

FINAL DRAFT

June 2009

**Conservation Services Programme
Observer Report: 1 July 2007 until
30 June 2008**

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Abstract

The Department of Conservation (DOC), through the Conservation Services Programme (CSP), has a statutory role to monitor and collect data on the interactions between protected species and fisheries. To fulfil this role, government observers are placed on commercial fishing vessels operating in New Zealand's Exclusive Economic Zone (EEZ). This report details protected species interactions by fishery, fishing method and area between 1 July 2007 and 30 June 2008 in relation to observer effort and commercial fishing effort. Protected species known to interact with commercial fishing operating include seabirds, marine mammals and marine turtles. Information on where fishing effort, observer coverage and interactions occur is presented at a course level, so that potential gaps on monitoring can be identified along with high-risk areas and time periods in various fisheries. The information collected by observers can be used to identify where the most significant interactions are occurring, and contribute to the development and application of strategies to minimise adverse effects.

Keywords: commercial fishing, fisheries observers, seabirds, marine mammals, turtles, incidental catch, New Zealand EEZ

1. Introduction

Understanding the nature and extent of interactions between commercial fisheries and protected species is the foundation of the Conservation Services Programme (CSP), which is run by the Department of Conservation (DOC). The Programme also works to develop effective solutions to mitigate adverse effects of commercial fishing on protected species in New Zealand fisheries' waters.

Government observers are placed on commercial fishing vessels operating in New Zealand's Exclusive Economic Zone (EEZ) in order to monitor interactions with protected species. This information can be used to identify where the most significant interactions are occurring, and can inform development and application of strategies to minimise adverse effects. Such data contribute to assessments of whether protected species mortality is sustainable and whether mitigation strategies employed by fishing fleets are effective at reducing protected species captures.

The specific objectives of the project are currently to:

- Identify, describe and, where possible, quantify protected species interactions with commercial fisheries;
- Identify, describe and, where possible, quantify measures for mitigating protected species interactions;
- Collect other relevant information on protected species interactions that will assist in assessing, developing and improving mitigation measures.

In recent years, protected species interactions with some fisheries have become well understood, although sometimes rarely quantified. For example, trends in seabird bycatch in parts of the hoki (*Macruronus novaezelandiae*) fishery and squid (*Nototodarus sloanii* and *N. gouldi*) fishery are relatively clear, and our understanding of those interactions is well developed. However, interactions with other fisheries are less well understood, especially for inshore fisheries where the nature of interactions still need to be determined and robust estimates of the extent of interactions are not yet broadly possible.

Progress with mitigating known interactions is at various stages in different fisheries, depending on both the degree to which interactions are understood and the ability to find practical and cost effective solutions to those interactions. For example, it has been shown that seabird warp captures on trawlers have been reduced through various bird scaring devices (Middleton and Abraham, 2007) and offal management (Abraham *et al.*, 2009). In contrast, dolphin bycatch in pelagic trawl fisheries is more difficult to address and currently no mitigation techniques are in place. Mitigation methods have been introduced through regulations into several fisheries, including trawlers over 28 m in length (requirement to use seabird scaring devices) and surface longline vessels (requirement to use tori lines and either night set or weight lines). In other fisheries, mitigation techniques or fishing practices are being investigated and / or developed (e.g. offal management, line weighting). However, for inshore fisheries, particularly setnet and trawl, little is currently known from the observer programme about fishing practices due to limited coverage. This makes it more difficult to assess the need or potential for mitigation measures to be developed and implemented.

This report details protected species interactions by fishery, method and area for the period 1 July 2007 to 30 June 2008 in relation to observer effort and commercial fishing effort. Information is presented at a coarse level to inform where fishing effort, observer coverage and captures occur so that potential gaps in monitoring can be identified along with high risk areas and time periods in various fisheries. More analytical assessments of protected species interactions are undertaken through other projects¹.

¹ Projects include estimation of total protected species captures, risk assessments, species prioritisation and other modelling projects undertaken by the Department of Conservation or Ministry of Fisheries.

All data used in this report has been provided by the Ministry of Fisheries Research Data and Reporting group. Observer comments are summarised to provide information on mitigation, protected species behaviour and fishing practices (e.g. offal management). It is important to note that observers may not comment on all aspects of fishing operations and individual observers comment to varying extent on particular aspects of fishing. In addition, observers have varying levels of experience. As such, comments are included to provide context but are not a complete reflection of fishing operations on individual vessels.

2. Data collection

To date, the bulk of publicly available information on at-sea interactions between fishing vessels and protected species in New Zealand waters has been collected by Government observers.

The duties of an observer in respect of the Conservation Services Programme can be summarised as:

- Monitoring and recording the interactions of protected species with fishing operations
- Reporting on the efforts made to mitigate the adverse effects of commercial fishing on protected species
- Recording, photographing, tagging all protected species bycatch
- Recovering and retaining specimens for autopsy and / or identification
- Recording at least on a daily basis the numbers, and the behaviour of, marine mammal and seabird species seen around the fishing vessel
- Carrying out other tasks (e.g. making observations on discard and offal discharge, net capture observations) as required.

It is important to note that observer programmes typically have high spatial and temporal variation, as well as multiple priorities for information collection, which can make the data challenging to interpret and extrapolate to get actual interaction rates by fishery, location, or other desired variables. Data accuracy and relevance can be affected by inter-observer variability, weather conditions and access to vessels, while precision is affected by the observer sampling design. Data quality may also be biased by the opportunistic allocation of observers to vessels, as it is not always possible to place observers on vessels randomly. Nevertheless, the use of fisheries observers is currently considered to be the most reliable and flexible means of acquiring data on protected species interactions with fisheries.

3. Format

The remainder of this document is divided into separate ‘fisheries’ within which certain target species are grouped according to fishing method. This approach has been taken because the mix of target species is of less importance to protected species interactions than the method, location and timing of fishing. For each ‘fishery’ an overall summary of commercial effort, observer effort and protected species interactions are provided by Fisheries Management Area (FMA; see Fig. 1). Protected species interactions and observer effort are then broken down further for each target stock by area and month, in order to view interactions and observer effort temporally and spatially. Observer comments relating to offal management, mitigation and protected species behaviour are provided per observed vessel in each ‘fishery’. Data on protected coral bycatch is not included in this report and is instead reported on separately through project INT 2007-03 (Identification of protected corals) which began in the 2007/08 fishing year (see www.doc.govt.nz/mcs). All species are referred to either by common name (seabirds, marine mammals, reptiles and protected fish species) or species code (commercial fish species). A full list of scientific names of all species mentioned is included in Appendix 1. A summary of

all protected species interactions and by method, month and Fisheries Management Area are provided in Appendices 2 to 5.

This report refers to Rowe (2009) when making comparisons between the 2007/08 observer year data and previous observer years. Rowe (2009) reported on protected species interactions with fisheries for the 2004/05, 2005/06 and 2006/07 observer years.

4. Definitions

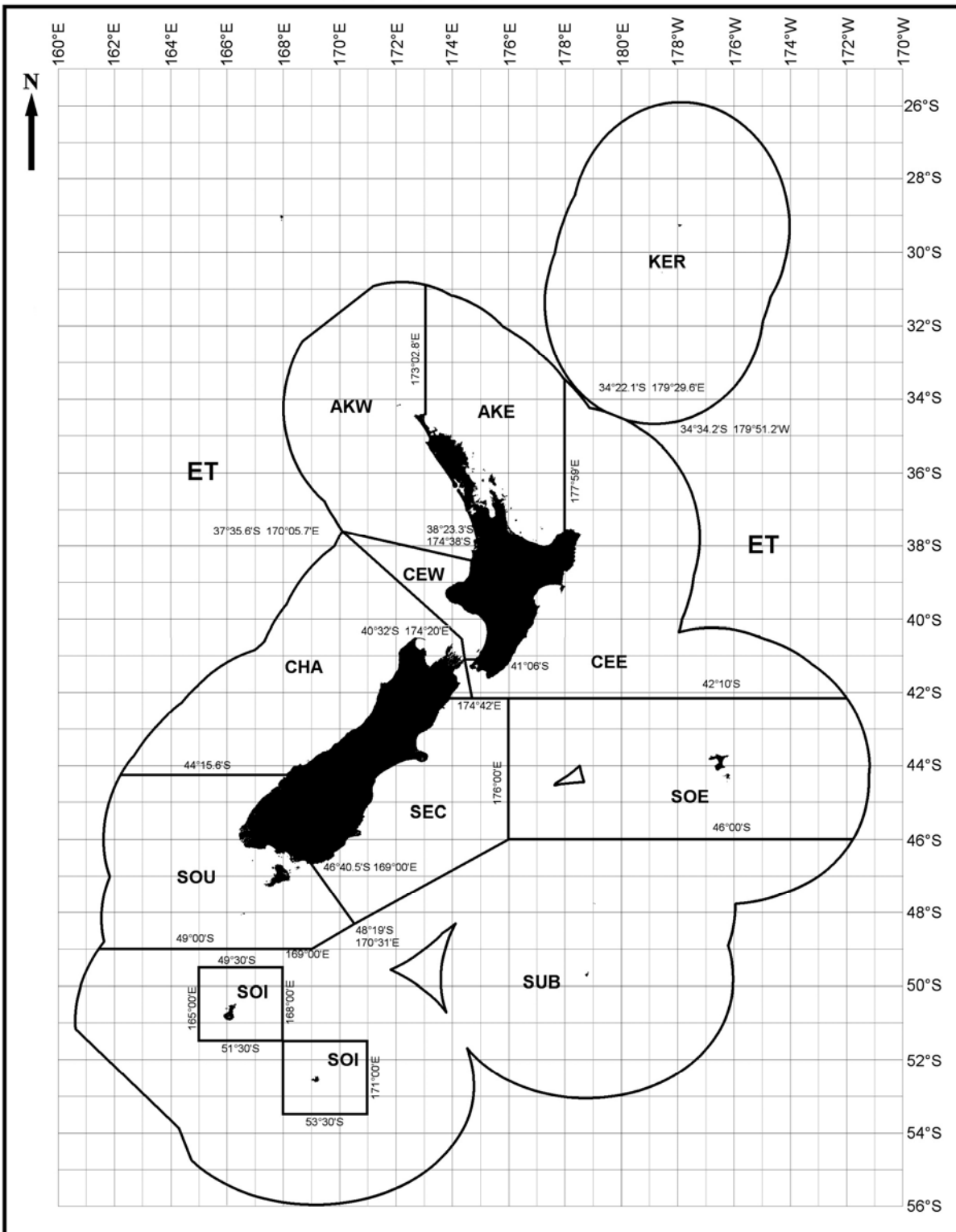
Capture: An interaction where a protected species is caught by fishing gear (e.g. hooked, caught in net, struck by warps).

Interaction: All interactions with fishing activity including captures on fishing gear, impacts against the vessels (i.e. deck strikes) and other non-fishing gear events (e.g. landing on vessel, marine mammals climbing up stern ramp).

SOI: The fisheries management area within SUB located around Auckland and Campbell Island groups where the squid 6T fishery operates.

Squid 6T fishery: The squid Quota Management Area that operates around Auckland and Campbell Islands in FMA SOI (see Figure 1).

Figure 1: New Zealand Fisheries Management Areas (source: Ministry of Fisheries)



Key:

FMA 1	AKE	East North Island from North Cape to Bay of Plenty
FMA 2	CEE	East North Island from south of Bay of Plenty to Wellington
FMA 3	SEC	East coast South Island from Pegasus Bay to Catlins
FMA 4	SOE	Chatham Rise
FMA 5	SOU	South Island from Foveaux Strait to Fiordland
FMA 6	SUB	Subantarctic including Bounty Island and Pukaki Rise
FMA6A	SOI	Southern offshore islands – Auckland and Campbell Islands
FMA 7	CHA	West Coast South Island to Fiordland including Kaikoura
FMA 8	CEW	West North Island from South Taranaki Bight to Wellington
FMA 9	AKW	West North Island from North Cape to North Taranaki Bight
FMA 10	KER	Kermadec
	ET	Outside NZ EEZ

5. Protected species interactions

MIDDLE DEPTH TRAWL FISHERIES

Hoki, hake, ling and warehou species

Protected species observer coverage of tows targeting the middle depth trawl stocks hoki, hake, ling or warehou species are discussed together. While additional stocks may also be targeted through this fishing method, these four stocks are subject to the greatest targeted observer effort, resulting in a higher number of observed protected species interactions than other target species. Other mid-water trawl fisheries (i.e. southern blue whiting, scampi and squid) are undertaken in specific areas (e.g. SOI) or with specific fishing methods (e.g. twin trawl), so are discussed separately.

Coverage in this middle depth trawl fishery can be split into the 'hoki season' and the 'out of hoki season', which operate during different months and fisheries areas. The 'hoki season' is focused in CHA and around the CEE, CHA boundary in the Cook Strait, where both hoki and hake are predominantly targeted from June to September. During the 'out of hoki season' from September until June, hoki, hake and silver warehou are targeted, mostly in SOE and SUB, with some coverage in SEC and SOU.

Mitigation techniques employed in this 'fishery' include offal and discard management, and the use of mandatory bird scaring devices. Trawl vessels over 28 m in length are required to use paired streamer (tori) lines, bird bafflers or warp scarers (deflectors). Based on observer reports during the 2007/08 observer year, most vessels use tori lines and / or bird bafflers depending on weather or other factors. Many vessels have a back-up device on board in case of breakages. At present, no mitigation devices are in place to reduce pinniped captures although fishing practices such as not setting while marine mammals are present around the vessel are practiced by some vessels. The potential to use Seal Exclusion Devices in this fishery is currently being investigated (CSP MIT 2006/09). Research into seabird net captures is also underway (CSP MIT 2006/02). Offal management research (started under MIT2004/01: Developing and testing of discard management technologies) is ongoing.

A summary of commercial fishing effort, observer effort and protected species interactions are shown in Table 1. The majority of commercial fishing effort and observer effort is undertaken throughout six FMAs. Over 10% observer coverage was achieved in each of these FMAs with 20% of all commercial tows observed overall. The highest rate of marine mammal capture was reported from CEE in the Cook Strait hoki fishery where captures are reported from the CEE / CHA boundary. The rate of seabird capture was similar in all FMAs where observer coverage was undertaken. Seabird capture rates are reduced compared to previous years (see Rowe 2009), but it should be noted that non-fishing interactions have been removed from Table 1 and were not removed in the 2004-07 observer report.

Table 1: Summary of commercial effort, observer effort and protected species captures in the HAK, HOK, LIN, SWA middle depth trawl fishery) during the 2007/08 observer year

FMA	Effort tows	Observer tows	Coverage (%)	Seabird captures*	Seabirds per 100 tows	Mammal captures	Mammals per 100 tows
1. AKE	1	0	0.00				
2. CEE	894	93	10.40	0	0.00	13	13.98
3. SEC	3849	480	12.47	9	2.08	6	1.25
4. SOE	2433	256	10.52	0	0.00	0	0.00
5. SOU	1760	511	29.03	9	1.76	5	0.98
6. SUB	1438	627	44.60	10	1.75	8	1.28
7. CHA	3167	726	22.92	10	1.38	19	2.62
8. CEW	0						
9. AKW	4	0	0.00				
10. KER	0						
Total	13546	2693	19.88	38	1.49	51	1.89

* Captures only, excludes deck strikes and other non-fishing interactions

Observer coverage

During the 2007/08 observer year, 53 individual trips were observed across 32 vessels (Appendix 6.1). Interactions with protected species (seabirds or marine mammals) were reported from 39 trips when hoki, hake, ling or warehou were the target species. Comments relating to offal management, mitigation used, protected species interactions and captures (i.e. interactions with fishing gear only) per vessel observed are given in Appendix 6.1. A common comment made by observers was the increasing number of birds arriving at the stern of the vessel during hauling. Both seabirds and fur seals were observed feeding from the codend and on lost fish.

Observer coverage was undertaken throughout the year with the greatest number of days observed in CHA from July to August (Table 2).

Table 2: Number of tows observed in the HAK, HOK, LIN, SWA middle depth trawl fishery by area and month during the 2007/08 observer year

FMA	Jul-07	Aug-07	Sep-07	Oct-07	Nov-07	Dec-07	Jan-08	Feb-08	Mar-08	Apr-08	May-08	Jun-08	Total
2. CEE	0	71	13	0	0	0	0	0	0	0	0	9	93
3. SEC	6	0	0	57	53	6	14	9	61	53	177	44	480
4. SOE	8	0	0	0	25	0	21	101	5	52	44	0	256
5. SOU	21	7	75	194	101	0	12	15	50	13	3	20	511
6. SUB	20	87	23	212	91	73	6	73	32	0	0	10	627
7. CHA	303	335	46	0	0	0	0	0	1	0	0	41	726
Total	358	500	157	463	270	79	53	198	149	118	224	124	2693

A greater number of tows were observed when the target was hoki, followed by ling (Table 3). More ling tows were observed during the 2007/08 observer year compared to previous years with fewer tows targeting warehou species (Rowe 2009).

Table 3: Number of tows observed in the HAK, HOK, LIN, SWA middle depth trawl fishery by area and target species during the 2007/08 observer year

Target	2. CEE	3. SEC	4. SOE	5. SOU	6. SUB	7. CHA	Total
Hake	0	0	8	2	50	154	214
Hoki	93	459	248	153	288	568	1809
Ling	0	0	0	304	276	0	580
Silver warehou	0	21	0	13	0	4	38
Common warehou	0	0	0	13	0	0	13
White warehou	0	0	0	26	13	0	39
Total	93	480	256	511	627	726	2693

Protected species interactions

Fewer fur seals were reported captured in the HAK, HOK, LIN, SWA middle depth trawl fishery during the 2007/08 observer year compared to the last three observer years (Rowe 2009). A greater number of seabirds were reported killed compared to the previous observer year, but numbers were lower than reported in the 2004/05 and 2005/06 observer years.

Table 4: Protected species interactions in the HAK, HOK, LIN, SWA middle depth trawl fishery during the 2007/08 observer year

Species	Dead	Alive	Total
Seabirds			
Black-browed albatross (unidentified)	1		1
Buller's albatross	8	2	10
Cape petrel	1	4	5
Fairy prion	1		1
Giant petrel (unidentified)	3		3
Grey petrel	1		1
Petrel (unidentified)	1	2	3
Prion (unidentified)		3	3
Salvin's albatross		1	1
Seabird small		1	1
Shy albatross	3		3
Sooty shearwater	7	1	8
Storm petrel		1	1
White-capped albatross	1	3	4
White-chinned petrel	12	1	13
Total seabirds	39	19	58
Marine mammals			
Fur seals	42	11	53
Total marine mammals	42	11	53
Total protected species interactions	81	30	111

The method of protected species capture as reported by observers on Observer Non-fish Bycatch Forms is detailed in Table 6. All live fishing related captures were animals recovered from the net (Table 5a). Three birds were reported as tangled in mitigation gear but the interactions were not considered fatal. Three mortalities resulted from birds hitting the deck of the vessel (Table 5b). The majority of bird mortalities were from net captures (26 birds), with only six warp captures reported. One bird was killed striking the bird baffler.

Table 5: Method of interaction for a) protected species released alive and b) dead protected species in the HAK, HOK, LIN, SWA middle depth trawl fishery during the 2007/08 observer year

a) Released alive

Species	Impact against vessel	Caught in net*	Other	Total	Comments relating to 'other' capture method
Seabirds					
Buller's albatross		1	1	2	Rode on top of codend when hauled up stern ramp
Cape petrel	3	1		4	
Petrel (Unidentified)			2	2	One bird tangled in tori line (unharmd), the other landed on deck
Prion (unidentified)	1		2	3	One bird found in 44 gallon drum, the other landed on trawl deck
Salvin's albatross		1		1	
Small seabird		1		1	
Sooty shearwater			1	1	Landed on aft deck
Storm petrel			1	1	Landed on deck
White-capped albatross		1	2	3	One bird tangled in tori line, the other caught by the wing in port bird baffler, being dragged
White-chinned petrel		1		1	
Seabirds total	4	6	9	19	
Marine mammals					
Fur seal		11		11	
Marine mammals total		11		11	
Total protected species interactions	4	17	9	30	

* Included as 'capture' in Table 1

b) Dead protected species

Species	Impact against vessel	Caught in net*	Caught on warp or door*	Tangled in line	Unknown	Other	Total	Comments relating to 'other' capture method
Seabirds								
Black browed albatross (unidentified)				1			1	
Buller's albatross		4	4				8	
Cape petrel		1					1	
Fairy prion	1						1	
Giant petrel (unidentified)	1	1	1				3	
Grey petrel	1						1	
Petrel (unidentified)					1		1	
Shy albatross		1	1			1	3	Hit bird baffler
Sooty shearwater		6				1	7	Found in pounds
White-capped albatross		1					1	
White-chinned petrel		12					12	
Seabirds total	3	26	6	1	1	2	39	
Marine mammals								
Fur seal		41			1		42	
Marine mammals total		41			1		42	
Total protected species interactions	3	67	6	1	2	2	81	

* Included as 'capture' in Table 1

Seabird and fur seal interactions by target species are shown in Table 6. The greatest number of captures occurred on hoki tows, but from Table 4 it can be seen that a greater number of hoki tows were observed.

Table 6: Protected species interactions by target species in the HAK, HOK, LIN, SWA middle depth trawl fishery during the 2007/08 observer year

Species	Target stock					Total
	Hake	Hoki	Ling	Silver warehou	White warehou	
Seabirds						
Black browed albatross (unidentified)			1			1
Buller's albatross	2	5		2	1	10
Cape petrel		5				5
Fairy prion			1			1
Giant petrels (unidentified)		3				3
Grey petrel		1				1
Petrel (unidentified)	1	1		1		3
Prion (unidentified)	1	2				3
Salvin's albatross			1			1
Shy albatross	1	1			1	3
Small seabird			1			1
Sooty shearwater	3	4	1			8
Storm petrel		1				1
White-capped albatross		3	1			4
White-chinned petrel		8	3		2	13
Seabirds total	8	34	9	3	4	58
Marine mammals						
Fur seal	5	37	9	2		53
Marine mammal total	5	37	9	2		53
Total protected species interactions	13	71	18	5	4	111

Seabird interactions were reported in all months during which observer coverage was undertaken (Table 7).

Table 7: Seabird interactions in the HAK, HOK, LIN, SWA middle depth trawl fishery by area during the 2007/08 observer year (a zero indicates no observed captures whereas a dash indicates there was no observer coverage during that month in that FMA).

