

Capture of protected species in New Zealand trawl and longline fisheries, 1998–99 to 2006–07

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EXECUTIVE SUMMARY

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Seabirds, marine mammals, and turtles are caught in New Zealand commercial fisheries. These captures are reported by Ministry of Fisheries observers when they are onboard fishing vessels. In this report, summaries of the captures are presented for all observed trawl and longline fishing events within the New Zealand Exclusive Economic Zone between 1 October 1998, and 30 September 2007. Where there was sufficient observer coverage within a stratum, a ratio method was used to estimate the total captures with bootstrap confidence intervals.

Captures are summarised into the following species groups: white-capped albatross (*Thalassarche steadi*); white-chinned petrel (*Procellaria aequinocalis*); sooty shearwater (*Puffinus griseus*); other albatross; other birds; New Zealand fur seal (*Arctocephalus forsteri*); New Zealand sea lion (*Phocarctos hookeri*); Hector's and Maui's dolphin (*Cephalorhynchus hectori*, *Cephalorhynchus hectori maui*); pilot whale (*Globicephala melas*); other dolphin; other seals; other marine mammals; and turtles. The captures are reported by fishery, which is based on the method (trawl, bottom longline, and surface longline) and the target species. The report contains time series and maps of the captures.

In the 2006–07 fishing year there were 212, 187, and 58 birds observed caught in trawl, surface longline and bottom longline fisheries, respectively. The birds most frequently caught were sooty shearwater, white-capped albatross, and Buller's albatross (*Thalassarche bulleri*), with 86, 84, and 56 individuals being observed caught, respectively. Other captures included 12 of the critically endangered Chatham albatross (*Thalassarche eremita*) caught in bottom longline fisheries; 30 wandering-type albatross caught in surface longline fisheries; and 1 black petrel (*Procellaria parkinsoni*) caught during an inshore trawl.

Estimated captures of seabirds in trawl fisheries decreased from 1930 (95% c.i.: 1563 to 2340, based on 27.7% of effort) in 2005–06 to 1272 (95% c.i.: 962 to 1641, based on 42.4% of effort) in 2006–07. This decrease was particularly marked in the squid fishery, which was well observed, where estimated catches reduced from 1251 (95% c.i.: 939 to 1627, based on 81.1% of effort) in 2005–06 to 427 (95% c.i.: 364 to 496, based on 72.6% of effort) in 2006–2007. In surface longline fisheries there were 715 birds estimated to have been caught during 2006–07 (95% c.i.: 565 to 885, based on 99.8% of effort). While this was similar to previous years, there was a large increase in birds caught in the charter surface longline fisheries, from 17 (95% c.i.: 16 to 18, based on 100.0% of effort) in 2005–06 to 176 (95% c.i.: 154 to 201, based on 100.0% of effort) in 2006–07. In bottom longline fisheries 1120 birds were estimated caught in 2006–07 (95% c.i.: 581 to 1796, based on 49.6% of effort). The high uncertainty in seabird captures in bottom longline fisheries reflects the low observer coverage of 6.1%.

In addition to the seabirds, in 2006–07, 12 New Zealand sea lions, 82 New Zealand fur seals, 11 dolphins, and 2 leatherback turtles (*Dermochelys coriacea*) were observed caught. There were no other seals, Hector's or Maui's dolphin, pilot whales, or other marine mammals observed caught. The estimated catch of fur seals in trawl fisheries during 2006–07 was 419 (95% c.i.: 319 to 528, based on 42.4% of effort), the lowest estimated catch during the nine years of data.

Observer coverage in inshore trawl fisheries remains low. In 2006–07 only 292 inshore trawls were observed, 0.5% of the fishery. Ten birds were observed caught during these trawls, leading to an estimated capture of 243 birds (95% c.i.: 10 to 554) from the 16.4% of the inshore fishery with sufficient observer coverage to attempt an estimate.

1. INTRODUCTION

Within New Zealand waters, 44 different bird taxa have recently been confirmed killed in commercial fisheries (Conservation Services Programme 2008), with white-capped albatross (*Thalassarche steadi*), sooty shearwater (*Puffinus griseus*), and white-chinned petrel (*Procellaria aequinoctialis*) being the most frequently caught species. The IUCN (2008) classifies white-capped albatross and sooty shearwater as near threatened, and white-chinned petrel as vulnerable. In addition, critically endangered (Chatham albatross, *Thalassarche eremita*) and endangered taxa (northern royal albatross, *Diomedea sanfordi*; black-browed albatross, *Thalassarche melanophrys*) have also been caught. The most frequently caught marine mammals are New Zealand fur seals (*Arctocephalus forsteri*), New Zealand sea lions (*Phocarctos hookeri*), and common dolphins (*Delphinus delphis*). New Zealand sea lions are classified as vulnerable (IUCN 2008), whereas the status of New Zealand fur seals and common dolphins is of least concern.

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 bycatch in specific fisheries and for analysing bycatch patterns. The observer data have previously been presented in a series of reports that give annual summaries of the bycatch data for seabirds (Baird 2004a, 2004b, Baird & Griggs 2004, Baird 2005f, Baird & Griggs 2005, Baird & Smith 2007, 2008), sea lions (Baird & Doonan 2005, Baird 2005a, 2005b, Smith & Baird 2007a, 2007b), fur seals (Baird 2005c, 2005d, 2005e, 2008b), and cetaceans (Baird 2008a). Over the last decade there has been an increasing use of statistical models to estimate total captures of various taxa in specific fisheries (Smith & Baird 2007a, Baird & Smith 2007, 2008, Abraham 2008) and throughout New Zealand waters (Manly, Seyb & Fletcher 2002a, 2002b, 2002c). Statistical modelling also allows analysis to be made of the factors that are associated with the occurrence of captures (Smith & Baird 2005, Du Fresne, Grant, Norden & Pierre 2007, Mormede, Baird & Smith 2008).

This report updates previous work to include data from trawl and longline fisheries for the 2006–07 fishing year (1 October 2006 to 30 September 2007, inclusive). To provide a context, previous data from 1998–99 to 2005–06 are also presented. All data have been treated in a consistent way to allow trends to be determined and different fisheries to be easily compared. Captures of seabirds, marine mammals, and marine reptiles in trawl and longline fisheries are included. Marine reptile captures have not previously been reported, and are presented for the first time. Turtles are caught in some northern fisheries, but no other reptiles have been captured on observed trips.

The intention of this report is to provide a comprehensive summary of the data that makes the information accessible. There is little accompanying analysis or interpretation. However, since the proportion of effort that is observed varies between fisheries and changes through time, some estimation of total captures must be made if data from different years and fisheries are to be compared. A full statistical analysis is beyond the scope of this report, but we have included stratified ratio estimates (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. These biases could be partially removed through a more sophisticated analysis, but this would be best carried out for particular taxa or fisheries of concern. The estimates presented here should be treated as preliminary.

Within the report, the protected species are divided into the following groups: white-capped albatross, white-chinned petrel, sooty shearwater, other albatross, other birds, fur seals, sea lions, dolphins, other pinnipeds, other cetaceans, and turtles. The fisheries are broken into groups based on method and target species. 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. For each fishery, there are also pages that summarise the captures at a high level, showing all bird, all mammal, and turtle captures. A consistent presentation has been used, so each summary page has closely related plots and tables, enabling a direct comparison to be made between taxa, fisheries, and years.

2. METHODS

2.1 Bycatch reporting

Ministry of Fisheries observers are required to complete an entry on the non-fish bycatch form whenever a seabird, marine mammal, or marine reptile is caught by a fishing vessel. In the current instructions given to observers, a bycatch event is defined as when an animal has become fixed, entangled, or trapped so that it is prevented from moving freely or freeing itself. In particular, the following are not intended to be recorded as bycatch.

- Sightings.
- Birds that strike the warps, unless they are actually caught on the warps.
- Birds that hit the superstructure of the vessel, unless they fall to the deck injured or dead and unable to move freely.
- Birds that are snagged momentarily, but then manage to free themselves because they have not been caught.
- Traces of individuals (such as feathers caught in a trawl warp splice) as it is then unclear whether the animal was caught.
- Birds that land on the vessel, unless they are unable to take off again under their own power
- Individuals that appear to have been caught but are then lost before they are brought onboard the vessel, unless they were definitely caught but cannot be recovered safely to the deck of the vessel.

When an animal is caught, observers record the life status at the time it is landed. This may be either:

- Alive.
- Dead and showing no signs of life.
- Killed by crew.
- Decomposing.
- Unknown, for example if the animal was not recovered.

Mortally wounded animals are recorded as being alive, as well as animals that are not injured in any way. Before the 2006–07 fishing year no further information was available on the animals' injuries. During the 2006–07 fishing year the form was changed to provide more information on the captures than had previously been noted, including information on injuries and on where the animals were caught. These additional data have been recorded since February 2007 and were used to exclude deck captures from the reporting.

Other information recorded by observers includes the date of capture, the trip and tow or set number, species identification, the length and sex of the animal (where it can be determined), a record of any tags put on the animal, codes for samples taken, a code describing what was done with the animal after it was caught, and comments. With the exception of fur seals and very large marine mammals, the observers retain dead (but not decomposed) animals for necropsy. The necropsy provides confirmation of the species and condition of the animal and allows detailed information on injuries to be collected. Specific instructions are also given for recording the location of marine mammal captures on trawls that are fitted with a sea lion exclusion device (SLED). The observers now record whether the animal was caught in the codend, at the SLED grid, or in the SLED hood.

2.2 Data sources

Observer data are entered into a database administered by the National Institute of Water and Atmospheric Research (NIWA) on behalf of the Ministry of Fisheries. Fishing effort information was also required for the analysis. Effort data are recorded by fishers on Trawl Catch Effort Processing Return (TCEPR), Tuna Longline Catch Effort Return (TLCER), Catch Effort Landing Return (CELR), and Lining Catch Effort Return (LCE) forms. The effort data are stored on databases administered by the Ministry of Fisheries. Documentation of these databases is available online (Ministry of Fisheries 2008).

The following data from within New Zealand waters from the 1995–96 fishing year to the 2006–07 fishing year were requested from the Ministry of Fisheries.

1. Data from within New Zealand waters (including all trips with at least one fishing event that started in the EEZ, or within the keyholes, or within the territorial sea). Reporting was restricted to New Zealand fisheries waters, but whole trip data were required for data grooming.
2. Data span the 12 year period from 1 October 1995 to 30 September 2007 (inclusive).
3. All trip and station information for commercial fishing from the *warehou* database within the ranges defined in (1) and (2), with one of the following methods: bottom trawl (BT), bottom pair-trawl (BPT), mid-water trawling (MW), mid-water pair-trawl (MPT), surface longline (SLL), or bottom longline (BLL).
4. All observer non-fish bycatch data, that recorded the capture of either a seabird, marine mammal, or reptile from the *l_line* and *obs_lfs* databases.
5. Observer station data from the *obs* and *l_line* databases for all fishing events on any trips with data selected in (3).
6. Selected vessel information (vessel key, size, nationality, etc.) for vessels with any trips in (3).
7. Available linking information between the commercial trawl effort and observer trawl data.

At the time of the request, February 2008, the necropsy data for seabirds had not been included in the database for the 2006–07 fishing year, and the necropsy data for marine mammals had not been included for the 2005–06 or 2006–07 fishing years. Seabird necropsy data were obtained from David Thompson (NIWA), and confirmation of sea lion and fur seal identifications was obtained from published and unpublished reports (Roe 2007, 2009). These records were merged into the relevant tables.

Table 1: Corrections made to the trawl observation data.

Description of fix	Number fixed
End time moved forward one day where it was before the end time	5 212
Start time moved back one day where it was after the end time	1 517
End of trip moved to latest station date	460
Start of trip moved to earliest station date	290
Missing observer vessel key updated from the trawl effort table	225
Day field corrected from surrounding records	18
Month field corrected from surrounding records	17
Year field corrected from surrounding records	10
Start point adjusted because of a speed anomaly	7
Start and end date adjusted to the next record because of a speed anomaly	6
Month and year fields corrected from surrounding records	1
East-west longitude indicator changed to make vessel speed plausible	1
Total number of changes	7 764

2.3 Data grooming

The only effort data used in this report were the date (and time when available) of sets or tows, the position of the start of sets or tows (either given as a longitude and latitude, or as a statistical area), the fisher declared target species, the number of hooks in longline sets, and information such as trip number and vessel keys. Where fishing effort was observed, a second source of data was available and this allowed for cross-checking. Unfortunately, there was no straightforward link between data recorded by observers and data recorded by fishers. The position and time information was the main way of connecting the two datasets.

The effort data contained errors in the date, time, and position data. These were found by looking for unrealistic vessel speeds. If a vessel needed to travel at more than 40 knots between sequential sets or tows, then there was assumed to be an error in either the time or position data for one of the fishing events. In some cases, it was possible to correct these errors (for example, if the recorded degree was different on one tow compared with surrounding tows, or if flipping the east-west indicator of the longitude data reduced the speed below the 40 knot threshold). For this report, preliminary grooming was carried out, but it is likely that errors remain. Errors were particularly difficult to correct in data that had been recorded on CELR forms, where the position was recorded only at the statistical area level.

The CELR forms provide only daily records, rather than a record for each trawl. In some cases, an unreasonable number of trawls were reported in a day. During the grooming, trawl numbers that were either higher than 10 per day, or were missing, were replaced with the average number of daily tows made by the vessel in the month before and after the outlying record. A total of 970 records were changed.

The observer data were more detailed than the effort, and redundancy in the recorded information provided further opportunity to correct errors. The trawl observation data, in particular, was thoroughly groomed. There were 67 030 tow observations made in the nine year period of the data extract. Table 1 describes the fixes applied and how many records were updated in each case. A total of 7764 changes were made to the observer station data.

In this report, all longline effort is given by number of hooks. In longline data from the 2005–06 fishing year some errors were previously identified in the number of hooks recorded, affecting less than 0.4% and 0.5% of records for the snapper longline and ling longline fisheries respectively (Baird & Smith

2008). No grooming of hook numbers was carried out in this reporting. In the surface longline data, observers estimated the numbers of observed hooks. Where the estimated number of hooks observed was higher than the number of hooks reported by the fisher, the number of hooks observed was set to the number that the fisher reported.

There were three surface longline trips in 2006–07 that were observed to set 737 510 hooks, and that had no records in the original fishing effort data extract. The trips were made by a single vessel fishing in an area that was otherwise entirely fished by the charter fleet. It was therefore assumed that this was a charter vessel. The data were not included in the data extract as the trips had not been assigned trip numbers. According to Ministry of Fisheries Research Data Management (RDM) there was a validation rule that prevented long trips being given a trip number and so being picked up by standard queries. We were provided an additional extract of 11 850 fishing effort events that were missing trip numbers. The extract included an additional 1 033 990 hooks set by the three vessels in 2006–07. However, one observed trip was not included in the extra data extract and these observed fishing events were added to the fishing effort dataset. The additional data extract also included fishing effort from the trawl (9040 tows) and bottom longline (1 879 858 hooks) fisheries going back to 1998. All this effort was included in the report.

On bottom longline trips, observers estimate the number of hooks set by the vessel and they watch only a portion of haul. The number of hooks observed on the haul is recorded on a separate form, and this form is not currently entered. Even if the data were available, a simple scaling from the portion of the haul observed to the total number of hooks may not be appropriate, as captured protected species may be handed to the observer when they are not watching the haul. In the current report, we worked as if captures were recorded from *all* hooks hauled during observed sets. This will have resulted in an overestimate of the coverage, and consequently the total captures in bottom longline fisheries will have been underestimated.

During initial investigation of the data, it was found that the seabird capture rate in the early years (1995–96 to 1997–98) was lower than in following years. There was no obvious cause for the low capture rate, and it is possible that the reporting of seabird captures by observers was less complete in this period. These years were not included in the data analysis.

2.4 Protected species groups

In analysing and presenting the data, the protected species were assigned to the groups given in Tables 2 and 3. The mammals were grouped into the categories required for reporting purposes by the Ministry of Fisheries. These included Hector’s dolphin; however no Hector’s or Maui’s dolphins were caught in observed trawl and longline fisheries during the period covered by this report. Aside from fur seals, sea lions, and common dolphins, captures of the other groups were infrequent. The marine reptiles that may be caught in New Zealand waters are turtles and sea snakes. No sea snakes were observed to be caught in the fisheries covered here. White-capped albatross, white-chinned petrel, and sooty shearwater were the most frequently caught seabird taxa, and were grouped separately (Table 3). Shy albatross breed on islands off the coast of Tasmania and are closely related to white-capped albatross. The common name shy albatross has been applied to white-capped albatross, and no true shy albatross have been confirmed caught in New Zealand fisheries. Consequently all observer records of shy albatross were grouped with the white-capped albatross. The remaining birds were either grouped as albatross or into an “other birds” category, that was mainly petrel taxa.

Where animals were autopsied, the necropsy record was used as a definitive identification. Otherwise, the birds were classified according to the observer identification. The skill of observers at identifying

Table 2: Grouping of marine mammal and turtle species used in the report. All marine mammal and turtle taxa included in the report are shown. An asterisk in the final column indicates that at least one animal of that taxa was confirmed killed by necropsy. The list includes the generic names used by observers when they are unable to identify the animals.

Species group	Common name	Scientific name	Code	
Sea lion	New Zealand sea lion	<i>Phocarcos hookeri</i>	HSL	*
Fur seal	New Zealand fur seal	<i>Arctocephalus forsteri</i>	FUR	*
Other seals	Leopard seal	<i>Hydruga leptonyx</i>	LEO	*
	Elephant seal	<i>Mirounga leonina</i>	EPH	*
Dolphin	Common dolphin	<i>Delphinus delphis</i>	CDD	*
	Dusky dolphin	<i>Lagenorhynchus obscurus</i>	DDO	*
	Bottlenose dolphin	<i>Tursiops truncatus</i>	BDO	
	Porpoise		POE	
Pilot whale	Pilot whale	<i>Globicephala melas</i>	PIW	
Hector's dolphin	Hector's dolphin	<i>Cephalorhynchus hectori</i>	HDO	
	Maui's dolphin	<i>Cephalorhynchus hectori maui</i>	HDM	
Whales	Humpback whale	<i>Megaptera novaeangliae</i>	HBW	
	Whale		WHU	
Turtles	Green turtle	<i>Chelonia mydas</i>	GNT	
	Leatherback turtle	<i>Dermochelys coriacea</i>	LBT	
	Turtle		TLE	

seabirds varies greatly. Some tend to use generic codes, and some use incorrect codes. Where appropriate, we reported on whether the observer identification was confirmed. This was particularly important for species that are rare or were caught infrequently.

2.5 Fisheries areas

Captures in all fisheries apart from surface longlining were reported for the areas shown in Figure 1. These were chosen to surround the prominent bathymetric features that were 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 2.

Effort recorded on CELR forms was assigned to statistical areas, based on where the set or tow started, as latitude and longitude were not recorded. The effort from these data was allocated to reporting areas using the position of the centroid of each statistical area. The boundaries of the statistical areas do not, in general, align either with the boundaries of the FMAs or with the boundaries of the reporting areas. In many cases, different parts of a given statistical area fall into different reporting areas. By taking the area of each statistical area that is outside of its allocated reporting area, it was estimated that 3.7% of the EEZ may be assigned to an incorrect reporting area. In total, 24% of trawls were reported on the basis of statistical area rather than latitude and longitude, suggesting that less than 1% of effort was allocated to the wrong trawl area.

The data request was made by trip, with all trips that had some effort outside New Zealand waters being included. This meant the request returned some data from outside the EEZ. While having this data assisted in the grooming process, no points from outside the EEZ were included in the report.

Table 3: Grouping of bird species used in the report. All bird taxa included in the report are shown. An asterisk in the final column indicates that at least one bird of that taxa was confirmed killed by necropsy. The list includes the generic names used by observers when they are unable to identify the birds.

Species group	Common name	Scientific name	Code	
White capped albatross	Shy albatross	<i>Thalassarche cauta</i>	XSX	
	White-capped albatross	<i>Thalassarche steadi</i>	XWM	*
White chinned petrel	White-chinned petrel	<i>Procellaria aequinoctialis</i>	XWC	*
Sooty shearwater	Sooty shearwater	<i>Puffinus griseus</i>	XSH	*
Other albatross	Antipodean albatross	<i>Diomedea antipodensis</i>	XAN	*
	Southern royal albatross	<i>Diomedea epomophora</i>	XRA	*
	Snowy albatross	<i>Diomedea exulans chionoptera</i>	XAS	*
	Wandering albatross	<i>Diomedea exulans spp.</i>	XWA	*
	Gibson's albatross	<i>Diomedea gibsoni</i>	XAU	*
	Northern royal albatross	<i>Diomedea sanfordi</i>	XNR	*
	Albatross (unidentified)	<i>Diomedidae (Family)</i>	XAL	
	Light-mantled sooty albatross	<i>Phoebetria palpebrata</i>	XLM	*
	Buller's albatross	<i>Thalassarche bulleri</i>	XBM	*
	Indian yellow-nosed albatross	<i>Thalassarche carteri</i>	XYN	*
	Grey headed albatross	<i>Thalassarche chrysostoma</i>	XGM	
	Chatham albatross	<i>Thalassarche eremita</i>	XCI	*
	Campbell albatross	<i>Thalassarche impavida</i>	XCM	*
	Black-browed albatross	<i>Thalassarche melanophrys</i>	XKM	*
	Southern black-browed albatross	<i>Thalassarche melanophrys melanophrys</i>	XSM	*
	Pacific albatross	<i>Thalassarche nov. sp.</i>	XNB	*
	Salvin's albatross	<i>Thalassarche salvini</i>	XSA	*
Other birds	Snares cape pigeon	<i>Daption australe</i>	XCA	*
	Southern cape pigeon	<i>Daption capense</i>	XCC	*
	Cape pigeon	<i>Daption spp.</i>	XCP	*
	Black bellied storm petrel	<i>Fregetta tropica</i>	XFT	*
	Grey-backed storm petrel	<i>Garrodia nereis</i>	XGB	*
	Black-backed gull	<i>Larus dominicanus</i>	XBG	*
	Seagull	<i>Larus spp.</i>	XSG	
	Southern giant petrel	<i>Macronectes giganteus</i>	XSP	*
	Northern giant petrel	<i>Macronectes halli</i>	XNP	*
	Giant petrels (unidentified)	<i>Macronectes spp.</i>	XTP	
	Gannet	<i>Morus serrator</i>	XGT	
	Storm petrels	<i>Oceanitidae (Family)</i>	XST	
	Antarctic prion	<i>Pachyptila desolata</i>	XPR	*
	Prion (unidentified)	<i>Pachyptila spp.</i>	XPN	
	Fairy prion	<i>Pachyptila turtur</i>	XFP	*
	Broad-billed prion	<i>Pachyptila vittata</i>	XPV	*
	White-faced storm petrel	<i>Pelagodroma marina</i>	XWF	*
	Common diving petrel	<i>Pelecanoides urinatrix</i>	XDP	*
	Pied shag	<i>Phalacrocorax varius</i>	XPS	*
	Grey petrel	<i>Procellaria cinerea</i>	XGP	*
	Black petrel	<i>Procellaria parkinsoni</i>	XBP	*
	Westland petrel	<i>Procellaria westlandica</i>	XWP	*
	Petrel (unidentified)	<i>Procellariidae (Family)</i>	XPE	
	White-headed petrel	<i>Pterodroma lessonii</i>	XWH	*
	Grey-faced petrel	<i>Pterodroma macroptera</i>	XGF	*
	Buller's shearwater	<i>Puffinus bulleri</i>	XBS	*
	Flesh-footed shearwater	<i>Puffinus carneipes</i>	XFS	*
	Fluttering shearwater	<i>Puffinus gavia</i>	XFL	*
	Short-tailed shearwater	<i>Puffinus tenuirostris</i>	XTS	*
	Antarctic petrel	<i>Thalassoica antarctica</i>	XAP	
	Seabird		XSB	
	Seabird large		XSL	
	Seabird small		XSS	

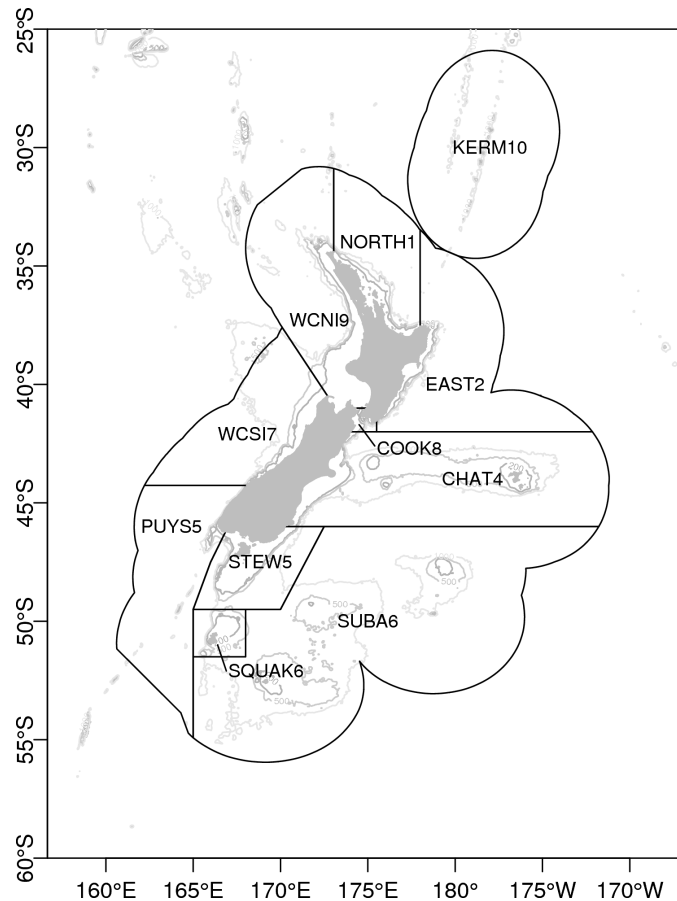


Figure 1: Reporting areas for trawl and bottom longline fisheries.

2.6 Fisheries definitions

Tows and sets were assigned to fisheries on the basis of the target species declared by the fisher on the catch effort form. The actual catch composition from the fishing event was not considered. All species that were targeted on more than 100 tows were allocated to a fishery, with the divisions decided in discussion with the Ministry of Fisheries. The groupings of target species are given in Table 4. The fishery was assigned on a tow or set basis and whole trips were often not assigned to the same fishery. There were many species codes that were used on less than 100 tows. Where it was unclear which fishery these tows should be assigned to, they were allocated to the same fishery as the closest tow (in time, on the same trip) that had a defined fishery. Within trawl fisheries, it was found that the fishery determined from the fisher declared target species and the fishery determined from the observer target species were the same for 98.2% of tows where the effort and observer data could be matched.

Bottom longline sets were assigned to snapper, ling, bluenose, or other fisheries, based on the target of the set. Surface longline effort was divided into domestic, charter, and Australian charter fisheries, based on the vessel nationality and on the declaration (charter or domestic) provided in the database. Domestic vessels were typically smaller (less than 30 m) long, the main charter fleet were Japanese and Philippines vessels, which were over 50 m in length. There were a few trips by Australian charter vessels. These vessels were also less than 30 m long and were treated separately from the main charter fleet.

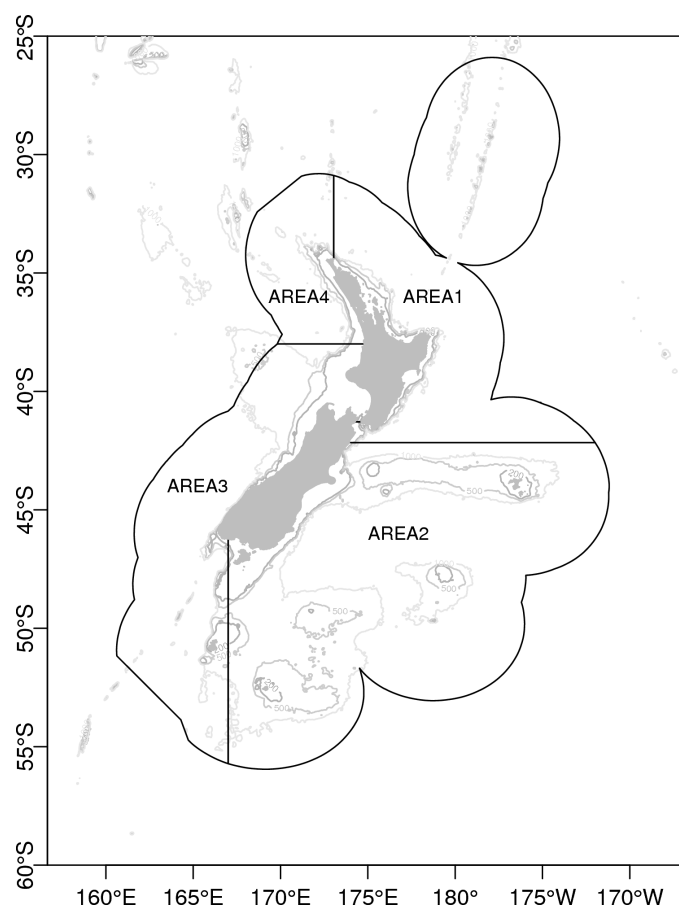


Figure 2: Reporting areas for longline fisheries.

Table 4: Allocation of target species to fisheries, for trawl fisheries, with the common names and three letter codes used by the Ministry of Fisheries.

Fishery	Target species
Squid	Squid (SQU, SQX, ASQ)
Hoki	Hoki (HOK)
Hake	Hake (HAK)
Ling	Ling (LIN)
Deep water	Orange roughy (ORH), Oreos (OEO, SOR, SSO, BOE), Patagonian toothfish (PTO), Cardinalfish (CDL)
Southern blue whiting	Southern blue whiting (SBW)
Pelagic	Jack mackerel (JMA), Blue mackerel (EMA)
Scampi	Scampi (SCI), Prawn killer (PRK)
Middle depths	Barracouta (BAR), Ribaldo (RIB), Rubyfish (RBY), Alfonsino (BYX, BYS), Bluenose (BNS), Frostfish (FRO), Ghost shark (GSH), Gemfish (SKI), Spiny dogfish (SPD), Sea perch (SPE), Warehou (WAR, WWA, SWA)
Inshore	Albacore tuna (ALB), Blue cod (BCO), Flatfish (FLA, BFL, FLO, ESO, GFL, LSO, RSK, SFL, SKA, SSK, YBF), Brill (BRI), Lobster (CRA), Elephantfish (ELE), Pale ghost shark (GSP), Gurnard (GUR), Hapuku (HAP, HPB), John dory (JDO), Kahawai (KAH), Leatherjacket (LEA), Mirror dory (MDO), Queen scallop (QSC), Red cod (RCO), School shark (SCH), Silver dory (SDO), Snapper (SNA), Rig (SPO), Giant stargazer (STA), Tarakihi (TAR), Thresher shark (THR), Trevally (TRE), Trumpeter (TRU)

Table 5: Numbers of incidents excluded from the data. These included deck landings, animals that swam into the moonpool, animals caught during research into bycatch mitigation, animals landed in a decomposed state, and warp strikes that were erroneously recorded as captures by one observer.

Year	Deck (alive)	Deck (dead)	Moonpool	Research	Warpstrike	Decomposed	Total
1998–99	12	3	0	0	0	3	18
1999–00	10	0	0	0	0	7	17
2000–01	11	3	0	0	0	1	15
2001–02	14	2	0	0	0	5	21
2002–03	173	3	28	0	0	0	204
2003–04	61	5	0	41	0	2	109
2004–05	90	5	0	0	61	3	159
2005–06	61	7	0	75	0	1	144
2006–07	34	4	0	0	0	5	43
Total	466	32	28	116	61	27	730

2.7 Excluded captures

Although observers are currently instructed to record only captures, there were many records in the database where birds landed on the vessel. At other times, birds hit overhead wires and were killed. In this report, only those captures that were directly caused by fishing activities are included. Birds that landed on or struck the vessel were not counted as captures. Similarly, seals that climbed the stern ramp or swam into the moonpool on a vessel were not counted as captures. For data from before 2006–07, the only way to identify these incidents was to read the observer comments. On the most recent forms, the recorded capture method was used to filter out captures that occurred as a result of deck strikes.

As part of the data grooming, all observer comments associated with captures in trawl and bottom longline fisheries were read. No comments were available for captures in surface longline fisheries. Often it was clear whether or not a capture was a deck landing, but it sometimes involved a subjective judgment to be made. For example, sometimes the observers found live birds on the trawl deck, and it was unclear whether they landed there or whether they came onboard caught in the net. Decomposed animals were also excluded.

There were two experiments on bycatch mitigation that required a special permit. The first was conducted on a bottom longliner and studied the efficacy of line weighting as a mitigation measure (Robertson et al. 2006). Special longlines were used that had weighted and unweighted sections, and many birds were caught on the unweighted line. In the analysis, we excluded all captures from this trip and the trip was treated as unobserved, so bycatch on the trip was estimated. Similarly, in 2004–05, an experiment was conducted in the Auckland Islands squid trawl fishery, comparing the performance of different mitigation measures (Middleton & Abraham 2007). As part of this experiment, some observed trawls were made without any warp mitigation. These tows were excluded from observations. The captures that occurred on the unmitigated tows were not included and the tows were treated as unobserved.

The numbers of excluded records are shown in Table 5. Most deck captures were of live birds, with less than 10% of birds being killed by deck strike. There was a marked peak in the recording of deck strikes in the 2002–03 fishing year. It is possible that instructions to observers changed in this year. There were also records of animals swimming up into the moonpool on two trips in 2002–03. Four of these records were of fur seals, with most other incidents being grey petrel. The number of reported deck strikes was low in 2006–07, with a total of 38 deck strikes and landings being reported.

2.8 Estimation

The total number of captures in a fishery was estimated as

$$N_t = N_o + N_e \quad (1)$$

where N_o were the observed captures and N_e were the estimated captures during unobserved fishing. The unobserved captures were estimated using a ratio method. Data were stratified by fishery and by area, following the definitions given above, with independent estimates being made for each fishing year. In trawl fisheries, the effort was determined by the number of tows. In in longline fisheries, the effort was determined by the number of hooks in the set. Within each stratum, s , the observed bycatch was n_s . If the total effort in a stratum was e_s and the observed effort was o_s then the unobserved captures, N_e were estimated by the product of the sum over strata of the observed catch rate, n_s/o_s , with the unobserved effort,

$$N_e = \sum_s \left(\frac{n_s}{o_s} (e_s - o_s) \right) \quad (2)$$

The sum over strata in equation (2) was restricted to strata s where there was sufficient observer coverage. We did not include strata where fewer than 100 tows (10 000 hooks), or less than 1% of the total effort was observed. Where the estimates are presented, the percentage of effort included in the estimate is also given,

$$f = (O + \sum_s (e_s - o_s)) / E \quad (3)$$

where E is the total effort and O is the total observed effort in the given fishery. This percentage indicates how much of the effort was observed at a level sufficient for making the estimate. If all strata were included in the estimate of N_e then $f = 1$. At the other extreme, if no strata were sufficiently observed to be included in the estimate of N_e , then $N_t = N_o$ and $f = O/E$. The strata, s , that 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 year and fishery. It was not possible to simply scale up the total estimated captures to account for effort in strata that were not included. The problem was that bycatch rates may vary greatly between strata, and this scaling up is best carried out within the framework of a statistical model.

The uncertainty in the total captures, N_t , was estimated by stratified bootstrap resampling (e.g., Davison & Hinkley 1997). The observed fishing events were resampled 5000 times, preserving the number of observations within each stratum, and the total bycatch was recalculated for each sample from equations 1 & 2. 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. This differed from the method used previously by Baird & Smith (2007, 2008). In their approach the variance in the rate n_s/o_s was estimated by using bootstrap resampling, but results from finite sampling theory were then used to estimate the uncertainty in N_t on the assumption that the catches were Poisson distributed (Cochran 1977, Manly 1992). We used the bootstrap to directly estimate the uncertainty in N_t itself.

This method for estimating the total captures relies on the observed effort being representative of the total effort. In many fisheries, this may not be so. For example the observations may be biased towards a particular time of year when captures are more or less frequent, or observers may be placed on vessels that are not representative of the fleet as a whole. These issues can be dealt with by using generalised linear models (e.g., Smith & Baird 2005, Baird & Smith 2007, 2008, Mormede et al. 2008), but this was not within the scope of this report.

3. RESULTS

3.1 Observed captures from 2006–07

All captures from 2006–07 are shown in Table 6, grouped by the three fishing methods covered by this report. The most frequently caught taxa were sooty shearwater, white-capped albatross, fur seals, Buller's albatross, and white-chinned petrel. Twelve of the critically endangered Chatham albatross (IUCN 2008) were caught in bottom longline fisheries, with the identification of 10 being confirmed by necropsy. These birds were caught on five sets from a single trip targeting ling on the Chatham Rise.

A total of 30 large wandering type albatross (wandering albatross, Gibson's albatross, Antipodean albatross) were caught across six trips in surface longline fisheries, with one Gibson's albatross also being caught in a trawl fishery. On one surface longline trip targeting swordfish in AREA1, 17 wandering albatross were caught. The other surface longline trips that caught wandering type albatross were targeting swordfish, southern bluefin tuna, and bigeye tuna.

An Indian yellow-nosed albatross was caught on a bluenose bottom longline set in AREA2 during August. This is the first time this species has been reported caught in New Zealand waters. Indian yellow-nosed albatrosses breed in subantarctic islands in the southern Indian ocean, and are endangered (IUCN 2008).

There were 12 sea lions observed caught in trawl fisheries. These were landed captures. Vessels fishing in the Auckland Islands squid area were using SLEDs, and sea lions entering nets fitted with SLEDs would not generally have been retained. In 2006–07, observers were asked to write a code in the comments field indicating where in the net sea lions were caught. A summary of this information is given in Table 7. There were three sea lions caught in the subantarctic southern blue whiting fishery, one sea lion caught in the scampi fishery, and one sea lion caught in the squid fishery on the Stewart-Snares shelf, where SLEDs were not required. No sea lions passed through a SLED grid into the codend. Further details of sea lion captures are given in Section 3.12 (p. 86).

The only marine mammals that were caught were fur seals, sea lions, and common dolphins. There were no captures of other seals, such as elephant seals or leopard seals, and there were no captures of other cetaceans. In particular, no Hector's or Maui's dolphins were caught in these fisheries. The 11 captures of common dolphins were all in the jack mackerel pelagic trawl fishery. The dolphin captures are detailed in Section 3.15 (p. 106).

Two leatherback turtles were caught in surface longline fisheries, one on a trip targeting swordfish and one on a trip targeting bigeye tuna. Both captures were in northern New Zealand (see Section 3.18, p. 120, for more details).

A different view of the 2006–07 observed captures is given in Table 8, that shows all observed captures by target species. Target fisheries without protected species bycatch are not shown in this table. Similarly, groups of protected species that were not caught are not shown. Within each method, the table is sorted in decreasing order of the number of incidents. Across all species, the most captures occurred in the squid trawl fishery. After this fishery, the southern bluefin tuna and swordfish surface longline fisheries had the highest number of incidents.

Table 6: Captures, mortality and necropsy numbers for 2006–07 in the trawl, surface longline, and bottom longline fisheries.

	Trawl			Surface longline			Bottom longline		
	cap.	dead	nec.	cap.	dead	nec.	cap.	dead	nec.
Sooty shearwater	83	69	70	2	1	1	1	1	1
White-capped albatross	55	51	45	29	28	25	0	0	0
New Zealand fur seal	72	63	0	10	1	0	0	0	0
Buller's albatross	6	6	6	50	35	35	0	0	0
White-chinned petrel	30	19	18	5	5	5	14	13	12
Albatross (unidentified)	2	2	1	34	32	0	1	1	0
Salvin's albatross	11	9	5	1	1	1	22	22	16
Grey petrel	3	3	3	19	18	19	1	1	1
Wandering albatross	0	0	0	19	1	0	0	0	0
Chatham albatross	0	0	0	0	0	0	12	12	10
New Zealand sea lion	12	12	8	0	0	0	0	0	0
Common dolphin	11	11	0	0	0	0	0	0	0
Flesh-footed shearwater	7	6	6	3	0	0	0	0	0
Gibson's albatross	1	1	1	8	8	8	0	0	0
Black petrel	1	1	1	0	0	0	4	0	0
Cape pigeon	2	1	0	1	0	0	2	0	0
Black-browed albatross	1	0	0	4	3	1	0	0	0
Seabird large	1	0	0	3	3	0	0	0	0
Campbell albatross	0	0	0	3	3	3	0	0	0
Antipodean albatross	0	0	0	3	3	3	0	0	0
Petrel (unidentified)	2	1	0	1	1	0	0	0	0
Southern cape pigeon	1	1	1	0	0	0	1	1	1
Grey-faced petrel	0	0	0	2	2	2	0	0	0
Leatherback turtle	0	0	0	2	0	0	0	0	0
Northern giant petrel	2	2	2	0	0	0	0	0	0
Indian yellow-nosed albatross	0	0	0	0	0	0	1	1	1
Prion (unidentified)	0	0	0	0	0	0	1	1	0
Giant petrels (unidentified)	1	1	0	0	0	0	0	0	0
Shy albatross	1	0	0	0	0	0	0	0	0
Seabird small	1	0	0	0	0	0	0	0	0
Common diving petrel	1	0	0	0	0	0	0	0	0

Table 7: Location of sea lion captures. Sea lions found in the cod end were caught in fisheries where SLED use is not required.

Description	Code	Number
At the grid, in the SLED lengthener (ahead of the grid)	B	1
Between the grid and the hood	B/C	1
In the SLED hood	C	2
Stuck in the SLED grid	D	3
SLED not required		5
Total		12

Table 8: All marine mammal, reptile and seabird captures observed in 2006–07, by target species. Within each method, the table is sorted in decreasing order of total captures. There were no observed captures in target species fisheries not on this list. The protected species groups are as defined in Section 2.4.

		Effort (tows or hooks)	% observed	Sooty shearwater	White-capped albatross	Other albatross	White-chinned petrel	Other bird	Fur seal	New Zealand sea lion	Common dolphin	Turtle
Trawl												
Arrow squid	SQU	5 880	21.6	51	41	6	26	2	6	8	0	0
Hoki	HOK	10 598	16.5	9	2	6	2	4	29	0	0	0
Scampi	SCI	5 086	7.6	14	2	1	0	8	0	1	0	0
Southern blue whiting	SBW	630	35.6	0	0	0	0	3	13	3	0	0
Jack mackerel	JMA	2 689	29.1	0	0	0	0	1	2	0	11	0
Ling	LIN	1 657	9.4	2	0	0	0	0	12	0	0	0
Hake	HAK	1 606	17.7	4	2	2	0	0	4	0	0	0
Barracouta	BAR	3 334	6.4	3	2	1	2	0	2	0	0	0
Tarakihi	TAR	11 486	0.8	0	5	2	0	1	0	0	0	0
Silver warehou	SWA	837	10.8	0	1	0	0	1	2	0	0	0
John dory	JDO	2 594	2.4	0	0	0	0	2	0	0	0	0
Orange roughy	ORH	4 057	29.8	0	0	1	0	0	1	0	0	0
White warehou	WWA	215	18.6	0	1	1	0	0	0	0	0	0
Oreos	OEO	1 269	17.4	0	0	0	0	0	1	0	0	0
Spiny dogfish	SPD	579	1.9	0	0	1	0	0	0	0	0	0
Tuna longline												
Southern bluefin tuna	STN	1 290 358	64.4	1	29	60	3	18	10	0	0	0
Swordfish	SWO	198 055	21.0	1	0	60	2	8	0	0	0	1
Bigeye tuna	BIG	1 478 071	5.6	0	0	2	0	3	0	0	0	1
Bottom longline												
Ling	LIN	16 703 436	13.0	1	0	35	13	4	0	0	0	0
Bluenose	BNS	7 396 939	1.3	0	0	1	1	5	0	0	0	0

3.2 Data summaries

The following sections of the report present summarised data in time-series form. Sets of pages are included for each of the species groups, and for each of the main fishing methods. The summaries are in two sets: the first is organised by protected species group; the second gives captures of birds, mammals, and turtles by fishery. Where there were no captures during any of the nine years (for example, turtles in trawl fisheries), the corresponding pages are not included.

Each summary includes a set of plots, that are in the same format for all species groups and fisheries. In subfigure (a), a time series of the observed captures is given as a barplot. The height of the bars represents the total number of captures, with the dark part of the bar representing dead captures, and the light part live captures. Overlaid on the bars is a red line showing the raw capture rate: the ratio of the number of captures in each year to the observed fishing effort. Years are indicated by the final year of the fishing year, so “07” is fishing year 2006–07. As an example, a plot of all observed seabird captures in all trawl fisheries is given in Figure 4(a). There was a decrease in the observed captures in 2006–07. The observed capture rate also decreased, showing that the reduction in captures was not due to a reduction in the number of trawls observed.

In subfigure (b), the ratio estimated captures is shown, calculated following the expressions in Section

2.8. The best estimate of the captures is given, with the error bars indicating the 95% bootstrap confidence interval. The overlaid red line indicates the percentage of effort that has been included in each yearly ratio estimate, following equation (3). Trends in the estimates need to be checked by referring to Appendix A, that details which fisheries and areas were included in the estimate for each year, as changes in the estimated total captures may have been due to changes in which areas were included in the estimate.

In subfigure (c) the total effort and the total observed effort within each year are given. This helps in making an assessment of whether trends in (a) and (b) were due to changes in effort or observer coverage. Overlaid on this graph is a red line indicating the percentage of effort within the fishery that was observed. In Figure 4(c) a steady decrease in the total trawl effort is seen over the nine year period. Over the same time there was an increase in observer coverage, with nearly 8% of all trawls being observed in 2006–07.

In subfigure (d) a histogram of the number of captures per tow (or per set in longline fisheries) is given. The dark bars are for 1998–99 to 2005–06, and the light bars are for 2006–07. The percentage of tows or sets with no captures is not shown. In Figure 4(d) it can be seen that there were incidents in 2006–07 where nine birds were caught on a single trawl.

Subfigures (e) and (f) show the seasonal distribution of the captures. The effort, observed effort, and captures have been normalised to a percentage of the annual total per month. These subfigures indicate whether the observations were seasonally representative of the effort, and whether the distribution of captures followed the distribution of the observations. Comparison of (e) and (f) shows whether the seasonal distribution in 2006–07 was the same as in past years. In Figure 4(e) it can be seen that the bird captures did not reflect the distribution of all trawl effort, but were strongly peaked in February, March, and April. The same pattern is seen in Figure 4(f). In contrast the seasonal distribution of captures of white-capped albatross on the Stewart-Snares shelf closely followed the distribution of observed effort, Figure 9(e). This suggests that the strong seasonal peak in white-capped albatross captures was related to the seasonal nature of the fishery, rather than seasonal variation in the white-capped albatross capture rate per tow.

Subfigures (g) and (h) show maps of the effort, observations, and captures. Only effort that had latitude and longitude is displayed, in particular data collected on CELR forms are not shown. The caption gives the percentage of the total effort that was included. In order to meet Ministry of Fisheries data confidentiality requirements, the effort and observations were plotted on a 0.2° grid, and the positions of the captures were jittered by a random uniform number between $\pm 0.1^\circ$. The colour indicates the number of tows or hooks within each cell. The number of observations is shown by a black dot, with the size of the dot increasing as the number of observations increases. Unobserved or poorly observed effort is seen in cells that are coloured, but that have no black dot. For example, in Figure 4(g) unobserved effort can be seen in many coastal regions. In subfigure (g) the effort and observations were converted to an average effort and average number of observations per year, so subfigures (g) and (h) can be directly compared. In contrast, all captures that occurred between 1998–99 and 2005–06 are shown in subfigure (g). This gives a good illustration of the spatial distribution of the captures, but the number of captures in subfigures (g) and (h) can not easily be compared.

Accompanying each set of plots is a page of tables. The content of these tables changes depending on the particular species and fishery. For sections that refer to individual species groups and fisheries, a table is given that lists all the data in subfigures (a), (b), and (c), summarising the effort, observations, captures and estimated captures. In some cases, such as the all trawl fishery, this table is broken down into smaller aggregates. Where there is room on the page, a second table is given that either lists the numbers of captured, dead, and necropsied animals by year and area, or else lists each individual capture event.

3.3 Estimates and trends

Summaries of the captures of all birds in trawl, surface longline, and bottom longline fisheries are in Section 3.5 (p. 24). Across all trawl fisheries, observed captures of birds decreased in 2006–07 compared with the two previous years. A total of 212 birds were observed caught, compared with 354 in 2005–06 and 481 in 2004–05. Over the period of the data, total trawl effort decreased and observer coverage increased. Estimated captures of seabirds in 2006–07 in trawl fisheries were 1272 (95% c.i.: 962 to 1641). This estimate was based on the 42.4% of the trawl effort with sufficient coverage for the ratio method to be used. The estimated total captures were reduced from 1930 in 2005–06 (95% c.i.: 1563 to 2340, based on 27.7% of effort).

The decrease in captures was especially marked for white-capped albatross, the most frequently caught species. Estimated captures in all trawl fisheries peaked at 802 (95% c.i.: 708 to 907, based on 26.1% of effort) in 2004–05 and then reduced to 363 captures (95% c.i.: 261 to 480, based on 27.7% of effort) in 2005–06 (Table 12, p. 30). Captures then reduced further to 236 (95% c.i.: 170 to 310, based on 42.4% of effort) in 2006–07. The decrease was clear in the Auckland Islands squid fishery, which was consistently well observed. Estimated captures reduced from 402 (95% c.i.: 341 to 467, based on 100.0% of effort) in 2004–05 to 41 in 2006–07 (95% c.i.: 30 to 54, based on 100.0% of effort), a reduction of close to 90%. These reductions may reflect the increased use of mitigation devices in trawl fisheries, which were made mandatory for trawlers over 28 m in length on 12 January, 2006, at the start of the 2005–06 squid season (Department of Internal Affairs 2006).

Observed captures of birds in surface longline fisheries increased from 37 in 2005–06 to 187 in 2006–07 (Table 10, p. 26), and estimated captures in 2006–07 were 715 (95% c.i.: 565 to 885, based on 99.8% of effort). The most frequently caught taxon in this fishery was Buller's albatross.

In 2006–07, bottom longline fisheries were poorly observed, with 6.1% observer coverage (Table 11, p. 28). While there were only 58 observed captures, this corresponded to an estimated 1120 captures (95% c.i.: 581 to 1796, based on 49.6% of effort). Increased observer coverage will be required to reduce the uncertainty in the estimated captures in this fishery.

Similar summaries of total marine mammal captures are given in Section 3.11 (p. 80). In 2006–07 there were 95 observed marine mammal captures in trawl fisheries, with an estimated total of 501 (95% c.i.: 392 to 615, based on 42.4% of effort). This estimate for the total number of marine mammal captures was the lowest for any year in the nine years of data used. In surface longline fisheries there were comparatively few marine mammal captures, with 10 fur seals being caught. The estimated total captures were 41 (95% c.i.: 14 to 80, based on 99.8% of effort). There were no captures of marine mammals or turtles in any of the observed bottom longline fisheries.

Most of the marine mammal captures were of fur seals, and the decreasing trend in marine mammal captures was reflected in the data on fur seal captures (Section 3.13, p. 92). The 2006–07 estimate of 419 fur seal captures in trawl fisheries (95% c.i.: 319 to 528, based on 42.4% of effort) compared with an estimate of 1208 captures in 2004–05 (95% c.i.: 926 to 1517, based on 26.1% of effort).

There were 13 turtles caught in surface longline fisheries over the nine year period (Section 3.18, p. 120). Where an identification was made, these were identified as leatherback turtles. The turtles were mainly caught to the north east of New Zealand, although one turtle was reported caught off Fiordland. Of these 13, only one was confirmed dead by the observer, and none of the identifications were confirmed by necropsy. There was also one green turtle observed caught in a bottom longline fishery on the west coast of the North Island. Although the catch rate was low, turtles were regularly caught, with catches observed in all but two of the years. The highest number observed caught in any one year was three.

Because of the low catch rate, the annual estimation produced high uncertainties in the total captures. In 2006–07 two turtles were observed caught, with the estimated bycatch being 15 animals (95% c.i.: 2 to 41, based on 99.8% of effort).

A summary of the bycatch data is given for trawl fisheries in Section 3.19 (p. 124), for surface longline fisheries in 3.20 (p. 164), and for bottom longline fisheries in 3.21 (p. 180). Observer coverage in inshore fisheries was extremely low in the past, and rose to 0.5% (292 tows) in 2006–07. There were 10 observed seabird captures, with a black petrel being one of the birds caught. This corresponded to an estimate of 243 seabird captures (95% c.i.: 10 to 554); however this was based only on the 16.4% of the fishery where there was sufficient observer coverage for the ratio estimate to be made. If the observed catch rate were representative of catches in all inshore fisheries, then the total catches would have been about six times higher.

There was a marked increase in seabird captures in the charter surface longline fishery (Table 146, p. 170). The observed captures increased from 15 birds in 2005–06 to 98 birds in 2006–07. The fishery was well observed and estimated captures followed a similar pattern, increasing from 17 (95% c.i.: 16 to 18, based on 100.0% of effort) in 2005–06 to 176 (95% c.i.: 154 to 201, based on 100.0% of effort). The increase occurred in fisheries in both AREA1 and AREA3, across a range of seabird species. It was unclear what caused this change, and there was no similar increase in the domestic surface longline fishery.

Australian vessels operated in the charter surface longline for two years. There were 58 observed bird captures in 2006–07, including 17 wandering albatross, all from one trip operating near the Kermadecs between 31 October 2006 and 11 November 2006 (Table 152, p. 176).

3.4 Comparison with previous results

There have been several previous analyses of the bycatch data. In Figure 3 the estimated total seabird captures from this report are compared with results from MacKenzie & Fletcher (2008) and Baird & Smith (2007, 2008). The comparison provides a check on both the ratio estimate technique, and on the bootstrap estimated confidence intervals. The estimates in MacKenzie & Fletcher (2008) were made by modelling the seabird bycatch data with a zero-inflated Poisson generalised linear model (GLM), fitted using maximum likelihood methods. Separate models were made for albatrosses and for petrels, estimating total captures in the New Zealand EEZ. Estimates were provided for captures by two groups of vessels, larger and smaller than 28 m in length. These were combined to give estimated total seabird captures. Baird & Smith (2007, 2008) estimated seabird captures in hoki and squid trawl fisheries using a negative binomial GLM, fitted with Bayesian methods. In longline fisheries, seabird captures were estimated with a ratio method. In their reports, errors were presented using a coefficient of variation (c.v.) and this was converted into a 95% confidence interval by assuming that the errors were normally distributed.

In nearly all cases, there was close agreement between the results presented by Baird & Smith (2007, 2008) and the results presented in this report, with the estimates not being significantly different at the 95% confidence level. The single exception was seabird captures in the domestic tuna longline fishery, which were estimated to be much lower by Baird & Smith (2008) than what is reported here. This was because Baird & Smith (2008) only included effort in AREA3 (3.4% of the total effort) in their estimate as they did not feel that observer coverage in the other areas was sufficient to allow an estimate to be made. This low observer coverage is why the estimate presented in this report has such a high uncertainty.

In general, the estimates of total captures by MacKenzie & Fletcher (2008) were higher than the estimates

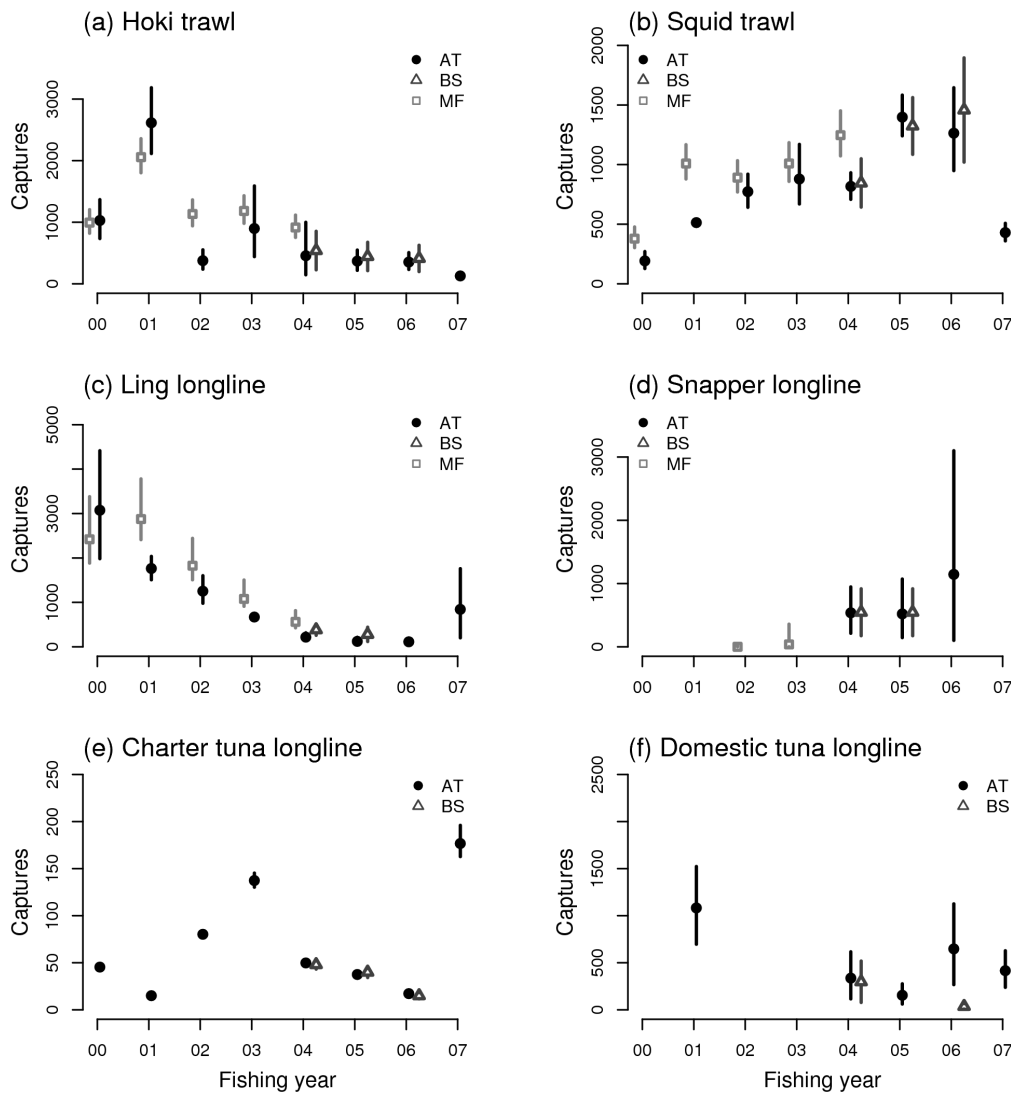


Figure 3: Comparison of estimates of total seabird captures from this report (AT) with previous estimates by MacKenzie and Fletcher (2008)(MF) and Baird and Smith (2007, 2008)(BS) in selected fisheries. The points show the best estimate and the 95% confidence intervals. A high estimated seabird bycatch in the 2001–02 domestic tuna longline fishery from this report is not shown, as it is off the scale.

in this report. This was likely to be because the MacKenzie & Fletcher (2008) model was able to estimate captures in fisheries or regions where the ratio method was not considered reliable. Despite this, the agreement is good in the three fisheries where a comparison can be made, with the exception of the 2001–02 hoki trawl, the 2000–01 squid trawl, and the 2000–01 ling longline estimates. In the single year where there was overlap, the MacKenzie & Fletcher (2008) estimates were higher than the estimates by Baird & Smith (2007), and the estimates presented in this report are closer to those presented by Baird & Smith (2007).

The comparison gives confidence that the ratio estimation used here is reliable, and that the bootstrap method gives uncertainties of a similar order to those obtained from more sophisticated methods. However, the estimated number of captures given in this report do not include captures in poorly observed fisheries. Statistical modelling will allow an estimate to be made for these fisheries.

3.5 All bird captures

3.5.1 All trawl, all birds, New Zealand EEZ

In 2006–07 there were 212 observed captures.

Table 9: Summary by year with 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.

