

7 April 2006

Minister of Fisheries

FINAL ADVICE PAPER - SQUIT IN-SEASON TAC INCREASE FOR THE 2005-06 FISHING YEAR

Purpose

1 This final advice paper (FAP) provides you with the Ministry of Fisheries' (Ministry) final advice and recommendations regarding the request from industry for a 20% in-season increase to the total allowable catch (TAC) for arrow squid in SQUIT.

Initial Position Paper and Final Advice Paper

2 The IPP was developed for the purpose of consultation as required under the Fisheries Act 1996 (the Act) and contained the Ministry's initial position on the industry request for an in-season increase to the TAC. The IPP contains an analysis of your legislative obligations. The views and options outlined in the paper were preliminary and provided as a basis for consultation with stakeholders.

3 The introduction section to this Final Advice Paper is followed by the summary final advice and recommendations section, greater detail on stakeholders' submissions and the Ministry's responses are provided in Appendix 1. The Initial Position Paper (IPP) is provided in Appendix 2 and complete versions of the submissions received are also attached as Appendix 3.

4 The Ministry recommends that you regard the complete document as the single final advice paper.

5 A copy of this advice paper will be forwarded to iwi and stakeholders who have expressed interest in being involved in the consultation process and receiving the FAP document.

Consultation

6 On 24 March 2006 the Ministry provided the IPP to relevant stakeholder groups including the Deepwater Stakeholders Group (DSG), the Seafood Industry Council (SeaFIC), environmental organisations and iwi.

7 Stakeholders and iwi were asked to provide written submissions on the proposal by 5 April 2006. A summary of submissions received and the Ministry's response to these submissions is attached as Appendix 1. A complete copy of each submission received is attached to the FAP section of this document as Appendix 3.

8 Owing to the short timeframe in which to review the proposal and undertake the necessary consultation, stakeholders were provided with an opportunity to meet directly with Ministry officials to discuss the proposal, or provide verbal (phone), email, or written response. No such requests were received.

Summary of submissions received

9 Stakeholder submissions are summarised in Appendix 1 under relevant headings and Ministry responses are included to facilitate your decision. Key issues for stakeholders focus on:

- The economic impacts of a constraining TACC preventing the fishery from utilising apparent abundant squid resources in the 2005-06 season;
- Environmental impacts from fishing resulting in incidental capture and mortality of seabirds; and
- The efficacy of Ministry and Industry led measures to mitigate seabird mortalities.

Background

10 The SQUIT arrow squid fishery covers all New Zealand's quota management areas except for two important areas around Auckland and Campbell Islands (SQU6T) and Kermadec Islands (SQU10). The SQUIT fishery is taken by trawling. A squid jigging fishery operates within the same geographical boundaries under a TAC/TACC set for SQU1J.

11 Every squid fishery season is based on what amounts to a new stock as arrow squid live for about one year, spawn once, and then die. Because of the short life span and rapid growth of arrow squid, it is not possible to estimate the biomass prior to the start of any fishing season. Moreover, the biomass increases rapidly during the season and then decreases to low levels as the animals spawn and die¹. Because of the biological characteristics of squid, the TAC for SQUIT has been set under section 14 of the Fisheries Act 1996. Assuming that increased catch and catch rates in the SQUIT 2005-06 fishery are indicative of increased squid abundance, a proposal to increase the SQUIT TAC is consistent with the intent of s 14 and the utilisation objective in the Act.

New information and key issues arising from submissions

Utilisation issues

12 The current TAC appears to be a constraint on utilisation in this year's SQUIT fishery. The industry has nearly exhausted the amount of annual catch entitlements in the SQUIT fishery for the 2005-06 season.

13 The analysis of available information supports industry's view that squid in SQUIT are abundant this season. Submissions generally agree with this conclusion and concur that a utilization opportunity exists. Providing for an in-season increase would enable industry to realize that opportunity. The proposed increase does not raise sustainability concerns for the stock.

¹ Ministry of Fisheries, Plenary Report 2004

Sustainability issues

14 The squid trawl fisheries have one of the highest seabird bycatch mortality rates in New Zealand fisheries. Providing an in-season increase would enable additional fishing effort in the SQUIT fishery and the additional effort is likely to increase interactions with seabirds and result in higher total seabird mortalities than if the increase was not granted.

15 The extent of the increased mortalities arising from increased squid catch cannot be determined reliably at this time. Similarly, the level of risk posed by the adverse effect of squid trawling on the sustainability or viability of seabird species cannot be determined as yet.

16 Balancing the likelihood of increased seabird mortalities and possible increased risk to seabird populations, are the measures currently being employed in the fishery, which serve to mitigate seabird interactions.

17 The Ministry and the squid fishing industry have collectively and separately embarked on mitigation measures to reduce seabird interactions in the squid fishery. These include regulations for paired streamer lines, bird bafflers or warp deflectors on vessels greater than 28 meters, greater than 30% observer coverage of the SQUIT fishery for January-April 2006, collaborative seabird mitigation measures, and an industry vessel management plan process, which includes offal management measures.

18 Stakeholders dispute the efficacy of these measures in reducing seabird bycatch. These issues are discussed below.

The Gazette Notice

19 WWF is concerned that seabird interaction and mortalities continue to occur in the squid fishery despite the use of warp strike mitigation devices.

20 In contrast, Industry consider that reductions in seabird bycatch associated with the Gazette Notice must be occurring, as mitigation measures, whilst not being necessarily totally effective, will be at least partially effective.

The seabird mitigation trial

21 Industry express concern that voluntary participation in seabird warp strike mitigation trials, may adversely affect the likelihood that an increase in SQUIT TACC will be granted, due to the associated likely increase in mortalities associated with the trials. MFish acknowledges this concern and continues to express support for the trial process.

22 The Ministry notes that it approved a special permit to authorise the mitigation trials, recognising the importance of the research into improving mitigation techniques. The Ministry approved the permit on the understanding that there would be risks of mortalities during the 'control' tows where no mitigation measures are used, and accepted that risk as a requirement of the experimental design.

Industry voluntary offal management measures

23 SeaFIC has noted that reports from observers and preliminary evidence from the mitigation trials indicate that the rate of seabird mortalities in SQUIT is lower this season than in the previous season.

24 SeaFIC support this assertion by providing detailed reports from MFish Observers relating to the successful implementation of offal management regimes that reduce the availability of offal to seabirds.

25 Whilst MFish does not consider that the effect of the currently employed mitigation and management measures can be determined reliably at this time, the Ministry notes that reports from observers are encouraging in suggesting that offal management measures on observed vessels appear to be effective in reducing offal discharges and seabird interactions.

Summary of options available

26 The purpose of the Act provides for the utilization of fisheries resources while ensuring their sustainability. The Ministry considers that agreeing to the in-season increase for SQUIT would be consistent with the utilization and sustainability considerations regarding the squid resource. However, the definition of sustainability includes that any adverse effects of fishing on the aquatic environment be avoided, remedied, or mitigated. The mortality of seabirds is an adverse effect of squid trawling in SQUIT.

27 Should you agree to the increase, you would need to be satisfied that the mitigation measures currently in use, and industry's measures to manage offal discharges, are adequately mitigating the adverse effects on seabirds. This applies not just at mortality levels associated with the current TACC, but taking into account the likely additional mortalities that will occur if you increase the TACC.

28 The extent of the increased mortalities arising from increased squid catch cannot be determined reliably at this time. Similarly, the level of risk posed by the adverse effect of squid trawling on the sustainability or viability of seabird species cannot be determined as yet.

29 Balancing the likelihood of increased seabird mortalities and possible increased risk to seabird populations, are the measures currently being employed in the fishery that serve to mitigate seabird interactions. Formal scientific analysis of the effectiveness of these mitigation measures will not be available until June 2006 at the earliest.

30 Nevertheless, the Ministry considers it is reasonable to assume that the combination of mitigation measures currently employed in the squid trawl fisheries is likely to reduce seabird interactions and mortalities compared with previous seasons. However, the size of the reduction is unknown and may or may not be significant.

31 MFish notes that no reductions are expected in net captures as no mitigation measures have been developed or deployed to address seabird bycatch in this area

Additional considerations and implementation of decisions

32 Following your final decision on any changes to Total Allowable Catch (TAC) and Total Allowable Commercial Catch (TACC) levels, officials will provide you with a *Gazette* notice to give effect to your decisions (if required), and a draft letter to stakeholders outlining your decisions and the reasons for them.

33 Providing reasons for your decisions is required under s 12(2) of the Fisheries Act 1996. This section requires that after setting or varying any sustainability measure, you are to, as soon as practicable, write to sector groups advising them of the reasons for your final decisions. You should note that you can choose an alternative option for an in-season increase within the range

considered that best meets the sustainability and utilisation obligations set out in the Act and discussed in the IPP.

34 Ongoing warp strike monitoring is an important source of information about long term measures to reduce seabird bycatch. MFish Observer monitoring is an essential component of this process in the SQUIT fishery. Should you decide to increase the SQUIT TAC, MFish will seek cooperation of the fishing industry to agree to continuation of observer coverage in the SQUIT fishery for additional fishing effort.

35 However, MFish cannot guarantee that continued observer coverage will be possible due to the need to consult with industry on the issue. You may consider raising this issue directly with Industry as part of your decision-making process.

Recommendations

36 The Ministry recommends that you:

- a) **Note** the contents of this final advice paper, including the submissions made by stakeholders and the Ministry discussion; and

EITHER

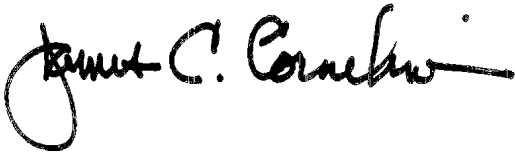
- b) **Option 1 - Agree to increase** the TAC for SQUIT by 20%, from 44,740.881 tonnes to 53,689.06 tonnes, and within the TAC:
 - i) **Agree** to retain the current zero allowances for Maori customary non-commercial interests, recreational interests and other sources of fishing related mortality;
 - ii) **Agree** to increase the SQUIT Annual Catch Entitlement (ACE) by 8,948.179 tonnes;
 - iii) **Note** that at the end of the current fishing year for SQUIT, the TAC will revert to 44,740.881 tonnes and the ACE will revert back to its current level;

OR

- c) **Option 2 - Maintain** the TAC for SQUIT for the 2005-06 fishing year at 44,740.881 tonnes;
 - i) Maintain zero allowances within the TAC for customary Maori interests, recreational fishery interests and other sources of fishing-related mortality;
 - ii) Maintain the TACC for SQUIT at 44,740.881 tonnes;

OR

- d) Decide on an option that lies within the ranges considered that best meets the sustainability and utilisation obligations set out in the Fisheries Act 1996 and discussed in the IPP.

A handwritten signature in black ink that reads "Jim C. Cornelius". The signature is written in a cursive style with a large initial 'J'.

Jim Cornelius
for Chief Executive

APPROVED / NOT APPROVED / APPROVED AS AMENDED

Hon Jim Anderton
Minister of Fisheries

/ / 2006

APPENDIX 1. SUMMARY OF SUBMISSIONS AND MINISTRY RESPONSES

General

37 Stakeholder submissions received on the SQUIT proposal include: **Anton’s Seafood’s Limited, World Wildlife Fund New Zealand, New Zealand Seafood Industry Council**, and the **Deepwater Stakeholder Group Ltd**. Submissions and Ministry responses are discussed below in relation to the following key issues regarding the proposed TAC increase and the environmental effects with respect to seabirds:

- Proposed TAC Increase
- Environmental Effects
 - Seabird Mitigation Trials
 - Industry Mitigation Measures including offal management
 - Impacts on Seabirds from a 20% TAC increase

Proposed TAC Increase

Submissions

38 **Anton’s Seafoods Limited (Anton’s)** support the proposed increase as “there are no sustainability issues in respect of SQUIT”.

39 **New Zealand Seafood Industry Council (SeaFIC)** acknowledges that for SQUIT “squid are abundant and a good opportunity exists to increase value from the fishery.”

40 The **Deepwater Stakeholder Group Ltd (DSG)** support the proposed in-season increase of 20%, and furthermore support and endorse the submission by SeaFIC.

Ministry Response

41 The Ministry acknowledges there is a potential utilisation opportunity to fishers should the proposed in-season TAC adjustment be granted. An increase in the TAC would pose no sustainability concerns for the squid resource.

Seabird Mitigation Trials

Submissions

42 **World Wildlife Fund New Zealand (WWF)** states it is collaboratively working with the industry on seabird mitigation and is a member of the seabird advisory group that steers the comparative mitigation device trials in the squid fishery.

43 WWF acknowledges the commitment the industry has demonstrated in exploring the seabird issue. However, WWF confirms that preliminary reports suggest that seabird mortalities are still occurring despite the use of mitigation techniques and are not restricted to tows where no mitigation device is deployed (control treatment).

44 **Seafood Industry Council (SeaFIC), whose submission is supported and endorsed by the DSG**, offer information on the efficacy of bafflers in the New Zealand squid fishery. Research based on data collected from the 2005 squid fishery shows that the use of bafflers was associated with a 50% reduction in the large bird strike rate².

