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EXECUTIVE SUMMARY

Thompson, F.N.; Abraham, E.R.; Oliver, M.D. (2010). Summary of the capture of seabirds, marine mammals, and turtles in New Zealand commercial fisheries, 1998–99 to 2007–08.

***New Zealand Aquatic Environment and Biodiversity Report No. 45* 148 p.**

A summary is presented of all captures of seabirds, marine mammals, and turtles during trawl and longline fishing within the outer boundary of the New Zealand Exclusive Economic Zone (EEZ) between 1 October 1998 and 30 September 2008. Ministry of Fisheries observers record captures of seabirds, marine mammals, and turtles, and these data, along with information on fishing effort, are used for estimating total captures.

Within this report, captures are divided into the following groups: sooty shearwater (*Puffinus griseus*), white-chinned petrel (*Procellaria aequinoctialis*), white-capped albatross (*Thalassarche steadi*), other albatrosses, other birds, New Zealand sea lion (*Phocarctos hookeri*), New Zealand fur seal (*Arctocephalus forsteri*), dolphins, whales, and turtles. Captures are also reported by fishery, based on method (trawl, bottom longline, and surface longline) and target species. The report contains time series and maps of the observed and estimated captures.

In the 2007–08 fishing year there were 233, 37, and 40 birds observed caught in trawl, surface longline, and bottom longline fisheries, respectively. The most frequently caught bird species were sooty shearwater, white-chinned petrel, and white-capped albatross with 82, 74, and 44 observed caught, respectively. Other observed captures included one Westland petrel (*Procellaria westlandica*) caught in the West Coast South Island trawl fishery; four black petrels, or Parkinson's petrels (*Procellaria parkinsoni*), caught in scampi trawl and hapuku bottom longline fisheries; and one wandering albatross (*Diomedea exulans*) caught in the northeast bluenose longline fishery. Another wandering albatross was caught and released alive. All of these species are classified as vulnerable by the IUCN.

Estimated captures of seabirds in trawl fisheries decreased by 13.2% from 1023 (95% c.i.: 906 to 1150, based on 40.9% of effort) in 2006–07 to 911 (95% c.i.: 797 to 1 040, based on 40.8% of effort) in 2007–08. This decrease is most likely explained by the concurrent 13.9% decrease in effort across all trawl fisheries. The ratio estimate for bird captures in surface longline fisheries for 2007–08 was 449 (95% c.i.: 127 to 862, based on 98.2% of effort). The ratio estimate for bird captures in bottom longline fisheries for 2007–08 was 368 (95% c.i.: 224 to 539, based on 61.6% of effort). No snapper target bottom longline fishing was included in this estimate, as no observations were made in this fishery.

In addition to seabirds, 11 New Zealand sea lions, 151 New Zealand fur seals, 20 common dolphins (*Delphinus delphis*), 1 bottlenose dolphin (*Tursiops truncatus*), 1 whale, and 1 leatherback turtle (*Dermochelys coriacea*) were observed caught during 2007–08. The estimated number of New Zealand sea lions captures in all trawl fisheries for 2007–08 was 39 (95% c.i.: 27 to 51, based on 41.8% of effort); the lowest estimated catch in nine years. This figure does not include sea lions that may have escaped or been ejected by sea lion exclusion devices used in the Auckland Islands squid trawl fishery. Ratio estimates of fur seal and dolphin captures in all trawl fisheries were the highest for three years.

Observer coverage in inshore trawl fisheries remained very low. In 2007–08, only 158 inshore trawls were observed, 0.3% of the fishery. In the 2007–08 fishing year, 56.1% of all trawls were in inshore fisheries: estimates of captures were not made on any of this effort.

1. INTRODUCTION

In this report, a summary is presented of the capture of seabirds, marine mammals and turtles during trawl and longline fishing in New Zealand waters. A comprehensive summary of captures in these fisheries, from the 1998–99 to the 2006–07 fishing year, was provided by Abraham & Thompson (2009a). An update gave similar information for the first half of the 2007–08 fishing year (Thompson & Abraham 2009c). This report extends the summaries to include capture data from the 2007–08 fishing year (1 October 2007 to 30 September 2008, inclusive). The report is prepared as part of Ministry of Fisheries projects PRO2007/01 and PRO2007/02, which have the objective of estimating seabird and marine mammal captures in New Zealand fisheries.

Information on protected species captures is recorded by Ministry of Fisheries observers when they are on fishing vessels. In fisheries where there has been sufficient observer coverage, this systematically collected data provides a basis for estimating total captures. Within the report, captures are divided into the following groups: sooty shearwater (*Puffinus griseus*), white-chinned petrel (*Procellaria aequinoctialis*), white-capped albatross (*Thalassarche steadi*), other albatrosses, other birds, New Zealand sea lion (*Phocarctos hookeri*), New Zealand fur seal (*Arctocephalus forsteri*), dolphins, whales, and turtles. The three individual seabird species were chosen as these are the species that have been most frequently caught in New Zealand trawl and longline fisheries. For each protected species group, there is a sequence of pages in the results section showing the captures within the different fisheries where those animals were caught. The captures are also summarised by fishery (defined by the method and target species). Summaries are included for every species-fishery combination that had observed captures in either the 2006–07 or 2007–08 years. The summaries give the effort, observer coverage and observed captures over the 10 year period of the data. For the 2006–07 and 2007–08 fishing years, a more detailed breakdown of the captures is provided.

Model-based statistical estimates of captures are available for dolphins (Thompson & Abraham 2009a), New Zealand sea lions (Thompson & Abraham 2009b), and seabirds (Waugh et al. 2008). A full statistical analysis is beyond the scope of this report, but in each summary we have included stratified ratio estimates of total captures (determining total bycatch by multiplying observed catch by the ratio of total effort to observed effort). These estimates are prone to bias if the observer coverage is not representative of the fishing effort in some way, for example, if the observations are concentrated at a particular time of year, or if the coverage is low. The advantage of the ratio method is that it may be applied across all the species groups and fisheries where there has been sufficient coverage. The consistent methodology allows comparison between species and fisheries, and helps identify fisheries with high bycatch. The ratio method has been changed since previous reports (Abraham & Thompson 2009a, Thompson & Abraham 2009c) in order to better represent species-fishery strata with low numbers of captures. Model based estimates of captures of seabirds and marine mammals in 2007–08 trawl and longline fisheries will be presented in due course.

Because this is essentially a summary of the data (containing 122 tables and 60 figures), not all the tables and figures are referred to in the text as is usual. Main features of the data are commented upon and reference to tables and figures is not sequential.

2. METHODS

2.1 Data sources

Ministry of Fishery observers on commercial fishing vessels record captures of protected species, including seabirds and marine mammals. The capture events are recorded on paper forms by the

observers and entered into a database maintained by the National Institute of Water and Atmospheric Research (NIWA) on behalf of the Ministry of Fisheries. Currently, data are housed in the Centralised Observer Database (COD). The following protected species bycatch information from COD was used in this analysis.

Species	The identification made by the observer. This may either be a species level or a more general classification, depending on how precisely the observer was able to identify the animal.
Capture method	A code indicating where the animal was captured. For example, in the net, on the warps, or tangled in line. Additional information from the observer's comments has also been used to identify the capture method.
Life status	Observers record whether the animal was alive, dead, killed by the crew, or decomposed (long dead).
Station details	Trip number, station number, date at beginning of the tow or set, and target species. This information is required for all observed stations, including those where there was no protected species bycatch.

Observer data from surface longline fisheries have not yet been integrated with COD and were provided directly from the *l_line* database. This contains hook level information on both fish and protected species catches. Station information, species identification, and life status were used.

In addition to the observer data, fishing effort data were required. Commercial fishing vessels return a record of all fishing effort on each trip to the Ministry of Fisheries. Skippers complete either a Trawl Catch Effort Processing Return (TCEPR), Trawl Catch Effort Return (TCER), Tuna Longline Catch Effort Return (TLCER), Catch Effort Landing Return (CELR), Lining Catch Effort Return (LCER), or Lining Trip Catch Effort Return (LTCER) form. During the 2007–08 fishing year, inshore trawl fisheries moved to reporting fishing effort on TCER forms, rather than CELR forms. The TCER form allows the latitude and longitude of fishing effort to be recorded, instead of only giving the statistical area. This has allowed a more accurate understanding of where inshore fishing is occurring. Data from these forms are stored in databases administered by the Ministry of Fisheries (Ministry of Fisheries 2008). In this report, information on station date, position and effort (either number of trawls or number of hooks) was used.

Data were groomed to remove a range of errors (Abraham & Thompson 2009a). In the trawl effort data, the start positions of 57 records were changed, because of unreasonable vessel speeds, and two records had missing CELR effort numbers added. Grooming rules were applied to the observer records from COD, but no changes were necessary. Much of the bottom longline effort data was recorded on CELR forms. These record the number of sets in each day (the effort number), along with the total number of hooks set. Grooming rules updated the effort number of 52 bottom longline records, and the total number of hooks of 1 record. The location of fishing effort is commercially sensitive, and must be anonymised before being displayed in plots. The position of effort and observations were binned to $0.2^\circ \times 0.2^\circ$ cells before plotting, and the capture locations were downgraded by adding a random number, uniformly distributed between $\pm 0.1^\circ$, to both the latitude and longitude.

Observer data were linked to the fisher reported effort data where possible. Where a match was made, the position and target species details were taken from the effort data. For the 2007–08 fishing year, 96% of observed trawl events, 99% of observed surface longline sets, and 83% of observed bottom longline effort were matched to fisher records.

Table 1: Necropsied seabirds returned by the Ministry of Fisheries observer programme from 1 October 2007 to 30 September 2008, with the species identified by the observer and the species identified by necropsy. The codes are those used by the Ministry of Fisheries for non-fish catch.

Necropsied species		Observed species		Number
Sooty shearwater	*Puffinus griseus*	XSH	Sooty shearwater	119
		XBP	Black petrel	6
		XPE	Petrel (unidentified)	4
		XWC	White-chinned petrel	2
		XWM	White-capped albatross	1
White-capped albatross	*Thalassarche steadi*	XWM	White-capped albatross	64
		XSY	Shy albatross	10
		XAL	Albatross (unidentified)	3
		XSH	Sooty shearwater	1
		XBM	Buller's albatross	1
		XWC	White-chinned petrel	1
		XSA	Salvin's albatross	1
		XBP	Black petrel	1
White-chinned petrel	*Procellaria aequinoctialis*	XWC	White-chinned petrel	51
		XPE	Petrel (unidentified)	14
		XBP	Black petrel	3
Buller's albatross	*Thalassarche bulleri*	XBM	Buller's albatross	17
		XGM	Grey-headed albatross	1
Flesh-footed shearwater	*Puffinus carneipes*	XFS	Flesh-footed shearwater	5
		XSH	Sooty shearwater	5
		XBP	Black petrel	1
Salvin's albatross	*Thalassarche salvini*	XSA	Salvin's albatross	9
Grey petrel	*Procellaria cinerea*	XGP	Grey petrel	3
		XPE	Petrel (unidentified)	1
Albatross (unidentified)	Diomedeidae	XAL	Albatross (unidentified)	2
Northern giant petrel	*Macronectes halli*	XTP	Giant petrels (unidentified)	2
Black petrel	*Procellaria parkinsoni*	XPE	Petrel (unidentified)	1
		XSH	Sooty shearwater	1
Southern royal albatross	*Diomedea epomophora*	XWA	Wandering albatross	1
		XRA	Southern royal albatross	1
Campbell albatross	*Thalassarche impavida*	XKM	Black-browed albatross	1
Gibson's albatross	*Diomedea gibsoni*	XWA	Wandering albatross	1
Southern cape pigeon	*Daption capense*	XCP	Cape pigeon	1
Westland petrel	*Procellaria westlandica*	XWC	White-chinned petrel	1

2.1.1 Necropsy information

Observers retain some animals for necropsy. When the capture data were supplied, the necropsy information had not been integrated back into the observer database. The seabird necropsy data were obtained directly from David Thompson (NIWA) and merged with the observer records. The identities of six sea lions and one fur seal were confirmed by necropsy, with information obtained from Roe (2009). Where the observer had incorrectly identified a species, or had only provided a general classification, the records were updated to the species identified by necropsy. The necropsied animals are listed in Table 1 with both the observer and necropsy identifications.

As discussed by Thompson & Abraham (2009c), six black petrels were reported captured and released alive on three tows between 17 and 21 March 2008. Unfortunately, black petrel is used by some observers as a descriptive term, and applied to other black coloured petrels. It should strictly only be used for *Procellaria parkinsoni*, also known as Parkinson's petrel. The observer species were changed

to unidentified petrels because the captures occurred near the Auckland Islands, well outside of the black petrel range (Brooke 2004). One of the six birds was returned for necropsy from the trip and was identified as a flesh-footed shearwater. Four black petrels were confirmed by necropsy in 2007–08, one caught in a scampi trawl, and three on bottom longline sets targeting hapuku.

2.1.2 Data completeness

The necropsy data provide an independent check on the completeness of the observer non-fish bycatch database. When they are caught, the animals are tagged by the observer with trip, station, and specimen numbers, and a species code. This information is also written on the non-fish bycatch form and then entered into the database. The two data sources should reconcile. In the first half of 2007–08, a cross-check of the necropsy information against the COD data extract showed that there were non-fish bycatch records missing from 10 observed trawl trips (Thompson & Abraham 2009c). These data have subsequently been incorporated into COD. A further 3 observed trawl trips were identified from the second half of the 2007–08 that had missing non-fish bycatch information. Photocopies of non-fish bycatch forms from these trips were provided by Ministry of Fisheries Research Data and Reporting (RD+R) to complete the dataset.

As a further check on the completeness of the data, a spreadsheet of all observer trips for the 2007–08 fishing year was obtained from the Ministry of Fisheries. A detailed reconciliation was carried out between the trips that observers had been placed on, and the records from the COD database. No missing observer trip data were identified.

2.2 Excluded captures

Animals that land on the deck or collide with the vessel's superstructure were not considered to be fishing related bycatch. The capture method code and observer comments were used to identify deck captures, and they were excluded from the data. In addition, decomposing animals are assumed to have died of causes unrelated to the fishing effort and are excluded. In total, 73 bird captures were excluded from the 2007–08 fishing year, mainly because of deck landings. Two fur seal captures in the squid trawl fishery were also excluded, one that was found decomposing in a SLED, and one that had climbed on board. A record of a trawl caught whale skull was excluded.

2.3 Fishery and area classification

Trawl fishing events were assigned to fisheries on the basis of the species targeted by the fishing effort, following the classification used by Abraham & Thompson (2009a). Deepwater and middle depths trawl fisheries included squid, hoki, hake, ling, southern blue whiting, other deepwater fish (orange roughy, oreos, and cardinal fish), and scampi. Pelagic trawl included effort targeting jack and blue mackerel. Other middle depths trawl included effort targeting barracouta, ribaldo, rubyfish, alfonsino, bluenose, frostfish, ghost shark, gemfish, spiny dogfish, sea perch, and warehou. All inshore target species were reported together as inshore trawl and included 89 species codes. The most frequently caught inshore fish were flatfish (9 species), tarakihi, snapper, red cod, gurnard, trevally, John dory, and giant stargazer.

In the 2006–07 summary (Abraham & Thompson 2009a), the surface longline effort was sorted into three groups by vessel registration type. Domestic surface longline included all vessels registered in New Zealand. Australian chartered vessels formed a category of their own as they were small vessels (less than 30 m) whereas the rest of the charter surface longline fleet were over 50 m long. In this report

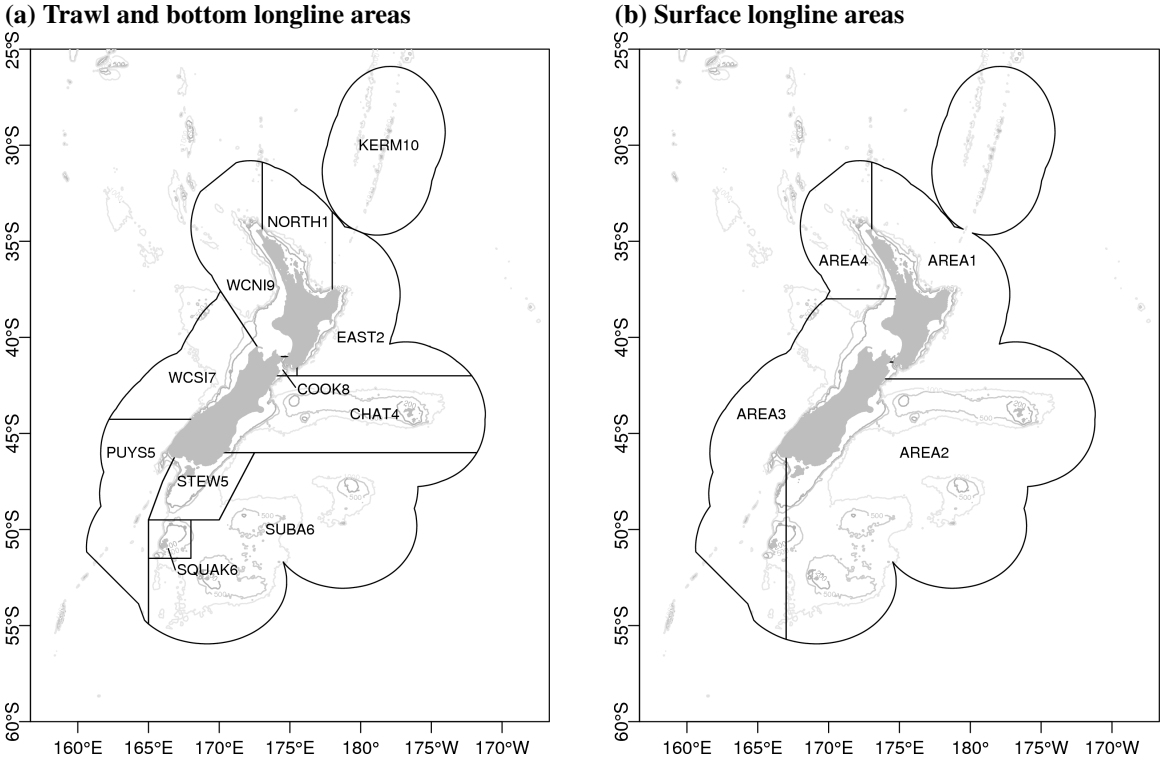

Figure 1: Reporting areas for trawl, bottom longline, and surface longline fisheries

surface fisheries are defined by the fisher declared target species, with southern bluefin tuna, bigeye tuna, swordfish, and other target species being used to define four fisheries. The charter vessels primarily target southern bluefin tuna, and the domestic vessels primarily target bigeye tuna.

Captures in all fisheries, apart from surface longline, were reported for the areas shown in Figure 1(a) (Abraham & Thompson 2009a, Thompson & Abraham 2009c). These were chosen to surround the prominent bathymetric features that are the focus of fishing effort. The areas included the Cook Strait, Stewart-Snares shelf, and Auckland Islands areas used in previous reports of protected species bycatch (e.g., Baird & Smith 2007, 2008). Away from these areas, the boundaries were chosen to avoid cutting through fishing grounds, and were aligned with the boundaries of the Fisheries Management Areas where possible. The areas used for reporting surface longline effort followed those defined previously (e.g., Baird & Smith 2007, 2008) and are shown in Figure 1(b).

2.4 Estimation of total captures

Ratio estimation rests on the assumption that the observed effort is similar to the unobserved effort. Fishing effort targeting the same species, with the same gear type, in the same area was considered similar. Effort was divided into strata based on the target species, fishing method, and fishing area. In this report, target species and method strata define 17 fisheries: 10 trawl fisheries, 3 surface longline fisheries, and 4 bottom longline fisheries. The EEZ was divided into 11 areas for the trawl and bottom longline fisheries, and into 4 areas for the surface longline. Using these definitions, there were 166 fishery-area strata.

Bird captures were divided into five groups: sooty shearwater, white-chinned petrel, white-capped albatross, other albatrosses, and other birds. The estimates were calculated separately for each of these groups. The other species captures estimated were New Zealand sea lion, New Zealand fur seal, common

dolphin, and turtles. In addition, a capture estimate was made for whales. Combining these species categories with the 166 fishery-area strata, there were a potential 1660 species-fishery-area combinations, each estimated separately.

The estimated total number of captures in a stratum, s, is

$$N_t^s = N_o^s + N_e^s \tag{1}$$

where N_o^s are the observed captures and N_e^s are the estimated captures during unobserved fishing. The unobserved captures are estimated using a ratio method. Note that the estimated total captures includes the observed captures. The captures during unobserved fishing, N_e^s, were calculated by multiplying the unobserved effort by the observed capture rate,

$$N_e^s = \frac{N_o^s}{O^s}(E^s - O^s)$$

where O^s is the amount of observed fishing effort, and E^s is the total fishing effort. Effort is measured in tows for trawl fisheries, and hooks for longline fisheries.

Two approaches were taken to estimate captures N_e^{sy} in each year y:

1. For strata with more than 10 observed captures in the 10 year period, ratio estimates were calculated independently in each year,

$$N_e^{sy} = \frac{N_o^{sy}}{O^{sy}}(E^{sy} - O^{sy}). \tag{2}$$

2. For strata with 10 or fewer observed captures in the 10 year period, the observed capture rate was estimated using observations from the whole 10year period, and then applied to the unobserved effort in each year,

$$N_e^{sy} = \frac{\sum_y N_o^{sy}}{\sum_y O^{sy}}(E^{sy} - O^{sy}). \tag{3}$$

Although there were 1660 possible combinations, not all of these strata had sufficient observed effort to make a reliable estimate. When less than 1% of the strata, or less than 100 tows (or 10 000 hooks), were observed, an estimate was not attempted. If separate estimates were being calculated for each year (Equation 2), then the ratio estimate may have been calculated for only some of the 10 years, depending on the observer coverage. Where the observed capture rate was calculated over all years (Equation 3), the check for sufficient observer coverage was made considering effort from the whole ten year period. This allowed estimates to be made in years when observer coverage was very low. The use of the second estimation method allows more strata to be included in the estimates.

The second method was also used for sooty shearwater captures in the Auckland Islands scampi trawl fishery. There were 20 sooty shearwater captures in this fishery, on only 10 separate trawls. Observer coverage in this fishery was low, and annual estimates could be made only in some years. By following the second method, variability in total seabird captures caused by this stratum coming in and out of the estimation was reduced.

The strata were combined together in various ways to present useful and interesting aggregates. For example, the fur seal captures in trawl fisheries summary (Section 3.14.1) includes 31 different strata, of which 15 have separate annual estimates. The estimate of captures in an aggregate is a sum over the strata of the total captures N_t^s in each of the strata,

$$N_t = \sum_s N_t^s. \tag{4}$$

Where the estimates are presented, the percentage of effort included in the estimate, f, is also given,

$$f = 100(O + \sum_s (E^s - O^s))/E, \tag{5}$$

where $O = \sum_s O^s$ is the total observed effort, $E = \sum_s E^s$ is the total effort, and the year index, y, is understood. This percentage indicates how much of the effort was observed at a level sufficient for making the estimate. Note that this includes the observed effort as well as effort over which captures were estimated. If all strata are included in the estimate of N_e then $f = 1$. At the other extreme, if no strata are sufficiently observed to be included in the estimate of N_e, then $N_t = N_o$ and $f = O/E$. The strata, s, which were included in the calculation of N_t, and the fraction of the total effort in the included strata ($\sum_s E^s/E$) are given in Appendix A, for each fishing year and fishery.

Out of the 1660 possible species-fisheries-area strata, only 478 were estimated, and of these only 74 had enough captures to calculate estimates separately for each year. Table 2 presents the number of species-fishery-area strata estimated, separately for each year and with all years together, by fishing method. There were 8062 capture events in the data, of which 7892 (98%) were in strata that were sufficiently well observed to be estimated, while 7370 (91%) of the captures were in strata that were estimated separately for each year.

Table 2: Number of species-fishery-area strata with enough observer coverage to allow an estimate to be calculated in at least one year, organised by fishing method and species group. The number of strata are given where estimates were made in separate years, and where they were made across all years.

	Trawl		Bottom longline		Surface longline	
	Annual	All years	Annual	All years	Annual	All years
Sooty shearwaters	8	32	1	15	-	10
White-chinned petrels	3	37	4	12	1	9
White-capped albatrosses	7	34	-	16	1	9
Other albatrosess	7	34	3	13	5	5
Other birds	8	33	5	12	3	7
Fur seals	14	26	-	16	2	8
Sea lions	2	39	-	-	-	-
Dolphins	1	40	-	-	-	-
Whales	-	12	-	-	-	10
Turtles	-	-	-	-	-	10

The uncertainty in the total captures, N_t, was estimated by bootstrap resampling (e.g., Davison & Hinkley 1997). The observed fishing events were resampled 5000 times, and the total bycatch was recalculated for each sample from Equations 2, 3, 4. The 95% confidence interval in the estimate was calculated from the 2.5% and 97.5% quantiles in the distribution of the resampled total catch. When the estimate was done with all years together, the confidence interval was a fixed proportion of the estimate in each year. This is because the uncertainty came from the capture rate estimate, which was applied across all years.

In Table 3 the percentage of effort included in the estimates of total captures is given for each of the bycatch species groups. The method used by Abraham & Thompson (2009a) did not depend on which species was being estimated, and the percentages calculated using this method are included for comparison. The inshore fishery was very poorly observed, but accounted for 52% of all trawl effort in the 10 year period. When this is excluded, over 90% of the remaining trawl effort is included in the capture estimates for most species. This is an improvement from the 66.8% of trawl effort (other than inshore) that was included if the method used by Abraham & Thompson (2009a) was followed.

There was also a marked improvement in the percentage of effort included in surface longline fisheries, from 64.1% to 98.2% for sooty shearwater, white-chinned petrel, and white capped albatross, and to over

Table 3: The percentage of fishing effort included in estimates, arranged by fishing method and species group. The corresponding percentages calculated following the method of Abraham & Thompson (2009a) are included for comparison. The percentage of trawl effort used in estimates excluding inshore fisheries is also included.

	Percentage of effort in estimates			
	Trawl	Trawl[a]	Bottom longline	Surface longline
Abraham & Thompson (2009a)	33.0	66.8	55.1	64.1
Sooty shearwaters	42.7	88.5	59.0	98.2
White-chinned petrels	46.3	95.9	54.3	98.2
White-capped albatrosses	46.0	95.3	59.6	98.2
Other albatrosess	46.0	95.1	55.6	84.2
Other birds	46.0	95.1	63.1	84.7
Fur seals	43.6	90.3	59.6	94.9
Sea lions	46.4	96.0	-	-
Dolphins	46.4	96.0	-	-
Turtles	-	-	-	98.2

[a] Trawl fisheries excluding inshore fisheries

80% for other albatrosses, other birds, and fur seals. The change in method has had less effect on bottom longline fisheries with less than 70% of total effort being included in the estimation.

3. RESULTS

3.1 Observed captures

A summary of all observed captures of seabirds, marine mammals and turtles is given in Table 4. This table reports the number of captures of each species identified either by necropsy or by observers. Where animals have been necropsied, the necropsy identification takes precedence. The captures are categorised by whether the animals were captured dead or released alive, and by whether they were caught in the net, on a warp, on a hook, or elsewhere. The numbers of animals that were reported by observers but that were excluded from the data summary are also given.

Deck landings recorded by observers, and decomposed or skeletal remains, were excluded from the summary. A trial was carried out during the 2007–08 fishing year on a surface longline vessel to test the efficacy of dyeing bait blue at reducing the number of birds that are hooked. There were three Antipodean albatrosses (*Diomedea antipodensis*) and one Campbell albatross (*Thalassarche impavida*) killed during the 8 sets (4390 hooks) on this trip. The trip (long-line trip number 245; observer trip number 2620) was carried out under a special permit, bird captures from this trip are not included elsewhere in the report. In past years, captures recorded on trips carrying out research on bycatch mitigation have also been excluded (Abraham & Thompson 2009a).

The animals that were most frequently observed caught during the 2007–08 fishing year were New Zealand fur seals, with 151 animals caught across all fisheries. Many of the captured fur seals (27.7%) were released alive. Most observed fur seal captures (92.6%) were in trawl nets. Sooty shearwater, white-chinned petrel, and white-capped albatross were the bird species that were most frequently observed caught, with most of these animals being caught in trawl fisheries. Sooty shearwater was the bird species that most frequently landed on deck. Buller's albatross (*Thalassarche bulleri*) was the bird species most frequently observed caught in longline fisheries.

Table 4: All seabird, marine mammal, and turtle captures in trawl, bottom longline, and surface longline fisheries recorded by the Ministry of Fisheries observer programme from 1 October 2007 to 30 September 2008, showing the number of captures, the total number of records including decomposing animals and deck landings, the number reported alive, dead, or decomposing, the number returned and necropsied, and the number of animals caught in the net, on the warp or elsewhere.

Species	Captures	Capture status		Nec.	Capture location				Exclusions		
		Alive	Dead		Net	Warp	Hook	Oth.	Deck	Deco.	Res.
New Zealand fur seal	151	41	110	1	140	-	10	1	1	1	-
Sooty shearwater	82	11	71	68	72	2	-	2	28	-	-
White-chinned petrel	74	8	66	62	59	-	4	1	3	-	-
White-capped albatross	44	4	40	40	27	10	3	4	5	3	-
Buller's albatross	44	14	30	25	13	4	21	-	2	-	-
Common dolphin	20	-	20	-	20	-	-	-	-	-	-
Salvin's albatross	11	2	9	5	1	7	2	1	4	-	-
New Zealand sea lion	11	1	10	6	11	-	-	-	-	-	-
Unidentified petrel	9	9	-	-	4	1	1	3	2	-	-
Flesh-footed shearwater	7	2	5	5	2	-	5	-	-	-	-
Grey petrel	7	1	6	6	1	-	1	1	-	-	-
Grey-faced petrel	6	-	6	6					-	-	-
Black petrel	4	-	4	4	1	-	-	-	1	-	-
Campbell albatross	4	-	4	4	1	-	-	-	-	-	1
Unidentified small seabird	3	3	-	-	3	-	-	-	-	-	-
Cape petrel	2	2	-	-	-	1	-	-	2	-	-
Black-browed albatross	2	1	1	-	-	-	2	-	-	-	-
Southern royal albatross	2	-	2	2	2	-	-	-	-	-	-
Wandering albatross	2	1	1	1	-	-	1	-	-	-	-
Unidentified albatross	1	-	1	1	1	-	-	-	6	1	-
Antipodean albatross	1	-	1	1	-	-	1	-	-	-	3
Fairy prion	1	1	-	-	1	-	-	-	3	-	-
Unidentified giant petrel	1	-	1	-	-	-	-	1	2	-	-
Westland petrel	1	-	1	1	1	-	-	-	2	-	-
Bottlenose dolphin	1	-	1	-	1	-	-	-	-	-	-
Gibson's albatross	1	-	1	1	-	-	1	-	-	-	-
Leatherback turtle	1	1	-	-	-	-	1	-	-	-	-
Shy albatross	1	-	1	-	-	-	-	1	-	-	-
Whale	1	1	-	-	-	-	1	-	-	-	-
Unidentified storm petrel	-	-	-	-	-	-	-	-	4	-	-
Unidentified prion	-	-	-	-	-	-	-	-	3	-	-
Common diving petrel	-	-	-	-	-	-	-	-	1	-	-
Dolphins and toothed whales	-	-	-	-	-	-	-	-	-	1	-
Grey-backed storm petrel	-	-	-	-	-	-	-	-	1	-	-
Unidentified seal	-	-	-	-	-	-	-	-	-	1	-
White-faced storm petrel	-	-	-	-	-	-	-	-	1	-	-

In 2007–08 one Westland petrel (*Procellaria westlandica*) was caught in the West Coast South Island trawl fishery targeting barracouta, and four black petrels were caught in the northeast fishing area: one in the scampi trawl fishery and three in the bottom longline fishery targeting hapuku. All five of these birds were formally identified by necropsy. Both petrel species are classified as vulnerable by the IUCN (2008).

Two black-browed albatrosses (*Thalassarche melanophrys*) were reported caught in 2007–08: one in the northeast southern bluefin surface longline fishery and the other in the subantarctic ling trawl fishery. The black-browed albatross is classified as endangered (IUCN 2008); however, these birds were not necropsied and observers often misidentify the closely related Campbell albatross as black-browed albatross. There were 4 great albatrosses (family Diomedeidae) observed caught: a single wandering albatross (*Diomedea exulans*) killed in the northeast southern bluefin tuna fishery, a wandering albatross

caught and released alive in the northeast bluenose longline fishery, a Gibson's albatross (*Diomedea gibsoni*) killed in the northeast bigeye tuna fishery, and an Antipodean albatross killed in the northeast southern bluefin tuna fishery. This compares with observed captures of 30 great albatrosses in 2006–07.

Although most fur seals caught in surface longline fisheries were caught in the southwest tuna longline fishery near Fiordland, two fur seals were caught and released in the far north of surface longline Area 4, southeast of Norfolk Island. This was the most northern record for fur seals collected by the observer programme. As these seals were released alive and no photographs were taken, it was not possible to confirm their identity, but fur seals have been recorded as vagrants in the Cook Islands (McCormack 2007) so these northern captures were within their range. No fur seals were caught in the bottom longline fishery.

There were 11 observed captures of the New Zealand sea lion in 2007–08. New Zealand sea lions are classified as vulnerable by the IUCN (2008). Five were killed in the Auckland Islands squid fishery; five were killed in the southern blue whiting trawl fisheries; and one was released alive from a hoki trawl on the Stewart-Snares shelf. Three of the sea lions killed in the southern blue whiting trawl fisheries were caught in October, at the end of the 2007 southern blue whiting season. Sea lion exclusion devices (SLEDs) are used in the Auckland Islands squid fishery. These are grids that prevent sea lions from entering the codend, with a hole in the top of the net where sea lions can either escape or be ejected. The observed captures do not include animals that are excluded from the codend by SLEDs. In the Auckland Islands squid fishery, observers are requested to record the location where the sea lion was first observed. Of the five animals: one was stuck in the SLED; one was recovered from the SLED lengthener, before the grid; two were first seen in the pounds, with the observer recording that the net was only opened on the codend side of the grid; and there was one sea lion where the capture location was not reported.

Common dolphins (*Delphinus delphis*) were the most frequently caught cetacean in 2007–08, with 20 observed killed in the jack mackerel trawl fishery (see Table 47). One bottlenose dolphin (*Tursiops truncatus*) was observed caught during the 2007–08 fishing year in the Hauraki Gulf by a trawler targeting John dory. This is the second observed capture of this species in 11 years; the last reported bottlenose dolphin was caught and released alive in January 1997 in the Bay of Plenty bigeye longline fishery. No dolphins were caught in longline fisheries. There were no Hector's dolphins (*Cephalorhynchus hectori*) or Maui's dolphins (*Cephalorhynchus hectori maui*) observed caught in trawl or longline fisheries, although there was poor observer coverage in the inshore waters where these dolphins live. There were 14 pilot whales caught between the 1998–99 and 2005–06 fishing years across a range of fisheries, but no captures were observed in either of the 2006–07 or 2007–08 fishing years.

A single whale was caught in the southern bluefin tuna longline fishery in the Bay of Plenty (see Table 49). The observer described the whale in their notes as a bottlenose whale (*Hyperoodon planifrons*). It is unclear whether this was the correct identification, as no photographs of the animal were taken. The observer noted that it was 800 cm in length, and that there were also bottlenose dolphins and pilot whales (*Globicephala melas*) around the vessel. The animal was entangled by a snood and was released alive. All eight whale captures in the previous nine years, excluding pilot whales, have been in the surface longline fishery.

One leatherback turtle (*Dermochelys coriacea*) was caught in the swordfish surface longline fishery and was subsequently released alive.

A summary of all observed seabird, marine mammal, and turtle captures, categorised by target species, is presented in Table 5. The numbers of seabirds, mammals, and turtles caught within trawl, surface longline, and bottom longline fisheries are given in decreasing order of capture. Fishing effort and the percentage of effort observed is also given, to provide a context for the number of captures. Target

Table 5: Seabird, marine mammal, and turtle captures in trawl, bottom longline, and surface longline fisheries by species group and target species in 2007–08, from 1 October 2006 to 30 September 2008. The fisheries are presented in decreasing order of the total captures (seabirds and mammals).

		Effort (tows or hooks)	% observed	Sooty shearwater	White-capped albatross	Other albatrosses	White-chinned petrel	Other birds	**All birds**	New Zealand fur seal	New Zealand sea lion	Cetaceans	Turtles
Trawl													
Squid	SQU	4 237	34.2	68	38	6	44	7	**163**	6	5	-	-
Hoki	HOK	8 794	21.9	3	2	12	8	3	**28**	58	1	-	-
Hake	HAK	1 543	25.3	3	-	-	-	1	**4**	28	-	-	-
Southern blue whiting	SBW	816	40.6	-	-	2	-	1	**3**	24	5	-	-
Jack mackerel	JMA	2 620	30.5	-	-	1	-	-	**1**	6	-	20	-
Scampi	SCI	4 807	10.9	2	-	4	-	5	**11**	1	-	-	-
Ling	LIN	2 202	10.9	-	1	2	3	1	**7**	4	-	-	-
Barracouta	BAR	3 168	8.2	-	-	-	3	1	**4**	9	-	-	-
Silver warehou	SWA	1 142	6.0	-	1	2	2	-	**5**	-	-	-	-
Black oreo	BOE	1 024	36.1	-	-	1	-	1	**2**	2	-	-	-
Oreos	OEO	650	39.2	-	-	-	-	1	**1**	2	-	-	-
Spiny dogfish	SPD	304	2.3	-	-	1	-	-	**1**	-	-	-	-
Tarakihi	TAR	11 352	0.3	-	-	-	-	1	**1**	-	-	-	-
Red cod	RCO	3 081	0.2	-	-	1	-	-	**1**	-	-	-	-
Orange roughy	ORH	3 695	44.0	-	-	-	-	1	**1**	-	-	-	-
Blue mackerel	EMA	21	19.0	-	-	-	-	-	-	1	-	-	-
John dory	JDO	2 106	0.3	-	-	-	-	-	-	-	-	1	-
Surface longline													
Southern bluefin tuna	STN	1 107 825	31.2	-	3	22	4	1	**30**	8	-	1	-
Bigeye tuna	BIG	973 629	2.5	-	-	4	-	2	**6**	2	-	-	-
Swordfish	SWO	125 330	16.7	-	-	-	-	1	**1**	-	-	-	1
Bottom longline													
Ling	LIN	19 189 093	16.9	5	-	3	9	5	**22**	-	-	-	-
Hapuku	HAP/HPB	2 228 886	5.5	1	-	1	-	9	**11**	-	-	-	-
Bluenose	BNS	9 344 577	2.5	-	-	6	1	-	**7**	-	-	-	-

fisheries are only included in this table if they had observed captures during 2007–08.

Most of observed bird captures in trawl fisheries (163 out of 233, or 70.0%) were on squid target trawls. Sooty shearwater, white-capped albatross, white-chinned petrels, and other birds were all observed caught more often on squid target trawls than in other trawl fisheries. Although tarakihi was the fish species that was most frequently targeted by trawlers, with a total of 11 352 trawls during 2007–08, only 32 of these trawls were observed and there was 1 observed bird capture. Fur seals and albatrosses (other than white-capped albatross) were most frequently observed caught on hoki target trawls. The southern bluefin tuna fishery had the most observed captures of both birds (30 of 37) and fur seals (8 of 10) of the surface longline fisheries. In this fishery albatrosses (other than white-capped albatross) were the birds that were caught most frequently. In bottom longline fisheries, most of the effort in observed fisheries was targeting ling. Although there were over 9 000 000 hooks during 2007–08 on snapper target sets, there were no observations made in this fishery, and so it does not appear in this table. There were a total of 40 observed seabird captures in bottom longline fisheries, with 22 of these being on sets targeting ling.

This report includes only summary pages for species-fisheries groups that had observed captures during either of the 2006–07 or 2007–08 fishing years. There were a number of other seabird, marine mammal, and turtle captures that occurred before 2006–07 and are not presented elsewhere. These are listed in Table 6. For summaries of these captures in previous years, see Abraham & Thompson (2009a).

Table 6: Captures that occurred in trawl and longline fisheries between October 1998 and September 2008, but that were not in strata that had observed captures in the 2006–07 or 2007–08 fishing years. These captures are not included elsewhere in the report.

Species		Fishing method	Captured	Necropsied
Pilot whale	*Globicephala melas*	Trawl	9	0
White-capped albatross	*Thalassarche steadi*	Bottom longline	8	1
New Zealand fur seal	*Arctocephalus forsteri*	Bottom longline	4	0
Pilot whale	*Globicephala melas*	Bottom longline	3	0
Leopard seal	*Hydruga leptonyx*	Trawl	3	2
Common dolphin	*Delphinus delphis*	Surface longline	2	0
Pilot whale	*Globicephala melas*	Surface longline	2	0
Dusky dolphin	*Lagenorhynchus obscurus*	Surface longline	2	0
Shy albatross	*Thalassarche cauta*	Bottom longline	1	0
Green turtle	*Chelonia mydas*	Bottom longline	1	0
Bottlenose dolphin	*Tursiops truncatus*	Surface longline	1	0
New Zealand sea lion	*Phocarctos hookeri*	Surface longline	1	0
Porpoise		Surface longline	1	0
Elephant seal	*Mirounga leonina*	Trawl	1	1

3.2 Data summaries

The following sections of the report summarise the captures of seabirds, marine mammals, and turtles in time-series form for the fishing years 1998–99 to 2006–07, with more detailed information provided for the 2006–07 and 2007–08 fishing years. Summaries are given in two sets: the first set, Sections 3.7 to 3.17, are of captures by protected species group (for example, white-capped albatrosses, or sea lions); the second set, Sections 3.18 to 3.20, are of captures of birds, mammals, and turtles by fishery (for example, the hake trawl fishery). Where there were no captures during any of the 10 years (for example, sea lions in the ling fishery) the corresponding data summary is not included.

Each summary includes a set of tables and plots. The content of these tables changes depending on the particular species and fishery. For sections that refer to individual species groups or specific fisheries (for example, white-capped albatross or the hoki trawl fishery) the first table summarises effort, observed and estimated captures by fishing area for the 2006–07 and 2007–08 fishing years only. The second table lists all the data given in the accompanying sets of plots summarising the effort, observations, captures, and estimated captures for the previous 10 years (1998–99 to 2008–09). In two cases, namely all bird captures in all trawl fisheries (see Table 7) and fur seal captures in all trawl fisheries (see Table 43) there were captures in too many fishery-area strata to present them all individually. Rather, tables are given that separately aggregate captures by fishery and by area. Where the captures of composite groups are summarised, a breakdown of observed captures by individual species over the whole 10 year period is given (see, for example, other bird captures in surface longline fisheries, Table 38).

Accompanying the tables are a set of plots that are in the same format for all species groups and fisheries. In subfigure (a) the ratio estimated captures are shown, calculated following the expressions in Section 2.4. The estimated number of captures is given, with the error bars indicating the 95% bootstrap confidence intervals. The red line indicates the percentage of effort that was included in each yearly ratio estimate, following Equation 5.

Subfigure (b) gives a map of the effort (as determined from the start position of the tow or set), observations and captures for the 2007–08 fishing year. The cells are coloured by the fishing effort within each $0.2^\circ \times 0.2^\circ$ area. The number of observations is shown by a black dot, where the increasing size of the dot reflects increasing numbers of observations. Coloured cells with no black dot indicate unobserved

effort. The location of captures is indicated by a red dot (with the location being only accurate to within 0.2° of latitude and longitude). Maps of observed effort and captures for all birds in all trawl fisheries are presented in detail in Figure 3.

In subfigure (c), a time series of the observed captures is represented by a bar plot. Bar height represents the total number of captures, with the dark part of the bar representing dead captures and light part representing live captures. The red line shows the raw capture rate: the ratio of the number of captures in each year to the observed fishing effort.

In subfigure (d) the total effort and total observed effort with each year are given. This helps in making an assessment of whether trends in (a) and (c) were due to changes in effort or observer coverage. The red line indicates the percentage of effort within the fishery that was observed.

3.3 Seabird captures – estimates and trends

Estimated captures of all birds in trawl fisheries decreased from 1023 (95% c.i.: 906 to 1150, based on 40.9% of effort) in 2006–07 to 911 (95% c.i.: 797 to 1040, based on 40.8% of effort) in 2007–08, a decrease of 13.2%. Between the two years there was a decrease of 13.9% in the total number of trawls, and a 10.8% decrease in the number of trawls in all trawl fisheries other than inshore trawl. The decrease in the estimated captures of all birds reflects the decrease in the trawl effort. The estimates in the two years were based on a similar percentage of the total effort, and the strata with the most captures were included in both years. The trawl fisheries with estimated captures of over 100 birds were squid, scampi, and hoki. Over 95% of the effort in these fisheries was included in the estimates. The decrease in captures occurred across all three of these fisheries, and there was also a decrease in the middle-depths fishery.

Estimated captures in trawl fisheries were highest on the Stewart-Snares shelf (328 captures, 95% c.i.: 272 to 394). The Stewart-Snares shelf includes inshore fisheries on the Southland and Otago coast that were not observed, and only 33.8% of the total effort in this area was included in the estimate. Other areas with estimated captures of over 100 birds were the Chatham Rise and the Auckland Islands.

Inshore trawl fisheries remain poorly observed, with only 0.3% of trawls being observed in 2007–08. In the 2007–08 fishing year, 56.1% of trawls were in inshore fisheries, yet none of the inshore strata were sufficiently well observed for estimates of total captures to be made. This lack of information from a large fraction of the total trawl effort restricts understanding of the impact of trawl fishing on seabirds and other protected species.

The distribution of seabird captures across all trawl fisheries is seen in detail in Figure 3 for the 2007–08 year. The lack of observer coverage in inshore fisheries is clear. The geographic variation in where different seabirds have been observed caught can be seen. The Stewart Snares shelf and the Auckland Islands have high numbers of observed captures, across all the species groups. In contrast, there were only five birds caught in the North Island across all trawl fisheries. These were four flesh-footed shearwaters (*Puffinus carneipes*) and one black petrel; all from the northeast scampi trawl fishery.

3.3.1 Sooty shearwater

Estimated captures of sooty shearwater in trawl fisheries decreased to 241 (95% c.i.: 186 to 308, based on 40.2% of effort) in 2007–08, from 332 (95% c.i.: 265 to 405, based on 39.5% of effort) in 2006–07 (see Table 14). Over 64% of sooty shearwater captures in trawl fisheries were on the Stewart-Snares shelf in the squid fishery (see Table 13). Sooty shearwaters were not caught in surface longline fisheries

during 2007–08, with low and sporadic estimates in prior years (see Table 15). There were 71 (95% c.i.: 9 to 180, based on 61.6% of effort) estimated captures in bottom longline fisheries for 2007–08, an increase from the 2006–07 estimate of 11 (95% c.i.: 2 to 31, based on 57.1% of effort) (see Table 17). The uncertainties are large, however, and the increase was not significant.

3.3.2 White-chinned petrel

White chinned petrels were primarily caught in trawl fisheries. Estimated captures in trawl fisheries during 2007–08 were 171 (95% c.i.: 126 to 235, based on 40.7% of effort), an increase from the 2006–07 estimate of 120 (95% c.i.: 89 to 156, based on 40.9% of effort) (see Table 20). Most trawl captures were in the squid trawl fishery in the Stewart-Snares and Auckland Islands fishing areas. In 2007–08, these two areas accounted for 63.2% of estimated white-chinned petrel captures in trawl fisheries, and 46.2% of estimated captures in all fisheries (see Table 19). These fishing areas were sufficiently well observed from 1998–99 to 2007–08 for an estimate to be made that was comparable between years, and the increase between 2006–07 and 2007–08 is not due to changes in which areas were included in the estimates.

There were very low numbers of white-chinned petrel caught in surface longline fisheries, with an estimate for 2007–08 of 16 (95% c.i.: 9 to 25, based on 98.2% of effort). This estimate was consistent with estimated captures for the previous nine years (see Table 22). Estimated captures of white-chinned petrel in bottom longline fisheries for 2007–08 were 50 (95% c.i.: 20 to 90, based on 61.6% of effort). Although this figure was higher than the previous year (30 , 95% c.i.: 14 to 63, based on 53.7% of effort) it was comparable with estimates for the previous five years, with there being a marked decrease in the number of estimated captures after 2002–03 (see Table 24).

3.3.3 White-capped albatross

Over 90% of observed captures of white-capped albatross were in the squid trawl fishery, in the Auckland Islands and Stewart-Snares fishing areas (see Table 25). The squid fishery in the Auckland Islands area is divided into two parts. In 2007–08, white-capped albatross were caught on the northwest Auckland Islands shelf, with no captures being observed in the fishery to the east of the islands. Captures have been decreasing since 2005–06, and the estimated captures of 170 (95% c.i.: 136 to 209, based on 40.8% of effort) were lower in 2007–08 than in any of the previous nine fishing years (see Table 26). The decrease in captures is consistent with the introduction of mitigation devices in trawl fisheries that deter birds from entering the region between the stern of the vessel and the warps (Abraham & Thompson 2009b). The breakdown of white-capped albatross captures by location shows that 27 were caught in the net compared with 10 on the warp (see Table 4). Three white-capped albatross were caught in surface longline fisheries (see Table 28). Although there were no observed captures in bottom longline fisheries in 2006–07 and 2007–08, there were low and sporadic captures between 1999–2000 and 2005–06 (Abraham & Thompson 2009a).

3.3.4 Other albatrosses

In 2007–08, there were an estimated 206 (95% c.i.: 145 to 289, based on 41.8% of effort) other albatrosses caught in a range of trawl fisheries. Over the 10 year period the most frequently caught species in this fishery were Salvin's albatross and Buller's albatross. The highest estimated number of captures in any single fishery-area stratum was in the scampi fishery on the Chatham Rise, with 44 captures (95% c.i.: 4 to 113) (see Table 29). The high uncertainty in this number reflects the low observer

coverage in this fishery, with only 185 trawls observed (9.2% of the effort). The estimated number of other albatross captures in trawl fisheries was similar in 2007–08 to 2006–07, with there being a general decline in the estimates since a 1999–2000 peak of 660 (95% c.i.: 447 to 913, based on 49.3% of effort) estimated captures (see Table 30).

Estimated captures of other albatrosses in surface longline fisheries decreased from 451 (95% c.i.: 281 to 670, based on 99.0% of effort) in 2006–07 to 289 (95% c.i.: 62 to 638, based on 98.2% of effort) in 2007–08 (see Table 32). This reversed a five year trend of increasing other albatross captures in surface longline fisheries. The peak in 2006–07 was partly associated with a single trip by a vessel targeting swordfish; however, there was also a decrease in estimated captures and effort in the Area 3 southern bluefin fishery between 2006–07 and 2007–08. In contrast, captures in the Area 1 bigeye tuna fishery increased from 41 (95% c.i.: 2 to 100, based on 100.0% of effort) in 2006–07 to 220 (95% c.i.: 4 to 573, based on 100.0% of effort) in 2007–08 (see Table 31). However, estimated captures in the Area 1 bigeye tuna fishery are based on low observer coverage (less than 5% of hooks observed), and the uncertainty is high.

In 2006–07, there were a large number of observed captures of other albatrosses in the ling bottom longline fishery (see Table 33), resulting in an estimated 832 (95% c.i.: 172 to 1 749, based on 53.7% of effort) captures in bottom longline fisheries (see Table 34). In 2007–08, the estimated captures were 83 (95% c.i.: 31 to 145, based on 61.6% of effort) (see Table 34). This was on the same order as annual estimated captures between 2001–02 and 2005–06.

3.3.5 Other birds

Other bird species were observed caught in low numbers across a wide range of trawl fisheries and geographic areas (see Table 35). Cape petrel, flesh-footed shearwater, and grey petrel are the species that have been most frequently observed caught in trawl, surface longline, and bottom longline fisheries, respectively.

Between 2001–02 and 2006–07, the estimated number of other bird captures in trawl fisheries were all between 123 and 223 (see Table 36). The 2007–08 estimate of other bird captures in trawl fisheries was the lowest in the 10 years at 123 (95% c.i.: 86 to 167, based on 41.8% of effort).

Estimated captures of other birds in surface longline fisheries were highly variable, ranging from 3810 in 2001–02 to 45 in 2004–05, being less than 300 in each year since 2002–03 (see Table 38). While the 2007–08 estimate of 131 (95% c.i.: 14 to 362, based on 98.2% of effort) was low, the variability suggests that this estimate must be treated with some caution. Similarly, estimates of other bird captures in bottom longline fisheries have been variable, with an estimate in 2005–06 of 243 (95% c.i.: 101 to 424, based on 97.2% of effort) captures (see Table 40).

In 2007–08 there were an estimated 163 (95% c.i.: 64 to 287, based on 61.6% of effort) other birds caught in bottom longline fisheries, a number that was similar to the 2006–07 estimate. The variability in the estimates may reflect the variation in which strata were included in the estimation (see Appendix A).

3.4 Marine mammal captures – estimates and trends

3.4.1 New Zealand sea lions

Estimated captures of sea lions were primarily in the subantarctic southern blue whiting fishery (12 captures), the Auckland Islands squid fishery (11 captures), and the Auckland Islands scampi fishery (11 captures) (see Table 41). The 2007–08 total estimate of 39 (95% c.i.: 27 to 51) sea lion captures decreased from the estimated value of 43 (95% c.i.: 30 to 57) calculated for the previous year (see Table 42). Sea lions were not caught in longline fisheries. Observer coverage in the scampi fishery has been low, and there were only 9 observed sea lion captures in the 10 year period (see Table 80). The estimate of sea lion captures in this fishery has been carried out by applying a single rate across all years.

These estimates do not include any account of sea lions that were excluded by sea lion exclusion devices (SLEDs). SLEDs were used in the Auckland Islands squid fishery to reduce the number of sea lion captures. The numbers presented here provide estimates of the number of captures that would have been seen had there been observers on all vessels. These numbers can be interpreted as an estimate of the minimum direct impact of trawl fishing on sea lions. SLEDs were progressively introduced into the Auckland Islands squid fishery from the 2000–01 fishing year. Since the 2003–04 fishing year they have been used on over 90% of trawls in the Auckland Islands squid fishery, being used on close to 100% of trawls since 2005–06.

A full statistical model of sea lion captures up until the 2006–07 fishing year was given by Thompson & Abraham (2009b). The ratio-estimated sea lion captures in 2004–05, 2005–06, and 2006–07, were all within the 95% confidence intervals of the model based estimates (Thompson & Abraham 2009b). In addition to captures, the statistical model gave estimates of total sea lion interactions, including sea lions that would have been caught had no SLEDs been used.

3.4.2 New Zealand fur seals

In 2007–08, there were an estimated 622 (95% c.i.: 522 to 730, based on 40.1% of effort) fur seals caught in all trawl fisheries (see Table 44). This was similar to the 2006–07 estimate. Most of these estimated captures were in the hoki fishery (327, 95% c.i.: 237 to 425, based on 96.9% of effort) (see Table 43). Estimated captures were split between the Cook Strait, the West Coast South Island, and the Chatham Rise fishing areas. Of these, the highest number of estimated captures were in Cook Strait (207, 95% c.i.: 131 to 299, based on 54.6% of effort) (see Table 43).

Observed fur seal captures in surface longline fisheries have steadily decreased over the last 10 years (see Table 46). Estimated captures for 2007–08 were 30 (95% c.i.: 18 to 44, based on 98.2% of effort), the lowest in 10 years. There were no fur seal captures in bottom longline fisheries.

3.4.3 Dolphins and whales – estimates and trends

The 2007–08 ratio estimate of common dolphin captures was 69 (95% c.i.: 30 to 122, based on 41.8% of effort), an increase from the 2006–07 fishing year estimate of 47 captures (95% c.i.: 20 to 83, based on 40.9% of effort) (see Table 48). A model-based estimate of dolphin captures in the jack mackerel fishery was given by Thompson & Abraham (2009a), in 2006–07 the model estimated captures were 52 (95% c.i.: 22 to 106). The ratio estimate was within this range.

Sporadic whale captures over the 10 year period resulted in an estimate of 2 whale captures in 2007-08

(95% c.i.: 1 to 4, based on 98.2% of effort), all in the northeastern southern bluefin surface longline fishery (see Table 49). This estimate was calculated by applying the catch rate calculated from all years to the 2007–08 effort data.

3.5 Turtle captures – estimates and trends

A summary of turtle captures is given in Section 3.17. There were 14 turtles caught in surface longline fisheries over the last 10 years, with only one individual caught in the 2007–08 fishing year (see Table 52). The animal was identified as a leatherback turtle and released alive. The ratio estimate of captures was 16 (95% c.i.: 8 to 25) for 2007–08; the lowest ratio estimate in 10 years (see Table 52).

Turtle captures occur throughout Area 1, and throughout the year (Abraham & Thompson 2009a). The total number of captures over the last 10 years was low, and the estimates were calculated using a single capture rate for the whole period, for each of the five strata with captures (see Table 51). Most estimated captures were in the bigeye surface longline fishery. In this fishery, the observed capture rate across all years was 0.012 turtles per thousand hooks.

3.6 Captures by fishery

Summaries of the bycatch data for all trawl, surface longline, and bottom longline fisheries are given in Sections 3.18, 3.19, and 3.20 respectively.

The squid trawl fishery had the highest number of estimated seabird captures, followed by the hoki and scampi trawl fisheries (see Table 7). The squid trawl fishery in 2007–08 had the lowest effort of any of the 10 years of the data, with a decrease of 28.3% between 2006–07 and 2007–08. The estimated captures of all birds in the squid fishery was 440 (95% c.i.: 379 to 511, based on 99.9% of effort) in 2007–08, the lowest estimate since 1999–2000, but not significantly different from the 2006–07 estimate (see Table 53). In 2007–08 there were 12 (95% c.i.: 7 to 18, based on 99.9% of effort) estimated sea lion captures, (see Table 56) and 30 (95% c.i.: 18 to 44, based on 99.9% of effort) estimated fur seal captures (see Table 58). Estimates of sea lion and fur seal captures in the squid fishery were the lowest for the last 10 years. As discussed previously, figures for sea lion captures in this fishery do not include sea lions that were excluded by SLEDs.

Observed captures of birds in the hoki trawl fishery were generally few in number and scattered across the Chatham Rise, West Coast South Island, and Stewart-Snares areas (see Table 59). The 2007–08 estimated captures of seabirds (147, 95% c.i.: 93 to 217, based on 97.9% of effort) were the lowest in the 10 years (see Table 60). Effort in the hoki fishery was also the lowest in the ten years, with a 17% decrease in the number of trawls between 2006–07 and 2007–08. In contrast, the related hake (see Table 66) and ling (see Table 70) trawl fisheries showed an increasing trend. In the hoki trawl fishery, the majority of fur seals were caught in the Cook Strait and West Coast South Island areas (see Table 63). Estimated fur seal captures in the hoki fishery for 2007–08 were 327 (95% c.i.: 237 to 425, based on 96.9% of effort) (see Table 64).

Estimated captures in deepwater trawl fisheries remained low, with an estimated 7 (95% c.i.: 4 to 11, based on 99.4% of effort) captures in 2007–08 (see Table 74). There were 4 observed fur seal captures in deepwater trawl fisheries in 2007–08.

Effort in the scampi fishery has been relatively consistent over the last 10 years. Estimated captures of birds in this fishery have not varied widely, with a peak of 156 in 2006–07 (95% c.i.: 104 to 218, based

on 100.0% of effort) decreasing to 139 (95% c.i.: 79 to 221, based on 100.0% of effort) estimated bird captures in 2007–08 (see Table 78). The difference in these estimates was not significant. Bird captures were spread across the scampi fishing areas (see Table 77). Although there were no observed captures of sea lions in the scampi fishery for 2007–08, there were sporadic captures in the previous nine years in the Auckland Islands scampi fishery. These captures contributed to the 2007–08 estimate of 11 (95% c.i.: 5 to 19, based on 100.0% of effort) captures (see Table 80). The scampi fishery is one of the three main fisheries, including southern blue whiting and squid, that have been observed catching sea lions. Fur seal captures in the scampi fishery have been sporadic, from the Chatham Rise, Auckland Islands and east of North Island areas (see Table 81). The 2007–08 ratio estimate of 11 (95% c.i.: 5 to 18, based on 100.0% of effort) captures was consistent with estimates for the previous nine years (see Table 82).

The subantarctic southern blue whiting fishery caught moderate numbers of fur seals, with a 2007–08 estimate of 59 (95% c.i.: 45 to 77, based on 100.0% of effort) (see Table 88). This fishery had the highest ratio estimate of sea lions captures (12, 95% c.i.: 6 to 21, based on 100.0% of effort) for 2007–08 (see Table 86). Estimated seabird captures in the southern blue whiting fishery were low, with only 5 (95% c.i.: 3 to 8, based on 100.0% of effort) seabirds estimated to have been caught in 2007–08 (see Table 84).

Estimated common dolphin captures in the mackerel fishery for 2007–08 were 63 (95% c.i.: 25 to 116, based on 99.9% of effort) (see Table 92). This was the only fishery in which common dolphin captures were estimated. Captures of seabirds in the mackerel fishery were low and sporadic, with 2007–08 estimate of 9(95% c.i.: 5 to 13, based on 99.5% of effort) (see Table 90).

The inshore trawl fishery was very poorly observed, with coverage of only 0.3% in 2007–08. Observer coverage in this fishery also suffered from being localised and not representative of the effort. An estimation of seabird (see Table 96) or marine mammal captures (see Table 98) could not be made because there was so little observer coverage of inshore fishing.

Effort in all surface longline fisheries decreased between 2006–07 and 2007–08. Effort in the southern bluefin fishery decreased by 42.9% between 2006–07 and 2007–08. Concurrent with this was a decrease in estimated seabird captures to 93 (95% c.i.: 68 to 121, based on 100.0% of effort) from 249 (95% c.i.: 214 to 288, based on 100.0% of effort) in 2006–07 (see Table 104). Effort in the bigeye surface longline fishery has declined since 2000–01, with a decrease of 86.2% between 2000–01 and 2007–08. Estimated captures of seabirds in the bigeye surface longline fishery were 339 (95% c.i.: 13 to 750, based on 100.0% of effort) for 2007–08. Because of the low observer coverage of 2.5%, the uncertainty in this estimate is high. Although there was an increase in the median estimated seabird captures between 2006–07 and 2007–08, the increase was not statistically significant. The ratio estimates for fur seals captures in surface longline fisheries were 30 (95% c.i.: 18 to 44, based on 98.2% of effort) (see Table 46). One leatherback turtle was caught in the swordfish longline fishery (see Table 52). The turtle and fur seals were all caught in the latter half of the 2007–08 fishing year.