FMA	Jul-07	Aug-07	Sep-07	Oct-07	Nov-07	Dec-07	Jan-08	Feb-08	Mar-08	Apr-08	May-08	Jun-08	Total
2. CEE	-	0	0	-	-	-	-	-	-	-	-	0	0
3. SEC	1	-	-	1	0	0	0	0	3	8	3	1	17
4. SOE	0	-	-	-	0	-	0	0	0	0	0	-	0
5. SOU	2	0	0	1	1	-	0	0	3	3	1	0	11
6. SUB	0	0	0	1	0	4	2	5	1	-	-	0	13
7. CHA	7	7	2	-	-	-	-	-	0	-	-	1	17
Total	10	7	2	3	1	4	2	5	7	11	3	2	58

Fur seals were caught throughout the observer year in five FMAs with the highest number of fur seal captures observed in August in the Cook Strait hoki fishery (Table 8).

Table 8: Fur seal interactions in the HAK, HOK, LIN, SWA middle depth trawl fishery by area during the 2007/08 observer year (a zero indicates no observed captures whereas a dash indicates there was no observer coverage during that month in that FMA).

FMA	Jul-07	Aug-07	Sep-07	Oct-07	Nov-07	Dec-07	Jan-08	Feb-08	Mar-08	Apr-08	May-08	Jun-08	Total
2. CEE	-	9	2	-	-	-	-	-	-	-	-	4	15
3. SEC	2	-	-	4	0	0	0	0	0	0	0	0	6
4. SOE	0	-	-	-	0	-	0	0	0	0	0	-	0
5. SOU	0	0	1	1	1	-	0	0	0	0	0	0	3
6. SUB	0	4	1	5	0	0	1	1	0	-	-	0	12
7. CHA	4	7	1	-	-	-	-	-	0	-	-	5	17
Total	6	20	5	10	1	0	1	1	0	0	0	9	53

Southern Blue Whiting

The southern blue whiting fishery operates in specific areas (SOI and SUB) during August and September.

Fur seals and NZ sea lions have been incidentally caught in this fishery, while seabird interactions have historically been lower than other trawl fisheries. Trawlers over 28 m in length are required to use seabird mitigation devices. Sea lion exclusion devices are not used in this fishery. Vessels also employ offal and discard management techniques to reduce seabird interactions.

A summary of commercial fishing effort, observer effort and protected species interactions are shown in Table 9. Thirty five percent of total fishing effort was observed during the 2007/08 observer year. This fishery has the highest rate of marine mammal capture (all pinnipeds) with ten animals caught per 100 tows. The marine mammal capture rate is lower than the 2006/07 rate. The seabird capture rate is similar to 2006/07 and, for the second year in a row, is higher than in the HOK, HAK, LIN SWA middle depth fishery.

Table 9: Summary of commercial effort, observer effort and protected species captures in the southern blue whiting fishery during the 2007/08 observer year

FMA	Effort tows	Observer tows	Coverage (%)	Seabird captures*	Seabirds per 100 tows	Mammal captures	Mammals per 100 tows
1. AKE							
2. CEE							
3. SEC							
4. SOE							
5. SOU							
6. SUB	615	216	35.12	4	1.85	23	10.65
7. CHA							
8. CEW							
9. AKW							
10. KER							
Total	615	216	35.12	4	1.85	23	10.65

* Captures only, excludes deck strikes and other non-fishing interactions

Observer coverage

During the 2007/08 observer year, eight trips were observed aboard seven vessels. Interactions with seabirds and / or marine mammals were reported from seven of the eight trips. Comments relating to offal management, mitigation used, protected species interactions and captures (i.e. interactions with fishing gear only) per vessel observed are given in Appendix 6.2. As for other trawl fisheries, seabird numbers generally increase during hauling and when discharging offal. Both seabird and pinniped species were observed feeding from the codend or eating lost fish. Most vessels kept the net at depth when turning in order to avoid marine mammal captures.

The greatest number of observed southern blue whiting tows were undertaken in September 2007 (Table 10).

Table 10: Number of tows observed in the southern blue whiting fishery by area and month during the 2007/08 observer year

FMA	Jul-07	Aug-07	Sep-07	Oct-07	Nov-07	Dec-07	Jan-08	Feb-08	Mar-08	Apr-08	May-08	Jun-08	Total
6. SUB	0	58	156	2	0	0	0	0	0	0	0	0	216
Total	0	58	156	2	0	0	0	0	0	0	0	0	216

Protected species interactions

Most observed protected species captures in this fishery were pinnipeds (Table 11). The number of NZ sea lions caught was higher than in previous years, while the number of fur seals caught was reduced. The number of seabirds caught has changed little over the last four years, with two captures in 2004/05, three in 2005/06, four in 2006/07 (see Rowe 2009) and four in the 2007/08 observer year.

Table 11: Protected species interactions in the southern blue whiting fishery during the 2007/08 observer year

Species	Dead	Alive	Total
Seabirds			
Black-browed albatross (unidentified)	1		1
Grey petrel	2		2
Seabird large		1	1
Seabirds total	3	1	4
Marine mammals			
Fur seal	17		17
NZ sea lion	6		6
Marine mammals total	23		23
Total protected species interactions	26	1	27

Only one warp interaction was observed during the 2007/08 observer year and was not fatal. All other interactions were net captures (Table 12).

Table 12: Method of capture for protected species interactions in the southern blue whiting fishery during the 2007/08 observer year

Species	Caught in net*	Caught on warp or door*	Total
Seabirds			
Grey petrel	2		2
Black-browed albatross (unidentified)	1		1
Seabird large		1	1
Seabirds total	3	1	4
Marine mammals			
Fur seal	17		17
NZ sea lion	6		6
Marine mammals total	23		23
Total protected species interactions	26	1	27

* Included as 'capture' in Table 9

The timing of observed protected species interactions does not align directly with observed fishing effort. Only two tows were observed in October, yet eight captures were reported (Table 13) compared to 156 tows observed in September with nine reported captures and 58 tows in August with ten captures. As in previous years, a greater rate of capture was reported in August compared to September when the majority of observer effort is achieved.

Table 13: Protected species interactions in the southern blue whiting fishery by area and month during the 2007/08 observer year.

Species	Aug-07	Sep-07	Oct-07	Total
Fur seals	8	5	4	17
Sea lions		3	3	6
Seabirds	2	1	1	4
Total	10	9	8	27

Almost all pinnipeds caught were determined by observers to be male (Table 16).

Table 14: Observer determined sex of captured pinnipeds in the southern blue whiting fishery by area during the 2007/08 observer year

Sex	Fur seals	NZ sea lions	Total
Male	16	6	22
Female	1		1
Total	17	6	23

Scampi

Historically, CSP 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. Observations are undertaken to monitor interactions with seabirds and NZ sea lions. Interactions with seabirds have been recorded in this fishery as well as occasional interactions with sea lions in the southern scampi fishery. Mitigation techniques employed in this fishery include offal and discard retention and the use of bird scaring devices (required for vessels over 28 m).

A summary of commercial fishing effort, observer effort and protected species interactions are shown in Table 15. The greatest number of observed tows was undertaken in SOE, of which only 8% of effort tows were observed. SUB has the second highest number of commercial tows reported but only 6% of tows were observed. Higher levels of observer coverage were achieved in AKE, CEE and SEC. Across all fishing effort, 10% of tows were observed. No captures were reported from CEE or SEC. Two seabirds per 100 tows were reported in SOE and one seabird per 100 tows in AKE. One marine mammal was caught in SUB. The seabird capture rate is reduced from previous years, although non-fishing interactions are excluded in Table 15.

Table 15: Summary of commercial effort, observer effort and protected species captures in the scampi trawl fishery during the 2007/08 observer year.

FMA	Effort tows	Observer tows	Coverage (%)	Seabird captures*	Seabirds per 100 tows	Mammal captures	Mammals per 100 tows
1. AKE	751	154	20.51	2	1.30	0	0.00
2. CEE	748	101	13.50	0	0.00	0	0.00
3. SEC	19	4	21.05	0	0.00	0	0.00
4. SOE	2295	179	7.80	4	2.23	0	0.00
5. SOU	1	0	0.00				
6. SUB	1297	82	6.32	0	0.00	1	1.22
7. CHA							
8. CEW							
9. AKW							
10. KER							
Total	5111	520	10.17	6	1.15	1	0.19

* Captures only, excludes deck strikes and other non-fishing interactions

Observer coverage

During the 2007/08 observer year, nine scampi trips were observed across five vessels, with protected species interactions reported from six trips. Comments relating to offal management, mitigation used, protected species interactions and captures (i.e. interactions with fishing gear only) per vessel observed are given in Appendix 6.3. Bird abundance around the vessel was greatest when trawl nets were on the surface. Sightings of pinnipeds were lower than reported for other middle depth trawl fisheries. Of the five individual vessels observed, four used twin tori lines. One of the vessels deploying tori lines also deployed a skipper designed device consisting of two buoys connected to a length of rope which deflected birds from where the warp breached the surface. The one vessel not using a tori line also used a float and rope device.

The majority of observed scampi tows were in November and May with the greatest single concentration of observer days in SOE in May and AKE and CEE in November (Table 16). Observer effort was spread through five FMAs in November.

Table 16: Number of tows observed in the scampi trawl fishery by area and month during the 2007/08 observer year.

FMA	Jul-07	Aug-07	Sep-07	Oct-07	Nov-07	Dec-07	Jan-08	Feb-08	Mar-08	Apr-08	May-08	Jun-08	Total
1. AKE	0	0	8	0	60	9	0	0	64	13	0	0	154
2. CEE	0	0	0	0	62	0	0	0	0	28	11	0	101
3. SEC	0	0	0	1	3	0	0	0	0	0	0	0	4
4. SOE	0	0	0	0	35	15	0	0	0	9	120	0	179
6. SUB	0	0	0	0	45	0	0	0	0	0	0	37	82
Total	0	0	8	1	205	24	0	0	64	50	131	37	521

Protected species interactions

Eighteen of the 24 observed seabird interactions were not interactions with the fishing gear (Tables 17 and 18). Thirteen sooty shearwaters were disorientated by deck lights and flew into the vessel. In AKE, further three sooty shearwaters were recovered from a trawl net entangled in fishing line, so had already been caught and discarded by another vessel, possibly recreational. As such, only six seabird fatalities were the result of fishing, being two net captures and four warp captures. The one fur seal caught was released alive.

Table 17: Protected species interactions in the scampi trawl fishery during the 2007/08 observer year.

Species	Dead	Alive	Total
Seabirds			
Buller's albatross		1	1
Common diving petrel		1	1
Salvin's albatross	4		4
Sooty shearwater	5	13	18
Seabird total	9	15	24
Marine mammals			
Fur seal		1	1
Marine mammal total		1	1
Total protected species interactions	9	16	25

Table 18: Method of protected species interactions in the scampi trawl fishery by area and month during the 2007/08 observer year

Species	Impact against vessel	Caught in net*	Caught on warp or door*	Tangled in line	Total
Seabirds					
Buller's albatross	1				1
Common diving petrel	1				1
Salvin's albatross			4		4
Sooty shearwater	13	2		3	18
Seabird total	15	2	4	3	24
Marine mammals					
Fur seals		1			1
Marine mammal total		1			1
Total protected species interactions	15	3	4	3	25

* Included as 'capture' in Table 15

The majority of seabird interactions were in AKE (Table 19), yet most of these were non-fishing interactions. Most fishing interactions were reported in SOE. One fur seal was caught in SUB in November 2007.

Table 19: Seabird interactions in the scampi trawl fishery by area during the 2007/08 observer year (a zero indicates no observed captures whereas a dash indicates there was no observer coverage during that month in that FMA)

FMA	Sep-07	Oct-07	Nov-07	Dec-07	Mar-08	Apr-08	May-08	Jun-08	Total
1. AKE	0	-	6	9	4	0	-	-	19
2. CEE	-	-	0	-	-	0	0	-	0
3. SEC	-	0	0	-	-	-	-	-	0
4. SOE	-	-	3	1	-	0	1	-	5
6. SUB	-	-	0	-	-	-	-	0	0
Total	0	0	9	10	4	0	1	0	24

Squid

Higher levels of observer coverage have been planned and delivered in the squid (SQU) fishery compared to other trawl fisheries due to historically high levels of seabird captures, especially white-capped albatross warp captures and net captures of sooty shearwaters and white-chinned petrels. Offal has been identified as a key issue leading to warp captures in this fishery (Middleton and Abraham 2007) and practices are currently being developed to manage discharging waste during active fishing. Research is also underway to investigate the factors that lead to net captures and possible mitigation techniques (CSP MIT 2006/02). In addition, the Deepwater Group Ltd has developed voluntary vessel management plans for deepwater factory trawlers which outline the offal and discard management plan and mitigation devices or practices employed by each vessel. This fishery is also a focus of observer coverage due to captures of NZ sea lions. Vessels operating in the squid 6T fishery area use Sea Lion Exclusion Devices. Observer coverage in the squid fishery has been focussed in the Squid 6T fishery in the Subantarctic FMA with additional coverage in SOU, which is usually achieved as vessels are travelling to 6T.

The majority of fishing effort for squid was in SEC, SOU and SUB while observer coverage was focussed in FMAs SOU and SUB (Table 20). A high rate of observed seabird captures occurs in both SOU and SUB and the highest rate of observed marine mammal capture occurred in SUB. The squid fishery had the highest rate of seabird captures in 2007/08 compared to other observed fisheries. While the capture rate has decreased compared to the 2004/05 and 2005/06 observer years, the rate of seabird capture is similar to that reported in 2006/07 (Rowe 2009). In previous years, high rates of seabird captures have been reported in SEC, but almost no observer coverage was achieved in SEC in the 2007/08 observer year. Fewer marine mammals were caught in the squid fishery in 2007/08 and the capture rate was lower compared to previous years.

Table 20: Summary of commercial effort, observer effort and protected species captures in the squid trawl fishery during the 2007/08 observer year.

FMA	Effort tows	Observer tows	Coverage (%)	Seabird captures*	Seabirds per 100 tows	Mammal captures	Mammals per 100 tows
1. AKE	2	0	0.00				
2. CEE							
3. SEC	549	3	0.55	0	0.00	0	0.00
4. SOE	25	0	0.00				
5. SOU	2397	855	35.67	100	11.93	5	0.58
6. SUB	1266	591	46.69	58	9.81	6	1.02
7. CHA	3	1	33.33	0	0.00	0	0.00
8. CEW							
9. AKW	1	0	0.00				
10. KER							
Total	4243	1450	34.17	158	11.03	11	0.76

* Captures only, excludes deck strikes and other non-fishing interactions

Observer coverage

During the 2007/08 observer year, 23 trips were observed aboard 19 vessels. Protected species captures of seabirds and / or marine mammals were reported from 21 of those trips when squid was the target. Comments relating to offal management, mitigation used, protected species interactions and captures (i.e. interactions with fishing gear only) per vessel observed are given in Appendix 6.4. All vessels deployed Sea Lion Exclusion Devices (SLEDs) when operating in the SQU 6T fishery area, but generally did not when outside this fishing area. Several vessels had alternative bird mitigation devices on board should the preferred device become damaged or unusable.

Almost all observed squid tows were in SOU and SUB from January to May (Table 21) with only four tows observed outside these areas.

Table 21: Number of tows observed in the squid trawl fishery by area and month during the 2007/08 observer year.

FMA	Jul-07	Aug-07	Sep-07	Oct-07	Nov-07	Dec-07	Jan-08	Feb-08	Mar-08	Apr-08	May-08	Jun-08	Total
3. SEC	0	0	0	0	0	0	0	0	0	2	1	0	3
5. SOU	0	1	0	0	0	0	69	322	341	110	12	0	855
6. SUB	0	0	0	0	0	0	13	267	205	136	0	0	590
7. CHA	0	0	0	0	0	0	0	1	0	0	0	0	1
Total	0	1	0	0	0	0	83	561	547	248	13	0	1453

Protected species interactions

Over 100 protected species were incidentally killed on observed squid vessels during the 2007/08 observer year (Table 22). The observed number of seabirds caught was higher than during the previous observer year, with lower numbers of white-capped albatrosses caught but higher numbers of sooty shearwaters and white-chinned petrels caught. Observed marine mammal captures were lower than in previous years. The first white point shark capture since the species became protected under the Wildlife Act 1953 was reported in this fishery during the 2007/08 observer year. Nine animals were recovered from squid trawls in a state of decomposition.

Table 22: Protected species interactions in the squid trawl fishery during the 2007/08 observer year.

Species	Dead	Alive	Decomposing	Total
Protected fish				
White pointer shark	1			1
Protected fish total	1			1
Seabirds				
Albatross (unidentified)	4	5		9
Buller's albatross	3			3
Fairy prion		1		1
Grey-back storm petrel		1		1
Petrel (unidentified)	27	8		35
Salvin's albatross	1			1
Small seabird		1		1
Sooty shearwater	48	12		60
Southern royal albatross	1			1
Storm petrels		1		1
Wandering albatross	1			1
White-capped albatross	29	6	5	40
White-chinned petrel	20	9	3	32
Seabird total	134	44	8	186
Marine mammals				
Fur seal	6	1	1	8
NZ sea lion	5			5
Marine mammal total	11	1	1	13
Total protected species interactions	146	45	9	200

During the 2007/08 observer year, 25 seabirds were caught in the net and released alive (Table 23a). One live warp capture and one tori line entanglement were also reported. Over 100 protected species were observed caught and incidentally killed in the squid fishery; 118 birds and 10 pinnipeds (Table 23b). Twelve seabird mortalities were reported as caught on the warp or door. One fatality resulted from a sooty shearwater impacting against the vessel. All four captures in the 'other' category were fishing interactions. 'Tangled in line' may indicate a bird tangled in part of the net or in a tori line.

Table 23: Method of interaction for a) protected species released alive and b) dead protected species in the squid trawl fishery during the 2007/08 observer year

a) Released alive

Species	Impact against vessel	Caught in net*	Caught on warp or door*	Unknown	Other	Total	Comments relating to 'other' capture method
Seabirds							
Albatross (unidentified)	5					5	
Fairy prion	1					1	
Grey-backed storm petrel	1					1	
Petrel (unidentified)	2	4	1	1		8	
Small seabird		1				1	
Sooty shearwater		11			1	12	Landed on deck
Storm petrel	1					1	
White-capped albatross	2	1			3	6	One tangled in tori line. Two landed on deck during storm
White-chinned petrel		8			1	9	Landed on deck
Seabird total	12	25	1	1	5	44	
Marine mammals							
Fur seal					1	1	Climbed on board
Marine mammal total					1	1	
Total protected species interactions	12	25	1	1	6	45	

* Included as 'capture' in Table 20

b) Dead protected species (excluding decomposing animals)

Species	Impact against vessel	Caught in net*	Caught on warp or door*	Tangled in line	Other*	Total	Comments relating to 'other' capture method
Protected fish							
White pointer shark		1				1	
Protected fish total		1				1	
Seabirds							
Albatross (unidentified)		3	1			4	
Buller's albatross		2		1		3	
Petrel (unidentified)		27				27	
Salvin's albatross		1				1	
Sooty shearwater	1	44	2		1	48	Caught inside SLED portside grid
Southern royal albatross		1				1	
Wandering albatross		1				1	
White-capped albatross		19	9		1	29	Found in between chaffing blanket
White-chinned petrel		19			1	20	Caught on chaffing gear, wrapped around leg
Seabird total	1	117	12	1	3	134	
Marine mammals							
Fur seal		5			1	6	Fur caught in ground rope, sliced through abdomen
NZ sea lion		5				5	
Marine mammal total		10			1	11	
Total protected species interactions	1	128	12	1	4	146	

* Included as 'capture' in Table 20. The 'other' captures are included as they all relate to fishing interactions with gear.

Most seabird interactions were reported in SOU in February with further captures in SOI in March and April (Table 24).

Table 24: Seabird interactions in the squid trawl fishery by area and month during the 2007/08 observer year (a zero indicates no observed captures whereas a dash indicates there was no observer coverage during that month in that FMA)

FMA	Aug-07	Jan-08	Feb-08	Mar-08	Apr-08	May-08	Total
3. SEC	-	-	-	-	0	0	0
5. SOU	0	3	87	16	7	2	115
6. SUB	-	0	6	43	21	-	71
7. CHA	-	-	0	-	-	-	0
Total		3	93	59	29		186

Most fur seals were caught in SOU during January and February (Table 25).

Table 25: Fur seals interactions in the squid trawl fishery by area and month during the 2007/08 observer year (a zero indicates no observed captures whereas a dash indicates there was no observer coverage during that month in that FMA)

FMA	Aug-07	Jan-08	Feb-08	Mar-08	Apr-08	May-08	Total
3. SEC	-	-	-	-	0	0	0
5. SOU	0	1	5	0	0	0	6
6. SUB	-	0	0	0	2	-	2
7. CHA	-	-	0	-	-	-	0
Total		1	5		2		8

All NZ sea lions were caught in SOI, mostly in March (Table 26).

Table 26: Sea lion interactions in the squid trawl fishery by area and month during the 2007/08 observer year (a zero indicates no observed captures whereas a dash indicates there was no observer coverage during that month in that FMA)

FMA	Aug-07	Jan-08	Feb-08	Mar-08	Apr-08	May-08	Total
3. SEC	-	-	-	-	0	0	0
5. SOU	0	0	0	0	0	0	0
6. SUB	-	0	0	4	1	-	5
7. CHA	-	-	0	-	-	-	0
Total				4	1		5

PELAGIC TRAWL FISHERIES

Jack Mackerel and Barracouta

Historically, common dolphins have been recorded caught in the pelagic trawl fishery including the capture of 17 dolphins by three vessels off west Auckland in November 2004. Dusky dolphins, fur seals and seabirds have also been recorded caught in this fishery. The majority of observer coverage is from October to December with some coverage from April to July. Vessels can employ several techniques aimed at reducing the likelihood of interacting with dolphins, including not fishing during hours when dolphin interactions are more likely and not setting nets when dolphins are present around the vessel. An industry-led Marine Mammal Operating Procedure is in place which provides guidance on best practice to reduce dolphin capture.

A summary of commercial fishing effort, observer effort and protected species interactions are shown in Table 27. Pelagic trawl effort is mostly in CHA, CEW and SEC. Little observer coverage was achieved in SEC but higher observer effort was achieved in CHA, CEW and AKW where common dolphin captures have historically been reported. While higher rates of seabird captures were reported in SEC and SOU, seabird and marine mammal captures were reduced compared to previous years. An unobserved vessel also reported common dolphin captures in December in the same area as the observed captures.

