

**2009/10 SQU6T OPERATIONAL PLAN:
INITIAL POSITION PAPER**

Submission by

The DeepWater Group Ltd

and

**The New Zealand Seafood Industry
Council**

BACKGROUND

- 1 The Deepwater Group Limited (*DWG*) and the New Zealand Seafood Industry Council (*SeaFIC*) appreciate the opportunity to make a submission on the Initial Position Paper (*IPP*) for the 2009/10 SQU6T Operational Plan.
- 2 *DWG* represents participants in New Zealand's major deepwater fisheries, including squid, hoki, hake, orange roughy, oreos and southern blue whiting. Shareholders in *DWG* hold about 97% of the quota in New Zealand's squid trawl fishery areas (SQU1T and SQU6T respectively). *DWG* makes the submission as a representative of quota holders in quota management area SQU6T.
- 3 *SeaFIC* represents the generic interests of all sectors of the New Zealand seafood industry. *SeaFIC*'s shareholders collectively represent around 95% of the seafood industry by value.

EXECUTIVE SUMMARY

- 4 The Industry considers that a FRML is not required for the SQU6T fishery. The best available information suggests that the SLED discount rate should be at least 50%, and assuming such a discount rate, the revised model demonstrates that a FRML is not required to meet the MFish management criteria. The Industry will work with MFish to ensure 100% SLED compliance and is prepared to discuss the implementation of voluntary limit on tows to ensure effort is within the assumptions in the model.
- 5 However, if the Minister considers that a FRML should be imposed, the Industry considers that a FRML of 127 is appropriate:
 - 5.1 The revised modelling has addressed much of the uncertainty that previously suggested the need for a conservative approach to the modelling results, and has been revised to address the lower pup counts;
 - 5.2 The modelling results are conservative due to the management criteria used and a conservative bias in the model which affects the performance of the rules against the MFish 2 criterion in particular;
 - 5.3 Under unconstrained fishing, and with a discount rate of 35%, the population stabilises at an average of 93% of the population size achieved in the absence of fishing (0.94 K). This indicates that unconstrained fishing should meet the MFish 2 criterion;
 - 5.4 The FRML at the cusp of the MFish 1 criterion is 127 (Rule 327) (35% assumed discount, which is very conservative based on the best available information).

- 6 The Industry agrees that there is insufficient new information to justify amending the current assumed strike rate of 5.65%.
- 7 The Industry strongly disagrees with MFish's initial view that the Minister not be given the option of increasing the SLED discount to 50%. Based on the best available information, including new information available this season, the SLED discount should be increased from 35% to at least 50%.

BACKGROUND

- 8 Together with MFish, the Industry has been at the forefront of managing the interaction between the squid fishery and sea lions. The leadership role taken by Industry has included committing resources and millions of dollars in funding (both directly, and indirectly through levies) to:
 - 8.1 research into the sea lion population and interaction with the squid fishery;
 - 8.2 research and development of SLEDs, and demonstrating their efficacy (including autopsy research);
 - 8.3 the implementation of the annual operational plans, reporting and SLED auditing.
- 9 DWG and SeaFIC have always committed to a reasoned science and policy based approach to managing the interaction, and quota holders have been prepared to take immediate action in response to new information.
- 10 This was demonstrated in Industry's prompt and unanimous decision to voluntarily reduce effort in the fishery to a level equivalent to a FRML of 95 in response to the reported significantly lower 2009 pup count. While the best available information indicated that a FRML of 113 remained a very conservative management measure, the Industry took this immediate and cautious approach because the new pup count information was outside the bounds of the model. The model has now been revised to address the lower pup numbers.

