilisation and recovery.

We encourage MPI to acknowledge the difficult truth – that any level of fishing related mortality will contribute to further population decline of sea lions. It's also important to acknowledge the efforts made by fishers to reduce mortality through use of SLEDs but recognise the uncertainty that exists over SLED efficacy. The question then becomes one of minimising potential mortality as much as possible while, through research, creating greater certainty for decision-making.

1.6 The plan needs to more accurately reflect the advice from the Technical Advisory Group

Some of the language used to describe the role of the Technical Advisory Group is misleading and inaccurate, and it is important that MPI clarifies and corrects the following sections. On page 16 in the section 'Fishing Related Mortality Limit' the text makes its sound like the TAG recommended a range of "*desired population outcomes.*" Technical Advisory Group discussed the need to test out a range of population outcomes to see what the demographic effects would be over time – for example 5% decline over 5 years and 2% decline over five years, as well as the need to look at longer timeframes (at the time of the TAG MPI had only looked at 10% over five years). The TAG never decided or discussed which population outomes would be "desired".

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[5] http://www.doc.govt.nz/nature/conservation-status/

[6] Roberts and Doonan, (2016). Quantitative Risk Assessment for the threats to New Zealand Sea lions. New Zealand Aquatic Environment and Biodiversity Report No. 166.

Again the description of 'Option 2' on page 17 refers to "*a desired population objective*" (paragraph 1) and "*desired population objectives proposed by the TAG*" (paragraph 4). MPI needs to be clear who "desired" the objective, and please note that the TAG came to no conclusions about what objective was most appropriate, but asked for MPI to provide some analysis to help stimulate further thought and discussion.

1.7   Include all possible sea lion – fisheries interaction fates

We highlight a small error on page 15 for MPI's amendment. An additional "possible fate" of a sea lion interacting with a trawl net is that it dies in the net but the body falls out via the SLED uncounted (body non-retention). MPI has included this in the list of possible causes of cryptic mortality (which is correct because it is mortality that is unobservable) however it also belongs in the list of "possible fates".

1.8   Provide proper evidence for statements in the plan that may have a significant influence on management decisions

After effectively outlining the range of uncertainties about the strike rate and discount rate, MPI then goes on to dismiss these uncertainties in a paragraph in page 16, without providing any evidence or citing any research to support their statements. The draft plan states:

"*MPI has invested considerable scientific resources to estimate sources of cryptic mortality. Extensive 'crash-test dummy' modelling suggests that mortality from mild traumatic brain injury will be very low (less than 3% of interactions). Anecdotal evidence from other jurisdictions suggests that body non-retention is likely to be negligible. Post-escape drowning is impossible to quantify but is judged unlikely to be high based on camera observations of sea lion behaviour in SLEDs, and known physiological characteristics.*"

In fact, MPI has only invested scientific resources into estimating one of the three sources of cryptic mortality. Work was done to quantify the proportion of sea lions that would suffer 'mild traumatic brain injury' from impact with SLEDs. No work has been done to assess the effectiveness of hoods at containing dead animals (body non-retention),[7] or post SLED exit mortality.[8] If MPI is going to dismiss these uncertainties, the Ministry needs to be transparent about what the "anecdotal evidence" is, and make the camera footage available for independent review.

Additionally MPI has provided no research report or analysis to back up the claim (on page 8) that "*Pup production has increased slightly in recent years, and outputs of the updated model suggest that the population may be stabilising.*" This is a significant claim that could influence assessment of how cautious management needs to be. Proper assessment of the certainty around this claim is

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[7] Hamilton, S., & Baker, B.B. (2015) Review of research and assessments on the efficacy of sea lion exclusion devices in reducing the incidental mortality of New Zealand sea lions *Phocarctos hookeri* in the Auckland Islands squid trawl fishery, *Fisheries Research* 161 (2015) 200-206

[8] Bradshaw, C.J.A.; Haddon, M.; & Lonergan, M. (2013) *Review of models and data underpinning the management of fishing-related mortality of New Zealand sea lions in the SQU6T trawl fishery*. P4.

essential i.e. how certain are we that the population is stabilising? That level of certainty then has an influence over the level of precaution in management.

2 Clearly acknowledge scientific uncertainty

WWF-New Zealand welcomes acknowledgment of some key uncertainties in the estimate of fishing threat including the strike rate and Sea Lion Exclusion Devises (SLEDs) efficacy. We commend MPI for establishing the Squid Operational Plan Technical Advisory Group (TAG) and committing to addressing these scientific uncertainties over the next two years. This work will enable a more certain estimate of current fishing related mortality and better informed management. It is also important for the reputation of the fishing industry. For over ten years, fishers have dedicated time and resources into the deployment of SLEDs to avoid sea lion bycatch, and they deserve to have the questions about the effectiveness of their efforts resolved.

While the draft report acknowledges some of the key uncertainties with fishing threat, it does not clearly communicate other issues and limitations associated with the best available science including the demographic model, quantitative risk assessment and the PST.

2.1 What are the uncertainties, limitations, and issues with the best available science?

Throughout the development of the demographic model, quantitative risk assessment and the PST, WWF has identified limitations and issues with the science. We have developed an understanding of these issues with the help of science experts within New Zealand (through the AEWG processes), and from scientists overseas (including from experts on the independent panel who reviewed the SEFRA and PST, and from international colleagues). The key uncertainties, limitations and issues with the sea lion demographic model/ quantitative risk assessment, and PST model are outlined below.

- A key finding of the quantitative risk assessment is that scientists don't know exactly what is driving the sea lion population decline. The risk assessment shows that there are multiple human and natural threats contributing to the decline, including a large and much unknown "trophic effect" – which limits food availability for sea lions affecting nutritional health. There is also lack of understanding about how the threats interact and compound.

- We don't have an accurate estimate of the fisheries threat due to uncertainties about interaction rate and SLED efficacy,[9] and these uncertainties are not reflected in the PST model. Assessment of fisheries risk in the PST (the risk ratio part of the PST equation), uses the old assumptions that 5.89 sea lions would die per 100 tows if it were not for SLEDs and that 82% of sea lions that come into contact with trawl nets survive due to SLEDs. The bycatch is assumed to be known. This means that the uncertainties in the interaction rate and the survival rate are not taken into account in the risk ratio part of the PST.

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[9] The uncertainties about interaction rate and SLED efficacy are outlined on page 15 and 16 of the draft plan and in more detail in Appendix 1 of this submission.

