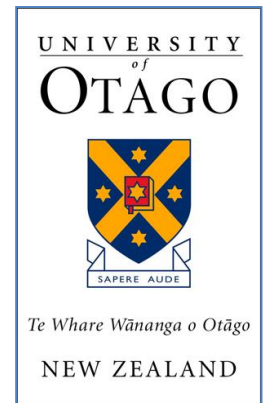# Department of Zoology

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Submission on the *Operational Plan to Manage the Incidental Capture of New Zealand Sea lions in the Southern Squid Fishery (SQU 6T) 2016-17*

Please find my submission on the proposed Operational Plan to Manage the Incidental Capture of New Zealand Sea lions in the Southern Squid Fishery (SQU 6T) 2016-17.

My key recommendations are:

1. The evidence for high SLED efficacy is weak and, given this, the use of an 82% SLED discount rate is not justifiable, hence the SLED discount rate must be revised down. **The previous discount rate was 35% and I support this as an interim measure** while further research on SLED efficacy is undertaken**.**

2. The FRML of 68 is based on the Breen-Fu-Gilbert (BFG) model, which in the modellers' own words is "badly dated". Given the major overhaul required of this model (6 points noted in discussion of Breen et al. 2016), it is imperative that a precautionary approach be applied to setting the sea lion mortality limit in SQU6T. **I propose that a mortality limit of 62** (the lowest value used since the 1992-93 squid season: Table 3.8 in Sea lion Chapter in AEBAR 2015) **be set until such time as a new model for determining a mortality limit is in place**. An alternative is to half the present limit and use a mortality limit of 34, which is more in keeping with a PBR approach to sea lion bycatch management.

3. **The current strike rate (5.89) needs to be set to a pre-cautionary level and hence to at least 10.** In the 2001 squid fishing season when there was 100% observer coverage of the SQU6T fishing fleet, the strike rate was over 10 sea lions per 100 tows. A strike rate of at least 10 will also reflect the impact of doubling of fishing effort in SQU6T from 2004 to the present.

4. Based on my proposed precautionary parameters (35% SLED discount rate; a 62 mortality limit, and a strike rate of 10), **the maximum number of tows that should be done in SQU6T in 2016-17 is 954 tows**.

   This level of fishing effort is within the range recorded over the course of the 5 year operational plan (i.e. 737 to 1281 tows), indicating that taking a precautionary approach to sea lion management in the

operational plan for the Southern Squid Fishery (SQU 6T) 2016-17 will not significantly impact on the squid fishery.

5. The question must be asked why MPI is choosing to ignore the expert scientific advice and sticking to its optimistic view that SLEDs are working as designed without appropriate evidence to back up this controversial claim.

This stance appears to be a reflection of "regulatory capture", in that the NZ fishing industry has worked its way deeply into the decision making processes of MPI, hence becoming an "influential force".

MPI relies heavily on working groups to run and peer-review the science process. These working groups are made up of predominantly government and fishing industry officials who decide how best to run the science process and what constitutes the best available information (the so called, BAI) for sea lion management. Other stakeholders (environmental NGOs and university) are fewer in number at these meetings and their dissenting views are invariably ignored in favour of the industry and governmental agenda. Expert scientific panels indicate that these working groups lead to science outcomes (the BAI) that may be acceptable to government and the NZ fishing industry, but do not stand up to international scientific scrutiny.

The working group approach to science decisions may allow the government to avoid legal battles with the NZ fishing industry, but it is at the expense of good science, logic and sustainable management of New Zealand's fisheries. Until MPI's science process changes to routinely include and heed expert scientific advice, we will continue to have non-sense, like the 82% SLED discount rate, being passed off as good science appearing in operational plans and government decision-making.

I call for a review of the apparent "regulatory capture" by the NZ fishing industry of MPI's decision-making and science review processes. This needs to examine the role that the NZ fishing industry is playing in the decision-making process of MPI, including the science review process.

It is worth noting that in the Seafood Industry Council's Business Plan 2011/12, it states that SeaFIC's Chief Executive spent 0.1 FTE in the existing activity of "manag[ing] relationships with Ministers, officials and industry participants" with the intent of "establish[ing] the seafood industry as an influential force in government decision-making". Clearly industry has been striving for "regulatory capture" of MPI's decision-making processes. In this context, MPI's strong resistance to expert scientific advice from independent sources needs to be examined urgently to rule out such "capture".

