12 September 2003

Minister of Fisheries

FINAL ADVICE PAPER

OPERATIONAL PLAN TO MANAGE THE INCIDENTAL CAPTURE OF NEW ZEALAND SEA LIONS IN THE SQU6T FISHERY FOR THE 2003–2004 FISHING YEAR

Introduction

1 This paper provides the final advice and recommendations on the proposed management regime and operational plan to address New Zealand sea lion interactions in the southern squid trawl fishery (SQU6T) during the 2003-04 fishing year.

2 The operational plan has been developed following consideration of alternative procedures for establishing an acceptable level of incidental sea lion fishing-related mortality, consistent with your powers under s 15(2) of the Fisheries Act 1996. These considerations include alternative means of monitoring sea lion interactions in the SQU6T fishery. This regime is similar to that used in previous years, relying on a scientifically determined Maximum Allowable Level of Fishing-Related Mortality (MALFiRM) to limit New Zealand sea lion mortalities in the SQU6T fishery to a biologically acceptable level.

3 An Initial Position Paper (IPP) outlining options and recommendations for the 2003-04 sea lion Operational Plan was prepared following a series of meetings by the Aquatic Environment Working Group (AEWG) and more general discussions with stakeholders. A copy of the IPP is attached for reference to issues brought forward in this FAP.

4 The complete details of the proposed management regime are outlined in the accompanying 2003-04 SQU6T Operational Plan. This final advice paper is to be read in conjunction with this 2003-04 Operational Plan.

5 If you agree with the proposed management regime, please forward the 2003-04 Operational Plan to the Minister of Conservation for consultation. A letter is attached for your signature. Once this agreement is obtained, you are able to approve the Operational Plan by signing the back page.

Organisation

6 This paper begins with a review of the pertinent issues identified in the IPP, and then presents a summary of submissions received from stakeholders on the IPP organized by submitter and topic issue. The submissions are followed by the Ministry of Fishery's (MFish) response to these comments, organized by topic, including some additional considerations relevant to the Plan. The paper concludes with a summary of key elements of the proposed Operational Plan.

Initial Position Paper Advice

7 The Initial Position Paper outlining options and recommendations for the 2003-04 sea lion operational plan was prepared following discussions by the AEWG, and a planning meeting with stakeholders. The complete IPP is appended to this paper for reference. The IPP addressed three principal management issues bearing on the 2003-04 SQU6T Operational Plan:

a) The appropriate MALFiRM level

b) Arrangements to monitor the MALFiRM

c) Sea lion exclusion device (SLED) efficacy, and the use a discount factor to the strike rate for SLED vessels

The MALFiRM Level

8 After analysis of all options ranging from no fishing to unconstrained fishing (unlimited sea lion bycatch) MFish presented three options relating to the MALFiRM level applicable for the 2003-04 SQU6T fishery. These MALFiRM level options were derived from alternative decision rules applied to a new sea lion population model developed by Breen and Kim based on the 2003 pup count data provided by the Department of Conservation. Each option satisfies the sustainability criteria developed by the AEWG to assess sea lion management objectives:

a) Option A (rule 310) establishes a MALFiRM of 62 sea lions

b) Option B (rule 320) establishes a MALFiRM of 124 sea lions

c) Option C (rule 4) establishes a MALFiRM of 103 sea lions.

9 Given that each option meets sustainability criteria, it is appropriate to consider the relative impacts on potential squid utilisation, as required by your responsibilities under the Fisheries Act 1996. MFish's preliminary MALFiRM recommendation was Option B, offering a considered balance between sea lion management objectives and SQU6T fish stock utilisation opportunities for fishers. Sea lion mortalities under Option B are twice those established under the NMFS/PBR estimation procedure applied in recent years, but MFish acknowledges that these prior estimates may have been conservative in light of findings from the subsequent Breen-Kim research[1].

Arrangements to monitor the MALFiRM

10 Estimation of the MALFiRM is the measure of allowable sea lion mortalities attributed to unintentional bycatch in associated fisheries, predominately the SQU6T fishery. A separate procedure is necessary to monitor sea lion mortalities against the MALFiRM. Monitoring the MALFiRM involves counting sea lion deaths that accrue as a result of fishing.

[1] Breen P.A. and Kim S.W. (30 June 2003.) Exploring alternative management procedures for controlling bycatch of Hooker's sea lions in the SQU 6T squid fishery. Final Research Report to the New Zealand Ministry of Fisheries. Wellington.

11 MFish proposed two options (described in detail in paragraphs 79-104 of the IPP) to monitor and estimate the total number of sea lion captures within the SQU6T fleet:

a) Option 1 - dedicated 'MALFiRM' vessels

b) Option 2 - predetermined strike rate.

12 Option 1 is similar to the monitoring arrangements adopted for the 2001-02 and 2002-03 seasons. MFish observers will be placed on selected vessels ('MALFiRM' vessels) intending to target squid to provide coverage for a representative 20% minimum sample of all tows undertaken in the SQU6T fishery. All MALFiRM vessels fishing in SQU6T must use trawl nets that either do not employ an exclusion device, or use a SLED that is closed (ie, a cover net is placed over the escape hatch). All sea lions caught by MALFiRM vessels will be retained in nets where they can be accurately counted by the observers and held for research purposes. Sea lion bycatch from MALFiRM vessels provides the basis for calculating an actual strike rate that is extrapolated to the entire fleet of vessels targeting squid in SQU6T. Those sea lions captured in tied down cover nets over escape hatches on SLED vessels will not be counted towards the MALFiRM according to the High Court ruling on this matter.

13 Option 2 applies in the event fishers do not achieve the required minimum 20% observer coverage rate during any relevant reporting period (weekly or daily, as described in the IPP) necessary to compute the actual strike rate. In this case, the procedure for estimating sea lion captures will rely on the use of a predetermined 5.3% strike rate applicable to all tows conducted by vessels participating in the SQU6T fishery. Given the random nature of the sea lion strike rate both within and between years over time, a procedure is established to allow for changes in the predetermined strike rate based on a four-period moving average of statistically valid, actual strike rates within the fishing season.

Justification for a SLED Discount Factor

14 Under MALFiRM monitoring Options 1 and 2, the industry may employ SLEDs when fishing in SQU6T to potentially mitigate the sea lion mortalities. As noted in paragraphs 37-43 of the IPP, the efficacy of SLEDs in reducing sea lion deaths remains uncertain, although some sealions appear to survive ejection. If SLEDs reduce mortalities by returning animals to the sea in a condition such that they survive the encounter, adverse impacts of fishing on sea lions can be reduced.

15 The potential to increase utilisation of the SQU6T fish stock through SLED use has inspired consideration of a "discount" factor applicable to vessels employing this technology. If SLEDs were proven to reduce sea lion mortalities by a given level, the strike rate applied to non-MALFiRM vessels employing a SLED might be reduced by an appropriate level in compiling the MALFiRM count.

16 Key to this logic, however, is accurate estimation of the sea lion survival from SLED-equipped trawl nets. As at July 2003, the scientific criteria set forth by the AEWG to establish SLED survivability have not been satisfied, such that statistically reliable conclusions on SLED efficacy cannot be made.

17 MFish acknowledges that in the absence of a sound scientific basis to determine the survival rate of sea lions ejected by SLEDs, it is still required to use the best available information under s10 of the Fisheries Act 1996 in formulating management actions. Such information may be drawn from injury diagnosis provided in the sea lion autopsy reports, conditioned with factors thought to further influence survival beyond the condition of the sea lion at the time drowning

occurred. Evidence and discussion of the survival prognosis available from autopsy results is presented in the IPP at paragraphs 37-43, 105-123, and in the autopsy review panel findings addendum to the IPP.

18 MFish proposed that a discount factor of 20% be applied to the actual or predetermined strike rate used to monitor the MALFiRM based on the limited evidence available from autopsy prognosis presented in the IPP, and subsequently corroborated by a panel of independent veterinary pathologists. This proposed discount factor also acknowledges uncertainty arising from other factors bearing on SLED survival not directly evident from the autopsy prognosis. These factors include the consciousness of the animal at the time of capture in the cover net, the animal's vulnerability after escaping the net, undetected injury that may threaten long term survivability, and the changing design of the SLED in use over time. The 20% discount factor proposed achieves a balance between recognising the likelihood of a modest level of survival, whilst withholding any scientific endorsement of SLED efficacy until more statistically valid information becomes available.

Consultation

19 Interested parties were encouraged to provide written comments on the 2003-04 Operational Plan proposed in the IPP. This consultation was undertaken between 15 and 29 August 2003. By prior arrangement with stakeholders, a report summarising the outside review of sea lion autopsies was distributed for consultation as an addendum to the IPP on 25 August 2003. Individuals from the following organizations were contacted, in addition to MFish and Department of Conservation personnel. A copy of the IPP was also posted on the MFish external website.

Royal Forest and Bird Society of NZ	Environmental and Conservation Organisations of NZ
Greenpeace New Zealand	Te Ohu Kai Moana
Seafood Consortium	New Zealand Seafood Industry Council
World Wildlife Fund (NZ)	Cawthorn Associates
University of Otago	Sealord Group Ltd
Sanford Limited	Independent Fisheries Ltd
NIWA	Squid Fishery Management Co Ltd
Ngai Tahu	Te Rununga o Ngai Tahu

20 The time period allowed for consultation was coordinated with stakeholders in order to obtain your decision prior to the beginning of the fishing year on 1 October 2003. The schedule for preparation and completion of the Operational Plan was advanced in time relative to recent years at the request of stakeholders.

21 Written comments were received from the Seafood Industry Council, Squid Fishery Management Company, Te Ohu Kai Moana, David Fletcher, World Wildlife Fund, Royal Forest and Bird Protection Society, and Environment and Conservation Organisations. These comments are summarised below. Copies of the complete submissions are available from MFish. The MFish response to individual submissions is provided in a later section of this paper.

Seafood Industry Council

In-season Management

22 The Seafood Industry Council (SeaFIC) disputes the in-season management proposed in the IPP to monitor sea lion mortalities, suggesting that MFish does not have a full understanding of how the estimation procedures for the strike rate works, and that the procedure is statistically indefensible and unworkable. In particular, SeaFIC does not accept the periodic (weekly/daily)

basis for monitoring mortalities, asserting that what really counts is the overall level of observer coverage that goes with the cumulative estimate of the strike rate.

