Level 1 Risk Assessment Methodology for incidental seabird mortality associated with New Zealand fisheries in the NZ-EEZ

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Introduction

In 2008, the Ministry of Fisheries consulted on a proposed Seabird Standard and revised National Plan of Action – Seabirds (NPOA). Following formal submissions, a Seabird Stakeholder Advisory Group (SSAG) was convened to develop, and assess, the relative merits of revised proposals for a seabird standard and NPOA management framework. The SSAG was formed out of an initiative by stakeholders to more actively engage with the Ministry of Fisheries (MFish) and consists of representatives from the Deepwater Group (DWG), SeaFIC, Forest & Bird, WWF, the Department of Conservation (DOC) and MFish.

A key component of the implementation of the NPOA in New Zealand will be a risk assessment that examines the likelihood of fisheries effects on populations of New Zealand seabirds. Risk assessment is the procedure by which the risks posed by inherent hazards are estimated either quantitatively or qualitatively. There is an Australian and New Zealand Risk Management Standard (AS/NZS 4360: 2004) that provides a framework for the entire risk management process. Environmental risk arises from the impact of humans and human activity on the environment. Environmental risk assessment (ERA) is often used to aid decision making or to prioritise research areas. A major difficulty facing ERA is complexity of the environment, in particular the availability of data, and the uncertainty in available data. New Zealand fisheries must be assessed to define management standards, assess progress, and identify and prioritise management actions for the risk posed to seabird species.

To develop a risk assessment framework that could be applied to the seabird standard and NPOA, the SSAG reviewed existing risk assessment methodologies and agreed on a hybrid of two known approaches (Baird & Gilbert 2007, Waugh et al. 2008). In February 2009, a two-day workshop was held comprising experts from New Zealand and Australia who discussed initial approaches to a "level 2" (semi-quantitative) methodology for assessing the risk to seabirds from New Zealand fisheries. The workshop considered how the method would fit within a hierarchical framework for assessing absolute risk to seabirds, and changes in risk over time. Since the workshop, further work has been undertaken on the Level 2 Risk Assessment framework and has been reviewed by the SSAG and the Aquatic Environment Working Group (AEWG) (see Sharp 2009, Waugh & Filippi 2009).

The Level 2 risk assessment framework applies the 'exposure-effects' approach (see Sharp 2009, Sharp et al. 2009). In addressing the effects of fishing on seabird

populations, ‘exposure’ refers to the total level of impact arising from the activity (e.g. numbers of bycatch species killed) and ‘effect’ refers to an ecological consequence of that exposure (e.g. population decline, disruption of ecosystem function). ‘Risk’ is then the sum of all such effects. All seabird species will be assessed using the ‘exposure-effects’ approach as part of the Level 2 RA. All fishing effort, for which there is sufficient data, is classified into one of sixteen distinct *fishery groups* within which gear configuration and fishing strategy is assumed to be sufficiently consistent that impact estimates can be applied uniformly to all effort in that group. Impacts are thus calculated separately *per species* fishery group*, then summed across fishery groups to yield total impact *per species* (Sharp 2009).

In addition to the Level 2 risk assessment process, the SSAG also agreed to run a more basic risk assessment process for species and fisheries that were data deficient. A qualitative, or Level 1, risk assessment aims to identify which hazards lead to a significant impact on any species.

Level 1 risk assessment methodologies often involve the examination of the sources of risk (issue identification), the potential consequences (impacts) associated with each issue, and the likelihood (probability) of a particular level of consequence actually occurring. This combination produces an estimated level of comparative risk, which can then be used to assist in determining the level of management response required. The key element for any valid risk analysis is having procedures for determining appropriate consequence and likelihood levels (Fletcher 2005). For qualitative analyses, this requires having adequate descriptions for each level of consequence and likelihood; the more precise, the less ambiguity in assigning ratings.

Hobday *et al* (2007) describe a general framework for ecological risk assessment in a fisheries context. They identify three levels: Level 1 SICA (Scale, Intensity, Consequence Analysis), Level 2 PSA (Productivity Susceptibility Analysis) and Level 3 fully quantitative with uncertainty analysis. In a Level 1 risk assessment where there is often an absence of information, evidence or logical argument, the workshop participants will assign scores based on best judgment and thoroughly document the rationale for that score. The rationale behind assessment and decisions at each step of the methodology must be documented. A profile of each fishery being assessed must be scoped prior to starting the risk assessment including the location and timing of fishing activities, and seabird species that may interact with the fishery (Hobday et al. 2007).

Fletcher *et al* (2002) and Fletcher (2005) describe a qualitative risk assessment methodology for prioritising fisheries management issues and its application to a range of Western Australian commercial fisheries. The process involves the examination of sources of risk, assessment of the consequences for each source and the likelihood of a particular level of consequence occurring. This methodology was developed from the AS/NZS 4360 standard, and used workshops with participants from government agencies, fishing industry and other stakeholder groups. Five sets of consequences are considered, including the impact on protected species. This method was found to be successful in identifying and prioritising fisheries management issues across the range of environmental impacts considered. It has since been used across a number of fisheries in Australia.

Astles et al (2007) describe a similar approach for data-deficient fisheries, with some key differences in the definition of risk and the way risk levels are determined.

Campbell & Gallagher (2007) developed a semi-quantitative risk-analysis model to aid New Zealand fisheries science management, primarily by prioritising environmental issues associated with the effects of fishing and prioritising research needs. Consequence matrices, including one for protected species, were developed using expert opinion in a similar manner to Fletcher *et al* (2002) and Fletcher (2005).

For many fisheries and seabird species there is insufficient data, such as observer or tracking data, to determine the likely level of interaction between particular species and fishing methods. The term 'interaction' means any interaction between a seabird and a fishing vessel leading to injury or mortality. This methodology combines attributes of the 'exposure-effects' approach and the 'likelihood-consequence' approach. Potential risk is expressed as a product of the likely exposure of a seabird to each fishing method and the expected consequence (i.e. effect on the population) of an interaction occurring in the absence of any mitigation. Actual risk will assess the reduction in effect as a result of mitigation devices reducing the likelihood of seabirds interacting with particular fishing methods. The experts at the workshop will assign subjective risk scores in an 'exposure-consequence' matrix (e.g. Australian/ New Zealand Standards 1999, Fletcher 2005). For fisheries where information on seabird interactions is unknown or anecdotal, this approach is applied so that expert opinion can be used to develop relative risk scores for each *species*fishery* combination.

Proposed methodology

The NPOA Level 1 risk assessment methodology describes six levels of exposure describing the likelihood of a seabird interacting with a fishing method. Levels of exposure range from remote to likely. There are also six levels of consequence ranging from negligible (virtually no impact with a score of 1) to intolerable (irreversible with a score of 6), with moderate (a score of 3) being defined as the highest acceptable level of consequence.

Risk scores will be determined for all seabird species listed in Appendix 1 and for all fisheries listed in Appendix 2, including those fisheries also being assessed in the level 2 risk assessment methodology. The risk score for each species provides a simple numerical assessment of whether or not a species is meeting government expectations around the biological goal of the NPOA. Uncertainty around this score will also need to be considered and highlighted to aid in management decisions. The risk score is a critical first step in determining risk reduction objectives at a fishery level. However, a number of other steps are equally critical, including determining which fisheries are causing any unacceptable risk and how reductions in risk can be monitored and / or mitigated. The cumulative impacts on any species across a number of fisheries must also be considered.

Scope

- The NPOA seabirds will address the risk to seabirds from New Zealand fisheries, including New Zealand flagged vessels fishing outside the EEZ. The workshop

will focus fisheries operating within the NZ EEZ and seabird species that occur within the EEZ.