The rushed timing of this consultation is disappointing, especially as the last 5-year plan for SQU6T expired on the 30 September 2016 and the consultation process for the sea lion Threat Management Planning process closed on the 19 August 2016. Furthermore, the "collaborative review of management settings for the SQU6T fishery" included as an action under the TMP cannot take place until the TMP is finalised, hence the present consultation was always going to be needed before late January 2017 when the southern squid fishery begins in 2017. [**At the rate of progress on the TMP and the future "collaborative review", I suspect that MPI will have to revert to an *ad hoc* operational plan in the 2017-18 fishing year also, hence getting this extension right is paramount.**]

Despite this, stakeholders are asked to consult urgently on an extension of the operational plan days before the Christmas break. This sends the message that MPI are trying to limit the inclusion of stakeholders in the consultation by dumping the operational plan out in this busy time of year or that the decision of what parameters to use in the operational plan has already been made and hence this consultation is just a formality. Another option is that MPI's processes are incompetent. Whatever the reason, all these options do not bode well for effective management of sea lion captures in SQU6T.

The proposed operational plan outlines keeping in place the previous 5-year operational plan (effectively rolling it over) that used a FRML of 68; a strike rate of 5.89; a SLED discount rate (which reflects SLED efficacy) of 82%; and a maximum number of tows of 4,700. **I do not support the use of these parameters in the proposed operational plan** given the remaining uncertainties associated with these parameters.

My stance should come as no surprise to MPI, as I have previously extensively set out my concerns with the "science" and "logic" that MPI uses to justify these parameter choices in various consultation submissions, email correspondence with MPI officials, and scientific publications. I would direct MPI officials to again reread my submission on the TMP (https://sealiontrust.org.nz/wp-content/uploads/2016/10/Assoc-Prof-Bruce-Robertson-TMP-submission-minus-appendices.pdf), which addresses a range of matters, including SLED efficacy that impacts on SLED discount rate.

The SLED discount rate is a pivotal parameter in the setting of the operational plan in SQU6T. For example, as noted in Figure 1, if the correct discount rate is actually 0.35 (35%) then less than 2000 tows can be done before breaching a FMRL of 68 and the Minister can close the fishery. If the correct discount rate was 0.35 (35%), but MPI incorrectly assumes it is 0.82 (82%), then allowing 4,700 tows would result in 180 sea lion deaths before the fishery is closed. Clearly getting the SLED discount rate right is paramount for meaningful sea lion management.

strike rate (SR, deaths per 100 tows)	5.89	5.89	5.89	5.89	5.89	5.89	5.89	5.89	5.89	5.89	5.89	5.89	5.89
discounted SR	1.06	1.18	1.47	1.77	2.06	2.36	2.65	2.95	3.24	3.53	3.83	4.12	4.42
SLED discount rate	0.82	0.8	0.75	0.7	0.65	0.6	0.55	0.5	0.45	0.4	0.35	0.3	0.25
tows													
Fishing effort in 2013 was 1015	10.8	12.0	14.9	17.9	20.9	23.9	26.9	29.9	32.9	35.9	38.9	41.8	44.8
1500	15.9	17.7	22.1	26.5	30.9	35.3	39.8	44.2	48.6	53.0	57.4	61.8	66.3
2000	21.2	23.6	29.5	35.3	41.2	47.1	53.0	58.9	64.8	70.7	76.6	82.5	88.4
2500	26.5	29.5	36.8	44.2	51.5	58.9	66.3	73.6	81.0	88.4	95.7	103.1	110.4
3000	31.8	35.3	44.2	53.0	61.8	70.7	79.5	88.4	97.2	106.0	114.9	123.7	132.5
3500	37.1	41.2	51.5	61.8	72.2	82.5	92.8	103.1	113.4	123.7	134.0	144.3	154.6
4000	42.4	47.1	58.9	70.7	82.5	94.2	106.0	117.8	129.6	141.4	153.1	164.9	176.7
4500	47.7	53.0	66.3	79.5	92.8	106.0	119.3	132.5	145.8	159.0	172.3	185.5	198.8
4700	49.8	55.4	69.2	83.0	96.9	110.7	124.6	138.4	152.3	166.1	179.9	193.8	207.6