Table 27: Summary of commercial effort, observer effort and protected species captures in the pelagic trawl fishery during the 2007/08 observer year.

FMA	Effort tows	Observer tows	Coverage (%)	Seabird captures*	Seabirds per 100 tows	Mammal captures	Mammals per 100 tows
1. AKE	49	1	2.04	0	0.00	0	0.00
2. CEE	25	3	12.00	0	0.00	0	0.00
3. SEC	1034	31	3.00	1	6.45	0	0.00
4. SOE	203	5	2.46	0	0.00	0	0.00
5. SOU	281	57	20.28	4	7.02	0	0.00
6. SUB	0						
7. CHA	2104	308	14.64	0	0.00	2	0.65
8. CEW	1525	454	29.77	0	0.00	3	0.66
9. AKW	185	148	80.00	0	0.00	17	11.49
10. KER	0						
Total	5406	1007	18.63	5	0.60	22	2.18

* Captures only, excludes deck strikes and other non-fishing interactions

Observer coverage

During the 2007/08 observer year, barracouta or mackerel species were targeted on 25 trips across 11 vessels. Five trips targeted jack or English mackerel exclusively in AKW and CEW while other trips targeted other stocks such as hoki. Captures occurred on seven trips when mackerel or barracouta were the target species. Comments relating to offal management, mitigation used, protected species interactions and captures (i.e. interactions with fishing gear only) per vessel observed are given in Appendix 6.5. As for other trawl fisheries, bird numbers increased at hauling.

Observer coverage was undertaken throughout the 2007/08 observer year (Table 28) with most observer effort from June to July and October to December. While observer effort was undertaken across eight FMAs, the focus of coverage was in AKW, CEW and CHA.

Table 28: Observer days in the pelagic trawl fishery by area and month during the 2007/08 observer year

FMA	Jul-07	Aug-07	Sep-07	Oct-07	Nov-07	Dec-07	Jan-08	Feb-08	Mar-08	Apr-08	May-08	Jun-08	Total
1. AKE	0	0	0	1	0	0	0	0	0	0	0	0	1
2. CEE	0	0	1	2	0	0	0	0	0	0	0	0	3
3. SEC	11	1	1	0	0	0	0	0	0	13	1	4	31
4. SOE	5	0	0	0	0	0	0	0	0	0	0	0	5
5. SOU	0	0	1	0	0	5	5	7	18	20	1	0	57
7. CHA	100	20	25	14	0	8	9	0	0	0	0	132	308
8. CEW	30	28	13	75	53	202	7	0	0	0	0	46	454
9. AKW	1	0	1	26	14	101	0	0	0	0	0	5	148
Total	147	49	42	118	67	316	21	7	18	33	2	187	1007

Jack mackerel tows are mostly observed in AKW, CEW and CHA (Table 29) where historically common dolphin captures have been reported. Tows targeting barracouta are generally observed in other FMAs, often when other stocks such as hoki are being targeting as well.

Table 29: Observer days in the pelagic trawl fishery by area and target species in the 2007/08 observer year

Target	1. AKE	2. CEE	3. SEC	4. SOE	5. SOU	7. CHA	8. CEW	9. AKW	Total
BAR	0	0	15	5	53	66	3	0	142
EMA	0	0	0	0	0	1	6	1	8
JMA	1	3	16	0	4	241	445	147	857
Total	1	3	31	5	57	308	454	148	1007

Protected species interactions

Fewer protected species interactions were reported compared to previous years (see Rowe 2009). A total of 20 common dolphins were observed caught in the jack mackerel fishery in 2007/08 and two additional captures were reported from unobserved vessels (Table 30).

Table 30: Protected species interactions in the pelagic trawl fishery during the 2007/08 observer year

Species	Dead	Alive	Total
Seabirds			
Buller's albatross	1		1
Common diving petrel		2	2
Petrel (unidentified)	3		3
Prion (unidentified)		2	2
Shy albatross	1		1
White-chinned petrel	1		1
White-faced storm petrel		3	3
Seabird total	6	7	13
Marine mammals			
Common dolphin	20		20
NZ fur seal	2		2
Marine mammal total	22		22
Total protected species interactions	28	7	35

All mammal captures were observed when targeting jack mackerel (Table 31) and seabird captures were reported when targeting both jack mackerel and barracouta.

Table 31: Protected species interactions by target species in the pelagic trawl fishery during the 2007/08 observer year

Species	Barracouta	Jack mackerel	Total
Seabirds			
Buller's albatross		1	1
Common diving petrel		2	2
Petrel (unidentified)	3		3
Prion (unidentified)		2	2
Shy albatross	1		1
White-chinned petrel	1		1
White-faced storm petrel		3	3
Seabird total	5	8	13
Marine mammals			
Common dolphin		20	20
NZ fur seal		2	2
Marine mammal totals	0	22	
Total protected species interactions	5	30	35

Four seabird net captures were reported in pelagic trawl fisheries during the 2007/08 observer year (Table 32).

Table 32: Method of interaction for protected species interactions in the pelagic trawl fishery during the 2007/08 observer year

Species	Impact against vessel	Caught in net*	Unknown	Other	Total	Comments relating to 'other' capture method
Seabirds						
Buller's albatross		1			1	
Common diving petrel				2	2	One landed on deck, the other covered in grease on deck
Petrel (unidentified)		3			3	
Prion (unidentified)	2				2	
Shy albatross			1		1	
White-chinned petrel		1			1	
White-faced storm petrel	3				3	
Seabird total	5	5	1	2	13	
Marine mammals						
Common dolphin		20			20	
NZ fur seal		2			2	
Marine mammal total		22			22	
Total protected species interactions	5	27	1	2	35	

* Included as 'capture' in Table 27

Seabird interactions were spread through four FMAs over four months (Table 33).

Table 33: Seabird interactions in the pelagic trawl fishery by area and month during the 2007/08 observer year (a zero indicates no observed captures whereas a dash indicates there was no observer coverage during that month in that FMA)

FMA	Jul-07	Aug-07	Sep-07	Oct-07	Nov-07	Dec-07	Jan-08	Feb-08	Mar-08	Apr-08	May-08	Jun-08	Total
1. AKE	-	-	-	0	-	-	-	-	-	-	-	-	0
2. CEE	-	-	0	0	-	-	-	-	-	-	-	-	0
3. SEC	1	0	0	-	-	-	-	-	-	0	0	1	2
4. SOE	0	-	-	-	-	-	-	-	-	-	-	-	0
5. SOU	-	-	0	-	-	0	0	2	0	0	2	-	4
7. CHA	2	0	0	0	-	0	0	-	-	-	-	0	2
8. CEW	0	0	0	0	0	3	0	-	-	-	-	0	3
9. AKW	0	-	0	1	0	1	-	-	-	-	-	0	2
Total	3	0	0	1	0	4	0	2	0	0	2	1	13

All common dolphin captures were in December (Table 34) with a further two dolphins caught on an unobserved vessel during the same month.

Table 34: Cetacean interactions in the pelagic trawl fishery by area and month during the 2007/08 observer year (a zero indicates no observed captures whereas a dash indicates there was no observer coverage during that month in that FMA)

FMA	Jul-07	Aug-07	Sep-07	Oct-07	Nov-07	Dec-07	Jan-08	Feb-08	Mar-08	Apr-08	May-08	Jun-08	Total
1. AKE	-	-	-	0	-	-	-	-	-	-	-	-	0
2. CEE	-	-	0	0	-	-	-	-	-	-	-	-	0
3. SEC	0	0	0	-	-	-	-	-	-	0	0	0	0
4. SOE	0	-	-	-	-	-	-	-	-	-	-	-	0
5. SOU	-	-	0	-	-	0	0	0	0	0	0	-	0
7. CHA	0	0	0	0	-	0	0	-	-	-	-	0	0
8. CEW	0	0	0	0	0	3	0	-	-	-	-	0	3
9. AKW	0	-	0	0	0	17	-	-	-	-	-	0	17
Total	0	0	0	0	0	20	0	0	0	0	0	0	20

DEEP WATER BOTTOM TRAWL FISHERIES

Orange Roughy and Oreo species

The majority of observer coverage on vessels targeting orange roughy and oreo species has been in the Auckland (West), Subantarctic and Chatham Rise fishery management areas with lesser coverage in other areas. A particular focus of observer coverage in this fishery is to monitor impacts of deepwater trawling on protected corals, particularly on the Chatham Rise (see INT 2007/03). Seabird interactions and behaviour around vessels are also monitored. Mitigation techniques employed in this fishery include offal and discard management and the mandatory use of bird scaring devices to mitigate seabird captures.

A summary of commercial fishing effort, observer effort and protected species interactions are shown in Table 35. Over 30% of total commercial fishing effort was observed during the 2007/08 observer year. The majority of commercial fishing effort is undertaken in SOE, SUB and CEE. Most seabird interactions reported were non-fishing interactions (e.g. impacting against the vessel). The rate of marine mammals capture is relatively low given the number of tows observed. The lowest rate of seabird and marine mammal interactions in trawl fisheries for the 2007/08 observer year were reported in this fishery.

Table 35: Summary of commercial effort, observer effort and protected species captures in the deep water bottom trawl fishery during the 2007/08 observer year.

FMA	Effort tows	Observer tows	Coverage (%)	Seabird captures*	Seabirds per 100 tows	Mammal captures	Mammals per 100 tows
1. AKE	535	305	57.01	0	0.00	0	0.00
2. CEE	1429	114	7.98	0	0.00	0	0.00
3. SEC	631	108	17.12	1	0.93	0	0.00
4. SOE	3104	1125	36.24	3	0.27	0	0.00
5. SOU	189	3	1.59	0	0.00	0	0.00
6. SUB	1663	948	57.01	0	0.00	4	0.42
7. CHA	22	0	0.00				
8. CEW	0						
9. AKW	311	215	69.13	0	0.00	0	0.00
10. KER	0						
Total	7884	2818	35.74	4	0.14	4	0.14

* Captures only, excludes deck strikes and other non-fishing interactions

Observer coverage

During the 2007/08 observer year, 34 deep water bottom trawl trips were observed aboard 11 individual vessels. Interactions with seabirds and / or marine mammals were reported from seven trips. Comments relating to offal management, mitigation used, protected species interactions and captures (i.e. interactions with fishing gear only) per vessel observed are given in Appendix 6.6. Many observers note the high number of seabirds present around deep water trawl vessels but low interactions compared to other trawl fisheries. One vessel was under 28 m in length and used no mitigation devices. Several vessels over 28 m in length were noted not to use any mitigation devices on some trips or used them only occasionally.

Observer coverage was spread throughout the observer year with the greatest number of tows observed in SOE and SUB (Table 36).

Table 36: Number of tows observed in the deep water bottom trawl fishery by area and month during the 2007/08 observer year.

FMA	Jul-07	Aug-07	Sep-07	Oct-07	Nov-07	Dec-07	Jan-08	Feb-08	Mar-08	Apr-08	May-08	Jun-08	Total
1. AKE	125	18	0	39	40	1	0	0	0	0	0	82	305
2. CEE	0	15	0	0	88	11	0	0	0	0	0	0	114
3. SEC	0	3	0	65	34	1	0	1	1	1	2	0	108
4. SOE	88	17	0	0	219	194	95	41	41	104	196	130	1125
5. SOU	0	0	0	0	0	0	0	3	0	0	0	0	3
6. SUB	42	140	153	96	1	0	0	51	173	147	145	0	948
9. AKW	75	17	0	44	56	0	0	0	0	0	0	23	215
Total	330	210	153	244	438	207	95	96	215	252	343	235	2818

Protected species interactions

Relatively low interactions with protected species were reported in deep water trawl fisheries (Table 37) given 30% observer coverage achieved. A spotted black grouper was landed in SOE in July 2007.

Table 37. Protected species interactions in the deep water bottom trawl fishery during the 2007/08 observer year

Species	Dead	Alive	Decomposing	Total
Protected fish				
Spotted black grouper	1			1
Protected fish total	1			1
Seabirds				
Albatross (unidentified)		1		1
Giant petrel (unidentified)	1	1		2
Grey petrel		1		1
Petrel (unidentified)		1		1
Salvin's albatross	1	3		4
Storm petrel		2		2
Wandering albatross	1			1
Seabird total	3	9		12
Marine mammals				
NZ fur seal	4			4
Whale (Unidentified)			1	1
Marine mammal total	4		1	5
Total protected species interactions	8	9	1	18

From Table 38 it can be seen that few seabird interactions were the result of interactions with trawl gear.

Table 38: Method of interaction for a) protected species released alive and b) dead protected species in the deep water bottom trawl fishery during the 2007/08 observer year

a) Released alive

Species	Impact against vessel	Unknown	Other	Total	Comments relating to 'other' capture method
Seabirds					
Albatross (unidentified)			1	1	Released by bosun during haul
Giant petrel (unidentified)	1			1	
Grey petrel			1	1	Covered in grease, not likely to survive
Petrel (unidentified)		1		1	
Salvin's albatross			3	3	Washed onto or landed on deck during haul
Storm petrel	1		1	2	Found on trawl deck
Seabird total	2	1	6	9	
Total protected species interactions	2	1	6	9	

b) Dead protected species

Species	Caught in net*	Unknown	Other	Total	Comments relating to 'other' capture method
Protected fish					
Spotted black grouper	1			1	
Protected fish total	1			1	
Seabirds					
Giant petrel (unidentified)			1*	1	Caught on paravane
Salvin's albatross			1*	1	Caught on paravane
Wandering albatross		1		1	
Seabird total	2	1	2	3	
Marine mammals					
NZ fur seal	4			4	
Marine mammal total	4			4	
Total protected species interactions	5	1	2	8	

* Included as 'capture' in Table 35 (excluding spotted black grouper)

Seabird interactions with deep water trawl bottom fisheries were reported in four FMAs (Table 39).

Table 39: Seabird interactions in the deep water bottom trawl fishery by area and month during the 2007/08 observer year (a zero indicates no observed captures whereas a dash indicates there was no observer coverage during that month in that FMA)

FMA	Jul-07	Aug-07	Sep-07	Oct-07	Nov-07	Dec-07	Jan-08	Feb-08	Mar-08	Apr-08	May-08	Jun-08	Total
1. AKE	0	0	-	0	0	0	-	-	-	-	-	0	0
2. CEE	-	0	-	-	0	0	-	-	-	-	-	-	0
3. SEC	-	0	-	0	2	0	-	0	0	0	0	-	2
4. SOE	1	0	-	-	2	0	0	0	0	1	0	0	4
6. SUB	0	0	0	7	0	-	-	0	0	2	0	-	9
9. AKW	1	0	-	0	0	-	-	-	-	-	-	0	1
Total	2	0	0	7	4	0	0	0	0	3	0	0	16

All fur seals were caught in SUB, two in October 2007 and two in June 2008.

INSHORE FISHERIES

As there is a large amount of inshore fishing effort throughout the EEZ, it is difficult to achieve coverage levels that would enable an estimation of total bycatch in these fisheries. In order to enhance the likelihood of achieving such coverage levels, observer coverage is focussed in specific areas where protected species interactions may be occurring and such coverage is rotated through different areas between years with some success. In addition, observer coverage is aimed at describing the fishing methods employed and identifying whether any protected species interactions are occurring and, if so, how those interactions might be mitigated.

Inshore trawl

The extent to which inshore trawl vessels interact with protected species is extremely poorly known due to minimal historic observer coverage in almost all areas. Observer coverage of the inshore trawl fishery in the Pegasus Bay – Canterbury Bight area in 1997-1998 reported the capture of one Hector’s dolphin (Starr and Langley 2000). Prior to observing this fishery, five dolphins were known to have been caught by trawlers off the east coast of the South Island. Hector’s dolphins have also been recorded caught on unobserved inshore trawl vessels operating on the west coast of the South Island in the late 1980s. Since 1997-1998, four dolphin mortalities have been caused by inshore trawlers including three animals caught in one trawling event in April 2006 (Hector’s dolphin incident database, Department of Conservation, viewed June 2008).

Observations aboard inshore trawl vessels began in the 2006/07 observer year with coverage undertaken in AKE to monitor seabird interactions, CHA to monitor Hector’s dolphin and seabird interactions and in CEW and AKW to monitor Maui’s dolphin interactions. A total of nine vessels were observed during the 2006/07 observer year during which seabird warp strikes and net captures were observed (see Rowe 2009).

Monitoring priorities include collecting data on protected species interactions and behaviours and the mitigation and offal management techniques employed aboard inshore trawl vessels.

A summary of commercial fishing effort, observer effort and protected species interactions are shown in Table 40. Less than 1% of total inshore trawl effort was observed during the 2007/08 observer year. Seabird catch rates are high compared with offshore trawl fisheries, especially in SEC. All captures were from the east and west coasts of the South Island

Table 46: Summary of commercial effort, observer effort and protected species captures in the inshore trawl fishery during the 2007/08 observer year

FMA	Effort tows	Observer tows	Coverage (%)	Seabird captures*	Seabirds per 100 tows	Mammal captures	Mammals per 100 tows
1. AKE	8264	0	0.00				
2. CEE	9211	0	0.00				
3. SEC	11733	47	0.40	6	12.77	0	0.00
4. SOE	491	0	0.00				
5. SOU	3165	0	0.00				
6. SUB	5	0	0.00				
7. CHA	10535	50	0.47	2	4.00	0	0.00
8. CEW	1562	7	0.45	0	0.00	0	0.00
9. AKW	2945	52	1.77	0	0.00	0	0.00
10. KER	2	0	0.00				
Total	47913	156	0.33	8	5.13	0	0.00

* Captures only, excludes deck strikes and other non-fishing interactions

Observer coverage

During the 2007/08 observer year, 11 inshore trips were observed onboard 10 vessels, nine of which were under 28 m in length. The vessel over 28 m in length targeted orange roughy offshore in AKW and snapper inshore in AKW and this vessel deployed tori lines. Six of the nine smaller vessels deployed no mitigation devices, two used warp scarers and two used tori lines. Seabird interactions were reported from seven trips. No marine mammal interactions were reported, although Hector's dolphins were sighted (see Appendix 6.7). Comments relating to offal management, mitigation used, protected species interactions and captures (i.e. interactions with fishing gear only) per vessel observed are given in Appendix 6.7. Given little is known about interactions between inshore trawl fishing methods and protected species, greater observer comment is provided by observers.

Observer coverage undertaken during the later months of 2007 with additional coverage in May 2008 (Table 41). Around 50 tows were observed in SEC, CHA and AKW with few tows observed in CEW.

Table 41: Observed tows for months and areas where inshore trawl observer coverage was undertaken during the 2007/08 observer year

FMA	Jul-07	Aug-07	Sep-07	Oct-07	Nov-07	Dec-07	Jan-08	Feb-08	Mar-08	Apr-08	May-08	Jun-08	Total
3. SEC	0	13	22	12	0	0	0	0	0	0	0	0	47
7. CHA	0	0	0	25	25	0	0	0	0	0	0	0	50
8. CEW	0	0	2	5	0	0	0	0	0	0	0	0	7
9. AKW	0	0	0	26	9	0	0	0	0	0	17	0	52
Total	0	13	24	68	34	0	0	0	0	0	17	0	156

Protected species interactions

Protected species interactions observed on inshore trawl vessels during the 2007/08 observer year are detailed in Table 42. All mortalities were warp strikes and all live interactions were non-fishing interactions (see Table 43).

Table 42. Protected species interactions in the inshore trawl fishery during the 2007/08 observer year

Species	Dead	Alive	Total
Seabirds			
Albatross (unidentified)	1		1
Cape petrel	1	1	2
Salvin's albatross	4		4
Sooty shearwater		12	12
White-capped albatross	2		2
Westland petrel		1	1
Seabird total	8	14	22
Total protected species interactions	8	14	22

Table 43: Method of seabird interactions in the inshore trawl fishery during the 2007/08 observer year

Species	Impact against vessel	Caught on warp or doors*	Other	Total	Comments relating to 'other' capture method
Albatross (unidentified)		1		1	
Cape petrel		1	1	2	Washed onto deck by wave, released alive
Salvin's albatross		4		4	
Sooty shearwater			12	12	Birds bumped into gantry/rigging at night and fell onto the
White-capped albatross		2		2	
Westland petrel	1			1	
Total	1	8	13	22	

* Included as 'capture' in Table 46

Protected species interactions were reported in CHA and SEC during the months observer coverage was undertaken in those FMAs (Table 44).

Table 44: Seabird interactions in the inshore trawl fishery by area and month for the period during the 2007/08 observer year (a zero indicates no observed captures whereas a dash indicates there was no observer coverage during that month in that FMA)

FMA	Aug-07	Sep-07	Oct-07	Nov-07	May-08	Total
3. SEC	1	3	3	-	-	7
7. CHA	-	-	14	1	-	15
8. CEW	-	0	0	-	-	0
9. AKW	-	-	0	0	0	0
Total	1	3	17	1	0	22

Inshore bottom longline (ling, blue nose, hapuku & bass)

Little is known about protected species interactions in inshore bottom longline fisheries due to minimal or no historic observer coverage. The nature of the fishery, including small vessel size and weather dependence, can make placing observers difficult. Observations of inshore bottom longline fisheries began in 2004/05. During the period of the 2004/05 to 2006/07 observer years, bottom longliners targeting snapper were observed separately from those targeting other stocks.

CSP observer coverage in the inshore LIN, BNS, HPB fisheries has been focussed in AKE, CEE, SOE and SOU. Observations in the snapper fishery were undertaken in AKE to monitor interactions with seabirds, particularly black petrels. Through CSP, an advisory officer was placed in both the inshore 'ling' and inshore snapper fisheries to learn about fishing practices and pass on knowledge regarding protected species behaviour and mitigation techniques (Kellian 2004; Johnson 2005). Mitigation includes tori lines, line weighting regimes and using fish oil to deter birds behind vessels.

A summary of commercial fishing effort, observer effort and protected species interactions are shown in Table 45. The greatest commercial effort is undertaken in AKE, CEE and SOE. The highest number of observer tows were in SOE and AKE with around 3% total effort observed. A total of 63 seabirds were caught during the 2007/08 observer year, 45 of which were in SOE.