There were 40 birds observed caught in bottom longline fisheries, all in the second half of the 2007–08 fishing year. Most of these were white-chinned petrels caught in the ling fishery (see Table 117). Estimated captures for all birds in the ling longline fishery were 145 (95% c.i.: 72 to 254, based on 92.4% of effort) in 2007–08, a substantial decrease from the 2006–07 estimate of 869 (95% c.i.: 215 to 1 800, based on 94.1% of effort), but similar to captures in 2004–05 and 2005–06 (see Table 118). The ling fishery is carried out by two distinct classes of vessels, large autoline vessels, typically longer than 30 m, and smaller vessels that set their hooks manually. Most observations have been on the ling autoline fishery, with relatively few observations being made on manually setting vessels. The peak in captures in 2006–07 was associated with the capture of 35 albatrosses on the Chatham Rise (see Table 117). These birds were all caught on a single trip made by a manually setting vessel. Because of the ratio estimation, captures from this trip were scaled into a large total estimate in 2006–07 for the ling fishery. To improve

the estimates, more observer coverage is needed on the smaller bottom longline vessels. No marine mammals or turtles were caught in bottom longline fisheries in 2007–08.

3.7 All bird captures

3.7.1 All birds, trawl fisheries, New Zealand EEZ

Table 7: Summary by year with number of tows, number of tows observed, percentage of tows observed, number of observed captures, capture rate per 100 tows, total estimated captures with 95% confidence intervals, and percentage of tows included in the estimate. (SBW, Southern blue whiting)

(a) All bird captures by fishery

		Observed				Estimated		
	Tows	No. obs	% obs	Capt.	Rate	Est. captures		% eff. in est.
2007–08								
Squid	4 237	1 456	34.4	167	11.47	440	(379 - 511)	99.9
Hoki	8 788	1 869	21.3	31	1.66	147	(93 - 217)	97.9
Scampi	4 807	524	10.9	11	2.10	139	(79 - 221)	100.0
Middle depth	7 421	435	5.9	13	2.99	90	(58 - 128)	81.0
Hake	1 559	395	25.3	4	1.01	37	(24 - 52)	100.0
Ling	2 210	241	10.9	7	2.90	26	(17 - 36)	42.9
Deepwater	6 743	2 810	41.7	6	0.21	16	(11 - 23)	99.4
Jack mackerel	2 646	817	30.9	2	0.24	9	(5 - 13)	99.5
SBW	816	331	40.6	3	0.91	5	(3 - 8)	100.0
Inshore	50 215	158	0.3	2	1.27	2	observed	0.3
2006–07								
Squid	5 910	1 289	21.8	127	9.85	470	(400 - 549)	97.5
Hoki	10 630	1 757	16.5	23	1.31	138	(96 - 186)	97.6
Scampi	5 135	389	7.6	25	6.43	156	(104 - 218)	100.0
Middle depth	8 221	393	4.8	12	3.05	156	(102 - 217)	93.3
Hake	1 606	295	18.4	8	2.71	43	(30 - 59)	99.7
Ling	1 665	157	9.4	2	1.27	23	(13 - 36)	51.7
Deepwater	7 477	2 320	31.0	1	0.04	10	(2 - 23)	99.7
Jack mackerel	2 711	802	29.6	1	0.12	7	(4 - 11)	98.8
SBW	630	224	35.6	3	1.34	9	(3 - 18)	100.0
Inshore	59 833	292	0.5	10	3.42	10	observed	0.5

(b) All bird captures by area

		Observed				Estimated		
	Tows	No. obs	% obs	Capt.	Rate	Est. captures		% eff. in est.
2007–08								
Stewart-Snares	12 513	1 536	12.3	121	7.88	328	(272 - 396)	33.7
Chatham Rise	21 959	2 559	11.7	31	1.21	248	(169 - 349)	61.4
Auckland Is.	2 746	753	27.4	64	8.50	179	(151 - 211)	99.3
West Coast SI	10 777	957	8.9	14	1.46	72	(46 - 104)	38.3
North East	9 557	495	5.2	5	1.01	33	(9 - 70)	15.3
Subantarctic	2 624	1 310	49.9	11	0.84	23	(16 - 31)	99.5
Cook Strait	3 232	208	6.4	0	0.00	10	(4 - 18)	54.6
East of NI	11 580	218	1.9	0	0.00	9	(5 - 14)	18.2
Puysegur	765	71	9.3	0	0.00	5	(3 - 8)	64.4
West Coast NI	13 689	929	6.8	0	0.00	3	(1 - 6)	25.3
Kermadec Is.	0							
2006–07								
Stewart-Snares	12 047	1 353	11.2	90	6.65	421	(346 - 502)	52.1
Chatham Rise	26 746	1 912	7.1	35	1.83	242	(181 - 309)	58.0
Auckland Is.	2 686	642	23.9	56	8.72	154	(126 - 185)	99.2
West Coast SI	13 257	947	7.1	15	1.58	85	(51 - 127)	42.5
North East	11 326	461	4.1	11	2.39	62	(26 - 111)	14.0
Subantarctic	2 416	1 183	49.0	3	0.25	22	(10 - 36)	95.2
Cook Strait	4 254	228	5.4	0	0.00	12	(5 - 22)	48.8
East of NI	13 130	54	0.4	0	0.00	12	(6 - 18)	21.5
Puysegur	3 484	72	2.1	2	2.78	11	(6 - 17)	9.2
West Coast NI	14 472	1 066	7.4	0	0.00	3	(1 - 6)	22.6
Kermadec Is.	0							

Table 8: Summary of bird captures in trawl fisheries, for 10 fishing years, with the number of tows, number of tows observed, percentage of tows observed, number of observed captures, capture rate per hundred tows, total estimated captures with 95% confidence intervals, and percentage of tows included in the estimate.

		Observed				Estimated		
	Tows	No. obs	% obs	Capt.[s]	Rate	Est. captures		% eff. in est.
2007–08	89 442	9 036	10.1	246	2.72	911	(797 - 1 040)	40.8
2006–07	103 818	7 918	7.6	212	2.68	1 023	(906 - 1 150)	40.9
2005–06	109 983	6 554	6.0	354	5.40	2 177	(1 829 - 2 602)	42.2
2004–05	120 476	7 710	6.4	481	6.24	2 021	(1 829 - 2 219)	41.8
2003–04	120 878	6 546	5.4	262	4.00	1 470	(1 238 - 1 779)	44.7
2002–03	130 177	6 835	5.3	270	3.95	2 007	(1 562 - 2 597)	49.1
2001–02	127 887	7 716	6.0	318	4.12	1 709	(1 490 - 1 959)	50.2
2000–01	134 243	9 114	6.8	726	7.97	3 448	(2 979 - 3 959)	49.8
1999–00	139 057	7 650	5.5	172	2.25	1 640	(1 357 - 1 967)	49.5
1998–99	153 412	7 257	4.7	308	4.24	2 086	(1 766 - 2 441)	47.1

[s] Observed captures by species, for all 10 years: white-capped albatross (1116), sooty shearwater (1075), white-chinned petrel (378), Salvin's albatross (142), Buller's albatross (126), albatrosses (unidentified) (65), cape petrels (61), seabird – small (60), petrel (unidentified) (41), short-tailed shearwater (33), seabird – large (30), black-browed albatross (unidentified) (27), flesh-footed shearwater (25), shy albatross (24), grey petrel (19), Campbell albatross (13), prions (unidentified) (13), southern royal albatross (11), northern giant petrel (10), common diving petrel (10), other species (70)

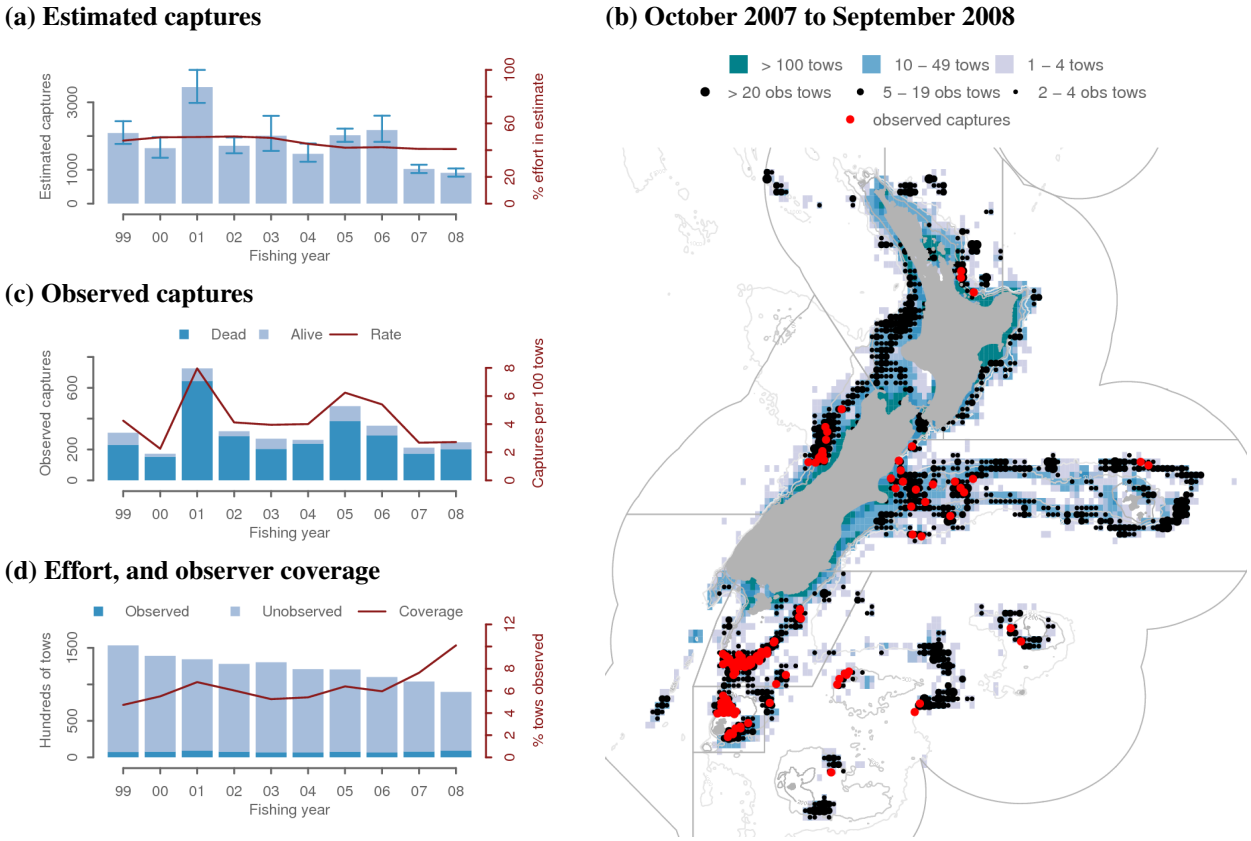

Figure 2: Bird captures in all trawl fisheries. (a) Ratio estimated captures, with 95% bootstrap confidence intervals, (b) Mapped effort and captures from 2007–08, (c) Observed captures, (d) Effort and observed effort.

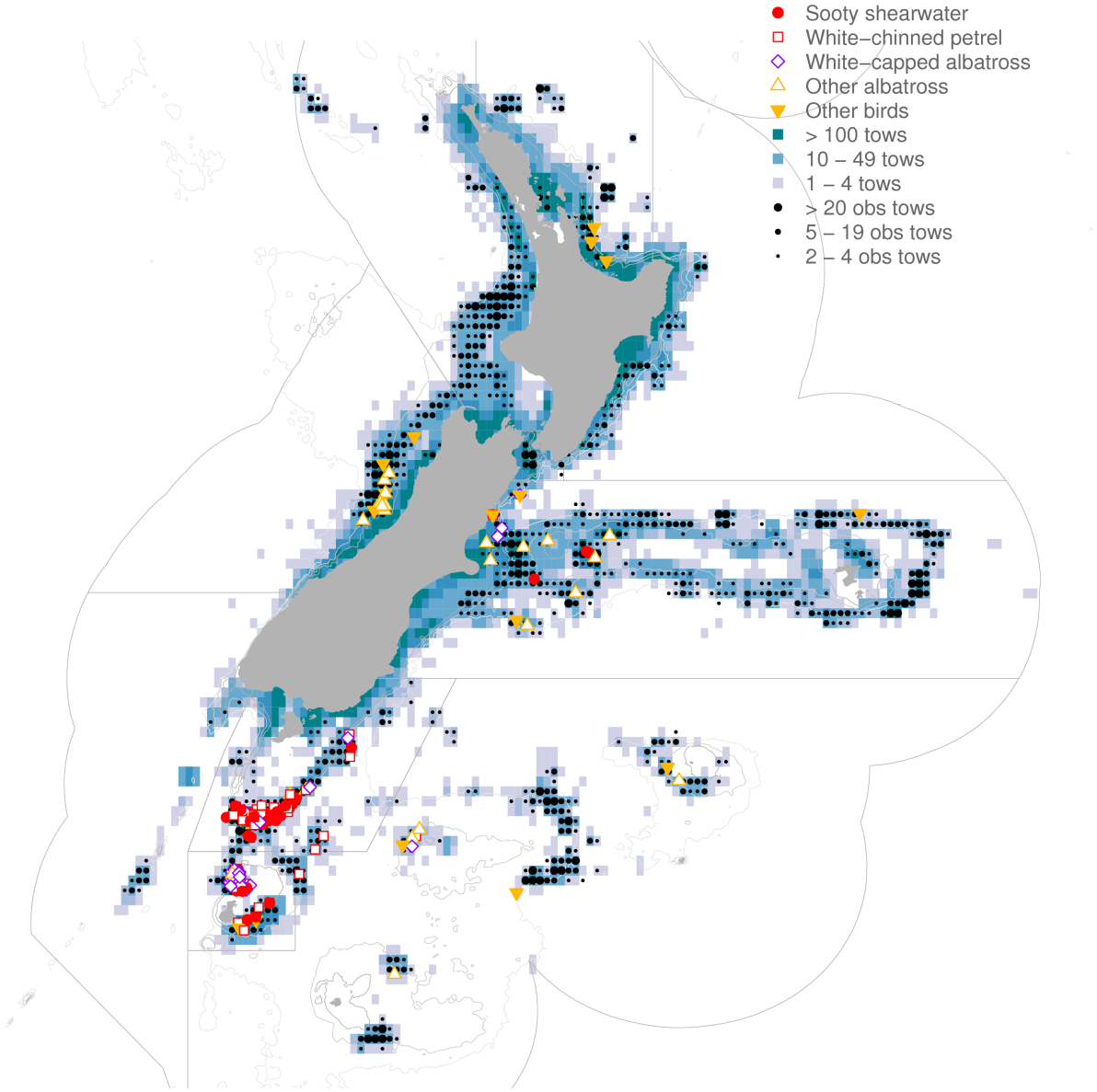

Figure 3: Mapped effort and bird captures in trawl fisheries from 1 October 2007 to 30 September 2008, with 98% of trawl effort shown. Bird captures are divided into five categories: sooty shearwaters, white-capped albatross, white-chinned petrels, other albatross and other birds.

3.7.2 All birds, surface longline, New Zealand EEZ

Table 9: Summary of all bird captures in the surface longline fishery, broken down by fishing areas, with the number of hooks, number of hooks observed, percentage of hooks observed, number of observed captures, capture rate per thousand hooks, total estimated captures with 95% confidence intervals, and percentage of hooks included in the estimate.

			Observed				Estimated		
		Hooks	No. obs	% obs	Capt.	Rate	Est. captures		% eff. in est.
2007–08									
Bigeye	Area 1	880 517	15 985	1.8	6	0.375	339	(13 - 750)	100.0
S. Bluefin	Area 3	654 625	254 208	38.8	24	0.094	63	(47 - 80)	100.0
S. Bluefin	Area 1	451 700	91 864	20.3	6	0.065	30	(12 - 54)	100.0
Swordfish	Area 1	83 630	17 540	21.0	1	0.057	14	(6 - 23)	100.0
Other	Area 1	31 705	0	0.0	-				
Bigeye	Area 4	93 112	8 360	9.0	0	0.000	0	(0 - 0)	100.0
Swordfish	Area 4	35 500	3 350	9.4	0	0.000	0	observed	9.4
Swordfish	Area 3	6 200	0	0.0	-				
Other	Area 4	2 750	0	0.0	-				
S. Bluefin	Area 4	1 500	0	0.0	-				
Albacore	Area 4	600	0	0.0	-				
Bigeye	Area 3	0							
Other	Area 3	0							
Albacore	Area 1	0							
2006–07									
Bigeye	Area 1	1 356 860	66 412	4.9	5	0.075	111	(36 - 203)	100.0
S. Bluefin	Area 3	1 109 950	588 130	53.0	84	0.143	158	(135 - 185)	100.0
S. Bluefin	Area 1	828 261	242 942	29.3	27	0.111	91	(65 - 121)	100.0
Swordfish	Area 1	191 511	40 301	21.0	71	1.762	323	(162 - 531)	100.0
Other	Area 1	43 355	0	0.0	-				
Bigeye	Area 4	177 161	16 842	9.5	0	0.000	0	(0 - 0)	100.0
Swordfish	Area 4	19 394	1 292	6.7	0	0.000	0	observed	6.7
Swordfish	Area 3	350	0	0.0	-				
Other	Area 4	0							
S. Bluefin	Area 4	1 000	0	0.0	-				
Albacore	Area 4	0							
Bigeye	Area 3	4 100	0	0.0	-				
Other	Area 3	1 000	0	0.0	-				
Albacore	Area 1	13 730	0	0.0	-				

Table 10: Summary of all bird captures in the surface longline fishery, for 10 fishing years, with the number of hooks, number of hooks observed, percentage of hooks observed, number of observed captures, capture rate per thousand hooks, total estimated captures with 95% confidence intervals, and percentage of hooks included in the estimate.

		Observed				Estimated		
	Hooks	No. obs	% obs	Capt.[s]	Rate	Est. captures		% eff. in est.
2007–08	2 241 839	391 307	17.5	37	0.095	449	(127 - 862)	98.2
2006–07	3 746 672	955 919	25.5	187	0.196	688	(498 - 916)	99.4
2005–06	3 687 569	636 796	17.3	37	0.058	434	(259 - 640)	98.8
2004–05	3 676 795	703 669	19.1	41	0.058	180	(108 - 291)	98.6
2003–04	7 382 293	1 464 465	19.8	71	0.048	342	(205 - 506)	98.7
2002–03	10 781 875	1 874 448	17.4	115	0.061	279	(235 - 327)	98.9
2001–02	10 876 381	918 159	8.4	167	0.182	4 442	(2 789 - 6 378)	96.7
2000–01	9 761 448	1 023 868	10.5	53	0.052	1 147	(750 - 1 591)	98.2
1999–00	8 286 120	793 770	9.6	74	0.093	3 436	(1 892 - 5 487)	98.8
1998–99	6 845 781	1 242 610	18.2	84	0.068	870	(508 - 1 349)	96.9

[s] Observed captures by species, for all 10 years: Buller's albatross (313), flesh-footed shearwater (139), white-capped albatross (85), grey petrel (46), Campbell albatross (37), albatrosses (unidentified) (36), white-chinned petrel (33), wandering albatross (unidentified) (31), Gibson's albatross (20), black petrel (20), great-winged petrel (19), sooty shearwater (18), antipodean albatross (13), Salvin's albatross (9), black-browed albatross (unidentified) (7), southern black-browed albatross (6), southern royal albatross (6), cape petrels (5), petrel (unidentified) (5), seabird – large (4), other species (14)

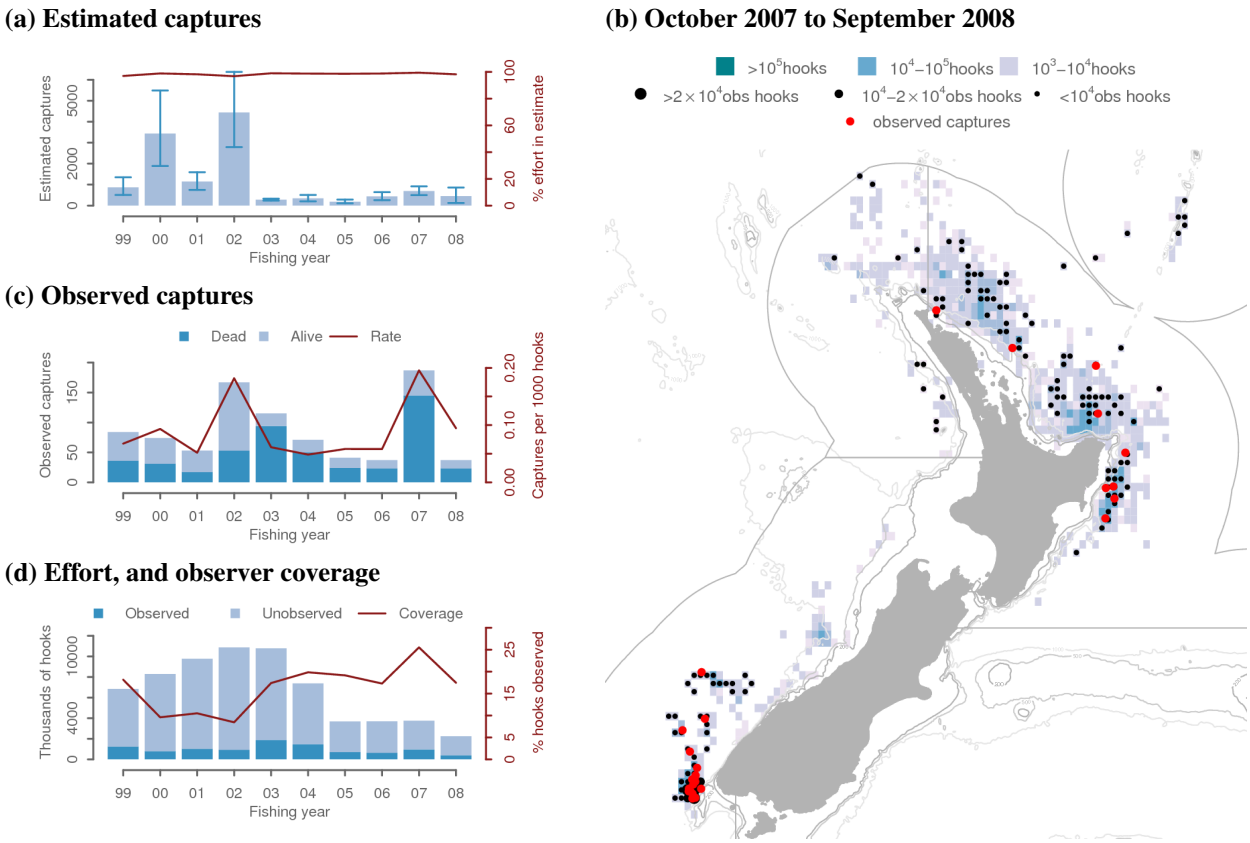

Figure 4: All bird captures in the surface longline fishery. (a) Ratio estimated captures, with 95% bootstrap confidence intervals, (b) Mapped effort and captures from 2007–08, (c) Observed captures, (d) Effort and observed effort.

3.7.3 All birds, bottom longline, New Zealand EEZ

Table 11: Summary of all bird captures in the bottom longline fishery, broken down by fishing areas, with the number of hooks, number of hooks observed, percentage of hooks observed, number of observed captures, capture rate per thousand hooks, total estimated captures with 95% confidence intervals, and percentage of hooks included in the estimate.

			Observed				Estimated		
		Hooks	No. obs	% obs	Capt.	Rate	Est. captures		% eff. in est.
2007–08									
Other	North East	1 014 656	73 000	7.2	10	0.137	84	(17 - 184)	100.0
Bluenose	East of NI	3 944 726	10 500	0.3	0	0.000	69	(13 - 149)	100.0
Bluenose	Chatham Rise	2 808 463	164 525	5.9	4	0.024	66	(19 - 132)	100.0
Ling	Chatham Rise	8 117 620	1 611 100	19.8	11	0.007	57	(28 - 94)	100.0
Ling	Stewart-Snares	1 242 431	114 423	9.2	5	0.044	53	(5 - 151)	100.0
Ling	Subantarctic	4 223 600	1 381 800	32.7	6	0.004	19	(8 - 33)	100.0
Ling	Puysegur	1 046 283	108 455	10.4	0	0.000	6	(3 - 10)	100.0
Bluenose	North East	1 630 724	42 550	2.6	3	0.071	3	observed	2.6
Other	Chatham Rise	1 322 370	69 565	5.3	1	0.014	1	observed	5.3
2006–07									
Other	North East	723 279	8 130	1.1	0	0.000	56	(6 - 132)	100.0
Bluenose	East of NI	2 364 810	40 285	1.7	2	0.050	43	(10 - 90)	100.0
Bluenose	Chatham Rise	2 661 220	6 000	0.2	0	0.000	63	(15 - 128)	100.0
Ling	Chatham Rise	8 615 760	391 250	4.5	38	0.097	841	(188 - 1 767)	100.0
Ling	Stewart-Snares	1 540 760	156 600	10.2	0	0.000	1	(0 - 2)	100.0
Ling	Subantarctic	1 306 700	0	0.0	-				
Ling	Puysegur	994 444	781 522	78.6	13	0.017	17	(16 - 20)	100.0
Bluenose	North East	1 784 886	46 433	2.6	5	0.108	5	observed	2.6
Other	Chatham Rise	1 208 310	0	0.0	-				

Table 12: Summary of all bird captures in the bottom longline fishery, for 10 fishing years, with the number of hooks, number of hooks observed, percentage of hooks observed, number of observed captures, capture rate per thousand hooks, total estimated captures with 95% confidence intervals, and percentage of hooks included in the estimate.

		Observed				Estimated		
	Hooks	No. obs	% obs	Capt.[s]	Rate	Est. captures		% eff. in est.
2007–08	41 907 447	3 614 518	8.6	40	0.011	368	(224 - 539)	61.6
2006–07	38 438 561	2 345 017	6.1	58	0.025	1 035	(375 - 1 965)	57.1
2005–06	37 125 639	3 822 459	10.3	41	0.011	1 405	(322 - 3 361)	54.8
2004–05	41 840 933	2 927 928	7.0	30	0.010	776	(390 - 1 333)	59.3
2003–04	43 449 733	4 994 320	11.5	54	0.011	1 230	(642 - 1 964)	60.7
2002–03	37 753 336	11 308 295	30.0	266	0.024	423	(384 - 471)	52.8
2001–02	47 024 332	7 547 517	16.1	427	0.057	1 202	(978 - 1 471)	60.6
2000–01	51 024 367	5 248 902	10.3	534	0.102	1 568	(1 360 - 1 798)	57.6
1999–00	53 277 149	3 611 278	6.8	202	0.056	1 968	(1 348 - 2 655)	61.8
1998–99	55 487 193	3 098 409	5.6	92	0.030	704	(531 - 893)	64.0

[s] Observed captures by species, for all 10 years: white-chinned petrel (818), grey petrel (417), Salvin's albatross (178), sooty shearwater (88), cape petrels (48), petrel (unidentified) (30), flesh-footed shearwater (24), Chatham Island albatross (22), albatrosses (unidentified) (17), black petrel (12), northern giant petrel (8), white-capped albatross (8), Buller's albatross (8), common diving petrel (7), great-winged petrel (6), wandering albatross (unidentified) (6), Buller's shearwater (6), southern giant petrel (5), seabird – small (4), giant petrels (unidentified) (4), other species (28)

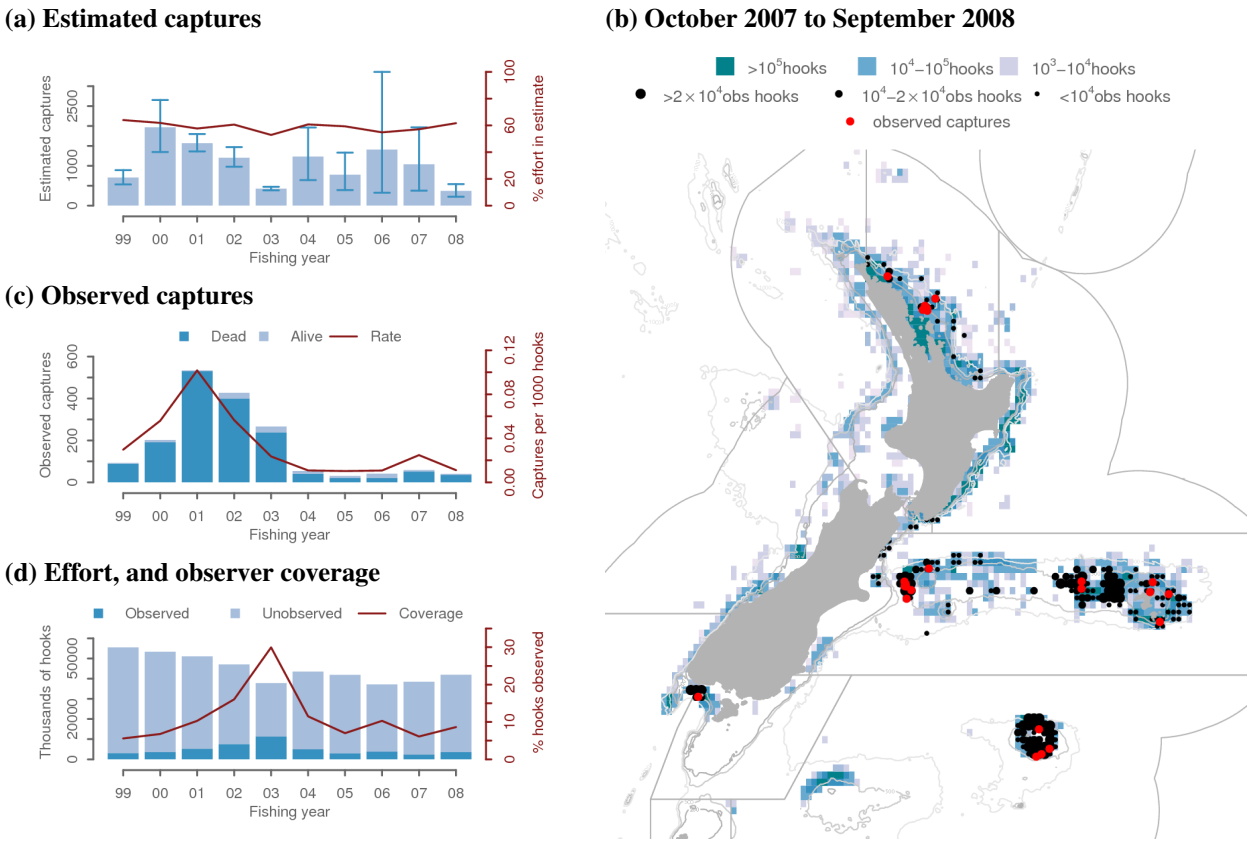

Figure 5: All bird captures in the bottom longline fishery. (a) Ratio estimated captures, with 95% bootstrap confidence intervals, (b) Mapped effort and captures from 2007–08, (c) Observed captures, (d) Effort and observed effort.

3.8 Sooty shearwater captures

3.8.1 Sooty shearwater, all trawl, New Zealand EEZ

Table 13: Summary of sooty shearwater captures in all trawl fisheries, broken down by fishing areas, with the number of tows, number of tows observed, percentage of tows observed, number of observed captures, capture rate per hundred tows, total estimated captures with 95% confidence intervals, and percentage of tows included in the estimate.

			Observed				Estimated		
		Tows	No. obs	% obs	Capt.	Rate	Est. captures		% eff. in est.
2007–08									
Squid	Stewart-Snares [y]	2 413	864	35.8	55	6.37	154	(107 - 213)	100.0
Squid	Auckland Is. [y]	1 265	590	46.6	13	2.20	28	(19 - 39)	100.0
Scampi	Auckland Is.	1 330	93	7.0	0	0.00	18	(3 - 40)	100.0
Hoki	Chatham Rise [y]	4 486	751	16.7	2	0.27	12	(2 - 27)	100.0
Scampi	Chatham Rise	2 014	185	9.2	2	1.08	7	(3 - 13)	100.0
Hake	Chatham Rise	318	26	8.2	0	0.00	7	(1 - 16)	100.0
Hake	Stewart-Snares	157	49	31.2	3	6.12	4	(3 - 6)	100.0
Ling	Stewart-Snares	694	136	19.6	0	0.00	3	(0 - 6)	100.0
Hoki	Stewart-Snares [y]	743	341	45.9	1	0.29	2	(1 - 5)	100.0
Scampi	North East	843	145	17.2	0	0.00	1	(0 - 4)	100.0
Middle depth	Stewart-Snares [y]	1 021	82	8.0	0	0.00	0	observed	8.0
Squid	Chatham Rise [y]	539	0	0.0	-				
2006–07									
Squid	Stewart-Snares [y]	2 926	705	24.1	42	5.96	174	(124 - 231)	100.0
Squid	Auckland Is. [y]	1 317	538	40.9	4	0.74	10	(5 - 16)	100.0
Scampi	Auckland Is.	1 328	101	7.6	13	12.87	31	(16 - 52)	100.0
Hoki	Chatham Rise [y]	4 921	795	16.2	7	0.88	43	(17 - 80)	100.0
Scampi	Chatham Rise	2 297	152	6.6	0	0.00	6	(1 - 13)	100.0
Hake	Chatham Rise	366	80	21.9	4	5.00	11	(5 - 20)	100.0
Hake	Stewart-Snares	166	55	33.1	0	0.00	1	(0 - 3)	100.0
Ling	Stewart-Snares	614	122	19.9	2	1.64	4	(2 - 8)	100.0
Hoki	Stewart-Snares [y]	1 181	206	17.4	2	0.97	11	(2 - 26)	100.0
Scampi	North East	815	106	13.0	1	0.94	2	(1 - 5)	100.0
Middle depth	Stewart-Snares [y]	1 235	143	11.6	3	2.10	26	(3 - 56)	100.0
Squid	Chatham Rise [y]	1 495	38	2.5	5	13.16	5	observed	2.5

[y] Estimates calculated separately for each year.

Table 14: Summary of sooty shearwater captures in all trawl fisheries, for 10 fishing years, with the number of tows, number of tows observed, percentage of tows observed, number of observed captures, capture rate per hundred tows, total estimated captures with 95% confidence intervals, and percentage of tows included in the estimate.

		Observed				Estimated		
	Tows	No. obs	% obs	Capt.	Rate	Est. captures		% eff. in est.
2007–08	89 442	9 036	10.1	76	0.84	241	(186 - 308)	40.2
2006–07	103 818	7 918	7.6	83	1.05	332	(265 - 405)	39.5
2005–06	109 983	6 554	6.0	169	2.58	976	(688 - 1 350)	38.2
2004–05	120 476	7 710	6.4	74	0.96	328	(254 - 415)	38.4
2003–04	120 878	6 546	5.4	53	0.81	383	(194 - 665)	42.1
2002–03	130 177	6 835	5.3	119	1.74	723	(404 - 1 250)	44.9
2001–02	127 887	7 716	6.0	108	1.40	407	(312 - 520)	46.3
2000–01	134 243	9 114	6.8	278	3.05	1 662	(1 291 - 2 088)	44.8
1999–00	139 057	7 650	5.5	32	0.42	277	(183 - 390)	45.6
1998–99	153 412	7 257	4.7	83	1.14	459	(315 - 640)	44.2

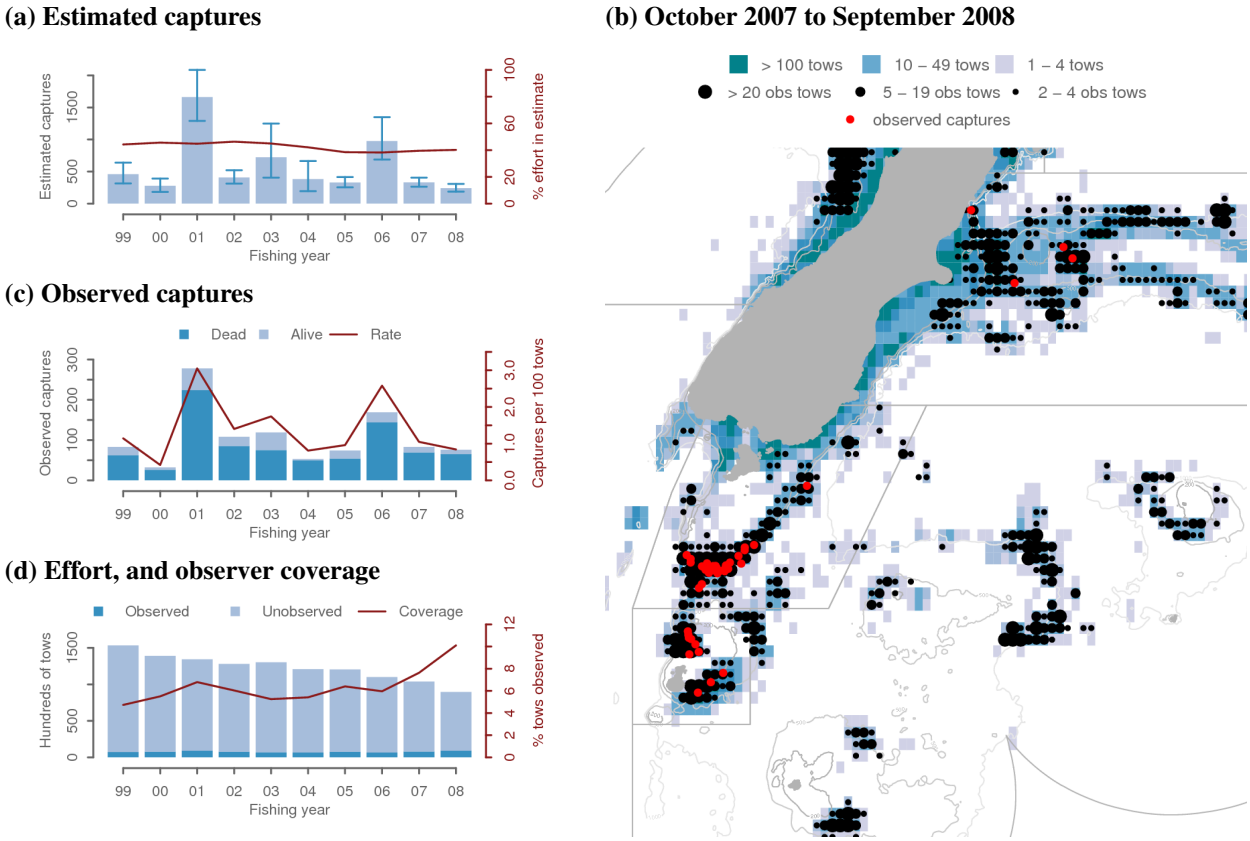

Figure 6: Sooty shearwater captures in all trawl fisheries. (a) Ratio estimated captures, with 95% bootstrap confidence intervals, (b) Mapped effort and captures from 2007–08, (c) Observed captures, (d) Effort and observed effort.

3.8.2 Sooty shearwater, surface longline, New Zealand EEZ

Table 15: Summary of sooty shearwater captures in the surface longline fishery, broken down by fishing areas, with the number of hooks, number of hooks observed, percentage of hooks observed, number of observed captures, capture rate per thousand hooks, total estimated captures with 95% confidence intervals, and percentage of hooks included in the estimate.

			Observed				Estimated		
		Hooks	No. obs	% obs	Capt.	Rate	Est. captures		% eff. in est.
2007–08									
Bigeye	Area 1	880 517	15 985	1.8	0	0.000	3	(0 - 7)	100.0
Swordfish	Area 1	83 630	17 540	21.0	0	0.000	1	(0 - 3)	100.0
S. Bluefin	Area 3	654 625	254 208	38.8	0	0.000	0	(0 - 0)	100.0
S. Bluefin	Area 1	451 700	91 864	20.3	0	0.000	0	(0 - 0)	100.0
Bigeye	Area 4	93 112	8 360	9.0	0	0.000	0	(0 - 0)	100.0
Swordfish	Area 4	35 500	3 350	9.4	0	0.000	0	observed	9.4
Other	Area 1	31 705	0	0.0	-				
Swordfish	Area 3	6 200	0	0.0	-				
Other	Area 4	2 750	0	0.0	-				
S. Bluefin	Area 4	1 500	0	0.0	-				
Albacore	Area 4	600	0	0.0	-				
Bigeye	Area 3	0							
Other	Area 3	0							
Albacore	Area 1	0							
2006–07									
Bigeye	Area 1	1 356 860	66 412	4.9	0	0.000	4	(0 - 10)	100.0
Swordfish	Area 1	191 511	40 301	21.0	1	0.025	3	(1 - 8)	100.0
S. Bluefin	Area 3	1 109 950	588 130	53.0	1	0.002	1	(1 - 1)	100.0
S. Bluefin	Area 1	828 261	242 942	29.3	0	0.000	0	(0 - 0)	100.0
Bigeye	Area 4	177 161	16 842	9.5	0	0.000	0	(0 - 0)	100.0
Swordfish	Area 4	19 394	1 292	6.7	0	0.000	0	observed	6.7
Other	Area 1	43 355	0	0.0	-				
Swordfish	Area 3	350	0	0.0	-				
Other	Area 4	0							
S. Bluefin	Area 4	1 000	0	0.0	-				
Albacore	Area 4	0							
Bigeye	Area 3	4 100	0	0.0	-				
Other	Area 3	1 000	0	0.0	-				
Albacore	Area 1	13 730	0	0.0	-				

Table 16: Summary of sooty shearwater captures in the surface longline fishery, for 10 fishing years, with the number of hooks, number of hooks observed, percentage of hooks observed, number of observed captures, capture rate per thousand hooks, total estimated captures with 95% confidence intervals, and percentage of hooks included in the estimate.

		Observed				Estimated		
	Hooks	No. obs	% obs	Capt.	Rate	Est. captures		% eff. in est.
2007–08	2 241 839	391 307	17.5	0	0.000	4	(0 - 8)	98.2
2006–07	3 746 672	955 919	25.5	2	0.002	9	(2 - 17)	99.4
2005–06	3 687 569	636 796	17.3	0	0.000	9	(1 - 19)	98.8
2004–05	3 676 795	703 669	19.1	0	0.000	7	(2 - 13)	98.6
2003–04	7 382 293	1 464 465	19.8	3	0.002	17	(7 - 32)	98.7
2002–03	10 781 875	1 874 448	17.4	10	0.005	37	(20 - 59)	98.9
2001–02	10 876 381	918 159	8.4	0	0.000	27	(7 - 55)	96.7
2000–01	9 761 448	1 023 868	10.5	2	0.002	25	(6 - 51)	98.2
1999–00	8 286 120	793 770	9.6	0	0.000	23	(6 - 47)	98.8
1998–99	6 845 781	1 242 610	18.2	1	0.001	18	(6 - 36)	96.9

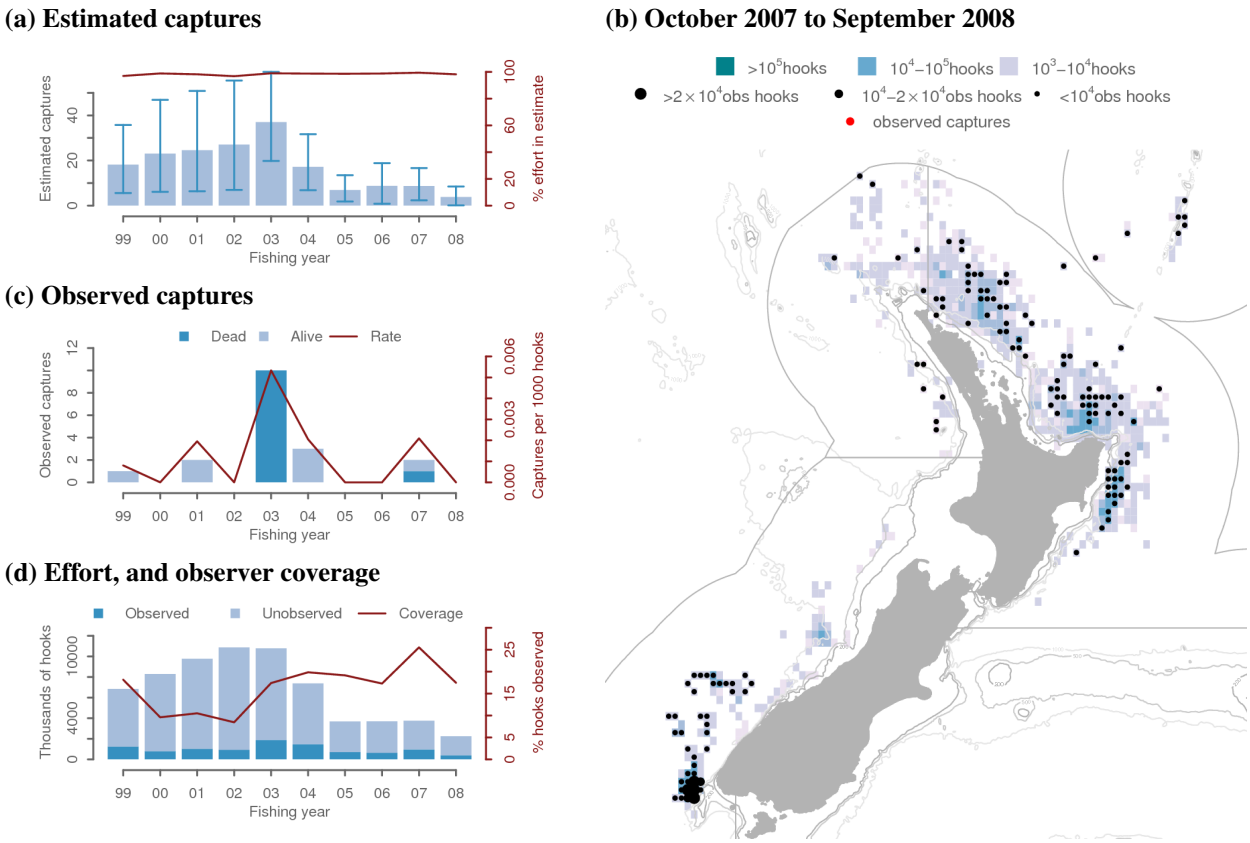

Figure 7: Sooty shearwater captures in the surface longline fishery. (a) Ratio estimated captures, with 95% bootstrap confidence intervals, (b) Mapped effort and captures from 2007–08, (c) Observed captures, (d) Effort and observed effort.

3.8.3 Sooty shearwater, bottom longline, New Zealand EEZ

Table 17: Summary of sooty shearwater captures in the bottom longline fishery, broken down by fishing areas, with the number of hooks, number of hooks observed, percentage of hooks observed, number of observed captures, capture rate per thousand hooks, total estimated captures with 95% confidence intervals, and percentage of hooks included in the estimate.

			Observed				Estimated		
		Hooks	No. obs	% obs	Capt.	Rate	Est. captures		% eff. in est.
2007–08									
Ling	Stewart-Snares [y]	1 242 431	114 423	9.2	5	0.044	54	(5 - 151)	100.0
Ling	Puysegur	1 046 283	108 455	10.4	0	0.000	2	(0 - 5)	100.0
Other	Chatham Rise	1 322 370	69 565	5.3	1	0.014	1	observed	5.3
2006–07									
Ling	Stewart-Snares [y]	1 540 760	156 600	10.2	0	0.000	0	(0 - 0)	100.0
Ling	Puysegur	994 444	781 522	78.6	1	0.001	2	(1 - 2)	100.0
Other	Chatham Rise	1 208 310	0	0.0	-				

[y] Estimates calculated separately for each year.

Table 18: Summary of sooty shearwater captures in the bottom longline fishery, for 10 fishing years, with the number of hooks, number of hooks observed, percentage of hooks observed, number of observed captures, capture rate per thousand hooks, total estimated captures with 95% confidence intervals, and percentage of hooks included in the estimate.

		Observed				Estimated		
	Hooks	No. obs	% obs	Capt.	Rate	Est. captures		% eff. in est.
2007–08	41 907 447	3 614 518	8.6	6	0.002	71	(9 - 180)	61.6
2006–07	38 438 561	2 345 017	6.1	1	0.000	11	(2 - 31)	57.1
2005–06	37 125 639	3 822 459	10.3	3	0.001	13	(5 - 29)	54.8
2004–05	41 840 933	2 927 928	7.0	3	0.001	13	(6 - 24)	59.3
2003–04	43 449 733	4 994 320	11.5	17	0.003	50	(32 - 74)	60.7
2002–03	37 753 336	11 308 295	30.0	23	0.002	31	(27 - 36)	52.8
2001–02	47 024 332	7 547 517	16.1	16	0.002	36	(26 - 48)	60.6
2000–01	51 024 367	5 248 902	10.3	12	0.002	21	(17 - 27)	57.6
1999–00	53 277 149	3 611 278	6.8	7	0.002	24	(15 - 35)	61.8
1998–99	55 487 193	3 098 409	5.6	0	0.000	9	(4 - 15)	59.1

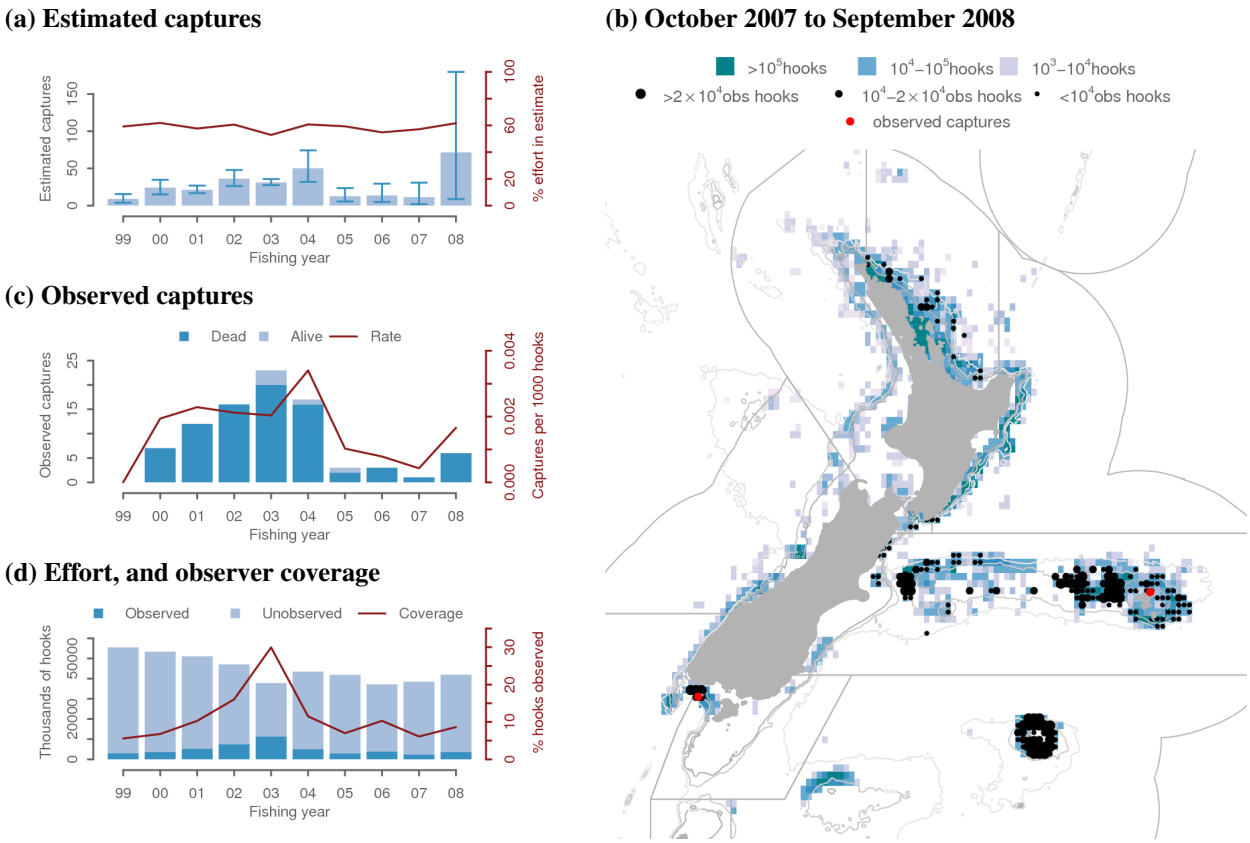

Figure 8: Sooty shearwater captures in the bottom longline fishery. (a) Ratio estimated captures, with 95% bootstrap confidence intervals, (b) Mapped effort and captures from 2007–08, (c) Observed captures, (d) Effort and observed effort.

3.9 White-chinned petrel captures

3.9.1 White-chinned petrel, all trawl, New Zealand EEZ

Table 19: Summary of white-chinned petrel captures in all trawl fisheries, broken down by fishing areas, with the number of tows, number of tows observed, percentage of tows observed, number of observed captures, capture rate per hundred tows, total estimated captures with 95% confidence intervals, and percentage of tows included in the estimate.

			Observed				Estimated		
		Tows	No. obs	% obs	Capt.	Rate	Est. captures		% eff. in est.
2007–08									
Squid	Stewart-Snares [y]	2 413	864	35.8	25	2.89	70	(48 - 95)	100.0
Squid	Auckland Is. [y]	1 265	590	46.6	21	3.56	45	(35 - 56)	100.0
Hoki	Chatham Rise [y]	4 486	751	16.7	5	0.67	30	(5 - 80)	100.0
Middle depth	Stewart-Snares [y]	1 021	82	8.0	7	8.54	7	observed	8.0
Ling	Subantarctic	205	55	26.8	2	3.64	5	(2 - 9)	100.0
Hoki	Stewart-Snares	743	341	45.9	3	0.88	4	(3 - 5)	100.0
Ling	Stewart-Snares	694	136	19.6	1	0.74	4	(1 - 7)	100.0
2006–07									
Squid	Stewart-Snares [y]	2 926	705	24.1	9	1.28	37	(22 - 56)	100.0
Squid	Auckland Is. [y]	1 317	538	40.9	17	3.16	42	(29 - 58)	100.0
Hoki	Chatham Rise [y]	4 921	795	16.2	1	0.13	6	(1 - 17)	100.0
Middle depth	Stewart-Snares [y]	1 235	143	11.6	2	1.40	17	(2 - 40)	100.0
Ling	Subantarctic	221	10	4.5	0	0.00	4	(0 - 10)	100.0
Hoki	Stewart-Snares	1 181	206	17.4	1	0.49	3	(2 - 5)	100.0
Ling	Stewart-Snares	614	122	19.9	0	0.00	2	(0 - 6)	100.0

[y] Estimates calculated separately for each year.

Table 20: Summary of white-chinned petrel captures in all trawl fisheries, for 10 fishing years, with the number of tows, number of tows observed, percentage of tows observed, number of observed captures, capture rate per hundred tows, total estimated captures with 95% confidence intervals, and percentage of tows included in the estimate.

		Observed				Estimated		
	Tows	No. obs	% obs	Capt.	Rate	Est. captures		% eff. in est.
2007–08	89 442	9 036	10.1	64	0.71	171	(126 - 235)	40.7
2006–07	103 818	7 918	7.6	30	0.38	120	(89 - 156)	40.9
2005–06	109 983	6 554	6.0	66	1.01	358	(241 - 497)	42.2
2004–05	120 476	7 710	6.4	52	0.67	203	(157 - 255)	41.8
2003–04	120 878	6 546	5.4	17	0.26	78	(53 - 107)	44.7
2002–03	130 177	6 835	5.3	12	0.18	60	(34 - 93)	49.2
2001–02	127 887	7 716	6.0	9	0.12	53	(35 - 73)	50.1
2000–01	134 243	9 114	6.8	86	0.94	292	(215 - 389)	49.7
1999–00	139 057	7 650	5.5	12	0.16	58	(38 - 82)	49.4
1998–99	153 412	7 257	4.7	30	0.41	104	(67 - 150)	46.9

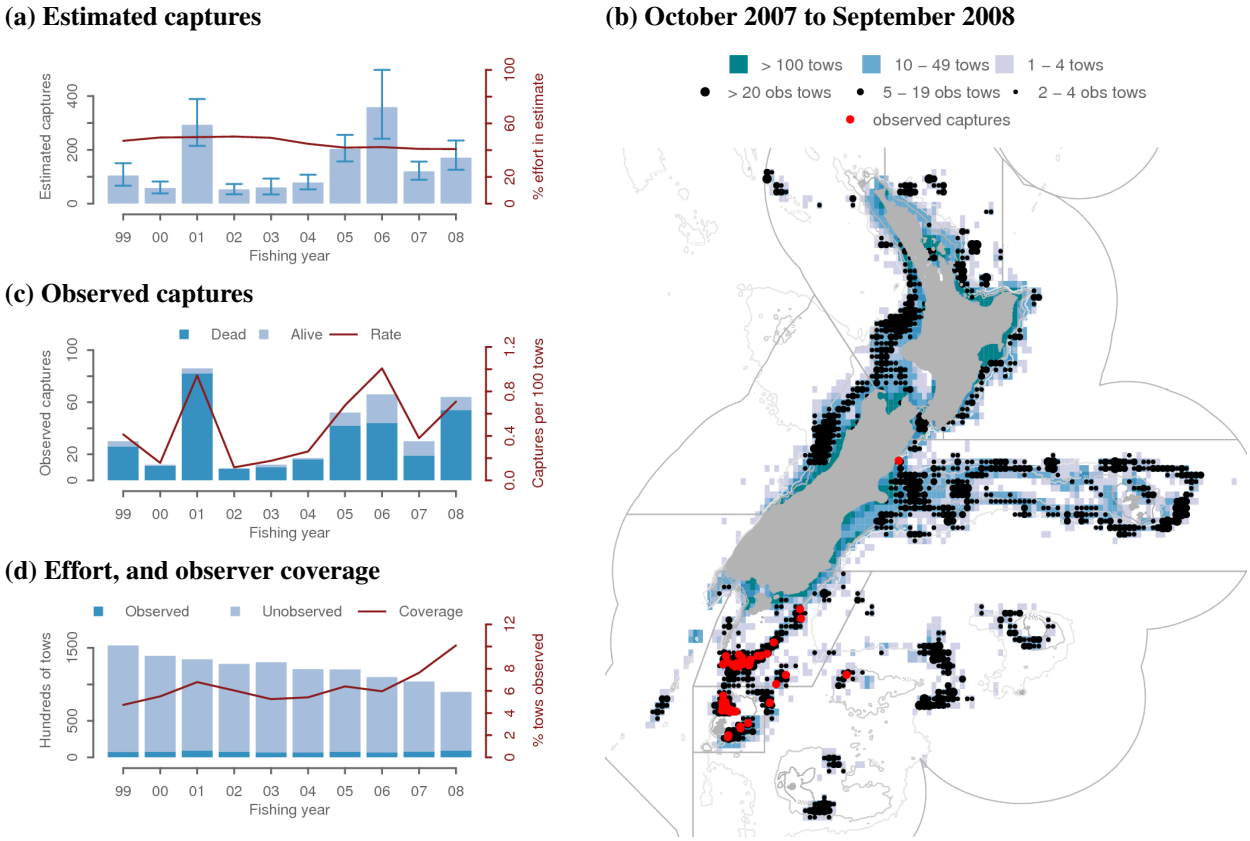

Figure 9: White-chinned petrel captures in all trawl fisheries. (a) Ratio estimated captures, with 95% bootstrap confidence intervals, (b) Mapped effort and captures from 2007–08, (c) Observed captures, (d) Effort and observed effort.

3.9.2 White-chinned petrel, surface longline, New Zealand EEZ

Table 21: Summary of white-chinned petrel captures in the surface longline fishery, broken down by fishing areas, with the number of hooks, number of hooks observed, percentage of hooks observed, number of observed captures, capture rate per thousand hooks, total estimated captures with 95% confidence intervals, and percentage of hooks included in the estimate.

			Observed				Estimated		
		Hooks	No. obs	% obs	Capt.	Rate	Est. captures		% eff. in est.
2007–08									
S. Bluefin	Area 3 [y]	654 625	254 208	38.8	4	0.016	10	(6 - 17)	100.0
Bigeye	Area 1	880 517	15 985	1.8	0	0.000	4	(0 - 9)	100.0
Swordfish	Area 1	83 630	17 540	21.0	0	0.000	2	(0 - 5)	100.0
S. Bluefin	Area 1	451 700	91 864	20.3	0	0.000	0	(0 - 0)	100.0
Bigeye	Area 4	93 112	8 360	9.0	0	0.000	0	(0 - 0)	100.0
Swordfish	Area 4	35 500	3 350	9.4	0	0.000	0	observed	9.4
Other	Area 1	31 705	0	0.0	-				
Swordfish	Area 3	6 200	0	0.0	-				
Other	Area 4	2 750	0	0.0	-				
S. Bluefin	Area 4	1 500	0	0.0	-				
Albacore	Area 4	600	0	0.0	-				
Bigeye	Area 3	0							
Other	Area 3	0							
Albacore	Area 1	0							
2006–07									
S. Bluefin	Area 3 [y]	1 109 950	588 130	53.0	3	0.005	6	(3 - 9)	100.0
Bigeye	Area 1	1 356 860	66 412	4.9	0	0.000	6	(0 - 14)	100.0
Swordfish	Area 1	191 511	40 301	21.0	2	0.050	6	(2 - 13)	100.0
S. Bluefin	Area 1	828 261	242 942	29.3	0	0.000	0	(0 - 0)	100.0
Bigeye	Area 4	177 161	16 842	9.5	0	0.000	0	(0 - 0)	100.0
Swordfish	Area 4	19 394	1 292	6.7	0	0.000	0	observed	6.7
Other	Area 1	43 355	0	0.0	-				
Swordfish	Area 3	350	0	0.0	-				
Other	Area 4	0							
S. Bluefin	Area 4	1 000	0	0.0	-				
Albacore	Area 4	0							
Bigeye	Area 3	4 100	0	0.0	-				
Other	Area 3	1 000	0	0.0	-				
Albacore	Area 1	13 730	0	0.0	-				

[y] Estimates calculated separately for each year.

Table 22: Summary of white-chinned petrel captures in the surface longline fishery, for 10 fishing years, with the number of hooks, number of hooks observed, percentage of hooks observed, number of observed captures, capture rate per thousand hooks, total estimated captures with 95% confidence intervals, and percentage of hooks included in the estimate.

