



INT 2013/02 IDENTIFICATION OF SEABIRD CAPTURED IN NEW ZEALAND FISHERIES

QUARTERLY REPORT: 1 July 2014 to 31 December 2014.

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Introduction:

New Zealand waters support a large and diverse range of seabird species. Much of the commercial fishing activity within New Zealand waters overlap with these seabirds. The accurate identification of seabirds captured in New Zealand fisheries is vital to determine the potential impact of fisheries interaction with these seabird populations. New Zealand Government observers are placed on commercial vessels in order to investigate interactions with seabird species. These observers are not always able to identify seabirds at sea with high precision. The autopsy programme has been in place to accurately determine the identification (and age, sex, diet and provenance) of specimens recovered dead by observers, but the identification reported for seabirds released alive were often poor and were not confirmed by an expert. The photography programme was developed to enable observers to capture and return images of birds interacting with vessels (whether alive or dead) which would enable correct identification to be determined.

Observers present on fishing trips within New Zealand's Exclusive Economic Zone have to return all seabirds caught and killed as incidental bycatch during fishing operations for necropsy. Additional information such as vessel name, location of capture (latitude and longitude) and date of capture is also recorded. Specific catch locations and vessel names have not been provided in this report on the grounds of commercial sensitivity. All autopsies were performed for the Department of Conservation (DOC) as part of Conservation Services Programme (CSP) project INT2013/02.

Objectives:

The overall objective is to determine which seabird species are captured in New Zealand commercial fisheries and the mode of capture.

The specific objectives are:

1. To determine, through examination of returned seabird specimens, the taxon, sex and where possible age class and provenance of seabirds killed in New Zealand fisheries (for returned dead specimens).
2. To detail the injuries, body condition and stomach contents and, where possible, the likely cause of mortality (for returned dead specimens).
3. To report any changes in the protocol used for necropsy of seabirds (for returned dead specimens).

4. To determine, through examination of photographs, the taxon and where possible, sex, age-class and provenance of seabirds captured in New Zealand fisheries (for live captures or dead specimens discarded at sea).

Scope of work completed:

This report summarises identification work completed on dead birds caught and returned and/or using photographs from 1 July 2014 to 31 December 2014.

There have been 92 birds necropsied from this period. Due to the length of some fishing trips and subsequent transport it is possible some birds captured in this period may not have been received at the time of writing. Any further specimens received will be reported at a later date.

Examination of photographs from Ministry of Primary Industries observers gave a total of 58 birds that were reported captured or photographed as bird interactions with fishing vessels (and may include some non-capture interactions) for this period. The extract of seabird captures from the Ministry of Primary Industries Central Observer Database ("COD") has not been received for this entire period; part extract information has been used to assess images to date.

Methods:

The necropsy methods followed those described by Bartle (2000) and used in autopsies in subsequent fishing years (Robertson 2000; Robertson & Bell 2002a, b; Robertson et al. 2003, 2004; Conservation Services Programme 2008; Thompson 2009, 2010a, b). Common and scientific names of all species caught and returned are provided in Table 1.

Nomenclature generally follows Marchant & Higgins (1990), but for the albatrosses where current taxonomy and nomenclature is in a state of flux, a combination of Nunn et al. (1996) and Robertson & Nunn (1998) has been used.

Birds were sexed by internal examination during necropsy except when birds were damaged by fishing gear and/or machinery, or from sea lice. Birds were characterised as either adult, breeding adult, non-breeding adult, sub-adult (pre-breeder), immature or juvenile based on a combination of plumage, morphological (such as bill size and colour), gonadal and brood patch characteristics.

Adults were birds of breeding morphology, but that active breeding could not be confirmed; breeding adults were considered to be actively breeding at the time of capture and non-breeding adults were identified by feather moult and gonadal evidence. Sub-adults (pre-breeders) were those birds in mostly adult or near adult plumage, but that had no gonadal evidence of obtaining breeding condition and immatures and juveniles were birds in non-adult plumage and/or morphology.