Fishing related morality limit = 68 sea lions

Figure 1 Impact of varying discount rate on the strike rate and the estimated number of sea lion deaths (numbers in the box) for varying levels of fishing effort (up to 4700 tows in the current operation plan for SQU6T). Green denotes number of sea lion deaths that are below the current Fishing Related Mortality Limit (FRML of 68 sea lions), while red indicate the fishing effort (tows) that would exceed the FRML of 68. Discount rates highlighted in yellow are the present (0.82), past (0.35) and a 0.5 discount rate (i.e. 50%). This analysis highlights that optimistic discount rates can result in higher numbers of estimated deaths than expected.

As MPI are not proposing to change the SLED discount rate in the current proposed operational plan, it is clear that my concerns with SLED efficacy and the other parameters are yet again being ignored.

So just for the record here are my concerns again:

- a SLED discount rate (which reflects SLED efficacy) of 82%:

100   MPI has been told repeatedly that the evidence for high SLED efficacy is weak and that given this the use of an 82% SLED discount rate is not justified. The sea lion expert panel in 2013 (Bradshaw et al. 2013) noted that until "real data" are available to inform SLED efficacy, a more precautionary discount rate should be used in the operational plan. Furthermore, available information, repeatedly ignored by MPI, indicates that hydrodynamics in the hood of the SLED could result in dead sea lions

105   falling or floating out of the hood of the SLED, hence statements that equate declines in observed captures of sea lions with SLED efficacy are deceptive at best (Robertson 2015). The previous SLED discount rate used in operational plans was 35% - I support this value as an interim measure until athorough reassessment of SLED efficacy is undertaken.

110   • a FRML of 68:

The FRML of 68 is based on the Breen-Fu-Gilbert (BFG) model that was extensively reviewed by the sea lion expert panel in 2013 (Bradshaw et al. 2013). This review was a consequence of widespread stakeholder concern with the assumptions and application of this model (Final Advice Paper 2012; available on MPI's website). The expert panel found that the modelling infrastructure was adequate

115   to undertake the task, but the panel (and various scientists) had many concerns with the assumptions and parameterisation of the model (Bradshaw et al. 2013; Breen et al. 2016).

Based on this, the panel concluded that "it will be impossible to determine whether the current limits upon the SQU6T fishery will succeed in meeting the agreed management requirements. Delaying re-assessment of the situation and management for five years appears inherently risky in the face of

120   the unknown uncertainty around the model's predictions." [pg1, (Bradshaw et al. 2013)].".

That was 3 years ago and, with no change, the BFG model is still being used to set the FRML, even in the present proposed operational plan.

Just recently, the BFG modellers made an extraordinary admission about their model. They noted that the model is still used as the basis of sea lion management, but that it is "now badly dated" (Breen et

125   al. 2016 AEBR-175).

So for the last 6 years (at least), MPI have used and defended a "badly dated" model to manage sea lion incidental mortality in SQU6T.

"Although it is the basis for MPI's bycatch management, this work is now badly dated.

130   If further work were to be conducted with a version of this model, much work would be required (in addition to incorporating the most recent data and the good estimates of bycatch now available, e.g. Thompson et al. 2013). This would include:

• revising the parameterisation for stochastic survival to remove the artefact

135   • including tag loss estimation in the predictions for tagged female re-sightings (Chilvers & MacKenzie 2010)
• trying to obtain pre-1988 bycatch estimates, which might have been high when the squid fishery first began (Richard Wells, pers. comm.)
• considering a female-only model, although this should not make much material

140   difference
• running sensitivity trials on the effects of assumed z, and basing the assumption of z on a literature review
• combining the rookery pup counts after 1993 and fitting a single Auckland Islands population

145   • relaxing the prior on $Rmax$ and conducting sensitivity trials to the effect of this prior

- given the increase in tow length in the fishery, re-considering the estimation and projection of catchability " [Breen et al. 2016]

Of even greater concern, the proposed operational plan glosses over that the BFG model is "badly dated" and instead, MPI proposes that a FRML of 68 will have no impact on the sea lion population. This is the same careless attitude that allowed FRMLs as high as 150 sea lions to be accepted in sea lion management using the BFG modelling (Table 3.8 in Sea lion Chapter in AEBAR 2015).

