



INT 2010/02 IDENTIFICATION OF SEABIRD CAPTURED IN NEW ZEALAND FISHERIES

QUARTERLY REPORT: 1 July 2012 to 31 December 2012.

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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 INT2010/02.

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 2012 to 31 December 2012.

There have been 83 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.

Extracts of seabird captures from the Ministry of Primary Industries Central Observer Database (“COD”) and examination of photographs gave a total of 83 birds that were reported captured or photographed as bird interactions with fishing vessels (and may include some non-capture interactions) for this period.

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.

Table 1 Common and scientific names of seabirds captured and returned or photographed from New Zealand fisheries between 1 July 2012 and 31 December 2012.

COMMON NAME	SCIENTIFIC NAME	AUTOPSY	PHOTO
Antipodean albatross	<i>Diomedea antipodensis antipodensis</i>		✓
Black-backed gull	<i>Larus dominicanus</i>	✓	
Black-browed albatross (unidentified)	<i>Thalassarche spp.</i>		✓
Buller’s albatross	<i>Thalassarche bulleri bulleri</i>	✓	✓
Campbell albatross	<i>Thalassarche impavida</i>	✓	✓
Cape petrels (unidentified)	<i>Daption spp.</i>		✓
Chatham albatross	<i>Thalassarche eremita</i>	✓	
Common diving petrel	<i>Pelecanoides urinatrix</i>	✓	✓
Fairy Prion	<i>Pachyptila turtur</i>		✓
Flesh-footed shearwater	<i>Puffinus carneipes</i>	✓	
Gibson’s albatross	<i>Diomedea antipodensis gibsoni</i>		✓
Grey petrel	<i>Procellaria cinerea</i>	✓	✓
New Zealand White-capped albatross	<i>Thalassarche steadi</i>	✓	✓
Petrel (unidentified)	Procellariidae	✓	✓
Petrels, prion and shearwaters (unidentified)			✓
Prion (unidentified)	<i>Pachyptila spp.</i>		✓
Salvin’s albatross	<i>Thalassarche salvini</i>	✓	✓
Snares cape petrel	<i>Daption capense australe</i>		✓
Sooty shearwater	<i>Puffinus griseus</i>	✓	✓
Southern Royal albatross	<i>Diomedea epomophora</i>		✓
Wandering albatross (unidentified)	<i>Diomedea exulans spp.</i>		✓
Westland petrel	<i>Procellaria westlandica</i>	✓	
White-chinned petrel	<i>Procellaria aequinoctialis</i>	✓	✓
White-faced storm petrel	<i>Pelagodroma marina</i>		✓

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.

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 will be 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:

A total of 83 seabirds (comprising of 13 taxa) were returned from 25 vessels between 1 July 2012 and 31 December 2012 (Table 2). Seabirds returned to date were dominated by four species (Salvin's albatross *Thalassarche salvini* ($n = 19$, 22.9%), New Zealand white-capped albatross *Thalassarche steadi* ($n = 17$, 20.5%), white-chinned petrel *Procellaria aequinoctialis* ($n = 13$, 15.6%) and sooty shearwater *Puffinus griseus* ($n = 12$, 14.5%)) (Table 2). These four species accounted for 73.5% of all returns to date (Table 2). With the exception of Buller's albatross *Thalassarche bulleri bulleri* with 8 captures (9.6%), the remaining 8 taxa had captures of three or less individuals (Table 2).