	Tows	No. obs	% obs	Captures	Rate	Estimated captures	% eff. in est.
2006–07							
Squid trawl	5910	1289	21.8	127	9.85	427 (364 - 496)	72.6
Hoki trawl	10 608	1758	16.6	23	1.31	126 (84 - 174)	97.1
Hake trawl	1606	296	18.4	8	2.70	25 (8 - 47)	75.0
Deepwater trawl	7388	2322	31.4	1	0.04	5 (1 - 13)	79.4
Ling trawl	1659	157	9.5	2	1.27	10 (2 - 22)	39.1
SBW trawl	632	224	35.4	3	1.34	8 (3 - 18)	100.0
Scampi trawl	5138	389	7.6	25	6.43	287 (126 - 504)	87.1
Pelagic trawl	2711	802	29.6	1	0.12	2 (1 - 5)	95.4
Inshore trawl	59 538	292	0.5	10	3.42	243 (10 - 554)	16.4
Other trawl	8194	393	4.8	12	3.05	137 (59 - 239)	50.1
Total	103 384	7922	7.7	212	2.68	1272 (962 - 1641)	42.4
2005–06							
Squid trawl	8582	1103	12.9	200	18.13	1251 (939 - 1627)	81.1
Hoki trawl	11 591	1777	15.3	54	3.04	352 (234 - 502)	81.5
Hake trawl	1359	421	31.0	1	0.24	3 (1 - 8)	90.7
Deepwater trawl	8291	1292	15.6	5	0.39	29 (10 - 52)	75.0
Ling trawl	1394	113	8.1	3	2.65	3 (3 - 3)	8.1
SBW trawl	624	217	34.8	2	0.92	6 (2 - 11)	100.0
Scampi trawl	4867	331	6.8	13	3.93	93 (19 - 215)	46.5
Pelagic trawl	2808	709	25.2	0	0.00	0	76.6
Inshore trawl	62 056	103	0.2	3	2.91	3 (3 - 3)	0.2
Other trawl	8410	488	5.8	73	14.96	190 (145 - 239)	16.3
Total	109 982	6554	6.0	354	5.40	1930 (1563 - 2340)	27.7
2004–05							
Squid trawl	10 490	2511	23.9	382	15.21	1337 (1212 - 1476)	82.7
Hoki trawl	14 540	2133	14.7	46	2.16	356 (221 - 510)	92.0
Hake trawl	1555	95	6.1	8	8.42	8 (8 - 8)	6.1
Deepwater trawl	8409	1618	19.2	19	1.17	79 (35 - 152)	66.6
Ling trawl	988	76	7.7	3	3.95	3 (3 - 3)	7.7
SBW trawl	870	335	38.5	2	0.60	5 (2 - 10)	99.9
Scampi trawl	4648	143	3.1	9	6.29	9 (9 - 9)	3.1
Pelagic trawl	2509	558	22.2	8	1.43	32 (15 - 57)	95.1
Inshore trawl	67 295	18	0.0	0	0.00	0	0.0
Other trawl	9192	223	2.4	4	1.79	4 (4 - 4)	2.4
Total	120 496	7710	6.4	481	6.24	1834 (1639 - 2054)	26.1

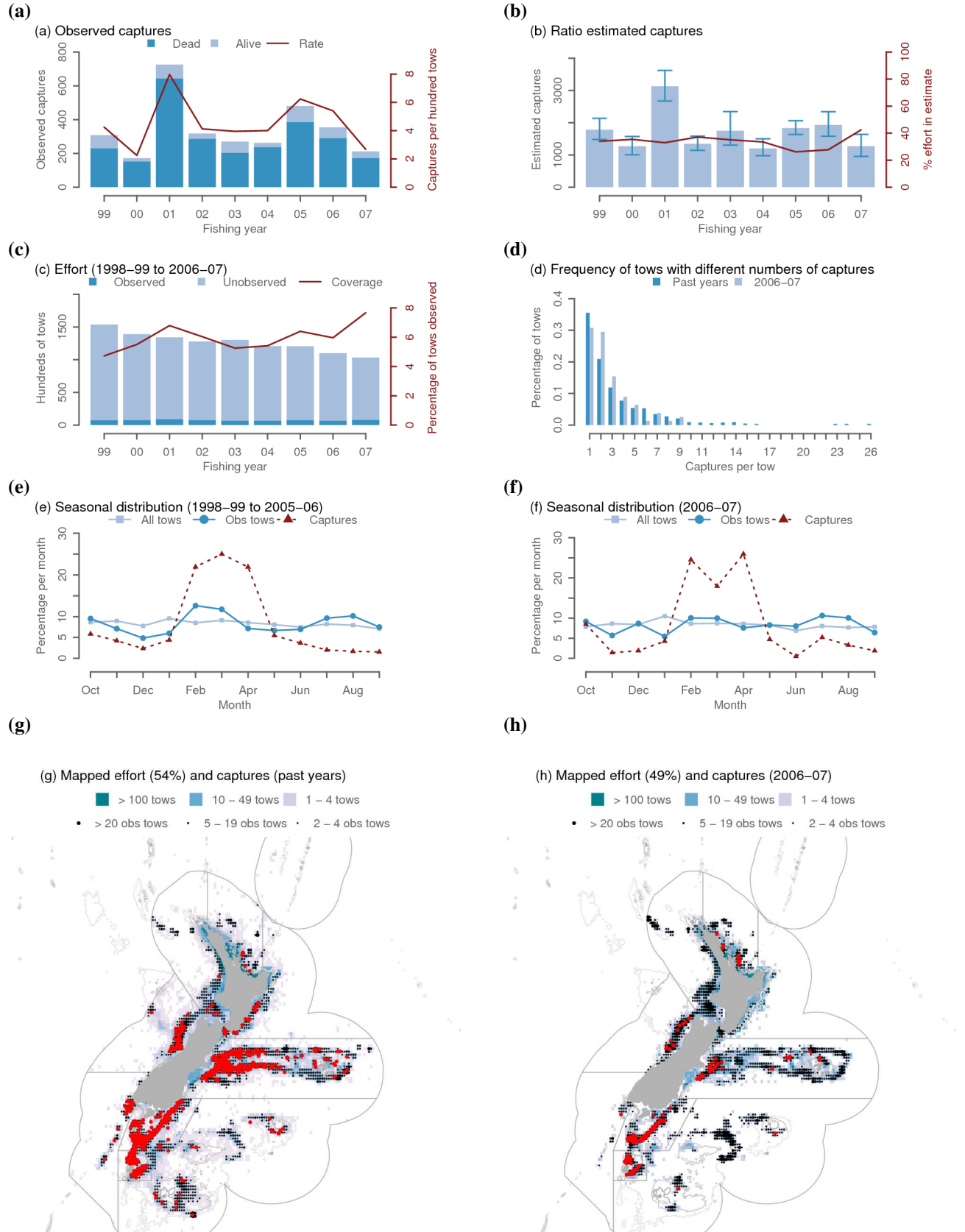


Figure 4: All bird captures in all trawl fisheries. (a) Observed captures, (b) Ratio estimated captures, with 95% bootstrap confidence intervals, (c) Effort and observed effort, (d) Histogram of the number of captures per tow, (e, f) Monthly distributions of effort, observations and captures, (g, h) Mapped effort and captures from past years (showing annual averaged effort and observations, but all captures) and from 2006–07.

3.5.2 All birds, surface longline, New Zealand EEZ

In 2006–07 there were 187 observed captures.

Table 10: Summary by year with number of hooks, number of hooks observed, percentage of hooks observed, number of observed captures, capture rate per ten thousand hooks, total estimated captures with 95% confidence intervals, and percentage of hooks included in the estimate.

	Hooks	No. obs	% obs	Captures	Rate	Estimated captures	% eff. in est.
2006–07							
Domestic	2 253 202	169 592	7.5	31	1.83	409 (266 - 571)	99.6
Charter	1 381 210	755 342	54.7	98	1.30	176 (154 - 201)	100.0
Australian	84 820	30 985	36.5	58	18.72	130 (92 - 177)	100.0
Total	3 719 232	955 919	25.7	187	1.96	715 (565 - 885)	99.8
2005–06							
Domestic	3 062 409	88 143	2.9	22	2.50	598 (326 - 904)	91.5
Charter	608 610	539 977	88.7	15	0.28	17 (16 - 18)	100.0
Australian	16 550	8676	52.4	0	0.00	0	52.4
Total	3 687 569	636 796	17.3	37	0.58	615 (343 - 927)	92.8
2004–05							
Domestic	3 038 211	140 844	4.6	8	0.57	155 (63 - 262)	83.5
Charter	638 584	562 825	88.1	33	0.59	37 (36 - 39)	100.0
Total	3 676 795	703 669	19.1	41	0.58	192 (101 - 300)	86.3
2003–04							
Domestic	6 212 260	393 749	6.3	25	0.63	329 (148 - 541)	89.7
Charter	1 170 033	1 070 716	91.5	46	0.43	50 (48 - 51)	99.9
Total	7 382 293	1 464 465	19.8	71	0.48	379 (208 - 588)	91.3
2002–03							
Domestic	8 869 423	241 779	2.7	1	0.04	2 (1 - 4)	5.6
Charter	1 912 452	1 638 676	85.7	114	0.70	135 (131 - 140)	100.0
Total	10 781 875	1 880 455	17.4	115	0.61	137 (132 - 142)	22.4
2001–02							
Domestic	10 154 145	242 476	2.4	91	3.75	4489 (2826 - 6500)	84.3
Charter	722 236	675 683	93.6	76	1.12	80 (79 - 81)	98.7
Total	10 876 381	918 159	8.4	167	1.82	4570 (2894 - 6632)	85.2
2000–01							
Domestic	9 161 530	431 784	4.7	38	0.88	1090 (722 - 1500)	95.9
Charter	599 918	597 334	99.6	15	0.25	15 (15 - 15)	97.4
Total	9 761 448	1 029 118	10.5	53	0.52	1105 (746 - 1512)	96.0

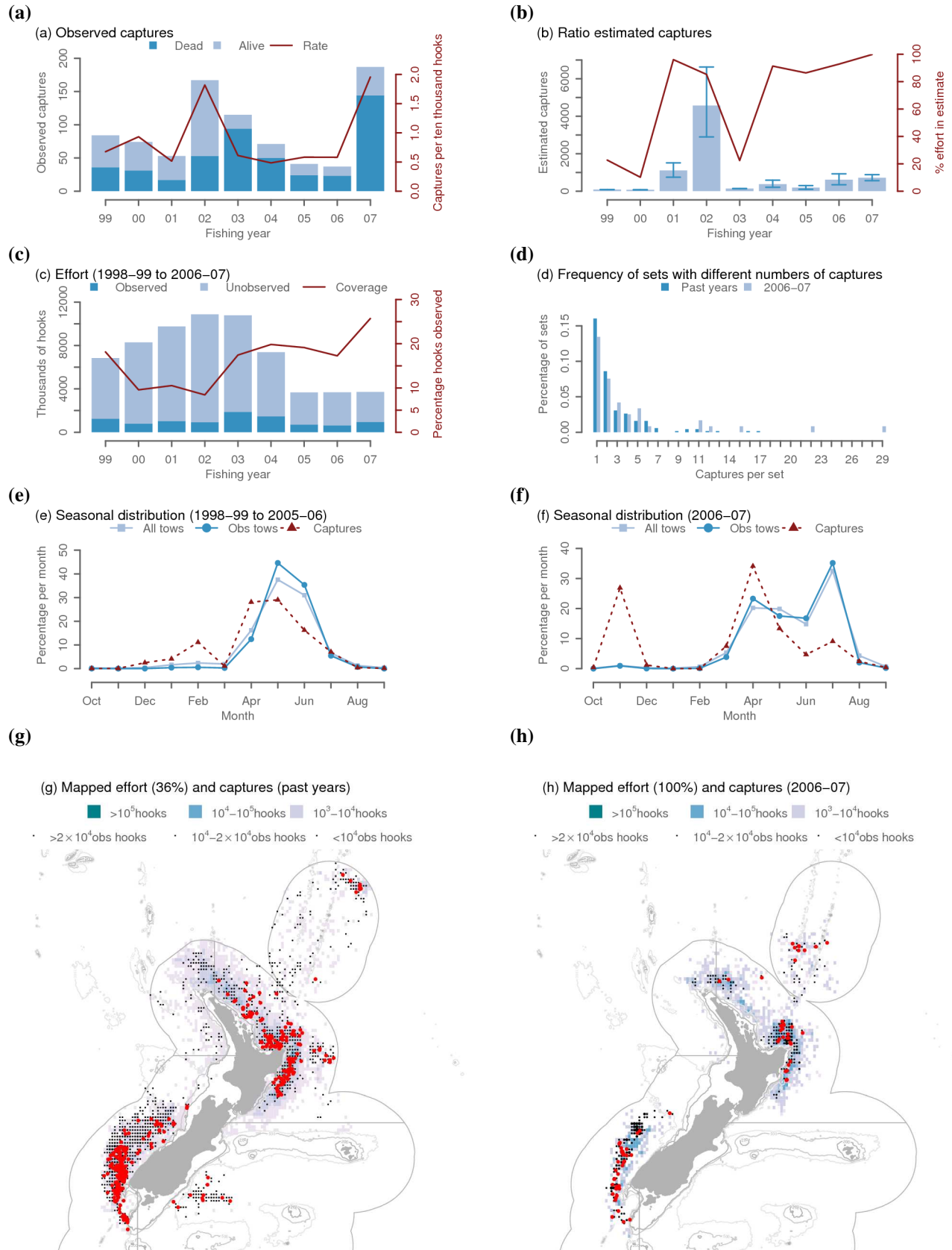


Figure 5: All bird captures in the surface longline fishery. (a) Observed captures, (b) Ratio estimated captures, with 95% bootstrap confidence intervals, (c) Effort and observed effort, (d) Histogram of the number of captures per tow, (e, f) Monthly distributions of effort, observations and captures, (g, h) Mapped effort and captures from past years (showing annual averaged effort and observations, but all captures) and from 2006-07.

3.5.3 All birds, bottom longline, New Zealand EEZ

In 2006–07 there were 58 observed captures.

Table 11: Summary by year with number of hooks, number of hooks observed, percentage of hooks observed, number of observed captures, capture rate per ten thousand hooks, total estimated captures with 95% confidence intervals, and percentage of hooks included in the estimate.

	Hooks	No. obs	% obs	Captures	Rate	Estimated captures	% eff. in est.
2006–07							
Ling	16 900 158	2 179 707	12.9	51	0.23	812 (333 - 1433)	87.0
Snapper	10 344 640	63 650	0.6	0	0.00	0	0.6
Bluenose	7 487 163	92 718	1.2	7	0.75	308 (77 - 591)	55.3
Other	3 432 890	8130	0.2	0	0.00	0	0.2
Total	38 164 851	2 344 205	6.1	58	0.25	1120 (581 - 1796)	49.6
2005–06							
Ling	16 222 501	3 599 075	22.2	29	0.08	116 (79 - 158)	78.0
Snapper	11 694 638	125 894	1.1	12	0.95	1114 (178 - 2395)	98.3
Bluenose	6 150 791	56 900	0.9	0	0.00	0	30.4
Other	3 057 709	40 590	1.3	0	0.00	0	27.6
Total	37 125 639	3 822 459	10.3	41	0.11	1230 (286 - 2534)	72.3
2004–05							
Ling	21 544 721	2 645 620	12.3	18	0.07	111 (55 - 176)	85.5
Snapper	11 531 586	264 404	2.3	12	0.45	521 (143 - 1077)	98.3
Bluenose	5 315 543	9955	0.2	0	0.00	0	0.2
Other	3 449 083	7949	0.2	0	0.00	0	0.2
Total	41 840 933	2 927 928	7.0	30	0.10	631 (260 - 1192)	71.2
2003–04							
Ling	24 741 780	5 698 560	23.0	57	0.10	195 (131 - 287)	91.7
Snapper	12 254 888	221 073	1.8	10	0.45	538 (222 - 949)	97.1
Bluenose	3 328 650	0	0.0	0	0.00	0	0.0
Other	3 124 415	0	0.0	0	0.00	0	0.0
Total	43 449 733	5 919 633	13.6	67	0.11	733 (405 - 1140)	79.6
2002–03							
Ling	19 702 549	11 299 295	57.3	266	0.24	374 (354 - 397)	90.7
Snapper	13 722 067	0	0.0	0	0.00	0	0.0
Bluenose	1 899 774	0	0.0	0	0.00	0	0.0
Other	2 428 946	9000	0.4	0	0.00	0	0.4
Total	37 753 336	11 308 295	30.0	266	0.24	374 (352 - 396)	47.3
2001–02							
Ling	27 995 371	7 547 517	27.0	427	0.57	1113 (900 - 1370)	86.8
Snapper	15 372 878	0	0.0	0	0.00	0	0.0
Bluenose	1 703 985	0	0.0	0	0.00	0	0.0
Other	1 952 098	0	0.0	0	0.00	0	0.0
Total	47 024 332	7 547 517	16.1	427	0.57	1113 (908 - 1372)	51.7
2000–01							
Ling	29 114 743	5 033 144	17.3	505	1.00	1421 (1245 - 1613)	51.4
Snapper	17 336 728	44 049	0.3	26	5.90	26 (26 - 26)	0.3
Bluenose	2 157 384	171 709	8.0	3	0.17	11 (3 - 21)	30.9
Other	2 415 512	0	0.0	0	0.00	0	0.0
Total	51 024 367	5 248 902	10.3	534	1.02	1458 (1276 - 1657)	30.7

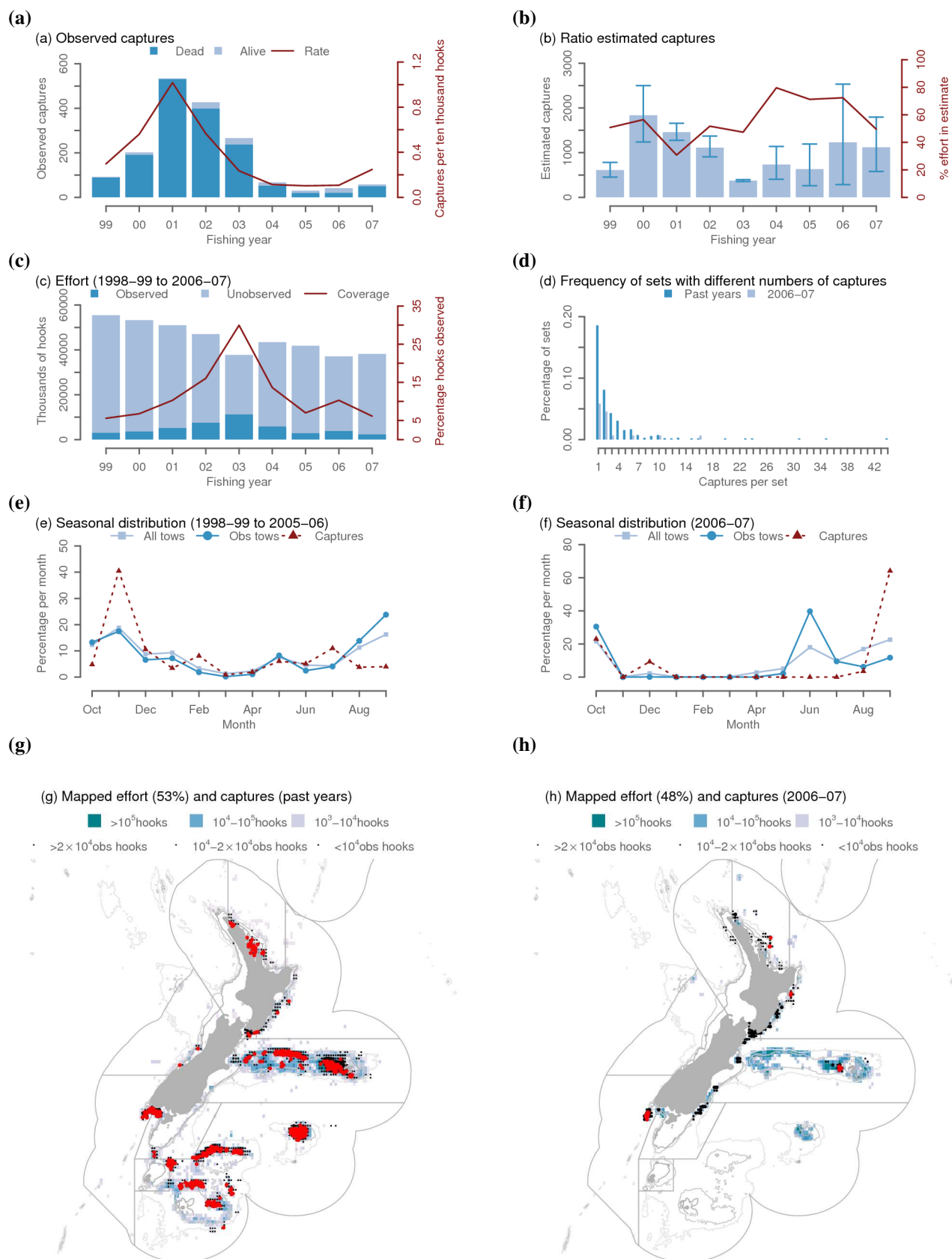


Figure 6: All bird captures in the bottom longline fishery. (a) Observed captures, (b) Ratio estimated captures, with 95% bootstrap confidence intervals, (c) Effort and observed effort, (d) Histogram of the number of captures per tow, (e, f) Monthly distributions of effort, observations and captures, (g, h) Mapped effort and captures from past years (showing annual averaged effort and observations, but all captures) and from 2006–07.

3.6 White-capped albatross captures

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

In 2006–07 there were 56 observed captures.

Table 12: Summary by year with 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.

	Tows	No. obs	% obs	Captures	Rate	Estimated captures	% eff. in est.
2006–07							
Squid, SQUAK6	1317	538	40.9	17	3.16	41 (30 - 54)	100.0
Squid, STEW5	2926	705	24.1	24	3.40	99 (68 - 133)	100.0
Other trawl	99 141	6681	6.7	15	0.22	96 (41 - 167)	40.0
Total	103 384	7922	7.7	56	0.71	236 (170 - 310)	42.4
2005–06							
Squid, SQUAK6	2459	550	22.4	28	5.09	124 (66 - 207)	100.0
Squid, STEW5	4481	537	12.0	16	2.98	132 (67 - 204)	100.0
Other trawl	103 042	5467	5.3	24	0.44	106 (66 - 154)	22.8
Total	109 982	6554	6.0	68	1.04	363 (261 - 480)	27.7
2004–05							
Squid, SQUAK6	2693	806	29.9	121	15.01	402 (341 - 467)	100.0
Squid, STEW5	5861	1580	27.0	104	6.58	383 (308 - 469)	100.0
Other trawl	111 942	5324	4.8	11	0.21	17 (11 - 29)	20.5
Total	120 496	7710	6.4	236	3.06	802 (708 - 907)	26.1
2003–04							
Squid, SQUAK6	2594	791	30.5	81	10.24	263 (218 - 315)	100.0
Squid, STEW5	4534	956	21.1	54	5.65	255 (199 - 318)	100.0
Other trawl	113 795	4800	4.2	9	0.19	41 (20 - 67)	29.3
Total	120 923	6547	5.4	144	2.20	559 (482 - 641)	33.5
2002–03							
Squid, SQUAK6	1466	417	28.4	16	3.84	56 (38 - 76)	100.0
Squid, STEW5	3281	506	15.4	45	8.89	289 (197 - 403)	100.0
Other trawl	125 455	5913	4.7	18	0.30	150 (83 - 232)	32.6
Total	130 202	6836	5.3	79	1.16	495 (376 - 636)	35.1
2001–02							
Squid, SQUAK6	1647	563	34.2	46	8.17	134 (92 - 199)	100.0
Squid, STEW5	3289	714	21.7	69	9.66	315 (229 - 415)	100.0
Other trawl	122 976	6440	5.2	38	0.59	256 (134 - 428)	34.6
Total	127 912	7717	6.0	153	1.98	705 (542 - 913)	37.1
2000–01							
Squid, SQUAK6	583	577	99.0	39	6.76	39 (39 - 40)	100.0
Squid, STEW5	3300	2327	70.5	145	6.23	205 (192 - 220)	100.0
Other trawl	130 373	6210	4.8	45	0.72	156 (101 - 217)	30.9
Total	134 256	9114	6.8	229	2.51	401 (346 - 466)	32.9

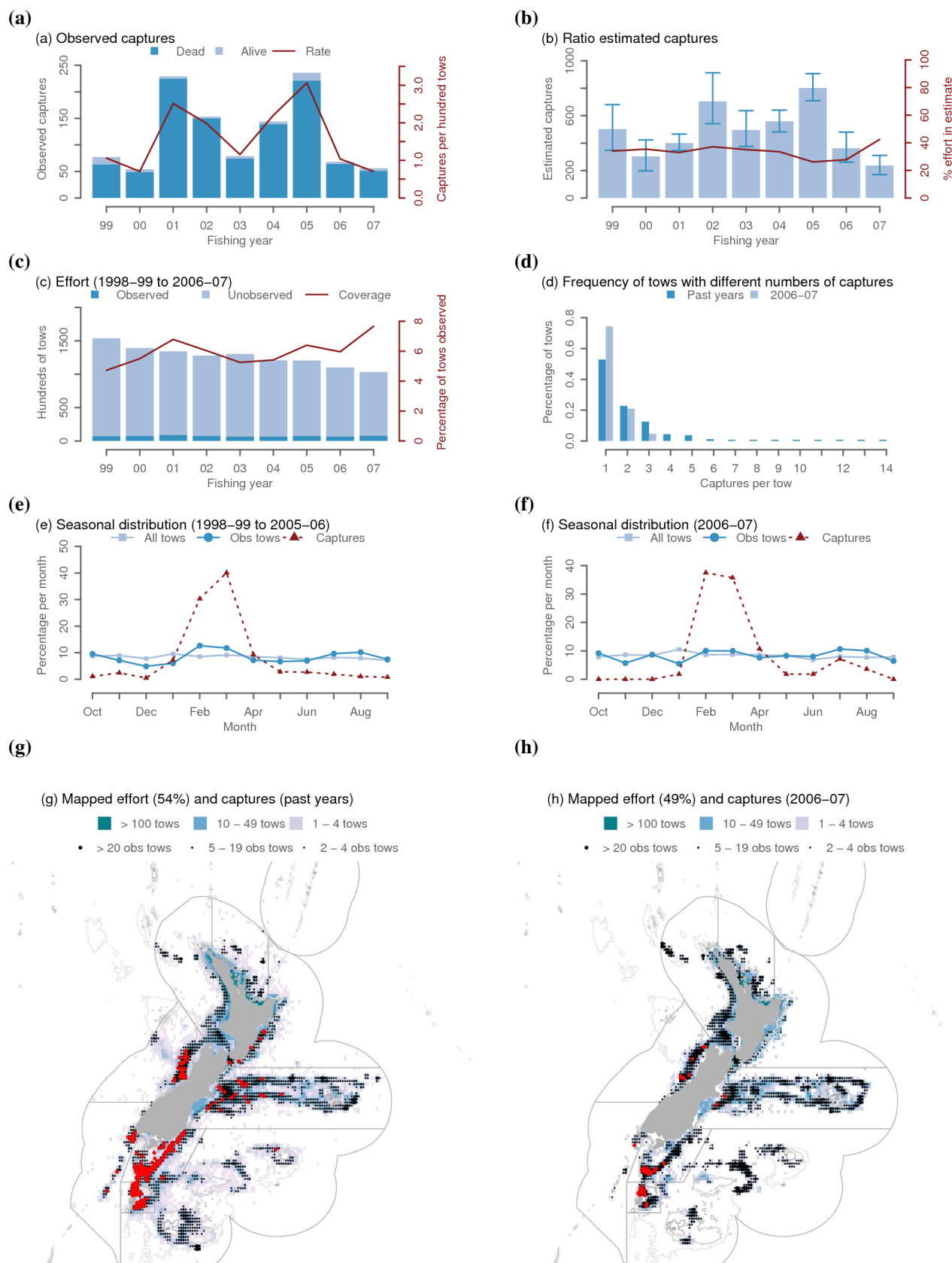


Figure 7: White-capped albatross captures in all trawl fisheries. (a) Observed captures, (b) Ratio estimated captures, with 95% bootstrap confidence intervals, (c) Effort and observed effort, (d) Histogram of the number of captures per tow, (e, f) Monthly distributions of effort, observations and captures, (g, h) Mapped effort and captures from past years (showing annual averaged effort and observations, but all captures) and from 2006–07.

3.6.2 White-capped albatross, squid trawl, Auckland Islands

In 2006–07 there were 17 observed captures.

Table 13: Summary by year with 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.

	Tows	No. obs	% obs	Captures	Rate	Estimated captures	% eff. in est.
2006–07	1317	538	40.9	17	3.16	41 (30 - 54)	100.0
2005–06	2459	550	22.4	28	5.09	124 (66 - 207)	100.0
2004–05	2693	806	29.9	121	15.01	402 (341 - 467)	100.0
2003–04	2594	791	30.5	81	10.24	263 (218 - 315)	100.0
2002–03	1466	417	28.4	16	3.84	56 (38 - 76)	100.0
2001–02	1647	563	34.2	46	8.17	134 (92 - 199)	100.0
2000–01	583	577	99.0	39	6.76	39 (39 - 40)	100.0
1999–00	1208	439	36.3	19	4.33	52 (36 - 70)	100.0
1998–99	402	156	38.8	1	0.64	3 (1 - 6)	100.0

Table 14: White-capped albatrosses caught by area with numbers of animals captured, dead and necropsied.

	SQUAK6		
	captured	dead	necropsied
2006–07			
White-capped albatross	16	15	13
Shy albatross	1	0	0
2005–06			
White-capped albatross	27	27	27
Shy albatross	1	1	0
2004–05			
White-capped albatross	121	114	71
2003–04			
White-capped albatross	79	79	71
Shy albatross	2	0	0
2002–03			
White-capped albatross	16	15	13
2001–02			
White-capped albatross	46	46	44
2000–01			
White-capped albatross	39	39	36
1999–00			
White-capped albatross	19	18	17
1998–99			
White-capped albatross	1	1	1

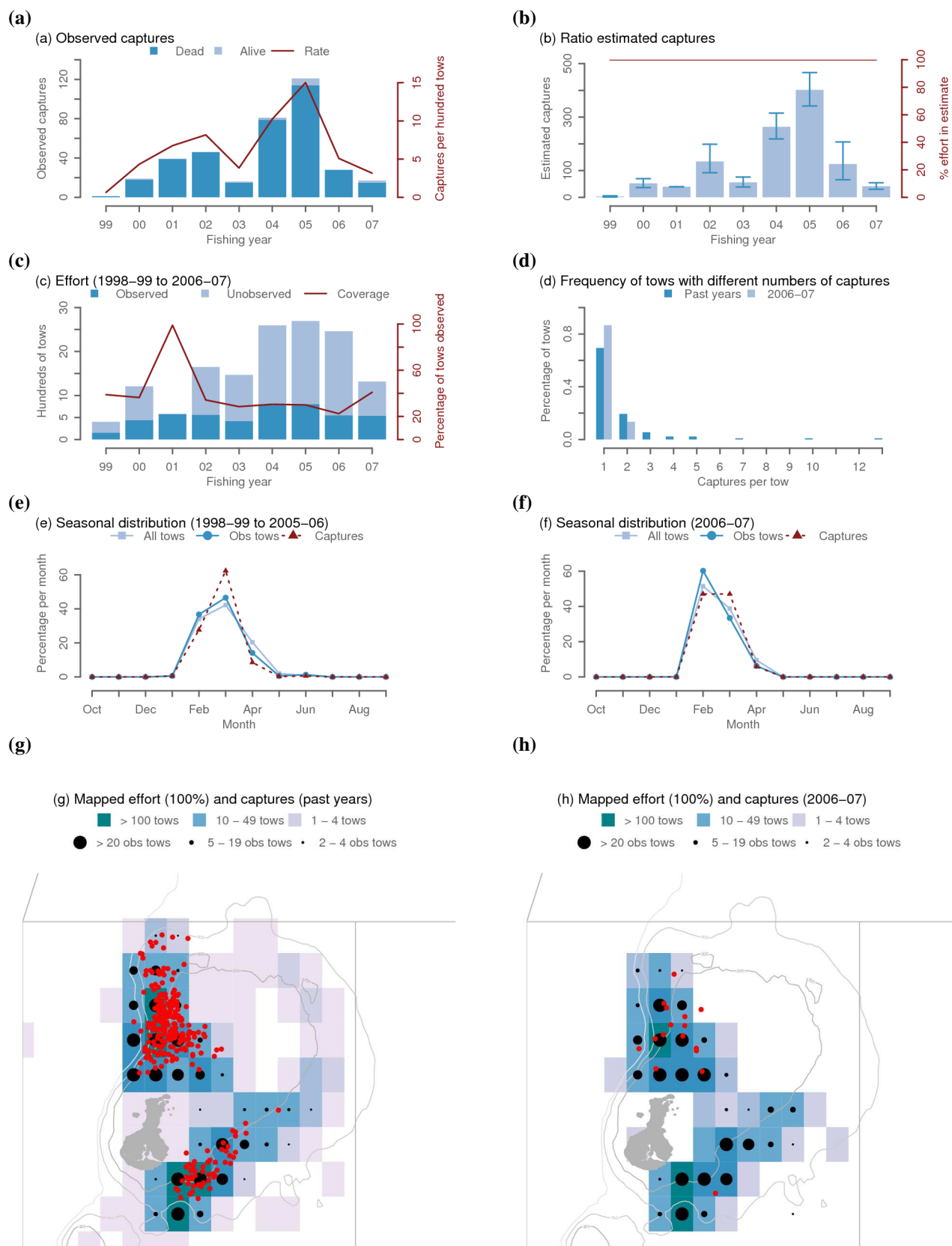


Figure 8: White-capped albatross captures in the squid trawl fishery, in the Auckland Islands area. (a) Observed captures, (b) Ratio estimated captures, with 95% bootstrap confidence intervals, (c) Effort and observed effort, (d) Histogram of the number of captures per tow, (e, f) Monthly distributions of effort, observations and captures, (g, h) Mapped effort and captures from past years (showing annual averaged effort and observations, but all captures) and from 2006–07.

3.6.3 White-capped albatross, squid trawl, Stewart Snares Shelf

In 2006–07 there were 24 observed captures.

Table 15: Summary by year with 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.

	Tows	No. obs	% obs	Captures	Rate	Estimated captures	% eff. in est.
2006–07	2926	705	24.1	24	3.40	99 (68 - 133)	100.0
2005–06	4481	537	12.0	16	2.98	132 (67 - 204)	100.0
2004–05	5861	1580	27.0	104	6.58	383 (308 - 469)	100.0
2003–04	4534	956	21.1	54	5.65	255 (199 - 318)	100.0
2002–03	3281	506	15.4	45	8.89	289 (197 - 403)	100.0
2001–02	3289	714	21.7	69	9.66	315 (229 - 415)	100.0
2000–01	3300	2327	70.5	145	6.23	205 (192 - 220)	100.0
1999–00	2003	370	18.5	8	2.16	43 (12 - 96)	100.0
1998–99	5887	821	13.9	40	4.87	282 (155 - 446)	100.0

Table 16: White-capped albatrosses caught by area with numbers of animals captured, dead and necropsied.

	STEW5		
	captured	dead	necropsied
2006–07			
White-capped albatross	24	22	20
2005–06			
White-capped albatross	16	16	16
2004–05			
White-capped albatross	96	91	88
Shy albatross	8	8	0
2003–04			
White-capped albatross	54	53	49
2002–03			
White-capped albatross	45	43	42
2001–02			
White-capped albatross	69	68	65
2000–01			
White-capped albatross	144	142	111
Shy albatross	1	1	0
1999–00			
White-capped albatross	8	7	7
1998–99			
White-capped albatross	40	29	28

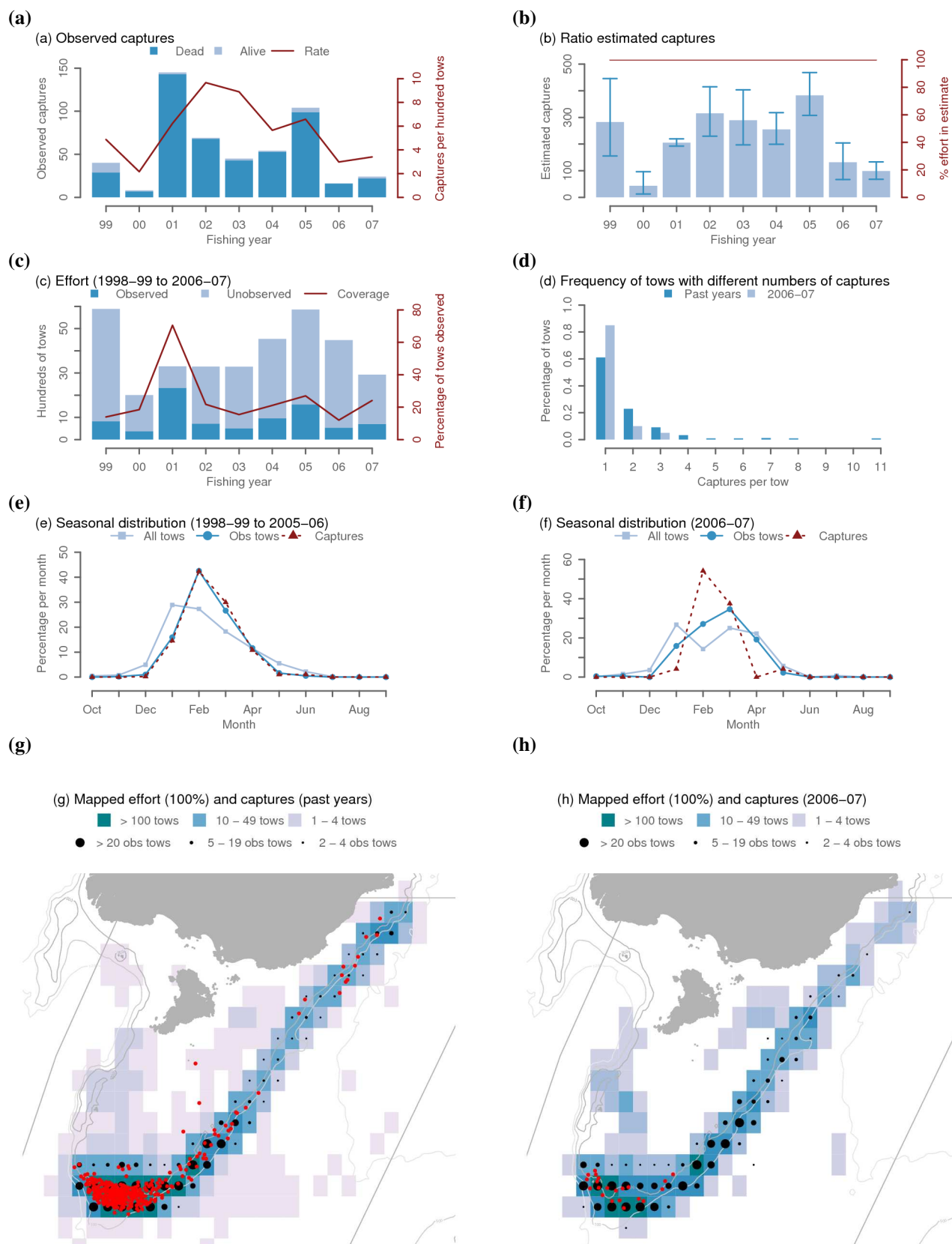


Figure 9: White-capped albatross captures in the squid trawl fishery, in Stewart Snares Shelf. (a) Observed captures, (b) Ratio estimated captures, with 95% bootstrap confidence intervals, (c) Effort and observed effort, (d) Histogram of the number of captures per tow, (e, f) Monthly distributions of effort, observations and captures, (g, h) Mapped effort and captures from past years (showing annual averaged effort and observations, but all captures) and from 2006–07.

3.6.4 White-capped albatross, all trawl, New Zealand EEZ excluding squid trawl in the Auckland Islands and Stewart-Snares shelf regions

In 2006–07 there were 15 observed captures.

Table 17: Summary by year with 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.

	Tows	No. obs	% obs	Captures	Rate	Estimated captures	% eff. in est.
2006–07	99 141	6681	6.7	15	0.22	96 (41 - 167)	40.0
2005–06	103 042	5467	5.3	24	0.44	106 (66 - 154)	22.8
2004–05	111 942	5324	4.8	11	0.21	17 (11 - 29)	20.5
2003–04	113 795	4800	4.2	9	0.19	41 (20 - 67)	29.3
2002–03	125 455	5913	4.7	18	0.30	150 (83 - 232)	32.6
2001–02	122 976	6440	5.2	38	0.59	256 (134 - 428)	34.6
2000–01	130 373	6210	4.8	45	0.72	156 (101 - 217)	30.9
1999–00	135 891	6842	5.0	27	0.39	208 (114 - 316)	33.8
1998–99	147 470	6280	4.3	36	0.57	217 (139 - 306)	31.1

Table 18: White-capped albatrosses caught by area with numbers of animals captured, dead and necropsied.

	STEW5			WCSI7			CHAT4			Other Areas		
	c.	d.	n.	c.	d.	n.	c.	d.	n.	c.	d.	n.
2006–07												
White-capped albatross	2	1	1	8	8	7	2	2	1	3	3	3
2005–06												
White-capped albatross	19	17	16	-	-	-	-	-	-	3	2	0
Shy albatross	1	1	0	-	-	-	-	-	-	1	0	0
2004–05												
White-capped albatross	2	2	2	3	2	2	2	2	2	3	2	2
Shy albatross	-	-	-	-	-	-	-	-	-	1	0	0
2003–04												
White-capped albatross	1	1	0	6	5	4	-	-	-	1	1	1
Shy albatross	-	-	-	1	0	0	-	-	-	-	-	-
2002–03												
White-capped albatross	3	3	3	3	3	3	1	1	1	8	8	8
Shy albatross	1	0	0	2	1	0	-	-	-	-	-	-
2001–02												
White-capped albatross	27	25	12	7	7	6	1	1	1	3	3	3
2000–01												
White-capped albatross	29	29	29	5	5	3	6	5	3	3	2	1
Shy albatross	-	-	-	-	-	-	-	-	-	2	2	0
1999–00												
White-capped albatross	10	7	7	3	3	3	10	10	9	3	3	3
Shy albatross	-	-	-	-	-	-	1	1	0	-	-	-
1998–99												
White-capped albatross	24	21	20	6	6	6	4	4	2	2	2	2

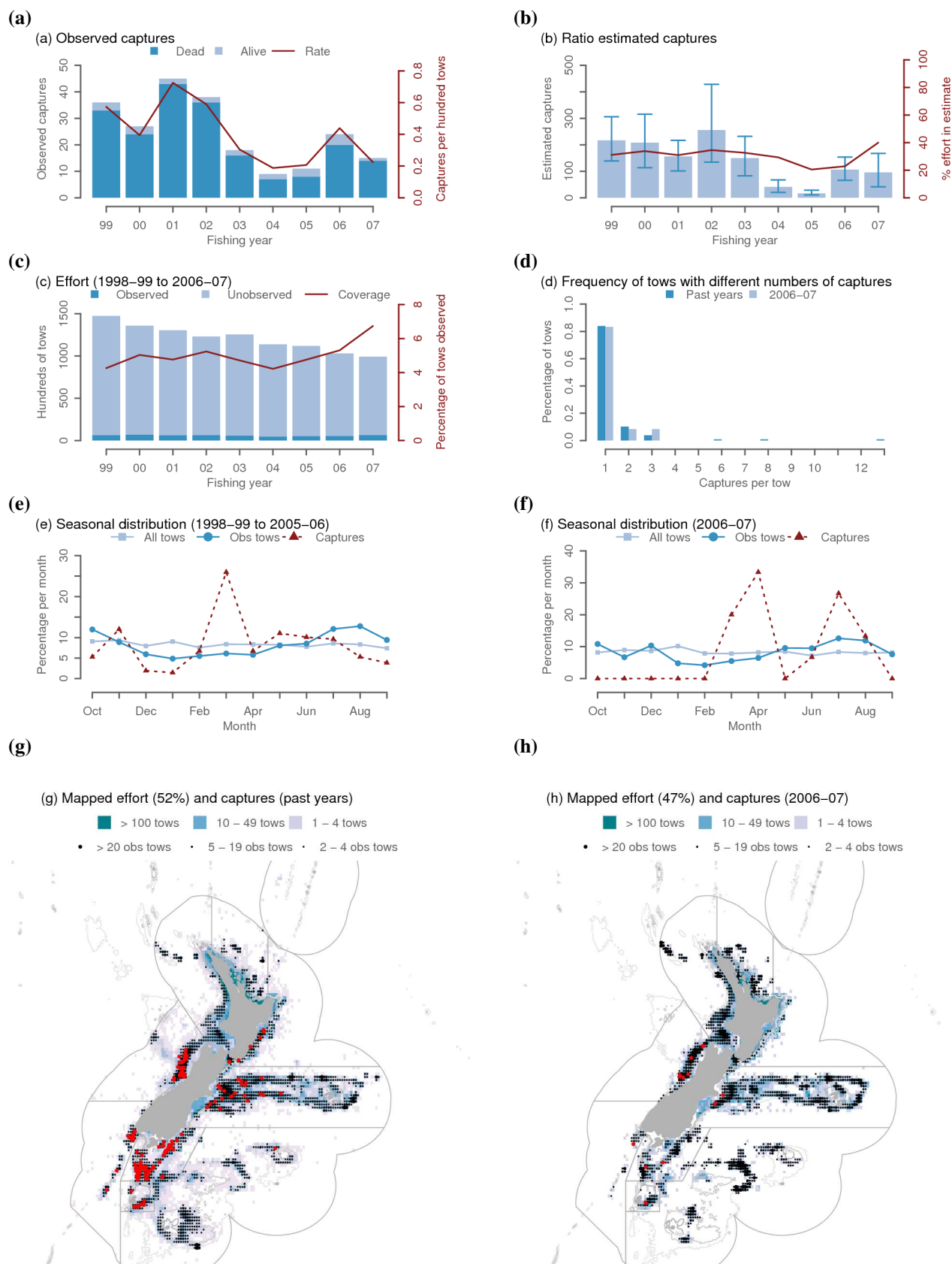


Figure 10: White-capped albatross captures in other trawl fisheries. (a) Observed captures, (b) Ratio estimated captures, with 95% bootstrap confidence intervals, (c) Effort and observed effort, (d) Histogram of the number of captures per tow, (e, f) Monthly distributions of effort, observations and captures, (g, h) Mapped effort and captures from past years (showing annual averaged effort and observations, but all captures) and from 2006–07.

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

In 2006–07 there were 29 observed captures.

Table 19: Summary by year with number of hooks, number of hooks observed, percentage of hooks observed, number of observed captures, capture rate per ten thousand hooks, total estimated captures with 95% confidence intervals, and percentage of hooks included in the estimate.

	Hooks	No. obs	% obs	Captures	Rate	Estimated captures	% eff. in est.
2006–07	3 719 232	955 919	25.7	29	0.30	64 (41 - 98)	99.8
2005–06	3 687 569	636 796	17.3	2	0.03	2 (2 - 2)	92.8
2004–05	3 676 795	703 669	19.1	3	0.04	3 (3 - 4)	86.3
2003–04	7 382 293	1 464 465	19.8	17	0.12	62 (19 - 146)	91.3
2002–03	10 781 875	1 880 455	17.4	2	0.01	2 (2 - 2)	22.4
2001–02	10 876 381	918 159	8.4	13	0.14	14 (13 - 14)	85.2
2000–01	9 761 448	1 029 118	10.5	3	0.03	3 (3 - 3)	96.0
1999–00	8 286 120	793 770	9.6	6	0.08	6 (6 - 7)	10.2
1998–99	6 845 781	1 242 610	18.2	8	0.06	8 (8 - 9)	22.7

Table 20: White-capped albatrosses caught by area with numbers of animals captured, dead and necropsied.

	AREA3			AREA1			AREA2		
	cap.	dead	nec.	cap.	dead	nec.	cap.	dead	nec.
2006–07	28	27	24	1	1	1	-	-	-
2005–06	2	2	2	-	-	-	-	-	-
2004–05	3	2	2	-	-	-	-	-	-
2003–04	16	15	15	1	1	1	-	-	-
2002–03	2	1	1	-	-	-	-	-	-
2001–02	13	10	10	-	-	-	-	-	-
2000–01	3	3	3	-	-	-	-	-	-
1999–00	4	3	3	-	-	-	2	2	2
1998–99	8	4	4	-	-	-	-	-	-

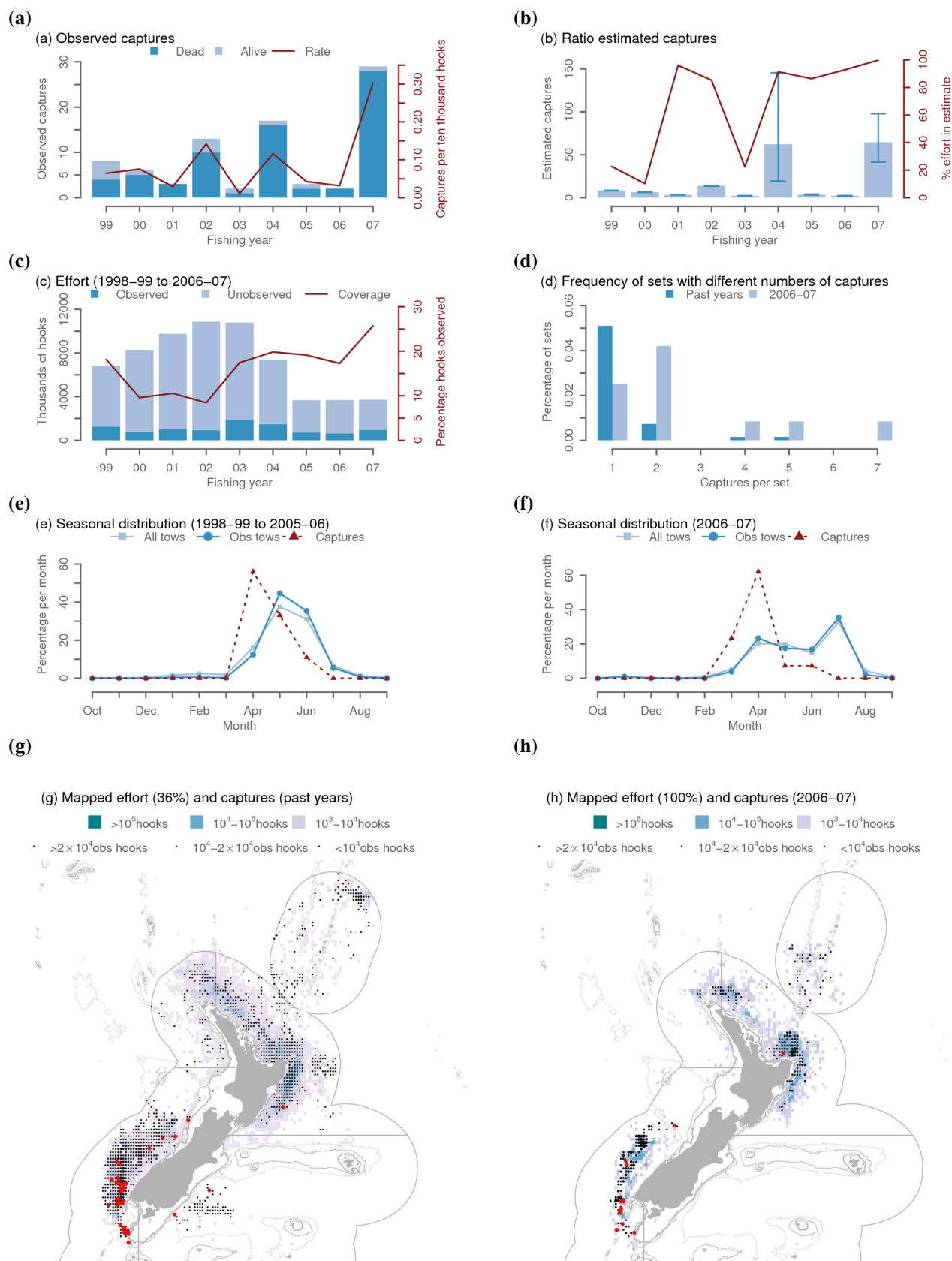


Figure 11: White-capped albatross captures in the surface longline fishery. (a) Observed captures, (b) Ratio estimated captures, with 95% bootstrap confidence intervals, (c) Effort and observed effort, (d) Histogram of the number of captures per tow, (e, f) Monthly distributions of effort, observations and captures, (g, h) Mapped effort and captures from past years (showing annual averaged effort and observations, but all captures) and from 2006–07.

3.6.6 White-capped albatross, bottom longline, New Zealand EEZ

In 2006–07 there were no observed captures.

Table 21: Summary by year with number of hooks, number of hooks observed, percentage of hooks observed, number of observed captures, capture rate per ten thousand hooks, total estimated captures with 95% confidence intervals, and percentage of hooks included in the estimate.

	Hooks	No. obs	% obs	Captures	Rate	Estimated captures	% eff. in est.
2006–07	38 164 851	2 344 205	6.1	0	0.00	0	49.6
2005–06	37 125 639	3 822 459	10.3	1	0.00	1 (1 - 1)	72.3
2004–05	41 840 933	2 927 928	7.0	0	0.00	0	71.2
2003–04	43 449 733	5 919 633	13.6	1	0.00	36 (1 - 114)	79.6
2002–03	37 753 336	11 308 295	30.0	1	0.00	2 (1 - 3)	47.3
2001–02	47 024 332	7 547 517	16.1	1	0.00	3 (1 - 6)	51.7
2000–01	51 024 367	5 248 902	10.3	1	0.00	3 (1 - 8)	30.7
1999–00	53 277 149	3 606 478	6.8	4	0.01	9 (4 - 16)	56.4
1998–99	55 487 193	3 097 198	5.6	0	0.00	0	50.7

Table 22: White-capped albatrosses caught by area with numbers of animals captured, dead and necropsied.

	STEW5			CHAT4			SUBA6			WCSI7		
	c.	d.	n.	c.	d.	n.	c.	d.	n.	c.	d.	n.
2005–06												
White-capped albatross	1	0	0	-	-	-	-	-	-	-	-	-
2003–04												
White-capped albatross	-	-	-	-	-	-	-	-	-	1	0	0
2002–03												
Shy albatross	-	-	-	1	1	0	-	-	-	-	-	-
2001–02												
White-capped albatross	-	-	-	1	0	0	-	-	-	-	-	-
2000–01												
White-capped albatross	-	-	-	-	-	-	1	1	1	-	-	-
1999–00												
White-capped albatross	4	4	0	-	-	-	-	-	-	-	-	-

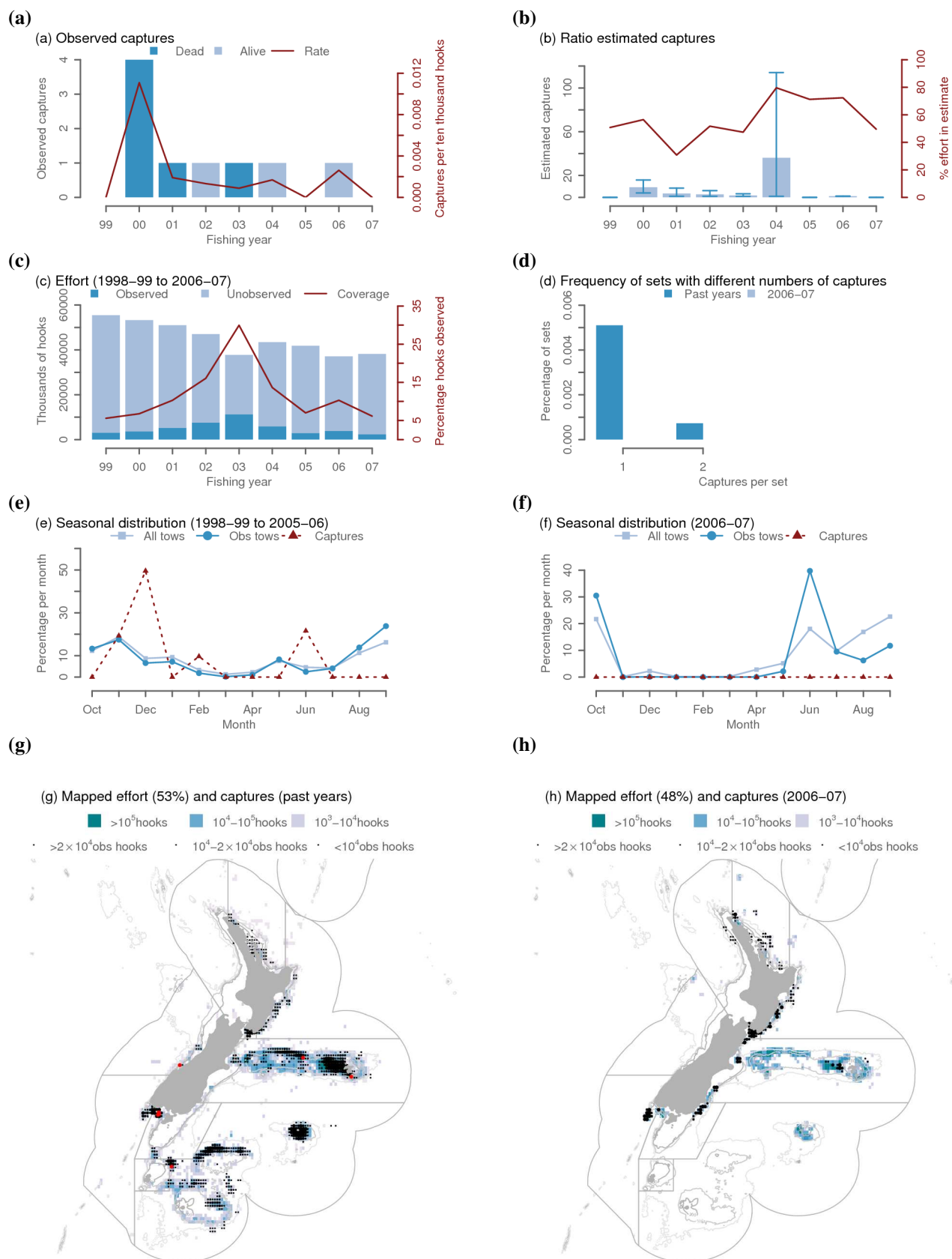


Figure 12: White-capped albatross captures in the bottom longline fishery. (a) Observed captures, (b) Ratio estimated captures, with 95% bootstrap confidence intervals, (c) Effort and observed effort, (d) Histogram of the number of captures per tow, (e, f) Monthly distributions of effort, observations and captures, (g, h) Mapped effort and captures from past years (showing annual averaged effort and observations, but all captures) and from 2006–07.

3.7 White-chinned petrel captures

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

In 2006–07 there were 30 observed captures.

Table 23: Summary by year with 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.

	Tows	No. obs	% obs	Captures	Rate	Estimated captures	% eff. in est.
2006–07							
Squid, SQUAK6	1317	538	40.9	17	3.16	41 (28 - 56)	100.0
Squid, STEW5	2926	705	24.1	9	1.28	37 (21 - 56)	100.0
Other trawl	99 141	6681	6.7	4	0.06	29 (9 - 57)	40.0
Total	103 384	7922	7.7	30	0.38	108 (76 - 145)	42.4
2005–06							
Squid, SQUAK6	2459	550	22.4	48	8.73	213 (117 - 331)	100.0
Squid, STEW5	4481	537	12.0	11	2.05	91 (40 - 156)	100.0
Other trawl	103 042	5467	5.3	7	0.13	39 (17 - 66)	22.8
Total	109 982	6554	6.0	66	1.01	343 (228 - 485)	27.7
2004–05							
Squid, SQUAK6	2693	806	29.9	15	1.86	50 (31 - 71)	100.0
Squid, STEW5	5861	1580	27.0	33	2.09	121 (84 - 167)	100.0
Other trawl	111 942	5324	4.8	4	0.08	16 (4 - 33)	20.5
Total	120 496	7710	6.4	52	0.67	187 (142 - 237)	26.1
2003–04							
Squid, SQUAK6	2594	791	30.5	9	1.14	29 (18 - 43)	100.0
Squid, STEW5	4534	956	21.1	7	0.73	33 (14 - 59)	100.0
Other trawl	113 795	4800	4.2	1	0.02	8 (1 - 22)	29.3
Total	120 923	6547	5.4	17	0.26	70 (44 - 102)	33.5
2002–03							
Squid, SQUAK6	1466	417	28.4	4	0.96	14 (4 - 29)	100.0
Squid, STEW5	3281	506	15.4	0	0.00	0	100.0
Other trawl	125 455	5913	4.7	8	0.14	32 (8 - 64)	32.6
Total	130 202	6836	5.3	12	0.18	46 (19 - 80)	35.1
2001–02							
Squid, SQUAK6	1647	563	34.2	4	0.71	12 (6 - 19)	100.0
Squid, STEW5	3289	714	21.7	3	0.42	14 (3 - 28)	100.0
Other trawl	122 976	6440	5.2	2	0.03	7 (2 - 17)	34.6
Total	127 912	7717	6.0	9	0.12	32 (16 - 51)	37.1
2000–01							
Squid, SQUAK6	583	577	99.0	6	1.04	6 (6 - 6)	100.0
Squid, STEW5	3300	2327	70.5	53	2.28	75 (66 - 86)	100.0
Other trawl	130 373	6210	4.8	27	0.43	207 (120 - 306)	30.9
Total	134 256	9114	6.8	86	0.94	288 (205 - 390)	32.9

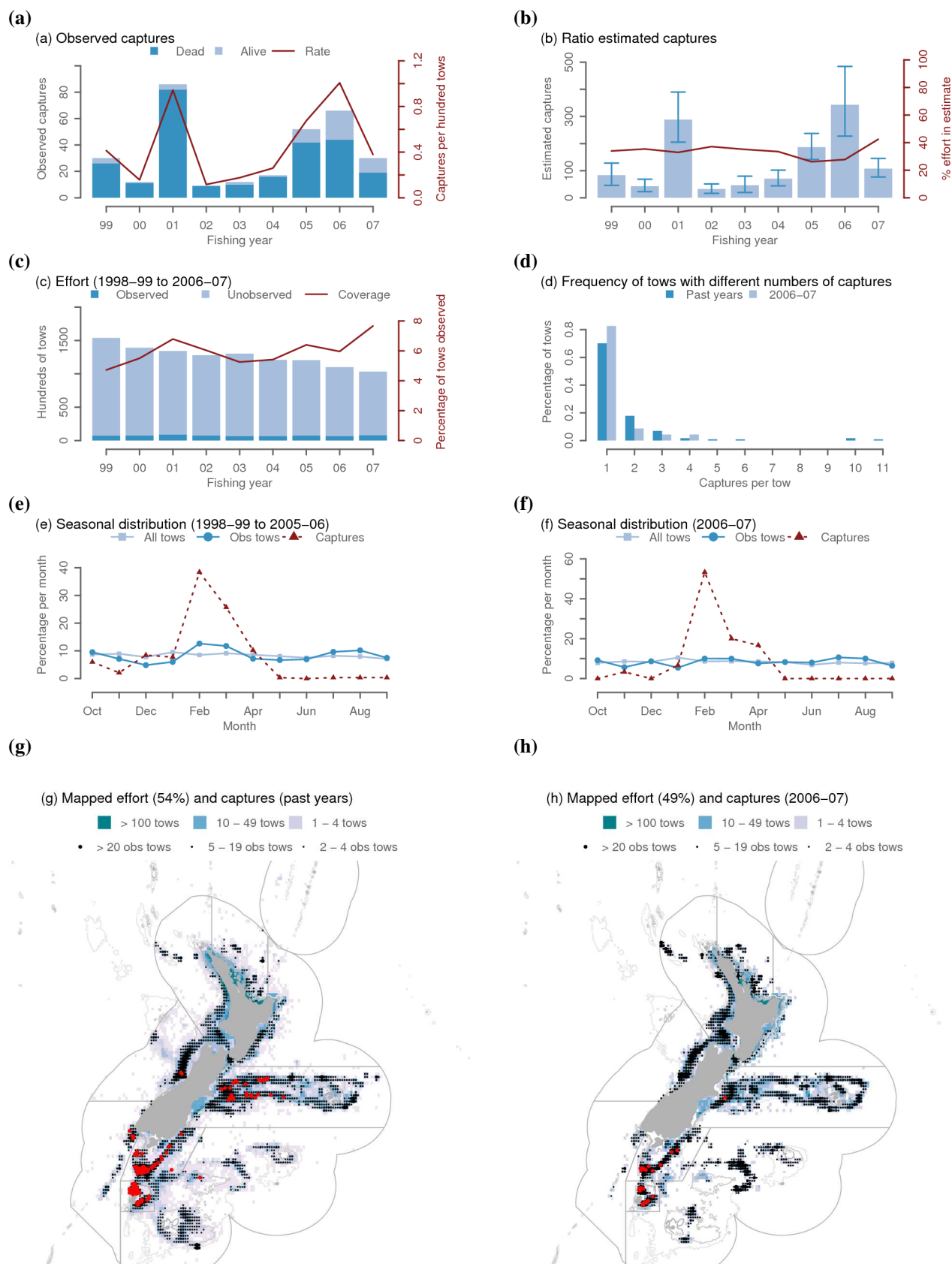


Figure 13: White-chinned petrel captures in all trawl fisheries. (a) Observed captures, (b) Ratio estimated captures, with 95% bootstrap confidence intervals, (c) Effort and observed effort, (d) Histogram of the number of captures per tow, (e, f) Monthly distributions of effort, observations and captures, (g, h) Mapped effort and captures from past years (showing annual averaged effort and observations, but all captures) and from 2006–07.