Table 45: Summary of commercial effort, observer effort and protected species captures in the inshore bottom longline fishery during the 2007/08 observer year

FMA	Effort sets	Observer sets	Coverage (%)	No. hooks observed	Seabird captures*	Seabirds per 1000 hooks	Mammal captures	Mammals per 1000 hooks
1. AKE	7030	115	1.64	133250	13	0.098	0	0.00
2. CEE	2443	62	2.54	147985	2	0.014	0	0.00
3. SEC	909	55	6.05	237200	3	0.013	0	0.00
4. SOE	2696	212	7.86	717050	45	0.063	0	0.00
5. SOU	166	0	0.00					
6. SUB	357	0	0.00					
7. CHA	999	0	0.00					
8. CEW	447	1	0.22	800	0	0.00	0	0.00
9. AKW	658	20	3.04	18900	0	0.00	0	0.00
10. KER	0							
Total	15705	465	2.96	1255185	63	0.050	0	0.00

* Captures only, excludes deck strikes and other non-fishing interactions

Observer coverage

During the 2007/08 observer year, 15 trips were observed on 14 bottom longline vessels under 46 m in length. Seabird interactions were reported from nine trips. Vessels employed various line weighting regimes and offal management measures. Comments relating to offal management, mitigation used, protected species interactions and captures (i.e. interactions with fishing gear only) per vessel observed are given in Appendix 6.8.

Observer coverage was scattered through the 2007/08 observer year and areas (Table 46), often dependent on the availability of observers as fishing effort is year round.

Table 46: Observer days in the inshore bottom longline fishery by area and month during the 2007/08 observer year

FMA	Jul-07	Aug-07	Sep-07	Oct-07	Nov-07	Dec-07	Jan-08	Feb-08	Mar-08	Apr-08	May-08	Jun-08	Total
1. AKE	7	46	28	0	0	0	0	0	0	0	24	10	115
2. CEE	12	41	0	0	0	0	0	0	0	0	2	7	62
3. SEC	0	0	0	0	5	0	0	0	0	0	14	36	55
4. SOE	0	3	50	55	25	0	23	9	0	0	28	19	212
8. CEW	0	0	0	0	0	0	0	0	0	0	1	0	1
9. AKW	0	0	19	0	0	0	0	0	0	0	1	0	20
Total	19	90	97	55	30	0	23	9	0	0	70	72	465

Most sets targeted ling or bluenose and a few sets targeted other species (Table 47).

Table 47: Observer days in the inshore bottom longline fishery by area and target species during the 2007/08 observer year

FMA	Bluenose	Hapuku	Hapuku / Bass	Ling	Other	Total
1. AKE	22	19		74		115
2. CEE	34			28		62
3. SEC	13			41	1	55
4. SOE	62	2	23	119	6	212
8. CEW				1		1
9. AKW		1		19		20
Total	131	22	23	282	7	465

Protected species interactions

All fishing interactions were with seabirds, with over half of the captures reported from one trip (Table 48).

Table 48: Protected species interactions in the inshore bottom longline fishery during the 2007/08 observer year

Species	Dead	Alive	Total
Seabirds			
Albatross (unidentified)	1		1
Black-browed albatross (unidentified)	3		3
Black petrel	3		3
Buller's albatross	4		4
Chatham albatross	12		12
Cape petrel	1	3	4
Grey-faced petrel	6		6
Indian yellow-nosed albatross	1		1
Salvin's albatross	22		22
Seabird (unidentified)	1		1
Sooty shearwater	1		1
Wandering albatross (unidentified)		1	1
White-chinned petrel	4		4
Seabird total	59	4	63
Protected species total	59	4	63

During the 2007/08 observer year all known fishing interactions were captures resulting from birds being hooked or tangled in longline gear (Table 49).

Table 49: Method of interaction for seabirds in the inshore bottom longline fishery during the 2007/08 observer year

Species	Caught on hook*	Tangled in line*	Unknown	Total
Albatross (unidentified)			1	1
Black-browed albatross (unidentified)	3			3
Black petrel	3			3
Buller's albatross	4			4
Chatham albatross	11	1		12
Cape petrel	4			4
Grey-faced petrel	6			6
Indian yellow-nosed albatross	1			1
Salvin's albatross	22			22
Seabird (unidentified)	1			1
Sooty shearwater	1			1
Wandering albatross (unidentified)		1		1
White-chinned petrel	4			4
Total	60	2	1	63

* Included as 'capture' in Table 45

Protected species interactions were reported in four of the six FMAs where observer was undertaken (Table 50).

Table 50: Seabird interactions in the inshore bottom longline fishery by area and month for the period during the 2007/08 observer year (a zero indicates no observed captures whereas a dash indicates there was no observer coverage during that month in that FMA)

FMA	Jul-07	Aug-07	Sep-07	Oct-07	Nov-07	Jan-08	Feb-08	May-08	Jun-08	Total
1. AKE	0	0	0	-	-	-	-	13	0	13
2. CEE	0	2	-	-	-	-	-	0	0	2
3. SEC	-	-	-	-	1	-	-	0	2	3
4. SOE	-	0	38	3	1	1	0	2	0	45
8. CEW	-	-	-	-	-	-	-	0	-	0
9. AKW	-	-	0	-	-	-	-	0	-	0
Total	0	2	38	3	2	1	0	15	2	63

Setnet

The extent to which commercial setnet fishing activities interact with protected species is largely unknown due to very low historic achievement of observer coverage. Despite historic intent to collect observer data, this fishery has been difficult to observe because, as with other inshore fisheries, it encompasses smaller vessels carrying out short trips, less predictable operations and there are practical difficulties notwithstanding the legal requirement to take government fisheries observers. The Pegasus Bay-Canterbury Bight setnet fishery (Statistical Areas 020 and 022) was observed during the 1997-1998 fishing year, during which time eight Hector's dolphins were observed caught in setnets, of which two were released alive (Starr and Langley 2000).

In the 2005/06 fishing year, observations were undertaken in Southland (SOU) and the Nelson / Marlborough region (CHA) to monitor interactions with Hector's dolphins and seabirds. During the 2005/06 fishing year, a small number of fur seals and shags were recorded caught. Setnet fisheries were also observed in the 2006/07 fishing year in Kaikoura (SEC), Nelson (CHA) and in Southland (SOU). Protected species mortalities during 2006/07 included one dusky dolphin, one Hector's dolphin, one fluttering shearwater and two yellow-eyed penguins, all as separate incidents (See Rowe 2009).

A summary of commercial fishing effort, observer effort and protected species interactions are shown in Table 51. The majority of fishing effort occurs in FMAs attached to the New Zealand mainland (i.e. minimal or no effort in KER, SOE and SUB). Due to the nature of this fishery, observers sometimes observe the hauling of nets that were set the day prior to the observer being on the vessel and sets are observed for which the haul will not be observed. In total, 532 sets and 563 hauls were observed. The greatest observer effort was in SEC (Kaikoura and Timaru) followed by SOU. Twenty five percent of fishing effort was observed in Southland and over 5% in SEC, even though only two ports were the focus of observer effort. Total and regional observer coverage is higher than previous years. All captures were reported from SEC and SOU.

Table 51: Summary of commercial effort, observer effort and protected species captures in the setnet fishery during the 2007/08 observer year

FMA	Commercial fishing events	Observed hauls*	Coverage (%)	Length of nets observed	Seabird captures*	Captures per 1000 m net	Mammal captures	Captures per 1000 m net
1. AKE	6812	0	0.00					
2. CEE	1095	0	0.00					
3. SEC	4252	291	6.84	115360	5	0.04	2	0.02
4. SOE	7	0	0.00					
5. SOU	643	161	25.04	151280	1	0.01	0	0.00
6. SUB	5	0	0.00					
7. CHA	546	6	1.10	11000	0	0.00	0	0.00
8. CEW	1882	91	4.84	94770	0	0.00	0	0.00
9. AKW	7697	14	0.18	11000	0	0.00	1	0.09
10. KER	0							
Total	22939	563	2.45	383410	6	0.02	3	0.01

* Captures only, excludes deck strikes and other non-fishing interactions

Observer coverage

During the 2007/08 observer year, 21 trips were observed across 20 vessels. Protected species interactions were reported from four trips. Mitigation to avoid the incidental capture of dolphins included avoiding river mouths and murky water, not setting when dolphins were present around the vessel and the use of pingers (acoustic alarms), particularly east coast South Island. Catch processing and discarding of waste generally took place

outside the periods of setting and hauling so that nets were not in the water when birds were feeding on waste around the vessel. Nets were also cleaned to some extent, providing less of an attractant to foraging seabirds. Some vessels also practiced night setting. Comments relating to offal management, mitigation used, protected species interactions and captures (i.e. interactions with fishing gear only) per vessel observed are given in Appendix 6.9. Marine mammals were sighted during a number of trips. Seabird numbers are generally highest when vessels are processing catch on the way back to port.

Observer coverage was undertaken over the summer months, mostly November to January (Table 52).

Table 52: Observed hauls in the setnet fishery by area and month during the 2007/08 observer year

FMA	Jul-07	Aug-07	Sep-07	Oct-07	Nov-07	Dec-07	Jan-08	Feb-08	Mar-08	Apr-08	May-08	Jun-08	Total
3. SEC	0	0	0	0	184	72	23	10	2	0	0	0	291
5. SOU	0	0	0	0	7	83	71	0	0	0	0	0	161
7. CHA	0	0	0	0	1	5	0	0	0	0	0	0	6
8. CEW	0	0	0	0	11	27	41	12	0	0	0	0	91
9. AKW	0	0	0	0	0	6	8	0	0	0	0	0	14
Total	0	0	0	0	203	193	143	22	2	0	0	0	563

Protected species interactions

Interactions with nine protected species were reported (Table 53). The Hector's dolphin interaction was seen by the observer to be floating away from the stern of the vessel during hauling. The animal was not seen in the net and was not recovered. The observer noted that blood was coming from the dolphin's head and bite marks consistent with those from dogfish around the head. The incident was reported when 2.9 nm from shore in water 17 m deep.

Table 53. Protected species interactions in the setnet fishery during the 2007/08 observer year

Species	Dead	Alive	Total	FMA	Month
Seabirds					
Cape petrel		1	1	SEC	Nov-07
Westland petrel		3	3	SEC	Nov-07
Sooty shearwater	1		1	SEC	Nov-07
Yellow-eyed penguin	1		1	SOU	Dec-07
Seabird total	2	4	6		
Marine mammals					
NZ fur seal	1		1	SEC	Nov-07
Hector's dolphin	1		1	SEC	Feb-08
Pilot whale		1	1	AKW	Jan-08
Marine mammal total	2	1	3		
Total protected species interactions	4	5	9		

SURFACE LONGLINE FISHERIES

Charter tuna

CSP observer coverage of charter tuna vessels has mostly been in SOU and CHA from March until July, with some coverage in CEE and KER. 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. Fur seals and sea turtles are occasionally caught on hooks or entangled in lines, but are usually released alive after being cut free.

Surface longline vessels are required to use streamer lines and to night set. Some vessels use brickle curtains and water canons during hauling to try and reduce the likelihood of seabird captures.

A summary of commercial fishing effort, observer effort and protected species interactions are shown in Table 54. Over 50% of charter tuna fishing effort was observed with two of four vessels in the fishery observed. Fewer sea birds were caught compared to the previous observer year. The rate of seabird capture was higher than in 2004/05 and 2005/06 but lower than 2006/07. The rate of marine mammal capture was lower than 2004/05 but higher than 2005/06 and 2006/07.

Table 54: Summary of commercial effort, observer effort and protected species captures in the charter surface longline fishery during the 2007/08 observer year

	Effort sets	Observer sets	% events observed	No. hooks observed	Seabird captures*	Seabirds per 1000 hooks	Mammal captures	Mammals per 1000 hooks
1. AKE	3	0	0.00					
2. CEE	79	56	70.89	167212	14	0.08	1	0.01
3. SEC								
4. SOE								
5. SOU	143	63	44.06	194581	20	0.10	6	0.03
6. SUB								
7. CHA	32	24	75.00	72939	4	0.05	4	0.05
8. CEW								
9. AKW								
10. KER								
Total	257	143	55.64	434732	38	0.09	11	0.03

* Captures only, excludes deck strikes and other non-fishing interactions

Observer coverage

During the 2007/08 observer year, two charter tuna vessels were observed twice each. Protected species captures were reported from all four trips. Following seabird captures on one of the vessels, the skipper then deployed 3 tori lines out to 185 m during setting and in a later set, the master added 4 x 7 m streamers to the centre and middle lines and let out a further 50 m. The crew also replaced weights on floats from 60 to 100 g and fit every snood with 3 g weight. The other vessel used deck hoses, streamer poles and acoustic devices during hauling. Snoods were weighted, line had lead core braid and bait was thawed. Comments relating to offal management, mitigation used, protected species interactions and captures (i.e. interactions with fishing gear only) per vessel observed are given in Appendix 6.10.

Observer coverage was undertaken in two month blocks throughout three FMAs (Table 55). Some trips were observed across two observer years.

Table 55: Observer sets in the charter surface longline fishery by area and month during the 2007/08 observer year

FMA	Jul-07	Aug-07	Sep-07	Oct-07	Nov-07	Dec-07	Jan-08	Feb-08	Mar-08	Apr-08	May-08	Jun-08	Total
2. CEE	52	4	0	0	0	0	0	0	0	0	0	0	56
5. SOU	0	0	0	0	0	0	0	0	0	23	40	0	63
7. CHA	4	0	0	0	0	0	0	0	0	0	14	6	24
Total	56	4	0	0	0	0	0	0	0	23	54	6	143

Protected species interactions

Almost 50 protected species interactions were observed during the 2007/08 observer year. Of the ten fur seals captured only one was incidentally killed (Table 56). Twenty nine seabirds were incidentally killed and nine were released alive.

Table 56. Protected species interactions in charter surface longline fisheries during the 2007/08 observer year

Species	Dead	Alive	Decomposing	Total
Seabirds				
Antipodean albatross	1			1
Buller's albatross	8	9		17
Campbell albatross	1			1
Gibson's albatross	1			1
Grey petrel	10			10
Salvin's albatross	1			1
White-capped albatross	3			3
White-chinned petrel	4			4
Seabird total	29	9		38
Marine mammals				
NZ fur seal	1	9	1	11
Marine mammal total	1	9	1	11
Total protected species interactions	30	18	1	49

Seabird interactions were reported in all months where observer coverage was undertaken (Table 57).

Table 57: Seabird interactions in the charter surface longline fishery by area and month during the 2007/08 observer year (a zero indicates no observed captures whereas a dash indicates there was no observer coverage during that month in that FMA)

FMA	Jul-07	Aug-07	Apr-08	May-08	Jun-08	Total
2. CEE	8	6	-	-	-	14
5. SOU	-	-	13	7	-	20
7. CHA	0	-	-	3	1	4
Total	8	6	13	10	1	38

Fur seal interactions were reported in July and May (Table 58).

Table 58: Fur seal captures in the charter surface longline fishery by area and month during the 2007/08 observer year (a zero indicates no observed captures whereas a dash indicates there was no observer coverage during that month in that FMA)

FMA	Jul-07	Aug-07	Apr-08	May-08	Jun-08	Total
2. CEE	1	0	-	-	-	1
5. SOU	-	-	0	6	-	6
7. CHA	4	-	-	0	0	4
Total	5	0	0	6	0	11

Domestic tuna and swordfish

Historically, there has been difficulty placing observers on smaller domestic tuna vessels and, therefore, further data is required to assess protected species interactions. Through CSP, an advisory officer was placed in this fishery from April 2003 to June 2004 to learn about fishing practices and to share information on protected species behaviour and mitigation techniques (Hibell 2005). Swordfish has recently been introduced into the quota management system so that observations in 2006/07 include vessels targeting tuna and swordfish. Following the large bycatch event of 58 birds (including 51 albatrosses) during one trip targeting swordfish in November 2006, regulations were introduced by the Ministry of Fisheries in January 2007 requiring all surface longline fishers to provide notice of departure to the Ministry of Fisheries observer programme. Vessels are required to use streamer lines and either set at night or weight lines if setting during the day.

A summary of commercial fishing effort, observer effort and protected species interactions are shown in Table 68. Commercial fishing effort is reduced from previous years, but observer effort has increased (Table 59). Eight percent of total observer coverage was observed compared to around 3% over the last three years. The rate of seabird capture is higher than the last three years, but the rate of marine mammal capture is lower. Only one turtle was observed caught in 2007/08 compared to four in 2006/07.

Table 59: Summary of commercial effort, observer effort and protected species captures in the domestic surface longline fishery during the 2007/08 observer year

	Effort sets	Observer sets	Coverage (%)	No. hooks observed	Seabird captures*	Seabirds per 1000 hooks	Mammal captures	Mammals per 1000 hooks	Reptiles	Reptiles per 1000 hooks
1. AKE	920	70	7.61	73728	7	0.095	0	0.000	0	0.000
2. CEE	836	69	8.25	107018	18	0.168	3	0.028	0	0.000
3. SEC										
4. SOE										
5. SOU	8	0								
6. SUB										
7. CHA	89	0								
8. CEW	5	0								
9. AKW	153	20	13.07	21550	0	0.000	0	0.000	0	0.000
10. KER	44	8	18.18	8900	0	0.000	0	0.000	1	0.112
Total	2055	167	8.13	211196	25	0.118	3	0.014	1	0.005

* Captures only, excludes deck strikes and other non-fishing interactions

Observer coverage

During the 2007/08 observer year, 19 trips were observed across 14 vessels. Protected species captures were reported from 13 trips. Comments relating to offal management, mitigation used, protected species interactions and captures (i.e. interactions with fishing gear only) per vessel observed are given in Appendix 6.11.

Observer coverage was undertaken throughout the year except for October to December (Table 60). Most coverage was undertaken in AKE and CEE.

Table 60: Observer days in the domestic surface longline fishery by area and month during the 2007/08 observer year

FMA	Jul-07	Aug-07	Sep-07	Oct-07	Nov-07	Dec-07	Jan-08	Feb-08	Mar-08	Apr-08	May-08	Jun-08	Total
1. AKE	10	23	11	0	0	0	4	6	3	4	6	3	70
2. CEE	43	0	0	0	0	0	0	7	0	0	3	16	69
9. AKW	0	7	2	0	0	0	0	1	7	0	0	3	20
10. KER	0	0	0	0	0	0	0	0	0	0	7	1	8
Total	53	30	13	0	0	0	4	14	10	4	16	23	167

Protected species interactions

Twenty six protected species interactions were reported (Table 61) including the capture and release of a leatherback turtle in KER in May 2008.

Table 61: Protected species interactions in the domestic surface longline fishery during the 2007/08 observer year

Species	Dead	Alive	Total
Seabirds			
Albatrosses (unidentified)	2		2
Black-browed albatross (unidentified)	2	1	3
Buller's albatross	2		2
Campbell albatross	1		1
Cape petrel		1	1
Flesh-footed shearwater		2	2
Grey petrel	6		6
Petrel (unidentified)		1	1
Salvin's albatross	1	1	2
Wandering albatross (unidentified)	4	1	5
Seabird total	18	7	25
Marine mammals			
NZ fur seal		3	3
Marine mammal total		3	3
Marine turtles			
Leatherback turtle		1	1
Marine turtle total		1	1
Protected species total	18	11	29

Seabird interactions were reported throughout the period of observer coverage in AKE and CEE (Table 62).

Table 62: Seabird interactions in the domestic surface longline fishery by area and month during the 2007/08 observer year (a zero indicates no observed captures whereas a dash indicates there was no observer coverage during that month in that FMA)

FMA	Jul-07	Aug-07	Sep-07	Jan-08	Feb-08	Mar-08	Apr-08	May-08	Jun-08	Total
1. AKE	0	0	1	1	0	1	4	0	0	7
2. CEE	9	-	-	-	5	-	-	0	4	18
9. AKW	-	0	0	-	0	0	-	-	0	0
10. KER	-	-	-	-	-	-	-	0	0	0
Total	9		1	1	5	1	4		4	25

Fur seal captures were reported in CEE (Table 63).

Table 63: Fur seal captures in the domestic surface longline fishery by area and month during the 2007/08 observer year (a zero indicates no observed captures whereas a dash indicates there was no observer coverage during that month in that FMA)

FMA	Jul-07	Aug-07	Sep-07	Jan-08	Feb-08	Mar-08	Apr-08	May-08	Jun-08	Total
1. AKE	0	0	0	0	0	0	0	0	0	0
2. CEE	2	-	-	-	0	-	-	0	1	3
9. AKW	-	0	0	-	0	0	-	-	0	0
10. KER	-	-	-	-	-	-	-	0	0	0
Total	2	0	0	0	0	0	0	0	1	3

BOTTOM LONGLINE FISHERY

Deep-sea ling

The deep-sea ling bottom longline fishery is observed to monitor for seabird and marine mammal interactions. Mitigation methods employed include tori lines, integrated weighted line and offal and bait discard management.

A summary of commercial fishing effort, observer effort and protected species interactions are shown in Table 64. The majority of fishing effort is undertaken in SOE, SOU and SUB. No observer effort was achieved in SOE during the 2007/08 observer year, an area where historical captures have been reported. Almost 30% of fishing effort was achieved. No marine mammals were captured and fewer seabirds were caught compared to previous years, yet the rate of seabird capture was the same as the previous year.

Table 64: Summary of commercial effort, observer effort and protected species captures in the deep water bottom longline fishery during the 2007/08 observer year

	Effort sets	Observer sets	% events observed	No. hooks observed	Seabird captures*	Seabirds per 1000 hooks	Mammal captures	Mammals per 1000 hooks
1. AKE								
2. CEE	63	42	66.67	309300	0	0.000	0	0.000
3. SEC	11	0						
4. SOE	135	0						
5. SOU	287	33	11.50	241200	5	0.021	0	0.000
6. SUB	303	173	57.10	1381800	6	0.004	0	0.000
7. CHA								
8. CEW								
9. AKW								
10. KER								
Total	736	206	27.99	1932300	11	0.006	0	0.000

* Captures only, excludes deck strikes and other non-fishing interactions

Observer coverage

During the 2007/08 observer year, three trips were observed aboard two vessels, one trip in SOU, one in SUB and one in CHA, CEE and SEC. Protected species captures were reported from two trips.

Two individual vessels observed, one vessel observed twice. One vessel used a tori line while setting, which the observer considered effective at preventing birds accessing baits. Integrated weighted line was used and lines were hauled through a moonpool from underneath the vessel. An acoustic cannon was also used. The other vessel also used a tori line during setting, which was kept in motion by a 'jiggler' winch. The observer considered it to be highly effective at keeping birds from bait entry zone. the vessel also used a gas cannon and occasionally the deck hose to deter birds during hauling. Comments relating to offal management, mitigation used, protected species interactions and captures (i.e. interactions with fishing gear only) per vessel observed are given in Appendix 6.12.