The pre-cautionary approach with setting a mortality limit of sea lions in SQU6T is to reduce the FRML until such a time as a new model is fully tested and validated. Unfortunately, **MPI seems to prefer the "inherently risky" (Bradshaw et al. 2013) approach to sea lion management in SQU6T**.

Given the major overhaul required of this model (6 points noted in discussion of Breen et al. 2016), it is imperative that a precautionary approach be applied to the setting the mortality limit. **I propose that a mortality limit of 62** (the lowest value used since the 1992-93 squid season: Table 3.8 in Sea lion Chapter in AEBAR 2015) **be used until such time as a new model for determining a mortality limit is in place**. An alternative is to half the present limit (68) and use a mortality limit of 34, which is more in keeping with a PBR approach to determining sea lion fisheries mortality.

- a strike rate of 5.89:

As I noted in my submission on the 5-year operational plan consultation in 2011, the fishing industry doubled their tow durations and effectively doubled its fishing effort in the face of tow restrictions between 2004 and 2008 (Robertson 2011 – in the final advice documents presented to the Minister). Despite fishing effort doubling, the strike rate increased by only 0.35.

This illogically means that nets in the water for double the amount of time only catch 6% more sea lions.

MPI has pointed to work done in the early 2000s that suggests that tow duration is not a factor in catchability of sea lions, which goes against what is known for otariids in other fisheries world-wide. Note above that even MPI's modellers (Breen et al 2016) highlight that "given the increase in tow length in the fishery, re-considering the estimation and projection of catchability" is important in sea lion modelling, and hence management.

Catchability of sea lions is determined by fishing practices. Fishing practices have changed over the period when tow duration doubled (i.e. between early and late 2000s). I found using underwater camera footage summarised in Middleton and Banks (2008) that the number of turns in tows had increased significantly since the early and late 2000s. This is not surprising given that fishing effort for squid in SQU6T targets spawning aggregations and vessels need to turn more often to keep in contact with identified aggregations now that trawls are longer.

As nets must be partially hauled off the bottom when a vessel turns, this significantly increased the chances of sea lions interacting with nets mid-tow (in some tows nets are observed to be brought to the surface on a turn). Couple this with the existing uncertainty of SLED efficacy (i.e. it is unknown if dead animals are retained in the hood of the SLED; Robertson 2015), then **it is unclear what the current strike rate is or should be**.

The observed change in fishing practice information has been passed onto MPI (to the fisheries management and to the Ministerial level), but clearly it has not been included into the decision-making or the proposed operational plan currently under consultation. This is yet another piece of evidence that MPI is happy to ignore, as it does not fit with the government's agenda.

In 2001, when there was 100% observer coverage of the SQU6T fishing fleet, the strike rate was over 10 sea lions per 100 tows. The current strike rate needs to be set to a pre-cautionary level and hence to at least 10, which would be consistent with fishing effort doubling in response to fishing restrictions.

195 As I note above, **MPI currently have no empirical evidence that rules out the possibility that SLED design allows dead sea lions to float or fall out of trawl nets** and hence are not present at hauling for government observers to record them as bycatch. Indeed, the best available information (camera footage of SLED hood underwater dynamics indicates that dead animals can float out of the hood of the SLED: Middleton & Banks 2008; Robertson 2015).

200 Despite this, **MPI is happy to mislead the general public into believing that SLEDs are functioning as planned** and that these devices are responsible for solving the issue of sea lion bycatch in the southern squid fishery SQU6T.

MPI repeatedly state that their decision making is "science-based". Even in the latest consultation on the "Future of our Fisheries" (consultation also closes the 23 December 2017), MPI states "MPI has a well-
205 established and internationally recognised science process". It is hard to see how an "internationally recognised science process" can allow decisions that are based on a lack of empirical evidence and that ignore the best available information that points to the need for a less optimistic conclusion (i.e. SLEDs may not be functioning as planned).