3.7.2 White-chinned petrel, squid trawl, Auckland Islands

In 2006–07 there were 17 observed captures.

Table 24: Summary by year with 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.

	Tows	No. obs	% obs	Captures	Rate	Estimated captures	% eff. in est.
2006–07	1317	538	40.9	17	3.16	41 (28 - 56)	100.0
2005–06	2459	550	22.4	48	8.73	213 (117 - 331)	100.0
2004–05	2693	806	29.9	15	1.86	50 (31 - 71)	100.0
2003–04	2594	791	30.5	9	1.14	29 (18 - 43)	100.0
2002–03	1466	417	28.4	4	0.96	14 (4 - 29)	100.0
2001–02	1647	563	34.2	4	0.71	12 (6 - 19)	100.0
2000–01	583	577	99.0	6	1.04	6 (6 - 6)	100.0
1999–00	1208	439	36.3	9	2.05	25 (12 - 42)	100.0
1998–99	402	156	38.8	0	0.00	0	100.0

Table 25: White-chinned petrels caught by area with numbers of animals captured, dead and necropsied.

	SQUAK6		
	captured	dead	necropsied
2006–07	17	8	8
2005–06	48	28	28
2004–05	15	11	10
2003–04	9	8	8
2002–03	4	2	2
2001–02	4	4	4
2000–01	6	5	5
1999–00	9	8	6

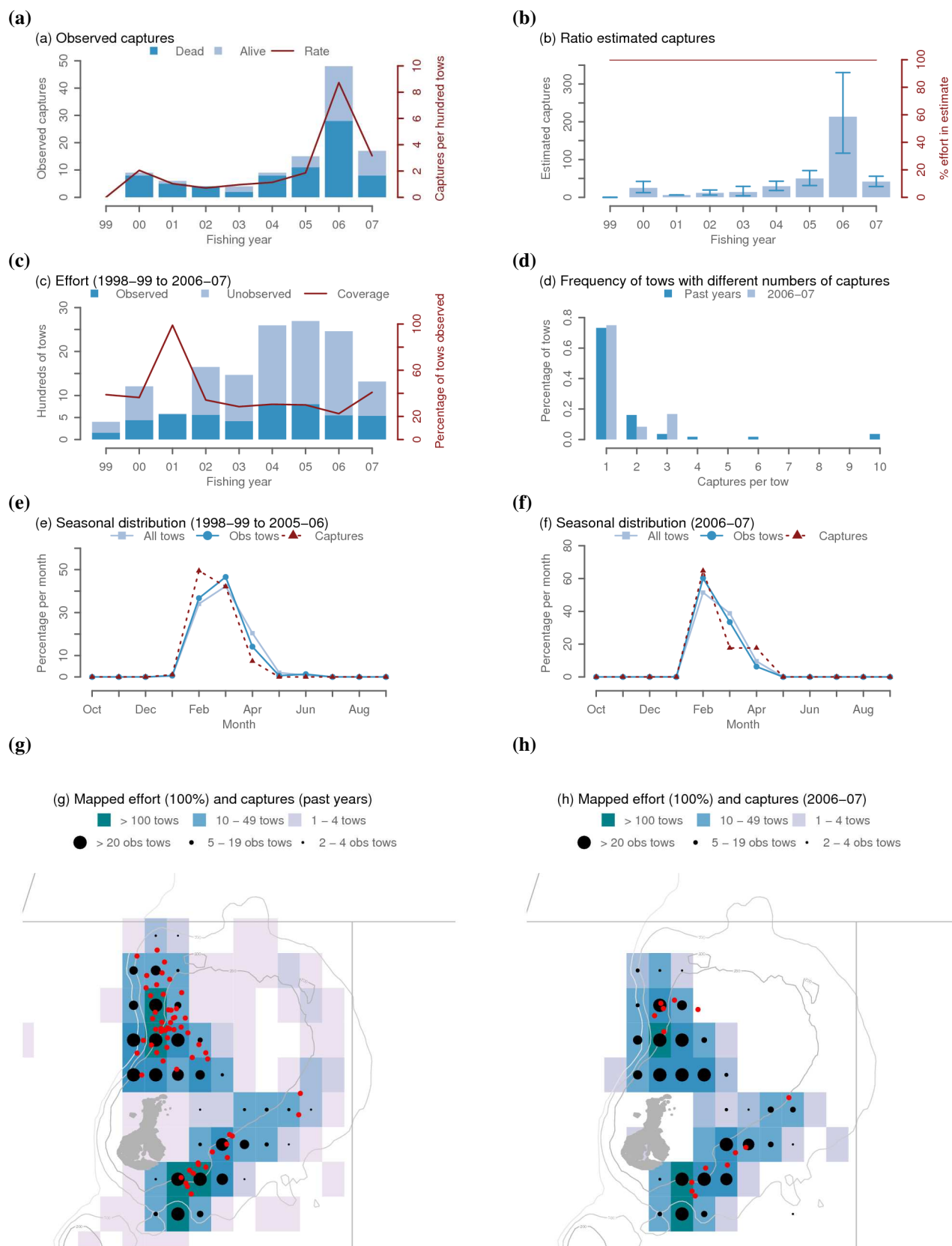


Figure 14: White-chinned petrel captures in the squid trawl fishery, in the Auckland Islands area. (a) Observed captures, (b) Ratio estimated captures, with 95% bootstrap confidence intervals, (c) Effort and observed effort, (d) Histogram of the number of captures per tow, (e, f) Monthly distributions of effort, observations and captures, (g, h) Mapped effort and captures from past years (showing annual averaged effort and observations, but all captures) and from 2006–07.

3.7.3 White-chinned petrel, squid trawl, Stewart Snares Shelf

In 2006–07 there were 9 observed captures.

Table 26: Summary by year with 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.

	Tows	No. obs	% obs	Captures	Rate	Estimated captures	% eff. in est.
2006–07	2926	705	24.1	9	1.28	37 (21 - 56)	100.0
2005–06	4481	537	12.0	11	2.05	91 (40 - 156)	100.0
2004–05	5861	1580	27.0	33	2.09	121 (84 - 167)	100.0
2003–04	4534	956	21.1	7	0.73	33 (14 - 59)	100.0
2002–03	3281	506	15.4	0	0.00	0	100.0
2001–02	3289	714	21.7	3	0.42	14 (3 - 28)	100.0
2000–01	3300	2327	70.5	53	2.28	75 (66 - 86)	100.0
1999–00	2003	370	18.5	1	0.27	5 (1 - 14)	100.0
1998–99	5887	821	13.9	4	0.49	28 (10 - 52)	100.0

Table 27: White-chinned petrels caught by area with numbers of animals captured, dead and necropsied.

	STEW5		
	captured	dead	necropsied
2006–07	9	7	6
2005–06	11	10	10
2004–05	33	27	26
2003–04	7	7	7
2001–02	3	3	3
2000–01	53	50	46
1999–00	1	1	1
1998–99	4	4	4

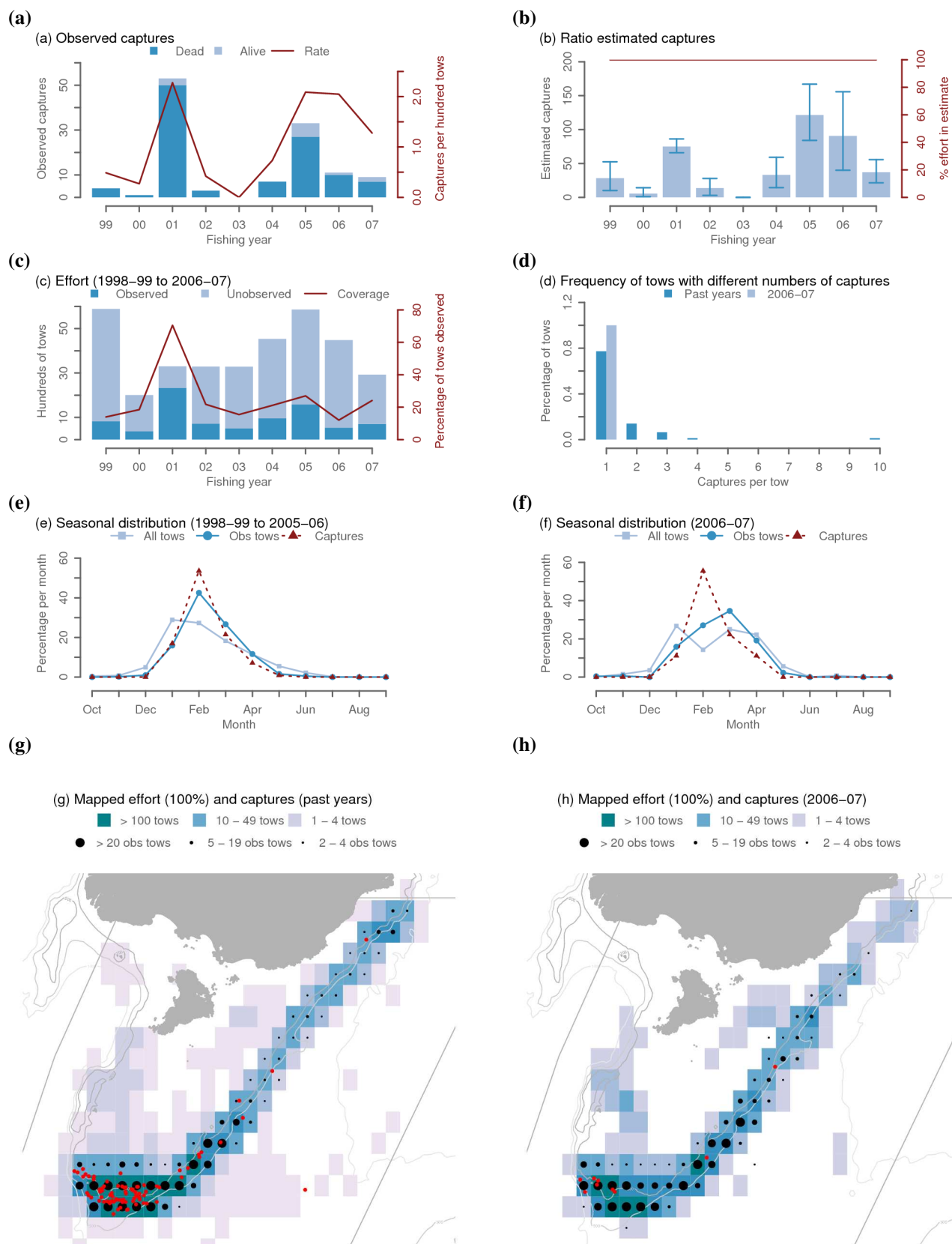


Figure 15: White-chinned petrel captures in the squid trawl fishery, in Stewart Snare Shelf. (a) Observed captures, (b) Ratio estimated captures, with 95% bootstrap confidence intervals, (c) Effort and observed effort, (d) Histogram of the number of captures per tow, (e, f) Monthly distributions of effort, observations and captures, (g, h) Mapped effort and captures from past years (showing annual averaged effort and observations, but all captures) and from 2006–07.

3.7.4 White-chinned petrels, all trawl, New Zealand EEZ excluding squid trawl in the Auckland Islands and Stewart Snares Shelf regions

In 2006–07 there were 4 observed captures.

Table 28: Summary by year with 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.

	Tows	No. obs	% obs	Captures	Rate	Estimated captures	% eff. in est.
2006–07	99 141	6681	6.7	4	0.06	29 (9 - 57)	40.0
2005–06	103 042	5467	5.3	7	0.13	39 (17 - 66)	22.8
2004–05	111 942	5324	4.8	4	0.08	16 (4 - 33)	20.5
2003–04	113 795	4800	4.2	1	0.02	8 (1 - 22)	29.3
2002–03	125 455	5913	4.7	8	0.14	32 (8 - 64)	32.6
2001–02	122 976	6440	5.2	2	0.03	7 (2 - 17)	34.6
2000–01	130 373	6210	4.8	27	0.43	207 (120 - 306)	30.9
1999–00	135 891	6842	5.0	2	0.03	13 (2 - 29)	33.8
1998–99	147 470	6280	4.3	26	0.41	55 (26 - 94)	31.1

Table 29: White-chinned petrels caught by area with numbers of animals captured, dead and necropsied.

	CHAT4			SQUAK6			STEW5			Other Areas		
	c.	d.	n.	c.	d.	n.	c.	d.	n.	c.	d.	n.
2006–07	1	1	1	-	-	-	3	3	3	-	-	-
2005–06	4	3	3	-	-	-	2	2	2	1	1	0
2004–05	3	3	3	-	-	-	1	1	1	-	-	-
2003–04	-	-	-	1	1	1	-	-	-	-	-	-
2002–03	1	1	1	-	-	-	2	2	2	5	5	4
2001–02	1	1	0	-	-	-	-	-	-	1	1	1
2000–01	23	23	22	-	-	-	3	3	3	1	1	1
1999–00	-	-	-	-	-	-	2	2	2	-	-	-
1998–99	3	3	3	23	19	0	-	-	-	-	-	-

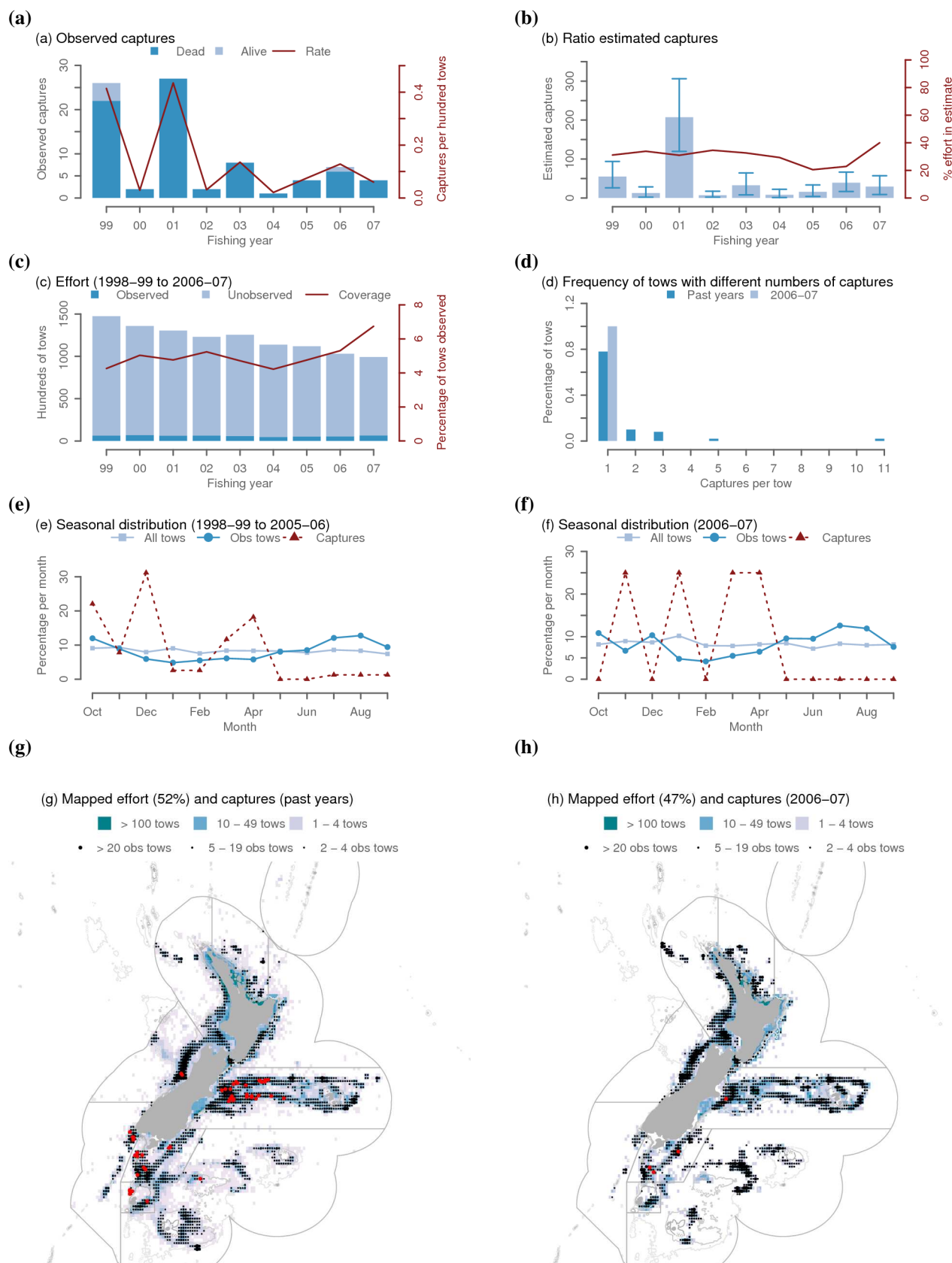


Figure 16: White-chinned petrel captures in other trawl fisheries. (a) Observed captures, (b) Ratio estimated captures, with 95% bootstrap confidence intervals, (c) Effort and observed effort, (d) Histogram of the number of captures per tow, (e, f) Monthly distributions of effort, observations and captures, (g, h) Mapped effort and captures from past years (showing annual averaged effort and observations, but all captures) and from 2006–07.

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

In 2006–07 there were 5 observed captures.

Table 30: Summary by year with number of hooks, number of hooks observed, percentage of hooks observed, number of observed captures, capture rate per ten thousand hooks, total estimated captures with 95% confidence intervals, and percentage of hooks included in the estimate.

	Hooks	No. obs	% obs	Captures	Rate	Estimated captures	% eff. in est.
2006–07	3 719 232	955 919	25.7	5	0.05	10 (6 - 15)	99.8
2005–06	3 687 569	636 796	17.3	1	0.02	1 (1 - 1)	92.8
2004–05	3 676 795	703 669	19.1	3	0.04	22 (3 - 61)	86.3
2003–04	7 382 293	1 464 465	19.8	2	0.01	2 (2 - 2)	91.3
2002–03	10 781 875	1 880 455	17.4	3	0.02	3 (3 - 4)	22.4
2001–02	10 876 381	918 159	8.4	6	0.07	107 (6 - 261)	85.2
2000–01	9 761 448	1 029 118	10.5	2	0.02	30 (2 - 88)	96.0
1999–00	8 286 120	793 770	9.6	7	0.09	7 (7 - 7)	10.2
1998–99	6 845 781	1 242 610	18.2	0	0.00	0	22.7

Table 31: White-chinned petrels caught by area with numbers of animals captured, dead and necropsied.

	AREA3			AREA1			AREA2		
	cap.	dead	nec.	cap.	dead	nec.	cap.	dead	nec.
2006–07	3	3	3	2	2	2	-	-	-
2005–06	1	1	0	-	-	-	-	-	-
2004–05	2	2	2	1	1	1	-	-	-
2003–04	2	2	2	-	-	-	-	-	-
2002–03	2	2	2	1	1	1	-	-	-
2001–02	4	3	3	2	2	2	-	-	-
2000–01	1	1	1	1	1	1	-	-	-
1999–00	-	-	-	-	-	-	7	7	7

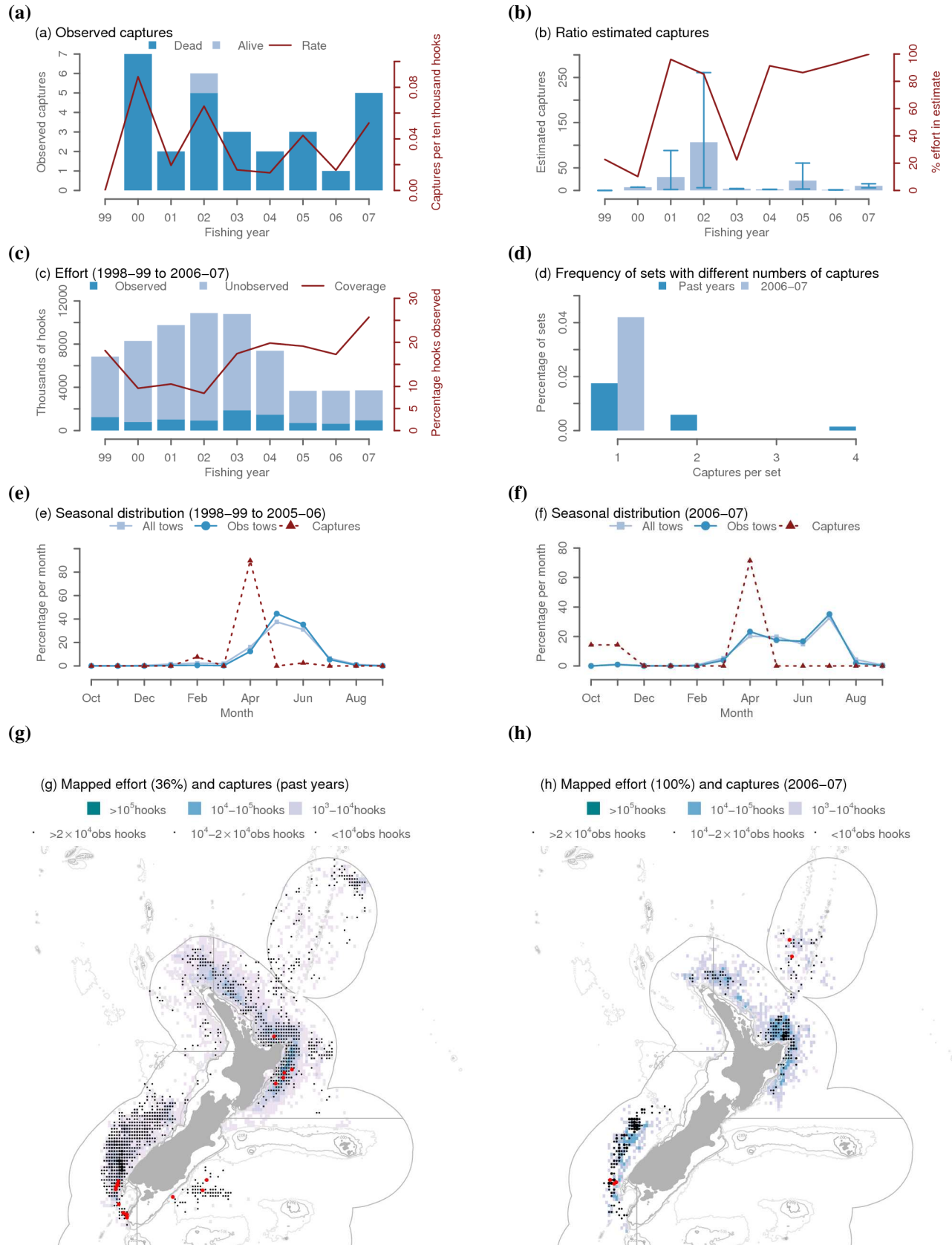


Figure 17: White-chinned petrel captures in the surface longline fishery. (a) Observed captures, (b) Ratio estimated captures, with 95% bootstrap confidence intervals, (c) Effort and observed effort, (d) Histogram of the number of captures per tow, (e, f) Monthly distributions of effort, observations and captures, (g, h) Mapped effort and captures from past years (showing annual averaged effort and observations, but all captures) and from 2006–07.

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

In 2006–07 there were 12 observed captures.

Table 32: Summary by year with number of hooks, number of hooks observed, percentage of hooks observed, number of observed captures, capture rate per ten thousand hooks, total estimated captures with 95% confidence intervals, and percentage of hooks included in the estimate.

	Hooks	No. obs	% obs	Captures	Rate	Estimated captures	% eff. in est.
2006–07	38 164 851	2 344 205	6.1	12	0.05	52 (14 - 133)	49.6
2005–06	37 125 639	3 822 459	10.3	13	0.03	58 (31 - 87)	72.3
2004–05	41 840 933	2 927 928	7.0	11	0.04	58 (24 - 102)	71.2
2003–04	43 449 733	5 919 633	13.6	16	0.03	52 (32 - 77)	79.6
2002–03	37 753 336	11 308 295	30.0	130	0.11	174 (161 - 190)	47.3
2001–02	47 024 332	7 547 517	16.1	353	0.47	917 (718 - 1171)	51.7
2000–01	51 024 367	5 248 902	10.3	210	0.40	411 (357 - 475)	30.7
1999–00	53 277 149	3 606 478	6.8	59	0.16	1023 (474 - 1677)	56.4
1998–99	55 487 193	3 097 198	5.6	5	0.02	117 (27 - 249)	50.7

Table 33: White-chinned petrels caught by area with numbers of animals captured, dead and necropsied.

	CHAT4			SUBA6			STEW5			Other Areas		
	c.	d.	n.	c.	d.	n.	c.	d.	n.	c.	d.	n.
2006–07	-	-	-	-	-	-	-	-	-	12	11	10
2005–06	10	8	8	-	-	-	3	3	3	-	-	-
2004–05	1	1	1	-	-	-	-	-	-	10	10	10
2003–04	-	-	-	14	13	12	2	2	2	-	-	-
2002–03	7	7	6	122	121	120	1	1	1	-	-	-
2001–02	320	319	318	-	-	-	33	33	31	-	-	-
2000–01	-	-	-	40	40	39	73	73	68	97	96	93
1999–00	14	14	13	6	6	5	39	38	0	-	-	-
1998–99	5	5	5	-	-	-	-	-	-	-	-	-

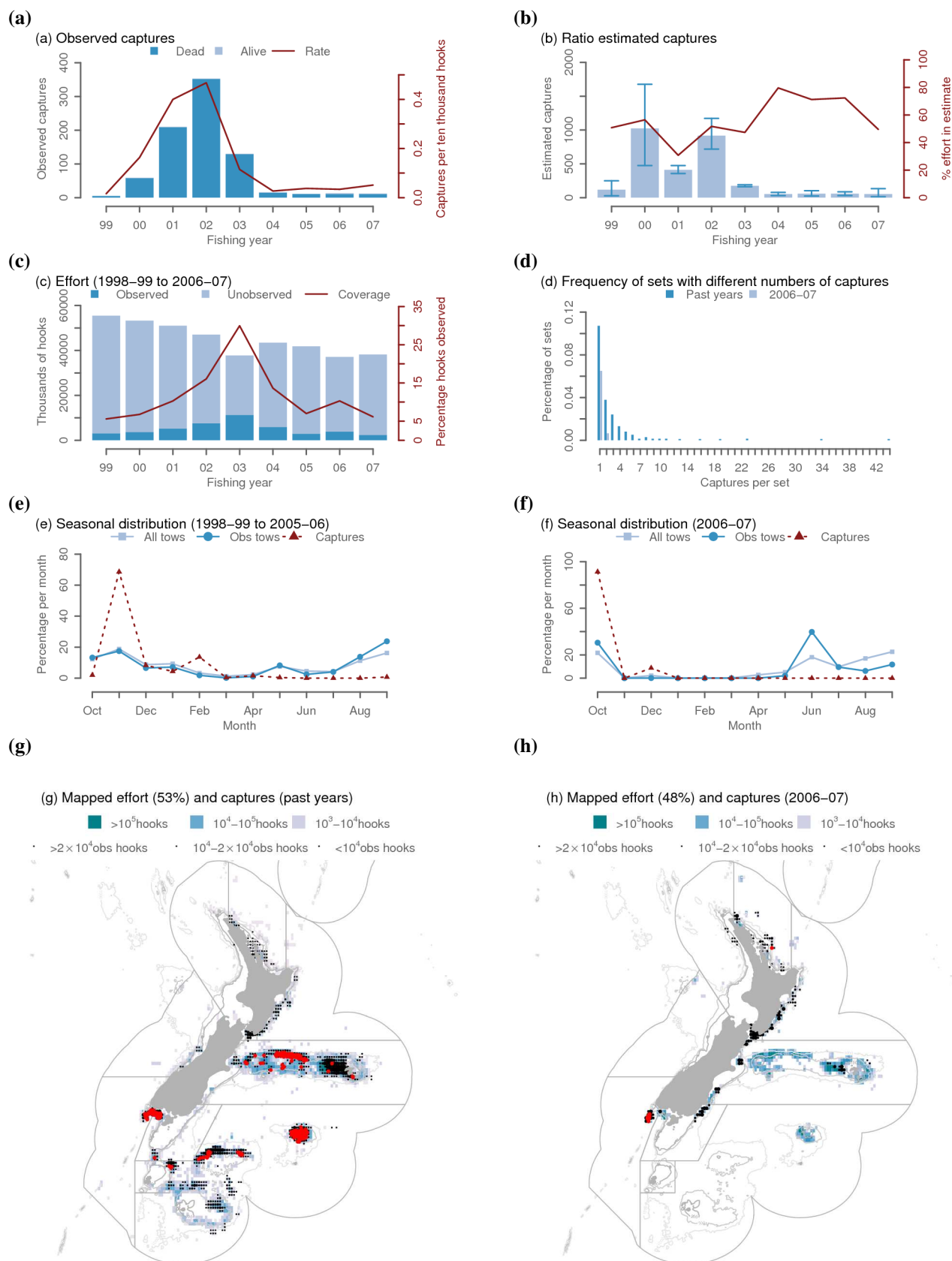


Figure 18: White-chinned petrel captures in the bottom longline fishery. (a) Observed captures, (b) Ratio estimated captures, with 95% bootstrap confidence intervals, (c) Effort and observed effort, (d) Histogram of the number of captures per tow, (e, f) Monthly distributions of effort, observations and captures, (g, h) Mapped effort and captures from past years (showing annual averaged effort and observations, but all captures) and from 2006–07.

3.8 Sooty shearwater captures

3.8.1 Sooty shearwater, all trawl, New Zealand EEZ

In 2006–07 there were 83 observed captures.

Table 34: Summary by year with 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.

	Tows	No. obs	% obs	Captures	Rate	Estimated captures	% eff. in est.
2006–07							
Squid, STEW5	2926	705	24.1	42	5.96	173 (123 - 232)	100.0
Other trawl	100 458	7219	7.2	41	0.57	288 (138 - 497)	40.8
Total	103 384	7922	7.7	83	1.05	461 (297 - 672)	42.4
2005–06							
Squid, STEW5	4481	537	12.0	65	12.10	535 (282 - 876)	100.0
Other trawl	105 501	6017	5.7	104	1.73	393 (278 - 534)	24.6
Total	109 982	6554	6.0	169	2.58	929 (640 - 1280)	27.7
2004–05							
Squid, STEW5	5861	1580	27.0	61	3.86	225 (160 - 302)	100.0
Other trawl	114 635	6130	5.3	13	0.21	49 (28 - 74)	22.3
Total	120 496	7710	6.4	74	0.96	274 (202 - 358)	26.1
2003–04							
Squid, STEW5	4534	956	21.1	18	1.88	85 (48 - 126)	100.0
Other trawl	116 389	5591	4.8	35	0.63	254 (75 - 527)	30.9
Total	120 923	6547	5.4	53	0.81	339 (152 - 629)	33.5
2002–03							
Squid, STEW5	3281	506	15.4	43	8.50	277 (168 - 412)	100.0
Other trawl	126 921	6330	5.0	76	1.20	404 (149 - 878)	33.4
Total	130 202	6836	5.3	119	1.74	680 (366 - 1234)	35.1
2001–02							
Squid, STEW5	3289	714	21.7	38	5.32	174 (109 - 259)	100.0
Other trawl	124 623	7003	5.6	70	1.00	165 (111 - 235)	35.4
Total	127 912	7717	6.0	108	1.40	338 (249 - 443)	37.1
2000–01							
Squid, STEW5	3300	2327	70.5	93	4.00	132 (121 - 144)	100.0
Other trawl	130 956	6787	5.2	185	2.73	1456 (1104 - 1854)	31.2
Total	134 256	9114	6.8	278	3.05	1588 (1231 - 1998)	32.9

Table 35: Sooty shearwaters caught by area with numbers of animals captured, dead and necropsied.

	STEW5			CHAT4			SQUAK6			Other Areas		
	c.	d.	n.	c.	d.	n.	c.	d.	n.	c.	d.	n.
2006–07	49	40	41	16	11	11	17	17	17	1	1	1
2005–06	82	64	62	75	71	71	12	9	8	-	-	-
2004–05	62	45	45	2	2	2	9	7	7	1	0	0
2003–04	23	22	22	15	14	14	13	12	12	2	2	0
2002–03	51	33	33	40	23	23	18	12	12	10	7	7
2001–02	47	35	34	49	38	37	9	9	9	3	3	3
2000–01	98	85	74	180	139	138	-	-	-	-	-	-
1999–00	25	21	20	7	5	2	-	-	-	-	-	-
1998–99	29	27	27	51	33	33	-	-	-	3	2	2

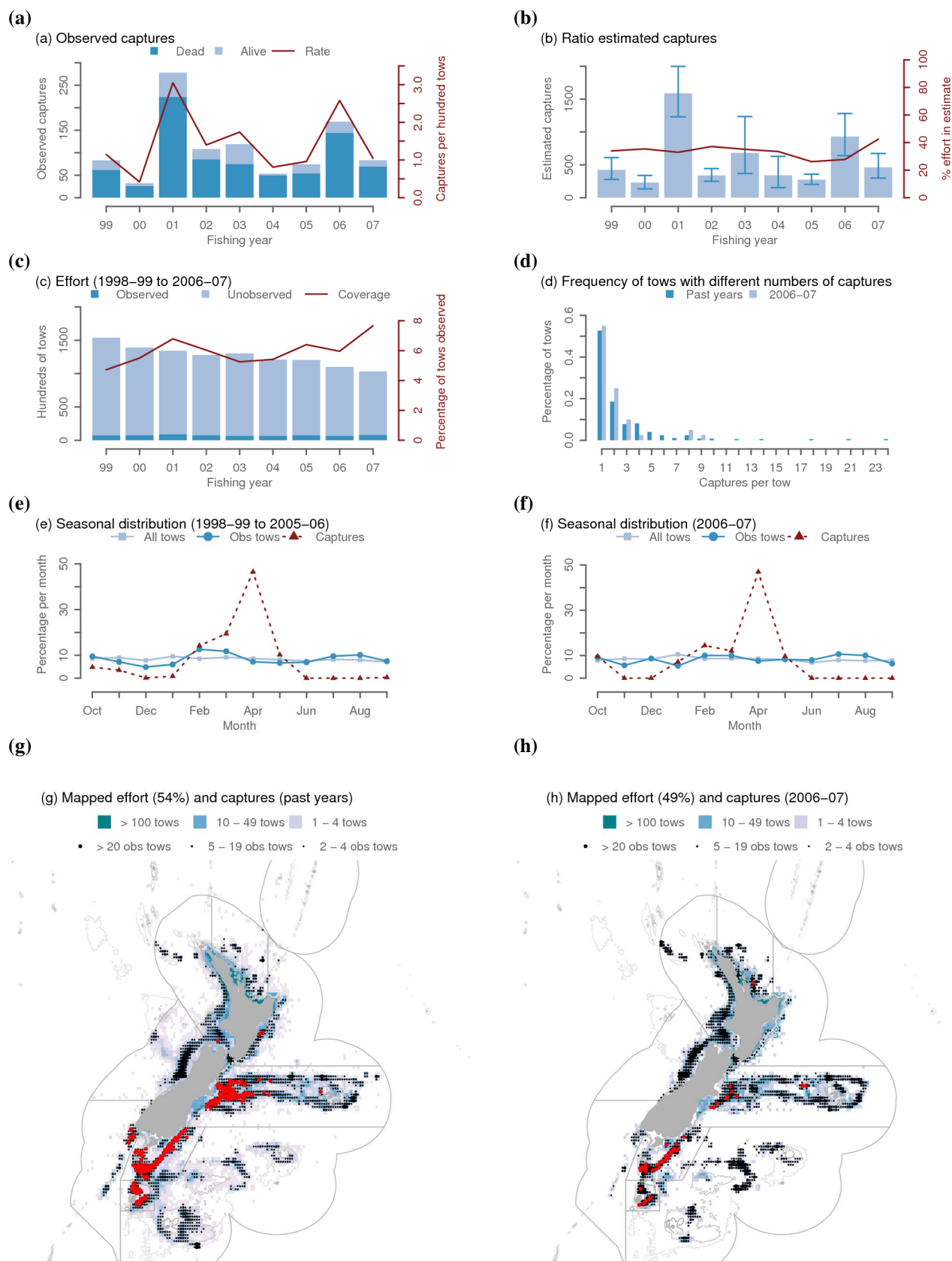


Figure 19: Sooty shearwater captures in all trawl fisheries. (a) Observed captures, (b) Ratio estimated captures, with 95% bootstrap confidence intervals, (c) Effort and observed effort, (d) Histogram of the number of captures per tow, (e, f) Monthly distributions of effort, observations and captures, (g, h) Mapped effort and captures from past years (showing annual averaged effort and observations, but all captures) and from 2006–07.

3.8.2 Sooty shearwater, squid trawl, Stewart Snares Shelf

In 2006–07 there were 42 observed captures.

Table 36: Summary by year with 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.

	Tows	No. obs	% obs	Captures	Rate	Estimated captures	% eff. in est.
2006–07	2926	705	24.1	42	5.96	173 (123 - 232)	100.0
2005–06	4481	537	12.0	65	12.10	535 (282 - 876)	100.0
2004–05	5861	1580	27.0	61	3.86	225 (160 - 302)	100.0
2003–04	4534	956	21.1	18	1.88	85 (48 - 126)	100.0
2002–03	3281	506	15.4	43	8.50	277 (168 - 412)	100.0
2001–02	3289	714	21.7	38	5.32	174 (109 - 259)	100.0
2000–01	3300	2327	70.5	93	4.00	132 (121 - 144)	100.0
1999–00	2003	370	18.5	7	1.89	38 (7 - 86)	100.0
1998–99	5887	821	13.9	18	2.19	127 (73 - 194)	100.0

Table 37: Sooty shearwaters caught by area with numbers of animals captured, dead and necropsied.

	STEW5		
	captured	dead	necropsied
2006–07	42	34	34
2005–06	65	51	51
2004–05	61	44	44
2003–04	18	17	17
2002–03	43	28	28
2001–02	38	26	25
2000–01	93	81	71
1999–00	7	5	5
1998–99	18	16	16

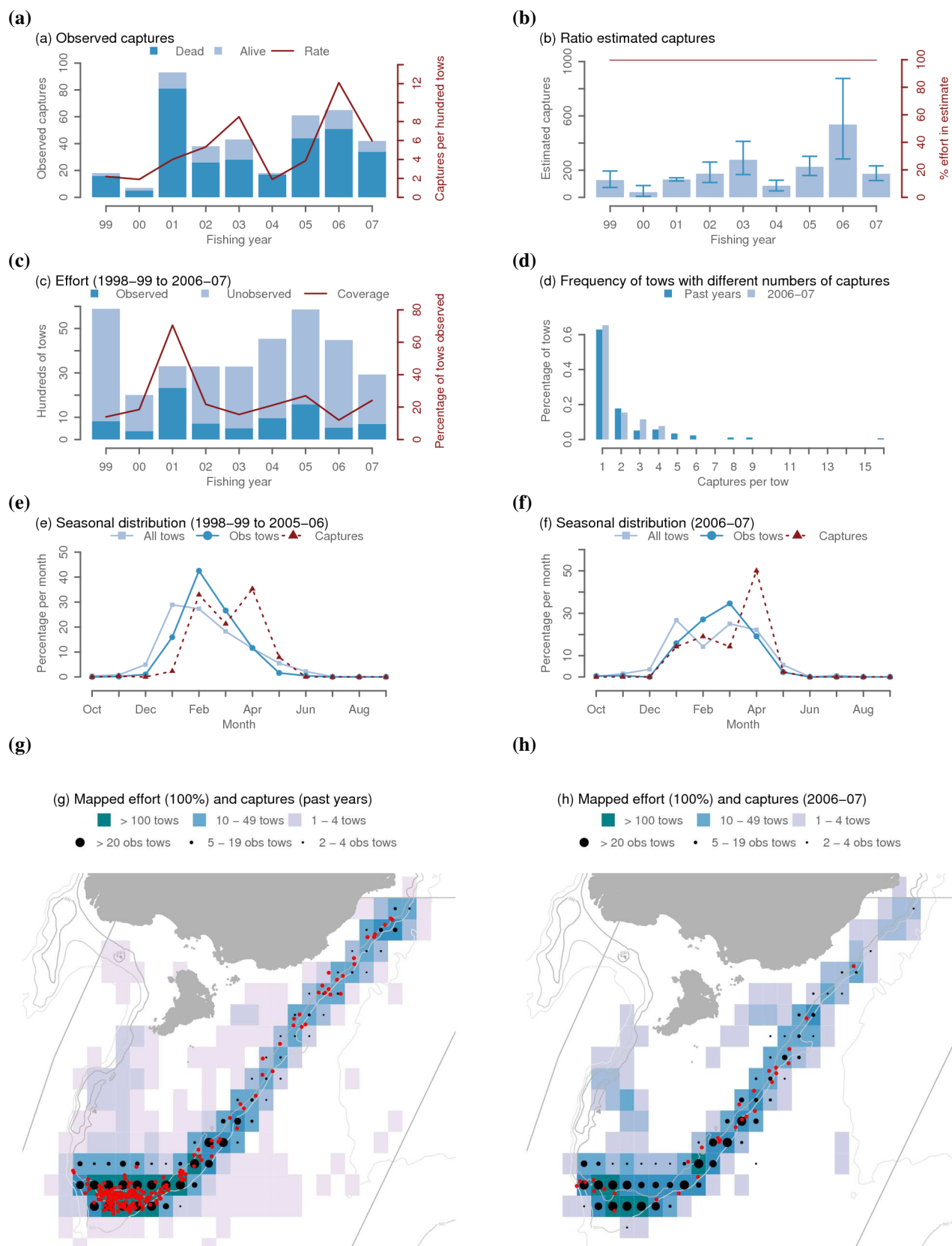


Figure 20: Sooty shearwater captures in the squid trawl fishery, in Stewart Snares Shelf. (a) Observed captures, (b) Ratio estimated captures, with 95% bootstrap confidence intervals, (c) Effort and observed effort, (d) Histogram of the number of captures per tow, (e, f) Monthly distributions of effort, observations and captures, (g, h) Mapped effort and captures from past years (showing annual averaged effort and observations, but all captures) and from 2006–07.

3.8.3 Sooty shearwater, all trawl, New Zealand EEZ excluding squid trawl on the Stewart Snares Shelf

In 2006–07 there were 41 observed captures.

Table 38: Summary by year with 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.

	Tows	No. obs	% obs	Captures	Rate	Estimated captures	% eff. in est.
2006–07	100 458	7219	7.2	41	0.57	288 (138 - 497)	40.8
2005–06	105 501	6017	5.7	104	1.73	393 (278 - 534)	24.6
2004–05	114 635	6130	5.3	13	0.21	49 (28 - 74)	22.3
2003–04	116 389	5591	4.8	35	0.63	254 (75 - 527)	30.9
2002–03	126 921	6330	5.0	76	1.20	404 (149 - 878)	33.4
2001–02	124 623	7003	5.6	70	1.00	165 (111 - 235)	35.4
2000–01	130 956	6787	5.2	185	2.73	1456 (1104 - 1854)	31.2
1999–00	137 099	7281	5.3	25	0.34	191 (109 - 293)	34.4
1998–99	147 872	6436	4.4	65	1.01	296 (167 - 473)	31.3

Table 39: Sooty shearwaters caught by area with numbers of animals captured, dead and necropsied.

	CHAT4			STEW5			SQUAK6			Other Areas		
	c.	d.	n.	c.	d.	n.	c.	d.	n.	c.	d.	n.
2006–07	16	11	11	7	6	7	17	17	17	1	1	1
2005–06	75	71	71	17	13	11	12	9	8	-	-	-
2004–05	2	2	2	1	1	1	9	7	7	1	0	0
2003–04	15	14	14	5	5	5	13	12	12	2	2	0
2002–03	40	23	23	8	5	5	18	12	12	10	7	7
2001–02	49	38	37	9	9	9	9	9	9	3	3	3
2000–01	180	139	138	5	4	3	-	-	-	-	-	-
1999–00	7	5	2	18	16	15	-	-	-	-	-	-
1998–99	51	33	33	11	11	11	-	-	-	3	2	2

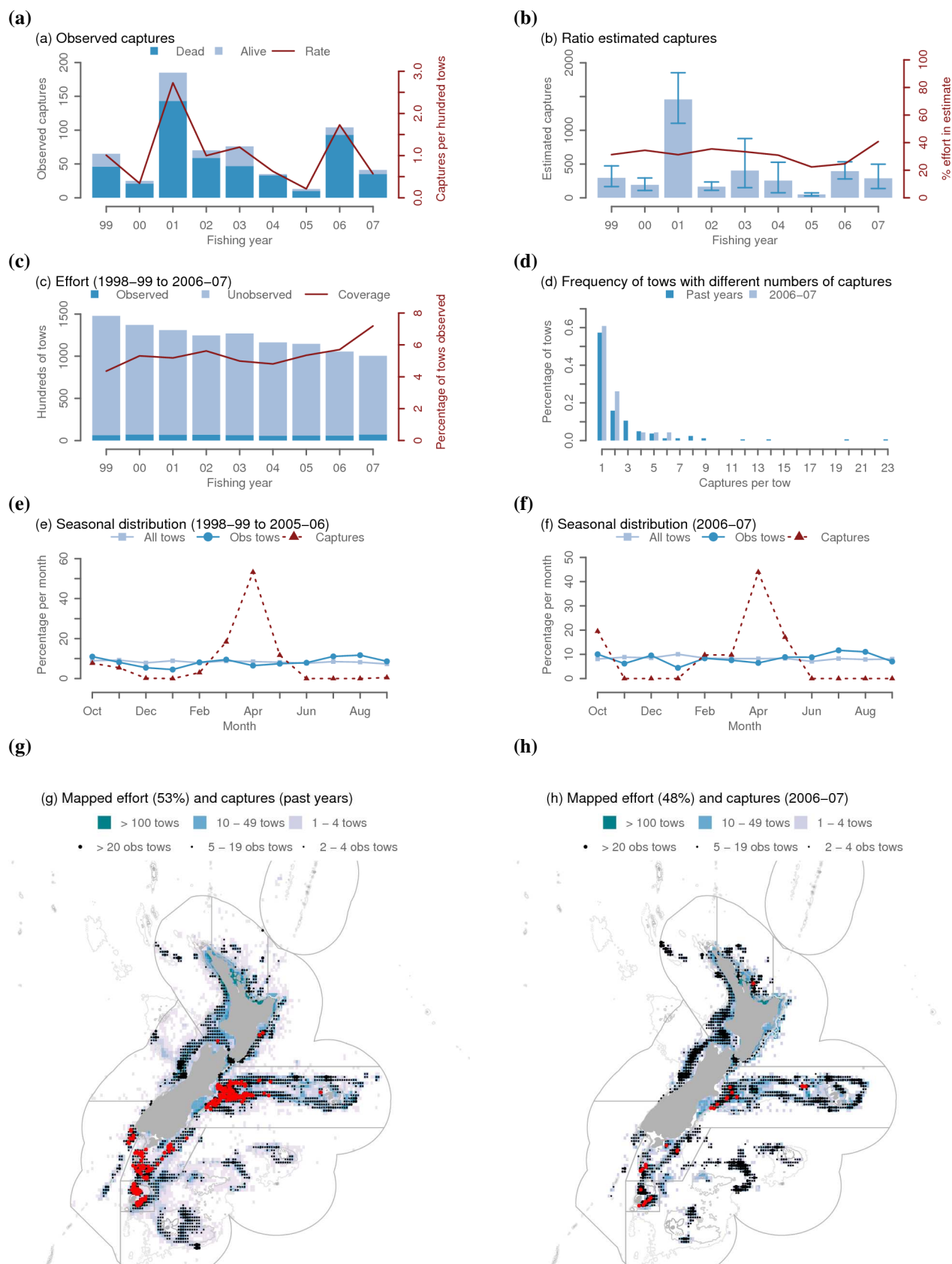


Figure 21: Sooty shearwater captures in other trawl fisheries. (a) Observed captures, (b) Ratio estimated captures, with 95% bootstrap confidence intervals, (c) Effort and observed effort, (d) Histogram of the number of captures per tow, (e, f) Monthly distributions of effort, observations and captures, (g, h) Mapped effort and captures from past years (showing annual averaged effort and observations, but all captures) and from 2006–07.

3.8.4 Sooty shearwater, surface longline, New Zealand EEZ

In 2006–07 there were 2 observed captures.

Table 40: Summary by year with number of hooks, number of hooks observed, percentage of hooks observed, number of observed captures, capture rate per ten thousand hooks, total estimated captures with 95% confidence intervals, and percentage of hooks included in the estimate.

	Hooks	No. obs	% obs	Captures	Rate	Estimated captures	% eff. in est.
2006–07	3 719 232	955 919	25.7	2	0.02	4 (2 - 7)	99.8
2005–06	3 687 569	636 796	17.3	0	0.00	0	92.8
2004–05	3 676 795	703 669	19.1	0	0.00	0	86.3
2003–04	7 382 293	1 464 465	19.8	3	0.02	5 (3 - 8)	91.3
2002–03	10 781 875	1 880 455	17.4	10	0.05	13 (11 - 15)	22.4
2001–02	10 876 381	918 159	8.4	0	0.00	0	85.2
2000–01	9 761 448	1 029 118	10.5	2	0.02	57 (2 - 143)	96.0
1999–00	8 286 120	793 770	9.6	0	0.00	0	10.2
1998–99	6 845 781	1 242 610	18.2	1	0.01	1 (1 - 1)	22.7

Table 41: Sooty shearwaters caught by area with numbers of animals captured, dead and necropsied.

	AREA1			AREA2			AREA3		
	cap.	dead	nec.	cap.	dead	nec.	cap.	dead	nec.
2006–07	1	1	1	-	-	-	1	0	0
2003–04	-	-	-	2	0	0	1	0	0
2002–03	10	10	6	-	-	-	-	-	-
2000–01	2	0	0	-	-	-	-	-	-
1998–99	-	-	-	1	0	0	-	-	-

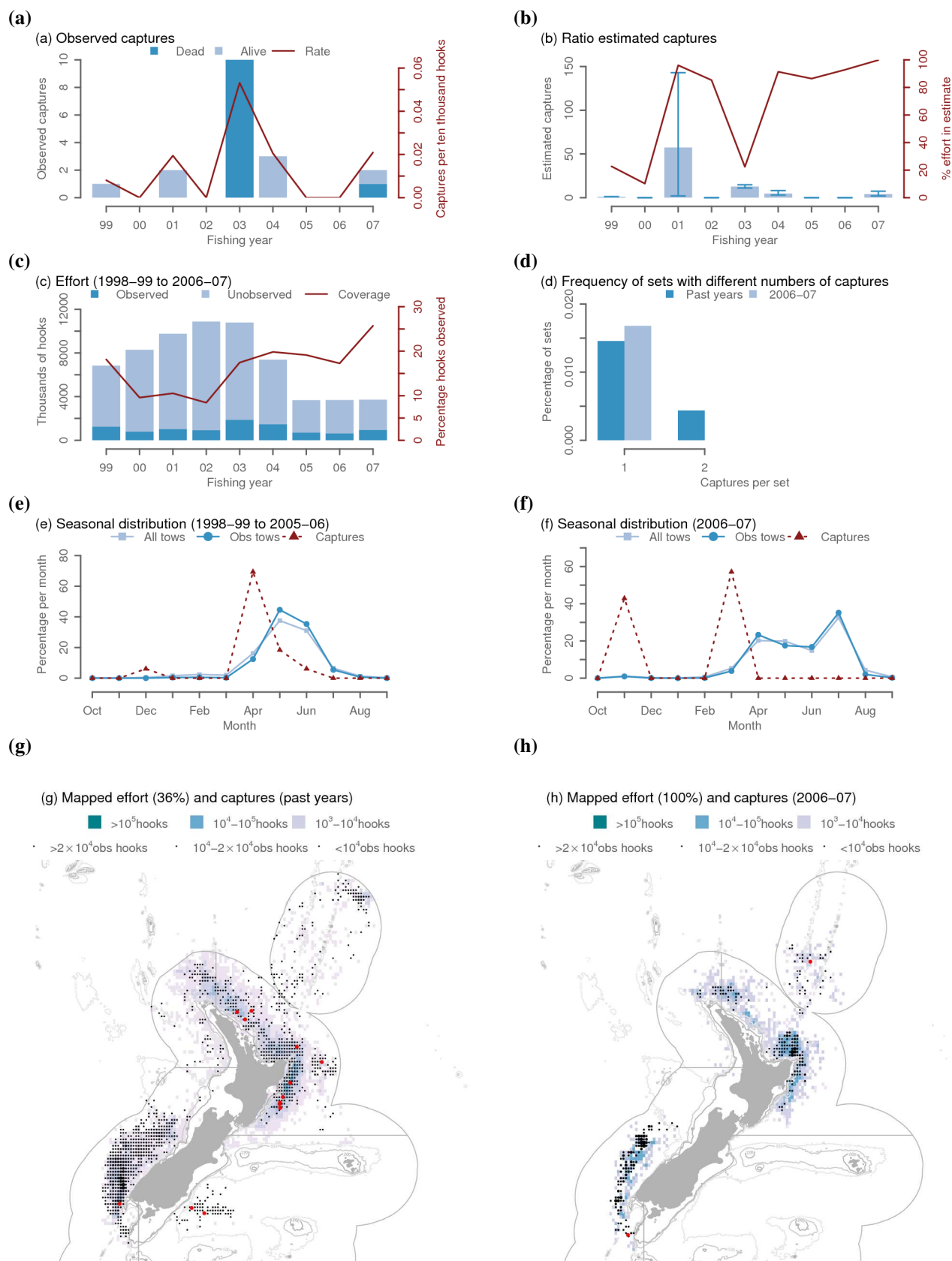


Figure 22: Sooty shearwater captures in the surface longline fishery. (a) Observed captures, (b) Ratio estimated captures, with 95% bootstrap confidence intervals, (c) Effort and observed effort, (d) Histogram of the number of captures per tow, (e, f) Monthly distributions of effort, observations and captures, (g, h) Mapped effort and captures from past years (showing annual averaged effort and observations, but all captures) and from 2006–07.

3.8.5 Sooty shearwater, bottom longline, New Zealand EEZ

In 2006–07 there was 1 observed capture.

Table 42: Summary by year with number of hooks, number of hooks observed, percentage of hooks observed, number of observed captures, capture rate per ten thousand hooks, total estimated captures with 95% confidence intervals, and percentage of hooks included in the estimate.

	Hooks	No. obs	% obs	Captures	Rate	Estimated captures	% eff. in est.
2006–07	38 164 851	2 344 205	6.1	1	0.00	1 (1 - 2)	49.6
2005–06	37 125 639	3 822 459	10.3	3	0.01	3 (3 - 3)	72.3
2004–05	41 840 933	2 927 928	7.0	3	0.01	11 (3 - 25)	71.2
2003–04	43 449 733	5 919 633	13.6	29	0.05	64 (43 - 91)	79.6
2002–03	37 753 336	11 308 295	30.0	23	0.02	28 (25 - 31)	47.3
2001–02	47 024 332	7 547 517	16.1	16	0.02	31 (22 - 41)	51.7
2000–01	51 024 367	5 248 902	10.3	12	0.02	24 (16 - 33)	30.7
1999–00	53 277 149	3 606 478	6.8	7	0.02	16 (10 - 25)	56.4
1998–99	55 487 193	3 097 198	5.6	0	0.00	0	50.7

Table 43: Sooty shearwaters caught by area with numbers of animals captured, dead and necropsied.

	STEW5			PUYS5			SUBA6			Other Areas		
	c.	d.	n.	c.	d.	n.	c.	d.	n.	c.	d.	n.
2006–07	-	-	-	1	1	1	-	-	-	-	-	-
2005–06	3	3	1	-	-	-	-	-	-	-	-	-
2004–05	-	-	-	2	2	2	1	0	0	-	-	-
2003–04	24	23	20	5	5	4	-	-	-	-	-	-
2002–03	21	18	17	-	-	-	1	1	1	1	1	1
2001–02	15	15	15	-	-	-	-	-	-	1	1	1
2000–01	7	7	7	2	2	2	1	1	1	2	2	2
1999–00	7	7	0	-	-	-	-	-	-	-	-	-

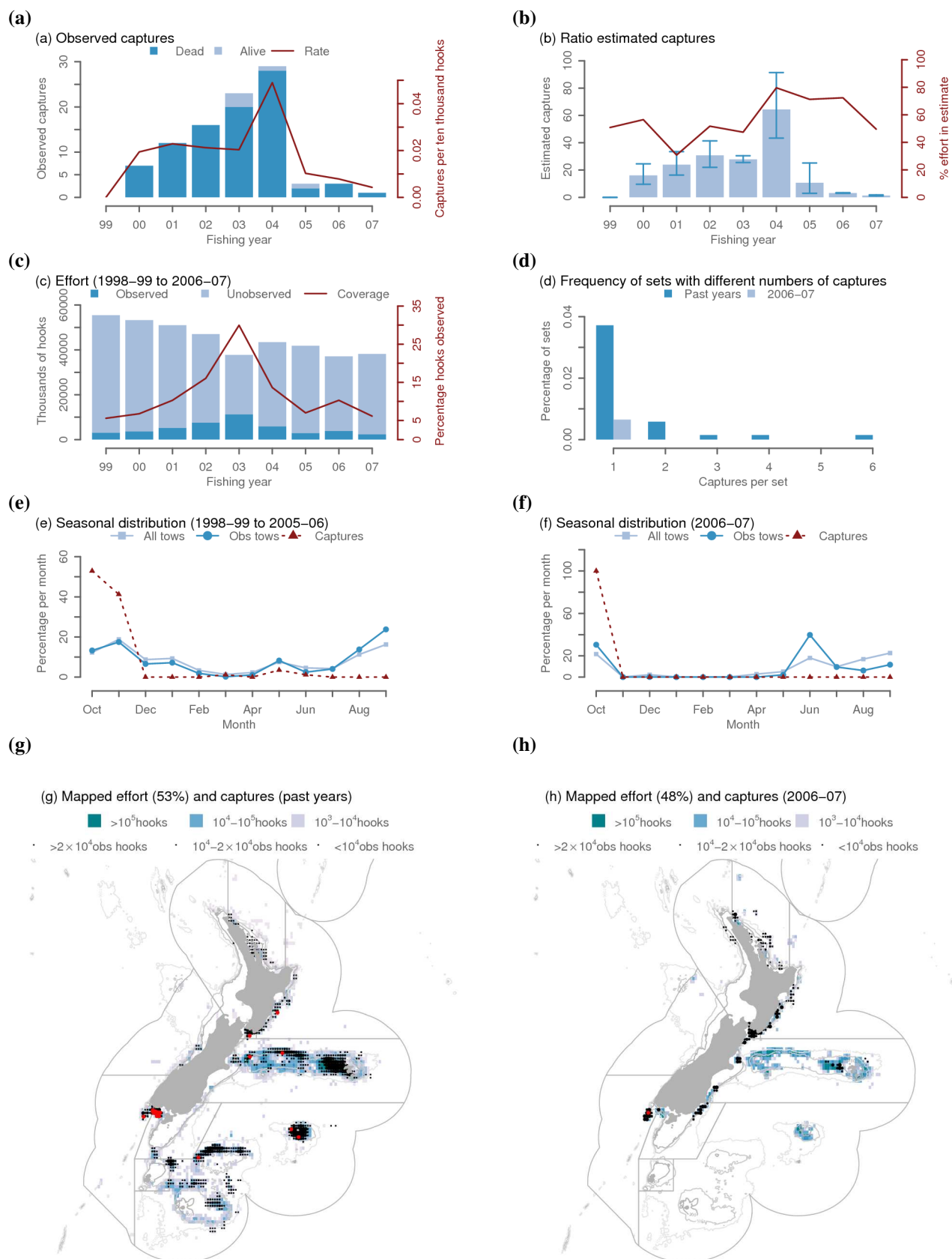


Figure 23: Sooty shearwater captures in the bottom longline fishery. (a) Observed captures, (b) Ratio estimated captures, with 95% bootstrap confidence intervals, (c) Effort and observed effort, (d) Histogram of the number of captures per tow, (e, f) Monthly distributions of effort, observations and captures, (g, h) Mapped effort and captures from past years (showing annual averaged effort and observations, but all captures) and from 2006–07.