- The workshop will qualitatively assess the risk to seabirds from NZ fisheries. Risk from non-NZ fisheries, or other human causes, is not included. However, individual species assessments may be annotated with information on other sources of risk to the species, where this is known. The known absence of other sources of risk should also be noted.

- The key output of the risk assessment will be a table of relative risk among the species and fisheries assessed.

- The risk will need to explicitly state uncertainty in the assessment, as a basis to developing management responses.

- The workshop will follow the agreed methodology and provide expert opinion to inform risk scores. Each decision will be thoroughly documented.

Workshop

The Level 1 Risk Assessment will be undertaken at a workshop comprising invited scientific and technical experts with knowledge of fisheries practices and / or seabird biology. Many ecological risk assessments address the risk posed to multiple components of the fishery, i.e. target, bycatch and byproduct, protected species, habitat and communities. For the purpose of the NPOA Level 1 risk assessment, the hazard being assessed is the adverse effects on seabird populations as a result of fisheries related mortality. Risk scores will be determined for the seabird species and fisheries listed in Appendices 1 and 2.

The workshop participants will work through the following steps for each *species*fishery* combination. The steps outlined below include a worked example comprising three seabird species and three fisheries. Three seabirds with varying threat classification and known level of fisheries interaction were chosen and three fisheries with varying levels of observer coverage were chosen. The example is provided to show how the method works and in no way should inform decisions of the workshop participants.

Seabird examples and IUCN status:
- Cape petrel, least concern
- Chatham Island shag, critically endangered
- (Gibson's) Antipodean albatross, vulnerable

Fishery examples:
- Potting
- Inshore trawl < 28m, excluding flat fish
- Surface longline vessels over 50 m

Each step of the risk assessment is documented with a rationale describing the pathway to the various scores.

Step 1: Score the vulnerability to fisheries mortality for each seabird species

The behavioural and life history characteristics that may render a seabird species vulnerable to fisheries mortality should be identified. Documentation will be provided to describe such characteristics and the behavioural vulnerability to capture for each species. The following criteria can be used to assess whether species are at risk from fisheries mortality (adapted from Phillips & Small 2007):

a) Global IUCN status	**Score**
Critically endangered	4
Endangered	3
Vulnerable	2
Near Threatened	1
Least Concern	0

b) Breeding population status	**Score**
Rapid decline (>2% per year)	3
Decline	2
Stable	1
Increase	0

c) Behavioural susceptibility to capture	**Score**
High	3
Medium	2
Low	1

{Based on the tendency to follow fishing vessels and relative incidence of capture in NZ fisheries}

d) Life-history strategy	**Score**
Biennial breeder, single egg clutch	3
Annual breeder, single egg clutch	2
Annual breeder, multiple egg clutch	1

The average of the attributes b) to d) for each population can be used to calculate relative vulnerability.

This method has been applied to the International Commission for the Conservation of Atlantic Tuan (ICCAT) and where information is unknown or uncertain, the highest risk score was allocated so that risk scoring is precautionary (Phillips & Small, 2007). Phillips & Small (2007) also scored the degree of overlap with the ICCAT fishery. For the NPOA Level 1 Risk Assessment, the spatial and temporal scale of fishing effort for each fishery will be documented through Steps 2 and 3.

The vulnerability scores will be supplied to participants prior to the meeting. The score for each taxa is not used directly, but the analysis is used in making judgments about the consequence scores at Step 4.

Example:
Cape petrel
(a) 0 – least concern
(b) 0 – increasing population
(c) 2 – medium behavioural susceptibility to capture
(d) 2 – annual breeder, single egg clutch
Average score = 1.33

Chatham Island shag
(a) 4 – critically endangered
(b) 3 – rapid decline
(c) 2 –susceptibility to capture unknown, precautionary score of medium applied
(d) 1 – annual breed, multiple egg clutch
Average score = 2

Salvin's albatross
(a) 2 - vulnerable
(b) 2 – population decreasing
(c) 3 – high susceptibility to capture
(d) 2 – annual breeder, single egg clutch
Average score = 2.33

Step 2: Assess spatial scale of activity

Maps showing the number of fishing events by statistical area for each fishery during the 2007/08 fishing year will be supplied to workshop participants.

For each fishery, the workshop will visually assess the number of fishing events undertaken in each statistical area to inform judgements about the level of exposure at Step 4.

Example:

- Potting
- Inshore trawl < 28m, excluding flat fish
- Surface longline vessels over 50 m

[NB: Fishing event data by area to be supplied for workshop]

Step3: Score temporal scale of activity

A table showing the number of fishing events per month for each fishery during the 2007/08 fishing year will be supplied to the workshop participants. For each fishery, the workshop will view data showing the number of fishing events per month to inform judgements about the level of exposure at Step 4.

Example:

- Potting
- Inshore trawl < 28m, excluding flat fish
- Surface longline vessels over 50 m

[NB: Fishing event data by month to be supplied for workshop]

Step 4: Score the level of exposure for each seabird by fishery combination
Participants will score the likelihood of each seabird species being exposed to, and interacting with, each fishery. Consideration must be given to the vulnerability scores in Step 1 and, in particular, the behaviour and at-sea distribution of each species. Participants will also consider the temporal and spatial scales viewed in steps 2 and 3 to decide whether each *seabird*fishery* combination is likely to lead to an interaction.

The score for exposure is based on the probability of a particular *species*fishery* interaction actually occurring. The likelihood of an interaction between a seabird and fishery may range from rare events to likely or frequent events and is determined using Table 2. For example, while the consequences of a magenta petrel capture in the southern blue whiting fishery is high, the likelihood of an individual of that species being exposed to the fishery is remote.

Table 2: Exposure scores for Level 1 Risk Assessment (modified from Fletcher 2005 and Campbell & Gallagher 2007)

Score	Descriptor	Description
0	Remote	The species is unlikely to interact directly with the fishery
1	Rare	Interactions may occur in exceptional circumstances
2	Unlikely	Interactions are uncommon, but have been known to occur
3	Possible	Evidence to suggest interactions possible
4	Occasional	Interactions likely to occur on occassoin
5	Likely	Interactions are expected to occur

Example:

Exposure	Potting	Inshore trawl	SLL > 50m
Cape petrel	1	2	2
Chatham Island shag	4	2	1
Salvin's albatross	1	5	4

Step 5: Score the consequence of exposure

Participants assess the potential effect (or consequence) to the population if each species were exposed to a particular fishing method. The consequences of the impact (adverse effect to populations) are scored based on the levels identified in Table 2. The score should be based on existing information and/or the expertise in the risk assessment workshop. The rationale for assigning each consequence score must be documented. In the absence of agreement or information, the workshop participants will agree on a score considered most plausible.