		Observed				Estimated		
	Hooks	No. obs	% obs	Capt.	Rate	Est. captures		% eff. in est.
2007–08	2 241 839	391 307	17.5	4	0.010	16	(9 - 25)	98.2
2006–07	3 746 672	955 919	25.5	5	0.005	18	(9 - 28)	99.4
2005–06	3 687 569	636 796	17.3	1	0.002	14	(4 - 27)	98.8
2004–05	3 676 795	703 669	19.1	3	0.004	12	(6 - 20)	98.6
2003–04	7 382 293	1 464 465	19.8	2	0.001	17	(4 - 34)	98.7
2002–03	10 781 875	1 874 448	17.4	3	0.002	26	(6 - 51)	98.9
2001–02	10 876 381	918 159	8.4	6	0.007	36	(11 - 70)	96.7
2000–01	9 761 448	1 023 868	10.5	2	0.002	30	(5 - 61)	98.2
1999–00	8 286 120	793 770	9.6	7	0.009	31	(10 - 59)	98.8
1998–99	6 845 781	1 242 610	18.2	0	0.000	17	(1 - 37)	96.9

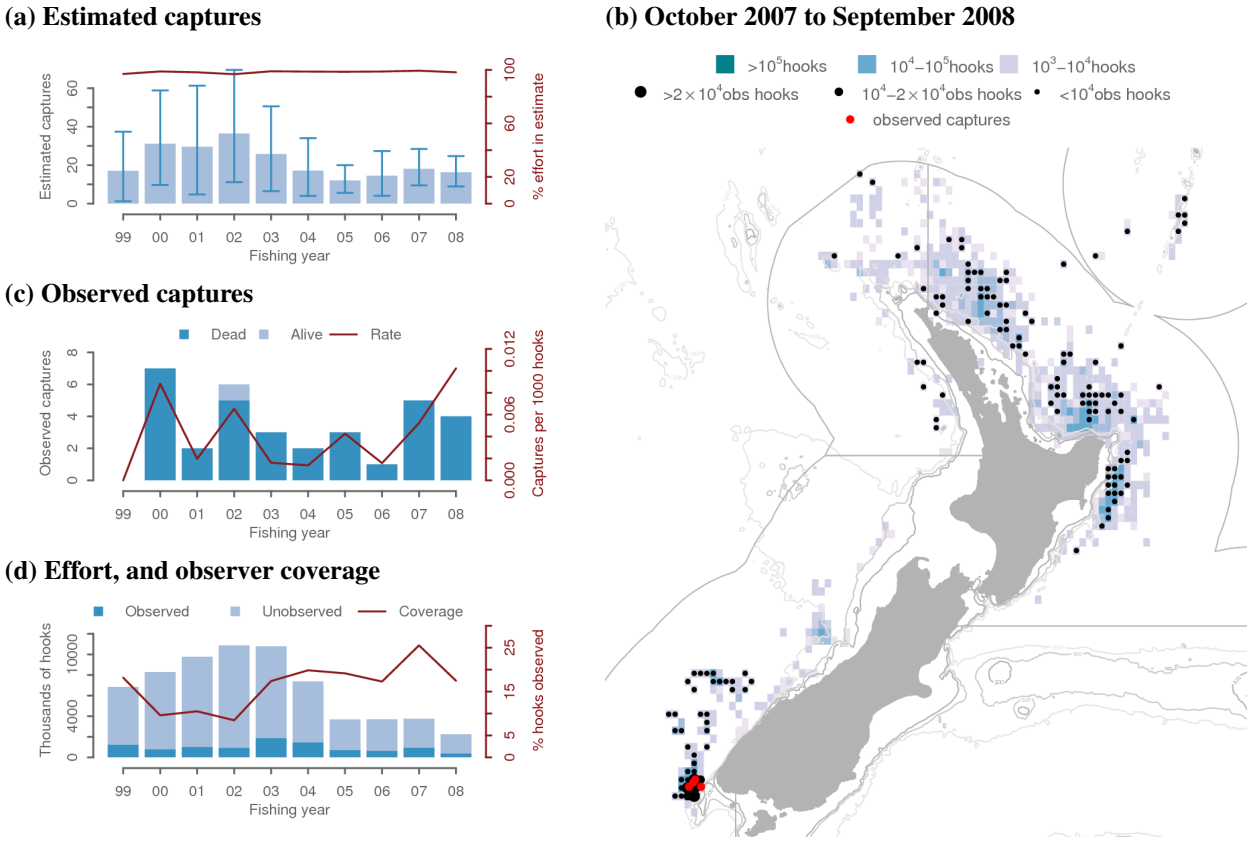

Figure 10: White-chinned petrel captures in the surface longline fishery. (a) Ratio estimated captures, with 95% bootstrap confidence intervals, (b) Mapped effort and captures from 2007–08, (c) Observed captures, (d) Effort and observed effort.

3.9.3 White-chinned petrel, bottom longline, New Zealand EEZ

Table 23: Summary of white-chinned petrel captures in the bottom longline fishery, broken down by fishing areas, with the number of hooks, number of hooks observed, percentage of hooks observed, number of observed captures, capture rate per thousand hooks, total estimated captures with 95% confidence intervals, and percentage of hooks included in the estimate.

			Observed				Estimated		
		Hooks	No. obs	% obs	Capt.	Rate	Est. captures		% eff. in est.
2007–08									
Ling	Subantarctic [y]	4 223 600	1 381 800	32.7	6	0.004	18	(8 - 32)	100.0
Bluenose	Chatham Rise	2 808 463	164 525	5.9	1	0.006	16	(1 - 49)	100.0
Ling	Chatham Rise [y]	8 117 620	1 611 100	19.8	3	0.002	15	(3 - 36)	100.0
Bluenose	North East	1 630 724	42 550	2.6	0	0.000	0	observed	2.6
Ling	Puysegur [y]	1 046 283	108 455	10.4	0	0.000	0	(0 - 0)	100.0
2006–07									
Ling	Subantarctic [y]	1 306 700	0	0.0	-				
Bluenose	Chatham Rise	2 661 220	6 000	0.2	0	0.000	15	(0 - 48)	100.0
Ling	Chatham Rise [y]	8 615 760	391 250	4.5	0	0.000	0	(0 - 0)	100.0
Bluenose	North East	1 784 886	46 433	2.6	1	0.022	1	observed	2.6
Ling	Puysegur [y]	994 444	781 522	78.6	11	0.014	14	(12 - 16)	100.0

[y] Estimates calculated separately for each year.

Table 24: Summary of white-chinned petrel captures in the bottom longline fishery, for 10 fishing years, with the number of hooks, number of hooks observed, percentage of hooks observed, number of observed captures, capture rate per thousand hooks, total estimated captures with 95% confidence intervals, and percentage of hooks included in the estimate.

		Observed				Estimated		
	Hooks	No. obs	% obs	Capt.	Rate	Est. captures		% eff. in est.
2007–08	41 907 447	3 614 518	8.6	10	0.003	50	(20 - 90)	61.6
2006–07	38 438 561	2 345 017	6.1	12	0.005	30	(14 - 63)	53.7
2005–06	37 125 639	3 822 459	10.3	13	0.003	70	(36 - 110)	48.2
2004–05	41 840 933	2 927 928	7.0	11	0.004	68	(28 - 116)	59.3
2003–04	43 449 733	4 994 320	11.5	15	0.003	57	(34 - 85)	57.4
2002–03	37 753 336	11 308 295	30.0	130	0.011	176	(162 - 191)	50.5
2001–02	47 024 332	7 547 517	16.1	353	0.047	926	(718 - 1 190)	58.1
2000–01	51 024 367	5 248 902	10.3	210	0.040	418	(363 - 482)	32.9
1999–00	53 277 149	3 611 278	6.8	59	0.016	1 059	(486 - 1 690)	61.8
1998–99	55 487 193	3 098 409	5.6	5	0.002	118	(27 - 250)	56.4

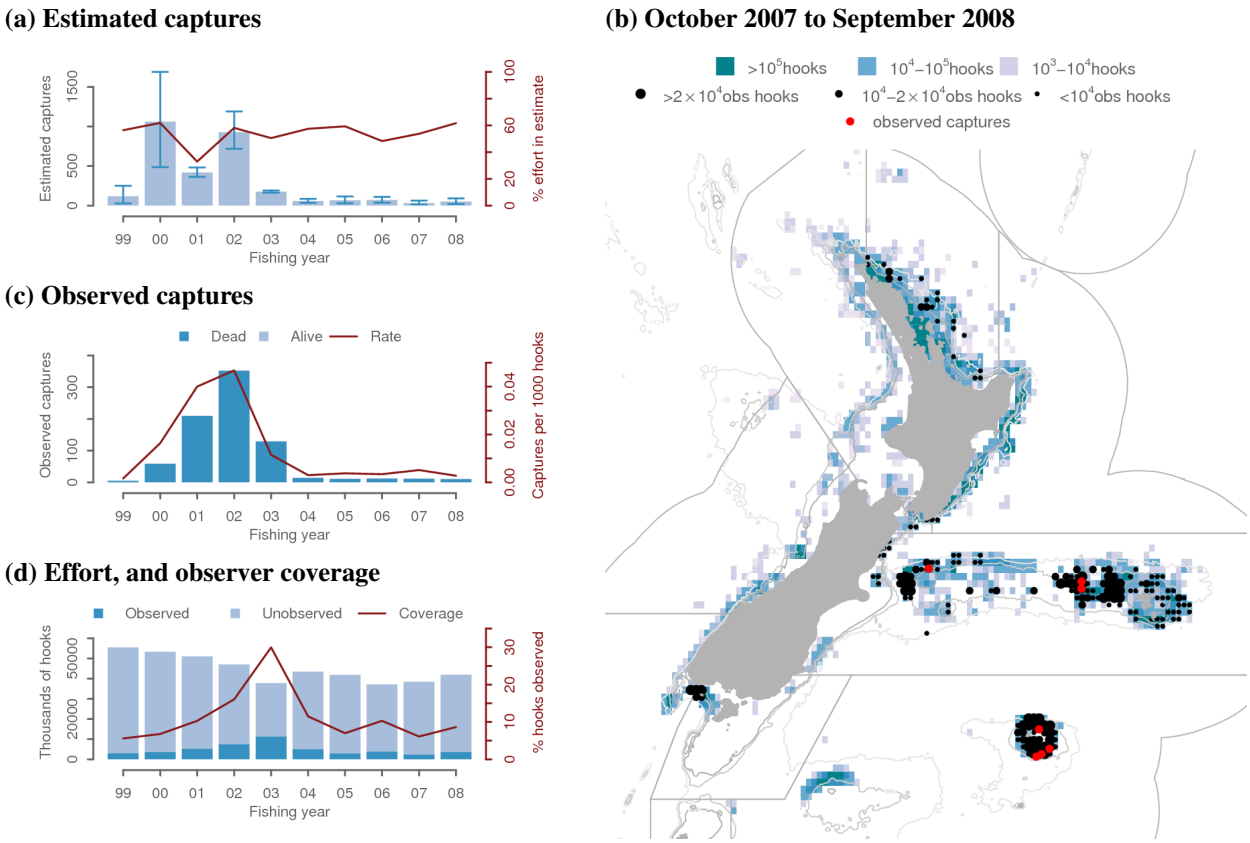

Figure 11: White-chinned petrel captures in the bottom longline fishery. (a) Ratio estimated captures, with 95% bootstrap confidence intervals, (b) Mapped effort and captures from 2007–08, (c) Observed captures, (d) Effort and observed effort.

3.10 White-capped albatross captures

3.10.1 White-capped albatross, all trawl, New Zealand EEZ

Table 25: Summary of white-capped albatross captures in all trawl fisheries, broken down by fishing areas, with the number of tows, number of tows observed, percentage of tows observed, number of observed captures, capture rate per hundred tows, total estimated captures with 95% confidence intervals, and percentage of tows included in the estimate.

			Observed				Estimated		
		Tows	No. obs	% obs	Capt.	Rate	Est. captures		% eff. in est.
2007–08									
Squid	Auckland Is. [y]	1 265	590	46.6	24	4.07	51	(41 - 64)	100.0
Squid	Stewart-Snares [y]	2 413	864	35.8	16	1.85	45	(30 - 63)	100.0
Scampi	Auckland Is.	1 330	93	7.0	0	0.00	13	(5 - 22)	100.0
Hoki	Chatham Rise [y]	4 486	751	16.7	2	0.27	12	(2 - 27)	100.0
Middle depth	Chatham Rise	2 661	225	8.5	1	0.44	10	(1 - 22)	100.0
Hake	West Coast SI	1 084	320	29.5	0	0.00	5	(2 - 8)	100.0
Ling	Subantarctic	205	55	26.8	1	1.82	2	(1 - 5)	100.0
Middle depth	Puysegur	83	0	0.0	-				
Inshore	Chatham Rise	7 948	8	0.1	0	0.00	0	observed	0.1
Inshore	West Coast SI	6 375	41	0.6	0	0.00	0	observed	0.6
Hoki	West Coast SI [y]	1 395	462	33.1	0	0.00	0	(0 - 0)	100.0
Middle depth	Stewart-Snares [y]	1 021	82	8.0	0	0.00	0	observed	8.0
2006–07									
Squid	Auckland Is. [y]	1 317	538	40.9	17	3.16	42	(30 - 55)	100.0
Squid	Stewart-Snares [y]	2 926	705	24.1	24	3.40	100	(68 - 134)	100.0
Scampi	Auckland Is.	1 328	101	7.6	2	1.98	15	(7 - 24)	100.0
Hoki	Chatham Rise [y]	4 921	795	16.2	0	0.00	0	(0 - 0)	100.0
Middle depth	Chatham Rise	2 734	110	4.0	1	0.91	11	(1 - 23)	100.0
Hake	West Coast SI	1 069	160	15.0	2	1.25	7	(4 - 12)	100.0
Ling	Subantarctic	221	10	4.5	0	0.00	2	(0 - 6)	100.0
Middle depth	Puysegur	209	29	13.9	1	3.45	4	(1 - 9)	100.0
Inshore	Chatham Rise	10 947	25	0.2	1	4.00	1	observed	0.2
Inshore	West Coast SI	7 571	59	0.8	4	6.78	4	observed	0.8
Hoki	West Coast SI [y]	2 129	516	24.2	2	0.39	8	(2 - 18)	100.0
Middle depth	Stewart-Snares [y]	1 235	143	11.6	2	1.40	17	(2 - 40)	100.0

[y] Estimates calculated separately for each year.

Table 26: Summary of white-capped albatross captures in all trawl fisheries, for 10 fishing years, with the number of tows, number of tows observed, percentage of tows observed, number of observed captures, capture rate per hundred tows, total estimated captures with 95% confidence intervals, and percentage of tows included in the estimate.

		Observed				Estimated		
	Tows	No. obs	% obs	Capt.[s]	Rate	Est. captures		% eff. in est.
2007–08	89 442	9 036	10.1	44	0.49	170	(136 - 209)	40.8
2006–07	103 818	7 918	7.6	56	0.71	253	(201 - 314)	40.9
2005–06	109 983	6 554	6.0	68	1.04	423	(321 - 546)	42.2
2004–05	120 476	7 710	6.4	236	3.06	884	(780 - 997)	41.8
2003–04	120 878	6 546	5.4	144	2.20	623	(540 - 710)	44.7
2002–03	130 177	6 835	5.3	79	1.16	538	(427 - 667)	49.1
2001–02	127 887	7 716	6.0	153	1.98	807	(635 - 1 017)	50.2
2000–01	134 243	9 114	6.8	229	2.51	489	(416 - 575)	49.8
1999–00	139 057	7 650	5.5	54	0.71	400	(281 - 538)	49.5
1998–99	153 412	7 257	4.7	77	1.06	578	(415 - 765)	47.1

[s] Observed captures by species, for all 10 years: white-capped albatross (1116), shy albatross (24)

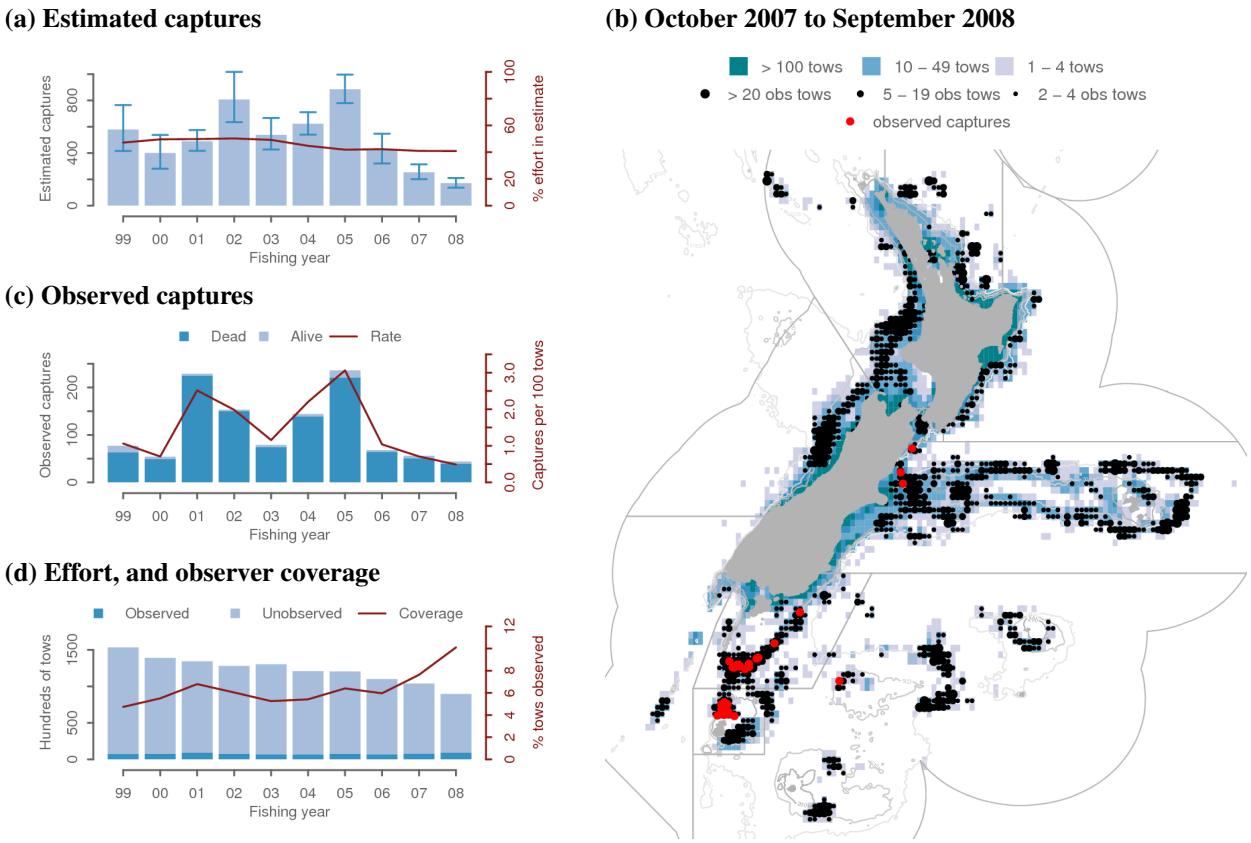

Figure 12: White-capped albatross captures in all trawl fisheries. (a) Ratio estimated captures, with 95% bootstrap confidence intervals, (b) Mapped effort and captures from 2007–08, (c) Observed captures, (d) Effort and observed effort.

3.10.2 White-capped albatross, surface longline, New Zealand EEZ

Table 27: Summary of white-capped albatross captures in the surface longline fishery, broken down by fishing areas, with the number of hooks, number of hooks observed, percentage of hooks observed, number of observed captures, capture rate per thousand hooks, total estimated captures with 95% confidence intervals, and percentage of hooks included in the estimate.

			Observed				Estimated		
		Hooks	No. obs	% obs	Capt.	Rate	Est. captures		% eff. in est.
2007–08									
S. Bluefin	Area 3 [y]	654 625	254 208	38.8	3	0.012	8	(3 - 16)	100.0
S. Bluefin	Area 1	451 700	91 864	20.3	0	0.000	1	(0 - 2)	100.0
Bigeye	Area 1	880 517	15 985	1.8	0	0.000	0	(0 - 0)	100.0
Bigeye	Area 4	93 112	8 360	9.0	0	0.000	0	(0 - 0)	100.0
Swordfish	Area 1	83 630	17 540	21.0	0	0.000	0	(0 - 0)	100.0
Swordfish	Area 4	35 500	3 350	9.4	0	0.000	0	observed	9.4
Other	Area 1	31 705	0	0.0	-				
Swordfish	Area 3	6 200	0	0.0	-				
Other	Area 4	2 750	0	0.0	-				
S. Bluefin	Area 4	1 500	0	0.0	-				
Albacore	Area 4	600	0	0.0	-				
Bigeye	Area 3	0							
Other	Area 3	0							
Albacore	Area 1	0							
2006–07									
S. Bluefin	Area 3 [y]	1 109 950	588 130	53.0	27	0.046	51	(37 - 69)	100.0
S. Bluefin	Area 1	828 261	242 942	29.3	1	0.004	2	(1 - 5)	100.0
Bigeye	Area 1	1 356 860	66 412	4.9	0	0.000	0	(0 - 0)	100.0
Bigeye	Area 4	177 161	16 842	9.5	0	0.000	0	(0 - 0)	100.0
Swordfish	Area 1	191 511	40 301	21.0	0	0.000	0	(0 - 0)	100.0
Swordfish	Area 4	19 394	1 292	6.7	0	0.000	0	observed	6.7
Other	Area 1	43 355	0	0.0	-				
Swordfish	Area 3	350	0	0.0	-				
Other	Area 4	0							
S. Bluefin	Area 4	1 000	0	0.0	-				
Albacore	Area 4	0							
Bigeye	Area 3	4 100	0	0.0	-				
Other	Area 3	1 000	0	0.0	-				
Albacore	Area 1	13 730	0	0.0	-				

[y] Estimates calculated separately for each year.

Table 28: Summary of white-capped albatross captures in the surface longline fishery, for 10 fishing years, with the number of hooks, number of hooks observed, percentage of hooks observed, number of observed captures, capture rate per thousand hooks, total estimated captures with 95% confidence intervals, and percentage of hooks included in the estimate.

		Observed				Estimated		
	Hooks	No. obs	% obs	Capt.	Rate	Est. captures		% eff. in est.
2007–08	2 241 839	391 307	17.5	3	0.008	9	(3 - 16)	98.2
2006–07	3 746 672	955 919	25.5	28	0.029	53	(39 - 72)	99.4
2005–06	3 687 569	636 796	17.3	2	0.003	4	(2 - 7)	98.8
2004–05	3 676 795	703 669	19.1	3	0.004	6	(3 - 10)	98.6
2003–04	7 382 293	1 464 465	19.8	17	0.012	27	(22 - 33)	98.7
2002–03	10 781 875	1 874 448	17.4	2	0.001	8	(2 - 16)	98.9
2001–02	10 876 381	918 159	8.4	13	0.014	25	(18 - 33)	96.7
2000–01	9 761 448	1 023 868	10.5	3	0.003	6	(4 - 10)	98.2
1999–00	8 286 120	793 770	9.6	6	0.008	10	(7 - 13)	98.8
1998–99	6 845 781	1 242 610	18.2	8	0.006	11	(9 - 13)	96.9

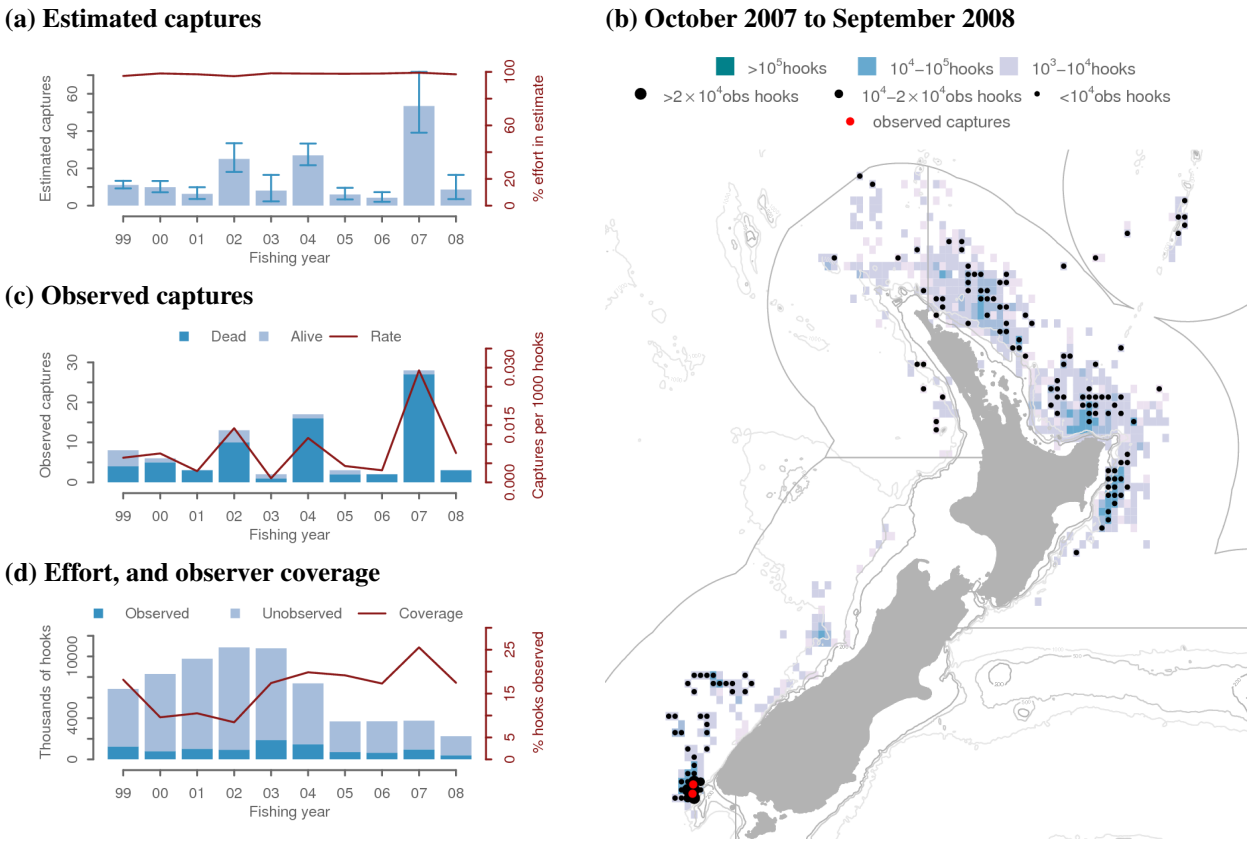

Figure 13: White-capped albatross captures in the surface longline fishery. (a) Ratio estimated captures, with 95% bootstrap confidence intervals, (b) Mapped effort and captures from 2007–08, (c) Observed captures, (d) Effort and observed effort.

3.11 Other albatross captures

3.11.1 Other albatrosses, all trawl, New Zealand EEZ

Table 29: Summary of other albatrosses captures in all trawl fisheries, broken down by fishing areas, with the number of tows, number of tows observed, percentage of tows observed, number of observed captures, capture rate per hundred tows, total estimated captures with 95% confidence intervals, and percentage of tows included in the estimate.

			Observed				Estimated		
		Tows	No. obs	% obs	Capt.	Rate	Est. captures		% eff. in est.
2007–08									
Scampi	Chatham Rise [y]	2 014	185	9.2	4	2.16	44	(4 - 113)	100.0
Hoki	West Coast SI [y]	1 395	462	33.1	10	2.16	30	(18 - 44)	100.0
Middle depth	Chatham Rise	2 661	225	8.5	1	0.44	28	(10 - 49)	100.0
Hoki	Chatham Rise [y]	4 486	751	16.7	4	0.53	24	(4 - 54)	100.0
Squid	Stewart-Snares [y]	2 413	864	35.8	5	0.58	14	(7 - 25)	100.0
Hake	Chatham Rise	318	26	8.2	0	0.00	9	(1 - 19)	100.0
Middle depth	Stewart-Snares	1 021	82	8.0	3	3.66	8	(4 - 13)	100.0
Squid	Chatham Rise	539	0	0.0	-				
Hake	West Coast SI	1 084	320	29.5	0	0.00	5	(2 - 10)	100.0
Ling	Subantarctic	205	55	26.8	2	3.64	5	(2 - 9)	100.0
Jack mackerel	Chatham Rise	177	21	11.9	2	9.52	4	(2 - 6)	100.0
SBW	Subantarctic	816	331	40.6	2	0.60	3	(2 - 3)	100.0
Deepwater	Chatham Rise [y]	3 257	1 320	40.5	1	0.08	2	(1 - 5)	100.0
Squid	Auckland Is. [y]	1 265	590	46.6	1	0.17	2	(1 - 4)	100.0
Inshore	Chatham Rise	7 948	8	0.1	1	12.50	1	observed	0.1
Middle depth	Puysegur	83	0	0.0	-				
2006–07									
Scampi	Chatham Rise [y]	2 297	152	6.6	1	0.66	15	(1 - 43)	100.0
Hoki	West Coast SI [y]	2 129	516	24.2	1	0.19	4	(1 - 10)	100.0
Middle depth	Chatham Rise	2 734	110	4.0	2	1.82	31	(12 - 53)	100.0
Hoki	Chatham Rise [y]	4 921	795	16.2	5	0.63	31	(10 - 57)	100.0
Squid	Stewart-Snares [y]	2 926	705	24.1	2	0.28	8	(2 - 18)	100.0
Hake	Chatham Rise	366	80	21.9	1	1.25	9	(2 - 19)	100.0
Middle depth	Stewart-Snares	1 235	143	11.6	0	0.00	5	(1 - 12)	100.0
Squid	Chatham Rise	1 495	38	2.5	3	7.89	24	(6 - 52)	100.0
Hake	West Coast SI	1 069	160	15.0	1	0.62	7	(3 - 13)	100.0
Ling	Subantarctic	221	10	4.5	0	0.00	4	(0 - 10)	100.0
Jack mackerel	Chatham Rise	110	17	15.5	0	0.00	1	(0 - 3)	100.0
SBW	Subantarctic	630	224	35.6	0	0.00	1	(0 - 1)	100.0
Deepwater	Chatham Rise [y]	3 556	695	19.5	1	0.14	5	(1 - 13)	100.0
Squid	Auckland Is. [y]	1 317	538	40.9	1	0.19	2	(1 - 5)	100.0
Inshore	Chatham Rise	10 947	25	0.2	2	8.00	2	observed	0.2
Middle depth	Puysegur	209	29	13.9	1	3.45	2	(1 - 4)	100.0

[y] Estimates calculated separately for each year.

Table 30: Summary of other albatrosses captures in all trawl fisheries, for 10 fishing years, with the number of tows, number of tows observed, percentage of tows observed, number of observed captures, capture rate per hundred tows, total estimated captures with 95% confidence intervals, and percentage of tows included in the estimate.

		Observed				Estimated		
	Tows	No. obs	% obs	Capt.[s]	Rate	Est. captures		% eff. in est.
2007–08	89 442	9 036	10.1	36	0.40	206	(145 - 289)	41.8
2006–07	103 818	7 918	7.6	21	0.27	177	(129 - 232)	40.9
2005–06	109 983	6 554	6.0	25	0.38	227	(165 - 294)	40.5
2004–05	120 476	7 710	6.4	67	0.87	380	(287 - 496)	41.1
2003–04	120 878	6 546	5.4	27	0.41	228	(171 - 293)	45.2
2002–03	130 177	6 835	5.3	38	0.56	485	(289 - 750)	49.3
2001–02	127 887	7 716	6.0	37	0.48	320	(247 - 399)	50.2
2000–01	134 243	9 114	6.8	54	0.59	387	(301 - 485)	49.4
1999–00	139 057	7 650	5.5	48	0.63	660	(447 - 913)	49.3
1998–99	153 412	7 257	4.7	59	0.81	545	(417 - 686)	47.5

[s] Observed captures by species, for all 10 years: Salvin's albatross (142), Buller's albatross (126), albatrosses (unidentified) (65), black-browed albatross (unidentified) (27), Campbell albatross (13), southern royal albatross (11), southern black-browed albatross (9), Chatham Island albatross (6), Pacific albatross (5), grey-headed albatross (3), northern royal albatross (2), Gibson's albatross (1), antipodean albatross (1), wandering albatross (unidentified) (1)

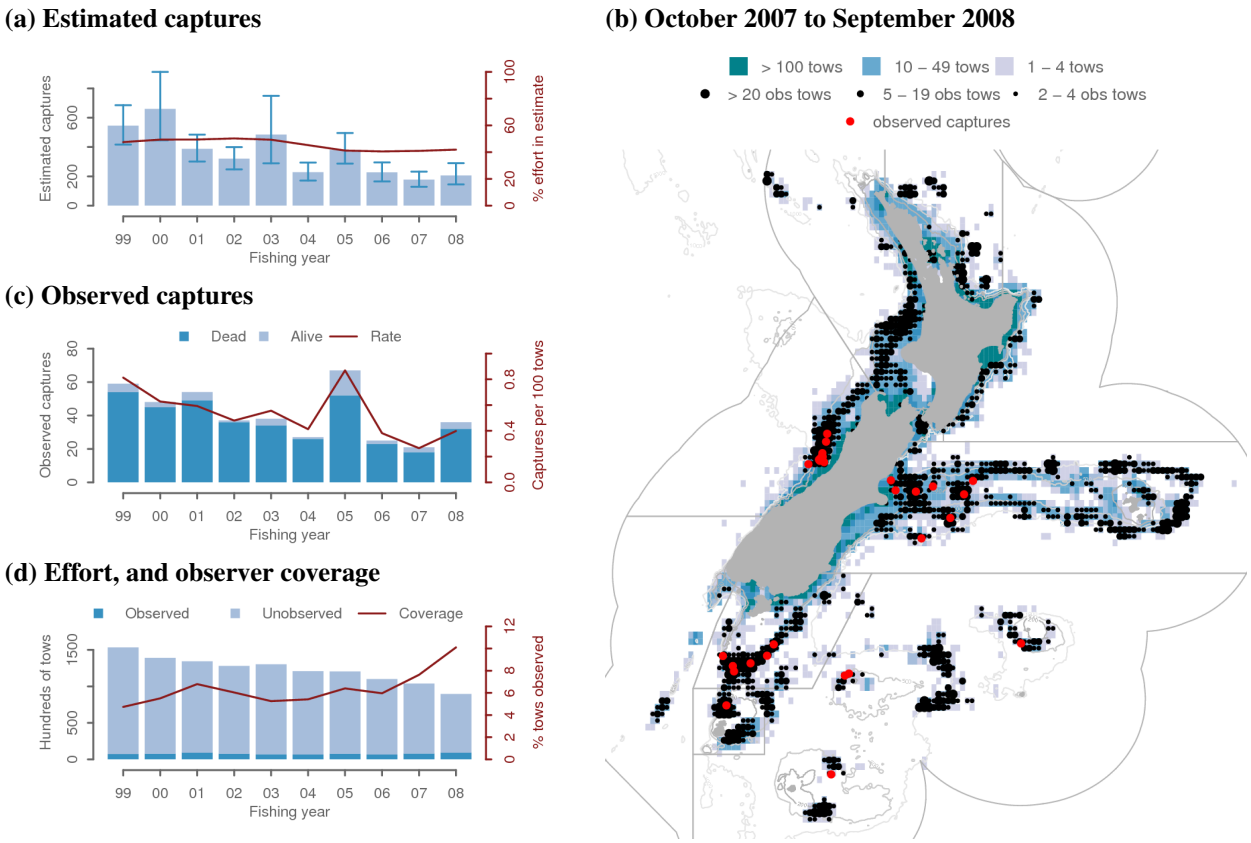

Figure 14: Other albatrosses captures in all trawl fisheries. (a) Ratio estimated captures, with 95% bootstrap confidence intervals, (b) Mapped effort and captures from 2007–08, (c) Observed captures, (d) Effort and observed effort.

3.11.2 Other albatrosses, surface longline, New Zealand EEZ

Table 31: Summary of other albatrosses captures in the surface longline fishery, broken down by fishing areas, with the number of hooks, number of hooks observed, percentage of hooks observed, number of observed captures, capture rate per thousand hooks, total estimated captures with 95% confidence intervals, and percentage of hooks included in the estimate.

			Observed				Estimated		
		Hooks	No. obs	% obs	Capt.	Rate	Est. captures		% eff. in est.
2007–08									
Bigeye	Area 1 [y]	880 517	15 985	1.8	4	0.250	220	(4 - 568)	100.0
S. Bluefin	Area 3 [y]	654 625	254 208	38.8	17	0.067	44	(31 - 60)	100.0
S. Bluefin	Area 1 [y]	451 700	91 864	20.3	5	0.054	25	(9 - 46)	100.0
Bigeye	Area 4	93 112	8 360	9.0	0	0.000	0	(0 - 0)	100.0
Swordfish	Area 1 [y]	83 630	17 540	21.0	0	0.000	0	(0 - 0)	100.0
Swordfish	Area 4	35 500	3 350	9.4	0	0.000	0	observed	9.4
Other	Area 1	31 705	0	0.0	-				
Swordfish	Area 3	6 200	0	0.0	-				
Other	Area 4	2 750	0	0.0	-				
S. Bluefin	Area 4	1 500	0	0.0	-				
Albacore	Area 4	600	0	0.0	-				
Bigeye	Area 3	0							
Other	Area 3	0							
Albacore	Area 1 [y]	0							
2006–07									
Bigeye	Area 1 [y]	1 356 860	66 412	4.9	2	0.030	41	(2 - 101)	100.0
S. Bluefin	Area 3 [y]	1 109 950	588 130	53.0	53	0.090	100	(82 - 120)	100.0
S. Bluefin	Area 1 [y]	828 261	242 942	29.3	8	0.033	27	(13 - 45)	100.0
Bigeye	Area 4	177 161	16 842	9.5	0	0.000	0	(0 - 0)	100.0
Swordfish	Area 1 [y]	191 511	40 301	21.0	60	1.489	285	(124 - 492)	100.0
Swordfish	Area 4	19 394	1 292	6.7	0	0.000	0	observed	6.7
Other	Area 1	43 355	0	0.0	-				
Swordfish	Area 3	350	0	0.0	-				
Other	Area 4	0							
S. Bluefin	Area 4	1 000	0	0.0	-				
Albacore	Area 4	0							
Bigeye	Area 3	4 100	0	0.0	-				
Other	Area 3	1 000	0	0.0	-				
Albacore	Area 1 [y]	13 730	0	0.0	-				

[y] Estimates calculated separately for each year.

Table 32: Summary of other albatrosses captures in the surface longline fishery, for 10 fishing years, with the number of hooks, number of hooks observed, percentage of hooks observed, number of observed captures, capture rate per thousand hooks, total estimated captures with 95% confidence intervals, and percentage of hooks included in the estimate.

		Observed				Estimated		
	Hooks	No. obs	% obs	Capt.[s]	Rate	Est. captures		% eff. in est.
2007–08	2 241 839	391 307	17.5	26	0.066	289	(62 - 638)	98.2
2006–07	3 746 672	955 919	25.5	123	0.129	451	(281 - 670)	99.0
2005–06	3 687 569	636 796	17.3	23	0.036	164	(73 - 276)	92.2
2004–05	3 676 795	703 669	19.1	30	0.043	110	(49 - 215)	92.8
2003–04	7 382 293	1 464 465	19.8	42	0.029	90	(55 - 156)	93.4
2002–03	10 781 875	1 874 448	17.4	73	0.039	130	(108 - 154)	40.0
2001–02	10 876 381	918 159	8.4	71	0.077	544	(209 - 975)	90.2
2000–01	9 761 448	1 023 868	10.5	13	0.013	77	(15 - 208)	94.1
1999–00	8 286 120	793 770	9.6	29	0.037	466	(127 - 890)	91.5
1998–99	6 845 781	1 242 610	18.2	53	0.043	152	(86 - 229)	89.7

[s] Observed captures by species, for all 10 years: Buller's albatross (313), Campbell albatross (37), albatrosses (unidentified) (36), wandering albatross (unidentified) (31), Gibson's albatross (20), antipodean albatross (13), Salvin's albatross (9), black-browed albatross (unidentified) (7), southern black-browed albatross (6), southern royal albatross (6), light-mantled sooty albatross (2), grey-headed albatross (2), Pacific albatross (1)

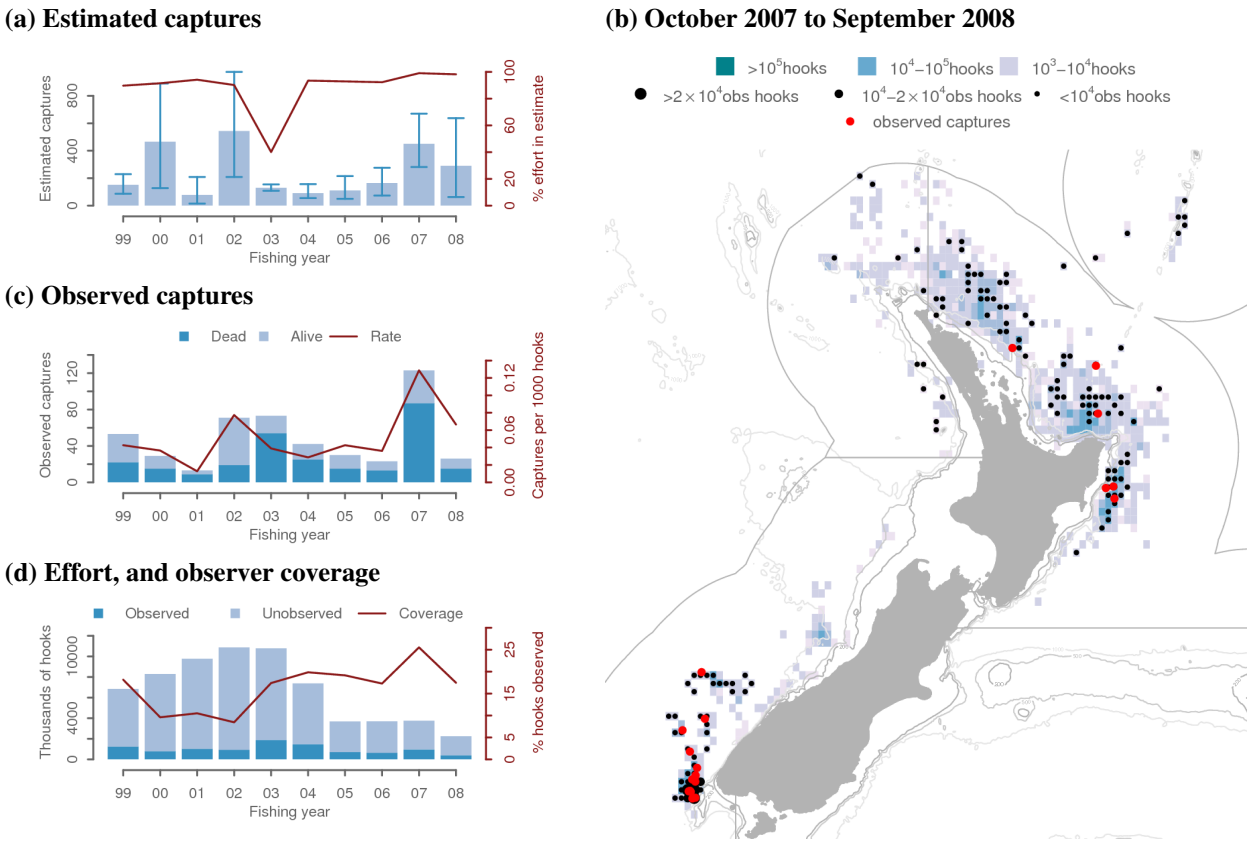

Figure 15: Other albatrosses captures in the surface longline fishery. (a) Ratio estimated captures, with 95% bootstrap confidence intervals, (b) Mapped effort and captures from 2007–08, (c) Observed captures, (d) Effort and observed effort.

3.11.3 Other albatrosses, bottom longline, New Zealand EEZ

Table 33: Summary of other albatrosses captures in the bottom longline fishery, broken down by fishing areas, with the number of hooks, number of hooks observed, percentage of hooks observed, number of observed captures, capture rate per thousand hooks, total estimated captures with 95% confidence intervals, and percentage of hooks included in the estimate.

			Observed				Estimated		
		Hooks	No. obs	% obs	Capt.	Rate	Est. captures		% eff. in est.
2007–08									
Bluenose	Chatham Rise	2 808 463	164 525	5.9	3	0.018	50	(3 - 109)	100.0
Ling	Chatham Rise [y]	8 117 620	1 611 100	19.8	3	0.002	15	(3 - 36)	100.0
Other	North East	1 014 656	73 000	7.2	1	0.014	9	(1 - 25)	100.0
Bluenose	North East	1 630 724	42 550	2.6	3	0.071	3	observed	2.6
2006–07									
Bluenose	Chatham Rise	2 661 220	6 000	0.2	0	0.000	47	(0 - 107)	100.0
Ling	Chatham Rise [y]	8 615 760	391 250	4.5	35	0.089	771	(118 - 1 693)	100.0
Other	North East	723 279	8 130	1.1	0	0.000	6	(0 - 18)	100.0
Bluenose	North East	1 784 886	46 433	2.6	0	0.000	0	observed	2.6

[y] Estimates calculated separately for each year.

Table 34: Summary of other albatrosses captures in the bottom longline fishery, for 10 fishing years, with the number of hooks, number of hooks observed, percentage of hooks observed, number of observed captures, capture rate per thousand hooks, total estimated captures with 95% confidence intervals, and percentage of hooks included in the estimate.

		Observed				Estimated		
	Hooks	No. obs	% obs	Capt.[s]	Rate	Est. captures		% eff. in est.
2007–08	41 907 447	3 614 518	8.6	10	0.003	83	(31 - 145)	61.6
2006–07	38 438 561	2 345 017	6.1	35	0.015	832	(172 - 1 749)	53.7
2005–06	37 125 639	3 822 459	10.3	6	0.002	72	(29 - 123)	51.1
2004–05	41 840 933	2 927 928	7.0	1	0.000	63	(16 - 122)	59.3
2003–04	43 449 733	4 994 320	11.5	9	0.002	55	(31 - 82)	60.7
2002–03	37 753 336	11 308 295	30.0	18	0.002	37	(26 - 49)	52.8
2001–02	47 024 332	7 547 517	16.1	21	0.003	80	(45 - 127)	60.6
2000–01	51 024 367	5 248 902	10.3	93	0.018	341	(238 - 464)	32.9
1999–00	53 277 149	3 611 278	6.8	45	0.012	283	(129 - 489)	61.8
1998–99	55 487 193	3 098 409	5.6	1	0.000	35	(4 - 88)	59.1

[s] Observed captures by species, for all 10 years: Salvin's albatross (178), Chatham Island albatross (22), albatrosses (unidentified) (17), Buller's albatross (8), wandering albatross (unidentified) (6), Campbell albatross (3), southern black-browed albatross (2), black-browed albatross (unidentified) (1), Pacific albatross (1), southern royal albatross (1)

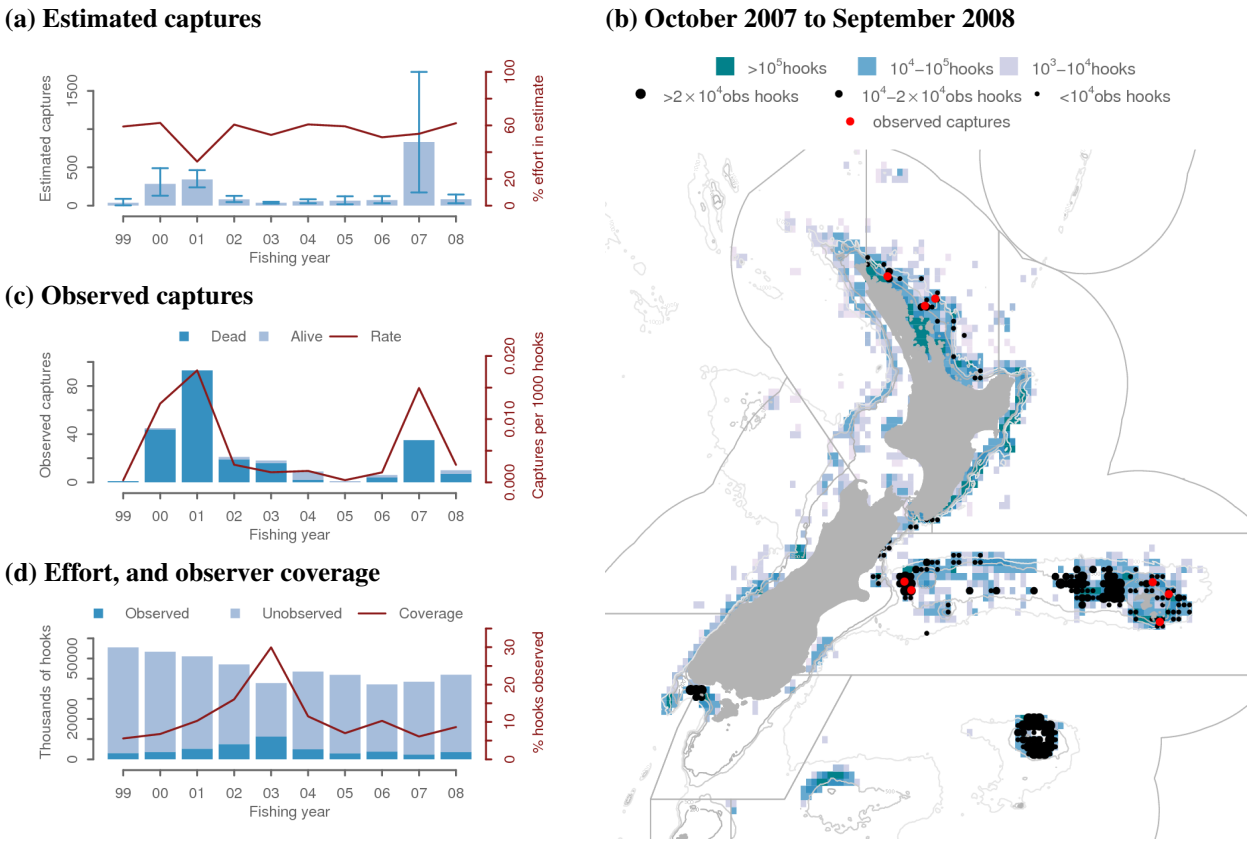

Figure 16: Other albatrosses captures in the bottom longline fishery. (a) Ratio estimated captures, with 95% bootstrap confidence intervals, (b) Mapped effort and captures from 2007–08, (c) Observed captures, (d) Effort and observed effort.

3.12 Other bird captures

3.12.1 Other birds, all trawl, New Zealand EEZ

Table 35: Summary of other bird captures in all trawl fisheries, broken down by fishing areas, with the number of tows, number of tows observed, percentage of tows observed, number of observed captures, capture rate per hundred tows, total estimated captures with 95% confidence intervals, and percentage of tows included in the estimate.

			Observed				Estimated		
		Tows	No. obs	% obs	Capt.	Rate	Est. captures		% eff. in est.
2007–08									
Scampi	North East [y]	843	145	17.2	5	3.45	29	(5 - 68)	100.0
Hoki	Chatham Rise [y]	4 486	751	16.7	3	0.40	18	(3 - 38)	100.0
Squid	Auckland Is. [y]	1 265	590	46.6	5	0.85	11	(5 - 20)	100.0
Deepwater	Chatham Rise [y]	3 257	1 320	40.5	3	0.23	7	(3 - 13)	100.0
Squid	Stewart-Snares [y]	2 413	864	35.8	2	0.23	6	(2 - 11)	100.0
Middle depth	West Coast SI	1 350	54	4.0	1	1.85	6	(1 - 17)	100.0
Scampi	Auckland Is.	1 330	93	7.0	0	0.00	5	(1 - 10)	100.0
Hake	West Coast SI	1 084	320	29.5	1	0.31	4	(1 - 8)	100.0
Hoki	West Coast SI [y]	1 395	462	33.1	1	0.22	3	(1 - 7)	100.0
Squid	Chatham Rise	539	0	0.0	-				
Deepwater	Subantarctic	1 434	839	58.5	2	0.24	2	(2 - 3)	100.0
SBW	Subantarctic [y]	816	331	40.6	1	0.30	2	(1 - 5)	100.0
Ling	Subantarctic	205	55	26.8	1	1.82	2	(1 - 5)	100.0
Inshore	West Coast SI	6 375	41	0.6	1	2.44	1	observed	0.6
Inshore	North East	7 992	44	0.6	0	0.00	0	observed	0.6
Jack mackerel	West Coast SI	255	80	31.4	0	0.00	0	(0 - 1)	100.0
2006–07									
Scampi	North East [y]	815	106	13.0	7	6.60	54	(20 - 101)	100.0
Hoki	Chatham Rise [y]	4 921	795	16.2	0	0.00	0	(0 - 0)	100.0
Squid	Auckland Is. [y]	1 317	538	40.9	1	0.19	2	(1 - 5)	100.0
Deepwater	Chatham Rise [y]	3 556	695	19.5	0	0.00	0	(0 - 0)	100.0
Squid	Stewart-Snares [y]	2 926	705	24.1	1	0.14	4	(1 - 10)	100.0
Middle depth	West Coast SI	1 729	31	1.8	0	0.00	7	(0 - 21)	100.0
Scampi	Auckland Is.	1 328	101	7.6	1	0.99	6	(2 - 11)	100.0
Hake	West Coast SI	1 069	160	15.0	0	0.00	4	(0 - 8)	100.0
Hoki	West Coast SI [y]	2 129	516	24.2	4	0.78	17	(7 - 29)	100.0
Squid	Chatham Rise	1 495	38	2.5	1	2.63	8	(1 - 18)	100.0
Deepwater	Subantarctic	1 423	946	66.5	0	0.00	0	(0 - 1)	100.0
SBW	Subantarctic [y]	630	224	35.6	3	1.34	8	(3 - 18)	100.0
Ling	Subantarctic	221	10	4.5	0	0.00	2	(0 - 6)	100.0
Inshore	West Coast SI	7 571	59	0.8	0	0.00	0	observed	0.8
Inshore	North East	9 689	122	1.3	3	2.46	3	observed	1.3
Jack mackerel	West Coast SI	416	181	43.5	1	0.55	2	(1 - 3)	100.0

[y] Estimates calculated separately for each year.

Table 36: Summary of other bird captures in all trawl fisheries, for 10 fishing years, with the number of tows, number of tows observed, percentage of tows observed, number of observed captures, capture rate per hundred tows, total estimated captures with 95% confidence intervals, and percentage of tows included in the estimate.

		Observed				Estimated		
	Tows	No. obs	% obs	Capt.[s]	Rate	Est. captures		% eff. in est.
2007–08	89 442	9 036	10.1	26	0.29	123	(86 - 167)	41.8
2006–07	103 818	7 918	7.6	22	0.28	142	(96 - 198)	40.9
2005–06	109 983	6 554	6.0	26	0.40	192	(109 - 316)	42.2
2004–05	120 476	7 710	6.4	52	0.67	225	(161 - 304)	41.9
2003–04	120 878	6 546	5.4	21	0.32	158	(106 - 223)	44.6
2002–03	130 177	6 835	5.3	22	0.32	201	(136 - 281)	48.6
2001–02	127 887	7 716	6.0	11	0.14	123	(84 - 168)	49.4
2000–01	134 243	9 114	6.8	79	0.87	617	(389 - 914)	49.3
1999–00	139 057	7 650	5.5	26	0.34	244	(166 - 337)	49.4
1998–99	153 412	7 257	4.7	59	0.81	399	(234 - 614)	47.3

[s] Observed captures by species, for all 10 years: cape petrels (61), seabird – small (60), petrel (unidentified) (41), short-tailed shearwater (33), seabird – large (30), flesh-footed shearwater (25), grey petrel (19), prions (unidentified) (13), northern giant petrel (10), common diving petrel (10), fairy prion (7), seabird (unspecified) (7), antarctic prion (6), giant petrels (unidentified) (4), Westland petrel (4), storm petrels (4), black petrel (3), grey-backed storm petrel (2), snares cape petrels (1), black-backed gull (1), other species (3)

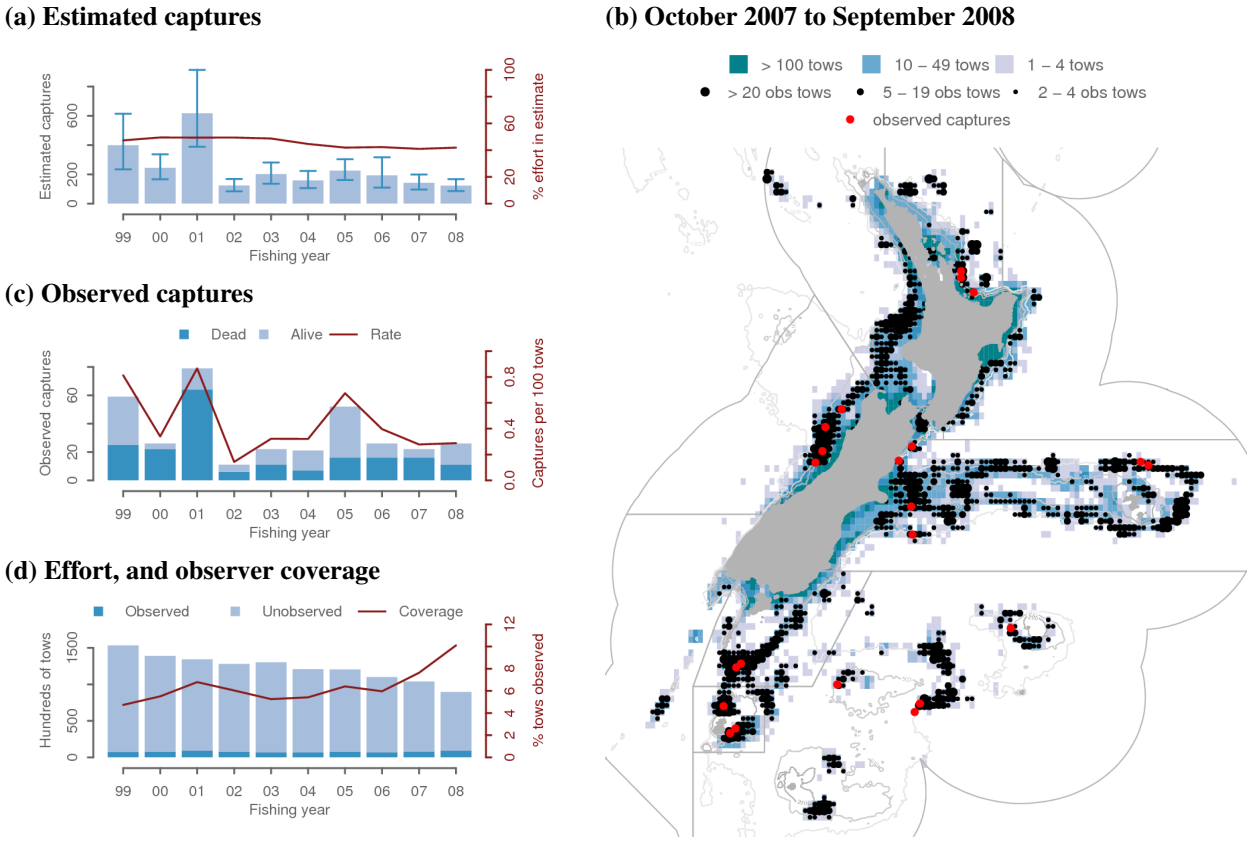

Figure 17: Other bird captures in all trawl fisheries. (a) Ratio estimated captures, with 95% bootstrap confidence intervals, (b) Mapped effort and captures from 2007–08, (c) Observed captures, (d) Effort and observed effort.

3.12.2 Other birds, surface longline, New Zealand EEZ

Table 37: Summary of other bird captures in the surface longline fishery, broken down by fishing areas, with the number of hooks, number of hooks observed, percentage of hooks observed, number of observed captures, capture rate per thousand hooks, total estimated captures with 95% confidence intervals, and percentage of hooks included in the estimate.

			Observed				Estimated		
		Hooks	No. obs	% obs	Capt.	Rate	Est. captures		% eff. in est.
2007–08									
Bigeye	Area 1 [y]	880 517	15 985	1.8	2	0.125	110	(2 - 343)	100.0
Swordfish	Area 1	83 630	17 540	21.0	1	0.057	11	(4 - 20)	100.0
S. Bluefin	Area 1 [y]	451 700	91 864	20.3	1	0.011	5	(1 - 13)	100.0
Other	Area 1	31 705	0	0.0	-				
S. Bluefin	Area 3	654 625	254 208	38.8	0	0.000	0	(0 - 1)	100.0
Bigeye	Area 4	93 112	8 360	9.0	0	0.000	0	(0 - 0)	100.0
Swordfish	Area 4	35 500	3 350	9.4	0	0.000	0	observed	9.4
Swordfish	Area 3	6 200	0	0.0	-				
Other	Area 4	2 750	0	0.0	-				
S. Bluefin	Area 4	1 500	0	0.0	-				
Albacore	Area 4	600	0	0.0	-				
Bigeye	Area 3	0							
Other	Area 3	0							
Albacore	Area 1 [y]	0							
2006–07									
Bigeye	Area 1 [y]	1 356 860	66 412	4.9	3	0.045	61	(3 - 137)	100.0
Swordfish	Area 1	191 511	40 301	21.0	8	0.199	31	(15 - 51)	100.0
S. Bluefin	Area 1 [y]	828 261	242 942	29.3	18	0.074	61	(40 - 86)	100.0
Other	Area 1	43 355	0	0.0	-				
S. Bluefin	Area 3	1 109 950	588 130	53.0	0	0.000	1	(0 - 1)	100.0
Bigeye	Area 4	177 161	16 842	9.5	0	0.000	0	(0 - 0)	100.0
Swordfish	Area 4	19 394	1 292	6.7	0	0.000	0	observed	6.7
Swordfish	Area 3	350	0	0.0	-				
Other	Area 4	0							
S. Bluefin	Area 4	1 000	0	0.0	-				
Albacore	Area 4	0							
Bigeye	Area 3	4 100	0	0.0	-				
Other	Area 3	1 000	0	0.0	-				
Albacore	Area 1 [y]	13 730	0	0.0	-				

[y] Estimates calculated separately for each year.

Table 38: Summary of other bird captures in the surface longline fishery, for 10 fishing years, with the number of hooks, number of hooks observed, percentage of hooks observed, number of observed captures, capture rate per thousand hooks, total estimated captures with 95% confidence intervals, and percentage of hooks included in the estimate.