45 SeaFIC specify that the inclusion of a “no mitigation” treatment in the trials will result in increased seabird captures compared to the use of a mitigation device on all tows. Further, the “no-mitigation” treatment is an essential part of the experimental design agreed by the technical advisory group.

46 SeaFIC call attention to research showing the efficacy of mitigation devices that include the Falkland Islands and New Zealand warp strike information from 2005. Preliminary evidence of seabird mortalities is to be expected from the mitigation trial: 1) because vessels participating in the trials must use the “no-mitigation” treatment, and 2) there was no expectation that mitigation devices would be 100% effective in preventing all captures. SeaFIC specify the importance of determining a capture rate for the 2005-06 squid fishery.

47 SeaFIC submitted an additional Technical Document (Appendix 3) prepared by David Middleton, a member of the mitigation trial Technical Working and Officials Group, supported by the DSG and carried out under the Ministry’s Special Permit 352. The technical document focused on: the mitigation trials, offal management, monitoring seabird bycatch, and made comparisons with the 2004-05 fishery data.

48 The SeaFIC technical document indicated that 18 trips have been notified for inclusion in the mitigation trials and relied on data from 13 trips to date. One vessel had triggered the decision rule twice by capturing 20 non-net related seabird captures on a single trip and was suspended from the trials. The Industry subsequently requested observers to send timely mitigation trial information for preliminary review. Table 2 of the technical report provides large and small seabird captures reported by observers from warps and net by mitigation treatment. To date, a total of 118 seabird captures have been observed from the mitigation trials in SQU1T and SQU6T fisheries. Table 3 summarises this data into warp and net captures showing that 70 of the total seabirds reported captured were captured in the net.

49 The SeaFIC technical document made elementary comparisons with the 2004-05 squid fishery and acknowledge difficulty with seabird recovery rates. Capture rates from the 2004-05 fishery were compared with capture rates from the 2005-06 fishery indicating that overall trip capture rates are generally lower in 2006 than in the 2005 fishery. The document suggests this lower rate indicates a lower background capture rate for the squid fishery attributable to the offal management regime.

50 The SeaFIC technical document provided comments from observers regarding offal management and effectiveness as analysis of information from the 2004-05 and 2005-06 fisheries cannot yet be completed. The document offered that the vessel offal management regime is not altered by the mitigation trials and that observer data could be considered representative of vessel procedures on unobserved trips.

² Abraham, E. 2005. Seabird warp strike in the Southern Squid Fishery – exploratory data analysis of a new collection protocol. Final Research Report for the Ministry of Fisheries project IPA2004/14 46pp.

51 The SeaFIC technical document concludes:

- That 2005-06 seabird capture rates (mortalities per tow) are lower than the 2004-05 fishery and trips with high capture rates are less common;
- The mitigation trials prevent an extrapolation of seabird captures from observed vessels to the entire fishery as a result of the required “no-mitigation” treatment; and
- There are indications that the offal management regime may lower the overall capture rate in the fishery given observer comments on the effectiveness of offal management.

Ministry Response

52 The Ministry welcomes the active participation by WWF as technical advisors in the collaborative efforts to mitigate seabird mortalities in the squid fishery. The Ministry acknowledges that preliminary information from the mitigation trials indicate that seabird mortalities continue to occur despite warp strike mitigation measures as expected given that the mitigation measures in the trials were not expected to be fully effective.

53 The seabird mitigation trials were designed around measures to mitigate seabird warp strike interactions and do not take into account seabird mortalities from net captures in the squid trawl fishery. Evidence from observer non-fish bycatch forms from the squid fishery show that net captures have also been a source of seabird injury and mortality during the ongoing mitigation trials. Net captures occur when the nets are set out and hauled in and can be an attractant to seabirds targeting squid in the net.

54 The Ministry acknowledges the SeaFIC statement that the “no-mitigation” treatment was a legitimate part of the mitigation trial experimental design. The Ministry granted a Special Permit (Special Permit 352) to waive the Fishery Regulations in order to complete the mitigation trial and allow the no-mitigation or control treatment to proceed, understanding that the control phases would carry an increased risk of seabird mortalities.

55 The Ministry concurs with SeaFIC that a capture rate for the 2005-06 SQUIT fishery is the most appropriate measure to determine the relative efficacy of the mitigation measures. However, a capture rate for the quantity of observed tows is unavailable as there is no opportunity for real time monitoring of catch and bycatch information. Rather, the Ministry relies on robust scientific data analysis once the fishery is complete.

56 The Ministry notes that with one exception (sea lion monitoring in SQU6T), none of the data collection systems currently in place in New Zealand fisheries are designed for real time monitoring of catch or bycatch information. The “real time” bycatch information available is limited to observer de-briefing and basic weekly bycatch reporting. Furthermore, these systems are not designed to provide the information required to assess the performance of a fleet when all observed vessels are participating in experimental trials.

57 The Ministry acknowledges the statement in the SeaFIC Technical document, regarding comparisons between 2005 and 2006 data, and consider that it is premature to make comparisons, when the information is incomplete and can be misconstrued.

Industry Mitigation Measures and Offal Management

Submissions

58 WWF raises concerns regarding the effectiveness of vessel management plans at reducing seabird bycatch. WWF states that VMPs are expected to reduce seabird-vessel interactions and result in less seabird mortalities due to warp strikes. Further, WWF claim anecdotal information on trials in the SQU1T and SQU6T fisheries for mitigation efficacy indicate that in spite of the use of VMPs offal dumping is still occurring and appears to be linked with high incidents of bird captures.

59 SeaFIC, supported by DSG, submits that the 2006 industry efforts are focused on improving mitigation processes to improve understanding seabird bycatch problems in the squid fishery. The industry is testing the efficacy of alternative mitigation techniques to improve prospects for solutions to seabird bycatch.

60 SeaFIC acknowledge that industry offal discharge information is reliant on observer data that is not available until six weeks after the end of the trip. SeaFIC attach a mitigation trial status report for 2006 (See Appendix 3) as part of their submission as evidence stating that “observers are unanimous that offal management is resulting in reduced offal discharges”.

61 SeaFIC assert that the industry voluntary records of seabird captures were to be used as an indicator of issues to review the VMP monitoring process, rather than a definitive account of seabird captures. SeaFIC state that the observed vessel capture rate was expected to exceed the rate from the entire fleet due to the requirement for “no-mitigation” treatments in the mitigation trials.

62 SeaFIC recognize the need for continuing improvement in offal management and bycatch mitigation techniques for all fisheries, particularly the squid trawl fishery. SeaFIC acknowledge that industry and collaborative efforts show that all parties agree on the importance of this work. SeaFIC contend that the Ministry IPP inappropriately focuses on the desired outcome when no proper measurement can be established.

63 SeaFIC suggest that the measures taken by government and industry will be effective in reducing bycatch and reports from observers indicated that they have been effective. SeaFIC assert that the observed seabird captures in the 2006 squid fishery are related to the current mitigation trials and cannot be taken as an indication of fishery performance in reducing bycatch.

Ministry Response

64 The SQU1T fishery has followed a voluntary Code of Practice in line with the National Plan of Action for Incidental Catch of Seabirds (NPOA) approved by the Minister of Fisheries and the Minister of Conservation in April 2004. The Industry has completed 39 Vessel Management Plans setting out specific mitigation measures by vessel including offal management; with weekly seabird bycatch reporting and corrective measures for non-compliance.

65 The Ministry acknowledges industry’s work in the initiation of vessel management plans including measures to reduce offal discharge have reduced the amount of fish waste that is a primary attractant to seabirds. Observer notations regarding the reduced amount of discharge observed indicate progress at reducing seabird interactions in the squid fishery.

Impact on seabirds of a 20% in-season increase to the SQUIT fishery

Submissions

66 WWF claim that the number of expected seabird mortalities as a result of a 20% increase in the TAC for SQUIT specified in the IPP, does not take into account the seabird mortalities that are not recovered. WWF assert that the “actual estimated total seabird mortality would amount to somewhere between five to seven times.... and result in a total additional 450-700 seabird deaths.

67 In summary, WWF suggests that measurable seabird bycatch reductions should be established before an in-season TAC increase is considered. WWF proposes conditions for the Minister to consider if granting an in-season increase: 1) set a total seabird bycatch limit instead of a TACC increase; and 2) set a requirement for 100% observer coverage with full application of warp strike observer protocol on all squid fishing trips.

68 SeaFIC, supported by DSG, contend that the statement that only a small proportion of birds killed or seriously injured by collision with warps are recovered is anecdotal. SeaFIC considers warp strike counts to be a useful index of seabird interactions but contend that it is not appropriate as an absolute measure of injuries to seabirds or seabird deaths. SeaFIC suggests the consequences of a strike rate may vary between seabird types.

69 SeaFIC acknowledge the difficulty in establishing conclusions for the 2005-06 fishing season given that there is no real time monitoring of bycatch occurs for the squid fishery and suggest that the Ministry advice concentrate on process rather than preliminary outcomes. SeaFIC contend that any fishing in the 2005-06 fishing season would represent a substantial improvement over the 2004-05 fishing season as a result of the enforcement of the regulations requiring all vessels to use warp strike mitigation.

70 SeaFIC recognize there is potential for net captures to be reduced through offal management by reducing the attractiveness of fishing boats to foraging seabirds. SeaFIC state that net captures may show an increase in seabird captures if seabird feeding behaviour changes as a result of reduced offal. SeaFIC claim that warp strikes tend to affect larger birds, especially albatross and net captures predominantly catch small birds such as petrels and shearwaters.

71 SeaFIC assert that fishing an extended SQUIT season represents effort displaced from other fisheries rather than additional effort and contend the Ministry’s assumption that seabird mortalities are additive.

72 SeaFIC acknowledge the 95% confidence intervals about the seabird bycatch rate purported by MacKenize and Fletcher 2006 and stress that this catch rate is modeled for the entire squid trawl fishery (SQUIT and SQU6T). SeaFIC assert that it is appropriate to acknowledge the 2004 rate is 9.78 to 13.16 seabirds per 100 tows, and that median rates from 1998-2004 have ranged from 3.93 to 13.27 seabirds per 100 tows.

73 In Summary, SeaFIC states that seabird bycatch constitutes the major impediment to an in-season TAC increase for the SQUIT fishery and that the abundant squid in SQUIT provide an opportunity to increase fishery value.

Ministry Response

74 The Ministry notes the WWF claim that as many as 450-700 seabird deaths may occur from the SQUIT increase. The IPP cites the average estimated seabird mortality rate for the squid fishery

in 2004 but cannot claim that the estimates account for only landed seabirds. The 2004 average estimates were derived from 51,385 observed tows between the 1998 and 2004 fishing years to model total seabird captures³. In addition, the 2004 estimates do not account for the mitigation measures that have been initiated for the 2005-06 fishing season.

75 The Ministry notes the advice WWF has suggested the Minister include as a condition of increasing the TAC for the SQUIT fishery. A total seabird bycatch limit, similar to the fishery related mortality limit (FRML) for sea lions, has not yet been established for seabirds. A research study is presently considering designing a programme of indicators of population performance with respect to captures of seabirds in New Zealand fisheries and one of the methodologies considered is to use the FRML approach but this research is not yet complete.

76 The Ministry acknowledges WWF's request for 100% observer coverage in the SQUIT fishery as a condition for an in-season increase. Observer coverage at 100%, although ideal, would prove difficult for the Ministry to fulfill in the present fishing year. Observer planning and budgeting is prepared with respect to research and conservation planning for future fishing seasons.

77 The Ministry acknowledges that the SeaFIC suggestion for real time monitoring of the SQUIT fishery including observer data and non-fish bycatch would facilitate analysis of the impacts from the SQUIT fishery.

78 The Ministry recognizes the SeaFIC assertion that the risk to seabird populations is unknown as the level of seabird mortality has some uncertainty surrounding the background mortality from mortally injured but non-captured seabirds. In addition, the Ministry cannot reliably determine the seabird capture rate from the 2005-06 fishing season as representative of the fishery due to the mitigation trials.

³ MacKenzie, D. and D. Fletcher. 2006. Characterisation of seabird captures in NZ fisheries. Final Report prepared for the Ministry of Fisheries ENV 2004/04 99pp.

APPENDIX 2. INITIAL POSITION PAPER

24 March 2006

Dear Stakeholder

PROPOSED IN-SEASON ADJUSTMENT TO THE SQUIT TAC

Purpose

1 The purpose of this letter is to inform you that the Ministry of Fisheries (Ministry) is reviewing fishing industry requests for an in-season TAC increase for the current 2005-06 SQUIT fishing season, and is circulating this proposal for public comment.

Overview

2 Information relevant to this request is structured around the following:

- a) The proposal
- b) The consultation process
- c) Factors relevant to the proposal
 - i) The squid fishery
 - Abundance
 - TAC levels in the squid fisheries
 - Capacity to harvest a increased catch allowance
 - ii) Environmental effects
 - Finfish bycatch
 - Marine mammal bycatch
 - Seabird bycatch
 - iii) Economic impacts
- d) Statutory considerations
- e) Conclusions

The Proposal

3 Requests have been received from Independent Fisheries Ltd, Vela Fishing Ltd, and Te Runanga A Iwi O Ngapuhi. A separate request has been made by the Deepwater Stakeholder Group (DSG) on behalf of SQUIT quota and ACE holders (the Applicants). MFish understands the DSG request supersedes the request from the individual industry stakeholders.