3.9 Other albatross captures

3.9.1 Other albatross, all trawl, New Zealand EEZ

In 2006–07 there were 21 observed captures.

Table 44: Summary by year with 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.

	Tows	No. obs	% obs	Captures	Rate	Estimated captures	% eff. in est.
2006–07	103 384	7922	7.7	21	0.27	129 (62 - 213)	42.4
2005–06	109 982	6554	6.0	25	0.38	143 (93 - 200)	27.7
2004–05	120 496	7710	6.4	67	0.87	344 (221 - 490)	26.1
2003–04	120 923	6547	5.4	27	0.41	118 (76 - 167)	33.5
2002–03	130 202	6836	5.3	38	0.56	388 (192 - 658)	35.1
2001–02	127 912	7717	6.0	37	0.48	206 (138 - 282)	37.1
2000–01	134 256	9114	6.8	54	0.59	271 (193 - 355)	32.9
1999–00	139 102	7651	5.5	48	0.63	515 (319 - 753)	35.4
1998–99	153 759	7257	4.7	59	0.81	430 (307 - 570)	33.9

Table 45: Species caught by area with numbers of animals captured, dead and necropsied.

	CHAT4			STEW5			WCSI7			Other Areas		
	c.	d.	n.	c.	d.	n.	c.	d.	n.	c.	d.	n.
2006–07												
Salvin's albatross	11	9	5	-	-	-	-	-	-	-	-	-
Buller's albatross	1	1	1	1	1	1	2	2	2	2	2	2
Albatross (unidentified)	2	2	1	-	-	-	-	-	-	-	-	-
Gibson's albatross	1	1	1	-	-	-	-	-	-	-	-	-
Black-browed albatross	-	-	-	1	0	0	-	-	-	-	-	-
2005–06												
Buller's albatross	4	4	4	2	1	1	-	-	-	2	2	1
Salvin's albatross	5	5	4	1	0	0	-	-	-	2	2	2
Albatross (unidentified)	2	2	1	3	3	0	-	-	-	2	2	1
Southern royal albatross	-	-	-	1	1	1	-	-	-	-	-	-
Black-browed albatross	-	-	-	-	-	-	-	-	-	1	1	0
2004–05												
Salvin's albatross	13	10	10	10	10	10	-	-	-	5	5	5
Buller's albatross	5	5	5	10	8	8	5	5	4	3	2	2
Albatross (unidentified)	7	0	0	1	1	0	-	-	-	1	1	0
Southern black-browed albatross	1	1	1	-	-	-	-	-	-	1	1	0
Black-browed albatross	-	-	-	1	0	0	-	-	-	-	-	-
Chatham albatross	1	1	1	-	-	-	-	-	-	-	-	-
Southern royal albatross	-	-	-	1	1	1	-	-	-	-	-	-
Campbell albatross	-	-	-	-	-	-	1	1	1	-	-	-
Wandering albatross	-	-	-	-	-	-	1	0	0	-	-	-

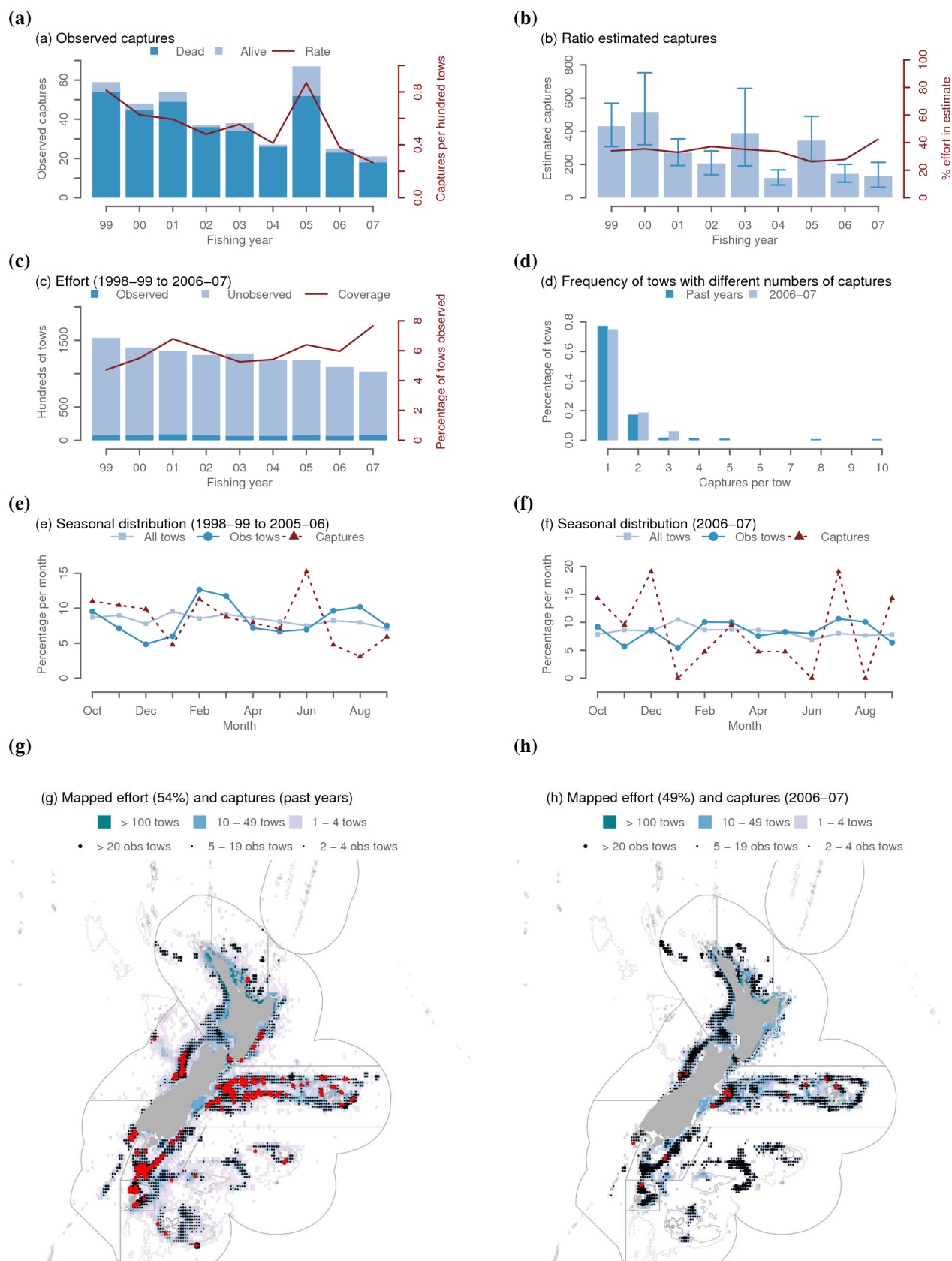


Figure 24: Other albatross captures in all trawl fisheries. (a) Observed captures, (b) Ratio estimated captures, with 95% bootstrap confidence intervals, (c) Effort and observed effort, (d) Histogram of the number of captures per tow, (e, f) Monthly distributions of effort, observations and captures, (g, h) Mapped effort and captures from past years (showing annual averaged effort and observations, but all captures) and from 2006–07.

3.9.2 Other albatross, domestic surface longline, New Zealand EEZ

In 2006–07 there were 15 observed captures.

Table 46: Summary by year with number of hooks, number of hooks observed, percentage of hooks observed, number of observed captures, capture rate per ten thousand hooks, total estimated captures with 95% confidence intervals, and percentage of hooks included in the estimate.

	Hooks	No. obs	% obs	Captures	Rate	Estimated captures	% eff. in est.
2006–07	2 253 202	169 592	7.5	15	0.88	198 (89 - 323)	99.6
2005–06	3 062 409	88 143	2.9	10	1.13	234 (74 - 427)	91.5
2004–05	3 038 211	140 844	4.6	6	0.43	116 (42 - 217)	83.5
2003–04	6 212 260	393 749	6.3	13	0.33	72 (24 - 155)	89.7
2002–03	8 869 423	241 779	2.7	1	0.04	2 (1 - 4)	5.6
2001–02	10 154 145	242 476	2.4	13	0.54	492 (197 - 836)	84.3
2000–01	9 161 530	431 784	4.7	2	0.05	57 (2 - 145)	95.9
1999–00	7 460 027	38 458	0.5	3	0.78	3 (3 - 3)	0.5
1998–99	5 742 935	173 683	3.0	0	0.00	0	8.0

Table 47: Species caught by area with numbers of animals captured, dead and necropsied.

	AREA1			AREA3		
	captured	dead	necropsied	captured	dead	necropsied
2006–07						
Gibson's albatross	5	5	5	-	-	-
Black-browed albatross	3	2	1	-	-	-
Antipodean albatross	2	2	2	-	-	-
Wandering albatross	2	1	0	-	-	-
Campbell albatross	1	1	1	-	-	-
Buller's albatross	1	1	1	-	-	-
Albatross (unidentified)	1	0	0	-	-	-
2005–06						
Wandering albatross	3	1	1	-	-	-
Buller's albatross	-	-	-	2	1	1
Campbell albatross	1	1	1	1	1	1
Black-browed albatross	2	2	0	-	-	-
Pacific albatross	1	1	1	-	-	-
2004–05						
Buller's albatross	3	2	0	-	-	-
Campbell albatross	2	2	2	-	-	-
Gibson's albatross	1	1	1	-	-	-
2003–04						
Buller's albatross	-	-	-	10	7	7
Light-mantled sooty albatross	-	-	-	1	1	1
Southern black-browed albatross	1	1	1	-	-	-
Campbell albatross	-	-	-	1	1	1
2002–03						
Southern royal albatross	-	-	-	1	1	1

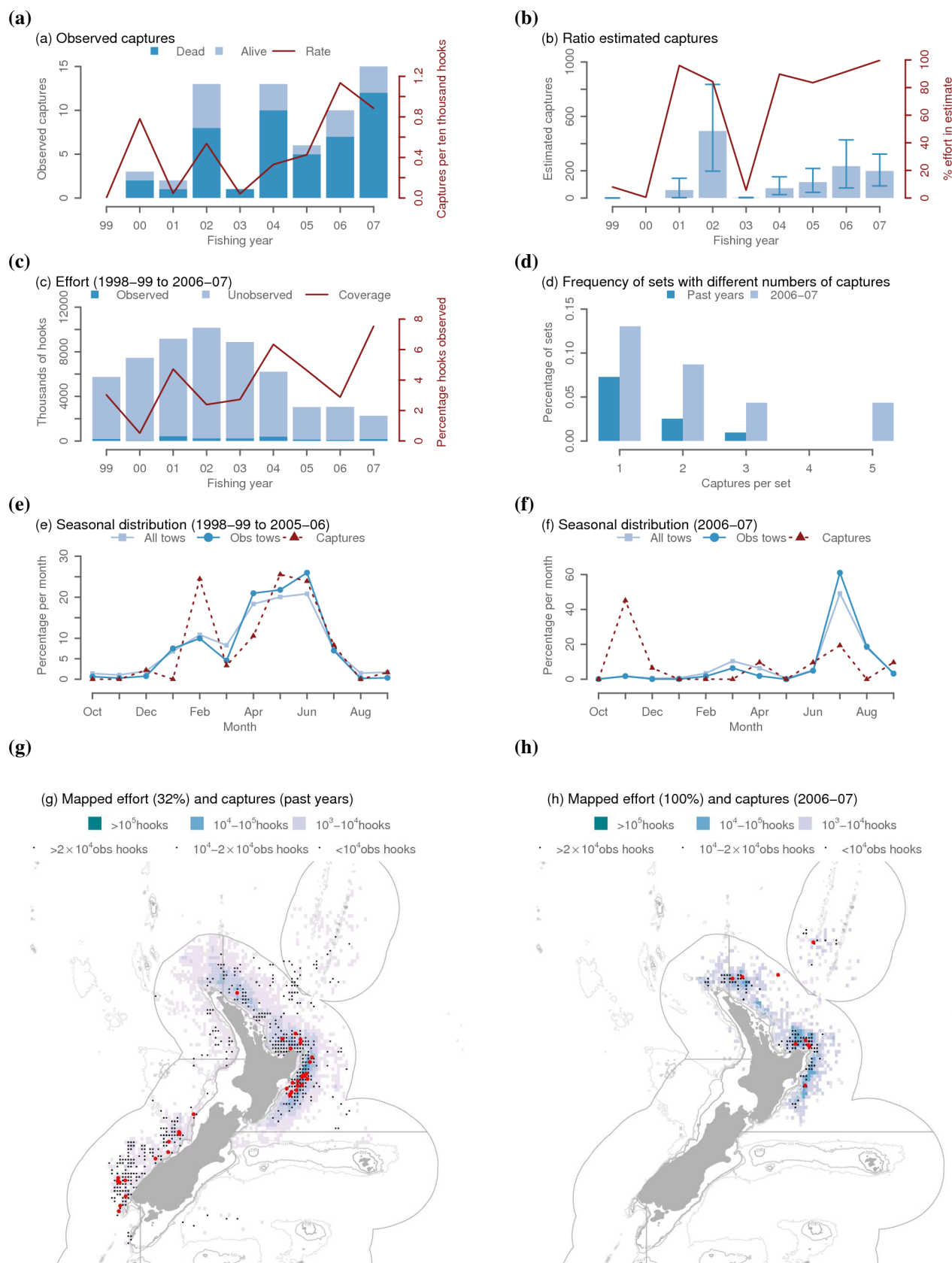


Figure 25: Other albatross captures in the domestic surface longline fishery. (a) Observed captures, (b) Ratio estimated captures, with 95% bootstrap confidence intervals, (c) Effort and observed effort, (d) Histogram of the number of captures per tow, (e, f) Monthly distributions of effort, observations and captures, (g, h) Mapped effort and captures from past years (showing annual averaged effort and observations, but all captures) and from 2006–07.

3.9.3 Other albatross, charter surface longline, New Zealand EEZ

In 2006–07 there were 56 observed captures.

Table 48: Summary by year with number of hooks, number of hooks observed, percentage of hooks observed, number of observed captures, capture rate per ten thousand hooks, total estimated captures with 95% confidence intervals, and percentage of hooks included in the estimate.

	Hooks	No. obs	% obs	Captures	Rate	Estimated captures	% eff. in est.
2006–07	1 381 210	755 342	54.7	56	0.74	102 (85 - 120)	100.0
2005–06	608 610	539 977	88.7	13	0.24	15 (14 - 16)	100.0
2004–05	638 584	562 825	88.1	24	0.43	27 (26 - 28)	100.0
2003–04	1 170 033	1 070 716	91.5	29	0.27	31 (30 - 33)	99.9
2002–03	1 912 452	1 638 676	85.7	72	0.44	83 (80 - 87)	100.0
2001–02	722 236	675 683	93.6	58	0.86	61 (60 - 62)	98.7
2000–01	599 918	597 334	99.6	11	0.18	11 (11 - 11)	97.4
1999–00	826 093	755 312	91.4	26	0.34	27 (27 - 28)	97.5
1998–99	1 102 846	1 068 927	96.9	53	0.50	55 (54 - 55)	99.4

Table 49: Species caught by area with numbers of animals captured, dead and necropsied.

	AREA3			AREA1		
	captured	dead	necropsied	captured	dead	necropsied
2006–07						
Buller's albatross	49	34	34	-	-	-
Gibson's albatross	2	2	2	1	1	1
Campbell albatross	1	1	1	1	1	1
Salvin's albatross	-	-	-	1	1	1
Antipodean albatross	-	-	-	1	1	1
2005–06						
Buller's albatross	10	4	4	-	-	-
Southern royal albatross	1	0	0	-	-	-
Antipodean albatross	-	-	-	1	1	1
Campbell albatross	-	-	-	1	1	1
2004–05						
Buller's albatross	19	6	6	-	-	-
Campbell albatross	-	-	-	4	4	4
Albatross (unidentified)	1	0	0	-	-	-
2003–04						
Buller's albatross	29	15	15	-	-	-
2002–03						
Buller's albatross	34	15	15	6	6	5
Campbell albatross	-	-	-	17	17	12
Gibson's albatross	1	1	1	4	4	4
Wandering albatross	-	-	-	4	4	0
Grey-headed albatross	-	-	-	2	2	0
Southern royal albatross	2	2	2	-	-	-
Antipodean albatross	-	-	-	2	2	2

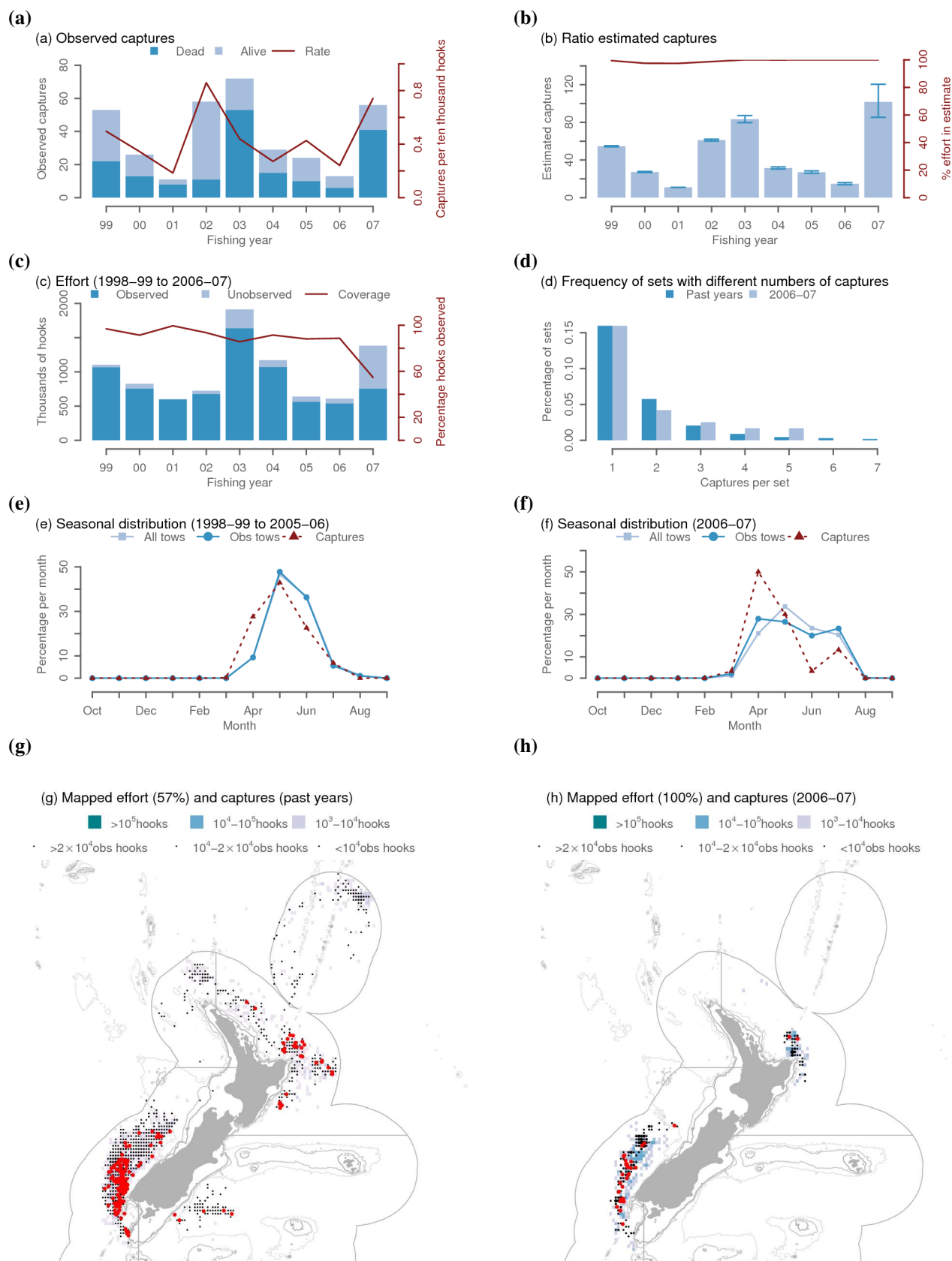


Figure 26: Other albatross captures in the charter surface longline fishery. (a) Observed captures, (b) Ratio estimated captures, with 95% bootstrap confidence intervals, (c) Effort and observed effort, (d) Histogram of the number of captures per tow, (e, f) Monthly distributions of effort, observations and captures, (g, h) Mapped effort and captures from past years (showing annual averaged effort and observations, but all captures) and from 2006-07.

3.9.4 Other albatross, Australian charter surface longline, New Zealand EEZ

In 2006–07 there were 51 observed captures.

Table 50: Summary by year with number of hooks, number of hooks observed, percentage of hooks observed, number of observed captures, capture rate per ten thousand hooks, total estimated captures with 95% confidence intervals, and percentage of hooks included in the estimate.

	Hooks	No. obs	% obs	Captures	Rate	Estimated captures	% eff. in est.
2006–07	84 820	30 985	36.5	51	16.46	114 (75 - 163)	100.0
2005–06	16 550	8676	52.4	0	0.00	0	52.4

Table 51: Species caught by area with numbers of animals captured, dead and necropsied.

	AREA1		
	captured	dead	necropsied
2006–07			
Albatross (unidentified)	33	32	0
Wandering albatross	17	0	0
Black-browed albatross	1	1	0

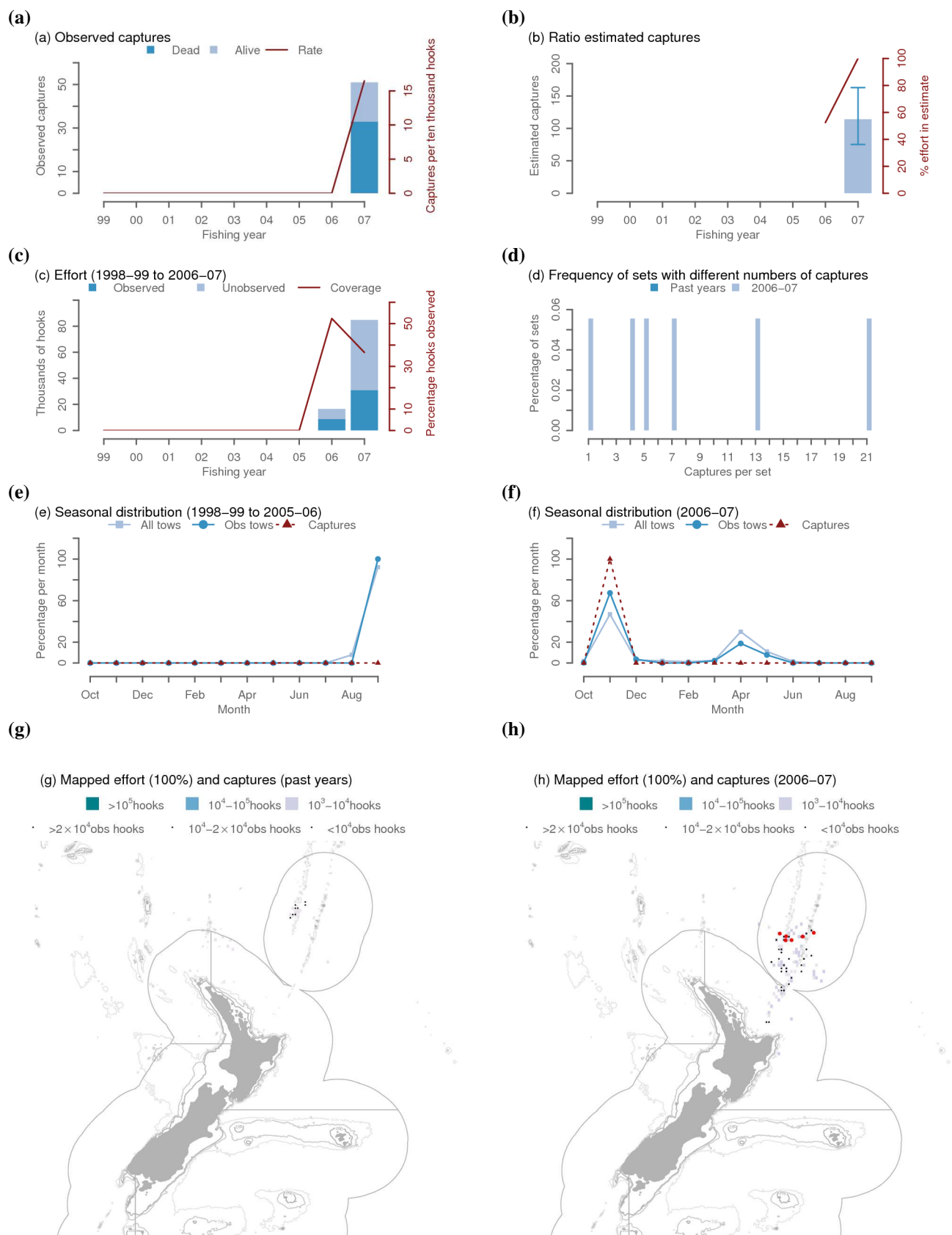


Figure 27: Other albatross captures in Australian charter surface longline. (a) Observed captures, (b) Ratio estimated captures, with 95% bootstrap confidence intervals, (c) Effort and observed effort, (d) Histogram of the number of captures per tow, (e, f) Monthly distributions of effort, observations and captures, (g, h) Mapped effort and captures from past years (showing annual averaged effort and observations, but all captures) and from 2006–07.

3.9.5 Other albatross, bottom longline, New Zealand EEZ

In 2006–07 there were 36 observed captures.

Table 52: Summary by year with number of hooks, number of hooks observed, percentage of hooks observed, number of observed captures, capture rate per ten thousand hooks, total estimated captures with 95% confidence intervals, and percentage of hooks included in the estimate.

	Hooks	No. obs	% obs	Captures	Rate	Estimated captures	% eff. in est.
2006–07	38 164 851	2 344 205	6.1	36	0.15	791 (307 - 1414)	49.6
2005–06	37 125 639	3 822 459	10.3	6	0.02	34 (10 - 64)	72.3
2004–05	41 840 933	2 927 928	7.0	1	0.00	18 (1 - 56)	71.2
2003–04	43 449 733	5 919 633	13.6	9	0.02	31 (16 - 48)	79.6
2002–03	37 753 336	11 308 295	30.0	18	0.02	27 (21 - 35)	47.3
2001–02	47 024 332	7 547 517	16.1	21	0.03	69 (38 - 114)	51.7
2000–01	51 024 367	5 248 902	10.3	93	0.18	318 (219 - 436)	30.7
1999–00	53 277 149	3 606 478	6.8	45	0.12	269 (119 - 468)	56.4
1998–99	55 487 193	3 097 198	5.6	1	0.00	23 (1 - 69)	50.7

Table 53: Species caught by area with numbers of animals captured, dead and necropsied.

	CHAT4			SUBA6			EAST2			Other Areas		
	c.	d.	n.	c.	d.	n.	c.	d.	n.	c.	d.	n.
2006–07												
Salvin's albatross	22	22	16	-	-	-	-	-	-	-	-	-
Chatham albatross	12	12	10	-	-	-	-	-	-	-	-	-
Albatross (unidentified)	1	1	0	-	-	-	-	-	-	-	-	-
Indian yellow-nosed albatross	-	-	-	-	-	-	1	1	1	-	-	-
2005–06												
Wandering albatross	-	-	-	-	-	-	2	0	0	-	-	-
Chatham albatross	2	2	2	-	-	-	-	-	-	-	-	-
Albatross (unidentified)	1	1	1	-	-	-	-	-	-	-	-	-
Salvin's albatross	1	1	1	-	-	-	-	-	-	-	-	-
2004–05												
Black-browed albatross	-	-	-	-	-	-	-	-	-	1	0	0
2003–04												
Salvin's albatross	-	-	-	9	2	2	-	-	-	-	-	-
2002–03												
Salvin's albatross	6	6	6	8	6	6	-	-	-	-	-	-
Chatham albatross	3	3	2	-	-	-	-	-	-	-	-	-
Buller's albatross	-	-	-	-	-	-	-	-	-	1	1	1
2001–02												
Salvin's albatross	10	10	10	2	2	2	-	-	-	-	-	-
Chatham albatross	5	5	5	-	-	-	-	-	-	-	-	-
Wandering albatross	2	1	0	-	-	-	-	-	-	-	-	-
Southern royal albatross	1	0	0	-	-	-	-	-	-	-	-	-
Pacific albatross	1	1	1	-	-	-	-	-	-	-	-	-

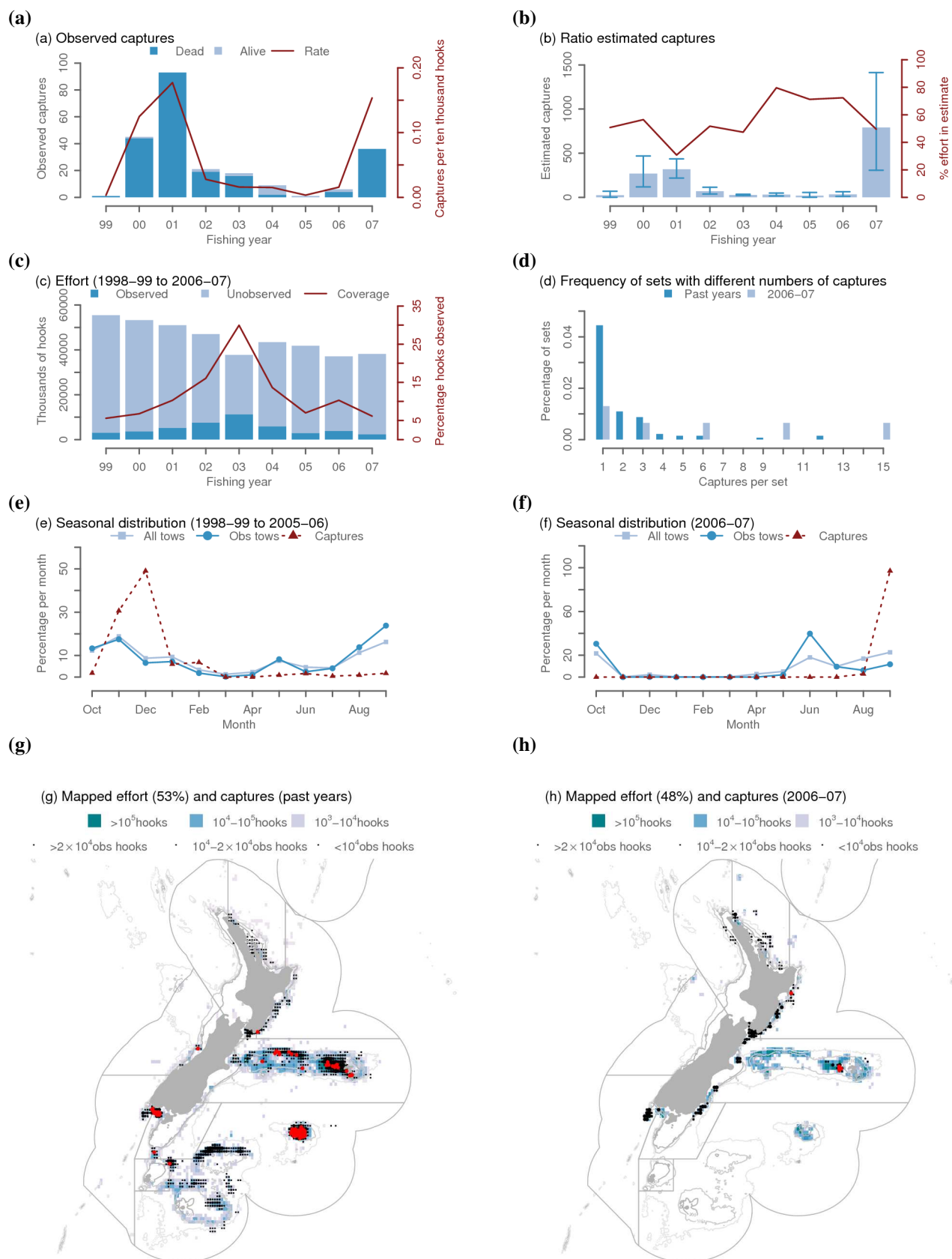


Figure 28: Other albatross captures in the bottom longline fishery. (a) Observed captures, (b) Ratio estimated captures, with 95% bootstrap confidence intervals, (c) Effort and observed effort, (d) Histogram of the number of captures per tow, (e, f) Monthly distributions of effort, observations and captures, (g, h) Mapped effort and captures from past years (showing annual averaged effort and observations, but all captures) and from 2006–07.

3.10 Other bird captures

3.10.1 Other birds, all trawl, New Zealand EEZ

In 2006–07 there were 22 observed captures.

Table 54: Summary by year with 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.

	Tows	No. obs	% obs	Captures	Rate	Estimated captures	% eff. in est.
2006–07	103 384	7922	7.7	22	0.28	338 (106 - 635)	42.4
2005–06	109 982	6554	6.0	26	0.40	153 (73 - 282)	27.7
2004–05	120 496	7710	6.4	52	0.67	228 (150 - 326)	26.1
2003–04	120 923	6547	5.4	21	0.32	114 (65 - 173)	33.5
2002–03	130 202	6836	5.3	22	0.32	140 (78 - 216)	35.1
2001–02	127 912	7717	6.0	11	0.14	65 (33 - 105)	37.1
2000–01	134 256	9114	6.8	79	0.87	579 (361 - 875)	32.9
1999–00	139 102	7651	5.5	26	0.34	181 (108 - 267)	35.4
1998–99	153 759	7257	4.7	59	0.81	345 (185 - 552)	33.9

Table 55: Species caught by area with numbers of animals captured, dead and necropsied.

	NORTH1			STEW5			WCSI7			Other Areas		
	c.	d.	n.	c.	d.	n.	c.	d.	n.	c.	d.	n.
2006–07												
Flesh-footed shearwater	7	6	6	-	-	-	-	-	-	-	-	-
Grey petrel	-	-	-	-	-	-	-	-	-	3	3	3
Northern giant petrel	-	-	-	-	-	-	1	1	1	1	1	1
Petrel (unidentified)	1	1	0	-	-	-	-	-	-	1	0	0
Cape pigeon	-	-	-	1	1	0	1	0	0	-	-	-
Seabird small	1	0	0	-	-	-	-	-	-	-	-	-
Giant petrels (unidentified)	-	-	-	-	-	-	1	1	0	-	-	-
Black petrel	1	1	1	-	-	-	-	-	-	-	-	-
Southern cape pigeon	-	-	-	-	-	-	1	1	1	-	-	-
Seabird large	-	-	-	-	-	-	-	-	-	1	0	0
Common diving petrel	-	-	-	-	-	-	1	0	0	-	-	-
2005–06												
Flesh-footed shearwater	8	8	8	-	-	-	-	-	-	-	-	-
Petrel (unidentified)	1	1	0	3	1	0	-	-	-	1	0	0
Cape pigeon	-	-	-	1	0	0	1	1	1	1	0	0
Grey petrel	-	-	-	-	-	-	-	-	-	2	1	1
Seabird large	-	-	-	-	-	-	-	-	-	2	2	0
Prion (unidentified)	-	-	-	1	0	0	-	-	-	-	-	-
Giant petrels (unidentified)	-	-	-	1	0	0	-	-	-	-	-	-
Grey-backed storm petrel	-	-	-	1	1	1	-	-	-	-	-	-
Black petrel	-	-	-	-	-	-	-	-	-	1	0	0
White-faced storm petrel	-	-	-	-	-	-	-	-	-	1	1	1
Black bellied storm petrel	-	-	-	1	0	0	-	-	-	-	-	-

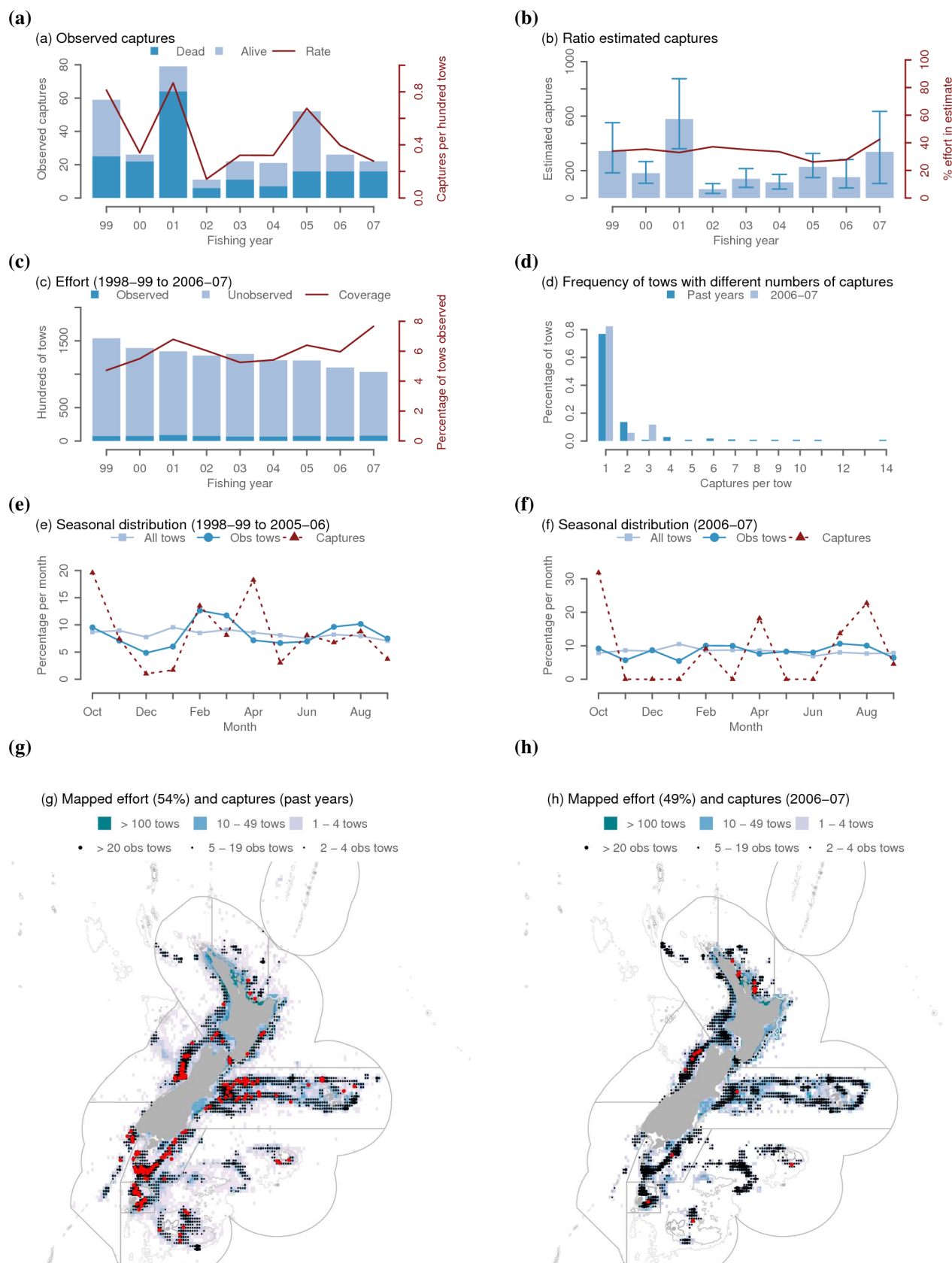


Figure 29: Other bird captures in all trawl fisheries. (a) Observed captures, (b) Ratio estimated captures, with 95% bootstrap confidence intervals, (c) Effort and observed effort, (d) Histogram of the number of captures per tow, (e, f) Monthly distributions of effort, observations and captures, (g, h) Mapped effort and captures from past years (showing annual averaged effort and observations, but all captures) and from 2006-07.

3.10.2 Other birds, surface longline, New Zealand EEZ

In 2006–07 there were 29 observed captures.

Table 56: Summary by year with number of hooks, number of hooks observed, percentage of hooks observed, number of observed captures, capture rate per ten thousand hooks, total estimated captures with 95% confidence intervals, and percentage of hooks included in the estimate.

	Hooks	No. obs	% obs	Captures	Rate	Estimated captures	% eff. in est.
2006–07	3 719 232	955 919	25.7	29	0.30	223 (126 - 335)	99.8
2005–06	3 687 569	636 796	17.3	11	0.17	363 (138 - 642)	92.8
2004–05	3 676 795	703 669	19.1	5	0.07	24 (5 - 63)	86.3
2003–04	7 382 293	1 464 465	19.8	7	0.05	206 (50 - 392)	91.3
2002–03	10 781 875	1 880 455	17.4	27	0.14	34 (31 - 37)	22.4
2001–02	10 876 381	918 159	8.4	77	0.84	3896 (2205 - 5946)	85.2
2000–01	9 761 448	1 029 118	10.5	33	0.32	946 (596 - 1351)	96.0
1999–00	8 286 120	793 770	9.6	32	0.40	32 (32 - 32)	10.2
1998–99	6 845 781	1 242 610	18.2	22	0.18	22 (22 - 22)	22.7

Table 57: Species caught by area with numbers of animals captured, dead and necropsied.

	AREA1			AREA3		
	captured	dead	necropsied	captured	dead	necropsied
2006–07						
Grey petrel	19	18	19	-	-	-
Flesh-footed shearwater	3	0	0	-	-	-
Seabird large	3	3	0	-	-	-
Grey-faced petrel	2	2	2	-	-	-
Petrel (unidentified)	1	1	0	-	-	-
Cape pigeon	1	0	0	-	-	-
2005–06						
Grey petrel	7	7	7	-	-	-
Flesh-footed shearwater	4	0	0	-	-	-
2004–05						
Southern giant petrel	2	2	2	-	-	-
Grey petrel	2	2	2	-	-	-
Flesh-footed shearwater	1	0	0	-	-	-
2003–04						
Grey petrel	3	3	3	-	-	-
Westland petrel	-	-	-	2	2	1
Seabird	1	1	0	-	-	-
Black petrel	1	1	0	-	-	-

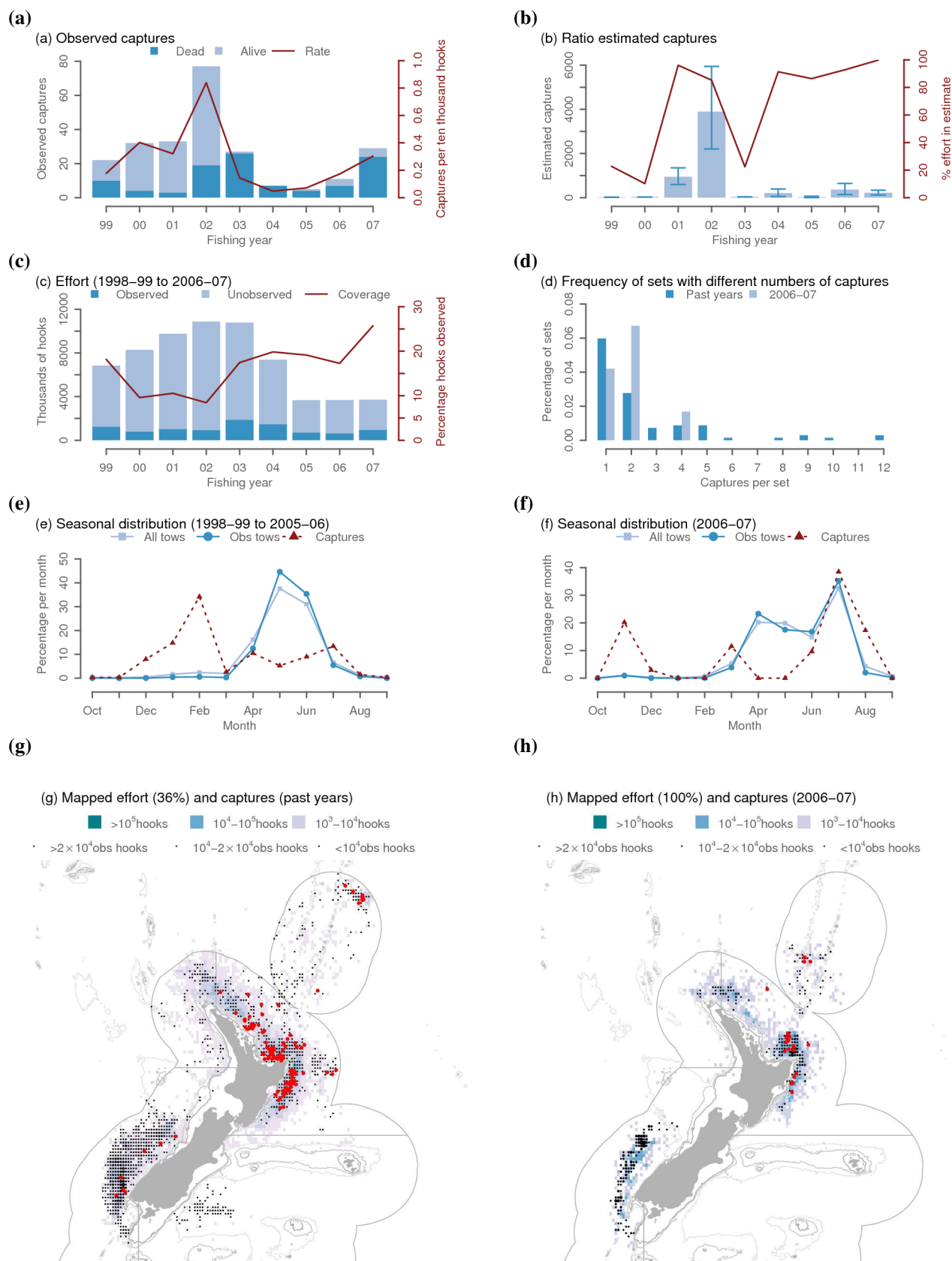


Figure 30: Other bird captures in the surface longline fishery. (a) Observed captures, (b) Ratio estimated captures, with 95% bootstrap confidence intervals, (c) Effort and observed effort, (d) Histogram of the number of captures per tow, (e, f) Monthly distributions of effort, observations and captures, (g, h) Mapped effort and captures from past years (showing annual averaged effort and observations, but all captures) and from 2006-07.

3.10.3 Other birds, bottom longline, New Zealand EEZ

In 2006–07 there were 9 observed captures.

Table 58: Summary by year with number of hooks, number of hooks observed, percentage of hooks observed, number of observed captures, capture rate per ten thousand hooks, total estimated captures with 95% confidence intervals, and percentage of hooks included in the estimate.

	Hooks	No. obs	% obs	Captures	Rate	Estimated captures	% eff. in est.
2006–07	38 164 851	2 344 205	6.1	9	0.04	275 (67 - 544)	49.6
2005–06	37 125 639	3 822 459	10.3	18	0.05	1134 (192 - 2391)	72.3
2004–05	41 840 933	2 927 928	7.0	15	0.05	545 (173 - 1073)	71.2
2003–04	43 449 733	5 919 633	13.6	12	0.02	549 (228 - 958)	79.6
2002–03	37 753 336	11 308 295	30.0	94	0.08	143 (129 - 158)	47.3
2001–02	47 024 332	7 547 517	16.1	36	0.05	94 (75 - 114)	51.7
2000–01	51 024 367	5 248 902	10.3	218	0.42	702 (562 - 864)	30.7
1999–00	53 277 149	3 606 478	6.8	87	0.24	518 (360 - 701)	56.4
1998–99	55 487 193	3 097 198	5.6	86	0.28	470 (363 - 589)	50.7

Table 59: Species caught by area with numbers of animals captured, dead and necropsied.

	NORTH1			CHAT4			STEW5			Other Areas		
	c.	d.	n.	c.	d.	n.	c.	d.	n.	c.	d.	n.
2006–07												
Black petrel	4	0	0	-	-	-	-	-	-	-	-	-
Cape pigeon	-	-	-	2	0	0	-	-	-	-	-	-
Southern cape pigeon	-	-	-	-	-	-	-	-	-	1	1	1
Prion (unidentified)	-	-	-	-	-	-	-	-	-	1	1	0
Grey petrel	-	-	-	1	1	1	-	-	-	-	-	-
2005–06												
Petrel (unidentified)	6	0	0	-	-	-	-	-	-	-	-	-
Buller's shearwater	4	0	0	-	-	-	-	-	-	-	-	-
Cape pigeon	-	-	-	2	0	0	1	1	1	-	-	-
Northern giant petrel	-	-	-	-	-	-	2	0	0	-	-	-
Black petrel	2	2	2	-	-	-	-	-	-	-	-	-
Common diving petrel	-	-	-	-	-	-	-	-	-	1	0	0
2004–05												
Flesh-footed shearwater	9	4	4	-	-	-	-	-	-	-	-	-
Seabird small	1	0	0	-	-	-	-	-	-	-	-	-
Black petrel	1	1	1	-	-	-	-	-	-	-	-	-
Cape pigeon	-	-	-	-	-	-	1	0	0	-	-	-
Common diving petrel	-	-	-	-	-	-	-	-	-	1	1	1
Gannet	1	0	0	-	-	-	-	-	-	-	-	-
Grey petrel	-	-	-	-	-	-	-	-	-	1	1	1

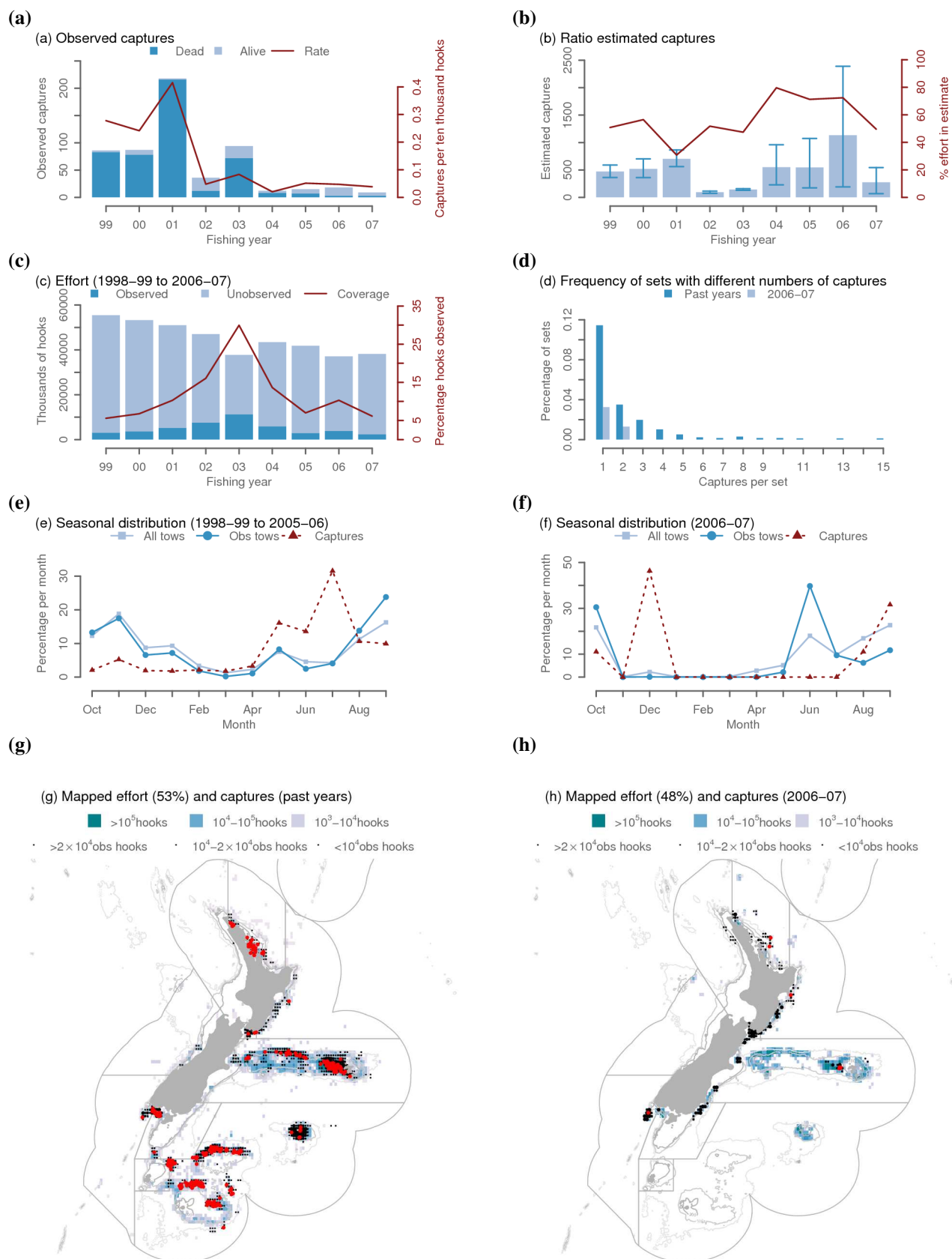


Figure 31: Other bird captures in the bottom longline fishery. (a) Observed captures, (b) Ratio estimated captures, with 95% bootstrap confidence intervals, (c) Effort and observed effort, (d) Histogram of the number of captures per tow, (e, f) Monthly distributions of effort, observations and captures, (g, h) Mapped effort and captures from past years (showing annual averaged effort and observations, but all captures) and from 2006-07.

3.11 All mammal captures

3.11.1 All trawl, all mammals, New Zealand EEZ

In 2006–07 there were 95 observed captures.

Table 60: Summary by year with 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.

	Tows	No. obs	% obs	Captures	Rate	Estimated captures	% eff. in est.
2006–07							
Squid trawl	5910	1289	21.8	16	1.24	48 (31 - 67)	72.6
Hoki trawl	10 608	1758	16.6	29	1.65	246 (158 - 346)	97.1
Hake trawl	1606	296	18.4	4	1.35	27 (10 - 49)	75.0
Deepwater trawl	7388	2322	31.4	2	0.09	3 (2 - 5)	79.4
Ling trawl	1659	157	9.5	12	7.64	56 (28 - 88)	39.1
SBW trawl	632	224	35.4	16	7.14	45 (31 - 61)	100.0
Scampi trawl	5138	389	7.6	1	0.26	13 (1 - 38)	87.1
Pelagic trawl	2711	802	29.6	13	1.62	45 (21 - 78)	95.4
Inshore trawl	59 538	292	0.5	0	0.00	0	16.4
Other trawl	8194	393	4.8	2	0.51	17 (2 - 40)	50.1
Total	103 384	7922	7.7	95	1.20	501 (392 - 615)	42.4
2005–06							
Squid trawl	8582	1103	12.9	15	1.36	78 (43 - 120)	81.1
Hoki trawl	11 591	1777	15.3	62	3.49	215 (148 - 291)	81.5
Hake trawl	1359	421	31.0	11	2.61	31 (18 - 48)	90.7
Deepwater trawl	8291	1292	15.6	2	0.15	10 (2 - 22)	75.0
Ling trawl	1394	113	8.1	2	1.77	2 (2 - 2)	8.1
SBW trawl	624	217	34.8	55	25.35	158 (105 - 225)	100.0
Scampi trawl	4867	331	6.8	1	0.30	11 (1 - 32)	46.5
Pelagic trawl	2808	709	25.2	9	1.27	22 (11 - 38)	76.6
Inshore trawl	62 056	103	0.2	2	1.94	2 (2 - 2)	0.2
Other trawl	8410	488	5.8	5	1.02	12 (5 - 21)	16.3
Total	109 982	6554	6.0	164	2.50	541 (438 - 659)	27.7
2004–05							
Squid trawl	10 490	2511	23.9	28	1.12	81 (60 - 104)	82.7
Hoki trawl	14 540	2133	14.7	120	5.63	1025 (750 - 1335)	92.0
Hake trawl	1555	95	6.1	2	2.11	2 (2 - 2)	6.1
Deepwater trawl	8409	1618	19.2	4	0.25	13 (6 - 22)	66.6
Ling trawl	988	76	7.7	10	13.16	10 (10 - 10)	7.7
SBW trawl	870	335	38.5	36	10.75	93 (68 - 122)	99.9
Scampi trawl	4648	143	3.1	0	0.00	0	3.1
Pelagic trawl	2509	558	22.2	32	5.73	143 (88 - 213)	95.1
Inshore trawl	67 295	18	0.0	0	0.00	0	0.0
Other trawl	9192	223	2.4	11	4.93	11 (11 - 11)	2.4
Total	120 496	7710	6.4	243	3.15	1379 (1087 - 1710)	26.1

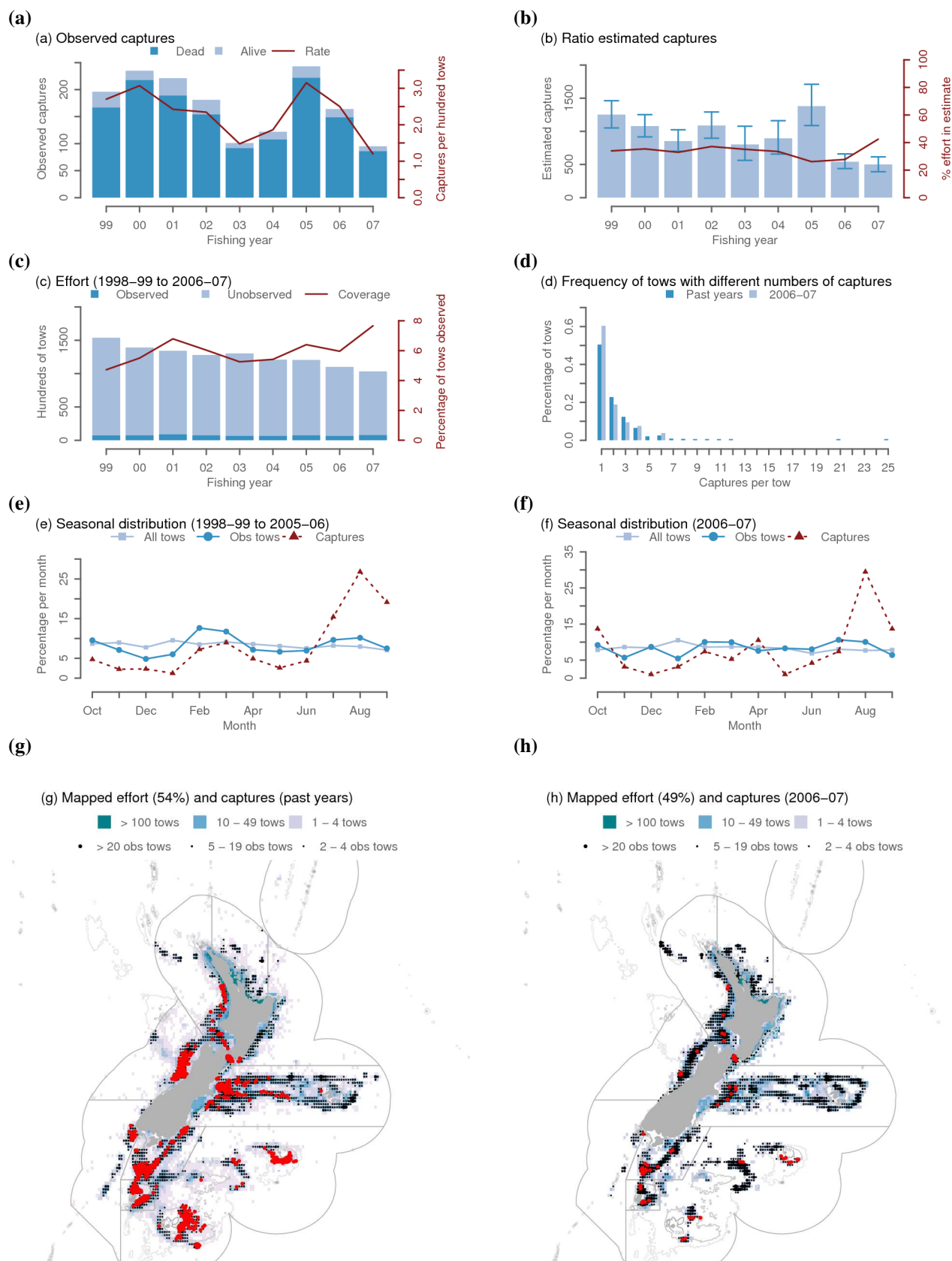


Figure 32: All mammal captures in all trawl fisheries. (a) Observed captures, (b) Ratio estimated captures, with 95% bootstrap confidence intervals, (c) Effort and observed effort, (d) Histogram of the number of captures per tow, (e, f) Monthly distributions of effort, observations and captures, (g, h) Mapped effort and captures from past years (showing annual averaged effort and observations, but all captures) and from 2006–07.