Observer coverage is in month blocks due to the nature of the fishery where long trips are undertaken (Table 65).

Table 65: Observer days in the deep water bottom longline fishery by area and month during the 2007/08 observer year

FMA	Jul-07	Aug-07	Sep-07	Oct-07	Nov-07	Dec-07	Jan-08	Feb-08	Mar-08	Apr-08	May-08	Jun-08	Total
2. CEE	42	0	0	0	0	0	0	0	0	0	0	0	42
5. SOU	0	0	2	31	0	0	0	0	0	0	0	0	33
6. SUB	0	0	0	0	0	0	0	0	0	77	96	0	173
Total	42		2	31	0	0	0	0	0	77	96	0	248

Protected species

All protected species interactions were either sooty shearwaters or white-chinned petrels, all of which were hooked (Table 66).

Table 66. Protected species interactions in the deep water bottom longline fishery during the 2007/08 observer year

Species	Alive	Dead
Seabirds		
Sooty shearwater		5
White chinned petrel		6
Seabird total		11
Total protected species interactions		11

Seabird interactions were reported in SOU and SUB (Table 67).

Table 67: Seabird interactions in the deep water bottom longline fishery by area and month during the 2007/08 observer year (a zero indicates no observed captures whereas a dash indicates there was no observer coverage during that month in that FMA)

FMA	Jul-07	Sep-07	Oct-07	Mar-08	Apr-08	Total
2. CEE	0	-	-	-	-	0
5. SOU	-	0	5	-	-	5
6. SUB	-	-	-	3	3	6
Total	0	0	5	3	3	11

Discussion

Middle depth trawl fisheries

Hake, hoki, ling and silver warehou

Historically, levels of observer coverage in this fishery are generally around 15% of fishing effort due to priorities of both the Department and the Ministry of Fisheries to monitor various aspects of fishing activity. During the 2007/08 observer year, 20% of total fishing effort was observed. In all fisheries management areas where considerable commercial fishing activity is undertaken for hake, hoki, ling or silver warehou, some level of observer coverage was achieved. The greatest level of observer coverage was in SUB and the lowest in CEE.

Moderate numbers of seabirds and fur seals are reported incidentally caught by vessels using the method of middle depth trawl to target hoki, hake, ling and silver warehou. Captures of seabirds and marine mammals are reported from most areas where there is observer effort. As in previous years, the highest rates of seabird captures were reported from SEC and the highest rate of pinniped capture was in CEE where fur seals are caught on the CEE / CHA boundary in Cook Strait.

Seabird mitigation devices are mandatory for all trawlers greater than 28 m length overall. Further research continues on offal management measures. This work has provided, and will continue to provide management information relating to minimising risk of seabird interactions, especially warp captures, which are exacerbated by fish waste discharge. Results of this work will shed light on how to address warp captures in SEC, and other areas. The quantity of offal produced in this fishery compared to the squid fishery presents greater challenges for offal management. Fur seal mitigation devices are being trialled and observer reports of seabird net captures have been investigated to help determine the feasibility of mitigating against net captures during setting and hauling.

Southern blue whiting

The southern blue whiting fishery operates in a discrete space and time and has higher levels of observer coverage than most other trawl fisheries. During the 2007/08 observer year, 35% of total fishing effort was observed. Of note in this fishery is increasing numbers of marine mammal captures over the last four observer years, particularly the capture of NZ sea lions. The capture rate of seabirds in 2007/08 was similar to the previous observer year, but the capture rate of seabirds has increased slowly over the last four observer years.

At present, no mitigation devices or operational procedures are currently in place in this fishery to reduce the likelihood of pinniped interactions, even though interaction rates are higher than in other trawl fisheries where mitigation is employed or under development. As for all trawlers > 28m in length, the deployment of specific devices intended to reduce interactions between seabirds and trawl warps is mandatory in this fishery.

Scampi

The scampi fishery has historically had poor observer coverage, although levels are slowly increasing due to wider interest in gaining observer coverage in this fishery (previously observed solely through CSP). During the 2007/08 observer year, low observer coverage was achieved in SOE and SUB despite high levels of commercial fishing effort in these FMAs. Greater levels of observer coverage were achieved in AKE, CEE and SEC. In future observer years, higher levels of observer coverage in SOE and SUB are desirable in this fishery given the number of seabird captures and occasional NZ sea lion captures.

The rate of seabird capture was lower during the 2007/08 observer year compared to the last three observer years. Historically, seabird interactions are most frequently reported in AKE, SOE and SUB, where the majority of observer coverage has been focused. During 2007/08, most seabird captures were in AKE and SOE. A variety of seabird mitigation devices are employed by scampi vessels, although many do not meet regulated specifications as they are not required to do so due to vessel length. Seabird mitigation research on scampi vessels under 28 m in length will occur in 2009/10.

Squid

Levels of observer coverage are generally above 20% for squid vessels operating in SOU or SUB due to priorities of both the Department and the Ministry of Fisheries to monitor protected species interactions. Historical high capture rates of seabirds in SEC are of concern considering minimal observer coverage was achieved in this area. Increased observer coverage is warranted for squid vessels operating in SEC, especially considering the high number of commercial effort days reported relative to other fishery management areas.

As observed in 2007/08 and in previous observer years, the squid fishery operating in both SOU and SUB has the highest rate of seabird captures of all trawl fisheries. While capture rates decreased from 2004/05 to 2006/07, with reductions in albatross captures most notable, the capture of seabirds in 2007/08 was similar to that reported in 2006/07.

Vessels operating in this fishery are required to use regulated seabird mitigation devices. Collaborative research between Government and the fishing industry and the development of discharge management measures has led to changes in offal management. Offal and discard discharge is the greatest cause of warp captures in this fishery. In addition, net captures continue to be a concern for which mitigation options are currently being investigated.

Pelagic trawl fisheries

While commercial effort targeting pelagic fish stocks is undertaken in eight Fisheries Management Areas, observer coverage is generally focussed in FMAs with the greatest levels of commercial effort. Observer effort has varied between FMAs over the last four observer years. In 2004/05, the greatest commercial fishing effort was in CHA but relatively few observer days were achieved there compared to other areas (AKW, CEW and SOU). In 2005/06, good levels of observer coverage were achieved in four FMAs and by the 2006/07 observer year, coverage was spread between eight FMAs. In 2007/08, the greatest number of observer days were in AKW, CEW and CHA with the highest levels of observer coverage in AKW, CEW, SOU

The most notable protected species interaction in pelagic trawl fisheries is that of multiple captures of common dolphins, with 22 captures reported in December across three observed vessels. In general, a few vessels contribute to such capture events in this fishery while other vessels report no captures. Seabird captures were greatest on vessels operating in SOU, particularly in 2005/06 when targeting barracouta. While vessels over 28 m in length are required to use bird mitigation devices, no mitigation devices are currently in place to avoid capturing common dolphins and no research is presently underway.

Deep water trawl fisheries

Historically, around 20% of total fishing effort has been observed in this fishery, mostly because of Ministry of Fisheries priorities in relation to stock management. High levels of observer coverage were achieved in SOE, SUB and AKE during the 2007/08 observer year with 35% of total fishing effort observed.

Compared to other trawl fisheries, fewer seabird and marine mammal captures were reported from this fishery. Of interest is the capture of two seabirds on the paravane, which is not always easily or consistently observed. Several vessels discharged offal during setting and hauling, though no seabird captures were reported.

Inshore fisheries

The development of an inshore observer programme to monitor interactions with protected species is progressing, but there are still difficulties associated with monitoring small setnet, trawl and bottom longline vessels. Ongoing difficulties include the higher cost of placing observers on inshore vessels, access to vessels, the difficulties of vessels accommodating an observer on board and the weather dependence of these fisheries. In addition, conflicting priorities for the small pool of Government observers makes it difficult to meet all monitoring requirements. Information gained in these fisheries to date indicates that interactions with seabirds and marine mammals do occur, but the extent of those interactions is currently unknown. Improving understanding of the range of gears and deployment in inshore fisheries will contribute to the development of mitigation measures.

Inshore trawl

Ten inshore trawl vessels were observed during the 2007/08 observer year through four FMAs. Less than 0.5% of total fishing effort was observed making it difficult to generalise about interactions between inshore trawl vessels and protected species. However, interactions detected demonstrate that inshore trawl fishing presents risk to protected species (at least in some areas/times of year) especially given the relatively high capture rate of seabirds. The broader extent of this risk is not known. Unlike the 2006/07 observer year when net captures were reported in AKE, in 2007/08 seabird captures were only reported from the east and west coasts of the South Island and all mortalities were the result of warp strikes.

Avenues for future research in this fishery include offal management, net capture mitigation and the potential to use mitigation devices to reduce warp strikes. While many vessels employ no mitigation devices, home-made devices are in use in some areas and research trials will be undertaken in 2009/10 to investigate the efficacy of some devices.

Inshore bottom longline (ling, bluenose, hapuku and bass)

While commercial effort in this 'fishery' is undertaken throughout the year and in all FMAs except KER, observer coverage achieved to date is very low. During the 2007/08 observer year, less than 3% of total fishing effort was observed and highest level of coverage was in SOE where 8% of fishing effort was observed.

Considering 63 seabirds were observed captured from minimal observer effort, there is a need to increase monitoring levels in this fishery. While there is scope for higher levels of observer coverage, many of the difficulties in placing observers in this fishery will need to be overcome including the development of better communication networks with vessel managers and operators, and addressing capacity issues in the observer programme. Avenues for mitigation and protected species research in this fishery includes the development of best practice line-weighting regimes given variable gear types and deployment patterns, safe turtle handling and release practices and offal and discard management practices.

Setnet

In the 2005/06 and 2006/07 observer years, less than 1% of total fishing effort was observed. During the 2007/08 observer year, 2.5% of total fishing effort was observed and 25% of fishing effort in SOU was observed. Of concern in this fishery is the third capture of a yellow-eyed penguin in the last two years and the second capture of a Hector's dolphin, although there is some uncertainty surrounding this incident as the specimen was not recovered. Due to the low number of observer days achieved, the extent of such interactions across the setnet fishery as a whole cannot be determined. Combined efforts with the Ministry of Fisheries Hector's monitoring project is likely to provide more extensive data on the nature and extent of seabird and marine mammal captures in setnet fisheries.

Surface longline fisheries

Charter

Higher levels of observer coverage are achieved aboard charter tuna vessels than any other fishing fleet due to the small number of vessels operating in this fishery, operator cooperation, and the capacity for vessels to accommodate observers. Two of four vessels operating in the New Zealand EEZ were observed during the 2007/08 observer year so that over 50% of total fishing effort was observed. As in 2006/07, relatively high levels of seabird captures were reported in 2007/08 despite vessels employing multiple mitigation techniques including tori lines, acoustic canons, weighted gear and bait retention practices.

Domestic

Domestic tuna vessels are difficult to observe due to similar restrictions found with other small vessels. Less than 5% observer coverage was achieved during the 2004/05, 2005/06 and 2006/07 observer years. The recently introduced requirement for these vessels to provide notice of departure to the observer programme has facilitated the achievement of greater observer coverage recently, and is expected to continue to do so in future years. Observer coverage increased during the 2007/08 observer year to 8% of total effort and almost 20% of fishing effort in KER was observed.

Despite low levels of coverage, protected species interactions are reported in this fishery including seabirds, marine mammals and marine reptiles. The capture rate of seabirds in 2007/08 was lower than that reported in 2006/07, although there was a large capture event aboard one vessel in the 2006/07 observer year. Mitigation research continues in this field and includes testing the efficacy of blue-dyed bait.

Bottom longline fishery

Historically, between 20 and 30% observer coverage has been achieved in this fishery due to the small number of vessels operating, operator cooperation, and the ability of vessels to accommodate observers. Almost 30% observer coverage was achieved in 2007/08.

The deep sea bottom longline fishery had a lower rate of seabird captures compared to surface longline fisheries during the 2007/08 observer year. Seabird interactions were reported in two of the three FMAs where observer coverage was undertaken, being SOU and SUB. Large capture events have occasionally occurred in this fishery

in the past but rate of seabird capture has remained fairly steady over the last four observer years, with fewer birds reported captured in the last two observer years.

Mitigation techniques are well developed in the deep sea bottom longline fishery and include tori lines, integrated weighted line and offal management. Few vessels operate in this fishery allowing greater knowledge to be gained on fishing and mitigation practices that may be relevant for application to smaller bottom longline vessels.

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Appendices

Appendix 1

Common names, scientific names and codes of species mentioned in this report

Table A1.1 Fish.

Code	Common name	Scientific name
BAR	Barracouta	<i>Thyrsites atun</i>
BIG	Bigeye tuna	<i>Thunnus obesus</i>
BNS	Bluenose	<i>Hyperoglyphe antarctica</i>
EMA	Blue mackerel	<i>Scomber australasicus</i>
HAK	Hake	<i>Merluccius australis</i>
HOK	Hoki	<i>Macruronus novaezelandiae</i>
HPB	Hapuku & Bass	<i>Polyprion oxygeneios, P. americanus</i>
JMA	Jack mackerel	<i>Trachurus declivis, T. murphyi, T. novaezelandiae</i>
LIN	Ling	<i>Genypterus blacodes</i>
OEO	Oreo	<i>Oreosomatidae (Family)</i>
ORH	Orange roughy	<i>Hoplostethus atlanticus</i>
SCI	Scampi	<i>Metanephrops challengeri</i>
SNA	Snapper	<i>Pagrus auratus</i>
SQU	Arrow squid	<i>Nototodarus sloanii, N. gouldi</i>
STN	Southern bluefin tuna	<i>Thunnus maccoyii</i>
SWA	Silver warehou	<i>Seriolella punctata</i>
SWO	Swordfish	<i>Xiphias gladius</i>
WAR	Common warehou	<i>Seriolella brama</i>
WWA	White warehou	<i>Seriolella caerulea</i>

Table A1.2 Seabirds

Common name	Scientific name
Albatross (unidentified)	Diomedeidae (Family)
Antipodean albatross	<i>Diomedea antipodensis antipodensis</i>
Black petrel	<i>Procellaria parkinsoni</i>
Black-browed albatross (unidentified)	<i>Thalassarche melanophris</i> or <i>T. impavida</i>
Buller's albatross	<i>Thalassarche bulleri</i>
Campbell albatross	<i>Thalassarche impavida</i>
Cape petrel	<i>Daption capense</i>
Chatham albatross	<i>Thalassarche eremita</i>
Common diving petrel	<i>Pelecanoides urinatrix</i>
Fairy prion	<i>Pachyptila turtur</i>
Flesh-footed shearwater	<i>Puffinus carneipes</i>
Giant petrel	<i>Macronectes</i> spp.
Gibson's albatross	<i>Diomedea antipodensis gibsoni</i>
Grey petrel	<i>Procellaria cinerea</i>
Grey-backed storm petrel	<i>Garrodia nereis</i>
Grey-faced petrel (Great winged)	<i>Pterodroma macroptera</i>
Indian yellow-nosed albatross	<i>Thalassarche carteri</i>
Petrel (unidentified)	<i>Procellariidae</i> (Family)
Prion (unidentified)	<i>Pachyptila</i> spp.
Salvin's albatross	<i>Thalassarche salvini</i>
Shy albatross	<i>Thalassarche cauta</i>
Sooty shearwater	<i>Puffinus griseus</i>
Southern black-browed albatross	<i>Thalassarche melanophris</i>
Southern royal albatross	<i>Diomedea epomophora</i>
Storm petrel	<i>Hydrobatidae</i> (Family)
Westland petrel	<i>Procellaria westlandica</i>
New Zealand white capped albatross	<i>Thalassarche steadi</i>
White-chinned petrel	<i>Procellaria aequinoctialis</i>
White-faced storm petrel	<i>Pelagodroma marina</i>
Yellow-eyed penguin	<i>Megadytes antipodes</i>

Table A1.3 Marine mammals

Common name	Scientific name
Common dolphin	<i>Delphinus delphis</i>
New Zealand fur seal	<i>Arctocephalus forsteri</i>
Hector's dolphin	<i>Cephalorhynchus hectori</i>
New Zealand sea lion	<i>Phocarctos hookeri</i>
Pilot whale	<i>Globicephala melas</i>

Table A1.4 Reptiles

Common name	Scientific name
Leatherback turtle	<i>Dermochelys coriacea</i>

Table A1.5 Protected fish species

Common name	Scientific name
Spotted black grouper	<i>Epinephelus daemeli</i>
White pointer shark	<i>Carcharodon carcharias</i>

Appendix 2

Protected species interactions during the 2007/08 observer year

Species	Dead	Alive	Decomposed	Total
Protected fish				
Spotted black grouper	1			1
White pointer shark	1			1
Protected fish total	2			2
Seabirds				
Albatross (unidentified)	7	7		14
Antipodean albatross	1			1
Black petrel	3			3
Black-browed albatross (unidentified)	6	1		7
Buller's albatross	26	12		38
Campbell albatross	2			2
Cape petrel	4	9		13
Chatham albatross	12			12
Common diving petrel		3		3
Fairy prion	1	1		2
Flesh-footed shearwater	2			2
Giant petrel	4	1		5
Gibson's albatross	1			1
Grey petrel	19	1		20
Grey-backed storm petrel		1		1
Grey-faced petrel	6			6
Indian yellow-nosed albatross	1			1
Petrel (unidentified)	31	12		43
Prion (unidentified)		5		5
Salvin's albatross	34	5		39
Seabird (large)		1		1
Seabird (small)		2		2
Seabird (unspecified)	1			1
Shy albatross	4			4
Sooty shearwater	67	38		105
Southern black-browed albatross	1			1
Southern royal albatross	1			1
Storm petrel		4		4
Wandering albatross (unidentified)	3	5		8
Westland petrel		4		4
White-capped albatross	35	9	5	49
White-chinned petrel	47	10	3	60
White-faced storm petrel		3		3
Yellow-eyed penguin	1			1
Seabird total	320	134	8	462

Species	Dead	Alive	Decomposed	Total
Marine mammals				
Common dolphin	20			20
Hector's dolphin	1			1
NZ fur seal	76	22	2	100
NZ sea lion	11			11
Pilot whale		1		1
Whale (unidentified)			1	1
Marine mammal total	108	23	3	134
Marine turtles				
Leatherback turtle		1		1
Marine turtle total		1		1
Total protected species interactions	430	158	11	599

Appendix 3

Protected species interactions by method during the 2007/08 observer year

Species code	BLL	SLL	SN	TRW	Total
Protected fish					
Spotted black grouper				1	1
White pointer shark				1	1
Protected fish total				2	2
Seabirds					
Albatross (unidentified)	1	2		11	14
Antipodean albatross		1			1
Black petrel	3				3
Black-browed albatross (unidentified)	3	2		2	7
Buller's albatross	4	19		15	38
Campbell albatross		2			2
Cape petrel	4	1	1	7	13
Chatham albatross	12				12
Common diving petrel				3	3
Fairy prion				2	2
Flesh-footed shearwater		2			2
Giant petrel				5	5
Gibson's albatross		1			1
Grey petrel		16		4	20
Grey-backed storm petrel				1	1
Grey-faced petrel	6				6
Indian yellow-nosed albatross	1				1
Petrel (unidentified)		1		42	43
Prion (unidentified)				5	5
Salvin's albatross	22	3		14	39
Seabird (large)				1	1
Seabird (small)				2	2
Seabird (unspecified)	1				1
Shy albatross				4	4
Sooty shearwater	6		1	98	105
Southern black-browed albatross		1			1
Southern royal albatross				1	1
Storm petrel				4	4
Wandering albatross (unidentified)	1	5		2	8
Westland petrel			3	1	4
White-capped albatross		3		46	49
White-chinned petrel	10	4		46	60
White-faced storm petrel				3	3
Yellow-eyed penguin			1		1
Seabird total	74	63	6	319	462

Species code	BLL	SLL	SN	TRW	Total
Marine mammals					
Common dolphin				20	20
Hector's dolphin			1		1
NZ fur seal		14	1	85	100
NZ sea lion				11	11
Pilot whale			1		1
Whale (unidentified)				1	1
Marine mammal total		14	3	117	134
Marine reptiles					
Leatherback turtle		1			1
Marine reptile total		1			1
Total protected species interactions	74	78	9	438	599

Appendix 4

Protected species interactions by month during the 2007/08 observer year

Species code	Jul-07	Aug-07	Sep-07	Oct-07	Nov-07	Dec-07	Jan-08	Feb-08	Mar-08	Apr-08	May-08	Jun-08	Total
Protected fish													
Spotted black grouper	1												1
White pointer shark									1				1
Protected fish total	1												
Seabirds													
Albatross (unidentified)			2		1		1	5	2	2		1	14
Antipodean albatross	1												1
Black petrel											3		3
Black-browed albatross (unidentified)	1			1		1				1	3		7
Buller's albatross	4				1		1	4	1	10	13	4	38
Campbell albatross	2												2
Cape petrel	4	2	3	2	1							1	13
Chatham albatross			12										12
Common diving petrel	2										1		3
Fairy prion					1				1				2
Flesh-footed shearwater								2					2
Giant petrel		3								1	1		5
Gibson's albatross	1												1
Grey petrel	9	8		1								2	20
Grey-backed storm petrel								1					1
Grey-faced petrel											6		6
Indian yellow-nosed albatross		1											1
Petrel (unidentified)	1				1			13	12	12	4		43
Prion (unidentified)		2	1	1		1							5
Salvin's albatross	1		24	5	4	2		1		1		1	39
Seabird (large)			1										1
Seabird (small)							1	1					2
Seabird (unspecified)			1										1
Shy albatross	3									1			4
Sooty shearwater				18	7	9	2	48	16	4	1		105

Species code	Jul-07	Aug-07	Sep-07	Oct-07	Nov-07	Dec-07	Jan-08	Feb-08	Mar-08	Apr-08	May-08	Jun-08	Total
Southern black-browed albatross	1												1
Southern royal albatross								1					1
Storm petrel				1	1				1	1			4
Wandering albatross (unidentified)	1		1					1		3	1	1	5
Westland petrel				1	3								4
White-capped albatross		2			1	1		8	26	10	1		49
White-chinned petrel				4	1	1	2	21	14	16	1		60
White-faced storm petrel						3							3
Yellow-eyed penguin						1							1
Seabirds total	31	18	45	34	22	19	7	106	73	62	35	10	459
Marine mammals													
Common dolphin						20							20
Hector's dolphin								1					1
NZ fur seal	14	28	10	16	3		2	6		2	6	13	100
NZ sea lion			3	3					4	1			11
Pilot whale							1						1
Whale (unidentified)				1									1
Marine mammal total	14	28	13	20	3	20	3	7	4	3	6	13	134
Marine reptiles	-	-	-	-	-	-	-	-	-	-	-	-	-
Leatherback turtle											1		1
Marine reptile total											1		1
Total protected species interactions	46	46	58	54	25	39	10	113	78	65	42	23	599