Table 2: Consequence scores for Level 1 Risk Assessment (modified from Fletcher 2005, Campbell & Gallagher 2007 and Hobday et al. 2007)

Level	Score	Description
Negligible	1	Some number of individual(s) impacted, no recovery time needed.
Minor	2	Some individuals are impacted, but minimal impact on population structure or dynamics. In the absence of further impact, rapid recovery would occur
Moderate	3	The level of interaction / impact is at the maximum acceptable level that still meets an objective. In the absence of further impact, recovery is expected in years
Major	4	Wider and longer term impacts; loss of individuals; potential loss of genetic diversity. Level of impact is above the maximum acceptable level. In the absence of further impact, recovery is expected in multiple years
Severe	5	Very serious impacts occurring, loss of seabird populations causing local extinction; decline in species with single breeding population, measurable loss of genetic diversity. In the absence of further impact, recovery is expected in years to decades
Intolerable	6	Widespread and permanent / irreversible damage or loss occurring; local extinction of multiple seabird populations; serious decline of a species with a single breeding population, significant loss of genetic diversity. Even in the absence of further impact, long-term recovery period to acceptable levels will be greater than decades or may never occur

Example:

Consequence	Potting	Inshore trawl	SLL > 50m
Cape petrel	1	2	2
Chatham Island shag	4	3	1
Salvin's albatross	1	4	3

Step 6: Record confidence/uncertainty for the exposure and consequence scores

The confidence ratings will reflect the levels of certainty or uncertainty for scores provided by participants. The confidence rating for the likelihood and consequence scores are rated as 1 (low confidence) or 2 (high confidence) with the qualifiers identified (Table 3). The score is recorded and the rationale documented in order to inform management decisions. The information used at this level is qualitative and each step is based on expert judgment.

Table 3: Description of confidence scores for consequences (from Hobday 2007)

Confidence rating	Score	Rationale for confidence score
Low	1a 1b 1c	Data exists, but is considered poor or conflicting. No data exists. Disagreement between experts
High	2a 2b 2c	Data exists and is considered sound. Consensus between experts. High confidence exposure to impact can not occur (e.g. no spatial overlap of fishing activity and at-sea seabird distribution)

Example:

Likelihood	Potting	Inshore trawl	SLL > 50m
Cape petrel	1 (2b)	2 (2b)	2 (2a)
Chatham Island shag	4 (2b)	2 (1b)	1 (2a)
Salvin's albatross	1 (2b)	5 (2a)	4 (2a)

Consequence	Potting	Inshore trawl	SLL > 50m
Cape petrel	1 (2b)	2 (2b)	2 (2a)
Chatham Island shag	4 (1a)	2 (1b)	1 (2a)
Salvin's albatross	1 (1b)	2 (1a)	3 (2a)

Step 7: Calculate potential risk values

Potential risk is the risk to seabirds in the absence of mitigation. Based upon information discussed and agreed at the workshop, each fishing method by seabird combination will be assigned exposure and consequence scores. The Risk Value for each issue is calculated as the mathematical product of these scores, producing possible risk values between 1 and 30 (from Fletcher 2005). To standardize the management outcomes that result from these risk analyses, the risk values were separated into five Risk Categories ranging from negligible to extreme (Table 5). The categories identify the level of reporting needed and, more importantly, whether direct management of the issue (e.g. introducing mitigation techniques, collecting more data) would be required to reduce or maintain the current level of risk.

Table 5: Risk categories (from Fletcher 2005)

Risk category	**Value**	**Likely management response**
Negligible	1	No direct management needed
Low	2-6	No specific management actions needed, indirect management likely
Moderate	7-12	Specific management needed, some additions to current levels possible
High	13-20	Increases to current management activities probably needed
Extreme	21-30	Significant additional management activities needed

Example:

Risk score	Potting	Inshore trawl	SLL > 50m
Cape petrel	1	4	4
Chatham Island shag	16	6	1
Salvin's albatross	1	20	12

Step 8: Calculate actual risk values

The Risk Value assigned to each seabird by fishery combination at Step 7 determines the unmitigated or potential risk to each seabird species from each fishery assessed. However, mitigation devices and / or avoidances practices are in place for some fisheries through either regulatory or voluntary frameworks (see Appendix 3). The workshop participants will reassess the exposure scores based on knowledge of mitigation devices in use. Consideration will be given to the efficacy of mitigation devices and whether they are in widespread use, for example, some longline fishers use blue dyed bait but the efficacy of this method for mitigating seabird interactions is unknown. As such, the exposure scores are unlikely to reduce for this mitigation practice. All discussion will be documented to outline why exposure scores did or did not change.

As in step 7, Table 5 can be used to view the mitigation risk value once the likelihood of capture has taken consideration of mitigation devices in place. Managers can view the potential risk scores against the actual risk scores to determine whether further management is required in the fishery.

Example:

From Step 7: the 'likelihood' of seabirds being exposed to each fishing method

Exposure	Potting	Inshore trawl	SLL > 50m
Cape petrel	1	2	2
Chatham Island shag	4	2	1
Salvin's albatross	1	5	4

The revised exposure scores taking into consideration whether mitigation practices reduce exposure

Exposure	Potting	Inshore trawl	SLL > 50m
Cape petrel	1	2	2
Chatham Island shag	4	2	1
Salvin's albatross	1	3	2

Step 9: Assess cumulative effects to seabird species from multiple fisheries risk

For all species and fishing methods, scores are added to determine which seabirds (or seabird group) cumulatively have the highest risk score and which fisheries pose the greatest risk to seabirds. These scores can be determined for the 'potential' and 'mitigated' risk scores. The temporal and spatial nature of these effects will be detailed in the final risk assessment report.

Table 6: Example of cumulative risk scores by fishery and seabird species

	Fishery A	Fishery B	Fishery C	Fishery D	Total all fisheries
Penguin sp.	1	15	0	16	32
Albatross sp.	0	4	25	20	49
Petrel sp.	1	8	30	25	64
Shag sp.	1	20	0	12	33
Total all spp.	3	47	55	73	178

Table 6 indicates that Fishery D has the highest impact across all taxa assessed and the petrel species has the highest risk scores of all taxa assessed.

Example:

Risk score	Potting	Inshore trawl	SLL > 50m	Total
Cape petrel	1	4	4	9
Chatham Island shag	12	4	1	17
Salvin's albatross	1	16	9	26
Total	14	24	14	52

Risk assessment report

The final risk assessment report will include the consequence and likelihood scores, the risk values and all rationales as documented during the workshop. The final report should reflect discussions undertaken in the workshop and the relevant information to justify each of the risk levels selected.

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Appendix 1:
Seabird groups to be included in Level 1 Risk Assessment

Highlighted rows in purple indicate taxa where the DOC classification listing differs from the IUCN / BLI listing.

Qualifiers: Conservation Dependent (CD); Data Poor (DP); Designated (De);
Extreme Fluctuations (EF); Increasing (Inc); Island Endemic (IE); One Location (OL); Partial Decline (PD); Range Restricted (RR); Recruitment Failure (RF); Secure Overseas (SO); Sparse (Sp); Stable (St); Threatened Overseas (TO)]

Common name	***Scientific name***	***IUCN threat classification***	***DOC threat classification***	***DOC qualifier***
Brown Skua	*Catharacta lonnbergi*	Least concern	Naturally Uncommon	Sp
Cape Petrel	*Daption capense*	Least concern		
Snares Cape pigeon	*Daption capense australe*		Naturally Uncommon	RR
Cape pigeon	*Daption capense capense*		Migrant	SO
Antipodean Albatross (Antipodes I)	*Diomedea antipodensis*	Vulnerable D2	Naturally Uncommon	IE RR
Antipodean Albatross (Auckland I)	*Diomedea antipodensis*	Vulnerable D2	Nationally Vulnerable D (1/1)	IE RR
Southern Royal Albatross	*Diomedea epomophora*	Vulnerable D2	Naturally Uncommon	RR
Wandering Albatross	*Diomedea exulans*	Vulnerable A4bd	Migrant	TO
Northern Royal Albatross	*Diomedea sanfordi*	Endangered A4bcd; B2ab(iii,v)	Naturally Uncommon	RR
Eastern Rockhopper Penguin	*Eudyptes filholi*	not listed	Nationally Critical C	TO
Fiordland Penguin	*Eudyptes pachyrhynchus*	Vulnerable A2be+3be+4be; C1+2a(i)	Nationally Vulnerable C (1/1)	Sp
Snares Penguin	*Eudyptes robustus*	Vulnerable D2	Naturally Uncommon	IE OL
Erect-crested Penguin	*Eudyptes sclateri*	Endangered A2b; B2ab(i,ii,iv,v)	Naturally Uncommon	RR
Little Penguin	*Eudyptula minor*	Least concern		
White-flippered blue penguin	*Eudyptula minor albosignata*		Nationally Vulnerable B	De RR
Chatham Island blue penguin	*Eudyptula minor chathamensis*		Naturally Uncommon	IE RR
Northern blue penguin	*Eudyptula minor iredalei*		Declining A (1/1)	DP EF
Southern blue penguin	*Eudyptula minor minor*		Declining A (1/1)	DP
White-bellied Storm-petrel	*Fregetta grallaria*	Least concern	Nationally Endangered B (1/1)	DP
Black-bellied Storm-petrel	*Fregetta tropica*	Least concern	Not Threatened	De RR
Grey-backed Storm-petrel	*Garrodia nereis*	Least concern	Relict B	RR SO
Common White Tern	*Gygis alba*	Least concern		
White tern	*Gygis alba royana*		Nationally Critical A	OL SO