		Observed				Estimated		
	Hooks	No. obs	% obs	Capt.[s]	Rate	Est. captures		% eff. in est.
2007–08	2 241 839	391 307	17.5	4	0.010	131	(14 - 362)	98.2
2006–07	3 746 672	955 919	25.5	29	0.030	158	(95 - 236)	99.0
2005–06	3 687 569	636 796	17.3	11	0.017	243	(101 - 424)	97.2
2004–05	3 676 795	703 669	19.1	5	0.007	45	(20 - 76)	95.0
2003–04	7 382 293	1 464 465	19.8	7	0.005	191	(69 - 340)	93.4
2002–03	10 781 875	1 874 448	17.4	27	0.014	79	(57 - 106)	40.1
2001–02	10 876 381	918 159	8.4	77	0.084	3 810	(2 199 - 5 695)	90.2
2000–01	9 761 448	1 023 868	10.5	33	0.032	1 009	(632 - 1 447)	94.2
1999–00	8 286 120	793 770	9.6	32	0.040	2 906	(1 381 - 4 915)	91.5
1998–99	6 845 781	1 242 610	18.2	22	0.018	673	(318 - 1 144)	89.9

[s] Observed captures by species, for all 10 years: flesh-footed shearwater (139), grey petrel (46), black petrel (20), great-winged petrel (19), cape petrels (5), petrel (unidentified) (5), Westland petrel (4), seabird – large (4), southern giant petrel (2), white-headed petrel (2), seabird (unspecified) (1)

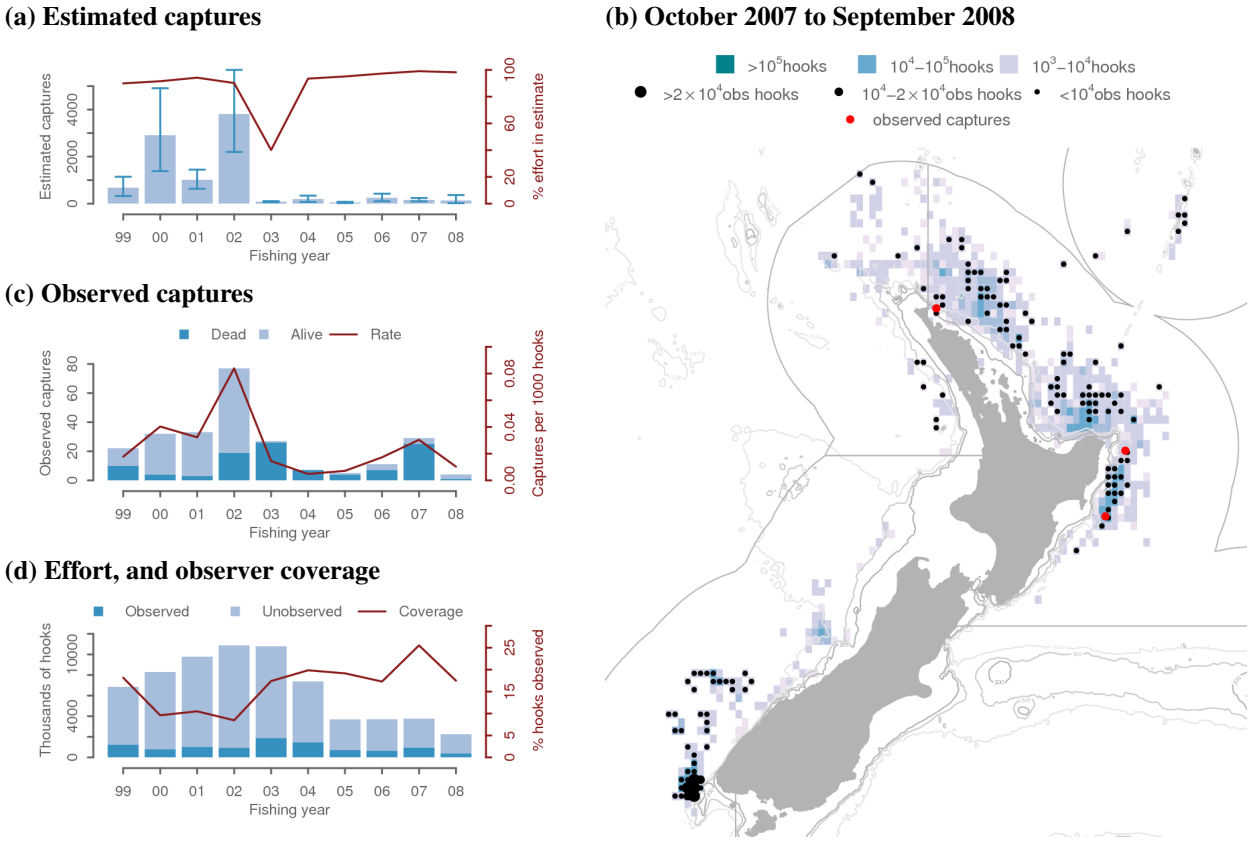

Figure 18: Other bird captures in the surface longline fishery. (a) Ratio estimated captures, with 95% bootstrap confidence intervals, (b) Mapped effort and captures from 2007–08, (c) Observed captures, (d) Effort and observed effort.

3.12.3 Other birds, bottom longline, New Zealand EEZ

Table 39: Summary of other bird captures in the bottom longline fishery, broken down by fishing areas, with the number of hooks, number of hooks observed, percentage of hooks observed, number of observed captures, capture rate per thousand hooks, total estimated captures with 95% confidence intervals, and percentage of hooks included in the estimate.

			Observed				Estimated		
		Hooks	No. obs	% obs	Capt.	Rate	Est. captures		% eff. in est.
2007–08									
Other	North East	1 014 656	73 000	7.2	9	0.123	75	(9 - 175)	100.0
Bluenose	East of NI	3 944 726	10 500	0.3	0	0.000	55	(0 - 130)	100.0
Ling	Chatham Rise [y]	8 117 620	1 611 100	19.8	5	0.003	25	(9 - 50)	100.0
Ling	Puysegur	1 046 283	108 455	10.4	0	0.000	3	(0 - 6)	100.0
Bluenose	North East	1 630 724	42 550	2.6	0	0.000	0	observed	2.6
2006–07									
Other	North East	723 279	8 130	1.1	0	0.000	50	(0 - 126)	100.0
Bluenose	East of NI	2 364 810	40 285	1.7	2	0.050	35	(2 - 79)	100.0
Ling	Chatham Rise [y]	8 615 760	391 250	4.5	3	0.008	66	(3 - 140)	100.0
Ling	Puysegur	994 444	781 522	78.6	1	0.001	2	(1 - 2)	100.0
Bluenose	North East	1 784 886	46 433	2.6	4	0.086	4	observed	2.6

[y] Estimates calculated separately for each year.

Table 40: Summary of other bird captures in the bottom longline fishery, for 10 fishing years, with the number of hooks, number of hooks observed, percentage of hooks observed, number of observed captures, capture rate per thousand hooks, total estimated captures with 95% confidence intervals, and percentage of hooks included in the estimate.

		Observed				Estimated		
	Hooks	No. obs	% obs	Capt.[s]	Rate	Est. captures		% eff. in est.
2007–08	41 907 447	3 614 518	8.6	14	0.004	163	(64 - 287)	61.6
2006–07	38 438 561	2 345 017	6.1	10	0.004	160	(67 - 274)	53.7
2005–06	37 125 639	3 822 459	10.3	18	0.005	1 248	(170 - 3 195)	81.7
2004–05	41 840 933	2 927 928	7.0	15	0.005	630	(248 - 1 201)	85.6
2003–04	43 449 733	4 994 320	11.5	12	0.002	1 066	(484 - 1 806)	87.3
2002–03	37 753 336	11 308 295	30.0	94	0.008	178	(144 - 223)	52.8
2001–02	47 024 332	7 547 517	16.1	36	0.005	157	(103 - 232)	60.5
2000–01	51 024 367	5 248 902	10.3	218	0.042	785	(616 - 977)	32.9
1999–00	53 277 149	3 611 278	6.8	87	0.024	594	(397 - 815)	61.8
1998–99	55 487 193	3 098 409	5.6	86	0.028	538	(409 - 679)	58.4

[s] Observed captures by species, for all 10 years: grey petrel (417), cape petrels (48), petrel (unidentified) (30), flesh-footed shearwater (24), black petrel (12), northern giant petrel (8), common diving petrel (7), great-winged petrel (6), Buller's shearwater (6), southern giant petrel (5), giant petrels (unidentified) (4), seabird – small (4), storm petrels (3), Australasian gannet (2), prions (unidentified) (2), seabird (unspecified) (2), fluttering shearwater (2), seagull (2), broad-billed prion (1), snares cape petrels (1), other species (4)

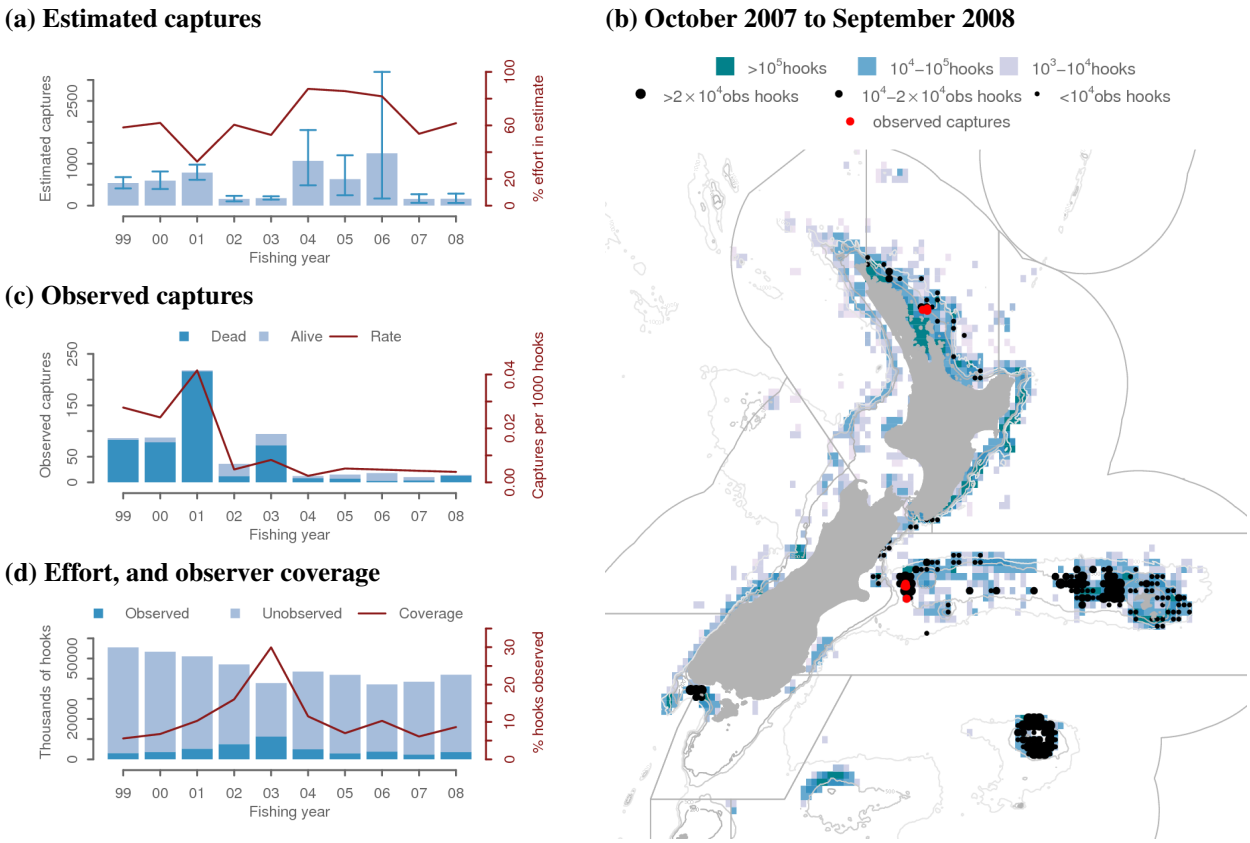

Figure 19: Other bird captures in the bottom longline fishery. (a) Ratio estimated captures, with 95% bootstrap confidence intervals, (b) Mapped effort and captures from 2007–08, (c) Observed captures, (d) Effort and observed effort.

3.13 New Zealand sea lion captures

3.13.1 New Zealand sea lions, all trawl, New Zealand EEZ

Table 41: Summary of New Zealand sea lion captures in all trawl fisheries, broken down by fishing areas, with the number of tows, number of tows observed, percentage of tows observed, number of observed captures, capture rate per hundred tows, total estimated captures with 95% confidence intervals, and percentage of tows included in the estimate.

			Observed				Estimated		
		Tows	No. obs	% obs	Capt.	Rate	Est. captures		% eff. in est.
2007–08									
SBW	Subantarctic [y]	816	331	40.6	5	1.51	12	(6 - 21)	100.0
Scampi	Auckland Is.	1 330	93	7.0	0	0.00	11	(5 - 19)	100.0
Squid	Auckland Is. [y]	1 265	590	46.6	5	0.85	11	(6 - 16) [s]	100.0
Squid	Stewart-Snares	2 413	864	35.8	0	0.00	1	(1 - 2)	100.0
Hoki	Stewart-Snares	743	341	45.9	1	0.29	1	(1 - 2)	100.0
2006–07									
SBW	Subantarctic [y]	630	224	35.6	3	1.34	8	(3 - 18)	100.0
Scampi	Auckland Is.	1 328	101	7.6	1	0.99	12	(6 - 20)	100.0
Squid	Auckland Is. [y]	1 317	538	40.9	7	1.30	17	(10 - 26) [s]	100.0
Squid	Stewart-Snares	2 926	705	24.1	1	0.14	3	(2 - 5)	100.0
Hoki	Stewart-Snares	1 181	206	17.4	0	0.00	1	(0 - 1)	100.0

[y] Estimates calculated separately for each year.

[s] Estimate of captures, does not include sea lion interactions with nets where the animal was excluded by a SLED.

Table 42: Summary of New Zealand sea lion captures in all trawl fisheries, for 10 fishing years, with the number of tows, number of tows observed, percentage of tows observed, number of observed captures, capture rate per hundred tows, total estimated captures with 95% confidence intervals, and percentage of tows included in the estimate.

		Observed				Estimated		
	Tows	No. obs	% obs	Capt.	Rate	Est. captures		% eff. in est.
2007–08	89 442	9 036	10.1	11	0.12	39	(27 - 51)	41.8
2006–07	103 818	7 918	7.6	12	0.15	43	(30 - 57)	40.9
2005–06	109 983	6 554	6.0	15	0.23	72	(44 - 105)	42.2
2004–05	120 476	7 710	6.4	14	0.18	57	(41 - 74)	42.6
2003–04	120 878	6 546	5.4	21	0.32	77	(57 - 101)	45.2
2002–03	130 177	6 835	5.3	12	0.18	59	(42 - 78)	49.3
2001–02	127 887	7 716	6.0	23	0.30	89	(66 - 115)	50.2
2000–01	134 243	9 114	6.8	47	0.52	67	(58 - 77)	50.0
1999–00	139 057	7 650	5.5	28	0.37	93	(74 - 114)	49.9
1998–99	153 412	7 257	4.7	6	0.08	37	(26 - 50)	47.5

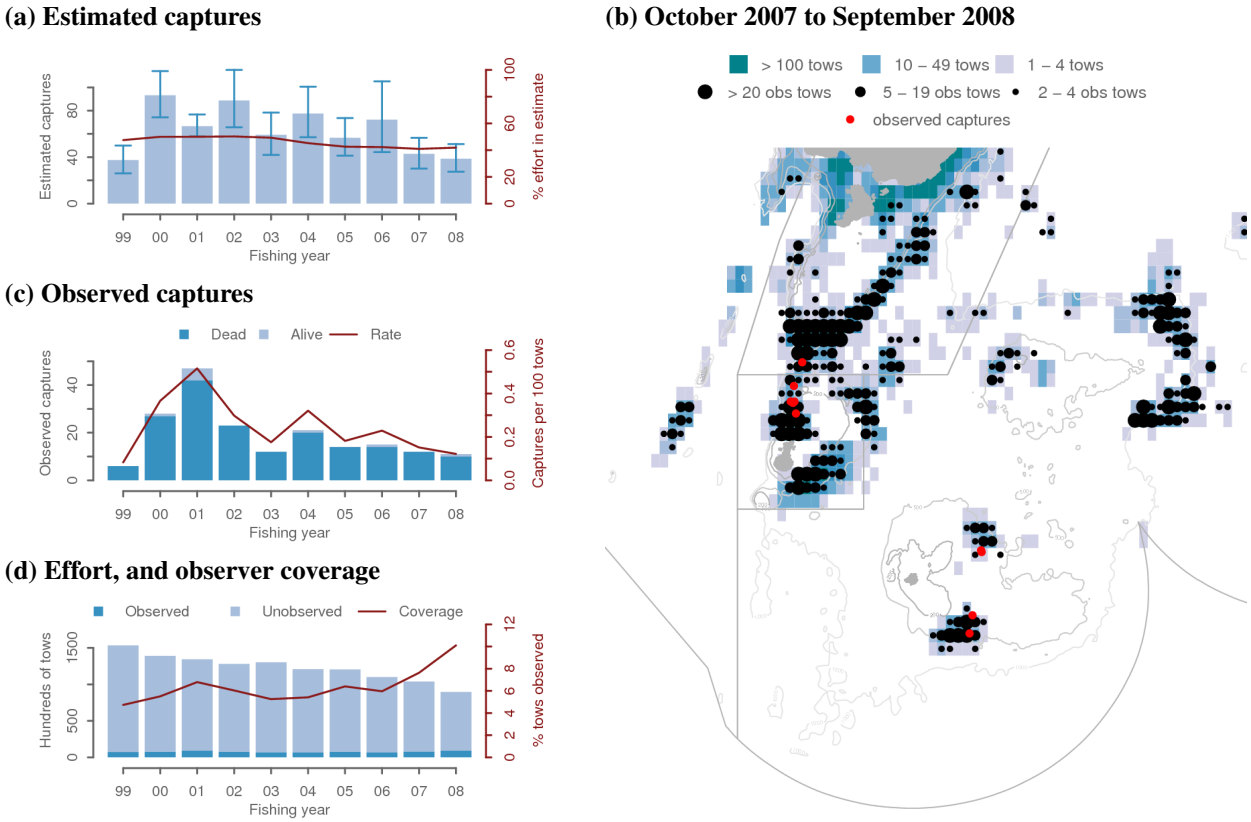

Figure 20: New Zealand sea lion captures in all trawl fisheries. (a) Ratio estimated captures, with 95% bootstrap confidence intervals, (b) Mapped effort and captures from 2007–08, (c) Observed captures, (d) Effort and observed effort.

3.14 New Zealand fur seal captures

3.14.1 New Zealand fur seals, all trawl, New Zealand EEZ

Table 43: Summary of New Zealand fur seal captures in all trawl fisheries, broken down by fishing areas, with the number of tows, number of tows observed, percentage of tows observed, number of observed captures, capture rate per hundred tows, total estimated captures with 95% confidence intervals, and percentage of tows included in the estimate.

(a) All captures by fishery

		Observed				Estimated		
	Tows	No. obs	% obs	Capt.	Rate	Est. captures		% eff. in est.
2007–08								
Hoki	8 788	1 869	21.3	58	3.10	327	(237 - 425)	96.9
Hake	1 559	395	25.3	28	7.09	92	(67 - 121)	100.0
SBW	816	331	40.6	24	7.25	59	(45 - 77)	100.0
Middle depth	7 421	435	5.9	9	2.07	53	(34 - 76)	76.1
Squid	4 237	1 456	34.4	6	0.41	30	(18 - 44)	99.9
Ling	2 210	241	10.9	4	1.66	28	(11 - 48)	42.9
Jack mackerel	2 646	817	30.9	7	0.86	15	(10 - 21)	93.3
Scampi	4 807	524	10.9	1	0.19	11	(5 - 18)	100.0
Deepwater	6 743	2 810	41.7	4	0.14	7	(4 - 11)	99.4
Inshore	50 215	158	0.3	0	0.00	0	observed	0.3
2006–07								
Hoki	10 630	1 757	16.5	29	1.65	247	(160 - 345)	97.2
Hake	1 606	295	18.4	4	1.36	31	(12 - 55)	99.7
SBW	630	224	35.6	13	5.80	36	(24 - 51)	100.0
Middle depth	8 221	393	4.8	2	0.51	48	(28 - 71)	72.6
Squid	5 910	1 289	21.8	8	0.62	55	(31 - 83)	97.5
Ling	1 665	157	9.4	12	7.64	73	(40 - 109)	51.7
Jack mackerel	2 711	802	29.6	2	0.25	9	(4 - 16)	99.6
Scampi	5 135	389	7.6	0	0.00	11	(4 - 20)	100.0
Deepwater	7 477	2 320	31.0	2	0.09	3	(2 - 5)	99.7
Inshore	59 833	292	0.5	0	0.00	0	observed	0.5

(b) All captures by area

		Observed				Estimated		
	Tows	No. obs	% obs	Capt.	Rate	Est. captures		% eff. in est.
2007–08								
Cook Strait	3 232	208	6.4	24	11.54	207	(123 - 299)	54.6
West Coast SI	10 777	957	8.9	58	6.06	164	(129 - 207)	24.6
Chatham Rise	21 959	2 559	11.7	15	0.59	105	(73 - 141)	61.4
Subantarctic	2 624	1 310	49.9	30	2.29	80	(61 - 102)	96.8
Stewart-Snares	12 513	1 536	12.3	14	0.91	51	(34 - 72)	41.3
West Coast NI	13 689	929	6.8	1	0.11	10	(1 - 21)	25.3
Auckland Is.	2 746	753	27.4	1	0.13	4	(1 - 7)	99.3
East of NI	11 580	218	1.9	0	0.00	1	(0 - 2)	18.2
North East	9 557	495	5.2	0	0.00	0	(0 - 0)	15.3
Puysegur	765	71	9.3	0	0.00	0	(0 - 0)	63.1
Kermadec Is.	0							
2006–07								
Cook Strait	4 254	228	5.4	23	10.09	211	(129 - 309)	48.8
West Coast SI	13 257	947	7.1	5	0.53	29	(11 - 53)	29.7
Chatham Rise	26 746	1 912	7.1	6	0.31	100	(66 - 141)	58.0
Subantarctic	2 416	1 183	49.0	15	1.27	56	(36 - 81)	94.2
Stewart-Snares	12 047	1 353	11.2	21	1.55	104	(70 - 142)	52.3
West Coast NI	14 472	1 066	7.4	1	0.09	8	(1 - 18)	22.6
Auckland Is.	2 686	642	23.9	0	0.00	3	(0 - 6)	99.2
East of NI	13 130	54	0.4	0	0.00	1	(0 - 3)	21.5
North East	11 326	461	4.1	0	0.00	0	(0 - 0)	14.0
Puysegur	3 484	72	2.1	1	1.39	1	(1 - 1)	8.6
Kermadec Is.	0							

Table 44: Summary of New Zealand fur seal captures in all trawl fisheries, for 10 fishing years, with the number of tows, number of tows observed, percentage of tows observed, number of observed captures, capture rate per hundred tows, total estimated captures with 95% confidence intervals, and percentage of tows included in the estimate.

		Observed				Estimated		
	Tows	No. obs	% obs	Capt.	Rate	Est. captures		% eff. in est.
2007–08	89 442	9 036	10.1	141	1.56	622	(522 - 730)	40.1
2006–07	103 818	7 918	7.6	72	0.91	513	(412 - 626)	39.2
2005–06	109 983	6 554	6.0	144	2.20	560	(461 - 675)	38.8
2004–05	120 476	7 710	6.4	200	2.59	1 325	(1 039 - 1 656)	39.9
2003–04	120 878	6 546	5.4	84	1.28	617	(487 - 764)	43.2
2002–03	130 177	6 835	5.3	67	0.98	666	(487 - 874)	46.8
2001–02	127 887	7 716	6.0	157	2.03	1 094	(903 - 1 301)	46.9
2000–01	134 243	9 114	6.8	170	1.87	933	(761 - 1 123)	46.5
1999–00	139 057	7 650	5.5	203	2.65	1 120	(953 - 1 305)	46.6
1998–99	153 412	7 257	4.7	190	2.62	1 341	(1 147 - 1 562)	44.4

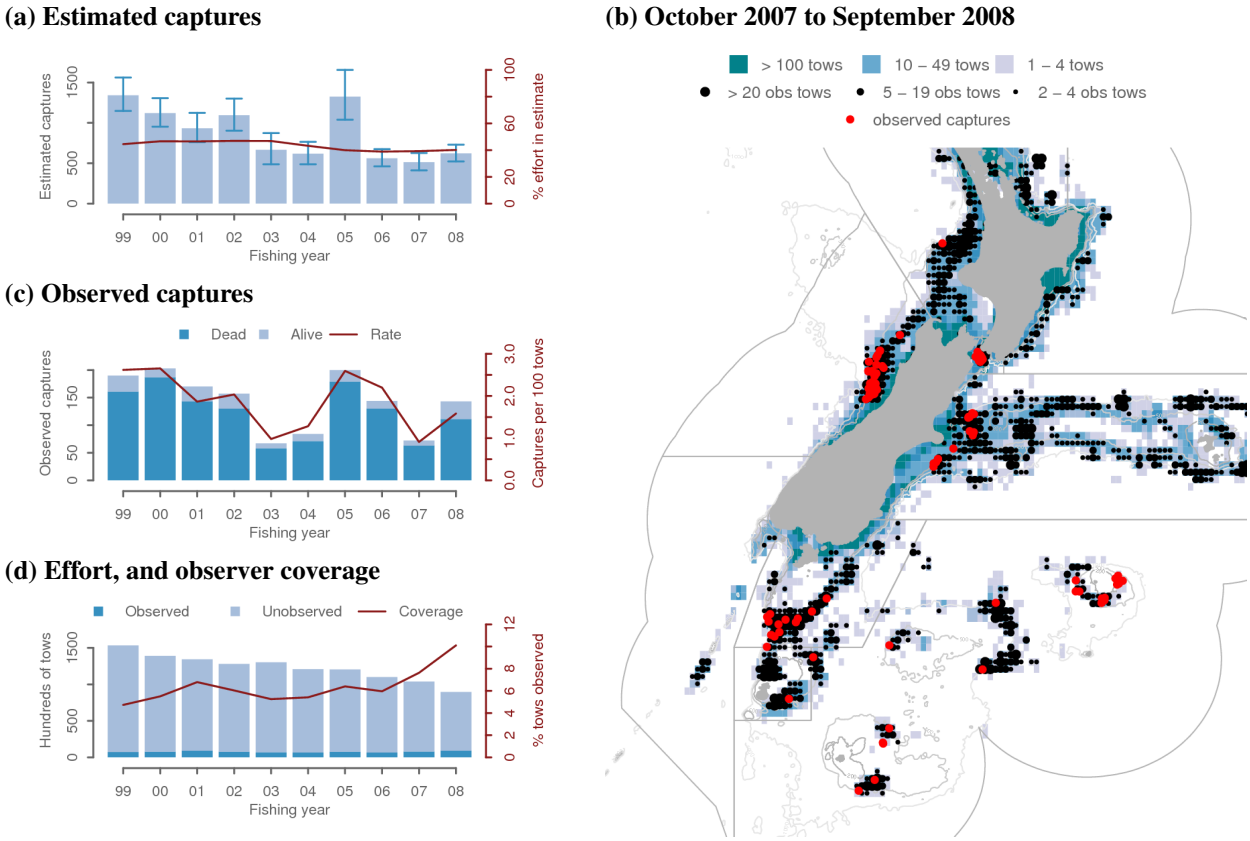

Figure 21: New Zealand fur seal captures in all trawl fisheries. (a) Ratio estimated captures, with 95% bootstrap confidence intervals, (b) Mapped effort and captures from 2007–08, (c) Observed captures, (d) Effort and observed effort.

3.14.2 New Zealand fur seals, surface longline, New Zealand EEZ

Table 45: Summary of New Zealand fur seal captures in the surface longline fishery, broken down by fishing areas, with the number of hooks, number of hooks observed, percentage of hooks observed, number of observed captures, capture rate per thousand hooks, total estimated captures with 95% confidence intervals, and percentage of hooks included in the estimate.

			Observed				Estimated		
		Hooks	No. obs	% obs	Capt.	Rate	Est. captures		% eff. in est.
2007–08									
S. Bluefin	Area 3 [y]	654 625	254 208	38.8	6	0.024	15	(9 - 23)	100.0
S. Bluefin	Area 1 [y]	451 700	91 864	20.3	2	0.022	10	(2 - 22)	100.0
Bigeye	Area 4	93 112	8 360	9.0	2	0.239	3	(2 - 4)	100.0
Swordfish	Area 1	83 630	17 540	21.0	0	0.000	2	(0 - 5)	100.0
Bigeye	Area 1	880 517	15 985	1.8	0	0.000	0	(0 - 0)	100.0
Swordfish	Area 4	35 500	3 350	9.4	0	0.000	0	observed	9.4
Other	Area 1	31 705	0	0.0	-				
Swordfish	Area 3	6 200	0	0.0	-				
Other	Area 4	2 750	0	0.0	-				
S. Bluefin	Area 4	1 500	0	0.0	-				
Albacore	Area 4	600	0	0.0	-				
Bigeye	Area 3	0							
Other	Area 3	0							
Albacore	Area 1	0							
2006–07									
S. Bluefin	Area 3 [y]	1 109 950	588 130	53.0	7	0.012	13	(8 - 20)	100.0
S. Bluefin	Area 1 [y]	828 261	242 942	29.3	3	0.012	10	(3 - 20)	100.0
Bigeye	Area 4	177 161	16 842	9.5	0	0.000	2	(0 - 4)	100.0
Swordfish	Area 1	191 511	40 301	21.0	0	0.000	4	(0 - 11)	100.0
Bigeye	Area 1	1 356 860	66 412	4.9	0	0.000	0	(0 - 0)	100.0
Swordfish	Area 4	19 394	1 292	6.7	0	0.000	0	observed	6.7
Other	Area 1	43 355	0	0.0	-				
Swordfish	Area 3	350	0	0.0	-				
Other	Area 4	0							
S. Bluefin	Area 4	1 000	0	0.0	-				
Albacore	Area 4	0							
Bigeye	Area 3	4 100	0	0.0	-				
Other	Area 3	1 000	0	0.0	-				
Albacore	Area 1	13 730	0	0.0	-				

[y] Estimates calculated separately for each year.

Table 46: Summary of New Zealand fur seal captures in the surface longline fishery, for 10 fishing years, with the number of hooks, number of hooks observed, percentage of hooks observed, number of observed captures, capture rate per thousand hooks, total estimated captures with 95% confidence intervals, and percentage of hooks included in the estimate.

		Observed				Estimated		
	Hooks	No. obs	% obs	Capt.	Rate	Est. captures		% eff. in est.
2007–08	2 241 839	391 307	17.5	10	0.026	30	(18 - 44)	98.2
2006–07	3 746 672	955 919	25.5	10	0.010	30	(18 - 42)	99.4
2005–06	3 687 569	636 796	17.3	12	0.019	65	(28 - 113)	98.8
2004–05	3 676 795	703 669	19.1	20	0.028	39	(27 - 55)	98.6
2003–04	7 382 293	1 464 465	19.8	40	0.027	93	(55 - 163)	98.7
2002–03	10 781 875	1 874 448	17.4	56	0.030	76	(66 - 91)	78.4
2001–02	10 876 381	918 159	8.4	44	0.048	82	(67 - 100)	96.7
2000–01	9 761 448	1 023 868	10.5	43	0.042	64	(49 - 87)	98.2
1999–00	8 286 120	793 770	9.6	42	0.053	72	(59 - 90)	98.8
1998–99	6 845 781	1 242 610	18.2	102	0.082	134	(124 - 145)	96.9

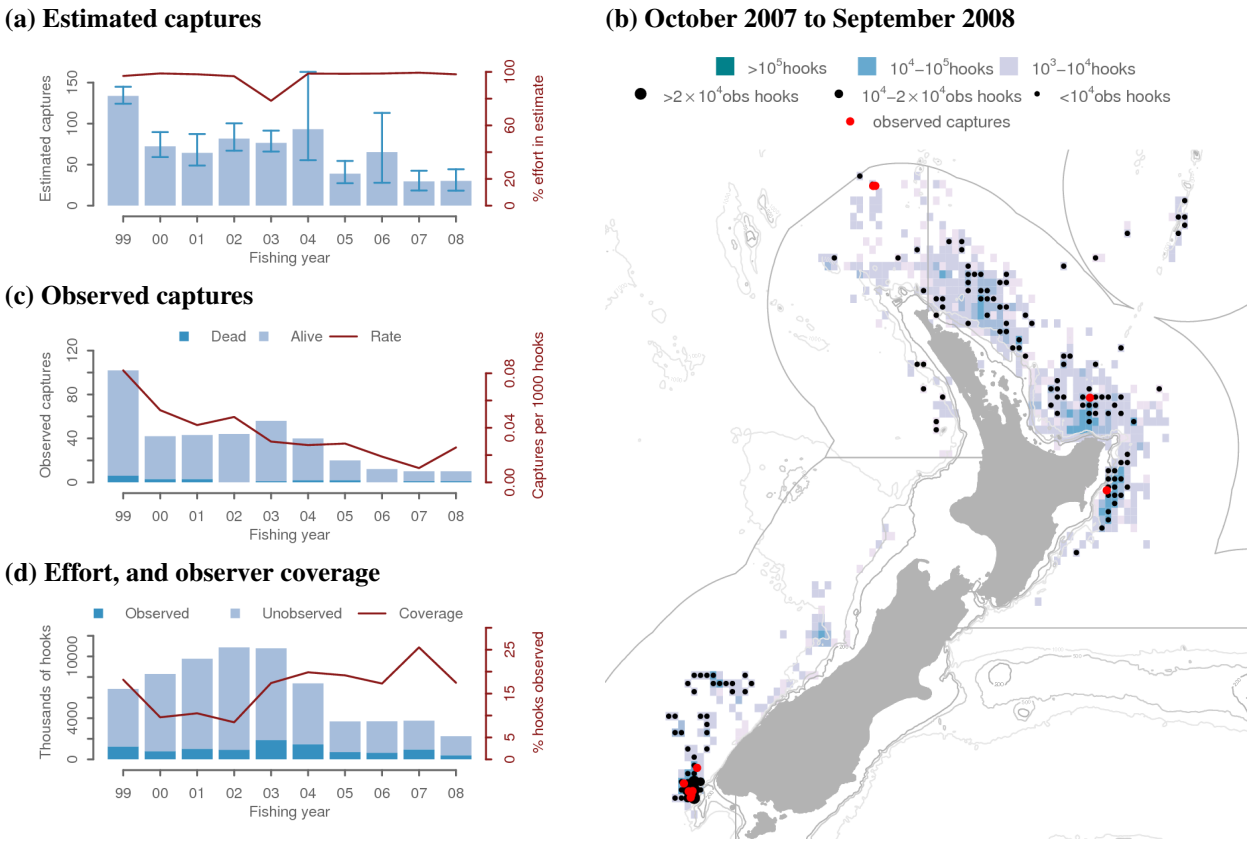

Figure 22: New Zealand fur seal captures in the surface longline fishery. (a) Ratio estimated captures, with 95% bootstrap confidence intervals, (b) Mapped effort and captures from 2007–08, (c) Observed captures, (d) Effort and observed effort.

3.15 Dolphin captures

3.15.1 Dolphins, all trawl, New Zealand EEZ

Table 47: Summary of dolphin captures in all trawl fisheries, broken down by fishing areas, with the number of tows, number of tows observed, percentage of tows observed, number of observed captures, capture rate per hundred tows, total estimated captures with 95% confidence intervals, and percentage of tows included in the estimate.

			Observed				Estimated		
		Tows	No. obs	% obs	Capt.	Rate	Est. captures		% eff. in est.
2007–08									
Jack mackerel	West Coast NI [y]	2 195	710	32.3	20	2.82	62	(24 - 114)	100.0
Inshore	North East	7 992	44	0.6	1	2.27	1	observed	0.6
2006–07									
Jack mackerel	West Coast NI [y]	2 152	603	28.0	11	1.82	39	(16 - 73)	100.0
Inshore	North East	9 689	122	1.3	0	0.00	0	observed	1.3

[y] Estimates calculated separately for each year.

Table 48: Summary of dolphin captures in all trawl fisheries, for 10 fishing years, with the number of tows, number of tows observed, percentage of tows observed, number of observed captures, capture rate per hundred tows, total estimated captures with 95% confidence intervals, and percentage of tows included in the estimate.

		Observed				Estimated		
	Tows	No. obs	% obs	Capt.[s]	Rate	Est. captures		% eff. in est.
2007–08	89 442	9 036	10.1	21	0.23	69	(30 - 122)	41.8
2006–07	103 818	7 918	7.6	11	0.14	47	(20 - 83)	40.9
2005–06	109 983	6 554	6.0	5	0.08	17	(6 - 31)	42.2
2004–05	120 476	7 710	6.4	22	0.29	103	(58 - 157)	42.6
2003–04	120 878	6 546	5.4	17	0.26	282	(92 - 537)	45.2
2002–03	130 177	6 835	5.3	21	0.31	222	(67 - 425)	49.3
2001–02	127 887	7 716	6.0	1	0.01	27	(2 - 69)	50.2
2000–01	134 243	9 114	6.8	4	0.04	24	(4 - 56)	50.0
1999–00	139 057	7 650	5.5	1	0.01	14	(1 - 38)	49.7
1998–99	153 412	7 257	4.7	0	0.00	14	(1 - 38)	47.5

[s] Observed captures by species, for all 10 years: common dolphin (98), dusky dolphin (4), bottlenose dolphin (1)

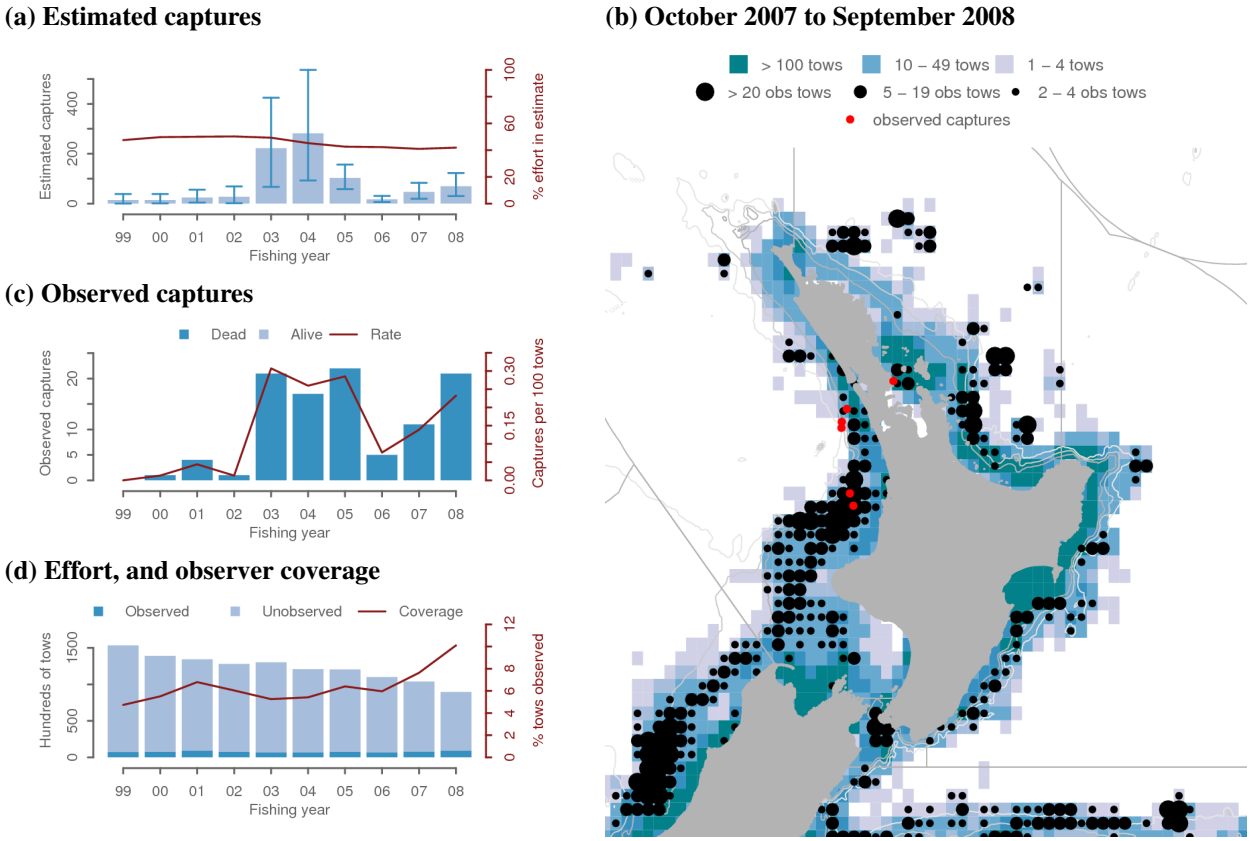

Figure 23: Dolphin captures in all trawl fisheries. (a) Ratio estimated captures, with 95% bootstrap confidence intervals, (b) Mapped effort and captures from 2007–08, (c) Observed captures, (d) Effort and observed effort.

3.16 Whale captures

3.16.1 Whales, surface longline, New Zealand EEZ

Table 49: Summary of whale captures in the surface longline fishery, broken down by fishing areas, with the number of hooks, number of hooks observed, percentage of hooks observed, number of observed captures, capture rate per thousand hooks, total estimated captures with 95% confidence intervals, and percentage of hooks included in the estimate.

			Observed				Estimated		
		Hooks	No. obs	% obs	Capt.	Rate	Est. captures		% eff. in est.
2007–08									
S. Bluefin	Area 1	451 700	91 864	20.3	1	0.011	2	(1 - 3)	100.0
Bigeye	Area 1	880 517	15 985	1.8	0	0.000	0	(0 - 0)	100.0
S. Bluefin	Area 3	654 625	254 208	38.8	0	0.000	0	(0 - 0)	100.0
Bigeye	Area 4	93 112	8 360	9.0	0	0.000	0	(0 - 1)	100.0
Swordfish	Area 1	83 630	17 540	21.0	0	0.000	0	(0 - 0)	100.0
Swordfish	Area 4	35 500	3 350	9.4	0	0.000	0	observed	9.4
Other	Area 1	31 705	0	0.0	-				
Swordfish	Area 3	6 200	0	0.0	-				
Other	Area 4	2 750	0	0.0	-				
S. Bluefin	Area 4	1 500	0	0.0	-				
Albacore	Area 4	600	0	0.0	-				
Bigeye	Area 3	0							
Other	Area 3	0							
Albacore	Area 1	0							
2006–07									
S. Bluefin	Area 1	828 261	242 942	29.3	0	0.000	1	(0 - 4)	100.0
Bigeye	Area 1	1 356 860	66 412	4.9	0	0.000	0	(0 - 0)	100.0
S. Bluefin	Area 3	1 109 950	588 130	53.0	0	0.000	0	(0 - 1)	100.0
Bigeye	Area 4	177 161	16 842	9.5	0	0.000	1	(0 - 2)	100.0
Swordfish	Area 1	191 511	40 301	21.0	0	0.000	0	(0 - 0)	100.0
Swordfish	Area 4	19 394	1 292	6.7	0	0.000	0	observed	6.7
Other	Area 1	43 355	0	0.0	-				
Swordfish	Area 3	350	0	0.0	-				
Other	Area 4	0							
S. Bluefin	Area 4	1 000	0	0.0	-				
Albacore	Area 4	0							
Bigeye	Area 3	4 100	0	0.0	-				
Other	Area 3	1 000	0	0.0	-				
Albacore	Area 1	13 730	0	0.0	-				

Table 50: Summary of whale captures in the surface longline fishery, for 10 fishing years, with the number of hooks, number of hooks observed, percentage of hooks observed, number of observed captures, capture rate per thousand hooks, total estimated captures with 95% confidence intervals, and percentage of hooks included in the estimate.

		Observed				Estimated		
	Hooks	No. obs	% obs	Capt.	Rate	Est. captures		% eff. in est.
2007–08	2 241 839	391 307	17.5	1	0.003	2	(1 - 4)	98.2
2006–07	3 746 672	955 919	25.5	0	0.000	2	(0 - 5)	99.4
2005–06	3 687 569	636 796	17.3	0	0.000	3	(0 - 6)	98.8
2004–05	3 676 795	703 669	19.1	1	0.001	5	(1 - 10)	98.6
2003–04	7 382 293	1 464 465	19.8	2	0.001	8	(2 - 16)	98.7
2002–03	10 781 875	1 874 448	17.4	0	0.000	10	(0 - 24)	98.9
2001–02	10 876 381	918 159	8.4	0	0.000	9	(0 - 22)	96.7
2000–01	9 761 448	1 023 868	10.5	1	0.001	10	(1 - 26)	98.2
1999–00	8 286 120	793 770	9.6	0	0.000	7	(0 - 18)	98.8
1998–99	6 845 781	1 242 610	18.2	1	0.001	5	(1 - 13)	96.9

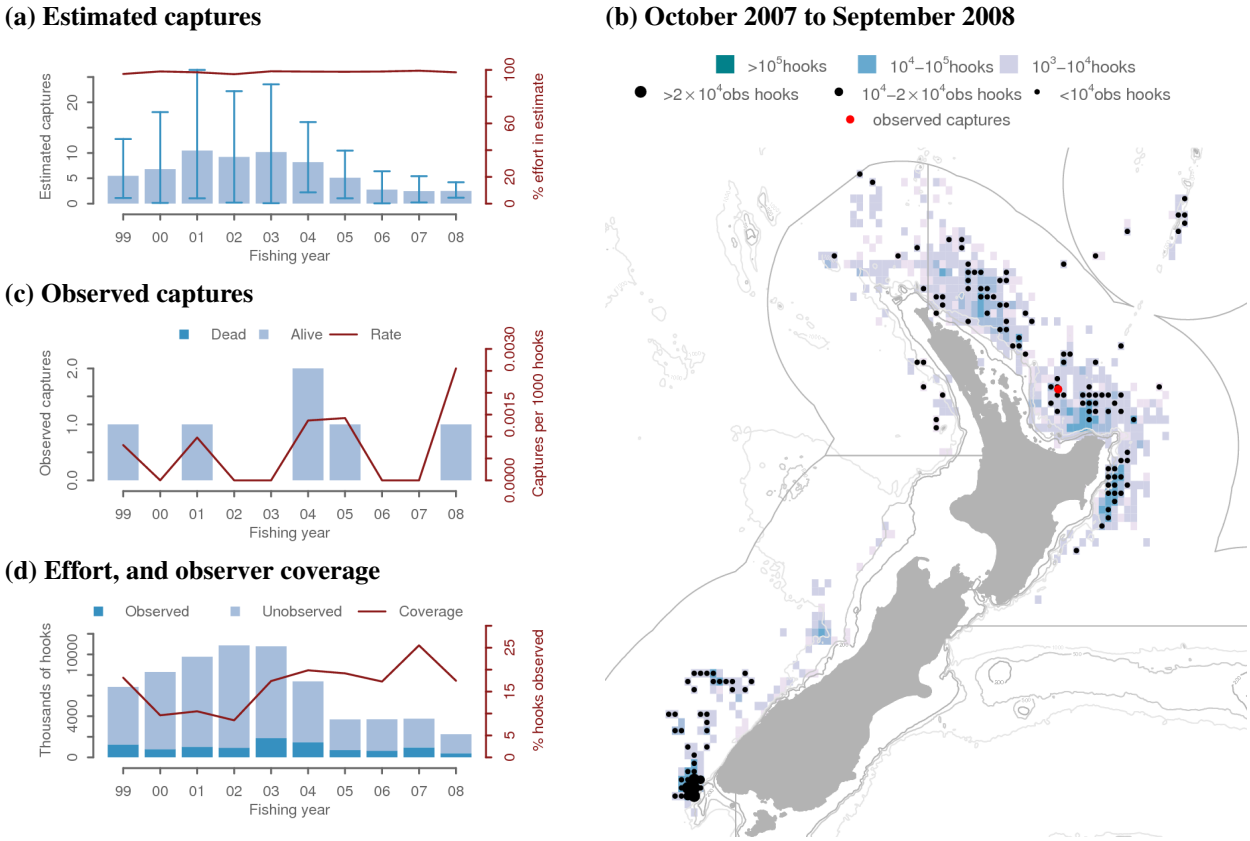

Figure 24: Whales captures in the surface longline fishery. (a) Ratio estimated captures, with 95% bootstrap confidence intervals, (b) Mapped effort and captures from 2007–08, (c) Observed captures, (d) Effort and observed effort.

3.17 Turtle captures

3.17.1 Turtles, surface longline, New Zealand EEZ

Table 51: Summary of turtle captures in the surface longline fishery, broken down by fishing areas, with the number of hooks, number of hooks observed, percentage of hooks observed, number of observed captures, capture rate per thousand hooks, total estimated captures with 95% confidence intervals, and percentage of hooks included in the estimate.

			Observed				Estimated		
		Hooks	No. obs	% obs	Capt.	Rate	Est. captures		% eff. in est.
2007–08									
Bigeye	Area 1	880 517	15 985	1.8	0	0.000	12	(5 - 20)	100.0
Swordfish	Area 1	83 630	17 540	21.0	1	0.057	3	(1 - 6)	100.0
S. Bluefin	Area 3	654 625	254 208	38.8	0	0.000	0	(0 - 0)	100.0
S. Bluefin	Area 1	451 700	91 864	20.3	0	0.000	0	(0 - 1)	100.0
Bigeye	Area 4	93 112	8 360	9.0	0	0.000	0	(0 - 1)	100.0
Swordfish	Area 4	35 500	3 350	9.4	0	0.000	0	observed	9.4
Other	Area 1	31 705	0	0.0	-				
Swordfish	Area 3	6 200	0	0.0	-				
Other	Area 4	2 750	0	0.0	-				
S. Bluefin	Area 4	1 500	0	0.0	-				
Albacore	Area 4	600	0	0.0	-				
Bigeye	Area 3	0							
Other	Area 3	0							
Albacore	Area 1	0							
2006–07									
Bigeye	Area 1	1 356 860	66 412	4.9	1	0.015	19	(9 - 31)	100.0
Swordfish	Area 1	191 511	40 301	21.0	1	0.025	6	(1 - 12)	100.0
S. Bluefin	Area 3	1 109 950	588 130	53.0	0	0.000	0	(0 - 0)	100.0
S. Bluefin	Area 1	828 261	242 942	29.3	0	0.000	1	(0 - 2)	100.0
Bigeye	Area 4	177 161	16 842	9.5	0	0.000	1	(0 - 2)	100.0
Swordfish	Area 4	19 394	1 292	6.7	0	0.000	0	observed	6.7
Other	Area 1	43 355	0	0.0	-				
Swordfish	Area 3	350	0	0.0	-				
Other	Area 4	0							
S. Bluefin	Area 4	1 000	0	0.0	-				
Albacore	Area 4	0							
Bigeye	Area 3	4 100	0	0.0	-				
Other	Area 3	1 000	0	0.0	-				
Albacore	Area 1	13 730	0	0.0	-				

Table 52: Summary of turtle captures in the surface longline fishery, for 10 fishing years, with the number of hooks, number of hooks observed, percentage of hooks observed, number of observed captures, capture rate per thousand hooks, total estimated captures with 95% confidence intervals, and percentage of hooks included in the estimate.

		Observed				Estimated		
	Hooks	No. obs	% obs	Capt.[s]	Rate	Est. captures		% eff. in est.
2007–08	2 241 839	391 307	17.5	1	0.003	16	(8 - 25)	98.2
2006–07	3 746 672	955 919	25.5	2	0.002	26	(14 - 40)	99.4
2005–06	3 687 569	636 796	17.3	1	0.002	31	(16 - 49)	98.8
2004–05	3 676 795	703 669	19.1	2	0.003	25	(13 - 38)	98.6
2003–04	7 382 293	1 464 465	19.8	1	0.001	45	(21 - 73)	98.7
2002–03	10 781 875	1 874 448	17.4	0	0.000	65	(30 - 106)	98.9
2001–02	10 876 381	918 159	8.4	3	0.003	87	(42 - 141)	96.7
2000–01	9 761 448	1 023 868	10.5	3	0.003	85	(42 - 139)	98.2
1999–00	8 286 120	793 770	9.6	0	0.000	71	(32 - 116)	98.8
1998–99	6 845 781	1 242 610	18.2	1	0.001	53	(24 - 86)	96.9

[s] Observed captures by species, for all 10 years: marine turtles (8), leatherback turtle (6)

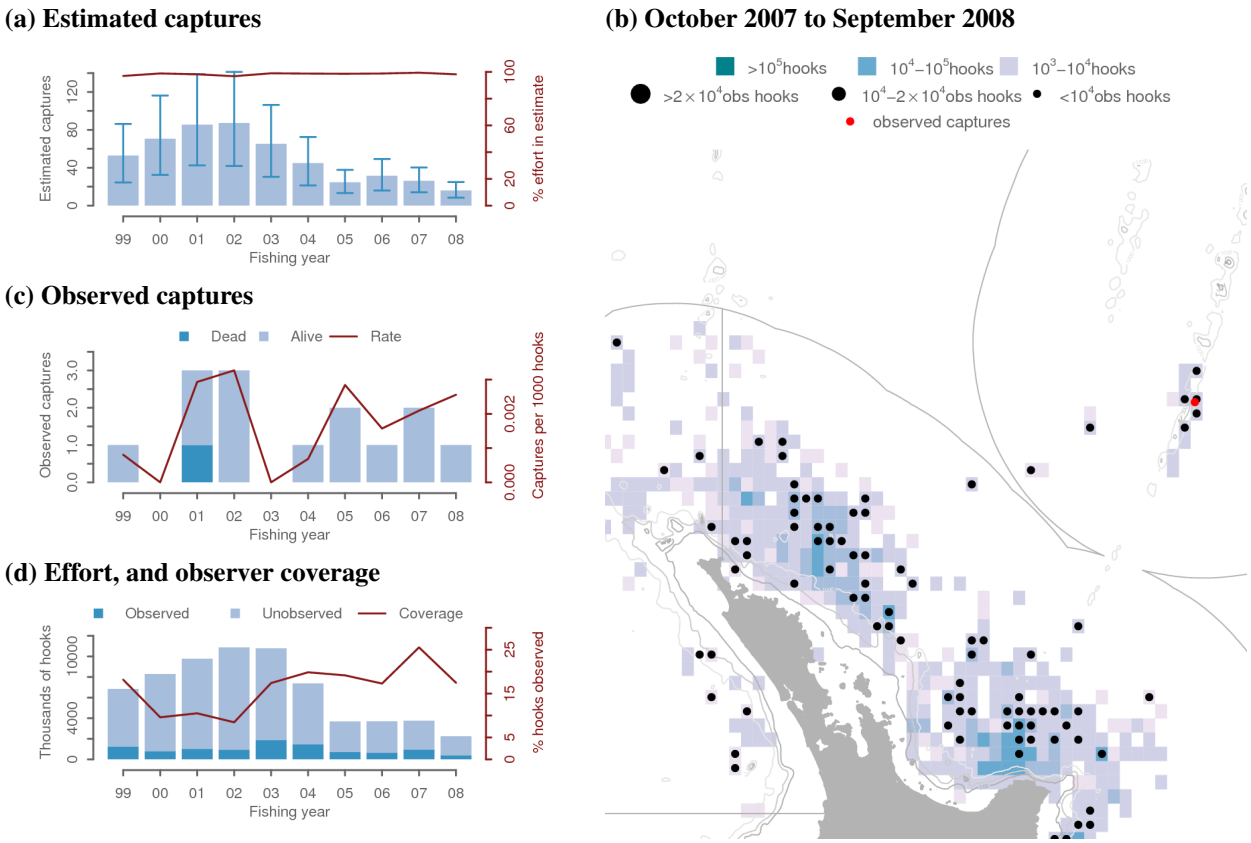

Figure 25: Turtle captures in the surface longline fishery. (a) Ratio estimated captures, with 95% bootstrap confidence intervals, (b) Mapped effort and captures from 2007–08, (c) Observed captures, (d) Effort and observed effort.

3.18 Trawl fisheries

3.18.1 Squid trawl, all birds, New Zealand EEZ

Table 53: Summary of all bird captures in the squid trawl fishery, broken down by fishing areas, with the number of tows, number of tows observed, percentage of tows observed, number of observed captures, capture rate per hundred tows, total estimated captures with 95% confidence intervals, and percentage of tows included in the estimate.

		Observed				Estimated		
	Tows	No. obs	% obs	Capt.	Rate	Est. captures		% eff. in est.
2007–08								
Stewart-Snares	2 413	864	35.8					
White-capped albatrosses				16	1.85	45	(30 - 63)	100.0
White-chinned petrels				25	2.89	70	(48 - 95)	100.0
Sooty shearwaters				55	6.37	154	(107 - 213)	100.0
Other albatrosses[a]				5	0.58	14	(7 - 25)	100.0
Other birds[b]				2	0.23	6	(2 - 11)	100.0
Auckland Is.	1 265	590	46.6					
White-capped albatrosses				24	4.07	51	(41 - 64)	100.0
White-chinned petrels				21	3.56	45	(35 - 56)	100.0
Sooty shearwaters				13	2.20	28	(19 - 39)	100.0
Other albatrosses (albatrosses (unidentified))				1	0.17	2	(1 - 4)	100.0
Other birds (petrel (unidentified))				5	0.85	11	(5 - 20)	100.0
Chatham Rise	539	0	0.0					
White-capped albatrosses				0		4	(0 - 9)	100.0
Other albatrosses				0		8	(1 - 18)	100.0
Other birds				0		3	(0 - 6)	100.0
Puysegur	15	0	0.0					
Subantarctic	2	2	100.0					
North East	2	0	0.0					
West Coast NI	1	0	0.0					
West Coast SI	0							
Cook Strait	0							
2006–07								
Stewart-Snares	2 926	705	24.1					
White-capped albatrosses				24	3.40	100	(68 - 134)	100.0
White-chinned petrels				9	1.28	37	(22 - 56)	100.0
Sooty shearwaters				42	5.96	174	(124 - 231)	100.0
Other albatrosses[c]				2	0.28	8	(2 - 18)	100.0
Other birds (cape petrels)				1	0.14	4	(1 - 10)	100.0
Auckland Is.	1 317	538	40.9					
White-capped albatrosses				17	3.16	42	(30 - 55)	100.0
White-chinned petrels				17	3.16	42	(29 - 58)	100.0
Sooty shearwaters				4	0.74	10	(5 - 16)	100.0
Other albatrosses (Buller's albatross)				1	0.19	2	(1 - 5)	100.0
Other birds (petrel (unidentified))				1	0.19	2	(1 - 5)	100.0
Chatham Rise	1 495	38	2.5					
White-capped albatrosses				0	0.00	11	(0 - 24)	100.0
Sooty shearwaters				5	13.16	5	observed	2.5
Other albatrosses (Salvin's albatross)				3	7.89	24	(6 - 52)	100.0
Other birds (grey petrel)				1	2.63	8	(1 - 18)	100.0
Puysegur	19	2	10.5					
Subantarctic	110	0	0.0					
North East	13	5	38.5					
West Coast NI	3	1	33.3					
West Coast SI	26	0	0.0					
Cook Strait	1	0	0.0					

[a] Buller's albatross (3), southern royal albatross (2)

[b] Seabird – small (1), petrel (unidentified) (1)

[c] Buller's albatross (1), black-browed albatross (unidentified) (1)

Table 54: Summary of all bird captures in the squid trawl fishery, for 10 fishing years, with the number of tows, number of tows observed, percentage of tows observed, number of observed captures, capture rate per hundred tows, total estimated captures with 95% confidence intervals, and percentage of tows included in the estimate.

		Observed				Estimated		
	Tows	No. obs	% obs	Capt.[s]	Rate	Est. captures		% eff. in est.
2007–08	4 237	1 456	34.4	167	11.47	440	(379 - 511)	99.9
2006–07	5 910	1 289	21.8	127	9.85	470	(400 - 549)	97.5
2005–06	8 582	1 103	12.9	200	18.13	1 307	(1 000 - 1 686)	99.3
2004–05	10 490	2 511	23.9	382	15.21	1 393	(1 252 - 1 536)	98.8
2003–04	8 336	1 769	21.2	204	11.53	821	(725 - 926)	95.7
2002–03	8 410	1 308	15.6	160	12.23	862	(701 - 1 044)	94.5
2001–02	7 475	1 455	19.5	225	15.46	830	(701 - 977)	95.5
2000–01	8 075	3 001	37.2	376	12.53	607	(550 - 677)	92.8
1999–00	5 651	917	16.2	53	5.78	242	(171 - 332)	93.8
1998–99	8 012	995	12.4	104	10.45	656	(474 - 867)	99.0

[s] Observed captures by species, for all 10 years: white-capped albatross (910), sooty shearwater (609), white-chinned petrel (281), Buller's albatross (38), albatrosses (unidentified) (25), petrel (unidentified) (24), Salvin's albatross (19), seabird – small (19), seabird – large (15), shy albatross (14), southern royal albatross (7), antarctic prion (6), black-browed albatross (unidentified) (5), common diving petrel (3), storm petrels (3), seabird (unspecified) (3), southern black-browed albatross (2), giant petrels (unidentified) (2), prions (unidentified) (2), cape petrels (1), other species (10)

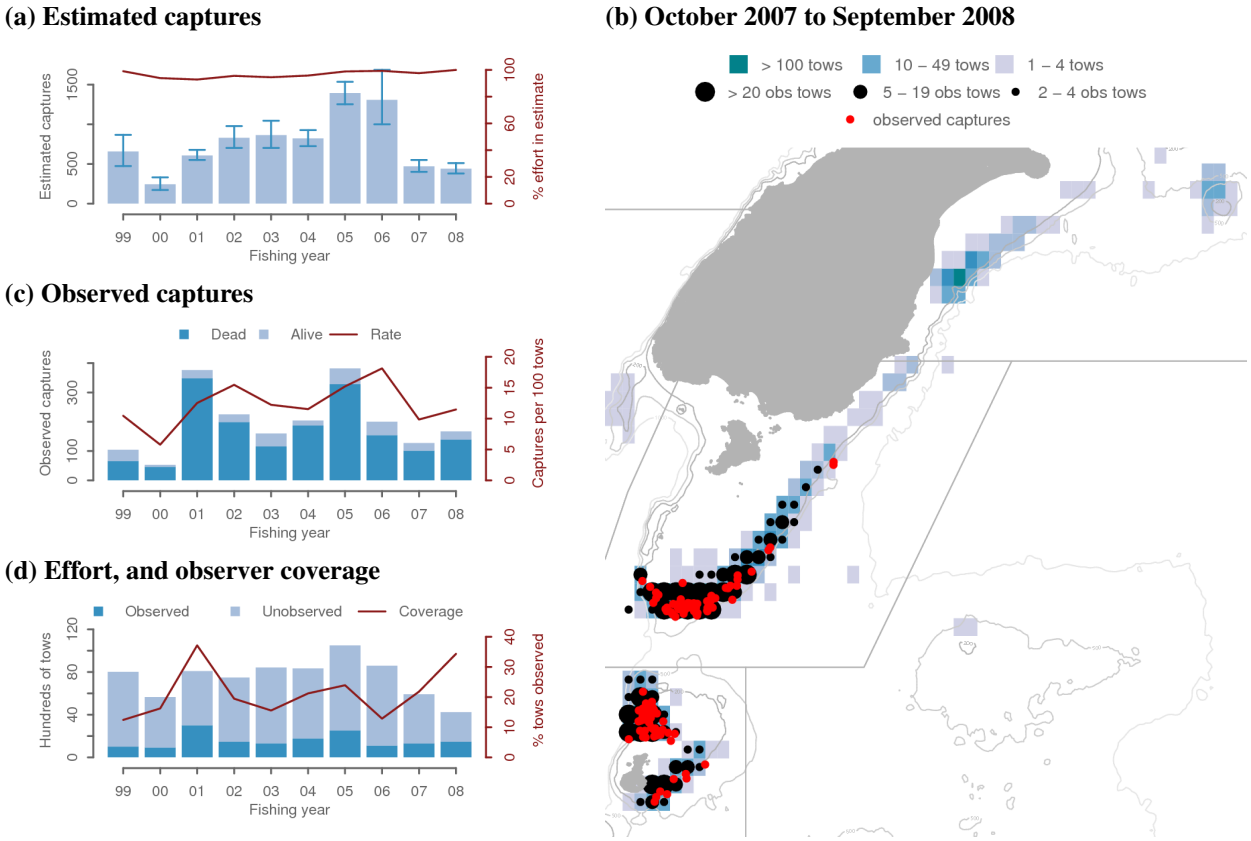

Figure 26: All bird captures in the squid trawl fishery. (a) Ratio estimated captures, with 95% bootstrap confidence intervals, (b) Mapped effort and captures from 2007–08, (c) Observed captures, (d) Effort and observed effort.