Body condition was determined by assigning a fat score based on the relative amount of subcutaneous fat and fat on and around organs. Fat scores go from '1' = no fat, to '5' = extremely fat (where internal examination becomes difficult).

Feather moult and the condition of the brood patch were recorded. For each bird, any injuries were recorded, and together with observer comments on the autopsy label, likely cause of death was determined.

Stomach and gizzard contents were identified to broad dietary groupings (squid, fish, crustaceans) and any hard parts (squid beaks, otoliths) were retained for future identification where possible. Additionally, any bait material was recorded, as was offal or discarded material, plastic, stones, algae and goose barnacle plates. All autopsy specimens were allocated a unique number.

Table 1 Common and scientific names of seabirds captured and returned or photographed from New Zealand fisheries between 1 July 2014 and 31 December 2014.

COMMON NAME	SCIENTIFIC NAME	AUTOPSY	PHOTO
Albatross (unidentified)			✓
Black-browed albatross (unidentified)	<i>Thalassarche spp.</i>		✓
Buller's albatross	<i>Thalassarche bulleri bulleri</i>	✓	✓
Buller's shearwater	<i>Puffinus bulleri</i>		✓
Cape petrel	<i>Daption capense</i>	✓	✓
Cape petrels (unidentified)	<i>Daption spp.</i>		✓
Chatham Island albatross	<i>Thalassarche eremita</i>		✓
Common diving petrel	<i>Pelecanoides urinatrix</i>		✓
Cook's petrel	<i>Pterodroma cookii</i>		✓
Fairy prion	<i>Pachyptila turtur</i>	✓	✓
Giant petrel (unidentified)	<i>Macronectes spp.</i>		✓
Great albatross (unidentified)	<i>Diomedea spp.</i>		✓
Great-winged petrel	<i>Pterodroma macroptera</i>	✓	
Grey petrel	<i>Procellaria cinerea</i>	✓	✓
Grey-backed storm petrel	<i>Garrodia nereis</i>	✓	✓
New Zealand white-capped albatross	<i>Thalassarche steadi</i>	✓	
Northern giant petrel	<i>Macronectes halli</i>		✓
Pacific albatross	<i>Thalassarche bulleri platei</i>	✓	
Petrel (unidentified)			✓
Petrels, prion and shearwaters (unidentified)			✓
Prion (unidentified)	<i>Pachyptila spp.</i>		✓
Salvin's albatross	<i>Thalassarche salvini</i>	✓	✓
Sooty shearwater	<i>Puffinus griseus</i>	✓	✓
Southern royal albatross	<i>Diomedea epomophora</i>	✓	
Storm petrel (unidentified)			✓
Westland petrel	<i>Procellaria westlandica</i>	✓	✓
White-chinned petrel	<i>Procellaria aequinoctialis</i>	✓	✓
White-faced storm petrel	<i>Pelagodroma marina</i>	✓	

Details relating to each specimen are available on request from the Manager, Marine Conservation Services, DOC (email csp@doc.govt.nz). In some cases (i.e. those specimens damaged by fishing gear and machinery, or by sea lice) it was not possible to collect all data; these are reported as 'unknown', and appear as such in the relevant tables.

Photographs were provided in electronic format with associated observer information (such as vessel name, date of capture, time of capture etc.) from the Ministry of Fisheries Central Observer Database in an Excel spreadsheet. Individual seabirds were allocated a unique autopsy number. The photograph (or photographs), the information from the observers and any other information observed in the photograph was entered into an Access database.

Where possible, the taxon, age, sex and provenance of the seabirds pictured were determined. Bill and head morphology and colour was usually sufficient to allow identification of albatross and larger petrels to species, but other key features (such as size, shape, foot colour, and wing markings) were needed for other smaller species. If key features were not visible in the photograph or the image was out of focus,

identification to species was not possible. Common and scientific names of all species caught and photographed are provided in Table 1.