- The demographic and PST models assume that sea lions have log uniform density dependent demographic response.[10] This means the population is expected to grow quickly when it is low (as there is little competition for food), then slow as their population and competition for food increases, and reach equilibrium at their natural carrying capacity. Experts have identified that assuming log-normal density dependence is quite arbitrary and is not likely to be accurate for species that are affected by multiple threats.[11] The risk assessment shows multiple threats affecting both pup and adult survival, which means that the sea lion population is not likely to be growing according to the normal density dependent assumption. We simply don't have good understanding of how the population responds to different threats and how quickly or slowly it can rebound.[12]

- There is uncertainty around the sea lion population estimate and key demographic rates including pupping rate, adult survival, and pup survival, however this uncertainty is not transparently communicated i.e. no confidence bounds are provided in the NIWA risk assessment report. There are issues in estimating the uncertainty associated with pinniped population estimates based on pup counts when the pup production is changing. This is because changes in pup production can be due to changes in adult numbers, changes in fecundity or age at maturity.[13]

- The PST assumes environmental stochasticity is 0.2. Scientists involved in the AEWG processes identified that this is likely to be too low for the Sub-Antarctic Islands.[14] Expert advice gained from Justin Cooke from the Centre for Ecosystem Management Studies identified that small changes in assumed stochasticity could have a significant effect on the PST result.

2.2 What do the uncertainties, limitations, and issues with the best available science mean for management?

MPI should address the limitations and issues with the best available science. Table 1 outlines the work needed to do this, and the immediate management response that MPI should take.

Issues/limitations with best available science	Work needed to address issues	Immediate management response
General uncertainty about what threats and combinations of threats is driving the sea lion population decline.	Build understanding about trophic effect and possible human causes of food limitation. Run statistical analysis on the	Transparent acknowledgment of uncertainty and ensure precaution in management.

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[10] A normal density dependent response is when the population is smaller – there is less competition for food and the population grows faster, until a point when there is lots of competition and the population growth slows and reaches equilibrium.

[11] Source/references must remain confidential die to the Aquatic Environment Working Group rules, however we can provide MPI references and details of science experts if required.

[12] Even a low level of fishing mortality can have significant impacts on sea lion populations, for example low levels of fishing mortality were sufficient to drive decline in Australian sea lions due to low population size and productivity (Goldsworthy & Page, 2007).

[13] Russell Leaper Pers. Comms. 22 August 2017.

[14] WWF-New Zealand can provide a reference and details about this for MPI, but due to AEWG confidentiality details are not provided here.

	relationship and interaction of threats.	
Uncertainties about interaction rate and SLED efficacy	Research into how changes in fishing practices (length of tows and number of turns) affect strike rate.

Improve sea lion spatial distribution data and estimate of fishery overlap.

Carry out research into body non-retention. | Acknowledge that PST assumes that the fisheries threat is known absolutely, and does not deal with uncertainty around bycatch estimates.

Management should apply precaution in their use of the PST (as no precaution is in-built). |
Assumptions in the demographic model and PST model that sea lions have a normal density dependent response may be incorrect.	Test the assumption. Fund research to answer the question: 'How does the mix of threats and the extreme environmental stochasticity in the Auckland Islands effect sea lion population growth?'	Acknowledge this limitation and apply precaution in management decisions.
Uncertainty around the sea lion population estimate and key demographic rates including pupping rate, adult survival, pup survival, and changes in fecundity or age at maturity.	Monitor sea lions over winter to gain better understanding of pup survival.	Be transparent about uncertainty, provide confidence intervals for key demographic estimates. Apply precautionary in decisions that are based on data where there is significant uncertainty.
The PST assumption that environmental stochasticity is 0.2, may not be accurate to the reality of the Sub Antarctic Islands.	Run sensitivity analysis for environmental stochasticity to see how important this input is to the PST result, and if it is found to be significant, ensure this input is accurate to reality i.e. should it be higher, or at different time scales?	Apply precautionary approach in the management plan.

2.2.1   A precautionary approach is required

The key message is that until uncertainty, limitations and issues with the science can be addressed, management should take a precautionary approach. Where there are no precautions built into the models to deal with uncertainty, managers need to explicitly incorporate precaution into their decisions about how to use model results. Explicitly adding in precaution to decisions is vital to ensure the long term viability of sea lions and to achieve the population recovery vision and objectives of the TMP.

Unfortunately there is no readily available science process or toolkit to help quantify the level of precaution that would be appropriate relative to the level of uncertainty to inform management decision. We encourage MPI to utilise their excellent scientists to develop new processes and science tools to better understand the level of precaution required to deal with particular levels of uncertainty, with the objective of ensuring long-term viability of protected species populations.

3 Recommended management approach

Management of fisheries threats to sea lions should be informed by: a) legal obligations including those under the te Triti o Waitangi, and the Fisheries Act; b) the policy context including the vision and objectives of the New Zealand Sea Lions/ Rāpoka Threat Management Plan (the TMP); c) society's values.

3.1 Legal obligations

3.1.1 Legal obligations under te Triti o Waitangi

In the case of management of sea lions, the crown has legal obligations to its Treaty Partner – Ngāi Tahu. Rāpoka are a taonga species under the Ngāi Tahu Claims Settlement Act 1998, in which the Crown acknowledges the cultural, spiritual, historical, and traditional association of Ngāi Tahu with rāpoka. This commits the Crown to ensure kaitiakitanga responsibilities for rāpoka are met and to consult with and have particular regard to the views of Ngāi Tahu in policy decisions concerning the protection, management, or conservation of rāpoka.

The draft plan makes no reference to the important role of Ngāi Tahu in the management of sea lions and their threats. Section 4 'The Management Context' may be an appropriate place for this, however MPI should talk directly with Ngāi Tahu about how the plan should acknowledge their role, and ensure Ngāi Tahu has a seat at decision-making table for important management decisions such as defining an "acceptable" level of fisheries impact.

3.1.2 Legal obligations in the Fisheries Act

Under the Fisheries Act the Government must enable utilisation of fisheries resources while ensuring sustainability – and in particular, the long term viability of sea lions.[15] The quantitative risk assessment for sea lions shows that multiple sources of mortality will need to be alleviated in order to slow the decline and ensure long-term viability of the population.[16] As fishing related mortality is the top human threat, an active reduction of fishing related mortality is required to meet the sustainability obligations. Active reduction of threats would also be in line with a precautionary approach which is appropriate inder section 10 of the Fisheries Act when there is scientific uncertainty as outlined in section 2.

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[15] The Fisheries Act, Section 9A states that: *"associated or dependent species should be maintained above a level that ensures their long-term viability." "Long-term viability, in relation to a biomass level of a stock or species, means there is a low risk of collapse of the stock or species, and the stock or species has the potential to recover to a higher biomass level"* (Section 2).

[16] The Sea lion TMP states: "The risk assessment indicates that sea lions are exposed to different natural and man-made threats and that no single factor is solely responsible for the decline. For this reason, the NZSL TMP takes a holistic approach to mitigate key threats and promote recovery across the range of the sea lion population." (DOC and MPI, 2017. p4)

3.2 The policy context: the TMP vision and objectives

The management of fishing threats needs to be done within the overarching policy context of the TMP, and the Squid Operational Plan should enable the achievement of the vision and objectives of the TMP. The TMP vision is for sea lion recovery to "non-threatened status" and the objectives are to halt the population decline within 5 years, and ensure the population is stable or increasing within 20 years. These TMP objectives should form the basis of the population objectives in the Operational Plan; and the definition of "adverse effect" in the case of sea lions should be related. Any bycatch that contributes to a declining population trend should be considered "adverse" and should require active management to reduce the mortality as much as possible towards zero.

