



## **INT 2016/02 IDENTIFICATION OF SEABIRDS CAPTURED IN NEW ZEALAND FISHERIES QUARTERLY REPORT: 1 July 2018 to 30 September 2018.**

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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 within New Zealand's Exclusive Economic Zone in order to investigate interactions with seabird species, including returning whole seabird specimens for necropsy and/or samples from seabirds caught and killed as incidental bycatch during fishing operations. 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 return seabirds caught and killed as incidental bycatch during fishing operations for necropsy or retain feather samples. 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 INT2016/02.

### **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 identifications using photographs or Central Observer Database (“COD”) records from Ministry of Primary Industries from 1 July 2018 to 30 September 2018.

There have been 21 seabirds from 9 taxa necropsied from this period. These seabirds were caught on 16 vessels; 16 seabirds on trawl, one on set net and four longline vessels. 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. Government observers correctly identified 85.7% of the seabirds that were returned for necropsy.

Examination of photographs and COD gave a total of 32 birds that were reported captured (i.e. *Interaction*;  $n = 16$ ) or photographed (i.e. *Photo*;  $n = 16$ ) as seabird interactions from this period with 16 fishing vessels (29 seabirds on trawl and three on longline vessels) and may include some non-capture interactions such as deck strikes. The extract of seabird captures from COD has been received for this period and has been used to assess photograph images and reported interactions to date. Government observers correctly identified 50% of the seabirds that were photographed for identification.

#### **Methods:**

The necropsy methods followed those described by Bartle (2000) and used in necropsies 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* – adult morphology (e.g. body size, bill size, bill colour, plumage colour), but active breeding could not be confirmed
- *Breeding adults* - considered to be actively breeding at the time of capture (e.g. bare brood patch, swollen ovaries or testes)
- *Non-breeding adults* - identified by feather moult (e.g. downy brood patch, body moult, wing moult) and gonadal evidence (i.e. regressed or small ovaries and testes)
- *Sub-adults (pre-breeders)* – non-adult or near-adult plumage and/or morphology (e.g. bill colour), but no gonadal evidence that they had obtained breeding condition
- *Juveniles* - juvenile plumage and/or morphology (e.g. bill colour, bill size, leg and foot colour)

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 necropsy label, likely cause of death was determined.

Stomach and gizzard contents were identified to broad dietary groupings (i.e. squid, fish, etc.) 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 necropsy specimens were allocated a unique number.

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, photographed or reported as interactions are provided in Table 1.

**Table 1** Common and scientific names of seabirds captured and returned or photographed from New Zealand fisheries between 1 July 2018 and 30 September 2018.

Where: ✓ = necropsy specimen with corresponding information obtained from COD, P = photo only, Pe = Photo with corresponding information obtained from COD and E = COD interaction information only (no photograph taken by observer)

COMMON NAME	SCIENTIFIC NAME	TOTAL	NECROPSY	PHOTO & EXTRACT (Pe), PHOTO ONLY (P) or COD EXTRACT (E)
Albatross (unidentified)		2		E
Black-backed gull	<i>Larus dominicanus</i>	1		P
Buller's albatross	<i>Thalassarche bulleri bulleri</i>	6	✓	Pe
Buller's and Pacific albatross	<i>Thalassarche bulleri</i>	1		E
Campbell albatross	<i>Thalassarche impavida</i>	1	✓	
Cape petrel (unidentified)	<i>Daption spp.</i>	1		E
Chatham albatross	<i>Thalassarche eremita</i>	2	✓	
Common diving petrel	<i>Pelecanoides urinatrix</i>	4		E
Fairy prion	<i>Pachyptila turtur</i>	2	✓	Pe
Fiordland crested penguin	<i>Eudyptes pachyrhynchus</i>	1	✓	
Great albatross (unidentified)	<i>Diomedea spp.</i>	1		Pe
Grey petrel	<i>Procellaria cinerea</i>	9	✓	Pe
Grey-backed storm petrel	<i>Garrodia nereis</i>	4		Pe & E
New Zealand white-capped albatross	<i>Thalassarche steadi</i>	4	✓	Pe & E
Salvin's albatross	<i>Thalassarche salvini</i>	10	✓	Pe & E
Storm petrel (unidentified)		1		E
Westland petrel	<i>Procellaria westlandica</i>	3	✓	Pe