Table 2 Species and numbers of seabirds killed and returned from observed fishing vessels between 1 July 2012 and 31 December 2012, by month of capture, 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	MONTH												SEX			AGE						TOTAL	% TOTAL	
	J	F	M	A	M	J	J	A	S	O	N	D	M	F	U	A	BA	N	SA	I	J			U
Black-backed gull										1				1						1			1	1.2%
Buller's albatross							6	1	1				5	3		8	1	7					8	9.6%
Campbell albatross							2		1				1	2		3	1	2					3	3.6%
Chatham Island albatross									1					1		1	1						1	1.2%
Common diving petrel										1			1			1	1						1	1.2%
Flesh-footed shearwater										1	1		2			2	1	1					2	2.4%
Grey petrel							1		2				1	1	1	2		2				1	3	3.6%
New Zealand white-capped albatross							5		2			10	13	3	1	16	10	4	1			1	17	20.5%
Petrel (unidentified)										1					1						1		1	1.2%
Salvin's albatross							1		6	5	7		11	8		19	12	6				1	19	22.9%
Sooty shearwater										10	2		12			12	11	1					12	14.5%
Southern royal albatross												1		1		1	1						1	1.2%
Westland petrel									1				1			1		1					1	1.2%
White-chinned petrel										1	3	9	10	3		13	10	3					13	15.7%
TOTAL							15	1	14	17	15	21	57	23	3	79	49	27	1	1		4	83	
% TOTAL							18.1%	1.2%	16.9%	20.5%	18.1%	25.3%	68.7%	27.7%	3.6%	95.2%	62.0%	34.2%	1.2%	1.2%		4.8%		

Table 3 Comparison of fat scores in the returned birds between 1 July and 31 December 2012 (1= no fat to 5 = extremely fat, U = unknown).

SPECIES	FAT SCORE						TOTAL	MEAN (±SE)
	1	2	3	4	5	U		
Black-backed gull			1				1	3.0 ± 0.0
Buller's albatross	3	2	2	1			8	2.1 ± 0.4
Campbell albatross	1		2				3	2.3 ± 0.7
Chatham Island albatross				1			1	4.0 ± 0.0
Common diving petrel	1						1	1.0 ± 0.0
Flesh-footed shearwater			1	1			2	3.5 ± 0.5
Grey petrel	1	1				1	3	1.5 ± 0.5
New Zealand white-capped albatross	2	4	3	4	3	1	17	3.1 ± 0.3
Petrel (unidentified)						1	1	
Salvin's albatross	2	3	5	4	5		19	3.4 ± 0.3
Sooty shearwater	5	4	2	1			12	1.9 ± 0.3
Southern royal albatross					1		1	5.0 ± 0.0
Westland petrel	1						1	1.0 ± 0.0
White-chinned petrel	5	6	2				13	1.8 ± 0.2
TOTAL	21	20	18	12	9	3	83	2.6 ± 0.2
% TOTAL	25.3%	24.1%	21.7%	14.5%	10.8%	3.6%		

Table 4 Stomach contents of seabirds killed and returned on fishing vessels between 1 July 2012 and 31 December 2012.

Note: Birds can have multiple items in the stomachs resulting in higher content figures than the total number of seabirds killed and returned ($n = 83$).

SPECIES	EMPTY	GONE	BAIT	OFFAL (OR DISCARDS)	NATURAL	SLUDGE	PROVENTRIC ULAR OIL	VEGETATION
Black-backed gull								1
Buller's albatross	1	1		1	6			
Campbell albatross	2				1			
Chatham Island albatross				1				
Common diving petrel					1			
Flesh-footed shearwater	2							
Grey petrel				1	1		1	
New Zealand white-capped albatross	3			15	5		1	
Petrel (unidentified)		1						
Salvin's albatross	3		1	18	7			
Sooty shearwater	5			4		2	2	
Southern royal albatross			1	2				
Westland petrel					2			
White-chinned petrel	8			4	5			
TOTAL	24	2	2	46	28	2	4	1
% TOTAL	28.9%	2.4%	2.4%	55.4%	33.7%	2.4%	4.8%	1.2%

Table 5 Gizzard contents of seabirds killed and returned on fishing vessels between 1 July 2012 and 31 December 2012.

Note: Birds can have multiple items in the gizzard resulting in higher content figures than the total number of seabirds killed and returned ($n = 83$).