3.3 Society's values – what do New Zealanders think managers should do?

In the absence of scientific tools and processes to help inform the appropriate level of precaution (relative to uncertainty), precautionary decisions are informed by international best practice, the expertise of managers, and stakeholder and society values and value judgements about what level of risk or impact is acceptable.

WWF-New Zealand commissioned Colmar Brunton to provide some research about what New Zealanders think is appropriate. In June 2017, a representative sample of 1000 New Zealanders answered the folloing poll question in an online Colmar Brunton survey:

New Zealand sea lions once lived all around New Zealand Coastline, now they live mostly on the sub-Antarctic Islands of New Zealand. They are the most endangered sea lion in the world, and are listed as a protected species in New Zealand. Their population has halved over the last 20 years, and they face a significant risk of extinction.

Sea lions are accidentally killed by commercial fishing. This is the top human threat to sea lions. The latest published science shows that other threats – like disease and food shortages – may be even bigger problems than commercial fishing.

One point of view is that we should do all we can to reduce the number of sea lions being killed by commercial fishing, to give their population a better chance at recovery.
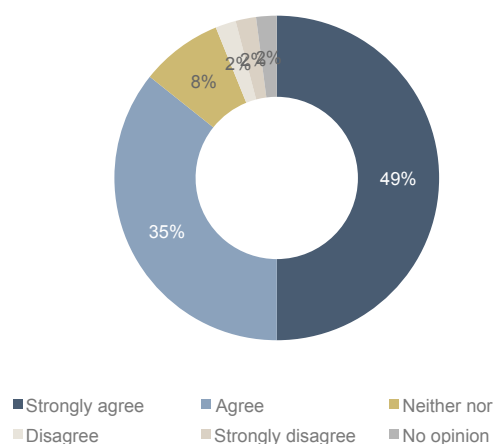
Another point of view is that commercial fishing is not the main cause of the sea lions' population drop, so the possible extra costs for companies fishing around the sub-Antarctic islands aren't justified.

Do you think that the number of sea lions being accidentally killed by fishing should be further reduced, even if fishing is not the only or most serious threat?

- Strongly agree we should further reduce the accidental killing of sea lions
- Agree
- Neither agree nor disagree
- Disagree
- Strongly disagree we should further reduce the accidental killing of sea lions
- Don't know

The survey results show that 84% of New Zealanders think that the number of sea lions being killed in fishing should be further reduced, even if fishing is not the only or most serious threat.

49%

35%

8%

2% 2% 2%

People aged 18-29 years old, and people who are single are more likely to strongly agree, while people aged 60+ years old, and those who live in a double income house with no children at home are less likely to agree.

■ Strongly agree   ■ Agree   ■ Neither nor
■ Disagree   ■ Strongly disagree   ■ No opinion

Q … Do you think that the number of sea lions being accidently killed by fishing should be further reduced, even if fishing is not the only or most serious threat? Note: Full question wording is in the appendix.
Base: All respondents (n=1,000). Percentages may not add to 100% or nett scores due to rounding.

COLMAR BRUNTON
A Kantar Millward Brown Company

3.4   Key management settings

3.4.1   *Fishing realated mortality limit*

Only one population objective is provided as an option in the draft plan, and there is no analysis about what effect this objective would have on the population over time (beyond 5 years). We are relieved that the objective is 5% rather than MPI's original proposal of 10%; however we are disappointed that MPI did not provide the 2% population objective that was discussed in the TAG as an option for consultation.[17]

Option 1 – Status Quo

While the PST is not perfect, it is a step up from the Breen-Fu-Gilbert Model which is now outdated, therefore we do not support option 1.

Option 2

We are pleased that MPI recognises the need to incorporate bycatch mortality from all fisheries that affect the Auckland Island population, and has adjusted the option 2 FRML to reflect this. Setting a

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[17] Technical Advisory Group discussed the need to test out a range of population outcomes to see what the demographic effects would be over time – for example 5% decline over 5 years and 2% decline over five years, as well as the need to look at longer timeframes (at the time of the TAG MPI had only looked at 10% over five years).

FRML of 38 based on the PST would be a step in the right direction as it is a significant reduction from the status quo of 68.

However, due to the significant uncertainties and issues with the demographic and PST model inputs outlined in section 2, we would have expected a more precautionary FRML option. We do not think a population objective of allowing up to 5% reduction over 5 years (with 90% confidence) is acceptably precautionary for a 'nationally critical' species, and in the context of significant scientific uncertainty.

We recommend the FRML be set using the PST with a population objective of 2% decline over five years (with 90% confidence) and then work towards further reducing bycatch as much as possible – in line with the desires of the New Zealand Public.

3.4.2 Strike Rate

Over the last 10 years, fishing practices may have changed in ways that mean that old estimates of strike rate are no longer accurate. For example the average tow duration in the SQU6T fishery has doubled since the introduction of SLEDs, and the number of turns has also increased along with tow length. Turns may also be a factor that influences catchability.

We recommend MPI prioritise research to improve and update the estimate of interaction rate with particular focus on finding out how changes in fishing practices influence interaction rate and catchability. Until this research is complete, we recommend MPI choose the most precautionary option, Option 5 – a strike rate of 7.58.

3.4.3 Discount Rate

The current discount rate only takes into account one of the three sources of cryptic mortality – mild traumatic brain injury. Body non-retention or post-escape drowning have not been taken into account at all, and there is no science about the probability of these events. We agree with the expert panel Bradshaw, Haddon, & Lonergan (2013) who judged that due to the significant uncertainty around the discount rate – it might as well be set at 50% to reflect that it is essentially a coin toss scenario – we just don't know.[18] We recommend MPI choose option three: 50%, the most precautionary option proposed, which is appropriate when the science is so uncertain.

Summary of recommendations

WWF-New Zealand recommends MPI remove biases, inaccuracies, and misleading language in the draft plan; clearly acknowledge the scientific uncertainties; and take a precautionary approach to management in the new operational plan including: a) setting a FRML using the PST with a population objective of 2% decline over five years (with 90% confidence) and then work over the coming years to further reducing bycatch towards zero – in line with the desires of the New Zealand Public; b) setting a strike rate of 7.58 (option 5); and a discount rate of 50%.

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[18] Bradshaw, C.J.A.; Haddon, M.; & Lonergan, M. (2013) *Review of models and data underpinning the management of fishing-related mortality of New Zealand sea lions in the SQU6T trawl fishery.*

Appendix 1: Uncertainties about fishing threat

Uncertainties about the interaction rate

Estimates of the number of sea lions that come into contact with fishing nets – the 'interaction rate'[19] has become increasingly uncertain – with the most recent interaction estimates being effectively "unbounded" (MPI, 2015, p30). For example, in the year 2012/13 the 95% confidence interval related to the estimated interactions ranged between 53-313, and in 2013/14 it ranged between 14 and 184. This wide range of possible interactions represents the increasing uncertainty.

The main reason for the increasing uncertainty is that SLEDs mean that sea lions pass through nets (either dead or alive) so can not be counted by onboard observers. According to MPI: "*Following the introduction of SLEDs, the number of NZ sea lions interacting with trawls and the proportion of those surviving are considerably more difficult to estimate*".