Results:

AUTOPSY BIRDS:

A total of 92 seabirds (comprising of 14 taxa) were returned from 18 vessels between 1 July 2014 and 31 December 2014 (Table 2). Seabirds returned to date were dominated by six species; Salvin's albatross *Thalassarche salvini* ($n = 24$, 26.1%), white-chinned petrel *Procellaria aequinoctialis* ($n = 24$, 26.1%), New Zealand white-capped albatross ($n = 10$, 10.9%), grey petrel *Procellaria cinerea* ($n = 9$, 9.8%), sooty shearwater *Puffinus griseus* ($n = 9$, 9.8%) and Buller's albatross *Thalassarche bulleri bulleri* ($n = 6$, 6.5%) (Table 2). These four species accounted for 89.2% of all returns to date (Table 2). The remaining seven taxa had either captures of two individuals or single captures (Table 2).

No banded birds were returned during this period. Banded specimens provide valuable longevity, survival and at-sea distribution data. Specimens still need to be checked for PTT tags (PTT tag reader to be provided by DOC).

The monthly distribution of returned specimens was not evenly spread across the fishing year with most birds returned to date being caught in October ($n = 28$, 30.4%) (Table 2). However this is to be expected as these specimens were only returned from those vessels fishing at sea between 1 July 2014 and 31 December 2014. It is likely that this distribution pattern will change as further specimens are returned through the remainder of the reporting period (i.e. last $\frac{1}{4}$ of the 2014/15 and first $\frac{1}{2}$ of the 2015/16 fishing years).

Over half of all birds returned were males ($n = 54$, 58.7%). However, grey-backed storm petrel, New Zealand white-capped albatross, Salvin's albatross, Westland petrel and white-chinned petrel had similar numbers of males and females while Buller's albatross, Fairy prion, great-winged petrel and Southern royal albatross were either all females or the majority of the returned birds were female (Table 3). All sooty shearwater returned to date were male and the majority of grey petrels returned to date were also male (Table 3). The majority of the birds returned were adults ($n = 88$, 95.6%) (Table 3), with only great-winged petrel and New Zealand white-capped albatross having sub-adult birds returned.

Fat scores of 3 were most often recorded in the birds returned between 1 July 2014 and 31 December 2014 (Table 4). Thirty-one birds had fat scores higher than 3 (Table 3). The mean fat score was 3.0 ± 0.1 (Table 4). Using this preliminary data, it appears that the mean fat scores will be higher to other recent fishing years (Bell 2011, 2012, 2013, 2014; Thompson 2009, 2010 a, b), although this may relate to time of the year and breeding condition and is likely to change as more birds are autopsied throughout the remainder of the year.

Stomach contents have been identified into main groups following a similar method to Thompson (2009, 2010a, b) and are shown in Table 5. Over 85% of the birds had bait, offal or discards in their stomachs and another 21 (22.8%) had empty stomachs (Table 5).

Most of the gizzard contents were natural food items (squid beaks, fish bones and eyeballs and otoliths), but 15.2% of the birds returned had empty gizzards (Table 6). Fourteen birds had worms in their gizzards (15.2%) and two birds had seaweed (2.2%) in their gizzards (Table 6). Samples (e.g. squid beaks and otoliths) have been collected for further analysis. There were eleven birds (12.0%) that had plastic in their gizzards. Photographs of plastic content have been taken.

Table 2 Species and numbers of seabirds killed and returned from observed fishing vessels between 1 July 2014 and 31 December 2014, by month of capture.

