INT2022-02: IDENTIFICATION OF SEABIRDS CAPTURED IN NEW ZEALAND FISHERIES:

1 July 2023 to 30 June 2024

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Bell, E.A. and Mclaren, D.

Wildlife Management International Ltd
PO Box 607
Blenheim 7240
New Zealand
www.wmil.co.nz

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Authors:	Elizabeth Bell, Managing Director
	Deleece Mclaren, Ecologist
Reviewed by:	Samantha Ray, Operations Manager Dan Burgin, Senior Ecologist

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Version History:

Version	Authors	Date	Reason for edition
1	Bell & Mclaren	22 August 2025	First iteration.
FINAL	Bell & Mclaren	28 November 2025	Final iteration following client edits.

Cover image: New Zealand Government Observer image of a toroa/New Zealand white-capped albatross (*Thalassarche cauta steadi)* interaction on commercial fishing vessel, 2024. Credit: NZ Government Observer Scheme.

INT2022-02: IDENTIFICATION OF SEABIRDS CAPTURED IN NEW ZEALAND FISHERIES, 1 July 2023 TO 30 June 2024

ABSTRACT

The New Zealand Exclusive Economic Zone (EEZ) supports a diverse range of seabird species. Much of the commercial fishing activity in the region overlaps with seabird foraging ranges. The accurate identification of bycatch seabirds interacting with New Zealand fisheries is vital for determining the impact of fisheries on these seabird populations.

Between 1 July 2023 and 30 June 2024, a total of 407 seabirds were reported as incidental interactions with commercial fishing vessels by on-board New Zealand Government Observers from 104 observed trips on 30 vessels. These 407 seabirds comprised 23 identifiable species with 13 only identified to family or genus level.

There were 139 seabirds (34%) classed as live interactions (birds released alive) and 268 (66%) resulted in the death of the seabird. Of the 139 alive events, 124 (89%) were interaction-only (i.e., no photograph taken) and only 15 (11%) were photographed interactions. Of the 268 deceased seabirds, 27 (10%) were interaction-only (i.e., no photograph taken), 101 (38%) were photographed interactions and the remaining 140 (52%) were returned for necropsy.

Of the 140 individual seabirds killed by incidental bycatch and returned for necropsy between 1 July 2023 and 30 June 2024, most were returned in the first six months of 2024 (n=88, 63%), with the highest captures during February 2024 (n=27, 19%) and March 2024 (n=22, 16%).

The five most prevalent seabird species returned for necropsy were toroa/Salvin's albatross (*Thalassarche salvini)* (n=36, 26%), tītī/sooty shearwater (*Ardenna grisea)* (n=31, 22%), karetai kauae mā/white-chinned petrel (*Procellaria aequinoctialis)* (n=22, 16%), toroa/New Zealand white-capped albatross (*Thalassarche cauta steadi*) (n=17, 12%), and toroa/southern Buller's albatross (*Thalassarche bulleri bulleri)* (n=15, 11%).

Of the 140 necropsy birds, 131 (94%) were adults, with mostly males (n=77, 55%) returned. The number of breeding birds were 84 individuals (60%), and seven (5%) birds were confirmed as non-breeding.

The birds returned for necropsy were killed from a variety of fishing methods, such as trawl (n=94, 67%), longline (n=30, 21%), set net (n=5, 4%) with the remaining 11 birds (8%) still to have their fishing method confirmed. This resulted in 221 injuries recorded with most predominant cause identified as waterlogged (n=57, 41% of all birds returned) of which 53% were represented as albatross. Broken wings were frequently observed (n=32, 23% of all birds returned) and present in 74 (53%) of all albatrosses and 66 (47%) smaller seabird (i.e., petrel, shearwater, prion, etc.) captures. No visible injuries were present in 33 (24%) of returned birds, of which 52% were albatross and 49% were smaller seabirds.

In addition to the seabirds that were returned for necropsy, examination of data, photographs or videos from the Ministry for Primary Industries (MPI) Central Observer Database (COD) and images provided by Government Observers identified a further 267 seabirds reported as seabird-vessel interactions or photographed (as dead or alive captures) aboard 30 fishing vessels. Of these interactions, 151 (57%) had no associated photographs taken (i.e., interaction-only) and most (n=126, 83%) were released alive or left the vessel unaided. The remaining 116 (43%) seabird interactions were photographed and had corresponding entries in the COD extract.

Keywords: commercial fishing, seabirds, necropsy, photo-identification, interaction-only, incidental mortality, long line, trawl, set-net, purse seine.

1. INTRODUCTION

New Zealand waters support a large and diverse range of seabird species. However, much of the commercial fishing activity within the New Zealand Exclusive Economic Zone (EEZ) overlaps with the ranges of these seabirds (Robertson et al. 2003), and seabirds are regularly interacting with fishing vessels and gear. Therefore, the accurate identification of seabirds interacting with commercial fisheries operations is vital for determining the impact of fisheries on these seabird populations.

New Zealand Government Observers have been placed on a subset of inshore and deep-water commercial vessels since 1989, partly to investigate interactions between fisheries and seabird species. However, observers are not always able to accurately identify seabirds to species level at sea. Consequently, a necropsy and morphometrics programme has been in place since 1996 to accurately determine the taxon (as well as age, sex, diet, and provenance) of specimens recovered as deceased by observers. Observers present on fishing trips within New Zealand's EEZ are required to return all bycatch seabirds recovered during fishing operations for necropsy. Additional information such as vessel name, location of bycatch (latitude and longitude), and date of bycatch is also recorded. Specific bycatch locations and vessel names have not been provided in this report on the grounds of commercial sensitivity. All necropsies were performed for the Department of Conservation (DOC) as part of Conservation Services Programme (CSP) project INT2022-02.

Due to historically uncertain observer identification of live-released seabirds not confirmed by an expert, a photography programme was developed to support expert verification (Bell & Larcombe 2023). This report summarises seabird species captured in, or interacting with, New Zealand commercial fisheries between1 July 2023 and 30 June 2024, based on necropsy specimens, imagery, and Ministry for Primary Industries (MPI) Central Observer Database (COD) entries.

1.1 Objectives

The overall objectives of the observer programme are to determine which protected species are captured in New Zealand commercial fisheries vessels and the mode of interaction.

The specific objectives of this project are to:

1. Determine the taxon, sex and, where possible, age class, morphometrics, and provenance of seabirds killed in New Zealand fisheries (for returned dead specimens).
2. Describe the injuries, body condition, and stomach contents and, where possible, the likely cause of mortality (for returned deceased specimens).
3. Report any changes in the protocol used for necropsy of seabirds (for returned deceased specimens).
4. Determine the species and, where possible, sex, age-class, and provenance of bycatch seabirds in New Zealand fisheries through examination of photographs (for live interactions or deceased specimens discarded at sea).

2. METHODS

Common English, te reo Māori, and scientific names of all seabird species recorded by observers as interacting with fishing vessels, whether caught, photographed, or recorded in the COD extract, are provided in **Table 1**. Nomenclature generally follows Marchant & Higgins (1990) and the Checklist of Birds of New Zealand (Checklist Committee 2024), but for the albatrosses for which current taxonomy and nomenclature is in a state of flux, it is based on a combination of Nunn et al. (1996) and Robertson & Nunn (1998) and is consistent with the taxonomy recognised by the Agreement on the Conservation of Albatrosses & Petrels (ACAP 2010).

Table 1: *Common English, te reo Māori, and scientific names of seabirds recorded by observers as interacting with fishing vessels between 1 July 2023 and 30 June 2024.*

Common English name	Te reo Māori name	*Scientific name*
Albatross (unidentified)	Toroa	
Black (Parkinson's) petrel	Tākoketai or tāiko	*Procellaria parkinsoni*
(Southern) Buller's albatross	Toroa	*Thalassarche bulleri bulleri*
Buller's and Pacific albatross (unidentified)	Toroa	*Thalassarche bulleri* spp.
Campbell (black-browed) albatross	Toroa	*Thalassarche impavida*
Cape petrel	Karetai hurukoko	*Daption capense*
Cape petrels		*Daption spp.*
Chatham Island albatross	Toroa	*Thalassarche eremita*
Common diving petrel	Kuaka	*Pelecanoides urinatrix*
Fairy prion	Tītī wainui	*Pachyptila turtur*
Flesh-footed shearwater	Toanui	*Ardenna carneipes*
Great albatross (unidentified)	Toroa	*Diomedea spp.*
Grey petrel	Kuia	*Procellaria cinerea*
Grey-backed storm petrel	Reoreo	*Garrodia nereis*
Little black shag	Kawau tūī	*Phalacrocorax sulcirostris*
Mid-sized petrel & shearwater (unidentified)		
New Zealand white-capped albatross	Toroa	*Thalassarche cauta steadi*
Northern giant petrel	Pāngurunguru	*Macronectes halli*
Otago shag	Matapo	*Leucocarbo chalconotus*
Petrel (unidentified)		*Procellariidae*
Petrels, prions, and shearwaters (unidentified)		
Prion (unidentified)		*Pachyptila spp.*
Procellaria petrel (unidentified)		*Procellaria spp.*
Pterodroma petrel (unidentified)		*Pterodroma spp.*
Royal albatross (unidentified)	Toroa	*Diomedea spp.*
Salvin's albatross	Toroa	*Thalassarche salvini*
Shag (unidentified)		
Shearwater (unidentified)		*Ardenna spp.*
Small albatross (unidentified)		*Thalassarche spp.*
Sooty shearwater	Tītī	*Ardenna griseus*
Southern royal albatross	Toroa	*Diomedea epomophora*
Storm petrel (unidentified)		*Hydrobates spp.*
Westland petrel	Tāiko	*Procellaria westlandica*
White-chinned petrel	Karetai kauae mā	*Procellaria aequinoctialis*
White-faced storm petrel	Takahikare	*Pelagodroma marina*
Yellow-eyed penguin	Hoiho	*Megadyptes antipodes*

2.1 Necropsy

The necropsy methods followed those described by Bartle (2000) and used in necropsies in subsequent fishing years (Robertson 2000, Robertson & Bell 2002a, Robertson & Bell 2002b, Robertson et al. 2003, Robertson et al. 2004, CSP 2008, Thompson 2009, Thompson 2010a, Thompson 2010b, Bell 2011, Bell 2012, Bell 2013, Bell & Mischler 2014, Bell & Mischler 2015, Bell & Bell 2016, Bell & Bell 2017, Bell & Bell 2018, Bell & Bell 2019, Bell & Larcombe 2023, Bell & McLaren 2024).

2.1.1 Individual specimens

Each specimen was allocated a unique necropsy number and photographed. During the necropsy, all birds were sexed by internal examination of reproductive organs, except for birds where that was not possible due to damage from fishing gear, machinery, or sea lice. All injuries were recorded, and the information below, together with observer comments on the necropsy label, was used to determine the likely cause of death.