3.18.2 Squid trawl, New Zealand sea lions, New Zealand EEZ

Table 55: Summary of New Zealand sea lion captures in the squid trawl fishery, broken down by fishing areas, with the number of tows, number of tows observed, percentage of tows observed, number of observed captures, capture rate per hundred tows, total estimated captures with 95% confidence intervals, and percentage of tows included in the estimate.

		Observed				Estimated		
	Tows	No. obs	% obs	Capt.	Rate	Est. captures		% eff. in est.
2007–08								
Stewart-Snares	2 413	864	35.8	0	0.00	1	(1 - 2)	100.0
Auckland Is.	1 265	590	46.6	5	0.85	11	(6 - 16) [s]	100.0
Chatham Rise	539	0	0.0	0		0	(0 - 0)	100.0
Puysegur	15	0	0.0	0		0	(0 - 0)	100.0
Subantarctic	2	2	100.0	0	0.00	0	observed	100.0
North East	2	0	0.0	0		0	observed	0.0
West Coast NI	1	0	0.0	0		0	observed	0.0
West Coast SI	0							
Cook Strait	0							
2006–07								
Stewart-Snares	2 926	705	24.1	1	0.14	3	(2 - 5)	100.0
Auckland Is.	1 317	538	40.9	7	1.30	17	(10 - 26) [s]	100.0
Chatham Rise	1 495	38	2.5	0	0.00	0	(0 - 0)	100.0
Puysegur	19	2	10.5	0	0.00	0	(0 - 0)	100.0
Subantarctic	110	0	0.0	0		0	observed	0.0
North East	13	5	38.5	0	0.00	0	observed	38.5
West Coast NI	3	1	33.3	0	0.00	0	observed	33.3
West Coast SI	26	0	0.0	0		0	observed	0.0
Cook Strait	1	0	0.0	0		0	observed	0.0

[s] Estimate of captures, does not include sea lion interactions with nets where the animal was excluded by a SLED.

Table 56: Summary of New Zealand sea lion captures in the squid trawl fishery, for 10 fishing years, with the number of tows, number of tows observed, percentage of tows observed, number of observed captures, capture rate per hundred tows, total estimated captures with 95% confidence intervals, and percentage of tows included in the estimate.

		Observed				Estimated		
	Tows	No. obs	% obs	Capt.	Rate	Est. captures		% eff. in est.
2007–08	4 237	1 456	34.4	5	0.34	12	(7 - 18)	99.9
2006–07	5 910	1 289	21.8	8	0.62	20	(13 - 28)	97.5
2005–06	8 582	1 103	12.9	11	1.00	50	(24 - 81)	99.3
2004–05	10 490	2 511	23.9	12	0.48	37	(25 - 52)	98.8
2003–04	8 336	1 769	21.2	17	0.96	57	(39 - 78)	95.7
2002–03	8 410	1 308	15.6	11	0.84	42	(27 - 59)	94.5
2001–02	7 475	1 455	19.5	21	1.44	64	(44 - 88)	95.5
2000–01	8 075	3 001	37.2	42	1.40	43	(43 - 44)	92.8
1999–00	5 651	917	16.2	25	2.73	70	(54 - 89)	93.8
1998–99	8 012	995	12.4	5	0.50	18	(11 - 26)	99.0

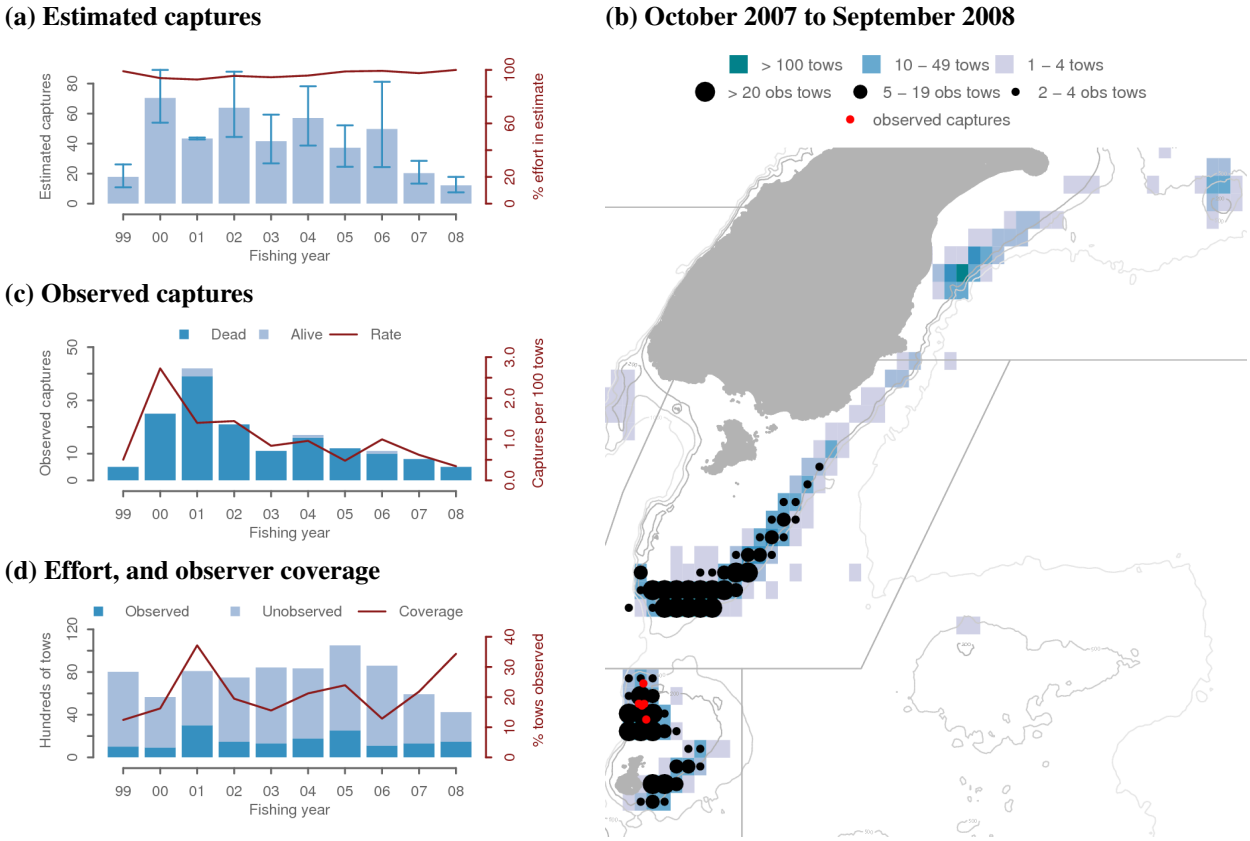

Figure 27: New Zealand sea lion captures in the squid trawl fishery. (a) Ratio estimated captures, with 95% bootstrap confidence intervals, (b) Mapped effort and captures from 2007–08, (c) Observed captures, (d) Effort and observed effort.

3.18.3 Squid trawl, New Zealand fur seals, New Zealand EEZ

Table 57: Summary of New Zealand fur seal captures in the squid trawl fishery, broken down by fishing areas, with the number of tows, number of tows observed, percentage of tows observed, number of observed captures, capture rate per hundred tows, total estimated captures with 95% confidence intervals, and percentage of tows included in the estimate.

		Observed				Estimated		
	Tows	No. obs	% obs	Capt.	Rate	Est. captures		% eff. in est.
2007–08								
Stewart-Snares	2 413	864	35.8	6	0.69	17	(10 - 26)	100.0
Auckland Is.	1 265	590	46.6	0	0.00	0	(0 - 0)	100.0
Chatham Rise	539	0	0.0	0		10	(4 - 19)	100.0
Puysegur	15	0	0.0	0		0	(0 - 0)	100.0
Subantarctic	2	2	100.0	0	0.00	0	observed	100.0
North East	2	0	0.0	0		0	observed	0.0
West Coast NI	1	0	0.0	0		0	observed	0.0
West Coast SI	0							
Cook Strait	0							
2006–07								
Stewart-Snares	2 926	705	24.1	6	0.85	25	(12 - 41)	100.0
Auckland Is.	1 317	538	40.9	0	0.00	0	(0 - 0)	100.0
Chatham Rise	1 495	38	2.5	2	5.26	30	(12 - 54)	100.0
Puysegur	19	2	10.5	0	0.00	0	(0 - 0)	100.0
Subantarctic	110	0	0.0	0		0	observed	0.0
North East	13	5	38.5	0	0.00	0	observed	38.5
West Coast NI	3	1	33.3	0	0.00	0	observed	33.3
West Coast SI	26	0	0.0	0		0	observed	0.0
Cook Strait	1	0	0.0	0		0	observed	0.0

Table 58: Summary of New Zealand fur seal captures in the squid trawl fishery, for 10 fishing years, with the number of tows, number of tows observed, percentage of tows observed, number of observed captures, capture rate per hundred tows, total estimated captures with 95% confidence intervals, and percentage of tows included in the estimate.

		Observed				Estimated		
	Tows	No. obs	% obs	Capt.	Rate	Est. captures		% eff. in est.
2007–08	4 237	1 456	34.4	6	0.41	30	(18 - 44)	99.9
2006–07	5 910	1 289	21.8	8	0.62	55	(31 - 83)	97.5
2005–06	8 582	1 103	12.9	4	0.36	54	(26 - 87)	99.3
2004–05	10 490	2 511	23.9	16	0.64	70	(46 - 99)	98.8
2003–04	8 336	1 769	21.2	17	0.96	84	(58 - 112)	95.7
2002–03	8 410	1 308	15.6	8	0.61	90	(54 - 132)	94.5
2001–02	7 475	1 455	19.5	23	1.58	134	(95 - 176)	95.5
2000–01	8 075	3 001	37.2	31	1.03	106	(64 - 158)	92.8
1999–00	5 651	917	16.2	12	1.31	97	(60 - 140)	93.8
1998–99	8 012	995	12.4	36	3.62	290	(211 - 380)	99.0

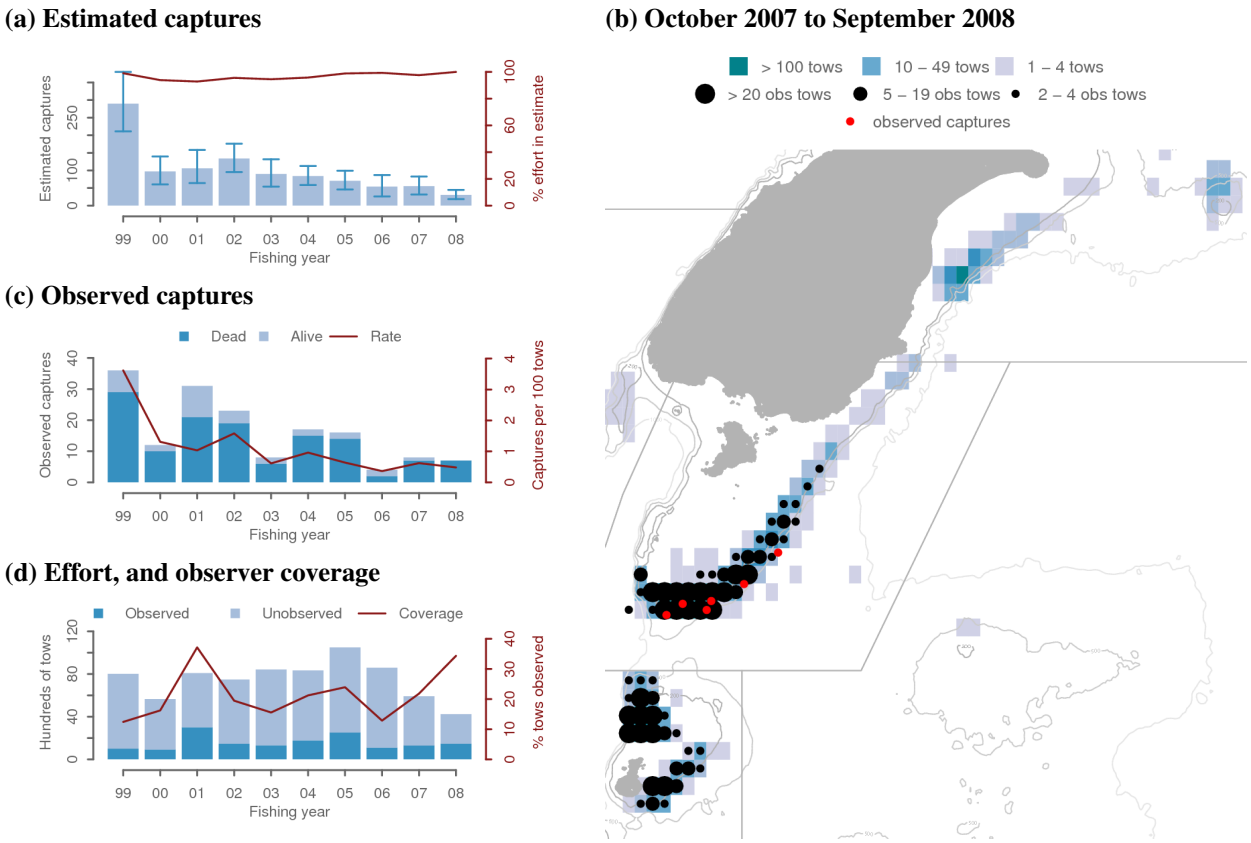

Figure 28: New Zealand fur seal captures in the squid trawl fishery. (a) Ratio estimated captures, with 95% bootstrap confidence intervals, (b) Mapped effort and captures from 2007–08, (c) Observed captures, (d) Effort and observed effort.

3.18.4 Hoki trawl, all birds, New Zealand EEZ

Table 59: Summary of all bird captures in the hoki trawl fishery, broken down by fishing areas, with the number of tows, number of tows observed, percentage of tows observed, number of observed captures, capture rate per hundred tows, total estimated captures with 95% confidence intervals, and percentage of tows included in the estimate.

		Observed				Estimated		
	Tows	No. obs	% obs	Capt.	Rate	Est. captures		% eff. in est.
2007–08								
Chatham Rise	4 486	751	16.7					
White-capped albatrosses				2	0.27	12	(2 - 27)	100.0
White-chinned petrels				5	0.67	30	(5 - 80)	100.0
Sooty shearwaters				2	0.27	12	(2 - 27)	100.0
Other albatrosses (Buller's albatross)				4	0.53	24	(4 - 54)	100.0
Other birds[a]				3	0.40	18	(3 - 38)	100.0
Cook Strait	1 762	204	11.6					
White-capped albatrosses				0	0.00	2	(0 - 4)	100.0
Other albatrosses				0	0.00	5	(1 - 11)	100.0
Other birds				0	0.00	3	(0 - 8)	100.0
West Coast SI	1 395	462	33.1					
Other albatrosses (Buller's albatross)				10	2.16	30	(18 - 44)	100.0
Other birds (seabird – small)				1	0.22	3	(1 - 7)	100.0
Stewart-Snares	743	341	45.9					
White-chinned petrels				3	0.88	4	(3 - 5)	100.0
Sooty shearwaters				1	0.29	2	(1 - 5)	100.0
Subantarctic	144	72	50.0					
East of NI	117	0	0.0					
North East	69	0	0.0					
Auckland Is.	60	39	65.0					
Puysegur	10	0	0.0					
West Coast NI	2	0	0.0					
2006–07								
Chatham Rise	4 921	795	16.2					
White-chinned petrels				1	0.13	6	(1 - 17)	100.0
Sooty shearwaters				7	0.88	43	(17 - 80)	100.0
Other albatrosses (Salvin's albatross)				5	0.63	31	(10 - 57)	100.0
Cook Strait	2 074	226	10.9					
White-capped albatrosses				0	0.00	2	(0 - 5)	100.0
Other albatrosses				0	0.00	6	(1 - 12)	100.0
Other birds				0	0.00	4	(0 - 9)	100.0
West Coast SI	2 129	516	24.2					
White-capped albatrosses				2	0.39	8	(2 - 18)	100.0
Other albatrosses (Buller's albatross)				1	0.19	4	(1 - 10)	100.0
Other birds[b]				4	0.78	17	(7 - 29)	100.0
Stewart-Snares	1 181	206	17.4					
White-chinned petrels				1	0.49	3	(2 - 5)	100.0
Sooty shearwaters				2	0.97	11	(2 - 26)	100.0
Subantarctic	25	3	12.0					
East of NI	135	7	5.2					
North East	128	0	0.0					
Auckland Is.	13	1	7.7					
Puysegur	24	3	12.5					
West Coast NI	0							

[a] Petrel (unidentified) (1), flesh-footed shearwater (1), grey petrel (1)

[b] Giant petrels (unidentified) (1), northern giant petrel (1), Cape petrel (1), Cape petrels (1)

Table 60: Summary of all bird captures in the hoki trawl fishery, for 10 fishing years, with the number of tows, number of tows observed, percentage of tows observed, number of observed captures, capture rate per hundred tows, total estimated captures with 95% confidence intervals, and percentage of tows included in the estimate.

		Observed				Estimated		
	Tows	No. obs	% obs	Capt.[s]	Rate	Est. captures		% eff. in est.
2007–08	8 788	1 869	21.3	31	1.66	147	(93 - 217)	97.9
2006–07	10 630	1 757	16.5	23	1.31	138	(96 - 186)	97.6
2005–06	11 591	1 777	15.3	54	3.04	370	(252 - 523)	97.8
2004–05	14 529	2 133	14.7	46	2.16	278	(189 - 390)	97.3
2003–04	22 516	2 347	10.4	33	1.41	369	(177 - 649)	97.3
2002–03	27 776	2 592	9.3	84	3.24	826	(437 - 1 384)	97.9
2001–02	27 224	3 274	12.0	50	1.53	429	(289 - 613)	98.1
2000–01	32 018	3 549	11.1	296	8.34	2 517	(2 065 - 3 019)	97.6
1999–00	33 061	3 273	9.9	91	2.78	1 075	(816 - 1 375)	97.5
1998–99	32 242	3 558	11.0	133	3.74	1 063	(824 - 1 339)	97.1

[s] Observed captures by species, for all 10 years: sooty shearwater (329), white-capped albatross (99), Salvin's albatross (83), Buller's albatross (65), white-chinned petrel (51), cape petrels (36), seabird – small (34), short-tailed shearwater (33), albatrosses (unidentified) (25), petrel (unidentified) (10), Campbell albatross (9), prions (unidentified) (9), seabird – large (8), northern giant petrel (7), grey petrel (6), black-browed albatross (unidentified) (6), southern black-browed albatross (5), shy albatross (5), fairy prion (4), common diving petrel (3), other species (14)

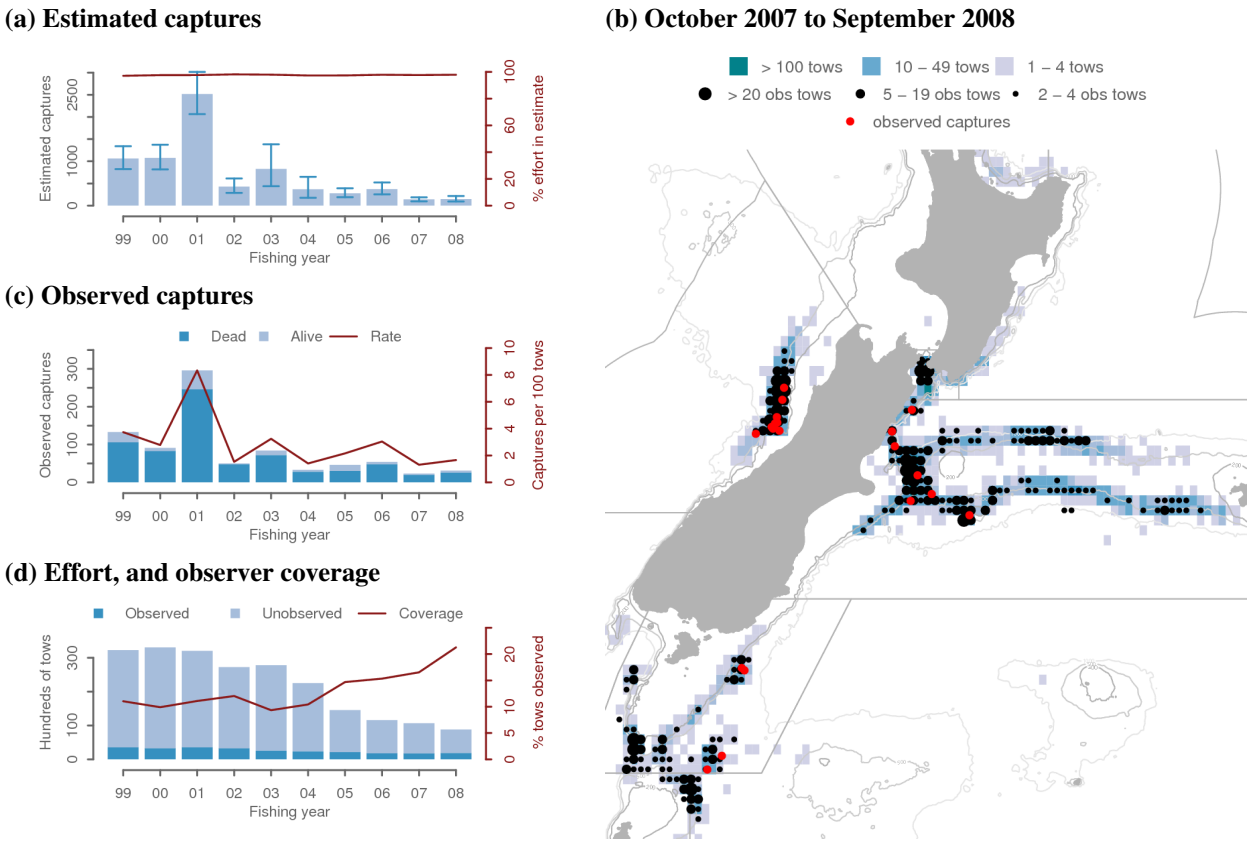

Figure 29: All bird captures in the hoki trawl fishery. (a) Ratio estimated captures, with 95% bootstrap confidence intervals, (b) Mapped effort and captures from 2007–08, (c) Observed captures, (d) Effort and observed effort.

3.18.5 Hoki trawl, New Zealand sea lions, New Zealand EEZ

Table 61: Summary of New Zealand sea lion captures in the hoki trawl fishery, broken down by fishing areas, with the number of tows, number of tows observed, percentage of tows observed, number of observed captures, capture rate per hundred tows, total estimated captures with 95% confidence intervals, and percentage of tows included in the estimate.

		Observed				Estimated		
	Tows	No. obs	% obs	Capt.	Rate	Est. captures		% eff. in est.
2007–08								
Chatham Rise	4 486	751	16.7	0	0.00	0	(0 - 0)	100.0
Cook Strait	1 762	204	11.6	0	0.00	0	(0 - 0)	100.0
West Coast SI	1 395	462	33.1	0	0.00	0	(0 - 0)	100.0
Stewart-Snares	743	341	45.9	1	0.29	1	(1 - 2)	100.0
Subantarctic	144	72	50.0	0	0.00	0	(0 - 0)	100.0
East of NI	117	0	0.0	0		0	observed	0.0
North East	69	0	0.0	0		0	observed	0.0
Auckland Is.	60	39	65.0	0	0.00	0	(0 - 0)	100.0
Puysegur	10	0	0.0	0		0	(0 - 0)	100.0
West Coast NI	2	0	0.0	0		0	observed	0.0
2006–07								
Chatham Rise	4 921	795	16.2	0	0.00	0	(0 - 0)	100.0
Cook Strait	2 074	226	10.9	0	0.00	0	(0 - 0)	100.0
West Coast SI	2 129	516	24.2	0	0.00	0	(0 - 0)	100.0
Stewart-Snares	1 181	206	17.4	0	0.00	1	(0 - 1)	100.0
Subantarctic	25	3	12.0	0	0.00	0	(0 - 0)	100.0
East of NI	135	7	5.2	0	0.00	0	observed	5.2
North East	128	0	0.0	0		0	observed	0.0
Auckland Is.	13	1	7.7	0	0.00	0	(0 - 0)	100.0
Puysegur	24	3	12.5	0	0.00	0	(0 - 0)	100.0
West Coast NI	0							

Table 62: Summary of New Zealand sea lion captures in the hoki trawl fishery, for 10 fishing years, with the number of tows, number of tows observed, percentage of tows observed, number of observed captures, capture rate per hundred tows, total estimated captures with 95% confidence intervals, and percentage of tows included in the estimate.

		Observed				Estimated	
	Tows	No. obs	% obs	Capt.	Rate	Est. captures	% eff. in est.
2007–08	8 788	1 869	21.3	1	0.05	1 (1 - 2)	97.9
2006–07	10 630	1 757	16.5	0	0.00	1 (0 - 1)	97.6
2005–06	11 591	1 777	15.3	0	0.00	0 (0 - 1)	97.8
2004–05	14 529	2 133	14.7	0	0.00	1 (0 - 3)	97.3
2003–04	22 516	2 347	10.4	0	0.00	2 (1 - 5)	97.3
2002–03	27 776	2 592	9.3	1	0.04	5 (2 - 10)	97.9
2001–02	27 224	3 274	12.0	0	0.00	5 (1 - 11)	98.1
2000–01	32 018	3 549	11.1	1	0.03	6 (2 - 12)	97.6
1999–00	33 061	3 273	9.9	1	0.03	6 (2 - 12)	97.5
1998–99	32 242	3 558	11.0	0	0.00	3 (0 - 6)	97.1

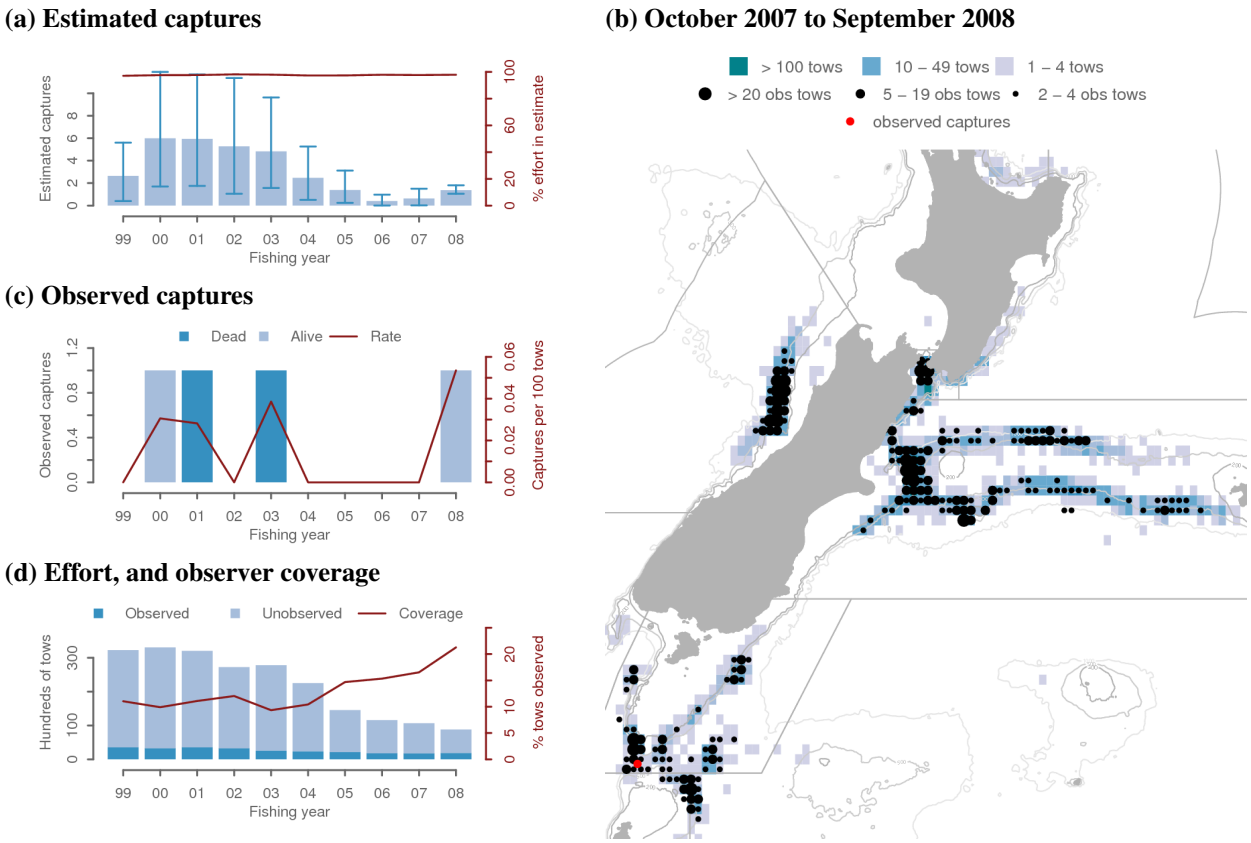

Figure 30: New Zealand sea lion captures in the hoki trawl fishery. (a) Ratio estimated captures, with 95% bootstrap confidence intervals, (b) Mapped effort and captures from 2007–08, (c) Observed captures, (d) Effort and observed effort.

3.18.6 Hoki trawl, New Zealand fur seals, New Zealand EEZ

Table 63: Summary of New Zealand fur seal captures in the hoki trawl fishery, broken down by fishing areas, with the number of tows, number of tows observed, percentage of tows observed, number of observed captures, capture rate per hundred tows, total estimated captures with 95% confidence intervals, and percentage of tows included in the estimate.

		Observed				Estimated		
	Tows	No. obs	% obs	Capt.	Rate	Est. captures		% eff. in est.
2007–08								
Chatham Rise	4 486	751	16.7	7	0.93	42	(17 - 72)	100.0
Cook Strait	1 762	204	11.6	24	11.76	207	(123 - 299)	100.0
West Coast SI	1 395	462	33.1	23	4.98	69	(45 - 100)	100.0
Stewart-Snares	743	341	45.9	3	0.88	7	(3 - 11)	100.0
Subantarctic	144	72	50.0	1	1.39	1	observed	50.0
East of NI	117	0	0.0	0		0	observed	0.0
North East	69	0	0.0	0		0	observed	0.0
Auckland Is.	60	39	65.0	0	0.00	0	(0 - 0)	100.0
Puysegur	10	0	0.0	0		0	observed	0.0
West Coast NI	2	0	0.0	0		0	observed	0.0
2006–07								
Chatham Rise	4 921	795	16.2	4	0.50	25	(9 - 46)	100.0
Cook Strait	2 074	226	10.9	23	10.18	211	(129 - 309)	100.0
West Coast SI	2 129	516	24.2	0	0.00	0	(0 - 0)	100.0
Stewart-Snares	1 181	206	17.4	2	0.97	11	(2 - 26)	100.0
Subantarctic	25	3	12.0	0	0.00	0	observed	12.0
East of NI	135	7	5.2	0	0.00	0	observed	5.2
North East	128	0	0.0	0		0	observed	0.0
Auckland Is.	13	1	7.7	0	0.00	0	(0 - 0)	100.0
Puysegur	24	3	12.5	0	0.00	0	observed	12.5
West Coast NI	0							

Table 64: Summary of New Zealand fur seal captures in the hoki trawl fishery, for 10 fishing years, with the number of tows, number of tows observed, percentage of tows observed, number of observed captures, capture rate per hundred tows, total estimated captures with 95% confidence intervals, and percentage of tows included in the estimate.

		Observed				Estimated		
	Tows	No. obs	% obs	Capt.	Rate	Est. captures		% eff. in est.
2007–08	8 788	1 869	21.3	58	3.10	327	(237 - 425)	96.9
2006–07	10 630	1 757	16.5	29	1.65	247	(160 - 345)	97.2
2005–06	11 591	1 777	15.3	62	3.49	214	(151 - 293)	81.5
2004–05	14 529	2 133	14.7	120	5.63	1 035	(757 - 1 358)	93.1
2003–04	22 516	2 347	10.4	49	2.09	405	(288 - 541)	96.7
2002–03	27 776	2 592	9.3	44	1.70	453	(284 - 653)	96.3
2001–02	27 224	3 274	12.0	110	3.36	808	(623 - 1 008)	96.3
2000–01	32 018	3 549	11.1	66	1.86	628	(472 - 803)	97.6
1999–00	33 061	3 273	9.9	102	3.12	743	(594 - 905)	95.8
1998–99	32 242	3 558	11.0	84	2.36	737	(568 - 926)	95.6

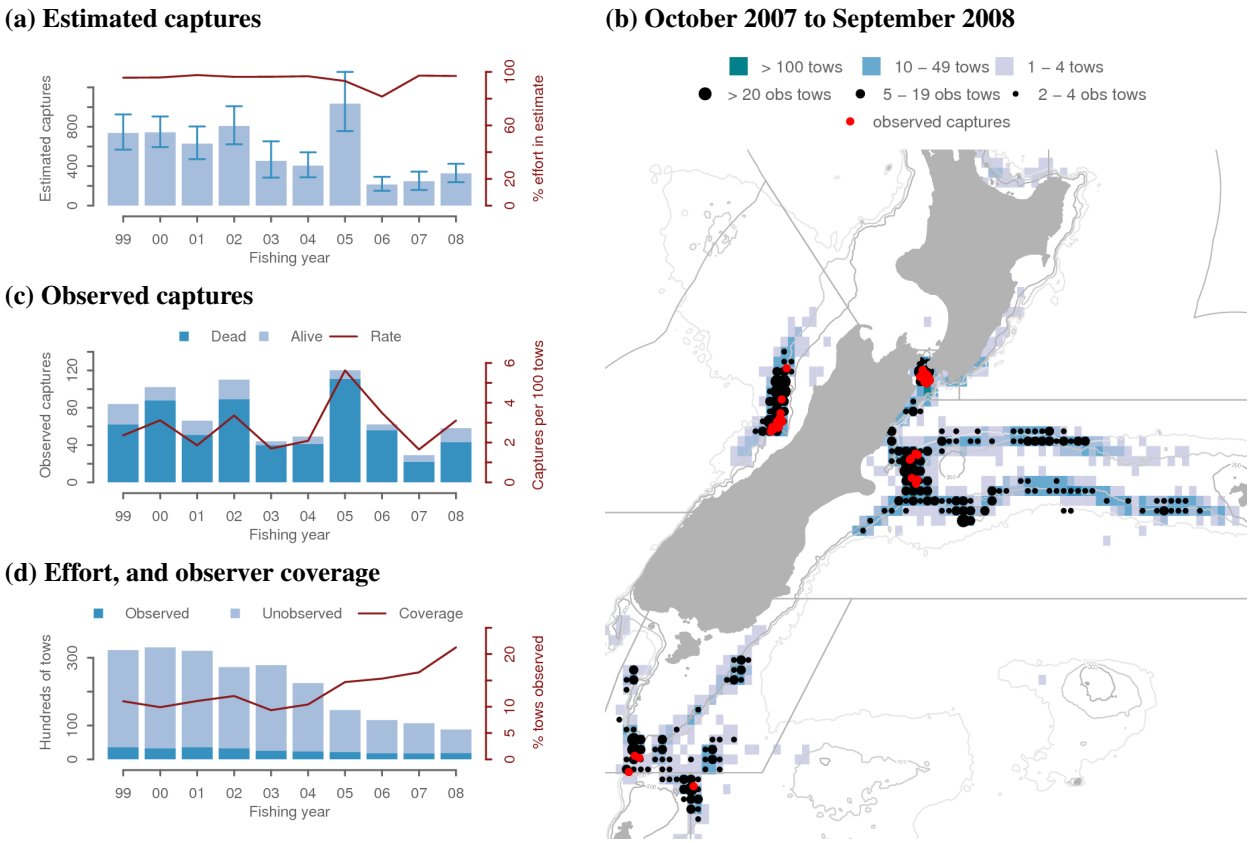

Figure 31: New Zealand fur seal captures in the hoki trawl fishery. (a) Ratio estimated captures, with 95% bootstrap confidence intervals, (b) Mapped effort and captures from 2007–08, (c) Observed captures, (d) Effort and observed effort.

3.18.7 Hake trawl, all birds, New Zealand EEZ

Table 65: Summary of all bird captures in the hake trawl fishery, broken down by fishing areas, with the number of tows, number of tows observed, percentage of tows observed, number of observed captures, capture rate per hundred tows, total estimated captures with 95% confidence intervals, and percentage of tows included in the estimate.

		Observed				Estimated		
	Tows	No. obs	% obs	Capt.	Rate	Est. captures		% eff. in est.
2007–08								
West Coast SI	1 084	320	29.5					
White-capped albatrosses				0	0.00	5	(2 - 8)	100.0
White-chinned petrels				0	0.00	1	(0 - 2)	100.0
Other albatrosses				0	0.00	5	(2 - 10)	100.0
Other birds (fairy prion)				1	0.31	4	(1 - 8)	100.0
Chatham Rise	318	26	8.2					
Sooty shearwaters				0	0.00	7	(1 - 16)	100.0
Other albatrosses				0	0.00	9	(1 - 19)	100.0
Other birds				0	0.00	1	(0 - 4)	100.0
Stewart-Snares	157	49	31.2					
White-capped albatrosses				0	0.00	1	(0 - 4)	100.0
Sooty shearwaters				3	6.12	4	(3 - 6)	100.0
Subantarctic	0							
Puysegur	0							
2006–07								
West Coast SI	1 069	160	15.0					
White-capped albatrosses				2	1.25	7	(4 - 12)	100.0
White-chinned petrels				0	0.00	1	(0 - 3)	100.0
Other albatrosses (Buller's albatross)				1	0.62	7	(3 - 13)	100.0
Other birds				0	0.00	4	(0 - 8)	100.0
Chatham Rise	366	80	21.9					
Sooty shearwaters				4	5.00	11	(5 - 20)	100.0
Other albatrosses (Salvin's albatross)				1	1.25	9	(2 - 19)	100.0
Other birds				0	0.00	1	(0 - 4)	100.0
Stewart-Snares	166	55	33.1					
White-capped albatrosses				0	0.00	1	(0 - 4)	100.0
Sooty shearwaters				0	0.00	1	(0 - 3)	100.0
Subantarctic	3	0	0.0					
Puysegur	2	0	0.0					

Table 66: Summary of all bird captures in the hake trawl fishery, for 10 fishing years, with the number of tows, number of tows observed, percentage of tows observed, number of observed captures, capture rate per hundred tows, total estimated captures with 95% confidence intervals, and percentage of tows included in the estimate.

		Observed				Estimated		
	Tows	No. obs	% obs	Capt.[s]	Rate	Est. captures		% eff. in est.
2007–08	1 559	395	25.3	4	1.01	37	(24 - 52)	100.0
2006–07	1 606	295	18.4	8	2.71	43	(30 - 59)	99.7
2005–06	1 361	421	30.9	1	0.24	19	(12 - 28)	99.7
2004–05	1 555	95	6.1	8	8.42	59	(36 - 86)	97.9
2003–04	1 651	140	8.5	6	4.29	68	(37 - 105)	100.0
2002–03	945	49	5.2	0	0.00	27	(16 - 40)	99.4
2001–02	848	42	5.0	0	0.00	34	(16 - 54)	99.6
2000–01	800	35	4.4	6	17.14	32	(21 - 46)	99.4
1999–00	527	38	7.2	1	2.63	19	(10 - 30)	96.8
1998–99	846	23	2.7	3	13.04	35	(19 - 53)	98.3

[s] Observed captures by species, for all 10 years: white-capped albatross (9), sooty shearwater (8), Buller's albatross (6), Salvin's albatross (5), seabird – large (2), cape petrels (1), shy albatross (1), northern giant petrel (1), wandering albatross (unidentified) (1), fairy prion (1), white-chinned petrel (1), Chatham Island albatross (1)

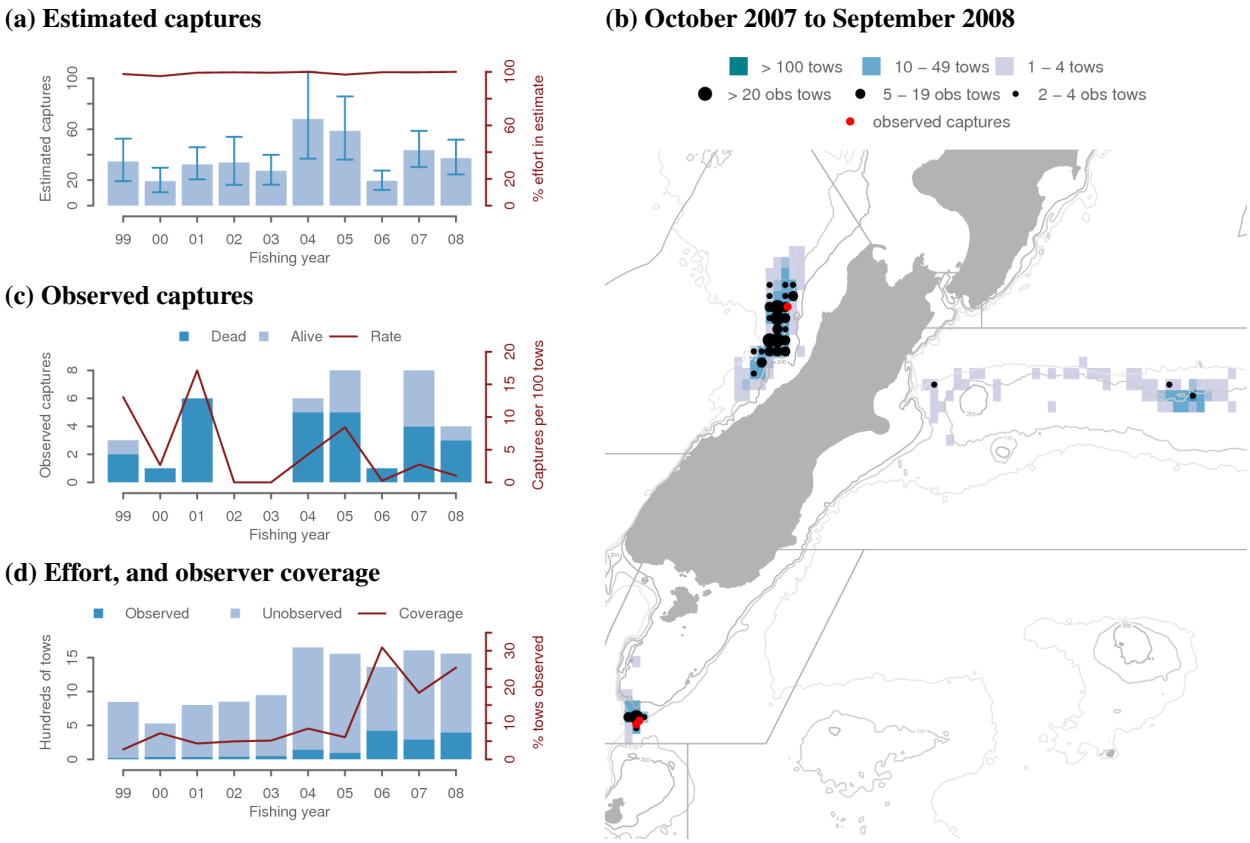

Figure 32: All bird captures in the hake trawl fishery. (a) Ratio estimated captures, with 95% bootstrap confidence intervals, (b) Mapped effort and captures from 2007–08, (c) Observed captures, (d) Effort and observed effort.

3.18.8 Hake trawl, New Zealand fur seals, New Zealand EEZ

Table 67: Summary of New Zealand fur seal captures in the hake trawl fishery, broken down by fishing areas, with the number of tows, number of tows observed, percentage of tows observed, number of observed captures, capture rate per hundred tows, total estimated captures with 95% confidence intervals, and percentage of tows included in the estimate.

		Observed				Estimated		
	Tows	No. obs	% obs	Capt.	Rate	Est. captures		% eff. in est.
2007–08								
West Coast SI	1 084	320	29.5	25	7.81	85	(61 - 113)	100.0
Chatham Rise	318	26	8.2	2	7.69	5	(2 - 9)	100.0
Stewart-Snares	157	49	31.2	1	2.04	2	(1 - 4)	100.0
Subantarctic	0							
Puysegur	0							
2006–07								
West Coast SI	1 069	160	15.0	4	2.50	27	(10 - 49)	100.0
Chatham Rise	366	80	21.9	0	0.00	3	(0 - 7)	100.0
Stewart-Snares	166	55	33.1	0	0.00	1	(0 - 3)	100.0
Subantarctic	3	0	0.0	0		0	observed	0.0
Puysegur	2	0	0.0	0		0	observed	0.0

Table 68: Summary of New Zealand fur seal captures in the hake trawl fishery, for 10 fishing years, with the number of tows, number of tows observed, percentage of tows observed, number of observed captures, capture rate per hundred tows, total estimated captures with 95% confidence intervals, and percentage of tows included in the estimate.

		Observed				Estimated		
	Tows	No. obs	% obs	Capt.	Rate	Est. captures		% eff. in est.
2007–08	1 559	395	25.3	28	7.09	92	(67 - 121)	100.0
2006–07	1 606	295	18.4	4	1.36	31	(12 - 55)	99.7
2005–06	1 361	421	30.9	11	2.61	32	(19 - 49)	99.7
2004–05	1 555	95	6.1	2	2.11	10	(3 - 19)	53.2
2003–04	1 651	140	8.5	0	0.00	10	(1 - 23)	66.4
2002–03	945	49	5.2	3	6.12	7	(4 - 12)	48.6
2001–02	848	42	5.0	0	0.00	6	(1 - 14)	77.5
2000–01	800	35	4.4	0	0.00	4	(1 - 9)	57.1
1999–00	527	38	7.2	0	0.00	3	(0 - 6)	54.8
1998–99	846	23	2.7	0	0.00	5	(1 - 11)	61.2

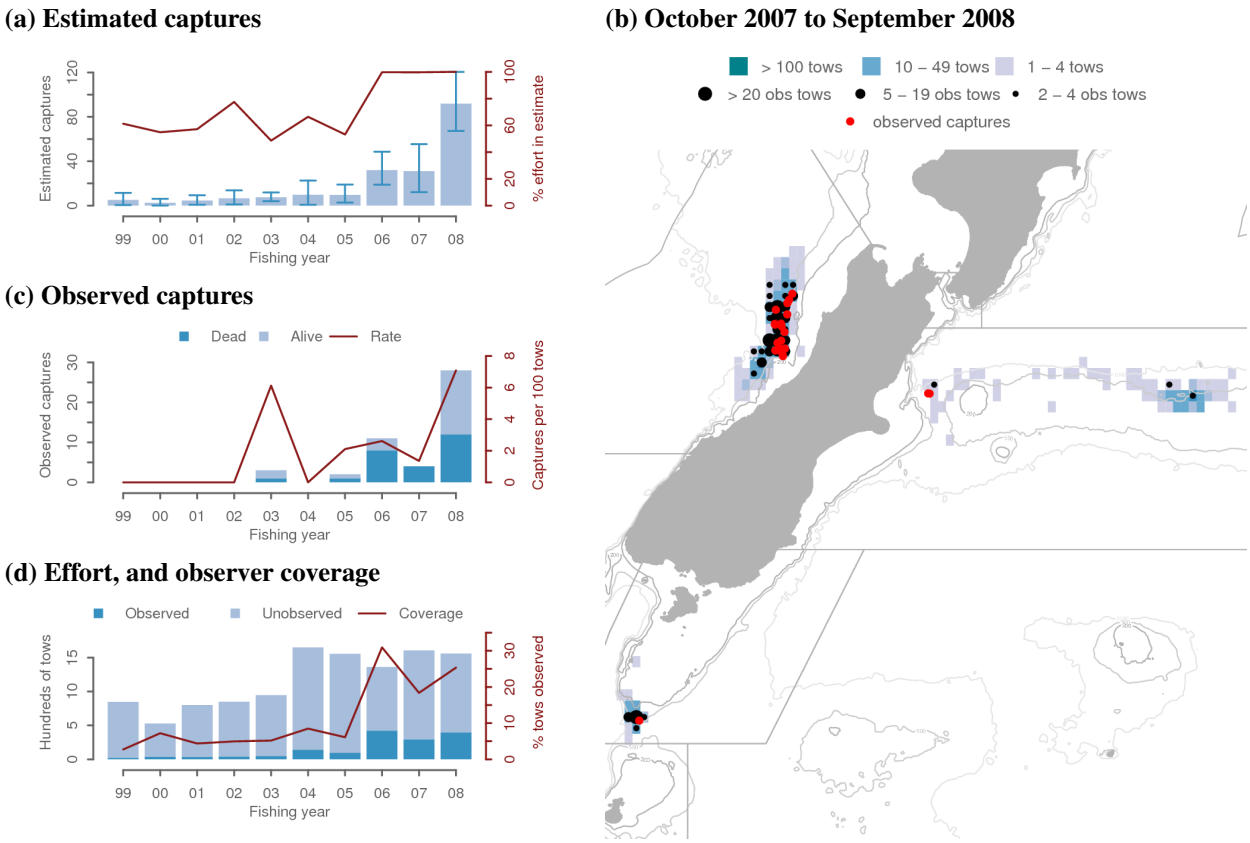

Figure 33: New Zealand fur seal captures in the hake trawl fishery. (a) Ratio estimated captures, with 95% bootstrap confidence intervals, (b) Mapped effort and captures from 2007–08, (c) Observed captures, (d) Effort and observed effort.

3.18.9 Ling trawl, all birds, New Zealand EEZ

Table 69: Summary of all bird captures in the ling trawl fishery, broken down by fishing areas, with the number of tows, number of tows observed, percentage of tows observed, number of observed captures, capture rate per hundred tows, total estimated captures with 95% confidence intervals, and percentage of tows included in the estimate.

		Observed				Estimated		
	Tows	No. obs	% obs	Capt.	Rate	Est. captures		% eff. in est.
2007–08								
Stewart-Snares	694	136	19.6					
White-capped albatrosses				0	0.00	3	(0 - 6)	100.0
White-chinned petrels				1	0.74	4	(1 - 7)	100.0
Sooty shearwaters				0	0.00	3	(0 - 6)	100.0
Other albatrosses				0	0.00	3	(0 - 6)	100.0
Chatham Rise	559	23	4.1					
West Coast SI	318	0	0.0					
Puysegur	218	13	6.0					
Subantarctic	205	55	26.8					
White-capped albatrosses				1	1.82	2	(1 - 5)	100.0
White-chinned petrels				2	3.64	5	(2 - 9)	100.0
Other albatrosses[a]				2	3.64	5	(2 - 9)	100.0
Other birds (seabird – small)				1	1.82	2	(1 - 5)	100.0
North East	77	0	0.0					
West Coast NI	66	0	0.0					
East of NI	36	0	0.0					
Auckland Is.	32	14	43.8					
Cook Strait	5	0	0.0					
2006–07								
Stewart-Snares	614	122	19.9					
White-capped albatrosses				0	0.00	2	(0 - 6)	100.0
White-chinned petrels				0	0.00	2	(0 - 6)	100.0
Sooty shearwaters				2	1.64	4	(2 - 8)	100.0
Other albatrosses				0	0.00	2	(0 - 6)	100.0
Chatham Rise	320	0	0.0					
West Coast SI	80	0	0.0					
Puysegur	236	17	7.2					
Subantarctic	221	10	4.5					
White-capped albatrosses				0	0.00	2	(0 - 6)	100.0
White-chinned petrels				0	0.00	4	(0 - 10)	100.0
Other albatrosses				0	0.00	4	(0 - 10)	100.0
Other birds				0	0.00	2	(0 - 6)	100.0
North East	39	0	0.0					
West Coast NI	26	6	23.1					
East of NI	99	0	0.0					
Auckland Is.	22	2	9.1					
Cook Strait	8	0	0.0					

[a] Salvin's albatross (1), black-browed albatross (unidentified) (1)

Table 70: Summary of all bird captures in the ling trawl fishery, for 10 fishing years, with the number of tows, number of tows observed, percentage of tows observed, number of observed captures, capture rate per hundred tows, total estimated captures with 95% confidence intervals, and percentage of tows included in the estimate.

		Observed				Estimated		
	Tows	No. obs	% obs	Capt.[s]	Rate	Est. captures		% eff. in est.
2007–08	2 210	241	10.9	7	2.90	26	(17 - 36)	42.9
2006–07	1 665	157	9.4	2	1.27	23	(13 - 36)	51.7
2005–06	1 394	113	8.1	3	2.65	17	(10 - 25)	50.1
2004–05	985	76	7.7	3	3.95	15	(9 - 22)	51.2
2003–04	557	22	3.9	0	0.00	10	(4 - 17)	52.4
2002–03	634	16	2.5	0	0.00	13	(5 - 23)	51.3
2001–02	575	5	0.9	0	0.00	11	(4 - 19)	43.5
2000–01	390	0	0.0	-				
1999–00	571	7	1.2	0	0.00	8	(4 - 13)	44.7
1998–99	468	0	0.0	-				

[s] Observed captures by species, for all 10 years: white-chinned petrel (4), white-capped albatross (3), Salvin's albatross (2), sooty shearwater (2), black-browed albatross (unidentified) (1), seabird – small (1), albatrosses (unidentified) (1), Buller's albatross (1)

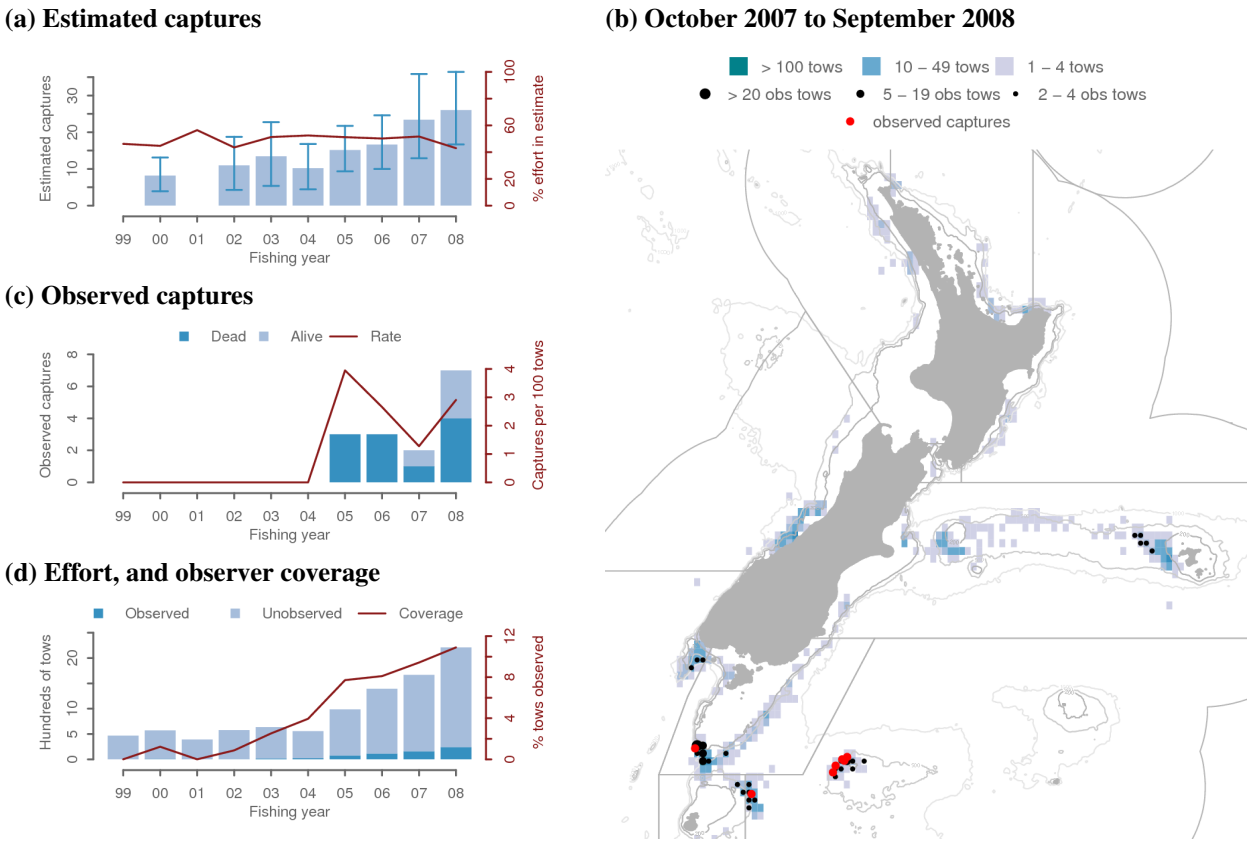

Figure 34: All bird captures in the ling trawl fishery. (a) Ratio estimated captures, with 95% bootstrap confidence intervals, (b) Mapped effort and captures from 2007–08, (c) Observed captures, (d) Effort and observed effort.

3.18.10 Ling trawl, New Zealand fur seals, New Zealand EEZ

Table 71: Summary of New Zealand fur seal captures in the ling trawl fishery, broken down by fishing areas, with the number of tows, number of tows observed, percentage of tows observed, number of observed captures, capture rate per hundred tows, total estimated captures with 95% confidence intervals, and percentage of tows included in the estimate.

		Observed				Estimated		
	Tows	No. obs	% obs	Capt.	Rate	Est. captures		% eff. in est.
2007–08								
Stewart-Snares	694	136	19.6	3	2.21	15	(3 - 32)	100.0
Chatham Rise	559	23	4.1	0	0.00	0	observed	4.1
West Coast SI	318	0	0.0	0		0	observed	0.0
Puysegur	218	13	6.0	0	0.00	0	observed	6.0
Subantarctic	205	55	26.8	1	1.82	13	(2 - 27)	100.0
North East	77	0	0.0	0		0	observed	0.0
West Coast NI	66	0	0.0	0		0	observed	0.0
East of NI	36	0	0.0	0		0	observed	0.0
Auckland Is.	32	14	43.8	0	0.00	0	observed	43.8
Cook Strait	5	0	0.0	0		0	observed	0.0
2006–07								
Stewart-Snares	614	122	19.9	11	9.02	55	(27 - 88)	100.0
Chatham Rise	320	0	0.0	0		0	observed	0.0
West Coast SI	80	0	0.0	0		0	observed	0.0
Puysegur	236	17	7.2	1	5.88	1	observed	7.2
Subantarctic	221	10	4.5	0	0.00	16	(2 - 37)	100.0
North East	39	0	0.0	0		0	observed	0.0
West Coast NI	26	6	23.1	0	0.00	0	observed	23.1
East of NI	99	0	0.0	0		0	observed	0.0
Auckland Is.	22	2	9.1	0	0.00	0	observed	9.1
Cook Strait	8	0	0.0	0		0	observed	0.0

Table 72: Summary of New Zealand fur seal captures in the ling trawl fishery, for 10 fishing years, with the number of tows, number of tows observed, percentage of tows observed, number of observed captures, capture rate per hundred tows, total estimated captures with 95% confidence intervals, and percentage of tows included in the estimate.