STATEMENT OF INTENT

- 11 The Industry considers that in making his decision the Minister should bear in mind the MFish Statement of Intent 2009 – 2014, and in particular the following statements:
 - MFish will look for all opportunities to reduce costs, improve efficiency and effectiveness and to support the economic development of the fishing industry;

- Achieving quota value increases by an estimated \$400 million in real terms by 2014;
 - Improving the effectiveness of MFish’s activities and services, reducing the costs of those services, and reducing business compliance costs will provide greater value to the commercial fishing industry;
 - Under the Fisheries 2030 vision, having profitable and efficient fisheries, with a strong focus on long-term economic value.
- 12 As one of the main sources of export revenue for the Industry, the squid fishery is an important component of achieving MFish’s goal of maximising value from the sustainable use of fisheries resources, and therefore contributing to the Government’s priority to grow our economy to deliver greater prosperity, security and opportunities.
- 13 Of course, the Industry recognises the need to protect the health of the aquatic environment as part of maximising value. The Industry is committed to working with MFish to continue to responsibly manage interactions while allowing for sustainable utilisation.

MINISTER’S STATUTORY ROLE

- 14 DWG and SeaFIC agree that in making his decision as to whether measures are necessary to avoid, remedy or mitigate the effect of fishing-related mortality on the sea lion population under s 15(2) of the Act, the Minister should take into account the considerations set out at paragraph 18 of the IPP. We note that:
- 14.1 as the IPP notes at paragraph 63, the Minister’s role is to assess the extent to which (or perhaps the point at which) utilisation of the fisheries resources threatens the sustainability of the population;¹
- 14.2 the Supreme Court recently succinctly stated of the purpose of the Act in s.8 “(f)isheries are to be utilised, but sustainability is to be ensured”.² While this was in the context of a harvestable species (kahawai), it is also applicable in the case of associated and protected species such as sea lions.

¹ *Squid Fishery Management Co Ltd v Minister of Fisheries* (CA39/04, 13 July 2004) [75]–[80]

² *NZRFC & Ors v Sanford & Ors* [2009] NZSC 54 at [39]

FISHING-RELATED MORTALITY LIMIT (FRML)

- 15 The FRML options in the IPP are derived from harvest control rules evaluated against management criteria in the Breen-Fu-Gilbert model. DWG and SeaFIC consider that the evaluation in the model constitutes the best available information for the purpose of the Minister's decision in relation to a FRML under s.15(2) of the Act.

Model results

Model revision addresses uncertainties

- 16 As acknowledged in MFish's 2008 final advice to the Minister, the Breen-Fu-Gilbert modelling addressed many of the uncertainties and concerns previously raised in relation to the Breen-Kim model.
- 17 The further revision in 2009 included modifications to incorporate the lower 2009 pup count and pup mortality data, and to increase the stochastic noise applied to survival and pupping rates. To address the few remaining areas of uncertainty, MFish also requested a series of sensitivity trials.
- 18 We acknowledge that, as with all modelling exercises, some uncertainty remains. While we comment on this in more detail below, the uncertainty is explored in the sensitivity analyses in the revised modelling, and is not a barrier to robust management using the model results. Clearly, there is less scope than with previous decisions for the Minister to adopt a precautionary approach based on uncertainty in the best available information.

Model results conservative

- 19 It is important to acknowledge that the model results are conservative. The management criteria used to assess harvest control rules are themselves conservative, as discussed further below. Moreover, because of the way survival deviations were parameterised, the model population stabilises at a level below the estimated parameter K, which is considered to be the population's carrying capacity for the model evaluation of the MFish 2 criterion. This introduces a clear conservative bias into the model. Results for models with the assumed discount rates of 35% and 50% are also slightly conservative because of the way incidental catch was estimated.

Model revision represents the actual management regime

- 20 It is also important to acknowledge that unlike previous modelling, the revised model represents the actual management regime of a limit on allowed tows.
- 21 In the original Breen-Kim model the management measures evaluated were rules for implementing an annual limit on fishing related mortality. Historically, in-season estimates of sea lion mortality were made by scaling

from observed mortalities to the entire fleet effort. However, the introduction of SLEDs, and concern that some escaping animals may not survive, led to the implementation of the FRML via an assumed strike rate and discount factor.

- 22 In effect, this imposes a limit on the number of tows in the fishery. Accordingly, Breen et al modelled this process directly by converting the notional FRML to a limit on the allowed tows. This has a number of implications, the most important of which is that the difference between the anticipated and actual management regime is removed. Therefore, while the previous model assumed that actual mortalities were counted, this was only implemented "on average" through an assumed strike rate. The updated model represents the actual management regime of a limit on allowed tows.