Clearly, MPI knows of the existing uncertainty with SLED efficacy, as it is proposing a research project
210 (PRO2017-10 assessing "Cryptic mortality method-specific estimates for marine mammals (sea lions) (include design workshop, SLED interactions and other)") to examine this uncertainty in SLED function, yet this uncertainty is ignored here and MPI insists on retaining the unjustified SLED discount rate of 82%.

This casual approach to fisheries management has been used before and appears to be one of MPI's strategies to circumvent stakeholder concerns while sticking to its agenda. For example, the Final Advice Paper on the
215 5 year operational plan for SQU6T noted that the BFG model was appropriate for setting the FRML of 68 used in the 5 year operational plan, but at the same time acknowledged that the model was in need of urgent independent expert scientific review because of consistent stakeholder concerns.

The fact that the model needed review should have ruled out it being appropriate for use in sea lion management. The fact that the subsequent expert panel review upheld stakeholder concerns about the BFG
220 model was of no consequence, as we are still lumped with this "badly dated" model that leaves sea lion management in an "inherently risky" position.

When claims are made that are not supported by evidence or do not adequately reflect real uncertainties, such claims are deceptive at best, but can be seen as fraudulent. **From a science perspective, I am embarrassed for MPI, because misrepresenting the findings of research or ignoring scientific findings risks heading**
225 **down the path of research misconduct.** This type of conduct is not what should be expected of an "internationally recognised science process", hence I encourage MPI to reconsider its operational plan and set a SLED discount rate that is precautionary and reflects the existing uncertainty in SLED efficacy.

As I note in my TMP submission (link above), the 2013 expert panel on sea lion management ""deliberate[d] extensively on the efficacy of SLEDs" [Bradshaw et al. 2013] and questioned the use of the current 82%
230 discount rate in sea lion management. The expert panel's report indicates that they thought the 82% discount rate was not precautionary, as they stated that the "most plausible value" for the discount rate would be one that is "deliberately low to provide a precautionary approach":

"Our terms of reference specify that we are to evaluate the model as a management tool.
We consider that until real data become available, MPI's options regarding discount rate use
235 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)." [Pg 25, Expert panel review of sea lion management, Bradshaw et al. 2013]

Given this damning expert criticism of an 82% SLED discount rate, the question must be asked, why is MPI choosing to ignore the expert advice and sticking to its optimistic view that SLEDs are working as designed without appropriate evidence to back up this controversial claim?

I suspect that this stance is a reflection of "regulatory capture", in that the NZ fishing industry has worked its way into the decision making processes of the MPI.

This is evident in the "internationally recognised science process" that relies heavily on working groups to run and peer-review the science process. These working groups are made up of predominantly government and fishing industry officials deciding how best to run the science process and what constitutes the best available information (the so called, BAI) for sea lion management. Other stakeholders (environmental NGOs and university) are fewer in number at these meetings and their dissenting views are invariably ignored in favour of the industry and governmental agenda.

There is also the perception that much of what is discussed in these working groups is a fait accompli, which is likely decided at other meetings, probably under the auspices of the Memorandum of Understanding between the NZ government and the NZ fishing industry. The MOU has brought MPI and the NZ fishing industry into closer partnership and was singled out for mention as contributing to SLED development in one MPI document.

As was demonstrated by the 2013 expert panel review of sea lion management (Bradshaw et al 2013), the working groups lead to science outcomes (referred to as the BAI defined in the Fisheries Act) that may be acceptable to government and the NZ fishing industry, but do not stand up to international scientific scrutiny (note, 3 years on, the expert panel's criticism of the SLED discount rate has still fallen on deaf ears).

The working group approach to science decisions may allow the government to avoid legal battles with the NZ fishing industry, but it is at the expense of good science, logic and sustainable management of New Zealand's fisheries. Threats of litigation – real or perceived – might also be ailing MPI's science and decision making process. Until MPI's science process changes to heed expert scientific advice, we will continue to have non-sense, like the 82% SLED discount rate, being passed off as good science appearing in operational plans and government decision-making to further government agendas.

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

Yours sincerely

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Associate Professor Bruce Robertson