SPECIES	MONTH												TOTAL	% TOTAL	
	J	F	M	A	M	J	J	A	S	O	N	D			
Buller's albatross							5	1						6	6.5%
Cape petrel								1						1	1.1%
Fairy prion							1							1	1.1%
Great-winged petrel										1				1	1.1%
Grey petrel								1	8					9	9.8%
Grey-backed storm petrel									2					2	2.2%
NZ white-capped albatross							2	1	2	1			4	10	10.9%
Pacific albatross							1							1	1.1%
Salvin's albatross								5	6	5	1	7		24	26.1%
Sooty shearwater										7	1	1		9	9.8%
Southern royal albatross								1						1	1.1%
Westland petrel								1	1					2	2.2%
White-chinned petrel									1	14	2	7		24	26.1%
White-faced storm petrel												1		1	1.1%
TOTAL							9	11	20	28	4	20		92	
% TOTAL							9.8%	12.0%	21.7%	30.4%	4.3%	21.7%			

Table 3 Species and numbers of seabirds killed and returned from observed fishing vessels between 1 July 2014 and 31 December 2014, by sex (M = male, F = female, U = unknown) and age (A = adult, BA = breeding adult, N = non-breeding adult, SA = sub-adult, I = immature and J = juvenile, U = unknown).

SPECIES	SEX			AGE							TOTAL	% TOTAL
	M	F	U	A	BA	N	SA	I	J	U		
Buller's albatross		5	1	6							6	6.5%
Cape petrel	1			1							1	1.1%
Fairy prion		1		1							1	1.1%
Great-winged petrel		1			1		1				1	1.1%
Grey petrel	8	1		9							9	9.8%
Grey-backed storm petrel	1	1		2	9						2	2.2%
NZ white-capped albatross	6	4		7			3				10	10.9%
Pacific albatross		1		1	1						1	1.1%
Salvin's albatross	13	10	1	24	22	1				1	24	26.1%
Sooty shearwater	9			9	9						9	9.8%
Southern royal albatross		1		1	23						1	1.1%
Westland petrel	1	1		2	1						2	2.2%
White-chinned petrel	14	10		24	5	1					24	26.1%
White-faced storm petrel	1			1	2						1	1.1%
TOTAL	54	36	2	88	73	2	4			1	92	
% TOTAL	58.7%	39.1%	2.2%	95.6%	83.0%	2.3%	5.4%			1.1%		

Table 4 Comparison of fat scores in the returned birds between 1 July 2014 and 31 December 2014 (1= no fat to 5 = extremely fat, U = unknown).

SPECIES	FAT SCORE						TOTAL	MEAN (\pm SE)
	1	2	3	4	5	U		
Buller's albatross	1	1	3			1	6	2.4 \pm 0.4
Cape petrel				1			1	4.0 \pm 0.0
Fairy prion				1			1	4.0 \pm 0.0
Great-winged petrel	1						1	1.0 \pm 0.0
Grey petrel	1	7	1				9	2.0 \pm 0.2
Grey-backed storm petrel				2			2	4.0 \pm 0.0
NZ white-capped albatross	2		6	1	1		10	2.9 \pm 0.3
Pacific albatross		1					1	2.0 \pm 0.0
Salvin's albatross	3	5	2	8	5	1	24	3.3 \pm 0.3
Sooty shearwater		3	6				9	2.7 \pm 0.2
Southern royal albatross			1				1	3.0 \pm 0.0
Westland petrel		2					2	2.0 \pm 0.0
White-chinned petrel	1	5	6	8	4		24	3.1 \pm 0.2
White-faced storm petrel			1				1	3.0 \pm 0.0
	9	24	26	21	10	2	92	3.0 \pm 0.1
% TOTAL	9.8%	26.1%	28.3%	22.8%	10.9%	2.2%		

Table 5 Stomach contents of seabirds killed and returned on fishing vessels between 1 July 2014 and 31 December 2014.

Note: Birds can have multiple items in the stomachs resulting in higher content figures than the total number of seabirds killed and returned ($n = 92$).