Since the introduction of SLEDs, estimates of the number of NZ sea lions interacting with trawls have to be made using a predetermined strike rate[20], based on rates observed on vessels without SLEDs from 2003/04 – 2005/06 (strike rates over these three years was 5.9, 5.1, 4.9) (MPI, 2015). Over the last 10 years, fishing practices may have changed in ways that mean that these old estimates are no longer accurate. For example the strike rate and catchability of sea lions may have increased because the average tow duration in the SQU6T fishery has doubled since the introduction of SLEDs (see table below). An expert panel brought together in 2013 to review the models and data undermining the management of fishing-related mortality of NZ sea lions in the SQU6T fishery (the 2013 expert panel) explained: "*The question remains whether increasing the length of tows increases the effectiveness at catching NZSL*" (Bradshaw et al, 2013, p15).

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[19] 'Interactions' are the number of sea lions that would be predicted to have been caught if no SLEDs had been used.
[20] The 'strike rate' is the number of NZ sea lions that would be caught per 100 tows if no SLEDs were fitted.

Table 3.9: Tow duration in the SQU6T fishery (based on trawl fishing targeting SQU in statistical areas 602 and 618). Years are calendar years. Data from MPI databases.

Year	No. of tows	Mean tow duration (hours)	Percentage of tows		
			Less than 4 hours	Between 4 & 8 hours	More than 8 hours
1995	4 014	3.7	64.2	33.5	2.2
1996	4 474	3.6	64.3	34.2	1.5
1997	3 719	3.8	62.7	33.7	3.7
1998	1 446	3.2	74.4	24.7	0.9
1999	403	3.5	73.0	24.3	2.7
2000	1 213	3.5	70.3	27.0	2.7
2001	583	3.3	72.9	26.6	0.5
2002	1 647	3.8	59.8	38.8	1.4
2003	1 467	4.1	52.4	44.0	3.6
2004	2 598	5.0	36.7	53.6	9.7
2005	2 693	4.7	43.7	48.6	7.7
2006	2 462	6.3	26.0	49.6	24.3
2007	1 317	7.3	18.9	46.3	34.8
2008	1 265	6.2	20.4	58.7	20.9
2009	1 925	6.5	21.1	51.4	27.5
2010	1 190	7.9	16.4	37.4	46.2
2011	1 585	6.8	24.7	42.8	32.4
2012	1 283	6.6	23.5	49.3	27.3
2013	1 027	7.1	18.7	49.4	31.9
2014	737	6.9	17.8	51.5	30.7

Despite recommendations from an expert panel in 2013[21] no robust studies have been done to better understand the relationship between tow length and the change in rate of sea lion captures (OIA response; MPI, 2015 AEBR).

Uncertainties about the efficacy of SLEDs

The fraction of sea lions that exit trawls through SLEDs alive or dead is "unknown" (MPI, 2015, p30). Therefore the decline in observed captures is not evidence that sea lions that enter the net are able to "escape". We don't know if the SLEDs are masking the mortality rate by allowing drown sea lions to fall out of the SLED escape hole during hauling (Row & Meynier, 2012).   There is no evidence that the hoods are effective at containing dead animals, and there have been no specific studies to assess the hoods (Hamilton & Baker, 2015).

An expert panel brought together by the government in 2013 to review the models and data undermining the management of fishing-related mortality of NZ sea lions in the SQU6T fishery stated: *"Recently, the numbers of NZSL carcasses brought on board trawlers has declined substantially (Thompson et al., 2013), but there remains uncertainty about whether those animals are all that have been killed in the fishery. Biomechanical testing has estimated a low risk of head injuries from impact with SLEDs (Ponte et al., 2010; 2011), but cannot resolve wider issues about whether other individuals are drowned but not recovered".*

At the more recent TMP workshop, DOC hand written notes state that there is "big" uncertainty about SLEDs and associated cryptic mortality.

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[21] See Bradshaw et al., (2013)
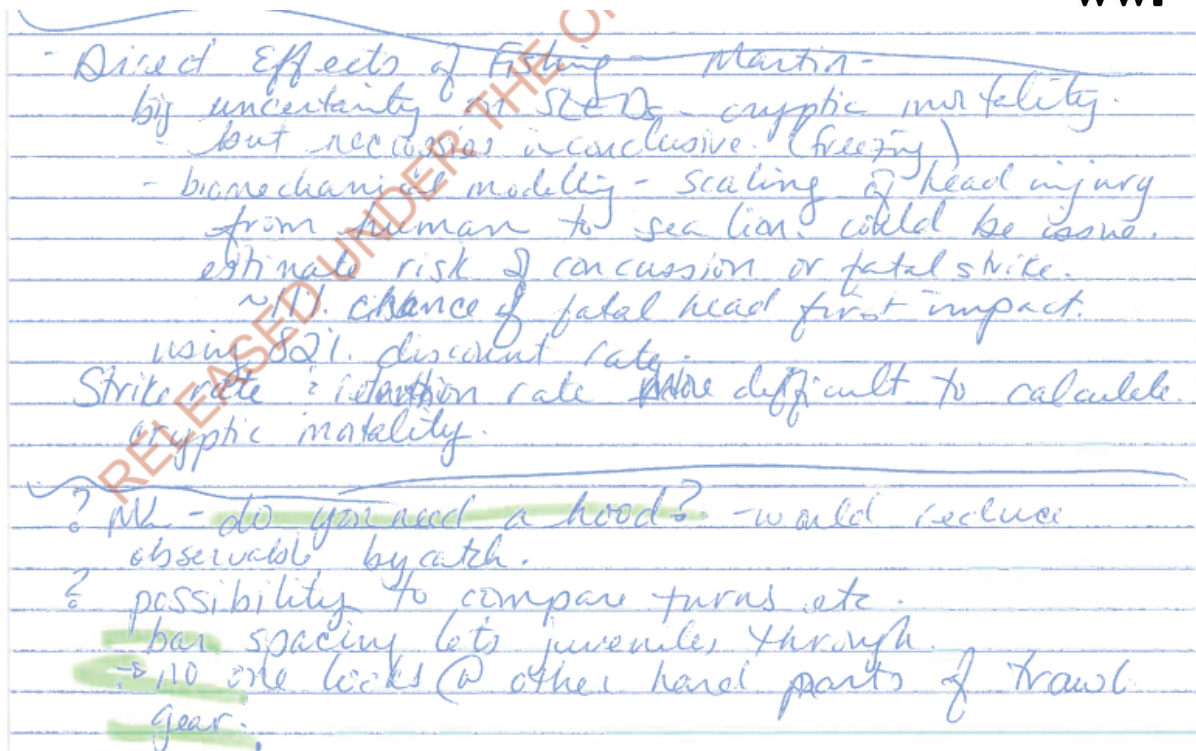
Uncertainties about cryptic mortality

We don't know the rate of survival once sea lions leave the SLED or net (Bradshaw et al., 2013; Robertson & Chilvers 2011). It is possible that some sea lions exceed their dive limit and drown before reaching the surface after escaping from either the SLED or the front of the net.[22] Such sources of 'cryptic mortality' are presently "unquantified and are not reflected in the estimated overall survival rate of encounters with trawls" (MPI, 2015, p43).

