

Conservation Services Programme observer report

1 July 2007 to 30 June 2008

S.J. Rowe

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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 operations include seabirds, marine mammals and marine turtles. Information on where fishing effort, observer coverage and interactions occur is presented at a coarse level, so that potential gaps in 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, bycatch, New Zealand EEZ

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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 the 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 interactions.

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 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 needs 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 the use of various bird scaring devices (Middleton & 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 (which are required to use seabird scaring devices) and surface longline vessels (which are required 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 indicate where fishing effort, observer coverage and interactions 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 being undertaken through other projects¹.

All data used in this report have been provided by the Ministry of Fisheries Research Data and Reporting Group. Observer comments are summarised to provide information on mitigation techniques, protected species behaviour and fishing practices (e.g. offal management). It is important to note, however, that observers may not comment on all aspects of fishing operations and that different observers may 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 should not be considered 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 to the Conservation Services Programme can be summarised as:

- Monitoring and recording the interactions between protected species and fishing operations
- Reporting on the efforts made to mitigate the adverse effects of commercial fishing on protected species
- Recording, photographing and tagging all protected species bycatch
- Recovering and retaining specimens for autopsy and/or identification
- Recording at least on a daily basis the numbers and behaviours 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 obtain actual interaction rates by fishery, location or other desired variables. Data

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.

accuracy and relevance can be affected by inter-observer variability, weather conditions and access to vessels, while precision can be 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 is provided by Fisheries Management Area (FMA; see Fig. 1). Protected species interactions and observer effort are then broken down further for each fishery by area and month, in order to view interactions and observer effort temporally and spatially. Observer comments relating to offal management, mitigation technique and protected species behaviour are provided for each observed vessel in each fishery. Data on protected coral bycatch are not included in this report—instead, these are 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; viewed 1 November 2009). All species are referred to either by common name (seabirds, marine mammals, reptiles and protected fish species) or by 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 their breakdown by method, month and FMA are provided in Appendices 2-5.

In this report, data for the 2007/08 observer year are compared with data for the 2004/05, 2005/06 and 2006/07 observer years, which were summarised in Rowe (2009).

4. Definitions

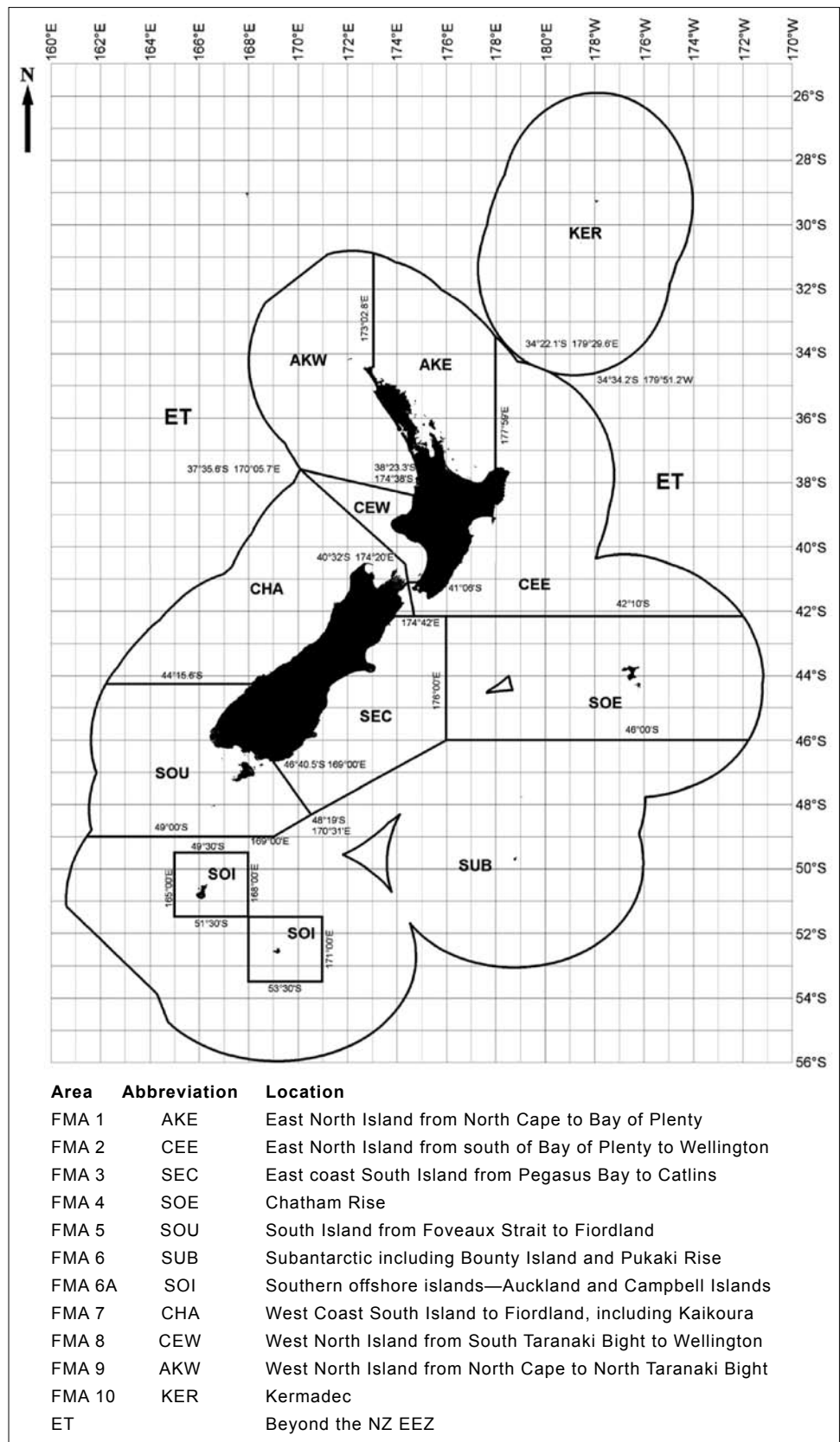
Capture An interaction where a protected species is caught by fishing gear (e.g. hooked, caught in net, struck by warps).