In some aspects of analysis, groupings are made into different size classes:

- *Albatross* – all small, medium, and great albatross and giant petrel species (e.g., Buller's albatross, Pacific albatross, Campbell albatross, southern royal albatross, Salvin's albatross, New Zealand white-capped albatross, northern giant petrel, etc.).
- *Smaller seabirds* – all petrel, shearwater, prion, storm petrel, gull, shag, and penguin species (e.g., black petrel, cape petrel, common diving petrel, fairy prion, flesh-footed shearwater, white-chinned petrel, Otago shag, yellow-eyed penguin, etc.).

2.1.2 Moult and morphology

Feather moult and the condition of the brood patch were recorded. Birds were characterised by age class (adult, sub-adult, immature, juvenile) and adults were assigned a breeding status (breeding adult or non-breeding adult) where possible. Categorisation was based on a combination of plumage, morphological (such as bill size and colour), gonadal, and brood patch characteristics.

- *Adult* – adult morphology (e.g., body size, bill size, bill colour, plumage colour). Active breeding could not be confirmed.
- *Sub-adult (pre-breeder)* – non-adult or near-adult plumage and/or morphology (e.g., bill colour). No gonadal evidence that they had obtained breeding condition.
- *Immature* – non-adult plumage, plumage indicates that individual is 1+ years from breeding age.
- *Juvenile* - juvenile plumage and/or morphology (e.g., bill colour, bill size, leg, and foot colour).
- *Breeding adult* - considered to be actively breeding at the time of capture (e.g., bare brood patch, swollen ovaries, or testes).
- *Non-breeding adult* - identified by feather moult (e.g., downy brood patch, body moult, wing moult) and gonadal evidence (i.e., regressed, or small ovaries and testes).

2.1.3 Body condition

Body condition was determined by assigning a fat score based on the relative amount of subcutaneous fat and fat on and around organs: '1' = no fat, to '5' = extremely fat (where internal examination became difficult). In instances where the birds had been damaged, the fat score was listed as unknown.

2.1.4 Stomach and gizzard contents

Stomach and gizzard contents were identified to broad dietary groupings (i.e., squid, fish, crustaceans, etc.) and relative quantities gauged from visual inspection. In addition, any bait material, offal or discarded material, plastic, stones, algae, and goose barnacle plates were recorded. Photographs were taken of plastic or other man-made debris in the gizzard or stomach and samples taken.

2.1.5 Data

Each specimen along with the information on the observer specimen tag and all other information collected during necropsy was entered into a Microsoft Access database. Details relating to each specimen are available on request from the Manager, Conservation Services Programme, and DOC (email: csp@doc.govt.nz).

2.2 Observer photo-identification of seabirds

Each seabird was assigned a unique ID, and associated data images, observer input, and COD extract details were stored in a Microsoft Access database. Photos analysed were from cases identified only by observers, including birds released alive, unreturned mortalities, and images lacking COD-linked data. Each bird was separated as follows:

- *Photo (photo and extract)*: seabird photographed/videoed by observer, image/footage provided, and interaction recorded in COD.
- *Photo (image not received to date)*: seabird interaction record in the COD annotated as photographed/videoed by observer but not received to date.
- *Photo (not in extract to date)*: image/video of seabird received but interaction record not listed in COD to date.

Photographs were provided in electronic format with associated observer COD extracted information (vessel name, type of fishery, date of bycatch, time of capture, etc.) in an Excel spreadsheet.

Deceased specimens were photographed with a label identifying the trip number, station, and sample number, making it easy to correlate to the COD extract. However, photographs of live specimens often contained no information on station or sample number, making it difficult to match the specimen to the extract unless the time and date stamp on the camera had been set correctly.

All photographed seabirds were identified to the lowest possible taxonomic level. Various seabird reference books (i.e., such as Marchant & Higgins 1990, Bartle 2000, Shirihai 2002, Onley & Scofield 2007) were used to confirm identification when necessary.

Bill and head morphology enabled species-level identification for albatrosses and larger petrels, while smaller species required additional traits (e.g. foot colour, wing markings). If key features were obscured or images unclear, identification was made to the lowest possible taxonomic level. Age, sex, and provenance were assessed when possible.

2.3 Interaction only (non-photographed) seabirds

These specimens relate to reported interactions in the COD extract with no corresponding image, including non-capture interactions.

- *Interaction-only*: seabird-vessel interaction (i.e., alive, or deceased capture, warp, or deck strike, etc.) listed in COD, but no image taken by observer.

Each individual seabird was allocated a unique identification number. The information from the observers, and any other information listed in the COD extract were entered into a Microsoft Access database. For any interaction-only records, observer comments in the COD database were used to determine the likely cause of death or condition if released alive. Correct species identification as entered by the observer could not be verified as there was no image, video or returned specimen to confirm.

2.4 Statistical analyses

Statistical analyses were conducted using Microsoft Excel. Descriptive statistics are presented. Means are given as values ± standard error (SE). Figures and tables were produced using Microsoft Excel and QGIS.

3. RESULTS

3.1 Summary of all interactions

A total of 407 seabird interactions were recorded as with New Zealand commercial fishing vessels within the New Zealand EEZ between 1 July 2023 and 30 June 2024 (Table 2). These were categorised into 23 species and 16 family or genus level (**Table 2**).

All interactions had end status recorded, with 139 seabirds (34%) classed as alive and 268 seabirds (66%) as deceased. The end status was further split into the type of interaction involved (photo, interaction-only, or necropsy). Percentages of alive or deceased seabirds were recorded against each

type of vessel interaction and then by the overall total number of seabird interactions. All data is summarised in **Table 2**.

Table 2: *Number of seabirds interactions with commercial fishing vessels within the New Zealand Exclusive Economic Zone between 1 July 2023 and 30 June 2024, grouped by end status (alive/deceased). Records are classified as interaction-only (I) if no photograph was obtained, photographed interaction (P) if a photograph was obtained, and necropsy (N) if the whole specimen was retained for necropsy.*

Species	Alive			Deceased				Total
	I	P	Total	I	P	N	Total	
Albatross (unidentified)	2		2	1			1	**3**
Black (Parkinson's) petrel						1	1	**1**
Buller's albatross	5	3	8	1	16	15	32	**40**
Buller's and Pacific albatross	9		9					**9**
Campbell albatross						1	1	**1**
Cape petrel	1		1		1	1	2	**3**
Cape petrels	9		9	2			2	**11**
Chatham Island albatross						1	1	**1**
Common diving petrel	1		1			1	1	**2**
Fairy prion	1	2	3			1	1	**4**
Flesh-footed shearwater	2		2	1			1	**3**
Great albatross (unidentified)	1		1					**1**
Grey petrel				1			1	**1**
Grey-backed storm petrel		1	1					**1**
Little black shag	1		1					**1**
Mid-sized petrel & shearwater (unidentified)				1			1	**1**
New Zealand white-capped albatross	19	5	24		11	17	28	**52**
Northern giant petrel	1		1					**1**
Otago shag						3	3	**3**
Petrel (unidentified)	2		2					**2**
Petrels, prion, and shearwaters (unidentified)	8		8					**8**
Prion (unidentified)	6		6					**6**
Procellaria petrel (unidentified)	4		4	3			3	**7**
Pterodroma petrel (unidentified)	1		1					**1**
Royal albatross (unidentified)	4		4					**4**
Salvin's albatross	22	1	23	3	25	36	64	**87**
Shag (unidentified)	1		1					**1**
Shearwater (unidentified)	1		1					**1**
Small albatross (unidentified)	1		1	4			4	**5**
Sooty shearwater	19		19	4	35	31	70	**89**
Black-browed albatross						1	1	**1**
Southern royal albatross				1	1	3	5	**5**
Storm petrel (unidentified)	1		1	2			2	**3**
Westland petrel						4	4	**4**
White-chinned petrel	2	3	5	3	11	22	36	**41**
White-faced storm petrel					1	1	2	**2**
Yellow-eyed penguin						1	1	**1**
Total	**124**	**15**	**139**	**27**	**101**	**140**	**268**	**407**
For status category (%)	89.2	10.8		10.1	37.7	52.2		
Overall (%)			34.2				65.8	

3.1.1 Alive specimens

Of the 139 interactions classed as alive, interaction-only (non-photographed) records accounted for 124 seabirds (89%) whereas photographed interactions accounted for only 15 seabirds (11%).

3.1.2 Deceased specimens

Of the 268 deceased specimens, interaction-only (non-photographed) accounted for 27 seabirds (10%), photographed interactions accounted for 101 seabirds (38%), and those returned for necropsy accounted for 140 seabirds (52%).

3.2 Seabirds returned for necropsy

Of the 140 returned seabirds necropsied, between 1 July 2023 and 30 June 2024, the following sections outline the results for species prevalence, monthly distribution, sex compositions, ages class, and breeding status. All data is summarised in **Table 3**, **Figure 1**, **Figure 2**, and **Figure 3**.

3.2.1 Species prevalence in necropsied seabirds

The five most prevalent seabird species returned for necropsy are also summarised below (Table 3).

1. Toroa/Salvin's albatross (n=36, 26%)
2. Tītī/sooty shearwater (n=31, 22%)
3. Karetai kauae mā/white-chinned petrel (n=22, 16%)
4. Toroa/New Zealand white-capped albatross (n=17, 12%)
5. Toroa/southern Buller's albatross (n=15, 11%)

Combined, these five species accounted for 86% of all seabirds returned for necropsy.

3.2.2 Banded deceased seabirds

No banded seabirds were detected during the necropsy sessions.

3.2.3 Monthly distribution of deceased seabirds

The monthly distribution of returned specimens was not evenly spread across the period analysed (**Table 3**); the highest number returned in February 2024 (n=27, 19%) and March 2024 (n=22, 16%).

3.2.4 Sex composition of deceased seabirds

Males represented most birds returned for necropsy (n=77, 55%) compared to females (n=56, 40%). Severn seabirds (7%) could not have sex confirmed due to either incomplete carcasses (i.e., heavily damaged by vessel/gear interaction), or the bird had been heavily liced and reproductive organs had been eaten. This data is summarised in **Figure 1**.

3.2.5 Age distribution of deceased seabirds

Most seabirds returned for necropsy were adults (n = 131, 94%). All other age categories were much lower in comparison with less than 10 specimens returned (**Figure 2**).