3.11.2 All mammals, surface longline, New Zealand EEZ

In 2006–07 there were 10 observed captures.

Table 61: Summary by year with number of hooks, number of hooks observed, percentage of hooks observed, number of observed captures, capture rate per ten thousand hooks, total estimated captures with 95% confidence intervals, and percentage of hooks included in the estimate.

	Hooks	No. obs	% obs	Captures	Rate	Estimated captures	% eff. in est.
2006–07							
Domestic	2 253 202	169 592	7.5	2	0.12	26 (2 - 64)	99.6
Charter	1 381 210	755 342	54.7	8	0.11	14 (9 - 21)	100.0
Australian	84 820	30 985	36.5	0	0.00	0	100.0
Total	3 719 232	955 919	25.7	10	0.10	41 (14 - 79)	99.8
2005–06							
Domestic	3 062 409	88 143	2.9	4	0.45	132 (35 - 266)	91.5
Charter	608 610	539 977	88.7	8	0.15	9 (8 - 10)	100.0
Australian	16 550	8676	52.4	0	0.00	0	52.4
Total	3 687 569	636 796	17.3	12	0.19	141 (44 - 273)	92.8
2004–05							
Domestic	3 038 211	140 844	4.6	3	0.21	58 (3 - 132)	83.5
Charter	638 584	562 825	88.1	18	0.32	20 (19 - 21)	100.0
Total	3 676 795	703 669	19.1	21	0.30	78 (23 - 150)	86.3
2003–04							
Domestic	6 212 260	393 749	6.3	33	0.84	200 (84 - 350)	89.7
Charter	1 170 033	1 070 716	91.5	11	0.10	12 (12 - 13)	99.9
Total	7 382 293	1 464 465	19.8	44	0.30	212 (97 - 361)	91.3
2002–03							
Domestic	8 869 423	241 779	2.7	30	1.24	59 (48 - 71)	5.6
Charter	1 912 452	1 638 676	85.7	27	0.16	29 (28 - 30)	100.0
Total	10 781 875	1 880 455	17.4	57	0.30	88 (77 - 99)	22.4
2001–02							
Domestic	10 154 145	242 476	2.4	15	0.62	117 (69 - 175)	84.3
Charter	722 236	675 683	93.6	29	0.43	31 (30 - 31)	98.7
Total	10 876 381	918 159	8.4	44	0.48	148 (100 - 205)	85.2
2000–01							
Domestic	9 161 530	431 784	4.7	13	0.30	27 (15 - 45)	95.9
Charter	599 918	597 334	99.6	31	0.52	31 (31 - 31)	97.4
Total	9 761 448	1 029 118	10.5	44	0.43	58 (46 - 75)	96.0

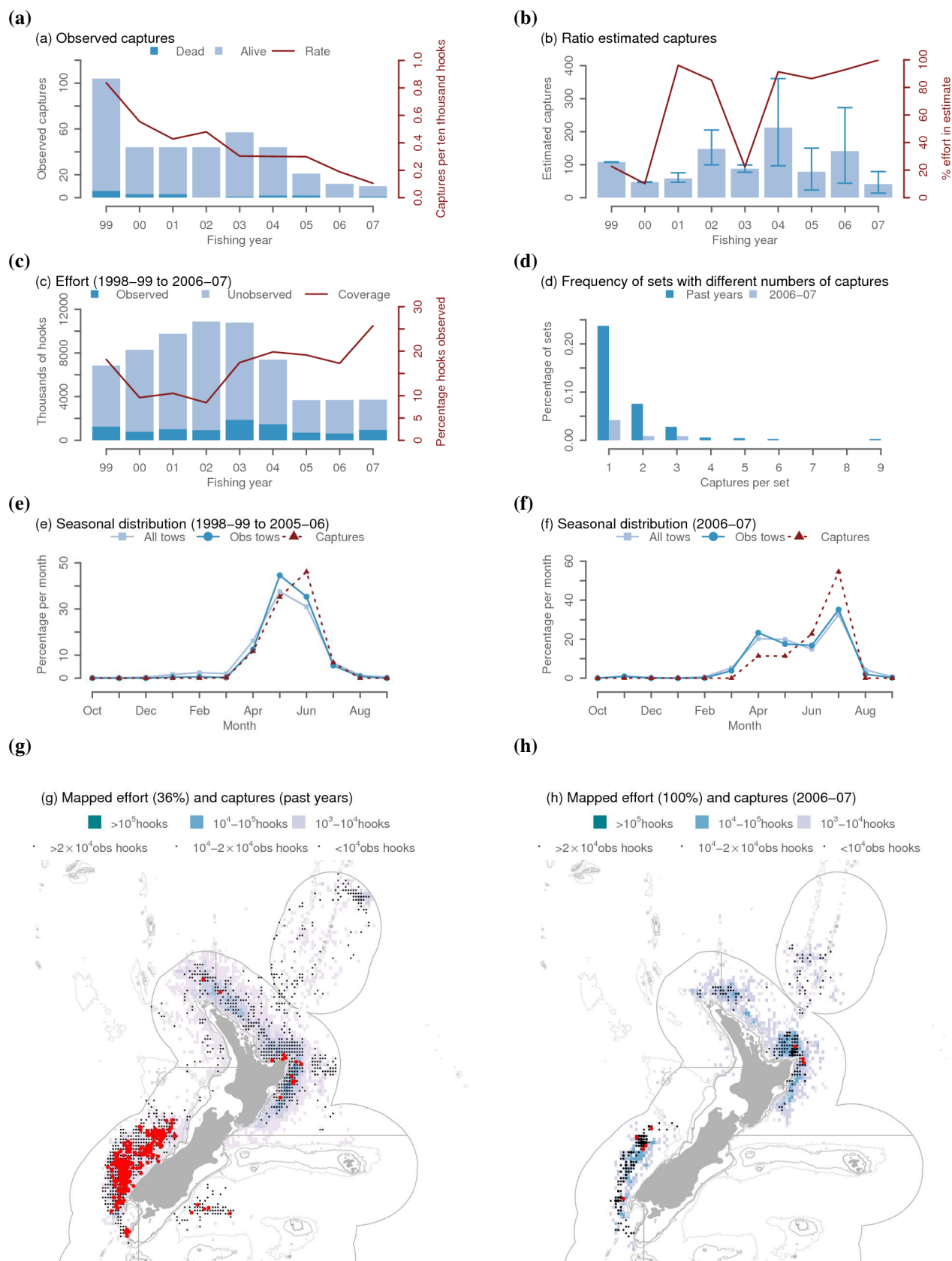


Figure 33: All mammal captures in the surface longline fishery. (a) Observed captures, (b) Ratio estimated captures, with 95% bootstrap confidence intervals, (c) Effort and observed effort, (d) Histogram of the number of captures per tow, (e, f) Monthly distributions of effort, observations and captures, (g, h) Mapped effort and captures from past years (showing annual averaged effort and observations, but all captures) and from 2006–07.

3.11.3 All mammals, bottom longline, New Zealand EEZ

In 2006–07 there were no observed captures.

Table 62: Summary by year with number of hooks, number of hooks observed, percentage of hooks observed, number of observed captures, capture rate per ten thousand hooks, total estimated captures with 95% confidence intervals, and percentage of hooks included in the estimate.

	Hooks	No. obs	% obs	Captures	Rate	Estimated captures	% eff. in est.
2006–07							
Ling	16 900 158	2 179 707	12.9	0	0.00	0	87.0
Snapper	10 344 640	63 650	0.6	0	0.00	0	0.6
Bluenose	7 487 163	92 718	1.2	0	0.00	0	55.3
Other	3 432 890	8130	0.2	0	0.00	0	0.2
Total	38 164 851	2 344 205	6.1	0	0.00	0	49.6
2005–06							
Ling	16 222 501	3 599 075	22.2	0	0.00	0	78.0
Snapper	11 694 638	125 894	1.1	0	0.00	0	98.3
Bluenose	6 150 791	56 900	0.9	1	0.18	37 (1 - 130)	30.4
Other	3 057 709	40 590	1.3	0	0.00	0	27.6
Total	37 125 639	3 822 459	10.3	1	0.00	37 (1 - 129)	72.3
2004–05							
Ling	21 544 721	2 645 620	12.3	0	0.00	0	85.5
Snapper	11 531 586	264 404	2.3	0	0.00	0	98.3
Bluenose	5 315 543	9955	0.2	0	0.00	0	0.2
Other	3 449 083	7949	0.2	0	0.00	0	0.2
Total	41 840 933	2 927 928	7.0	0	0.00	0	71.2
2003–04							
Ling	24 741 780	5 698 560	23.0	0	0.00	0	91.7
Snapper	12 254 888	221 073	1.8	0	0.00	0	97.1
Bluenose	3 328 650	0	0.0	0		0	0.0
Other	3 124 415	0	0.0	0		0	0.0
Total	43 449 733	5 919 633	13.6	0	0.00	0	79.6
2002–03							
Ling	19 702 549	11 299 295	57.3	3	0.00	4 (3 - 6)	90.7
Snapper	13 722 067	0	0.0	0		0	0.0
Bluenose	1 899 774	0	0.0	0		0	0.0
Other	2 428 946	9000	0.4	0	0.00	0	0.4
Total	37 753 336	11 308 295	30.0	3	0.00	4 (3 - 6)	47.3
2001–02							
Ling	27 995 371	7 547 517	27.0	1	0.00	3 (1 - 6)	86.8
Snapper	15 372 878	0	0.0	0		0	0.0
Bluenose	1 703 985	0	0.0	0		0	0.0
Other	1 952 098	0	0.0	0		0	0.0
Total	47 024 332	7 547 517	16.1	1	0.00	3 (1 - 6)	51.7
2000–01							
Ling	29 114 743	5 033 144	17.3	0	0.00	0	51.4
Snapper	17 336 728	44 049	0.3	0	0.00	0	0.3
Bluenose	2 157 384	171 709	8.0	1	0.06	4 (1 - 10)	30.9
Other	2 415 512	0	0.0	0		0	0.0
Total	51 024 367	5 248 902	10.3	1	0.00	4 (1 - 10)	30.7

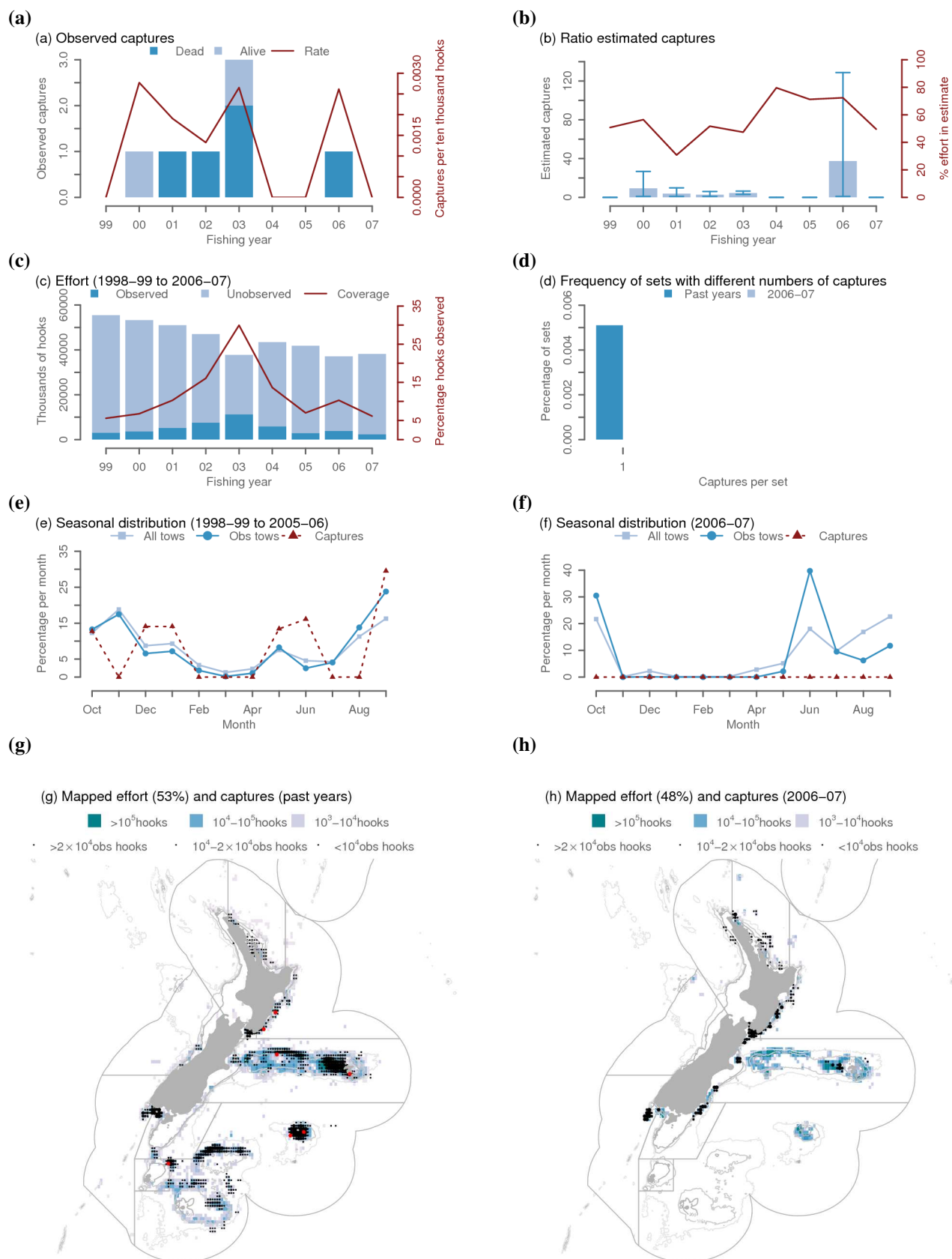


Figure 34: All mammal captures in the bottom longline fishery. (a) Observed captures, (b) Ratio estimated captures, with 95% bootstrap confidence intervals, (c) Effort and observed effort, (d) Histogram of the number of captures per tow, (e, f) Monthly distributions of effort, observations and captures, (g, h) Mapped effort and captures from past years (showing annual averaged effort and observations, but all captures) and from 2006–07.

3.12 Sea lion captures

3.12.1 Sea lions, all trawl, New Zealand EEZ

In 2006–07 there were 12 observed captures.

Table 63: Summary by year with 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.

	Tows	No. obs	% obs	Captures	Rate	Estimated captures		% eff. in est.
2006–07								
Squid, SQUAK6	1317	538	40.9	7	1.30	17	(10 - 26)	100.0
Other trawl	102 067	7386	7.2	5	0.07	26	(7 - 56)	41.7
Total	103 384	7922	7.7	12	0.15	43	(22 - 74)	42.4
2005–06								
Squid, SQUAK6	2459	550	22.4	10	1.82	44	(20 - 75)	100.0
Other trawl	107 523	6004	5.6	5	0.08	28	(7 - 58)	26.1
Total	109 982	6554	6.0	15	0.23	73	(38 - 114)	27.7
2004–05								
Squid, SQUAK6	2693	806	29.9	9	1.12	30	(18 - 44)	100.0
Other trawl	117 803	6904	5.9	5	0.07	16	(8 - 27)	24.4
Total	120 496	7710	6.4	14	0.18	46	(30 - 64)	26.1
2003–04								
Squid, SQUAK6	2594	791	30.5	16	2.02	52	(34 - 75)	100.0
Other trawl	118 329	5756	4.9	5	0.09	32	(11 - 61)	32.0
Total	120 923	6547	5.4	21	0.32	84	(55 - 118)	33.5
2002–03								
Squid, SQUAK6	1466	417	28.4	11	2.64	38	(23 - 56)	100.0
Other trawl	128 736	6419	5.0	1	0.02	1	(1 - 1)	34.3
Total	130 202	6836	5.3	12	0.18	39	(24 - 57)	35.1
2001–02								
Squid, SQUAK6	1647	563	34.2	21	3.73	61	(42 - 84)	100.0
Other trawl	126 265	7154	5.7	2	0.03	9	(2 - 22)	36.3
Total	127 912	7717	6.0	23	0.30	70	(48 - 98)	37.1
2000–01								
Squid, SQUAK6	583	577	99.0	39	6.76	39	(39 - 40)	100.0
Other trawl	133 673	8537	6.4	7	0.08	8	(7 - 10)	32.6
Total	134 256	9114	6.8	46	0.50	48	(46 - 49)	32.9

Table 64: Sea lions caught by area with numbers of animals captured, dead and necropsied.

	SQUAK6			STEW5			SUBA6		
	cap.	dead	nec.	cap.	dead	nec.	cap.	dead	nec.
2006–07	8	8	8	1	1	0	3	3	0
2005–06	11	11	10	1	0	0	3	3	0
2004–05	9	9	0	3	3	0	2	2	0
2003–04	19	19	0	1	0	0	1	1	0
2002–03	12	12	0	-	-	-	-	-	-
2001–02	21	21	18	1	1	1	1	1	0
2000–01	43	38	37	3	3	3	-	-	-
1999–00	25	25	19	3	2	2	-	-	-
1998–99	6	6	5	-	-	-	-	-	-

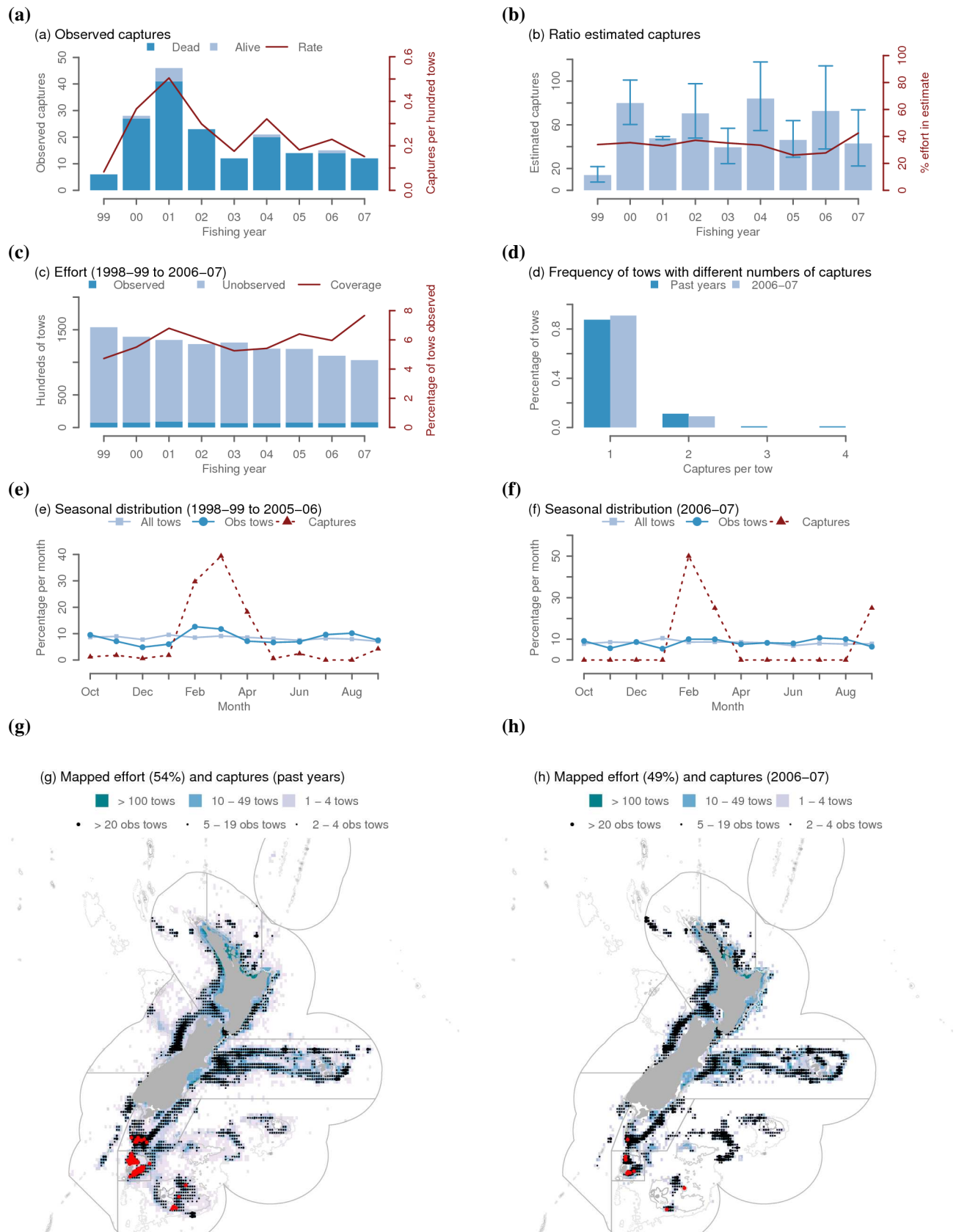


Figure 35: Sea lion captures in all trawl fisheries. (a) Observed captures, (b) Ratio estimated captures, with 95% bootstrap confidence intervals, (c) Effort and observed effort, (d) Histogram of the number of captures per tow, (e, f) Monthly distributions of effort, observations and captures, (g, h) Mapped effort and captures from past years (showing annual averaged effort and observations, but all captures) and from 2006–07.

3.12.2 Sea lions, squid trawl, Auckland Islands

In 2006–07 there were 7 observed captures.

Table 65: Summary by year with 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.

	Tows	No. obs	% obs	Captures	Rate	Estimated captures	% eff. in est.
2006–07	1317	538	40.9	7	1.30	17 (10 - 26)	100.0
2005–06	2459	550	22.4	10	1.82	44 (20 - 75)	100.0
2004–05	2693	806	29.9	9	1.12	30 (18 - 44)	100.0
2003–04	2594	791	30.5	16	2.02	52 (34 - 75)	100.0
2002–03	1466	417	28.4	11	2.64	38 (23 - 56)	100.0
2001–02	1647	563	34.2	21	3.73	61 (42 - 84)	100.0
2000–01	583	577	99.0	39	6.76	39 (39 - 40)	100.0
1999–00	1208	439	36.3	25	5.69	69 (51 - 86)	100.0
1998–99	402	156	38.8	5	3.21	13 (7 - 21)	100.0

Table 66: Sea lions caught by area with numbers of animals captured, dead and necropsied.

	SQUAK6		
	captured	dead	necropsied
2006–07	7	7	7
2005–06	10	10	10
2004–05	9	9	0
2003–04	16	16	0
2002–03	11	11	0
2001–02	21	21	18
2000–01	39	36	35
1999–00	25	25	19
1998–99	5	5	5

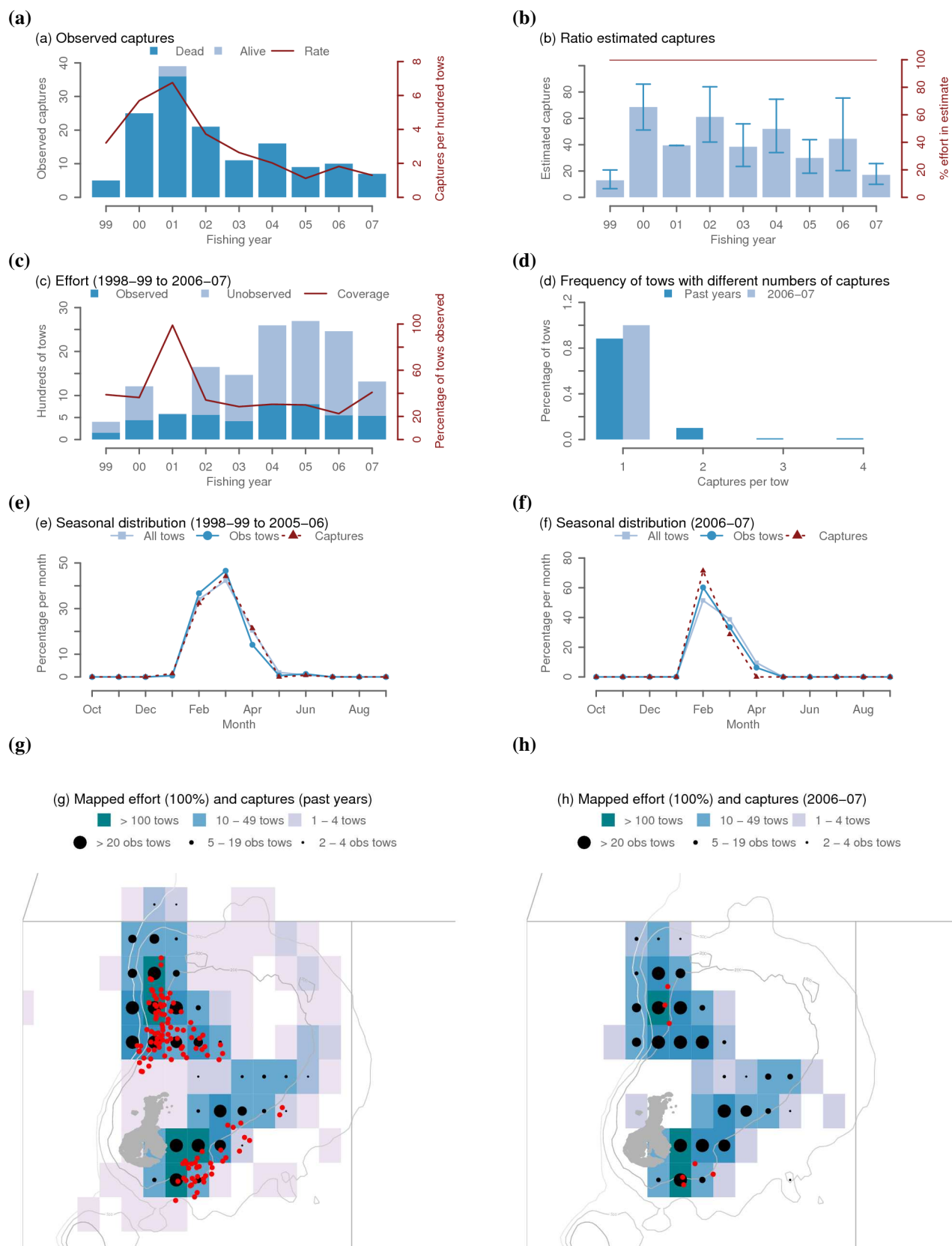


Figure 36: Sea lion captures in the squid trawl fishery, in the Auckland Islands area. (a) Observed captures, (b) Ratio estimated captures, with 95% bootstrap confidence intervals, (c) Effort and observed effort, (d) Histogram of the number of captures per tow, (e, f) Monthly distributions of effort, observations and captures, (g, h) Mapped effort and captures from past years (showing annual averaged effort and observations, but all captures) and from 2006–07.

3.12.3 Sea lions, all trawl, New Zealand EEZ excluding squid trawl at the Auckland Islands

In 2006–07 there were 5 observed captures.

Table 67: Summary by year with 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.

	Tows	No. obs	% obs	Captures	Rate	Estimated captures	% eff. in est.
2006–07	102 067	7386	7.2	5	0.07	26 (7 - 56)	41.7
2005–06	107 523	6004	5.6	5	0.08	28 (7 - 58)	26.1
2004–05	117 803	6904	5.9	5	0.07	16 (8 - 27)	24.4
2003–04	118 329	5756	4.9	5	0.09	32 (11 - 61)	32.0
2002–03	128 736	6419	5.0	1	0.02	1 (1 - 1)	34.3
2001–02	126 265	7154	5.7	2	0.03	9 (2 - 22)	36.3
2000–01	133 673	8537	6.4	7	0.08	8 (7 - 10)	32.6
1999–00	137 894	7212	5.2	3	0.04	11 (3 - 23)	34.8
1998–99	153 357	7101	4.6	1	0.01	1 (1 - 1)	33.7

Table 68: Sea lions caught by area with numbers of animals captured, dead and necropsied.

	STEW5			SQUAK6			SUBA6		
	cap.	dead	nec.	cap.	dead	nec.	cap.	dead	nec.
2006–07	1	1	0	1	1	1	3	3	0
2005–06	1	0	0	1	1	0	3	3	0
2004–05	3	3	0	-	-	-	2	2	0
2003–04	1	0	0	3	3	0	1	1	0
2002–03	-	-	-	1	1	0	-	-	-
2001–02	1	1	1	-	-	-	1	1	0
2000–01	3	3	3	4	2	2	-	-	-
1999–00	3	2	2	-	-	-	-	-	-
1998–99	-	-	-	1	1	0	-	-	-

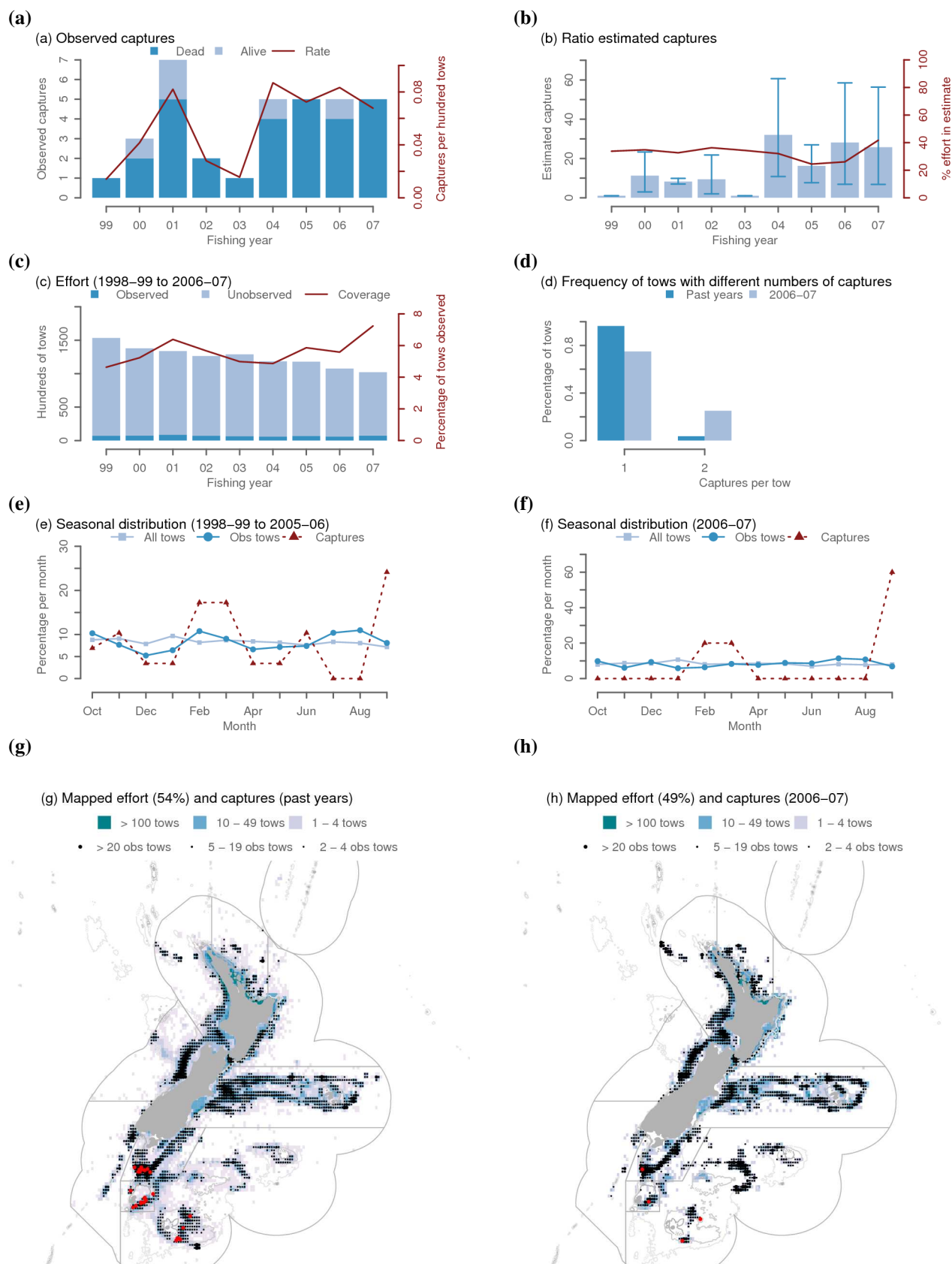


Figure 37: Sea lion captures in other trawl fisheries. (a) Observed captures, (b) Ratio estimated captures, with 95% bootstrap confidence intervals, (c) Effort and observed effort, (d) Histogram of the number of captures per tow, (e, f) Monthly distributions of effort, observations and captures, (g, h) Mapped effort and captures from past years (showing annual averaged effort and observations, but all captures) and from 2006–07.

3.13 Fur seal captures

3.13.1 Fur seals, all trawl, New Zealand EEZ

In 2006–07 there were 72 observed captures.

Table 69: Summary by year with 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.

	Tows	No. obs	% obs	Captures	Rate	Estimated captures	% eff. in est.
2006–07							
Trawl, COOK8	4236	228	5.4	23	10.09	210 (129 - 308)	48.8
Trawl, WCSI7	13 106	950	7.2	5	0.53	29 (11 - 53)	28.2
Trawl, Other areas	86 042	6746	7.8	44	0.65	180 (135 - 229)	44.3
Total	103 384	7922	7.7	72	0.91	419 (319 - 528)	42.4
2005–06							
Trawl, COOK8	4417	65	1.5	19	29.23	19 (19 - 19)	1.5
Trawl, WCSI7	13 476	1180	8.8	31	2.63	129 (87 - 179)	35.1
Trawl, Other areas	92 089	5309	5.8	94	1.77	310 (229 - 402)	27.9
Total	109 982	6554	6.0	144	2.20	459 (367 - 561)	27.7
2004–05							
Trawl, COOK8	5796	139	2.4	32	23.02	657 (384 - 970)	49.6
Trawl, WCSI7	13 602	1251	9.2	74	5.92	255 (206 - 307)	30.7
Trawl, Other areas	101 098	6320	6.3	94	1.49	296 (236 - 361)	24.1
Total	120 496	7710	6.4	200	2.59	1208 (926 - 1517)	26.1
2003–04							
Trawl, COOK8	7557	131	1.7	1	0.76	30 (1 - 89)	52.4
Trawl, WCSI7	15 347	1403	9.1	29	2.07	140 (99 - 185)	45.0
Trawl, Other areas	98 019	5013	5.1	54	1.08	366 (254 - 487)	30.2
Total	120 923	6547	5.4	84	1.28	537 (408 - 679)	33.5
2002–03							
Trawl, COOK8	7223	135	1.9	4	2.96	116 (4 - 256)	53.7
Trawl, WCSI7	15 754	1008	6.4	21	2.08	156 (88 - 238)	50.4
Trawl, Other areas	107 225	5693	5.3	42	0.74	268 (174 - 385)	31.5
Total	130 202	6836	5.3	67	0.98	540 (365 - 735)	35.1
2001–02							
Trawl, COOK8	6293	186	3.0	21	11.29	341 (213 - 485)	39.9
Trawl, WCSI7	15 263	1412	9.3	57	4.04	347 (245 - 469)	53.8
Trawl, Other areas	106 356	6119	5.8	79	1.29	313 (243 - 390)	34.5
Total	127 912	7717	6.0	157	2.03	1001 (816 - 1206)	37.1
2000–01							
Trawl, COOK8	7493	268	3.6	11	4.10	168 (82 - 268)	54.1
Trawl, WCSI7	18 238	1182	6.5	48	4.06	306 (205 - 427)	49.5
Trawl, Other areas	108 525	7664	7.1	112	1.46	318 (246 - 398)	28.7
Total	134 256	9114	6.8	171	1.88	792 (629 - 964)	32.9

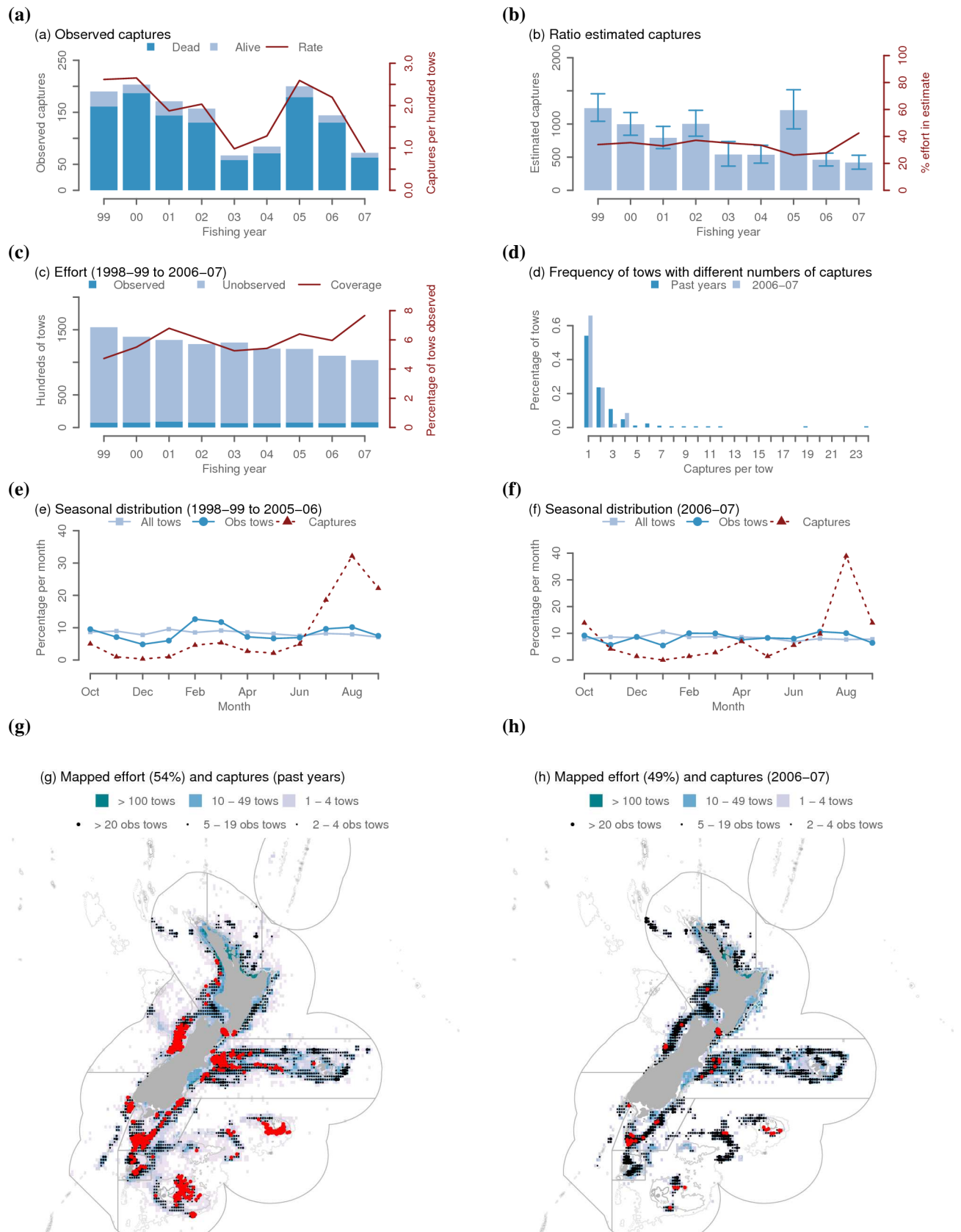


Figure 38: Fur seal captures in all trawl fisheries. (a) Observed captures, (b) Ratio estimated captures, with 95% bootstrap confidence intervals, (c) Effort and observed effort, (d) Histogram of the number of captures per tow, (e, f) Monthly distributions of effort, observations and captures, (g, h) Mapped effort and captures from past years (showing annual averaged effort and observations, but all captures) and from 2006–07.

3.13.2 Fur seals, all trawl, Cook Strait

In 2006–07 there were 23 observed captures.

Table 70: Summary by year with 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.

	Tows	No. obs	% obs	Captures	Rate	Estimated captures	% eff. in est.
2006–07	4236	228	5.4	23	10.09	210 (129 - 308)	48.8
2005–06	4417	65	1.5	19	29.23	19 (19 - 19)	1.5
2004–05	5796	139	2.4	32	23.02	657 (384 - 970)	49.6
2003–04	7557	131	1.7	1	0.76	30 (1 - 89)	52.4
2002–03	7223	135	1.9	4	2.96	116 (4 - 256)	53.7
2001–02	6293	186	3.0	21	11.29	341 (213 - 485)	39.9
2000–01	7493	268	3.6	11	4.10	168 (82 - 268)	54.1
1999–00	8837	169	1.9	1	0.59	29 (1 - 84)	54.3
1998–99	9368	310	3.3	13	4.19	213 (90 - 351)	52.1

Table 71: Capture events with details of species, number caught, area code, observer identification and necropsy identification (where available).

Date	Species	#	Area	Obs.	Aut.
08/09/2007	New Zealand fur seal (<i>Arctocephalus forsteri</i>)	1	COOK8	FUR	
03/09/2007	New Zealand fur seal (<i>Arctocephalus forsteri</i>)	1	COOK8	FUR	
02/09/2007	New Zealand fur seal (<i>Arctocephalus forsteri</i>)	1	COOK8	FUR	
24/08/2007	New Zealand fur seal (<i>Arctocephalus forsteri</i>)	1	COOK8	FUR	
24/08/2007	New Zealand fur seal (<i>Arctocephalus forsteri</i>)	1	COOK8	FUR	
23/08/2007	New Zealand fur seal (<i>Arctocephalus forsteri</i>)	3	COOK8	FUR	
21/08/2007	New Zealand fur seal (<i>Arctocephalus forsteri</i>)	1	COOK8	FUR	
19/08/2007	New Zealand fur seal (<i>Arctocephalus forsteri</i>)	2	COOK8	FUR	
19/08/2007	New Zealand fur seal (<i>Arctocephalus forsteri</i>)	1	COOK8	FUR	
17/08/2007	New Zealand fur seal (<i>Arctocephalus forsteri</i>)	1	COOK8	FUR	
09/08/2007	New Zealand fur seal (<i>Arctocephalus forsteri</i>)	2	COOK8	FUR	
08/08/2007	New Zealand fur seal (<i>Arctocephalus forsteri</i>)	1	COOK8	FUR	
05/08/2007	New Zealand fur seal (<i>Arctocephalus forsteri</i>)	1	COOK8	FUR	
04/08/2007	New Zealand fur seal (<i>Arctocephalus forsteri</i>)	1	COOK8	FUR	
04/08/2007	New Zealand fur seal (<i>Arctocephalus forsteri</i>)	1	COOK8	FUR	
26/06/2007	New Zealand fur seal (<i>Arctocephalus forsteri</i>)	1	COOK8	FUR	
26/06/2007	New Zealand fur seal (<i>Arctocephalus forsteri</i>)	2	COOK8	FUR	
16/06/2007	New Zealand fur seal (<i>Arctocephalus forsteri</i>)	1	COOK8	FUR	
09/09/2006	New Zealand fur seal (<i>Arctocephalus forsteri</i>)	2	COOK8	FUR	
09/09/2006	New Zealand fur seal (<i>Arctocephalus forsteri</i>)	1	COOK8	FUR	
07/09/2006	New Zealand fur seal (<i>Arctocephalus forsteri</i>)	2	COOK8	FUR	
06/09/2006	New Zealand fur seal (<i>Arctocephalus forsteri</i>)	1	COOK8	FUR	
06/09/2006	New Zealand fur seal (<i>Arctocephalus forsteri</i>)	2	COOK8	FUR	
05/09/2006	New Zealand fur seal (<i>Arctocephalus forsteri</i>)	1	COOK8	FUR	
04/09/2006	New Zealand fur seal (<i>Arctocephalus forsteri</i>)	1	COOK8	FUR	
04/09/2006	New Zealand fur seal (<i>Arctocephalus forsteri</i>)	4	COOK8	FUR	

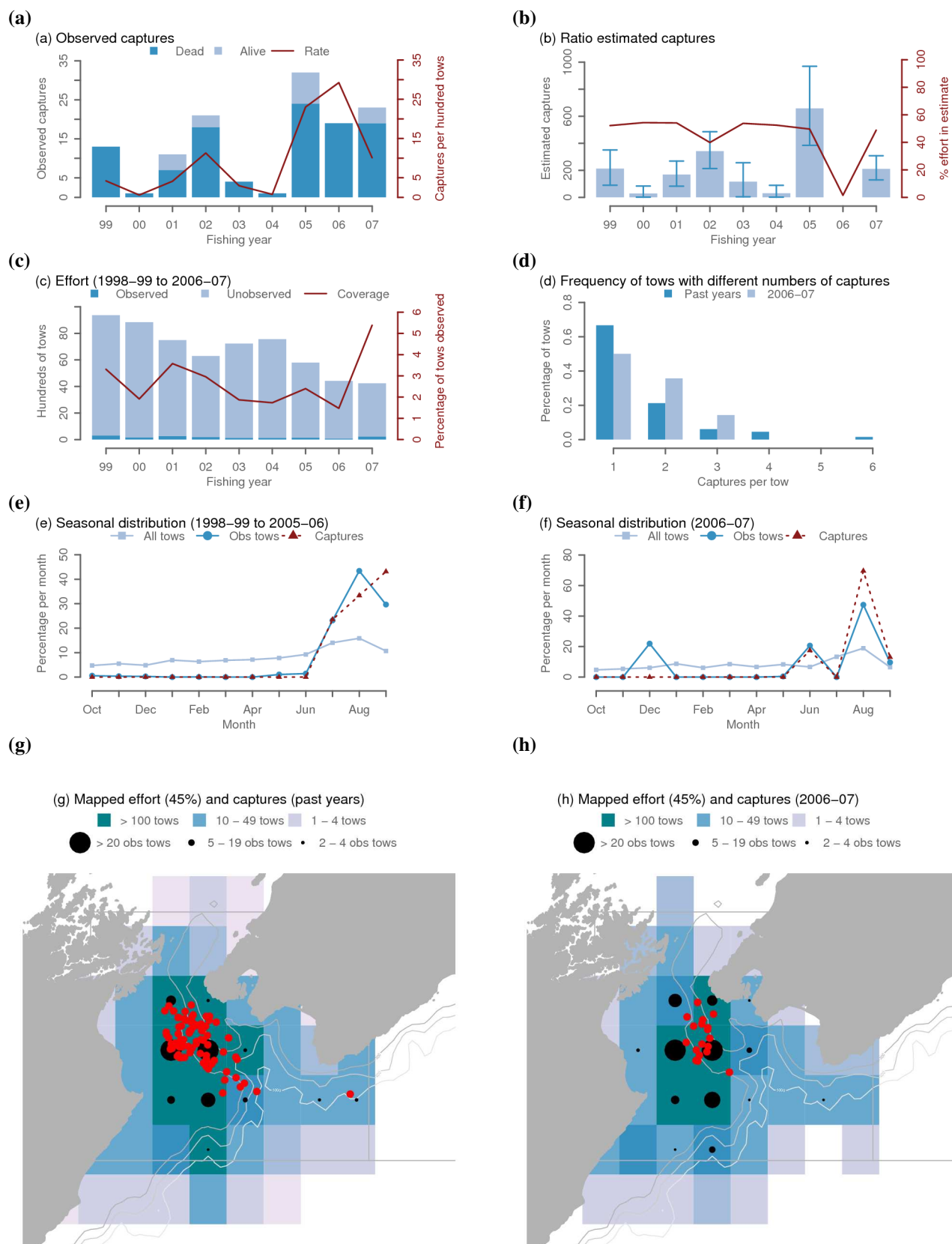


Figure 39: Fur seal captures in all trawl fisheries, in Cook Strait. (a) Observed captures, (b) Ratio estimated captures, with 95% bootstrap confidence intervals, (c) Effort and observed effort, (d) Histogram of the number of captures per tow, (e, f) Monthly distributions of effort, observations and captures, (g, h) Mapped effort and captures from past years (showing annual averaged effort and observations, but all captures) and from 2006–07.

3.13.3 Fur seals, all trawl, West Coast South Island

In 2006–07 there were 5 observed captures.

Table 72: Summary by year with 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.

	Tows	No. obs	% obs	Captures	Rate	Estimated captures	% eff. in est.
2006–07	13 106	950	7.2	5	0.53	29 (11 - 53)	28.2
2005–06	13 476	1180	8.8	31	2.63	129 (87 - 179)	35.1
2004–05	13 602	1251	9.2	74	5.92	255 (206 - 307)	30.7
2003–04	15 347	1403	9.1	29	2.07	140 (99 - 185)	45.0
2002–03	15 754	1008	6.4	21	2.08	156 (88 - 238)	50.4
2001–02	15 263	1412	9.3	57	4.04	347 (245 - 469)	53.8
2000–01	18 238	1182	6.5	48	4.06	306 (205 - 427)	49.5
1999–00	16 823	1231	7.3	85	6.90	573 (452 - 710)	47.1
1998–99	21 282	1617	7.6	54	3.34	304 (222 - 393)	48.9

Table 73: Capture events with details of species, number caught, area code, observer identification and necropsy identification (where available).

Date	Species	#	Area	Obs.	Aut.
27/07/2007	New Zealand fur seal (<i>Arctocephalus forsteri</i>)	1	WCSI7	FUR	
25/07/2007	New Zealand fur seal (<i>Arctocephalus forsteri</i>)	1	WCSI7	FUR	
18/07/2007	New Zealand fur seal (<i>Arctocephalus forsteri</i>)	1	WCSI7	FUR	
17/07/2007	New Zealand fur seal (<i>Arctocephalus forsteri</i>)	1	WCSI7	FUR	
15/07/2007	New Zealand fur seal (<i>Arctocephalus forsteri</i>)	1	WCSI7	FUR	
01/09/2006	New Zealand fur seal (<i>Arctocephalus forsteri</i>)	1	WCSI7	FUR	
28/08/2006	New Zealand fur seal (<i>Arctocephalus forsteri</i>)	2	WCSI7	FUR	
20/08/2006	New Zealand fur seal (<i>Arctocephalus forsteri</i>)	1	WCSI7	FUR	
18/08/2006	New Zealand fur seal (<i>Arctocephalus forsteri</i>)	1	WCSI7	FUR	
16/08/2006	New Zealand fur seal (<i>Arctocephalus forsteri</i>)	1	WCSI7	FUR	
16/08/2006	New Zealand fur seal (<i>Arctocephalus forsteri</i>)	2	WCSI7	FUR	
14/08/2006	New Zealand fur seal (<i>Arctocephalus forsteri</i>)	1	WCSI7	FUR	
12/08/2006	New Zealand fur seal (<i>Arctocephalus forsteri</i>)	2	WCSI7	FUR	
08/08/2006	New Zealand fur seal (<i>Arctocephalus forsteri</i>)	1	WCSI7	FUR	
07/08/2006	New Zealand fur seal (<i>Arctocephalus forsteri</i>)	1	WCSI7	FUR	
07/08/2006	New Zealand fur seal (<i>Arctocephalus forsteri</i>)	3	WCSI7	FUR	
06/08/2006	New Zealand fur seal (<i>Arctocephalus forsteri</i>)	1	WCSI7	FUR	
03/08/2006	New Zealand fur seal (<i>Arctocephalus forsteri</i>)	1	WCSI7	FUR	
01/08/2006	New Zealand fur seal (<i>Arctocephalus forsteri</i>)	2	WCSI7	FUR	
31/07/2006	New Zealand fur seal (<i>Arctocephalus forsteri</i>)	1	WCSI7	FUR	
24/07/2006	New Zealand fur seal (<i>Arctocephalus forsteri</i>)	1	WCSI7	FUR	
07/07/2006	New Zealand fur seal (<i>Arctocephalus forsteri</i>)	3	WCSI7	FUR	
07/07/2006	New Zealand fur seal (<i>Arctocephalus forsteri</i>)	1	WCSI7	FUR	
06/07/2006	New Zealand fur seal (<i>Arctocephalus forsteri</i>)	1	WCSI7	FUR	
05/07/2006	New Zealand fur seal (<i>Arctocephalus forsteri</i>)	1	WCSI7	FUR	
04/07/2006	New Zealand fur seal (<i>Arctocephalus forsteri</i>)	1	WCSI7	FUR	

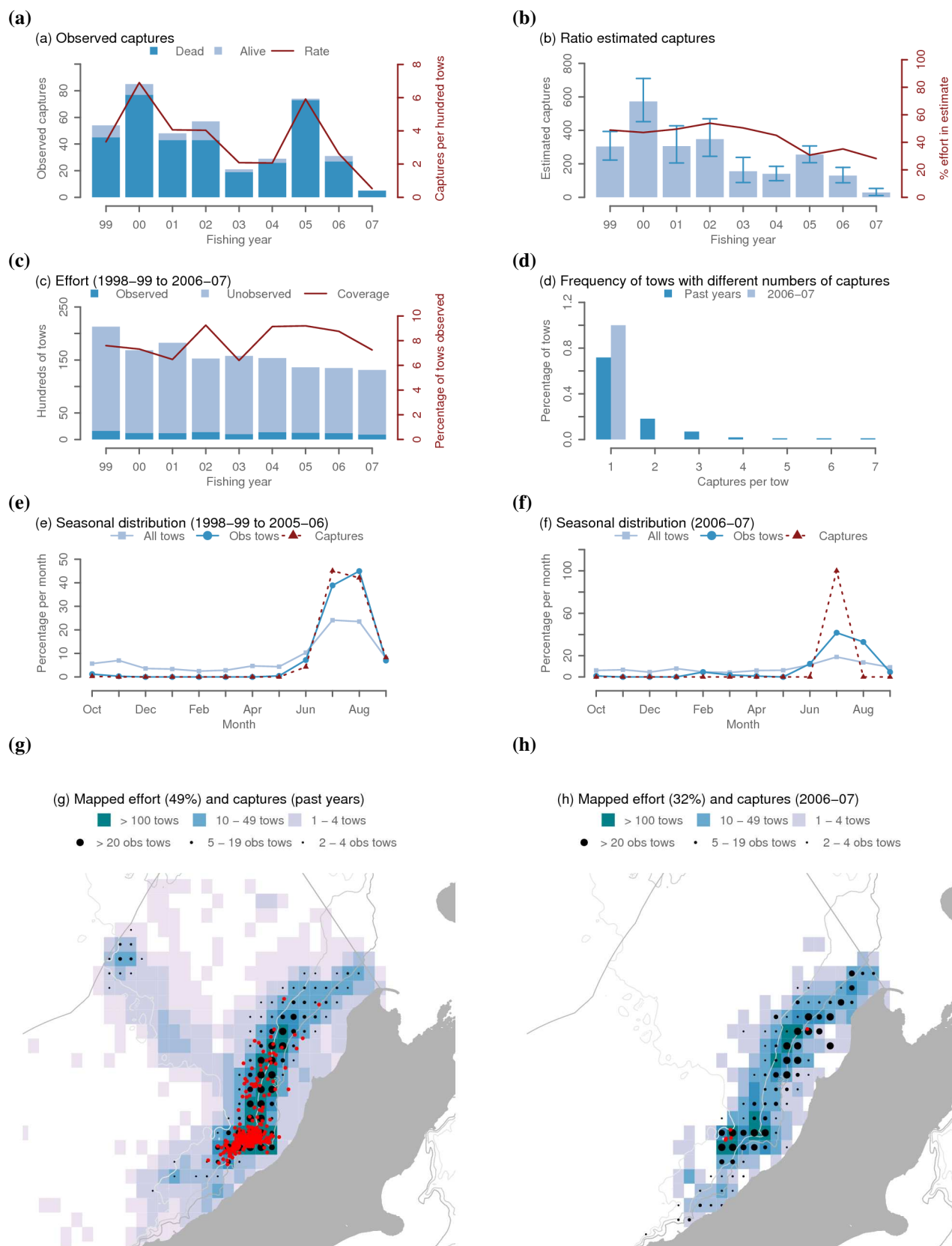


Figure 40: Fur seal captures in all trawl fisheries, in West Coast South Island. (a) Observed captures, (b) Ratio estimated captures, with 95% bootstrap confidence intervals, (c) Effort and observed effort, (d) Histogram of the number of captures per tow, (e, f) Monthly distributions of effort, observations and captures, (g, h) Mapped effort and captures from past years (showing annual averaged effort and observations, but all captures) and from 2006–07.

3.13.4 Fur seals, all trawl, New Zealand EEZ excluding West Coast South Island and Cook Strait

In 2006–07 there were 44 observed captures.

Table 74: Summary by year with 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.

	Tows	No. obs	% obs	Captures	Rate	Estimated captures	% eff. in est.
2006–07	86 042	6746	7.8	44	0.65	180 (135 - 229)	44.3
2005–06	92 089	5309	5.8	94	1.77	310 (229 - 402)	27.9
2004–05	101 098	6320	6.3	94	1.49	296 (236 - 361)	24.1
2003–04	98 019	5013	5.1	54	1.08	366 (254 - 487)	30.2
2002–03	107 225	5693	5.3	42	0.74	268 (174 - 385)	31.5
2001–02	106 356	6119	5.8	79	1.29	313 (243 - 390)	34.5
2000–01	108 525	7664	7.1	112	1.46	318 (246 - 398)	28.7
1999–00	113 442	6251	5.5	117	1.87	394 (304 - 493)	32.1
1998–99	123 109	5330	4.3	123	2.31	722 (594 - 860)	29.9

Table 75: Fur seals caught by area with numbers of animals captured, dead and necropsied.

	SUBA6			STEW5			CHAT4			Other Areas		
	c.	d.	n.	c.	d.	n.	c.	d.	n.	c.	d.	n.
2006–07	15	15	0	21	20	0	6	2	0	2	2	0
2005–06	54	53	0	10	8	0	16	10	0	14	13	1
2004–05	44	35	0	13	13	0	17	14	0	20	20	0
2003–04	16	14	0	10	9	0	17	13	0	11	8	0
2002–03	9	8	0	10	7	0	16	15	0	7	5	0
2001–02	22	21	0	24	18	2	8	6	0	25	24	0
2000–01	59	59	0	34	23	2	14	7	0	5	5	2
1999–00	85	85	2	24	20	1	6	3	2	2	1	0
1998–99	45	45	0	55	41	3	22	16	0	1	1	0

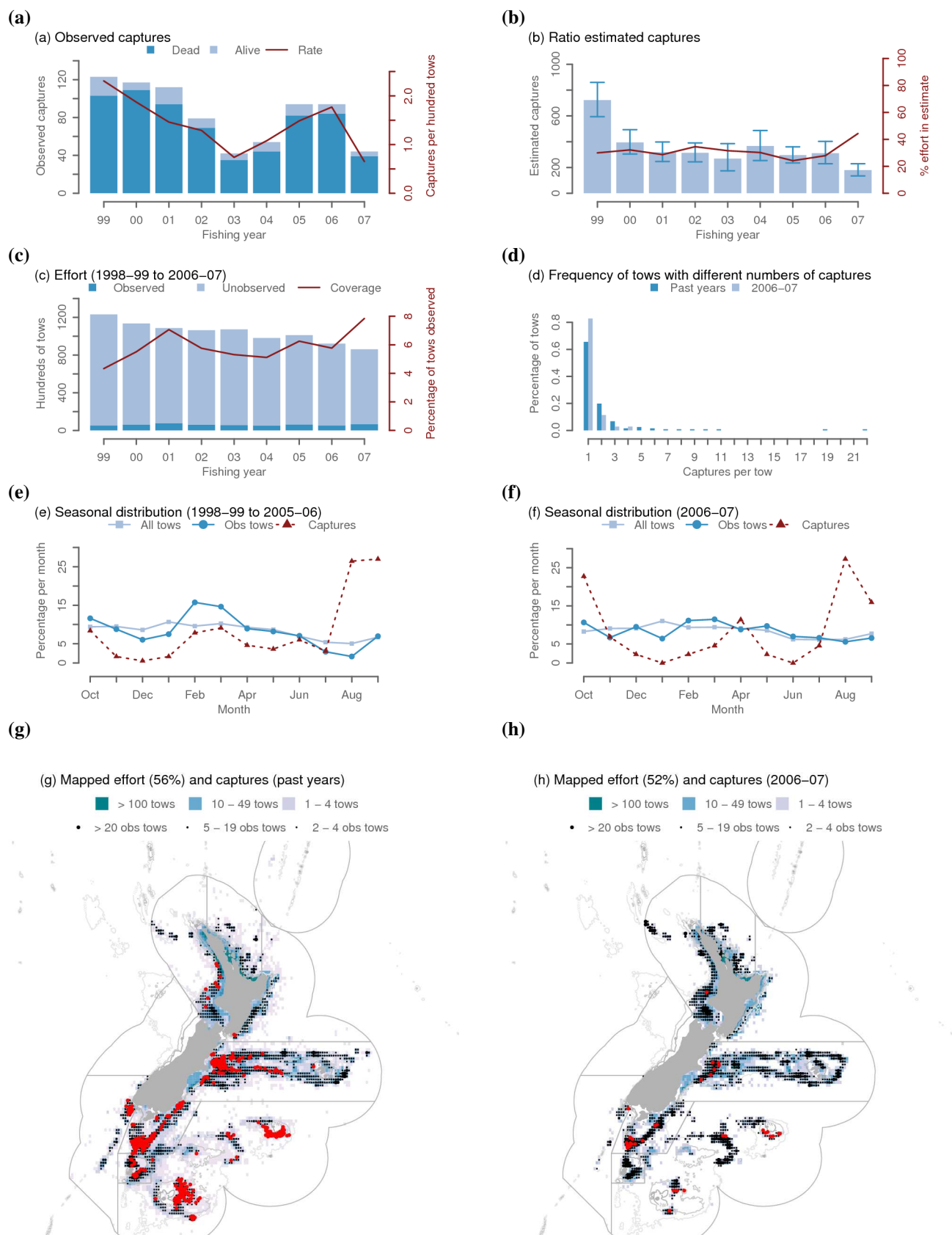


Figure 41: Fur seal captures in all trawl fisheries, in other areas. (a) Observed captures, (b) Ratio estimated captures, with 95% bootstrap confidence intervals, (c) Effort and observed effort, (d) Histogram of the number of captures per tow, (e, f) Monthly distributions of effort, observations and captures, (g, h) Mapped effort and captures from past years (showing annual averaged effort and observations, but all captures) and from 2006–07.