Details relating to each specimen are available on request from the Manager, Conservation Services Programme, DOC (email: [csp@doc.govt.nz](mailto: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 COD in an Excel spreadsheet. The photograph (or photographs), the information from the observers and any other information observed in the photograph was entered into an Access database.

Reported interactions by the observer (where images could not be taken due to crew releasing the bird, the bird disentangling itself before reaching the vessel, or a carcass falling off the line or warp and not being recovered, etc.) also have the associated information (such as vessel name, date of capture, time of capture, possible identification, etc.) provided from COD information in an Excel spreadsheet. All relevant information was entered into an Access database.

Individual seabirds (i.e. necropsy, photo or interaction birds) were allocated a unique necropsy number. If multiple photographs are received of an individual bird, the best image is used to match to the corresponding Access database entry, but all images are used to confirm species identification.

## **Results:**

### **NECROPSY BIRDS:**

A total of 21 seabirds (comprising of nine taxa) were returned from 16 vessels between 1 July 2018 and 30 September 2018 (Table 2).

Three species of seabirds returned to date make up 61.9% of the total captures: Buller's albatross *Thalassarche bulleri bulleri* ( $n = 5$ , 23.8%), grey petrel *Procellaria cinerea* ( $n = 5$ , 23.8%) and Salvin's albatross *Thalassarche salvini* ( $n = 3$ , 14.3%).

The remaining six taxa had captures ranging in number from one individual to three individuals (Table 2).

No banded birds were recorded during this period. Banded specimens provide valuable longevity, survival and at-sea distribution data. No specimens carried PTT tags.

Over three-quarters of all birds returned were males ( $n = 16$ , 76.2%). However, the Fiordland crested penguin and Salvin's albatross were either all females or dominated by females (Table 2).

The majority of Buller's albatross, Campbell albatross, Chatham albatross, fairy prion, grey petrel, New Zealand white-capped albatross and Westland petrel returned to date were male (Table 2).

All of the birds returned were adults ( $n = 21$ , 100%) and 57.1% of all the adult birds were in breeding condition (Table 2).

Fat scores of 2 and 3 were most often recorded in the birds returned between 1 July 2018 and 30 September 2018 ( $n = 14$ , 66.6%), with 85.7% of birds having fat scores of 3 or less (Table 7).

Only 3 birds (14.3%) had a fat score higher than 3 (Table 7).

There were no birds that could not have their fat scores determined due to damage (Table 7).

**Table 2** Species and numbers of seabirds killed and returned from observed fishing vessels between 1 July 2018 and 30 September 2018, 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	3	2		3	1						5	23.8
Campbell albatross	1			1							1	4.8
Chatham albatross	2			2	2						2	9.5
Fairy prion	1			1	1						1	4.8
Fiordland crested penguin		1		1	1						1	4.8
Grey petrel	5			5	3	1					5	23.8
NZ white-capped albatross	2			2							2	9.5
Salvin's albatross	1	2		3	3						3	14.3
Westland petrel	1			1	1						1	4.8
<b>TOTAL</b>	<b>16</b>	<b>5</b>		<b>21</b>	<b>12</b>	<b>1</b>					<b>21</b>	
<b>% TOTAL</b>	<b>76.2</b>	<b>23.8</b>		<b>100</b>	<b>57.1</b>	<b>4.8</b>						

**Table 3** Stomach contents of seabirds killed and returned on fishing vessels between 1 July 2018 and 30 September 2018.Note: Birds can have multiple items in the stomachs resulting in higher content figures than the total number of seabirds killed and returned ( $n = 21$ ).