3.2.6 Breeding status of deceased seabirds

The breeding status of the adults were analysed; sub-adults were not part of the breeding status analysis. Of the 131 a total of breeding birds equated to 84 (64%), seven (5%) non-breeding, two (2%) pre-breeders, and unknown accounted for 38 (29%) (**Figure 3**). Unknown sexes were primarily associated with specimens which had been categorised as an adult, as no distinction could be made between breeding and non-breeding, alternative the specimen could not be determined as the carcass was heavily liced or in a decomposed state upon inspection.

Table 3: *Number of seabirds of each species returned for necropsy from observed fishing vessels between 1 July 2023 and 30 June 2024, by month of capture.*

Species	2023						2024						Total	Total necropsy returned seabirds (%)
	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun		
Black (Parkinson's) petrel								1					**1**	0.7
Buller's albatross	4	3	1				2			1	4		**15**	10.7
Campbell albatross		1	1										**2**	1.4
Cape petrel			1										**1**	0.7
Chatham Island albatross			1										**1**	0.7
Common diving petrel												1	**1**	0.7
Fairy prion								1					**1**	0.7
New Zealand white-capped albatross	4	5						3		2	2	1	**17**	12.1
Otago shag				2			1						**3**	2.1
Salvin's albatross	2		5	1	3	4	1	9	9	2			**36**	25.7
Sooty shearwater		1		8	2		1	7	7	3	1	1	**31**	22.1
Southern royal albatross	1								1			1	**3**	2.1
Westland petrel	1	2			1								**4**	2.9
White-chinned petrel				2		1	2	5	4	5	2	1	**22**	15.7
White-faced storm petrel								1					**1**	0.7
Yellow-eyed penguin									1				**1**	0.7
Total	**12**	**12**	**9**	**13**	**6**	**5**	**7**	**27**	**22**	**13**	**9**	**5**	**140**	
Monthly Total (%)	8.6	8.6	6.4	9.3	4.3	3.6	5.0	19.3	15.7	9.3	6.4	3.6		
Half-yearly total	**52**						**88**						**140**	
Half-yearly total (%)	37.1						62.9							

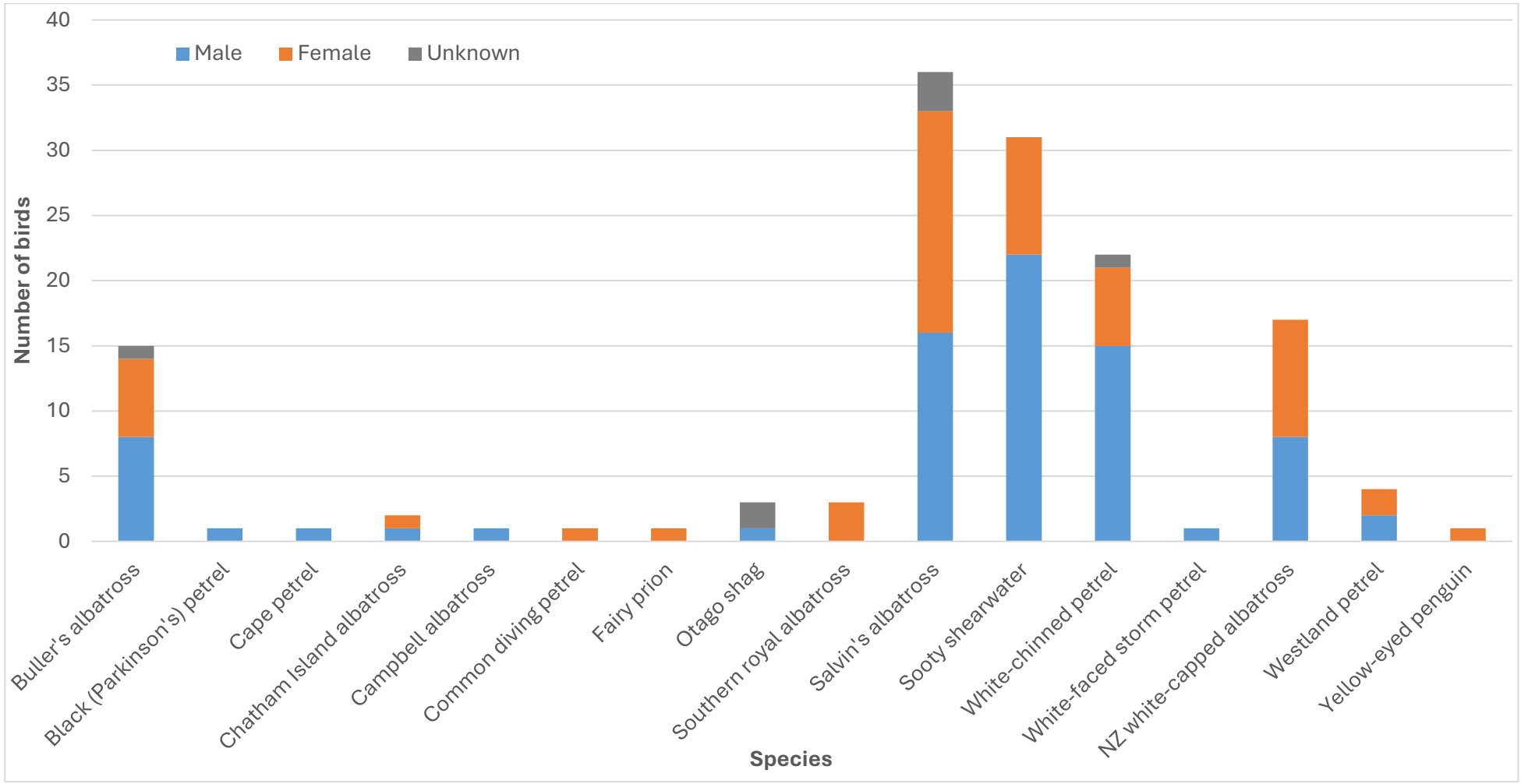

Figure 1: *Number of deceased seabirds (n=140) returned from observed fishing vessels between 1 July 2023 and 30 June 2024, by species and sex (male (n=77, 55%), female (n=56, 40%), and unknown (n=7, 5%)).*

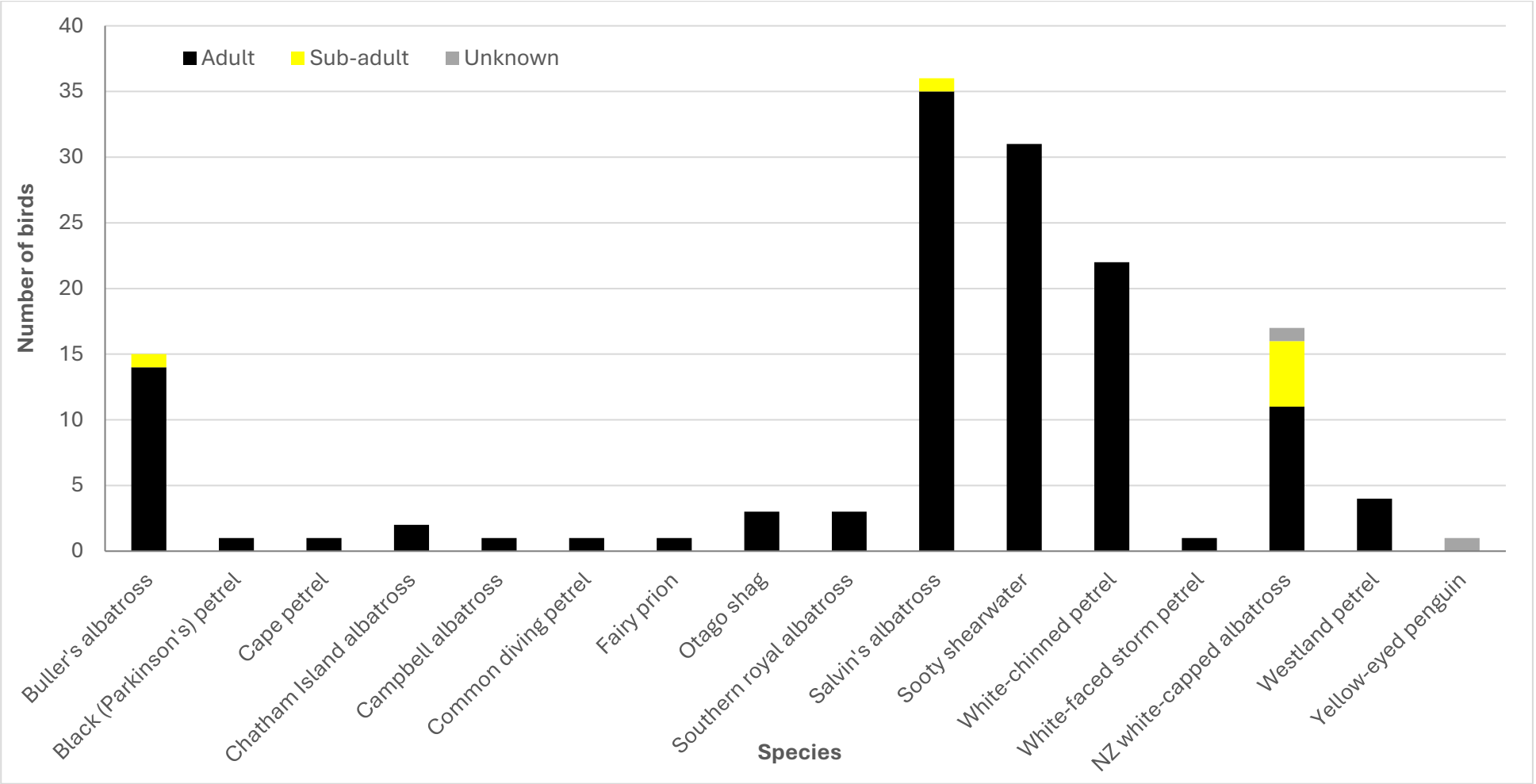

Figure 2: *Numbers of deceased seabirds (n=140) returned from observed fishing vessels between 1 July 2023 and 30 June 2024, by species and age class (adult (n=131, 93.6%), sub-adult (n=7, 5%), and unknown (n=2, 1.4%)).*