Common name	***Scientific name***	***IUCN threat classification***	***DOC threat classification***	***DOC qualifier***
Blue Petrel	*Halobaena caerulea*	Least concern	Migrant	SO
Black-billed Gull	*Larus bulleri*	Endangered A2ce+3ce+4ce	Nationally Endangered E	De
Kelp Gull (black-backed)	*Larus dominicanus*	Least concern	Not Threatened	SO
Silver Gull (red-billed)	*Larus novaehollandiae*	Least concern	Nationally Vulnerable E (1/1)	
Southern Giant-petrel	*Macronectes giganteus*	Near Threatened	Migrant	SO(NT)
Northern Giant-petrel	*Macronectes halli*	Near Threatened	Naturally Uncommon	RR SO(NT)
Yellow-eyed Penguin	*Megadyptes antipodes*	Endangered B2b(iii)+c(iv)	Nationally Vulnerable B (1/1)	EF
Australasian Gannet	*Morus serrator*	Least concern	Not Threatened	De Inc SO
New Zealand Storm-petrel	*Oceanites maorianus*	Critically Endangered D	Data deficient	DP
Fulmar Prion	*Pachyptila crassirostris*	Least concern		RR St
Fulmar prion	*Pachyptila crassirostris crassirostris*		Naturally Uncommon	RR St
Lesser fulmar prion	*Pachyptila crassirostris flemingi*		Naturally Uncommon	OL SO St
Chatham fulmar prion	*Pachyptila crassirostris pyramidalis*		Naturally Uncommon	IE RR
Antarctic Prion	*Pachyptila desolata*	Least concern	Naturally Uncommon	RR SO
Fairy Prion	*Pachyptila turtur*	Least concern	Relict B	RR SO
Broad-billed Prion	*Pachyptila vittata*	Least concern	Relict B	RR SO
White-faced Storm-petrel	*Pelagodroma marina*	Least concern		
Kermadec white-faced storm petrel	*Pelagodroma albiclunis*		Nationally Critical A	IE OL
Australian white-faced storm petrel	*Pelagodroma marina dulciae*		Vagrant B	SO
New Zealand white-faced storm petrel	*Pelagodroma marina maoriana*		Relict B	RR
South Georgia Diving-petrel	*Pelecanoides georgicus*	Least concern		
Codfish Island South Georgian diving petrel	*Pelecanoides georgicus "Codfish Island"*		Nationally Critical A	IE OL
Common Diving-petrel	*Pelecanoides urinatrix*	Least concern	Relict B	Inc RR SO
Southern diving petrel	*Pelecanoides urinatrix chathamensis*		Relict B	RR
Subantarctic diving petrel	*Pelecanoides urinatrix exsul*		Not Threatened	De RR SO
Northern diving petrel	*Pelecanoides urinatrix urinatrix*		Relict B	Inc RR SO

Common name	***Scientific name***	***IUCN threat classification***	***DOC threat classification***	***DOC qualifier***
Red-tailed Tropicbird	*Phaethon rubricauda*	Least concern	Nationally Endangered B (1/1)	RR SO St
Campbell Island Shag	*Phalacrocorax campbelli*	Vulnerable D2	Naturally Uncommon	DP IE OL
New Zealand King Shag	*Phalacrocorax carunculatus*	Vulnerable D1; D2	Nationally Endangered B (1/1)	
Stewart Island Shag	*Phalacrocorax chalconotus*	Vulnerable B1ab(ii,iii,iv); B2ab(ii,iii,iv)	Nationally Vulnerable B (1/1)	
Auckland Island Shag	*Phalacrocorax colensoi*	Vulnerable D2	Nationally Vulnerable B (1/1)	IE RR St
Pitt Island Shag	*Phalacrocorax featherstoni*	Endangered C1	Nationally Endangered A (1/1)	IE RR
Chatham Island Shag	*Phalacrocorax onslowi*	Critically Endangered B2ab(ii,iii,iv,v)	Nationally Endangered B (1/1)	DP IE RR
Spotted Shag	*Phalacrocorax punctatus*	Least concern	Not Threatened	
Bounty Island Shag	*Phalacrocorax ranfurlyi*	Vulnerable D1; D2	Nationally Critical A	IE OL
Large Pied Cormorant	*Phalacrocorax varius*	Vulnerable D1; D2	Nationally Vulnerable C (1/1)	
Light-mantled Albatross	*Phoebetria palpebrata*	Near Threatened	Declining B (1/1)	DP RR SO(NT)
White-chinned Petrel	*Procellaria aequinoctialis*	Vulnerable A4bcde	Declining C (1/1)	RR TO
Grey Petrel	*Procellaria cinerea*	Near Threatened	Declining B (1/1)	
Parkinson's Petrel	*Procellaria parkinsoni*	Vulnerable D2	Nationally Vulnerable B (1/1)	RR
Westland Petrel	*Procellaria westlandica*	Vulnerable D2	Naturally Uncommon	OL St
Blue Noddy	*Procelsterna cerulea*	Least concern	Naturally Uncommon	RR
Chatham Petrel	*Pterodroma axillaris*	Critically Endangered B2ab(v)	Nationally Vulnerable A (1/1)	CD IE Inc OL
White-necked Petrel	*Pterodroma cervicalis*	Vulnerable D2	Relict B	OL
Cook's Petrel	*Pterodroma cookii*	Endangered B2ab(i,ii,iv)	Relict B	Inc RR
Mottled Petrel	*Pterodroma inexpectata*	Near Threatened	Relict B	Inc RR
White-headed Petrel	*Pterodroma lessonii*	Least concern	Not Threatened	De RR SO
Great-winged Petrel	*Pterodroma macroptera*	Least concern	Not Threatened	De Inc RR
Magenta Petrel	*Pterodroma magentae*	Critically Endangered A2ce; B2ab(v); C2a(ii)	Nationally Critical A	CD IE Inc OL