23 SeaFIC further contends that a shift between an in-season estimation procedure (Option 1) and a "predetermined strike rate" (Option 2) is unworkable. This procedure will result in MALFIRM estimates that are not realistic and which will once again cause a great deal of discontent in the fleet.

24 SeaFIC maintains that it is also not practical to ask the fleet to declare its intentions of where it will fish in advance of the trip. Squid abundances and catchability appear to change rapidly and the fleet will always reserve the option to move to where catch rates are highest. A solution to this problem, proposed in the 1990s by Paul Starr, is to ensure that the coverage level of the entire SQU trawl fishery is maintained at the required level, with the expectation that, on average, the observed boats will be representative of the fleet.

25 As an alternative to the monitoring regime options presented in the IPP, SeaFIC proposes a new estimation procedure that would effectively combine historical evidence of the strike rate with updated strike rate information for the current season. The underlying methodology employs a Bayesian estimation procedure with the gradual replacement of the prior with the actual data.

26 SeaFIC notes that the proposed "SeaFIC" rule will function well even if MFish and the Squid Fishery Management Company select to operate entirely under the "default" strike rate with little or no monitoring. In this situation, the rule will automatically remain at the "default" or "prior" strike rate if there is no observer coverage. However, if a few vessels choose to become MALFIRM vessels, then, under the proposed rule, the information collected from those vessels would be incorporated as in-season estimates and will result in a small amount of weight which will be tied to the level of observer coverage. This effect will update the "default" strike rate based on actual in-season data which is a desirable outcome.

Choice of Decision Rule

27 SeaFIC asserts that the characterisation of the decision rules used to formulate the MALFiRM in the IPP mixes up strategic considerations for the choice of a rule (how well are the agreed objectives met) with what are the implications for the coming season's MALFIRM. The evaluation exercise undertaken by Breen and Kim leads to a comparison of alternative decision rules with respect to how well they meet agreed objectives. The choice of a rule for continued use should be made on that comparison alone, not on the in-season consequences.

28 SeaFIC also stresses the interpretation of decision rules, emphasising that Rule 310 is effectively the NMFS PBR rule developed by Wade and as recently used to set Hooker sea lion MALFIRMs. The rule was developed (using a simulation approach similar to that used by Breen and Kim) to ensure the recovery of a depleted pinniped population (presumed to be starting at 30% *K*) to above 90% *K* within 100 years with a high probability. SeaFIC notes that part of the NMFS PBR rule is the so-called "recovery factor" of 0.15. The value of 0.15 was selected from the simulation results to achieve the desired recovery goals.

29 SeaFIC feels it more instructive to describe Rule 320 as effectively the same as the NMFS PBR rule but "retuned" to use a "maintenance factor" of 0.30 instead of a recovery factor of 0.15. This makes it clear why the rule is effective in meeting the agreed conservation objectives - because the Hooker sea lion population is estimated as being most probably above the target of 90% *K*. The purpose of setting a MALFIRM for Hooker sea lions in New Zealand is therefore different to the purpose of setting a PBR under Wade's default rule.

30 SeaFIC contends that Rule 1 (unconstrained fishing) achieves good conservation performance even though it does not set a formal constraint on fishing. This is because the estimate of the rate of by-catch in the SQU6T fishery is low relative to the total population. These modelling results imply that the "effects of fishing" on this population are so small that there is little requirement for "mitigation" as conceived under the Act.

31 Commenting on the three options A (Rule 310), B (Rule 320), and C (Rule 4) proposed in the IPP, SeaFIC concludes that all three rules meet the agreed conservation objectives – they all result in the maintenance of the sea lion population above 90% *K* with a high probability. As such, they all meet the goal that assumes that a high population level will result in the best chance of colonisation of new breeding sites. Given that all three rules meet the agreed conservation objectives, the choice of rule should be made dependent on how well each provides for utilisation.

32 SeaFIC concludes that Rules 320 and 4 clearly out-perform Rule 310 in terms of utilisation. Unless Rule 1 is adopted, the choice of rule should therefore be between these two rules. Both rules perform similarly in the frequency of fishery closure and the constraints they impose on fishing. Structurally, however, rule 320 is simpler and is a clear and understandable modification to the currently used NMFS PBR rule. SeaFIC suggests that Rule 320 is preferable on the criterion of simplicity. Rule 320, whilst achieving similar overall performance to Rule 4, should also result in slightly less annual variation in the MALFIRM. Therefore, on the criterion of lower annual variation, Rule 320 is also preferable. Rule 320 also has the desirable feature of not allowing the MALFIRM to be set at as high a value as would be under Rule 4 if pup counts increased markedly. On the criterion of greater sensibility, Rule 320 is also preferable. It is also likely that a large increase in the MALFIRM under Rule 4 would not result in a substantial increase in the SQU6T fishery because the deemed value payments for by-catch of finfish species would constrain fishing before the MALFIRM took effect.

33 Overall, SeaFIC sees no legal or technical reasons to discount Rule 1. In the event that Rule 1 is not adopted, however, SeaFIC is of the opinion that the MALFIRM for the 2003/04 and subsequent seasons should be set according to Rule 320.

Squid Fishery Management Company

34 The Squid Fishery Management Company (SFMC) is a representative of participants in the squid fishery. Shareholders in SFMC hold about 98.5% (SQU1T) and 99.7% (SQU6T) of the quota in New Zealand's squid trawl fishery areas.

35 SFMC is concerned generally that the 2003-4 IPP appears to have been drafted in a fragmented way, demonstrates a lack of understanding of the key issues, and fails to take into account and properly analyse the best available information. SFMC notes that is perhaps a reflection of the tight timeframes required in terms of this year's Plan and consultation.

Statutory Requirements and Published Policy

36 SMFC contends that while the Minister has a discretion as to whether to impose management measures in the absence of a PMP under section 15(2), the Ministry's formally published (and consulted on) policy is that the Minister should only take management action where fishing-related mortality is having an "adverse effect" on a protected "species population". This policy reflects the general requirements of the purpose of the Act to ensure sustainability (which is defined to include avoiding, remedying, or mitigating any *adverse* effects of fishing on the aquatic environment).

37 Whether or not there is an "adverse effect" on the protected population will be guided by the criteria under the Marine Mammals Protection Act for "threatened species" or other specific management objectives. In relation to sea lions, the Aquatic Environment Working Group (AEWG) and the Ministry have adopted more specific objectives:

a) Management interventions will be designed to ensure the sea lion population remained above 90% of its carrying capacity, *K*, or else remained above 90% of the level it would obtain in the absence of fishery bycatch, 90% of the time and in 20 or 100 year runs.

38 SFMC concludes that on the Ministry's own published interpretation of s 15(2), if the best available information demonstrates that this management objective is met without the necessity of any management intervention, fishing cannot be said to be having an adverse effect on the sea lion population, and it would be scientifically and legally unjustifiable for the Minister to impose a MALFiRM under section 15(2).

Proposed MALFiRM for 2003-04

39 SFMC agrees that the analyses using the Breen-Kim model constitutes the best available information in terms of the performance of the respective decision rule alternatives against the AEWG management objectives but notes that the Campbell Island pup count and population data has not been incorporated into the model. The failure to include this data into the model means it is conservative.

40 SMFC asserts that the best available information approved by the AEWG and accepted by the Ministry demonstrates that there is no scientific or legal justification for a formal limit on fishing-related mortalities through the imposition of a MALFiRM in the 2003-4 season, concluding that there is clearly no longer any sustainability issue relating to sea lions and no justification for the imposition of a MALFiRM or other limit on fishing-related mortality. SFMC concludes that any decision to the contrary would be contrary to the best available information (s 10), the purpose of the Act (s 8) and s 15(2). It would also be contrary to the Ministry's own published policy guidelines for the interpretation of the Fisheries Act.

41 SFMC is firmly of the view that the MALFiRM or other limits on fishing are no longer relevant to the fishery and believe that the focus should now be on mitigating all sea lion capture by continuing to develop, refine, test and evaluate SLEDs and any other mitigation devices.

42 The choice of decision rule should be based on how well the rules perform in relation to the management objective criteria and in terms of the utilisation and sustainability objectives of the Fisheries Act. The best available information clearly supports the adoption of Rule 1 (no limit on fishing). SFMC does not support the adoption of any of the other alternative decision rules.

43 SFMC notes that SeaFIC's submission in relation to the proposed management rules supports SFMC's view that there is no legal or scientific reason why Rule 1 (no limit on fishing) should not be adopted.

Monitoring the MALFiRM

44 Based on their support for unconstrained fishing (rule 1), SFMC does not support the imposition of a MALFiRM. In any event, however, SFMC believes that the MALFiRM monitoring requirements detailed in the IPP are deficient and unworkable. SeaFIC has already commented on this in detail in its submission. SFMC supports this submission in so far as it highlights the serious deficiencies in the Ministry's proposal.

45 In the event that the Minister decides to impose a MALFiRM, SFMC agrees with SeaFIC that the "SeaFIC rule" set out in para 8 of the SeaFIC submission should be adopted for in season management in the event the industry did not opt for a pre-determined strike rate.

Predetermined Strike Rate

46 SFMC notes that the actual strike rate recommended in the IPP is 5.3%, based on a simple average of the seven most recent years where the observer coverage was above the 20% minimum. SFMC supports a 5.3% strike rate to estimate sea lion mortalities generally, subject to an appropriate discount for the use of SLEDs with cover nets open. SFMC also notes the typographical error in the IPP at paragraphs 101, 121, and 139e incorrectly stating the predetermined strike rate to be 5.7%. The IPP provides that the predetermined strike rate option applies in the event that the criteria for MALFiRM vessels are not achieved, although it acknowledges that the industry may elect to operate under a predetermined rate rather than have MALFiRM vessels.

47 The IPP proposes that the predetermined strike rate is compared with a 4-week moving average of the actual in season strike rate. SeaFIC's submission alleges serious deficiencies with this proposal. For the same reasons as SeaFIC, SFMC does not support the adjustment of the predetermined strike rate as proposed by the Ministry. SFMC supports the use of the "SeaFIC Rule" as described in the SeaFIC submission.

Discount Strike Rate for SLEDs

48 In terms of survivability, SFMC agrees with the work commissioned by MFish that concludes that the probability of ejection (P_E) is near to 1. This means that a SLED will almost certainly eject sea lions. SFMC proposes that for the current season all the fleet in SQU1T and SQU6T utilise the latest standardised model (Model 13) SLEDs with cover nets open.