Investigation into post SLED mortality was recommended by the 2013 expert panel: "*We recommend that means of investigating post-exit SLED mortality be investigated to assess the practicality of reducing this source of uncertainty in their real role in reducing NZSL deaths*" (Bradshaw et al., 2013, p4).

References

Bradshaw, C.J.A.; Haddon, M.; & Lonergan, M. (2013) *Review of models and data underpinning the management of fishing-related mortality of New Zealand sea lions in the SQU6T trawl fishery.*

Hamilton, S., & Baker, B.B. (2015) Review of research and assessments on the efficacy of sea lion exclusion devices in reducing the incidental mortality of New Zealand sea lions *Phocarctos hookeri* in the Auckland Islands squid trawl fishery, *Fisheries Research* 161 (2015) 200-206.

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[22] There is evidence that sea lions operate at their energetic limit, and have to travel long distances and diver very deep to find enough food (Meynier, 2010; Meynier et al., 2009). If the time it takes to navigate out of the net may be longer than they have planned for, they will drown either in the net or on their way back to the surface.

Ministry for Primary Industries (MPI). (2015) Aquatic Environment and Biodiversity Annual Review, 2014 – Summary of environmental interactions between the seafood sector and the aquatic environment.

Row, W.D., & Meynier, L. (2012) Review of necropsy records for bycaught New Zealand sea lions (Phocarctos hookeri), 2000–2008.

Robertson, B.C, & Chilvers, B.L. (2011) The population decline of the New Zealand sea lion *Phocarctos hookeri*: a review of possible causes. *Mammal Review*, 41:253-275.

Appendix 2: SLED Design 'Mark 3/13' Specifications

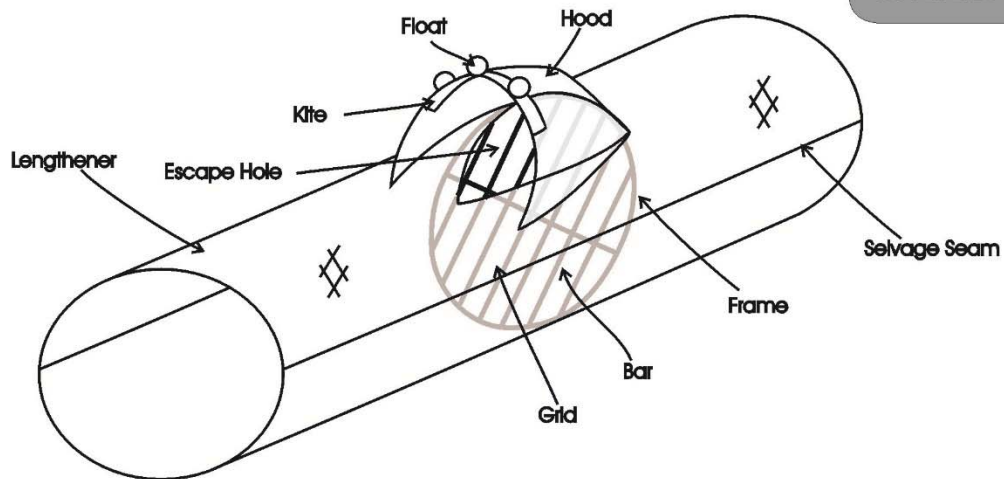## DWG AND MPI SLED SPECIFICATION FOR SQU6T OPERATIONAL PLAN

October 2010 MK 3/13 SLED approved by SLED Working Group September 2009. Clause 11 modified by MFish November 2010; clause 7 modified by MAF January 2012; clause 6 modified by MPI July 2012.
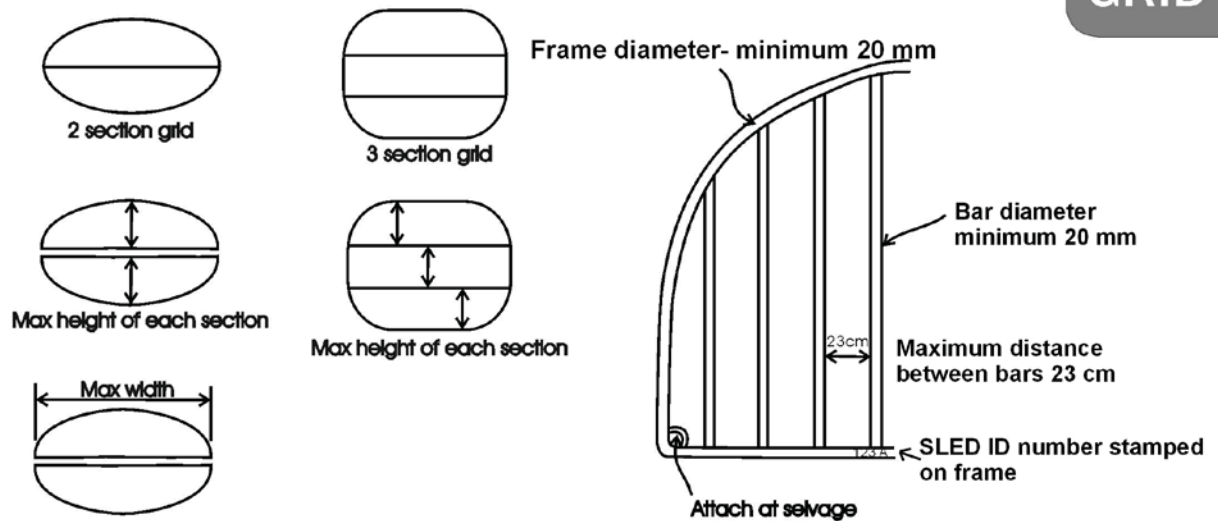
The SLED required for use by all vessels in the SQU6T fishery is an approved type that meets the following criteria:

1. The SLED must consist of a lengthener section of net, with either 2 or 4 seams, containing a 2 or 3 piece grid, hinged horizontally along the middle. The grid must be set in the net at about 45° ± 5° from the vertical with the top of the grid closest to the cod end section and continuously sewn to the net meshes around its outer edge.

2. The grid must be constructed of minimum 20 mm outside diameter solid stainless steel bar and should be shaped to conform to the working parameters of the net (refer diagram).

3. Vertical grid bars must be evenly spaced at a continuous maximum distance of 23cm between bars (see diagram). There will be no minimum number of bars, provided they are evenly spaced and do not exceed the required maximum spacing. It may be necessary to have the last spacing between the final bar and the grid frame differing from the rest of the spacings provided they are less than 23 cm apart between bars and frame.

4. The escape hole must be triangular and cut into the upper surface of the lengthener section. This hole must be a minimum of 130 cm wide at the base, measured along the top bar of the grid. The apex of the triangle must be a minimum of 150 cm forward of the base (refer diagram).