- 4 The Ministry seeks your views and opinions on the proposal set out below:
- a) The proposal is to increase the TAC for SQUIT by 20%, from 44,740.881 tonnes to 53,689.06 tonnes, and within the TAC:
 - i) retain the current zero allowances for Maori customary non-commercial interests, recreational interests and other sources of fishing related mortality; and
 - ii) increase the Annual Catch Entitlement (ACE) by 8,948.179 tonnes.
 - b) At the end of the current fishing year for SQUIT, the TAC will revert to 44,740.881 tonnes.

5 The Applicants anticipate that the existing SQUIT TACC will be caught by the end of March or early April 2006. Accordingly, the MFish proposes that the review of the SQUIT TAC follow an expedited schedule so the Minister can make a decision on this proposal in early April 2006.

6 Because of the biological characteristics for squid, the TAC for SQUIT has been set under section 14 of the Fisheries Act 1996 (the Act). Section 14 provides an alternative TAC setting process for any quota management stock listed in the Third Schedule to the Act, whereby the Minister does not have to set the TAC at a level that produces the maximum sustainable yield (MSY). All squid quota management areas are included in the Third Schedule. Further, under s 14, the Minister may by Gazette notice, vary any total allowable catch set under s 14(1) by increasing or reducing the total allowable catch. Section 14(6) provides that, after considering information about the abundance during the current fishing year of any stock listed in the Third Schedule to the Act, the Minister may by Gazette notice, increase the total allowable catch for the stock with effect from such date in the fishing year in which the notice applies. Under s 14(7), any increase set under s 14(6) reverts to the total allowable catch that applied to that stock at the beginning of that fishing year.

7 The Ministry acknowledges that letters from Independent and Vela Fisheries requested a 50% increase in the TACC on behalf of quota holders representing less than 30% of the quota for SQUIT. The letter from Te Runanga A Iwi O Ngapuhi supported a general increase in the TACC. The Minister requested that the industry present a unified proposal broadly representative of stakeholders and that it include information regarding catch rates for squid and reductions in seabird incidental catch. The Deepwater Stakeholders Group held a meeting on 23 February 2006 and the shareholders agreed to apply for a 20% in-season increase in place of the request received from Independent Fisheries Limited (that identifies Vela Fisheries Ltd in the request). The Applicants indicate increases in squid abundance and catch rates during this season, especially in the area of the Stewart-Snares Shelf. In view of the apparent abundance of squid and the consequent utilisation opportunities, the Applicants have requested an in-season increase in SQUIT.

Consultation process to review the TAC

8 To progress this review, the Ministry is circulating this initial position paper for public comment and to collect relevant and timely information regarding the squid fishery and environmental mitigation. The consultation process includes:

- Distribution to stakeholders of this proposal for an in-season increase in the SQUIT TAC;
- Consultation with quota holders, Iwi, Non Governmental Organisations and other interested parties on the proposed increase in the TAC. Stakeholders are encouraged to provide written comments no later than 5 April 2006. Recognising short time available for consultation, the Ministry will be available to conduct group or individual meetings with stakeholders on request; and
- Stakeholder's submissions and information on this proposal will be included in a final advice paper to the Minister.

9 Submissions on the SQUIT TAC in-season increase proposal are to be mailed to Charmaine Gallagher, Ministry of Fisheries, Private Bag 14, Nelson by 5 April 2006. Alternatively, submissions may be emailed to Charmaine.Gallagher@fish.govt.nz.

The squid fishery

10 Every squid fishery season is based on what amounts to a new stock as arrow squid live for about one year, spawn once, and then die. Because of the short life span and rapid growth of arrow squid, it is not possible to estimate the biomass prior to the start of any fishing season. Moreover, the biomass increases rapidly during the season and then decreases to low levels as the animals spawn and die⁴.

Indications of increased squid abundance in the 2005-06 fishing year

11 SQUIT covers all New Zealand's squid fisheries except for two important areas around Auckland and Campbell Islands (SQU6T) and Kermadec Islands (SQU10). Within the SQUIT quota management area, over 95% of catch reported during the past several fishing seasons has occurred around the south and southeast coast of the South Island extending from the Snares Shelf to the Mernoo Bank (along the east coast). The relative importance of specific areas within the general fishing grounds varies from year to year, but area 28 (Snares Shelf and Snares Island region) is the statistical area of greatest importance, accounting for over 77% of total SQUIT catch in recent years. Lower catch in areas 20, 22, and 26 reflect the inter-annual spatial variability of squid, as well as relatively better catch results in areas 27, 28, and 504. Targeted squid catch-effort results during the 2005-06 season to date from area 28 and other key statistical areas are examined here as a measure of catch and abundance in SQUIT.

12 The preliminary Ministry catch-effort reports for the 2005-06 SQUIT fishing year indicate that there is an increase in stock abundance in SQUIT compared to historical averages. This finding is based on considerations of total catch, effort (tows undertaken), and catch per tow as shown in Appendix 1.

⁴ MFish Plenary Report 2004

13 Current catch data for this fishing season is available from 1 October 2005 to 8 February 2006.⁵ Comparing catch records for this period with the most recent eight-year average historic catch for the same time interval indicates that current catch levels are approximately 40% greater than average. While the number of vessels targeting squid in the key fishing areas has increased only slightly, the number of tows undertaken into February is 33% less than the eight-year average. Thus, vessel reports illustrate a reduced number of tows undertaken, but a significant increase in catch per tow, and overall higher total squid catch relative to the longer-term average.

14 Calculating the ratio of total catch to total effort provides an indication of relative abundance expressed as catch per tow. Squid catch per tow then provides a measure of comparing relative abundance in the key fishing areas among years, or in comparison with the longer-term average. Appendix 1 summarises catch and catch per tow estimates for key SQUIT statistical areas over the past eight seasons for the comparable October-February period. SQUIT catch per tow compilations from key statistical areas in 2005-06 indicate that squid abundance is about 108% higher than the eight-year historical average, all other factors being equal. Assuming that increased catch and catch rates are indicative of increased squid abundance, an increase in the SQUIT TAC appears consistent with the intent of s 14 and the utilisation objective in the Act.

TACC levels in SQU1

15 The squid TACC is allocated across two fishing methods in squid quota management area 1 (QMA 1), reflecting respective shares based on maximum catch levels established for both jig and trawl fisheries (Appendix 2). A TACC of 94,952.981 tonnes currently exists for SQU1 divided between 50,212.1 tonnes in SQU1J (jig fishery), and 44,740.881 tonnes in SQU1T (trawl fishery). The proportional share of squid catch from the jig fishery has declined significantly from levels realised in the late 1980s and in the mid 1990s, such that less than 10% of the SQU1J TACC has been caught during the past six seasons. Although there has been a modest recovery in SQU1J catch since the 2002-03 season, including an increase in the number of jig vessels operating in New Zealand waters during the last three years, the Applicants project that only about 10,000 – 20,000 tonnes will be taken in SQU1J during the 2005/06 season from the 50,212.1 tonne TACC. For purposes of this analysis, the Ministry assumes SQU1J landings in the current 2005-06 fishing year will be around 15,000 tonnes. On this projection, it is anticipated that at least 30,000 tonnes of the available SQU1J TACC will not be harvested in 2005-06, and will furthermore not be available to SQU1J fishers in subsequent years due to the annual lifecycle of the species.

16 An 8,948.179 tonne increase in the SQU1T TAC would conceivably increase total catch levels in the fishery to 53,689.06 tonnes in the 2005-06 fishing year. From Appendix 2, the projected 2005-06 total available TAC across both SQU1T and SQU1J (including the 20% SQU1T increase) would be 103,901.16 tonnes. However, given relatively modest catch anticipated for SQU1J, combined landings for SQU1 (including the 20% SQU1T increase) are projected to be in the range from 63,689 to 83,689 tonnes. Combined SQU1T and SQU1J landings have exceeded 50,000 tonnes in six of the past 19 years. There is some indication of a three-to-four year cycle of relatively higher landings in the combined SQU1 fishery over time, although this has not been rigorously analysed or tested scientifically. The recent favourable fishing years (2003-04 to 2005-06) are consistent with this cyclical pattern.

17 From the perspective of the combined jig and trawl TAC available in squid QMA 1, it appears that there is a substantial portion of SQU1J that can be made available for SQU1T within

⁵ Note that the 2005/06 catch effort data for the October through February period is likely incomplete, subject to delayed catch reporting by vessels that have not yet, or only recently returned to port.

the existing harvest potential represented in the combined TAC levels. This can be accomplished without adversely affecting SQU1J quota holders, or raising adverse sustainability concerns for the fishstock. Since an in-season TAC increase in SQU1T under s 14 of the Act applies only to the present 2005-06 fishing year, and is not expected to come at the expense of foregone catch by the SQU1J fishers, it is not anticipated that a corresponding reduction in the SQU1J TACC is needed.

Industry capacity to harvest a 20% increase in the SQU1T TACC

18 A summary of catch and effort data from the SQU1T fishery between 1989-90 and 1999-2000⁶ reveals that essentially all of the SQU1T harvest in these years occurred during the months between December and May. Within this six-month interval, the peak period of harvest has been between January and April, but with modest proportions of the total catch (ranging from 3% to 29%) reported during May. Combined catch proportions across April and May range from 9% to 60% for the eleven-year period previously analysed, suggesting that an increased harvest of 20% is not unreasonable, particularly if high vessel participation, abundance and catch rates persist over the next two months. As noted above, unharvested ACE arising from the 20% increase is assumed to be of no lasting consequence since the SQU1T TAC would revert back to the pre-existing level in the 2006-07 fishing year.

Environmental effects

Finfish bycatch

19 Ministry of Fisheries observer data on the squid trawl fisheries (including SQU6T) indicates that targeted squid catch accounts for 67% of total catch from the fishery.⁷ Comparable bycatch rates from catch in the SQU1J fishery would likely be lower owing to gear specificity in the jig fishery. Of the 33% non-squid bycatch in the trawl fishery, about 27% is comprised of other quota species, principally barracouta (15.3%), jack mackerel (4.7%), silver warehou (3.9%) and spiny dogfish (2.5%).

20 The Ministry notes some concern regarding the likelihood of increased silver warehou (SWA) bycatch as a result of an increase in the SQU1T TAC. Fishstocks from SWA3 and SWA4 quota management areas overlap the key fishing grounds in the SQU1T fishery. SWA3 landings have exceeded the TACC in 7 of the last 9 years with over half of the SWA3 and SWA4 catch coming from vessels targeting squid. Overall SWA3 landings in the 2004-05 fishing year were 3,797 tonnes (15% over-catch) and SWA4 landings for 2004-05 were 4,279 tonnes (4% over-catch). Increased silver warehou bycatch in the SQU1T fishery arising from the proposed 20% increase may aggravate silver warehou bycatch since the squid fishery has accounted for over 30% of the SWA3 and SWA4 catch in the last 6 years. In 2003-04, for example, when the SQU1T TAC was increased in-season by 30%, the TACC for SWA4 was exceeded by 35%.

21 It is difficult to determine what portion of the 2003-04 SWA4 over-catch may have been directly attributable to the in-season increase, but it is reasonable to expect that higher SQU1T effort and/or catch would lead to increased SWA4 bycatch. As the SWA4 TACC has been exceeded in recent years, it is likely this situation will continue. The current status of the SWA3 and SWA4 stocks are unknown, so it is not possible to determine the extent of a sustainability risk arising from increased bycatch in the absence of an updated SWA stock assessment.

⁶ Langley, A.D. 2001. Summary of catch and effort data from the SQU 1J, SQU 1T, and SQU 6T fisheries for 1989-90 to 1999-2000. New Zealand Fisheries Assessment Report 2001/51.

⁷ Anderson, O.F. 2002. Fish discards and non-target catch in the trawl fisheries for arrow squid, jack mackerel, and scampi in New Zealand waters covering the period 1998-99 to 2000-2001. New Zealand Fisheries Assessment Report.

Marine mammal bycatch

22 Sea lion bycatch is a recurring problem in the SQU6T fishery further to the south around the Auckland Islands, and sea lion bycatch is occasionally reported in the SQU1T fishery, although this is not regarded as a significant threat to the sea lion population. In 2002 and 2003 a single sea lion was captured in the SQU1T fishery. In 2005, three (possibly four) sea lion mortalities were reported in the SQU1T fishery⁸. There have been no sea lion mortalities reported in SQU1T for the 2005-06 fishing year to date.

23 New Zealand fur seals are also taken as bycatch in the SQU1T fishery. Total captures projected for the Stewart-Snares Shelf area based on observer bycatch reports are 29 in the 2001 season, 74 in 2002, and 39 in 2003.

Seabird Bycatch

Seabird bycatch information

24 The Ministry is concerned about seabird bycatch in the target squid trawl fishery. Observed seabird captures in SQU1T fishing regions averaged about 200 birds per season during the 2000/01, 2001/02, 2002/03 fishing years⁹. Observer coverage varies significantly among the areas reported, and from year-to-year. Based on the observed bycatch, a projected average 537 seabirds were caught per season during the 2001 to 2003 seasons. The projected totals do not include estimates from areas with low observer coverage (<10%), including the east coast south island (ECSI) area where there are indications of high bycatch rates in the past.