Management criteria very conservative

- 23 The model evaluates harvest control rules against very conservative management criteria. The first of the MFish management criteria requires that the sea lion population (mature numbers) remains above 90% of its carrying capacity (K), or above 90% of the level it would be in the absence of fishing (but including background catch), with 90% certainty, over 100 year projection runs (called MFish 1 in the modelling). We note that paragraph 26(a) of the IPP refers to this criteria also being over 20 year projections. However, the 20 year projections related to the DoC's criteria rather than MFish's.
- 24 The second of the management criteria requires a rule to attain a mean number of mature mammals that exceeded 90% of carrying capacity in the second 50 years of 100-year projection runs (called MFish 2 in the modelling).
- 25 The original purpose of these criteria was to give effect to DoC's objective of ensuring the population is at a very high percentage of its carrying capacity to encourage the expansion of the population to new breeding colonies. This is a far more conservative approach than, for example, the maximum net productivity level objective used in the US marine mammals legislation.
- 26 It is significant that even in the complete absence of fishing, the average of mature numbers after 100 years is 94.4% of K. This means that in assessing rule performance against K, the model evaluation is more conservative than it should be.³ As the IPP acknowledges at para 54(c), this introduces a conservative bias into the model and makes it more likely that model runs will fail the MFish 2 criterion. In the updated modelling it is this

³ Breen et al. (2009) pg 11

second criterion that is most influential in setting the overall FRML 'cusp'; for example, under the 35% discount assumption, the FRML 'cusp' under the MFish 2 criterion is 90, which is significantly lower than the 'cusp' under the MFish 1 criterion of 127.

Rule 3 series results

- 27 DWG and SeaFIC agree that the Minister should consider whether the respective rules meet the MFish management criteria. However, it should be explained to the Minister that the model results insofar as the MFish 2 criterion is concerned are affected by the conservative bias mentioned above.
- 28 The conservative bias is evident in Table 2 in the IPP which indicates that the MFish 2 criterion is 0.949 for Rule 0. In other words, even in the absence of fishing, the MFish 2 criterion is not met in more than 5% of runs, largely due to this conservative bias. The implications of this in terms of the continuum of rules which meet both criteria are not explained.
- 29 The bias arises because the model parameter K is taken to be the population's carrying capacity. This was the original approach adopted by Breen & Kim and, in that earlier modelling, the population stabilised around a mean of K in the absence of fishing. However, as a result of the revised parameterisation of survival in the Breen et al. model, this is no longer the case. In the revised model the population stabilises at a mean level of 94.4% of K in the absence of fishing, and it is this level (0.94 K) that is most logically considered to be the population's carrying capacity for the purposes of the management criteria.
- 30 Under unconstrained fishing (Rule 1) the population stabilises at 0.88 K in the model with a 35% discount rate. That is, under unconstrained fishing, the population stabilises at an average of 93% of the size achieved in the absence of fishing (0.94 K). Thus, the constraints imposed by the MFish 2 criterion arise simply from the technical problem of interpreting the model parameter K as the population's carrying capacity.
- 31 Accordingly, while Rule 319 just met the MFish 2 criterion, this result is more conservative than it should be as a consequence of the conservative bias. The Minister should also be told that MFish 1 was just met by Rule 327 (FRML 127), and Rule 327 should also be included in Table 2.
- 32 We also note that the IPP's assessment of the Rule 3 series results against the various operating models (paras 46 to 49 and Table 4) in effect only summarise the results (Rules and FRMLs) which meet the MFish 2 criterion. Given the conservative bias, MFish should provide the Minister with the results in terms of both the MFish 1 criterion and the MFish 2 criterion.