Common name	***Scientific name***	***IUCN threat classification***	***DOC threat classification***	***DOC qualifier***
Soft-plumaged Petrel	*Pterodroma mollis*	Least concern	Coloniser	Inc OL SO
Kermadec Petrel	*Pterodroma neglecta*	Least concern	Relict A	SO
Black-winged Petrel	*Pterodroma nigripennis*	Least concern	Not Threatened	De Inc RR
Pycroft's Petrel	*Pterodroma pycrofti*	Vulnerable D2	Recovering B	Inc RR
Little Shearwater	*Puffinus assimilis*	Least concern		
Norfolk Island little shearwater	*Puffinus assimilis assimilis*		Vagrant B	SO
North Island little shearwater	*Puffinus assimilis haurakiensis*		Recovering B	Inc RR
Kermadec little shearwater	*Puffinus assimilis kermadecensis*		Relict B	IE RR
Buller's Shearwater	*Puffinus bulleri*	Vulnerable D2	Naturally Uncommon	OL St
Flesh-footed Shearwater	*Puffinus carneipes*	Least concern	Declining B (1/1)	RR TO
Fluttering Shearwater	*Puffinus gavia*	Least concern	Relict B	RR
Sooty Shearwater	*Puffinus griseus*	Near Threatened	Declining C (1/1)	SO(NT)
Hutton's Shearwater	*Puffinus huttoni*	Endangered B2ab(ii,iii)	Declining C (1/1)	OL
Wedge-tailed Shearwater	*Puffinus pacificus*	Least concern	Relict B	RR SO
Caspian Tern	*Sterna caspia*	Least concern	Nationally Vulnerable B (1/1)	SO
Sooty Tern	*Sterna fuscata*	Least concern	Naturally Uncommon	DP RR
Fairy Tern	*Sterna nereis*	Vulnerable C1	Nationally Critical A	CD RR
White-fronted tern	*Sterna striata*	Least concern	Declining B (1/1)	DP
Antarctic Tern	*Sterna vittata*	Least concern	Recovering A	RR
Masked Booby	*Sula dactylatra*	Least concern	Nationally Endangered B (1/1)	RR St TO
Buller's Albatross (Northern)	*Thalassarche bulleri*	Near Threatened	Naturally Uncommon	RR
Buller's Albatross (Southern)	*Thalassarche bulleri*	Near Threatened	Naturally Uncommon	RR
Indian Yellow-nosed Albatross	*Thalassarche carteri*	Endangered A4bde	Coloniser	TO
Grey-headed Albatross	*Thalassarche chrysostoma*	Vulnerable A4bd	Nationally Critical C	DP OL TO
Chatham Albatross	*Thalassarche eremita*	Critically Endangered B2ab(iii)	Naturally Uncommon	IE OL
Campbell Albatross	*Thalassarche impavida*	Vulnerable D2	Naturally Uncommon	IE OL
Black-browed Albatross	*Thalassarche melanophrys*	Endangered A4bd	Coloniser	TO
Salvin's Albatross	*Thalassarche salvini*	Vulnerable D2	Nationally Vulnerable D (1/1)	DP RR TO

Common name	***Scientific name***	***IUCN threat classification***	***DOC threat classification***	***DOC qualifier***
White-capped Albatross	*Thalassarche steadi*	Near Threatened	Declining C (1/1)	DP RR

Appendix 2:
Fisheries to be included in Level 1 Risk Assessment

Beach seine, drag net

Method

Beach seining or drag netting is normally carried out using a length of net and an additional length of warp (rope). The net and warp are laid out from, and back to, the shore and retrieved by hauling on to the shore. The net used is similar to that used for set-netting.

Target species

Most fishing effort targets trevally.

Spatial and temporal effort

Relatively little effort compared to other fishing methods, which is mostly in the Bay of Plenty and east coast Northland. The majority of effort is for trevally in statistical areas 9 and 9H throughout summer.

Vessel size classes and other methods employed

Small vessels (4 m to 14 m) use this method. Most vessels also use other methods including bottom longlining, potting and setnetting,

Observer coverage

None

Level 2 risk assessment division of fishery

Not included

Bottom longline inshore

Method

Longlining is a passive method which involves luring the fish to take a baited hook. The term longline derives from the long main line to which numerous branchlines - snoods - are attached, each of which has a hook tied to it which catches the fish. Bottom longlines are significantly shorter in length compared to surface longlines. The line is anchored on one or both ends and is often left on the bottom for a period of time, while other lengths of lines are set at different locations. At one end of the line is an anchor which is dropped to the sea floor. The other end has a weight attached. Depending on the length of the line a series of hauling lines are attached that come to the surface and are marked with buoys. The line is then set from a moving boat, and left for between six and 12 hours, before being hauled in using the surface lines. Bait may be hooked by hand or baiting machine.

Target species

Multiple targets but most effort for bass, bluenose, hapuku, ling, school shark and snapper.

Spatial and temporal effort

Vessels fish inshore and offshore in AKE, AKW, CEE, CEW, CHA, SEC, SOE, SOU and SUB. Around 50 vessels fish over 100 days a year.

Vessel size classes and other methods employed

Vessels range in length from 4 m to 34 m. Other methods employed include dredging, potting, setnetting, surface longlining and trolling.

Observer coverage

Historically very little observer effort considering there are over 10 000 fishing days a year and less than 200 observer days achieved in recent years. Observations of inshore bottom longline fisheries began in 2004/05 in the snapper fishery and later in the other bottom longline fisheries. Less than 5% observer coverage has been achieved.

Seabird interactions

Despite low coverage, seabird interactions have been reported including one large bycatch event in SOE where 22 Salvin's and 12 Chatham albatrosses were incidentally killed. Incidental mortalilities of the following species have also been reported; black petrels, black-browed albatross, Buller's albatrosses, cape petrel, flesh-footed shearwaters, grey-faced petrel, Indian yellow-nosed albatross, sooty shearwater and white chinned petrels.

Level 2 risk assessment division of fishery

- Bluenose <=36m BNS BLL
- Bottom longline – small vessel <=36m all except BNS and SNA BLL
- Snapper longline <=36m SNA BLL

Bottom longline deep sea

Method

Bottom longlines are significantly shorter in length compared to surface longlines. The line is anchored on one or both ends and is often left on the bottom for a period of time, while other lengths of lines are set at different locations. At one end of the line is an anchor which is dropped to the sea floor. The other end has a weight attached. Depending on the length of the line a series of hauling lines are attached that come to the surface and are marked with buoys. The line is then set from a moving boat, and left for between six and 12 hours, before being hauled in using the surface lines. Larger deep sea vessels use automated baiting.

Target species

Mostly ling.

Spatial and temporal effort

Fishing effort throughout the year ith most effort in CEE in June and July, SOE in August and September, Southland in October and November and in SUB from March to June.

Vessel size classes and other methods employed

The few vessels operating in this fishery range in size from 46m to 52 m and only fish using the method of bottom longlining.

Observer coverage

Ongoing observer coverage in this fishery with 20 – 30% effort observed.

Seabird interactions

Historically, large bycatch events have been reported from this fishery. Seabird mortalities still reported but at lower rates.

Level 2 risk assessment division of fishery

- Bottom longline – large vessel >36m

Dahn line

Method

Dahn lines are a form of drop-line, vertically deployed between surface buoys and a seabed weight, with a bottom section rigged with hooked snoods to fish a specific depth range above the seabed.

Target species

Multiple targets with greatest effort for bass, bluenose, hapuku and ling.

Spatial and temporal effort

Most effort targets HPB throughout the year in the North and South Islands and bluenose throughout the year in the upper North Island.

Vessel size classes and other methods employed

Vessels range in size from 5 m to 21 m. Most vessels use other methods in addition to dahn lining including bottom longlining, bottom trawling, potting, setnetting, surface longlining and trolling.

Observer coverage

None.

Level 2 risk assessment division of fishery

Not included

Danish seine (including pair Danish seine)

Method

Danish seining is used to encircle, herd and finally trap the fish. A net bag, similar in shape to a trawl bag is operated by a long, weighted rope fixed to each end. The two ropes are used to encircle the fish and also to haul the net in.