25 New research findings using more comprehensive modelling techniques provide additional analysis of existing sea bird bycatch up to 2004. These data show that in 2004, squid target tows accounted for 1,246 seabird deaths. Model estimates indicate that a high proportion of incidental albatross deaths occur from the squid fishery in the summer and autumn seasons.

26 The majority of seabird captures in the SQU1T fishery are reported from the Stewart-Snares Shelf region, where observer coverage has ranged from 15% to 70% across the 2001 to 2004 seasons. Reports from observed squid trawls indicate that seabird captures are dominated by white-capped albatross *Thalassarche steadi* (classified as a threatened species), followed by sooty shearwater *Puffinus griseus*.

The Minister's decision in 2004-05

27 The Minister of Fisheries declined an industry request for a 10% increase in the SQU1T TAC in 2005 due to concerns over seabird bycatch in the squid trawl fishery. Ministry observer reports indicated seabird interactions in the squid fishery were substantial due to a lack of appropriate mitigation measures. Although the seabird National Plan of Action (NPOA) was approved by joint Ministers to manage impact on seabirds from fishing, information from observers indicated that there was widespread non-compliance with the voluntary code of practice developed under the NPOA framework. In his decision letter declining the 10% in-season TACC increase request, the Minister concluded:

⁸ Duighnan, P; & Jones, G. (2006) Identification of Marine Mammals Captured in New Zealand Fisheries, 2004-2005. Interim Report Contract ENV2005/04 February 2006.

⁹ Data obtained from annual New Zealand Fisheries Assessment Reports prepared by Baird, S.J, Incidental capture of seabird species in commercial fisheries in New Zealand waters; 2000/01, 2001/02, and draft 2002/03 reports.

In this, I have ultimately decided that the environmental risks outweigh the potential utilisation gains. This is due largely to the serious threat to seabirds that has been brought to light by non-compliance with the seabird NPOA exhibited by some squid fishers, and the lack of near term measures that might be employed to mitigate the risks of unnecessary additional seabird deaths.

New information on seabird mitigation efforts following the 2004-05 season

Gazette Notice

28 In view of concerns over seabird bycatch that came to light in the 2004-05 fishing season, the Minister directed the Ministry to pursue regulatory measures to reduce seabird bycatch. There is uncertainty as to the efficacy of various warp-strike mitigation devices. The Ministry determined that paired streamer lines¹⁰ were likely to be the most effective mitigation measure available, based on a global review of mitigation device efficacy, and regulated for their use by *Gazette* notice in 2005.

29 However, when deployed in New Zealand according to the Gazette Notice specifications, fishers identified a number of issues relating to efficacy, practicality, and safety of the streamer lines, including reports of death and injury of seabirds caused by interactions with the lines. This information suggested that the paired streamer lines might not be operating as intended in all situations, or across the range of vessel configurations represented in New Zealand trawl fisheries.

30 In response, the Minister broadened the paired streamer line specifications and allowed fishers the option of deploying alternative warp-strike mitigation devices to paired streamer lines. Fishers now have the option of deploying paired streamer lines, bird bafflers, or warp deflectors, generically called warp-strike mitigation devices. The efficacy of all permitted measures is unknown due to the considerable flexibility of measures and specifications currently allowable, and a lack of information to suggest that these measures are effective in New Zealand waters.

Seabird mitigation trials in the 2005-06 squid trawl fisheries

31 In order to assess the efficacy of the various trawl mitigation measures allowable under the current Gazette Notice, the Ministry, in collaboration with Industry, the Department of Conservation, and World Wildlife Foundation New Zealand, developed a program to trial the efficacy of different mitigation measures.

32 The seabird mitigation trials are currently underway on all observed vessels in the squid trawl fishery (25-30% of the fleet). The trials should provide information to advance understanding of the relative efficacy between those devices in the context of the New Zealand squid trawl fishery. The Ministry notes that the trials include a control treatment where vessels are directed to employ no mitigation devices during some tows, such that seabird bycatch from these vessels may be affected, accounting for about 10% of all tows undertaken in the squid trawl fishery.

33 The trials will provide information about relative efficacy of different warp strike mitigation measures, but they will not assess the most effective standards and specifications for the mitigation measures. Further research will be required to improve the efficacy of all promising devices in the trials. The results of the trials will be available in June 2006.

¹⁰ Paired streamer lines work by forming a visual 'curtain' on either side of the trawl warps that birds are deterred from flying into, creating a 'safe zone' around the trawl warps.

34 At present, there is little information to evaluate whether warp strike mitigation measures are effective. Preliminary reports suggest that mortalities are still occurring despite the use of mitigation techniques, and are not restricted to tows where no mitigation is deployed as part of the mitigation trial being conducted.

Industry bycatch mitigation measures

35 The industry has provided vessel management plans (VMPs) for 36 vessels participating in the 2005-06 squid fishery. Vessel management plans describe the vessel operations and the mitigation devices and measures the vessel will employ to reduce seabird interaction. Offal management is recognized as an important component of these seabird bycatch mitigation efforts.

36 Offal management measures are designed to reduce the availability of offal to seabirds. Some squid vessels are now processing squid offal into squid meal and discharging only if the meal plant is full. This reduces the volume of offal available to seabirds since the pieces of squid waste are much smaller and thus less attractive to large seabirds in particular. The practice also reduces the length of time that the offal is available for seabirds. Various offal management practices are being evaluated, including holding offal onboard while the nets are in the water, batch discarding, skirt covered discharge, meal and mincing. Overall, these practices are expected to reduce seabird-vessel interactions and result in less seabird mortalities due to warp strikes. However, as yet there is not robust evidence of discharge reductions other than anecdotal evidence.

37 The Deepwater Stakeholders Group has appointed a seabird mitigation liaison officer to monitor incidental seabird deaths and audit vessel management plans. The liaison officer ensures that VMPs are being followed, and assists problem vessels to reduce incidental seabird deaths. Vessel daily and weekly seabird bycatch rates are used as a relative indicator to the industry of compliance to the mitigation measures.

38 Vessel operators correspond with the industry seabird liaison officer and provide weekly seabird mortality reports (by warp or net interaction). Vessels that rate high in any week receive a telephone call, a call to the vessel owner and a personal audit by the liaison officer to correct any misunderstanding of deployment or use. Corrective measures have been made for three of the vessels participating in the seabird mitigation trials and for four vessels in the squid fishery but not participating in the seabird mitigation trials. Industry representatives report a decline in seabird captures once an audit is complete.

Assessment of likely impacts of measures on seabird bycatch reduction

39 No scientifically robust information is currently available relating to seabird bycatch reductions for the 2005-06 season. Anecdotal evidence on seabird bycatch is available from both Industry and Ministry observers.

40 Industry provides a running account of seabird mortalities by all squid fishing vessels in the 2006 squid fishery. The running account indicates whether seabirds were captured in the net or warps and maintained a weekly and seasonal account of seabird captures. The evidence starts 16 January 06 through 12 March 2006 and has recorded 159 seabird mortalities (net or warp) from the squid fishery.

41 All Ministry observers send weekly reports of seabird mortalities and, at the end of an observer trip, non-fish bycatch forms identify how these birds were captured (warp, net or other factors). All vessels also complete non-fish bycatch forms for each trip. The data is sent to the

Ministry of Fisheries Research Data Management group for processing and recording. Observer data are held at the National Institute of Water and Atmospheric Research (NIWA).

42 A review of observer weekly reports shows the number of seabird captures per week by species. Preliminary results from the observers returned trips and those still at sea record 110 seabird mortalities based on an estimated 30% observer coverage of all squid trawlers. The observed mortality per vessel appears to be significantly higher than the number of seabird mortalities recorded through industry reports. However, the Ministry notes that observed coverage includes the 14 squid vessels participating in the mitigation trial, and seabird bycatch may be influenced by the control treatment (no mitigation device) specified in the trial.

43 The Ministry notes that only a small proportion (<10%) of birds killed or seriously injured by collisions with warps are recovered on board vessels, with the remainder falling off into the water after interactions. Therefore, the number of birds recovered by fishing operations underestimates total mortalities. Extensive observer coverage of the SQU6T fishery in 2005 (prior to imposition of current mitigation measures requirements) showed birds were colliding with trawl warps in injury or death-causing incidents at a rate of over 5 birds per hour.

44 Although final confirmation awaits more thorough taxonomic analysis, preliminary reports of seabird species identified by observers indicate that shy albatross *Thalassarche cauta* and white chin petrel *Procellaria aequinoctialis steadi* dominate the seabird captures. In addition New Zealand white capped albatross *Thalassarche steadi*, Salvin's Albatross *Thalassarche salvini* and sooty shearwaters *Puffinus griseus* are also represented as well as a few captures of southern royal albatross *Diomedea epomophora*.

45 It is not yet possible to conclude whether seabird bycatch has been reduced in the current season when compared to previous years. Such conclusions await a scientifically robust analysis of the data after the close of the squid season

Discussion of remaining risk to seabirds

46 The Ministry notes several areas of risk to seabirds based on the foregoing information:

- a) Uncertainty over the efficacy of measures deployed under the Gazette Notice
- b) Uncertainty over the efficacy of voluntary offal management measures
- c) Risk from net captures

47 It is not possible to determine at this time whether the measures imposed by Gazette Notice and voluntary offal management measures will significantly reduce seabird bycatch. Anecdotal evidence suggests that mitigation measures are not yet completely effective, but that at least a proportion of squid vessels have taken steps to improve their offal management procedures.

48 Some reduction in seabird bycatch in the squid trawl fishery is likely, but that the size of the reduction is unknown and may or may not be significant. The Ministry notes that no reductions are expected in net captures as no mitigation measures have been developed or deployed to address seabird bycatch in nets.

Impact on seabirds of increasing TAC by 20%

49 The above information provides an assessment of changes in seabird bycatch compared to

previous years. Should a 20% increase in the SQUIT TAC be approved, a number of additional mortalities are likely to occur. However, the exact number is difficult to quantify based on several unknowns.

50 Increasing the TACC by 20% creates the potential for about 800 additional trawl tows at current SQUIT catch rates (8,948 tonnes ÷ 11.5 tonnes/tow). If seabird bycatch rates in SQUIT were to remain unchanged from that during 2004 (11.36 seabirds per 100 tows), this might result in an estimated additional mortality of perhaps 90 to 100 seabirds. However, it is not known if industry would take the entire 20% increase in the TACC even if it were forthcoming, how fishing effort might change, or if ongoing mitigation measures would reduce the seabird bycatch rate.

51 Some reduction from this total is likely if offal management measures and mitigation measures have been effective. However, it is not possible to quantify the likely effectiveness of these measures and, subsequently, the likely number of additional mortalities that will actually occur.

Summary Considerations Regarding Seabird Bycatch

52 The available information on 2005-06 season seabird bycatch and mitigation measures obtained by the Ministry suggests the following points to consider regarding the consequences of a 20% increase in the SQUIT TAC:

- a) The squid trawl fishery has one of the highest seabird bycatch mortality rates in New Zealand fisheries. Estimates from the 2004 squid fishery (prior to the mitigation measures employed in 2006) indicate that 1,246 seabirds were caught across all squid fisheries in New Zealand.
- b) The fishing industry had also requested an in-season TAC increase for the previous two seasons. An increase was granted in 2004, however the request was declined in 2005 due to concerns over high seabird bycatch.
- c) Since November 2005, all squid trawl vessels in this fishery are required to use approved seabird warp strike bycatch mitigation devices.
- d) Both observer and industry reports note continued seabird mortalities in the squid fishery this season, despite mitigation efforts undertaken. Both net and warp captures are occurring across the squid fleet.
- e) Ongoing trials are being conducted to evaluate the effectiveness of the warp strike bycatch mitigation devices on observed vessels in the squid fishery. Conclusive analysis regarding the effectiveness of the trials will not be available until June 2006.
- f) Improved offal management is considered to be a critical component of long-term measures to mitigate seabird mortalities. The fishing industry has put into place a system of voluntary vessel management plans designed to reduce offal discharge related to seabird bycatch. The efficacy of these measures has not yet been established.
- g) Robust information and scientific analysis to assess the effectiveness of warp strike mitigation measures and offal management practices will not be available until after the completion of the current squid season. It is therefore not yet possible to

conclude definitively whether seabird bycatch has been reduced in the current season when compared to previous years.

- h) Raising the SQUIT TACC by 20% is expected to lead to additional seabird mortalities as the result of an increase in trawl tows, despite regulated and voluntary mitigation measures employed. Seabird bycatch mitigation efforts currently employed may reduce mortalities relative to the past, but it is not known if the additional fishing effort generated by a 20% increase in available squid TACC will pose a significant threat to sustainability of the individual seabird species affected.

Economic Impacts

53 The potential value of a 20% (8,948.179 tonnes) TACC increase to industry is approximately \$6.89 million, given a port price¹¹ of \$0.77/kg and assuming that the TACC is all caught. An additional benefit likely to be associated with an increase in the SQUIT TACC is reduced pressure on the SQU6T fishery and associated sea lion bycatch, due to limited capacity of the squid fleet to harvest additional catch coupled with the relatively short length of time that squid can be harvested.