Interaction Any interaction 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 that is located around the Auckland and Campbell Island groups where the squid 6T fishery operates.

Squid 6T fishery The squid quota management area that operates around the Auckland and Campbell Island groups in the SOI area (FMA 6A) (see Fig. 1).

Figure 1. New Zealand Fisheries Management Areas (FMAs). (Source: Ministry of Fisheries.)



5. Protected species interactions

5.1 MIDDLE DEPTH TRAWL FISHERIES

5.1.1 Hoki, hake, ling and silver warehou

Protected species observer coverage of tows targeting the middle depth trawl stocks of hoki, hake, ling and silver warehou (HAK, HOK, LIN, SWA) 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 using 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 in different months and fisheries areas. During the 'hoki season', from June to September, both hoki and hake are predominantly targeted, and fishing is focused in CHA and around the CEE-CHA boundary in Cook Strait. During the 'out of hoki season', from September to 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 28m in length are required to use paired streamer (tori) lines, bird bafflers or warp scarers (deflectors). Based on observer reports from 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 carried out by some vessels. The potential to use Seal Exclusion Devices (SEDs) 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 MIT 2004/01: Developing and testing of discard management technologies) is ongoing.

Commercial fishing effort, observer effort and protected species interactions in this fishery are summarised in Table 1. The majority of commercial fishing effort and observer effort was undertaken in six FMAs. Over 10% of fishing effort was observed in each of these FMAs, and 20% of all commercial tows were observed overall. The highest rate of marine mammal captures was reported from the Cook Strait hoki fishery in CEE, where captures were reported from the CEE-CHA boundary. The rate of seabird captures was similar in all FMAs where observer coverage was undertaken. Seabird capture rates were lower than in previous years (see Rowe 2009), but it should be noted that Table 1 does not include non-fishing interactions, unlike the 2004–2007 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	1.88	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	1.59	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	13 546	2693	19.88	38	1.41	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, Table A6.1). Interactions with protected species (seabirds or marine mammals) were reported from 39 trips and actual captures were reported from 35 trips when hoki, hake, ling or warehou were the target species. Comments relating to offal management, mitigation techniques, and protected species interactions and captures (i.e. interactions with fishing gear only) for each vessel observed are given in Table A6.1. A common comment made by observers was the greater number of birds arriving at the stern of the vessel during hauling. Both seabirds and New Zealand (NZ) 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	2007						2008						TOTAL
	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	
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 than in previous years, with fewer tows targeting warehou species being observed (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
HAK	0	0	8	2	50	154	214
HOK	93	459	248	153	288	568	1809
LIN	0	0	0	304	276	0	580
SWA	0	21	0	13	0	4	38
WAR	0	0	0	13	0	0	13
WWA	0	0	0	26	13	0	39
Total	93	480	256	511	627	726	2693

Protected species interactions

Fewer NZ fur seals were reported captured in this middle depth trawl fishery during the 2007/08 observer year (Table 4) than in the previous 3 observer years (Rowe 2009). A greater number of seabirds were reported killed compared with the previous observer year, but numbers were lower than reported in the 2004/05 and 2005/06 observer years.

The methods by which protected species were captured, as reported by observers on Observer Non-fish Bycatch Forms, are detailed in Table 5. All live captures (i.e. caught in fishing gear) were animals recovered from the net (Table 5A). Three birds were reported as tangled in mitigation gear, but the interactions were not considered to be fatal. The majority of bird mortalities were from net captures (26 birds), with only six warp captures reported (Table 5B). Three mortalities resulted from birds hitting the deck of the vessel and one bird was killed striking the bird baffler.

Seabird and NZ fur seal interactions by target species are shown in Table 6. The greatest number of interactions occurred on hoki tows, but it should also be noted that a greater number of hoki tows were observed (see Table 3).

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

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

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	2		2
Flesh-footed shearwater	1		1
Giant petrel (unidentified)	3		3
Petrel (unidentified)	1	2	3
Prion (unidentified)		3	3
Salvin's albatross		1	1
Seabird small		1	1
Shy albatross*	2		2
Sooty shearwater	6	1	7
Storm petrel		1	1
White-capped albatross	2	3	5
White-chinned petrel	12	1	13
Total seabirds	39	19	58
MARINE MAMMALS			
NZ fur seal	42	11	53
Total marine mammals	42	11	53
Total protected species interactions	81	30	111

* Historically, white-capped albatrosses (*Thalassarche steadi*) were reported by observers under a general code for shy albatrosses (*T. cauta*). Some observers still use this code, although these birds are most likely to be white-capped albatrosses.

TABLE 5. THE TYPES OF INTERACTIONS 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

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					
NZ fur seal		11		11	
Marine mammals total		11		11	
Total protected species interactions	4	17	9	30	

B

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	2						2	
Flesh-footed shearwater		1					1	
Giant petrel (unidentified)	1	1	1				3	
Petrel (unidentified)					1		1	
Shy albatross [†]		1				1	2	Hit bird baffler
Sooty shearwater		5				1	7	Found in pounds
White-capped albatross		1	1				2	
White-chinned petrel		12					12	
Seabirds total	3	26	6	1	1	2	39	
MARINE MAMMALS								
NZ 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.

[†] Historically, white-capped albatrosses (*Thalassarche steadi*) were reported by observers under a general code for shy albatrosses (*T. cauta*). Some observers still use this code, although these birds are most likely to be white-capped albatrosses.

TABLE 6. PROTECTED SPECIES INTERACTIONS IN THE HAK, HOK, LIN, SWA MIDDLE DEPTH TRAWL FISHERY BY TARGET SPECIES DURING THE 2007/08 OBSERVER YEAR.