49 SFMC concludes that based on their interpretation of available information from the sea lion autopsy reports, the average survivability percentage of sea lions ejected through SLEDs is 42.2% over the three years, or 33.3% for the last two years. SFMC acknowledges that this table differs from the IPP and invites the Ministry's comment on its accuracy.

50 SFMC therefore contends that the Ministry's proposal of a 20% discount for the use of SLEDs is unjustifiable. Given that the expert reports obtained by SFMC indicate that the DOC pathology results were very conservative in terms of conclusions as to survivability, and given the uncertainty as to whether the sea lions sustained the trauma as a result of the SLED or as a result of the thrashing around in the cover net, SFMC submits that a discount for the use of SLEDs of 40% is appropriate even on the most conservative basis.

51 SFMC is also of the view that it is inappropriate for the Ministry to ignore the 2000-01 findings (IPP para 114). The Ministry specifically stated in the High Court proceedings that 40% of sea lions ejected in 2000-01 would have survived (see judgment para 21). This was considered by the Court to be part of the best available information which should have been considered by the Minister. SFMC asserts that there is no justifiable basis to ignore the results from 2000-1.

52 SFMC approves of the AEWG's recommendation to assemble an expert panel to review the autopsy findings and set criteria to be used to assess survivability in the future. However, SFMC is concerned at the process by which the expert panel was compiled, the terms of reference by which they were instructed, and the information provided to them. SFMC was not consulted by the Ministry in terms of drafting the terms of reference and the material provided to the

reviewers. This is despite SFMC's clear understanding at the pre-IPP consultative meeting that they would be formally involved.

53 SFMC agrees with the sea lion Technical Working Group's (TWG) conclusion at the 22 August meeting that the available expert reviewers reached similar survivability conclusions to DoC's pathologist, for sea lions which had been ejected through SLEDs. However, paragraph 9 of the Addendum to the IPP is misleading because it implies that the TWG agreed that the results of the review did not differ from those as reported in the IPP. SFMC believes this is incorrect. As para 9 of the Addendum makes clear, the TWG concluded that for those sea lions *ejected* through SLEDs, the results did not differ. The IPP does not evaluate survivability on this basis.

54 SFMC notes that the IPP states that the conclusion of the TWG based on the expert reviews was that 2 of 7 (28.6%) sea lions in 2001-2 ejected through SLEDs had a high likelihood of survival. SFMC contends that this figure includes an extra sea lion which the Ministry claims was ejected through a SLED, but was previously not considered to have been. The Ministry has not yet provided the TWG with any evidence to support this. Moreover, only one of the experts has reviewed the autopsy report for this animal. SFMC is of the view that this sea lion should be excluded from the analysis until these matters can be satisfied. If this sea lion is excluded, 2 of 6 (33.3%) ejected sea lions would be classified as highly likely to survive. Even if the additional animal is included in 2001/02, it still leaves a 28.6% survival rate. This is consistent with the summary data for 2002/03, which is a lot lower than the 2000/01 data.

55 Following the expert review, SFMC asserts that it is incomprehensible that the Ministry can conclude (on either the IPP or the addendum) that 20% is an appropriate discount factor for the use of SLEDs. To do so continues to ignore the best (only) available information.

SLEDs and Observer Coverage

56 SFMC notes that the effect of observer coverage requirements necessary to obtain the SLED discount factor would be to require 100% coverage, assuming that all vessels are using SLEDs with cover nets open (a likely scenario).

57 SFMC believe there is no logic to this proposal. Fisheries regulations impose hundreds of different requirements on industry. The Ministry does not require 100% observer coverage to ensure those requirements are met. There is nothing in principle different about the use of SLEDs. At a meeting of the shareholders of SMFC on 12 August 2003 all operators agreed to use SLED Model 13 for the 2003/04 season. SMFC will ensure that this will occur and would be happy to confirm this to the Ministry prior to the start of the season.

58 Second, the IPP notes that the Ministry seeks advance notice of the likely number of SLED vessels operating in SQU6T so that it can arrange appropriate observer coverage, and also cautions that it cannot guarantee all requested observer coverage. If the Ministry remain of the view that all vessels with SLEDs and cover nets open must carry observers to qualify for a discount, then all vessels will need observers. It is the Ministry's statutory responsibility to provide the observer coverage required. This is clear under the Fisheries Act and was made clear in the High Court proceedings. The Ministry is now on notice and has months before the start of the season to get its house in order in relation to the observer programme.

59 SFMC puts the Ministry on notice that its preliminary view is that 100% of the fleet will be using SLEDs with cover nets open.

Role of Department of Conservation and the Sea Lion Population Management Plan

60 SMFC believes that DoC's conduct over particularly the past two years demonstrates that it has now moved from an approach designed to stall timely management decisions to one where they are actively seeking to frustrate the process. DOC appears to appreciate that it is unable to win the debate in a scientific forum and that it is becoming increasingly difficult for it to justify any limitation on fishing activity around the Auckland Islands, let alone the cessation of that activity.

61 SMFC contends that DOC has now abdicated its right to participate in this process, much less run it. Its conduct demonstrates that it has now become nothing more than an advocate for a conservation outcome that fails to take any cognisance of the scientific evidence concerning the interaction between commercial fishing and the sea lion population.

Te Ohu Kai Moana

62 Te Ohu Kai Moana (Commission) has similar views to those expressed by SeaFIC and SFMC on matter canvassed in the IPP, and emphasise several issues of concern.

63 The Commission very strongly supports the SFMC comments on the failure of the Department of Conservation to produce a PMP for sea lions. Eight years is far too long to wait for such a plan and still see no immediate prospects of its completion.

64 The Commission sees no need for a sea lion MALFiRM to be established for the 2003-04 year in light of the Breen and Kim modelling results. The Commission concludes that it is clear that the New Zealand sea lion population is not in any way endangered by the operation of the SQU6T fishery, particularly considering the industry's stated intention of deploying SLEDs at all times in the fishery. The Commission contends that the modelling results clearly show that the Minister would be unnecessarily interfering with the prosecution of the SQU6T fishery if he imposed a MALFiRM limit for the 2003-04 year.

65 In the event the Minister ignores the modelling Rule 1 results, the Commission strongly suggests that Rule 320 (Option B) be adopted, involving the doubling of the NMFS recovery factor to 0.3. The Commission would also support the SeaFIC alternative proposal for the in-season estimation of the MALFiRM, definitely rejecting the IPP proposal for monitoring the MALFiRM as statistically unsound.

66 The Commission notes that MFish has a duty to ensure that the minimum level of observer coverage is achieved in the SQU6T fishery during the 2003-04 year. The Commission agrees with the SeaFIC comments that the calculation of the observer coverage level needs to be on a season, not a weekly, basis.

67 The Commission rejects both monitoring options put forward by MFish as inappropriate and unworkable, maintaining that the existing reporting arrangements have proved effective and informative and need no change.

David Fletcher (Proteus Research and Consulting)

68 Mr Fletcher conducted an analysis of SQU6T sea lion strike rates from 1993 to 2000, and suggests that the methods used in the IPP to calculate the predetermined strike rate can probably be improved, and should be reconsidered.

69 Mr Fletcher identifies two related issues of concern. The first is the use of a simple unweighted average in the IPP to calculate the 5.3% predetermined strike rate applied in

MALFiRM monitoring Option 2. He suggests a procedure for weighting the observed strike rate in any given year by the corresponding level of observer coverage. Such adjustment, Mr Fletcher contends, acknowledges the greater statistical reliability of high coverage observations, relative to lower coverage observations.

70 As a second concern, Mr Fletcher calculates that there is a positive correlation over time between the level of observer coverage, and the observed sea lion strike rate; the higher the observer coverage in a given season, the higher the observed strike rate. He notes that MFish should be able to explain the apparent relationship, but cautions that association is not the same as causality.

World Wildlife Fund New Zealand

Management Objectives

71 The World Wildlife Fund New Zealand (WWF) welcomes the adoption by the stakeholder group of the interim population management measure "to manage fisheries interaction with New Zealand sea lions such that the population could reach 90% of *K* with a high probability". WWF notes, however, that the perception as to where the sea lion population is relative to *K* differs strongly among stakeholders.

72 WWF observes that in the absence of a population management plan, the fishery/sea lion interaction has been managed under operational plans for over 10 years. WWF urges government to produce a population management plan to sufficiently address the conservation of the New Zealand sea lion. In the interim, WWF believes the operational plan, as the de facto management plan for the species, must adopt and be monitored for delivery against the overall goal and medium term objective for the recovery of the New Zealand sea lion as presented at the Ministry of Fisheries Aquatic Environment Working Group (AEWG) on 24 March 2003. These were as follows:

a) *Overall goal: Self sustaining populations of New Zealand sea lions are occurring throughout their natural range.* Attainment of the long term goal would result in an increase in both the total number of sea lions, and the distribution and number of breeding colonies throughout New Zealand. This would remove the vulnerability of this species and ensure the total population's ability to withstand the effects of human activities or stochastic events.

b) *Medium term objective: The New Zealand sea lion population has 5 sea lion management clusters throughout New Zealand.* This goal recognises that the key factor contributing to sea lion vulnerability is their geographically restricted range and seeks to remove this characteristic of the population and consequently the threatened species status as defined by the IUCN.

73 Under the direction of the overall goal and medium-term objective, WWF contends that the operational plan must demand a precautionary approach to the management of sea lion deaths in fisheries. WWF believes that the current operational plan provides advice contrary to a precautionary approach and fails to afford sufficient protection to the New Zealand sea lion as a threatened endemic species.

Options to Estimate the MALFiRM

74 WWF is greatly concerned that officials have recommended to the Minister of Fisheries the Option B MALFIRM of 124, which is about twice as high as in previous years. Since enforcement of a squid fishery sea lion MALFIRM in 1992/93, this figure has ranged from 60 to

80 animals. They deem this to be absolutely inconsistent with the precautionary approach required, in particular considering the severe epidemic mortality events amongst New Zealand sea lions observed over recent years and their effect upon pup production, pup and adult survival as well as long-term changes to population dynamics.