3.13.5 Fur seals, surface longline, New Zealand EEZ

In 2006–07 there were 10 observed captures.

Table 76: Summary by year with number of hooks, number of hooks observed, percentage of hooks observed, number of observed captures, capture rate per ten thousand hooks, total estimated captures with 95% confidence intervals, and percentage of hooks included in the estimate.

	Hooks	No. obs	% obs	Captures	Rate	Estimated captures	% eff. in est.
2006–07	3 719 232	955 919	25.7	10	0.10	41 (14 - 80)	99.8
2005–06	3 687 569	636 796	17.3	12	0.19	141 (44 - 274)	92.8
2004–05	3 676 795	703 669	19.1	20	0.28	77 (22 - 150)	86.3
2003–04	7 382 293	1 464 465	19.8	40	0.27	128 (74 - 221)	91.3
2002–03	10 781 875	1 880 455	17.4	56	0.30	87 (76 - 98)	22.4
2001–02	10 876 381	918 159	8.4	44	0.48	148 (99 - 201)	85.2
2000–01	9 761 448	1 029 118	10.5	43	0.42	57 (45 - 75)	96.0
1999–00	8 286 120	793 770	9.6	42	0.53	45 (44 - 46)	10.2
1998–99	6 845 781	1 242 610	18.2	102	0.82	106 (105 - 106)	22.7

Table 77: Fur seals caught by area with numbers of animals captured, dead and necropsied.

	AREA3			AREA1			AREA2		
	cap.	dead	nec.	cap.	dead	nec.	cap.	dead	nec.
2006–07	7	1	0	3	0	0	-	-	-
2005–06	8	0	0	4	0	0	-	-	-
2004–05	16	2	0	4	0	0	-	-	-
2003–04	39	2	0	1	0	0	-	-	-
2002–03	56	1	0	-	-	-	-	-	-
2001–02	43	0	0	-	-	-	1	0	0
2000–01	43	3	0	-	-	-	-	-	-
1999–00	39	3	0	-	-	-	3	0	0
1998–99	101	6	0	-	-	-	1	0	0

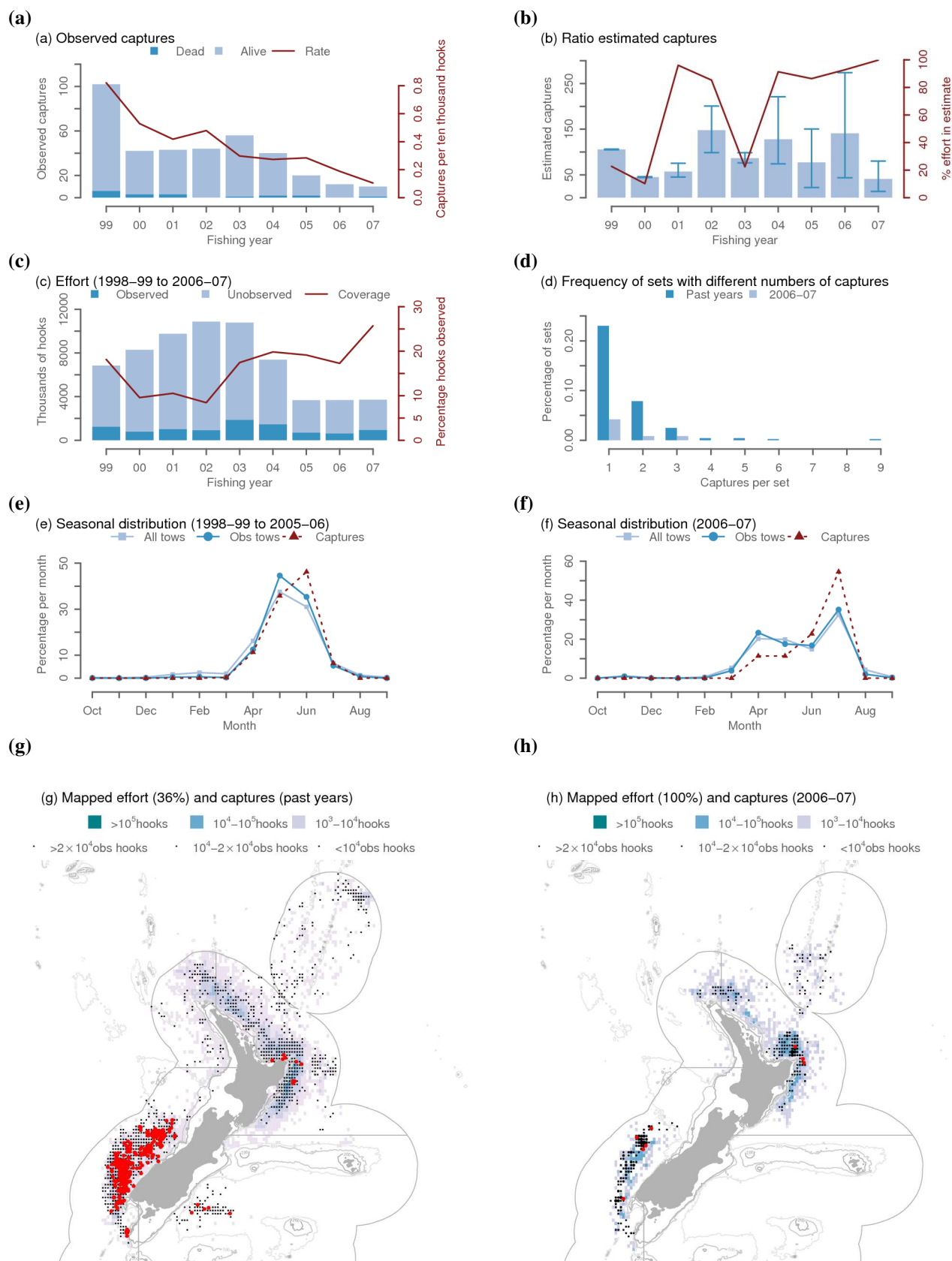


Figure 42: Fur seal captures in the surface longline fishery. (a) Observed captures, (b) Ratio estimated captures, with 95% bootstrap confidence intervals, (c) Effort and observed effort, (d) Histogram of the number of captures per tow, (e, f) Monthly distributions of effort, observations and captures, (g, h) Mapped effort and captures from past years (showing annual averaged effort and observations, but all captures) and from 2006–07.

3.13.6 Fur seals, bottom longline, New Zealand EEZ

In 2006–07 there were no observed captures.

Table 78: Summary by year with number of hooks, number of hooks observed, percentage of hooks observed, number of observed captures, capture rate per ten thousand hooks, total estimated captures with 95% confidence intervals, and percentage of hooks included in the estimate.

	Hooks	No. obs	% obs	Captures	Rate	Estimated captures	% eff. in est.
2006–07	38 164 851	2 344 205	6.1	0	0.00	0	49.6
2005–06	37 125 639	3 822 459	10.3	1	0.00	37 (1 - 127)	72.3
2004–05	41 840 933	2 927 928	7.0	0	0.00	0	71.2
2003–04	43 449 733	5 919 633	13.6	0	0.00	0	79.6
2002–03	37 753 336	11 308 295	30.0	1	0.00	1 (1 - 2)	47.3
2001–02	47 024 332	7 547 517	16.1	0	0.00	0	51.7
2000–01	51 024 367	5 248 902	10.3	1	0.00	4 (1 - 10)	30.7
1999–00	53 277 149	3 606 478	6.8	1	0.00	9 (1 - 27)	56.4
1998–99	55 487 193	3 097 198	5.6	0	0.00	0	50.7

Table 79: Fur seals caught by area with numbers of animals captured, dead and necropsied.

	EAST2			SQUAK6			SUBA6		
	cap.	dead	nec.	cap.	dead	nec.	cap.	dead	nec.
2005–06	1	1	0	-	-	-	-	-	-
2002–03	-	-	-	-	-	-	1	1	0
2000–01	1	1	0	-	-	-	-	-	-
1999–00	-	-	-	1	0	0	-	-	-

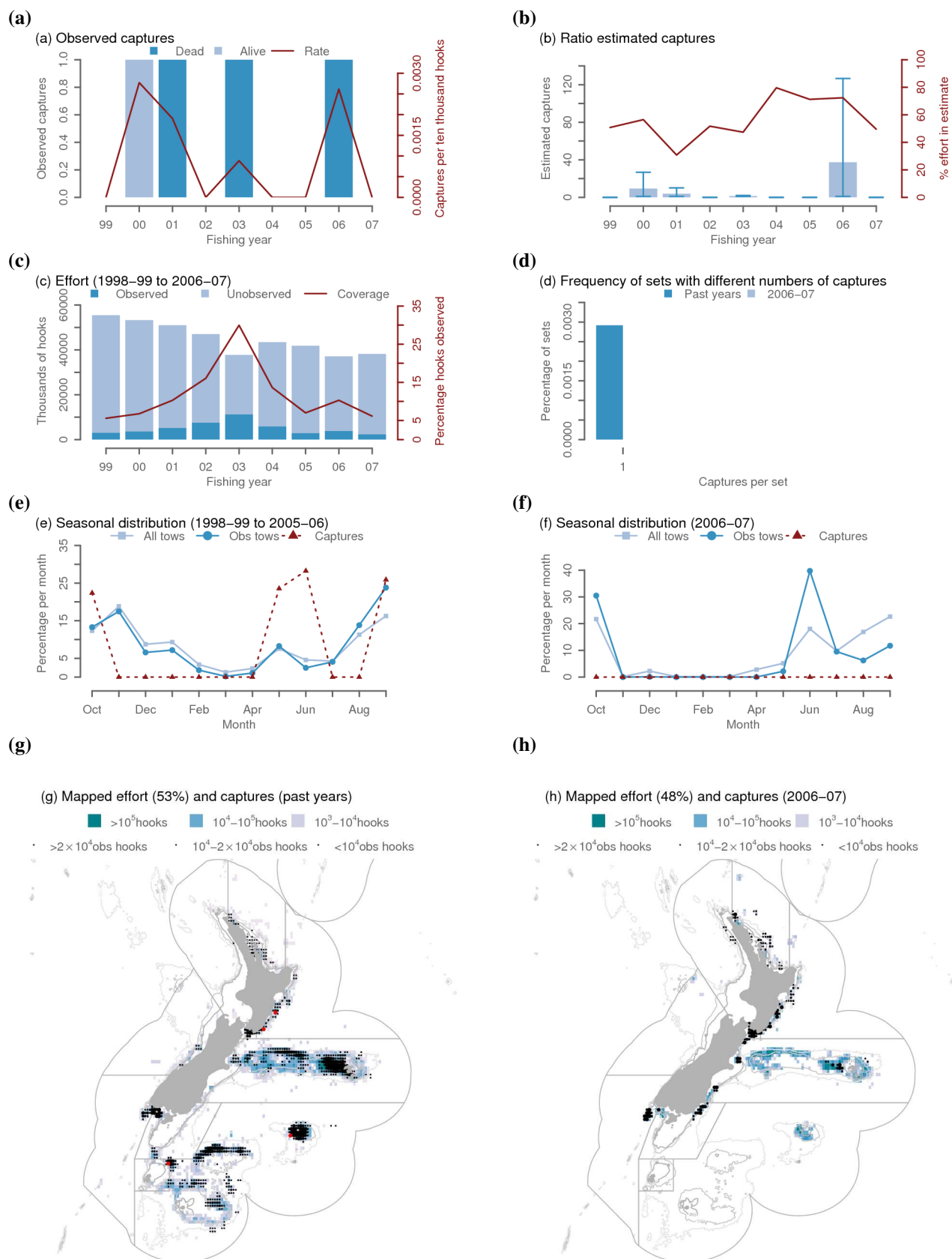


Figure 43: Fur seal captures in the bottom longline fishery. (a) Observed captures, (b) Ratio estimated captures, with 95% bootstrap confidence intervals, (c) Effort and observed effort, (d) Histogram of the number of captures per tow, (e, f) Monthly distributions of effort, observations and captures, (g, h) Mapped effort and captures from past years (showing annual averaged effort and observations, but all captures) and from 2006-07.

3.14 Other seal captures

3.14.1 Other seals, all trawl, New Zealand EEZ

In 2006–07 there were no observed captures.

Table 80: Summary by year with 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.

	Tows	No. obs	% obs	Captures	Rate	Estimated captures	% eff. in est.
2006–07	103 384	7922	7.7	0	0.00	0	42.4
2005–06	109 982	6554	6.0	0	0.00	0	27.7
2004–05	120 496	7710	6.4	1	0.01	3 (1 - 6)	26.1
2003–04	120 923	6547	5.4	0	0.00	0	33.5
2002–03	130 202	6836	5.3	1	0.01	9 (1 - 25)	35.1
2001–02	127 912	7717	6.0	0	0.00	0	37.1
2000–01	134 256	9114	6.8	0	0.00	0	32.9
1999–00	139 102	7651	5.5	0	0.00	0	35.4
1998–99	153 759	7257	4.7	0	0.00	0	33.9

Table 81: Capture events with details of species, number caught, area code, observer identification and necropsy identification (where available).

Date	Species	#	Area	Obs.	Aut.
18/09/2005	Leopard seal (<i>Hydrurga leptonyx</i>)	1	SUBA6	LEO	
05/11/2002	Elephant seal (<i>Mirounga leonina</i>)	1	SQUAK6	HSL	EPH

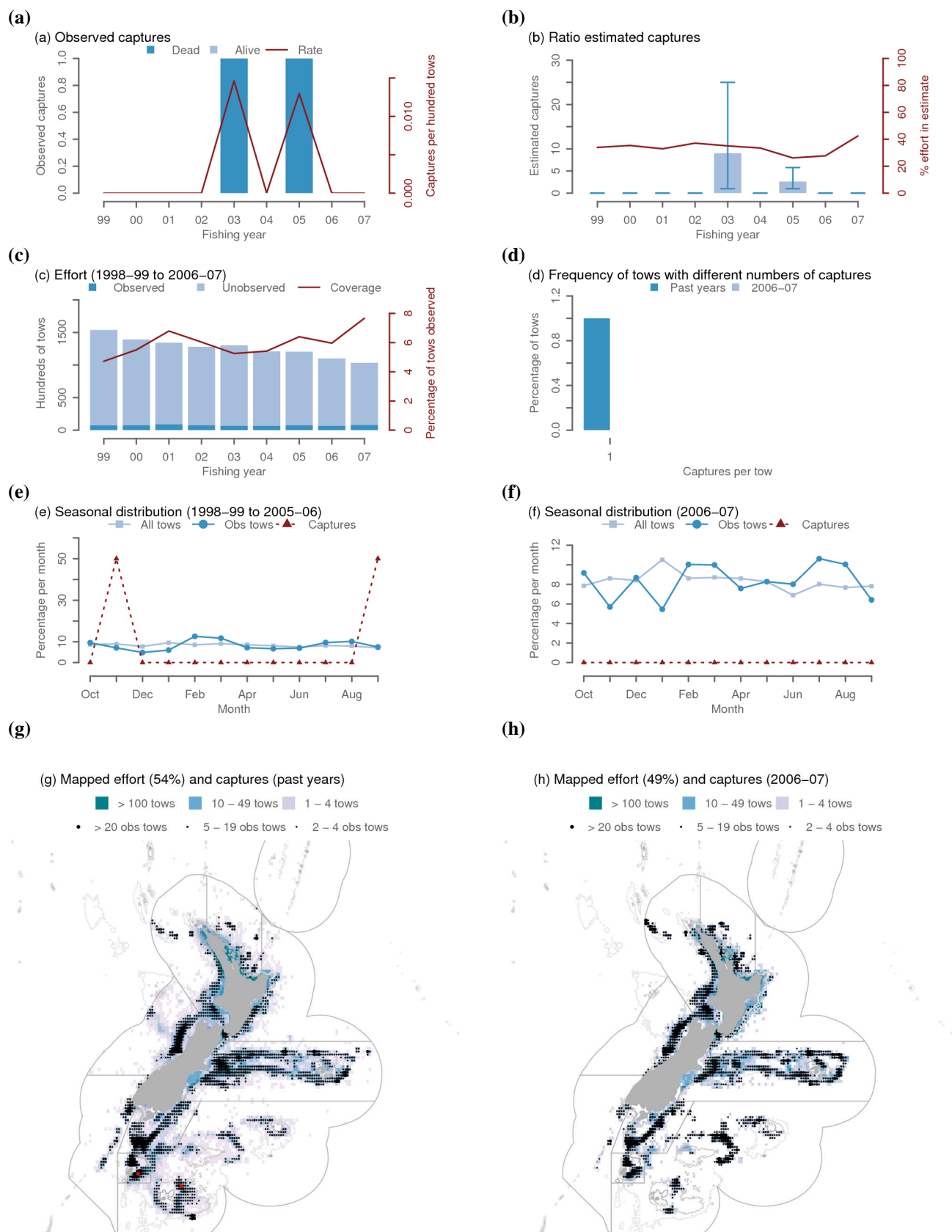


Figure 44: Other seals captures in all trawl fisheries. (a) Observed captures, (b) Ratio estimated captures, with 95% bootstrap confidence intervals, (c) Effort and observed effort, (d) Histogram of the number of captures per tow, (e, f) Monthly distributions of effort, observations and captures, (g, h) Mapped effort and captures from past years (showing annual averaged effort and observations, but all captures) and from 2006-07.

3.15 Common dolphin captures

3.15.1 Dolphins, pelagic trawl, New Zealand EEZ

In 2006–07 there were 11 observed captures.

Table 82: Summary by year with 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.

	Tows	No. obs	% obs	Captures	Rate	Estimated captures	% eff. in est.
2006–07	2711	802	29.6	11	1.37	39 (16 - 73)	95.4
2005–06	2808	709	25.2	3	0.42	7 (3 - 16)	76.6
2004–05	2509	558	22.2	27	4.84	121 (65 - 190)	95.1
2003–04	2383	152	6.4	17	11.18	274 (77 - 515)	95.1
2002–03	3067	346	11.3	21	6.07	213 (58 - 424)	78.8
2001–02	3002	351	11.7	1	0.28	16 (1 - 47)	78.2
2000–01	1941	404	20.8	1	0.25	9 (1 - 24)	73.9
1999–00	2290	516	22.5	1	0.19	1 (1 - 1)	47.6
1998–99	3866	627	16.2	0	0.00	0	88.5

Table 83: Species caught by area with numbers of animals captured, dead and necropsied.

	WCNI9			CHAT4		
	captured	dead	necropsied	captured	dead	necropsied
2006–07						
Common dolphin	11	11	0	-	-	-
2005–06						
Common dolphin	2	2	0	-	-	-
Dusky dolphin	-	-	-	1	1	0
2004–05						
Common dolphin	20	20	0	-	-	-
Porpoise	6	6	0	-	-	-
Bottlenose dolphin	1	1	0	-	-	-
2003–04						
Common dolphin	17	17	0	-	-	-
2002–03						
Common dolphin	20	20	3	-	-	-
Porpoise	1	1	0	-	-	-
2001–02						
Common dolphin	1	1	1	-	-	-
2000–01						
Common dolphin	1	1	1	-	-	-
1999–00						
Common dolphin	1	1	1	-	-	-

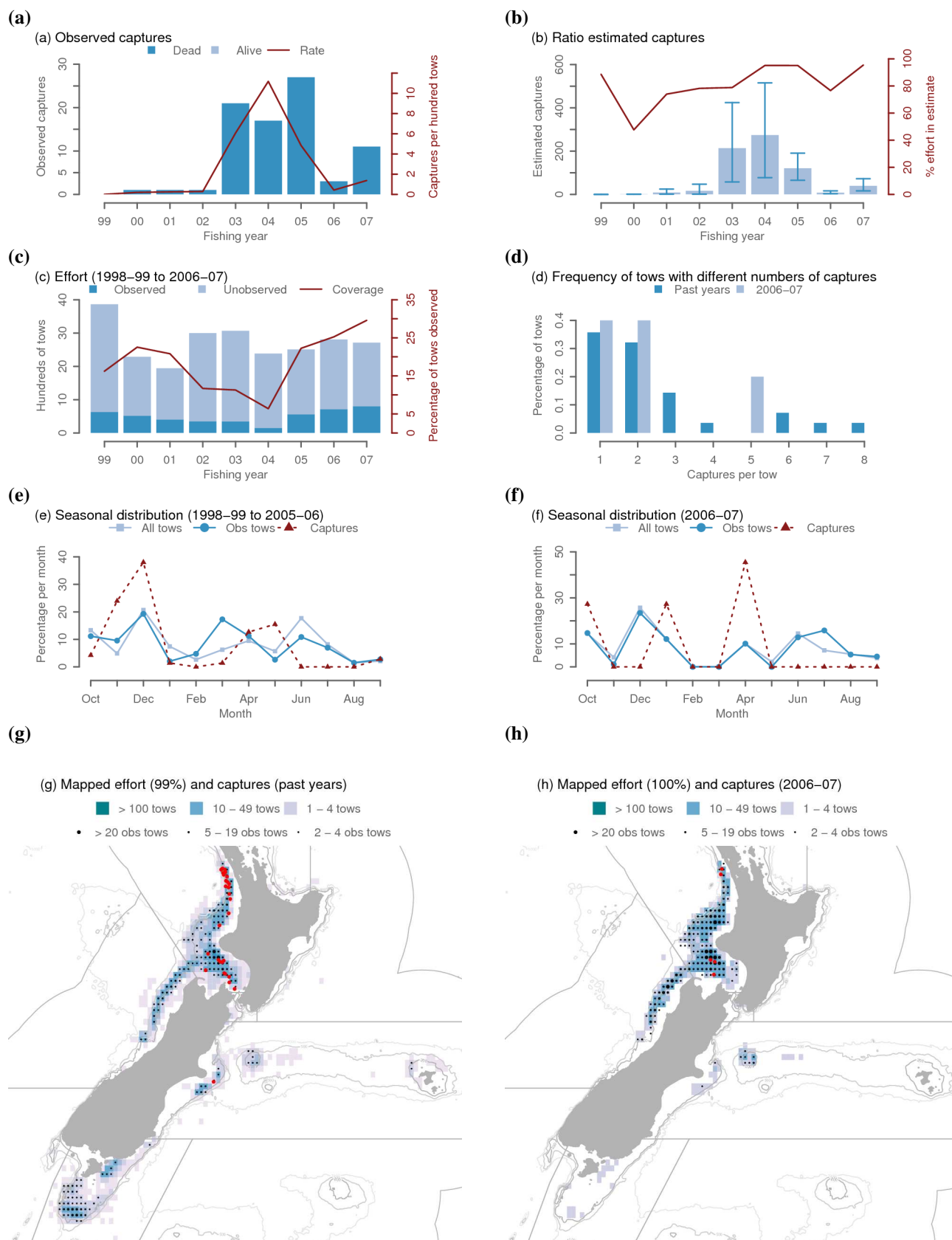


Figure 45: Dolphin captures in the pelagic trawl fishery. (a) Observed captures, (b) Ratio estimated captures, with 95% bootstrap confidence intervals, (c) Effort and observed effort, (d) Histogram of the number of captures per tow, (e, f) Monthly distributions of effort, observations and captures, (g, h) Mapped effort and captures from past years (showing annual averaged effort and observations, but all captures) and from 2006-07.

3.15.2 Dolphins, all trawl excluding pelagic trawl, New Zealand EEZ

In 2006–07 there were no observed captures.

Table 84: Summary by year with 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.

	Tows	No. obs	% obs	Captures	Rate	Estimated captures	% eff. in est.
2006–07	100 673	7122	7.1	0	0.00	0	41.0
2005–06	107 174	5845	5.5	2	0.03	2 (2 - 2)	26.4
2004–05	117 987	7152	6.1	1	0.01	1 (1 - 1)	24.6
2003–04	118 540	6395	5.4	0	0.00	0	32.2
2002–03	127 135	6490	5.1	0	0.00	0	34.0
2001–02	124 910	7366	5.9	0	0.00	0	36.1
2000–01	132 315	8710	6.6	3	0.03	4 (3 - 6)	32.3
1999–00	136 812	7135	5.2	0	0.00	0	35.2
1998–99	149 893	6630	4.4	0	0.00	0	32.5

Table 85: Capture events with details of species, number caught, area code, observer identification and necropsy identification (where available).

Date	Species	#	Area	Obs.	Aut.
16/12/2005	Common dolphin (<i>Delphinus delphis</i>)	2	WCNI9	CDD	
21/08/2005	Common dolphin (<i>Delphinus delphis</i>)	1	WCSI7	CDD	
07/02/2001	Dusky dolphin (<i>Lagenorhynchus obscurus</i>)	1	STEW5	CDD	DDO
17/01/2001	Dusky dolphin (<i>Lagenorhynchus obscurus</i>)	2	STEW5	DDO	

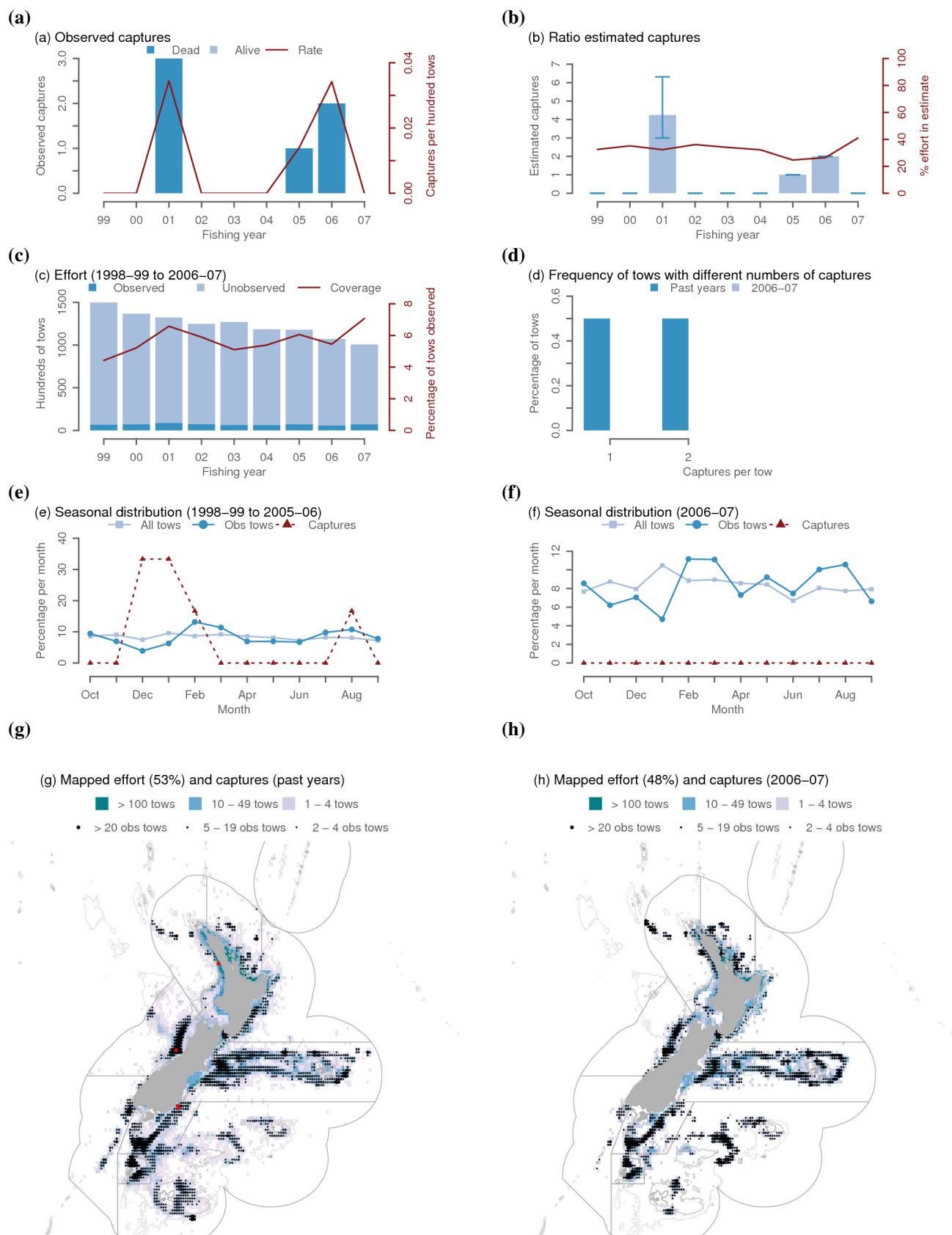


Figure 46: Dolphin captures in other trawl fisheries. (a) Observed captures, (b) Ratio estimated captures, with 95% bootstrap confidence intervals, (c) Effort and observed effort, (d) Histogram of the number of captures per tow, (e, f) Monthly distributions of effort, observations and captures, (g, h) Mapped effort and captures from past years (showing annual averaged effort and observations, but all captures) and from 2006–07.

3.15.3 Dolphins, surface longline, New Zealand EEZ

In 2006–07 there were no observed captures.

Table 86: Summary by year with number of hooks, number of hooks observed, percentage of hooks observed, number of observed captures, capture rate per ten thousand hooks, total estimated captures with 95% confidence intervals, and percentage of hooks included in the estimate.

	Hooks	No. obs	% obs	Captures	Rate	Estimated captures	% eff. in est.
2006–07	3 719 232	955 919	25.7	0	0.00	0	99.8
2005–06	3 687 569	636 796	17.3	0	0.00	0	92.8
2004–05	3 676 795	703 669	19.1	0	0.00	0	86.3
2003–04	7 382 293	1 464 465	19.8	0	0.00	0	91.3
2002–03	10 781 875	1 880 455	17.4	1	0.01	1 (1 - 2)	22.4
2001–02	10 876 381	918 159	8.4	0	0.00	0	85.2
2000–01	9 761 448	1 029 118	10.5	0	0.00	0	96.0
1999–00	8 286 120	793 770	9.6	1	0.01	1 (1 - 1)	10.2
1998–99	6 845 781	1 242 610	18.2	1	0.01	1 (1 - 1)	22.7

Table 87: Species caught by area with numbers of animals captured, dead and necropsied.

	AREA3			AREA1		
	captured	dead	necropsied	captured	dead	necropsied
2002–03						
Porpoise	-	-	-	1	0	0
1999–00						
Dusky dolphin	1	0	0	-	-	-
1998–99						
Dusky dolphin	1	0	0	-	-	-

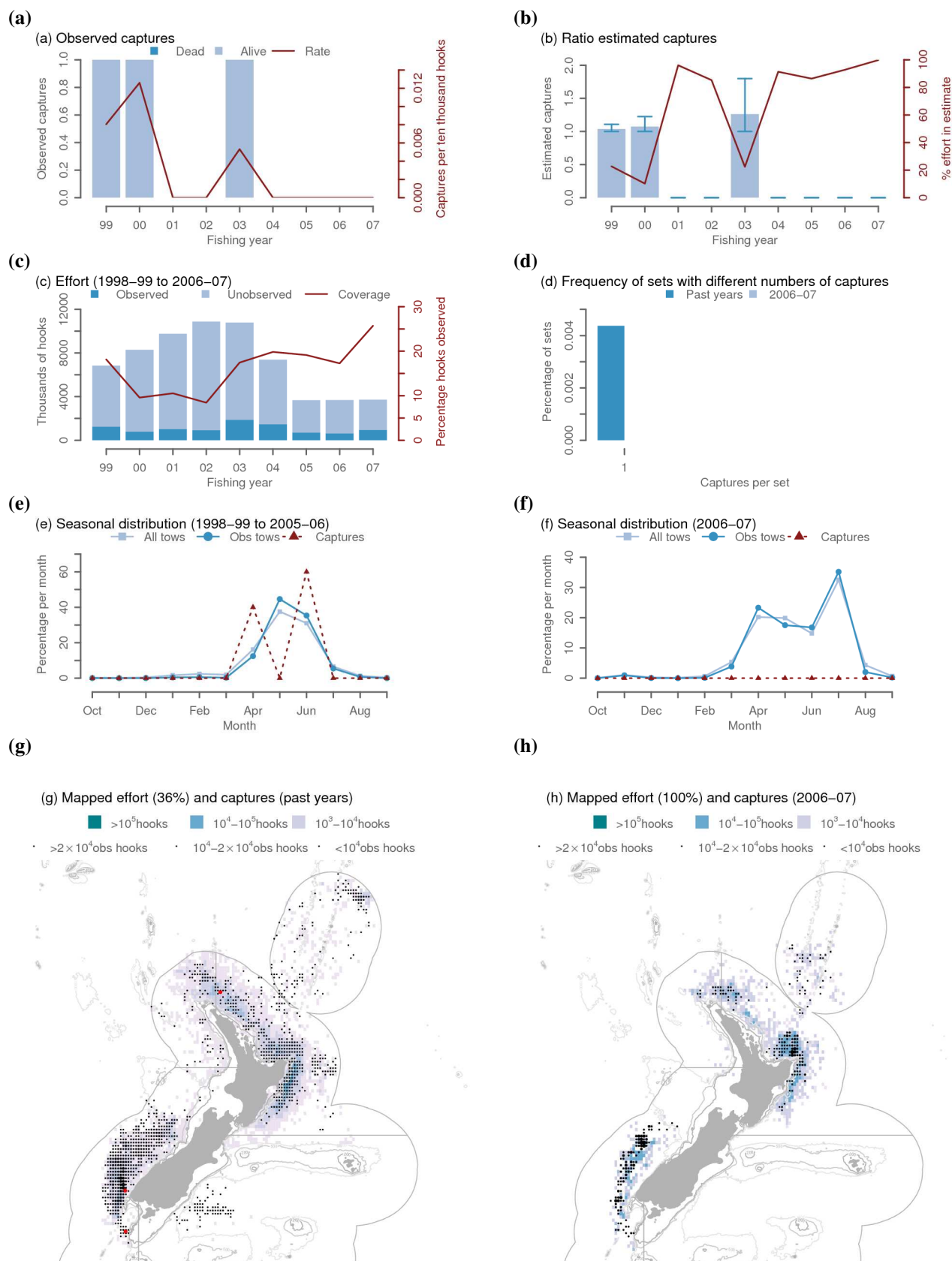


Figure 47: Dolphin captures in the surface longline fishery. (a) Observed captures, (b) Ratio estimated captures, with 95% bootstrap confidence intervals, (c) Effort and observed effort, (d) Histogram of the number of captures per tow, (e, f) Monthly distributions of effort, observations and captures, (g, h) Mapped effort and captures from past years (showing annual averaged effort and observations, but all captures) and from 2006–07.

3.16 Pilot whale captures

3.16.1 Pilot whale, all trawl, New Zealand EEZ

In 2006–07 there were no observed captures.

Table 88: Summary by year with 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.

	Tows	No. obs	% obs	Captures	Rate	Estimated captures	% eff. in est.
2006–07	103 384	7922	7.7	0	0.00	0	42.4
2005–06	109 982	6554	6.0	0	0.00	0	27.7
2004–05	120 496	7710	6.4	0	0.00	0	26.1
2003–04	120 923	6547	5.4	0	0.00	0	33.5
2002–03	130 202	6836	5.3	0	0.00	0	35.1
2001–02	127 912	7717	6.0	0	0.00	0	37.1
2000–01	134 256	9114	6.8	0	0.00	0	32.9
1999–00	139 102	7651	5.5	3	0.04	3 (3 - 3)	35.4
1998–99	153 759	7257	4.7	0	0.00	0	33.9

Table 89: Capture events with details of species, number caught, area code, observer identification and necropsy identification (where available).

Date	Species	#	Area	Obs.	Aut.
25/10/1999	Pilot whale (<i>Globicephala melas</i>)	3	WCNI9	PIW	

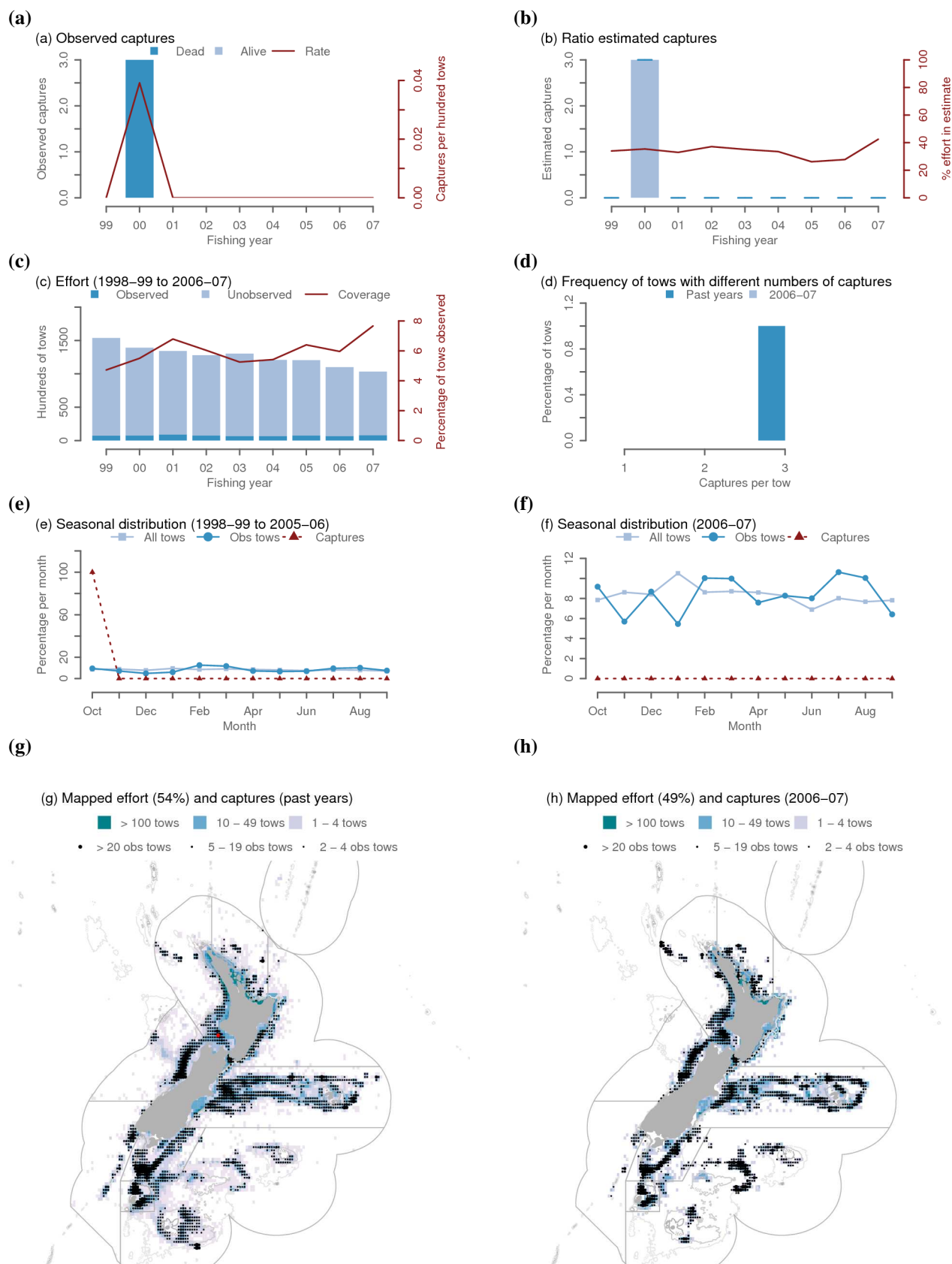


Figure 48: Pilot whale captures in all trawl fisheries. (a) Observed captures, (b) Ratio estimated captures, with 95% bootstrap confidence intervals, (c) Effort and observed effort, (d) Histogram of the number of captures per tow, (e, f) Monthly distributions of effort, observations and captures, (g, h) Mapped effort and captures from past years (showing annual averaged effort and observations, but all captures) and from 2006–07.

3.16.2 Pilot whale, surface longline, New Zealand EEZ

In 2006–07 there were no observed captures.

Table 90: Summary by year with number of hooks, number of hooks observed, percentage of hooks observed, number of observed captures, capture rate per ten thousand hooks, total estimated captures with 95% confidence intervals, and percentage of hooks included in the estimate.

	Hooks	No. obs	% obs	Captures	Rate	Estimated captures	% eff. in est.
2006–07	3 719 232	955 919	25.7	0	0.00	0	99.8
2005–06	3 687 569	636 796	17.3	0	0.00	0	92.8
2004–05	3 676 795	703 669	19.1	0	0.00	0	86.3
2003–04	7 382 293	1 464 465	19.8	2	0.01	43 (2 - 126)	91.3
2002–03	10 781 875	1 880 455	17.4	0	0.00	0	22.4
2001–02	10 876 381	918 159	8.4	0	0.00	0	85.2
2000–01	9 761 448	1 029 118	10.5	0	0.00	0	96.0
1999–00	8 286 120	793 770	9.6	0	0.00	0	10.2
1998–99	6 845 781	1 242 610	18.2	0	0.00	0	22.7

Table 91: Capture events with details of species, number caught, area code, observer identification and necropsy identification (where available).

Date	Species	#	Area	Obs.	Aut.
07/07/2004	Pilot whale (<i>Globicephala melas</i>)	1	Area 1	PIW	
02/06/2004	Pilot whale (<i>Globicephala melas</i>)	1	Area 3	PIW	

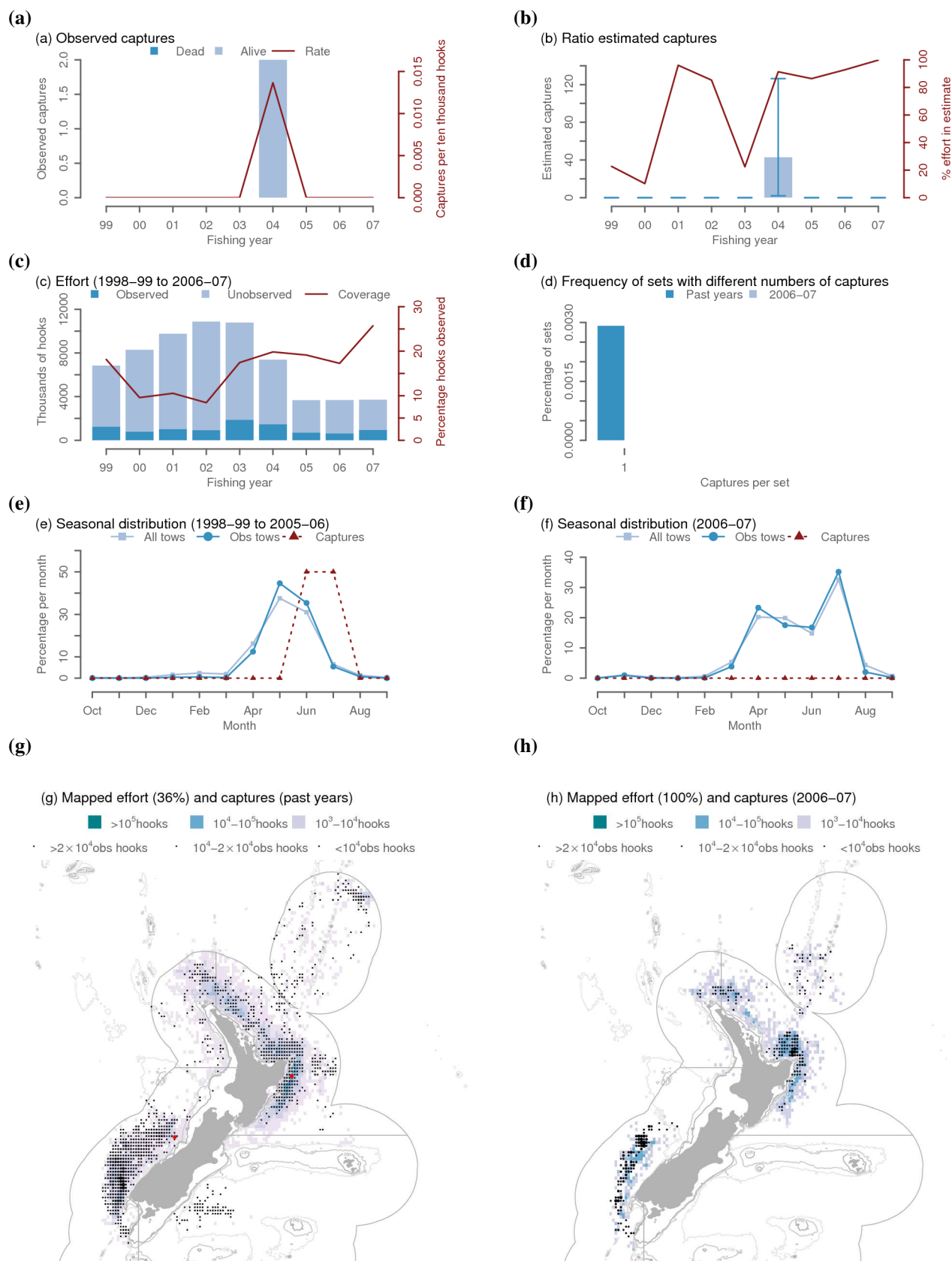


Figure 49: Pilot whale captures in the surface longline fishery. (a) Observed captures, (b) Ratio estimated captures, with 95% bootstrap confidence intervals, (c) Effort and observed effort, (d) Histogram of the number of captures per tow, (e, f) Monthly distributions of effort, observations and captures, (g, h) Mapped effort and captures from past years (showing annual averaged effort and observations, but all captures) and from 2006–07.

3.16.3 Pilot whale, bottom longline, New Zealand EEZ

In 2006–07 there were no observed captures.

Table 92: Summary by year with number of hooks, number of hooks observed, percentage of hooks observed, number of observed captures, capture rate per ten thousand hooks, total estimated captures with 95% confidence intervals, and percentage of hooks included in the estimate.

	Hooks	No. obs	% obs	Captures	Rate	Estimated captures	% eff. in est.
2006–07	38 164 851	2 344 205	6.1	0	0.00	0	49.6
2005–06	37 125 639	3 822 459	10.3	0	0.00	0	72.3
2004–05	41 840 933	2 927 928	7.0	0	0.00	0	71.2
2003–04	43 449 733	5 919 633	13.6	0	0.00	0	79.6
2002–03	37 753 336	11 308 295	30.0	2	0.00	3 (2 - 5)	47.3
2001–02	47 024 332	7 547 517	16.1	1	0.00	3 (1 - 6)	51.7
2000–01	51 024 367	5 248 902	10.3	0	0.00	0	30.7
1999–00	53 277 149	3 606 478	6.8	0	0.00	0	56.4
1998–99	55 487 193	3 097 198	5.6	0	0.00	0	50.7

Table 93: Capture events with details of species, number caught, area code, observer identification and necropsy identification (where available).

Date	Species	#	Area	Obs.	Aut.
09/09/2003	Pilot whale (<i>Globicephala melas</i>)	1	CHAT4	PIW	
14/12/2002	Pilot whale (<i>Globicephala melas</i>)	1	SUBA6	PIW	
17/01/2002	Pilot whale (<i>Globicephala melas</i>)	1	CHAT4	PIW	

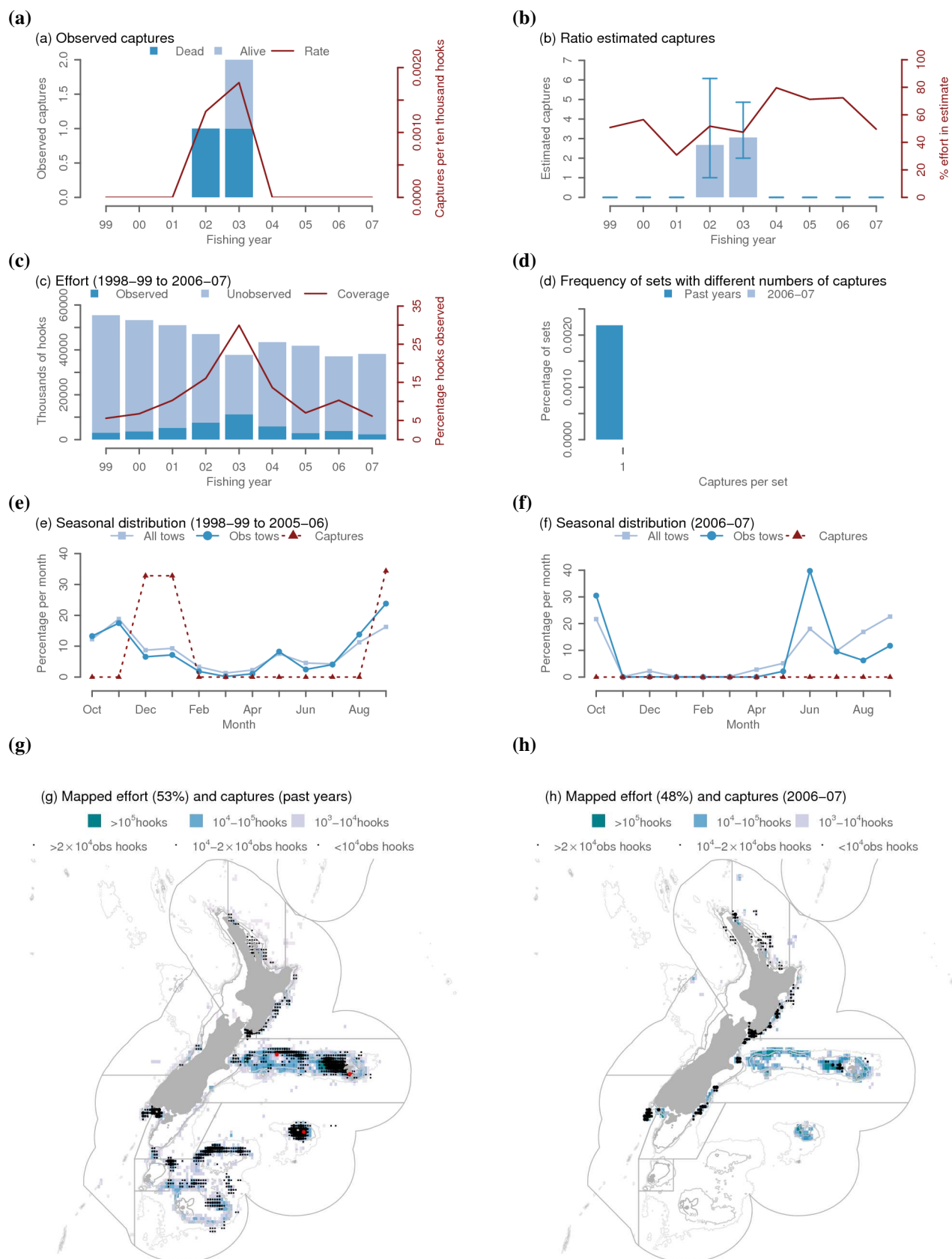


Figure 50: Pilot whale captures in the bottom longline fishery. (a) Observed captures, (b) Ratio estimated captures, with 95% bootstrap confidence intervals, (c) Effort and observed effort, (d) Histogram of the number of captures per tow, (e, f) Monthly distributions of effort, observations and captures, (g, h) Mapped effort and captures from past years (showing annual averaged effort and observations, but all captures) and from 2006–07.

3.17 Other whale captures

3.17.1 Other whales, surface longline, New Zealand EEZ

In 2006–07 there were no observed captures.

Table 94: Summary by year with number of hooks, number of hooks observed, percentage of hooks observed, number of observed captures, capture rate per ten thousand hooks, total estimated captures with 95% confidence intervals, and percentage of hooks included in the estimate.

	Hooks	No. obs	% obs	Captures	Rate	Estimated captures	% eff. in est.
2006–07	3 719 232	955 919	25.7	0	0.00	0	99.8
2005–06	3 687 569	636 796	17.3	0	0.00	0	92.8
2004–05	3 676 795	703 669	19.1	1	0.01	1 (1 - 1)	86.3
2003–04	7 382 293	1 464 465	19.8	2	0.01	41 (2 - 121)	91.3
2002–03	10 781 875	1 880 455	17.4	0	0.00	0	22.4
2001–02	10 876 381	918 159	8.4	0	0.00	0	85.2
2000–01	9 761 448	1 029 118	10.5	1	0.01	1 (1 - 1)	96.0
1999–00	8 286 120	793 770	9.6	0	0.00	0	10.2
1998–99	6 845 781	1 242 610	18.2	1	0.01	1 (1 - 1)	22.7

Table 95: Species caught by area with numbers of animals captured, dead and necropsied.

	AREA3			AREA4			AREA1		
	cap.	dead	nec.	cap.	dead	nec.	cap.	dead	nec.
2004–05	1	0	0	-	-	-	-	-	-
2003–04	-	-	-	1	0	0	1	0	0
2000–01	1	0	0	-	-	-	-	-	-
1998–99	1	0	0	-	-	-	-	-	-

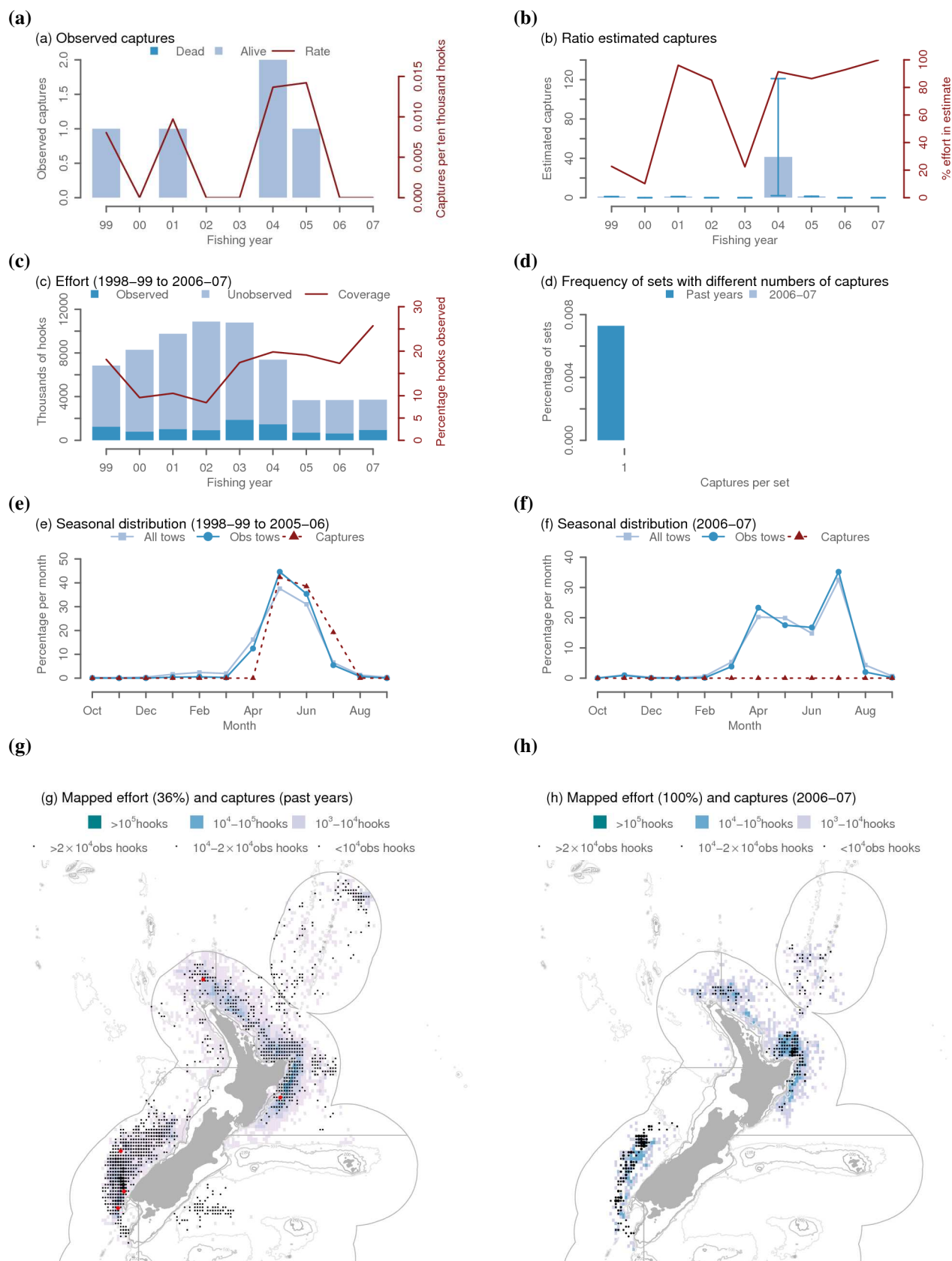


Figure 51: Other whale captures in the surface longline fishery. (a) Observed captures, (b) Ratio estimated captures, with 95% bootstrap confidence intervals, (c) Effort and observed effort, (d) Histogram of the number of captures per tow, (e, f) Monthly distributions of effort, observations and captures, (g, h) Mapped effort and captures from past years (showing annual averaged effort and observations, but all captures) and from 2006–07.

3.18 Turtle captures

3.18.1 Turtles, surface longline, New Zealand EEZ

In 2006–07 there were 2 observed captures.

Table 96: Summary by year with number of hooks, number of hooks observed, percentage of hooks observed, number of observed captures, capture rate per ten thousand hooks, total estimated captures with 95% confidence intervals, and percentage of hooks included in the estimate.

	Hooks	No. obs	% obs	Captures	Rate	Estimated captures	% eff. in est.
2006–07	3 719 232	955 919	25.7	2	0.02	15 (2 - 41)	99.8
2005–06	3 687 569	636 796	17.3	1	0.02	1 (1 - 1)	92.8
2004–05	3 676 795	703 669	19.1	2	0.03	20 (2 - 59)	86.3
2003–04	7 382 293	1 464 465	19.8	1	0.01	40 (1 - 122)	91.3
2002–03	10 781 875	1 880 455	17.4	0	0.00	0	22.4
2001–02	10 876 381	918 159	8.4	3	0.03	154 (3 - 350)	85.2
2000–01	9 761 448	1 029 118	10.5	3	0.03	59 (3 - 145)	96.0
1999–00	8 286 120	793 770	9.6	0	0.00	0	10.2
1998–99	6 845 781	1 242 610	18.2	1	0.01	1 (1 - 1)	22.7

Table 97: Species caught by area with numbers of animals captured, dead and necropsied.

	AREA1			AREA4			AREA3		
	cap.	dead	nec.	cap.	dead	nec.	cap.	dead	nec.
2006–07									
Leatherback turtle	2	0	0	-	-	-	-	-	-
2005–06									
Leatherback turtle	1	0	0	-	-	-	-	-	-
2004–05									
Leatherback turtle	1	0	0	1	0	0	-	-	-
2003–04									
Turtle	1	0	0	-	-	-	-	-	-
2001–02									
Turtle	3	0	0	-	-	-	-	-	-
2000–01									
Turtle	2	1	0	-	-	-	1	0	0
1998–99									
Turtle	1	0	0	-	-	-	-	-	-

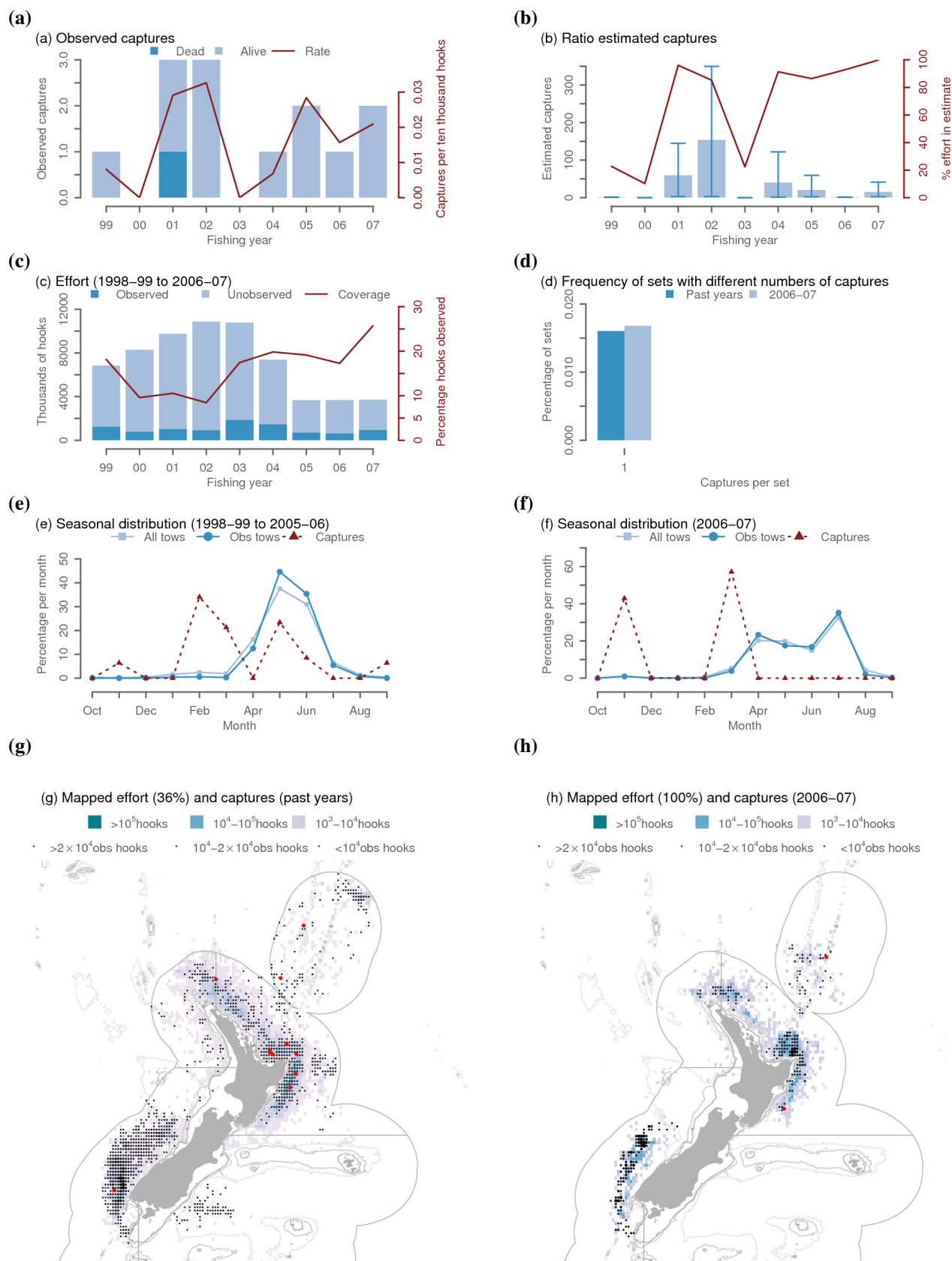


Figure 52: Turtle captures in the surface longline fishery. (a) Observed captures, (b) Ratio estimated captures, with 95% bootstrap confidence intervals, (c) Effort and observed effort, (d) Histogram of the number of captures per tow, (e, f) Monthly distributions of effort, observations and captures, (g, h) Mapped effort and captures from past years (showing annual averaged effort and observations, but all captures) and from 2006-07.