SPECIES	TARGET STOCK					TOTAL
	HAK	HOK	LIN	SWA	WWA	
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						
NZ 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

* Historically, white-capped albatrosses (*Thalassarche steadi*) were reported by observers under a general code for shy albatrosses (*T. cauta*). Some observers still use this code, although these birds are most likely to be white-capped albatrosses.

TABLE 7. SEABIRD INTERACTIONS IN THE HAK, HOK, LIN, SWA MIDDLE DEPTH TRAWL FISHERY BY AREA DURING THE 2007/08 OBSERVER YEAR.

'-' indicates there was no observer coverage during that month in that area.

FMA	2007						2008						TOTAL
	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	
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	4	2	58

TABLE 8. NZ FUR SEAL INTERACTIONS IN THE HAK, HOK, LIN, SWA MIDDLE DEPTH TRAWL FISHERY BY AREA DURING THE 2007/08 OBSERVER YEAR.

'-' indicates there was no observer coverage during that month in that area.

FMA	2007						2008						TOTAL
	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	
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

5.1.2 Southern blue whiting

The southern blue whiting fishery operates during August and September within the SUB FMA, but particularly in the SOI area within that FMA.

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

Commercial fishing effort, observer effort and protected species interactions in this fishery are summarised in Table 9. In the 2007/08 observer year, 35% of total fishing effort was observed. This fishery had the highest rate of marine mammal captures (all pinnipeds), with ten animals caught per 100 tows. The marine mammal capture rate was lower than in 2006/07, while the seabird capture rate was similar to 2006/07 and, for the second year in a row, was higher than in the HOK, HAK, LIN, SWA middle depth trawl 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 (Appendix 6, Table A6.2). Captures of seabirds and/or marine mammals were reported from seven of the eight trips, but interactions with protected species were reported from all trips. Comments relating to offal management, mitigation techniques, and protected species interactions and captures (i.e. interactions with fishing gear only) for each vessel observed are given in Table A6.2. As for other trawl fisheries, seabird numbers generally increased during hauling and when discharging offal. 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 capturing marine mammals.

The greatest number of observed southern blue whiting tows was 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	2007						2008						TOTAL
	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	
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 of the observed protected species interactions in this fishery were of pinnipeds (Table 11). The number of NZ sea lions caught was higher than in previous years, while the number of NZ fur seals caught was reduced. The number of seabirds caught has changed little over the last 4 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			
Campbell albatross	1		1
Grey petrel	2		2
Seabird large		1	1
Seabirds total	3	1	4
MARINE MAMMALS			
NZ 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 this was not fatal. All other interactions were net captures (Table 12).

TABLE 12. THE TYPES OF 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			
Campbell albatross	1		1
Grey petrel	2		2
Seabird large		1	1
Seabirds total	3	1	4
MARINE MAMMALS			
NZ 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 number of protected species interactions observed did not correspond directly with the amount of fishing effort observed. Only two tows were observed in October, yet eight captures were reported (Table 13), while 156 tows were observed in September with only nine reported captures, and 58 tows were observed in August with ten captures reported. As in previous years, a greater rate of capture was reported in August compared with September, despite the majority of observer effort being achieved in the latter month.

Almost all pinnipeds caught were determined by observers to be male (Table 14).

TABLE 13. PROTECTED SPECIES INTERACTIONS IN THE SOUTHERN BLUE WHITING FISHERY BY AREA AND MONTH DURING THE 2007/08 OBSERVER YEAR.

SPECIES	2007			TOTAL
	AUG	SEP	OCT	
NZ fur seals	8	5	4	17
NZ sea lions		3	3	6
Seabirds	2	1	1	4
Total	10	9	8	27

TABLE 14. OBSERVER-DETERMINED SEX OF CAPTURED PINNIPEDS IN THE SOUTHERN BLUE WHITING FISHERY BY AREA DURING THE 2007/08 OBSERVER YEAR.

SPECIES	MALE	FEMALE	TOTAL
NZ fur seals	16	1	17
NZ sea lions	6	0	6
Total	22	1	23

5.1.3 Scampi

Historically, CSP observer coverage in the scampi fishery has been in SOE from July to December and SUB 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 have occasional interactions with NZ 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 28m in length).

Commercial fishing effort, observer effort and protected species interactions in this fishery are summarised in Table 15. The highest number of commercial tows was reported in SOE, and the second highest number in SUB, but only 8% and 6% of tows, respectively, were observed in these FMAs. Higher levels of observer coverage were achieved in AKE, CEE and SEC. Across all fishing effort, 10% of tows were observed. No protected species captures were reported from CEE or SEC. A capture rate of two seabirds per 100 tows was reported in SOE and one seabird per 100 tows in AKE. One marine mammal was caught in SUB. The seabird capture rate was lower than in previous years, although non-fishing interactions are not included 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 and captures reported from four trips (Appendix 6, Table A6.3). Comments relating to offal management, mitigation techniques, and protected species interactions and captures (i.e. interactions with fishing gear only) for each vessel observed are given in Table A6.3. Bird abundance around the vessel was greatest when trawl nets were on the surface. There were fewer sightings of pinnipeds reported than 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 that did not use 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 in March (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	2007						2008						TOTAL
	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	
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	520

Protected species interactions

Six of the 24 observed seabird interactions involved interactions with the fishing gear (Tables 17 & 18). This included two net captures and four warp captures. Thirteen sooty shearwaters were disorientated by deck lights and flew into the vessel. In AKE, a further three sooty shearwaters were recovered from a trawl net entangled in fishing line, and so had already been caught and discarded by another vessel, possibly recreational. The one NZ fur seal that was captured was released alive.