75 WWF believes that Option A (rule 310), which is the current rule applied to the calculation of MALFIRM, is the only valid approach to generate a sea lion MALFIRM in the current operational plan. WWF notes that the recent modelling of management rules incorporated a component on lost fishing effort. Considering past strike rates of the fishery, WWF acknowledges that a MALFIRM of 62 sea lions will clearly limit the squid fishing effort in 6T. However, WWF believes that MALFIRM levels must be driven by the level of protection that needs to be afforded to New Zealand sea lions in order to achieve overall goals.

76 WWF considers that the level of protection required in this case outweighs the economic cost assigned by modelling, and further note that squid availability has fluctuated greatly since inception of the fishery in the 1970s and that the TACC has not been reached in three of the past eight seasons even though the fishery remained open. WWF believes that introducing this economic measure into the evaluation of the different MALFIRM rules is misleading because it cannot be assumed that the economic cost of the MALFIRM is the dollar value of uncaught TACC.

77 While WWF acknowledges the effort that has gone into development of the sea lion model and fine tuning of decision rules, data input and model structure, they are astonished to find that although the external review of the model has not been completed the model is used as the basis to calculate MALFIRM in the current operational plan. WWF expects that this model should have undergone rigorous international peer review before being applied to a management situation as critical as this. Further, with the current model structure geared towards fish stock assessments, they believe that parallel sensitivity testing using Population Viability Analysis (PVA) is vital.

Arrangements to Monitor the MALFiRM

78 WWF believes that to ensure the fishery abides by the 2002/03 MALFIRM, strict monitoring of mortalities is required and urges the Minister to adopt 'Option 1 – dedicated MALFIRM vessels'. While in previous years WWF has opted for a minimum of 20% observer coverage, it is their understanding that based on the 2003 High Court decision, those sea lions caught on the 20% monitoring vessels while used to extrapolate catch levels cannot legally be counted against the MALFIRM itself. This ruling means that any MALFIRM that is set must be increased by an additional 20%.

79 WWF urges the Minister to set the observer coverage at a maximum of 20% and demand that industry effectively works with the Ministry to achieve this coverage. It is unclear to WWF whether the High Court ruling applies only to vessels that carry SLEDS. If that is the case WWF urges the Minister to require that all monitoring vessels carry full trawl nets rather than SLEDS and that there be a minimum of 20% coverage on those vessels.

80 WWF believes the High Court ruling that sea lion catch of SLED MALFIRM vessels are not to be counted against the MALFIRM urgently needs to be challenged by the Ministry of Fisheries on the grounds that conclusive results on SLED efficacy cannot be drawn at this early stage of SLED development. The issues regarding SLED performance are well presented in the IPP and commented on by WWF later.

81 Paragraph 124 of the IPP refers to sea lions caught in other fisheries. WWF considers that observer coverage in those fisheries is low to non-existent, which means that the understanding of

sea lion bycatch in those fisheries is non-existent. WWF believes that the mortality of sea lions in those fisheries referred to in paragraph 124 needs to be assessed by a one-off programme, using 20% observer coverage, so that an appropriate number can be calculated and included in the catch records when monitoring progress towards the MALFIRM. WWF believes that bycatch in those fisheries is likely to be higher than the stated 1.75 animals.

82 WWF considers monitoring of the MALFIRM by applying an extrapolated strike rate to the fleet, as suggested in Option 2, an unsafe method due to observed variation in the strike rate, particular over recent years. WWF believes that when dealing with the fisheries-incidental mortality of a threatened species, the degree of uncertainty posed by this method presents an unacceptable risk to achieving the agreed management target of moving the population close to *K*.

83 WWF seeks clarification from Ministry officials regarding their reasons for suggesting the Ministry may not be in a position to effectively implement a bycatch enforcement option. Paragraph 139 of the IPP states that the Ministry's preference is to implement a monitoring and reporting regime to estimate the total number of sea lion catches against the MALFIRM. In paragraph 96 onwards the IPP states that if the MALFIRM vessel option cannot be effectively implemented, the Ministry considers that an average strike rate of 5.3% should apply to the 2003/04 SQU6T fishery. WWF believes the Ministry sets a dangerous precedent in that it appears that non-compliance with a preferred, scientifically informed management process is regarded as acceptable.

Discount Strike Rate

84 WWF strongly opposes the use of a discount rate for the use of SLEDS in the current operational plan for the reasons described in the IPP. For a discount rate to be assigned an accurate estimation of sea lion survival from SLED-equipped trawl nets is essential. WWF is concerned that advice by the Technical Working Group not to apply a discount at this inconclusive stage of SLED trials has been disregarded by Ministry officials who go on to conclude their discussion on the shortcomings of SLED trials by suggesting a 20% discount rate.

85 WWF notes that they, the Department of Conservation and the Ministry of Fisheries have actively engaged with the Squid Fishing Company on the design of effective SLED trials. Discussions have been well received by all parties engaged and have resulted in advice regarding practical solutions in terms of staged trials so as to assess and address the issues surrounding SLED design and survivability of sea lions.

86 WWF encourages the Squid Fishing Company to plan a timed, peer-reviewed programme of staged SLED trials to assess their effectiveness of releasing sea lions in a good state of health. Trials and outcomes should be reviewed by a working group, including Ministry of Fishery and Department of Conservation officials, environmental NGOs and the fishing industry.

Royal Forest and Bird Protection Society/Environment and Conservation Organisations

87 The Royal Forest and Bird Protection Society and Environment and Conservation Organisations (RFB/ECO) welcomes the opportunity to make a submission on the Initial Position Paper, but asserts that the time available for making submissions is impossibly short and can only lead to rushed and poor decision making.

88 RFB/ECO is concerned at the poor consultation with, and reporting to, environmental NGOs that have occurred in recent years. In past years there was an agreement to report all sea

lion deaths to the end of February and then report weekly. RFB/ECO notes that this system, which was agreed in the mid-1990s, does not occur, and feels this system must be reinstated.

89 For the reasons noted below, RFB/ECO requests that the IPP be withdrawn and replaced with an IPP which fairly treats that threatened nature of the sea lion.

MALFiRM Estimation Model

90 RFB/ECO considers that the IPP is a major step backward in the protection of sea lions and rejects the industry promoted model of the sea lion biology as untested and requiring further work and input data. The process of producing the current model results removed much of extinction risk variability from the model that was the original basis for the model development.

91 The model results are driven by 10 years of pup monitoring results and three years of key biological information. With this data it is impossible to know what *K* is. RFB/ECO rejects any suggestion that the model result is indicating the current sea lion population in relation to *K*. RFB/ECO notes from the report "population productivity was still poorly determined with respect to the rate of increase at low population size, ." RRB/ECO contends this has implication for what the population is in relation to *K*.

92 RFB/ECO recommends that any MALFIRM selected should be required to show that the species will move to a non-threatened state in the quickest time possible if not within 20 years required by the Marine Mammals Protection Act (section 3F). RFB/ECO considers the only option is close to zero mortality.

93 RFB/ECO believes that MFish has shown clear bias against the sea lion in its recommendations to the Minister. The figures of loss to the industry of fishing closure are just speculation and should not be taken seriously given the highly variable nature of any squid fishery. A comparison of rule 310 to the 1988 to 2003 fishing effort fails to acknowledge this variability and the poor nature of many squid fishing years since the peak in catches in 1993. In addition, in two years when the fishery was closed 1996 and 1997 the number of tows well exceeded the average number by 15 and 40 percent respectively.

94 RFB/ECO asserts that the effects of the 1997 mass deaths of pups and adults and the last two year's high mortality of pups has not been adequately considered in this year's operational plan. For this reason RFB/ECO is strongly opposed to any increase in sea lion deaths in the squid fishery. The MALFIRM approach should be a maximum level with a declining pathway in numbers of deaths to zero.

SLED Effectiveness

95 RFB/ECO maintains that the true effectiveness of the SLED to eject sea lions has been poorly assessed by MFish. There has clearly been failure in SLEDs to eject sea lions which is not just due to "cover nets tied down.., damage to SLED, large rocks or other material". SLEDs are nowhere near 100 percent effective in ejecting sea lions. This is compounded by the changing design of the SLED and the number of designs used each season. RFB/ECO considers that the ongoing failure of the fishing industry to report on it's SLED research, the design of the device used, the use of video cameras etc, continues to plague a resolution of the deaths of sea lions in fisheries.

96 Given the uncertainty about the type of sleds used (both design and type of gear used which has not been assessed), RFB/ECO contends that the results of autopsy cannot be used to apply a discount factor. RFB/ECO questions how can a discount factor be applied when there is so much uncertainty over the type of SLEDs used and the effectiveness of each type of SLED?

MALFiRM Monitoring

97 Given the problems over observer coverage in the last two Auckland Islands squid seasons, RFB/ECO supports 100 percent observer coverage; this means that any vessel wishing to fish within SQU6T must carry an observer. RFB/ECO contends that this criteria avoids any suggestion of bias in observer coverage, ensures all vessels are treated equally and ensures that the strike rate is determined from actual data.

Sea lion Mortalities in Other Fisheries

98 RFB/ECO asserts that the IPP fails to acknowledge that other fisheries kill sea lions and need to be managed as part of any operational plan, and calls for an increased level of observer coverage in these fisheries including scampi, oreos and orange roughy.

MFish Response to Comments

99 The submissions received from stakeholders cover a range of issues presented in the Initial Position Paper. MFish has organised responses to these comments structured in three categories:

a) the MALFiRM,

b) procedures to monitor the MALFiRM , and

c) justification for a SLED discount factor.

The MALFiRM

100 MFish considers that development of the Breen-Kim model has occurred under the careful scrutiny of the AEWG, and that the working group has accepted the resulting population model. The AEWG has also agreed upon the interim sea lion population management objectives established as criteria for judging management alternatives. MFish emphasises that the interim management criteria do not constitute a formal sea lion population management plan (PMP) as this is the responsibility of the Department of Conservation, but contends that the modeling effort provides the best information available at present to judge the impact of interactions between sea lions and the SQU6T fishery.

101 MFish rejects the WWF submission that measures taken under s 15(2) in the SQU6T sea lion Operational plan constitute a de facto management plan for the species. In the absence of a PMP the Minister of Fisheries may implement measures to avoid, remedy, or mitigate the effects of fishing on the population, but he still has to act within the Fisheries Act. Key to the Fisheries Act is balancing use of the fishery (the squid resource) against sustainability of the sea lion population, as required under s 8 of the Act.