5. Above the escape hole, a hood-shaped mesh scoop must be attached with its open (leading) end facing into the water-flow and its closed (trailing) end attached and over stretched to the top bar of the grid. The leading edge of the hood must be a minimum of 90 cm high when fully open. The leading edge rope around the mouth of the hood must be a minimum of 320 cm long after attachment of kite and floats. The hood must be a minimum length of 170cm long (refer diagram).

6. The hood must have a semi rigid kite 220 cm long by 32 cm wide (both measurements + 10%; a piece of thick conveyor-belt is ideal) attached under the meshes of the hood. The kite must be attached to the hood by stitching at regular intervals the leading edge of the hood and the leading edge of the kite using a minimum of eight attachment points. The trailing edge of the kite should also be attached to the hood netting. The leading corners of the hood must extend forward of the escape hole.

7. Three floats of between 19 and 30 cm in diameter (a centre hole float is best) must be each attached to the leading edge on the kite. One float must be in the centre of the kite length and the other two equidistant between the centre float each end of the kite (refer diagram).

8. The SLED should be inserted into the trawl (between the body of the trawl and the lengthener) with the escape hole always on the upper surface when the net is fishing.

9. Each SLED grid frame must have a unique registration number, identifying it as a unit, clearly stamped into the frame bar at each end of each hinge section. Deepwater Group Ltd will record each SLED registration number. DWG's register of SLED numbers must be provided to MPI on an annual basis before fishing commences.

10. Depending on the net for which the SLED is built, there are elements of the SLED configuration that may vary, including: the presence or absence of floats attached to the outside of the grid or back of the kite, the shape, width and height of the grid, the number of vertical bars in the grid, the number of meshes in the hood and the number and size of meshes in the lengthener section.

11. No extra panels or mesh material may be fitted inside the net or lengthener before the SLED. Additional floats may be fitted outside the lengthener to the top of the grid frame. Floats may also be fitted inside the lengthener behind the grid or frame but NOT in front of the grid.

12. Alterations are not to be made to the design outside of this specification. For new builds or major repairs contact Motueka Nets Ltd or Hampidjan NZ Ltd.
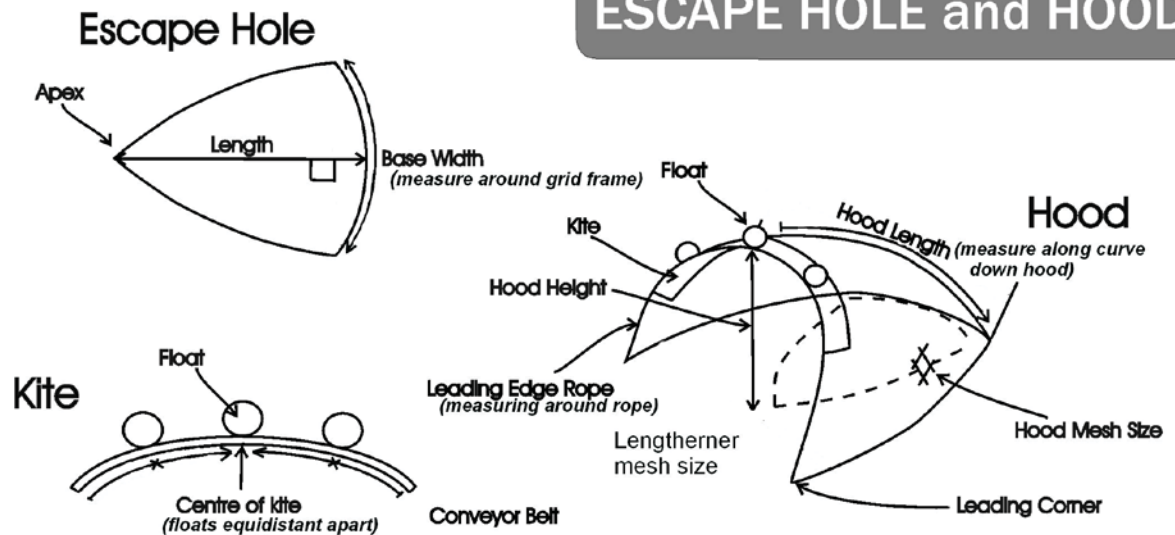
SLED TERMS

Float
Hood
Kite
Escape Hole
Lengthener
Selvage Seam
Frame
Bar
Grid

GRID

2 section grid

3 section grid

Max height of each section

Max height of each section

Max width

Frame diameter- minimum 20 mm

Bar diameter minimum 20 mm

23cm

Maximum distance between bars 23 cm

SLED ID number stamped on frame

Attach at selvage

ESCAPE HOLE and HOOD

Escape Hole

Apex
Length
Base Width
(measure around grid frame)

Float

Hood

Kite

Hood Length *(measure along curve down hood)*

Hood Height

Leading Edge Rope
(measuring around rope)

Lengtherner mesh size

Hood Mesh Size

Leading Corner

Kite

Float

Centre of kite
(floats equidistant apart)

Conveyor Belt

Appendix 3: Review of Meyer et al. PNAS paper

To:	**Tiffany Bock**			
CC:	**Shelton Harley**			
From:	**Martin Cryer, Ben Sharp**			
Date:	**27 November 2017**		**File Ref:**	
Subject:	External publications potentially relevant to the development of final advice on the SQU6T operation plan and effects on sea lions			
Remarks	☐ Urgent	☐ Reply ASAP	☐ For Your Review	☐ Please Comment

Tiffany

You asked us to review the paper by Stefan Meyer and several co-authors "*Marine mammal population decline linked to obscured by-catch*" recently published in the PNAS[1] (Proceedings of the National Academy of Sciences of the United States of America) about New Zealand sea lions, to assess the extent to which we might use this paper to inform management advice.

Below we review this paper against the *Research and Science Information Standard for New Zealand Fisheries*[2] (the Research Standard) and its key principles: Peer review; Relevance; Integrity; Objectivity; and Reliability.

Overall conclusions

We conclude that Meyer et al.'s inferences about the impact of the squid fishery on the sea lion population and the efficacy of SLEDs are not well supported by available evidence and that the analysis contains several flaws which directly impact on the authors conclusions. We therefore grade this paper as a 3 against the Research Standard, i.e., that this paper should not be used to inform management advice.

Full details of our concerns are provided in this review, but briefly these concerns (and how they relate to the Research Standard) are:

- The statistical modelling techniques used did not appropriately account for the uncertainty and correlation structure in input data (Reliability);
- Several incorrect assumptions were made regarding available information and processes (Reliability); and
- The analyses did not explicitly consider a full range of alternative hypotheses recognised by other researchers in the field (Objectivity); and

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[1] Stefan Meyer, Bruce C. Robertson, B. Louise Chilvers, and Martin Krkošekc (2017). Marine mammal population decline linked to obscured by-catch. PNAS 114 (44) 11781–11786. (www.pnas.org/cgi/doi/10.1073/pnas.1703165114)
[2] https://www.mpi.govt.nz/dmsdocument/3692-research-and-science-information-standard-for-new-zealand-fisheries

- It does not appear that the paper was peer reviewed by scientists with appropriate expertise and experience (Peer review).