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

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
Flesh-footed shearwater	4		4
Salvin's albatross	4		4
Sooty shearwater	1	13	14
Seabird total	9	15	24
MARINE MAMMALS			
NZ fur seal		1	1
Marine mammal total		1	1
Total protected species interactions	9	16	25

TABLE 18. THE TYPES 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
Flesh-footed shearwater		1		3	4
Salvin's albatross			4		4
Sooty shearwater	13	1			14
Seabird total	15	2	4	3	24
MARINE MAMMALS					
NZ fur seal		1			1
Marine mammal total		1			1
Total protected species interactions	15	3	4	3	25

* Included as 'capture' in Table 15.

TABLE 19. SEABIRD INTERACTIONS IN THE SCAMPI TRAWL FISHERY BY AREA DURING THE 2007/08 OBSERVER YEAR.

'-' indicates there was no observer coverage during that month in that area.

FMA	2007				2008				TOTAL
	SEP	OCT	NOV	DEC	MAR	APR	MAY	JUN	
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

5.1.4 Squid

Higher levels of observer coverage have been planned and delivered in the squid (SQU) fishery than in 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 & Abraham 2007) and practices are currently being developed to manage the discharge of 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), and 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 SLEDs. 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.

During 2007/08, the majority of fishing effort for squid was carried out in SEC, SOU and SUB, while observer coverage was focussed in SOU and SUB (Table 20). A high rate of observed seabird captures occurred 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 of all observed fisheries. While the capture rate had decreased from values reported in the 2004/05 and 2005/06 observer years, the rate of seabird capture was 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. The number and rate of marine mammal captures in the squid fishery was lower in 2007/08 than in 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	11.70	5	0.58
6. SUB	1266	591	46.68	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	10.90	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 (Appendix 6, Table A6.4). Protected species captures of seabirds and/or marine mammals were reported from 22 of those trips when squid was the target. Comments relating to offal management, mitigation techniques, and protected species interactions and captures (i.e. interactions with fishing gear only) for each vessel observed are given in Table A6.4. All vessels deployed SLEDs when operating in the squid 6T fishery area, but generally did not deploy them 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	2007						2008						TOTAL
	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	
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	237	205	136	0	0	591
7. CHA	0	0	0	0	0	0	0	1	0	0	0	0	1
Total	0	1	0	0	0	0	82	560	546	248	13	0	1450

Protected species interactions

In total, 146 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 higher numbers of sooty shearwaters and white-chinned petrels caught. Lower numbers of white-capped albatrosses were caught, however. Observed marine mammal captures were lower than in previous years. The first white pointer 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)	1	5		6
Buller's albatross	3			3
Fairy prion		1		1
Grey-backed storm petrel		1		1
Petrel (unidentified)	5	8		13
Small seabird		1		1
Sooty shearwater	57	12		69
Southern royal albatross	1			1
Storm petrels		1		1
Wandering albatross	1			1
White-capped albatross	35	6	5	46
White-chinned petrel	31	9	3	43
Seabird total	134	44	8	186
MARINE MAMMALS				
NZ 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. In total, 128 protected species were observed caught and incidentally killed in the squid fishery: 118 birds and 10 pinnipeds (Table 23B). Twelve seabird mortalities resulted from birds being caught on the warp or door, and 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. THE TYPES OF INTERACTIONS FOR A. PROTECTED SPECIES RELEASED ALIVE AND B. DEAD PROTECTED SPECIES IN THE SQUID TRAWL FISHERY DURING THE 2007/08 OBSERVER YEAR.

A							
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	2	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		10			1	9	Landed on deck
Seabird total	12	25	1	1	5	44	
MARINE MAMMALS							
NZ fur seal					1	1	Climbed on board
Marine mammal total					1	1	
Total protected species interactions	12	25	1	1	6	45	
B							
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)		1				1	
Buller's albatross		2		1		3	
Petrel (unidentified)		5				5	
Sooty shearwater	1	53	2		1	57	Caught inside SLED portside grid
Southern royal albatross		1				1	
Wandering albatross		1				1	
White-capped albatross		24	10		1	35	Found in between chaffing blanket
White-chinned petrel		30			1	31	Caught on chaffing gear, wrapped around leg
Seabird total	1	117	12	1	3	134	
MARINE MAMMALS							
NZ 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 in Table 23B as they all relate to fishing interactions with gear.

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

Most NZ fur seals interactions were in SUB in April and in SOU during January and February (Table 25).

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

TABLE 24. SEABIRD INTERACTIONS IN THE SQUID TRAWL FISHERY BY AREA AND MONTH DURING THE 2007/08 OBSERVER YEAR.

'-' indicates there was no observer coverage during that month in that area.

FMA	2007	2008					TOTAL
	AUG	JAN	FEB	MAR	APR	MAY	
3. SEC	-	-	-	-	0	0	0
5. SOU	0	3	87	16	7	2	115
6. SUB	-	0	6	44	21	-	71
7. CHA	-	-	0	-	-	-	0
Total	0	3	93	60	28	2	186

TABLE 25. NZ FUR SEAL INTERACTIONS IN THE SQUID TRAWL FISHERY BY AREA AND MONTH DURING THE 2007/08 OBSERVER YEAR.

'-' indicates there was no observer coverage during that month in that area.

FMA	2007	2008					TOTAL
	AUG	JAN	FEB	MAR	APR	MAY	
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	0	1	5	0	2	0	8

TABLE 26. NZ SEA LION INTERACTIONS IN THE SQUID TRAWL FISHERY BY AREA AND MONTH DURING THE 2007/08 OBSERVER YEAR.

'-' indicates there was no observer coverage during that month in that area.

FMA	2007	2008					TOTAL
	AUG	JAN	FEB	MAR	APR	MAY	
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	0	0	0	4	1	0	5

5.2 PELAGIC TRAWL FISHERIES

5.2.1 Jack mackerel and barracouta

Historically, common dolphins have been recorded caught in this pelagic trawl fishery, including the capture of 17 dolphins by three vessels off west Auckland in November 2004. Captures of dusky dolphins, NZ fur seals and seabirds have also been recorded in this fishery. The majority of observer coverage is carried out from October to December, with some additional coverage from April to July. Vessels can employ several techniques to reduce 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.