SPECIES	EMPTY	GONE	SQUID BEAKS	OTOLITHS	FISH OR SQUID EYEBALLS	FISH BONES	FISH OR SQUID FLESH, KRILL OR SALPS	PLASTIC	SEEDS OR STONE	STRING OR TWINE	WORMS	BARNACLES OR CUTTLEFISH	SEAWEED OR VEGETATION
Black-backed gull													1
Buller's albatross	3	1	2		2	1			1				
Campbell albatross	1		2		1	1							1
Chatham Island albatross			1			1							
Common diving petrel				1									1
Flesh-footed shearwater								2	2	1			
Grey petrel			2			1							
New Zealand white-capped albatross	6	1	2		6	5							
Petrel (unidentified)		1											
Salvin's albatross	8		6		4	6			1			3	2
Sooty shearwater			3	4	1	1	5	5	1	1			
Southern royal albatross					1								
Westland petrel			1		1								
White-chinned petrel	1		12		2	1	1			2			
TOTAL	19	3	31	5	18	17	6	7	5	4	0	3	5
% TOTAL	22.9%	3.6%	37.3%	6.0%	21.7%	20.5%	7.2%	8.4%	6.0%	4.8%	0%	3.6%	6.0%

Table 6 Number of seabirds of each species killed and returned from observed fishing vessels between 1 July 2012 and 31 December 2012, by fisheries type.

Species	Bottom Longline	Surface Longline	Bottom Trawl	Midwater Trawl	Total
Black-backed gull	1				1
Buller's albatross		2	1	5	8
Campbell albatross		2	1		3
Chatham Island albatross			1		1
Common diving petrel			1		1
Flesh-footed shearwater	2				2
Grey petrel		2	1		3
New Zealand white-capped albatross				17	17
Petrel (unidentified)				1	1
Salvin's albatross		1	14	4	19
Sooty shearwater			11	1	12
Southern royal albatross				1	1
Westland petrel		1			1
White-chinned petrel		1	3	9	13
Total	3	9	33	38	83
% Total	3.6%	10.8%	39.8%	45.8%	

One Chatham albatross also had a uniquely numbered metal band and darvic band, having been banded as an adult on The Pyramid, Chatham Islands (band number O33866 on the right leg and white darvic number B97 on the left leg). 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 December ($n = 21$, 25.3%) (Table 2). However this is to be expected as these specimens were only returned from those vessels fishing at sea between 1 July 2012 and 31 December 2012. 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 2011/12 and $\frac{3}{4}$ of the 2012/13 fishing years).

The majority of all birds returned were males ($n = 57$, 68.7%); with only Campbell albatross, Chatham albatross and Southern royal albatross having more females returned than males (Table 2). Also, with the exception of the black-backed gull, the majority of the birds returned were adults ($n = 79$, 95.2%) (Table 2).

Fat scores less than 3 were most often recorded in the birds returned between 1 July 2012 and 31 December 2012 ($n = 59$, 71.1%; Table 3). There were 21 birds with fat scores higher than 3 and the mean (\pm SE) fat score for all birds was 2.6 (\pm 0.2) (Table 3). Using this preliminary data, it appears that the mean fat scores will be similar to other fishing years (Thompson 2009, 2010 a, b).

Stomach contents have been identified into main groups following a similar method to Thompson (2009, 2010a, b) and are shown in Table 4; over 50% of the birds had offal or discards in their stomachs, 33.7% had eaten natural food items and another 28.9% had empty stomachs.

Most of the gizzard contents were natural food items (squid beaks, fish bones and eyeballs and otoliths), but 22.9% of the birds returned had empty gizzards (Table 5). Samples (e.g. squid beaks and otoliths) have been collected for further analysis. Photographs of plastic content have been taken from the seven birds that had plastic in the gizzard.

Both trawl and longline vessels have returned birds to date and preliminary data are shown in Table 6. The majority of birds have been caught and returned on trawl vessels (85.5%), but this probably relates to the vessels with observers, rather than actual seabird bycatch rates. 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' (EAB, pers. obs.). Ten birds (12.1%) had hooks in the bill or swallowed. Many birds ($n = 49$, 59.0%) had been caught in the trawl nets and were very wet and sandy. Other birds ($n = 21$, 25.3%) showed injuries suggesting entanglement and crush injuries from the trawl warp and blocks; many had heavy grease over the wings or parts of the body. One bird (common diving petrel, *Pelecanoides urinatrix*) had deck strike or impact injuries. More detailed reporting of injuries and cause of death will be reported at the end of the reporting year.