102 Stakeholder submissions concerning the MALFiRM relate largely to the MALFiRM levels proposed, and the underlying decisions rules employed to estimate these levels. The Breen-Kim model is used to evaluate alternative decision rules in light of the interim management objectives. The rules put forth have been reviewed by the AEWG, but there has not been consensus agreement by the working group specifically, or stakeholders in general, for a preferred decision rule. Rather, rules were evaluated against a set of performance criteria, determined by the AEWG, before the modelling work was carried out, to enable an objective assessment of rule performance relative to management objectives. An acceptable management regime was determined to be among those rules that passed all performance criteria.

103 SFMC suggest that MFish has a "formally published policy" by which s15 of the Act is interpreted in light of the decision rules adopted by the AEWG, or "legitimate expectation" held by stakeholders. MFish seeks to clarify that advice provided to you is based on s15, and other relevant provisions of the Act.

104 Three critical criteria were defined by the AEWG to reflect, in modelling terms, the intent of the interim and medium term management objectives, i.e. to allow the sea lion population to grow to attain 90% of *K* with high probability, and to move the species to non-threatened status in no less than 20 years. The criteria related to the certainty that the sea lion population attained target management levels of greater than 90% *K* or to within 10% of the population level that would have been attained in the absence of fishing. The criteria were evaluated over: a) 20 year time periods in projection runs, and b) 100 year time periods in projection runs, and c) for the mean population of mature sea lions which needed to exceed 90% of *K* for the second half of 100 year projection runs, when averaged over 5000 projection runs. The only rules that passed on the performance criteria were Rules 305, 310, 320, and 4.

105 Rule 1 (Unconstrained fishing) failed the second performance criterion (*Crit100*), and therefore cannot be considered an acceptable regime to be used in managing the fishery.

106 Industry submissions note that Rule 1 only narrowly fails the *Crit100* test, and assert that unconstrained fishing should be considered an applicable management regime. MFish rejects this conclusion. The Breen-Kim model used the best available data, and model parameters were set to be neither conservative nor liberal, rather to represent the current state of knowledge of sea lion biology and demography as accurately as possible. For this reason, a failure to meet the criteria for acceptance as a management strategy, for any one of the performance criteria, indicates a failure by the rule to attain pre-defined goals for management, using a realistic representation of sea lion biology and population dynamics. For Rule 1, the model outcomes show that over 100 years, an average level of sea lion take of 99 animals per year significantly reduces the probability of the population growing to levels that are considered acceptable for management of the population, in order to allow it to attain non-threatened status in the near future. Further, this indicates that, irrespective of where the current population is, relative to *K*, there is a high probability that the difference between the level of the population that would have been attained in the absence of fishing, and that with fishing under Rule 1 is significantly more than the accepted 10%.

107 MFish also notes that the Breen-Kim model is not a stock-assessment tool for sea lions, rather it is a management strategy evaluation model. A PMP, when developed, will be the tool to manage sea lion populations. Therefore, any inference made about the level of the population status relative to *K* needs to be regarded with caution. The model evaluates the probability that the population can attain a level relative to *K* given a particular set of biological, fisheries and environmental parameters, not whether the population is at that level currently. Further modelling and significant restructuring of the current model would be needed to assess the current population level relative to *K*.

108 The three MALFiRM options presented in the IPP all satisfy the interim management criteria relating to sea lion conservation objectives. There is a much larger set of decision rules that would equally satisfy these criteria. However, the decision rules do not provide precise metrics for judging relative optimality among options across other consideration such as utilisation of the squid resource. MFish notes strong ideological differences among stakeholders in their attitudes towards the optimal MALFiRM and the additional criteria that they have differentially applied in submissions to arrive at their respective judgements.

109 Submissions from SeaFIC, SFMC and the Commission support a preferred management strategy that, having satisfied the underlying sea lion conservation objectives, allows for the

greatest utilisation of the squid resource, which are the decision rules that generate the highest MALFiRM levels. Industry supports decision Rule 1 as modelled in the Breen-Kim research that allows unconstrained fishing (no MALFiRM limit), subject only to the underlying SQU6T TACC. SeaFIC submits that should decision Rule 1 not be recommended, Option B is preferable to Option C on the criterion of simplicity.

110 The exclusion of Campbell Island pup numbers in the Breen-Kim model is cited by SFMC as likely to create conservative MALFiRM estimates, to the extent pup numbers should be incorporated into the modelling effort and the decision rule criteria. MFish considered this assertion to be unfounded given that the flux of animals from one site to another is little understood, and it remains to be demonstrated that a significant proportion of the captured sea lions originate from Campbell Island. The Breen-Kim research deals only with the Auckland Island population, where the population has been monitored continuously from the 1990s with corresponding monitoring of sea-lion mortality in the Auckland Island's squid fishery. Harvest levels defined by the Breen-Kim model deals with the Auckland Islands fishery-population dynamic as a closed system.

111 MFish disagrees with the industry contention that it would be scientifically and legally unjustifiable for you to impose a MALFiRM under section 15(2). Your authority under the Act allows you to take such measures as you consider necessary to avoid, remedy, or mitigate the effect of fishing-related mortality on any protected species, and such measures may include setting a limit on fishing related mortality. The key question is the extent to which limits on fishing related mortality of sea lions are appropriate in light of the Breen-Kim model results. As discussed above, MFish concludes that decision Rule 1 does not meet the criteria established by the AEWG to justify unconstrained fishing.

112 The scientific findings brought forward by the Breen-Kim model indicate that a significantly higher MALFiRM can be supported given the size of the sea lion population. The model is new, although it has been tested extensively under the direction of the AEWG. The model will not be considered fully accepted pending the results of a thorough peer review by outside expertise.[2] This has the effect of introducing some precaution into conclusions drawn from the Breen-Kim model, but is not considered to be reason to defer judgement based on the information available.

113 Submissions from WWF and RFB/ECO back the more conservative MALFiRM decision rules. WWF supports Option A as a conservative management alternative until such time that the Breen-Kim model has undergone rigorous international peer review. RFB/ECO rejects all three of the MFish MALFiRM options, and considers that management at close to zero mortality (rule 0 – no fishing) is appropriate.

114 MFish questions the position by WWF and RFB/ECO that utilisation opportunities for industry are not relevant considerations for you to set a higher MALFiRM relative to recent years. The Breen-Kim results allow for higher incidental bycatch of sea lions in the SQU6T fishery than estimated in prior years using the NMFS/PBR model. MFish considers that some control on sea lion bycatch is appropriate based on model results, but the sea lion population appears sufficiently resilient to absorb an increase in bycatch mortality beyond that prescribed in recent years, and that an increase in the MALFiRM can be justified in respect to section 8 of the Act under your obligation to balance between allowing for squid utilisation while ensuring sea lion sustainability.

[2] Detailed comments were received by the outside reviewer on 3 September, after the consultation period had closed. Preliminary discussion of the review is provided in a subsequent section of this advice paper.

Procedures to Monitor the MALFiRM

115 The options to monitor the MALFiRM and the procedures by which they are implemented are primarily intended to provide a robust measure of sea lion bycatch. The two options proposed in the IPP represent fundamentally different means of bycatch estimation given the highly variable level of sea lion interactions. Option 1 (dedicated 'MALFiRM vessels') relies upon empirical evidence of current bycatch observed in trawl nets. MFish considers this procedure the most scientifically reliable method for monitoring the MALFiRM given the highly random nature of interactions recorded over time.

116 Option 2 (predetermined strike rate) applies historical average bycatch rates to estimate the MALFiRM based on the number of trawls conducted. This methodology does not account for inter-season variation among years, but offers a simplistic approach for approximating average mortality associated with a given level of squid fishing effort. As documented in the IPP, Option 2 has arisen as a monitoring technique primarily due to fishers' unwillingness or inability to meet conditions established for empirical in-season strike rate reporting requiring tied down cover nets.

117 The implementation of the two options is also fundamentally different in that Option 1 is deemed to require independent observer coverage of vessels to provide unbiased reports of sea lion bycatch results. Option 2 projects sea lion mortalities based on the number of trawls completed, such that observer coverage of fishing activity is not necessary. For both options, accurate and timely reporting of fishing effort in SQU6T is essential.

118 Given these monitoring objectives, MFish considers that accuracy of sea lion bycatch monitoring procedures holds precedence over convenience or simplicity of application. MFish contends that there is inadequate scientific understanding of causal factors underlying sea lion bycatch to rely entirely on simple past averages if the underlying concern for sea lion conservation is highly sensitive to the annual MALFiRM. This is borne out in the information provided in the submission by Fletcher, that there is a positive relationship between observer coverage and sea lion strike rate, and by ongoing research being undertaken at NIWA for the Ministry of Fisheries, which suggests that some spatial factors can influence the probability of capture of sea lions.

119 MFish also acknowledges that results from the Breen-Kim model indicate the sea lion population is capable of withstanding higher bycatch levels than estimated in the past. However, science information does not endorse unconstrained fishing as a management option. The Breen-Kim model explicitly tested the viability of this and other harvest rules, and unconstrained fishing was found to allow a slower recovery of the population to levels agreed by the government agencies and stakeholders represented at the Aquatic Environment Working Group.

120 MFish notes the SeaFIC, SFMC, and Commission allegations that the in-season MALFiRM monitoring provisions are unworkable and statistically indefensible. There is unconvincing evidence or documentation provided of these alleged failings, but MFish concedes the monitoring procedures are different than in past years. The differences are primarily with regard to the dependence on periodic (weekly/daily) bycatch accumulating over the season, and the inclusion of a mechanism for in-season changes to the predetermined strike rate.

121 This provision for periodic bycatch (rather than seasonal average) accounting is made necessary by the inclusion of MALFiRM monitoring Option 2, whereby the bycatch accounting procedure may shift between Option 1 and Option 2, as noted in the IPP (paragraph 104). Prior to the introduction of a predetermined strike rate option in 2001-02, minimum observer coverage was the sole MALFiRM monitoring mechanism, such that ongoing seasonal average strike rate could be compiled throughout the season and applied to cumulative tows. The introduction of a predetermined strike rate raises the possibility that some fraction of total tows might be under

Option 1, and another share under Option 2. Option 2 bycatch estimates are derived from total actual tows conducted in a given period. Under Option 2, MFish does not see how it is possible to monitor the MALFiRM count (predetermined strike rate applied to tows) based on a seasonal average observer coverage rate.