Commercial fishing effort, observer effort and protected species interactions in this fishery are summarised in Table 27. Pelagic trawl effort mostly occurred in CHA, CEW and SEC. Little observer coverage was achieved in SEC, but higher coverage was achieved in CHA, CEW and AKW. The latter three FMAs are of particular interest as common dolphin captures have historically been reported in these areas. While higher rates of seabird captures were reported in SEC and SOU, seabird and marine mammal captures were lower than in previous years. An unobserved vessel also reported common dolphin captures in December in the same area as the observed captures on the west coast of the North Island.

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	3.23	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	0.50	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 (Appendix 6, Table A6.5). Five trips targeted jack or blue (English) mackerel exclusively in AKW and CEW, while other trips also targeted other stocks such as hoki. Protected species captures occurred on seven trips when mackerel or barracouta were the target species. Comments relating to offal management, mitigation techniques, and protected species interactions and captures (i.e. interactions with fishing gear only) for each vessel observed are given in Table A6.5. 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 CHA, CEW and AKW.

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

TABLE 28. OBSERVER DAYS IN THE PELAGIC TRAWL FISHERY BY AREA AND MONTH DURING THE 2007/08 OBSERVER YEAR.

FMA	2007						2008						TOTAL
	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	
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

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

All observed mammal captures occurred on vessels targeting jack mackerel (Table 31), whereas seabird captures were reported from vessels targeting both jack mackerel and barracouta.

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

Seabird interactions were spread through five FMAs over 6 months (Table 33).

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

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
Prion (unidentified)		2	2
Shy albatross*	1		1
White-chinned petrel	4		4
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

* Historically, white-capped albatrosses (*Thalassarche steadi*) were reported by observers under a general code for shy albatrosses (*T. cauta*). Some observers still use this code, although these birds are most likely to be white-capped albatrosses.

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

* Historically, white-capped albatrosses (*Thalassarche steadi*) were reported by observers under a general code for shy albatrosses (*T. cauta*). Some observers still use this code, although these birds are most likely to be white-capped albatrosses.

TABLE 32. THE TYPES OF 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
Prion (unidentified)	2				2	
Shy albatross†			1		1	
White-chinned petrel		4			4	
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.

† Historically, white-capped albatrosses (*Thalassarche steadi*) were reported by observers under a general code for shy albatrosses (*T. cauta*). Some observers still use this code, although these birds are most likely to be white-capped albatrosses.

TABLE 33. SEABIRD INTERACTIONS IN THE PELAGIC TRAWL FISHERY BY AREA AND MONTH DURING THE 2007/08 OBSERVER YEAR.

'-' indicates there was no observer coverage during that month in that area.

FMA	2007						2008						TOTAL
	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	
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

TABLE 34. CETACEAN INTERACTIONS IN THE PELAGIC TRAWL FISHERY BY AREA AND MONTH DURING THE 2007/08 OBSERVER YEAR.

'-' indicates there was no observer coverage during that month in that area.

FMA	2007						2008						TOTAL
	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	
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

5.3 DEEP-WATER BOTTOM TRAWL FISHERIES

5.3.1 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 FMAs, with lesser coverage in other areas. A particular focus of observer coverage in this fishery is to monitor impacts of deep-water 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.

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

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, 32 deep-water bottom trawl trips were observed aboard 11 individual vessels (Appendix 6, Table A6.6). Interactions with seabirds and/or marine mammals were reported from four trips. Comments relating to offal management, mitigation techniques, and protected species interactions and captures (i.e. interactions with fishing gear only) for each vessel observed are given in Table A6.6. Many observers noted the high number of seabirds present around deep-water trawl vessels, but the low number of interactions compared with other trawl fisheries. One vessel was less than 28 m in length and used no mitigation devices. It was also noted that several vessels over 28 m in length did not 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	2007						2008						TOTAL
	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	
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 few interactions with protected species were reported in this deep-water trawl fishery (Table 37), given that 35% observer coverage was achieved. A spotted black grouper was landed in SOE in July 2007.

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

Seabird interactions were reported in four FMAs (Table 39).

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

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

TABLE 38. THE TYPES OF INTERACTIONS 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

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

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		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).

TABLE 39. SEABIRD INTERACTIONS IN THE DEEP-WATER BOTTOM TRAWL FISHERY BY AREA AND MONTH DURING THE 2007/08 OBSERVER YEAR.

'-' indicates there was no observer coverage during that month in that area.

FMA	2007						2008						TOTAL
	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	
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

5.4 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. 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.

5.4.1 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. 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 dolphin captures were also recorded on unobserved inshore trawl vessels operating on the west coast of the South Island in the late 1980s. 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 & Langley 2000). Since then, 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, DOC; viewed June 2008).

Observations using government observers 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 CEW and AKW to monitor Maui's dolphin interactions. A total of nine vessels were observed during the 2006/07 observer year, and seabird warp strikes and net captures were recorded (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.

Commercial fishing effort, observer effort and protected species interactions in this fishery are summarised in Table 40. Less than 1% of total inshore trawl effort was observed during the 2007/08 observer year. Seabird capture rates were high compared with offshore trawl fisheries, especially in SEC. All captures occurred on the east and west coasts of the South Island.

TABLE 40. 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
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
8. CEW	1562	7	0.45	0	0.00	0	0
9. AKW	2945	52	1.77	0	0.00	0	0
10. KER	2	0	0.00				
Total	47913	156	0.33	8	5.13	0	0

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

Observer coverage

During the 2007/08 observer year, 11 inshore trips were observed aboard ten vessels, nine of which were under 28 m in length (Appendix 6, Table A6.7). The single vessel that was over 28 m in length targeted orange roughly offshore in AKW and snapper inshore in AKW, and this vessel deployed tori lines. Of the nine smaller vessels, six deployed no mitigation devices, two used warp scarers and one used a tori line. Seabird interactions were reported from six trips, but no marine mammal interactions were reported, although Hector's dolphins were sighted. Comments relating to offal management, mitigation techniques, and protected species interactions and captures (i.e. interactions with fishing gear only) for each vessel observed are given in Table A6.7. Since little is known about interactions between inshore trawl fisheries and protected species, observers provided more comments than usual.