		Observed				Estimated		
	Tows	No. obs	% obs	Capt.	Rate	Est. captures		% eff. in est.
2007–08	2 210	241	10.9	4	1.66	28	(11 - 48)	42.9
2006–07	1 665	157	9.4	12	7.64	73	(40 - 109)	51.7
2005–06	1 394	113	8.1	2	1.77	8	(3 - 14)	13.2
2004–05	985	76	7.7	10	13.16	18	(11 - 29)	18.5
2003–04	557	22	3.9	0	0.00	10	(1 - 23)	27.3
2002–03	634	16	2.5	0	0.00	15	(2 - 34)	33.0
2001–02	575	5	0.9	1	20.00	14	(3 - 29)	28.9
2000–01	390	0	0.0	-				
1999–00	571	7	1.2	0	0.00	7	(1 - 16)	17.0
1998–99	468	0	0.0	-				

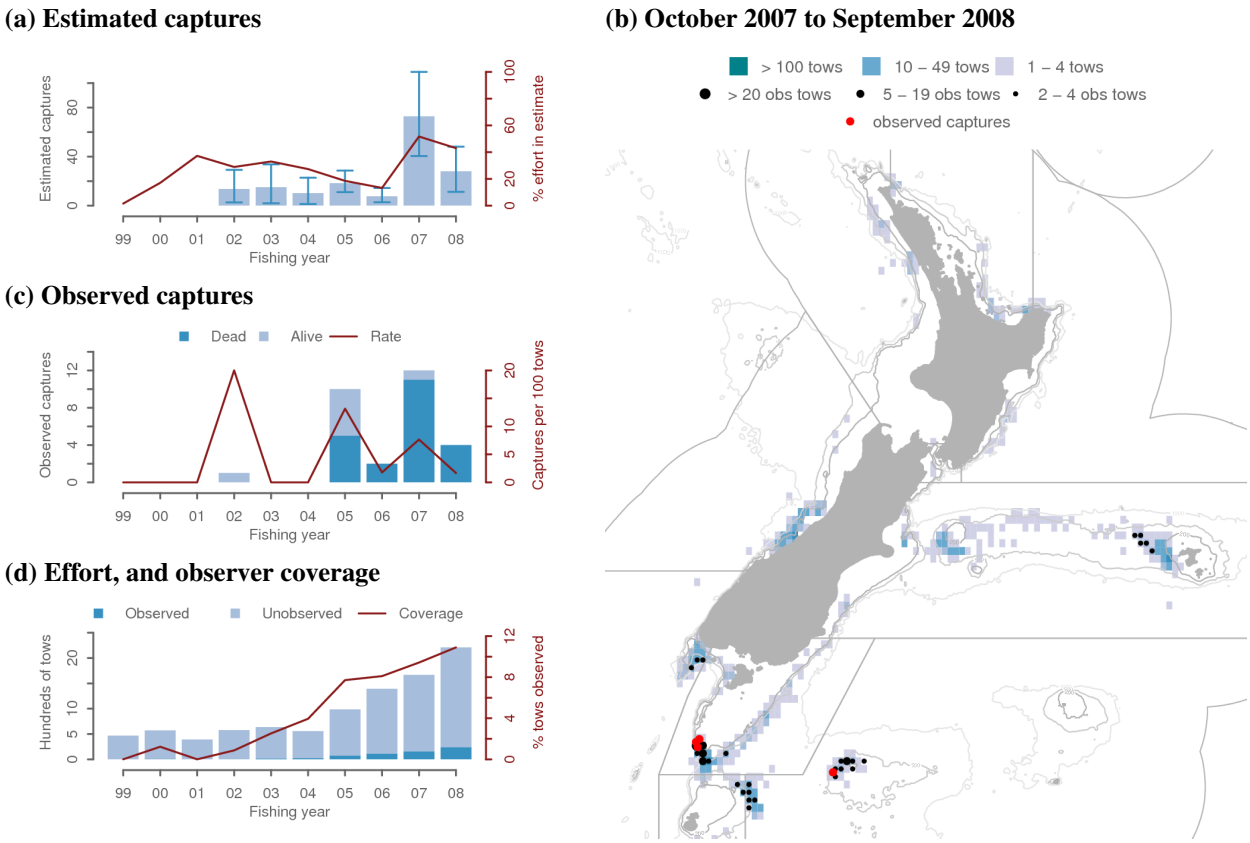

Figure 35: New Zealand fur seal captures in the ling trawl fishery. (a) Ratio estimated captures, with 95% bootstrap confidence intervals, (b) Mapped effort and captures from 2007–08, (c) Observed captures, (d) Effort and observed effort.

3.18.11 Deepwater trawl, all birds, New Zealand EEZ

Table 73: Summary of all bird captures in the deepwater trawl fishery, broken down by fishing areas, with the number of tows, number of tows observed, percentage of tows observed, number of observed captures, capture rate per hundred tows, total estimated captures with 95% confidence intervals, and percentage of tows included in the estimate.

		Observed				Estimated		
	Tows	No. obs	% obs	Capt.	Rate	Est. captures		% eff. in est.
2007–08								
Chatham Rise	3 257	1 320	40.5					
Other albatrosses (Salvin's albatross)				1	0.08	2	(1 - 5)	100.0
Other birds[a]				3	0.23	7	(3 - 13)	100.0
Subantarctic	1 434	839	58.5					
Other birds[b]				2	0.24	2	(2 - 3)	100.0
East of NI	834	97	11.6					
North East	380	287	75.5					
Puysegur	372	58	15.6					
West Coast NI	233	130	55.8					
Stewart-Snares	131	61	46.6					
Auckland Is.	58	16	27.6					
Other albatrosses				0	0.00	2	(0 - 4)	100.0
Cook Strait	44	2	4.5					
West Coast SI	0							
2006–07								
Chatham Rise	3 556	695	19.5					
Other albatrosses (Gibson's albatross)				1	0.14	5	(1 - 13)	100.0
Subantarctic	1 423	946	66.5					
East of NI	1 307	15	1.1					
North East	405	206	50.9					
Puysegur	48	17	35.4					
West Coast NI	312	319	102.2					
Stewart-Snares	159	122	76.7					
Auckland Is.	5	0	0.0					
Cook Strait	25	0	0.0					
West Coast SI	237	0	0.0					
Other albatrosses				0		3	(0 - 10)	100.0

[a] Giant petrels (unidentified) (1), Cape petrels (1), petrel (unidentified) (1)

[b] Storm petrels (1), grey petrel (1)

Table 74: Summary of all bird captures in the deepwater trawl fishery, for 10 fishing years, with the number of tows, number of tows observed, percentage of tows observed, number of observed captures, capture rate per hundred tows, total estimated captures with 95% confidence intervals, and percentage of tows included in the estimate.

		Observed				Estimated		
	Tows	No. obs	% obs	Capt.[s]	Rate	Est. captures		% eff. in est.
2007–08	6 743	2 810	41.7	6	0.21	16	(11 - 23)	99.4
2006–07	7 477	2 320	31.0	1	0.04	10	(2 - 23)	99.7
2005–06	8 291	1 292	15.6	5	0.39	33	(13 - 57)	99.2
2004–05	8 406	1 618	19.2	19	1.17	86	(39 - 157)	99.7
2003–04	8 006	1 261	15.8	3	0.24	29	(12 - 52)	99.8
2002–03	8 867	1 380	15.6	1	0.07	13	(6 - 21)	99.6
2001–02	8 220	1 377	16.8	6	0.44	34	(17 - 54)	99.2
2000–01	8 925	1 187	13.3	4	0.34	30	(13 - 52)	99.2
1999–00	12 505	1 934	15.5	5	0.26	53	(20 - 102)	99.3
1998–99	13 714	1 010	7.4	35	3.47	74	(44 - 124)	99.4

[s] Observed captures by species, for all 10 years: white-chinned petrel (24), cape petrels (16), black-browed albatross (unidentified) (12), albatrosses (unidentified) (5), grey petrel (3), Salvin's albatross (3), white-capped albatross (3), seabird – large (2), common diving petrel (2), Chatham Island albatross (2), Buller's albatross (2), Gibson's albatross (1), petrel (unidentified) (1), giant petrels (unidentified) (1), Pacific albatross (1), white-faced storm petrel (1), seabird – small (1), sooty shearwater (1), storm petrels (1), shy albatross (1), other species (2)

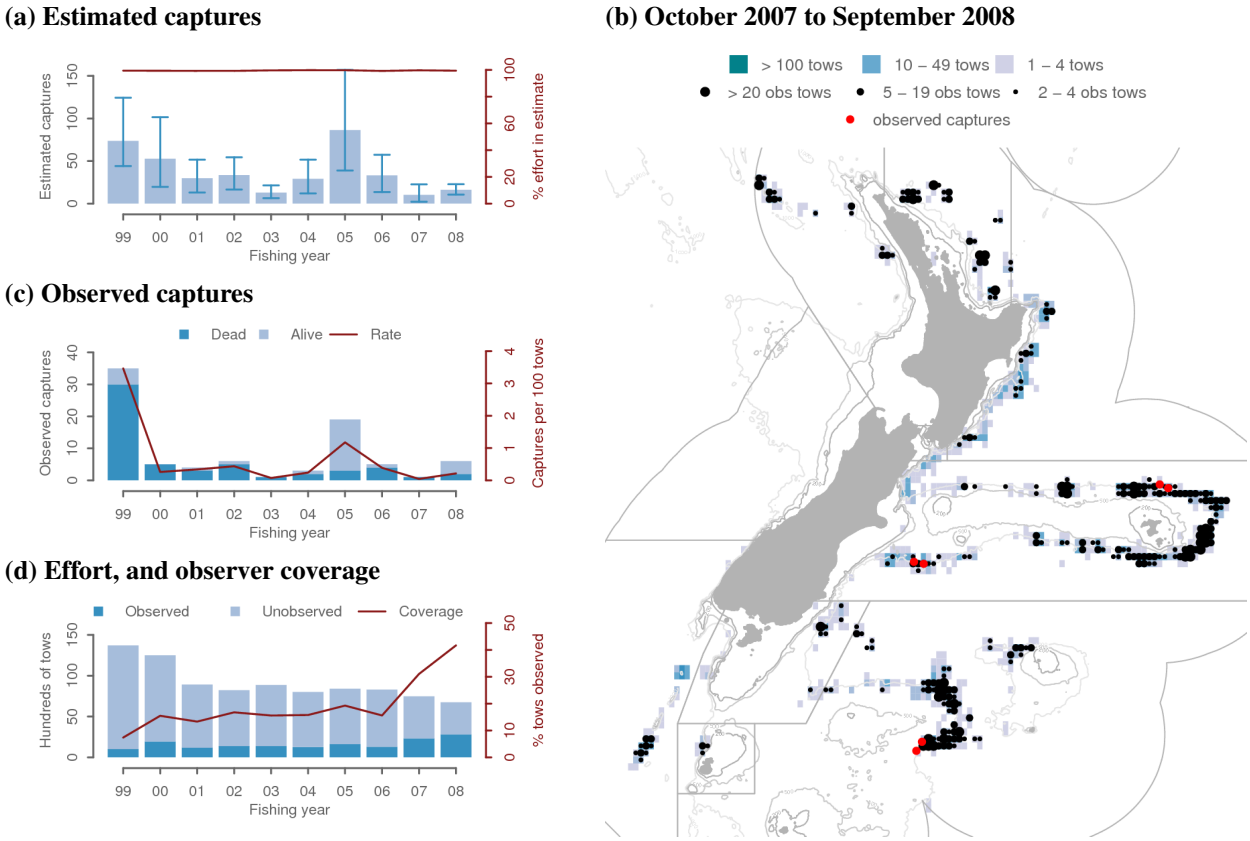

Figure 36: All bird captures in the deepwater trawl fishery. (a) Ratio estimated captures, with 95% bootstrap confidence intervals, (b) Mapped effort and captures from 2007–08, (c) Observed captures, (d) Effort and observed effort.

3.18.12 Deepwater trawl, New Zealand fur seals, New Zealand EEZ

Table 75: Summary of New Zealand fur seal captures in the deepwater trawl fishery, broken down by fishing areas, with the number of tows, number of tows observed, percentage of tows observed, number of observed captures, capture rate per hundred tows, total estimated captures with 95% confidence intervals, and percentage of tows included in the estimate.

		Observed				Estimated		
	Tows	No. obs	% obs	Capt.	Rate	Est. captures		% eff. in est.
2007–08								
Chatham Rise	3 257	1 320	40.5	0	0.00	0	(0 - 1)	100.0
Subantarctic	1 434	839	58.5	4	0.48	7	(4 - 11)	100.0
East of NI	834	97	11.6	0	0.00	0	(0 - 0)	100.0
North East	380	287	75.5	0	0.00	0	(0 - 0)	100.0
Puysegur	372	58	15.6	0	0.00	0	(0 - 0)	100.0
West Coast NI	233	130	55.8	0	0.00	0	(0 - 0)	100.0
Stewart-Snares	131	61	46.6	0	0.00	0	(0 - 0)	100.0
Auckland Is.	58	16	27.6	0	0.00	0	(0 - 0)	100.0
Cook Strait	44	2	4.5	0	0.00	0	observed	4.5
West Coast SI	0							
2006–07								
Chatham Rise	3 556	695	19.5	0	0.00	0	(0 - 1)	100.0
Subantarctic	1 423	946	66.5	2	0.21	3	(2 - 5)	100.0
East of NI	1 307	15	1.1	0	0.00	0	(0 - 0)	100.0
North East	405	206	50.9	0	0.00	0	(0 - 0)	100.0
Puysegur	48	17	35.4	0	0.00	0	(0 - 0)	100.0
West Coast NI	312	319	102.2	0	0.00	0	(0 - 0)	100.0
Stewart-Snares	159	122	76.7	0	0.00	0	(0 - 0)	100.0
Auckland Is.	5	0	0.0	0		0	(0 - 0)	100.0
Cook Strait	25	0	0.0	0		0	observed	0.0
West Coast SI	237	0	0.0	0		0	(0 - 0)	100.0

Table 76: Summary of New Zealand fur seal captures in the deepwater trawl fishery, for 10 fishing years, with the number of tows, number of tows observed, percentage of tows observed, number of observed captures, capture rate per hundred tows, total estimated captures with 95% confidence intervals, and percentage of tows included in the estimate.

		Observed				Estimated		
	Tows	No. obs	% obs	Capt.	Rate	Est. captures		% eff. in est.
2007–08	6 743	2 810	41.7	4	0.14	7	(4 - 11)	99.4
2006–07	7 477	2 320	31.0	2	0.09	3	(2 - 5)	99.7
2005–06	8 291	1 292	15.6	2	0.15	11	(2 - 23)	99.2
2004–05	8 406	1 618	19.2	4	0.25	13	(6 - 23)	99.7
2003–04	8 006	1 261	15.8	2	0.16	11	(2 - 25)	99.8
2002–03	8 867	1 380	15.6	0	0.00	0	(0 - 1)	99.6
2001–02	8 220	1 377	16.8	0	0.00	0	(0 - 1)	91.1
2000–01	8 925	1 187	13.3	1	0.08	1	(1 - 2)	89.0
1999–00	12 505	1 934	15.5	0	0.00	0	(0 - 1)	99.3
1998–99	13 714	1 010	7.4	3	0.30	4	(3 - 5)	92.9

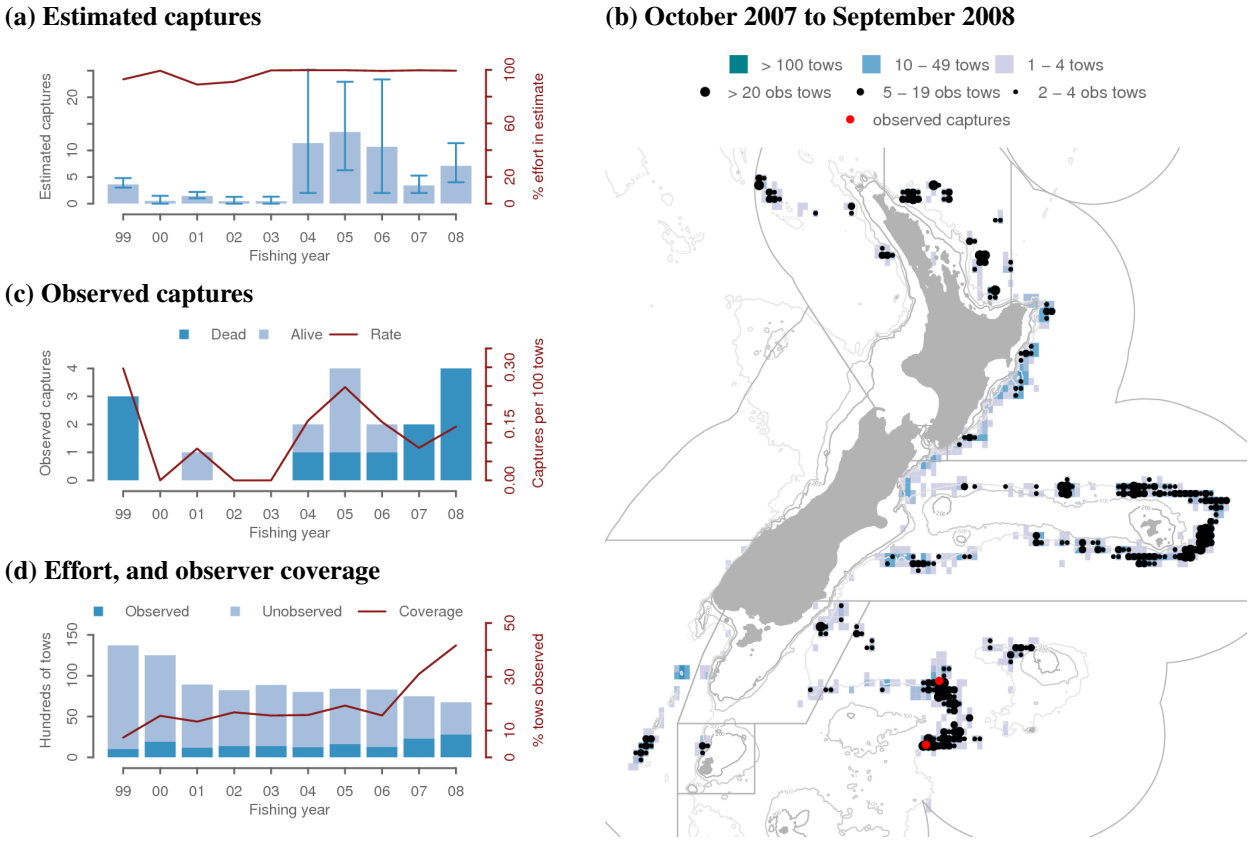

Figure 37: New Zealand fur seal captures in the deepwater trawl fishery. (a) Ratio estimated captures, with 95% bootstrap confidence intervals, (b) Mapped effort and captures from 2007–08, (c) Observed captures, (d) Effort and observed effort.

3.18.13 Scampi trawl, all birds, New Zealand EEZ

Table 77: Summary of all bird captures in the scampi trawl fishery, broken down by fishing areas, with the number of tows, number of tows observed, percentage of tows observed, number of observed captures, capture rate per hundred tows, total estimated captures with 95% confidence intervals, and percentage of tows included in the estimate.

		Observed				Estimated		
	Tows	No. obs	% obs	Capt.	Rate	Est. captures		% eff. in est.
2007–08								
Chatham Rise	2 014	185	9.2					
White-capped albatrosses				0	0.00	3	(0 - 6)	100.0
White-chinned petrels				0	0.00	1	(0 - 4)	100.0
Sooty shearwaters				2	1.08	7	(3 - 13)	100.0
Other albatrosses (Salvin's albatross)				4	2.16	44	(4 - 113)	100.0
Other birds				0	0.00	4	(0 - 9)	100.0
Auckland Is.	1 330	93	7.0					
White-capped albatrosses				0	0.00	13	(5 - 22)	100.0
White-chinned petrels				0	0.00	1	(0 - 4)	100.0
Sooty shearwaters				0	0.00	18	(3 - 40)	100.0
Other albatrosses				0	0.00	3	(0 - 6)	100.0
Other birds				0	0.00	5	(1 - 10)	100.0
North East	843	145	17.2					
Sooty shearwaters				0	0.00	1	(0 - 4)	100.0
Other albatrosses				0	0.00	2	(0 - 6)	100.0
Other birds[a]				5	3.45	29	(5 - 68)	100.0
East of NI	619	101	16.3					
White-capped albatrosses				0	0.00	1	(0 - 3)	100.0
Sooty shearwaters				0	0.00	2	(0 - 4)	100.0
Other albatrosses				0	0.00	4	(2 - 7)	100.0
Other birds				0	0.00	2	(0 - 3)	100.0
Stewart-Snares	1	0	0.0					
Subantarctic	0							
Cook Strait	0							
2006–07								
Chatham Rise	2 297	152	6.6					
White-capped albatrosses				0	0.00	3	(0 - 7)	100.0
White-chinned petrels				0	0.00	1	(0 - 4)	100.0
Sooty shearwaters				0	0.00	6	(1 - 13)	100.0
Other albatrosses (albatrosses (unidentified))				1	0.66	15	(1 - 43)	100.0
Other birds				0	0.00	4	(0 - 10)	100.0
Auckland Is.	1 328	101	7.6					
White-capped albatrosses				2	1.98	15	(7 - 24)	100.0
White-chinned petrels				0	0.00	1	(0 - 4)	100.0
Sooty shearwaters				13	12.87	31	(16 - 52)	100.0
Other albatrosses				0	0.00	3	(0 - 6)	100.0
Other birds (northern giant petrel)				1	0.99	6	(2 - 11)	100.0
North East	815	106	13.0					
Sooty shearwaters				1	0.94	2	(1 - 5)	100.0
Other albatrosses				0	0.00	2	(0 - 6)	100.0
Other birds[b]				7	6.60	54	(20 - 101)	100.0
East of NI	693	29	4.2					
White-capped albatrosses				0	0.00	2	(0 - 4)	100.0
Sooty shearwaters				0	0.00	2	(0 - 5)	100.0
Other albatrosses				0	0.00	6	(3 - 10)	100.0
Other birds				0	0.00	2	(0 - 4)	100.0
Stewart-Snares	0							
Subantarctic	1	0	0.0					
Cook Strait	1	1	100.0					

[a] Flesh-footed shearwater (4), black petrel (1)

[b] Flesh-footed shearwater (6), petrel (unidentified) (1)

Table 78: Summary of all bird captures in the scampi trawl fishery, for 10 fishing years, with the number of tows, number of tows observed, percentage of tows observed, number of observed captures, capture rate per hundred tows, total estimated captures with 95% confidence intervals, and percentage of tows included in the estimate.

		Observed				Estimated		
	Tows	No. obs	% obs	Capt.[s]	Rate	Est. captures		% eff. in est.
2007–08	4 807	524	10.9	11	2.10	139	(79 - 221)	100.0
2006–07	5 135	389	7.6	25	6.43	156	(104 - 218)	100.0
2005–06	4 867	331	6.8	13	3.93	137	(68 - 254)	100.0
2004–05	4 648	143	3.1	9	6.29	77	(54 - 104)	98.8
2003–04	3 730	412	11.0	8	1.94	75	(52 - 102)	96.5
2002–03	5 123	512	10.0	8	1.56	89	(64 - 117)	95.3
2001–02	6 719	591	8.8	6	1.02	124	(88 - 164)	99.4
2000–01	4 978	266	5.3	9	3.38	89	(64 - 119)	96.8
1999–00	4 767	421	8.8	8	1.90	84	(59 - 112)	98.2
1998–99	4 323	499	11.5	14	2.81	97	(70 - 130)	88.9

[s] Observed captures by species, for all 10 years: flesh-footed shearwater (23), sooty shearwater (22), Salvin's albatross (21), white-capped albatross (14), albatrosses (unidentified) (6), black-browed albatross (unidentified) (3), seabird – small (3), Buller's albatross (3), petrel (unidentified) (2), white-chinned petrel (2), shy albatross (2), cape petrels (2), Chatham Island albatross (2), grey-headed albatross (1), seabird (unspecified) (1), northern giant petrel (1), black petrel (1), common diving petrel (1), southern black-browed albatross (1)

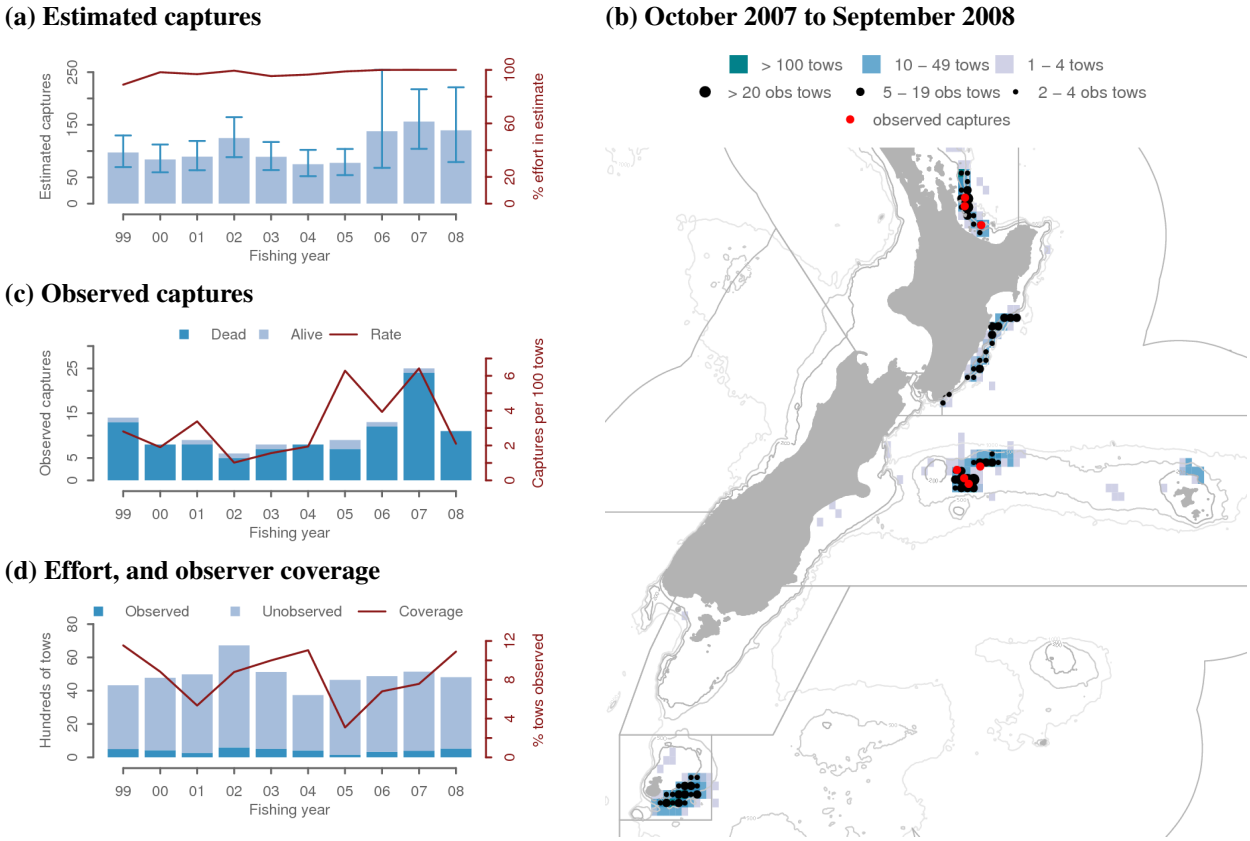

Figure 38: All bird captures in the scampi trawl fishery. (a) Ratio estimated captures, with 95% bootstrap confidence intervals, (b) Mapped effort and captures from 2007–08, (c) Observed captures, (d) Effort and observed effort.

3.18.14 Scampi trawl, New Zealand sea lions, New Zealand EEZ

Table 79: Summary of New Zealand sea lion captures in the scampi trawl fishery, broken down by fishing areas, with the number of tows, number of tows observed, percentage of tows observed, number of observed captures, capture rate per hundred tows, total estimated captures with 95% confidence intervals, and percentage of tows included in the estimate.

		Observed				Estimated		
	Tows	No. obs	% obs	Capt.	Rate	Est. captures		% eff. in est.
2007–08								
Chatham Rise	2 014	185	9.2	0	0.00	0	(0 - 0)	100.0
Auckland Is.	1 330	93	7.0	0	0.00	11	(5 - 19)	100.0
North East	843	145	17.2	0	0.00	0	(0 - 0)	100.0
East of NI	619	101	16.3	0	0.00	0	(0 - 0)	100.0
Stewart-Snares	1	0	0.0	0		0	observed	0.0
Subantarctic	0							
Cook Strait	0							
2006–07								
Chatham Rise	2 297	152	6.6	0	0.00	0	(0 - 0)	100.0
Auckland Is.	1 328	101	7.6	1	0.99	12	(6 - 20)	100.0
North East	815	106	13.0	0	0.00	0	(0 - 0)	100.0
East of NI	693	29	4.2	0	0.00	0	(0 - 0)	100.0
Stewart-Snares	0							
Subantarctic	1	0	0.0	0		0	observed	0.0
Cook Strait	1	1	100.0	0	0.00	0	observed	100.0

Table 80: Summary of New Zealand sea lion captures in the scampi trawl fishery, for 10 fishing years, with the number of tows, number of tows observed, percentage of tows observed, number of observed captures, capture rate per hundred tows, total estimated captures with 95% confidence intervals, and percentage of tows included in the estimate.

		Observed				Estimated		
	Tows	No. obs	% obs	Capt.	Rate	Est. captures		% eff. in est.
2007–08	4 807	524	10.9	0	0.00	11	(5 - 19)	100.0
2006–07	5 135	389	7.6	1	0.26	12	(6 - 20)	100.0
2005–06	4 867	331	6.8	1	0.30	12	(6 - 20)	100.0
2004–05	4 648	143	3.1	0	0.00	12	(5 - 20)	98.8
2003–04	3 730	412	11.0	3	0.73	14	(8 - 22)	96.5
2002–03	5 123	512	10.0	0	0.00	11	(5 - 19)	95.3
2001–02	6 719	591	8.8	0	0.00	13	(6 - 22)	99.4
2000–01	4 978	266	5.3	4	1.50	16	(9 - 25)	96.8
1999–00	4 767	421	8.8	0	0.00	12	(5 - 20)	98.2
1998–99	4 323	499	11.5	0	0.00	11	(5 - 19)	88.9

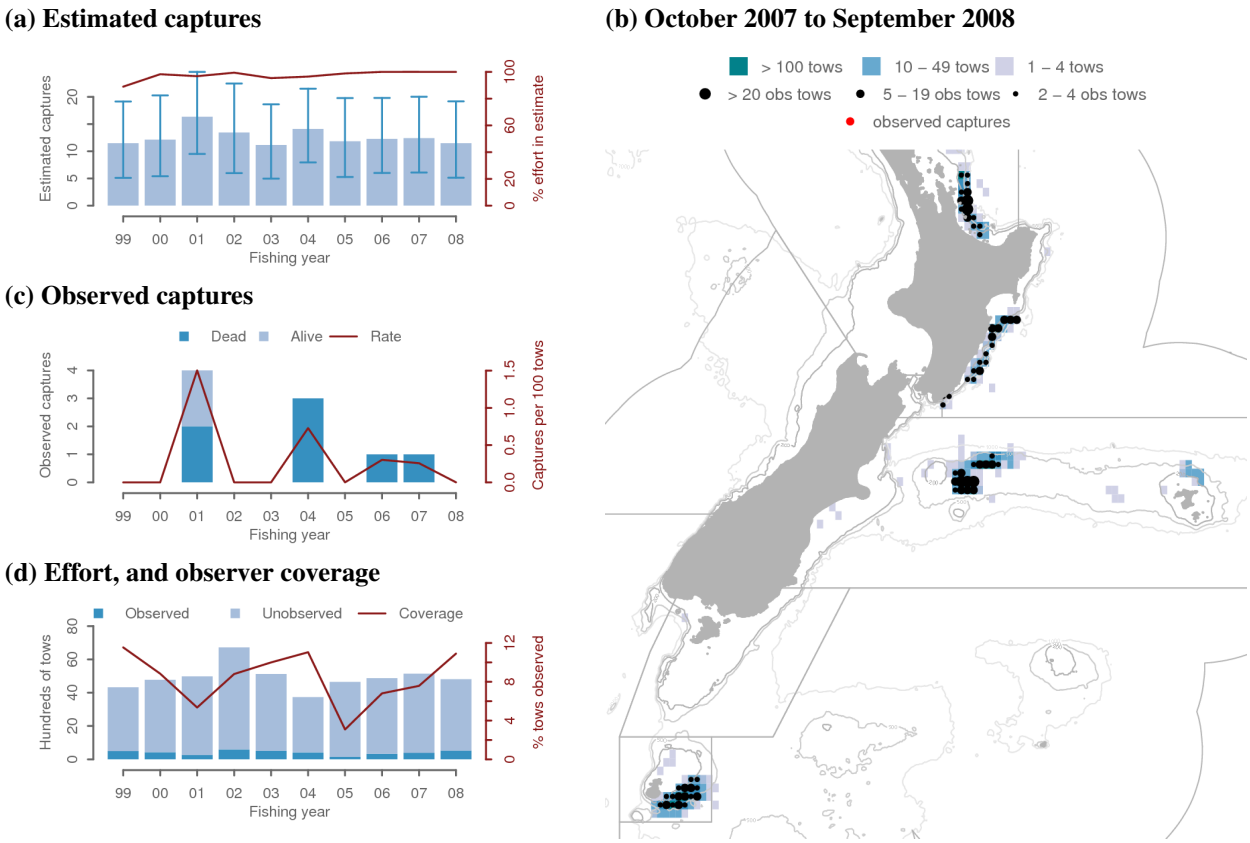

Figure 39: New Zealand sea lion captures in the scampi trawl fishery. (a) Ratio estimated captures, with 95% bootstrap confidence intervals, (b) Mapped effort and captures from 2007–08, (c) Observed captures, (d) Effort and observed effort.

3.18.15 Scampi trawl, New Zealand fur seals, New Zealand EEZ

Table 81: Summary of New Zealand fur seal captures in the scampi trawl fishery, broken down by fishing areas, with the number of tows, number of tows observed, percentage of tows observed, number of observed captures, capture rate per hundred tows, total estimated captures with 95% confidence intervals, and percentage of tows included in the estimate.

		Observed				Estimated		
	Tows	No. obs	% obs	Capt.	Rate	Est. captures		% eff. in est.
2007–08								
Chatham Rise	2 014	185	9.2	0	0.00	6	(1 - 13)	100.0
Auckland Is.	1 330	93	7.0	1	1.08	4	(1 - 7)	100.0
North East	843	145	17.2	0	0.00	0	(0 - 0)	100.0
East of NI	619	101	16.3	0	0.00	1	(0 - 2)	100.0
Stewart-Snares	1	0	0.0	0		0	observed	0.0
Subantarctic	0							
Cook Strait	0							
2006–07								
Chatham Rise	2 297	152	6.6	0	0.00	7	(1 - 15)	100.0
Auckland Is.	1 328	101	7.6	0	0.00	3	(0 - 6)	100.0
North East	815	106	13.0	0	0.00	0	(0 - 0)	100.0
East of NI	693	29	4.2	0	0.00	1	(0 - 3)	100.0
Stewart-Snares	0							
Subantarctic	1	0	0.0	0		0	observed	0.0
Cook Strait	1	1	100.0	0	0.00	0	observed	100.0

Table 82: Summary of New Zealand fur seal captures in the scampi trawl fishery, for 10 fishing years, with the number of tows, number of tows observed, percentage of tows observed, number of observed captures, capture rate per hundred tows, total estimated captures with 95% confidence intervals, and percentage of tows included in the estimate.

		Observed				Estimated		
	Tows	No. obs	% obs	Capt.	Rate	Est. captures		% eff. in est.
2007–08	4 807	524	10.9	1	0.19	11	(5 - 18)	100.0
2006–07	5 135	389	7.6	0	0.00	11	(4 - 20)	100.0
2005–06	4 867	331	6.8	0	0.00	10	(4 - 18)	100.0
2004–05	4 648	143	3.1	0	0.00	10	(4 - 17)	98.8
2003–04	3 730	412	11.0	1	0.24	7	(3 - 11)	96.5
2002–03	5 123	512	10.0	2	0.39	10	(5 - 17)	95.3
2001–02	6 719	591	8.8	3	0.51	14	(6 - 24)	99.4
2000–01	4 978	266	5.3	1	0.38	9	(4 - 16)	96.8
1999–00	4 767	421	8.8	0	0.00	8	(3 - 15)	98.2
1998–99	4 323	499	11.5	2	0.40	9	(4 - 15)	88.9

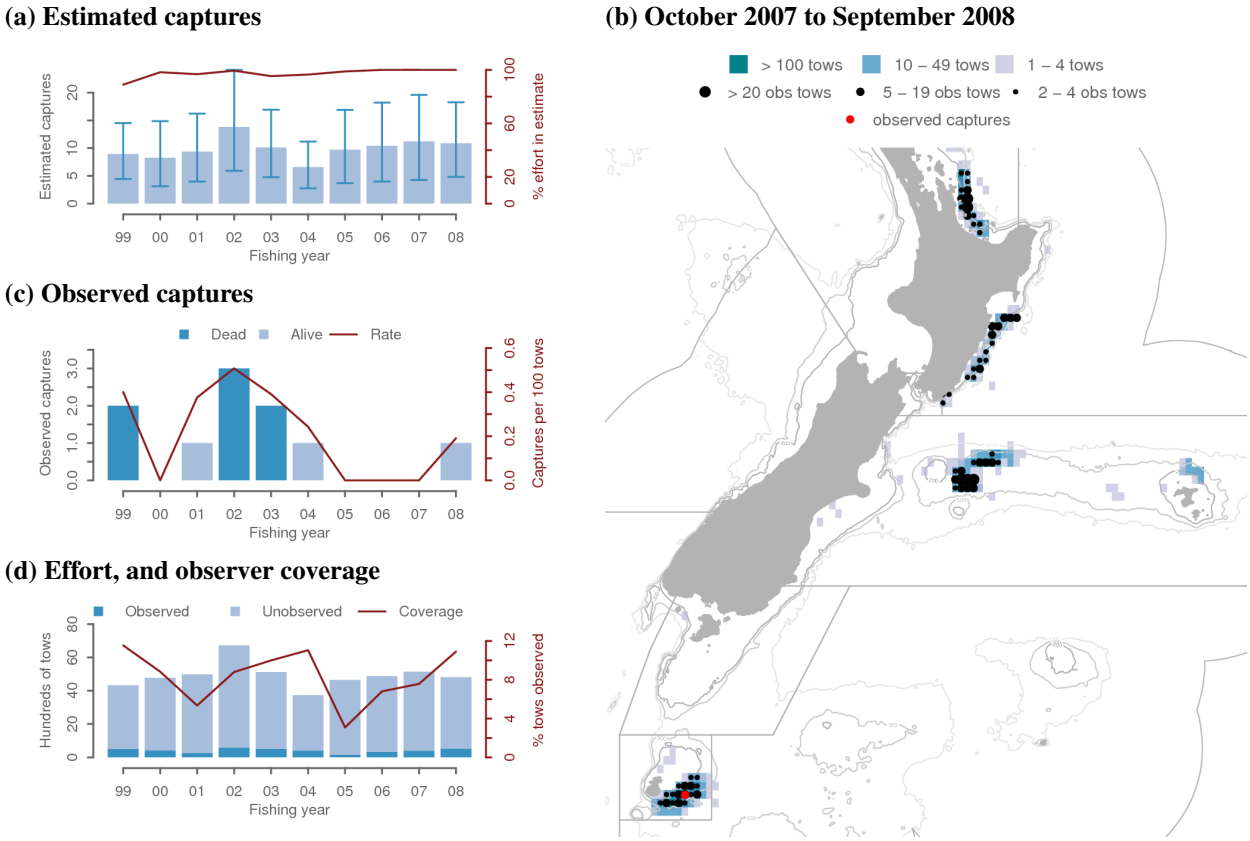

Figure 40: New Zealand fur seal captures in the scampi trawl fishery. (a) Ratio estimated captures, with 95% bootstrap confidence intervals, (b) Mapped effort and captures from 2007–08, (c) Observed captures, (d) Effort and observed effort.

3.18.16 Southern blue whiting trawl, all birds, New Zealand EEZ

Table 83: Summary of all bird captures in the southern blue whiting trawl fishery, broken down by fishing areas, with the number of tows, number of tows observed, percentage of tows observed, number of observed captures, capture rate per hundred tows, total estimated captures with 95% confidence intervals, and percentage of tows included in the estimate.

		Observed				Estimated		
	Tows	No. obs	% obs	Capt.	Rate	Est. captures		% eff. in est.
2007–08								
Subantarctic	816	331	40.6					
Other albatrosses[a]				2	0.60	3	(2 - 3)	100.0
Other birds (grey petrel)				1	0.30	2	(1 - 5)	100.0
2006–07								
Subantarctic	630	224	35.6					
Other albatrosses				0	0.00	1	(0 - 1)	100.0
Other birds[b]				3	1.34	8	(3 - 18)	100.0

[a] Salvin's albatross (1), Campbell albatross (1)
[b] Grey petrel (2), seabird – large (1)

Table 84: Summary of all bird captures in the southern blue whiting trawl fishery, for 10 fishing years, with the number of tows, number of tows observed, percentage of tows observed, number of observed captures, capture rate per hundred tows, total estimated captures with 95% confidence intervals, and percentage of tows included in the estimate.

		Observed				Estimated		
	Tows	No. obs	% obs	Capt.[s]	Rate	Est. captures		% eff. in est.
2007–08	816	331	40.6	3	0.91	5	(3 - 8)	100.0
2006–07	630	224	35.6	3	1.34	9	(3 - 18)	100.0
2005–06	624	217	34.8	2	0.92	6	(2 - 12)	100.0
2004–05	869	335	38.6	2	0.60	6	(2 - 11)	100.0
2003–04	740	241	32.6	0	0.00	1	(0 - 1)	100.0
2002–03	638	275	43.1	0	0.00	0	(0 - 1)	100.0
2001–02	1 159	334	28.8	0	0.00	1	(0 - 2)	98.2
2000–01	664	388	58.4	3	0.77	5	(3 - 7)	99.8
1999–00	693	314	45.3	2	0.64	5	(2 - 9)	100.0
1998–99	1 250	341	27.3	1	0.29	2	(1 - 3)	98.9

[s] Observed captures by species, for all 10 years: grey petrel (9), Salvin's albatross (3), cape petrels (2), seabird – large (1), Campbell albatross (1)

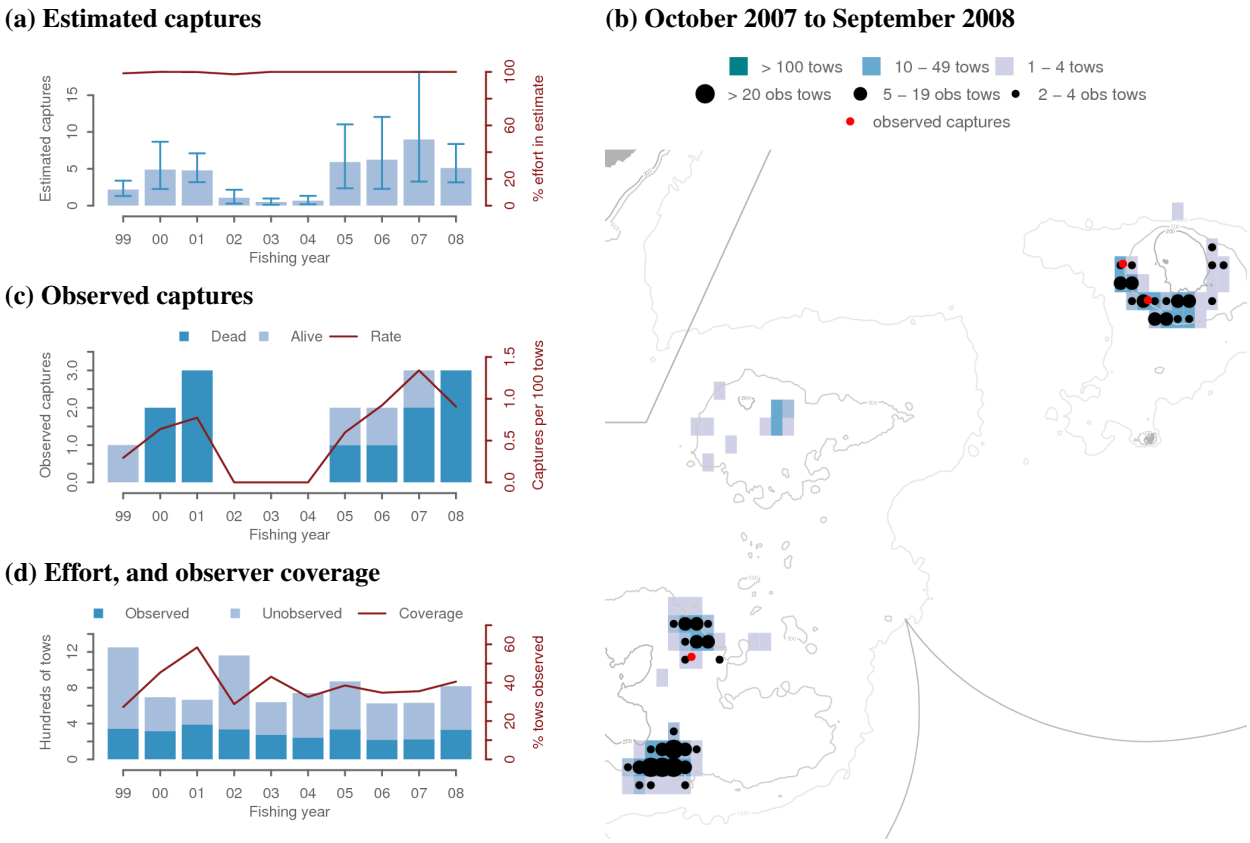

Figure 41: All bird captures in the southern blue whiting trawl fishery. (a) Ratio estimated captures, with 95% bootstrap confidence intervals, (b) Mapped effort and captures from 2007–08, (c) Observed captures, (d) Effort and observed effort.

3.18.17 Southern blue whiting trawl, New Zealand sea lions, New Zealand EEZ

Table 85: Summary of New Zealand sea lion captures in the southern blue whiting trawl fishery, broken down by fishing areas, with the number of tows, number of tows observed, percentage of tows observed, number of observed captures, capture rate per hundred tows, total estimated captures with 95% confidence intervals, and percentage of tows included in the estimate.

		Observed				Estimated		
	Tows	No. obs	% obs	Capt.	Rate	Est. captures		% eff. in est.
2007–08								
Subantarctic	816	331	40.6	5	1.51	12	(6 - 21)	100.0
2006–07								
Subantarctic	630	224	35.6	3	1.34	8	(3 - 18)	100.0

Table 86: Summary of New Zealand sea lion captures in the southern blue whiting trawl fishery, for 10 fishing years, with the number of tows, number of tows observed, percentage of tows observed, number of observed captures, capture rate per hundred tows, total estimated captures with 95% confidence intervals, and percentage of tows included in the estimate.

		Observed				Estimated		
	Tows	No. obs	% obs	Capt.	Rate	Est. captures		% eff. in est.
2007–08	816	331	40.6	5	1.51	12	(6 - 21)	100.0
2006–07	630	224	35.6	3	1.34	8	(3 - 18)	100.0
2005–06	624	217	34.8	3	1.38	9	(3 - 18)	100.0
2004–05	869	335	38.6	2	0.60	5	(2 - 10)	100.0
2003–04	740	241	32.6	1	0.41	3	(1 - 7)	100.0
2002–03	638	275	43.1	0	0.00	0	(0 - 0)	100.0
2001–02	1 159	334	28.8	1	0.30	3	(1 - 8)	98.2
2000–01	664	388	58.4	0	0.00	0	(0 - 0)	99.8
1999–00	693	314	45.3	0	0.00	0	(0 - 0)	100.0
1998–99	1 250	341	27.3	0	0.00	0	(0 - 0)	98.9

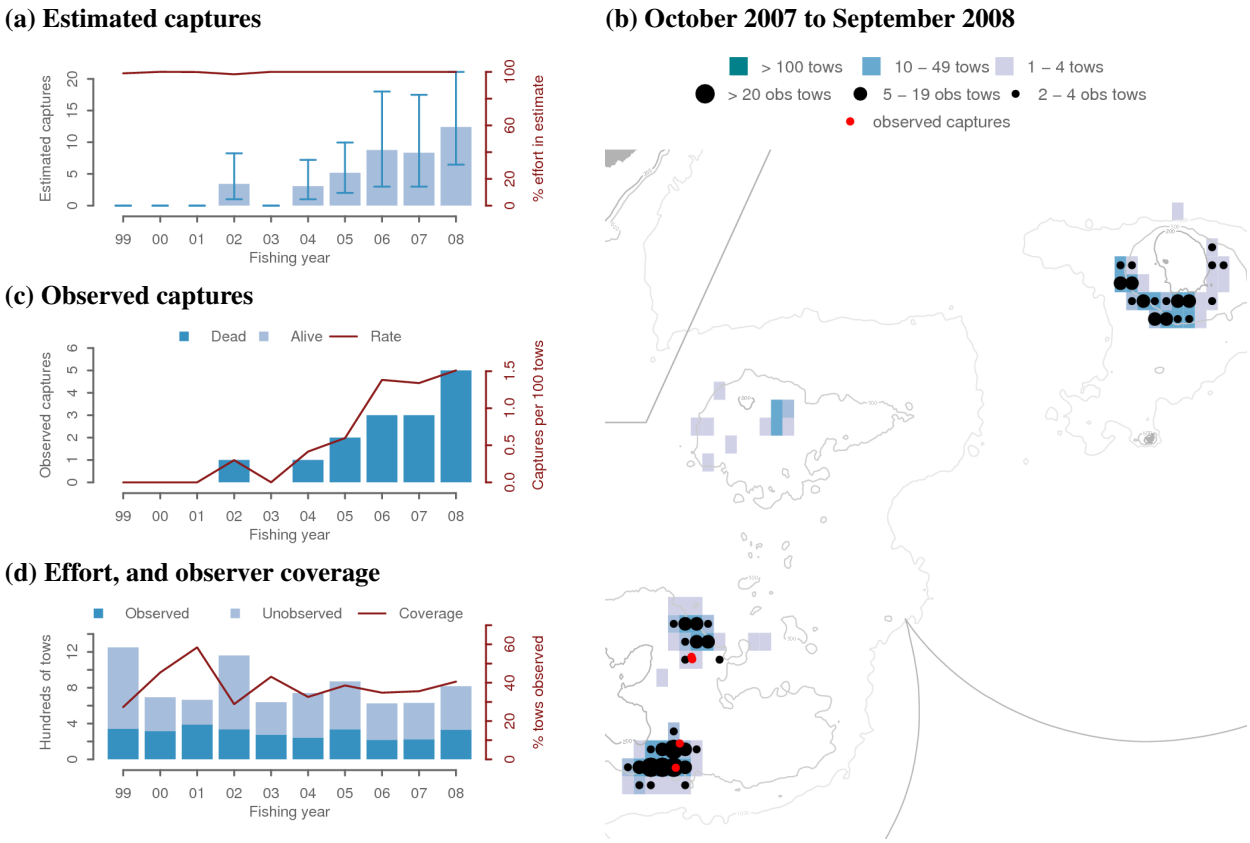

Figure 42: New Zealand sea lion captures in the southern blue whiting trawl fishery. (a) Ratio estimated captures, with 95% bootstrap confidence intervals, (b) Mapped effort and captures from 2007–08, (c) Observed captures, (d) Effort and observed effort.

3.18.18 Southern blue whiting trawl, New Zealand fur seals, New Zealand EEZ

Table 87: Summary of New Zealand fur seal captures in the southern blue whiting trawl fishery, broken down by fishing areas, with the number of tows, number of tows observed, percentage of tows observed, number of observed captures, capture rate per hundred tows, total estimated captures with 95% confidence intervals, and percentage of tows included in the estimate.

		Observed				Estimated		
	Tows	No. obs	% obs	Capt.	Rate	Est. captures		% eff. in est.
2007–08								
Subantarctic	816	331	40.6	24	7.25	59	(45 - 77)	100.0
2006–07								
Subantarctic	630	224	35.6	13	5.80	37	(24 - 51)	100.0

Table 88: Summary of New Zealand fur seal captures in the southern blue whiting trawl fishery, for 10 fishing years, with the number of tows, number of tows observed, percentage of tows observed, number of observed captures, capture rate per hundred tows, total estimated captures with 95% confidence intervals, and percentage of tows included in the estimate.

		Observed				Estimated		
	Tows	No. obs	% obs	Capt.	Rate	Est. captures		% eff. in est.
2007–08	816	331	40.6	24	7.25	59	(45 - 77)	100.0
2006–07	630	224	35.6	13	5.80	36	(24 - 51)	100.0
2005–06	624	217	34.8	52	23.96	150	(97 - 217)	100.0
2004–05	869	335	38.6	33	9.85	86	(62 - 114)	100.0
2003–04	740	241	32.6	13	5.39	40	(15 - 81)	100.0
2002–03	638	275	43.1	8	2.91	19	(12 - 26)	100.0
2001–02	1 159	334	28.8	13	3.89	44	(27 - 64)	98.2
2000–01	664	388	58.4	58	14.95	99	(76 - 135)	99.8
1999–00	693	314	45.3	85	27.07	187	(138 - 256)	100.0
1998–99	1 250	341	27.3	42	12.32	157	(110 - 210)	98.9

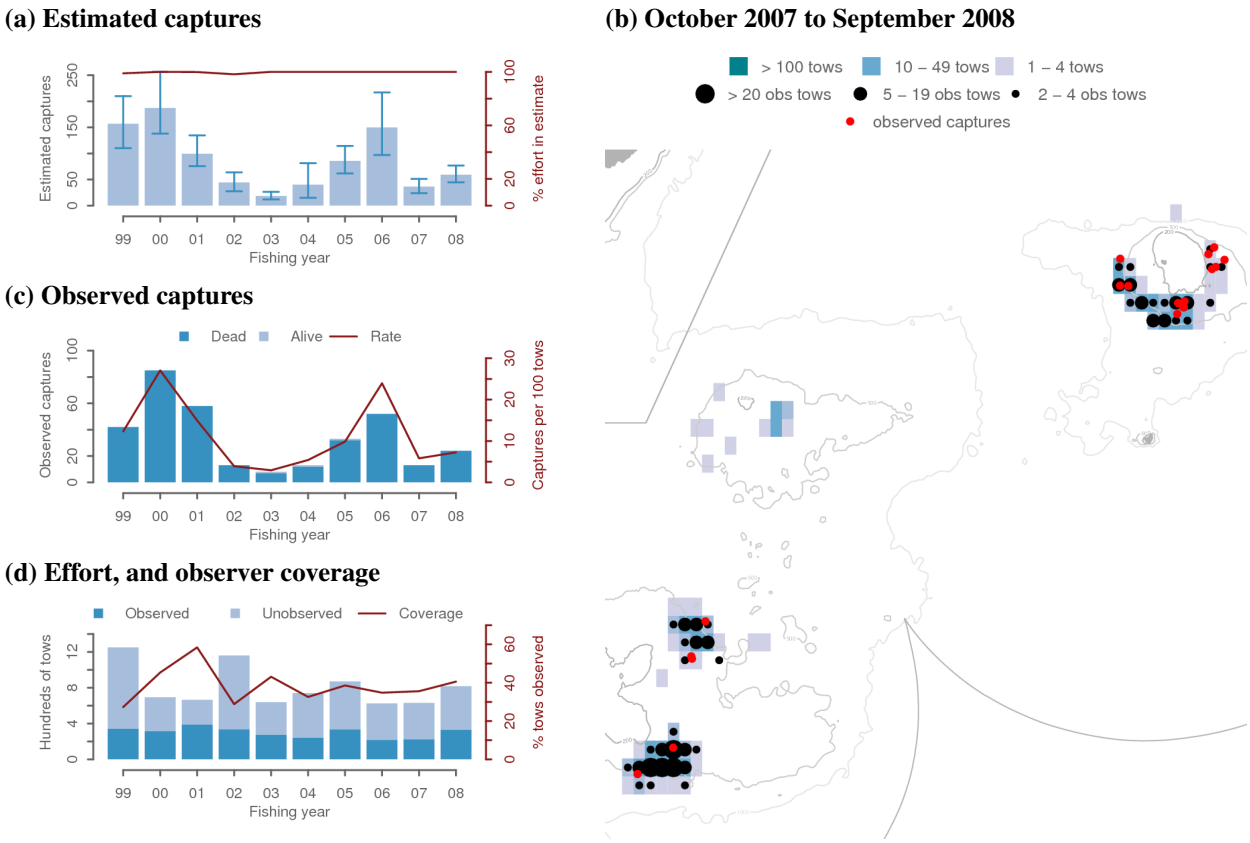

Figure 43: New Zealand fur seal captures in the southern blue whiting trawl fishery. (a) Ratio estimated captures, with 95% bootstrap confidence intervals, (b) Mapped effort and captures from 2007–08, (c) Observed captures, (d) Effort and observed effort.

3.18.19 Jack mackerel trawl, all birds, New Zealand EEZ

Table 89: Summary of all bird captures in the jack mackerel trawl fishery, broken down by fishing areas, with the number of tows, number of tows observed, percentage of tows observed, number of observed captures, capture rate per hundred tows, total estimated captures with 95% confidence intervals, and percentage of tows included in the estimate.

		Observed				Estimated		
	Tows	No. obs	% obs	Capt.	Rate	Est. captures		% eff. in est.
2007–08								
West Coast NI	2 195	710	32.3					
Other birds				0	0.00	3	(0 - 5)	100.0
West Coast SI	255	80	31.4					
Chatham Rise	177	21	11.9					
Sooty shearwaters				0	0.00	2	(0 - 4)	100.0
Other albatrosses (Buller's albatross)				2	9.52	4	(2 - 6)	100.0
Stewart-Snares	14	3	21.4					
Cook Strait	5	0	0.0					
North East	0							
2006–07								
West Coast NI	2 152	603	28.0					
Other birds				0	0.00	3	(0 - 6)	100.0
West Coast SI	416	181	43.5					
Other birds (common diving petrel)				1	0.55	2	(1 - 3)	100.0
Chatham Rise	110	17	15.5					
Sooty shearwaters				0	0.00	1	(0 - 2)	100.0
Other albatrosses				0	0.00	1	(0 - 3)	100.0
Stewart-Snares	22	0	0.0					
Cook Strait	10	0	0.0					
North East	1	0	0.0					

Table 90: Summary of all bird captures in the jack mackerel trawl fishery, for 10 fishing years, with the number of tows, number of tows observed, percentage of tows observed, number of observed captures, capture rate per hundred tows, total estimated captures with 95% confidence intervals, and percentage of tows included in the estimate.

		Observed				Estimated		
	Tows	No. obs	% obs	Capt.[s]	Rate	Est. captures		% eff. in est.
2007–08	2 646	817	30.9	2	0.24	9	(5 - 13)	99.5
2006–07	2 711	802	29.6	1	0.12	7	(4 - 11)	98.8
2005–06	2 808	709	25.2	0	0.00	13	(5 - 21)	96.9
2004–05	2 509	558	22.2	8	1.43	13	(10 - 16)	98.2
2003–04	2 383	152	6.4	0	0.00	5	(2 - 9)	98.5
2002–03	3 067	346	11.3	4	1.16	14	(9 - 19)	94.8
2001–02	3 002	351	11.7	9	2.56	32	(22 - 45)	99.8
2000–01	1 941	404	20.8	9	2.23	16	(13 - 19)	98.7
1999–00	2 290	516	22.5	9	1.74	31	(22 - 41)	99.7
1998–99	3 866	626	16.2	5	0.80	38	(22 - 58)	98.8

[s] Observed captures by species, for all 10 years: sooty shearwater (15), white-capped albatross (13), Buller's albatross (4), petrel (unidentified) (3), cape petrels (2), Campbell albatross (2), fairy prion (2), white-chinned petrel (2), Salvin's albatross (1), seabird – large (1), common diving petrel (1), prions (unidentified) (1)

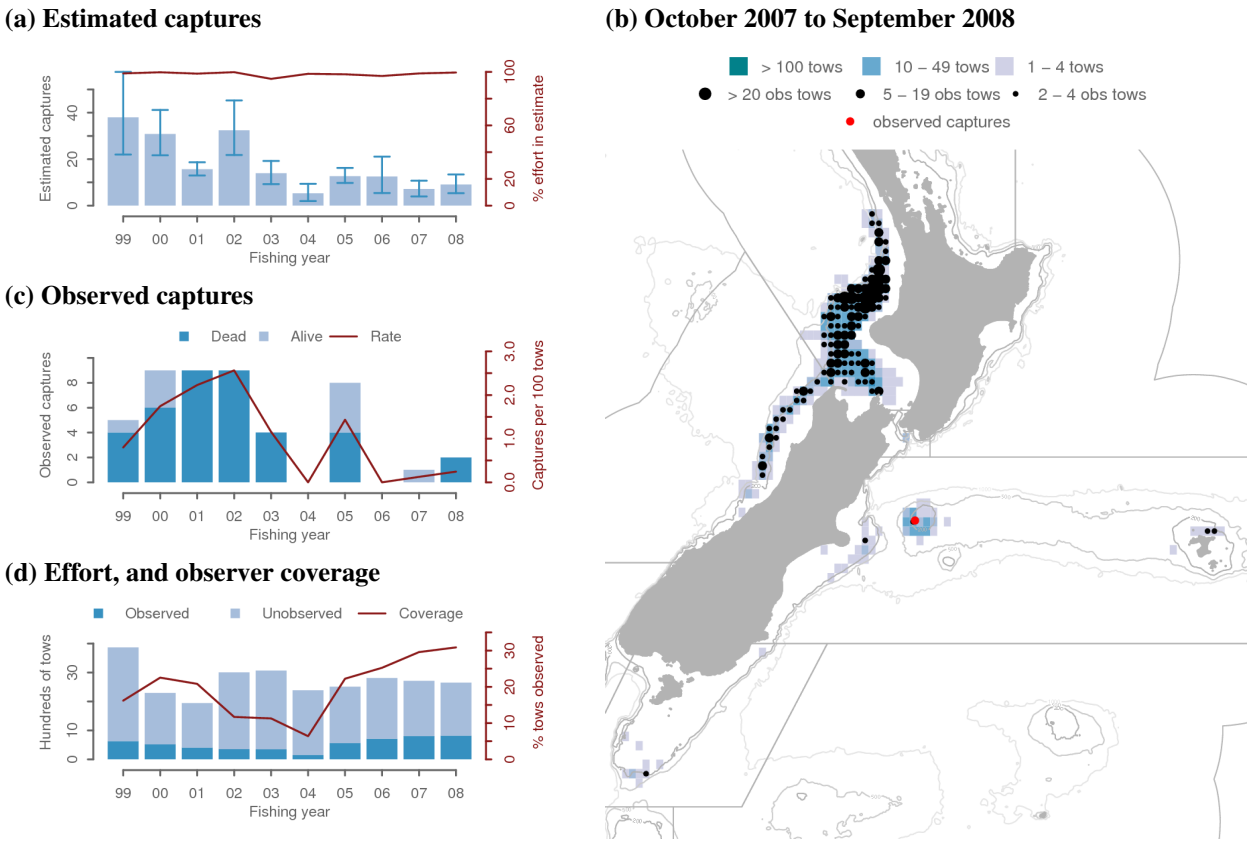

Figure 44: All bird captures in the jack mackerel trawl fishery. (a) Ratio estimated captures, with 95% bootstrap confidence intervals, (b) Mapped effort and captures from 2007–08, (c) Observed captures, (d) Effort and observed effort.