Appendix 5

Protected species interactions by Fisheries Management Area during the 2007/08 observer year

Species	1. AKE	2. CEE	3. SEC	4. SOE	5. SOU	6. SUB	6.SUB	6A. SOI	7. CHA	8. CEW	9. AKW	10. KER	Total
Protected fish													
Spotted black grouper											1		1
White pointer shark								1					1
Protectd fish total													
Seabirds													
Albatross (unidentified)	1	1	1	2	6	1		2					14
Antipodean albatross		1											1
Black browed albatross (unidentified)	4	1				1		1					7
Black petrel	3												3
Buller's albatross	1	2	4	3	20				8				38
Campbell albatross		2											2
Cape petrel		2	2	2					7				13
Chatham Island albatross				12									12
Common diving petrel				1					2				3
Fairy prion					1			1					2
Flesh-footed shearwater		2											2
Giant petrel				1		1			3				5
Gibson's albatross		1											1
Grey petrel		16	1			3							20
Grey-backed storm petrel					1								1
Grey-faced petrel	6												6
Indian yellow-nosed albatross		1											1
Petrel (unidentified)	1		3		21	1		17					43
Prion (unidentified)									3	1	1		5
Salvin's albatross		3	5	26		4		1					39
Seabird (unspecified)				1									1
Seabird large						1							1
Seabird small					1	1							2
Shy albatross			2		1				1				4
Sooty shearwater	18		4	1	59	3		8	12				105

Species	1. AKE	2. CEE	3. SEC	4. SOE	5. SOU	6. SUB	6.SUB	6A. SOI	7. CHA	8. CEW	9. AKW	10. KER	Total
Sothorn black browed albatross		1											1
Southern royal albatross					1								1
Storm petrel			1	1	1	1							4
Wandering albatross (unidentified)	5	1		1	1								8
Westland petrel			4		1								5
White-capped albatross			3		18	2		24	2				49
White-chinned petrel			6	3	25	12		14					60
White-faced storm petrel										2	1		3
Seabirds total													
Marine mammals													
Common dolphin										3	17		20
Hector's dolphin			1										1
NZ fur seal		19	7		15	27	1	8	23				100
NZ sea lion						2		9					11
Pilot whale											1		1
Whale (unidentified)						1							1
Marine mammal total													
Marine reptiles													
Leatherback turtle												1	1
Marine reptile total													
Total protected species interactions	39	53	44	54	172	61	1	86	61	6	21	1	599

Appendix 6

Observer comments per vessel from observed trips during the 2007/08 observer year for each 'fishery'

(AC = acoustic canon, BB = bird baffler, DB = dyed bait, DH = deck hose, IWL = integrated weighted line, LW = line weighting, NS = night setting, PI = Pinger, SL = Sea Lion Exclusion Device, TL = tori line, WS = warp scarer)

Table A6.1 HAK, HOK, SWA, LIN middle depth trawl fishery

Vessel No.	No. times observed	FMA's fished	Offal management	Mitigation used	Seabird interactions	Seabird capture?	Marine mammal interactions	Marine mammal capture?
1	3	1. CHA 2. CHA 3. CHA	Vessel has meal plant so little offal discharge and not during shooting or hauling	BB	Accompanied vessel at all times. Numbers increased dramatically during hauling, especially when codend approached surface.	- - -	Fur seals feeding on escaped fish.	- - -
2	1	1. CHA	Factory wash all the time but not a problem during shooting or hauling	TL or WS	No problems with birds	-	A couple of fur seals spotted as net coming up stern ramp	-
3	2	1. CHA 2. SUB, SOU, SEC	Meal plant operated. Only discarded material was factory floor wash, hoki skins and dropped fish or waste. Offal and discarding of whole fish occurred in SEC	TL	Feeding aggressively from codend, especially in SOU and SEC	Y -	Fur seals seen feeding from net on stickers and on hoki skins	- Y
4	2	1. SUB 2. SOE, SEC	None discharged as meal plant on board	BB (TL backup)	Seabirds present throughout trip, arriving in numbers at hauling. Frenetic feeding on fish dropping from net	- -	Fur seals seen occasionally	Y -
5	1	1. SUB, CHA	Meal plant on board, small particles discharged	BB	More seabirds seen when fishing SUB. Cape petrels feeding on very small particles from meal plant. Larger birds feeding from net and on discarded heads.	-	Fur seals regularly seen around vessel in SUB and CHA, all captures at night.	Y

Vessel No.	No. times observed	FMA's fished	Offal management	Mitigation used	Seabird interactions	Seabird capture?	Marine mammal interactions	Marine mammal capture?
6	3	1. SUB, SEC, CHA 2. SEC, SOE 3. SOU, SUB	Meal plant on board	BB	Smaller birds feeding on water pumped from sumps. Bird numbers increased rapidly during hauling as birds feeding from codend, eating stickers and escaped whole fish. Crew cleaned net of stickers prior to shooting.	Y Y -	No specific comments	- - -
7	1	1. CEE, CHA	No processing as vessel an ice boat. Only a very small amount of non-ITQ discarding during stowing of fish	TL	Seabirds present throughout trip, while seabirds following vessel, they did not land close to stern and were not seen feeding	-	No specific comments	Y
8	3	1. SEC, CHA 2. SEC 3. SEC, SOE	Vessel operates a meal plant but still creates enough offal discharge to attract birds. Floor washing from fillet processing and skins are discharged during setting and hauling via scuppers and sumps	TL	Seabirds more interested in hoki skin discards than the codend if the vessel was processing, otherwise they fed from the codend. At the time of seabird captures, hoki skins and floor washings were drifting into net meshes	Y - Y	Fur seals fed from codend and on discarded hoki skins	- Y -
9	1	1. CEE, CHA	No specific comments	Not stated	Seabirds constantly present especially at hauling when they fed aggressively on both the codend and fish floating free from the net	-	Consistent presence of fur seals with numbers greatest at hauling taking directly from codend or floating from net	Y
10	1	1. SOU, SEC	Offal and bycatch discharged in batches	TL	Seabirds accompanied vessel at all times, seabird abundance increased during hauling and batch discharging	-	No specific comments	-
11	2	1. CHA 2. CHA	Most offal mealed, but overflowed on a few occasions. Deck wash when factory busy. Stickers removed from net	TL	Seabird numbers increased during hauling, especially when codend approached surface.	Y Y	Fur seals feeding from codend and on lost fish. Hauling undertaken as quickly as possible, turns made with doors at surface	- Y

Vessel No.	No. times observed	FMA's fished	Offal management	Mitigation used	Seabird interactions	Seabird capture?	Marine mammal interactions	Marine mammal capture?
12	3	1. SOU, SUB 2. SOU 3. SEC, CHA	Meal plant operated but when at capacity offal discharged directly overboard. During hoki processing, deck wash flows out continuously. All ling viscera offal disposed overboard and fed on voraciously by birds. During one trip no effort was made to contain offal discharge during shooting and hauling.	TL (WS when too windy)	Seabirds present at all times, maximum number while discharging offal. During the second trip, birds quieter than usual, fed from codend but not aggressively.	Y - Y	No marine mammal sightings during second trip. Fur seals observed commonly on third trip but little interest	Y - -
13	2	1. CHA 2. SEC, SOU	During shooting and hauling factory floor wash continuously discharged	TL	Seabirds feeding from codend and offal line	Y -	Fur seals feeding on livers in the offal line, no direct interaction with codend	- -
14	1	1. CEE, CHA	No specific comments	None (vessel 22 m in length)	Seabirds constantly present, fed on fish spilling from codend, very aggressive. Ninety percent of fishing at night	-	Fur seals constant presence at haul. Up to 25 animals. Fed on fish escaping from codend	Y
15	2	1. SEC, CHA 2. CHA	Offal discharged during shooting and hauling	TL	Seabirds commonly seen around vessel both during hauling and while discharging during processing, with the greatest numbers interacting as the net surfaced, feeding aggressively	- -	Fur seals seen regularly in small numbers feeding on offal trail while factory processing. Crew member monitored for marine mammal activity	- -
16	2	1. SEC, SOE, CHA 2. SEC, SUB	Offal and whole fish discards frequently disposed of over the side during shooting and hauling. Net cleared of some stickers after hauling but not thoroughly. No capacity for bulk retention of offal. Uncoordinated batch discharge scheme attempted	BB & TL	Seabirds feeding from codend	Y Y	Fur seals and NZ sea lions sighted, fur seals feeding from codend	Y -
17	1	1. CHA	Meal plant onboard, offal not discharged during shooting or hauling.	BB (TL, WS on board)	Seabirds scavenged around net during hauling and sump / scuppers for offal at all times	Y	Doors only hauled to 100 m during turns. Fur seals commonly observed	Y

Vessel No.	No. times observed	FMA's fished	Offal management	Mitigation used	Seabird interactions	Seabird capture?	Marine mammal interactions	Marine mammal capture?
18	1	1. CEE, CHA	No offal discarding during shooting or hauling	TL	Seabirds constant presence at haul, fed on lost fish and from codend. Feeding aggressively	-	Fur seals constant presence at haul, feeding aggressively on lost fish and taking fish from codend. Common dolphins constant presence, up to 500, not seen feeding from net	Y
19	2	1. CEE, CHA 2. CEE, CHA	Offal not discharged. Whole fish discarded from starboard side during processing	BB	Seabirds flocked to stern as hauling began and fed aggressively from codend	- -	Fur seals seen occasionally swimming alongside vessel or feeding from codend	Y -
20	1	1. SUB	Offal batch discarded	TL	Bird abundance variable. Few birds followed vessel when no offal or discards. When batches discharged, birds followed the batch astern of the vessel	Y	No specific comments	Y
21	1	1. SOU, SUB	Batch discarding of discards and offal. When catching ling or hake, guts had to be continuously discarded	TL	No specific comments	-	Only a few sightings of fur seals in SOU	-
22	1	1. SOU, SUB	All unwanted species mealed. The only discards were warehouse heads which were stored in a hopper and discarded when the doors were up or no gear was in the water	Not stated	Birds number from 300 – 1000 and numbers increased when no other vessels nearby	-	Fur seals consistently present alongside the vessel in SOU	Y
23	1	1. SOU, SUB	Minced offal discharged during 3% of hauls and 65% of shots	TL	Seabird numbers peaked during offal discarding	-	No specific comments	-
24	2	1. CHA 2. SOU	No offal discharged during shooting or hauling	BB (TL backup)	Seabirds ever present in numbers 50 – 1500	Y -	When fishing in the Hokitika trench and south west on hake grounds, fur seals were in constant attendance, following the codend from the surface to the stern ramp	Y -

Vessel No.	No. times observed	FMA's fished	Offal management	Mitigation used	Seabird interactions	Seabird capture?	Marine mammal interactions	Marine mammal capture?
25	3	1. CHA 2. SEC, SUB, SOU 3. SEC, SOE	No offal discharged during hauling, but meal water often discharged	BB (all tows) TL (some tows)	Seabirds present in low numbers, feeding from codend and numbers increased during hauling	- - -	Fur seals seen occasionally, sometimes feeding on lost fish	- Y -
26	2	1. SEC, SOE, SUB, SOU 2. SOU, SEC	Not discharged during shooting or hauling, but whole fish and offal discarded during tows. Meal plant used	BB & TL	Seabirds feeding from codend	- Y	Fur seals and NZ sea lions feeding from codend	Y -
27	1	1. SUB	Offal and fish minced. Crew actively attempted to remove stickers. Rarely was any attempt made to hold or minimise discharge of minced fish and offal during shooting and hauling	BB & TL	Discharging mince during turning was cause of seabird fatality. Observer felt mincing increased seabird foraging effort, competitive interactions and proximity of feeding attempts from nets. Gear events coincided with captures	Y	No specific comments	Y
28	2	1. CHA 2. SOU	During one trip the vessel discharged during shooting but not hauling. During another trip, the vessel held during shooting and hauling and later offal and whole fish discards were minced and discharged during tows.	BB & TL	Seabirds commonly seen during hauling and while discharging waste, birds interacting as net surfaced.	Y Y	Fur seals seen in small numbers feeding on offal trail while factory processing during first trip. Marine mammals not sighted second trip.	- -
29	1	1. CEE, CHA	Offal and whole fish discharged during towing. Stickers removed from net before shooting	BB	Seabirds feeding aggressively from codend and on any floating fish	-	Fur seals most commonly observed following and feeding from the net on hauling, numbers varied between 2 and 8. Actively fed on hoki from net.	Y
30	1	1. CEE, CHA	Whole fish discharged from the deck during processing and on some tows when offal was discharged	None	Birds flocked towards codend and fed aggressively	-	Furs seals seen on many occasions, often appearing shortly after hauling began and feeding from codend as it hung from stern	Y

Vessel No.	No. times observed	FMA's fished	Offal management	Mitigation used	Seabird interactions	Seabird capture?	Marine mammal interactions	Marine mammal capture?
31	2	1. CHA, SEC 2. SEC	During another trip, vessel discharged during setting and hauling, but flow generally at a minimum at those times.	BB & TL	Birds commonly seen during hauling and processing, greatest numbers interacting as net surfaced	- Y	No specific comments	- -
32	1	1. CHA, SOU	Vessel stopped discharge of offal and discard species during shooting and hauling	BB	Seabirds followed vessel while hauling and processing fish and during offal discharge	Y	Fur seals seen around vessel six times, on one occasion two fur seals seen feeding from codend	-

Table A6.2 Southern blue whiting trawl fishery

Vessel No.	No. times observed	FMA's fished	Offal management	Mitigation used.	Seabird interactions	Seabird capture?	Marine mammal interactions	Marine mammal capture?
1	1	SUB	Vessel did not discharge offal as meal plant used throughout trip.	BB	Bird numbers, especially white-capped albatrosses, increased dramatically during hauling. Birds sometimes fed aggressively at codend.	-	Fur seals and NZ sea lions seen feeding regularly from codend. All sea lions seen were male. During one night time haul, around 20 fur seals and male NZ sea lions were seen close by the stern as the codend was being hauled aboard. The codend contained few fish, but two NZ sea lions and two fur seals. Another fur seal was caught in the next tow.	Y
2	1	SUB	The vessel initially held offal, which was discharged from the port processing line out the scuppers. Later, offal was discharged during shooting and hauling.	TL & WS	Seabirds attracted to offal	-	NZ sea lions and fur seals were sighted in numbers from 1-9 on occasion. Mammals seemed attracted to offal and then followed codend to surface.	Y
3	1	SUB	No offal discharge during shooting and hauling.	TL	Bird interactions between vessels occurred. Although birds feeding from codend, no aggressive behaviour.	-	Fur seals seen four times in SUB, between 2 - 7 individuals following codend once it surfaced and feeding from net.	-
4	1	SUB	Vessel has meal plant. Factory floor sumps covered with grids to prevent offal and fish going over board.	TL	Birds feeding from codend, not aggressive. Splices bound to cover any sprags on warps.	Y	When in SOI, fur seal numbers from 3-20 alongside vessel and feeding from codend during hauling. Five fur seals and three NZ sea lions caught in last 3 tows.	Y
5	1	SUB	All offal waste was pumped directly overboard above waterline without mincing. No attempt was made to reduce or stop the discharge of offal during shooting or hauling.	TL (for 60% of tows due to bad weather, otherwise nothing)	Seabird activity highly variable depending on fishing area and offal discharge. Albatross highest on Bounty and Pukaki grounds but significantly less on Campbell Rise. When offal being discharged bird numbers greatest with 100s to 1000s of birds.	-	Fur seals seen regularly around vessel on Bounty platform. NZ sea lions seen on Campbell Rise.	Y

Vessel No.	No. times observed	FMA's fished	Offal management	Mitigation used.	Seabird interactions	Seabird capture?	Marine mammal interactions	Marine mammal capture?
6	1	SUB	Factory wash during processing and hauling.	TL	Birds feeding from codend and offal line	Y	Up to 30 fur seals seen around the vessel in SUB (Bounties) during processing and hauling. Commonly observed feeding on livers in the offal line and no direct interaction with codend.	Y
7	2	SUB	As vessel processing to surimi, large quantities of offal produced so not possible to stop discharge during shooting and hauling.	BB (not within in 1 m of sea)	Seabirds continuously present during both trips, feeding on offal from port and starboard sumps. During haul, larger birds fed aggressively from the net while smaller birds continued to feed on offal.	- -	During both trips fur seals were feeding from the codend and following the vessel. Headline below 100 m when turning.	Y Y

Table A6.3 Scampi trawl fishery

Vessel No.	No. times observed	FMA's fished	Offal management	Mitigation used.	Seabird interactions	Seabird capture?	Marine mammal interactions	Marine mammal capture?
1	2	1. CEE, SOE 2. SOE	Heads and offal usually collected in a hopper to be discarded when net at depth, but sometimes heads thrown as processing.	TL	Birds very aggressive over full moon period. Frenetic feeding when batch discarding from hopper occurred. The relatively short stretch of water (6-7 m) immediately along port side becomes embroiled with birds. At this time, tori line had scant deterrent effect. The mate protected birds physically with a short handled plastic spade which proved to be the most effective deterrent. Birds congregated during hauling, taking fish floating out of net	Y -	Only four fur seal sightings on one trip, not interacting.	- -
2	1	1. SOI	The vessel did not discharge waste during shooting until the doors were back in the water and processing was always finished before the next hauling event.	TL	Seabirds commonly seen around the vessel during hauling and while discharging during processing. Greatest number present when net on surface. Numbers peaked at 300 birds. Tori line deployed only during processing and actively fishing.	-	Small numbers of NZ sea lions sighted.	-
3	3	1. AKE 2. AKE 3. AKE	Vessel discharged during shooting of the net during some trips.	TL (no streamers) & WS (buoy attached to rope)	Birds constantly in attendance and numbers increased markedly from the start of hauling to when net was on surface and birds would stay around vessel for next 2 hours while catch was processed, feeding on discards and offal. As numbers increased during the trip, the skipper deployed a warp scarer consisting of a buoy attached to a rope. A mixture of mitigation used on this vessel including bird bafflers, tori line and homemade warp scarer.	- Y Y	No specific comments	- - -
4	1	1. SOI	No specific comments	Floats attached to vessel stabilisers	Seabird abundance variable but increased during haul as they fed from fish escaping.	-	Fur seal abundance variable, fed in fish escaping from codend	Y

Vessel No.	No. times observed	FMA's fished	Offal management	Mitigation used.	Seabird interactions	Seabird capture?	Marine mammal interactions	Marine mammal capture?
5	2	1. CEE, SOE, SEC 2. CEE, SOE	Fish were not discarded until trawl and bridles were submerged after shooting. The main danger appeared to be hitting the warp while wire was paying out and birds were drawn in as fish were being discarded. The vessel emptied port and starboard chutes in an attempt to mitigate this.	TL and escape panels in net	Birds regularly feeding aggressively from discards. Warp strikes observed when bird concentrations increased around stern but appeared to recover without injury. Seabirds were present in high numbers throughout the trip, and increased dramatically during hauling and dumping fish.	- -	Fur seals seen in low numbers feeding on lost and discarded fish. Both codends possessed windows that would allow marine mammals to escape.	- -

Table A6.4 Squid trawl fishery

Vessel No.	No. times observed	FMA's fished	Offal management	Mitigation used.	Seabird interactions	Seabird capture?	Marine mammal interactions	Marine mammal capture?
1	1	1. SOU, SOI	Discharging of offal or other discards did not occur at shooting or hauling as vessel has holding bins.	BB SL	Bird numbers ranged from 100 - 500. Apart from feeding on squid offal from factory floor wash there was little interaction with the vessel except at hauling when squid floating free of the net were eaten.	Y	No specific comments	-
2	1	1. SOU, SOI	There were a couple of instances when the vessel discarded offal whilst fishing due to the meal plant breaking down. Discarding of spiny dogfish occurred during some tows. Large bags of squid offal discarded once fishing stopped.	WS SL TL	Birds feeding voraciously from codend, diving at the net and fighting. Birds moving between vessels.	Y	No specific comments	Y
3	1	1. SOU, SOI	Offal discharged during shooting and hauling in negligible amounts, this included gut remnants and tentacles.	TL SL	Birds fed on offal from factory floor wash and sump water, feeding aggressive. Petrels diving near vessel to collect sinking tentacles.	Y	Marine mammal sightings rare, dusky dolphins and fur seals seen.	Y
4	1	1. SOU, SOI	The vessel mealed all waste so no offal discarding.	TL SL	Seabirds were present throughout the trip.	Y	NZ sea lions observed on two occasions following vessel.	Y
5	1	1. SOU, SOI	Vessel discharging offal and bycatch in batches.	TL SL	Seabirds accompanied the vessel at all times, seabird abundance increased during hauling and batch discharging.	Y	NZ sea lions observed seven times, usually feeding on escaped fish from codend.	Y
6	2	1. SOU, SOI 2. SOU, SOI	The vessel only discharged offal while towing, not during shooting or hauling	TL SL (WS backup)	Larger birds were 99% white-capped albatrosses, but royal albatrosses often present during hauling. Bird behaviour aggressive	Y Y	During first trip on this vessel, female NZ seal lions were seen feeding on offal at stern. During the second trip no marine mammals were sighted.	- -