122 SeaFIC has submitted (with support from the SFMC and Commission) a proposal to replace the existing MALFiRM monitoring procedure with a new methodology that combines historical evidence of the strike rate with updated strike rate information from the current season. MFish judges this approach to hold promise. However, the presentation of this concept after the AEWG discussion on management procedures hinders its application in the 2003/04 Operational Plan as a replacement methodology until such time as it can be more thoroughly reviewed. MFish is supportive of the examination and further testing of any alternative models of estimating strike rate in a working group context during the remainder of 2003 and early 2004. MFish proposes to work with SeaFIC on development and assessment of the proposed new methodology, and notes that this approach could be trialled in the 2003-04 season in the event it is proven acceptable and superior to the existing monitoring procedures.

123 As an interim measure, MFish proposes that the MALFiRM monitoring procedures described in the IPP be modified such that bycatch-monitoring occurring under Option 1 be assessed and compiled on a cumulative basis over the season, as applicable. Option 2 bycatch monitoring will be accumulated separately by the appropriate periodic (weekly/daily) basis when that monitoring procedure is in effect. MFish proposes no change in the methodology planned to make in-season revisions to the predetermined strike rate, but will work with NIWA, SeaFIC and industry to ensure a transparent, equitable interpretation of appropriate changes.

124 Mr Fletcher's comments on the methodology used to estimate the predetermined strike rate parallel similar discussions conducted by the AEWG over the uncertainty surrounding any estimate of the strike rate based on historical data. MFish acknowledges this concern in Table 5 in the IPP, illustrating the sensitivity of resulting MALFiRM impacts to the methodology used to estimate the predetermined strike rate. At issue in Mr Fletcher's submission is the apparent positive relationship between the level of observer coverage for any given year, and the corresponding level of the observed strike rate.

125 WWF expresses concern that fishers are not compelled to comply with the Option 1 MALFiRM monitoring regime, and considers that the use of a predetermined strike rate is an unsafe method. MFish also raises concerns that the scientific understanding of the sea lion strike rate in the SQU6T fishery is inadequate to accept the 5.3% estimate (as derived in the IPP) on a long term basis without further analysis. MFish emphasises the recommendation that further investigation is warranted to establish a scientifically robust procedure for estimating a predetermined strike rate as the basis for monitoring the MALFiRM. However, MFish does not consider that regulations requiring fishers to tie down cover nets over SLED escape hatches, in order to calculate the strike rate, would be a satisfactory long-term solution to sea lion bycatch management.

126 MFish notes that there is an ongoing NIWA research effort to identify causal relationships underlying the sea lion strike rate that may provide better future understanding of the strike rate, and how it should be applied in MALFiRM monitoring. There is also an opportunity to address such questions as part of the SeaFIC MALFiRM-monitoring proposal noted above.

127 In response to submissions by WWF and RFB/ECO, MFish notes that the bycatch of sea lions in other, non-SQU6T fisheries is a matter of concern, and acknowledgement of this is made in the IPP (paragraphs 124-125). MFish notes that other sea lion bycatch is balanced against the likely conservative MALFiRM estimate resulting from the exclusion of Campbell Island pup

numbers. MFish tracks sea lion bycatch reports from both observer and vessel reports, and notes some discrepancies in the accounting of mortalities from the two sources over time. Stakeholders interested in the weekly sea lion bycatch report can arrange to be included in the distribution of sea lion bycatch information as distributed by NIWA.

Justification for a SLED Discount Factor

128 There appears to be deep disagreement between stakeholders on the justification for a SLED discount factor. MFish cites two points that are central to the SLED discount factor issue:

a) The scientific criteria established under prior Operational Plans to judge SLED survival and thereby establish a SLED discount factor have not been met (see IPP paragraphs 107-110.)

b) Information obtained from autopsy reports of SLED-captured sea lions indicates that for animals ejected in viable condition, there was some certainty that a proportion had a high likelihood of survival.

129 MFish does not consider these two points to be irreconcilable. The impediment arises because a sufficient number of filmed SLEDS observations have not been made available, with corresponding autopsy results, for researchers to attain the statistical certainty of SLED efficacy set out in the criteria. Between February 2002 and July 2003, a total of 69 autopsies have been conducted on sea lions recovered from SQU6T trawls where a prognosis of survival was accorded to the animals. Of these, 16 are considered to have been ejected from SLEDs. Using autopsy data alone, 13 of these animals were given a prognosis of low survival probability, and three a high survival probability. During 2001, three video captures of sea lions have been available for review, and of these, two were judged likely to have survived. At the time these determinations of survivability were made using video data, autopsy procedures had not been developed for determining survivability.

130 A simple proportion of numbers of animals ejected and deemed to have survived does not suffice to estimate SLED efficacy. The development of the current agreed methodology is set out in the following explanation. Criteria for according a discount rate for the use of SLEDs has been worked out by the Aquatic Environment Working Group, and through development of previous Operational Plans. The agreed methodology for determining sea lion survival is to use a combination of video and autopsy data, with a positive outcome required from both to determine whether the animal would have had a high probability of survival if released from the SLED. The video component to this is considered essential by some stakeholders, in that this allows an examination of whether the animal was conscious at the time of its ejection from the SLED. According to these criteria, no animals have received both a positive outcome from video and autopsy. This is because animals viewed on video in 2001 were not autopsied to determine survival probability, and since this time, no video footage has been forthcoming from the SFMC from which to judge the status of animals subsequently autopsied.

131 A number of uncertainties exist regarding the likely survival probabilities for sea lions ejected from SLEDs. Aside from death resulting from trauma injuries, necropsy experts cite stress and catecholamine release as factors that can result in death of seemingly healthy animals. To account for this level of uncertainty, and difficulties arising from providing prognoses from necropsy of frozen corpse to determine the outcome of SLED ejections, the Aquatic Environment Working Group determined that a 25% probability of survival was necessary with 90% statistical confidence in order to recommended a discount for SLED use.

132 Statistical modeling using the latest available data on sea lion ejection and survival probability was carried out in June 2003 by Darryl MacKenzie of Proteus Ltd. This showed that this 25% threshold would be reached with a sample size of around 15 where the underlying probability of survival was near to 50%, presuming that autopsy data alone were acceptable to form the basis of survivability prognoses, and that the probability of ejection was near to one. Where the underlying survival probability was nearer 30%, sample sizes exceeding 200 were needed to attain the same threshold. The same research also showed that there appear to be factors affecting the probability of survival related to the size and weight of animals and whether cameras were deployed on trawl tows. This latter factor also appeared to explain some of the variation in probability of capture of sea lions in trawl nets, analysed in a separate statistical examination by NIWA.

133 Following from these research findings, the Aquatic Environment Working Group worked actively with the SFMC to examine research approaches to determining efficacy of SLEDs. On multiple occasions since January 2003, Ministry of Fisheries officials have discussed the need for comprehensive research design to test SLED efficacy with SFMC. Further, on 16 June 2003, the Aquatic Environment Working Group met with the SFMC to discuss explicitly the requirements for statistical design for SLED efficacy research. To date, no proposal has been forthcoming from SFMC to elaborate their research plan to test factors influencing sea lion survival and capture probability. Statistical advice received by the Ministry indicates that testing that ignores underlying gradients in the data can lead to erroneous conclusions about SLED efficacy. In this light, caution is required in determining to what level SLEDs are effective at ejecting viable sea lions, especially as small sample sizes and sub-optimal sampling regimes have been adopted to date to test these factors.

134 MFish considers that the implication of the uncertainty, both in the conclusions drawn from the autopsy prognosis interpretations, and the inability to satisfy the scientific SLED survival criteria, calls for a precautionary stance on your part in establishing a SLED discount factor. This approach is consistent with s 10 of the Act, which requires that where information is uncertain, you must act cautiously, but uncertainty in information is not a ground to not act. MFish also notes that the scientific criteria established to judge SLED efficacy are relatively conservative. The issue is further aggravated by the difficulty in obtaining video captures of sea lions captured in SLEDs. Thus, little progress has been made in building the video evidence necessary to confirm survival prognosis from the autopsy results. Since January 2002, SFMC have been unable to furnish MFish with a research plan detailing how they will deploy cameras to address these issues, aside from stating that a number of cameras will be used to assess SLED efficacy.

135 The outside review of the Department of Conservation sea lion autopsy reports (as provided in the IPP addendum) has generally confirmed the sea lion survival prognosis made by Massey University veterinary pathologist Padrig Duignan. MFish contends that the best available information concerning SLED survival prognosis based on autopsy results is as shown in Table 1 of the IPP addendum report. The interpretation of these results by a technical working group concludes that for purposes of determining the efficacy of SLEDs at ejecting sea lions in viable condition, there was some certainty that a proportion (2/7) had a high likelihood of survival. The technical working group did not agree, however, that this information constituted sufficient certainty that a proportion of sea lions were exiting from SLEDs in viable condition to enable a discount for SLED use to be recommended, for the reasons elaborated above, relating to sample size and deficiencies in the sampling regime to address uncontrolled heterogeneity in the dataset.

136 The Department of Conservation, WWF, and RFB/ECO do not support establishing a discount factor based on the autopsy results, given uncertainty arising from other factors bearing on SLED survival not directly evident from the autopsy prognosis. These considerations include the consciousness of the animal at the time of capture in the cover net, the animal's vulnerability

after escaping the net, undetected injury that may threaten long term survivability, and the changing design of the SLED in use over time. MFish acknowledges these to be valid concerns, but does not consider that this uncertainty alone should preclude your consideration of a discount factor for SLED vessels, in view of the survival prognosis information available from the autopsy results.

137 MFish considers that SFMC has constructed an argument for a SLED discount factor founded on their interpretation of survival prognosis that ignores critical statistical advice about the data, as discussed above. MFish does not concur with SFMC's SLEDs efficacy conclusions, and further rejects their assertion that MFish acknowledged in the High Court proceedings that 40% of sea lions ejected in 2000-01 would have survived. MFish notes that these assertions refer to sea lion survival generalisations provided by SFMC, not MFish.

138 MFish also contends that resolving current disagreements over SLED efficacy and the justification for a discount factor will require additional scientific information on SLED performance. MFish supports ongoing work in the area of sea lion bycatch mitigation, and encourages efforts by stakeholders to work cooperatively in advancing the understanding of SLED efficacy. MFish continues to urge SFMC to provide a research plan for SLED testing that details statistical design of the sampling regime, addresses heterogeneity issues with the data, and provides specifications of the SLEDs to be tested. MFish officials have on several occasions since January 2003 urged SFMC to submit their research plan for review by the Aquatic Environment Working Group.