Rule 2 series results

- 33 Rule 2 sets a “constant FRML”, which is actually a constant permissible number of tows that is determined only by the assumed strike rate and discount rate, not by annual pup counts. DWG and SeaFIC agree that the Rule 2 results should be available to the Minister as a basis for selecting a FRML, although acknowledge MFish’s preference to continue to use the Rule 3 series.
- 34 The Rule 2 results in Table 3 include a constant FRML of 106, on the basis that this is the rule which just met MFish 2. For the reasons stated previously in relation to the conservative bias inherent in the results relating to MFish 2, the rule which just meets MFish 1 should also be included in the table. Based on linear interpolation of the results for constant FRMLs of 100 and 150, presented to the AEWG on 17 July 2009, a constant FRML of approximately 137 would just meet the MFish 1 criterion.
- 35 As with the Rule 3 series results, the IPP’s assessment of the Rule 2 series results against the various operating models only summarises results which meet the MFish 2 criterion (paras 50 to 52 and Table 5). MFish should provide the Minister with the results in terms of both the MFish 1 and MFish 2 criterion given the conservative bias in assessing rule performance against K.

Selection of modelled discount rate

- 36 The revised modelling assesses model results against operating models with four assumptions about the discount rate – 0%, 20%, 35% and 50%. The IPP characterises these as the “four Base Cases”.
- 37 While we agree that it is useful for the results of rule evaluations against models with different discount rates to be available for consideration, we consider that the terminology adopted is potentially confusing. Typically working groups report either a *single* base case, or a number of models of equivalent status. In both cases additional models exploring the sensitivity to key assumptions are often provided.
- 38 The IPP provides limited clarity on the distinction between “sensitivities” and “alternative base models”. The distinction is somewhat academic in that both represent an evaluation of the sensitivity of model results to areas of uncertainty. However, in practice, the model implementation assumes that the Minister has made a decision on the appropriate “discount rate”.
- 39 The IPP states at paragraph 40 that information was not available that would have allowed the AEWG to select a preferred Base Case, so the results of all four will be presented to the Minister for his consideration.

- 40 Although it is true that the AEWG did not have new quantitative information directly relating to the survival of sea lions which escape SLEDs (a key component of the overall SLED effectiveness which gives rise to the “discount rate”), the IPP acknowledges that Ministers have previously selected a discount rate of 35% based on his assessment of the best available information on SLED survivability. DWG and SeaFIC consider that this provides a clear basis for the selection of a “base case”.
- 41 As a consequence of the Minister’s previous selection of a 35% discount rate, the IPP considers that it is most appropriate to consider harvest control rules which meet the MFish criteria when using this model. We agree that the choice of control rule should be made in the light of a decision on the appropriate discount rate.
- 42 As discussed later in this submission, DWG and SeaFIC consider that the 35% discount rate is too low, and that based on the best available information, a discount of at least 50% is appropriate. If the Minister were to agree, it would obviously be appropriate for the Minister to look at the model results using this rate. Under the 50% discount rate, unconstrained fishing meets both MFish criteria, indicating that no FRML is required.

Lower harvest control rules

- 43 DWG and SeaFIC do not agree with MFish’s proposal at paragraph 45 to present the Minister with harvest controls rules at the lower end of the continuum to “*address the continued uncertainty associated with the population model assessment*”. If anything, the uncertainty associated with the population model suggests that the results are too conservative. No fishing and Rules 305 and 310 would severely constrain utilisation and cannot be considered ‘necessary’ for the purposes of section 15(2).

Other sources of uncertainty

- 44 As discussed above, most of the sources of uncertainty have been addressed by the Breen-Fu-Gilbert model and the 2009 revisions. As with any modelling exercise, some uncertainty remains, reflected in paragraph 54 of the IPP. In relation to the caveats to the modelling listed:
- 44.1 It is unclear what the AEWG meant when it stated “*the model cannot fit the large decline in pup counts between 2008 and 2009*” (our emphasis). Clearly the model has been fitted to these data. The residuals for the 2009 pup counts (Figure 2 in the document provided to AEWG on 17 July 2009) are consistently negative; however, a consistent signed residual (i.e. all positive or all negative) across all rookeries is not unique to the 2009 counts. Significant uncertainty around recent events is typical of population models. We note that the tag re-sighting data from 2009 was not available for the model update, limiting the model’s ability to interpret the change.