3.18.2 Turtles, bottom longline, New Zealand EEZ

In 2006–07 there were no observed captures.

Table 98: Summary by year with number of hooks, number of hooks observed, percentage of hooks observed, number of observed captures, capture rate per ten thousand hooks, total estimated captures with 95% confidence intervals, and percentage of hooks included in the estimate.

	Hooks	No. obs	% obs	Captures	Rate	Estimated captures	% eff. in est.
2006–07	38 164 851	2 344 205	6.1	0	0.00	0	49.6
2005–06	37 125 639	3 822 459	10.3	1	0.00	93 (1 - 315)	72.3
2004–05	41 840 933	2 927 928	7.0	0	0.00	0	71.2
2003–04	43 449 733	5 919 633	13.6	0	0.00	0	79.6
2002–03	37 753 336	11 308 295	30.0	0	0.00	0	47.3
2001–02	47 024 332	7 547 517	16.1	0	0.00	0	51.7
2000–01	51 024 367	5 248 902	10.3	0	0.00	0	30.7
1999–00	53 277 149	3 606 478	6.8	0	0.00	0	56.4
1998–99	55 487 193	3 097 198	5.6	0	0.00	0	50.7

Table 99: Species caught by area with numbers of animals captured, dead and necropsied.

		NORTH1		
		captured	dead	necropsied
2005–06				
	Green turtle	1	0	0

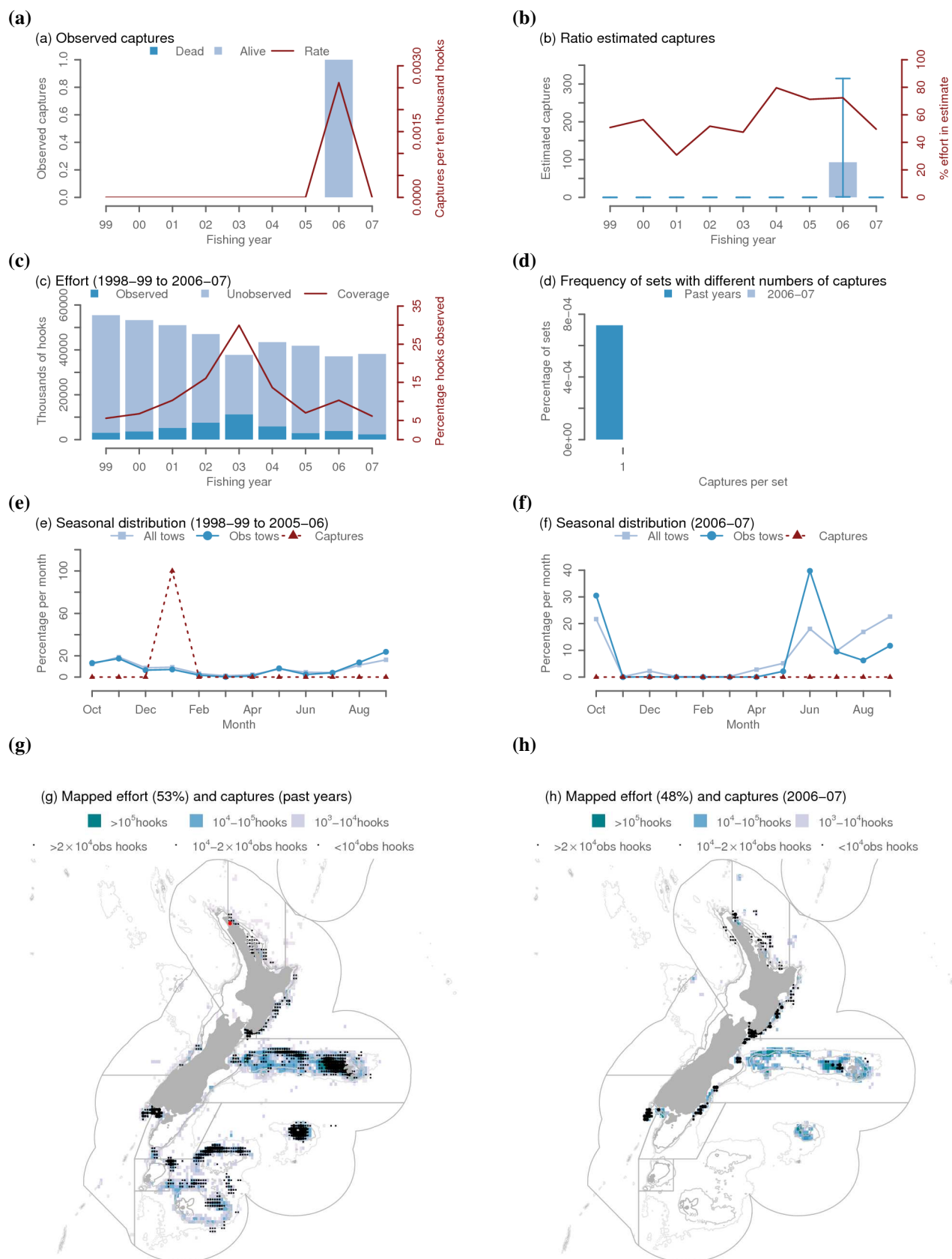


Figure 53: Turtle captures in the bottom longline fishery. (a) Observed captures, (b) Ratio estimated captures, with 95% bootstrap confidence intervals, (c) Effort and observed effort, (d) Histogram of the number of captures per tow, (e, f) Monthly distributions of effort, observations and captures, (g, h) Mapped effort and captures from past years (showing annual averaged effort and observations, but all captures) and from 2006-07.

3.19 Trawl fishery captures

3.19.1 Hoki trawl, all birds, New Zealand EEZ

In 2006–07 there were 23 observed captures.

Table 100: Summary by year with 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.

	Tows	No. obs	% obs	Captures	Rate	Estimated captures	% eff. in est.
2006–07	10 608	1758	16.6	23	1.31	126 (84 - 174)	97.1
2005–06	11 591	1777	15.3	54	3.04	352 (234 - 502)	81.5
2004–05	14 540	2133	14.7	46	2.16	356 (221 - 510)	92.0
2003–04	22 522	2348	10.4	33	1.41	330 (140 - 609)	95.9
2002–03	27 787	2593	9.3	84	3.24	826 (425 - 1391)	95.0
2001–02	27 239	3275	12.0	50	1.53	368 (237 - 546)	94.5
2000–01	32 024	3549	11.1	296	8.34	2480 (2020 - 2955)	96.2
1999–00	33 061	3276	9.9	91	2.78	1003 (759 - 1292)	94.4
1998–99	32 247	3558	11.0	133	3.74	1008 (768 - 1286)	95.1

Table 101: Species caught by area with numbers of animals captured, dead and necropsied.

	CHAT4			STEW5			WCSI7			COOK8		
	c.	d.	n.	c.	d.	n.	c.	d.	n.	c.	d.	n.
2006–07												
Sooty shearwater	7	6	6	2	2	2	-	-	-	-	-	-
Salvin's albatross	5	4	1	-	-	-	-	-	-	-	-	-
White-capped albatross	-	-	-	-	-	-	2	2	1	-	-	-
White-chinned petrel	1	1	1	1	1	1	-	-	-	-	-	-
Northern giant petrel	-	-	-	-	-	-	1	1	1	-	-	-
Giant petrels (unidentified)	-	-	-	-	-	-	1	1	0	-	-	-
Buller's albatross	-	-	-	-	-	-	1	1	1	-	-	-
Cape pigeon	-	-	-	-	-	-	1	0	0	-	-	-
Southern cape pigeon	-	-	-	-	-	-	1	1	1	-	-	-
2005–06												
Sooty shearwater	33	31	31	1	1	1	-	-	-	-	-	-
Salvin's albatross	5	5	4	-	-	-	-	-	-	1	1	1
White-capped albatross	-	-	-	4	3	3	-	-	-	-	-	-
White-chinned petrel	4	3	3	-	-	-	-	-	-	-	-	-
Cape pigeon	1	0	0	1	0	0	1	1	1	-	-	-
Grey-backed storm petrel	-	-	-	1	1	1	-	-	-	-	-	-
Buller's albatross	1	1	1	-	-	-	-	-	-	-	-	-
Albatross (unidentified)	1	1	1	-	-	-	-	-	-	-	-	-

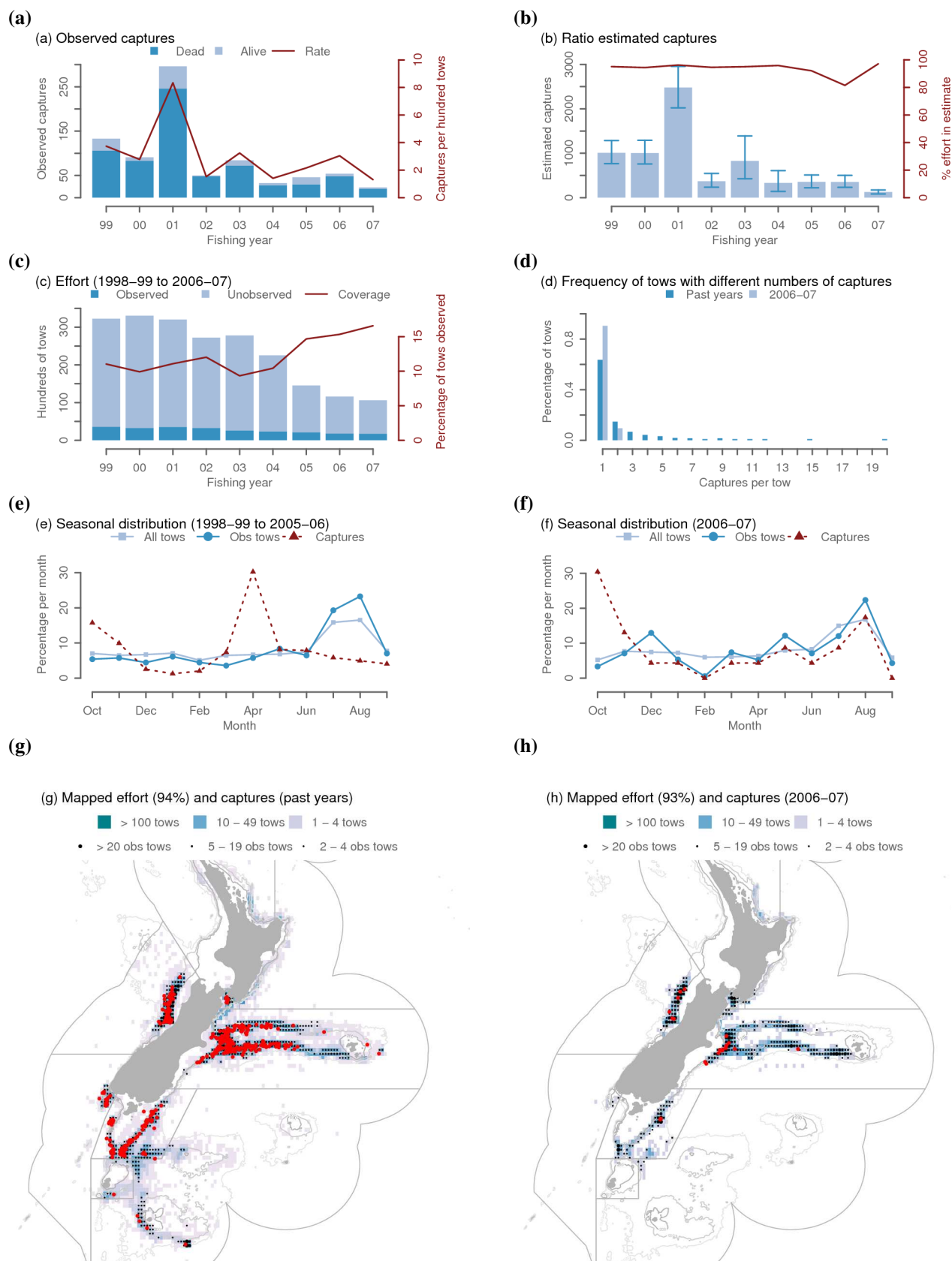


Figure 54: All bird captures in the hoki trawl fishery. (a) Observed captures, (b) Ratio estimated captures, with 95% bootstrap confidence intervals, (c) Effort and observed effort, (d) Histogram of the number of captures per tow, (e, f) Monthly distributions of effort, observations and captures, (g, h) Mapped effort and captures from past years (showing annual averaged effort and observations, but all captures) and from 2006–07.

3.19.2 Hoki trawl, all mammals, New Zealand EEZ

In 2006–07 there were 29 observed captures.

Table 102: Summary by year with 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.

	Tows	No. obs	% obs	Captures	Rate	Estimated captures	% eff. in est.
2006–07	10 608	1758	16.6	29	1.65	246 (158 - 346)	97.1
2005–06	11 591	1777	15.3	62	3.49	215 (148 - 291)	81.5
2004–05	14 540	2133	14.7	120	5.63	1025 (750 - 1335)	92.0
2003–04	22 522	2348	10.4	49	2.09	406 (283 - 538)	95.9
2002–03	27 787	2593	9.3	45	1.74	455 (288 - 658)	95.0
2001–02	27 239	3275	12.0	110	3.36	808 (631 - 1007)	94.5
2000–01	32 024	3549	11.1	67	1.89	632 (479 - 798)	96.2
1999–00	33 061	3276	9.9	103	3.14	747 (594 - 903)	94.4
1998–99	32 247	3558	11.0	84	2.36	736 (571 - 922)	95.1

Table 103: Species caught by area with numbers of animals captured, dead and necropsied.

	WCSI7			COOK8			CHAT4			Other Areas		
	c.	d.	n.	c.	d.	n.	c.	d.	n.	c.	d.	n.
2006–07												
New Zealand fur seal	-	-	-	23	19	0	4	1	0	2	2	0
2005–06												
New Zealand fur seal	23	22	0	19	19	0	12	8	0	8	7	0
2004–05												
New Zealand fur seal	63	63	0	32	24	0	14	13	0	11	11	0
2003–04												
New Zealand fur seal	27	24	0	1	1	0	17	13	0	4	3	0
2002–03												
New Zealand fur seal	18	18	0	4	4	0	13	12	0	9	6	0
New Zealand sea lion	-	-	-	-	-	-	-	-	-	1	1	0
2001–02												
New Zealand fur seal	57	43	0	20	17	0	4	2	0	29	27	0
2000–01												
New Zealand fur seal	36	31	0	11	7	0	9	6	0	11	8	2
1999–00												
New Zealand fur seal	85	77	2	1	1	0	4	1	0	12	9	0
New Zealand sea lion	-	-	-	-	-	-	-	-	-	1	0	0
1998–99												
New Zealand fur seal	34	25	0	13	13	0	18	12	0	19	12	0

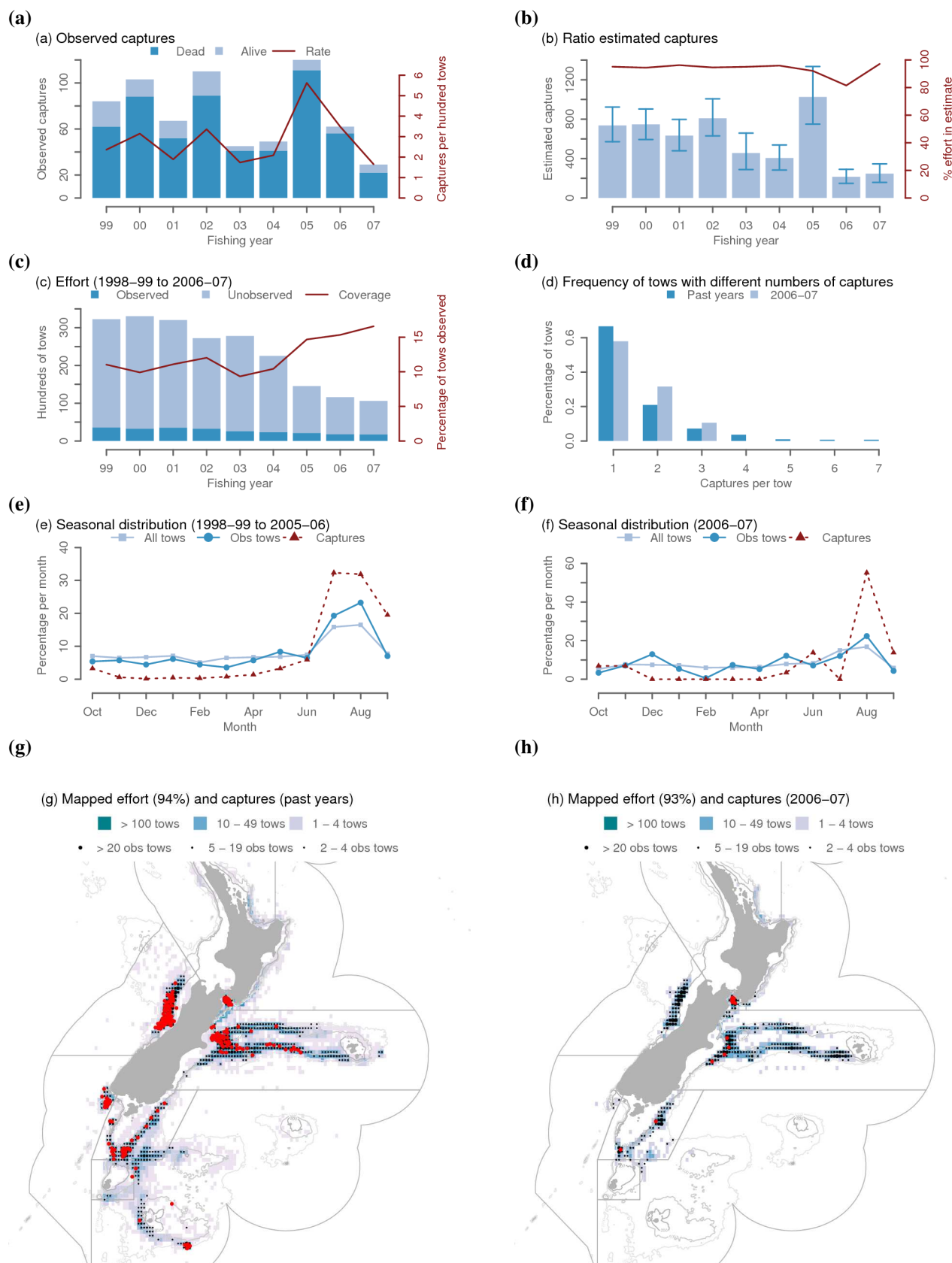


Figure 55: All mammal captures in the hoki trawl fishery. (a) Observed captures, (b) Ratio estimated captures, with 95% bootstrap confidence intervals, (c) Effort and observed effort, (d) Histogram of the number of captures per tow, (e, f) Monthly distributions of effort, observations and captures, (g, h) Mapped effort and captures from past years (showing annual averaged effort and observations, but all captures) and from 2006–07.

3.19.3 Squid trawl, all birds, New Zealand EEZ

In 2006–07 there were 127 observed captures.

Table 104: Summary by year with 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.

	Tows	No. obs	% obs	Captures	Rate	Estimated captures	% eff. in est.
2006–07	5910	1289	21.8	127	9.85	427 (364 - 496)	72.6
2005–06	8582	1103	12.9	200	18.13	1251 (939 - 1627)	81.1
2004–05	10 490	2511	23.9	382	15.21	1337 (1212 - 1476)	82.7
2003–04	8336	1769	21.2	204	11.53	793 (698 - 893)	85.8
2002–03	8410	1308	15.6	160	12.23	814 (659 - 989)	74.2
2001–02	7475	1455	19.5	225	15.46	767 (645 - 909)	75.1
2000–01	8075	3001	37.2	376	12.53	510 (490 - 532)	49.3
1999–00	5651	915	16.2	53	5.79	189 (128 - 270)	58.7
1998–99	8014	995	12.4	104	10.45	602 (427 - 816)	78.7

Table 105: Species caught by area with numbers of animals captured, dead and necropsied.

	STEW5			SQUAK6			CHAT4			PUYS5		
	c.	d.	n.	c.	d.	n.	c.	d.	n.	c.	d.	n.
2006–07												
Sooty shearwater	42	34	34	4	4	4	5	4	4	-	-	-
White-capped albatross	24	22	20	16	15	13	-	-	-	-	-	-
White-chinned petrel	9	7	6	17	8	8	-	-	-	-	-	-
Salvin's albatross	-	-	-	-	-	-	3	3	3	-	-	-
Buller's albatross	1	1	1	1	1	1	-	-	-	-	-	-
Black-browed albatross	1	0	0	-	-	-	-	-	-	-	-	-
Shy albatross	-	-	-	1	0	0	-	-	-	-	-	-
Petrel (unidentified)	-	-	-	1	0	0	-	-	-	-	-	-
Cape pigeon	1	1	0	-	-	-	-	-	-	-	-	-
Grey petrel	-	-	-	-	-	-	1	1	1	-	-	-
2005–06												
Sooty shearwater	65	51	51	12	9	8	5	4	4	-	-	-
White-chinned petrel	11	10	10	48	28	28	-	-	-	-	-	-
White-capped albatross	16	16	16	27	27	27	-	-	-	-	-	-
Petrel (unidentified)	2	1	0	1	0	0	-	-	-	-	-	-
Buller's albatross	2	1	1	1	1	1	-	-	-	-	-	-
Salvin's albatross	1	0	0	1	1	1	-	-	-	-	-	-
Albatross (unidentified)	1	1	0	1	1	0	-	-	-	-	-	-
Giant petrels (unidentified)	1	0	0	-	-	-	-	-	-	-	-	-
Shy albatross	-	-	-	1	1	0	-	-	-	-	-	-
Southern royal albatross	1	1	1	-	-	-	-	-	-	-	-	-
Black petrel	-	-	-	1	0	0	-	-	-	-	-	-
Black bellied storm petrel	1	0	0	-	-	-	-	-	-	-	-	-
Seabird large	-	-	-	-	-	-	-	-	-	1	1	0

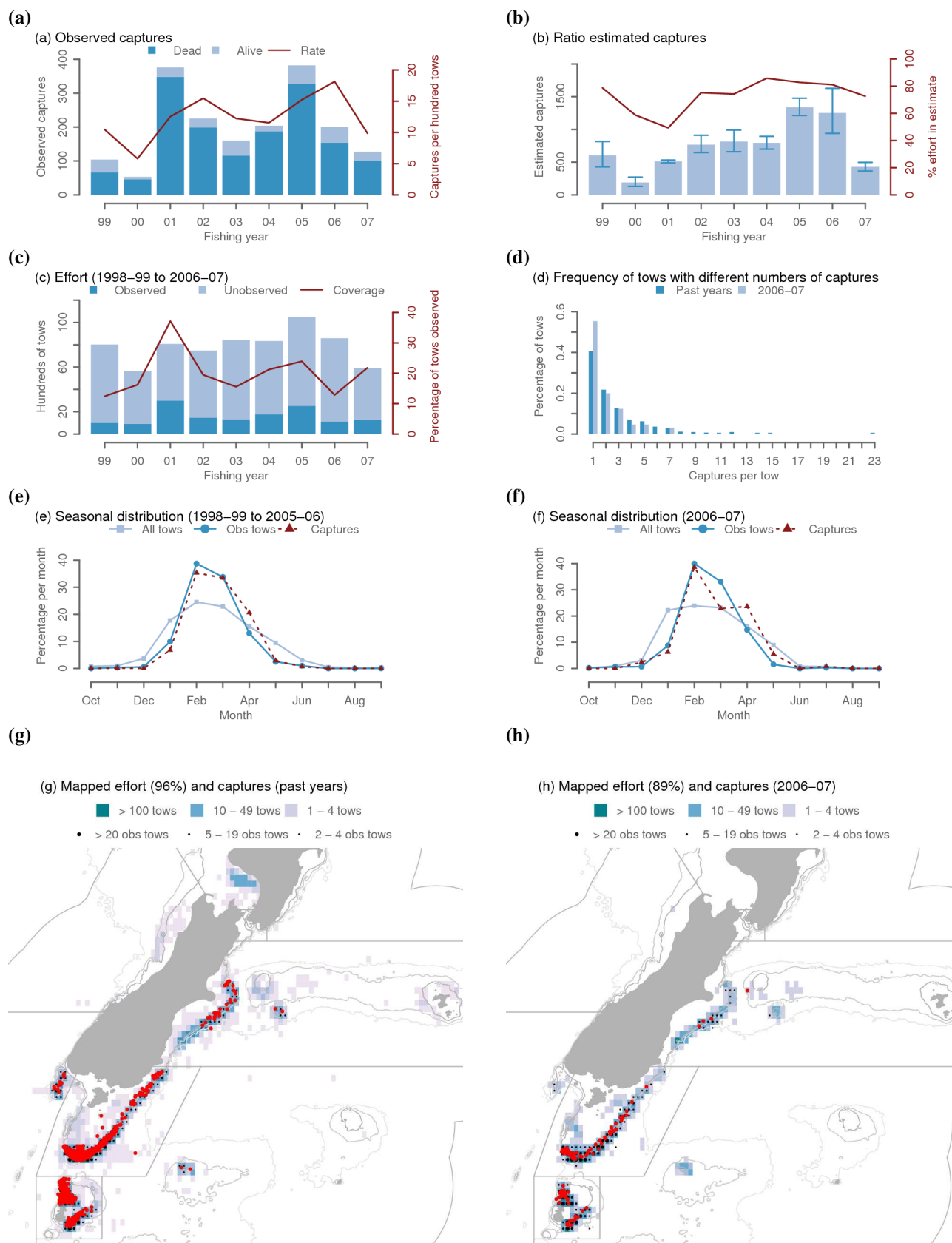


Figure 56: All bird captures in the squid trawl fishery. (a) Observed captures, (b) Ratio estimated captures, with 95% bootstrap confidence intervals, (c) Effort and observed effort, (d) Histogram of the number of captures per tow, (e, f) Monthly distributions of effort, observations and captures, (g, h) Mapped effort and captures from past years (showing annual averaged effort and observations, but all captures) and from 2006–07.

3.19.4 Squid trawl, all mammals, New Zealand EEZ

In 2006–07 there were 16 observed captures.

Table 106: Summary by year with 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.

	Tows	No. obs	% obs	Captures	Rate	Estimated captures	% eff. in est.
2006–07	5910	1289	21.8	16	1.24	48 (31 - 67)	72.6
2005–06	8582	1103	12.9	15	1.36	78 (43 - 120)	81.1
2004–05	10 490	2511	23.9	28	1.12	81 (60 - 104)	82.7
2003–04	8336	1769	21.2	34	1.92	127 (95 - 161)	85.8
2002–03	8410	1308	15.6	19	1.45	88 (56 - 123)	74.2
2001–02	7475	1455	19.5	44	3.02	159 (123 - 201)	75.1
2000–01	8075	3001	37.2	76	2.53	90 (85 - 95)	49.3
1999–00	5651	915	16.2	37	4.04	128 (98 - 162)	58.7
1998–99	8014	995	12.4	41	4.12	267 (190 - 356)	78.7

Table 107: Species caught by area with numbers of animals captured, dead and necropsied.

	SQUAK6			STEW5			CHAT4			PUYS5		
	c.	d.	n.	c.	d.	n.	c.	d.	n.	c.	d.	n.
2006–07												
New Zealand fur seal	-	-	-	6	6	0	2	1	0	-	-	-
New Zealand sea lion	7	7	7	1	1	0	-	-	-	-	-	-
2005–06												
New Zealand sea lion	10	10	10	1	0	0	-	-	-	-	-	-
New Zealand fur seal	2	2	1	2	0	0	-	-	-	-	-	-
2004–05												
New Zealand fur seal	1	1	0	8	8	0	3	1	0	4	4	0
New Zealand sea lion	9	9	0	3	3	0	-	-	-	-	-	-
2003–04												
New Zealand fur seal	7	6	0	10	9	0	-	-	-	-	-	-
New Zealand sea lion	16	16	0	1	0	0	-	-	-	-	-	-
2002–03												
New Zealand sea lion	11	11	0	-	-	-	-	-	-	-	-	-
New Zealand fur seal	-	-	-	7	6	0	-	-	-	1	0	0
2001–02												
New Zealand fur seal	4	3	0	19	16	1	-	-	-	-	-	-
New Zealand sea lion	21	21	18	-	-	-	-	-	-	-	-	-
2000–01												
New Zealand sea lion	39	36	35	3	3	3	-	-	-	-	-	-
New Zealand fur seal	2	2	1	26	18	1	3	1	0	-	-	-
Dusky dolphin	-	-	-	3	3	2	-	-	-	-	-	-
1999–00												
New Zealand sea lion	25	25	19	-	-	-	-	-	-	-	-	-
New Zealand fur seal	2	1	0	10	9	1	-	-	-	-	-	-

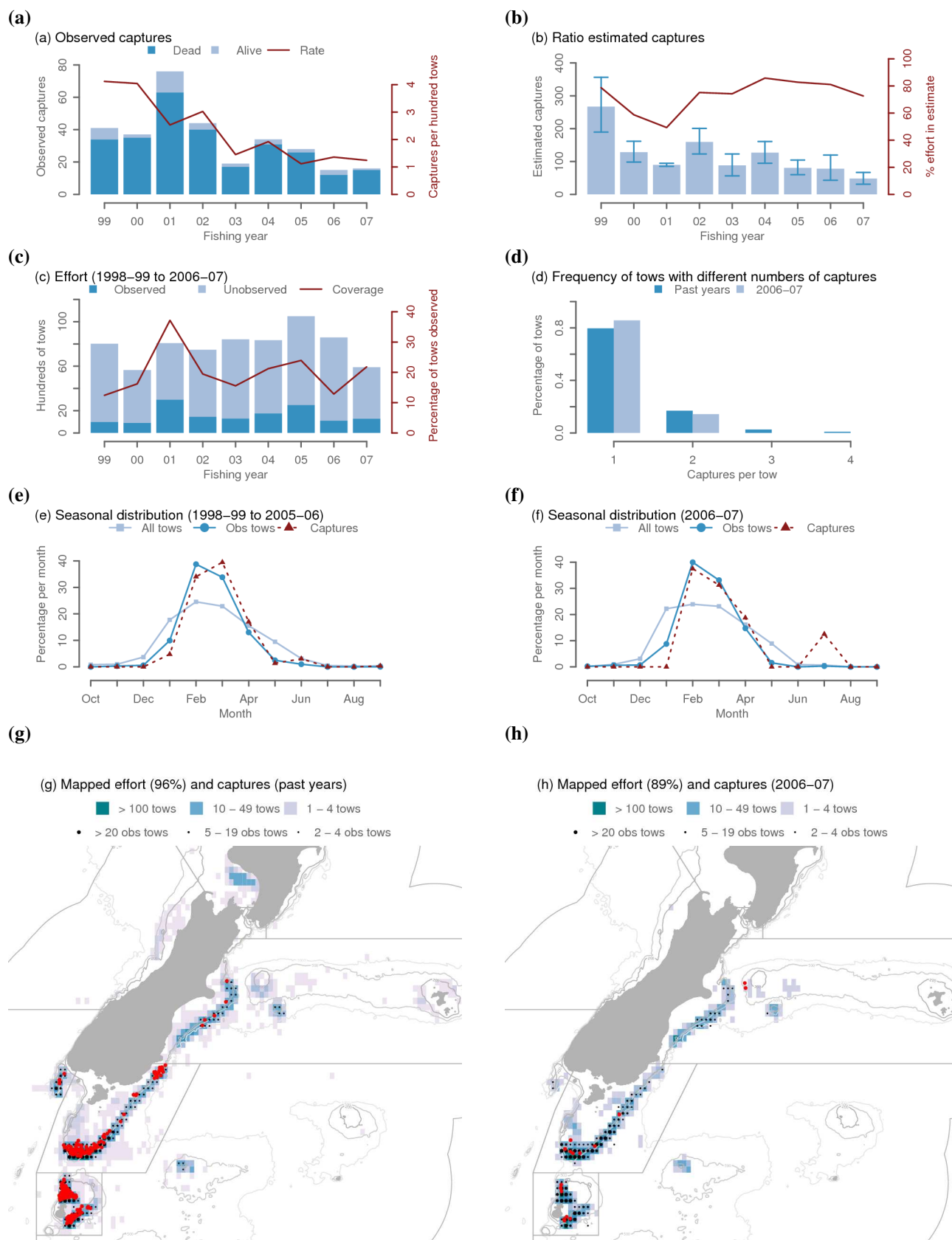


Figure 57: All mammal captures in the squid trawl fishery. (a) Observed captures, (b) Ratio estimated captures, with 95% bootstrap confidence intervals, (c) Effort and observed effort, (d) Histogram of the number of captures per tow, (e, f) Monthly distributions of effort, observations and captures, (g, h) Mapped effort and captures from past years (showing annual averaged effort and observations, but all captures) and from 2006-07.

3.19.5 Hake trawl, all birds, New Zealand EEZ

In 2006–07 there were 8 observed captures.

Table 108: Summary by year with 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.

	Tows	No. obs	% obs	Captures	Rate	Estimated captures	% eff. in est.
2006–07	1606	296	18.4	8	2.70	25 (8 - 47)	75.0
2005–06	1359	421	31.0	1	0.24	3 (1 - 8)	90.7
2004–05	1555	95	6.1	8	8.42	8 (8 - 8)	6.1
2003–04	1651	140	8.5	6	4.29	6 (6 - 6)	8.5
2002–03	945	49	5.2	0	0.00	0	5.2
2001–02	848	42	5.0	0	0.00	0	5.0
2000–01	801	35	4.4	6	17.14	6 (6 - 6)	4.4
1999–00	527	38	7.2	1	2.63	1 (1 - 1)	7.2
1998–99	846	23	2.7	3	13.04	3 (3 - 3)	2.7

Table 109: Species caught by area with numbers of animals captured, dead and necropsied.

	WCSI7			CHAT4			STEW5		
	cap.	dead	nec.	cap.	dead	nec.	cap.	dead	nec.
2006–07									
Sooty shearwater	-	-	-	4	1	1	-	-	-
White-capped albatross	2	2	2	-	-	-	-	-	-
Buller's albatross	1	1	1	-	-	-	-	-	-
Salvin's albatross	-	-	-	1	0	0	-	-	-
2005–06									
White-chinned petrel	1	1	0	-	-	-	-	-	-
2004–05									
Buller's albatross	3	3	2	-	-	-	-	-	-
White-capped albatross	3	2	2	-	-	-	-	-	-
Cape pigeon	1	0	0	-	-	-	-	-	-
Wandering albatross	1	0	0	-	-	-	-	-	-
2003–04									
Salvin's albatross	-	-	-	3	3	3	-	-	-
Buller's albatross	2	2	2	-	-	-	-	-	-
Shy albatross	1	0	0	-	-	-	-	-	-
2000–01									
White-capped albatross	-	-	-	-	-	-	3	3	3
Northern giant petrel	-	-	-	1	1	1	-	-	-
Chatham albatross	-	-	-	1	1	1	-	-	-
Salvin's albatross	-	-	-	1	1	1	-	-	-
1999–00									
White-capped albatross	-	-	-	-	-	-	1	1	1
1998–99									
Seabird large	2	2	0	-	-	-	-	-	-
Sooty shearwater	-	-	-	1	0	0	-	-	-

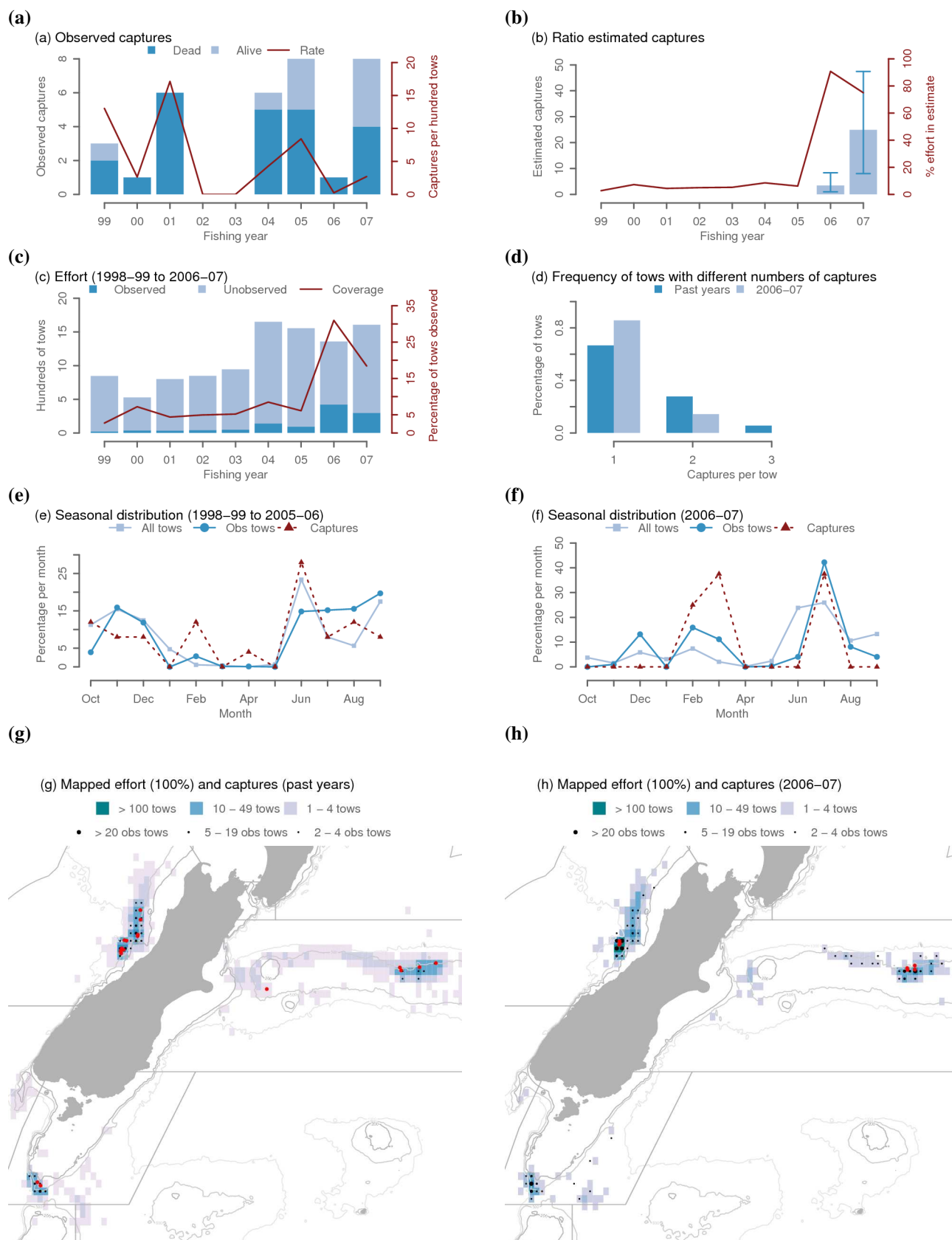


Figure 58: All bird captures in the hake trawl fishery. (a) Observed captures, (b) Ratio estimated captures, with 95% bootstrap confidence intervals, (c) Effort and observed effort, (d) Histogram of the number of captures per tow, (e, f) Monthly distributions of effort, observations and captures, (g, h) Mapped effort and captures from past years (showing annual averaged effort and observations, but all captures) and from 2006–07.

3.19.6 Hake trawl, all mammals, New Zealand EEZ

In 2006–07 there were 4 observed captures.

Table 110: Summary by year with 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.

	Tows	No. obs	% obs	Captures	Rate	Estimated captures	% eff. in est.
2006–07	1606	296	18.4	4	1.35	27 (10 - 49)	75.0
2005–06	1359	421	31.0	11	2.61	31 (18 - 48)	90.7
2004–05	1555	95	6.1	2	2.11	2 (2 - 2)	6.1
2003–04	1651	140	8.5	0	0.00	0	8.5
2002–03	945	49	5.2	3	6.12	3 (3 - 3)	5.2
2001–02	848	42	5.0	0	0.00	0	5.0
2000–01	801	35	4.4	0	0.00	0	4.4
1999–00	527	38	7.2	0	0.00	0	7.2
1998–99	846	23	2.7	0	0.00	0	2.7

Table 111: Species caught by area with numbers of animals captured, dead and necropsied.

	WCSI7			STEW5		
	captured	dead	necropsied	captured	dead	necropsied
2006–07						
New Zealand fur seal	4	4	0	-	-	-
2005–06						
New Zealand fur seal	8	5	0	3	3	0
2004–05						
New Zealand fur seal	2	1	0	-	-	-
2002–03						
New Zealand fur seal	3	1	0	-	-	-

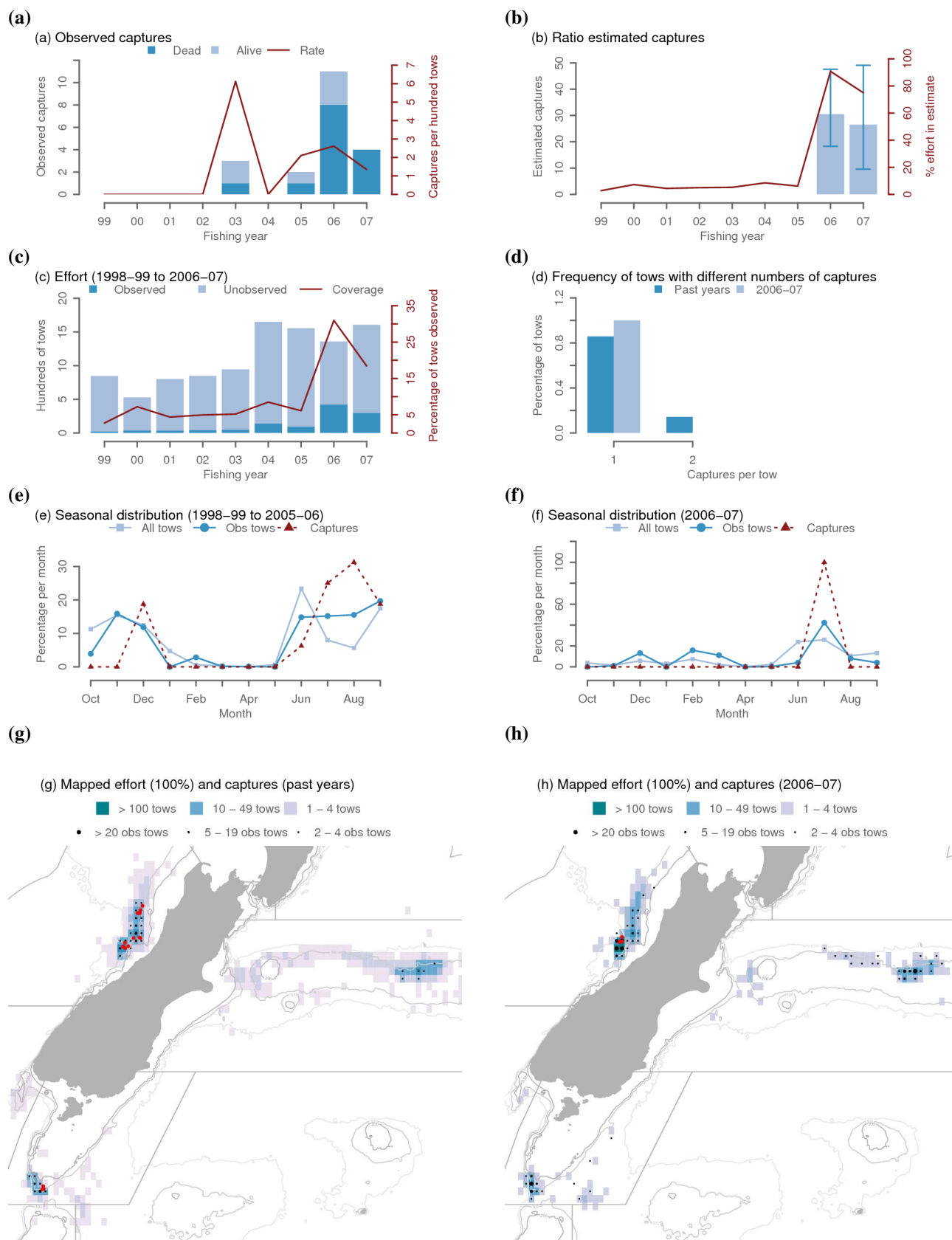


Figure 59: All mammal captures in the hake trawl fishery. (a) Observed captures, (b) Ratio estimated captures, with 95% bootstrap confidence intervals, (c) Effort and observed effort, (d) Histogram of the number of captures per tow, (e, f) Monthly distributions of effort, observations and captures, (g, h) Mapped effort and captures from past years (showing annual averaged effort and observations, but all captures) and from 2006-07.

3.19.7 Ling trawl, all birds, New Zealand EEZ

In 2006–07 there were 2 observed captures.

Table 112: Summary by year with 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.

	Tows	No. obs	% obs	Captures	Rate	Estimated captures	% eff. in est.
2006–07	1659	157	9.5	2	1.27	10 (2 - 22)	39.1
2005–06	1394	113	8.1	3	2.65	3 (3 - 3)	8.1
2004–05	988	76	7.7	3	3.95	3 (3 - 3)	7.7
2003–04	559	22	3.9	0	0.00	0	3.9
2002–03	634	16	2.5	0	0.00	0	2.5
2001–02	575	5	0.9	0	0.00	0	0.9
2000–01	390	0	0.0	0		0	0.0
1999–00	571	7	1.2	0	0.00	0	1.2
1998–99	470	0	0.0	0		0	0.0

Table 113: Capture events with details of species, number caught, area code, observer identification and necropsy identification (where available).

Date	Species	#	Area	Obs.	Aut.
21/10/2006	Sooty shearwater (<i>Puffinus griseus</i>)	1	STEW5	XSH	XSH
05/10/2006	Sooty shearwater (<i>Puffinus griseus</i>)	1	STEW5	XSH	XSH
06/07/2006	Buller's albatross (<i>Thalassarche bulleri</i>)	1	PUYS5	XBM	
15/10/2005	Albatross (unidentified) (<i>Diomedidae</i> (Family))	1	STEW5	XAL	
04/10/2005	White-capped albatross (<i>Thalassarche steadi</i>)	1	STEW5	XWM	XWM
13/11/2004	White-capped albatross (<i>Thalassarche steadi</i>)	1	STEW5	XWM	XWM
06/11/2004	White-chinned petrel (<i>Procellaria aequinoctialis</i>)	1	STEW5	XFS	XWC
31/10/2004	Salvin's albatross (<i>Thalassarche salvini</i>)	1	STEW5	XSA	XSA

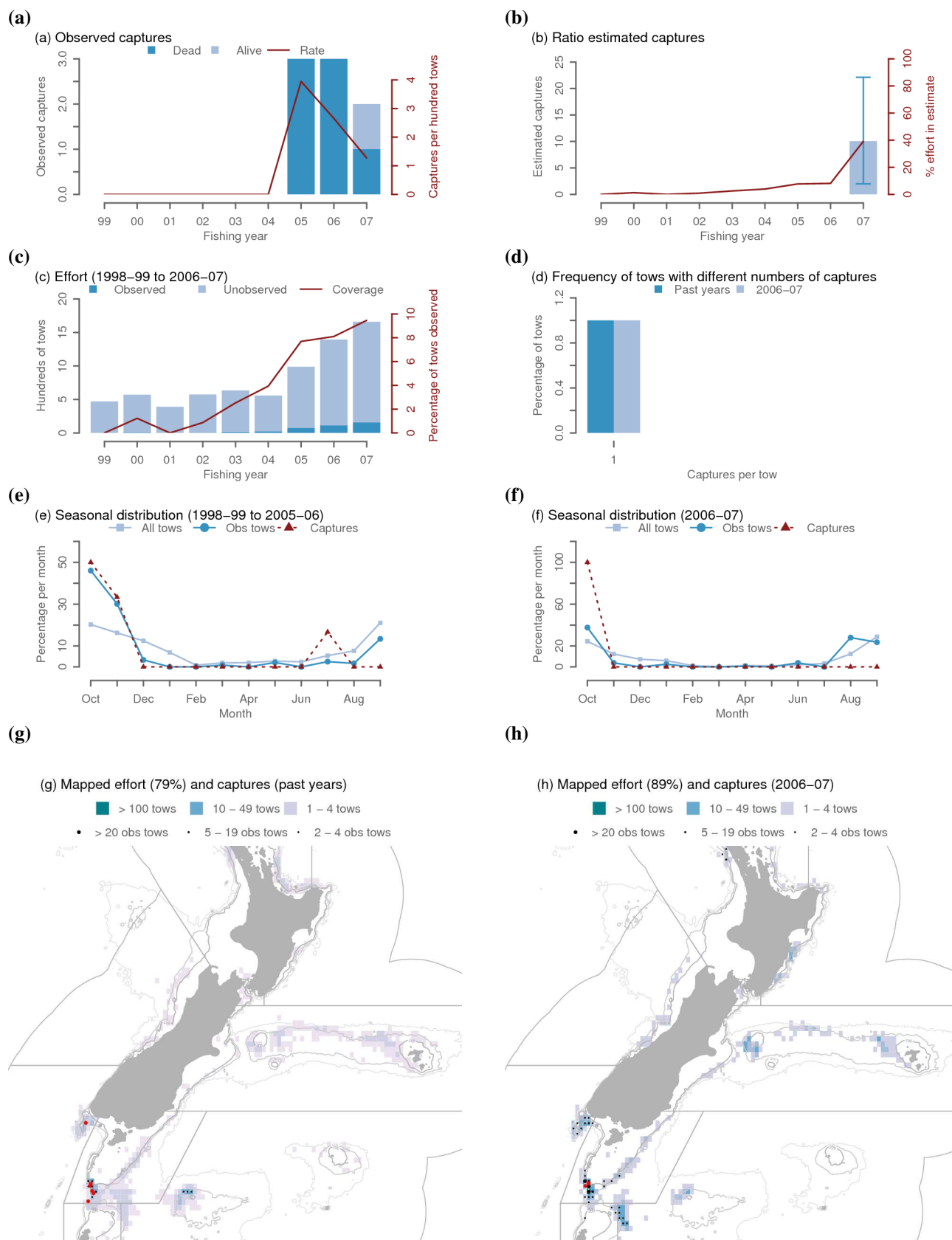


Figure 60: All bird captures in the ling trawl fishery. (a) Observed captures, (b) Ratio estimated captures, with 95% bootstrap confidence intervals, (c) Effort and observed effort, (d) Histogram of the number of captures per tow, (e, f) Monthly distributions of effort, observations and captures, (g, h) Mapped effort and captures from past years (showing annual averaged effort and observations, but all captures) and from 2006–07.

3.19.8 Ling trawl, all mammals, New Zealand EEZ

In 2006–07 there were 12 observed captures.

Table 114: Summary by year with 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.

	Tows	No. obs	% obs	Captures	Rate	Estimated captures	% eff. in est.
2006–07	1659	157	9.5	12	7.64	56 (28 - 88)	39.1
2005–06	1394	113	8.1	2	1.77	2 (2 - 2)	8.1
2004–05	988	76	7.7	10	13.16	10 (10 - 10)	7.7
2003–04	559	22	3.9	0	0.00	0	3.9
2002–03	634	16	2.5	0	0.00	0	2.5
2001–02	575	5	0.9	1	20.00	1 (1 - 1)	0.9
2000–01	390	0	0.0	0		0	0.0
1999–00	571	7	1.2	0	0.00	0	1.2
1998–99	470	0	0.0	0		0	0.0

Table 115: Species caught by area with numbers of animals captured, dead and necropsied.

	STEW5			SUBA6			PUYS5		
	cap.	dead	nec.	cap.	dead	nec.	cap.	dead	nec.
2006–07									
New Zealand fur seal	11	10	0	-	-	-	1	1	0
2005–06									
New Zealand fur seal	2	2	0	-	-	-	-	-	-
2004–05									
New Zealand fur seal	3	3	0	7	2	0	-	-	-
2001–02									
New Zealand fur seal	1	0	0	-	-	-	-	-	-

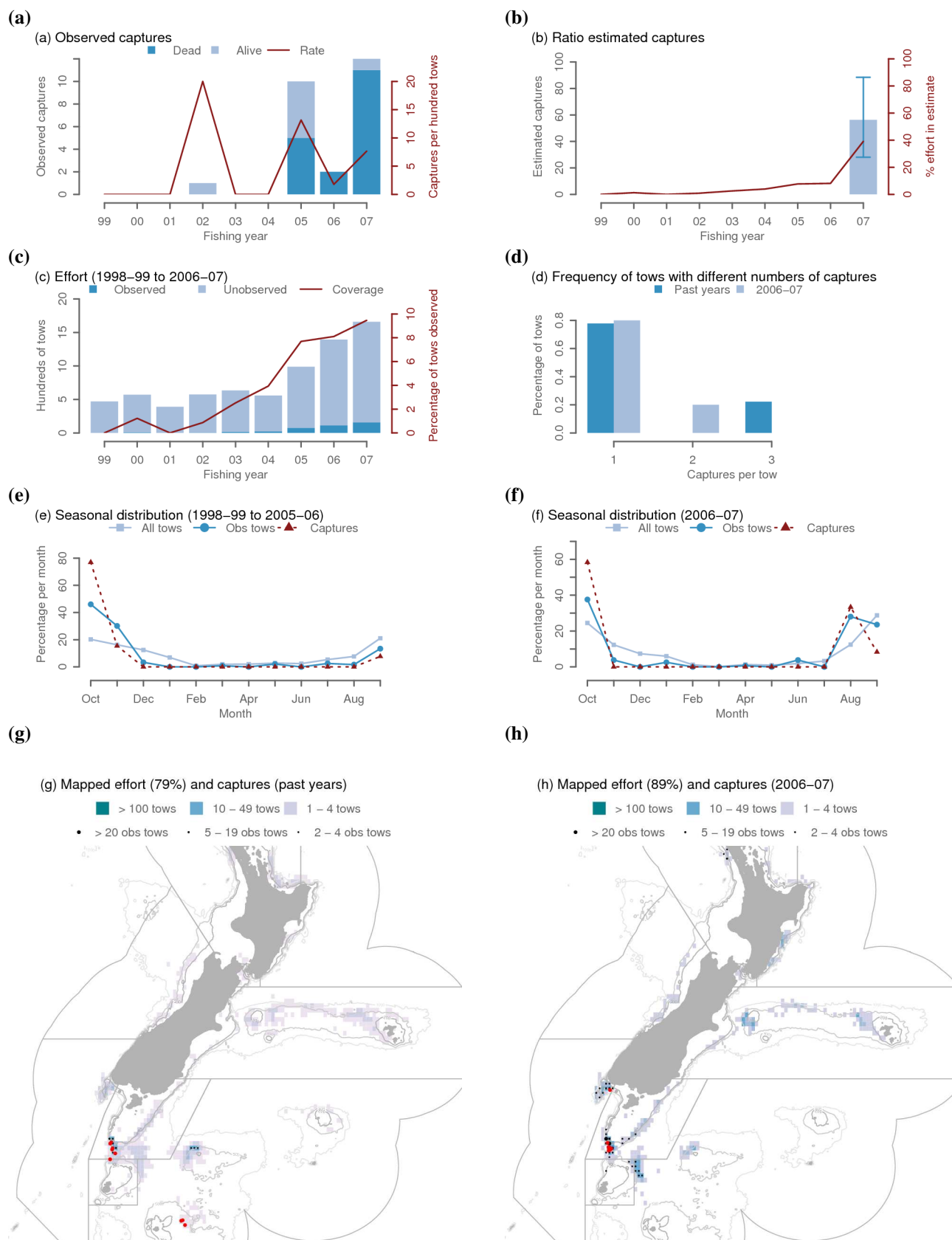


Figure 61: All mammal captures in the ling trawl fishery. (a) Observed captures, (b) Ratio estimated captures, with 95% bootstrap confidence intervals, (c) Effort and observed effort, (d) Histogram of the number of captures per tow, (e, f) Monthly distributions of effort, observations and captures, (g, h) Mapped effort and captures from past years (showing annual averaged effort and observations, but all captures) and from 2006-07.

3.19.9 Deepwater trawl, all birds, New Zealand EEZ

In 2006–07 there was 1 observed capture.

Table 116: Summary by year with 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.

	Tows	No. obs	% obs	Captures	Rate	Estimated captures	% eff. in est.
2006–07	7388	2322	31.4	1	0.04	5 (1 - 13)	79.4
2005–06	8291	1292	15.6	5	0.39	29 (10 - 52)	75.0
2004–05	8409	1618	19.2	19	1.17	79 (35 - 152)	66.6
2003–04	8006	1261	15.8	3	0.24	20 (3 - 42)	78.3
2002–03	8867	1380	15.6	1	0.07	1 (1 - 1)	70.6
2001–02	8220	1377	16.8	6	0.44	32 (14 - 56)	73.5
2000–01	8925	1187	13.3	4	0.34	17 (4 - 33)	57.6
1999–00	12 512	1934	15.5	5	0.26	25 (9 - 48)	86.4
1998–99	13 891	1010	7.3	35	3.47	65 (35 - 126)	57.6

Table 117: Species caught by area with numbers of animals captured, dead and necropsied.