139 MFish advises that you are not required to establish a SLED discount factor. In the strict sense, the scientific criteria set forth to judge SLED efficacy and agree to a discount factor has not been met for the reasons outlined above. There is, however, information available to indicate that some sea lions are being ejected from SLEDs in a viable condition with a high likelihood of survival. You should consider this information when making your decision on the strike rate. MFish considers that the assessment of autopsy results provided by the panel of outside reviewers is the best information available at this time to assess survival prognosis of SLED captured animals. The review panel concluded that 2 of 7 sea lions (28.6%) had a high likelihood of survival. MFish cautions that there is significant uncertainty in extrapolating this survival prognosis from the autopsy results to SLED efficacy conclusions that underlie justification of a discount factor.

140 On this basis, MFish confirms recommendations in the IPP that you consider a discount factor for SLED vessels operating in the SQU6T fishery set at 20%, based on precautionary consideration of the information available, pursuant to s 10 Fisheries Act 1996. Alternatively, you may decide to withhold action on a discount factor after considering the information as to likely survival of sea lions expelled through the SLED, or establish an alternative discount factor based on your consideration of the information available.

Additional Considerations

Consultation with Department of Conservation

141 Under s15(2) of the Fisheries Act, you are required to consult with the Minister of Conservation in taking measures set forth in the SQU6T sea lion Operational Plan. The Department of Conservation (Department) is an active participant in the working group discussions pertaining to sea lions, provides the pup count estimates used to generate MALFiRM estimates, and possesses significant expertise in the biology and scientific understanding of the New Zealand sea lion.

142 As a consequence of these relationships, the Department is afforded the opportunity to provide critical review and comment of MFish policy papers leading to the SQU6T sea lion Operational Plan. This communication also allows Department officials to better advise their Minister in consulting with you on the Operational Plan.

143 The Department has not provided a formal submission on the IPP, but did present both editorial review and strategic comment during its preparation. While there is general agreement between the two Departments over many areas, there are differences in certain aspects of the respective positions of MFish and the Department regarding the 2003-04 Operational Plan that you should be aware of. Prominent areas of agreement and disagreement noted by the Department are summarized below, by issue:

Objective for Management and Status of the Sea Lion

144 The Department had previously supplied policy advice to the Aquatic Environment Working Group technical working group on overall goal, medium term objectives and interim objectives for management of New Zealand Sea lions with respect to commercial fishing interactions and Operational Plans developed under s 15(2) Fisheries Act 1996. A modified version of the interim objective was adopted by the technical working group in the development of the Breen and Kim 2003 model. The Department supports the adoption of this management objective as noted in paragraph 14 of the notified IPP.

The Breen-Kim Model

145 The Department acknowledges that the derived interim management objective may be achieved under a range of hypothetical harvest scenarios as predicted by this fully stochastic model.

146 It is noted that MFish intended to use this model to inform the Operational Plan. The Breen & Kim model represents a strategy which is only useful while the parameters upon which it has been formulated continue, e.g. effort of the fishery remains at a level consistent with that modelled (approximately 3000 tows annually).

SLEDs and the Discount Factor

147 The Department maintains that there is currently insufficient scientific data available to include a discount rate when calculating measurement of the MALFIRM to account for the implementation of SLEDs throughout the fishing fleet. This is due to the questionable survivability of sea lions passing through SLEDs.

148 The Department advocates that no discount rate should be incorporated into the Operational Plan unless scientific analysis of how this discount has been derived has been demonstrated to the Department's satisfaction.

149 The Department supports ongoing work in the area of mitigation including the establishment of a working group to progress this work and ensure that adequate experimental design to assess SLED efficacy is undertaken.

Observer Coverage

150 Recent court proceedings have found that sea lions caught in observed MALFIRM vessels with tied down cover nets are not considered to be "incidentally or accidentally" caught, and therefore unable to be counted when calculating fishery approach to the selected MALFIRM limit. Therefore, it is recommended that the minimum level of observer coverage required to ensure

statistically robust observation of the fishery is undertaken. Requiring coverage to levels greater than statistically required will result in increased levels of fishery impact on the sea lion population under harvest scenarios 305, 310, 320 and Rule 4.

151 The Department acknowledges the MFish recommendation for a minimum 20% and maximum 30% observer coverage under MALFiRM monitoring Option 1, based on a statistical frame to ensure adequate coverage of squid trawl vessels. The Department notes that while the Ministry has clarified maximum and minimum levels of observer coverage for this fishery, MFish has not addressed how the impacts of "uncountable" sea lions deaths will be resolved.

152 MFish suggests that this finding and its consequences for the management of the sea lion MALFiRM may place the Minister at risk of exceeding the biologically acceptable limit of sea lion removals from the population in a fishing year, by a percentage approximately equal to the level of observer cover achieved in that season. MFish concurs with the Department that this should be taken into account in determining the level of the MALFiRM to be set.

Preferred Management Scenario

153 The Department maintains that the selection of a preferred management scenario is not an isolated decision but must be considered as part of the mix of other parameters (such as discount rate and observer coverage) that will collectively determine the degree of impact the selected management scenario will have on the sea lion population. Identification of a preferred harvest scenario is also dependent on the results of the independent review.

154 Selection of a preferred harvest rule must also take into consideration the High Court finding that sea lions caught in observed MALFIRM vessels are unable to be "counted". The result of this additional impact on the population (over and above the impact set at the selected MALFIRM level) has not been accommodated in the fully stochastic model that has been used to inform the Operational Plan.

155 The Department of Conservation advocates that a single MALFIRM (decision Rule 310) is the preferred harvest scenario. A number of parameters will in combination determine the degree of impact that commercial fishing will have on the Auckland Island Sea lion population. Given that the effect of "uncountable" sea lion deaths have not been incorporated into the model and that the efficacy of SLEDs remains unclear, a Rule 310 is considered by the Department to be the preferred harvest rule.

156 MFish acknowledges the difficulties created by sea lion mortalities associated with tied down cover net requirements not being included in the MALFiRM accounting. However, MFish perceives little opportunity to make explicit adjustments for these mortalities in characterisation of the MALFiRM decision rules (Options A, B, or C) in terms of the definition of "fishing related mortality" in s 2 of the Fisheries Act 1996.

Process

157 As it is appreciated that the Ministry of Fisheries has been working within a very tight timeframe, the Department has attempted to give timely feedback and input into consultation documents as they have been developed. However, it is recommended that in future, consultation planning process be developed that allow for adherence to the protocol between the Department of Conservation and Ministry of Fisheries regarding consultation timeframes.

Independent Review of the Breen-Kim Model

158 Several submissions have made reference to the pending independent review of the Breen-Kim model; these parties have generally reserved final judgment on specific MALFiRM levels pending outside verification of the model.

159 Given receipt of the final research report on the Breen-Kim model and acceptance by the AEWG, MFish arranged with Dr Dan Goodman, Director of the Environmental Statistics Group at Montana State University in the United States to undertake a thorough review of the model. Dr Goodman is an internationally recognised expert in marine mammal population modelling.

160 The Goodman review was received on 3 September 2003 after close of the consultation period for the Operational Plan IPP. The report was reviewed by MFish officials, but has not been discussed by the AEWG. The complete report was distributed to stakeholders without comment on 4 September 2003.

161 A copy of the complete Goodman review is appended to this FAP. Goodman summarizes his findings as follows:

Briefly, I find the modeling to be of high scientific quality, and the 6/30/03 Breen and Kim report documenting the model and the model results is lucid and forthright. But exclusive reliance on these modeling results to justify adoption of an alternative management regime such as the "twice MALFIRM" or "adaptive rule," described in the report, would not constitute a management procedure that is "robust" in the sense of Wade (1998), as cited in the Breen and Kim report.

162 Goodman goes on to acknowledge, however, that the basis for management of the New Zealand sea lion may be somewhat different from that which motivated the development of the Potential Biological Removals approach, developed by Wade and others for use in the United States. This is because the New Zealand sea lion population is neither endangered nor severely depleted, and data about this species are of high quality. Given these considerations, Goodman recognizes that in this context, it may be appropriate to adopt alternative means of estimating a MALFiRM than the highly conservative approach adopted under US legislation.

163 Goodman raises concerns about the Breen-Kim modeling in four main areas: 1) the models do not consider sub-population dynamics in making assessment, although he recognizes that data to support this approach would be difficult to obtain; 2) the data in the model allow little ability to estimate density dependent factors that ultimately drive population recovery, as the current measures of population dynamics and fisheries effects have been made during a period of relative stability for the sea lion population and for the number of sea lions caught in the fishery. For this reason the model may be poor at estimating population response to events that are outside the scope of the current situation; 3) the Bayesian approach to modeling is relatively new and nuanced, and therefore it is difficult to assess how influential elements such as data-set weighting or penalties are for the model outcomes; 4) Goodman considers that the model needs to be developed further the examine the dynamics of each sex of sea lion separately. Data recovered about population dynamics to date relate mainly to females and their fecundity, while the model deals with all sea lions.

164 The remainder of the comments by Goodman relate to the need for contingency planning in the case where the model assumptions are challenged and to the requirement for far greater detail about the motivation and propensity for animals to colonise new breeding sites. However, MFish proposes to await discussion of the review by the AEWG before concluding whether the Breen-Kim model provides a robust procedure for future application in its present form.

165 Given the very short time frame available for stakeholder consultation, MFish has received only limited comment concerning the Goodman review, as summarized below.

166 SeaFIC notes that Goodman has said much about research that might be done. This was not part of his remit and should not be of concern at this stage. SeaFIC considers that Goodman has commented on model structure issues such as the fact that it would be preferable to have a meta population model. SeaFIC notes that if the AEWG had been able to develop such a model and deal explicitly with issues of colonisation, that is the route that would have been followed.

167 SeaFIC considers that Goodman has also suggested additional objectives that appear more relevant for a recovering population, and derives from application to other sea lion species. In the case of Hooker's sea lions, however, SeaFIC suggests this may be superfluous. SeaFIC also notes that Goodman has not seen all of that work undertaken necessary to understand the reasoning that brought the AEWG to select the constrained set of performance indicators pertinent to the Hooker's case, and a constrained model and parameter space for final testing.