SPECIES	EMPTY	GONE	BAIT	OFFAL (OR DISCARDS)	NATURAL	SLUDGE	PROVENTRICULAR OIL	WORMS
Buller's albatross	1	2		5				1
Cape petrel					1			
Fairy prion							1	
Great-winged petrel						1		
Grey petrel				8	1	2	9	
Grey-backed storm petrel	1							1
NZ white-capped albatross	6			7		2	1	
Pacific albatross				1				
Salvin's albatross	2	1	1	33	3		2	2
Sooty shearwater	3			4		3		
Southern royal albatross					1	1		
Westland petrel				3			2	
White-chinned petrel	7	1	11	6	1		4	1
White-faced storm petrel	1							1
TOTAL	21	4	12	68	7	9	19	6
% TOTAL	22.8%	4.3%	13.0%	73.9%	7.6%	9.8%	20.7%	6.5%

Table 6 Gizzard contents of seabirds killed and returned on fishing vessels between 1 July 2014 and 31 December 2014.

Note: Birds can have multiple items in the gizzard resulting in higher content figures than the total number of seabirds killed and returned ($n = 92$).

SPECIES	EMPTY	GONE	SQUID BEAKS	OTOLITHS	FISH OR SQUID EYEBALLS	FISH BONES/SKIN	PLASTIC	SEEDS OR STONE	WORMS	SEAWEED
Buller's albatross	3	1	1	1	1	1			1	
Cape petrel						1	1	1		
Fairy prion	1									
Great-winged petrel			1							
Grey petrel			9	4	1	4			3	
Grey-backed storm petrel						1				1
NZ white-capped albatross	3		3	1	4	7				
Pacific albatross			1							
Salvin's albatross	5	1	4	9	9	15		1	2	1
Sooty shearwater			7	3	1	3	9			
Southern royal albatross			1		1					
Westland petrel			2	2					1	
White-chinned petrel	1	1	21	5	4	9	1	2	7	
White-faced storm petrel	1									
TOTAL	14	3	50	25	21	41	11	4	14	2
% TOTAL	15.2%	3.2%	54.3%	27.2%	22.8%	44.6%	12.0%	4.3%	15.2%	2.2%

Table 7 Number of seabirds of each species killed and returned from observed fishing vessels between 1 July 2014 and 31 December 2014, by fisheries type and location.

Species	Bottom/Midwater Trawl						Surface Longline	Impact	Set net	Total
	Net	Codend	Lengthener	Pound	Trawl Door	Warp				
Buller's albatross	2					4				6
Cape petrel								1		1
Fairy prion								1		1
Great-winged petrel	1									1
Grey petrel	8			1						9
Grey-backed storm petrel			1					1		2
NZ white-capped albatross	4				1	4	1			10
Pacific albatross						1				1
Salvin's albatross	7	3			1	12	1			24
Sooty shearwater	7	1	1							9
Southern royal albatross							1			1
Westland petrel	2									2
White-chinned petrel	12						12			24
White-faced storm petrel			1							1
Total	43	4	3	1	2	21	15	2	1	92
% Total	46.7%	4.3%	3.3%	1.1%	2.2%	22.8%	16.3%	2.2%	1.1%	
TOTAL	74						15	2	1	
% TOTAL	80.4%						16.3%	2.2%	1.1%	

Trawl, longline and set-net vessels have returned birds to date and preliminary data are shown in Table 7. There were 74 birds returned from trawl vessels (80.4%), 15 from surface longline vessels (16.3%), 1 from a set net vessel (1.1%) and 2 birds returned following an impact with the vessel (2.2%) (Table 7). Detailed analysis of captures per vessel type and target fisheries will be undertaken at the end of the reporting year when this information has been collated from CSP and Ministry of Fisheries.

Most of the returned birds to date had a range of injuries from 'no obvious injury' to 'mangled' (Table 8). Fifteen birds (16.3%) had a hook in the bill or wing. Over half the birds ($n = 62$, 67.4%) had been caught in the trawl nets and were very wet and sandy (i.e. waterlogged). Forty-four birds (47.8%) showed injuries suggesting entanglement and crush injuries from the trawl warp and blocks. Nineteen birds (20.6%) had grease covering part or all of the body. Thirty-six birds (39.1%) had no obvious injuries, but many of these were waterlogged and had drowned in the trawl nets. More detailed reporting of injuries and cause of death will be reported in the end of year report.