Vessel No.	No. times observed	FMA's fished	Offal management	Mitigation used.	Seabird interactions	Seabird capture?	Marine mammal interactions	Marine mammal capture?
7	1	1. SOU, SOI, SEC	During shooting / hauling factory floor wash was continuously discharged in which minimal offal was observed on floor.	TL SL	No specific comments	Y	No specific comments	Y
8	2	1. SOU, SOI 2. SOU, SOI	Offal held during hauling and net hauled as quickly as possible. Vessel discharged minced offal during shooting on five tows and offal on two tows. During the second trip the vessel discharged during shooting four times when the factory was processing tows with high non-quota bycatch.	TL SL	Seabirds followed vessel and congregated at stern during shooting and hauling to feed from net. During processing birds scavenged offal from cutter pumps.	Y Y	During turns headline only 25 m below surface instead of 100m. A few NZ sea lions and fur seals seen during hauling.	- Y
9	1	1. SOU, SOI, CHA	Uncoordinated batch discharge scheme attempted	BB & TL SL	Between 60 - 300 birds around vessel. White-capped albatrosses feeding voraciously from codend.	Y	Nine marine mammal sightings, including fur seals and NZ sea lions. Seen feeding from codend. Fur seal pup came up the stern ramp.	Y
10	2	1. SOU, SOI 2. SOU, SOI	When meal plant was full there were small amounts of offal discharge	BB (TL backup) SL	Birds often dived into net / mesh to get squid or dived under net. When offal was discharged, bird strikes with warps were frequent and bird abundance increased.	Y Y	FURs seen occasionally in SOU	Y -
11	1	1. SOU, SOI	Batch discarding	TL SL	Bird abundance variable. Few birds followed when there was no discard of offal or whole fish and when there was no sump discharge of fish particles. When batches discharged, birds followed the batch astern of the vessel. Birds also moving to other vessels.	Y	No specific comments	Y
12	1	1. SOU, SOI	Vessel has specific Code of Practice. Batch discarding of offal and discards was followed. Offal limited when targeting squid compared to ling and hake.	TL SL	Tori lines and batch discarding seemed to be an effective combination to limit warp strikes.	Y	Only a few sightings of marine mammals, all fur seals in SOU.	-

Vessel No.	No. times observed	FMA's fished	Offal management	Mitigation used	Seabird interactions	Seabird capture?	Marine mammal interactions	Marine mammal capture?
13	1	1. SOU, SOI	Vessel commonly discharged offal and whole fish while shooting and hauling.	TL SL	Most seabird captures occurred during hauling. Seabirds numbered from 40 to 1000 each day and were greater when vessel discarding whole fish.	Y	Fur seals and NZ sea lions seen, eating whole fish discards.	-
14	1	1. SOU, SOI	No offal or fish discharged during hauls or sets.	BB SL	Monitored bird activity for all hauls in daylight.	Y	No marine mammals sighted.	-
15	2	1. SOU, SOI 2. SOU, SOI	Offal batching trial undertaken on one trip. During the other trip offal and heads were batched by vessel and released while not fishing, if possible, or mid tow when fishing at night. Some fish species were discarded whole for two tows as meal plant broken.	BB TL SL	Birds actively feeding on offal and from codend.	Y Y	On most days in SOI, 1-4 HSL were observed following vessel. During second trip on this vessel, fur seals seen swimming behind or beside vessel. NZ sea lions seen around vessel, usually at night while vessel not fishing.	Y Y
16	1	1. SOU, SOI	Offal was held in the factory and batch discarded when holding tank full. Discharge intermittent but consistent during tow. Some whole fish discarded.	BB TL AC SL	Seabirds in constant attendance especially when no meal plant operating. Aggressively feeding on all discharge from vessel. Acoustic cannon used during turning, shooting & hauling or when headline at surface.	Y	Marine mammals not present in significant numbers. NZ sea lions seen on four occasions with a maximum of three sighted at one time. All observations north of Auckland Islands.	Y
17	1	1. SOU, SOI	On occasion offal was discharged when shooting the net and during hauling.	BB TL SL	Warp strike observations undertaken on every tow, a single strike was noted.	-	Fur seals were seen three times, swimming / foraging by discard chute primarily on port side. A NZ sea lion was seen once in SOU behaving the same as the fur seals.	-
18	1	1. SOU, SOI	Offal and NQBC retained during shooting and hauling. During fishing or steaming offal and NQBC held or minced. NQBC discharged when mincer jammed. Stickers removed prior to shooting.	TL BB SL	Large seabirds were feeding aggressively from the codend, on minced offal and NQBC. Small seabirds were feeding on floaters and diving around the headline during hauling and fed on offal and NQBC.	Y	Fur seals observed were large males feeding on floaters during hauling.	-

Vessel No.	No. times observed	FMA's fished	Offal management	Mitigation used	Seabird interactions	Seabird capture?	Marine mammal interactions	Marine mammal capture?
19	1	1. SOU, SOI	Offal and whole fish discards were held during shooting and hauling and were later minced and discharged during the tow.	BB TL SL	A flock of birds present every day. Warp strike observations were undertaken with 95% occurring when the factory was discharging minced offal and whole fish, one heavy contact.	Y	Marine mammals not sighted around the vessel.	-

Table A6.5 Pelagic trawl fishery

Vessel No.	No. times observed	FMA's fished	Offal management	Mitigation used	Seabird interactions	Seabird captures?	Marine mammal interactions	Marine mammal captures?
1	3	1. CEW 2. CHA, CEW, AKW 3. CHA, CEW, AKW	Vessel had a meal plant so very little discharging and not during hauling or shooting.	BB	Bird numbers, especially white-capped albatrosses, increased dramatically during hauling, sometimes feeding aggressively at codend.	- - -	No marine mammals sighted in CEW, CHA or AKW during one trip. During the second trip fur seals and common dolphins were seen in CHA. Fur seals were present 19% of tows, usually seen feeding on fish escaping from the codend. Fur seals also present on third trip.	Y - -
2	3	1. CHA, CEW 2. AKE, CEE, CHA, CEW, AKW 3. SOU, CHA, CEW	Had factory wash all the time but was not a problem during shooting and hauling. All by-products mealed and whole fish discards limited during shoot and haul.	TL or WS	Seabirds constantly following vessel and feeding on any fish lost through mesh during hauling, numbers dramatically increased during hauling.	- - Y	No specific comments	- - -
3	2	1. CHA, CEW 2. CEW, AKW	Most offal mealed, overflowed on a few occasions and was discarded. All stickers removed and hauling undertaken as quickly as possible.	TL	Birds followed vessel feeding on floor wash and offal, densities increased during hauling. Vessel contacted shore when trigger points reached.	- -	Turns made with doors on surface. During one trip when common dolphins were caught, dolphins had been observed swimming alongside the vessel on two occasions. Following captures, the vessel stopped fishing between 2300 and 0100.	Y Y
4	4	1. CHA 2. CHA 3. CHA, SOU 4. SOU, CHA, CEW	Offal occasionally discharged but rarely during hauling. Meal plant operated. Only discarded offal when meal plant 'couldn't cope'. Unwanted fish discarded at times other than shooting and hauling.	TL (WS backup)	Seabirds often seen feeding as net surfaced on fish that floated free or were in the wings of the net.	- - Y Y	Fur seals observed showing little interest in fishing activities.	- - - Y
5	3	1. SEC, CHA, CEW 2. CEW, AKW 3. SEC	During shooting / hauling factory floor wash was continuously discharged in which minimal offal was observed on floor.	TL	Birds followed vessel, fed on discharge washed off factory floor through sump. Followed net in towards vessel, sometimes diving just behind codend. Some aggressive feeding.	- - -	No specific comments	- Y -

Vessel No.	No. times observed	FMA's fished	Offal management	Mitigation used	Seabird interactions	Seabird captures?	Marine mammal interactions	Marine mammal captures?
6	1	1. SEC, SOE	Offal and whole fish discards are frequently disposed of over the side during shooting and hauling. Net is cleaned of some stickers after hauling, but not thoroughly. No capacity for bulk retention of offal.	BB TL	No specific comments	Y	No specific comments	-
7	1	1. CHA	Offal discharged during shooting and hauling.	TL	Seabirds commonly seen around vessel both during hauling and while discharging during processing, with the greatest numbers interacting as the net surfaced.	-	Fur seals regularly seen in small numbers feeding on the offal trail while the factory was processing. One crew member monitored for marine mammal activity.	-
8	3	1. SOU, CHA 2. CEW, AKW 3. CHA, CEW	Vessel has meal plant, discarding only occurred when it was full and offal was discharged when net on deck or during the tow when net on bottom. If shooting or hauling occurred when meal plant was full, processing would cease and offal held.	BB (TL, WS on board)	Birds would congregate during hauling and scavenged on any fish that fell from the net.	Y - Y	Fur seals commonly observed during a trip in CHA, feeding around net or foraging offal. 10 - 12 common dolphins seen swimming alongside the vessel once during one trip whilst fishing.	- - -
9	1	1. CHA	Minced offal was being discharged during 3% of hauls and 65% of shots.	TL	Bird numbers peaked during offal discarding.	-	Only marine mammals encountered were a pod of 30-40 common dolphins that followed vessel for 45 minutes.	-
10	3	1. CEW, AKW 2. CHA, CEW 3. SEC, SOU	Vessel had new screens for the sumps in the factory which were very effective at preventing floor washings from going overboard. All offal mealed and not discharged.	BB (TL backup)	Bird numbers increased during hauling. Birds fed on debris and small fish off the codend.	- - -	A blue whale was the only marine mammal sighting during one trip. On the other trip, the crew were very concerned about common dolphin captures and immediately steamed away from the area to avoid further captures.	Y - -

Vessel No.	No. times observed	FMA's fished	Offal management	Mitigation used	Seabird interactions	Seabird captures?	Marine mammal interactions	Marine mammal captures?
11	1	1. SOU	Offal and fish minced. Crew actively attempted to remove stickers. Rarely was any attempt made to hold or minimise discharge of minced fish and offal during shooting or turning	BB & TL	Seabird abundances were variable but greatest when shooting, turning, hauling and discharging.	-	No specific comments	-

Table A6.6 Deep-water bottom trawl fishery

Vessel No.	No. times observed	FMA's fished	Offal management	Mitigation used	Seabird interactions	Seabird capture?	Marine mammal interactions	Marine mammal capture?
1	4	1. SUB 2. SOU, SUB 3. SUB 4. SUB	Offal discharged during shooting and hauling on all trips, although modifications were underway to allow offal and NQBC to be held during shooting and hauling.	BB	On all trips, feeding by seabirds opportunistic, feeding on stickers, from codend and on discharged offal.	- - - -	On all trips, feeding by fur seals opportunistic, feeding on stickers, from codend and on discharged offal.	- Y - -
2	2	1. CEE, SEC, SOE 2. CEE	No processing of offal as vessel is an ice boat. Whole bycatch discarding minimal and only during steaming.	TL	Minimal seabird interactions with vessel except when codend on surface and birds took fish occasionally.	- -	No specific comments	- -
3	1	1. SOE	The vessel discharged offal during shooting and hauling, however attempts were made on some hauls to hold back offal.	TL	Noticeable increase in bird numbers when the vessel discharged offal. Cape petrels most common seabird.	-	No marine mammals sighted.	-
4	1	1. AKW	Net was down to around 300 m when offal was discharged during sets, no discharge at hauling.	Not stated	Birds present were mainly black-browed albatrosses, 60-100 waiting in area and feeding on floating fish on surface near net.	-	Common dolphin spotted on one occasion riding wake.	-
5	2	1. SEC, SOE 2. SEC, SOE	During first trip whole fish discarded during shooting, towing, hauling.	BB	During first trip in SOE, several hundred birds following vessel, fed from codend at haul or from discarded whole fish. During the second trip, bird numbers varied depending on whether fishing was in CHA or SOE. Birds following vessel and numbers increased at hauling when they fed from codend.	-	No specific comments	-

Vessel No.	No. times observed	FMA's fished	Offal management	Mitigation used	Seabird interactions	Seabird capture?	Marine mammal interactions	Marine mammal capture?
6	5	1. AKE 2. AKE 3. AKE 4. AKE, AKW, 5. AKE	Vessel did not discard bycatch or offal while shooting or hauling.	TL	Generally few birds around vessel when targeting ORH, birds tried to feed from codend. Tori line damaged occasionally when becoming entangled in warps or the propeller.	- - - - -	No specific comments	- - - - -
7	5	1. SOE 2. SOE, SUB 3. SEC, SOE 4. SOE 5. SOE	Large capacity meal hopper on board, enabling mealing of all non-processed whole fish and offal. Discarding occurred when all operations complete. Whole fish discards only result of mechanical breakdown. During one trip offal not held when large amounts of heads and offal were discharged.	BB	Seabirds always present, up to 1000, when occasionally offal was discarded numbers increased. Interactions reported on rare occasion when discarding occurred during setting. Birds fed on codend, but not overly interested. Birds feeding on offal from floor wash. On several trips discharging of offal intermittent.	- - Y Y -	Few or no marine mammals sighted during trips.	- - - - Y
8	3	1. AKE 2. AKE 3. AKW	All fish stowed green. Any discarding of whole fish occurred when gear out of water.	TL (rarely, vessel under 28 m)	Birds generally present in low numbers at hauling, very little to attract them to vessel. Birds would occasionally feed from codend or on fish escaping through net mesh, but not aggressively.	- - -	No specific comments	- - -
9	4	1. AKE, AKW 2. AKE, AKW 3. AKE, AKW 4. AKE	No offal or whole fish discarded at any time. Vessel following industry COP	BB (on one trip only)	Seabirds sighted in low numbers on all trips, birds generally kept away and would turn up when winches started, followed codend in but kept distance. Occasionally fed from codend but not aggressively.	- - - -	No specific comments	- - - -
10	3	1. CEE 2. CEE 3. CEE	No offal or whole fish discarded.	TL	Birds around vessel in low numbers at end of tow when net at surface.	- - -	No marine mammals sighted.	- - -

Vessel No.	No. times observed	FMA's fished	Offal management	Mitigation used	Seabird interactions	Seabird capture?	Marine mammal interactions	Marine mammal capture?
11	2	1. SEC, SOE 2. SOE	There is a hasher installed and used for heads, offal and bone fish discards. All reduced to 2-3 cm size pieces upon which birds fed. Vessel discharged during shooting and hauling but flow was generally minimal at those times.	BB	Birds were always active about the offal discharge point. Greatest number of birds present as net surfaced.	- -	No specific comments	- -

Table A6.7 Inshore trawl fishery

Vessel No.	No. times observed	FMA's fished	Offal management	Mitigation used	Seabird interactions	Seabird capture?	Marine mammal interactions	Marine mammal capture?
1	1	1. SEC	Once the catch was dumped into the pound, the net was generally shot for the next tow, before the catch was fully sorted and processed. This meant that offal and discards were not produced during shooting and hauling, but were produced for the first hour or so of the next tow.	None	Birds feeding aggressively around stern on discards and offal. Seabirds were initially attracted by the sounds of hauling and the sight of deck lights at night-time. Seabirds congregated around the cod-end as it surfaced and approached the stern as the net was hauled onboard. The main concentration of seabirds was seen at hauling and during fish sorting and cutting, when discards were swept out both port and starboard scuppers and offal was thrown overboard. The placement of discards of whole fish and offal was a significant factor in bird warp strikes, as shown during warp strike observations. When small discarded fish or offal landed in front of the warps, warp strikes often occurred, usually involving albatrosses and Westland petrels. One albatrosses was observed being dragged under by the starboard warp but was seen to resurface.	Y	Four Hector's dolphins observed at haul of tow 3 and one seen at haul of tow 5.	-
2	1	1. CEW, CHA	Offal retained while warps in water.	None	During hauling, larger birds would actively attack and feed from codend while at surface. Smaller birds scavenged on any loose offal or fish. Birds not interested during tows unless offal discharged, during which activity increased. Heavy warp strikes only noted when offal was being discharged. 6 interactions were deck strikes at night in bad weather.	-	No specific comments	-

Vessel No.	No. times observed	FMA's fished	Offal management	Mitigation used	Seabird interactions	Seabird capture?	Marine mammal interactions	Marine mammal capture?
3	1	1. SEC	Offal was usually retained on board during fishing and seabirds were not usually attracted close to the vessel during fish cutting. Offal and discards were not produced during shooting and hauling, but were produced for the first hour or two of the next tow. Discarded whole fish generally landed in the prop-wash area, away from the warps and warp entry points.	None	Birds feeding on a few small discards. Offal discarded under port warp on one tow, which resulted in a number of warp strikes. Seabirds were initially attracted by the sounds of hauling and the sight of deck lights being turned on at night-time. The main concentration of seabirds was seen at hauling and during fish sorting, when discards were swept off the trawl deck into the prop-wash. Birds were feeding aggressively around the cod-end, once it surfaced, and around the stern ramp during hauling and during fish sorting	-	No specific comments	-
4	1	1. SEC	Once the catch was dumped into the pound, the net was shot for the next tow, before the catch was processed. This meant that offal and discards were not produced during shooting and hauling, but were produced for the first hour or two of the next tow. The fish and offal from the scuppers generally passed between the two warps, in the area of the prop-wash.	WS when processing	Many warp strikes. Birds feeding on barracouta escaping from net and pulling fish through net mesh right up to stern, especially giant petrels and white-capped albatrosses. Birds feeding very aggressively at stern on discards and offal (discharged during tow). Birds were feeding aggressively around the codend, once it surfaced, and around the stern ramp during hauling, but especially during fish processing and discarding.	Y	Two Hector's dolphins sighted on return to port.	-
5	1	1. CHA	Sometimes offal was cased during processing and tipped down the stern ramp between the warps. Single tori line deployed on port side during processing, this was retracted when offal discharge ceased even if towing. Offal not discarded during shooting or hauling.	TL	Seven sooty shearwater interactions were deck strikes.	Y	Single sighting of four Hector's dolphins which swam in front of the starboard paravane chain briefly before disappearing.	-

Vessel No.	No. times observed	FMA's fished	Offal management	Mitigation used	Seabird interactions	Seabird capture?	Marine mammal interactions	Marine mammal capture?
6	1	1. SEC	The fish and offal from the discard chute passed under the port warp and port warp scarer device.	WS, but displaced laterally 1-2 m from warp	Birds feeding on discards and on fish escaping through net. Several birds were dragged underwater by the warp. Birds were feeding aggressively around the codend, once it surfaced, and around the stern ramp during hauling, but especially during fish processing and discarding. When the warp scarer was displaced laterally from the warp entry point, bird strikes were common.	Y	No specific comments	-
7	1	1. CHA	Whole fish discards were discarded at the end of processing and while towing. When targeting flat fish offal was retained during setting, towing and hauling. When targeting tarakihi offal was binned and discarded after processing and during tow.	None	White-capped albatross caught on warp, went through block and dropped overboard. Intermittent offal and discards were being discharged for that tow.	Y	Three separate sightings of Hector's dolphins around vessel on same day. Common dolphins and fur seals sighted on occasion.	-
8	1	1. SEC	Offal and discards were not produced during shooting and hauling, but were produced for the first hour or two of the next tow.	None	Some small stickers fall through the mesh at hauling, birds aggressively feeding. Birds also feeding aggressively on discards and offal. Albatrosses eating whole, small spiny dogfish. Seabirds were initially attracted by the sounds of hauling and the sight of deck lights at night-time. Seabirds congregated around the cod-end as it surfaced and approached the starboard side of the vessel as the net was hauled onboard. The main concentration of seabirds was seen at hauling and during fish sorting and cutting, when discards were swept out the starboard scuppers and offal was thrown overboard. Warp strike observations were concentrated during times when fish processing was occurring and a new tow was in progress. Sooty shearwaters were observed diving under the net and under the vessel at hauling and during fish processing.	Y	No specific comments	-

Vessel No.	No. times observed	FMA's fished	Offal management	Mitigation used	Seabird interactions	Seabird capture?	Marine mammal interactions	Marine mammal capture?
9	2	1. AKW 2. AKW	A small amount of offal and heads from school shark and rig was discharged and undersized snapper were discarded along with some NQ species. This occurred during the shoot and beginning of haul.	TL	White-capped albatrosses, flesh-footed shearwaters (mainly) and giant petrels, wandering albatrosses (occasionally) were observed feeding aggressively at the codend. Tori lines deployed over each warp for every tow. No birds were observed to come into any contact with the warps in the snapper fishery. Bird numbers low when targeting ORH, higher when targeting SNA and feeding on washed out fish.	- -	No specific comments	- -
10	1	1. AKW	Whole fish discards were discharged while setting, often coinciding with net shooting. All target species caught were landed green except flatfish and sharks. Offal low quantity, batch discharged following sorting, generally coinciding with trawling.	None	Seabirds rarely came within 2 m of the warps . Observer considered there to be minimal threat to birds from warp strikes. Seabird estimates within 50 m ranged from 0 to 23 and beyond 50 m from 0 to 136. Larger birds more attracted to fishing vessel. Black backed gulls and white-capped albatrosses most prevalent seabirds seen to interact with the fishing vessel. No birds attempted to feed directly from the net. Fish lost through the net during hauling were scavenged. Large birds going for whole fish (incl. discards) while smaller birds go for offal.	-	Common dolphins seen twice, no interest in net.	-

Table A6.8 Inshore bottom longline fishery

Vessel No.	No. times observed	FMA's fished	Offal management	Mitigation used	Seabird interactions	Seabird capture?	Marine mammal interactions	Marine mammal capture?
1	1	1. AKE, AKW	No specific comments	LW	Seabirds observed at hauls and seen targeting offal and baits. Up to 75 birds present at haul. Setting undertaken at night.	-	Orca suspected of removing fish from line, vessel stopped fishing and returned to port. Orca not sighted.	-
2	1	1. SEC	No fish processing occurred during setting.	LW	Seabirds primarily attracted to offal discarding between sets. Birds sometimes pecked at baits on the surface.	-	No specific comments	-
3	1	1. AKE	No specific comments	LW	Seabirds not present in large numbers during night time sets. During first daylight haul numbers increased gradually. Smaller albatrosses attracted by lost baits. During daylight sets bird activity increased. Most birds flew around the end of the aerial section of the tori line.	-	On one occasion orca were present when fishing for bluenose and skipper steamed away from the grounds overnight and changed to hapuku / bass which are not taken by orca.	-
4	2	1. CEE, SOE 2. SOE	During the first trip only 65% of baits were hooked and remaining baits dropped overboard. On hauling spent bait was falling off stern and floating over line. Offal retained. Some heads going overboard. During the second trip the vessel was operating under COP (developed post bycatch event on first trip).	LW	Seabirds always present, fed aggressively on discards which were discarded at end of each set. Birds showed interest in line during hauling and also picked up lost baits at set. Poor line weighting regime and ineffective tori line during first trip. High seabird captures on first trip.	Y Y	During first trip fur seals followed vessel, taking eel and ling from line.	- -
5	1	1. AKE	Bait and offal retained during hauling and no offal discarded during shooting.	TL LW	Seabirds constantly present and feeding on any offal / used bait discarded by the vessel as well as any lost fish during hauling. Numbers increased during hauling. Sets generally at night.	-	On three occasions, 3-6 orca around vessel actively feeding from mainline. Vessel steamed away from the area to avoid further losses.	-