Statutory Considerations

54 In forming this advice the following statutory considerations have been taken into account.

a) **Section 14** provides an alternative TAC setting process for any quota management stock listed in the Third Schedule to the Act, whereby the Minister is not constrained to set the TAC at a level that produces the maximum sustainable yield (MSY). Because of the biological characteristics of squid, the TAC for SQUIT has been set under s 14 of the Fisheries Act 1996 (the Act). Section 14 provides an alternative TAC setting process for any quota management stock listed in the Third Schedule to the Act, whereby the Minister does not have to set the TAC at a level that maintains stock size at or above, or moves it towards or above, the level that produces the maximum sustainable yield (MSY). All squid quota management areas are included in the Third Schedule. Thus, the Minister may choose to increase the squid TAC/TACC under s 14 when he considers it appropriate to achieve the purpose of the Act.

b) The proposed in-season increase is consistent with section 14, as the Minister, may by Gazette notice, vary any total allowable catch set under 14(1) by increasing or reducing the total allowable catch. Section 14(6) provides that, after considering information about the abundance during the current fishing year of any stock listed in the Third Schedule to the Act, the Minister by Gazette notice, can increase the total allowable catch for the stock with effect from such date in the fishing year in which the notice is published. Under s 14(7), any increase set under s 14(6) reverts to the total allowable catch that applied to that stock at the beginning of that fishing year.

c) **Section 11(1)** of the Act requires that before setting or varying any sustainability measure, the Minister must take into account specified matters. These include:

- i) any effects of fishing on any stock and the aquatic environment;
- ii) any existing controls that apply to the stock or area concerned; and

¹¹ The 2005 port price is set in 2005 from data collected from the fishing year to 30 September 2004 and used in the 2005/06 cost recovery levy order.

- iii) the natural variation of the stock concerned.

The SQUIT fishery involves bycatch of other species (primarily barracouta, jack mackerel, silver warehou and spiny dogfish) that are managed through the QMS and, to a lesser extent, non-QMS species (primarily redbait). Related impacts of fishing (sea lions, fur seals, sea birds, benthic effects) are managed through industry codes of practice and the National Plan of Action for Seabirds. At present and contemplated catch levels, there is no evidence that the interdependence of stocks is of significant magnitude to impact on the proposed in-season increase of the TAC.

A TAC and TACC (44,740.881 tonnes) are in place for SQUIT. These are the key controls under consideration for change. Other existing controls are a minimum trawl mesh size of 60 mm within the Sub-Antarctic Fishery Management area (including the southern waters of SQUIT). General restrictions regarding the use of trawl net mesh layers, liners etc., also apply. The use of net sonde monitor cables is prohibited on all New Zealand fishing vessels or foreign-owned New Zealand fishing vessels. Those restrictions on trawling have applied for some time and the Ministry does not consider that they materially affect the Minister's consideration of the proposed in-season increase to the TAC. No changes to existing controls beyond the TAC are proposed.

Arrow squid live for one year, spawn once then die. It is a biological characteristic of this species that high fishing pressure does not directly determine long-term biomass. Rather, short-term abundance is determined by recruitment patterns related to environmental conditions.

Section 11(2A) of the Act requires that before varying any sustainability measure, the decision-maker must take into account any approved fisheries plan, any conservation or fisheries required services, and any decisions not to require fisheries services. Conservation and fisheries services are both cost recovered in the form of monthly levies per tonne. The proposed increase to the TAC will automatically increase the amount fishers are levied to cover conservation and fisheries services in proportion with the in-season increase. There is no draft or approved fisheries plan for the SQUIT fishery.

In relation to **section 11(2)** of the Act, there are no provisions applicable to the coastal marine area known to exist in the Hauraki Gulf Marine Park Act 2000, any policy statement or plan under the Resource Management Act 1991, or any other management strategy or plan under the Conservation Act 1987, that are considered relevant to the setting of sustainability measures for the SQUIT fishery.

Section 9 – requires that decisions take into account the environmental principles set out in:
s 9(a) - specifies that associated or dependent species should be maintained above a level that ensures their long-term viability. The recorded bycatch in the SQUIT fishery shows that the fishery takes proportionally little non-QMS by-catch. There are no known concerns regarding the viability of associated or dependent species.

s 9(b) – requires that the biological diversity of the aquatic environment should be maintained. There is no evidence of adverse effects of the SQUIT fishery on the maintenance of biodiversity.

s 9(c) – stipulates that habitats of particular significance to fisheries management should be protected. About 55% of SQUIT effort has been conducted using bottom

trawl methods in recent years, and the remaining 45% with midwater trawl gear. Midwater trawling generally is not known to have effects on the benthos, as the gear comes into contact with the sea floor only temporarily. No habitats of particular significance for fisheries management have been identified within SQUIT.

Section 15 of the Act provides the specific facility for the Minister of Fisheries to fulfil his obligations with respect to managing the effect of fishing related mortality on marine mammals or other wildlife such as seabirds.

Section 68 of the Act states that, if the Minister is satisfied that after considering the matters required for TACC setting (as prescribed under s 21 (1)) he would have made an in-season increase to the TACC but for the prohibition against that in s 20(4), then he may create additional ACE for fishers equal to the amount of the increase in the TACC that he would have made. It is suggested that additional ACE is created to equal the increase in the TAC.

Section 68(1)(b) provides that the Minister shall consider the matters in s 21(1). That is to make an allowance for Maori customary fishing, recreational fishing, and other sources of fishing-related mortality. There is no quantitative information available on other sources of mortality, and Maori customary or recreational catch is not known. It is not intended to increase the Maori customary catch.

Section 5 – requires that decisions should be consistent with New Zealand’s international obligations relating to fishing, and the provisions of the Treaty of Waitangi (Fisheries Claims) Settlement Act 1992. The Ministry considers issues arising under international obligations and the provisions of the Treaty of Waitangi (Fisheries Claims) Settlement Act 1992 are adequately addressed in the management of SQUIT. The Ministry is not aware of any issues concerning international obligations and the provisions of the Treaty of Waitangi (Fisheries Claims) Settlement Act 1992 that will result from adjusting the TAC.

Conclusion

55 It is the Ministry’s preliminary view that the Minister should consider this initial proposal to increase the TAC for SQUIT by 20% percent (to 53,689.06 tonnes) for the remainder of the 2005-06 season, and within the TAC, consider:

- a) Retaining the current zero allowances for Maori customary non-commercial interests, recreational interests, and other sources of fishing related mortality; and
- b) Increasing the Annual Catch Entitlement (ACE) by 8,948.179 tonnes (twenty percent of the TAC).

56 Preliminary Ministry analysis indicates above average squid catch rates as supporting evidence to indicate greater stock abundance in the SQUIT fishery this season.

57 The potential for increased seabird mortalities should a TAC increase be granted is a major uncertainty bearing upon this proposal. Given the average squid catch rates from October to mid-February, a 20% increase to the TACC would allow for around 800 additional trawls in the SQUIT fishery and subsequently would increase the potential to capture additional seabirds. Industry is invited to provide evidence regarding the effectiveness of measures in effect to reduce sea bird mortalities to advance the review.

58 Although ongoing trials are being conducted to evaluate the effectiveness of the warp strike

bycatch mitigation devices, preliminary reports indicate some of the bycatch mitigation devices are only moderately successful in reducing warp strikes.

59 The fishing industry has put into place a system of vessel management plans designed to minimize offal discharge related to seabird bycatch. This effort includes active monitoring of seabird bycatch on all vessels, with follow-up management measures to address and remedy problems for those vessels incurring high bycatch.

60 If the Minister agrees to this 20% increase, the SQUIT TAC will revert to 44,740.881 tonnes and the ACE will revert back to its current level, at the end of the current fishing year for SQUIT.

61 The Ministry seeks comments from stakeholders following their consideration of this initial analysis on an expedited basis, and will be available to meet with interested parties concerning information presented in this document.

Yours sincerely

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Senior Fishery Management Advisor
Ministry of Fisheries

Appendix 1. Area catch statistics SQUIT; 2005/06 season with previous season comparisons

Total Catch season	Reported Catch Oct – February (kg)							sub total
	Statistical Area							
	20	22	26	27	28	30	504	
97/98	89,910	779,132	1,070,430	833,230	9,455,997	26,700	3,802,250	16,057,649
98/99	33,400	1,421,256	132,600	412,560	10,173,523	17,000	2,432,283	14,622,622
99/00	38,050	197,970	16,540	31,879	2,707,780	12,400	317,850	3,322,469
00/01	24,500	1,623,200	475,430	152,560	7,290,030	4,000	875,240	10,444,960
01/02	-	268,431	28,210	511,500	18,107,153	41,550	1,705,400	20,662,244
02/03	550	212,160	122,300	99,170	12,229,640	3,784,000	324,640	16,772,460
03/04	800	95,320	2,465,406	145,750	15,891,940	20,800	631,750	19,251,766
04/05	0	29,930	18,960	177,000	17,118,215	59,550	1,585,750	18,989,405
8-yr average	23,401	578,425	541,235	295,465	11,621,785	495,750	1,459,395	15,015,447
05/06	100	395,070	10,200	197,425	19,637,842	33,150	771,995	21,045,782
% chg 8-yr avg	-100%	-32%	-98%	-33%	69%	-93%	47%	40%

Average Catch/tow season	Reported Catch Oct – February (kg/tow)							sub total
	Statistical Area							
	20	22	26	27	28	30	504	
97/98	4,281	3,080	3,324	3,787	4,471	954	5,159	4,345
98/99	4,175	4,512	1,658	2,714	3,246	810	3,411	3,306
99/00	1,585	1,158	368	559	3,025	1,240	2,148	2,461
00/01	2,227	2,501	2,671	1,981	5,638	800	4,333	4,325
01/02	-	1,100	742	4,966	10,695	1,385	7,415	8,815
02/03	61	769	913	1,803	7,069	9,460	3,731	6,233
03/04	200	1,148	5,491	3,390	11,541	1,095	5,014	9,163
04/05	0	907	758	3,848	7,347	2,382	5,525	5,519
8-yr avg	1,566	1,897	1,991	2,881	6,629	2,266	4,592	5,521
8-yr totals average	2,256	2,286	3,407	3,139	6,383	7,372	4,615	5,519
05/06	100	3,991	638	3,656	12,802	1,507	7,352	11,494
% chg 8-yr average	-94%	110%	-68%	27%	93%	-33%	60%	108%

Appendix 2. Reported landings and TACs 1986-87 to 2004-05 with 2006 projections (tonnes)

	<u>SQU1J</u>		<u>SQU1T</u>		<u>SQU1 Combined</u>		<u>SQU6T</u>		<u>Total</u>	
	Landings	TAC	Landings	TAC	Landings	TAC	Landings	TAC	Landings	TAC
1986-87	32,394	57,705	25,621	30,962	58,015	88,667	16,025	32,333	74,040	121,010
1987-88	40,312	57,705	21,983	30,962	62,295	88,667	7,021	32,333	69,316	121,010
1988-89	53,872	62,996	26,825	36,081	80,697	99,077	33,462	35,933	114,160	135,080
1989-90	13,895	76,136	13,161	47,986	27,056	124,122	19,859	42,118	46,915	166,250
1990-91	11,562	46,087	18,680	42,284	30,242	88,371	10,658	30,190	40,900	118,571
1991-92	12,985	45,766	36,653	42,284	49,638	88,050	10,861	30,190	60,509	118,571
1992-93	4,865	49,891	30,862	42,615	35,727	92,506	1,551	30,369	37,278	122,875
1993-94	6,524	49,891	33,434	42,615	39,958	92,506	34,534	30,369	74,492	122,875
1994-95	33,615	49,891	35,017	42,615	68,632	92,506	30,683	30,369	99,315	123,011
1995-96	30,805	49,891	17,823	42,615	48,628	92,506	14,041	30,369	62,668	123,011
1996-97	20,792	50,212	24,769	42,615	45,561	92,827	19,843	30,369	65,403	123,332
1997-98	9,329	50,212	28,687	44,741	38,016	94,953	7,344	32,369	45,362	127,332
1998-99	3,240	50,212	23,362	44,741	26,602	94,953	950	32,369	27,553	127,332
1999-00	1,457	50,212	13,049	44,741	14,506	94,953	6,241	32,369	20,747	127,332
2000-01	521	50,212	31,297	44,741	31,818	94,953	3,254	32,369	35,071	127,332
2001-02	799	50,212	35,872	44,741	36,671	94,953	11,502	32,369	48,173	127,332
2002-03	2,896	50,212	33,932	44,741	36,828	94,953	6,887	32,369	43,715	127,322
2003-04	2,267	50,212	48,060	58,163	50,327	108,375	34,635	32,369	84,962	140,744
2004-05	9,625	50,212	51,792	44,741	61,417	94,953	26,453	32,369	87,871	127,322
2005-06P ¹²	10,000-20,000	50,212	53,689	53,689	63,689-83,689	103,901		32,369		131,796

¹² Projected

APPENDIX 3. ORIGINAL STAKEHOLDER SUBMISSIONS

This appendix contains copies of the full texts of submissions received by the Ministry as follows:

1. Anton's Seafoods Limited
2. New Sealand Seafood Industry Council
3. Deepwater Stakeholder Group Ltd

29 March 2006

Mr. Jim Cornelius
Ministry of Fisheries
Private Bag 14
Nelson

Dear Mr. Cornelius

Re: Proposed Squid 1T In-Season Increase

We are in receipt of your letter of 24th March 2006 discussing an increase in SQUIT.