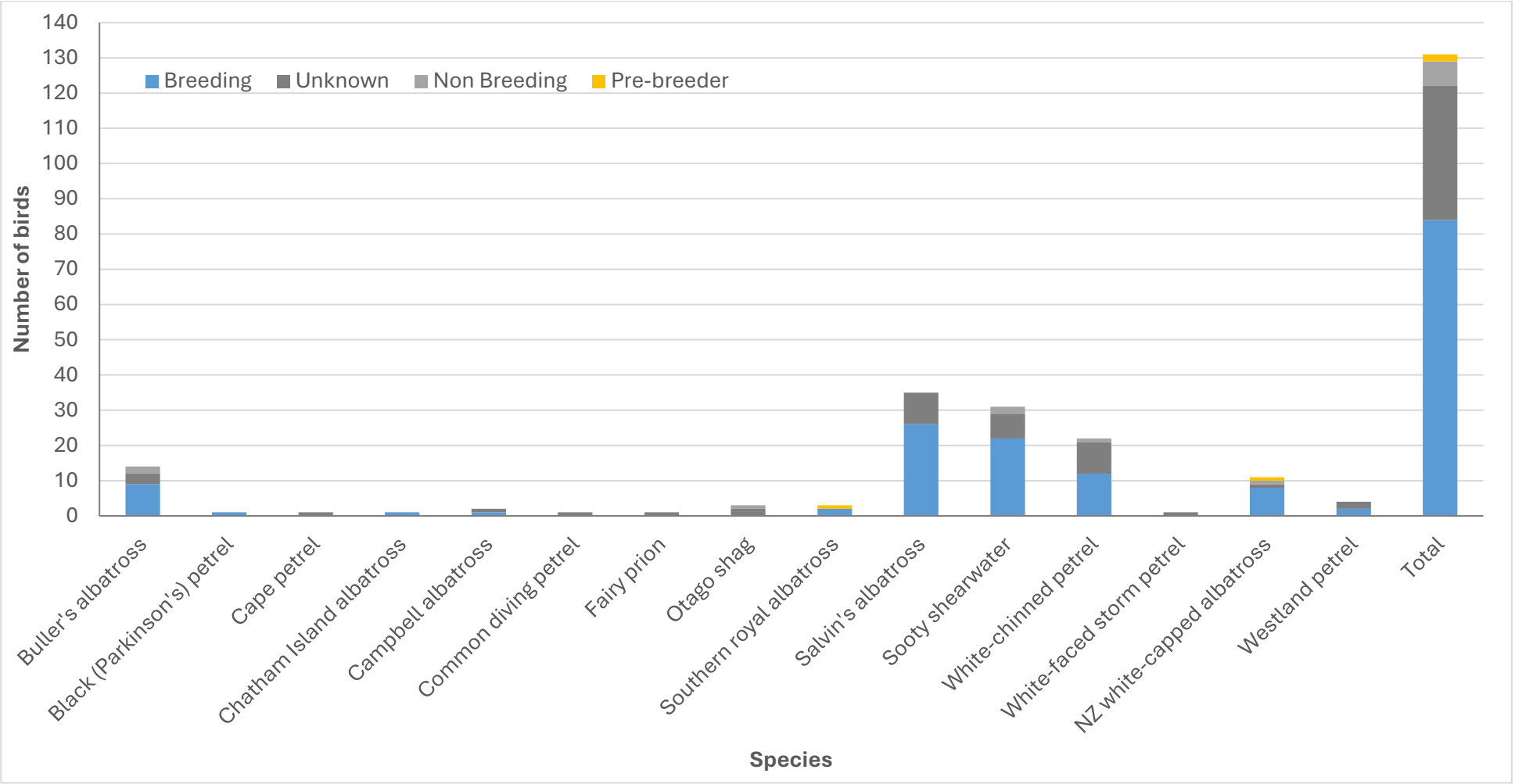

Figure 3: *Numbers of deceased adult seabirds (n=131) returned from observed fishing vessels between 1 July 2023 and 30 June 2024, by species and breeding class (breeding (n=84, 64.1%)), unknown (n=38, 29%), non-breeding (n=7, 5.3%), and pre-breeder (n=2, 1.5%)).*

3.2 Vessel type and target fishery of necropsy seabirds

For the study period 1 July 2023 to 30 June 2024, the 140 bycatch seabirds returned for necropsy were caught in a range of Fishery Management Areas (FMA 2, 3, 4, 5, 6, and 7). General positions are shown in **Figure 4**.

There were 191 observed trips on 79 vessels between 1 July 2023 - 30 June 2024 (E. Hewetson, DOC CSP, pers. comm.; MPI Observer data, unpublished). A total of 30 vessels (38% of observed vessels) is known to have returned seabirds for necropsy during this period from 104 observed trips (55% of all observed trips).

Seabirds returned for necropsy by fishing type included trawl (n=94, 67%), longline (n=30, 21%), and set net (n=5, 4%) (**Table 4**). The remaining 11 seabirds (8%) have not had their capture method confirmed to date (and this will be updated when an updated COD extract has been provided).

Of the 94 seabirds that were returned from trawl fisheries, trawlers targeting *Nototodarus* squid species accounted for 39 seabirds (41.5%), targeting hoki (*Macruronus novaezelandiae*) accounted for 29 seabirds (30.9%) and targeting ling (*Genypterus blacodes*) accounted for two seabirds (2.1%) (**Table 4**). There were 17 seabirds (18.1%) caught on trawlers targeting other species (nine different target fish species) and another 7 seabirds (7.4%) caught on trawlers that did not have the target fish recorded (**Table 4**).

Of the 30 seabirds that were returned from longline vessels, bottom longline accounted for 16 seabirds (53%) and surface longline accounted for 14 seabirds (46.7%). Longline vessels targeting southern bluefin tuna (*Thunnus maccoyii*) returned 13 (43.3%) of all longline specimens, and those targeting ling also returned 13 (43.3%) of the longline specimens (Table 4). The remaining four seabirds (13.3%) were caught on longline vessels targeting other fish species (**Table 4**).

A total of five seabirds were returned from set net vessels, with those targeting school shark (*Galeorhinus galeus*) accounting for 80% of set net returns (four seabirds) (**Table 4**).

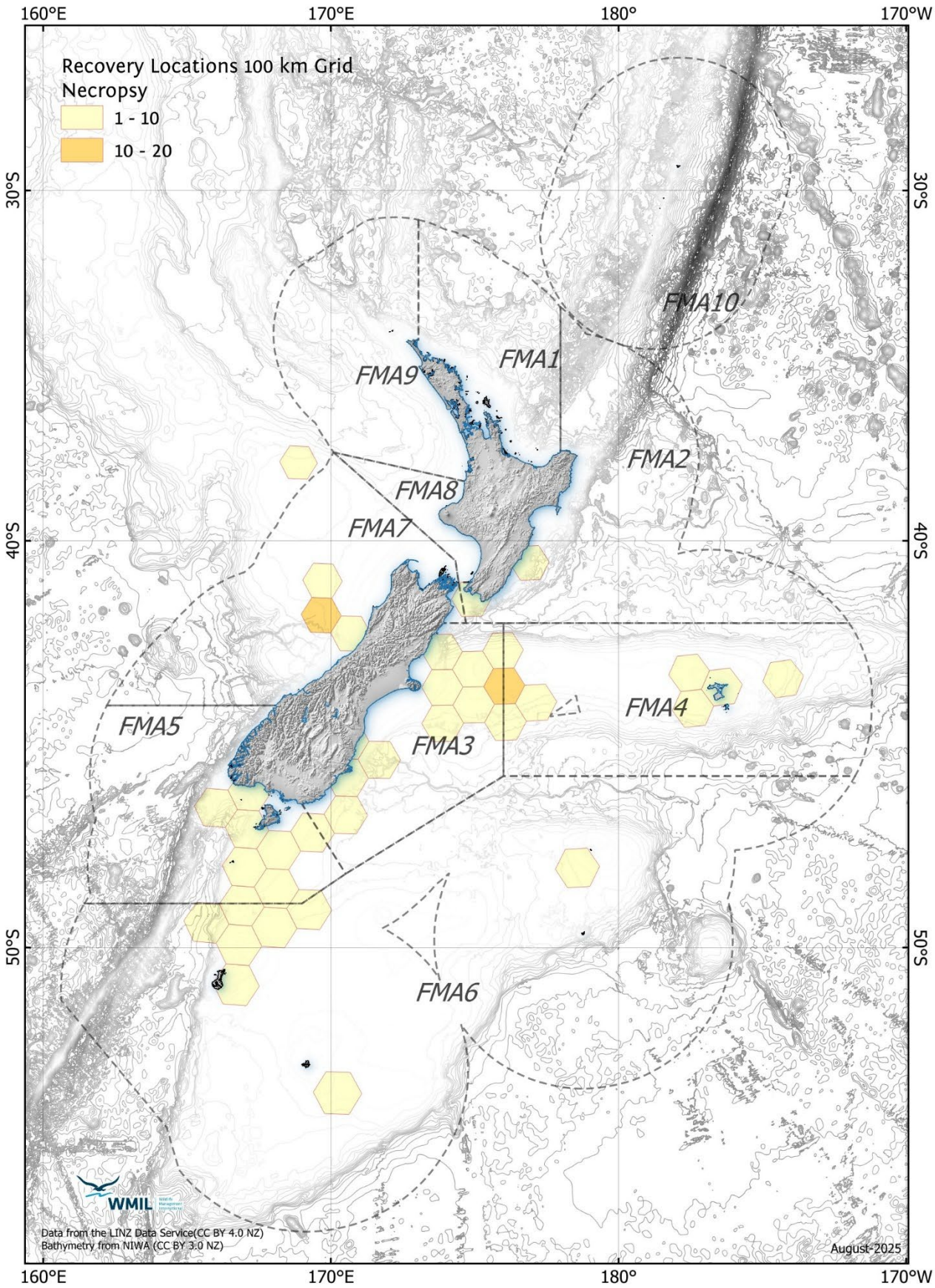

Figure 4: *Grouped catch locations of all bycatch seabirds returned in New Zealand fisheries for necropsy between 1 July 2023 and 30 June 2024.*

WMIL: Bell & Mclaren 2025

Table 4: *Number of seabirds (n=140) of each species returned from observed trawl, longline, setnet and purse seine fishing vessels between 1 July 2023 and 30 June 2024 by fishing target species.*

Species	Bottom/Midwater Trawl						Longline				Set net			Unknown[1]	Total
	Squid	Hoki	Ling	Other species[2]	Not recorded	Total	Southern blue fin tuna	Ling	Other Species[3]	Total	School shark	Other species[4]	Total		
Black (Parkinson's) petrel														**1**	**1**
Buller's albatross	3	2	1	4	2	**12**	2			**2**				**1**	**15**
Campbell albatross				1		**1**	1			**1**					**2**
Cape petrel											1		**1**		**1**
Chatham Island albatross								1		**1**					**1**
Common diving petrel														**1**	**1**
Fairy prion	1					**1**									**1**
NZ white-capped albatross	6	1			2	**9**	8			**8**					**17**
Otago shag											2	1	**3**		**3**
Salvin's albatross	11	15	1	5	2	**34**		1		**1**				**1**	**36**
Sooty shearwater	8	7		4	1	**20**		9		**9**				**2**	**31**
Southern royal albatross	1					**1**	1			**1**				**1**	**3**
Westland petrel		1				**1**	1		1	**2**	1		**1**		**4**
White-chinned petrel	9	3		3		**15**		2	3	**5**				**2**	**22**
White-faced storm petrel														**1**	**1**
Yellow-eyed penguin														**1**	**1**
Total	**39**	**29**	**2**	**17**	**7**	**94**	**13**	**13**	**4**	**30**	**4**	**1**	**5**	**11**	**140**
Each fishery type (%)	41.5	30.9	2.1	18.1	7.4		43.3	43.3	13.3		80.0	20.0		7.9	
Total necropsy returned (%)	27.9	20.7	1.4	12.1	5.0	67.1	9.3	9.3	2.9	21.4	2.9	0.7	3.6	7.9	

[1] No information on fisheries type or target species provided to date. This will be confirmed when the final COD is received.
[2] Other species include barracouta, *Thyrsites atun* (n=4); jack mackerel, *Trachurus* spp. (n=1); southern blue whiting, *Micromesistius australis* (n=1); scampi, *Metanephrops challengeri* (n=6); silver warehou, *Seriolella punctata* (n=1), southern bluefin tuna, *Thunnus maccoyii* (n=1), hake, *Merluccius merluccius* (n=1), common warehou, *Seriolella brama* (n=1), and smooth oreo, *Pseudocyttus maculatus* (n=1).
[3] Other species include snapper, *Pagrus auratus* (n=2), and squid, *Nototodarus sloanii* or *N. gouldi* (n=2).
[4] Other species include hoki, *Macruronus novaezelandiae* (n=1).