The conclusion that the residual pattern in 2009 “*may make the model results optimistic*” is surprising, given that the model has to attribute the decline in pup counts to survival variation rather than the direct effects of fisheries incidental capture and mortality (such that the MFish 1 criterion is unaffected), and the trajectories in Figures 16 and 17 of the document provided to AEWG suggest no effect on the MFish 2 criterion of a slightly lower start point. However, the additional variability added to survival and pup production rates to ensure that pup counts can be as low or lower than those observed in 2009, may well make the results unduly constraining of the fishery;

- 44.2 The distribution of sea lions outside the breeding season is not well known. Given the apparent low level of interchange between the populations, DWG and SeaFIC consider that it is unlikely that the small numbers of sea lions caught east of Campbell Island in the SBW fishery are from the Auckland Islands population. Moreover, almost all of the animals caught in this area have been male. The corollary of the stated possible “optimism” is that if any of the animals caught and attributed to the Auckland Islands population are actually from other populations then the results are “pessimistic” (more constraining of the fishery than necessary);
- 44.3 As previously discussed, DWG and SeaFIC agree there is a conservative bias in the model, and in particular in relation to the assessment of the rules against the MFish 2 criterion;
- 44.4 The modelling specifically recognises the observed apparent increase in catchability by resampling values from the recent period only;
- 44.5 While there is uncertainty about the maximum pupping rate, this is not unexpected in view of the relatively small range of population sizes over which data are available.
- 45 These uncertainties (individually and/or collectively) are to be expected; we do not have perfect knowledge of the dynamics of any population. They are not such as to preclude robust management using the model results.

Pup production numbers

- 46 There is no evidence to suggest that fluctuations in sea lion numbers, as reflected in pup counts, are significantly affected by fishing-related mortality. Incidental catch estimated from observer data does not account for the recent decline in population. The general decline in pup production since the late-1990s may be related to the fact that the model estimates a somewhat cyclical trajectory, with the numbers in the late-1990s above carrying capacity.

- 47 Under the AEWG's direction the model was revised to address the significant decline in pup counts between 2008 and 2009 by increasing stochasticity. While a better understanding of the nature of this decline is likely to require ongoing data collection for a number of years, the revised modelling allows for the greater variation in pup counts that has now been observed.
- 48 DWG and SeaFIC consider that the recent change in pup numbers does not necessitate a more cautious approach to setting a FRML beyond the variability incorporated in the revised model. We further note that, by design, the series 3 rules reduce the FRML if pup numbers decrease. Even under the "constant FRML" (series 2) rules average incidental catch reduces if population decreases.
- 49 DWG and SeaFIC acknowledge that the revised modelling results are less optimistic than last year, where all the rules (including Rule 1, unconstrained fishing) met both MFish criteria. We agree that the more pessimistic results could be a consequence of the increased stochastic noise or the new pup count data. In view of the model's projected population trajectories (Figures 16 and 17 in the 17 July 2009 AEWG document on the revised modelling) we also agree with Dr Breen's suggestion that the increased variability is the more likely explanation for the more conservative rule evaluations.

FRML for the 2009/10 fishing year

Utilisation

- 50 As the IPP acknowledges, the SQU6T fishery forms a significant component (about 60% of total landings in 2008/09) of the squid fishery, which in turn is one of the main sources of export revenue for the Industry. In 2008, squid was the Industry's fourth largest export earner.
- 51 While SQU6T catch is variable, in recent years a significant proportion of the SQU6T TACC of 32,369t has been caught: 34,635 t (107%) in 2003/04; 27,314 t (84%) in 2004/05; 17,425 t (54%) in 2005/06; 18,479 t (57%) in 2006/07; 18,493 t (57%) in 2007/08 and 28,872 t (89%) in 2008/09.
- 52 It goes without saying that the lower the FRML, the greater the potential constraint on squid utilisation. The IPP suggests that the Minister will be advised that if he chooses a FRML from the lower end of the range of rules available, this is likely to constrain fishing activity and may reduce export earnings and the direct value of the fishery.
- 53 However, DWG and SeaFIC consider that even if the Minister chose a FRML at the top end of the range MFish has indicated it intends to recommend (i.e. 90), there is a very real prospect that the SQU6T fishery will be constrained in the 2009/10 season. The model indicates that a FRML based on Rule 319 would result in an early closure in 38% of years with a loss of

an average 516 tows. FRMLs previously set by Ministers have, in a number of years, significantly restricted utilisation leading to the loss of many millions of dollars of revenue.