Observer coverage was 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, and a few tows were 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	2007						2008						TOTAL
	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	
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 a result of 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. THE TYPES OF PROTECTED SPECIES 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 deck
White-capped albatross		2		2	
Westland petrel	1			1	
Total	1	8	13	22	

* Included as 'capture' in Table 40.

TABLE 44. SEABIRD INTERACTIONS IN THE INSHORE TRAWL FISHERY BY AREA AND MONTH FOR THE PERIOD DURING THE 2007/08 OBSERVER YEAR.

'-' indicates there was no observer coverage during that month in that area.

FMA	2007				2008	TOTAL
	AUG	SEP	OCT	NOV	MAY	
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

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

5.4.2 Inshore bottom longline—ling, bluenose, hapuku and bass

Little is known about protected species interactions in the ling, bluenose, hapuku and bass (LIN, BNS, HPB) inshore bottom longline fishery, as there has been minimal or no historic observer coverage. The nature of the fishery, including small vessel size and weather dependence of trips, can make placing observers difficult. CSP observer coverage in the inshore LIN, BNS, HPB fishery has been focussed in CEE, SOE and SOU. Through CSP, an advisory officer was placed in the inshore LIN, BNS, HPB fishery to learn about fishing practices and to pass on knowledge regarding protected species behaviour and mitigation techniques (Kellian 2004). Mitigation techniques include tori lines, line weighting regimes and using fish oil to deter birds behind vessels.

Commercial fishing effort, observer effort and protected species interactions in inshore bottom longline fisheries are summarised in Table 45. The greatest commercial effort was undertaken in AKE, CEE and SOE. The highest number of tows was observed in SOE and AKE, with around 3% of total effort observed. A total of 63 seabirds were caught during the 2007/08 observer year, 45 of which were captured 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	133 250	13	0.098	0	0.000
2. CEE	2443	62	2.54	147 985	2	0.014	0	0.000
3. SEC	909	55	6.05	237 200	3	0.013	0	0.000
4. SOE	2696	212	7.86	717 050	45	0.063	0	0.000
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	0.000	0	0.000
9. AKW	658	20	3.04	18 900	0	0.000	0	0.000
10. KER	0							
Total	15 705	465	2.96	1 255 185	63	0.050	0	0.000

* 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 (Appendix 6, Table A6.8). Seabird interactions were reported from nine trips. Vessels employed various line weighting regimes and offal management measures. Comments relating to offal management, mitigation techniques, and protected species interactions and captures (i.e. interactions with fishing gear only) for each vessel observed are given in Table A6.8.

Although fishing effort occurs year round, observer coverage was scattered through the 2007/08 observer year and between areas (Table 46), often being dependent on the availability of observers.

TABLE 46. OBSERVER DAYS IN THE INSHORE BOTTOM LONGLINE FISHERY BY AREA AND MONTH DURING THE 2007/08 OBSERVER YEAR.

FMA	2007						2008						TOTAL
	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	
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

TABLE 47. OBSERVER DAYS IN THE INSHORE BOTTOM LONGLINE FISHERY BY AREA AND TARGET SPECIES DURING THE 2007/08 OBSERVER YEAR.

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

FMA	BNS	HAP	HPB	LIN	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).

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

Protected species interactions were reported in four of the six FMAs in which there was observer coverage (Table 50).

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 petrel	3		3
Buller's albatross	4		4
Campbell albatross	3		3
Cape petrel	1	3	4
Chatham albatross	12		12
Grey-faced petrel	6		6
Grey petrel	1		1
Indian yellow-nosed albatross	1		1
Salvin's albatross	22		22
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

TABLE 49. THE TYPES OF INTERACTIONS 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 petrel	3			3
Buller's albatross	4			4
Campbell albatross	3			3
Cape petrel	4			4
Chatham albatross	11	1		12
Grey-faced petrel	6			6
Grey petrel	1			1
Indian yellow-nosed albatross	1			1
Salvin's albatross	22			22
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.

TABLE 50. SEABIRD INTERACTIONS IN THE INSHORE BOTTOM LONGLINE FISHERY BY AREA AND MONTH DURING THE 2007/08 OBSERVER YEAR.

'-' indicates there was no observer coverage during that month in that area.

FMA	2007						2008			TOTAL
	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	
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

5.4.3 Setnet

The extent to which commercial setnet fishing activities interact with protected species is largely unknown due to very low historical achievement of observer coverage. Despite historical 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 and less predictable operations. There are also practical difficulties of placing observers on small vessels, 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 1997/98 fishing year, during which time eight Hector's dolphins were observed caught in setnets, of which two were released alive (Starr & 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 this fishing year, a small number of NZ fur seals and shags were recorded as being caught. Setnet fisheries were also observed in the 2006/07 fishing year in Kaikoura (SEC), Nelson (CHA) and Southland (SOU), during which protected species mortalities included one dusky dolphin, one Hector's dolphin, one fluttering shearwater and two yellow-eyed penguins, all of which were separate incidents (see Rowe 2009).