SPECIES	EMPTY	MISSING	BAIT	OFFAL (OR DISCARDS)	NATURAL	BARNACLES OR SEAWEED	PLASTIC	PROVENTRICULAR OIL	WORMS
Buller's albatross				5	2			1	1
Campbell albatross				1					
Chatham albatross			2		1				
Fairy prion								1	
Fiordland crested penguin	1								
Grey petrel	1			3	1			3	
NZ white-capped albatross	2								
Salvin's albatross	2				1	2			
Westland petrel								1	
<b>TOTAL</b>	<b>6</b>	<b>0</b>	<b>2</b>	<b>9</b>	<b>5</b>	<b>2</b>	<b>0</b>	<b>6</b>	<b>1</b>
<b>% TOTAL</b>	<b>28.6</b>		<b>9.5</b>	<b>42.9</b>	<b>23.8</b>	<b>9.5</b>		<b>28.6</b>	<b>4.8</b>

**Table 4** Gizzard contents of seabirds killed and returned on fishing vessels between 1 July 2018 and 30 September 2018.Note: Birds can have multiple items in the gizzard resulting in higher content figures than the total number of seabirds killed and returned ( $n = 21$ ).

SPECIES	EMPTY	MISSING	SQUID BEAKS	OTOLITHS	EYEBALLS	BONES OR SKIN	PLASTIC	WORMS	STONES, BARNACLES, FEATHERS, SEAWEED
Buller's albatross			3	1	1	3			2
Campbell albatross	1								
Chatham albatross			1	1		2		1	
Fairy prion			1						
Fiordland crested penguin	1								
Grey petrel			5	2		4		4	1
NZ white-capped albatross				2	2	1			
Salvin's albatross	1		1	1	1	1			
Westland petrel	1								
<b>TOTAL</b>	<b>4</b>	<b>0</b>	<b>11</b>	<b>7</b>	<b>4</b>	<b>11</b>	<b>0</b>	<b>5</b>	<b>3</b>
<b>% TOTAL</b>	<b>19.0</b>		<b>52.4</b>	<b>33.3</b>	<b>19.0</b>	<b>52.4</b>		<b>23.8</b>	<b>14.3</b>

**Table 5** Number of seabirds of each species killed and returned from observed fishing vessels between 1 July 2018 and 30 September 2018, by fisheries type and location of capture.

Species	Bottom/Midwater Trawl						Setnet	Longline		Total
	Net	Cod-end	Lengthener	Other	Warp	Deck strike		Hook	Deck strike	
Buller's albatross	2				2			1		5
Campbell albatross						1				1
Chatham albatross								2		2
Fairy prion		1								1
Fiordland crested penguin							1			1
Grey petrel	4							1		5
NZ white-capped albatross	1				1					2
Salvin's albatross	1			1	1					3
Westland petrel	1									1
<b>Total</b>	<b>9</b>	<b>1</b>	<b>0</b>	<b>1</b>	<b>4</b>	<b>1</b>	<b>1</b>	<b>4</b>	<b>0</b>	<b>21</b>
<b>% Total</b>	<b>42.9</b>	<b>4.8</b>		<b>0</b>	<b>19.0</b>	<b>4.8</b>	<b>4.8</b>	<b>19.0</b>		
<b>TOTAL</b>	<b>16</b>						<b>1</b>	<b>4</b>		
<b>% TOTAL</b>	<b>76.2</b>						<b>4.8</b>	<b>19.0</b>		

**Table 6** Number of seabirds killed and returned from observed fishing vessels between 1 July 2017 and 30 September 2018, by injury.Note: Birds can have multiple injuries resulting in higher figures than the total number of seabirds killed and returned ( $n = 21$ ).