3.3 Injuries and likely cause of death of necropsied seabirds

Of the 140 seabirds returned for necropsy, cause of death ranged from drowning in trawl or set nets, drowning on a hook, or died from entering the warp or other areas such as the pound. Many of the birds sustained multiple injuries; the total number of injuries recorded. Detail of injuries is summarised in **Table 5** and **Table 6**.

3.3.1 Cause of death

Of the 94 seabirds returned from trawl vessels, most were caught within the net (internal) (n=46, 46%), and 35 other seabirds (35%) were caught in either the pound, lengthener, or cod-end. Seabirds caught in either the net or other categories would have resulted in death by drowning from entanglement. The remaining seabirds caught on trawl vessels were caught in the warp (n=12, 12%). A small number of seabirds were caught in setnets (n=5, 4%) and would have died by drowning. Seabirds returned from longline vessels were caught on hooks, with 77% caught in the head, bill, or neck and 17% caught by the wing which would have resulted in death by drowning.

Of the 140 seabirds returned for necropsy, there were 74 individual albatross (53%) compared to 66 smaller seabirds (47%) returned. All data is summarised in **Table 5**.

3.3.2 Injury location and type

Of the 140 seabirds that were returned, each was analysed for injuries, resulting in the identification of 221 different sustained injuries. Birds were most frequently returned in a waterlogged state (n=57, 41%), most likely due to drowning in fishing nets or on hooks. Of those birds returned waterlogged, albatross accounted for 53%.

Some seabirds were returned with no visible injuries (n=33, 24%) and both albatross (n=17, 52%) and smaller seabirds (n=16, 48%) were similarly found without visible injuries.

In all returned birds, broken wings (n=32, 23%), broken legs and feet (n=10, 7%), and broken bill (n=7, 5%) were also observed. Albatrosses were more frequently observed with broken wings (n=24, 75%) compared to smaller seabirds (n=8, 25%). These types of injuries are often attributed to seabirds that have likely become entangled in internal or external trawl nets or set nets.

There were relatively few birds returned from hooks (n=8, 6% of all returned birds), predominately of which were smaller seabirds (n=5, 63%).

Among all the returned birds, injuries likely sustained from warps included open or severed body parts (n=24, 17%), crushed or multiple trauma injuries (n=15, 11%), and greasing-related injuries (n=15, 11%). These three types of injuries were more commonly observed in albatrosses and collectively accounted for 76% (n=41) of all records in these categories.

Finally, seabirds that returned liced, were exclusively observed in albatross (n=7, 100%). Relatively few birds returned with ‘other’ injuries (n=13, 9% of all returned birds). All injury location and type data are summarised in **Table 6**.

Table 5: *Likely cause of death for seabird species returned from commercial trawl, longline, and set net fisheries between 1 July 2023 and 30 June 2024. The proportion of albatross versus smaller seabird species returned is also presented as a percentage.*

Species	Trawl			Set Net	Longline			Unknown	Total
					Hook Found in				
	Warp	Net	Other		Head, Bill, Neck, or Throat	Wing	Unknown position		
Black (Parkinson's) petrel								1	**1**
Buller's albatross	3	3	6		2			1	**15**
Campbell albatross		1			1				**2**
Cape petrel				1					**1**
Chatham Island albatross					1				**1**
Common diving petrel								1	**1**
Fairy prion			1						**1**
NZ white-capped albatross	4	2	3		8				**17**
Otago shag		1		2					**3**
Salvin's albatross	5	18	10				1	2	**36**
Sooty shearwater		14	6		7	2		2	**31**
Southern royal albatross			1		1			1	**3**
Westland petrel		1		1	2				**4**
White-chinned petrel		7	8		1	3	1	2	**22**
White-faced storm petrel								1	**1**
Yellow-eyed penguin				1					**1**
Total	**12**	**47**	**35**	**5**	**23**	**5**	**2**	**11**	**140**
% Overall	**11.9%**	**46.5%**	**34.7%**		**76.7%**	**16.7%**	**6.7%**		
Albatross (%)	100	51.1	57.1		56.5				52.9
Smaller seabirds (%)		46.8	42.9	100	43.5	100	100		46.2

Table 6: *Injury types recorded (n=221) for seabirds returned (n=140) from commercial fisheries between 1 July 2023 and 30 June 2024. The proportion of albatross and smaller seabird species returned is also presented as a percentage.*

Species	No visible injuries	Waterlogged	Broken wing	Broken legs or feet	Broken bill	Hook	Open wound or severed body part	Crushed or more than 3 injuries	Grease	Liced	Other	Total
Black (Parkinson's) petrel	1	1										2
Buller's albatross	2	4	8		2	1	3	2	3	1	2	28
Campbell albatross	1	1					1					3
Cape petrel		1	1								1	3
Chatham Island albatross						1						1
Common diving petrel		1										1
Fairy prion							1					1
NZ white-capped albatross	5	9	5	1	1		3	3	5		2	34
Otago shag		1			1					2	1	5
Salvin's albatross	9	16	11	2	2		7	8	4	4	2	65
Sooty shearwater	8	13	3	5	1	2	7	1			3	43
Southern royal albatross						1	1		1			3
Westland petrel	1	1				1	1				1	5
White-chinned petrel	6	8	3	2		2			2		1	24
White-faced storm petrel			1					1				2
Yellow-eyed penguin		1										1
Total	**33**	**57**	**32**	**10**	**7**	**8**	**24**	**15**	**15**	**7**	**13**	**221**
Returned birds (n=140) (%)	23.6	40.7	22.9	7.1	5.0	5.7	17.1	10.7	10.7	5.0	9.3	
Albatross (%)	51.5	52.6	75.0	30.0	71.4	37.5	62.5	86.7	86.7	100.0	46.2	
Smaller seabirds (%)	48.5	47.4	25.0	70.0	28.6	62.5	37.5	13.3	13.3		53.8	

3.4 Body condition of necropsy seabirds

Of the 131 returned seabirds where fat scores could be determined, the mean fat scores were marginally higher (2.07 ± 0.12 SE) than the previous survey (2022/23 = 1.8 ± 0.08) (Bell & McLaren 2024). Fat scores could not be determined for the remaining nine seabirds due to heavy lice infestation or severe specimen damage.

Overall, the mean fat score has fluctuated over the past 14 years (Bell & Bell 2015, Bell & Bell 2016, Bell & Bell 2017, Bell & Bell 2018, Bell & Bell 2019, Bell 2021, Bell & Larcombe 2022, Bell & Larcombe 2023, Bell & McLaren 2024).The fat score data is summarised in **Table 7** and **Figure 5**.

Table 7: *Fat scores of bycatch seabirds returned from commercial fishing vessels between 1 July 2023 and 30 June 2024 (1= no fat; 5 = extremely fat; U = unknown).*

Species	Fat Score						Total	Mean	SE (±)
	1	2	3	4	5	U			
Black (Parkinson's) petrel	1						1	1.00	0.00
Buller's albatross	8	3	1	2		1	15	1.79	0.30
Campbell albatross		1	1				2	2.50	0.50
Cape petrel						1	1		
Chatham Island albatross	1						1	1.00	0.00
Common diving petrel			1				1	3.00	0.00
Fairy prion				1			1	4.00	0.00
NZ white-capped albatross	6	2	8	1			17	2.24	0.23
Otago shag		1				2	3	2.00	0.00
Salvin's albatross	20	5	2	6		3	36	1.82	0.00
Sooty shearwater	12	11	3	3	1		31	2.00	0.07
Southern royal albatross	2		1				3	1.67	0.67
Westland petrel	1	3					4	1.75	0.25
White-chinned petrel	13	6	1	1		1	22	2.67	0.29
White-faced storm petrel						1	1		
Yellow-eyed penguin		1					1	2.00	0.00
Total	**64**	**33**	**18**	**14**	**1**	**9**	**140**	**2.07**	**0.12**
Total Fat Score (%)	45.7	23.6	12.9	10.0	0.7	6.4			

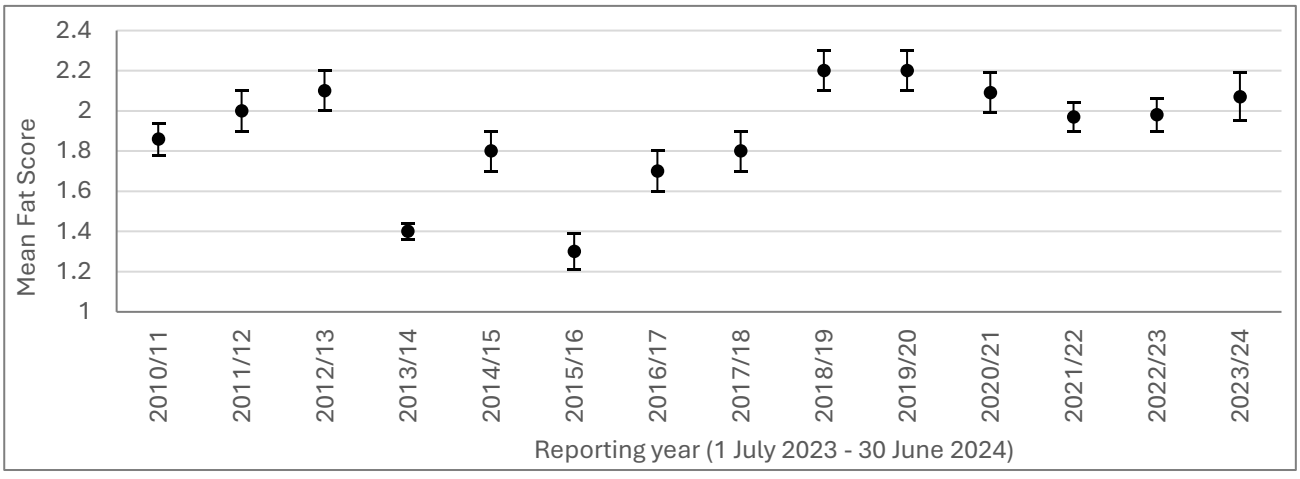

Figure 5: *Mean fat scores (and standard error bars) for all bycatch seabirds returned from commercial fishing vessels, per survey year, between 1 October 2010 and 30 June 2024. Note: 1= no fat; 5 = extremely fat; data analysis excludes unknown values.*

3.5 Stomach and gizzard contents

Many seabirds had multiple prey items in their stomachs and/or gizzards, resulting in higher stomach and gizzard content totals than the number of seabirds killed and returned (n=140). This data is summarised in **Table 8** and **Table 9**.