Overview of paper

Meyer and his co-authors set out to test empirically whether Sea Lion Exclusion Devices (SLEDs) in squid trawl fisheries contribute to recovery or decline of the endangered New Zealand sea lion.

To quote their introduction:

> *Exclusion devices are contentious because they may bias by-catch estimates and cause unknown post-release mortality or reproductive failure due to injuries sustained during capture and release. Crucially, despite decades of use, there is scant empirical evidence to verify whether exclusion devices improve the population growth of bycaught species. Most analyses focus on changes in reported bycatch numbers, compliance levels of fishers, or simulated model predictions of population responses. In this study, we empirically analyze whether exclusion devices contribute to recovery or decline of the endangered New Zealand (NZ) sea lion.*

They conclude by stating (in their executive summary) that:

> "*Exclusion devices have been used since 2001 but have not slowed or reversed population decline*" and

> "*Our results indicate that exclusion devices can obscure rather than alleviate fishery impacts on marine megafauna*".

Detailed comments on the paper

First, the authors treat the published time series of estimated interactions and interaction rates (between sea lions and squid trawl fishing effort) as though they are actual observations. In fact, these numbers were estimated from another model, and are themselves highly uncertain.

Since the universal adoption of SLEDs in the squid fishery, the model from which Meyer et al. derive their interaction rate time series has almost no new data to inform its estimates of interaction rate and this quantity is also highly confounded with the SLED retention rate. The authors of that model (Ed Abraham et al.) have acknowledged for several years (and this has been discussed multiple times in working groups) that their model outputs are useful to estimate the number of captures *but not to estimate the number of interactions or the interaction rate.* The very wide confidence intervals for annual estimates of interaction rate are clearly shown in the publication from which Meyer et al. sourced their information (Table B-80 of this report: https://fs.fish.govt.nz/Doc/24049/AEBR-169-Protected-species-catch.pdf.ashx) and this uncertainty is critical to the analysis and resulting conclusions. Thus, in this regard, Meyer et al. do not meet the key principle of the Research Standard that requires (as part of Reliability) that "*Information should not be biased and should not suffer from such a high level of imprecision that the results and conclusions are rendered meaningless*".

Abraham et al.'s (2016) model estimates total captures using a combination of estimates of the interaction rate and the retention rate, scaled by fishing effort. Because the first two parameters are heavily confounded in the model and there is very little information to inform them in the available data, the model is unstable in this regard and has been found to be highly sensitive to new data. Hence, year-specific estimates of both interaction rate and retention rate are unreliable and the real uncertainty in the estimates of interaction rate is higher than the reported confidence limits. If this uncertainty had been included in their analyses, we suspect that the statistical correlation that Meyer et al. rely on for their conclusions would be very much less convincing.

Second, even if the interaction rate estimates were observed data and without uncertainty, it is not logical to use interaction rate as an independent variable to assess the questions that Meyer et al. set out to answer. The relevant figure legend in their paper refers to "*NZ sea lion fishery interactions*", but the actual graphs included in that figure depict interaction rate (IR, **not** interactions) as the independent variable. No explanation is given for this difference, but it is critically important. By using the estimated interaction rate (interactions per trawl), Meyer et al. implicitly assume that interaction rate is a good proxy for total interactions (which would be a reasonable index of actual fisheries impact on the sea lion population). This assumption would be reasonable if the number of trawls were constant between years; however effort levels in the squid fishery vary considerably between years, and this information was readily available to Meyer et al.. Had they used the estimated total number of interactions each year as their independent variable, they would have seen trivially low statistical correlation with population growth rate. For instance, using just such an analysis, Roberts & Doonan (2014) found "*Poor correlations were obtained when relating survival at ages 2–5 (juveniles) or age 6–14 (adults) to estimated captures and interactions in the Southern arrow squid trawl fishery at the Auckland Islands (SQU6T)*". The choice of interaction rate as a proxy for the impact of the squid fishery means that Meyer et al. do not meet either the Peer review principle of the Research Standard (if the choice was a simple mistake) or the Objectivity principle (if the choice was conscious).

It is possible to conceive of mechanisms for correlation between interaction rate and sea lion population growth rate (or other population metrics such as pupping rate or pup survival). For instance, in a year where natural food is hard to find arising from environmental variability, foraging sea lions may be more inclined to adopt high risk strategies like entering squid trawls to obtain food. In those same years, it is logical to expect that pup and/or adult survival rates could be lower as a result of food shortage, potentially affecting population growth rate. This would produce a correlation consistent with that reported by Meyer et al., but it would make no sense to conclude from this correlation that the interaction rate with fisheries is somehow driving population performance. Simple examples can be used to demonstrate this non-sequitur. Meyer et al.'s suggestion that interaction rate is the most influential independent variable implies that a squid fishery with very few tows (say, 100) but a high interaction rate (say, 20 per 100 tows, about four times the estimated average) would likely result in negative population growth rate, whereas a squid fishery with very many tows (say, 10,000) but a low interaction rate (say, 2 per 100 tows, about one-third the estimated average) would likely result in positive population growth rate. This clearly makes no sense; the low-effort scenario results in 20 interactions with sea lions whereas the high effort scenario results in 200 interactions.

Third, Meyer et al. dismiss disease-induced pup mortality as a potential driver of population decline based on faulty logic, and supported only by selective citation of their own publications. They cite the lead author's PhD thesis to assert that, because Meyer could not

detect the effects of *Klebsiella* using mark-recapture data, *Klebsiella* must be having no effect on the sea lion population. However, using mark-recapture data is not the only, nor the best, way to detect the effects of disease on pup survival, and the paper ignores other (published) sources that do quantify significant effects of *Klebsiella*-induced pup mortality on critical demographic rates in this sea lion population. Similarly, in a 2015 paper, Meyer et al. (the same four authors) dismiss the potential effects of disease-induced pup mortality based on their assertion that, because adult survival is often more important than pup survival in driving the population dynamics of long-lived species, pup survival can safely be ignored as a driver of population decline. But it is self-evident that a healthy population requires both pups and adults to survive, and that a sufficiently low pup survival rate can result in population decline. Meyer et al. inexplicably ignore published evidence (e.g., Roe et al. 2015, Roberts & Doonan 2016) that disease is a strong driver for the Auckland Islands sea lion population.