Species	No injuries	Hook						Broken bones, etc.	Lacerations and/or severed body parts	Crushed	Greased	Liced	Waterlogged
		Body	Wing	Bill	Throat or Swallowed	Foot	Unknown <sup>1</sup>						
Buller's albatross	1				1			2	2	2	1		2
Campbell albatross	1												
Chatham albatross				2					1	1			1
Fairy prion	1												1
Fiordland crested penguin	1												1
Grey petrel								5	1				1
NZ white-capped albatross									2	1	1		2
Salvin's albatross								3	2				2
Westland petrel	1												1
<b>Total</b>	<b>5</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>10</b>	<b>8</b>	<b>4</b>	<b>2</b>	<b>0</b>	<b>11</b>
<b>% Total</b>	<b>23.8</b>			<b>9.5</b>	<b>4.8</b>			<b>47.6</b>	<b>38.1</b>	<b>19.0</b>	<b>9.5</b>		<b>52.4</b>

<sup>1</sup> An unknown hook location relates to a seabird caught and killed on a longline vessel but with no apparent hook injury anywhere on the body. No additional capture information was provided by the observer. These seabirds may have been tangled in the line rather than hooked.



**Table 7** Comparison of fat scores in the returned birds between 1 July 2018 and 30 September 2018 (1= no fat to 5 = extremely fat, U = unknown).

SPECIES	FAT SCORE						MEAN ( $\pm$ SE)
	1	2	3	4	5	U	
Buller's albatross	2	2	1				1.8 $\pm$ 0.4
Campbell albatross	1						1.0 $\pm$ 0.0
Chatham albatross		1			1		3.5 $\pm$ 1.5
Fairy prion			1				3.0 $\pm$ 0.0
Fiordland crested penguin			1				3.0 $\pm$ 0.0
Grey petrel	1	3		1			2.2 $\pm$ 0.5
NZ white-capped albatross		1	1				2.5 $\pm$ 0.5
Salvin's albatross			2	1			3.3 $\pm$ 0.3
Westland petrel			1				3.0 $\pm$ 0.0
<b>TOTAL</b>	<b>4</b>	<b>7</b>	<b>7</b>	<b>2</b>	<b>1</b>	<b>0</b>	<b>2.5 <math>\pm</math> 0.2</b>
<b>% TOTAL</b>	<b>19.0%</b>	<b>33.3%</b>	<b>33.3%</b>	<b>9.5%</b>	<b>4.8%</b>		

The mean fat score was  $2.5 \pm 0.2$  (Table 7). Using this preliminary data, it appears that the mean fat scores will be higher compared to the last fishing year ( $1.8 \pm 0.1$ ; Bell & Bell, 2018) and many other recent fishing years (ranging between  $1.3 \pm 0.1$  to  $2.1 \pm 0.1$ ; Thompson, 2009; Thompson, 2010a; Thompson, 2010b; Bell, 2011; Bell, 2012; Bell, 2013; Bell, 2014; Bell & Mischler 2015; Bell & Bell, 2016; Bell & Bell, 2017), 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.