Target species

Multiple targets but greatest effort for flatfish, gurnard, john dory and snapper.

Spatial and temporal effort

Effort is undertaken throughout the year, mostly targeting flatfish (east and west coasts South Island), gurnard (North Island), john dory and snapper (upper North Island).

Vessel size classes and other methods employed

Vessel sizes range from 10 m to 24 m. Most vessels in this fishery only use the method of Danish seining but a few vessels also bottom trawl, dredge, handline or troll.

Observer coverage

None

Level 2 risk assessment division of fishery

Not included

Deep water bottom trawl

Target species

Orange roughy, oreo species, cardinal fish, rubyfish and other deep water fish stocks.

Spatial and temporal effort

Fishing effort is throughout the year, mostly in CEE, AKW, SOE and SUB. Most larger vessels operate in SOE and SUB while smaller vessels operate in the upper north island.

Vessel size classes and other methods employed

Vessels range in size from around 20 m to over 100 m in length. Many smaller vessels operating in the upper North Island also fish inshore for other targets, for example, snapper.

Observer coverage

Ongoing observer coverage of large vessels in this fishery (around 20%) with some minimal coverage of smaller vessels.

Seabird interactions

Seabird mortalities reported, but at lower rates compared to other trawl fisheries. On larger vessels, there are often non fishing gear related seabird interactions (e.g. birds striking the deck).

Level 2 risk assessment division of fishery

- Vessels targeting ORH, OEO and associated stocks

Diving

Method

Some commercial and recreational fishers dive for seafood. Paua may only be taken by divers using snorkels, not scuba gear.

Target species

Three main target species - rock lobster, sea cucumbers and sea urchins.

Spatial and temporal effort

Most effort targets red rock lobster and sea cucumber in the Marlborough Sounds and sea urchins in the North and South Islands.

Observer coverage

None

Level 2 risk assessment division of fishery

Not included

Dredge

Method

Dredging is used to gather scallops and oysters. To gather scallops, the fishing vessel tows a rigid steel-framed dredge along the sea floor. With oysters, a heavier ring mesh is usually used.

Target species

Deepwater tuatua, oysters, scallops, sea urchins, triangle shells and trough shells are all targeted using this method. Most effort targets oysters and scallops.

Spatial and temporal effort

Fishing effort is undertaken throughout the year with oysters targeted from January through to June and scallops from July through to February. The fishery can be divided into: oyster dredge in Foveaux Straight; oyster dredge in Marlborough/Nelson; and scallop dredge.

Vessel size classes and other methods employed

Vessels range in size from 5 m to 22 m. Some vessels employ other methods including bottom trawling, fish pots, potting and trolling.

Observer coverage

None

Level 2 risk assessment division of fishery

Not included

Fish traps

Method

Fish are trapped in stationary gear where the fish can enter the trap but cannot escape.

Target species

Multiple targets but most effort is for hagfish and paddle crabs.

Spatial and temporal effort

Fishing effort is undertaken throughout the year. Most effort targets paddle crabs in the Bay of Plenty and northern South Island and hagfish in northern North Island, west coast North Island and west coast South Island.

Vessel size classes and other methods employed

Vessels that set fish traps range in size from 5 m to 32 m. While some vessels in this fishery only use the method of fish trapping, most vessels use multiple methods including bottom longline, bottom pair trawl, cod pots, crab pots, dredge, rock lobster pots and setnet.

Observer coverage

None

Level 2 risk assessment division of fishery

Not included

Hand gather

Method

Seafood suitable for gathering by hand includes aquatic invertebrates such as molluscs, crustaceans, and echinoderms as well as aquatic plants.

Target species

Most commercial effort targets cockles and pipi.

Spatial and temporal effort

Fishing is undertaken throughout the year, particularly over the summer months.

Vessel size classes and other methods employed

Vessel sizes range from 2.5 m to 18 m. Some vessels, particularly those targeting cockles and pipi, employ only the method of hand gathering, whereas other vessels use other methods as well including dahn lining, diving, rock lobster potting and setnetting.

Observer coverage

None

Level 2 risk assessment division of fishery

Not included

Hand Line

Method

A hand-line is a single fishing line, usually attached to a rod, and held by hand. This method is mainly used by recreational fishers, but also commercial fishers.

Target species

Many fish species are targeted with most effort targeting blue code, hapuku, bass and snapper.

Spatial and temporal effort

Commercial fishing effort is undertaken throughout the year around the New Zealand mainland and the Chatham Islands.

Vessel size classes and other methods employed

Vessel using the method of hand line range in size from 3 m to 36 m. Most vessels using this method also use at least one other fishing method including bottom longline, bottom trawl, cod pots, setnet. dahn line, Danish seine, dredge, rock lobster potting, surface longline and troll.

Observer coverage

None

Level 2 risk assessment division of fishery

Not included

Inshore drift net

Method

A gillnet that drifts with the current or tide.

Target species

Flatfish, grey mullet, kahawai, yellow belly flounder and yellow-eyed mullet.

Spatial and temporal effort

Effort throughout the year, especially over summer months, only in two areas: Hauraki gulf (yellow belly flounder) and north of Taranaki (grey mullet, kahawai and yellow-eyed mullet).

Vessel size classes and other methods employed

Few vessels use this method and are 4 m or 5 m in length. Two of four vessels using this method also use setnets.

Observer coverage

None

Level 2 risk assessment division of fishery

Not included

Inshore trawl

Method

One or two boats tow a large net, generally on the bottom. The net consists of several parts. Strong steel cables (referred to as warps) connect the net to the trawler. The net is held open by two large trawl doors (or trawl boards) which act as hydrodynamic kites, and stop the mouth of the net from closing. The weight of the boards also determine the depth at which the net will operate.

Fish enter the net through the mouth and then make their way to the other end, called the "codend". This part of the net contains the smallest mesh size.

Pair trawling is used on smaller boats and at shallower depths. One of the lines from the net is passed to a second trawler and the two boats tow in tandem, using the distance between them to assist in keeping the mouth of the net open. Prior to hauling the net in, the line is passed back to the first boat, and the net is hauled onto one boat.

Target species

Multiple target species with greatest effort for flatfish, gurnurd, john dory, lemon sole, red cod, snapper, tarakihi and trevally.

Spatial and temporal effort

Fishing effort is undertaken throughout the year with multiple species targeted. Over 100 vessels fish more than 100 days a year with the method of bottom trawl on small vessels.

Vessel size classes and other methods employed

Vessels range in size from 5 m to 30 m and may employ other methods including potting, dahn lining and trolling.

Observer coverage

Some observer coverage achieved in the Pegasus Bay – Canterbury Bight area in 1997-1998 to monitor Hector's dolphin interactions. Further observations were undertaken in 2006/07 and 2007/08 to monitor all protected species interactions. In 2006/07, nine vessels were observed and in 2007/08 10 vessels were observed (11 trips). Less than 1% of total inshore trawl effort was observed during those observer years. A summer observer programme was conducted in 2008/09 to look predominantly for interactions with Hector's and Maui's dolphins; this may have achieved high coverage for the mid-January to end of February period.

Seabird interactions

Despite very low observer coverage, seabird catch rates are high compared with offshore trawl fisheries, especially in SEC. White-capped and Salvin's albatrosses have been reported caught by inshore trawl vessels from the east and west coasts of the South Island and black petrels and flesh-footed shearwaters have been caught in the Hauraki Gulf area. Recent coverage for the Hector's dolphin project over January and February 2009 reported captures of spotted shags, albatrosses, petrels, and shearwaters.