The majority ($n = 61$, 73.5%) of the returned seabirds between 1 July 2012 and 31 December 2012 were identified correctly by the observers. There were 5 (6.0%) identified to the correct group, but wrong species code (although this may relate to changes in the coding system), 11 (13.3%) did not have codes on the labels and 6 (7.2%) were identified wrong.

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 8) and general positions are shown in Figures 1-2.

Figure 1 Catch locations of all seabirds killed and returned in New Zealand fisheries for necropsy between 1 July 2012 and 31 December 2012.

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).

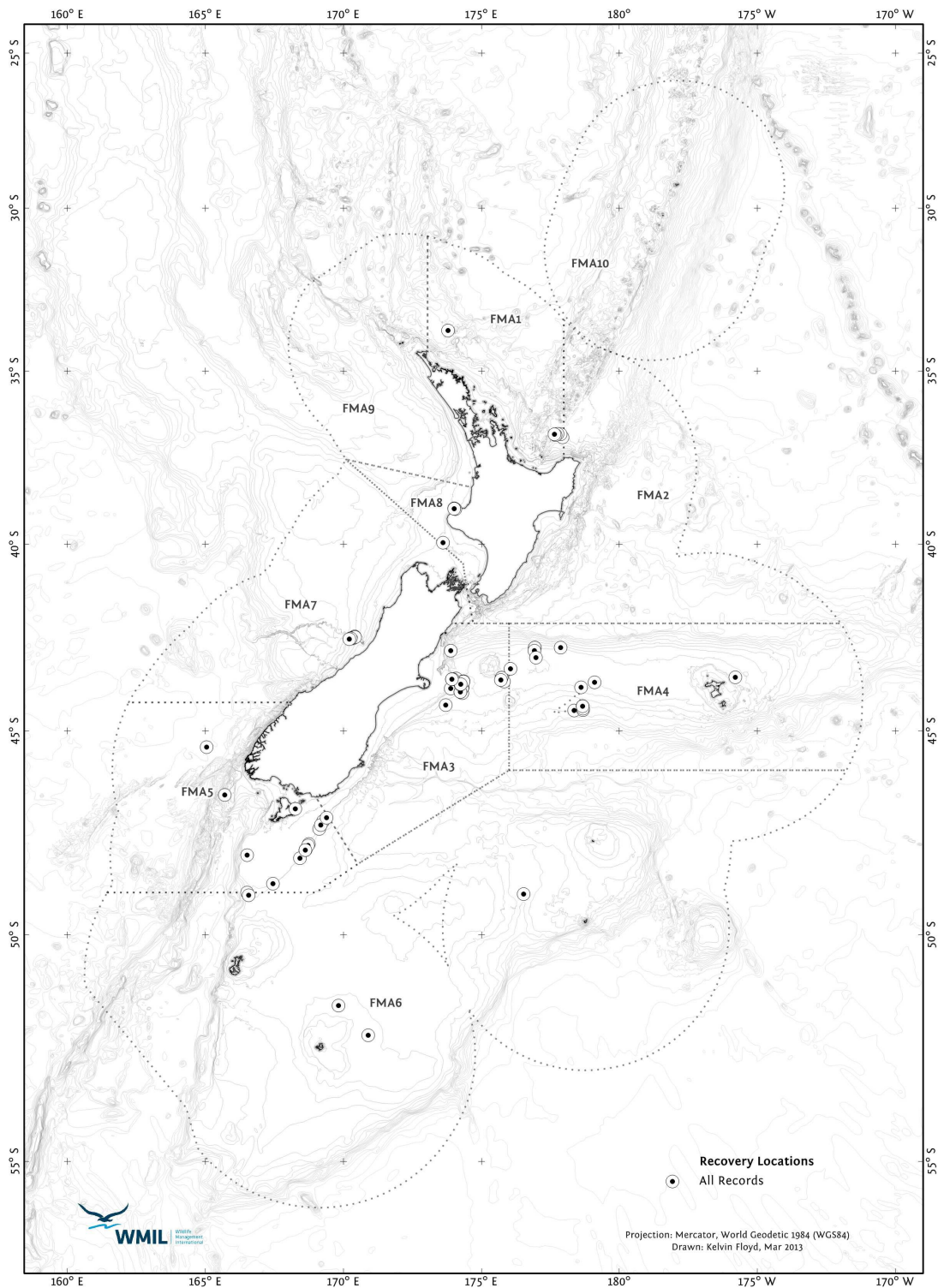
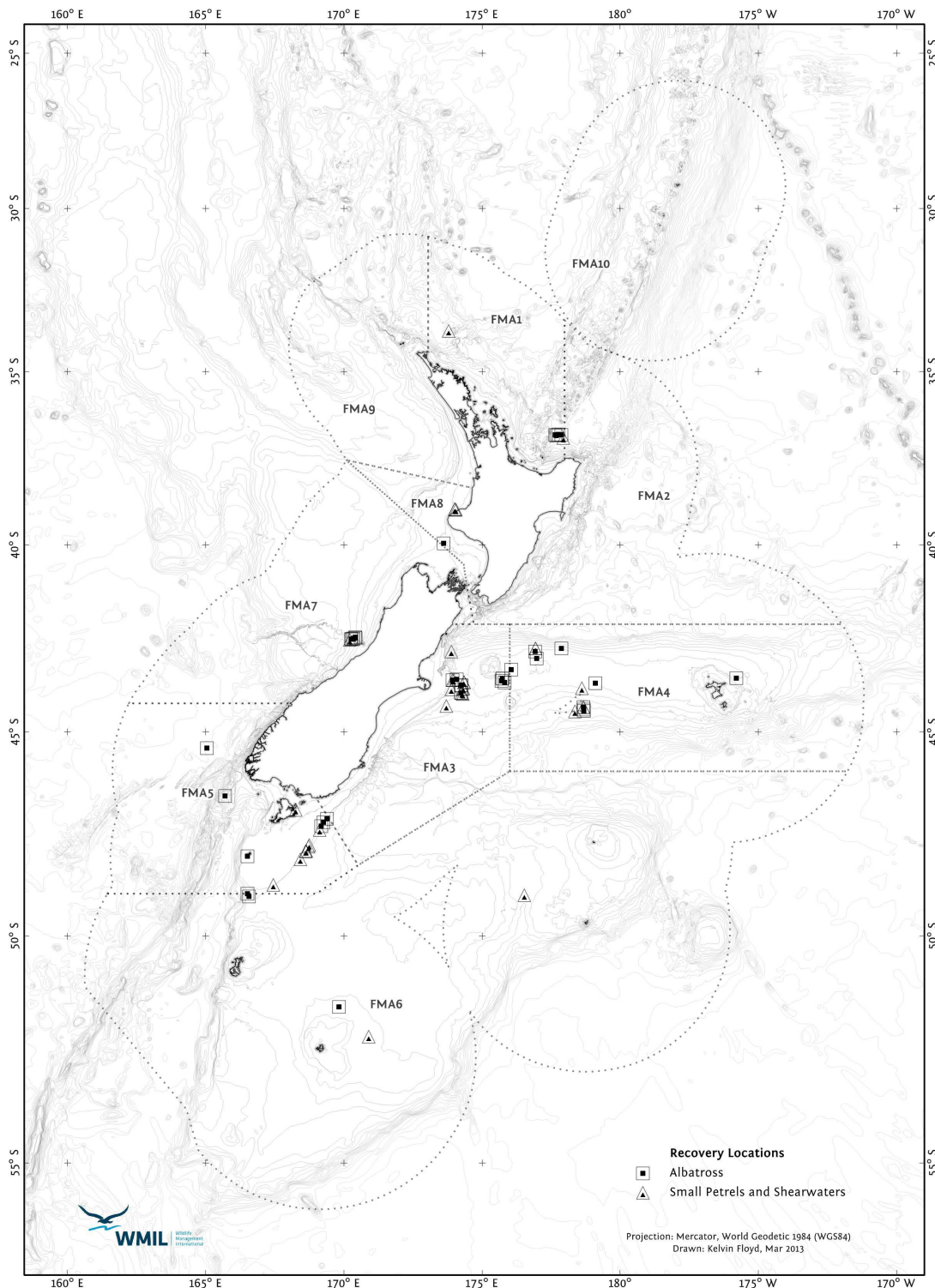