Table 8 Number of seabirds killed and returned from observed fishing vessels between 1 July 2014 and 31 December 2014, by injury.

Note: Birds can have multiple injuries resulting in higher figures than the total number of seabirds killed and returned ($n = 92$).

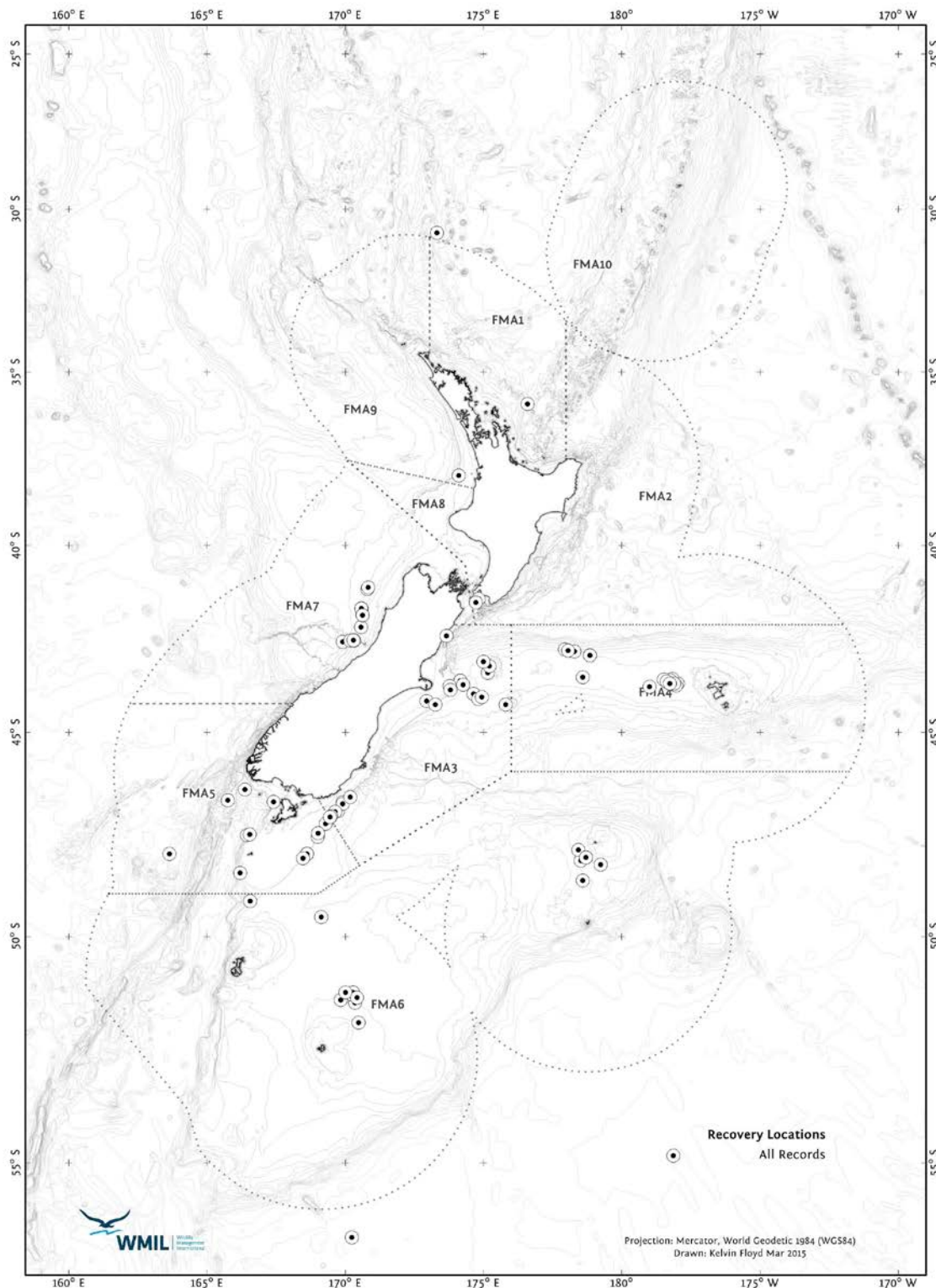
Species	No injuries	Broken bones	Greased	Lacerations	Liced	Hook	Waterlogged
Buller's albatross		4	3	2			6
Cape petrel	1						
Fairy prion	1						
Great-winged petrel	1						1
Grey petrel	6	3					8
Grey-backed storm petrel		1					1
NZ white-capped albatross	1	5	3	3		1	8
Pacific albatross			1				1
Salvin's albatross	7	16	9	4		1	7
Sooty shearwater	6	3					7
Southern royal albatross	1					1	
Westland petrel	1			1			2
White-chinned petrel	11	11		1	1	12	19
White-faced storm petrel		1	3				1
Total	36	44	19	11	1	15	62
% Total	39.1%	47.8%	20.6%	12.0%	1.1%	16.3%	67.4%