Level 2 division of fishery

- Inshore trawl <=28m Except FLA
- Inshore trawl – flatfish <=28m FLA
- Inshore trawl – flatfish >28m FLA

Middle depth trawl targeting finfish

Target species

Hoki, hake, ling and warehou species (excludes southern blue whiting).

Spatial and temporal effort

Fishing effort is undertaken throughout the year in CEE, CHA, SEC, SOE, SOU and SUB. The fishery can be split into the following areas:

- WCSI
- Cook Strait
- Pegasus Bay
- Chatham Rise
- Sub Antarctic

Vessel size classes and other methods employed

Vessels range in size from 30 m to over 100 m in length. Vessels targeting these species also target other species including barracouta and squid.

Observer coverage

Historically, around 20% observer coverage has been achieved in this fishery.

Seabird interactions

Seabirds are known to be caught by middle depth trawl vessels targeting finfish including a number of albatross and petrel species, particularly Buller's albatross, Salvin's albatross, white-capped albatross, sooty shearwater and white-chinned petrel.

Level 2 risk assessment division of fishery

- Middle depth trawl fishery – processor >28m all except BYX ORH OEO CDL SWB, SCI SQU JMA EMA FLA Packhouse certificate
- Middle depth trawl fishery – fresher >28m all except BYX ORH OEO CDL SWB, SCI SQU JMA EMA FLA No packhouse certificate

Middle depth trawl other – scampi

Spatial and temporal effort

Scampi fishing effort is undertaken throughout the year in AKE, CEE, SOE and SUB.

Vessel size classes and other methods employed

Vessel range in size from 18 m to over 40 m in length.

Observer coverage

Historically, observer coverage in the scampi fishery has been in SOE from July to December and SUB (SOI) from January to April, with lesser coverage in AKE and CEE.

Seabird interactions

High rates of seabird captures have been reported from this fishery. Seabird species incidentally killed include Buller's albatross, Salvin's albatross, white-capped albatross, white-chinned petrel, flesh-footed shearwater, sooty shearwater, northern giant petrel and black-browed albatross.

Level 2 risk assessment division of fishery

- Middle depth trawl vessels targeting SCI

Middle depth trawl other – southern blue whiting

Target species

Southern blue whiting.

Spatial and temporal effort

Fishing effort is undertaken from August to October in SUB.

Vessel size classes and other methods employed

Vessels range in size from 30 m to over 100 m in length.

Observer coverage

Historically, around 20% observer coverage has been achieved in this fishery.

Seabird interactions

Seabirds are known to be caught by middle depth trawl vessels targeting finfish including a number of albatross and petrel species.

Level 2 risk assessment division of fishery

- Middle depth trawl vessels targeting SBW

Middle depth trawl other – squid

Spatial and temporal effort

Squid trawl effort occurs in three main areas: east coast South Island, south coast South Island and in SOI.

Vessel size classes and other methods employed

Vessels targeting squid range in size from 15 m (inshore vessels) to over 100 m. Other species targeted by these vessels include hake, hoki, ling and warehou.

Observer coverage

Historically most observer effort has been in SOU and SUB with little effort in SEC despite high seabird capture rates in that area.

Seabird interactions

Historically, high levels of seabird bycatch has been reported in this fishery, especially white-capped albatross warp captures and net captures of sooty shearwaters and white-chinned petrels. The squid fishery had the highest rate of seabird captures in 2007/08 compared to other observed fisheries.

Level 2 risk assessment division of fishery

- Middle depth trawl vessels targeting SQU

Pelagic mackerel trawl

Target species

Jack mackerel, English mackerel and barracouta.

Spatial and temporal effort

Pelagic trawl effort is mostly in AKW, CHA, CEW and SEC and is undertaken throughout the year.

Vessel size classes and other methods employed

Vessels targeting these stocks range in size from around 15 m to over 100 m in length. Other stocks are also targeted including hake, hoki, ling and squid.

Observer coverage

Ongoing observer coverage in this fishery, generally around 20% of effort observed.

Seabird interactions

Seabird interactions have been reported in this fishery including mortalities of Buller's albatrosses, common diving petrel, fairy prions, sooty shearwaters, white-capped albatrosses and white-chinned petrels.

Level 2 risk assessment division of fishery

Pelagic trawl vessels targeting JMA

Pots

Method

Rock lobsters and blue cod are caught in pots, usually made of a steel frame, covered with wire mesh. The pot is baited with fish and dropped from the boat on the end of a rope long enough to reach the bottom. The position of the pot is marked with floats so the pot can be easily recovered.

Target species

Three main species targeted with this method – rock lobster, cod and crab.

Spatial and temporal effort

Fishing effort throughout the year around the NZ mainland and Chatham Islands.

Vessel size classes and other methods employed

Vessel size ranges from 4 m to 27 m. Vessels using pots may target multiple species (e.g. cod and rock lobster) as well as use other methods (e.g. bottom trawling, dahn lining, handline, setnetting).

Observer coverage

None (rock lobster fishery observed for catch effort data)

Seabird interactions

Some anecdotal evidence of mainland and Chatham Island shag species being caught in pots.

Level 2 risk assessment division of fishery

Not included

Purse seine

Method

Purse seining is used to catch surface dwelling species such as tuna, mackerels, kahawai and trevally. Aerial spotter planes are usually used to locate the intended catch. The purse seine net is laid in a circle around the school . The net is then "pursed", drawing the bottom closed and entrapping the fish. Purse seining cannot be used by recreational fishers.

Target species

Skipjack tuna, jack and English mackerel, kahawai, trevally and pilchard.

Spatial and temporal effort

Fishing effort is throughout the year, particularly in the summer months. Most fishing effort is in the upper North Island, and the west coast of the South Island.

Vessel size classes and other methods employed

Vessels range in size from 17 m to over 60 m in length. Most vessels in this fishery only use the method of purse seining, but a few also Danish seine, handline or surface longline.

Observer coverage

Ongoing observer coverage in this fishery divided into: Skipjack PS, jack mackerel PS, English mackerel PS, kahawai PS, trevally PS and pilchard PS

Seabird interactions

Minimal interactions in recent years.

Level 2 risk assessment division of fishery

Not included

Ring net

Method

Ring netting is defined as a gill net which: acts by enmeshing, entrapping, or entangling any fish; is set for a time of less than 1 hour and is continuously attended and used by the fisher.

Target species

Mostly grey mullet.

Spatial and temporal effort

Most commercial effort targets grey mullet in west coast North Island harbours.

Vessel size classes and other methods employed

All vessels are very small and range in size from 3 to 9 m. Many vessels also setnet and a few surface longline and troll as well.

Observer coverage

Some recent observer effort on a few vessels operating in west coast North Island harbours.

Seabird interactions

Observers considered there was minimal risk to seabirds as nets were attended at all times and fishing events were quick relative to other methods.

Level 2 risk assessment division of fishery

Not included

Setnet

Method

Setnetting is the most common form of netting. Most nets have a series of floats at the top, and a series of weights at the bottom that keep the net upright in the water. Fish are caught as they swim into the net. The size of the mesh in the set net determines the size and species of fish caught. Surface nets are used in shallow water, or where the targeted fish feeds on the surface. Bottom setnets are similar in design to surface nets, but use lighter floats and heavier weights so that the net sinks to the bottom. Haul ropes are attached to marker buoys so that the net can be recovered.

Target species

Multiple species are targeted with greatest fishing effort for butterfish, flatfish, grey mullet, school shark, rig, tarakihi and yellow belly flounder.

Spatial and temporal effort

Fishing effort is throughout the year around the mainland and the Chatham Islands.