Commercial fishing effort, observer effort and protected species interactions in this fishery are summarised in Table 51. The majority of fishing effort occurred in FMAs attached to the New Zealand mainland (i.e. there was minimal or no effort in KER, SOE and SUB). Due to the nature of this fishery, some sets were observed for which the haul was not observed and, conversely, observers sometimes observed the hauling of nets that were set the day prior to the observer being on the vessel. In total, 532 sets and 563 hauls were observed. The greatest observer effort was in SEC (Kaikoura and Timaru), followed by SOU. In total, 25% of fishing effort was observed in SOU and over 5% in SEC, even though only two ports (Kaikoura and Timaru) were the focus of observer effort. Total and regional observer coverage was higher than in previous years. All reported captures occurred in AKW, 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	115 360	5	0.04	2	0.02
4. SOE	7	0	0.00					
5. SOU	643	161	25.04	151 280	1	0.01	0	0.00
6. SUB	5	0	0.00					
7. CHA	546	6	1.10	11 000	0	0.00	0	0.00
8. CEW	1882	91	4.84	94 770	0	0.00	0	0.00
9. AKW	7697	14	0.18	11 000	0	0.00	1	0.09
10. KER	0							
Total	22939	563	2.45	383 410	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 (Appendix 6, Table A6.9). Protected species captures were reported from four trips. Mitigation techniques to avoid the incidental capture of dolphins included avoiding river mouths and murky water, not setting when dolphins were present around the vessel, and using pingers (acoustic alarms), particularly along the east coast of the 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, so they were less of an attractant to foraging seabirds. Some vessels also practised night setting. Comments relating to offal management, mitigation techniques, and protected species interactions and captures (i.e. interactions with fishing gear only) for each vessel observed are given in Table A6.9. Marine mammals were sighted during a number of trips. Seabird numbers were generally highest when vessels were processing catch on the way back to port.

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

TABLE 52. OBSERVED HAULS IN THE SETNET FISHERY BY AREA AND MONTH DURING THE 2007/08 OBSERVER YEAR.

FMA	2007						2008						TOTAL
	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	
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 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 spiny dogfish were around the head. The incident was reported when 2.9 n.m. from shore in water that was 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
Sooty shearwater	1		1	SEC	Nov-07
Westland petrel		3	3	SEC	Nov-07
Yellow-eyed penguin	1		1	SOU	Dec-07
Seabird total	2	4	6		
MARINE MAMMALS					
Hector's dolphin	1		1	SEC	Feb-08
NZ fur seal	1		1	SEC	Nov-07
Pilot whale		1	1	AKW	Jan-08
Marine mammal total	2	1	3		
Total protected species interactions	4	5	9		

5.5 SURFACE LONGLINE FISHERIES

5.5.1 Charter tuna

CSP observer coverage of charter tuna (STN, BIG) 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 capture rates of seabirds (including a variety of albatrosses and petrels), and while there were fewer captures during the 2004/05 and 2005/06 observer years, a higher number of seabird captures was recorded during 2006/07. NZ 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 cannons during hauling to try to reduce the likelihood of seabird captures.

Commercial fishing effort, observer effort and protected species interactions for this fishery are summarised in Table 54. Over 50% of charter tuna fishing effort was observed on two of the four vessels operating in the fishery. Fewer seabirds were caught during 2007/08 than in the previous observer year. The rate of seabird capture was higher than in 2004/05 and 2005/06, but lower than in 2006/07. The rate of marine mammal capture was lower than in 2004/05, but higher than in 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.

FMA	EFFORT SETS	OBSERVER SETS	COVERAGE (%)	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	167 212	14	0.08	1	0.01
3. SEC	0							
4. SOE	0							
5. SOU	143	63	44.06	194 581	20	0.10	6	0.03
6. SUB	0							
7. CHA	32	24	75.00	72 939	4	0.05	4	0.05
8. CEW	0							
9. AKW	0							
10. KER	0							
Total	257	143	55.64	434 732	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 (Appendix 6, Table A6.10). Protected species captures were reported from all four trips. Following seabird captures on one of the vessels, the skipper deployed three tori lines out to 185 m during setting, and in a later set the master added four 7-m streamers to the centre and middle lines and let out a further 50 m. The crew also replaced the 60-g weights on floats with 100-g weights, and fitted each snood with a 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 techniques, and protected species interactions and captures (i.e. interactions with fishing gear only) for each vessel observed are given in Table A6.10.

Observer coverage was undertaken in 2-month blocks throughout three FMAs (Table 55). Some trips were observed across 2 observer years.

TABLE 55. OBSERVER SETS IN THE CHARTER SURFACE LONGLINE FISHERY BY AREA AND MONTH DURING THE 2007/08 OBSERVER YEAR.

FMA	2007						2008						TOTAL
	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	
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

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

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

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

TABLE 56. PROTECTED SPECIES INTERACTIONS IN THE CHARTER SURFACE LONGLINE FISHERY 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

TABLE 57. SEABIRD INTERACTIONS IN THE CHARTER SURFACE LONGLINE FISHERY BY AREA AND MONTH DURING THE 2007/08 OBSERVER YEAR.

'-' indicates there was no observer coverage during that month in that area.

FMA	2007		2008			TOTAL
	JUL	AUG	APR	MAY	JUN	
2. CEE	8	6	-	-	-	14
5. SOU	-	-	13	7	-	20
7. CHA	0	-	-	3	1	4
Total	8	6	13	10	1	38

TABLE 58. NZ FUR SEAL CAPTURES IN THE CHARTER SURFACE LONGLINE FISHERY BY AREA AND MONTH DURING THE 2007/08 OBSERVER YEAR.

'-' indicates there was no observer coverage during that month in that area.

FMA	2007		2008			TOTAL
	JUL	AUG	APR	MAY	JUN	
2. CEE	1	0	-	-	-	1
5. SOU	-	-	0	6	-	6
7. CHA	4	-	-	0	0	4
Total	5	0	0	6	0	11

5.5.2 Domestic tuna and swordfish

Historically, there has been difficulty placing observers on smaller domestic tuna (BIG, STN, SWO) vessels and, therefore, further data are 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 included vessels targeting tuna and swordfish. Following the large bycatch event of 58 birds (including 51 albatrosses) during one trip targeting swordfish in November 2006, the Ministry of Fisheries introduced regulations 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.