Figure 2 Catch locations of all seabirds killed and returned in NZ fisheries for necropsy between 1 July 2012 and 31 December 2012, split into (i) small petrels and shearwaters, and (ii) albatross.
Note: some catch location symbols may be obscured by overlying symbols (e.g. where several individuals 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).



Extracts of seabird captures from the Ministry of Primary Industries Central Observer Database (“COD”) and examination of photographs gave a total of 83 birds that were reported captured or photographed as bird interactions with fishing vessels (and may include some non-capture interactions). A total of 60 seabirds were photographed by observers for the period 1 July 2012 to 31 December 2012; in addition to these photographs, there were 23 observed seabird captures that had no photographs taken (Table 7). Of the 83 records, over 70% were of live bird interactions ($n = 59$, 71.1%, Table 7). The location of these interactions have shown in Figure 3.

Table 7 Number of seabird interactions photographed or recorded on fishing vessels between 1 July 2012 and 31 December 2012.

	Dead	Alive	Unknown	Total
Photograph & listed in Ministry of Primary Industries COD extract	10	34	0	54
Photograph; not listed in Ministry of Primary Industries COD extract	1	3	2	6
No photograph; listed in Ministry of Primary Industries COD extract	1	22	0	23
Total	12	59	2	83
% Total	14.5%	71.1%	2.4%	

Examination of 54 photographs (with COD extract information) provided the correct identification which was consistent with the identification made by observers only 12.9% of the time ($n = 7$); the majority of the birds were incorrectly identified ($n = 41$, 75.9%; Table 8). The large error was due to 27 cape pigeon and 11 grey petrels only being identified as seabirds by the observer (multiple birds on six photographs, with a corresponding observer note saying that over 50 birds crashed onto the deck due to snow and wind); many of these birds may have left the vessel unaided. The white-chinned petrel was incorrectly identified by the observer as a black petrel.

Table 8 Analysis of 54 seabird species observer identifications made at sea from the Ministry of Primary Industries COD extract information from fishing vessels between 1 July 2012 and 31 December 2012 when compared with photograph identification.