Vessel size classes and other methods employed

Fishing vessels range in size from 2 m to 20 m. Other methods employed include bottom trawling, trolling, hand lining, potting and dahn lining.

Observer coverage

The Pegasus Bay-Canterbury Bight setnet fishery (Statistical Areas 020 and 022) was observed during the 1997-1998 fishing year to monitor for Hector's dolphin interactions. In the 2005/06 observer year, observations were undertaken in Southland (SOU) and the Nelson / Marlborough region (CHA) to monitor interactions with Hector's dolphins and seabirds. Setnet fisheries were also observed in the 2006/07 fishing year in Kaikoura (SEC), Nelson (CHA) and in Southland (SOU). In 2007/08, the greatest observer effort was in SEC (Kaikoura and Timaru) followed by SOU. While acceptable level of observer coverage have been achieved in Southland (25% in 2007/08), less than 5% of total effort has been observed in recent years. A summer observer programme was conducted in 2008/09 to look predominantly for interactions with Hector's and Maui's dolphins; this may have achieved high coverage for the mid-January to end of February period.

Seabird interactions

During the 2005/06 observer year, two spotted shags and one pied shag were incidentally killed. Protected species mortalities during 2006/07 included one fluttering shearwater and two yellow-eyed penguins, all as separate incidents. During 2007/08, one sooty shearwater and one yellow-eyed penguin were incidentally killed. Recent coverage for the Hector's dolphin project over January and February 2009 reported captures of five yellow-eyed penguins and an albatross.

Level 2 division of fishery

- Setnet shallow
- Setnet deep

Squid jig

Method

Jigging is a method of catching squid by continuously lowering and retrieving lines from the fishing vessel. Fishing is generally done at night when squid are attracted by powerful lights on the vessel. Jigging is used in preference to trawling when high quality squid is required.

Target species

Squid

Spatial and temporal effort

Minimal commercial effort compared to SQU trawl. Mostly east coast South Island and south coast South Island over summer months.

Vessel size classes and other methods employed

The two vessels using this method were 66 and 70 m in length and both vessels only used the method of jigging.

Observer coverage

In 1998/1999, 100 observer days were achieved in this fishery operating off the Otago Coast.

Seabird interactions

No seabirds were injured or captured during 100 days observer coverage.

Level 2 risk assessment division of fishery

Not included

Surface longline - vessels less than 50 m in length

Method

A surface longlines consists of a main line that can be many kilometres long, supported in the water by a series of floats; the surface long line is not anchored to the seabed.

Target species

Most effort targets bigeye tuna (AKE, AKW, CEE and KER) southern bluefin tuna (AKE, CEE and CHA) and swordfish (AKE, AKW, CEE and KER). Other tuna stocks are also targeted to a lesser degree.

Spatial and temporal effort

Bigeye tuna is fished throughout the year, with greater effort over the summer months, while southern bluefin tuna is fished April to August and swordfish from March to June.

Vessel size classes and other methods employed

Vessels range in size from 12 m to 29 m in length.

Observer coverage

Historically, there has been difficulty placing observers on smaller domestic tuna vessels. Swordfish has recently been introduced into the quota management system so that observations in 2006/07 include vessels targeting tuna and swordfish. Observer coverage in recent years has ranged between 4 and 8%.

Seabird interactions

A number of albatross and petrel species have been reported incidentally killed in this fishery including black-browed albatrosses, Buller's albatrosses (both southern and northern), Campbell albatrosses, grey petrel, grey-faced petrel, Salvin's albatrosses, sooty shearwaters and wandering albatrosses (both Gibson's and Antipodean).

Level 2 risk assessment division of fishery

- Surface longline vessels over 50 m in length

Surface longline – vessels greater than 50 m in length

Method

A surface longlines consists of a main line that can be many kilometres long, supported in the water by a series of floats; the surface long line is not anchored to the seabed.

Attached to this main line are branch lines that are each up to 50-75 metres long. Every branch line carries a baited hook, and there can be up to 3000 hooks on a longline.

The line is set as the boat moves forward, at a speed of five to seven knots, with setting taking from two to six hours. Once the line is fully extended, it is then hauled in. Hauling is done at a slower speed, depending on the amount of catch, and the whole process can take up to 12 hours.

Target species

Bigeye and southern bluefin tuna.

Spatial and temporal effort

Most fishing activity undertaken in CEE, SOU and CHA from April to August

Vessel size classes and other methods employed

All surface longline vessels over 50 m in length.

Observer coverage

Historically, 2 to 4 vessels operate in this fishery each year with 50 – 100% observer coverage achieved in the past.

Seabird interactions

This fishery has historically had high captures of seabirds (including a variety of albatrosses and petrels), and while captures were lower during the 2004/05 and 2005/06 observer years, higher seabird captures were recorded during 2006/07.

Level 2 risk assessment division of fishery

- Surface longline vessels under 50 m in length

Troll

Method

In trolling, baited hooks or lures are towed behind a boat and fish are pulled aboard when caught. This method is designed to target fast moving surface swimming fish such as tuna, marlin and kingfish.

Target species

Most common target albacore tune.

Spatial and temporal effort

Fishing effort mostly from January to March with the majority of coverage west coast South Island and west coast North Island.

Vessel size classes and other methods employed

Vessel range in size from 5 m to 27 m. Other methods used by these vessels include bottom longlining, bottom trawling, dredging, potting, setnetting and surface longlining.

Observer coverage

Only a few trips have been observed in this fishery to date.

Seabird interactions

None detected from minimal coverage.

Level 2 risk assessment division of fishery

Not included

Trot line

Method

Trot lines can be considered to be a combination of the bottom longline and drop line fishing methods, using a buoyed longline suspended above the seabed, equipped with short dropper lines of 20 - 25 hooked short snoods.

Target species

Bass, bluenose, hapuku and school shark.

Spatial and temporal effort

Very little commercial effort relative to other methods, coverage scattered throughout the year in upper North Island, east coast South Island, south coast South Island and the Chathams.

Vessel size classes and other methods employed

Vessels using the method of trot line range in size from 7 to 22 m. The greatest number of events undertaken by any one vessel was 5 with many vessels only using the method of trot line once in the year examined. Primary methods employed by these vessels include bottom longline and surface longline.

Observer coverage

None

Level 2 risk assessment division of fishery

Not included

Appendix 3:
Mitigation devices known to be in use

Fishery	Mitigation devices
Beach seine / drag net	Unknown
BLL inshore	Line weighting, tori lines, bait and discard management, acoustic or physical deterrents
BLL deepsea	Line weighting, tori lines, bait and discard management, acoustic or physical deterrents
Dahn line	Unknown
Danish seine	Unknown
Deep water bottom trawl	Bird scaring devices, offal management
Diving	Unknown
Dredge	Unknown
Fish traps	Unknown
Hand gather	Unknown
Hand line	Unknown
Inshore drift net	Unknown
Inshore trawl	Bird scaring devices, offal management
Middle depth trawl targeting finfish	Bird scaring devices, offal management
Middle depth trawl - scampi	Bird scaring devices, offal management
Middle depth trawl - southern blue whiting	Bird scaring devices, offal management
Middle depth trawl - squid	Bird scaring devices, offal management
Pelagic mackerel trawl	Bird scaring devices, offal management
Pots	Unknown
Purse seine	Unknown
Ring net	Unknown
Setnet	Offal management
Squid jig	Unknown
Surface longline < 50 m	Tori lines, bait and discard management, line weighting
Surface longline > 50 m	Tori lines, bait and discard management, line weighting
Troll	Unknown
Trot line	Unknown