Having reviewed your letter at length, we are supportive of the Increase proposed and further to that we hold a view that there are no sustainability issues in respect of SQUIT.

As a stock that lives for a short timeframe our view is that we must harvest this stock when it is available.

Yours sincerely,

Milan Barbarich
Managing Director



The New Zealand Seafood Industry Council Ltd

SUBMISSION ON

PROPOSED IN-SEASON ADJUSTMENT TO THE SQU1T TAC

5th April 2006

i)

1. This submission is made by the New Zealand Seafood Industry Council (SeaFIC) on behalf of the commercial fishing industry. The following comments reflect the views of SeaFIC and have been made following discussions with the Deepwater Stakeholder Group Ltd (DSG). If you require further information or clarification of this submission, please do not hesitate to contact us.
2. We note that the Ministry's letter of 24th March, outlining the proposal for an in-season TAC increase for the current 2005-06 SQUIT fishing season, provides a wide information brief. In our view, issues relating to high squid abundance and economic opportunity are straightforward. If these were the only factors to be considered, agreement to an in-season increase would be uncontroversial.
3. Bycatch of finfish is not in our view a problem and the QMS has mechanisms in place to deal with any potential impacts. We recognize the low level bycatch of fur seals, and occasional captures of NZ sea lions, in SQU 1T but do not consider the proposed in-season increase to be problematic in this respect.
4. The one factor that might clearly influence the Minister's decision against an in-season increase, as it did against a similar request in 2005, is seabird bycatch. This submission therefore concentrates on seabird bycatch and paragraphs 24-52 of the Ministry's letter; detailed comments are set out below. Generally, we consider that paragraphs 24-52 do not properly represent the state of play with respect to mitigation trials, improvements in process compared to past years, relevant knowledge gained etc. As such, they provide a somewhat unhelpful and unnecessarily pessimistic basis for decision-making. We appreciate that proposals for in-season increases must be drafted rapidly and therefore seek to clarify a number of areas where we are concerned that the Ministry's letter could give a misleading impression.

Seabird bycatch information

5. At paragraph 25, no reference is given for the "*new research findings using more comprehensive modelling techniques*". We presume this refers to estimates by MacKenzie and Fletcher (2006)¹³. We note:
 - Whilst the text implies this estimate uses new and improved methodology, it does not adequately represent the concerns of the AEWG regarding that methodology and resulting bycatch estimates. The AEWG agreed that the estimation technique had merit but advised caution as to the use of the estimates provided. In particular, the AEWG noted the lack of consideration of model selection, limited diagnostics, and no comparison of model based and ratio estimators for equivalent fisheries.
 - The figure of 1,246 seabird deaths is a median of an estimated posterior distribution. That is, the figure is not as precisely estimated as the text implies.
 - The 2004 estimate is not comparable with the 2001 to 2003 estimates presented in paragraph 24. Those estimates are for parts of 1T only, whilst the estimate of 1,246 is for all SQU target trawls in all FMAs.

¹³ MacKenzie, D. & Fletcher, D. (2006). Characterisation of seabird captures in NZ fisheries. Final Report for MFish project ENV2004/04.

The Minister's decision in 2004-05

6. The Minister's decision in 2005, as highlighted at paragraph 27, was based largely on dissatisfaction with process (non-compliance) rather than on numbers of seabirds caught *per se*. In 2006, efforts have been focused on improving processes (e.g. vessel management plans and offal management) and better understanding the nature of the bycatch problem and the efficacy of alternative mitigation techniques so as to improve prospects for robust solutions. It is disappointing, therefore, that the Ministry's advice concentrates more on lack of instant outcomes rather than on the important process issues.

Gazette Notice

7. Paragraph 28 notes mitigation measures have been pursued through regulation. We note that in 2005, regulatory measures considered were both mitigation devices and offal management. Although only the use of mitigation devices was pursued through regulation, offal management has been pursued through vessel management plans (VMP), the importance of which is recognized at paragraph 35.
8. Paragraph 30 is worded to suggest that the efficacy of permitted mitigation methods is unknown and that there is a lack of information to suggest such measures are effective in New Zealand waters. In fact, there is some information on the efficacy of bafflers (albeit loosely defined) in the New Zealand squid fishery. Data collected during the 2005 squid fishery showed that the use of bafflers was associated with a 50% reduction in the large bird strike rate¹⁴. Although this study did not allow vessel effects to be separated from mitigation device effects, it nevertheless suggests that bafflers are somewhat effective.

Seabird mitigation trials in the 2005-06 squid trawl fisheries

9. At paragraph 32 it is noted that the inclusion of a "no mitigation" treatment will result in increased seabird captures compared to the use of a mitigation device on all tows. This is true but paragraph 32 fails to point out that the no-mitigation treatment is an essential part of the experimental design agreed by the technical advisory group (comprised of officials, environmental group representatives and industry). If the no mitigation treatment did not result in additional seabird interactions and captures there would be no resolution in the data, implying that the use of mitigation devices was irrelevant to reducing seabird capture rate. Likewise, it is expected that there will be variation in the efficacy of the mitigation devices included in the trials. The consensus among all parties involved in the trials was that the value of the data from the trials (to future seabird bycatch reduction) outweighs the expected (short-term) seabird capture risk. The trials include a decision rule to further address the risk of additional seabird captures that result from the trials.

¹⁴ Abraham, E. (2005). Warp strike observations. Final research report for MFish project IPA2004/14.

10. While it is certainly true (as noted at paragraph 33) that the trials are not intended to define a specification for the ultimate mitigation device, it is not necessarily the case that *“further research will be required to improve the efficacy of all promising devices”*. The difficulty with this paragraph is that it seems to presuppose an ideal bureaucratic endpoint where it is possible to write a single “one size fits all” mitigation device specification. The form that standards and specifications can realistically take will need to be considered before determining if further research on details of the devices is likely to be helpful.
11. We disagree with paragraph 34 and consider it to be misleading. There is actually a lot of research that shows that mitigation devices are effective, in general. This includes the Falkland Islands work and the warp strike data from the 2005 New Zealand squid fishery. What is not well understood (but is addressed in the current mitigation trials) are the factors that influence variability in efficacy (between vessels, weather etc.). Offal discharge is known to be a major factor influencing the need for mitigation devices. The fact that *“preliminary reports suggest that mortalities are still occurring”* should not be a surprise for two reasons. Firstly, a significant proportion of recent reports will be from vessels in the trials, where captures are certainly anticipated – indeed, they are required to create resolution in data. Secondly, presumably no one realistically expected that mitigation devices would be 100% effective in preventing all captures. Obviously, what is important is establishing that the capture rate is reduced, and to what extent. Although the initial trial results are scheduled for June 2006, the final report is not scheduled until September 2006.

Industry bycatch mitigation measures

12. At paragraph 36 it is stated that there is not yet *“robust evidence of discharge reductions”*. Whilst this is true, it is not unexpected. The only quantitative data that can be used to compare offal discharge will be from the observers carrying out warp strike observations – these data are entered ashore and are not expected to be available until six weeks after the end of a trip. However (see attached report) observers are unanimous that offal management is resulting in reduced offal discharges.

Assessment of likely impacts of measures on seabird bycatch reduction

13. Paragraph 39 is true but expected. There is no real time reporting and analysis of bycatch information.
14. At paragraph 40, it should be noted that the industry recording of captures was intended to provide a useful “heads up” that an issue may have to be looked at through the VMP monitoring process. It was not established to be an auditable, definitive account of captures.
15. Paragraph 42 does not tell the whole story. The seabird mortalities reported are presumably for 1T and 6T combined. The paragraph appears to cast doubt on the veracity of the industry data. Leaving aside the purpose of these data, it is entirely expected that the capture rate will be higher in the observed fleet than the whole fleet, because all observed vessels are participating in the warp strike mitigation device trials. Indeed, this differential is an encouraging sign that the trials are likely to be

producing useful data! The data from the observed fleet WILL be influenced by the no-mitigation treatment, and also by the inclusion of potentially sub-optimal mitigation techniques for a given vessel. As part of the trial design, vessels are instructed to only use one mitigation device (some vessels use multiple devices in normal fishing) and not to use additional devices that are outside of the trials (e.g. acoustic cannons). The trials data cannot be simply extrapolated to provide a measure of fleet performance. We are concerned that the Ministry's letter does not make it absolutely clear that the data from the observed fleet cannot simply be extrapolated to the entire fleet for the purposes of monitoring seabird bycatch.

16. At paragraph 43, no reference is provided for the statement that "*only a small proportion (<10%) of birds killed or seriously injured by collisions with trawl warps are recovered on board vessels*". This is presumably anecdote rather than robust scientific information. SeaFIC certainly accepts that birds recovered on board represent a minimum measure of seabird mortalities, but the recovery rate of seabirds likely varies from vessel to vessel (and over time). It is therefore unlikely that there is any reliable figure that can be used to scale recovered birds to actual warp mortalities. The warp strike data collected in the 2005 squid fishery represents "heavy strikes", not "injury or death-causing incidents". While there is likely to be a higher risk of injury following a heavy warp strike than a light strike, no relationship has been established between heavy strikes and the fate of the seabird. SeaFIC considers warp strike counts to be a useful index of seabird interactions but not appropriate as absolute measures of injuries to seabirds or seabird deaths. The quoted rate of 5 strikes per hour appears to have been derived by summing the strike rates for large birds (3.5 per hour) and that for small birds (1.4 strikes per hour) [and rounding up], as reported by Abraham (2005). It should be noted that the consequences of a heavy strike are likely to vary between seabird types.
17. Of course (paragraph 45) it is not yet possible to conclude whether seabird bycatch has been reduced. There is no real time monitoring of bycatch so this necessarily awaits data entry and analysis according to the established schedules. Thus (as we note at paragraph 6, above) it is a mistake for the Ministry's advice to concentrate on outcomes rather than process.

Discussion of remaining risk to seabirds

18. Paragraph 46 is misleading. There is information that warp strike mitigation measures are somewhat effective, even though there is uncertainty over the variation in effectiveness between vessels and according to conditions. The Gazette notice (and enforcement thereof) provides certainty that all vessels are now using some sort of warp strike mitigation, except when the trials require otherwise on observed vessels. This represents a substantial improvement over 2005 when some vessels did not routinely use mitigation. Reports from observers are unanimous in indicating that voluntary offal management is effective in both reducing discharges and reducing interactions. The mitigation trials have no influence on a vessel's offal management regime. However, if MFish considers these observations cannot be extrapolated to the whole fleet, and does not have confidence in the processes established for VMP compliance, then other monitoring options (e.g. overflights) are available to the Ministry.

19. We are surprised at paragraph 47 that there is an apparent expectation (and implied, believed sustainability need) that mitigation measures could be “*completely effective*”.
20. With regard to paragraph 48, there is potential for net captures to be reduced through offal management reducing the attractiveness of fishing boats to foraging seabirds. However, net captures may also show an increase if seabirds adapt their foraging around vessels in a reduced-offal regime. Industry has specifically stated that its initial aim is dealing with the problem of warp strikes (which tend to affect the larger birds, especially albatrosses) before dealing with net captures (which are predominantly of small birds such as petrels and shearwaters).

Impact on seabirds of increasing TAC by 20%

21. It appears to be assumed at paragraphs 49 and 50 that any seabird mortalities resulting from squid fishing under an increased TAC will be additive. This is unlikely to be the case. Fishing an extended SQU 1T TAC more likely represents effort displaced from other fisheries, rather than additional effort. While seabird capture risks vary between fisheries, mortalities associated with fishing for an increased SQU 1T TAC are unlikely simply to be additive
22. At paragraph 50, the quoted seabird bycatch rate of 11.36 birds per 100 tows is from the MacKenzie and Fletcher analysis referred to at paragraph 5, above. The caveats noted above also apply here, both with regard to the modelling and the fact that this represents a rate for all SQU target tows in all FMAs, not just SQU 1T. The 95% CI for the 2004 rate is 9.78 to 13.16%, and median annual rates from 1998 to 2004 have ranged from 3.93 to 13.27%.
23. At paragraph 50, it should be noted that a proportion of the ongoing risk of seabird mortalities is due to the continuation of the mitigation trials. This risk has been accepted by all parties, including government and environmental groups.