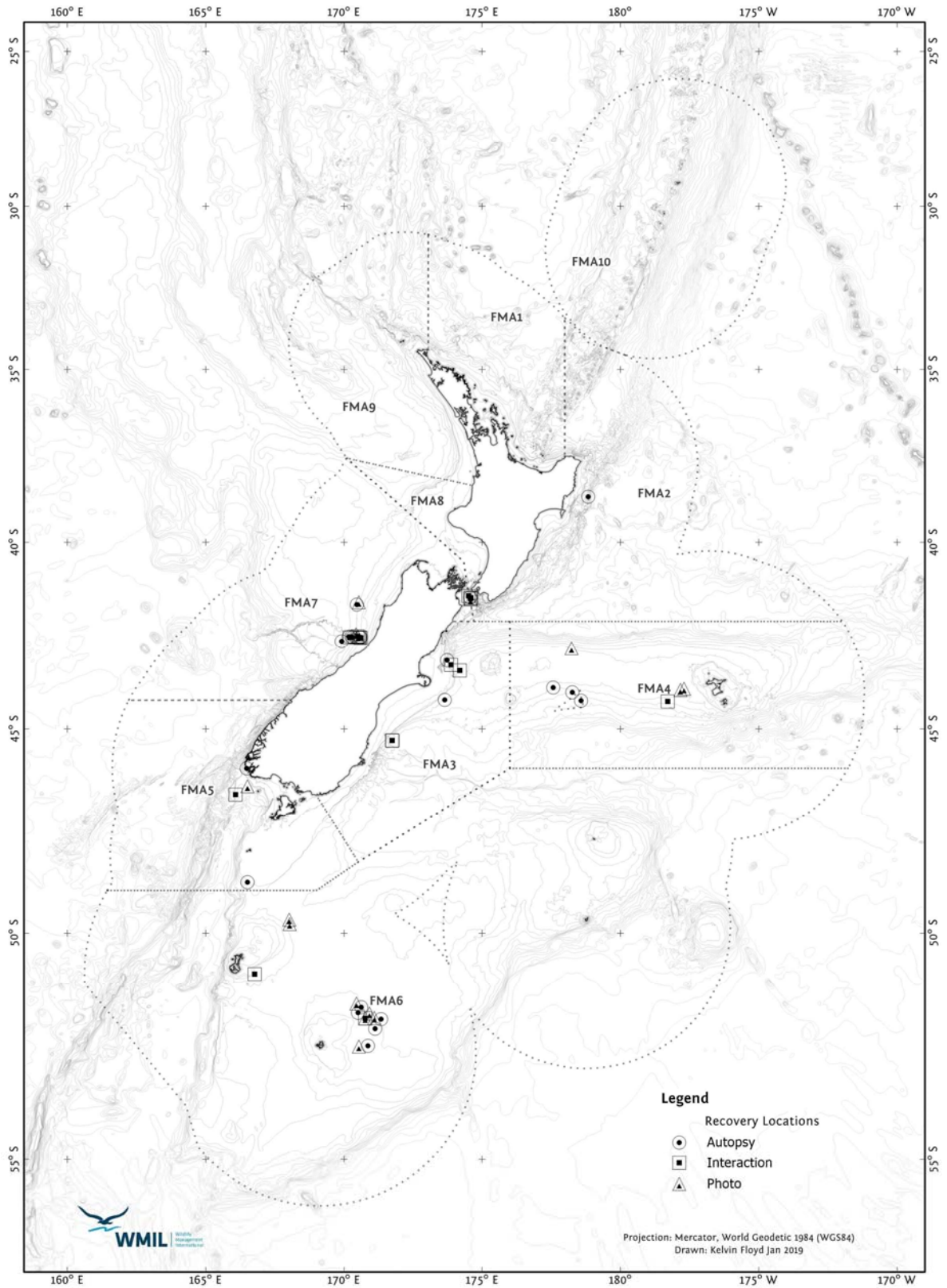
Stomach contents have been identified into main groups following a similar method to Thompson (2009; 2010a; 2010b) and are shown in Table 3. Over 50% of the returned birds had bait, offal or discards in their stomachs ( $n = 11$ ) and another six (28.6%) had empty stomachs (Table 3). One Buller's albatross, one fairy prion, three grey petrels and a Westland petrel had proventricular oil in the stomach which is evidence of feeding a chick (Table 3). Nearly one-quarter of the birds ( $n = 5$ , 23.8%) had natural food items in their stomachs. Barnacles and/or seaweed was recorded in two birds (9.5%). No birds had plastic in their stomachs.

Most gizzard contents were natural food items (i.e. squid beaks, bones, eyeballs and otoliths), but 19% of returned birds ( $n = 4$ ) had empty gizzards (Table 4). Five birds (Chatham albatross and grey petrels) had worms in their gizzards (Table 4). No birds had plastic in their gizzards (Table 4). Three birds also had stones, barnacles, feathers and/or seaweed in their gizzards (Table 4).