- 54 Moreover, because the SQU6T fishery is a critical component of the wider deep water fisheries catch plans in the southern ocean (and in particular the SQU1T fishery complex), utilisation constraints imposed in SQU6T raise the costs of harvest in these other fisheries.

FRML

- 55 The Industry considers that no FRML is required for the fishery because, as discussed later in this submission, the best available information suggests that the SLED discount rate should be at least 50%. Under a 50% discount rate assumption, the model demonstrates that no FRML is required to meet the MFish criteria.
- 56 Not imposing a FRML does not mean that an operational plan is not required. The model assumes 100% SLED use and the Industry would need to continue to work with MFish to ensure this occurs. The Industry is also prepared to adopt a voluntary cap on effort (tows) to ensure that effort is consistent with the assumptions in the model.
- 57 However, if the Minister considers that a FRML should be imposed, the Industry considers that the Minister should set a FRML of 127 (based on Rule 327). As discussed above:
- 57.1 the model addresses many of the areas of uncertainty previously identified in relation to the modelling, and in particular, has been revised to address the lower pup counts;
 - 57.2 the model results are conservative in a number of respects, particularly as they relate to the assessment of rules against the MFish 2 criterion;
 - 57.3 at the cusp a FRML of 127 meets the MFish 1 criterion and would only just fail the MFish 2 criterion, and the MFish 2 criterion is affected by a clear conservative bias;
 - 57.4 under unconstrained fishing the population stabilises at 93% of where it would be in the absence of fishing, which indicates that unconstrained fishing should meet the MFish 2 criterion;
 - 57.5 the 35% SLED discount assumption is very conservative, and under a 50% assumption unconstrained fishing meets both MFish criteria.

STRIKE RATE

- 58 The use of an assumed strike rate was a pragmatic approach to estimating captures when the use of SLEDs became widespread in the fishery. As a result of applying a pre-determined strike rate (and discount rate) the FRML was, in effect, translated into a limit on allowed tows. This process is now implemented directly in the model. Any change in assumed strike rate would require that the Breen et al rule evaluations be re-run with the new value.
- 59 DWG and SeaFIC agree that the current strike rate assumption of 5.65% should be retained. As the IPP notes, this is based on a modelled assessment of the mean strike rate for the 2003/04 to 2005/06 seasons, and is similar to the results of the strike rate modelling undertaken in 2008 by Abrahams et al.
- 60 In the current situation where the population size has declined, strike rate is expected to fall. However, the model already addresses this factor by estimating incidental catch by resampling from estimated catchability values, rather than from estimated strike rate. Catchability estimates, and assumptions used in projections, should typically be revisited as part of periodic model updates, not on an annual basis.

DISCOUNT FOR SLEDs

- 61 The Industry strongly disagrees with MFish's proposal that the discount rate not be reviewed this season and remain at 35%. The best available information, including new information, supports a SLED discount of at least 50%. Accordingly, the Minister should be provided with the option of increasing the discount.

Camera footage

- 62 While the camera footage from the 2007/08 season did not show sea lions escaping through the SLED, it demonstrated that sea lions interact with trawl nets and the SLED hood freely and without impediment. Simply stated, sea lions are competent in this environment. This is similar to previous footage obtained of the interaction between trawl nets with SLEDs and sea lions and other pinnipeds.
- 63 Significantly, the 2008/09 camera footage showed a sea lion, fur seal and shark actively swimming out of a trawl through the SLED escape hatch. Further, no pinnipeds were caught (i.e. retained in the trawl) during the trip. This supports the Industry's long standing view that sea lions which escape through SLEDs do so actively and competently, without interacting with the gear in a manner liable to cause injury or death.