Summary Considerations Regarding Seabird Bycatch

24. For the many reasons outlined above, we consider the summary at paragraph 52 to be somewhat misleading. We note, as at paragraph 6 above, that the Ministry advice has focused on outcomes rather than improved and improving process and that unrealistic expectations as to outcomes seem to prevail – for example, explicitly at paragraph 47 and implicitly at 52(d). At 52(a), the high bycatch figure quoted (1,246) is for all squid fisheries, not just SQU 1T, from a year with high bycatch rates (see paragraph 22 above). 52(e) is correct but expectations based on work elsewhere and reports from trials to date suggest that the requirement to use mitigation devices will result in reduced captures. 52(g) implies an expectation of reduced bycatch in 2006, but the processes in place and undertaking of trials in fact are aimed at better understanding and the creation of a robust foundation for future reduction. 52(h) does not take account of displaced effort from other fisheries in which seabirds could in any case be bycaught (see paragraph 21 above), and effectively repeats 52(g). 52(h) is also the only place where bycatch and “threat to sustainability” are linked. We note that true

threats to seabird sustainability are poorly understood, but that a general reduction in fishing effort resulting from the current low hoki TAC provides an expectation of reduced overall seabird mortality in this period in which the issue of seabird bycatch is being systematically addressed by the NZ deepwater fleet.

SUMMARY

25. Seabird bycatch clearly constitutes the major impediment to an in-season TAC increase for SQU 1T. Squid are abundant and a good opportunity exists to increase value from the fishery.
26. SeaFIC recognises the need for continuing improvement in offal management and bycatch mitigation techniques in all fisheries. We also recognize a particular problem with seabird bycatch in the squid trawl fishery. We are aware of industry and collaborative efforts to improve vessel management and mitigation techniques, and note that all parties have agreed on the importance of this work, despite the expected captures that will result from the mitigation trial regime.
27. We consider that the advice in the Ministry's letter of 24th March focuses inappropriately on the desired outcome, when there is no expectation that this can be properly measured at this stage. Instead, and consistent with the Minister's decision in 2005, we suggest that the focus should be on the process followed. Best available information suggests that the measures taken by both government and industry (regulated mitigation measures and voluntary offal management) will be effective in reducing bycatch, and reports from observers indicate that they have been effective. Industry and government are jointly undertaking trials that, whilst resulting in a short term increased risk to seabirds, are expected to yield long term benefits in resolving the problem of seabird bycatch in trawl fisheries.
28. We consider it absolutely critical to emphasise that observed seabird captures in the 2006 squid fishery are related to the current mitigation trials, and cannot simply be taken as an indication of the fishery performance in reducing bycatch. Indeed, it has been recognized that obtaining robust information from the trials has a higher priority than simply monitoring bycatch. We note that the mitigation trials are being carried out *via* a cooperative process at the request of both industry and government, and would be disappointed if seabird mortalities, arising out of trials conducted jointly with the Ministry of Fisheries, jeopardised an increase in the SQU 1T TACC.

SOUTHERN SQUID FISHERY 2006: MITIGATION TRIALS STATUS, SEABIRD CAPTURES TO DATE AND OBSERVER IMPRESSIONS OF VMP PERFORMANCE

David Middleton, SeaFIC, 4 April 2006

Introduction

The mitigation trials

Observed vessels in the southern squid fishery are currently taking part in trials of warp strike mitigation devices. These trials have been designed collaboratively by scientists from the NZ Seafood Industry Council (SeaFIC), the Ministry of Fisheries (MFish), Department of Conservation (DoC) and WWF-NZ, and have been endorsed by the National Plan of Action (NPOA) Technical Working and Officials Groups, are supported by the Deepwater Stakeholders Group, and are being carried out under MFish Special Permit 352.

The trials have been designed to meet the needs of both industry and government for robust, quantitative information on the efficacy of devices designed to reduce seabird warp strikes. The trial design¹⁵ addresses a number of important issues:

- **Separation of the vessel effect and the mitigation device effect.** Observational studies, where a single device is operated on each vessel, have to deal with the confounding of between-vessel differences with the effects of the mitigation devices. The trials employ an experimental approach, where each vessel deploys each mitigation treatment according to a randomised tow by tow schedule, to disentangle these effects.
- **Quantification of between-vessel variability in device efficacy.** The effectiveness of mitigation devices is likely to vary between vessels. The trials have addressed this by including multiple vessels. The squid fishery provides an ideal opportunity for this study due to existing, relatively high levels of observer coverage.
- **Measuring the effects of other factors.** Warp strike rates are affected by factors other than the use of mitigation devices, including offal discharge and weather conditions. The trials are being carried out across the range of conditions encountered in the squid fishery. The use of appropriate statistical models, and the observation of a large number of tows, is designed to allow the effects of these factors to be accounted for.

Offal discharge, in particular, is known to be related to the risk of seabird warp strike. In designing the mitigation device trials it was noted that the DSG had put particular effort into Vessel Management Plans which are designed to reduce the discharge of offal in the 2006 fishery. The effect of reduced offal discharge is expected to be reduced seabird warp strikes, even in the absence of mitigation devices. This acts to reduce the potential resolution of the trials, resulting in the need for a large sample size.

¹⁵ Middleton, D.A.J., Waugh, S., Pierre, J., Schröder, C., Walker, N. (2006). Determining the efficacy of warp strike mitigation devices: trial design for the 2006 southern squid fishery. Final version, 17 January 2006. The final version of the trial design incorporated feedback from the NPOA-TWG following presentation of the trial design on 7 December 2005.

Monitoring seabird bycatch in the squid fishery

The mitigation trials, and in particular the inclusion of a control treatment where tows are carried out with no mitigation devices deployed, clearly influences the data on seabird captures from the squid fishery. As all observed vessels are participating in the mitigation trials, and unobserved vessels are not, data from the observed fleet cannot be simply extrapolated to unobserved vessels.

It was noted at an early stage in the development of the mitigation trials that data collected during the trials could not be used in routine fishery monitoring¹⁶, but parties agreed that the production of robust data on mitigation device efficacy were more important than routine bycatch monitoring. Nevertheless, it is expected that the warp strike data obtained from the observed vessels during the trials will provide useful information on the performance of the various offal management strategies adopted in the squid fleet, albeit not through the same experimental framework applied to the mitigation devices.

The trial design proposed an initial analysis of data from trips completed by mid-April 2006 to be carried out in May/June 2006, with the final report of the trials to be presented to the NPOA-TWG by the end of September 2006. This schedule takes into account the requirement for data entry ashore following the completion of observed trips.

The mitigation trial design called for observers to notify the Technical Advisory Group (TAG), via the MFish Observer Programme, in the event that seabird captures (other than those in the net) exceeded a decision rule trigger limit of twenty. The inclusion of a decision rule is designed to balance the need for statistically robust trials with the need to avoid unnecessary seabird captures.

SQU 1T IPP

As a result of good squid catches in the SQU 1T fishery the DSG has proposed a 20% increase in the SQU 1T TACC for the 2005-06 fishing year. The MFish IPP¹⁷ (para. 57) notes that “*potential for increased seabird mortalities should a TAC increase be granted is a major uncertainty bearing upon this proposal*” and invites industry “*to provide evidence regarding the effectiveness of measures in effect to reduce sea bird mortalities*”. The operation of the mitigation trials clearly complicates this assessment. More significantly, it must be noted that, with one exception¹⁸, none of the data collection systems currently in place in New Zealand fisheries are designed for real time monitoring of catch or bycatch information. The mitigation trials make use of existing MFish data collection and management systems. Although real time monitoring of seabird captures was considered by the mitigation trials TAG, SeaFIC, and the DSG this was not pursued for a number of reasons¹⁹, not least of which was the potential for confusion with the proposed introduction of the regulated Non-Fish Incidental Catch Return.

The “real time” bycatch information available is limited to observer de-briefing and basic weekly bycatch reporting. These data are limited to a bare minimum, as the majority of observer data entry is done ashore following completion of the trip. Furthermore these systems were not designed to provide the information required to assess the performance of a fleet when all observed vessels are participating in experimental trials.

¹⁶ Testing the efficacy of warp mitigation devices. Discussion draft, SeaFIC, 5 October 2005. Paper circulated on 6 October 2005.

¹⁷ Proposed In-Season Adjustment to the SQU1T TAC. Ministry of Fisheries, 24 March 2006.

¹⁸ Monitoring of sea lion captures in the SQU 6T fishery.

¹⁹ Industry monitoring referred to in paragraph 40 of the IPP was intended as a indicator for use in monitoring the VMPs rather than an auditable source of bycatch data.

In response to the clear need to provide at least an initial assessment of the progress of the trials, seabird captures to date, and the utility of offal management measures in place via VMPs, observers have been approached to provide some further information beyond that available through their standard weekly reporting. These data are necessarily limited to simple tallies of seabird captures²⁰ and observer comments on offal management procedures.

Information available

Mitigation trials

The mitigation trials have progressed as per the trial design. To date, eighteen trips have been notified for inclusion in the trials (Table 1), representing all trips on which an observer was placed as part of the SQU 6T operational plan coverage. Logistical problems have generally been overcome. In one case, following a change in the vessel to observed, the mitigation devices were not successfully delivered to the vessel prior to sailing. However, that vessel has been able to join the trials following a port call.

The decision rule limit of 20 non-net seabird captures has been reached on one trip (2202). After reviewing the capture tally data, the TAG advised that the vessel should rejoin the trial but with the omission of one treatment (with captures from this treatment to date excluded from the decision rule tally). However, the decision rule trigger was again reached on this vessel, and trials suspended until the end of the trip. As a result of the suspension of trials on this vessel, additional data are available from tows during which the vessel was deploying its preferred mitigation devices.

Table 1. Trips participating in mitigation trials and information available from observer.

<i>Trip Number</i>	<i>Information available</i>
2203	Trip completed prior to information request, capture tally sheet available.
2201	Trip completed prior to information request, capture tally sheet available.
2207	Trip completed prior to information request, capture tally sheet available.
2208	No report from observer.
2202	Report received 14/03/2006, trip now ended, capture tally sheet available. Decision rule tally provided 23/02/2006.
2204	Report received 14/03/2006, trip now ended, capture tally sheet available.
2205	Report received 13/03/2006, trip now ended, capture tally sheet available.
2206	Report received 20/03/2006.
2211	Report received 14/03/2006.
2227	Report received 14/03/2006.
2226	Report received 13/03/2006.
2213	Report received 31/03/2006.
2220	Report received 13/03/2006. Was not participating in trials at time of report. Joined trials following port call on 24/03/2006.
2214	Report received 13/03/2006.
2222	Trip had not commenced at time of information request.
2233	Trip had not commenced at time of information request.
2238	Trip had not commenced at time of information request.
2240	Trip had not commenced at time of information request.

ii) Observer data

Through the MFish Observer Programme, all observers in the squid fishery were requested to respond to the following queries:

²⁰ The mitigation trials call for the use of warp strike data in preference to seabird capture data in assessing the efficacy of mitigation devices.

- Are you aware of the vessel's approach to offal management as per their Vessel Management Plan?
(e.g. if fitted with a meal plant, what proportion of tows is all offal going to meal; any general observations on the effectiveness of the offal shrouds or batch discarding of offal).
- On approximately what proportion of tows are the planned measures in place?
- Do you consider that the measures adopted to limit the offal discharged during trawling are proving effective in reducing seabird interactions with the vessel? If not, please briefly describe any problems.
- Total number of tows conducted to date under each experimental treatment (control, bafflers [if appropriate], tori lines, warp deflector)
- Total large seabird captures under each treatment, and whether these are recovered from the warps or net
- Total small seabird captures under each treatment, and whether these are recovered from the warps or net
- Any specific comments on how the trials are going, problems encountered etc.
- A brief assessment of the offal discharge practice of the vessel

The request was sent to all observers in the squid fishery on 14 March 2006. Responses were received from ten observers: only one observer deployed at that time failed to respond. Decision rule tally sheets, recording seabird captures from sources other than the net, are also available from all trips completed to date. Reports were not available from three trips where the trip was completed prior to 14 March 2006. In this case the decision rule tally data were supplemented by net captures from the observer nonfish bycatch forms advised by the MFish RDM. However the tows completed under each treatment are not available.

Seabird mortalities reported by observers (to date, as per Table 1) are summarised in Table 2 and Table 3. Observer awareness of the offal management procedures specified in the Vessel's Management Plan, adherence to these procedures, and impressions of their efficacy in reducing seabird interactions are summarised in Table 4. Most observers, including those who did not comment on the vessel's VMP provided detailed comments on the vessel's offal management procedures: the relevant text is quoted in Appendix 1.

Table 2. Large and small seabird captures reported by observers from warps and net by mitigation treatment.