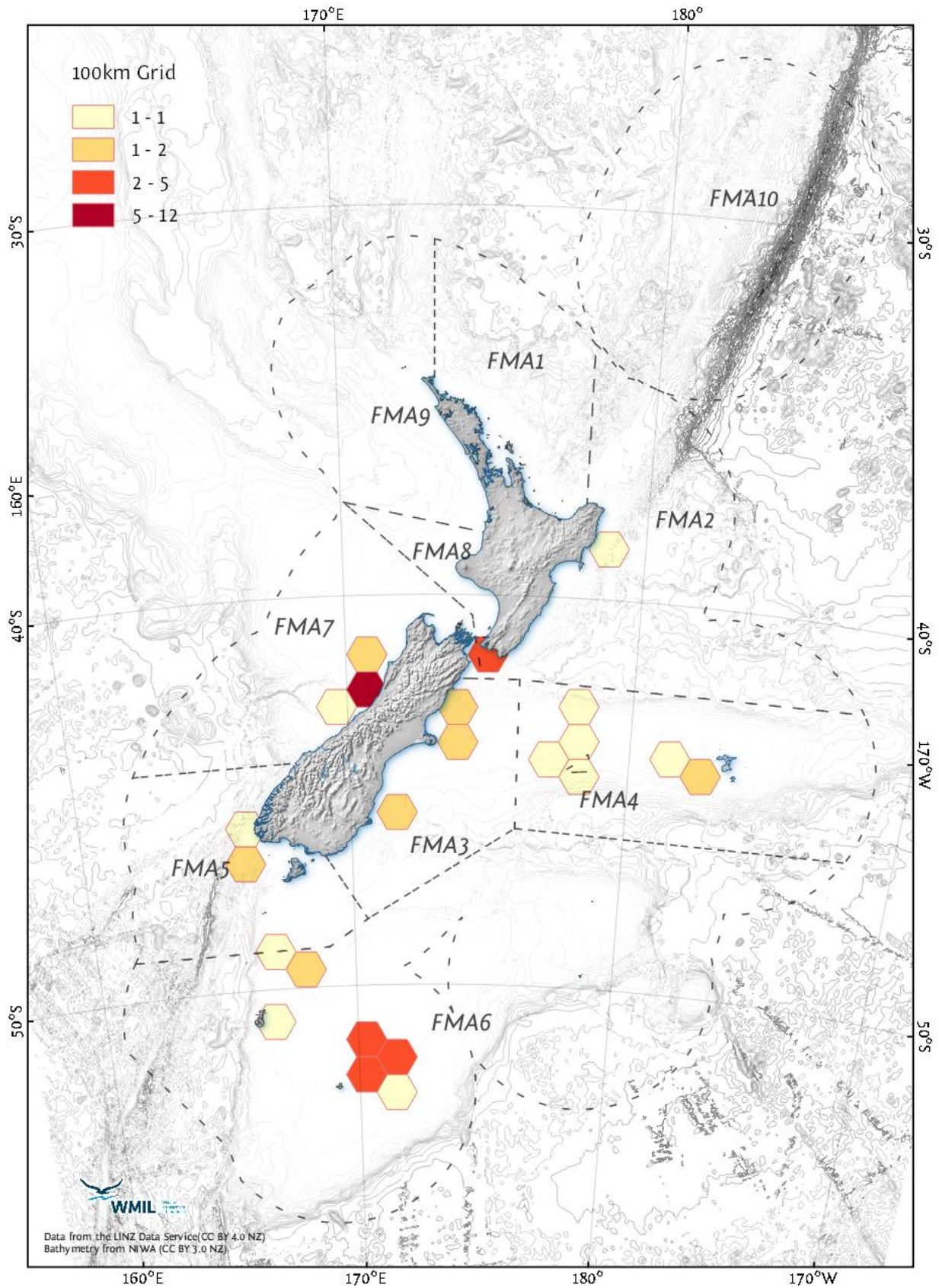
Trawl, longline and setnet vessels have returned birds to date and preliminary data are shown in Table 5. There were 16 birds returned from trawl vessels (76.2%; with nine caught in the net, one in the cod-end, one in other areas, four on the warp and one recorded as deck strike), one from setnet vessels (4.8%) and four from longline vessels (19.0%; with three hooked in the bill or swallowed the hook and one with unknown hook position (likely to be in the bill)) (Tables 5 and 6). 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 DOC CSP and MPI.