64 Accordingly, we now know that sea lions appear to interact with trawl nets and the SLED hood freely and without impediment, and can actively swim through the SLED escape hatch. The IPP acknowledges (para 92) that this footage lends weight to the argument that sea lions suffer no long term adverse effects through interacting with a SLED. It is therefore baffling that MFish does not propose an increase for the SLED discount based on the new video evidence.

SLED continuous improvement

65 The Industry has supported Ulrik Hansen's investigation of SLED design and specification as part of our commitment to continuous improvement. As the IPP acknowledges, Mr Hansen study did not identify any major concerns about SLED specifications. Mr Hansen also dispelled some of the concerns held by some stakeholders about SLED's relative approach speed in terms of sea lion interaction. DWG will continue with its SLED audit programme and its commitment to continuous SLED improvement.

66 DWG does not propose to undertake further camera work in the 2009/10 season. From the footage previously obtained we know that sea lions can actively escape through SLEDs and without apparent injury. The studies are very expensive, with about \$1 million spent to date.

Research into artefacts of freezing

67 Necropsy data provides another means of assessing the potential survival of sea lions that escape from SLEDs. These data are clearly not ideal as they represent animals which either did not escape, or which were intentionally caught and drowned in cover nets. Historically these autopsy data have not always been assessed in the light of the circumstances of the capture – for example, whether or not a SLED was used.

68 As the IPP notes at paragraph 100, Massey University's preliminary research into the effects of freezing on injuries observed during autopsies indicates that lesions previously considered to be caused by blunt trauma may be a result of the effects of freezing on tissues rather than from interactions with trawl gear or SLEDs. This is not surprising - 6 years ago at Industry's request marine mammal pathologist Dr Terry Spraker reviewed sea lion autopsy results and questioned whether the reported blunt trauma was an artefact of freezing.

69 Massey University's preliminary results, which are consistent with Dr Spraker's previous concerns, provide a further reason for providing the Minister with the option to increase the SLED discount.

Recent autopsy results

70 In recent years the presence of SLEDs in nets from which animals were returned for autopsy is clearly established. One in 5 animals caught in 2008, all from vessels using SLEDs, was assessed as having sustained

severe trauma, while one had moderate trauma and three mild trauma⁴. Of the 8 animals recovered from trawls using SLEDs in 2007, two were categorised as having severe trauma, and three each with moderate or mild trauma⁵. Of 11 sea lions autopsied in 2006⁶ from trawls with SLEDs, three were classified as having severe trauma, and four each with moderate or mild trauma.

- 71 Recent data on escapement rate (72.4%⁷) and potential survival rate (18 of 24 animals did not have severe trauma) lead to an estimate of SLED effectiveness of 54.3%. While small sample sizes imply a certain amount of uncertainty in this value, it suggests that a discount rate of at least 50% would be appropriate.
- 72 Having regard to the likely survivability of sea lions and escapement rates we consider that the Minister should be provided with the option of increasing the discount rate. The Industry considers that the discount should be at least 50%.

Conclusion – increase to at least 50% justified

- 73 We note that in the 2007/08 final advice the Minister was given the option of increasing the discount to 40%. Given the new video footage, the preliminary results from Massey’s University’s research into freezing on body tissues and an analysis of the autopsy data, an increase in the discount to at least 50% is clearly justified and should be an option provided to the Minister.

OTHER MANAGEMENT MEASURES

- 74 DWG and SeaFIC agree with MFish’s position set out in paragraph 118 in relation to DoC’s Louise Chilver’s “management options” paper in *Endangered Species Research*. The options proposed do not warrant further consideration.

⁴ Roe, W.D. (2008). Necropsy of marine mammals captured in New Zealand fisheries in the 2007–08 fishing year. Draft report to Aquatic Environment Working Group (22 October 2008, AEWG 2008/xx).