3.5.1 Stomach analysis

Of the items visually examined from stomach contents, natural items were among the most frequently observed (n=54, 39%). Empty stomachs (n=44, 31%) had the second highest rate of detection. Offal or discards (n=42, 30%) were also frequently detected and bait attributed to a low rate (n=14, 10%) compared to all other categories. This data is summarised in **Table 8**.

Table 8: *Stomach contents of bycatch seabirds returned (n=140) from commercial fishing vessels between 1 July 2023 and 30 June 2024.*

Species	Bait	Barnacles or Seaweed	Natural	Offal or Discards	Proventricular Oil	Worms	Other[1]	Empty	Missing
Black (Parkinson's) petrel				1					
Buller's albatross			4	3	2			7	
Campbell albatross			1	1				1	
Cape petrel									1
Chatham Island albatross	1								
Common diving petrel			1						
Fairy prion								1	
NZ white-capped albatross	1		5	11		1	1	5	
Otago shag			2	1					1
Salvin's albatross	8	1	13	5			1	10	3
Sooty shearwater	1		20	11	1		1	8	
Southern royal albatross			1	2		1			
Westland petrel	1		2	1				1	
White-chinned petrel	2		5	6				11	1
Yellow-eyed penguin							1		
Total	**14**	**1**	**54**	**42**	**3**	**2**	**4**	**44**	**6**
Total (%)	10.0	0.7	38.6	30.0	2.1	1.4	2.9	31.4	4.3

1. Unidentifiable food content

3.5.2 Gizzard analysis

Of the items visually examined from gizzard contents, fish bones and fish skin had the highest detection rate (n=67, 48%) followed by squid beaks (n=64, 46%). Empty gizzards were also frequently observed (n=31, 22%). Anthropogenic materials such as plastic, string, or metal (n=13, 9%) were found amongst the gizzard contents. Five seabirds (4%) had missing stomachs due to damage from fishing gear or by lice. This data is summarised in **Table 9**.

Table 9: *Gizzard contents (n=248) of bycatch seabirds returned (n=140) from commercial fishing vessels between 1 July 2023 and 30 June 2024.*

Species	Eyeballs	Fish Bones or Skin	Krill, Feathers, Barnacles, or Seaweed	Otoliths	Plastic, metal, or String	Squid Beaks	Worms	Other[1]	Empty	Missing
Black (Parkinson's) petrel						1				
Buller's albatross	1	7		2		2	1		8	
Campbell albatross		2				1				
Cape petrel		2								
Chatham Island albatross								1		

Species	Eyeballs	Fish Bones or Skin	Krill, Feathers, Barnacles, or Seaweed	Otoliths	Plastic, metal, or String	Squid Beaks	Worms	Other[1]	Empty	Missing
Common diving petrel			1							
Fairy prion					1					
NZ white-capped albatross	2	9		3		7		2	4	
Otago shag									1	1
Salvin's albatross		21	3	7		17	1	6	8	3
Sooty shearwater		9	4	3	9	14	3	2	8	
Southern royal albatross	1	5			1	1		1		
Westland petrel		1		1	1	3	1	1		
White-chinned petrel		11	1	12	1	18	7	1	2	1
Total	**4**	**67**	**9**	**28**	**13**	**64**	**13**	**14**	**31**	**5**
Total (%)	2.9	47.9	6.4	20	9.3	45.7	9.3	10	22.1	3.6

1. Included seeds, stones, shells, and shell fragments.

3.6 Identification of necropsied birds

Necropsy results confirmed that 72% of retained seabirds were correctly identified to species level, while 22% were accurately identified to the correct species group, by on-board observers based on the information provided on specimen tags (**Table 10**). These findings underscore the value of the necropsy programme in ensuring accurate species identification, but given 5% of the birds did not have an attempt at identification (no species identification code added to the observer card) and 0.7% were wrong (one NZ white-capped albatross was wrongly identified), as well as 22% only identified to group level, this raises concerns about the reliability of species-level data in Protected Species Identification reports.

Table 10: *Comparison of species identifications (ID) recorded by on-board observers compared with ID from necropsy seabirds returned (n=140) from commercial fishing boats between 1 July 2023 and 30 June 2024.*

Species	ID Correct to Species group[1]	ID Correct	ID Wrong	Code did not exist	Total
Black (Parkinson's) petrel		1			**1**
Buller's albatross	11	3		1	**15**
Campbell albatross	1	1			**2**
Cape petrel	1				**1**
Chatham Island albatross		1			**1**
Common diving petrel		1			**1**
Fairy prion	1				**1**
NZ white-capped albatross		15	1	1	**17**
Otago shag	2	1			**3**
Salvin's albatross	6	28		2	**36**
Sooty shearwater	3	26		2	**31**
Southern royal albatross		3			**3**
Westland petrel		4			**4**
White-chinned petrel	5	16		1	**22**
White-faced storm petrel	1				**1**
Yellow-eyed penguin		1			**1**
Total	**31**	**101**	**1**	**7**	**140**
Total (%)	22.1	72.1	0.7	5.0	

1. Identified to correct group but given the wrong species code.

3.7 Photographs and Interactions

3.7.1 Numbers of photographed seabirds or those listed as interactions

There were a total of 268 interactions involving seabirds and fishing vessels that were recorded in the MPI COD extract, either as 'photographed' records, or as 'interaction-only' records (if the seabird interacted with the fishing vessel but was not photographed). This total includes both live and deceased seabirds.

Of these, 154 (58%) had no associated photographs taken (i.e., interaction-only) and most of these (n=124, 81%) were released alive or left the vessel unaided. The remaining 114 (42%) seabird interactions were photographed and had corresponding entries in the COD extract. This data is summarised in **Table 11**.

The monthly distribution of these interactions was not evenly spread across the study period, with February 2024 (n=54, 20%) and May 2024 (n=43, 16%) having the highest interaction rates (**Table 12**).

The most prevalent species recorded as interaction seabirds were:

1. Tītī/ sooty shearwater (n=58, 22%)
2. Toroa/Salvin albatross (n=51, 19%)
3. Toroa/New Zealand white-capped albatross (n=35, 13%)
4. Buller albatross (n=25, 9%)
5. Karetai kauae mā/white-chinned petrel (n=20, 8%)

Combined these five species comprised of 71% of all interactions combined (photo and interaction-only) between 1 July 2023 and 30 June 2024 (**Table 12**).

Table 11: *Number of seabirds reported as photographed (n=114) or interaction-only (n=154) on commercial fishing vessels between 1 July 2023 and 30 June 2024.*

Species	Photo			Interaction-only			Total
	Alive	Deceased	Total	Alive	Deceased	Total	
Albatross (unidentified)				2	1	3	**3**
Buller's albatross	3	16	19	5	1	6	**25**
Buller's and Pacific albatross				9		9	**9**
Cape petrel		1	1	1	1	2	**3**
Cape petrels				9	2	11	**11**
Common diving petrel				1		1	**1**
Fairy prion	2		2	1		1	**3**
Flesh-footed shearwater				2	1	3	**3**
Great albatross (unidentified)				1		1	**1**
Grey petrel					1	1	**1**
Grey-backed storm petrel	1		1				**1**
Little black shag				1		1	**1**
Mid-sized petrel & shearwater (unidentified)					1	1	**1**
NZ white-capped albatross	5	11	16	19		19	**35**
Northern giant petrel				1		1	**1**
Petrel (unidentified)				2		2	**2**
Petrels, prion, and shearwaters (unidentified)				8		8	**8**
Prion (unidentified)				6		6	**6**
Procellaria petrel (unidentified)				4	3	7	**7**
Pterodroma petrel (unidentified)				1		1	**1**
Royal albatross (unidentified)				4		4	**4**
Salvin's albatross	1	25	26	22	3	25	**51**
Shag (unidentified)				1		1	**1**

Species	Photo			Interaction-only			Total
	Alive	Deceased	Total	Alive	Deceased	Total	
Shearwater (unidentified)				1		1	**1**
Small albatross (unidentified)				1	4	5	**5**
Sooty shearwater		35	35	19	4	23	**58**
Southern black-browed albatross					1	1	**1**
Southern royal albatross					1	**1**	**1**
Storm petrel (unidentified)				1	2	3	**3**
White-chinned petrel	3	11	14	2	4	6	**20**
Total	**15**	**99**	**114**	**124**	**30**	**154**	**268**
Total (%)	13.2	86.8		80.5	19.5		
Total (all combined) (%)	42.5			57.5			

Table 12: *Number of seabird interactions (photographed or interaction-only) with fishing vessels between 1 July 2023 and 30 June 2024, by month of incident.*

Species	2023						2024						Total
	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	
Albatross (unidentified)	1							1	1				3
Buller's albatross	13	2	1				1	1		1	4	3	25
Buller's and Pacific albatross	3		1					2			1	2	9
Cape petrel	1			1									2
Cape petrels	2	3	4	1							1		11
Common diving petrel			1										1
Fairy prion		1	1							1			3
Flesh-footed shearwater							1		2				3
Great albatross (unidentified)								1					1
Grey petrel												1	1
Grey-backed storm petrel		1											1
Little black shag			1										1
Mid-sized petrel & shearwater (unidentified)										1			1
New Zealand white-capped albatross	5	1			1	1		8	3	8	5	3	35
Northern giant petrel			1										1
Petrel (unidentified)										2			2
Petrels, prion, and shearwaters (unidentified)		3		2	1				2				8
Prion (unidentified)	1	2						1			2		6
Procellaria petrel (unidentified)		1							2	3	1		7
Pterodroma petrel (unidentified)							1						1
Royal albatross (unidentified)						3						1	4
Salvin's albatross			1	2	5	5	1	14	21	1	1		51
Shag (unidentified)						1							1
Shearwater (unidentified)								1					1
Small albatross (unidentified)		1						1		1	1	1	5
Sooty shearwater							4	19	3	8	24		58
Southern royal albatross									1	1			2
Storm petrel (unidentified)	1							1				1	3
White-chinned petrel					1			4	3	9	3		20
Total	**27**	**15**	**11**	**6**	**8**	**10**	**8**	**54**	**38**	**36**	**43**	**12**	**268**
Total Photo and Interaction (%)	10.1	5.6	4.1	2.2	3.0	3.7	3.0	20.1	14.2	13.4	16.0	4.5	

3.7.2 Target fishery and vessels of photographed or interaction-only seabirds

The seabirds that were photographed, discarded or released alive, and listed in the COD extract were caught in FMAs 2, 3, 4, 5, 6, and 7 (**Figure 6**).