3.18.20 Jack mackerel trawl, dolphins, New Zealand EEZ

Table 91: Summary of dolphin captures in the jack mackerel trawl fishery, broken down by fishing areas, with the number of tows, number of tows observed, percentage of tows observed, number of observed captures, capture rate per hundred tows, total estimated captures with 95% confidence intervals, and percentage of tows included in the estimate.

		Observed				Estimated		
	Tows	No. obs	% obs	Capt.	Rate	Est. captures		% eff. in est.
2007–08								
West Coast NI	2 195	710	32.3	20	2.82	62	(24 - 114)	100.0
West Coast SI	255	80	31.4	0	0.00	0	(0 - 0)	100.0
Chatham Rise	177	21	11.9	0	0.00	1	(0 - 2)	100.0
Stewart-Snares	14	3	21.4	0	0.00	0	(0 - 0)	100.0
Cook Strait	5	0	0.0	0		0	observed	0.0
North East	0							
2006–07								
West Coast NI	2 152	603	28.0	11	1.82	39	(16 - 73)	100.0
West Coast SI	416	181	43.5	0	0.00	0	(0 - 0)	100.0
Chatham Rise	110	17	15.5	0	0.00	0	(0 - 1)	100.0
Stewart-Snares	22	0	0.0	0		0	(0 - 0)	100.0
Cook Strait	10	0	0.0	0		0	observed	0.0
North East	1	0	0.0	0		0	observed	0.0

Table 92: Summary of dolphin captures in the jack mackerel trawl fishery, for 10 fishing years, with the number of tows, number of tows observed, percentage of tows observed, number of observed captures, capture rate per hundred tows, total estimated captures with 95% confidence intervals, and percentage of tows included in the estimate.

		Observed				Estimated		
	Tows	No. obs	% obs	Capt.[s]	Rate	Est. captures		% eff. in est.
2007–08	2 646	817	30.9	20	2.45	63	(25 - 116)	99.9
2006–07	2 711	802	29.6	11	1.37	39	(16 - 73)	99.6
2005–06	2 808	709	25.2	3	0.42	9	(3 - 19)	99.9
2004–05	2 509	558	22.2	21	3.76	94	(52 - 147)	100.0
2003–04	2 383	152	6.4	17	11.18	275	(78 - 530)	100.0
2002–03	3 067	346	11.3	21	6.07	214	(58 - 417)	99.9
2001–02	3 002	351	11.7	1	0.28	17	(1 - 49)	99.8
2000–01	1 941	404	20.8	1	0.25	9	(1 - 25)	98.7
1999–00	2 290	516	22.5	1	0.19	2	(1 - 4)	83.9
1998–99	3 866	626	16.2	0	0.00	1	(0 - 4)	98.8

[s] Observed captures by species, for all 10 years: common dolphin (95), dusky dolphin (1)

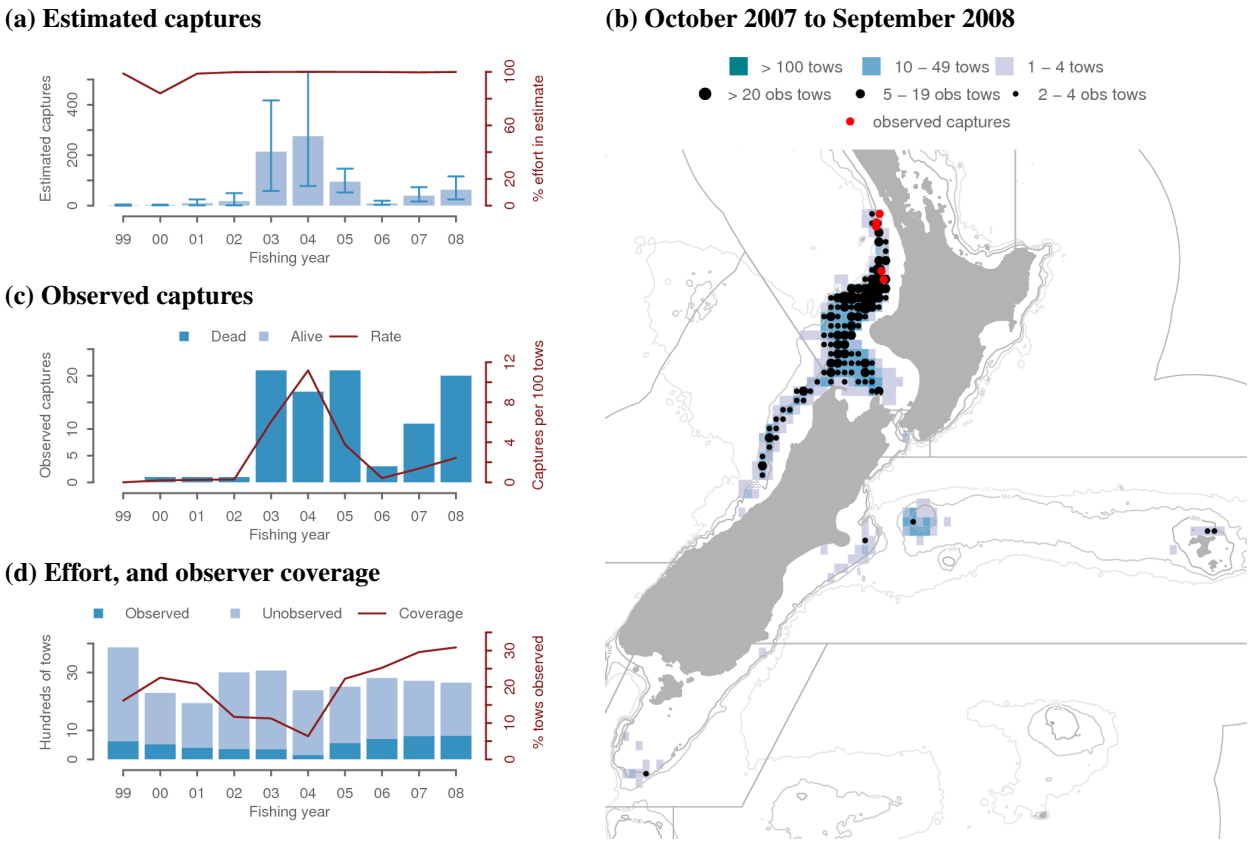

Figure 45: Dolphin captures in the jack mackerel trawl fishery. (a) Ratio estimated captures, with 95% bootstrap confidence intervals, (b) Mapped effort and captures from 2007–08, (c) Observed captures, (d) Effort and observed effort.

3.18.21 Jack mackerel trawl, New Zealand fur seals, New Zealand EEZ

Table 93: Summary of New Zealand fur seal captures in the jack mackerel trawl fishery, broken down by fishing areas, with the number of tows, number of tows observed, percentage of tows observed, number of observed captures, capture rate per hundred tows, total estimated captures with 95% confidence intervals, and percentage of tows included in the estimate.

		Observed				Estimated		
	Tows	No. obs	% obs	Capt.	Rate	Est. captures		% eff. in est.
2007–08								
West Coast NI	2 195	710	32.3	1	0.14	3	(1 - 7)	100.0
West Coast SI	255	80	31.4	6	7.50	6	observed	31.4
Chatham Rise	177	21	11.9	0	0.00	5	(2 - 9)	100.0
Stewart-Snares	14	3	21.4	0	0.00	0	(0 - 0)	100.0
Cook Strait	5	0	0.0	0		0	observed	0.0
North East	0							
2006–07								
West Coast NI	2 152	603	28.0	1	0.17	4	(1 - 9)	100.0
West Coast SI	416	181	43.5	1	0.55	2	(1 - 5)	100.0
Chatham Rise	110	17	15.5	0	0.00	3	(1 - 5)	100.0
Stewart-Snares	22	0	0.0	0		0	(0 - 0)	100.0
Cook Strait	10	0	0.0	0		0	observed	0.0
North East	1	0	0.0	0		0	observed	0.0

Table 94: Summary of New Zealand fur seal captures in the jack mackerel trawl fishery, for 10 fishing years, with the number of tows, number of tows observed, percentage of tows observed, number of observed captures, capture rate per hundred tows, total estimated captures with 95% confidence intervals, and percentage of tows included in the estimate.

		Observed				Estimated		
	Tows	No. obs	% obs	Capt.	Rate	Est. captures		% eff. in est.
2007–08	2 646	817	30.9	7	0.86	15	(10 - 21)	93.3
2006–07	2 711	802	29.6	2	0.25	9	(4 - 16)	99.6
2005–06	2 808	709	25.2	6	0.85	28	(15 - 43)	93.4
2004–05	2 509	558	22.2	5	0.90	23	(9 - 40)	97.1
2003–04	2 383	152	6.4	2	1.32	2	(2 - 3)	97.0
2002–03	3 067	346	11.3	1	0.29	6	(3 - 10)	89.0
2001–02	3 002	351	11.7	5	1.42	12	(8 - 17)	84.3
2000–01	1 941	404	20.8	5	1.24	7	(6 - 8)	76.1
1999–00	2 290	516	22.5	4	0.78	16	(9 - 23)	60.6
1998–99	3 866	626	16.2	19	3.04	87	(54 - 133)	98.8

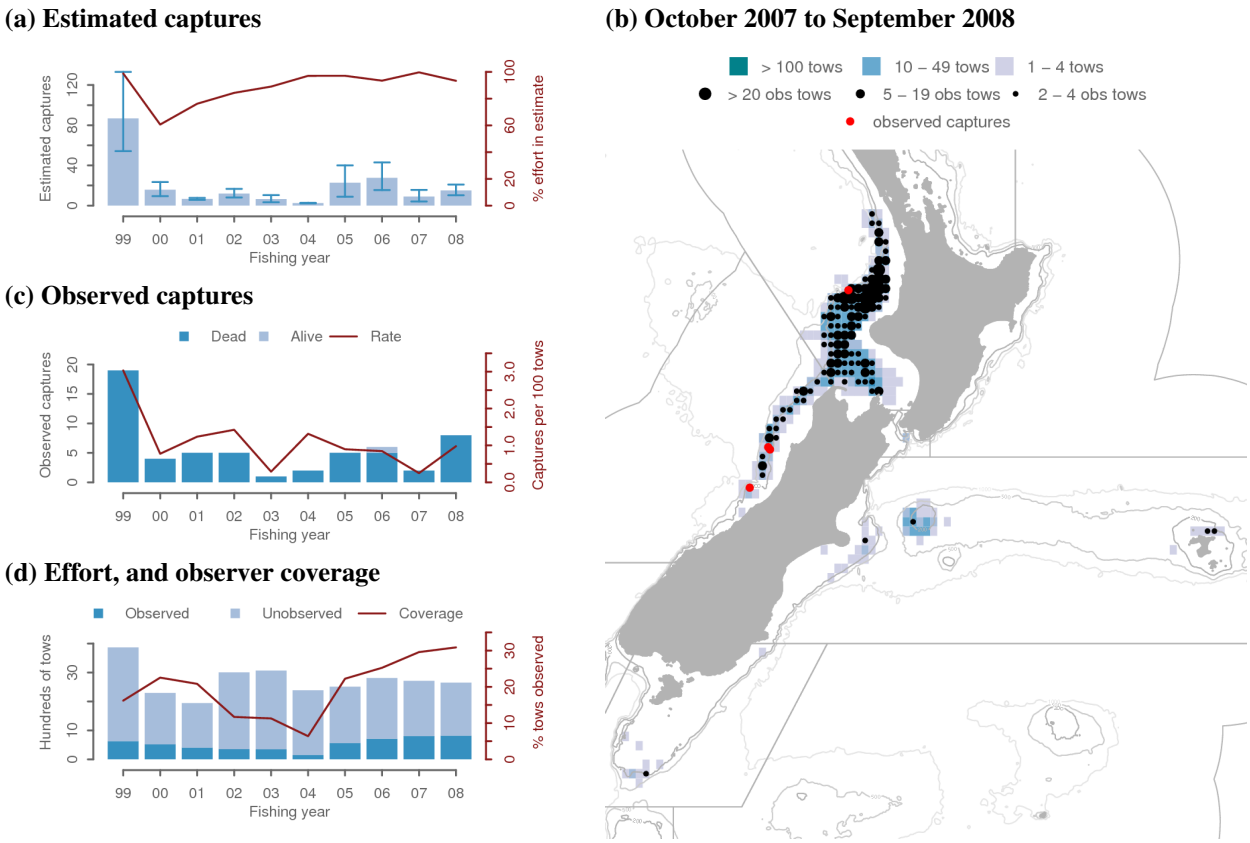

Figure 46: New Zealand fur seal captures in the jack mackerel trawl fishery. (a) Ratio estimated captures, with 95% bootstrap confidence intervals, (b) Mapped effort and captures from 2007–08, (c) Observed captures, (d) Effort and observed effort.

3.18.22 Inshore trawl, all birds, New Zealand EEZ

Table 95: Summary of all bird captures in the inshore trawl fishery, broken down by fishing areas, with the number of tows, number of tows observed, percentage of tows observed, number of observed captures, capture rate per hundred tows, total estimated captures with 95% confidence intervals, and percentage of tows included in the estimate.

		Observed				Estimated		
	Tows	No. obs	% obs	Capt.	Rate	Est. captures		% eff. in est.
2007–08								
West Coast NI	10 220	64	0.6					
East of NI	9 321	0	0.0					
North East	7 992	44	0.6					
Chatham Rise	7 948	8	0.1					
Other albatrosses (Salvin's albatross)				1	12.50	1	observed	0.1
Stewart-Snares	7 339	0	0.0					
West Coast SI	6 375	41	0.6					
Other birds (cape petrels)				1	2.44	1	observed	0.6
Cook Strait	947	0	0.0					
Puysegur	67	0	0.0					
Subantarctic	5	0	0.0					
Auckland Is.	1	1	100.0					
2006–07								
West Coast NI	11 261	81	0.7					
East of NI	10 087	0	0.0					
North East	9 689	122	1.3					
Other birds[a]				3	2.46	3	observed	1.3
Chatham Rise	10 947	25	0.2					
White-capped albatrosses				1	4.00	1	observed	0.2
Other albatrosses[b]				2	8.00	2	observed	0.2
Stewart-Snares	5 744	0	0.0					
West Coast SI	7 571	59	0.8					
White-capped albatrosses				4	6.78	4	observed	0.8
Cook Strait	1 586	1	0.1					
Puysegur	2 946	4	0.1					
Subantarctic	2	0	0.0					
Auckland Is.	0							

[a] Seabird – small (1), black petrel (1), flesh-footed shearwater (1)
[b] Albatrosses (unidentified) (1), Salvin's albatross (1)

Table 96: Summary of all bird captures in the inshore trawl fishery, for 10 fishing years, with the number of tows, number of tows observed, percentage of tows observed, number of observed captures, capture rate per hundred tows, total estimated captures with 95% confidence intervals, and percentage of tows included in the estimate.

		Observed				Estimated	
	Tows	No. obs	% obs	Capt.[s]	Rate	Est. captures	% eff. in est.
2007–08	50 215	158	0.3	2	1.27	2 observed	0.3
2006–07	59 833	292	0.5	10	3.42	10 observed	0.5
2005–06	62 055	103	0.2	3	2.91	3 observed	0.2
2004–05	67 293	18	0.0	0	0.00	0 observed	0.0
2003–04	63 774	8	0.0	0	0.00	0 observed	0.0
2002–03	63 536	9	0.0	0	0.00	0 observed	0.0
2001–02	61 451	28	0.0	0	0.00	0 observed	0.0
2000–01	64 190	48	0.1	2	4.17	2 observed	0.1
1999–00	66 510	29	0.0	0	0.00	0 observed	0.0
1998–99	77 676	18	0.0	0	0.00	0 observed	0.0

[s] Observed captures by species, for all 10 years: white-capped albatross (7), Salvin's albatross (3), albatrosses (unidentified) (2), cape petrels (1), black petrel (1), seabird – large (1), flesh-footed shearwater (1), seabird – small (1)

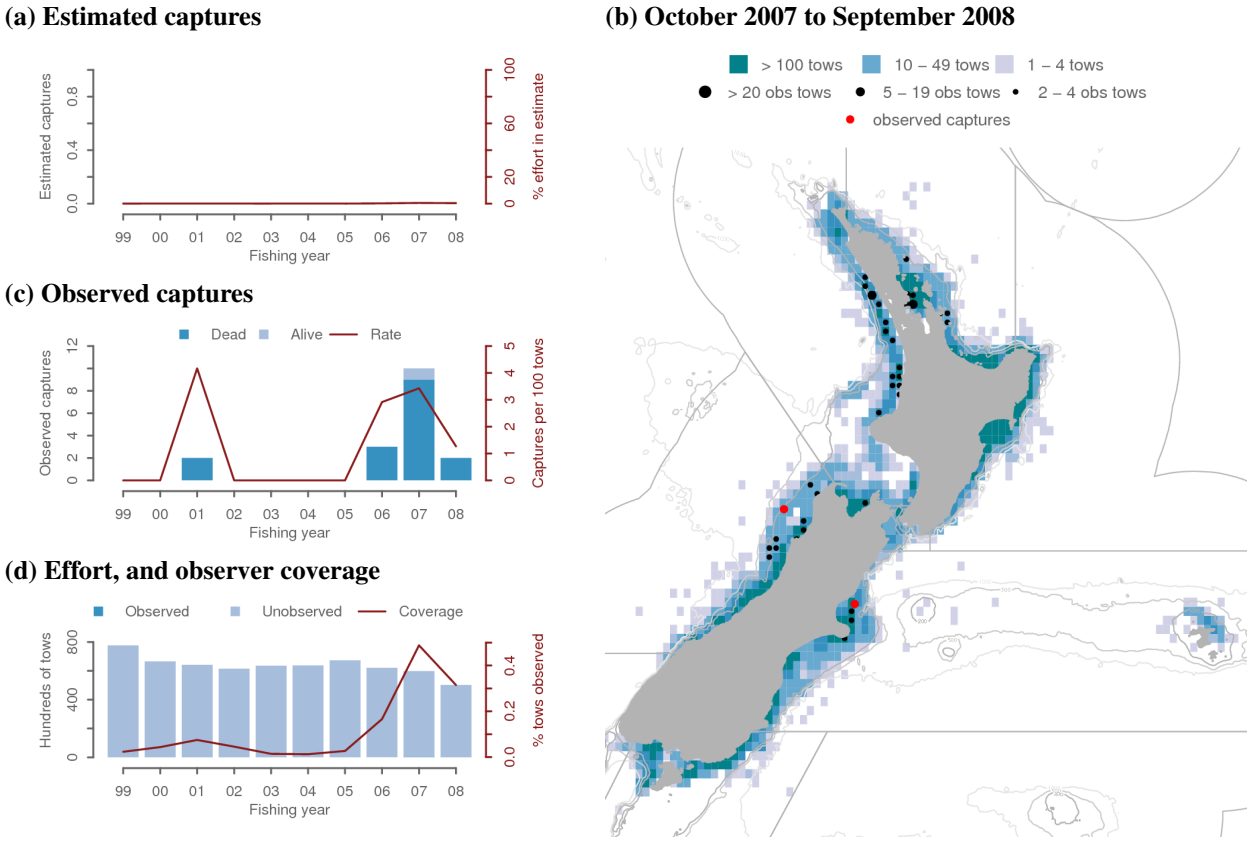

Figure 47: All bird captures in the inshore trawl fishery. (a) Ratio estimated captures, with 95% bootstrap confidence intervals, (b) Mapped effort and captures from 2007–08, (c) Observed captures, (d) Effort and observed effort.

3.18.23 Inshore trawl, dolphins, New Zealand EEZ

Table 97: Summary of dolphin captures in the inshore trawl fishery, broken down by fishing areas, with the number of tows, number of tows observed, percentage of tows observed, number of observed captures, capture rate per hundred tows, total estimated captures with 95% confidence intervals, and percentage of tows included in the estimate.

		Observed				Estimated		
	Tows	No. obs	% obs	Capt.	Rate	Est. captures		% eff. in est.
2007–08								
West Coast NI	10 220	64	0.6	0	0.00	0	observed	0.6
East of NI	9 321	0	0.0	0		0	observed	0.0
North East	7 992	44	0.6	1	2.27	1	observed	0.6
Chatham Rise	7 948	8	0.1	0	0.00	0	observed	0.1
Stewart-Snares	7 339	0	0.0	0		0	observed	0.0
West Coast SI	6 375	41	0.6	0	0.00	0	observed	0.6
Cook Strait	947	0	0.0	0		0	observed	0.0
Puysegur	67	0	0.0	0		0	observed	0.0
Subantarctic	5	0	0.0	0		0	observed	0.0
Auckland Is.	1	1	100.0	0	0.00	0	observed	100.0
2006–07								
West Coast NI	11 261	81	0.7	0	0.00	0	observed	0.7
East of NI	10 087	0	0.0	0		0	observed	0.0
North East	9 689	122	1.3	0	0.00	0	observed	1.3
Chatham Rise	10 947	25	0.2	0	0.00	0	observed	0.2
Stewart-Snares	5 744	0	0.0	0		0	observed	0.0
West Coast SI	7 571	59	0.8	0	0.00	0	observed	0.8
Cook Strait	1 586	1	0.1	0	0.00	0	observed	0.1
Puysegur	2 946	4	0.1	0	0.00	0	observed	0.1
Subantarctic	2	0	0.0	0		0	observed	0.0
Auckland Is.	0							

Table 98: Summary of dolphin captures in the inshore trawl fishery, for 10 fishing years, with the number of tows, number of tows observed, percentage of tows observed, number of observed captures, capture rate per hundred tows, total estimated captures with 95% confidence intervals, and percentage of tows included in the estimate.

		Observed				Estimated	
	Tows	No. obs	% obs	Capt.[s]	Rate	Est. captures	% eff. in est.
2007–08	50 215	158	0.3	1	0.63	1 observed	0.3
2006–07	59 833	292	0.5	0	0.00	0 observed	0.5
2005–06	62 055	103	0.2	2	1.94	2 observed	0.2
2004–05	67 293	18	0.0	0	0.00	0 observed	0.0
2003–04	63 774	8	0.0	0	0.00	0 observed	0.0
2002–03	63 536	9	0.0	0	0.00	0 observed	0.0
2001–02	61 451	28	0.0	0	0.00	0 observed	0.0
2000–01	64 190	48	0.1	0	0.00	0 observed	0.1
1999–00	66 510	29	0.0	0	0.00	0 observed	0.0
1998–99	77 676	18	0.0	0	0.00	0 observed	0.0

[s] Observed captures by species, for all 10 years: common dolphin (2), bottlenose dolphin (1)

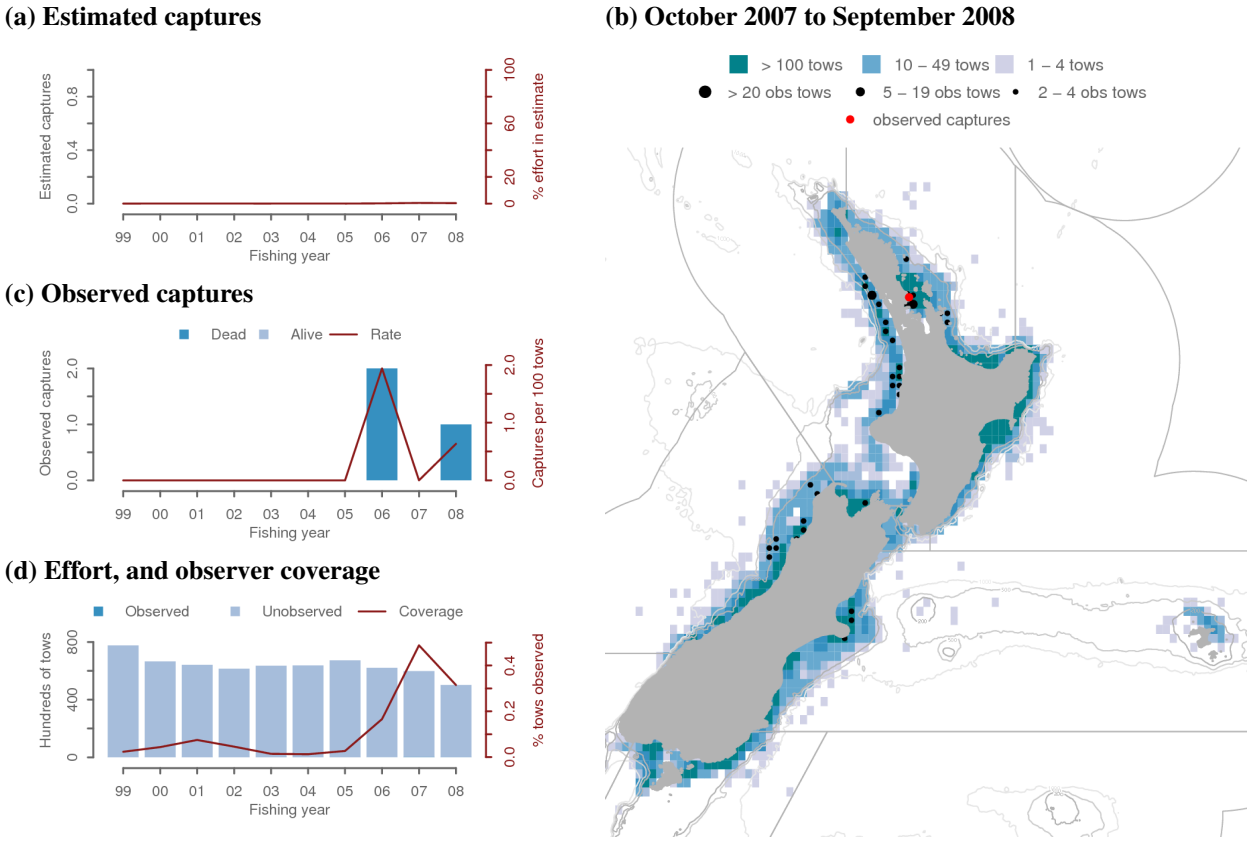

Figure 48: Dolphin captures in the inshore trawl fishery. (a) Ratio estimated captures, with 95% bootstrap confidence intervals, (b) Mapped effort and captures from 2007–08, (c) Observed captures, (d) Effort and observed effort.

3.18.24 Other middle depth trawl, all birds, New Zealand EEZ

Table 99: Summary of all bird captures in other middle depth trawl fisheries, broken down by fishing areas, with the number of tows, number of tows observed, percentage of tows observed, number of observed captures, capture rate per hundred tows, total estimated captures with 95% confidence intervals, and percentage of tows included in the estimate.

		Observed				Estimated		
	Tows	No. obs	% obs	Capt.	Rate	Est. captures		% eff. in est.
2007–08								
Chatham Rise	2 661	225	8.5					
White-capped albatrosses				1	0.44	10	(1 - 22)	100.0
White-chinned petrels				0	0.00	3	(0 - 9)	100.0
Other albatrosses (Salvin's albatross)				1	0.44	28	(10 - 49)	100.0
Other birds				0	0.00	6	(0 - 15)	100.0
West Coast SI	1 350	54	4.0					
White-capped albatrosses				0	0.00	16	(0 - 42)	100.0
Other birds (Westland petrel)				1	1.85	6	(1 - 17)	100.0
Stewart-Snares	1 021	82	8.0					
White-chinned petrels				7	8.54	7	observed	8.0
Other albatrosses (Buller's albatross)				3	3.66	8	(4 - 13)	100.0
Other birds				0	0.00	3	(0 - 7)	100.0
West Coast NI	972	25	2.6					
East of NI	653	18	2.8					
Cook Strait	469	2	0.4					
North East	194	18	9.3					
Puysegur	83	0	0.0					
White-capped albatrosses				0		2	(0 - 4)	100.0
Sooty shearwaters				0		1	(0 - 3)	100.0
Other albatrosses				0		1	(0 - 2)	100.0
Subantarctic	18	11	61.1					
Auckland Is.	0							
2006–07								
Chatham Rise	2 734	110	4.0					
White-capped albatrosses				1	0.91	11	(1 - 23)	100.0
White-chinned petrels				0	0.00	3	(0 - 10)	100.0
Other albatrosses[a]				2	1.82	31	(12 - 53)	100.0
Other birds				0	0.00	6	(0 - 16)	100.0
West Coast SI	1 729	31	1.8					
White-capped albatrosses				0	0.00	21	(0 - 55)	100.0
Other birds				0	0.00	7	(0 - 21)	100.0
Stewart-Snares	1 235	143	11.6					
White-capped albatrosses				2	1.40	17	(2 - 40)	100.0
White-chinned petrels				2	1.40	17	(2 - 40)	100.0
Sooty shearwaters				3	2.10	26	(3 - 56)	100.0
Other albatrosses				0	0.00	5	(1 - 12)	100.0
Other birds				0	0.00	3	(0 - 8)	100.0
West Coast NI	718	56	7.8					
East of NI	809	2	0.2					
Cook Strait	549	0	0.0					
North East	236	22	9.3					
Puysegur	209	29	13.9					
White-capped albatrosses				1	3.45	4	(1 - 9)	100.0
Sooty shearwaters				0	0.00	2	(0 - 6)	100.0
Other albatrosses (Buller's albatross)				1	3.45	2	(1 - 4)	100.0
Subantarctic	1	0	0.0					
Auckland Is.	1	0	0.0					

[a] Salvin's albatross (1), Buller's albatross (1)

Table 100: Summary of all bird captures in other middle depth trawl fisheries, for 10 fishing years, with the number of tows, number of tows observed, percentage of tows observed, number of observed captures, capture rate per hundred tows, total estimated captures with 95% confidence intervals, and percentage of tows included in the estimate.

		Observed				Estimated		
	Tows	No. obs	% obs	Capt.[s]	Rate	Est. captures		% eff. in est.
2007–08	7 421	435	5.9	13	2.99	90	(58 - 128)	81.0
2006–07	8 221	393	4.8	12	3.05	156	(102 - 217)	93.3
2005–06	8 410	488	5.8	73	14.96	271	(214 - 336)	94.2
2004–05	9 192	223	2.4	4	1.79	93	(57 - 136)	81.6
2003–04	9 185	194	2.1	8	4.12	92	(56 - 135)	81.8
2002–03	11 181	348	3.1	13	3.74	162	(105 - 229)	92.0
2001–02	11 214	259	2.3	22	8.49	214	(132 - 312)	91.5
2000–01	12 262	236	1.9	21	8.90	140	(82 - 214)	87.6
1999–00	12 482	201	1.6	3	1.49	124	(67 - 196)	83.9
1998–99	11 015	187	1.7	13	6.95	117	(65 - 183)	85.6

[s] Observed captures by species, for all 10 years: sooty shearwater (89), white-capped albatross (58), white-chinned petrel (13), Buller's albatross (7), Pacific albatross (3), Salvin's albatross (2), petrel (unidentified) (1), seabird – small (1), shy albatross (1), southern black-browed albatross (1), seabird (unspecified) (1), northern giant petrel (1), Westland petrel (1), albatrosses (unidentified) (1), northern royal albatross (1), prions (unidentified) (1)

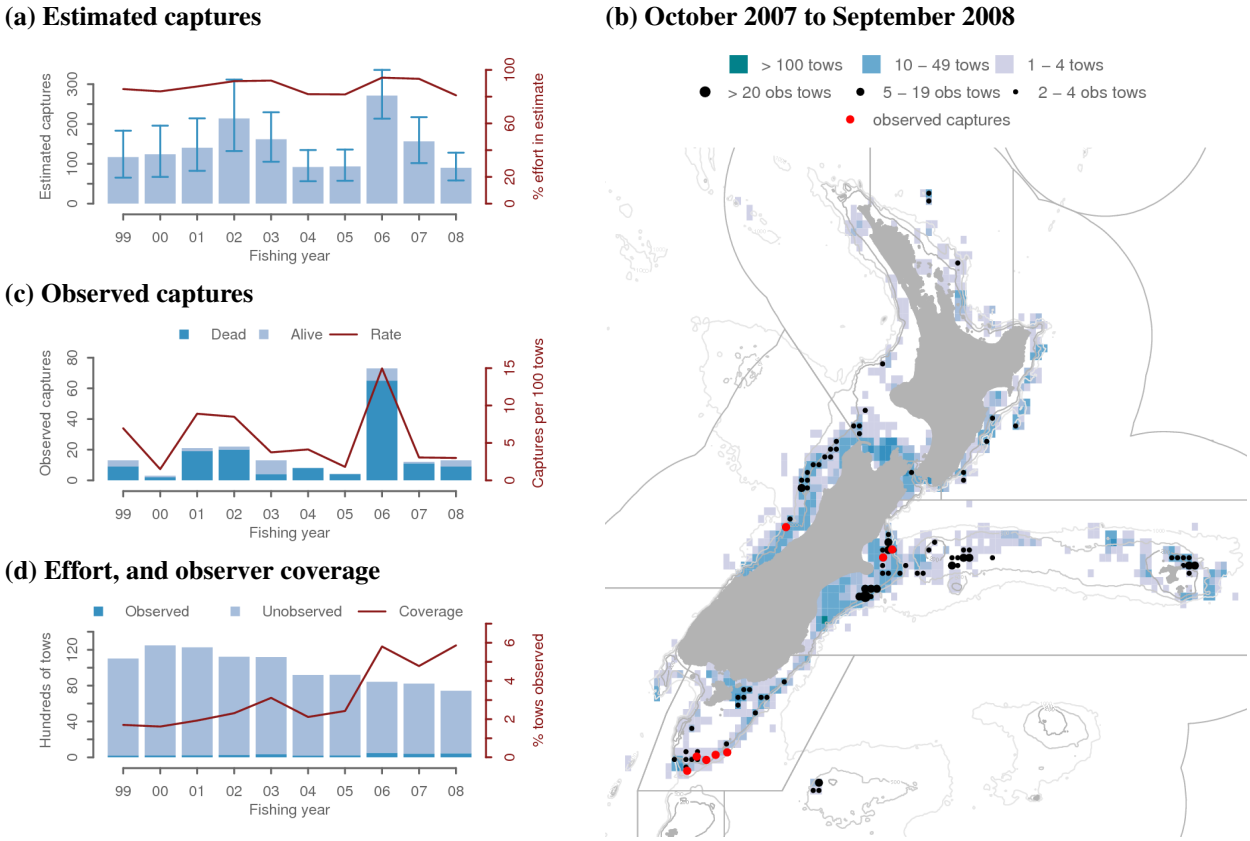

Figure 49: All bird captures in other middle depth trawl fisheries. (a) Ratio estimated captures, with 95% bootstrap confidence intervals, (b) Mapped effort and captures from 2007–08, (c) Observed captures, (d) Effort and observed effort.

3.18.25 Middle depth trawl, New Zealand fur seals, New Zealand EEZ

Table 101: Summary of New Zealand fur seal captures in the middle depth trawl fishery, broken down by fishing areas, with the number of tows, number of tows observed, percentage of tows observed, number of observed captures, capture rate per hundred tows, total estimated captures with 95% confidence intervals, and percentage of tows included in the estimate.

		Observed				Estimated		
	Tows	No. obs	% obs	Capt.	Rate	Est. captures		% eff. in est.
2007–08								
Chatham Rise	2 661	225	8.5	6	2.67	36	(18 - 57)	100.0
West Coast SI	1 350	54	4.0	3	5.56	3	observed	4.0
Stewart-Snares	1 021	82	8.0	0	0.00	8	(3 - 13)	100.0
West Coast NI	972	25	2.6	0	0.00	7	(0 - 17)	100.0
East of NI	653	18	2.8	0	0.00	0	(0 - 0)	100.0
Cook Strait	469	2	0.4	0	0.00	0	observed	0.4
North East	194	18	9.3	0	0.00	0	(0 - 0)	100.0
Puysegur	83	0	0.0	0		0	(0 - 0)	100.0
Subantarctic	18	11	61.1	0	0.00	0	observed	61.1
Auckland Is.	0							
2006–07								
Chatham Rise	2 734	110	4.0	0	0.00	32	(13 - 54)	100.0
West Coast SI	1 729	31	1.8	0	0.00	0	observed	1.8
Stewart-Snares	1 235	143	11.6	2	1.40	11	(5 - 17)	100.0
West Coast NI	718	56	7.8	0	0.00	5	(0 - 12)	100.0
East of NI	809	2	0.2	0	0.00	0	(0 - 0)	100.0
Cook Strait	549	0	0.0	0		0	observed	0.0
North East	236	22	9.3	0	0.00	0	(0 - 0)	100.0
Puysegur	209	29	13.9	0	0.00	0	(0 - 0)	100.0
Subantarctic	1	0	0.0	0		0	observed	0.0
Auckland Is.	1	0	0.0	0		0	observed	0.0

Table 102: Summary of New Zealand fur seal captures in the middle depth trawl fishery, for 10 fishing years, with the number of tows, number of tows observed, percentage of tows observed, number of observed captures, capture rate per hundred tows, total estimated captures with 95% confidence intervals, and percentage of tows included in the estimate.

		Observed				Estimated		
	Tows	No. obs	% obs	Capt.	Rate	Est. captures		% eff. in est.
2007–08	7 421	435	5.9	9	2.07	53	(34 - 76)	76.1
2006–07	8 221	393	4.8	2	0.51	48	(28 - 71)	72.6
2005–06	8 410	488	5.8	5	1.02	55	(32 - 81)	80.5
2004–05	9 192	223	2.4	10	4.48	60	(37 - 88)	75.0
2003–04	9 185	194	2.1	0	0.00	48	(25 - 76)	71.5
2002–03	11 181	348	3.1	1	0.29	66	(35 - 101)	75.6
2001–02	11 214	259	2.3	2	0.77	61	(33 - 95)	71.1
2000–01	12 262	236	1.9	8	3.39	67	(37 - 102)	66.2
1999–00	12 482	201	1.6	0	0.00	60	(31 - 94)	65.6
1998–99	11 015	187	1.7	4	2.14	53	(29 - 80)	65.6

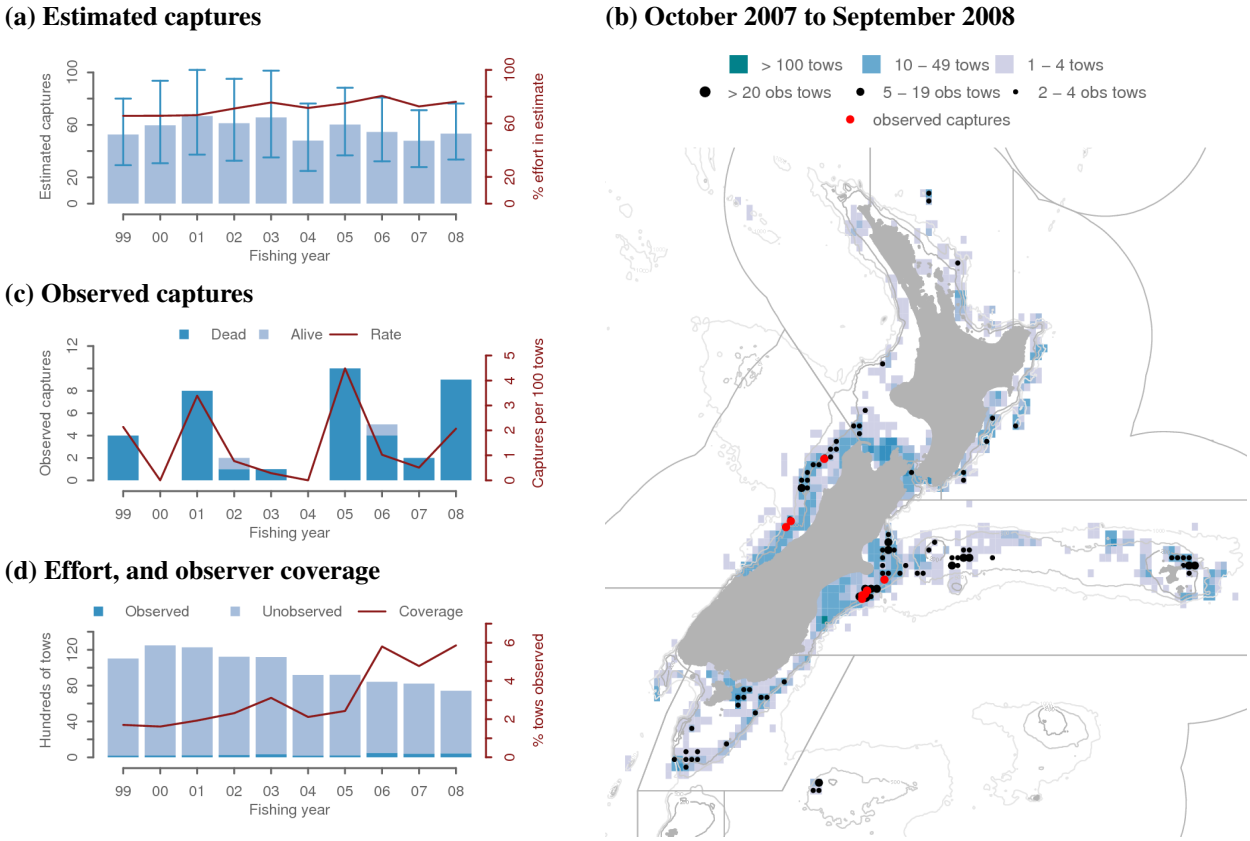

Figure 50: New Zealand fur seal captures in the middle depth trawl fishery. (a) Ratio estimated captures, with 95% bootstrap confidence intervals, (b) Mapped effort and captures from 2007–08, (c) Observed captures, (d) Effort and observed effort.

3.19 Surface longline

3.19.1 Southern bluefin longline, all birds, New Zealand EEZ

Table 103: Summary of all bird captures in the southern bluefin longline fishery, broken down by fishing areas, with the number of hooks, number of hooks observed, percentage of hooks observed, number of observed captures, capture rate per thousand hooks, total estimated captures with 95% confidence intervals, and percentage of hooks included in the estimate.

		Observed			Estimated		
	Hooks	No. obs	% obs	Capt.	Rate	Est. captures	% eff. in est.
2007–08							
Area 3	654 625	254 208	38.8				
White-capped albatrosses				3	0.012	8 (3 - 16)	100.0
White-chinned petrels				4	0.016	10 (6 - 17)	100.0
Other albatrosses (Buller's albatross)				17	0.067	44 (31 - 60)	100.0
Area 1	451 700	91 864	20.3				
White-capped albatrosses				0	0.000	1 (0 - 2)	100.0
Other albatrosses[a]				5	0.054	25 (9 - 46)	100.0
Other birds (grey petrel)				1	0.011	5 (1 - 13)	100.0
Area 4	1 500	0	0.0				
2006–07							
Area 3	1 109 950	588 130	53.0				
White-capped albatrosses				27	0.046	51 (37 - 69)	100.0
White-chinned petrels				3	0.005	6 (3 - 9)	100.0
Sooty shearwaters				1	0.002	1 (1 - 1)	100.0
Other albatrosses[b]				53	0.090	100 (82 - 120)	100.0
Other birds				0	0.000	1 (0 - 1)	100.0
Area 1	828 261	242 942	29.3				
White-capped albatrosses				1	0.004	2 (1 - 5)	100.0
Other albatrosses[c]				8	0.033	27 (13 - 45)	100.0
Other birds[d]				18	0.074	61 (40 - 86)	100.0
Area 4	1 000	0	0.0				

[a] Black-browed albatross (unidentified) (1), Antipodean albatross (1), Salvin's albatross (1), wandering albatross (unidentified) (1), Buller's albatross (1)

[b] Buller's albatross (49), Gibson's albatross (2), albatrosses (unidentified) (1), Campbell albatross (1)

[c] Campbell albatross (2), Antipodean albatross (1), Buller's albatross (1), black-browed albatross (unidentified) (1), southern black-browed albatross (1), Gibson's albatross (1), Salvin's albatross (1)

[d] Grey petrel (17), Cape petrels (1)

Table 104: Summary of all bird captures in the southern bluefin longline fishery, for 10 fishing years, with the number of hooks, number of hooks observed, percentage of hooks observed, number of observed captures, capture rate per thousand hooks, total estimated captures with 95% confidence intervals, and percentage of hooks included in the estimate.

		Observed				Estimated		
	Hooks	No. obs	% obs	Capt.[s]	Rate	Est. captures		% eff. in est.
2007–08	1 107 825	346 072	31.2	30	0.087	93	(68 - 121)	100.0
2006–07	1 939 211	831 072	42.9	111	0.134	249	(214 - 288)	100.0
2005–06	1 493 418	576 234	38.6	29	0.050	190	(101 - 295)	100.0
2004–05	1 662 079	656 231	39.5	36	0.055	92	(63 - 128)	100.0
2003–04	3 193 936	1 343 064	42.1	70	0.052	252	(135 - 387)	100.0
2002–03	3 509 003	1 051 810	30.0	43	0.041	58	(51 - 68)	100.0
2001–02	2 813 894	793 297	28.2	83	0.105	301	(127 - 660)	100.0
2000–01	1 906 725	785 940	41.2	15	0.019	24	(20 - 29)	100.0
1999–00	1 743 562	721 190	41.4	41	0.057	321	(78 - 647)	100.0
1998–99	1 892 036	1 171 046	61.9	74	0.063	264	(172 - 368)	99.9

[s] Observed captures by species, for all 10 years: Buller's albatross (299), white-capped albatross (84), grey petrel (39), white-chinned petrel (26), Campbell albatross (19), Gibson's albatross (10), antipodean albatross (8), southern royal albatross (6), cape petrels (5), southern black-browed albatross (5), wandering albatross (unidentified) (5), sooty shearwater (5), Salvin's albatross (3), flesh-footed shearwater (3), Westland petrel (3), black-browed albatross (unidentified) (3), light-mantled sooty albatross (2), albatrosses (unidentified) (2), southern giant petrel (2), seabird – large (1), other species (2)

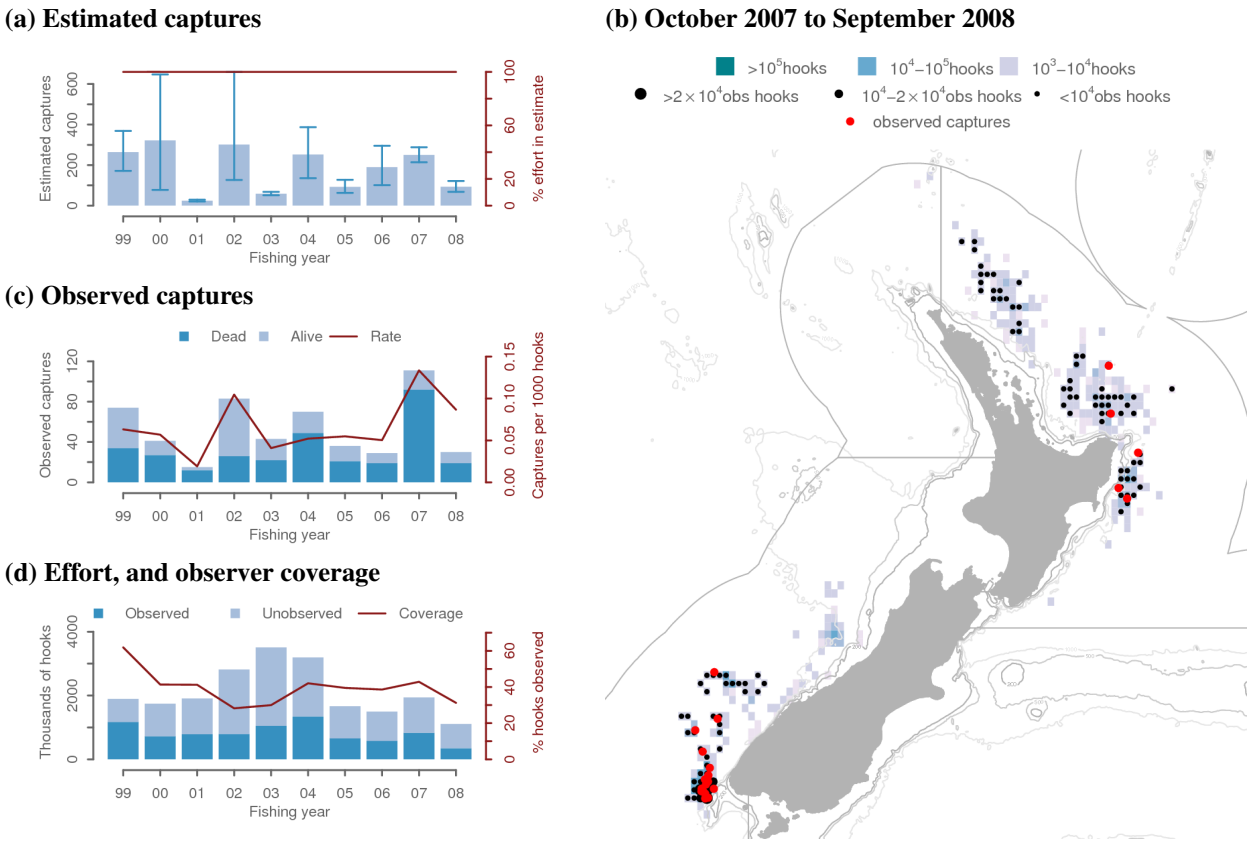

Figure 51: All bird captures in the southern bluefin longline fishery. (a) Ratio estimated captures, with 95% bootstrap confidence intervals, (b) Mapped effort and captures from 2007–08, (c) Observed captures, (d) Effort and observed effort.

3.19.2 Southern bluefin longline, New Zealand fur seals, New Zealand EEZ

Table 105: Summary of New Zealand fur seal captures in the southern bluefin longline fishery, broken down by fishing areas, with the number of hooks, number of hooks observed, percentage of hooks observed, number of observed captures, capture rate per thousand hooks, total estimated captures with 95% confidence intervals, and percentage of hooks included in the estimate.

		Observed				Estimated		
	Hooks	No. obs	% obs	Capt.	Rate	Est. captures		% eff. in est.
2007–08								
Area 3	654 625	254 208	38.8	6	0.024	15	(9 - 23)	100.0
Area 1	451 700	91 864	20.3	2	0.022	10	(2 - 22)	100.0
Area 4	1 500	0	0.0	0		0	(0 - 0)	100.0
2006–07								
Area 3	1 109 950	588 130	53.0	7	0.012	13	(8 - 20)	100.0
Area 1	828 261	242 942	29.3	3	0.012	10	(3 - 20)	100.0
Area 4	1 000	0	0.0	0		0	(0 - 0)	100.0

Table 106: Summary of New Zealand fur seal captures in the southern bluefin longline fishery, for 10 fishing years, with the number of hooks, number of hooks observed, percentage of hooks observed, number of observed captures, capture rate per thousand hooks, total estimated captures with 95% confidence intervals, and percentage of hooks included in the estimate.

		Observed				Estimated		
	Hooks	No. obs	% obs	Capt.	Rate	Est. captures		% eff. in est.
2007–08	1 107 825	346 072	31.2	8	0.023	25	(14 - 39)	100.0
2006–07	1 939 211	831 072	42.9	10	0.012	23	(14 - 35)	100.0
2005–06	1 493 418	576 234	38.6	12	0.021	58	(24 - 105)	100.0
2004–05	1 662 079	656 231	39.5	18	0.027	31	(21 - 45)	100.0
2003–04	3 193 936	1 343 064	42.1	40	0.030	88	(52 - 155)	100.0
2002–03	3 509 003	1 051 810	30.0	56	0.053	67	(64 - 70)	36.9
2001–02	2 813 894	793 297	28.2	44	0.055	71	(63 - 80)	100.0
2000–01	1 906 725	785 940	41.2	43	0.055	50	(48 - 53)	100.0
1999–00	1 743 562	721 190	41.4	42	0.058	62	(56 - 69)	100.0
1998–99	1 892 036	1 171 046	61.9	102	0.087	127	(121 - 133)	99.9

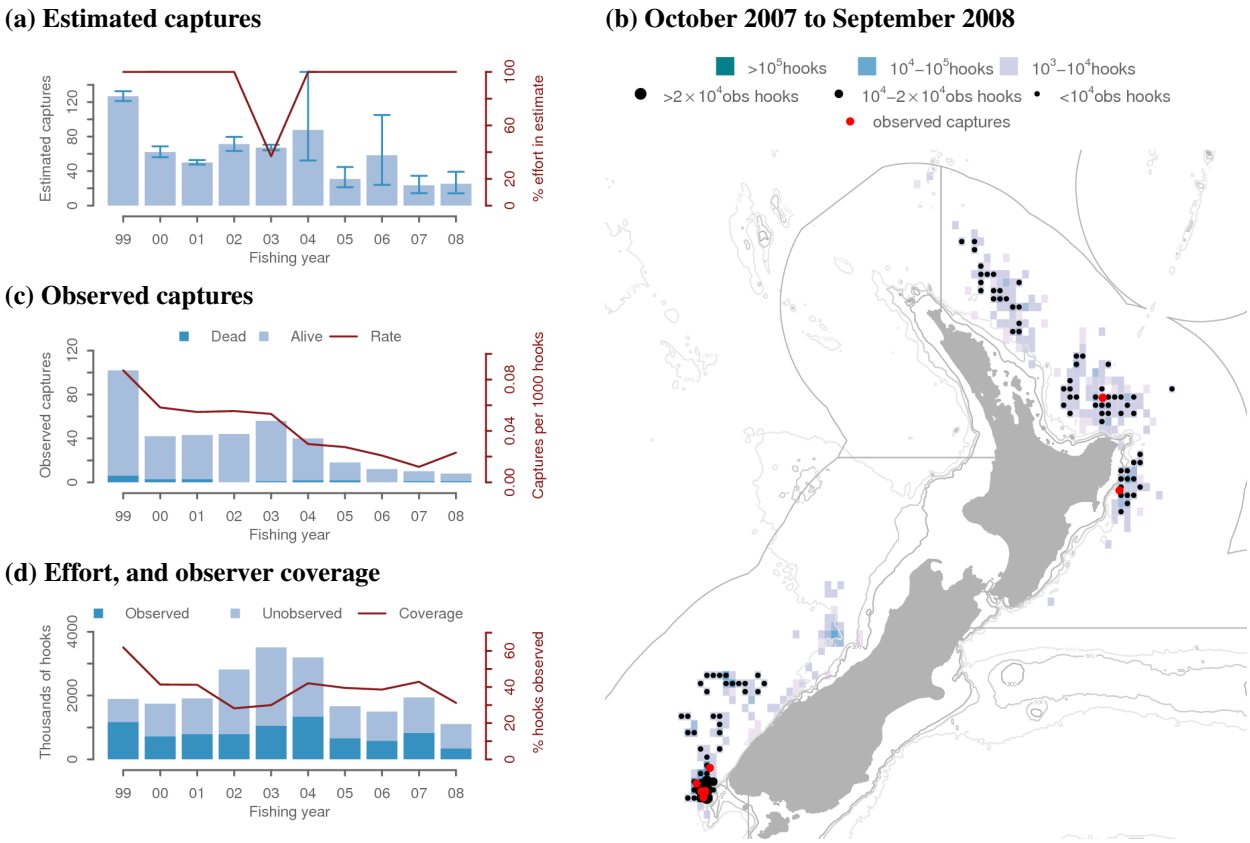

Figure 52: New Zealand fur seal captures in the southern bluefin longline fishery. (a) Ratio estimated captures, with 95% bootstrap confidence intervals, (b) Mapped effort and captures from 2007–08, (c) Observed captures, (d) Effort and observed effort.

3.19.3 Bigeye longline, all birds, New Zealand EEZ

Table 107: Summary of all bird captures in the bigeye longline fishery, broken down by fishing areas, with the number of hooks, number of hooks observed, percentage of hooks observed, number of observed captures, capture rate per thousand hooks, total estimated captures with 95% confidence intervals, and percentage of hooks included in the estimate.

		Observed				Estimated		
	Hooks	No. obs	% obs	Capt.	Rate	Est. captures		% eff. in est.
2007–08								
Area 1	880 517	15 985	1.8					
White-chinned petrels				0	0.000	4	(0 - 9)	100.0
Sooty shearwaters				0	0.000	3	(0 - 7)	100.0
Other albatrosses[a]				4	0.250	220	(4 - 568)	100.0
Other birds (flesh-footed shearwater)				2	0.125	110	(2 - 343)	100.0
Area 4	93 112	8 360	9.0					
Area 3	0							
2006–07								
Area 1	1 356 860	66 412	4.9					
White-chinned petrels				0	0.000	6	(0 - 14)	100.0
Sooty shearwaters				0	0.000	4	(0 - 10)	100.0
Other albatrosses[b]				2	0.030	41	(2 - 101)	100.0
Other birds (flesh-footed shearwater)				3	0.045	61	(3 - 137)	100.0
Area 4	177 161	16 842	9.5					
Area 3	4 100	0	0.0					

[a] Buller's albatross (2), Salvin's albatross (1), Gibson's albatross (1)
[b] Wandering albatross (unidentified) (1), albatrosses (unidentified) (1)

Table 108: Summary of all bird captures in the bigeye longline fishery, for 10 fishing years, with the number of hooks, number of hooks observed, percentage of hooks observed, number of observed captures, capture rate per thousand hooks, total estimated captures with 95% confidence intervals, and percentage of hooks included in the estimate.

		Observed				Estimated		
	Hooks	No. obs	% obs	Capt.[s]	Rate	Est. captures		% eff. in est.
2007–08	973 629	24 345	2.5	6	0.246	339	(13 - 750)	100.0
2006–07	1 538 121	83 254	5.4	5	0.060	111	(36 - 203)	99.7
2005–06	1 866 616	55 162	3.0	6	0.109	201	(58 - 388)	99.8
2004–05	1 645 111	30 142	1.8	1	0.033	55	(5 - 155)	99.7
2003–04	3 504 722	113 501	3.2	1	0.009	62	(10 - 152)	99.7
2002–03	5 189 562	62 701	1.2	0	0.000	32	(6 - 63)	98.9
2001–02	6 911 490	124 862	1.8	84	0.673	4 108	(2 471 - 6 045)	97.0
2000–01	7 058 687	218 731	3.1	36	0.165	1 092	(698 - 1 534)	98.9
1999–00	5 796 808	72 580	1.3	33	0.455	3 095	(1 563 - 5 146)	98.8
1998–99	4 244 819	71 564	1.7	10	0.140	589	(235 - 1 058)	97.4

[s] Observed captures by species, for all 10 years: flesh-footed shearwater (133), black petrel (19), Salvin's albatross (6), Buller's albatross (6), wandering albatross (unidentified) (4), white-chinned petrel (3), black-browed albatross (unidentified) (2), sooty shearwater (2), great-winged petrel (2), Gibson's albatross (1), petrel (unidentified) (1), southern black-browed albatross (1), antipodean albatross (1), albatrosses (unidentified) (1)

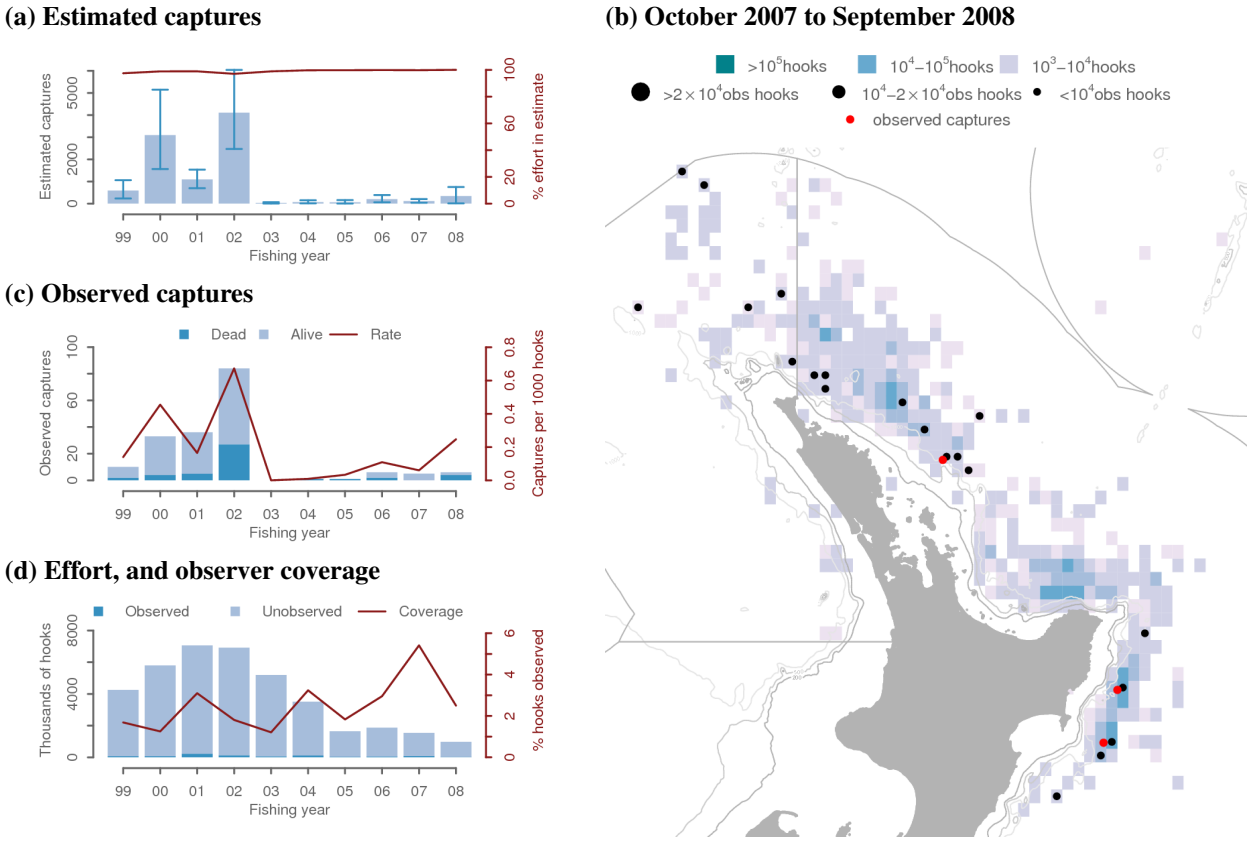

Figure 53: All bird captures in the bigeye longline fishery. (a) Ratio estimated captures, with 95% bootstrap confidence intervals, (b) Mapped effort and captures from 2007–08, (c) Observed captures, (d) Effort and observed effort.

3.19.4 Bigeye longline, New Zealand fur seals, New Zealand EEZ

Table 109: Summary of New Zealand fur seal captures in the bigeye longline fishery, broken down by fishing areas, with the number of hooks, number of hooks observed, percentage of hooks observed, number of observed captures, capture rate per thousand hooks, total estimated captures with 95% confidence intervals, and percentage of hooks included in the estimate.