168 SeaFIC's overall impression is that Goodman has produced a document of only limited value, and that the review does not detract at all from the Breen and Kim work as a sufficient basis to provide advice this year, and that there is no reason to alter the approach as presented in the IPP.

169 The Department of Conservation considers that the review by Goodman supports their precautionary position favouring Decision rule 310 from the perspective that the "twice MALFIRM" or "adaptive rule," would not constitute a management procedure that is "robust" in the sense of Wade, as cited in the Breen and Kim report.

170 The WWF notes that given the late notice of the review outcome, they are unable to comment on the review, but expect that due process would take the model to the AEWG for discussion. WWF reiterates their submission on the IPP (reported previously) that the Breen-Kim model should have undergone rigorous international peer review before being applied to the management decisions called for in the Operational Plan.

Summary

171 MFish has developed in the IPP a management regime to address the New Zealand sea lion-trawl interactions in the SQU6T fishery during the 2003-04 fishing year. This regime is similar to that used in previous years and continues to rely on the use of a MALFiRM as enabled under s15(2) of the Fisheries Act, to constrain New Zealand sea lion mortalities to a biologically acceptable level. The MALFiRM options A, B, and C presented satisfy sea lion management objectives agreed upon by the Aquatic Environment Working Group, according to specific criteria also established by that group. MFish has acknowledged these options to present a considered balance between allowing for utilization while ensuring sustainability.

172 Procedures to measure and monitor the sea lion bycatch applicable to the MALFiRM levels are accorded careful consideration in light of the uncertainty surrounding the incidence of sea lion interactions in the SQU6T fishery, and the uncertainty of SLED efficacy in reducing sea lion mortalities.

173 Interested parties have been given an opportunity to provide written comments on the Initial Position Paper assessing operational plan alternatives. Comments were received from the Squid Fishery Management Company, Seafood Industry Council, Te Ohu Kai Moana, David Fletcher, World Wildlife Fund New Zealand, and Royal Forest and Bird Protection

Society/Environment and Conservation Organisations. These parties have proposed a variety of operational plan refinements or changes for both estimating and monitoring the MALFiRM.

Key Elements of the Operational Plan

174 Having given due consideration to the submissions received, MFish proposes the following elements of the Operational Plan to address fishing-related mortality of the New Zealand sea lion in the SQU6T fishery for the 2003-04 season. These elements include modest but noteworthy changes and clarifications relative to that proposed in the IPP.

175 MFish recommends implementation of a MALFiRM for New Zealand sea lions under s 15(2) of the Fisheries Act 1996. The MALFiRM is estimated using the Breen-Kim model, based on sea lion population information. Three options are presented with regard to the appropriate MALFiRM level based on alternative decision rules:

a) Decision Rule 310 – 62 sea lions

b) Decision Rule 320 – 124 sea lions (preferred alternative)

c) Decision Rule 4 – 103 sea lions

176 In the event that the MALFiRM is reached, the Minster of Fisheries will close the fishery by gazette pursuant to s 15(5) of the Fisheries Act 1996

177 The MALFiRM will be monitored under two alternative criteria:

a) Option 1. Designated 'MALFiRM' vessels from the fleet will be randomly selected to obtain an actual sea lion strike rate for the fleet. The number of vessels selected will depend on the total fleet number to ensure a minimum 20% and maximum 30% fleet coverage is obtained in the SQU6T fishery. The MFish's Observer Programme will undertake the vessel selection process with the assistance of the Squid Fishery Management Company.

   i) All 'MALFiRM' vessels will be required to carry an MFish observer. The role of observers is to ensure that each vessel accurately records and reports any New Zealand sea lion captures in accordance with the 2003-04 Operational Plan.

   ii) The observed 'MALFiRM' vessels will use closed trawl nets, or have cover nets tied down over escape hatches if SLEDs are employed, in order to accurately monitor the strike rate.

   iii) The total number of New Zealand sea lions caught by the 'MALFiRM' vessels will be used to calculate an actual strike rate of sea lion catch per tow. This actual strike rate will be multiplied by the total number of tows conducted in the fishery by all vessels to estimate total sea lion catch by the entire fleet (ie 'MALFiRM' vessels and non 'MALFiRM' vessels). Actual sea lion mortalities occurring as a result of tied down cover nets are then subtracted from the estimated total sea lion catch (as required under the High Court ruling.) The resulting estimated captures will be used to monitor sea lion mortality against the MALFiRM.

   iv) Non 'MALFiRM' vessels may employ SLEDs but must operate with escape hatches open.

b) Option 2. If at any time during the season a cumulative 20% observer coverage of 'MALFiRM" vessel tows is not attained, a predetermined strike rate of 5.3% will be assessed on all vessels then active in the SQU6T fishery, applied to all tows conducted by the SQU6T fleet.

   i) The 5.3% predetermined strike rate is subject to revision if evidence from observed MALFiRM vessels representing at least 20% coverage over SQU6T fishing activity reveals a different actual strike rate. A four-week moving average of actual strike rate information will be used to revise the predetermined strike rate.

178 MFish proposes the use of a 20% discount factor adjustment be made to the strike rate of SLED equipped vessels, whether under monitoring Option 1 or 2. The 20% discount factor will be applied to the assessed strike of SLED-equipped vessels not designated as 'MALFiRM' vessels. In the event minimum 20% observer coverage of MALFiRM vessels is not obtained, the 20% discount factor will also be applied to all SLED-equipped vessels under the 5.3% predetermined strike rate.

a) As a condition for the application of a strike rate discount factor, vessels will be required to participate in a research programme following a plan approved by the Aquatic Environment Working Group, prior to the commencement of fishing in the 2003-04 SQU6T season. The research plan will detail SLED design and a procedure for reporting statistical characteristics of fishing operations relevant to SLED use in SQU6T.

b) In order to qualify for the discount strike rate, qualifying SLED vessels must satisfy the following conditions:

   i) That vessel used a SLED device approved by MFish (as established by the AEWG research programme described above), and that the escape hatch on the SLED remained open during fishing operations.

   ii) That device's specifications have been provided by the Squid Fishery Management Company to the Ministry of Fisheries as part of the AEWG research programme design, and for use in observer briefings.

   iii) A Ministry of Fisheries observer was present on that vessel to document net deployment and report on sea lion interactions associated with fishing activity.

c) In the event MFish is unable to provide observer coverage for all SQU6T SLED vessels seeking the strike rate discount factor, MFish will endeavor to utilize alternative monitoring procedures including on board video surveillance or gear inspections. Applicable costs will be borne by the vessels involved. Such vessels will be allowed to operate without an observer and will obtain the discount factor. Any such vessel is required to use a SLED device approved by the Ministry of Fisheries in all SQU6T fishing operations. Such allowance will only be made in the case where vessels have provided the MFish observer program with at least 72 hours advanced notice of fishing intentions and voyage dates.

d) If total observer sea-days in the squid fishery exceed those days already levied to the Industry, the additional sea-days will be charged to the Squid Fishery Management Company.

Aggregate Effects of the Operational Plan Options

179 MFish notes that the options presented in this Final Advice Paper can be conveyed from two perspectives; one that takes a conservative approach by choosing the lower MALFiRM and more restrictive monitoring provisions, and a second that provides a more liberal perspective in setting a higher MALFiRM and a larger strike rate discount factor. MFish has sought to portray defensible options in all cases, rather than polarized extremes. MFish considers that the options presented represent a precautionary approach consistent with your obligations under s 10 of the Act given uncertain, unreliable, or inadequate information, but acknowledges that this still provides a wide range of possible outcomes, particularly as regards the MALFiRM. A key consideration is weighing the benefits of greater squid utilisation against higher levels of sea lion mortality, as required by s 8 of the Act.

180 The SQU6T TACC has been under caught each year since the 1995-96 season, averaging 27% of the TACC. However, the portion of this foregone catch attributable to the MALFiRM limit is uncertain. Given the annual variation in squid availability in the 6T fishery, the TACC has not been reached in three of the past eight seasons even though the fishery remained open. Thus, estimates of the loss incurred by industry due to MALFiRM-triggered closure are conjectural, and it is misleading to presume that the economic cost of the MALFiRM is the dollar value of uncaught TACC. Depending on the availability of squid in area 6T and sea lion bycatch, the adverse economic impact of MALFiRM limits may range from nil (based on those years when the MALFiRM was not reached), to as high as $25 million (if early closure lead to maximum foregone catch.)

181 MFish recognises that the MALFiRM levels represented in the three decision rule options pose significantly different impacts on the potential returns to fishers in terms of the likely catch enabled with the greater number of tows, other things equal. In this regard, decision rule 320 (and to a slightly lesser extent, Rule 4) provides fishers with the opportunity to achieve a much greater catch than Rule 310. To the extent all three rules satisfy the underlying sea lion population management objective, those allowing greater catch from SQU6T represent increased utilisation, and are therefore more desirable in terms of economic benefits to fishers and related interests.

Recommendations

182 It is recommended that you:

a) **Agree**, pursuant to s 15(2) of the Fisheries Act 1996, to establish a MALFiRM applicable to New Zealand sea lions for the 2003-04 SQU6T fishery

b) **Agree** to set the level of that MALFiRM according to**:**

i) Decision Rule 310 resulting in a MALFiRM of 62 sea lions, **or**

ii) Decision Rule 320 – resulting in a MALFiRM of 124 sea lions, **or**

iii) Decision Rule 4 – resulting in a MALFiRM of 103 sea lions.

c) **Agree** to implement a monitoring and reporting regime outlined in the attached 2003-04 SQU6T sea lion Operational Plan dated 12 September 2003, to estimate the total number of New Zealand sea lion catches against the MALFiRM.

d) **Note** the information in the IPP and this paper concerning SLED efficacy and the justification for a SLED discount factor and

i) **Agree** to adopt a 20% discount factor adjustment to the strike rate applied to vessels employing SLEDs without tied down cover nets in the SQU6T fishery

e) **Agree** to forward the 2003-04 Operational Plan to the Minister of Conservation for consultation before you approve the Operational Plan.

Jim Cornelius
for Chief Executive
Ministry of Fisheries

APPROVED / APPROVED AS AMENDED / NOT APPROVED

Hon Pete Hodgson
Ministry of Fisheries

/ /2002

Encl