Commercial fishing effort, observer effort and protected species interactions in this fishery are summarised in Table 59. Commercial fishing effort was lower than in previous years, but observer effort was higher (Table 59). In total, 8% of fishing effort (hooks set) was observed compared with around 3% over the last 3 years. The seabird capture rate was higher than for the last 3 years, but the marine mammal capture rate was lower. Only one turtle was observed caught in 2007/08 compared with 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.

FMA	EFFORT SETS	OBSERVER SETS	COVERAGE (%)	NO. HOOKS OBSERVED	SEABIRD CAPTURES*	SEABIRDS PER 1000 HOOKS	MAMMAL CAPTURES	MAMMALS PER 1000 HOOKS	REPTILE CAPTURES	REPTILES PER 1000 HOOKS
1. AKE	920	70	7.61	73728	7	0.095	0	0.000	0	0
2. CEE	836	69	8.25	107018	18	0.168	3	0.028	0	0
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
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 (Appendix 6, Table A6.11). Protected species captures were reported from 12 trips. Comments relating to offal management, mitigation techniques, and protected species interactions and captures (i.e. interactions with fishing gear only) for each vessel observed are given in Table A6.11.

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	2007						2008						TOTAL
	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	
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-nine protected species interactions were reported (Table 61), including the capture and release of a leatherback turtle in KER in May 2008.

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

NZ fur seal captures were reported in CEE (Table 63).

TABLE 61. PROTECTED SPECIES INTERACTIONS IN THE DOMESTIC SURFACE LONGLINE FISHERY DURING THE 2007/08 OBSERVER YEAR.

SPECIES	DEAD	ALIVE	TOTAL
SEABIRDS			
Antipodean albatross	4		4
Black-browed albatross (unidentified)	1	1	2
Buller's albatross	2		2
Campbell albatross	2		2
Cape petrel		1	1
Flesh-footed shearwater		2	2
Gibson's wandering albatross	1		1
Grey petrel	6		6
Petrel (unidentified)		1	1
Salvin's albatross	1	1	2
Wandering albatross (unidentified)	1	1	2
Seabird total	18	7	25
MARINE MAMMALS			
NZ fur seal		3	3
Marine mammal total		3	3
MARINE REPTILES			
Leatherback turtle		1	1
Marine reptile total		1	1
Protected species total	18	11	29

TABLE 62. SEABIRD INTERACTIONS IN THE DOMESTIC SURFACE LONGLINE FISHERY BY AREA AND MONTH DURING THE 2007/08 OBSERVER YEAR.

'-' indicates there was no observer coverage during that month in that area.

FMA	2007			2008						TOTAL
	JUL	AUG	SEP	JAN	FEB	MAR	APR	MAY	JUN	
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	0	1	1	5	1	4	0	4	25

TABLE 63. NZ FUR SEAL CAPTURES IN THE DOMESTIC SURFACE LONGLINE FISHERY BY AREA AND MONTH DURING THE 2007/08 OBSERVER YEAR.

'-' indicates there was no observer coverage during that month in that area.

FMA	2007			2008						TOTAL
	JUL	AUG	SEP	JAN	FEB	MAR	APR	MAY	JUN	
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

5.6 BOTTOM LONGLINE FISHERY

5.6.1 Deep-sea ling

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

Commercial fishing effort, observer effort and protected species interactions in this fishery are summarised in Table 64. The majority of fishing effort was undertaken in SOE, SOU and SUB. No observer coverage was achieved in SOE during the 2007/08 observer year, despite this being an area where historical captures have been reported and almost 30% of fishing effort being carried out here. During 2007/08, no marine mammals were captured and fewer seabirds were caught than in previous years; however, the rate of seabird capture was the same as during the previous year.

TABLE 64. SUMMARY OF COMMERCIAL EFFORT, OBSERVER EFFORT AND PROTECTED SPECIES CAPTURES IN THE DEEP-SEA LING BOTTOM LONGLINE FISHERY DURING THE 2007/08 OBSERVER YEAR.

FMA	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
3. SEC	11	0						
4. SOE	135	0						
5. SOU	287	33	11.50	241200	5	0.021	0	0
6. SUB	303	173	57.10	1381800	6	0.004	0	0
7. CHA	0							
8. CEW	0							
9. AKW	0							
10. KER	0							
Total	799	248	31.04	1932300	11	0.006	0	0

* 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 (Appendix 6, Table A6.12). Protected species captures were reported from two trips. One vessel used a tori line while setting, which the observer considered effective at preventing birds from accessing bait. This vessel also used integrated weighted lines, which were hauled through a moonpool² underneath the vessel, and an acoustic cannon. The other vessel also used a tori line during setting, which was kept in motion by a 'jiggler' winch. The observer considered this to be highly effective at keeping birds away from the 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 techniques, and protected species interactions and captures (i.e. interactions with fishing gear only) for each vessel observed are given in Table A6.12.

Observer coverage was in 2-month blocks because long trips are undertaken in this fishery (Table 65).

TABLE 65. OBSERVER DAYS IN THE DEEP-SEA LING BOTTOM LONGLINE FISHERY BY AREA AND MONTH DURING THE 2007/08 OBSERVER YEAR.

FMA	2007						2008						TOTAL
	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	
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	0	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).

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

TABLE 66. PROTECTED SPECIES INTERACTIONS IN THE DEEP-SEA LING 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

TABLE 67. SEABIRD INTERACTIONS IN THE DEEP-SEA LING BOTTOM LONGLINE FISHERY BY AREA AND MONTH DURING THE 2007/08 OBSERVER YEAR.

'-' indicates there was no observer coverage during that month in that area.

FMA	2007			2008		TOTAL
	JUL	SEP	OCT	MAR	APR	
2. CEE	0	-	-	-	-	0
5. SOU	-	0	5	-	-	5
6. SUB	-	-	-	3	3	6
Total	0	0	5	3	3	11

² A moonpool system hauls lines through the hull of the vessel using a chain pulley system. This makes it possible to haul the line more smoothly and recover any fish that fall off.