Vessel No.	No. times observed	FMA's fished	Offal management	Mitigation used	Seabird interactions	Seabird capture?	Marine mammal interactions	Marine mammal capture?
6	1	1. SEC, SOE	Offal discarded during hauling and bait scraps washed over the side during setting.	TL NS LW	Birds followed vessel and fed from bait scraps washed over the side during setting or from discarded offal during hauling. The TL broke on 2 occasions and birds came in closer to vessel and began diving on baits during setting. Birds fed aggressively on offal during hauling.	Y	No marine mammals sighted.	-
7	1	1. AKE	No offal discarded during setting or hauling. Hauls 9 & 12, crew member fed birds shark liver during haul. Haul 14, crew instructed not to feed birds during haul and bait carefully kept, not washing out scuppers.	TL NS LW	Birds feeding on lost bait during setting. Seabirds interested in line hauling, feeding on occasional lost baits. Some XPE diving onto line during hauling.	Y	As general practice to avoid orca, the boat quickly hauled, then steamed away overnight, then changed target to species to hapuku / bass. Six orca seen during haul 16, bluenose taken from line, vessel steamed elsewhere.	-
8	1	1. CEE	Practices employed included bait retention and not dumping offal during setting or hauling.	LW	Seabirds constantly observed following vessel and feeding on any offal or bait discharged as well as any fish lost from the line during hauling. Numbers increased considerably during hauling and setting. Night setting.	Y	Several fur seals seen around vessel but no direct interactions. About 10 common dolphins also seen around vessel during a haul, but no direct interaction.	-

Vessel No.	No. times observed	FMA's fished	Offal management	Mitigation used	Seabird interactions	Seabird capture?	Marine mammal interactions	Marine mammal capture?
9	1	1. CEE, SEC	Any fish discarded during hauling thrown over port side.	TL LW DH	Seabirds present at all times during the day, less than 200. Birds feeding on lost baits and fish during hauls and on offal and discards at other times.	-	Common dolphins commonly seen when fishing in SEC near Kaikoura, pods of up to 60 around vessel during hauling but no interest in fish being hauled. Fur seals seen in SEC and CEE on several occasions and showed considerable interest in fish. During hauling of set 21 five to six orca were seen feeding aggressively near the vessel.	-
10	1	1. SOE	During haul, larger birds fed on lost fish and used bait washed out the scuppers.	TL LW	Tori line tangled on four occasions as caught on hooks during set, on two of these occasions, birds caught. Surprisingly few birds seen for the Chatham Island area. During 29 hauls, 2113 birds observed within 150 m of vessel during hauling.	Y	No marine mammals seen.	-
11	1	1. AKE	Baits and non ITQ discarded during hauling.	LW	During setting, no more than 3 grey-faced petrels would fly above line. No diving on line. During hauling the discarding of baits and non ITQ species would attract up to 30 wandering albatrosses which fed on discards.	-	No specific comments	-
12	1	1. SOE	During hauling, all offal and non ITQ species were retained and dumped at the end of hauling. No offal was discharged during setting.	TL (3) LW	The bait line was always within the tori line area and birds stayed out of this area. Sets made during day and night.	Y	No specific comments	-

Vessel No.	No. times observed	FMA's fished	Offal management	Mitigation used	Seabird interactions	Seabird capture?	Marine mammal interactions	Marine mammal capture?
13	1	1. SEC, SOE	No offal or discards discharged during setting.	TL LW	Seabirds following vessel while hauling, feeding on offal and lost fish.	Y	A pod of 60 plus common dolphins passed the vessel on one occasion and a pod of over 22 pilot whales also crossed paths with the vessel, neither interacted. Fur seals were observed alongside the vessel on 14 occasions, seen eating conger eels discarded by vessel.	-
14	1	1. SOE	Used baits and offal retained during setting and hauling.	TL LW	Seabirds constantly following vessel and feeding on any offal or used bait discarded by the vessel as well as lost fish. Numbers increased during hauling and setting.	Y	No marine mammals sighted.	-

Table A6.9 Setnet fishery

Vessel No.	No. times observed	FMA's fished	Offal management	Mitigation used	Seabird interactions	Seabird capture?	Marine mammal interactions	Marine mammal capture?
1	1	1. SEC	Processing undertaken during steam back to port	PI	Between 15 and 250 seabirds constantly present, but no feeding from net observed. Aggressive feeding only occurred during the steam to port while the vessel was processing fish and discarding offal.	-	Hector's dolphins observed on 2 of 3 day trips. During set 1 Hector's dolphin were abundant, with around 10 present during hauling diving over and under the net, swimming up and down the net and around the vessel. Around 20 were bow riding on steam to port.	-
2	1	1. SEC	Processing undertaken during steam back to port	PI	Between 5 and 120 seabirds constantly present around the vessel and on three occasions observed to be around net during the haul. No actual feeding on fish observed. Aggressive feeding only occurred during processing when steaming back to port.	-	Hector's dolphins observed on all trips, 1 - 4 on each occasion. Generally swimming around vessel, bow riding, jumping. On a single occasion 4 Hector's dolphins were observed around vessel during haul and on another 1 Hector's dolphin around vessel during setting.	-
3	1	1. SEC	No specific comments	None	Birds could usually be seen following the vessel at all times and numbers varied from less than 5 to around 50. The greatest number congregated as fish were being processed, feeding on discarded offal. During sets and hauls birds would follow vessel but seldom came within 5 m of net.	-	The only marine mammals seen during the trip were a pod of 15-20 common dolphins which passed under the vessel stern, then turned to follow the vessel as it steamed away.	-
4	1	1. SEC	Only fish cutting during hauling occurred when large skate were caught occasionally, most occurred whilst steaming between hauls. No processing during setting. Nets cleared of all fish pieces prior to setting.	None	Seabirds primarily attracted to offal discarding between sets. Seabirds accumulated from first haul of day, sat on water during hauling. Fed aggressively when discards and offal thrown overboard. Birds were not seen feeding from nets.	-	Dusky dolphins and fur seals seen, not feeding. No Hector's dolphins seen. Avoided fishing in shallow water, near beaches or near river mouths.	-

Vessel No.	No. times observed	FMA's fished	Offal management	Mitigation used	Seabird interactions	Seabird capture?	Marine mammal interactions	Marine mammal capture?
5	1	1. SOU	Damaged whole fish were regularly discarded during hauling. No feeding from or interaction with net observed.	None	Birds did not appear to be interested in the net or the vessel unless offal was being discarded during setting or hauling, and bird numbers dramatically increased.	-	3 Hector's dolphins seen when steaming to anchorage, no interest in vessel.	-
6	2	1. CEW, CHA 2. CHA	No specific comments	None	Few species of seabirds were observed, these included white-chinned petrel and white-capped albatross (1-6). During setting and hauling, seabirds were seen to swim or fly by with no interest. During the second trip the species of seabirds observed were minimal with seagulls observed once. Seabirds flew around or near the vessel but not feeding.	-	Seven common dolphins observed on one occasion swimming at the sides of the vessel and in front whilst the net was being hauled. Appeared to have no interest in fishing activity and were away from the net at all times. No marine mammals observed during second trip on this vessel.	-
7	1	1. SEC	Fish were cut intermittently during hauling, no fish processing during setting. Net cleaned during hauling.	Set > 60 m depth	Seabirds attracted during processing and fed aggressively on offal, especially livers. Feeding occurred on both sides of the vessel, clear of the net. Birds gathered around the vessel at first haul of day, and followed vessel until the last net was re-set. A sooty shearwater was seen diving down several metres and swimming under vessel.	Y	Vessel avoided setting nets at depths less than 60 m as he believed Hector's dolphins can only dive to 50m, also avoided known Hector's dolphins areas near river mouths, along the coast and around Kaikoura peninsula. Small pods of DDO occasionally passed by, no interactions.	Y
8	1	1. SEC	Offal discharged during hauling thrown away from the net and vessel. Offal not discharged during setting.	None	Seabirds present were observed feeding intermittently on offal discharged from the vessel. When nets re-set birds followed vessel in lesser numbers.	-	Only 2 observations of marine mammals. On one occasion up to 6 Dusky dolphins in vicinity of vessel and 1 fur seal seen near vessel on another occasion. The vessel will delay re-setting of nets if marine mammals in vicinity.	-

Vessel No.	No. times observed	FMA's fished	Offal management	Mitigation used	Seabird interactions	Seabird capture?	Marine mammal interactions	Marine mammal capture?
9	1	1. SOU	No specific comments	None	The main seabirds were black-backed gulls, cape petrels, white-capped albatrosses, red billed gull and white-chinned petrels. Apart from gulls, no species were interested in the net and were only observed following the boat during sets and hauls.	-	No marine mammals observed during setting or hauling.	-

Vessel No.	No. times observed	FMA's fished	Offal management	Mitigation used	Seabird interactions	Seabird capture?	Marine mammal interactions	Marine mammal capture?
10	1	1. SEC	Processing undertaken during steam back to port	PI	Between 3 and 100 birds constantly around vessel. Birds competed for discarded fish during hauling, some aggressive feeding. Most activity during steam home when processing and discarding offal.	-	Hector's dolphins observed each day, 2 - 4 on each occasion. Generally swimming around vessel, bow riding, jumping.	-
11	1	1. SOU	The vessel very rarely discarded offal during setting or hauling, only when fishing was slow so a crew member had time to process fish during haul. Whole, severely damaged fish regularly discarded during hauling.	None	Birds not interested in vessel unless offal being discarded during which bird numbers increased dramatically. No feeding or interacting with net.	-	Marine mammals observed on 2 occasions when small groups of Hector's dolphins approached vessel on anchorage.	-
12	1	1. SOU	Processing undertaken during steam back to port	None	Apart from gulls, seabirds showed little interest in the net while it was being set or hauled. Once the vessel moved off and started processing fish, birds showed much more interest.	Y	No specific comments	-
13	1	1. SEC	Processing undertaken during steam back to port	PI	Seabirds constantly present, showed little interest in fishing activity with aggressive feeding only occurring during processing and offal discarding when steaming back to port.	-	Hector's dolphins observed on all trips. Between 2 and 10 present and were swimming around vessel, jumping in distance and bow riding.	-
14	1	1. SOU	No offal was produced during setting or hauling, all processing was done after the last net was hauled as the vessel was its way back to port.	None	Apart from gulls, no other seabirds showed any interest in the net during setting or hauling. White-capped albatrosses, cape petrels and white-chinned petrels present.	-	No marine mammals seen.	-
15	1	1. CEW	No offal discharged while vessel actively fishing.	None	Low seabird numbers, generally observed sitting on water or flying past with no interest.	-	No marine mammals observed.	-

Vessel No.	No. times observed	FMA's fished	Offal management	Mitigation used	Seabird interactions	Seabird capture?	Marine mammal interactions	Marine mammal capture?
16	1	1. SEC	Processing undertaken during steam back to port	PI	Between 30 and 125 seabirds were constantly present, generally showing little interest except on 2 occasions when ~ 25 black-backed gulls were at stern of vessel around net. No actual feeding observed. Aggressive feeding only occurred during steam home while vessel processing fish and discarding offal.	-	Hector's dolphins observed on all four trips with between 2 and 10 animals observed on any one occasion - swimming around vessel, jumping, bow riding. On one occasion 2 Hector's dolphins seen swimming around stern of vessel at haul.	Y
17	1	1. SEC	No fish gutting performed until hauling completed and none during setting.	None	Seabirds attracted to vessel primarily due to offal discarding between sets. Aggressive feeding from seabirds when offal discarded between sets. Nets always cleaned during hauling and no birds observed feeding from net.	-	Dusky dolphins and fur seals sighted but not interacting with net. No Hector's dolphins sighted. Avoided fishing in shallow water, near beaches or near river mouths.	-
18	1	1. CEW, AKW	Offal discharged during 41% of hauls	None	Seabirds not always in attendance to the vessel and never in great numbers. Proximity to land dictated species present. Dominated by black-backed gulls when close to land and flesh-footed shearwaters when over 12 nm from land. All birds typically displayed little or no interest in the setting operations. During hauling seabird numbers would swell regardless of offal discharge, which occurred 41% of the time during hauling and a noticeable increase in numbers was evident when this occurred. School shark livers most sort after	-	Common dolphins were sighted twice, both with pods coming to the vessel and bow riding. One pod of 8 long-finned pilot whale came to the vessel during hauling of set 18 and stayed close to the line, bobbing and showing interest in the vessel. The pod stayed ~ 30 mins and then swam off.	Y

Vessel No.	No. times observed	FMA's fished	Offal management	Mitigation used	Seabird interactions	Seabird capture?	Marine mammal interactions	Marine mammal capture?
19	1	1. CEW	No offal discharged while vessel actively fishing.	None	Seabirds most often sitting on water or flying past showing no interest in net	-	No marine mammals sighted.	-
20	1	1. SEC	Processing undertaken during steam back to port	None	Between 50 and 150 birds constantly present around the vessel. The birds showed no interest in the fishing activity itself but seemed content to wait until processing fish and subsequent discarding of offal was undertaken on the steam to port when feeding was aggressive.	-	Hector's dolphins observed on both day trips during steam back to port.	-

Table A6.10 Charter tuna surface longline fishery

Vessel No.	FMA's fished	Offal management	Mitigation used	Seabird interactions	Seabird capture?	Marine mammal interactions	Marine mammal capture?
1 Trip 1	CEE, CHA	Offal discharged during hauling.	TL, pendulum, water hose, weighted snood, bait thawed	Seabirds commonly seen following vessel, a total of 40 birds captured on this trip (some captures during the 2006/07 observer year). Many bird captures can be attributed to the tori line snapping in rough weather.	Y	Fur seals, pilot whales, common dolphins and bottlenose dolphins each seen at least once.	Y
1 Trip 1	SOU, CHA	From set 22 onwards returned baits were held and discharged out the port side. Bait thrower used	NS, TL, pendulum, weighted hooks and swivels, deck hose, streamer poles	Birds, mainly black-browed albatrosses and white-chinned petrels, followed baited hooks and attempted to feed on baits. During set 6 noticeably fewer birds were around the hauling area as crew retaining used baits.	Y	Fur seals present around vessel occasionally in groups of up to 5. A pod of ~ 50 common dolphins observed on one occasion feeding around vessel. Of 5 live seals, two swallowed hooks, 3 hooked in flipper or skin.	Y
2 Trip 1	CEE	Unused baits were retained in a basket and discarded through the discard shoot on the opposite side of the hauling station.	TL, pendulum, weighted swivels	Seabird numbers ranged from 30 to 120, average 63. All species except albatrosses observed to feed opportunistically on offal discards and deck wash.	Y	No fur seals observed but one hooked at night, snood cut off while animal still in water. In CEE on 4 occasions, dolphins and pilot whales observed during hauling, up to 200 individuals.	Y
2 Trip 2	SOU, CHA	Offal discarded opposite side of hauling station. Crew followed COP and didn't discard baits which were discarded at end of hauling.	TL, pendulum, weighted swivels, additional mitigation following captures	12 birds caught in first 10 sets. Changed mitigation practices. Only 1 bird caught following these adjustments. Bird numbers during hauling ranged from 40-170. Birds often fed on discarded offal from opposite side of hauling and sometimes chased baited snoods back to vessel. During hauling, 2 poles with streamers attached were deployed over hauling side of vessel, these proved successful.	Y	Fur seals observed around vessel during haul on 8 occasions with numbers ranging from 1 - 20. Mainly groups of pups and not close to line. On one occasion, two orca were observed close to the line and on two occasions common dolphin were seen.	-

Table A6.11 Domestic tuna and swordfish surface longline fishery

Vessel No.	No. times observed	FMA's fished	Offal management	Mitigation used	Seabird interactions	Seabird capture?	Marine mammal interactions	Marine mammal capture?	Turtle capture?
1	1	1. AKE	Offal discharged, bait not retained.	NS, TL	Seabird numbers low. Petrels were observed taking discarded squid baits with cape petrels and albatrosses occasionally seen.	-	No marine mammals sighted.	-	-
2	3	1. CEE 2. CEE, KER 3. CEE	Birds fed on discarded baits and occasionally on discarded offal.	NS, TL, weighted swivels	During first trip (CEE), birds present in low numbers, but numbers increased substantially during hauling. Two captures occurred during extended pause in haul. No captures during second trip (CEE, KER), bird numbers increased during the day in KER. During third trip, bird numbers low with max of 40 at hauling.	Y - Y	During third trip (CEE), orca damage on one set.	- - -	- Y -
3	1	1. CEE	The vessel discarded offal and used bait (SQU) while hauling and birds were frequently observed feeding on this.	None first 5 sets then TL	During the day the number and variety of seabird species would increase. Sets 1 - 5 used no mitigation, then a tori line used.	Y	No specific comments	Y	-
4	1	1. AKW	Offal discharge only occurred when fish was being processed and the vessel was usually stationary.	TL	Overall very few birds seen and those present showed no interest in the line during setting or hauling. Birds only approached vessel during intermittent period of offal discharge. At these times birds came into close proximity of vessel to feed but retreated when hauling resumed.	-	No marine mammals sighted.	-	-

Vessel No.	No. times observed	FMA's fished	Offal management	Mitigation used	Seabird interactions	Seabird capture?	Marine mammal interactions	Marine mammal capture?	Turtle capture?
5	1	1. AKE, CEE, KER	Baits discarded	TL	Seabirds accompanied the vessel at all times, black-browed albatross most abundant, about 20 a day. Birds attempted to feed on discarded bait.	-	Four orca present, eating fish on line. Six pilot whale seen on another occasion, the vessel did not shoot away near the pod and steamed for several hours before shooting.	-	-
6	2	1. AKE, AKW 2. AKW	When hauling in daylight hours used baits (SQU) were retained onboard and discarded once dark. Only discharged offal from fish processing during hauling.	TL, NS, DB, weighted swivels	Vessel follows COP, uses tori lines during setting and retains used baits onboard during hauling. During setting seabirds attempted to remove baits from hooks, this was achieved by black petrels diving below surface and bringing baits to surface where larger birds would snatch it. During hauling birds snatched remaining bait, no seabirds hooked during hauling.	Y Y	No specific comments	- -	- -
7	1	1. CEE, AKE	All unused baits held on board	TL	Seabirds often followed vessel especially at the beginning of hauling, but as all baits held on board, numbers died off.	-	Pilot whales sighted close to vessel on two occasions.	-	-
8	2	1. AKE, AKW 2. CEE	Unused bait and offal discarded.	NS, TL	Seabirds present throughout the trip with up to 75 present during hauling, feeding on discarded bait and offal astern of vessel. During second trip observer noted, birds followed vessel during hauling due to constant stream of uneaten bait being discarded.	- -	No marine mammal sightings.	- -	- -
9	1	1. AKE	Offal dumped during haul.	DB, NS	Snoods and baits sink below the surface quickly approximately 16 to 20 m behind the vessel. 20% snoods fitted with lead swivels. Also fitted with Kortz nozzle and the thrust from propeller causes turbulence, preventing birds from accessing baits.	Y	No specific comments	-	-

Vessel No.	No. times observed	FMA's fished	Offal management	Mitigation used	Seabird interactions	Seabird capture?	Marine mammal interactions	Marine mammal capture?	Turtle capture?
10	1	1. CEE	No bait retention or dying of baits. No weighted swivels used. SQU bait pliable to limp.	NS, TL (tangling issues with TL)	Seabirds in constant presence during hauling, competing for returning SQU baits as discarded throughout haul.	Y	No marine mammals sighted.	-	-
11	1	1. AKE, CEE	No specific comments	NS, TL	Trip covers 06/07 and 07/08 observer years. Captures in 06/07 year.	-	No marine mammals sighted.	-	-
12	1	1. CEE	Unused baits discarded	NS, TL	Small numbers of birds observed during setting. Birds present in reasonably large numbers during hauls. Flesh-footed shearwaters fed aggressively on discarded sanma bait. Squid bait was ignored.	Y	No marine mammals were sighted.	-	-
13	1	1. AKE, CEE	Offal and baits discarded. Bait was retained in some instances	NS, TL	Seabirds constantly present around vessel, feeding on any offal or bait discharged, numbers increased during hauling.	Y	No marine mammals observed.	-	-
14	2	1. AKE, CEE 2. CEE	Vessel kept all baits on board whilst hauling	TL, NS	During first trip, usually 20 grey petrels and 10 cape petrels sighted while hauling. Albatrosses also sighted. During 2nd trip, bird assemblage similar with black browed albatrosses most abundant.	Y -	During first trip, one fur seal caught and one pod of pilot whales sighted. During second trip, no marine mammals observed apart from two fur seals caught alive.	Y Y	- -

Table A6.12 Deep-sea ling bottom longline fishery

Vessel No.	FMA's fished	Offal management	Mitigation used	Seabird interactions	Seabird capture?	Marine mammal interactions	Marine mammal capture?
1 Trip 1	CEE, SEC, CHA	Offal never discharged during setting. Some species gutted or winged and offal immediately discarded along with anything that could not be mealed. This resulted in increased bird numbers and aggression. Vessel attempted to dump offal as far as possible from the line.	TL, IWL, AC	Seabirds abundant during hauling and setting. XCP always present. Birds appeared to show little interest in the line itself during hauling and instead scavenged on fish lost from the line.	-	Fur seals commonly seen during hauling, particularly while fishing in the Wellington area. Damage from fur seals didn't seem significant compared to lice damage. Four dusky dolphins swam within 10 m of vessel.	-
1 Trip 2	SUB	No offal was discarded during setting or hauling. Whole fish retained on board to be discarded on completion of hauling.	TL, IWL, AC, DH	Seabirds following vessel at all times. Salvin's albatrosses prominent during first half of trip. An erect crested penguin was continuously near the vessel on 5-6th April. Birds fed on factory wash, lost fish during hauling and lost baits during setting.	Y	Fur seals near vessel on a number of occasions, feeding on fish pulled from the line and lost fish. A single orca observed at stern on one occasion.	-
2 Tripl	SOU	Vessel batch dumped offal and any discarded species.	TL, IWL, AC	Seabirds present in moderate numbers. Number and activity highest during setting with white-chinned petrels and sooty shearwaters being most active, by diving and feeding on lost bait. Activity greatest 60 - 80 m behind vessel during setting. During hauling birds followed the vessel feeding on lost fish or offal discharged through the sumps.	Y	Fur seals seen on rare occasions and in low numbers.	-