Trip Number	Tows completed				Large bird captures								Small bird captures								Trip Total
	Tori lines	Bird Bafflers	Warp Deflect.	No Mitig.	Tori		Bafflers		Deflector		No Mitigat.		Tori		Bafflers		Deflector		No Mitigat.		
					Warp	Net	Warp	Net	Warp	Net	Warp	Net	Warp	Net	Warp	Net	Warp	Net	Warp	Net	
2203†					0	*0			0	0	0	0	0	*5			0	1	0	*1	7
2201†					0	1			0	0	0	1	0	12			0	0	0	3	17
2207†					1	0			0	0	0	0	0	0			1	0	1	*1	4
2202	14	16	14	14	0	1	14	0	5	0	17	0	0	1	0	0	0	1	0	*0	‡42
2204	28	32	22	18	0	0	1	1	0	0	0	0	0	0	0	1	0	1	0	0	4
2205	29	25	29	20	1	1	**2	1	0	1	**1	2	0	0	0	1	0	2	0	*0	12
2206	24	26	30	25	1	2	0	1	0	1	0	0	0	0	0	8	0	1	0	2	16
2211	19		20	20	0	2			0	2	0	0	0	0			0	2	0	0	6
2226	18		8	7	0	0			0	0	0	0	0	0	0	0	0	0	0	0	0
2227	10	12	9	9	0	0	0	1	2	0	1	0	0	0	0	0	0	1	0	0	5
2213	24		26	30	0	2	0	0	0	0	0	0	0	0	0	0	0	2	0	0	4
2220^		21			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2214	10		7	17	0	0			0	0	0	2	0	2	0	0	0	0	0	0	4
Totals					3	9	17	4	7	4	19	5	0	20	0	10	1	11	1	7	118

* Excludes birds released alive

** Includes a mortality identified by landed feathers only

† Warp captures from Decision Rule Tally Sheets as trips completed. Net captures from MFish RDM (Observer non-fish bycatch forms)

‡ Total includes three large bird warp captures whilst deploying tori lines and bafflers in periods when trials were suspended (at least 76 non-trial were tows completed)

^ Vessel had not joined mitigation trials at time of report

Table 3. Summary of seabird captures to date during mitigation trials in the southern squid fishery.

	<i>Warp captures</i>	<i>Net captures</i>	<i>Total</i>
Large birds	46	22	68
Small birds	2	48	50
Total	48	70	118

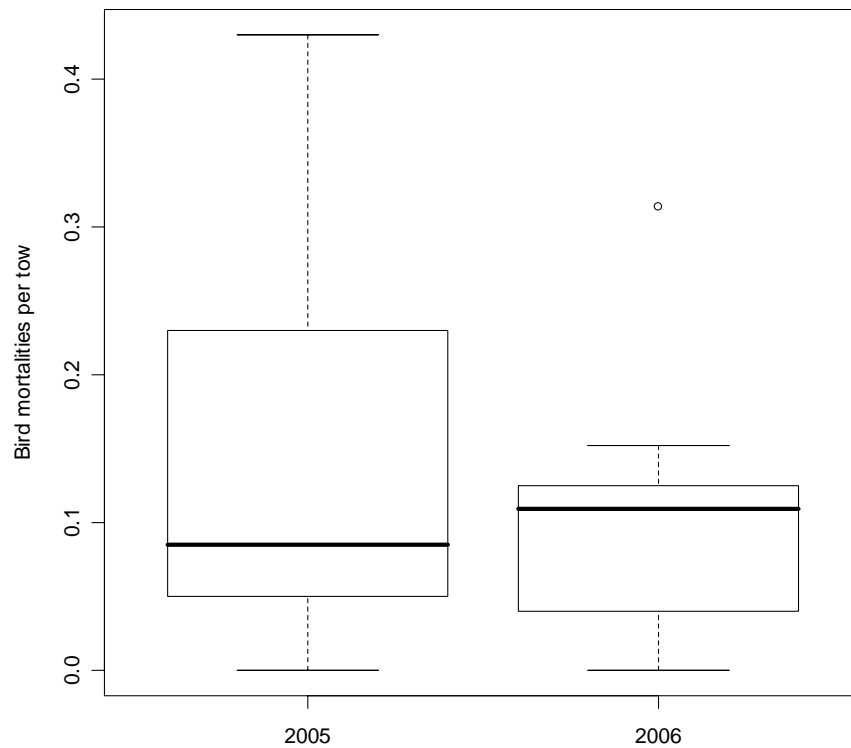
Table 4. Observer awareness of offal management plans, vessel adherence to procedures, and their efficacy.

Trip Number	Observer aware of VMP offal management?	Proportion of tows that planned measures are in place?	Effective in reducing seabird interactions?
2202	Yes	"When possible ... 100% of tows, but at times reach capacity"	Y**
2204	Yes	"98%"	Y
2205	No comment		
2206	Yes*	100%	Y
2211	Yes	"In general"	Y
2226	No?		
2227	Yes	95%	Y
2213	No comment		
2220	Yes	"Largely adhered to"	Y
2214	No		

* Observer noted that vessel's VMP is generic (not vessel specific), dated June 2005

** Observer noted that spillage to factory floor could be reduced further

Figure 1. Bird mortalities per tow for trips in the 2005 and 2006 squid fisheries. Data for 26 trips in the 2005 squid fishery supplied by MFish to SFMC. Trip capture rate for trip 2202 includes captures and tows for the non-trial period (assuming 76 non-trial tows which is the minimum indicated by available observer records).



Comparison with 2005

The available data only allow a crude comparison of seabird captures in the 2005 and 2006 squid fisheries. A robust and detailed comparison must await the availability of the warp strike data. Data on landed dead seabirds are confounded by differences in recovery rate. Figure 1 compares the capture rate (captures per tow) for observed trips in the 2005 and 2006 fisheries (where the number of tows is known). Despite the fact that observed vessels in the 2006 fishery are taking part in mitigation trials, and are therefore presumed to have higher capture rates than would be achieved if mitigation devices were used on all tows, overall trip capture rates are generally lower in 2006 than in the 2005 fishery. This potentially indicates a generally lower background capture rate attributable to the offal management regime. In particular, trips with high capture rates are less prevalent in the 2006 fishery. Information supplied to SFMC by MFish in 2005 showed 7 of 26 trips (27%) had capture rates exceeding 0.2 birds per tow. In 2006 only one trip, to date, has exceeded this level.

Effects of the mitigation trials

All observed vessels in the 2006 squid fishery are participating in warp strike mitigation device trials. The need for robust data from these trials has consciously been prioritised above routine monitoring of bycatch in the squid fishery. Data from the observed vessels are not representative of the wider squid fleet, and cannot be simply extrapolated to the wider fleet.

Data are available from two observed vessels for periods when they were not participating in the trials. Due to logistical difficulties in delivering the required mitigation devices to the vessel, trip

2220 did not join the trials until after a port call. During the initial part of the trip the vessel deployed its preferred mitigation device (Bird bafflers) on all tows. No captures were recorded on the 21 tows completed prior to the observer's report. Captures during the mitigation trials on trip 2202 resulted in the suspension of trials on this vessel. During the trials 39 seabird mortalities were recorded over 58 tows. Outside of the trials just three mortalities were recorded from at least 76 tows, during which the vessel deployed both bafflers and tori lines. Data are not currently available to allow a detailed comparison of the two periods (e.g. in terms of areas fished and species targeted), but at face value the available data indicate that the vessel's preferred mitigation strategy was performing reasonably well, and that the large number of captures during the trial can be attributed to the trial requirements to deploy specific mitigation devices.

As anticipated, the raw capture data from the trials thus far provide little resolution between the mitigation treatments, especially if trip 2202 is omitted. The warp strike data are expected to provide improved resolution when available. However, the capture data do illustrate the need for large numbers of observations when considering the factors affecting relatively rare events.

Offal management

Data collected in the 2005 and 2006 fisheries under the warp strike observation protocol will allow a quantitative comparison of offal discharge in the two years. In the interim, comments from observers, detailed in Appendix 1, are unanimous in recognising that the observed vessels have implemented procedures that have brought about a general reduction in offal discharge compared to past seasons, and that this is effective in reducing seabird interactions.

The offal management regime operated by vessels is not intentionally altered through the experimental regime imposed by the mitigation trials, so observer data could be considered representative of vessel procedures on unobserved trips.

Observer comments on offal management highlight that interactions increase when normal offal management procedures reach capacity and result in unusually large discharges. Some observers also comment on increased offal discharge during processing of tows where finfish, rather than squid, predominate in the catch.

Conclusions

- Seabird capture rates (overall mortalities per tow) for observed trips in the 2006 fishery appear to be generally lower than in the 2005 fishery. In particular trips with high capture rates are less common. Despite the confounding effect of the mitigation trials in the 2006 fishery, there are indications that the offal management regime may have effectively lowered the overall capture rate in the fishery.
- The mitigation trials prevent a simple extrapolation of captures on the observed vessels to the entire fishery. The observed fleet is a priori unrepresentative of the remainder of the fleet.
- Observers are unanimous in commenting on the effectiveness of offal management in reducing seabird interactions, and in stating that the planned offal management procedures are followed on the majority of tows.

Appendix 1. Observer comments on offal management procedures and their effectiveness.

Trip number	Observer comments on offal management
2220	"Vess has no meal plant, but discards have been kept to a minimum, and the principles of the plan, largely adhered to. Treatment of discards has been more cautious and better managed than in previous yrs. This I would say has impacted positively in reducing foraging activity with warps streamed."
2214	"The vessel's approach to offal is very good. They have a meal plant on board, and all offal is being mealed. The nature of their processing means there is very little offal anyway. ... Slippage in the factory is very low. The measures in place seem to reduce seabird interactions, simply because there is little for birds to feed on."
2205	"All offal mealed every tow. Meal plant full on two occasions when SQU offal discharged for about 30 minutes and once BAR heads discharged for short period. All unwanted fish mealed except crabs and SPD. ... On the whole birds are not approaching vessel too closely ... There is intermittent small discharge of wash from factory floor which brings birds close and in interaction with warps. Many congregate and try to get food from net during haul, hence a number of net captures. ... Offal management very good ..."
2226	"To Sun 12/03 Except for 1 tow all dis outside tow time in 6T. Mon 13/03 onwards. Smaller SQU = longer processing time but cleaner tows. Minimal bycatch offal during tows, otherwise discoloured sump water and deck wash etc. Dis of dis species normally outside tow time. ... V. effective so far. No Dis = No birds competing for dis = No warp strike (2 Tori strikes). ... So far the proof of no dis as a contributor to no bird strikes is obvious ..."
2211	"In general all tows have had offal going to meal plant except for some deck wash ... No intentional dumping of offal has occurred. Limiting offal discharge, in conjunction with the use of mitigation devices does seem to impact on the amount of seabird interactions with the vessel i.e. lessen these occurrences. Both devices this vessel is using have their limitations, but so far no warp captures ... It seems to be common practice on the vessel to send all offal to the meal plant and not to 'dump'."
2227	"95% of all offal has being going to meal, including squid offal. Non ITQ species of sharks ... are being batch discarded. SWA offal – heads and guts are being batch discarded ... [Sumps] intermittently discharge water and macerated scraps of guts/offal ... Only once was SWA offal observed being continuously discharged. ... The situation was drawn to the attention of the leading hand and the Captain. The discarding immediately ceased. ... Batch discarding of SWA offal was again implemented ... Offal management is very important in reducing the incidence of accidental seabird bycatch When the practice is combined with the use of one of the mitigation devices the concentration of birds around the vessel and warp area is noticeably reduced. Mitigation devices have been of variable effectiveness ... The vessel says they plan to deploy both Tori lines and Bird Bafflers at once in the future."
2202	"Approach to offal management is as per the vessel management plan when possible. ... offal that is not suitable to be mealed [is] periodically emptied ..."

	<p>avoiding a constant stream of offal. .. SQU guts discharged through cutter pumps and sumps from factory floor wash and overflowed conveyors. Batch discharging of offal appears to reduce, for much of the time, the number of birds in the immediate vicinity of the vessels stern. The planned measures are in place 100% of the tows, but at times they reach holding capacity. Spillage on the floor may need to be reduced further. Measures adopted appear to reduce seabird interactions with the vessel ... possible to reduce or mitigate further by preventing SQU gut from falling on the floor. ... Offal discharge practice of the vessel during SQU fishing usually works well. We are now targeting SWA and because the offal levels are much higher the vessel is forced to discharge offal continuously while processing.”</p>
2204	<p>“Vessel has a policy of ALL offal to meal, even Squid guts. Only when meal plant is overloaded is there any discharge of offal. Seen twice in 5 weeks and then only briefly. ... Without offal being discharged there are very few bird strikes on warps. This is extremely effective in reducing interactions with vessel. In fact, mitigation devices are just another hazard for birds following vessel. ... Overall the vessel’s offal management plan is strictly adhered to, with discard shutes [sic] closed during shooting and hauling.”</p>
2206	<p>“Vessel meal plant used 100% of the time for all offal. We had one DIS of whole fish ... but too large for the prevalent [sic] seabirds to eat. ... Having a meal plant is of course highly effective in reducing offal, but ... the difference in bird numbers when the vessel is processing versus when the factory empty is considerably less. ... virtually impossible to effectively 100% stop discharge ... compared to a vessel with no meal plant it is effective. Area 6t, little discharge, negligible – washings from factory floor out scuppers. Area 5 similar with meal plant sump pump intermittent with small amounts of mysentry present. Both areas, minimal amounts of small SQU gre and the odd gre fish have washed from factory via scuppers, minimal. Overall as good as can be expected with some small improvements possible”</p>
2213	<p>“I consider that the measurements (sic) taken to reduce offal discharge are considerably reducing the incidence of seabird interactions with the warps. ... The Discharge practice onboard the vessel is that no offal is discharged, with all offal going to the meal plant, except in the rare event of overloading or malfunction. In general this seems to be the case, with the barest minimum of offal pieces observed occasionally, due to the cutter pump action. With hoki however, the skins from the Trio run continuously out to sea whilst the factory is in production. This has enabled me to gain a greater insight into the significant increase of seabird interaction with the warps whilst this occurs.”</p>