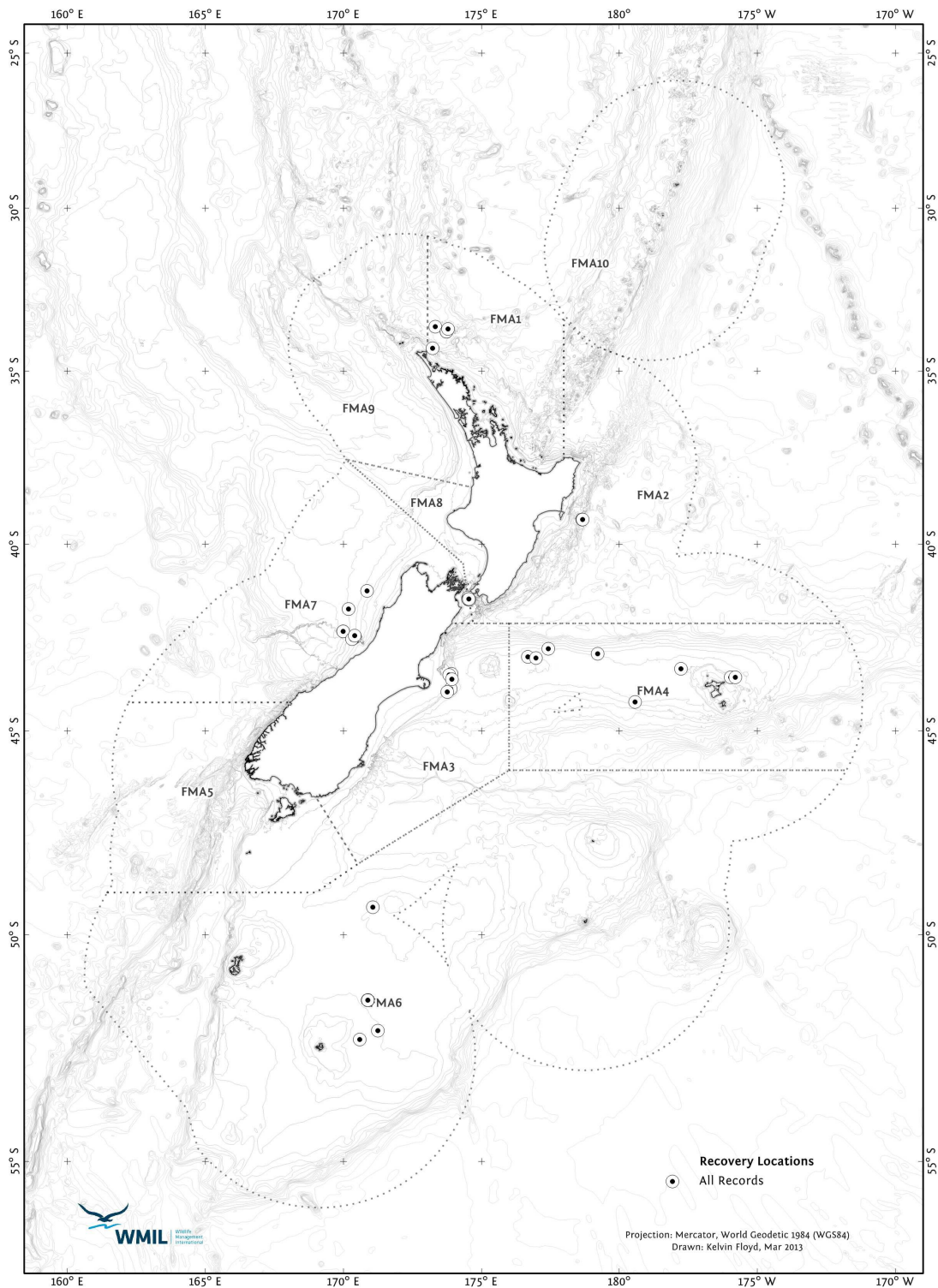
Where: Confirmed = identification confirmed observer identification; New, consistent = identification was to a lower taxonomic group and consistent with the observer identification; and New, not consistent = identification was not consistent with observer identification.

Species (observer)	Confirmed	New, consistent	New, not consistent	Total
Antipodean albatross		2		2
Buller’s albatross	2		2	4
Campbell albatross		1		1
Gibson’s albatross		1		1
Grey petrel	1		11	12
NZ white-capped albatross	1	1		2
Salvin’s albatross	1			1
Snares cape petrel		1	27	28
Sooty shearwater	1			1
White-chinned petrel			1	1
White-faced storm petrel	1			1
Total	7	6	41	54
% total	12.9%	11.1%	75.9%	

The quality of the images varied widely; a number of issues including only one photograph for some seabirds, one photograph for multiple birds, not all key features were photographed, poor focus, and under or over-exposure are still occurring. Poor images were common for birds that were alive and seen onboard for short periods (when photographs were taken from a long distance).

Figure 3 Locations of all seabird interactions photographed in NZ fisheries between 1 July 2012 and 31 December 2012.

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).



A number of seabirds ($n = 23$) 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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