The seabirds that were reported as an interaction-only (non-photographed), discarded or released alive, and in the COD extract were caught in FMAs 1, 2, 3, 4, 5, 6, and 7 (**Figure 7**).

The 263 seabirds that were either photographed or recorded as an interaction were from 30 individual vessels. **Table 13** summarises this data by vessel and interaction type.

Table 13: *Number of seabirds photographed or recorded as interaction-only (n=263) from commercial fisheries vessels between 1 July 2023 and 30 June 2024. The total number of unique vessels on which both photographed and interaction-only were recorded is given.*

Fishery Type	Photograph		Interaction		Total	
	Seabirds	Vessels	Seabirds	Vessels	Seabirds	Vessels
Longline	2	1	6	2	**8**	**2**
Trawl	112	19	146	24	**158**	**27**
Set Net			2	1	**2**	**1**
All fisheries combined	**114**	**20**	**154**	**27**	**268**	**30**

There were 191 observed trips on 79 vessels between 1 July 2023 - 30 June 2024 (E. Hewetson, DOC CSP, pers. comm.; MPI Observer data, unpublished). Interactions with seabirds (photographed and interaction only) were reported from 30 individual vessels (38% of all vessels) over 79 observed trips (41% of all observed trips). Most of these vessels reported relatively low numbers of bird interactions on each trip (≤5 birds reported each trip; n = 68, 86%). There were four trips (5%) that had interactions with ten or more seabirds, including one vessel that recorded 24 interactions on one trip.

3.7.3 Injuries of photographed or interaction-only seabirds

Of the 268 interactions, the number of seabirds reported as either as interaction-only or photographed were closely distributed for birds recovered and determined deceased (excluding those birds that were not recovered) or were released alive.

Of the 132 (50%) seabirds released alive within the photograph or interaction-only category, most were interaction-only cases (n=117, 89%). The remaining 131 birds were predominantly discarded dead and unmarked (49%) with only three (1%) birds not recovered (i.e., died, but fell off the net or warp) (**Table 14** and **Table 15**). As many seabirds were discarded, cause of death cannot be confirmed (unless additional information can be seen in the images or videos or observers make additional comments in the COD).

Table 14: *Number of seabird interactions (photographed and interaction-only) from commercial fishing vessels between 1 July 2023 and 30 June 2024.*

Status	Photographed	Interaction-only	Total	Total %
Alive	15	124	**139**	51.9%
Not recovered (deceased)		3	**3**	1.1%
Discarded deceased (unmarked)	99	27	**128**	47.8%
Total	**114**	**154**	**268**	

Of the seabird interactions, 278 seabird injuries were recorded. Birds were frequently observed with no visible injuries and accounted for more than half (n=161, 58%), birds that were waterlogged (n=34, 12%), or had broken wings (n=24, 9%). All data is summarised in **Table 16**.

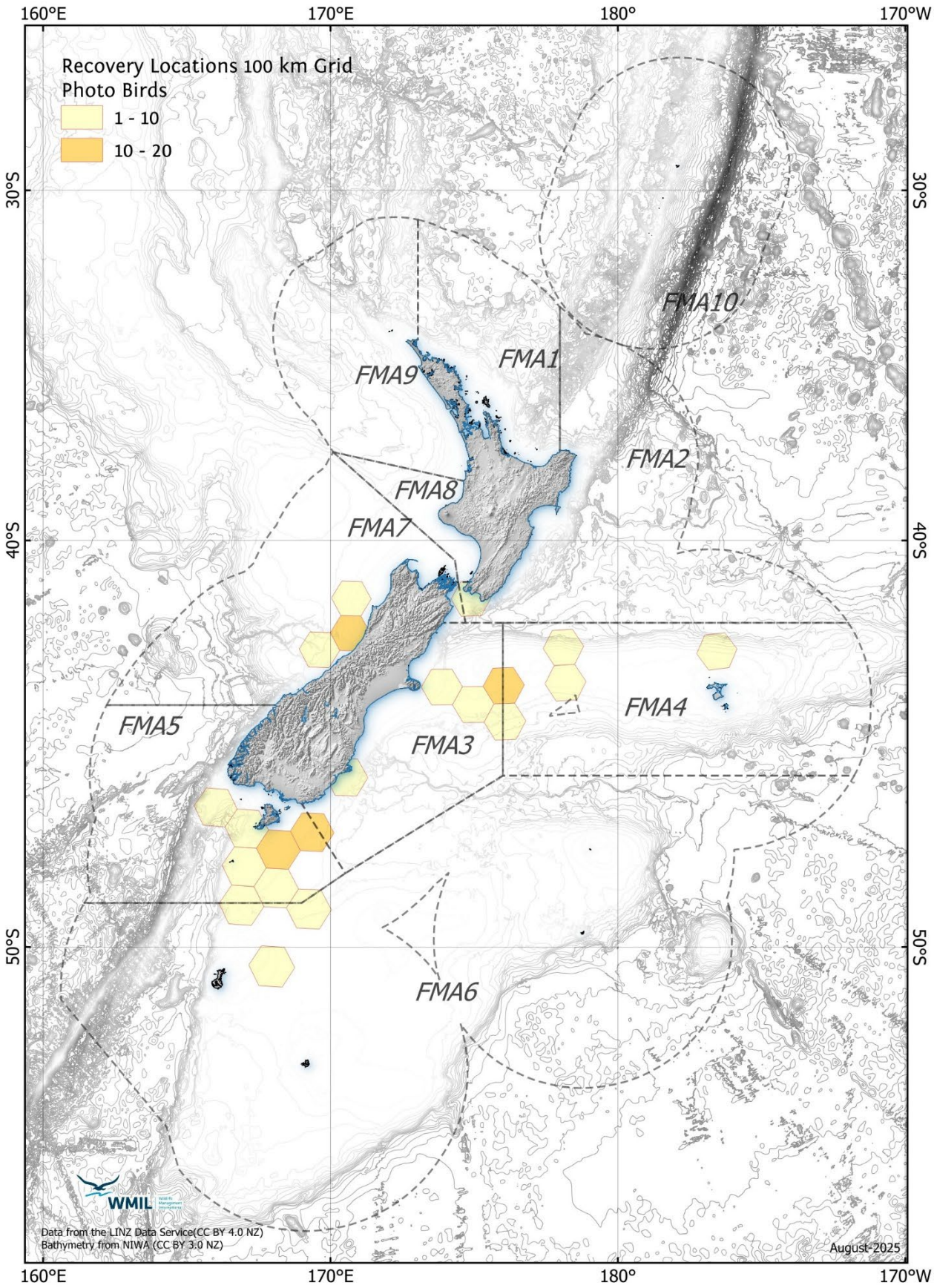

Figure 6: *Grouped catch locations of all seabirds caught and photographed in New Zealand commercial fisheries between 1 July 2023 and 30 June 2024.*

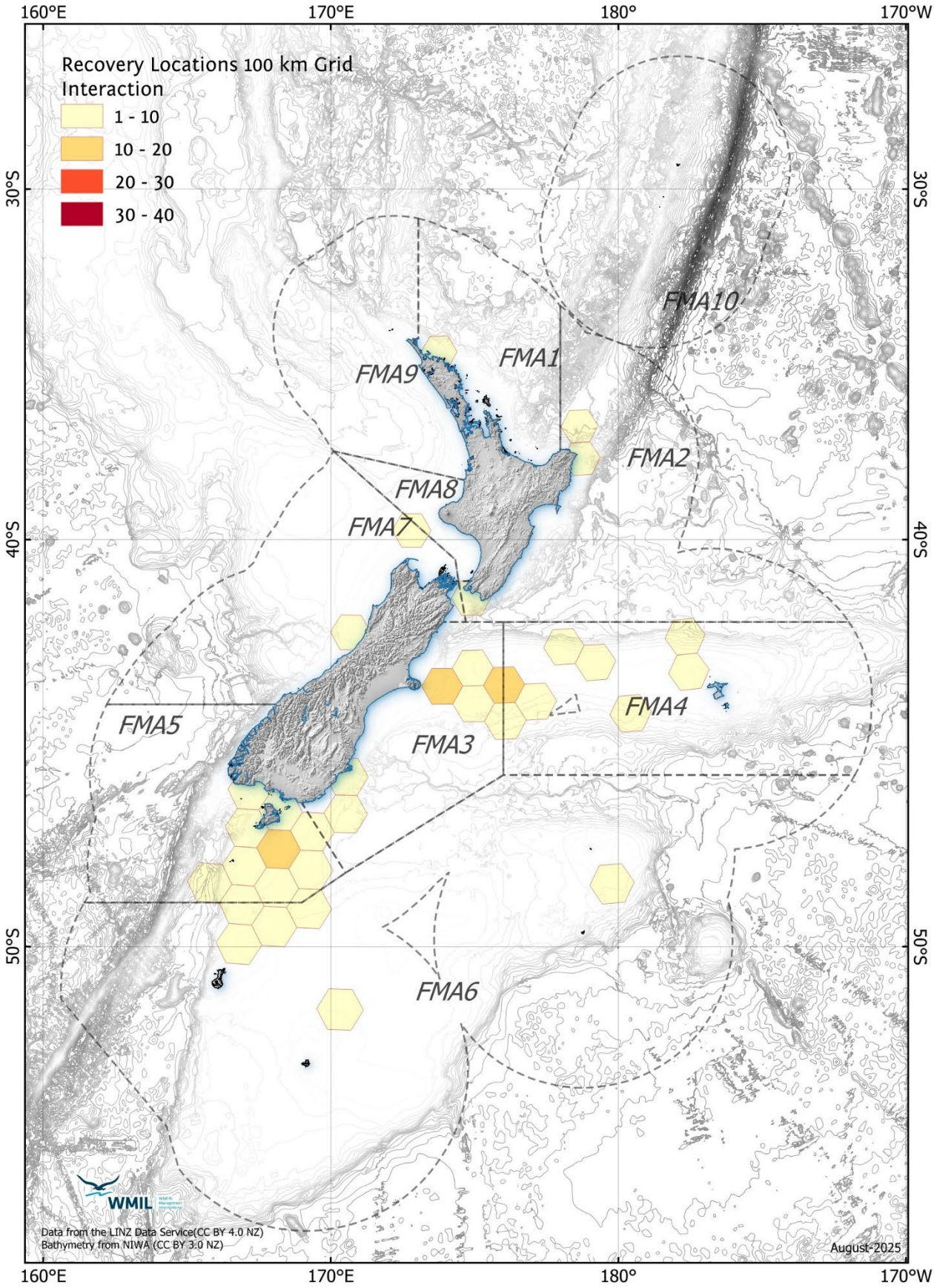

Figure 7: *Grouped catch locations of all seabirds reported as an interaction-only (non-photographed) in New Zealand commercial fisheries between 1 July 2023 and 30 June 2024.*