Most of the returned birds to date had a range of injuries from 'no obvious injury' to 'lacerated' (Table 6). Eight birds (38.1%) showed injuries suggesting entanglement and crush injuries from the trawl warp and blocks. Two birds (9.5%) had grease covering part or all of the body. Five birds (23.8%) had no obvious injuries, but obviously drowned in the trawl net or on a longline hook as all were waterlogged.

**Figure 1** Catch locations of all seabirds killed and returned for necropsy, photographed and/or reported as interactions in New Zealand fisheries between 1 July 2018 and 30 September 2018.  
 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** Grouped catch locations of all seabirds killed and returned for necropsy, photographed and/or reported as interactions in New Zealand fisheries between 1 July 2018 and 30 September 2018.



Over half of the birds (52.4%) were waterlogged and had drowned in the trawl nets or when attached to hooks. Three birds still had hooks present (one in the throat and two in the bill). More detailed reporting of injuries and cause of death will be reported in the end of year report.

Over three-quarters ( $n = 18$ , 85.7%) of the returned seabirds between 1 July 2018 and 30 September 2018 were identified correctly by the observers. There were two (9.5%) identified to the correct group and one that was identified incorrectly (a grey petrel).

The seabirds caught and killed and returned to date were caught in a range of Fishing Management Areas (FMA 2, 3, 4, 5, 6 and 7) and general positions are shown in Figures 1 and 2.

#### **PHOTOGRAPH AND INTERACTION BIRDS:**

Examination of COD and images provided by Government observers gave a total of 32 seabirds that were reported captured ( $n = 16$ ) or photographed ( $n = 16$ ) as seabird interactions with 16 fishing vessels (and may include some non-capture interactions such as deck strike) (Table 8).

Of these 32 reported interactions, 16 seabirds were photographed by observers for the period 1 July 2018 to 30 September 2018 (Table 8).

**Table 8** Number of seabird interactions photographed or recorded on fishing vessels between 1 July 2018 and 30 September 2018.

	Dead	Alive	Total
Photographed and listed in MPI COD extract	9	6	<b>15</b>
Photographed but not listed in MPI COD extract to date	1	0	<b>1</b>
Photographed and listed in MPI COD extract, but image not received to date	0	0	<b>0</b>
Listed as an interaction only in MPI COD extract, but not photographed	0	16	<b>16</b>
<b>Total</b>	<b>10</b>	<b>22</b>	<b>32</b>
<b>% Total</b>	<b>31.25%</b>	<b>68.75%</b>	

Birds that were either photographed or recorded as an interaction were from 16 different vessels. Longline vessels had three interactions (9.4%) whereas trawl vessels accounted for 29 birds (90.6%).

Of the 16 birds that are listed in the COD extract and with photographs, eight (50%) were identified correctly by the observers, three (18.8%) were identified to the correct group, one (6.3%) did not have the identification on the label and four (25%) were identified incorrectly (a fairy prion, two grey petrels and a Westland petrel).

The images received of seabirds in this period were very clear and the birds were easily identifiable. However, the quality of the images continues to vary widely from year to year; particularly for live captures. There have been a number of issues including only one photograph for dead seabirds, not all key features being 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).

Half of the seabirds recorded as having an interaction with the vessel had no images taken and as a result, identification of these birds could not be confirmed. It is important that more photographs are taken of each seabird, particularly dead birds. If dead birds are photographed, images of head, bill, feet, wings (upper and lower) and whole-body shots should be 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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