Fourth, Meyer et al. ignore the work on critical demographic rates done by other authors (Jim Roberts et al.) and reviewed in great detail. In the model described in their paper they focus on pup production in isolation, and their choice of covariates for inclusion in their model is highly selective. As above, they ignore *Klebsiella* as a potential driver. Further, they conclude that environmental variability has no effect on the sea lion population based solely on the absence of a relationship between sea surface temperature and squid catch rates with a 1-year time lag. Their implicit assumption here is that the main, or only, way in which the environment can affect sea lions is via an annual or 1-year-delayed effect of sea surface temperature on squid abundance. We don't think this is a reasonable assumption because squid is not a major component of sea lion diet and the authors do not appear to have considered other available evidence of linkages. For instance, there is very strong evidence that the ocean environment around the Subantarctic Islands is highly variable at the decadal scale (e.g., see Figure A-10 of Roberts & Doonan 2014), and that these variations correlate with sea lion diet composition and important demographic rates that strongly suggest nutritional stress. For instance, Roberts & Doonan (2014) state "*A correlation with cohort survival to age 2 years was consistent with disease-related mortality affecting a decline in survival after 2005*" and "*a strong negative correlation was observed between survival at ages 6–14 (1999-2004) and cohort survival to age 2 in the previous year (1998-2003), which would be consistent with the high energetic costs of lactation affecting maternal survival during this time period*" and "*Climate indices including Inter-decadal Pacific Oscillation (IPO) and sea surface height (SSH) were well-correlated with the occurrence of an array of key prey species in the diet, from an analysis of* scats". This evidence appears not to have been considered by Meyer et al..

Conclusions

On this basis of these issues, we conclude that Meyer et al.'s inferences about the impact of the squid fishery on the sea lion population and the efficacy of SLEDs are not well supported by available evidence, and that this paper should not be used to inform management advice. More thorough and well-informed peer review (i.e., by more "*peer scientists with appropriate expertise and experience*" of the population and the fishery as required by the Research Standard) would have identified some of these serious issues before publication. The authors of the Meyer et al. paper have been offered the opportunity to present their work at the Aquatic Environment Working Group (AEWG) and we believe that the study would have been greatly improved by the input of this group.

References cited:

Abraham, E.R.; Richard, Y.; Berkenbusch, K.; Thompson, F. (2016). Summary of the capture of seabirds, marine mammals, and turtles in New Zealand commercial fisheries, 2002–03 to 2012–13. *New Zealand Aquatic Environment and Biodiversity Report No. 169.* 205 p.

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Appendix 4: Recommendations from Squid 6T Technical Advisory Group

CHAIR: Dr Neil Gilbert, Constantia Consulting Ltd

Attendees: Tiffany Bock, Ben Sharp, Greg Lydon (MPI), Laura Boren and Kris Ramm (DOC), Katrina Goddard (Forest & Bird), Amanda Leathers (WWF), Barry Weeber (ECO), Richard Wells (Deepwater Group Ltd (DWG)), Tom Clark (Fisheries Inshore NZ), David Middleton (Trident on behalf of DWG), Dr Bruce Robertson (University of Otago), Kirsty Wood (TOKM), Mike Gerner (Australian Fisheries Management Authority), Dr Alice Mackay (South Australian Research Development Institute), Dr Simon Childerhouse (Blue Planet Marine)

Apologies: Laws Lawson (TOKM)

Recommendations from 14 June:

Introduction

- Confirmation of Dr Neil Gilbert as the Chair of the Squid 6T Operational Plan Technical Advisory Group meeting for 14 and 15 June
- That the notes of this meeting will be an appendix in the Squid 6T Operational Plan Consultation Document
- That all presentations will be made available on the Group Website

Terms of Reference

- Agreement with the Terms of Reference, however noted that:

  I.   'majority view' is subjective and that assenting views will be noted
  II. that 'trust and confidence of the group' should be added to the 'General confidentiality requirements' section of the TOR
  III. the role of observers should be defined and
  IV. members of the Squid 6T Operational Plan Technical Advisory Group will be notified of any OIA requests regarding the Group and final OIA responses available upon request
  V.   Any relevant media announcements by MPI and DOC will be circulated to members of the Group in advance when possible (anything mentioning AFMA and/or SARDI must go through the respective agencies)

General Recommendations

The New Zealand Sea Lion Threat Management Plan should be released prior to the consultation on the SQU6T Operational Plan for 2017/18 and stakeholders notified

MPI to continue working with AFMA to identify collaboration opportunities to share knowledge, data and expertise on marine mammal bycatch issues

Consideration be given in the long term of the potential to move towards more direct estimation of mortality (and monitoring of FRML)

Clearly define ALL terms used in management and advice

MPI to continue considering all management options to manage interactions of sea lions with the SQU6T fishery (including spatial management) - link to TMP

Population objective criteria and setting of FRML

2017/18 –

- Test effects on PST of:
  - using 95% and 98% thresholds (5% and 2% impact from fishing) with 90% probability.
  - using 'estimated captures' as future mortality assumption
- Give explicit consideration to direct impacts from other fisheries when setting FRML
- Provide a range of options for the FRML (including consideration of option to reduce FRML from current number)

  - Specific statement from WWF, Forest & Bird, and ECO regarding the need to consider active fisheries mortality reduction as an option to reflect society's views and desire to reduce human impacts on threatened marine mammal species

Longer term –

- Ensure that consideration be given to the direct impacts of all fisheries that impact on Auckland Islands sea lion population.
- The Squid 6T Operational Plan needs to be consistent with the goals/objectives of the Sea Lion Threat Management Plan - Consideration be given towards setting an aspirational goal for the SQU6T fishery of zero bycatch under framework of TMP
- Projections should be made over 5 years and a longer timeframe as possible (at least 10 years) (consistent with capacity of model)(noting the TMP has 5-year and 20-year goals)
- MPI will work on a proposal for the next meeting of SqOPTAG (later in 2017) to discuss 'population objective' criteria for future Operational Plans

Strike Rate

2017/18

- MPI to confirm if/why early (pre-2000) data was discarded and see if it can be used to inform estimation of current Strike Rate.
- Provide multiple options on Strike Rate based on different reference periods and reflect uncertainty (including consideration of information in Smith & Baird 2005 and changes in fisher behaviour/fleet make-up)

o   If possible, model strike rate for entire period of available data but only use last 10 years (or other more recent period) to calculate mean

Longer Term

- Consideration be given to further exploration of tow duration and turns data (and/or other factors which may explain differences including changes in the make-up of the fleet)
- Note that if analysis of Smith & Baird 2005 etc cannot be completed for 2017/18, that work should still be progressed.

Discount Rate

2017/18

- MPI to provide multiple options for Discount Rate including clear consideration of best available data (including consideration of Bradshaw et al. 2013) and uncertainty with regards to cryptic mortality.
    o   Specific statement from WWF, Forest & Bird and ECO noting Bradshaw report, that until real data becomes available then a precautionary approach is recommended. A discount rate of 0.5 or less is recommended as an appropriate interim option.

Recommendations from 15 June:

- Update of the NZ sea lion demographic model with consideration given to in-depth review and/or getting clarity on the differences between the NIWA model and Stefan Meyer's model (refer to TMP expert workshop report as a starting point)
- Update Smith & Baird using all available data, consider partitioning into pre-SLED and post-SLED periods and consideration of all explanatory variables
- Proposal to apply risk assessment framework to use best available information to estimate priors to quantify uncertainty and allow for informed prioritisation of future work
- Scoping exercise in conjunction with risk assessment to assess potential methodologies to address uncertainties in retention including consideration of cameras and/or PIT tags
    o   Note interest of some members in investigating pseudo sea lion trials
    o   Fishing industry does not support pseudo sea lion trials
- Operational Plan proposed for 2 years with trigger based on availability of significant new information