Table 15: *The number of interactions and photographed seabird interactions (n=268) with commercial fishing vessels between 1 July 2023 and 30 June 2024, categorised by species, outcome (alive or deceased), and likely cause of death. The data also presents the percentage breakdown of albatross versus smaller seabird records.*

Species	LONGLINE		TRAWL				SET NET		Total
	Alive	Dead	Dead			Alive	Dead	Alive	
		Hook	Net	Warp	Impact				
Albatross (unidentified)				1		2			3
Buller's albatross			11	5	2	8			26
Buller's and pacific albatross						9			9
Cape petrel			1			1			2
Cape petrels			2			8		1	11
Common diving petrel						1			1
Fairy prion						3			3
Flesh-footed shearwater	1			1		1			3
Great Albatross						1			1
Grey petrel					1				1
Grey backed storm petrel						1			1
Little black shag						1			1
Mid-sized petrel			1						1
NZ white-capped albatross			6	5		24			35
Northern Giant petrel	1								1
Petrel (unidentified)						2			2
Petrels, prion, and shearwaters (unidentified)	3					5			8
Prion(unidentified)						6			6
Procellaria (unidentified)			3			4			6
Pterodroma petrel						1			1
Royal albatross						4			4
Salvin's albatross	1		26	2		22			51
Shag (unidentified)						1			1
Shearwater (unidentified)						1			1
Small albatross (unidentified)			2			3			5
Sooty shearwater			39			19			58
Southern royal albatross			2						2
Storm petrel	1		2						3
White-chinned petrel		2	12	1		4		1	20
Total	**7**	**2**	**107**	**15**	**3**	**132**	**0**	**2**	**268**
Total (%)	2.6	0.7	39.9	5.6	1.1	49.3		0.7	
Total (per fishery type)	3.4		95.9				0.7		
Albatrosses (%)	28.6		43.7	86.7	66.7	55.7			
Smaller seabirds (%)	71.4	100	56.3	13.3	33.3	44.3		100	

Table 16: *Injury types recorded on seabird interactions (photographed and interaction-only) with commercial fishing vessels between 1 July 2023 and 30 June 2024.*

Species	Broken Wing	Greased	No visible Injuries	Open wound or severed body part	Other	Waterlogged	Total
Albatross (unidentified)			2		1		**3**
Buller's albatross	10	3	7	3	4	6	**33**
Buller's and Pacific albatross			8				**8**
Cape petrel			2				**2**
Cape petrels			5		5	1	**11**
Common diving petrel			1				**1**
Fairy prion			3				**3**
Flesh-footed shearwater			3				**3**
Great albatross (unidentified)			1				**1**
Grey petrel			1				**1**
Grey-backed storm petrel			1				**1**
Little black shag			1				**1**
New Zealand white-capped albatross	6	3	22	1	3	3	**38**
Northern giant petrel	1						**1**
Petrel (unidentified)			1				**1**
Petrels, prion, and shearwaters (unidentified)			3	1	4		**8**
Prion (unidentified)			5		1		**6**
Procellaria petrel (unidentified)			3		1		**4**
Pterodroma petrel (unidentified)			1				**1**
Royal albatross (unidentified)			4				**4**
Salvin's albatross	5		28	3	13	5	**54**
Shag (unidentified)			1				**1**
Shearwater (unidentified)			1				**1**
Small albatross (unidentified)	1			1	3		**5**
Sooty shearwater	1		40	1	2	12	**56**
Southern royal albatross			2				**2**
Storm petrel (unidentified)			3				**3**
White-chinned petrel			12	3	2	7	**24**
Total	**24**	**6**	**161**	**13**	**40**	**34**	**278**
Total %	8.6	2.2	57.9	4.7	14.4	12.2	

3.7.4 Identification of photographed seabirds

Analysis of 114 photographed seabird interactions revealed that 99 individual seabirds (86%) were correctly identified to species level by observers. Twelve (10%) individuals were accurately assigned to the appropriate species group but could not be resolved to species level. Two (2%) were presumed correct as photos have not been supplied to date and one (1%) identification was confirmed wrong. This data is summarised in **Table 17**.

Table 17: *Comparison of 117 observer identifications with expert identifications for photographed captures listed in COD from fishing vessels between 1 July 2023 and 30 June 2024, by species. 'ID correct' = expert identification confirmed the observer identification; 'ID as correct species group' = expert identification was confirmed to species, which was consistent with the lower taxonomic group as identified by the observer; 'ID Presumed Correct' = identification assumed only as no photo was provided to confirm, and 'ID wrong' = observer identified the species incorrectly.*

Species	ID correct	ID as correct species group	ID presumed correct	ID wrong	Total
Buller's albatross	10	9			**19**
Cape petrel		1			**1**
Fairy prion	1	1			**2**
Grey-backed storm petrel		1			**1**
NZ white-capped albatross	16				**16**
Salvin's albatross	25		1		**26**
Sooty shearwater	35				**35**
White-chinned petrel	12		1	1	**14**
Total	**99**	**12**	**2**	**1**	**114**
Total %	86.8	10.5	1.8	0.9	

3.7.5 Quality and number of photographs

The quality of the images obtained by observers continued to vary widely, particularly for live seabirds. Video footage is now being received as well as still imagery. Video footage was useful in determining species released alive in situations where photos may not have provided enough detail, such as in poor lighting and at a distance.

Photography of deceased birds continues to improve with several images being taken for most of the dead specimens, often with multiple images focusing on key features.

The usual issues with the imagery (i.e., only one photograph, not all key features being photographed, poor focus, labels being omitted from the photographs, and under- or over-exposure) continue to occur.

Poor images were particularly common for birds that were alive and seen on-board for short periods (particularly when photographs were taken from a long distance). Many of these images are out of focus or only showing the bird in the distance.

On occasion, cameras used by observers were not programmed with the correct date and time. This means metadata of images do not match the data and time recorded in the COD which makes it difficult to link birds to the correct trip and haul in situations where several seabirds were photographed in the same haul and sample labels were unclear in the image (i.e., couldn't read the trip, haul and sample number in the photograph).

3.7.6 Recommendations for photograph identification

It is recommended that:

- Wherever possible, all seabird interactions are photographed and recorded. If possible, haul and sample information should be included in the image.

- Images (with scale if possible) include the head and bill from the side and above, body (full body and side shots), wings (above and below) and shots of the feet whenever possible. This is particularly important for dead birds.
- Observers are encouraged to take multiple images of live and dead birds from all angles to enable more accurate identification of specimens. When holding live birds in the hand, images of the head and entire body and wing should be taken.
- Photo logs are completed for all images (which can be correlated to date and time stamps from the camera). Cameras are programmed to show correct date and time. Descriptions of the interaction would also help with the identification and matching of images.
- Photograph numbers are recorded on the observer non-fish bycatch form.
- Photographs (and extracts from the observer logbooks) are provided regularly throughout the fishing year for photo-identification.
- Training and instruction on the use of the cameras and on how to take suitable photographs for identification use (i.e., number of images, type of images, date, and time stamps etc.) is provided for all observers.

4. SUMMARY AND RECOMMENDATIONS

The five seabird species retained for necropsy most frequently in 2023/24 (white-chinned petrel, Salvin's albatross, New Zealand white-capped albatross, Buller's albatross, and sooty shearwater) were the same most frequently reported species as those reported in the preceding year, and in similar numbers. These five species consistently comprise most seabirds caught in New Zealand commercial fisheries.

Where the sex of seabirds retained in 2023/24 could be identified, most of the birds (55%) were males. Almost one third more males were retained than females, although five species only returned females (common diving petrel, fairy prion, southern royal albatross, Campbell albatross, and yellow-eyed penguin). This proportion is consistent with observations in previous years. Sex-specific differences in foraging behaviour have been documented in several seabird species, such as grey petrels in New Zealand waters (Bartle 1990, Patrick & Weimerskirch 2014). Furthermore, the behaviour of seabirds around fishing vessels may vary by sex (Giménez et al. 2021) especially as males are often more aggressive when targeting food sources.

Sooty shearwaters, Salvin's albatross, New Zealand white-capped albatross, Buller's albatross, and white-chinned petrels made up most interactions (photographed and interaction-only). This is likely attributable to observer requirements not necessitating that all specimens of these species be retained. It may also be related to sooty shearwaters and white-chinned petrels often being caught in multiple numbers during one haul. Observer requirements determining the frequency at which each species is retained must be considered when comparing necropsy figures over time.

It would be valuable to compare the observer data with electronic monitoring (cameras on vessels) to determine whether observer coverage provides accurate information on bycatch and seabird interaction.

WMIL recommend that:

- Improved photograph methodology is implemented (see Section 3.7.6: Recommendations for photograph identification).
- Observer training includes additional seabird identification options and refresher training each year prior to deployment on vessels.
- Observers are encouraged to attempt higher level seabird identification.

- Observers are encouraged to provide more notes about the seabird interaction, including injuries, terminal status for birds released "alive", other seabirds present, mitigation being used, weather, etc. to assist with identification and understanding fisheries/seabird interaction.
- Photographed interactions are provided at a regular schedule to enable prompt identification of these birds.
- COD extracts are provided at a regular schedule to enable more prompt analysis of interaction and photographed birds.
- All deceased seabirds are returned whenever possible as this would enable additional data to be collected from these birds.
- When not possible to returned deceased seabirds, these should be photographed, and sampled (i.e., feathers collected), to enable accurate identification.
- Bycatch data is analysed over time to determine how fisheries effort and Observer coverage variation over time affects seabird interaction numbers.
- Electronic monitoring data is compared to Observer data to determine whether accurate levels of seabird interactions are being reported.

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