		Observed				Estimated		
	Hooks	No. obs	% obs	Capt.	Rate	Est. captures		% eff. in est.
2007–08								
Area 1	880 517	15 985	1.8	0	0.000	0	(0 - 0)	100.0
Area 4	93 112	8 360	9.0	2	0.239	3	(2 - 4)	100.0
Area 3	0							
2006–07								
Area 1	1 356 860	66 412	4.9	0	0.000	0	(0 - 0)	100.0
Area 4	177 161	16 842	9.5	0	0.000	2	(0 - 4)	100.0
Area 3	4 100	0	0.0	0		0	observed	0.0

Table 110: Summary of New Zealand fur seal captures in the bigeye longline fishery, for 10 fishing years, with the number of hooks, number of hooks observed, percentage of hooks observed, number of observed captures, capture rate per thousand hooks, total estimated captures with 95% confidence intervals, and percentage of hooks included in the estimate.

		Observed				Estimated		
	Hooks	No. obs	% obs	Capt.	Rate	Est. captures		% eff. in est.
2007–08	973 629	24 345	2.5	2	0.082	3	(2 - 4)	100.0
2006–07	1 538 121	83 254	5.4	0	0.000	2	(0 - 4)	99.7
2005–06	1 866 616	55 162	3.0	0	0.000	1	(0 - 4)	99.8
2004–05	1 645 111	30 142	1.8	0	0.000	4	(0 - 9)	99.7
2003–04	3 504 722	113 501	3.2	0	0.000	6	(0 - 14)	99.7
2002–03	5 189 562	62 701	1.2	0	0.000	9	(0 - 24)	98.9
2001–02	6 911 490	124 862	1.8	0	0.000	11	(0 - 27)	97.0
2000–01	7 058 687	218 731	3.1	0	0.000	14	(0 - 37)	98.9
1999–00	5 796 808	72 580	1.3	0	0.000	10	(0 - 26)	98.8
1998–99	4 244 819	71 564	1.7	0	0.000	6	(0 - 17)	97.4

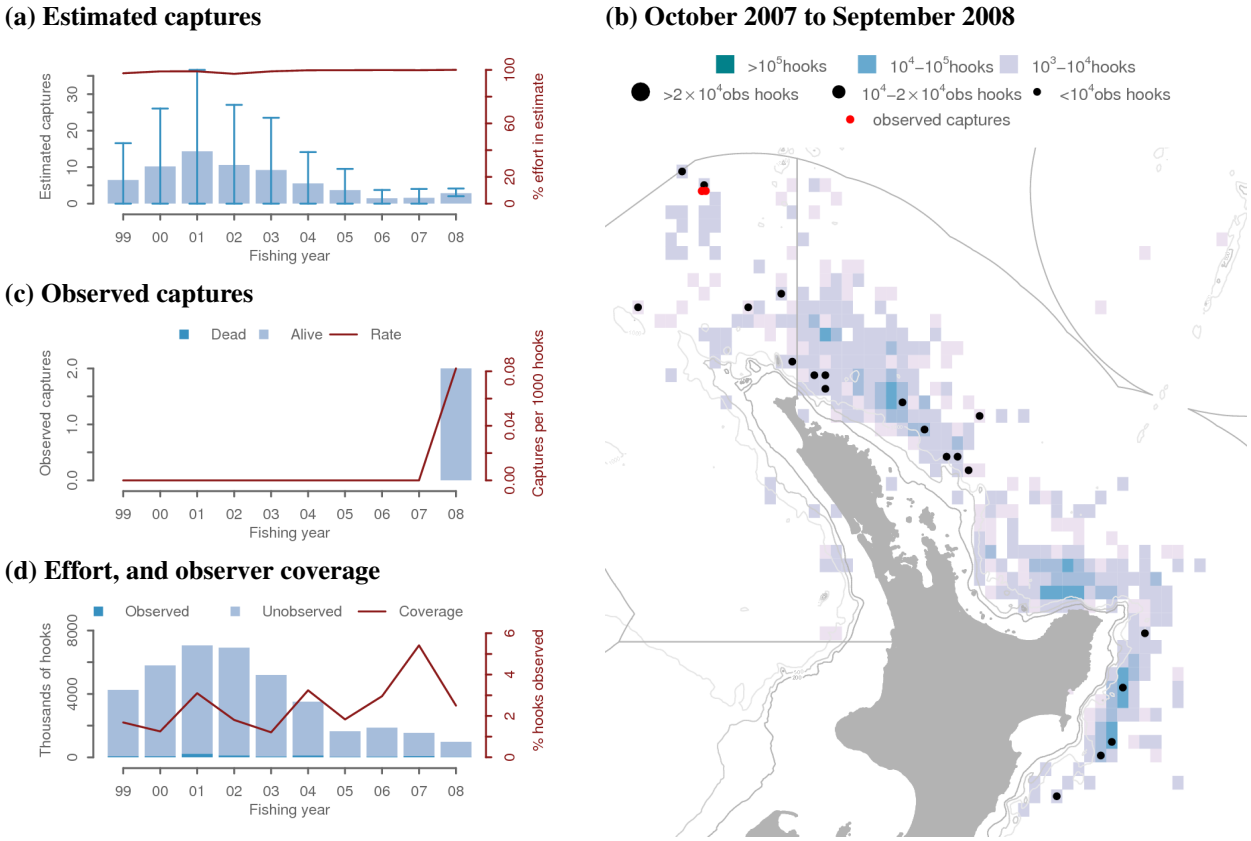

Figure 54: New Zealand fur seal captures in the bigeye longline fishery. (a) Ratio estimated captures, with 95% bootstrap confidence intervals, (b) Mapped effort and captures from 2007–08, (c) Observed captures, (d) Effort and observed effort.

3.19.5 Bigeye longline, turtles, New Zealand EEZ

Table 111: Summary of turtle captures in the bigeye longline fishery, broken down by fishing areas, with the number of hooks, number of hooks observed, percentage of hooks observed, number of observed captures, capture rate per thousand hooks, total estimated captures with 95% confidence intervals, and percentage of hooks included in the estimate.

		Observed				Estimated		
	Hooks	No. obs	% obs	Capt.	Rate	Est. captures		% eff. in est.
2007–08								
Area 1	880 517	15 985	1.8	0	0.000	12	(5 - 20)	100.0
Area 4	93 112	8 360	9.0	0	0.000	0	(0 - 1)	100.0
Area 3	0							
2006–07								
Area 1	1 356 860	66 412	4.9	1	0.015	19	(9 - 31)	100.0
Area 4	177 161	16 842	9.5	0	0.000	1	(0 - 2)	100.0
Area 3	4 100	0	0.0	0		0	observed	0.0

Table 112: Summary of turtle captures in the bigeye longline fishery, for 10 fishing years, with the number of hooks, number of hooks observed, percentage of hooks observed, number of observed captures, capture rate per thousand hooks, total estimated captures with 95% confidence intervals, and percentage of hooks included in the estimate.

		Observed				Estimated		
	Hooks	No. obs	% obs	Capt.[s]	Rate	Est. captures		% eff. in est.
2007–08	973 629	24 345	2.5	0	0.000	13	(5 - 21)	100.0
2006–07	1 538 121	83 254	5.4	1	0.012	20	(9 - 32)	99.7
2005–06	1 866 616	55 162	3.0	1	0.018	25	(11 - 41)	99.8
2004–05	1 645 111	30 142	1.8	2	0.066	21	(11 - 34)	99.7
2003–04	3 504 722	113 501	3.2	1	0.009	43	(20 - 71)	99.7
2002–03	5 189 562	62 701	1.2	0	0.000	62	(28 - 103)	98.9
2001–02	6 911 490	124 862	1.8	3	0.024	85	(39 - 139)	97.0
2000–01	7 058 687	218 731	3.1	1	0.005	82	(40 - 136)	98.9
1999–00	5 796 808	72 580	1.3	0	0.000	70	(32 - 115)	98.8
1998–99	4 244 819	71 564	1.7	1	0.014	52	(23 - 85)	97.4

[s] Observed captures by species, for all 10 years: marine turtles (6), leatherback turtle (4)

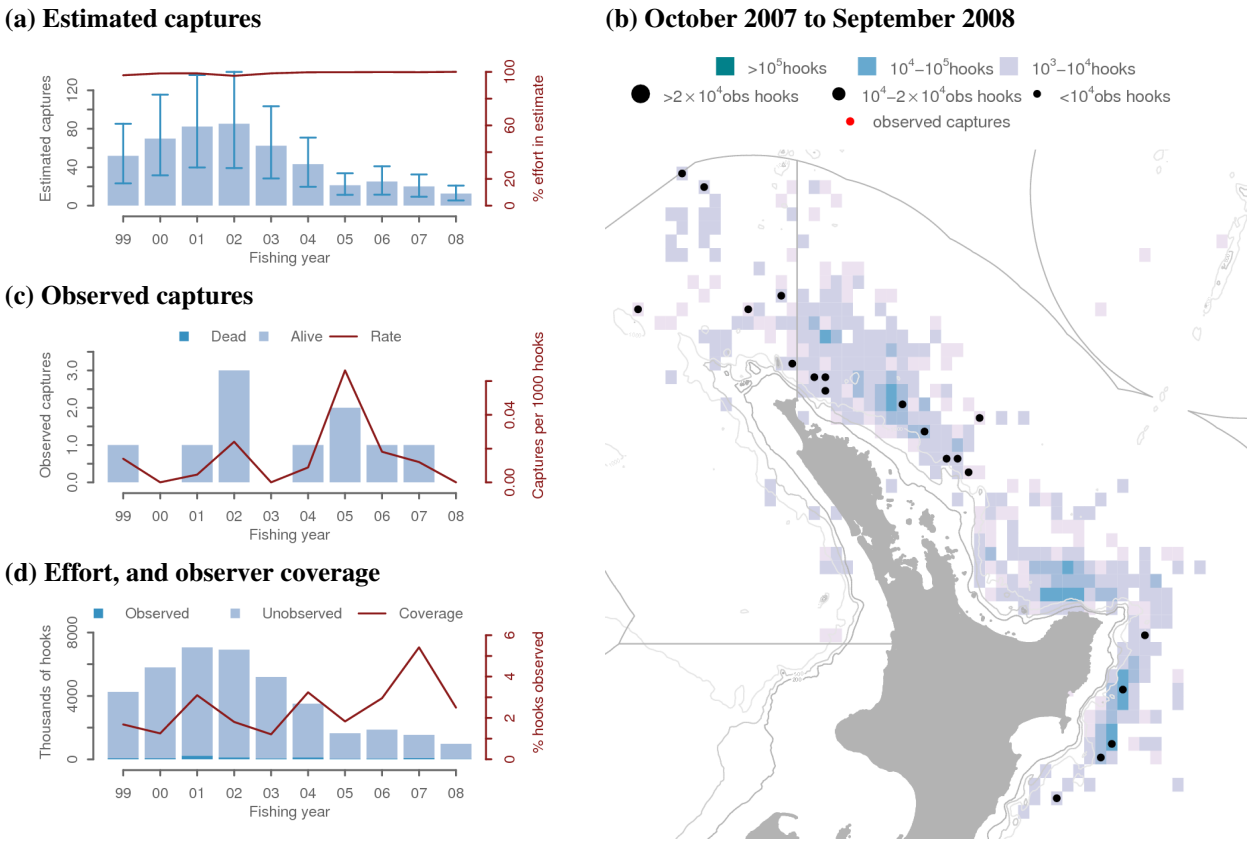

Figure 55: Turtle captures in the bigeye longline fishery. (a) Ratio estimated captures, with 95% bootstrap confidence intervals, (b) Mapped effort and captures from 2007–08, (c) Observed captures, (d) Effort and observed effort.

3.19.6 Swordfish longline, all birds, New Zealand EEZ

Table 113: Summary of all bird captures in the swordfish longline fishery, broken down by fishing areas, with the number of hooks, number of hooks observed, percentage of hooks observed, number of observed captures, capture rate per thousand hooks, total estimated captures with 95% confidence intervals, and percentage of hooks included in the estimate.

		Observed				Estimated		
	Hooks	No. obs	% obs	Capt.	Rate	Est. captures		% eff. in est.
2007–08								
Area 1	83 630	17 540	21.0					
White-chinned petrels				0	0.000	2	(0 - 5)	100.0
Sooty shearwaters				0	0.000	1	(0 - 3)	100.0
Other birds (petrel (unidentified))				1	0.057	11	(4 - 20)	100.0
Area 4	35 500	3 350	9.4					
Area 3	6 200	0	0.0					
2006–07								
Area 1	191 511	40 301	21.0					
White-chinned petrels				2	0.050	6	(2 - 13)	100.0
Sooty shearwaters				1	0.025	3	(1 - 8)	100.0
Other albatrosses[a]				60	1.489	285	(124 - 492)	100.0
Other birds[b]				8	0.199	31	(15 - 51)	100.0
Area 4	19 394	1 292	6.7					
Area 3	350	0	0.0					

[a] Albatrosses (unidentified) (33), wandering albatross (unidentified) (18), Gibson's albatross (5), black-browed albatross (unidentified) (2), Antipodean albatross (2)

[b] Seabird – large (3), great-winged petrel (2), grey petrel (2), petrel (unidentified) (1)

Table 114: Summary of all bird captures in the swordfish longline fishery, for 10 fishing years, with the number of hooks, number of hooks observed, percentage of hooks observed, number of observed captures, capture rate per thousand hooks, total estimated captures with 95% confidence intervals, and percentage of hooks included in the estimate.

		Observed				Estimated		
	Hooks	No. obs	% obs	Capt.[s]	Rate	Est. captures		% eff. in est.
2007–08	125 330	20 890	16.7	1	0.048	14	(6 - 23)	69.4
2006–07	211 255	41 593	19.7	71	1.707	323	(162 - 531)	91.3
2005–06	228 305	4 800	2.1	2	0.417	38	(16 - 64)	82.7
2004–05	132 503	12 218	9.2	2	0.164	18	(8 - 29)	70.4
2003–04	0							
2002–03	2 400	0	0.0	-				
2001–02	0							
2000–01	1 850	0	0.0	-				
1999–00	3 800	0	0.0	-				
1998–99	18 950	0	0.0	-				

[s] Observed captures by species, for all 10 years: albatrosses (unidentified) (33), wandering albatross (unidentified) (18), Gibson's albatross (5), seabird – large (3), black-browed albatross (unidentified) (2), petrel (unidentified) (2), white-chinned petrel (2), grey petrel (2), great-winged petrel (2), antipodean albatross (2), Campbell albatross (1), white-capped albatross (1), flesh-footed shearwater (1), sooty shearwater (1), Buller's albatross (1)

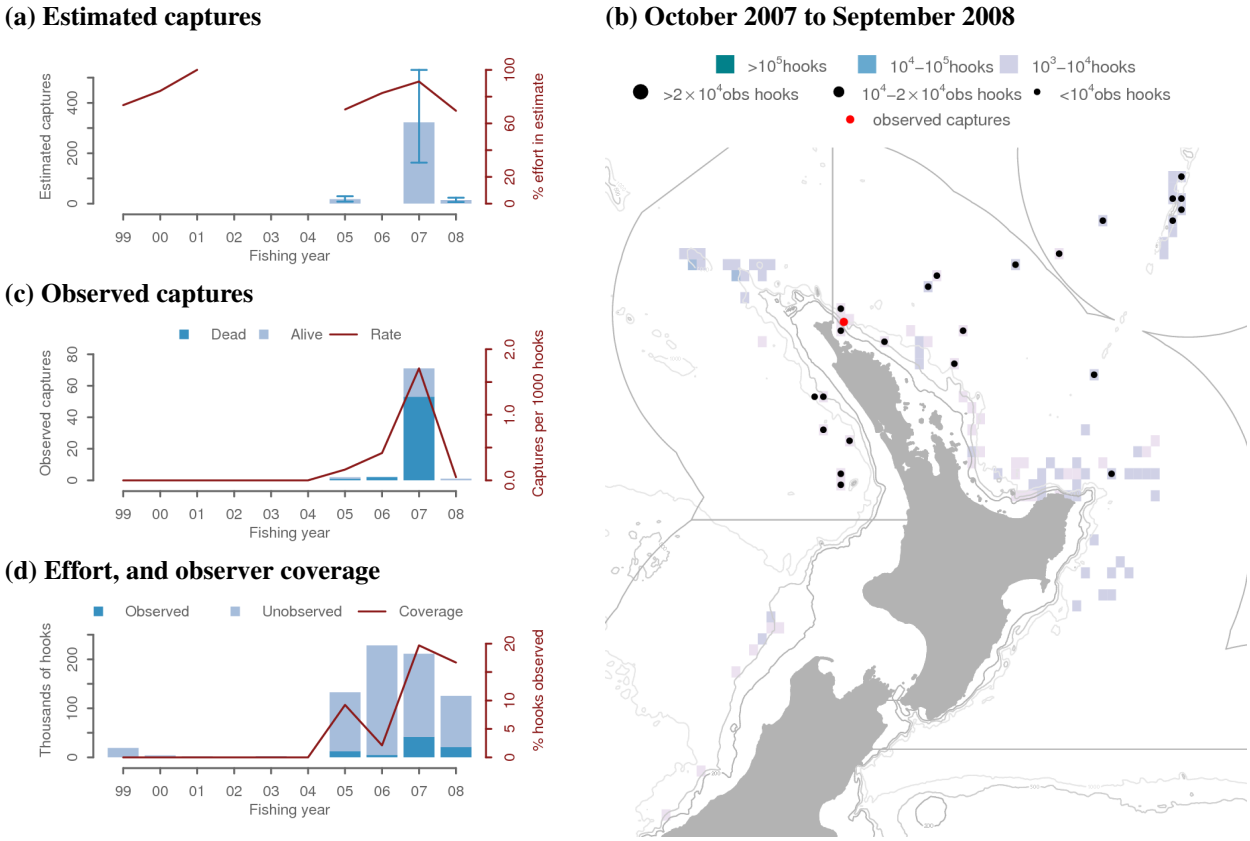

Figure 56: All bird captures in the swordfish longline fishery. (a) Ratio estimated captures, with 95% bootstrap confidence intervals, (b) Mapped effort and captures from 2007–08, (c) Observed captures, (d) Effort and observed effort.

3.19.7 Swordfish longline, turtles, New Zealand EEZ

Table 115: Summary of turtle captures in the swordfish longline fishery, broken down by fishing areas, with the number of hooks, number of hooks observed, percentage of hooks observed, number of observed captures, capture rate per thousand hooks, total estimated captures with 95% confidence intervals, and percentage of hooks included in the estimate.

		Observed				Estimated		
	Hooks	No. obs	% obs	Capt.	Rate	Est. captures		% eff. in est.
2007–08								
Area 1	83 630	17 540	21.0	1	0.057	3	(1 - 6)	100.0
Area 4	35 500	3 350	9.4	0	0.000	0	observed	9.4
Area 3	6 200	0	0.0	0		0	observed	0.0
2006–07								
Area 1	191 511	40 301	21.0	1	0.025	6	(1 - 12)	100.0
Area 4	19 394	1 292	6.7	0	0.000	0	observed	6.7
Area 3	350	0	0.0	0		0	observed	0.0

Table 116: Summary of turtle captures in the swordfish longline fishery, for 10 fishing years, with the number of hooks, number of hooks observed, percentage of hooks observed, number of observed captures, capture rate per thousand hooks, total estimated captures with 95% confidence intervals, and percentage of hooks included in the estimate.

		Observed				Estimated	
	Hooks	No. obs	% obs	Capt.	Rate	Est. captures	% eff. in est.
2007–08	125 330	20 890	16.7	1	0.048	3 (1 - 6)	69.4
2006–07	211 255	41 593	19.7	1	0.024	6 (1 - 12)	91.3
2005–06	228 305	4 800	2.1	0	0.000	5 (0 - 14)	82.7
2004–05	132 503	12 218	9.2	0	0.000	2 (0 - 6)	70.4
2003–04	0						
2002–03	2 400	0	0.0	-			
2001–02	0						
2000–01	1 850	0	0.0	-			
1999–00	3 800	0	0.0	-			
1998–99	18 950	0	0.0	-			

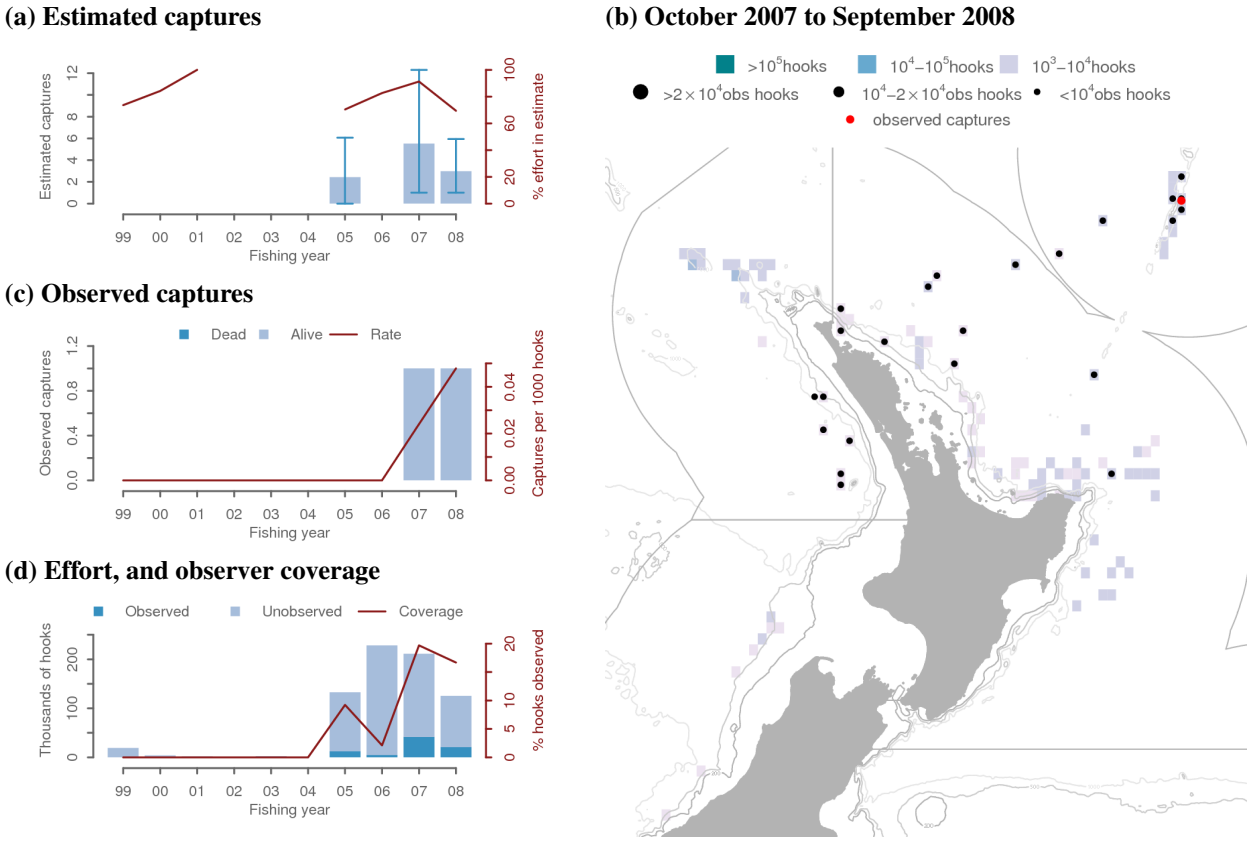

Figure 57: Turtle captures in the swordfish longline fishery. (a) Ratio estimated captures, with 95% bootstrap confidence intervals, (b) Mapped effort and captures from 2007–08, (c) Observed captures, (d) Effort and observed effort.

3.20 Bottom longline

3.20.1 Ling longline, all birds, New Zealand EEZ

Table 117: Summary of all bird captures in the ling longline fishery, broken down by fishing areas, with the number of hooks, number of hooks observed, percentage of hooks observed, number of observed captures, capture rate per thousand hooks, total estimated captures with 95% confidence intervals, and percentage of hooks included in the estimate.

		Observed				Estimated		
	Hooks	No. obs	% obs	Capt.	Rate	Est. captures		% eff. in est.
2007–08								
Chatham Rise	8 117 620	1 611 100	19.8					
White-capped albatrosses				0	0.000	1	(0 - 2)	100.0
White-chinned petrels				3	0.002	15	(3 - 36)	100.0
Sooty shearwaters				0	0.000	1	(0 - 2)	100.0
Other albatrosses (Buller's albatross)				3	0.002	15	(3 - 36)	100.0
Other birds[a]				5	0.003	25	(9 - 50)	100.0
Subantarctic	4 223 600	1 381 800	32.7					
White-chinned petrels				6	0.004	18	(8 - 32)	100.0
Sooty shearwaters				0	0.000	1	(0 - 1)	100.0
East of NI	1 913 440	3 600	0.2					
Other albatrosses				0	0.000	6	(0 - 18)	100.0
Other birds				0	0.000	3	(0 - 9)	100.0
West Coast SI	1 264 485	0	0.0					
Stewart-Snares	1 242 431	114 423	9.2					
White-capped albatrosses				0	0.000	1	(0 - 2)	100.0
Sooty shearwaters				5	0.044	54	(5 - 151)	100.0
Puysegur	1 046 283	108 455	10.4					
Sooty shearwaters				0	0.000	2	(0 - 5)	100.0
Other albatrosses				0	0.000	1	(0 - 2)	100.0
Other birds				0	0.000	3	(0 - 6)	100.0
Cook Strait	658 600	3 000	0.5					
Other birds				0	0.000	1	(0 - 2)	100.0
North East	620 008	11 000	1.8					
West Coast NI	190 326	0	0.0					
2006–07								
Chatham Rise	8 615 760	391 250	4.5					
White-capped albatrosses				0	0.000	1	(0 - 2)	100.0
Sooty shearwaters				0	0.000	1	(0 - 2)	100.0
Other albatrosses[b]				35	0.089	771	(118 - 1 693)	100.0
Other birds[c]				3	0.008	66	(3 - 140)	100.0
Subantarctic	1 306 700	0	0.0					
East of NI	1 938 239	255 100	13.2					
Other albatrosses				0	0.000	5	(0 - 16)	100.0
Other birds				0	0.000	2	(0 - 8)	100.0
West Coast SI	935 710	0	0.0					
Stewart-Snares	1 540 760	156 600	10.2					
White-capped albatrosses				0	0.000	1	(0 - 2)	100.0
Puysegur	994 444	781 522	78.6					
White-chinned petrels				11	0.014	14	(12 - 16)	100.0
Sooty shearwaters				1	0.001	2	(1 - 2)	100.0
Other birds (prions (unidentified))				1	0.001	2	(1 - 2)	100.0
Cook Strait	1 247 500	528 500	42.4					
Other birds				0	0.000	1	(0 - 2)	100.0
North East	360 798	51 185	14.2					
West Coast NI	80 547	16 300	20.2					

[a] Grey petrel (4), Cape petrels (1)

[b] Salvin's albatross (22), Chatham Island albatross (12), albatrosses (unidentified) (1)

[c] Cape petrels (2), grey petrel (1)

Table 118: Summary of all bird captures in the ling longline fishery, for 10 fishing years, with the number of hooks, number of hooks observed, percentage of hooks observed, number of observed captures, capture rate per thousand hooks, total estimated captures with 95% confidence intervals, and percentage of hooks included in the estimate.

		Observed				Estimated		
	Hooks	No. obs	% obs	Capt.[s]	Rate	Est. captures		% eff. in est.
2007–08	19 280 393	3 233 378	16.8	22	0.007	145	(72 - 254)	92.4
2006–07	17 020 458	2 180 457	12.8	51	0.023	869	(215 - 1 800)	94.1
2005–06	16 222 501	3 599 075	22.2	29	0.008	115	(81 - 153)	94.8
2004–05	21 544 721	2 645 620	12.3	18	0.007	123	(65 - 192)	95.9
2003–04	24 741 780	4 870 537	19.7	44	0.009	162	(125 - 204)	96.7
2002–03	19 702 549	11 299 295	57.3	266	0.024	381	(359 - 405)	96.3
2001–02	27 995 371	7 547 517	27.0	427	0.057	1 139	(924 - 1 400)	97.4
2000–01	29 114 743	5 033 144	17.3	505	0.100	1 471	(1 275 - 1 693)	95.9
1999–00	32 473 273	3 611 278	11.1	202	0.056	1 896	(1 277 - 2 584)	97.2
1998–99	35 831 754	3 060 232	8.5	90	0.029	632	(469 - 813)	95.3

[s] Observed captures by species, for all 10 years: white-chinned petrel (816), grey petrel (403), Salvin's albatross (178), sooty shearwater (86), cape petrels (46), petrel (unidentified) (23), Chatham Island albatross (22), albatrosses (unidentified) (17), northern giant petrel (8), white-capped albatross (8), common diving petrel (7), southern giant petrel (5), wandering albatross (unidentified) (5), Buller's albatross (5), giant petrels (unidentified) (4), seabird – small (3), storm petrels (3), southern black-browed albatross (2), prions (unidentified) (2), seagull (2), other species (9)

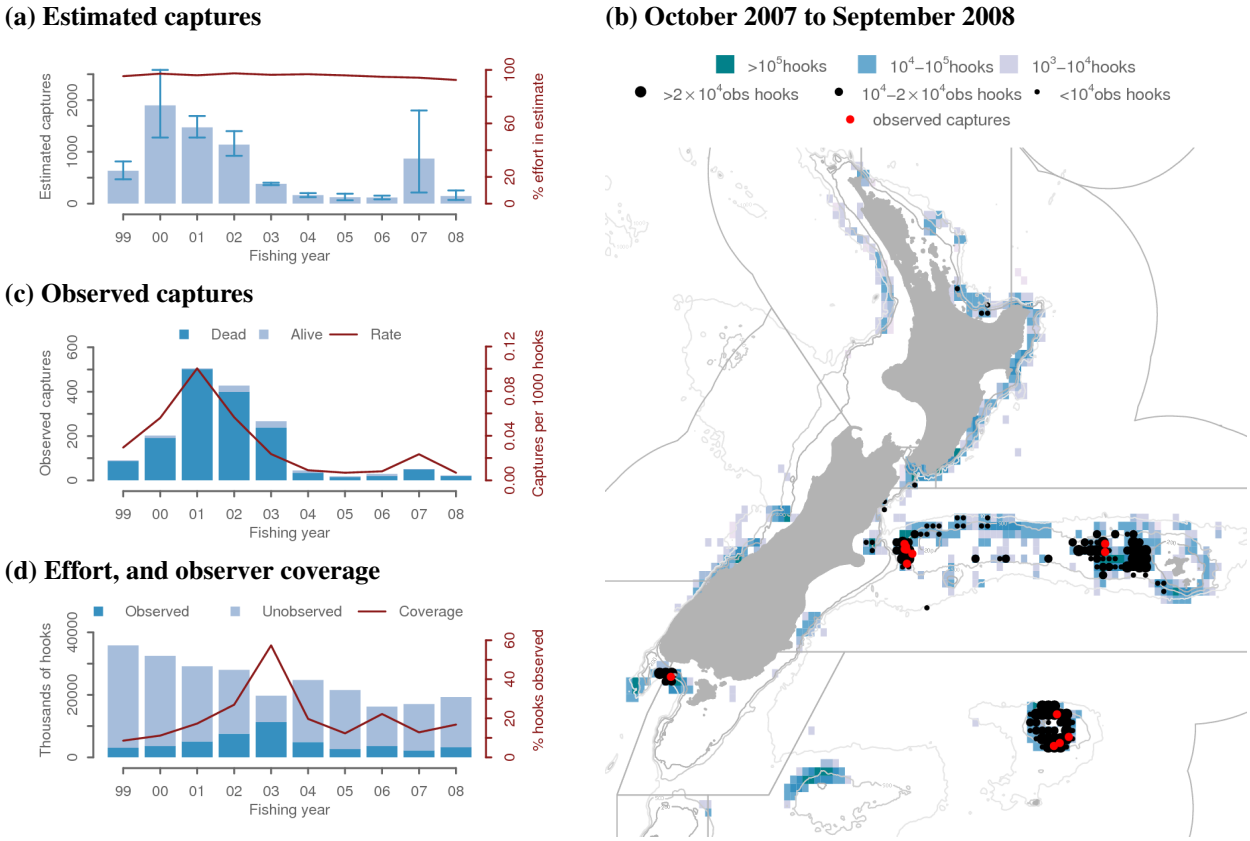

Figure 58: All bird captures in the ling longline fishery. (a) Ratio estimated captures, with 95% bootstrap confidence intervals, (b) Mapped effort and captures from 2007–08, (c) Observed captures, (d) Effort and observed effort.

3.20.2 Bluenose longline, all birds, New Zealand EEZ

Table 119: Summary of all bird captures in the bluenose longline fishery, broken down by fishing areas, with the number of hooks, number of hooks observed, percentage of hooks observed, number of observed captures, capture rate per thousand hooks, total estimated captures with 95% confidence intervals, and percentage of hooks included in the estimate.

		Observed				Estimated		
	Hooks	No. obs	% obs	Capt.	Rate	Est. captures		% eff. in est.
2007–08								
East of NI	3 944 726	10 500	0.3					
Sooty shearwaters				0	0.000	14	(0 - 47)	100.0
Other birds				0	0.000	55	(0 - 130)	100.0
Chatham Rise	2 808 463	164 525	5.9					
White-chinned petrels				1	0.006	16	(1 - 49)	100.0
Other albatrosses (Buller's albatross)				3	0.018	50	(3 - 109)	100.0
North East	1 630 724	42 550	2.6					
Other albatrosses[a]				3	0.071	3	observed	2.6
West Coast NI	426 274	0	0.0					
West Coast SI	311 370	0	0.0					
Cook Strait	112 050	16 000	14.3					
Puysegur	89 500	0	0.0					
Stewart-Snares	45 500	0	0.0					
2006–07								
East of NI	2 364 810	40 285	1.7					
Sooty shearwaters				0	0.000	8	(0 - 28)	100.0
Other birds[b]				2	0.050	35	(2 - 79)	100.0
Chatham Rise	2 661 220	6 000	0.2					
White-chinned petrels				0	0.000	15	(0 - 48)	100.0
Other albatrosses				0	0.000	47	(0 - 107)	100.0
North East	1 784 886	46 433	2.6					
White-chinned petrels				1	0.022	1	observed	2.6
Other birds (black petrel)				4	0.086	4	observed	2.6
West Coast NI	280 267	62	0.0					
West Coast SI	213 700	0	0.0					
Cook Strait	61 000	0	0.0					
Puysegur	77 200	0	0.0					
Stewart-Snares	65 600	0	0.0					

[a] Campbell albatross (2), wandering albatross (unidentified) (1)
[b] Indian yellow-nosed albatross (1), Cape petrel (1)

Table 120: Summary of all bird captures in the bluenose longline fishery, for 10 fishing years, with the number of hooks, number of hooks observed, percentage of hooks observed, number of observed captures, capture rate per thousand hooks, total estimated captures with 95% confidence intervals, and percentage of hooks included in the estimate.

		Observed				Estimated		
	Hooks	No. obs	% obs	Capt.[s]	Rate	Est. captures		% eff. in est.
2007–08	9 368 607	233 575	2.5	7	0.030	139	(54 - 238)	73.7
2006–07	7 508 683	92 780	1.2	7	0.075	110	(46 - 191)	68.4
2005–06	6 150 791	56 900	0.9	0	0.000	81	(30 - 145)	64.7
2004–05	5 315 543	9 955	0.2	0	0.000	62	(22 - 112)	55.5
2003–04	3 328 650	0	0.0	-				
2002–03	1 899 774	0	0.0	-				
2001–02	1 703 985	0	0.0	-				
2000–01	2 157 384	171 709	8.0	3	0.017	12	(5 - 22)	31.2
1999–00	2 122 207	0	0.0	-				
1998–99	1 799 663	1 211	0.1	0	0.000	10	(4 - 19)	31.0

[s] Observed captures by species, for all 10 years: black petrel (4), Buller's albatross (3), cape petrels (2), Campbell albatross (2), white-chinned petrel (2), sooty shearwater (1), grey petrel (1), wandering albatross (unidentified) (1), Indian yellow-nosed albatross (1)

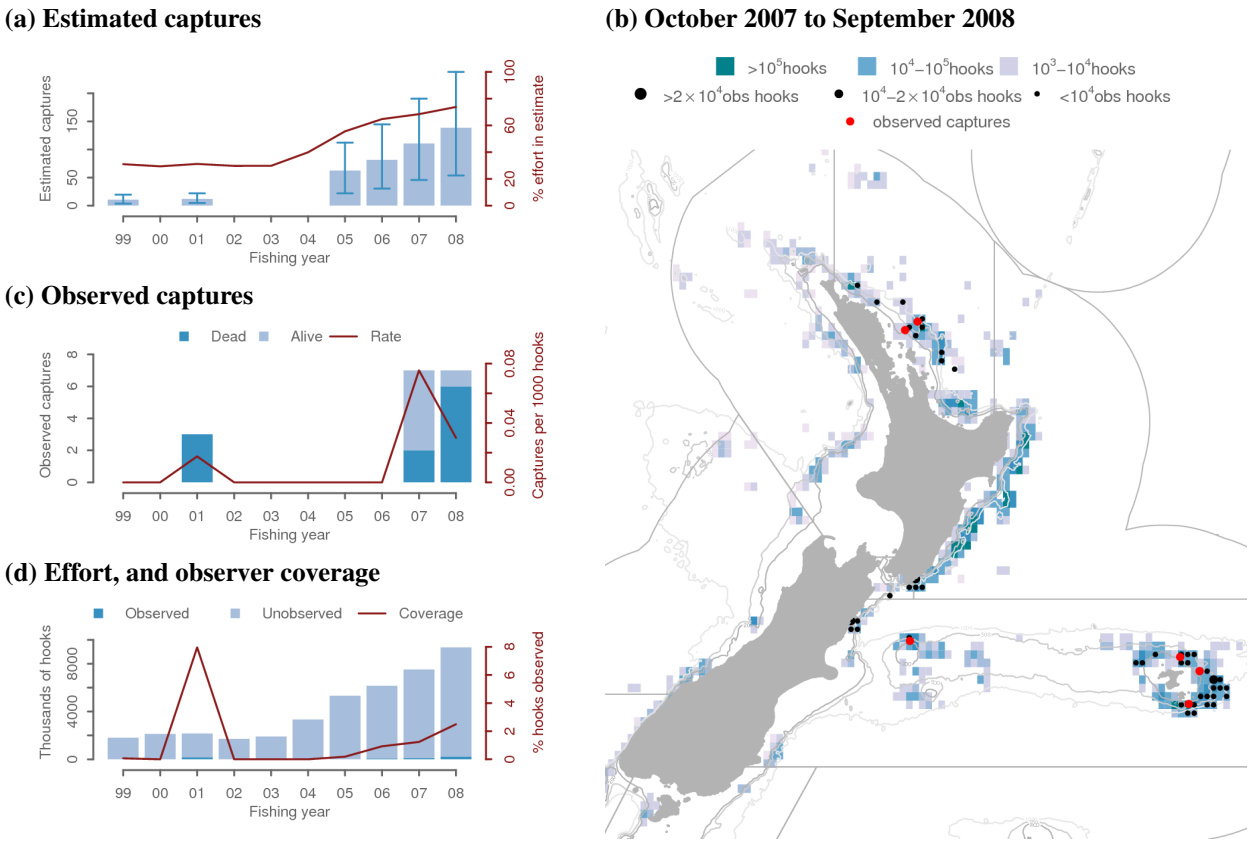

Figure 59: All bird captures in the bluenose longline fishery. (a) Ratio estimated captures, with 95% bootstrap confidence intervals, (b) Mapped effort and captures from 2007–08, (c) Observed captures, (d) Effort and observed effort.

3.20.3 Other longline, all birds, New Zealand EEZ

Table 121: Summary of all bird captures in other longline fisheries, broken down by fishing areas, with the number of hooks, number of hooks observed, percentage of hooks observed, number of observed captures, capture rate per thousand hooks, total estimated captures with 95% confidence intervals, and percentage of hooks included in the estimate.

		Observed				Estimated		
	Hooks	No. obs	% obs	Capt.	Rate	Est. captures		% eff. in est.
2007–08								
Chatham Rise	1 322 370	69 565	5.3					
Sooty shearwaters				1	0.014	1	observed	5.3
North East	1 014 656	73 000	7.2					
Other albatrosses (Campbell albatross)				1	0.014	9	(1 - 25)	100.0
Other birds[a]				9	0.123	75	(9 - 175)	100.0
West Coast NI	904 525	5 000	0.6					
East of NI	526 251	0	0.0					
West Coast SI	199 310	0	0.0					
Cook Strait	115 438	0	0.0					
Puysegur	76 200	0	0.0					
Stewart-Snares	36 500	0	0.0					
2006–07								
Chatham Rise	1 208 310	0	0.0					
North East	723 279	8 130	1.1					
Other albatrosses				0	0.000	6	(0 - 18)	100.0
Other birds				0	0.000	50	(0 - 126)	100.0
West Coast NI	670 775	0	0.0					
East of NI	494 226	0	0.0					
West Coast SI	125 690	0	0.0					
Cook Strait	161 000	0	0.0					
Puysegur	79 600	0	0.0					
Stewart-Snares	0							

[a] Great-winged petrel (6), black petrel (3)

Table 122: Summary of all bird captures in other longline fisheries, for 10 fishing years, with the number of hooks, number of hooks observed, percentage of hooks observed, number of observed captures, capture rate per thousand hooks, total estimated captures with 95% confidence intervals, and percentage of hooks included in the estimate.

		Observed				Estimated		
	Hooks	No. obs	% obs	Capt.[s]	Rate	Est. captures		% eff. in est.
2007–08	4 196 450	147 565	3.5	11	0.075	85	(18 - 185)	26.0
2006–07	3 462 880	8 130	0.2	0	0.000	56	(6 - 132)	20.9
2005–06	3 057 709	40 590	1.3	0	0.000	63	(6 - 149)	27.6
2004–05	3 449 083	7 949	0.2	0	0.000	72	(7 - 169)	26.8
2003–04	3 124 415	0	0.0	-				
2002–03	2 428 946	9 000	0.4	0	0.000	31	(3 - 73)	16.7
2001–02	1 952 098	0	0.0	-				
2000–01	2 415 512	0	0.0	-				
1999–00	2 171 657	0	0.0	-				
1998–99	2 871 143	36 966	1.3	2	0.054	61	(8 - 141)	27.8

[s] Observed captures by species, for all 10 years: great-winged petrel (6), black petrel (3), grey petrel (2), Campbell albatross (1), sooty shearwater (1)

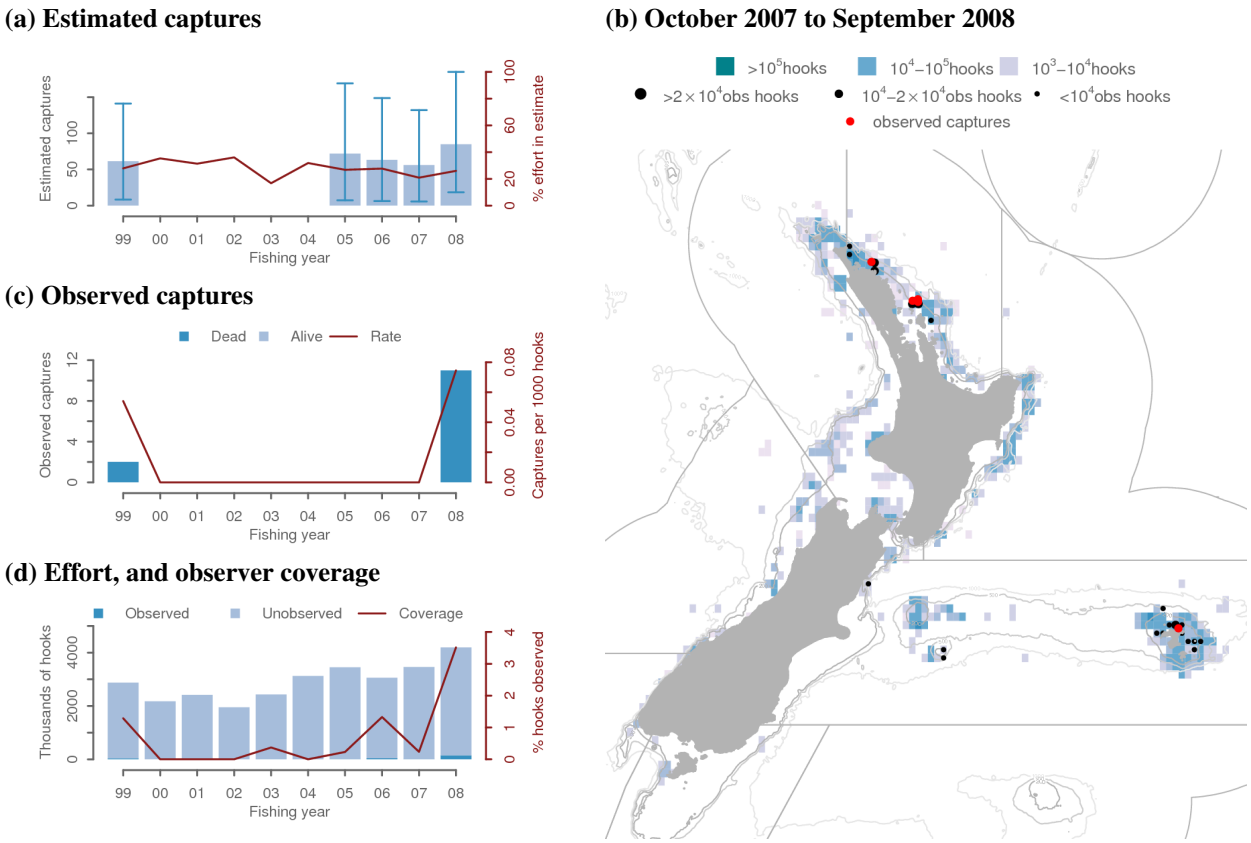

Figure 60: All bird captures in other longline fisheries. (a) Ratio estimated captures, with 95% bootstrap confidence intervals, (b) Mapped effort and captures from 2007–08, (c) Observed captures, (d) Effort and observed effort.

4. ACKNOWLEDGMENTS

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Appendix A: Areas and fisheries included in estimates

The fisheries-area strata in which there was sufficient effort and observer coverage to allow estimates to be made are given in Table A-1. Species-area strata in which there were more than 10 captures in a year were estimated using an independent ratio estimate within each year. These strata are also listed.

For strata with more than 10 captures per year, Tables A-2, A-3, and A-4 contain a summary of the fraction of the effort which is included in the estimates, for each year and fishery. The areas that are included are also given. This allows tracking of how different areas and fisheries contribute to the ratio estimates presented in the body of the report.

Table A-1: Areas with enough effort to be estimated, listed by fishery. Strata with enough captures to be estimated independently in each year are also listed. The area codes are as defined in text; and the following species codes are used: SSH, sooty shearwaters; WCP, white-chinned petrels; WCA, white-capped albatrosses; OAL, other albatrosses; OBD, other birds; FUR, New Zealand fur seals; HSL, New Zealand sea lions; CDO, dolphins.

Fishery	Areas estimated	Species-area strata estimated annually
Trawl		
Squid	CHAT4, STEW5, SQUAK6, PUYS5	SSH-STEW5, WCP-STEW5, WCA-STEW5, OAL-STEW5, OBD-STEW5, FUR-STEW5, SSH-SQUAK6, WCP-SQUAK6, WCA-SQUAK6, OAL-SQUAK6, OBD-SQUAK6, FUR-SQUAK6, HSL-SQUAK6
Hoki	CHAT4, STEW5, SQUAK6, PUYS5, SUBA6, WCSI7, COOK8	SSH-CHAT4, WCP-CHAT4, WCA-CHAT4, OAL-CHAT4, OBD-CHAT4, FUR-CHAT4, SSH-STEW5, WCA-STEW5, OAL-STEW5, OBD-STEW5, FUR-STEW5, FUR-PUYS5, FUR-SUBA6, WCA-WCSI7, OAL-WCSI7, OBD-WCSI7, FUR-WCSI7, FUR-COOK8
Hake	CHAT4, STEW5, WCSI7	FUR-WCSI7
Ling	STEW5, SUBA6	FUR-STEW5
Scampi	NORTH1, EAST2, CHAT4, SQUAK6	OBD-NORTH1, OAL-CHAT4
Jack mackerel	CHAT4, STEW5, WCSI7, WCNI9	SSH-STEW5, WCA-STEW5, FUR-WCSI7, FUR-WCNI9, CDO-WCNI9
SBW	SUBA6	OBD-SUBA6, FUR-SUBA6, HSL-SUBA6
Deepwater	NORTH1, EAST2, CHAT4, STEW5, SQUAK6, PUYS5, SUBA6, WCSI7, WCNI9	OAL-CHAT4, OBD-CHAT4, FUR-SUBA6
Middle depth	NORTH1, EAST2, CHAT4, STEW5, PUYS5, WCSI7, WCNI9	SSH-CHAT4, SSH-STEW5, WCA-STEW5
Bottom longline		
Ling	NORTH1, EAST2, CHAT4, STEW5, SQUAK6, PUYS5, SUBA6, COOK8, WCNI9	WCP-CHAT4, OAL-CHAT4, OBD-CHAT4, SSH-STEW5, WCP-STEW5, OAL-STEW5, OBD-STEW5, OBD-SQUAK6, WCP-PUYS5, WCP-SUBA6, OAL-SUBA6, OBD-SUBA6
Snapper		OBD-NORTH1
Bluenose	EAST2, CHAT4, COOK8, KERM10	
Other	NORTH1, SUBA6, KERM10	
Surface longline		
Domestic	AREA1, AREA2, AREA3, AREA4	OAL-AREA1, OBD-AREA1, FUR-AREA1, OAL-AREA3, FUR-AREA3
Charter	AREA1, AREA2, AREA3, AREA4	OAL-AREA1, OBD-AREA1, WCP-AREA3, WCA-AREA3, OAL-AREA3, FUR-AREA3
Australian	AREA1	OAL-AREA1

Table A-2: Effort included in ratio estimates for trawl fisheries.

	Inshore	Deep	Hoki	Hake	Ling	Squid	Scampi	SBW	Pelagic	Other
2007–08										
Effort (tows)	50 173	6 743	8 802	1 559	2 210	4 237	4 807	816	2 646	7 414
% observed	0.3	41.7	21.2	25.3	10.9	34.4	10.9	40.6	30.5	5.9
% eff. in est.	0.0	78.7	95.3	69.5	31.4	86.8	72.3	100.0	83.0	35.9
Areas in est.		CHAT4 NORTH1 SUBA6 WCNI9	CHAT4 COOK8 STEW5 WCSI7	WCSI7	STEW5	SQUAK6 STEW5	CHAT4 EAST2 NORTH1	SUBA6	WCNI9	CHAT4
2006–07										
Effort (tows)	59 833	7 477	10 630	1 606	1 666	5 910	5 135	630	2 711	8 221
% observed	0.5	31.0	16.5	18.4	9.4	21.8	7.6	35.6	29.6	4.8
% eff. in est.	16.2	78.3	96.9	66.6	36.9	71.8	86.5	100.0	94.7	48.3
Areas in est.	NORTH1	CHAT4 NORTH1 STEW5 SUBA6 WCNI9	CHAT4 COOK8 STEW5 WCSI7	WCSI7	STEW5	SQUAK6 STEW5	CHAT4 NORTH1 SQUAK6	SUBA6	WCNI9 WCSI7	CHAT4 STEW5
2005–06										
Effort (tows)	62 056	8 291	11 591	1 361	1 394	8 582	4 867	624	2 808	8 410
% observed	0.2	15.6	15.3	30.9	8.1	12.9	6.8	34.8	25.2	5.8
% eff. in est.	0.0	73.9	80.6	84.3	0.0	80.9	44.5	100.0	74.2	13.7
Areas in est.		CHAT4 NORTH1 SUBA6 WCNI9	CHAT4 STEW5 WCSI7	WCSI7		SQUAK6 STEW5	NORTH1 SQUAK6	SUBA6	WCNI9	STEW5
2004–05										
Effort (tows)	67 295	8 406	14 543	1 555	988	10 490	4 648	870	2 509	9 192
% observed	0.0	19.2	14.7	6.1	7.7	23.9	3.1	38.5	22.2	2.4
% eff. in est.	0.0	63.5	91.5	0.0	0.0	81.5	0.0	99.9	93.7	0.0
Areas in est.		CHAT4 SUBA6	CHAT4 COOK8 STEW5 WCSI7			SQUAK6 STEW5		SUBA6	WCNI9	
2003–04										
Effort (tows)	63 788	8 006	22 522	1 651	559	8 336	3 753	740	2 383	9 185
% observed	0.0	15.8	10.4	8.5	3.9	21.2	11.0	32.6	6.4	2.1
% eff. in est.	0.0	76.7	95.6	0.0	0.0	85.5	56.1	100.0	94.6	0.0
Areas in est.		CHAT4 NORTH1 SUBA6 WCNI9	CHAT4 COOK8 STEW5 SUBA6 WCSI7			SQUAK6 STEW5	CHAT4 SQUAK6	SUBA6	WCNI9	
2002–03										
Effort (tows)	63 544	8 867	27 787	945	634	8 410	5 129	638	3 067	11 181
% observed	0.0	15.6	9.3	5.2	2.5	15.6	10.0	43.1	11.3	3.1
% eff. in est.	0.0	68.6	94.6	0.0	0.0	73.3	47.0	100.0	74.9	8.7
Areas in est.		CHAT4 NORTH1 SUBA6 WCNI9	CHAT4 COOK8 STEW5 SUBA6 WCSI7			PUYS5 SQUAK6 STEW5	CHAT4 SQUAK6	SUBA6	WCNI9	STEW5
2001–02										
Effort (tows)	61 459	8 220	27 239	848	575	7 475	6 720	1 160	3 002	11 214
% observed	0.0	16.8	12.0	5.0	0.9	19.5	8.8	28.8	11.7	2.3
% eff. in est.	0.0	71.7	94.3	0.0	0.0	74.4	82.2	98.0	74.1	6.3
Areas in est.		CHAT4 NORTH1 PUYS5 STEW5 WCNI9	CHAT4 COOK8 STEW5 SUBA6 WCSI7			PUYS5 SQUAK6 STEW5	CHAT4 EAST2 SQUAK6	SUBA6	STEW5 WCNI9	STEW5
2000–01										
Effort (tows)	64 194	8 925	32 024	801	390	8 075	4 980	664	1 941	12 262
% observed	0.1	13.3	11.1	4.4	0.0	37.2	5.3	58.4	20.8	1.9
% eff. in est.	0.0	56.2	96.1	0.0	0.0	48.1	34.7	99.7	69.0	0.0
Areas in est.		CHAT4 PUYS5	CHAT4 COOK8 PUYS5 STEW5 SUBA6 WCSI7			SQUAK6 STEW5	EAST2	SUBA6	STEW5 WCNI9	

Table A-2: Effort included in ratio estimates for trawl fisheries.

	Inshore	Deep	Hoki	Hake	Ling	Squid	Scampi	SBW	Pelagic	Other
1999–00										
Effort (tows)	66 546	12 512	33 061	527	571	5 651	4 769	693	2 290	12 482
% observed	0.0	15.5	9.9	7.2	1.2	16.2	8.8	45.3	22.5	1.6
% eff. in est.	0.0	84.9	94.1	0.0	0.0	56.8	32.7	100.0	42.2	0.0
Areas in est.		CHAT4 EAST2 NORTH1 PUYS5 STEW5 SUBA6	CHAT4 COOK8 STEW5 SUBA6 WCSI7			SQUAK6 STEW5	EAST2	SUBA6	STEW5	
1998–99										
Effort (tows)	77 829	13 891	32 247	846	470	8 014	4 329	1 251	3 866	11 016
% observed	0.0	7.3	11.0	2.7	0.0	12.4	11.5	27.3	16.2	1.7
% eff. in est.	0.0	55.3	94.9	0.0	0.0	78.5	51.8	98.6	87.9	0.0
Areas in est.		CHAT4 NORTH1 WCSI7	CHAT4 COOK8 STEW5 SUBA6 WCSI7			SQUAK6 STEW5	CHAT4 EAST2	SUBA6	STEW5 WCNI9 WCSI7	

Table A-3: Effort included in ratio estimates for surface longline fisheries.

	S. bluefin	Bigeye	Albacore	Swordfish	Other
2007–08					
Effort (hooks)	1 107 825	973 629	600	125 330	34 455
% observed	31.2	2.5	0.0	16.7	0.0
% eff. in est.	99.9	90.4	0.0	66.7	0.0
Areas in est.	AREA 1 AREA 3	AREA 1		AREA 1	
2006–07					
Effort (hooks)	1 939 211	1 538 121	13 730	211 255	44 355
% observed	42.9	5.4	0.0	19.7	0.0
% eff. in est.	99.9	99.7	0.0	90.7	0.0
Areas in est.	AREA 1 AREA 3	AREA 1 AREA 4		AREA 1	
2005–06					
Effort (hooks)	1 493 418	1 866 616	60 360	228 305	38 870
% observed	38.6	3.0	1.0	2.1	0.0
% eff. in est.	99.9	91.8	0.0	0.0	0.0
Areas in est.	AREA 1 AREA 3	AREA 1			
2004–05					
Effort (hooks)	1 662 079	1 645 111	136 812	132 503	100 290
% observed	39.5	1.8	3.1	9.2	0.8
% eff. in est.	99.5	76.6	0.0	0.0	0.0
Areas in est.	AREA 1 AREA 3	AREA 1			
2003–04					
Effort (hooks)	3 193 936	3 504 722	462 348	0	221 287
% observed	42.1	3.2	0.6	-	2.3
% eff. in est.	98.9	99.7	0.0	-	0.0
Areas in est.	AREA 1 AREA 3	AREA 1 AREA 4			
2002–03					
Effort (hooks)	3 509 003	5 189 562	1 906 695	2 400	174 215
% observed	30.0	1.2	39.9	0.0	0.0
% eff. in est.	36.5	19.1	99.2	0.0	0.0
Areas in est.	AREA 2 AREA 3	AREA 4	AREA 1 AREA 4		

Table A-3: Effort included in ratio estimates for surface longline fisheries.

	S. bluefin	Bigeye	Albacore	Swordfish	Other
2001–02					
Effort (hooks)	2 813 894	6 911 490	878 287	0	272 710
% observed	28.2	1.8	0.0	-	0.0
% eff. in est.	99.0	97.0	0.0	-	0.0
Areas in est.	AREA 1 AREA 2 AREA 3	AREA 1 AREA 4			
2000–01					
Effort (hooks)	1 906 725	7 058 687	496 756	1 850	297 430
% observed	41.2	3.1	0.0	0.0	6.5
% eff. in est.	99.6	98.8	0.0	0.0	67.8
Areas in est.	AREA 1 AREA 2 AREA 3	AREA 1 AREA 4			AREA 1
1999–00					
Effort (hooks)	1 743 562	5 796 808	647 480	3 800	94 470
% observed	41.4	1.3	0.0	0.0	0.0
% eff. in est.	98.9	98.8	0.0	0.0	0.0
Areas in est.	AREA 1 AREA 2 AREA 3	AREA 1 AREA 4			
1998–99					
Effort (hooks)	1 892 036	4 244 819	533 220	18 950	156 756
% observed	61.9	1.7	0.0	0.0	0.0
% eff. in est.	97.7	81.7	0.0	0.0	0.0
Areas in est.	AREA 1 AREA 2 AREA 3	AREA 1			

Table A-4: Effort included in ratio estimates for bottom longline fisheries.

	Ling	Snapper	Bluenose	Other
2007–08				
Effort (hooks)	19 189 093	9 060 997	9 344 577	4 182 850
% observed	16.9	0.0	2.5	3.5
% eff. in est.	79.1	0.0	48.5	55.5
Areas in est.	CHAT4 NORTH1 PUYS5 STEW5 SUBA6		CHAT4 COOK8 NORTH1	CHAT4 NORTH1
2006–07				
Effort (hooks)	17 020 458	10 446 540	7 508 683	3 462 880
% observed	12.8	0.6	1.2	0.2
% eff. in est.	86.8	0.0	55.3	0.0
Areas in est.	CHAT4 COOK8 EAST2 NORTH1 PUYS5 STEW5 WCNI9		EAST2 NORTH1	
2005–06				
Effort (hooks)	16 222 501	11 694 638	6 150 791	3 057 709
% observed	22.2	1.1	0.9	1.3
% eff. in est.	78.0	98.2	30.2	27.6
Areas in est.	CHAT4 COOK8 EAST2 STEW5	NORTH1	EAST2	NORTH1

Table A-4: Effort included in ratio estimates for bottom longline fisheries.

	Ling	Snapper	Bluenose	Other
2004–05				
Effort (hooks)	21 544 721	11 531 586	5 315 543	3 449 083
% observed	12.3	2.3	0.2	0.2
% eff. in est.	85.5	98.3	0.0	0.0
Areas in est.	CHAT4 NORTH1 PUYS5 STEW5 SUBA6	NORTH1		
2003–04				
Effort (hooks)	24 741 780	12 254 888	3 328 650	3 124 415
% observed	19.7	1.0	0.0	0.0
% eff. in est.	85.0	97.1	0.0	0.0
Areas in est.	CHAT4 STEW5 SUBA6 WCSI7	NORTH1		
2002–03				
Effort (hooks)	19 702 549	13 722 067	1 899 774	2 428 946
% observed	57.3	0.0	0.0	0.4
% eff. in est.	90.6	0.0	0.0	0.0
Areas in est.	CHAT4 COOK8 EAST2 STEW5 SUBA6			
2001–02				
Effort (hooks)	27 995 371	15 372 878	1 703 985	1 952 098
% observed	27.0	0.0	0.0	0.0
% eff. in est.	86.8	0.0	0.0	0.0
Areas in est.	CHAT4 STEW5 SUBA6			
2000–01				
Effort (hooks)	29 114 743	17 336 728	2 157 384	2 415 512
% observed	17.3	0.3	8.0	0.0
% eff. in est.	51.4	0.0	30.9	0.0
Areas in est.	COOK8 EAST2 PUYS5 SQUAK6 STEW5 SUBA6		EAST2	
1999–00				
Effort (hooks)	32 473 273	16 510 012	2 122 207	2 171 657
% observed	11.1	0.0	0.0	0.0
% eff. in est.	92.6	0.0	0.0	0.0
Areas in est.	CHAT4 PUYS5 SQUAK6 STEW5 SUBA6			
1998–99				
Effort (hooks)	35 831 754	14 984 633	1 799 663	2 871 143
% observed	8.5	0.0	0.1	1.3
% eff. in est.	78.4	0.0	0.0	1.8
Areas in est.	CHAT4 SUBA6			SUBA6