The majority ($n = 76$, 82.6%) of the returned seabirds between 1 July 2014 and 31 December 2014 were identified correctly by the observers. There were 10 (10.9%) identified to the correct group and six bird (grey-faced petrel, one of the New Zealand white-capped albatross, two of the Salvin's albatross and two white-chinned petrels) were identified incorrectly (6.5%).

The birds killed and returned to date were caught in a range of Fishing Management Areas (FMA 1, 2, 3, 4, 5, 6, 7 and 9) as well as just outside FMAs 1 and 6 and general positions are show in Figure 1.

Figure 1 Catch locations of all seabirds killed and returned in New Zealand fisheries for necropsy between 1 July 2014 and 31 December 2014.

Note: some catch location symbols may be obscured by overlying symbols (e.g. where several individuals were captured from the same tow or set, each bird will have the same catch location and appear on the maps as a single symbol).



PHOTOGRAPH BIRDS:

Examination of the Ministry of Primary Industries Central Observer Database (“COD”) and images provided by Government observer gave a total of 58 birds that were reported captured or photographed as bird interactions with 22 fishing vessels (and may include some non-capture interactions) (Table 9). Of these 58 reported interactions, only nine seabirds were photographed by observers for the period 1 July 2014 to 31 December 2014 and only four of these were not listed in the COD extract (Table 9). Information in the COD extract stated that two seabirds were photographed, but these images have not been received to date.

Table 9 Number of seabird interactions photographed or recorded on fishing vessels between 1 July 2014 and 31 December 2014.

	Dead	Alive	Total
Photograph & listed in Ministry of Primary Industries COD extract	0	4	4
Photograph; not listed in Ministry of Primary Industries COD extract	0	5	5
No photograph; listed in Ministry of Primary Industries COD extract	5	44	49
Total	5	53	58
% Total	8.6%	91.4%	

Birds that were either photographed or recorded as an interaction were from 22 different vessels (bottom longline ($n = 2$), surface longline ($n = 8$) and trawl ($n = 48$)). Of the five dead birds, one was drowned in the net, one was drowned on a hook and three were killed by warp strike. Of the four birds that are listed in the COD extract and photographed, all were identified correctly by the observers.

The quality of the images continues to vary widely. There were a number of issues including only one photograph for some seabirds, not all key features were photographed, poor focus, and under or over-exposure. Poor images were common for birds that were alive and seen onboard for short periods (when photographs were taken from a long distance). A number of seabirds were recorded as having an interaction with the vessel, but no images were taken of these birds and as a result, identification of these birds could not be confirmed. It is important that more photographs are taken of each seabird and that there are images of head, bill, feet, wings (upper and lower) and whole body shots taken. Photographs need to be taken of all bird interactions (as much as possible) and if a photograph of a seabird is taken, data relevant to that bird should be recorded (i.e. observer identification, date, time, haul, sample etc.).

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