⁵ Roe, W.D. (2007). Necropsy of marine mammals captured in New Zealand fisheries in the 2006–07 fishing year. Draft report to Aquatic Environment Working Group (15 August 2007, AEWG 2007/42).

⁶ Roe, W.D. (2007). Necropsy of marine mammals captured in New Zealand fisheries in the 2005–06 fishing year. New Zealand Aquatic Environment and Biodiversity Report 11, Ministry of Fisheries, Wellington.

⁷ Smith, M.H. & Baird, S. (2007). Estimation of New Zealand sea lion incidental captures in 2006 for the squid trawl fishery in the Auckland Islands part of SQU 6T. AEWG 2007/37.

FUTURE MANAGEMENT MEASURES

FRML terminology

- 75 Strictly speaking, the management measure proposed for the fishery is not a “fishing-related mortality limit”; rather, it is a limit on the number of tows permitted in the fishery. While the IPP recognises that the “FRML” is actually implemented as a limit on the number of tows permitted, it largely presents the required decision as a “fishing-related mortality limit”.
- 76 Although this terminology has been used for a number of years and reflects the wording in s.15(2) of the Act, it is potentially confusing. DWG and SeaFIC therefore suggest that the advice to the Minister explain the terminology used in more detail, and that in the future consideration be given to whether different terminology should be adopted.
- 77 The revised modelling by Breen et al evaluates rules that set a limit on effort permitted in the fishery. While these rules have been expressed in terms of a notional FRML consistent with previous implementations of a modelled mortality limit, DWG and SeaFIC consider that this terminology is not helpful in the long term.
- 78 Actual sea lion incidental captures in a given year is affected by a number of factors, including the effort undertaken, the population size, and the variation in catchability. The likely magnitude of sea lion incidental catch under a given management rule is best evaluated using the model’s projected catch (i.e. as summarised in the Mean and Max catch statistics in Table 2 of the IPP) rather than by considering the magnitude of the notional FRML.
- 79 The description of the management measure as an FRML has potential to confuse because:
- 79.1 actual management constrains allowed effort. Actual captures under this regime will vary due to the factors noted above, and in some years will exceed the notional limit;
- 79.2 very high FRMLs, while notionally provided by some rules in some circumstances, are typically not expected to be taken as effort attempted restricts the expected incidental catch;
- 79.3 when population size changes, the number of sea lion captures is expected to change. In particular, under a rule 3 variant where the FRML is reduced in response to decreased pup counts, the expected incidental catch decreases further than the notional FRML. In other words, while a specific number of tows link to a specific “FRML”, the expected sea lion captures from those tows is lower when the population is small than when it is large.

A long-term management regime

- 80 Paragraph 9 of the IPP suggests that the Minister is required annually to consider and impose management measures. However, this is not a requirement under s.15(2), and DWG and SeaFIC consider that there is scope for a longer term approach to the regime for managing the SQU 6T fishery.
- 81 A number of factors favour a longer term approach to management:
- 81.1 the management rules evaluated by Breen et al are evaluated on the basis of the consistent application of a single rule, not an annual decision on the appropriate rule. Although the rules are evaluated in 100 year projections, management procedures are typically put in place for around 5 years;
 - 81.2 DoC's decision not to proceed with a PMP at this time provides an opportunity for the Ministry of Fisheries to implement a consistent management regime;
 - 81.3 annual consultation on all aspects of the operational plan is time consuming and expensive;
 - 81.4 a longer term management plan could usefully extend to research planning. For example, the ongoing need for pup counts on an annual basis should be considered in the light of: (i) the performance of management rules with less frequent pup counts (the constant effort rules already provide the most extreme case); (ii) the need for ongoing data collection, especially tag resights, for future management procedure evaluation; (iii) the costs of the research; and (iv) the risk that unnecessary research adversely affects the population, for example through disturbance.
- 82 SeaFIC encourages the Ministry to work with DWG to provide a longer term management framework for the SQU6T fishery.

CONTACT DETAILS

- 83 To discuss any of the matters raised in this submission, please contact, in the first instance, David Middleton (SeaFIC) for scientific and technical matters, and Richard Wells (DWG) for other matters.