	CHAT4			PUYS5			SUBA6			STEW5		
	c.	d.	n.	c.	d.	n.	c.	d.	n.	c.	d.	n.
2006–07												
Gibson's albatross	1	1	1	-	-	-	-	-	-	-	-	-
2005–06												
Buller's albatross	2	2	2	-	-	-	-	-	-	-	-	-
White-faced storm petrel	1	1	1	-	-	-	-	-	-	-	-	-
Shy albatross	-	-	-	-	-	-	1	0	0	-	-	-
Albatross (unidentified)	1	1	0	-	-	-	-	-	-	-	-	-
2004–05												
Cape pigeon	14	1	0	-	-	-	-	-	-	-	-	-
Seabird large	2	0	0	-	-	-	-	-	-	-	-	-
Salvin's albatross	-	-	-	-	-	-	1	1	1	-	-	-
Grey petrel	1	1	1	-	-	-	-	-	-	-	-	-
Common diving petrel	1	0	0	-	-	-	-	-	-	-	-	-
2003–04												
Salvin's albatross	1	1	1	-	-	-	-	-	-	-	-	-
Grey petrel	1	0	0	-	-	-	-	-	-	-	-	-
Northern royal albatross	1	1	1	-	-	-	-	-	-	-	-	-
2002–03												
Common diving petrel	-	-	-	1	1	1	-	-	-	-	-	-
2001–02												
Albatross (unidentified)	2	1	0	-	-	-	-	-	-	-	-	-
Southern royal albatross	1	1	1	-	-	-	-	-	-	-	-	-
White-capped albatross	-	-	-	1	1	1	-	-	-	-	-	-
White-chinned petrel	1	1	0	-	-	-	-	-	-	-	-	-
Seabird small	-	-	-	-	-	-	-	-	-	1	1	0

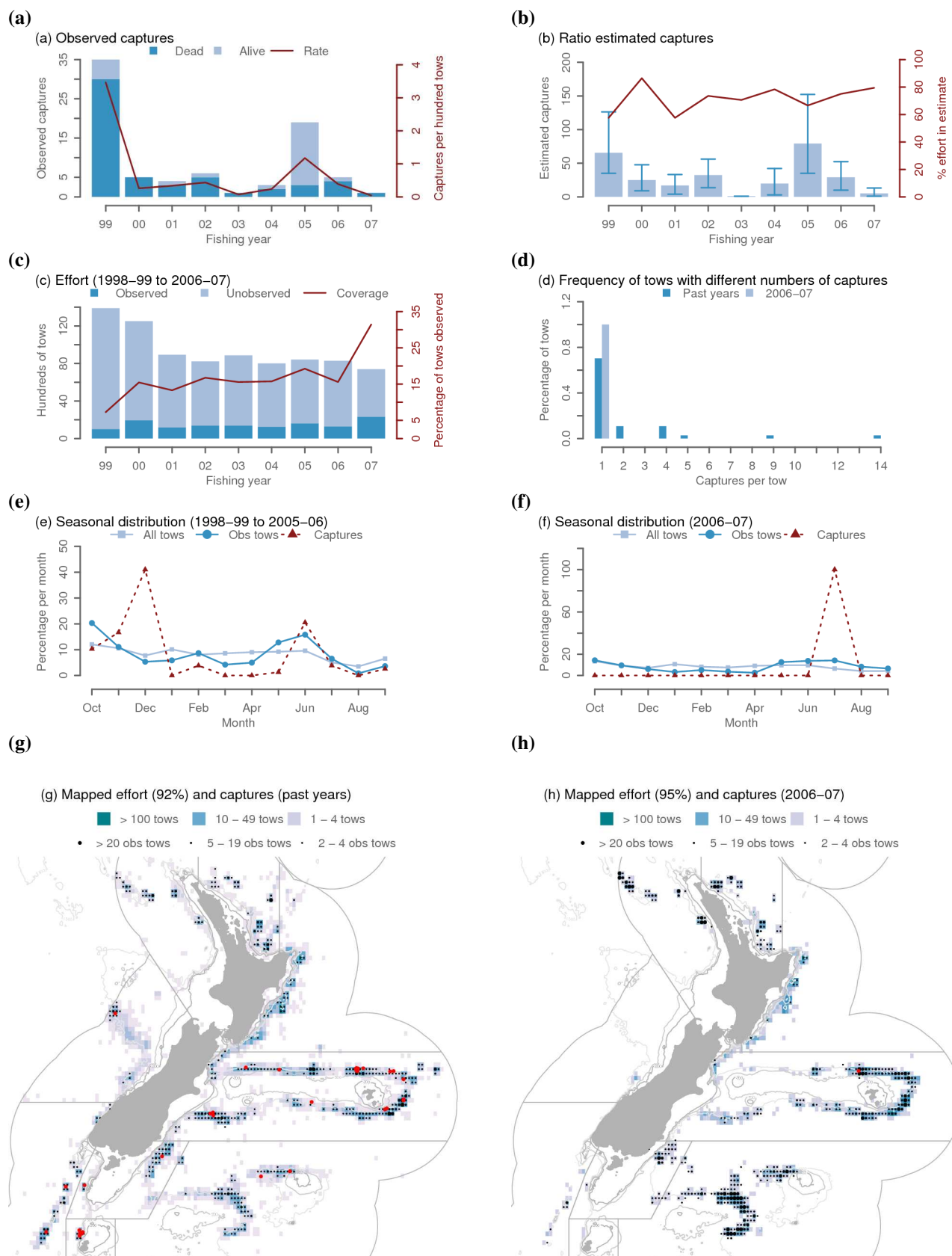


Figure 62: All bird captures in the deepwater trawl fishery. (a) Observed captures, (b) Ratio estimated captures, with 95% bootstrap confidence intervals, (c) Effort and observed effort, (d) Histogram of the number of captures per tow, (e, f) Monthly distributions of effort, observations and captures, (g, h) Mapped effort and captures from past years (showing annual averaged effort and observations, but all captures) and from 2006–07.

3.19.10 Deepwater trawl, all mammals, New Zealand EEZ

In 2006–07 there were 2 observed captures.

Table 118: Summary by year with 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.

	Tows	No. obs	% obs	Captures	Rate	Estimated captures	% eff. in est.
2006–07	7388	2322	31.4	2	0.09	3 (2 - 5)	79.4
2005–06	8291	1292	15.6	2	0.15	10 (2 - 22)	75.0
2004–05	8409	1618	19.2	4	0.25	13 (6 - 22)	66.6
2003–04	8006	1261	15.8	2	0.16	11 (2 - 24)	78.3
2002–03	8867	1380	15.6	0	0.00	0	70.6
2001–02	8220	1377	16.8	0	0.00	0	73.5
2000–01	8925	1187	13.3	1	0.08	4 (1 - 11)	57.6
1999–00	12 512	1934	15.5	0	0.00	0	86.4
1998–99	13 891	1010	7.3	4	0.40	4 (4 - 4)	57.6

Table 119: Species caught by area with numbers of animals captured, dead and necropsied.

	SUBA6			SQUAK6			CHAT4		
	cap.	dead	nec.	cap.	dead	nec.	cap.	dead	nec.
2006–07									
New Zealand fur seal	2	2	0	-	-	-	-	-	-
2005–06									
New Zealand fur seal	2	1	0	-	-	-	-	-	-
2004–05									
New Zealand fur seal	4	1	0	-	-	-	-	-	-
2003–04									
New Zealand fur seal	2	1	0	-	-	-	-	-	-
2000–01									
New Zealand fur seal	-	-	-	-	-	-	1	0	0
1998–99									
New Zealand fur seal	3	3	0	-	-	-	-	-	-
New Zealand sea lion	-	-	-	1	1	0	-	-	-

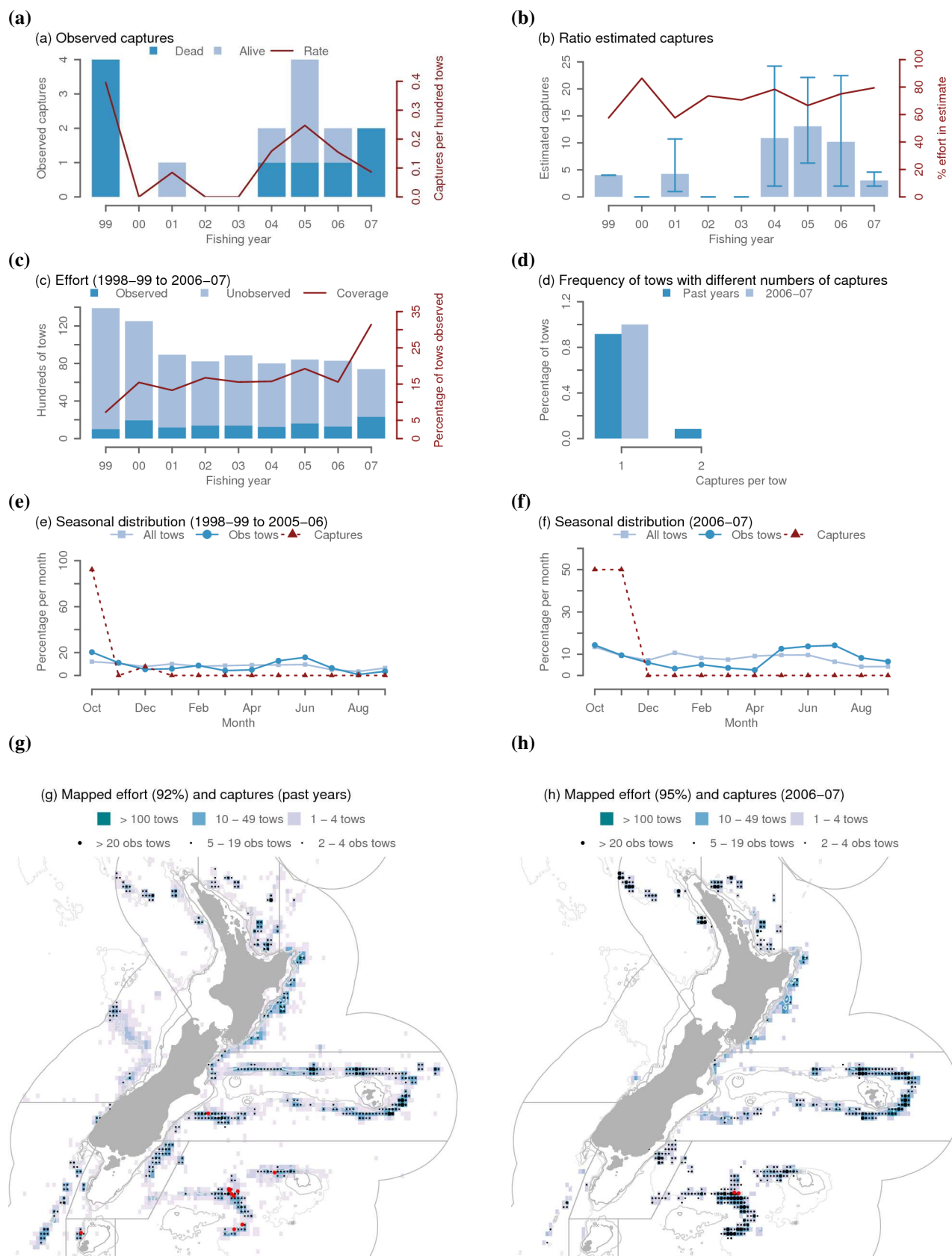


Figure 63: All mammal captures in the deepwater trawl fishery. (a) Observed captures, (b) Ratio estimated captures, with 95% bootstrap confidence intervals, (c) Effort and observed effort, (d) Histogram of the number of captures per tow, (e, f) Monthly distributions of effort, observations and captures, (g, h) Mapped effort and captures from past years (showing annual averaged effort and observations, but all captures) and from 2006–07.

3.19.11 Scampi trawl, all birds, New Zealand EEZ

In 2006–07 there were 25 observed captures.

Table 120: Summary by year with 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.

	Tows	No. obs	% obs	Captures	Rate	Estimated captures	% eff. in est.
2006–07	5138	389	7.6	25	6.43	287 (126 - 504)	87.1
2005–06	4867	331	6.8	13	3.93	93 (19 - 215)	46.5
2004–05	4648	143	3.1	9	6.29	9 (9 - 9)	3.1
2003–04	3753	412	11.0	8	1.94	45 (19 - 75)	56.2
2002–03	5129	512	10.0	8	1.56	55 (23 - 93)	47.7
2001–02	6720	591	8.8	6	1.02	53 (15 - 105)	83.7
2000–01	4980	266	5.3	9	3.38	74 (31 - 128)	37.1
1999–00	4769	421	8.8	8	1.90	24 (8 - 48)	37.9
1998–99	4329	499	11.5	14	2.81	61 (34 - 93)	53.1

Table 121: Species caught by area with numbers of animals captured, dead and necropsied.

	NORTH1			SQUAK6			CHAT4			EAST2		
	c.	d.	n.	c.	d.	n.	c.	d.	n.	c.	d.	n.
2006–07												
Sooty shearwater	1	1	1	13	13	13	-	-	-	-	-	-
Flesh-footed shearwater	6	5	5	-	-	-	-	-	-	-	-	-
White-capped albatross	-	-	-	2	2	2	-	-	-	-	-	-
Northern giant petrel	-	-	-	1	1	1	-	-	-	-	-	-
Petrel (unidentified)	1	1	0	-	-	-	-	-	-	-	-	-
Albatross (unidentified)	-	-	-	-	-	-	1	1	1	-	-	-
2005–06												
Flesh-footed shearwater	8	8	8	-	-	-	-	-	-	-	-	-
Black-browed albatross	1	1	0	-	-	-	-	-	-	-	-	-
Petrel (unidentified)	1	1	0	-	-	-	-	-	-	-	-	-
Buller's albatross	-	-	-	-	-	-	1	1	1	-	-	-
White-capped albatross	-	-	-	1	0	0	-	-	-	-	-	-
Albatross (unidentified)	1	1	1	-	-	-	-	-	-	-	-	-
2004–05												
Salvin's albatross	-	-	-	-	-	-	3	1	1	1	1	1
Buller's albatross	-	-	-	-	-	-	2	2	2	-	-	-
White-capped albatross	-	-	-	-	-	-	1	1	1	-	-	-
Chatham albatross	-	-	-	-	-	-	1	1	1	-	-	-
White-chinned petrel	-	-	-	-	-	-	1	1	1	-	-	-

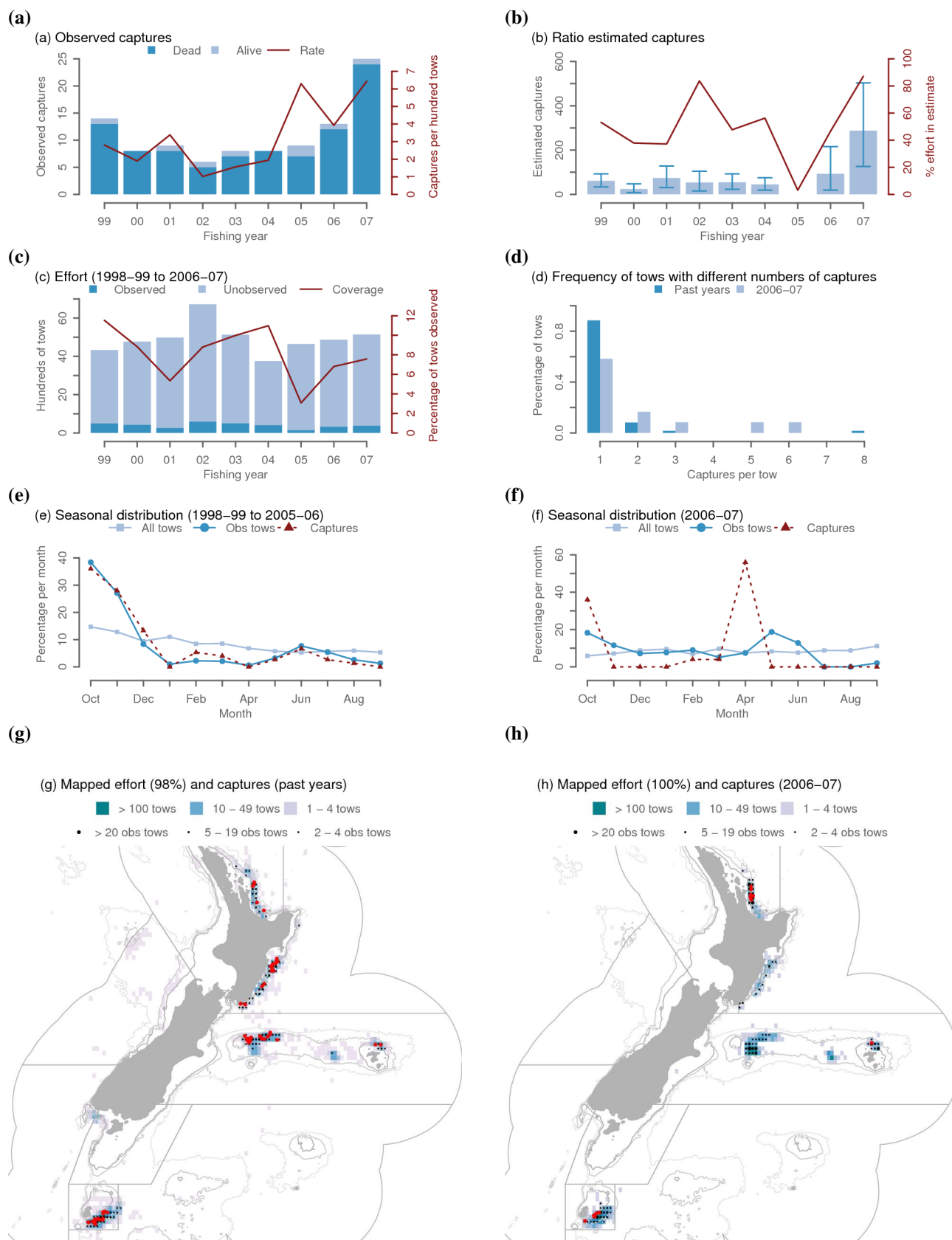


Figure 64: All bird captures in the scampi trawl fishery. (a) Observed captures, (b) Ratio estimated captures, with 95% bootstrap confidence intervals, (c) Effort and observed effort, (d) Histogram of the number of captures per tow, (e, f) Monthly distributions of effort, observations and captures, (g, h) Mapped effort and captures from past years (showing annual averaged effort and observations, but all captures) and from 2006-07.

3.19.12 Scampi trawl, all mammals, New Zealand EEZ

In 2006–07 there was 1 observed capture.

Table 122: Summary by year with 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.

	Tows	No. obs	% obs	Captures	Rate	Estimated captures	% eff. in est.
2006–07	5138	389	7.6	1	0.26	13 (1 - 38)	87.1
2005–06	4867	331	6.8	1	0.30	11 (1 - 32)	46.5
2004–05	4648	143	3.1	0	0.00	0	3.1
2003–04	3753	412	11.0	4	0.97	32 (11 - 61)	56.2
2002–03	5129	512	10.0	3	0.59	15 (3 - 36)	47.7
2001–02	6720	591	8.8	3	0.51	30 (3 - 71)	83.7
2000–01	4980	266	5.3	5	1.88	5 (5 - 5)	37.1
1999–00	4769	421	8.8	0	0.00	0	37.9
1998–99	4329	499	11.5	2	0.40	13 (2 - 30)	53.1

Table 123: Species caught by area with numbers of animals captured, dead and necropsied.

	SQUAK6			CHAT4			EAST2			COOK8		
	c.	d.	n.	c.	d.	n.	c.	d.	n.	c.	d.	n.
2006–07												
New Zealand sea lion	1	1	1	-	-	-	-	-	-	-	-	-
2005–06												
New Zealand sea lion	1	1	0	-	-	-	-	-	-	-	-	-
2003–04												
New Zealand sea lion	3	3	0	-	-	-	-	-	-	-	-	-
New Zealand fur seal	1	0	0	-	-	-	-	-	-	-	-	-
2002–03												
New Zealand fur seal	-	-	-	2	2	0	-	-	-	-	-	-
Elephant seal	1	1	1	-	-	-	-	-	-	-	-	-
2001–02												
New Zealand fur seal	-	-	-	-	-	-	2	2	0	1	1	0
2000–01												
New Zealand sea lion	4	2	2	-	-	-	-	-	-	-	-	-
New Zealand fur seal	-	-	-	1	0	0	-	-	-	-	-	-
1998–99												
New Zealand fur seal	-	-	-	2	2	0	-	-	-	-	-	-

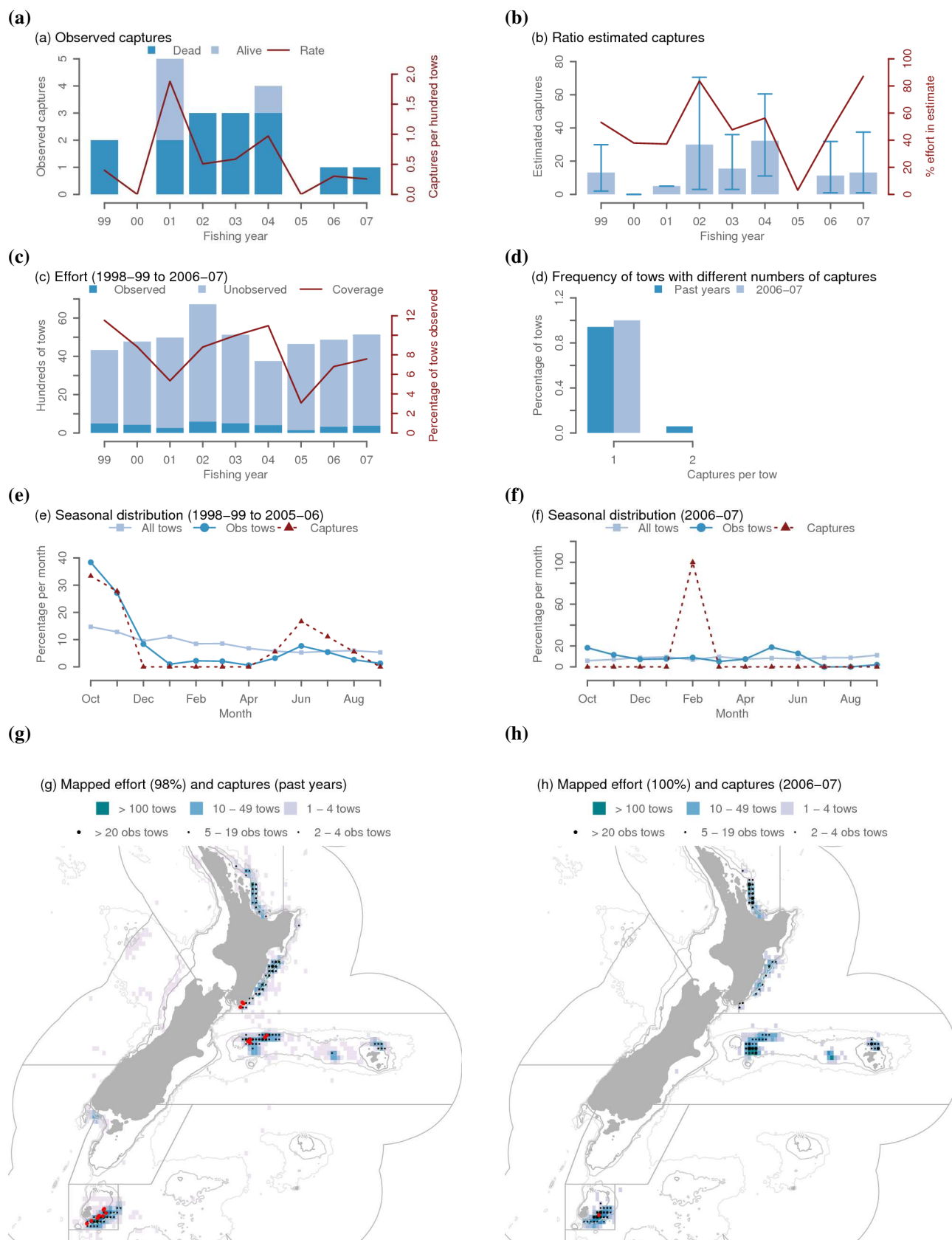


Figure 65: All mammal captures in the scampi trawl fishery. (a) Observed captures, (b) Ratio estimated captures, with 95% bootstrap confidence intervals, (c) Effort and observed effort, (d) Histogram of the number of captures per tow, (e, f) Monthly distributions of effort, observations and captures, (g, h) Mapped effort and captures from past years (showing annual averaged effort and observations, but all captures) and from 2006–07.

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

In 2006–07 there were 3 observed captures.

Table 124: Summary by year with 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.

	Tows	No. obs	% obs	Captures	Rate	Estimated captures	% eff. in est.
2006–07	632	224	35.4	3	1.34	8 (3 - 18)	100.0
2005–06	624	217	34.8	2	0.92	6 (2 - 11)	100.0
2004–05	870	335	38.5	2	0.60	5 (2 - 10)	99.9
2003–04	740	241	32.6	0	0.00	0	100.0
2002–03	638	275	43.1	0	0.00	0	100.0
2001–02	1160	334	28.8	0	0.00	0	98.1
2000–01	664	388	58.4	3	0.77	5 (3 - 8)	99.8
1999–00	693	314	45.3	2	0.64	4 (2 - 8)	100.0
1998–99	1251	341	27.3	1	0.29	4 (1 - 9)	98.8

Table 125: Capture events with details of species, number caught, area code, observer identification and necropsy identification (where available).

Date	Species	#	Area	Obs.	Aut.
24/09/2007	Seabird large	1	SUBA6	XSL	
17/08/2007	Grey petrel (<i>Procellaria cinerea</i>)	2	SUBA6	XGP	XGP
27/08/2006	Grey petrel (<i>Procellaria cinerea</i>)	1	SUBA6	XGP	
17/08/2006	Grey petrel (<i>Procellaria cinerea</i>)	1	SUBA6	XGP	XGP
01/09/2005	Cape pigeon (<i>Daption spp.</i>)	1	SUBA6	XCP	
20/08/2005	Grey petrel (<i>Procellaria cinerea</i>)	1	SUBA6	XGP	XGP
03/09/2001	Southern cape pigeon (<i>Daption capense</i>)	1	SUBA6	XCP	XCC
29/08/2001	Salvin's albatross (<i>Thalassarche salvini</i>)	1	SUBA6	XSA	XSA
24/08/2001	Grey petrel (<i>Procellaria cinerea</i>)	1	SUBA6	XPE	XGP
29/09/2000	Grey petrel (<i>Procellaria cinerea</i>)	1	SUBA6	XGP	XGP
24/09/2000	Grey petrel (<i>Procellaria cinerea</i>)	1	SUBA6	XGP	XGP
30/08/1999	Salvin's albatross (<i>Thalassarche salvini</i>)	1	SUBA6	XSA	

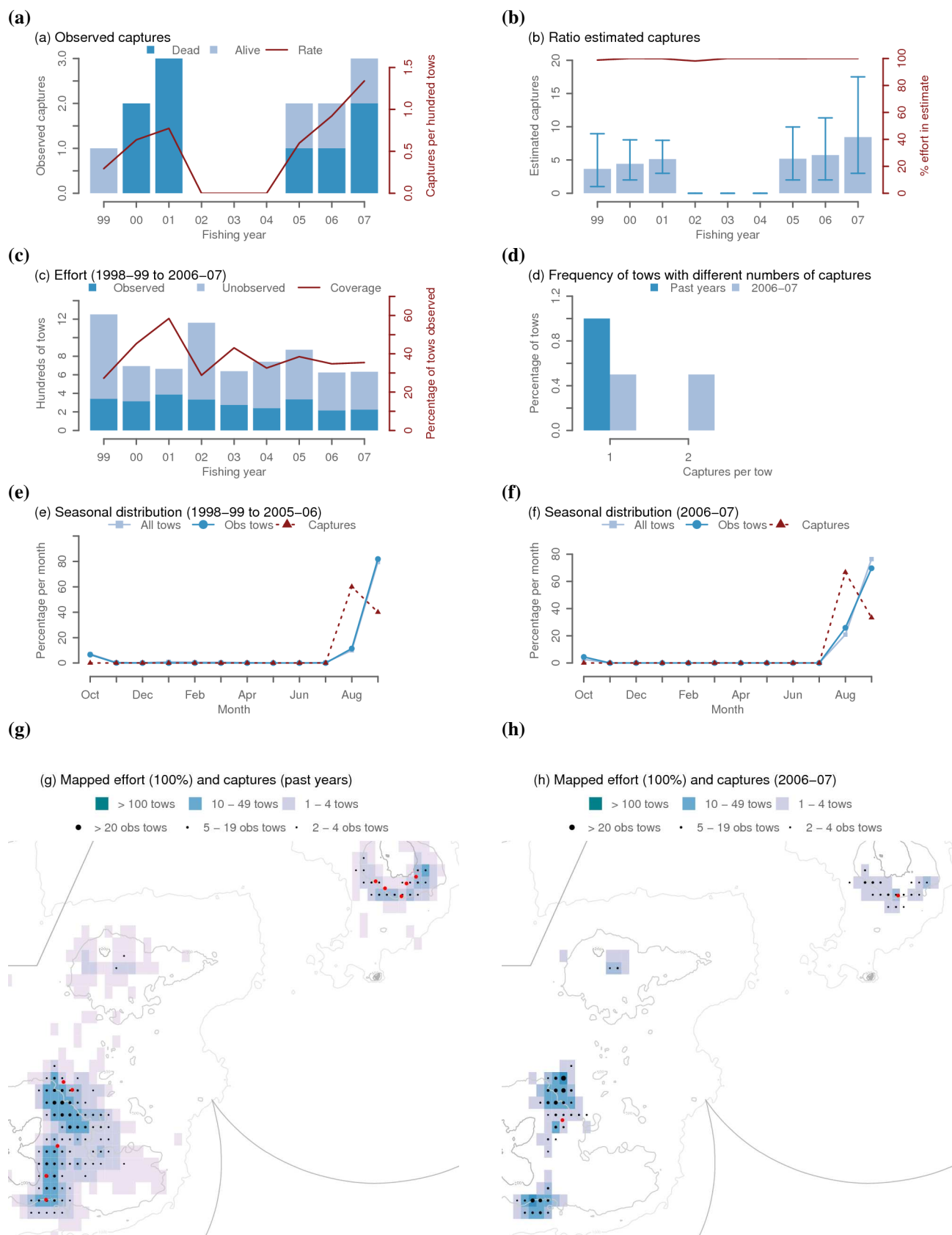


Figure 66: All bird captures in the southern blue whiting trawl fishery. (a) Observed captures, (b) Ratio estimated captures, with 95% bootstrap confidence intervals, (c) Effort and observed effort, (d) Histogram of the number of captures per tow, (e, f) Monthly distributions of effort, observations and captures, (g, h) Mapped effort and captures from past years (showing annual averaged effort and observations, but all captures) and from 2006–07.

3.19.14 Southern blue whiting trawl, all mammals, New Zealand EEZ

In 2006–07 there were 16 observed captures.

Table 126: Summary by year with 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.

	Tows	No. obs	% obs	Captures	Rate	Estimated captures	% eff. in est.
2006–07	632	224	35.4	16	7.14	45 (31 - 61)	100.0
2005–06	624	217	34.8	55	25.35	158 (105 - 225)	100.0
2004–05	870	335	38.5	36	10.75	93 (68 - 122)	99.9
2003–04	740	241	32.6	14	5.81	43 (18 - 84)	100.0
2002–03	638	275	43.1	8	2.91	19 (12 - 26)	100.0
2001–02	1160	334	28.8	14	4.19	48 (31 - 67)	98.1
2000–01	664	388	58.4	58	14.95	99 (75 - 134)	99.8
1999–00	693	314	45.3	85	27.07	188 (139 - 256)	100.0
1998–99	1251	341	27.3	42	12.32	153 (108 - 206)	98.8

Table 127: Species caught by area with numbers of animals captured, dead and necropsied.

	SUBA6		
	captured	dead	necropsied
2006–07			
New Zealand fur seal	13	13	0
New Zealand sea lion	3	3	0
2005–06			
New Zealand fur seal	52	52	0
New Zealand sea lion	3	3	0
2004–05			
New Zealand fur seal	33	32	0
New Zealand sea lion	2	2	0
Leopard seal	1	1	0
2003–04			
New Zealand fur seal	13	12	0
New Zealand sea lion	1	1	0
2002–03			
New Zealand fur seal	8	7	0
2001–02			
New Zealand fur seal	13	13	0
New Zealand sea lion	1	1	0
2000–01			
New Zealand fur seal	58	58	0
1999–00			
New Zealand fur seal	85	85	2
1998–99			
New Zealand fur seal	42	42	0

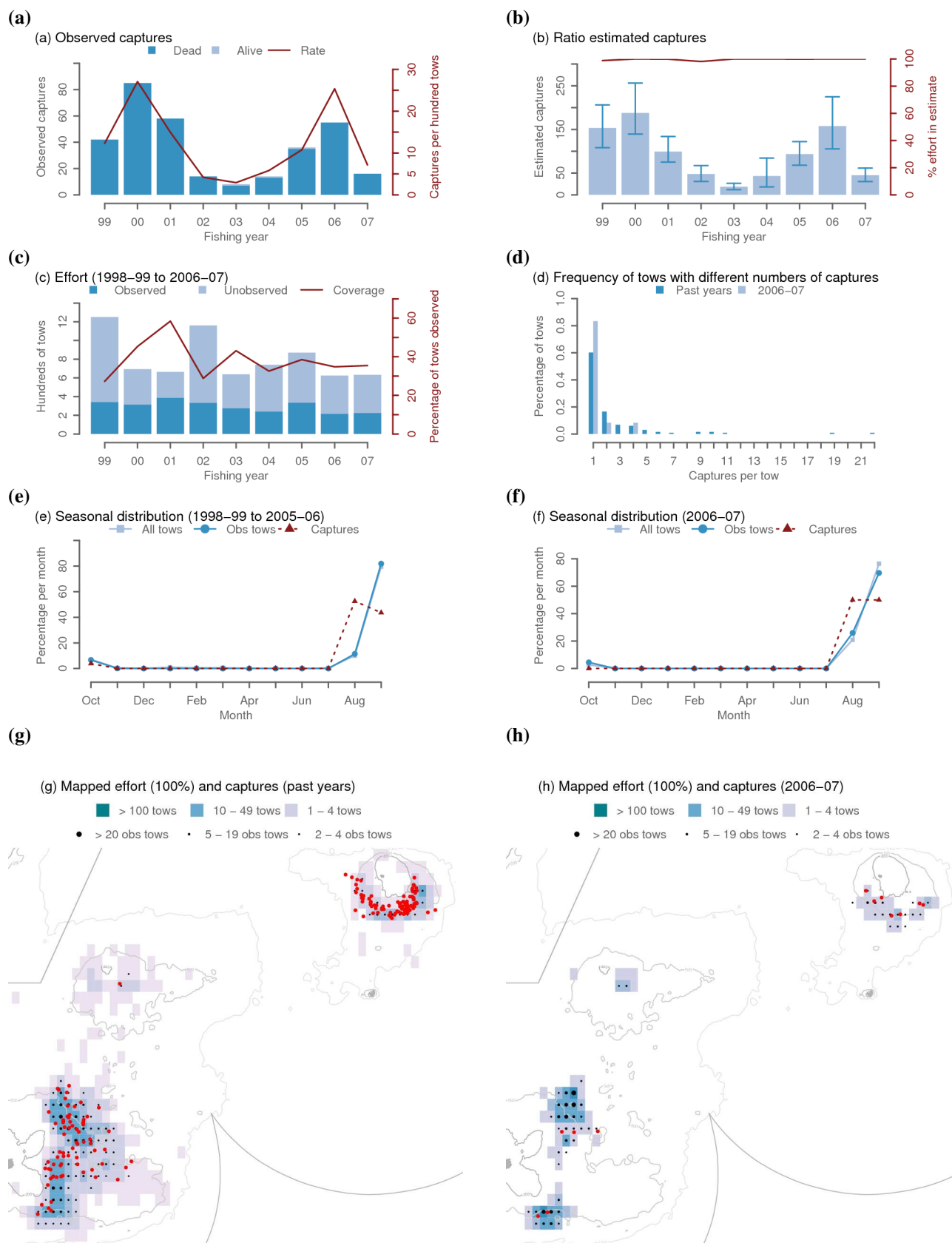


Figure 67: All mammal captures in the southern blue whiting trawl fishery. (a) Observed captures, (b) Ratio estimated captures, with 95% bootstrap confidence intervals, (c) Effort and observed effort, (d) Histogram of the number of captures per tow, (e, f) Monthly distributions of effort, observations and captures, (g, h) Mapped effort and captures from past years (showing annual averaged effort and observations, but all captures) and from 2006–07.

3.19.15 Pelagic trawl, all birds, New Zealand EEZ

In 2006–07 there was 1 observed capture.

Table 128: Summary by year with 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.

	Tows	No. obs	% obs	Captures	Rate	Estimated captures	% eff. in est.
2006–07	2711	802	29.6	1	0.12	2 (1 - 5)	95.4
2005–06	2808	709	25.2	0	0.00	0	76.6
2004–05	2509	558	22.2	8	1.43	32 (15 - 57)	95.1
2003–04	2383	152	6.4	0	0.00	0	95.1
2002–03	3067	346	11.3	4	1.16	4 (4 - 4)	78.8
2001–02	3002	351	11.7	9	2.56	24 (14 - 36)	78.2
2000–01	1941	404	20.8	9	2.23	11 (10 - 13)	73.9
1999–00	2290	516	22.5	9	1.74	22 (15 - 31)	47.6
1998–99	3866	627	16.2	5	0.80	26 (10 - 47)	88.5

Table 129: Species caught by area with numbers of animals captured, dead and necropsied.

	STEW5			WCNI9			CHAT4			WCSI7		
	c.	d.	n.	c.	d.	n.	c.	d.	n.	c.	d.	n.
2006–07												
Common diving petrel	-	-	-	-	-	-	-	-	-	1	0	0
2004–05												
Cape pigeon	-	-	-	1	0	0	-	-	-	1	0	0
Fairy prion	-	-	-	2	2	2	-	-	-	-	-	-
Prion (unidentified)	-	-	-	1	1	0	-	-	-	-	-	-
Petrel (unidentified)	-	-	-	1	0	0	-	-	-	-	-	-
Sooty shearwater	-	-	-	1	0	0	-	-	-	-	-	-
Seabird large	-	-	-	1	1	0	-	-	-	-	-	-
2002–03												
Sooty shearwater	3	3	3	-	-	-	-	-	-	-	-	-
White-chinned petrel	1	1	1	-	-	-	-	-	-	-	-	-
2001–02												
Sooty shearwater	4	4	4	-	-	-	2	2	2	-	-	-
Buller's albatross	1	1	1	-	-	-	1	1	1	-	-	-
White-capped albatross	1	1	0	-	-	-	-	-	-	-	-	-
2000–01												
White-capped albatross	7	7	7	-	-	-	-	-	-	-	-	-
Sooty shearwater	1	1	1	-	-	-	-	-	-	-	-	-
White-chinned petrel	1	1	1	-	-	-	-	-	-	-	-	-
1999–00												
White-capped albatross	5	3	3	-	-	-	-	-	-	-	-	-
Campbell albatross	2	1	0	-	-	-	-	-	-	-	-	-
Sooty shearwater	1	1	1	-	-	-	-	-	-	-	-	-
Salvin's albatross	1	1	1	-	-	-	-	-	-	-	-	-

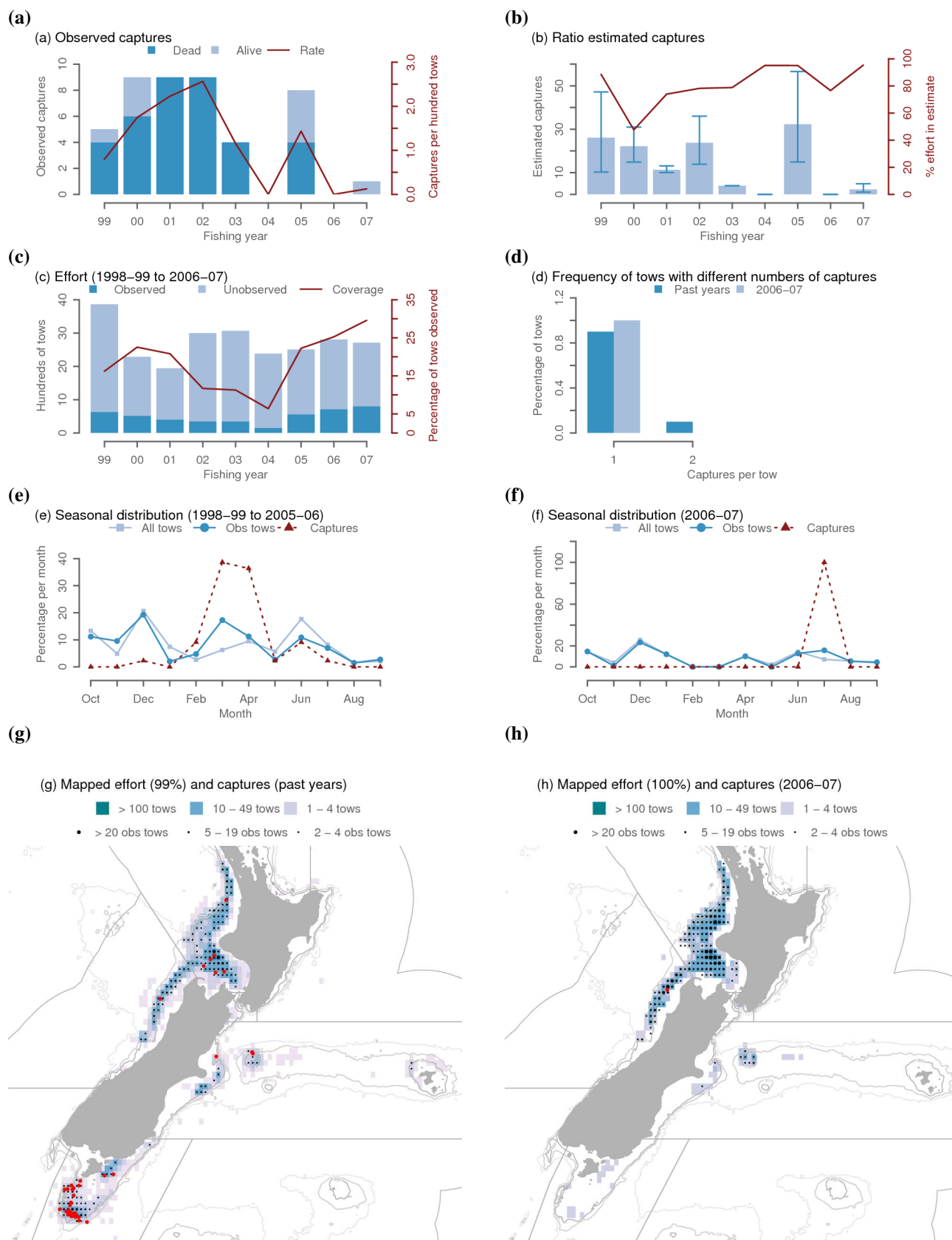


Figure 68: All bird captures in the pelagic trawl fishery. (a) Observed captures, (b) Ratio estimated captures, with 95% bootstrap confidence intervals, (c) Effort and observed effort, (d) Histogram of the number of captures per tow, (e, f) Monthly distributions of effort, observations and captures, (g, h) Mapped effort and captures from past years (showing annual averaged effort and observations, but all captures) and from 2006-07.

3.19.16 Pelagic trawl, all mammals, New Zealand EEZ

In 2006–07 there were 13 observed captures.

Table 130: Summary by year with 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.

	Tows	No. obs	% obs	Captures	Rate	Estimated captures	% eff. in est.
2006–07	2711	802	29.6	13	1.62	45 (21 - 78)	95.4
2005–06	2808	709	25.2	9	1.27	22 (11 - 38)	76.6
2004–05	2509	558	22.2	32	5.73	143 (88 - 213)	95.1
2003–04	2383	152	6.4	19	12.50	276 (94 - 548)	95.1
2002–03	3067	346	11.3	22	6.36	214 (59 - 416)	78.8
2001–02	3002	351	11.7	6	1.71	24 (6 - 57)	78.2
2000–01	1941	404	20.8	6	1.49	14 (6 - 29)	73.9
1999–00	2290	516	22.5	10	1.94	16 (11 - 22)	47.6
1998–99	3866	627	16.2	19	3.03	75 (41 - 119)	88.5

Table 131: Species caught by area with numbers of animals captured, dead and necropsied.

	WCNI9			WCSI7			CHAT4			STEW5		
	c.	d.	n.	c.	d.	n.	c.	d.	n.	c.	d.	n.
2006–07												
Common dolphin	11	11	0	-	-	-	-	-	-	-	-	-
New Zealand fur seal	1	1	0	1	1	0	-	-	-	-	-	-
2005–06												
New Zealand fur seal	4	4	0	-	-	-	2	1	0	-	-	-
Common dolphin	2	2	0	-	-	-	-	-	-	-	-	-
Dusky dolphin	-	-	-	-	-	-	1	1	0	-	-	-
2004–05												
Common dolphin	20	20	0	-	-	-	-	-	-	-	-	-
Porpoise	6	6	0	-	-	-	-	-	-	-	-	-
New Zealand fur seal	5	5	0	-	-	-	-	-	-	-	-	-
Bottlenose dolphin	1	1	0	-	-	-	-	-	-	-	-	-
2003–04												
Common dolphin	17	17	0	-	-	-	-	-	-	-	-	-
New Zealand fur seal	-	-	-	2	2	0	-	-	-	-	-	-
2002–03												
Common dolphin	20	20	3	-	-	-	-	-	-	-	-	-
Porpoise	1	1	0	-	-	-	-	-	-	-	-	-
New Zealand fur seal	-	-	-	-	-	-	1	1	0	-	-	-
2001–02												
New Zealand fur seal	-	-	-	-	-	-	4	4	0	1	1	0
Common dolphin	1	1	1	-	-	-	-	-	-	-	-	-
2000–01												
New Zealand fur seal	-	-	-	5	5	0	-	-	-	-	-	-
Common dolphin	1	1	1	-	-	-	-	-	-	-	-	-

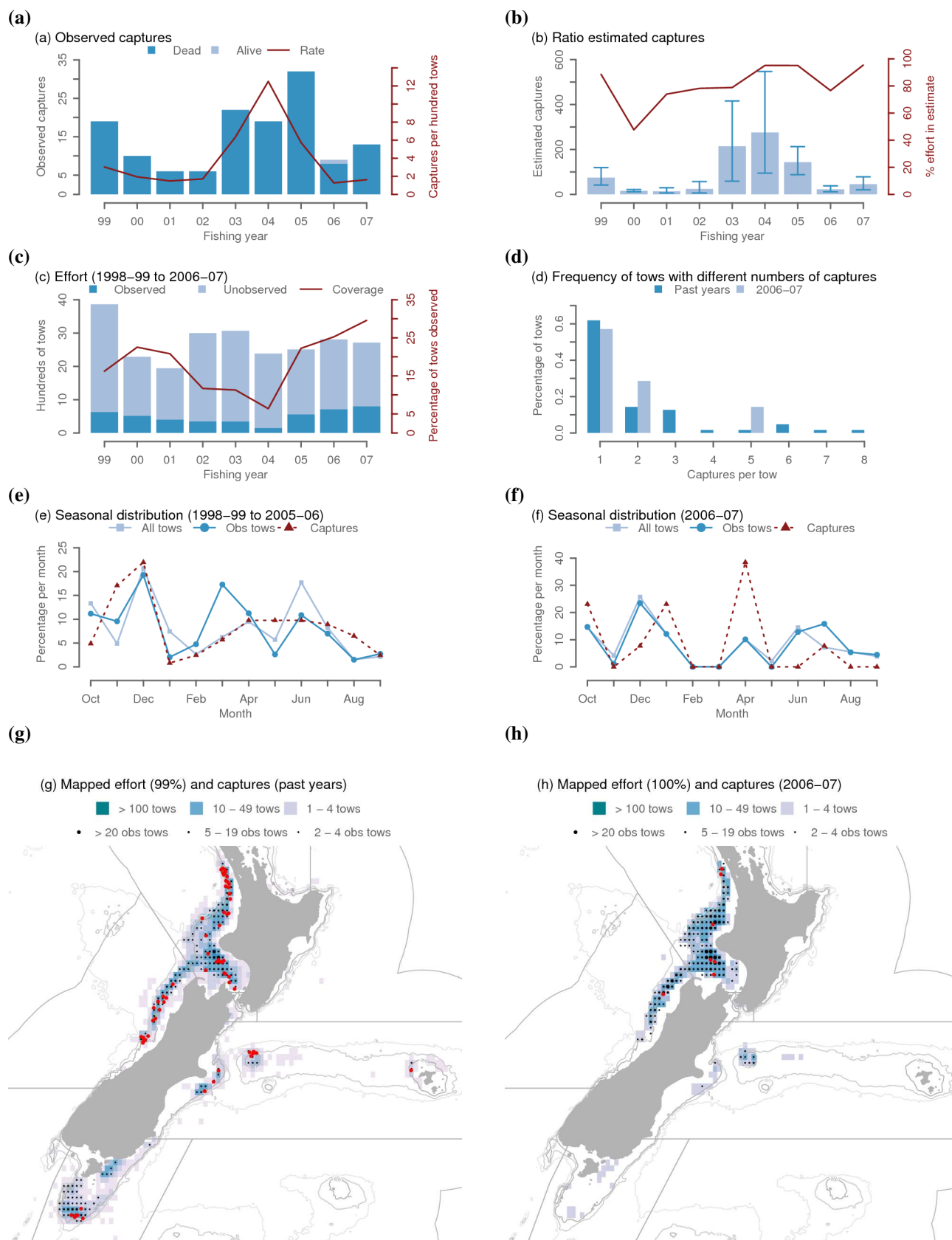


Figure 69: All mammal captures in the pelagic trawl fishery. (a) Observed captures, (b) Ratio estimated captures, with 95% bootstrap confidence intervals, (c) Effort and observed effort, (d) Histogram of the number of captures per tow, (e, f) Monthly distributions of effort, observations and captures, (g, h) Mapped effort and captures from past years (showing annual averaged effort and observations, but all captures) and from 2006–07.

3.19.17 Inshore trawl, all birds, New Zealand EEZ

In 2006–07 there were 10 observed captures.

Table 132: Summary by year with 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.

	Tows	No. obs	% obs	Captures	Rate	Estimated captures	% eff. in est.
2006–07	59 538	292	0.5	10	3.42	243 (10 - 554)	16.4
2005–06	62 056	103	0.2	3	2.91	3 (3 - 3)	0.2
2004–05	67 295	18	0.0	0	0.00	0	0.0
2003–04	63 788	8	0.0	0	0.00	0	0.0
2002–03	63 544	9	0.0	0	0.00	0	0.0
2001–02	61 456	28	0.0	0	0.00	0	0.0
2000–01	64 194	48	0.1	2	4.17	2 (2 - 2)	0.1
1999–00	66 546	29	0.0	0	0.00	0	0.0
1998–99	77 822	17	0.0	0	0.00	0	0.0

Table 133: Species caught by area with numbers of animals captured, dead and necropsied.

	CHAT4			WCSI7			EAST2			NORTH1		
	c.	d.	n.	c.	d.	n.	c.	d.	n.	c.	d.	n.
2006–07												
White-capped albatross	1	1	0	4	4	4	-	-	-	-	-	-
Seabird small	-	-	-	-	-	-	-	-	-	1	0	0
Black petrel	-	-	-	-	-	-	-	-	-	1	1	1
Salvin's albatross	1	1	0	-	-	-	-	-	-	-	-	-
Albatross (unidentified)	1	1	0	-	-	-	-	-	-	-	-	-
Flesh-footed shearwater	-	-	-	-	-	-	-	-	-	1	1	1
2005–06												
White-capped albatross	-	-	-	-	-	-	2	2	0	-	-	-
Seabird large	-	-	-	-	-	-	1	1	0	-	-	-
2000–01												
Salvin's albatross	1	1	1	-	-	-	-	-	-	-	-	-
Albatross (unidentified)	1	1	0	-	-	-	-	-	-	-	-	-

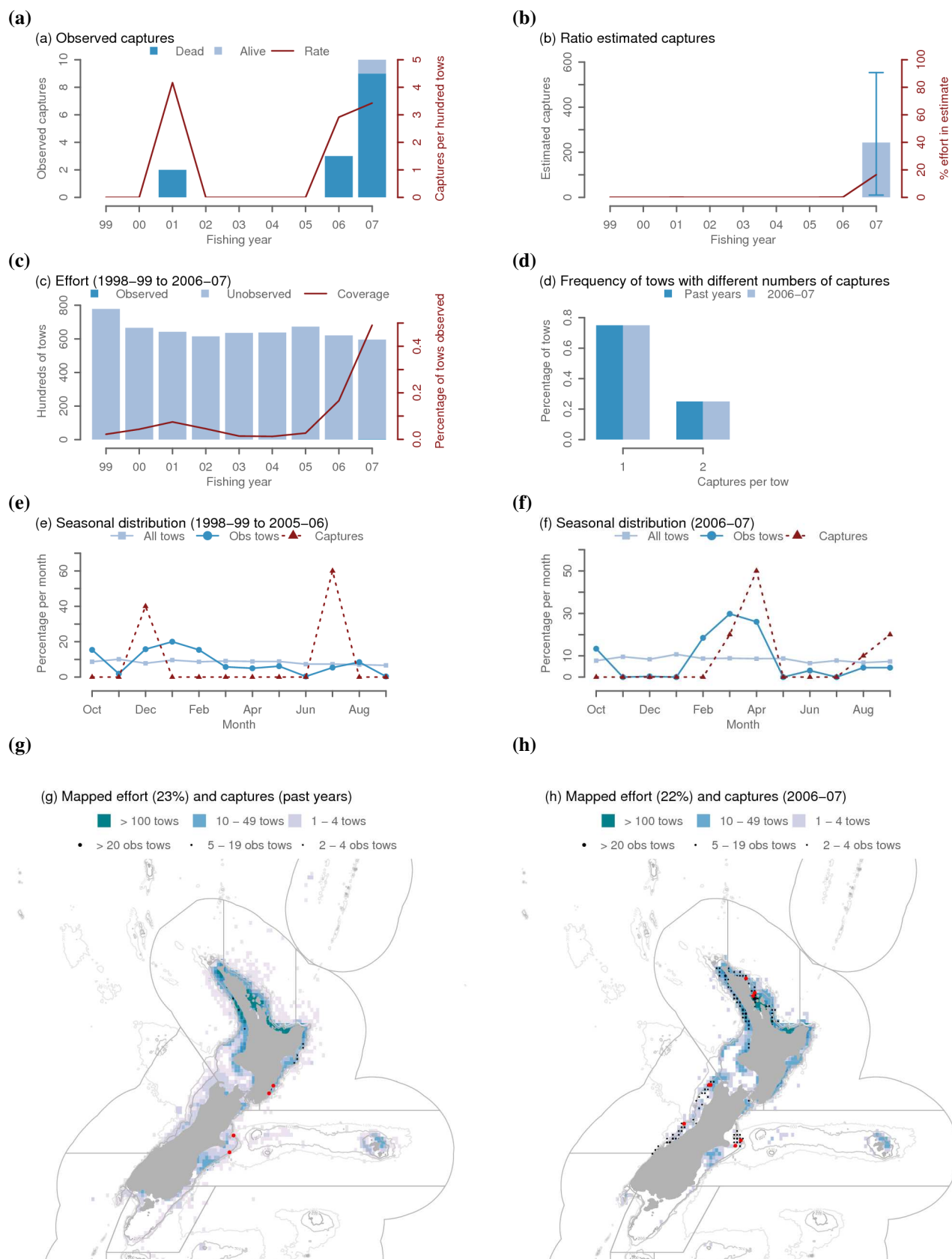


Figure 70: All bird captures in the inshore trawl fishery. (a) Observed captures, (b) Ratio estimated captures, with 95% bootstrap confidence intervals, (c) Effort and observed effort, (d) Histogram of the number of captures per tow, (e, f) Monthly distributions of effort, observations and captures, (g, h) Mapped effort and captures from past years (showing annual averaged effort and observations, but all captures) and from 2006-07.

3.19.18 Inshore trawl, all mammals, New Zealand EEZ

In 2006–07 there were no observed captures.

Table 134: Summary by year with 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.

	Tows	No. obs	% obs	Captures	Rate	Estimated captures	% eff. in est.
2006–07	59 538	292	0.5	0	0.00	0	16.4
2005–06	62 056	103	0.2	2	1.94	2 (2 - 2)	0.2
2004–05	67 295	18	0.0	0	0.00	0	0.0
2003–04	63 788	8	0.0	0	0.00	0	0.0
2002–03	63 544	9	0.0	0	0.00	0	0.0
2001–02	61 456	28	0.0	0	0.00	0	0.0
2000–01	64 194	48	0.1	0	0.00	0	0.1
1999–00	66 546	29	0.0	0	0.00	0	0.0
1998–99	77 822	17	0.0	0	0.00	0	0.0

Table 135: Capture events with details of species, number caught, area code, observer identification and necropsy identification (where available).

Date	Species	#	Area	Obs.	Aut.
16/12/2005	Common dolphin (<i>Delphinus delphis</i>)	2	WCNI9	CDD	

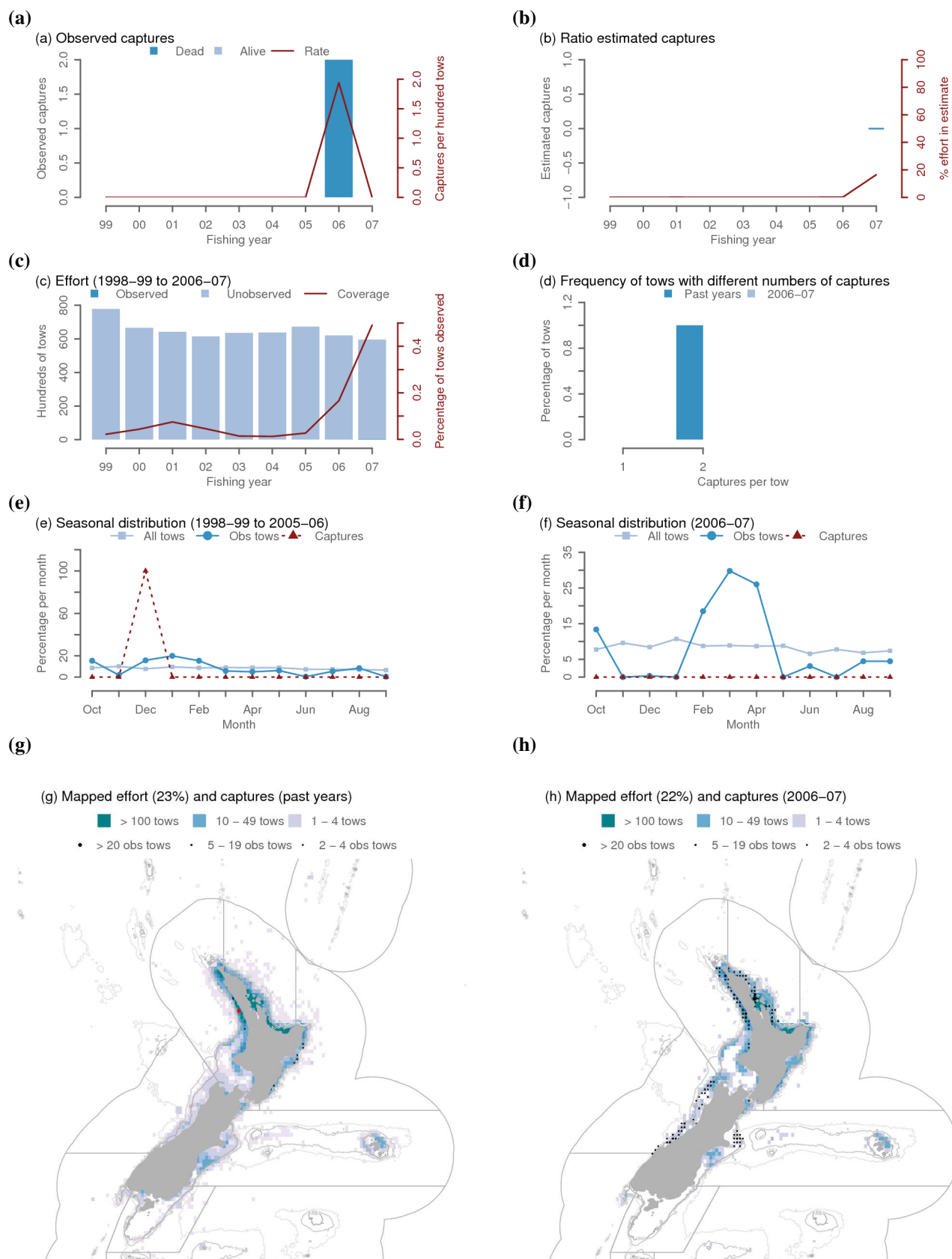


Figure 71: All mammal captures in the inshore trawl fishery. (a) Observed captures, (b) Ratio estimated captures, with 95% bootstrap confidence intervals, (c) Effort and observed effort, (d) Histogram of the number of captures per tow, (e, f) Monthly distributions of effort, observations and captures, (g, h) Mapped effort and captures from past years (showing annual averaged effort and observations, but all captures) and from 2006–07.

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

In 2006–07 there were 12 observed captures.

Table 136: Summary by year with 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.

	Tows	No. obs	% obs	Captures	Rate	Estimated captures	% eff. in est.
2006–07	8194	393	4.8	12	3.05	137 (59 - 239)	50.1
2005–06	8410	488	5.8	73	14.96	190 (145 - 239)	16.3
2004–05	9192	223	2.4	4	1.79	4 (4 - 4)	2.4
2003–04	9185	194	2.1	8	4.12	8 (8 - 8)	2.1
2002–03	11 181	348	3.1	13	3.74	49 (19 - 86)	10.6
2001–02	11 217	259	2.3	22	8.49	102 (47 - 181)	7.6
2000–01	12 262	236	1.9	21	8.90	21 (21 - 21)	1.9
1999–00	12 482	201	1.6	3	1.49	3 (3 - 3)	1.6
1998–99	11 023	187	1.7	13	6.95	13 (13 - 13)	1.7

Table 137: Species caught by area with numbers of animals captured, dead and necropsied.

	STEW5			CHAT4			PUYS5		
	cap.	dead	nec.	cap.	dead	nec.	cap.	dead	nec.
2006–07									
White-capped albatross	2	1	1	1	1	1	1	1	1
Sooty shearwater	3	3	3	-	-	-	-	-	-
Buller's albatross	-	-	-	1	1	1	1	1	1
White-chinned petrel	2	2	2	-	-	-	-	-	-
Salvin's albatross	-	-	-	1	1	1	-	-	-
2005–06									
Sooty shearwater	16	12	10	37	36	36	-	-	-
White-capped albatross	14	13	12	-	-	-	-	-	-
White-chinned petrel	2	2	2	-	-	-	-	-	-
Prion (unidentified)	1	0	0	-	-	-	-	-	-
Shy albatross	1	1	0	-	-	-	-	-	-
Petrel (unidentified)	1	0	0	-	-	-	-	-	-
Albatross (unidentified)	1	1	0	-	-	-	-	-	-
2004–05									
White-capped albatross	1	1	1	-	-	-	1	1	1
Buller's albatross	1	1	1	-	-	-	-	-	-
Sooty shearwater	1	1	1	-	-	-	-	-	-
2003–04									
Sooty shearwater	5	5	5	-	-	-	2	2	0
White-capped albatross	1	1	0	-	-	-	-	-	-
2002–03									
Sooty shearwater	3	0	0	6	0	0	-	-	-
White-capped albatross	2	2	2	-	-	-	-	-	-
Northern giant petrel	-	-	-	1	1	1	-	-	-
White-chinned petrel	1	1	1	-	-	-	-	-	-

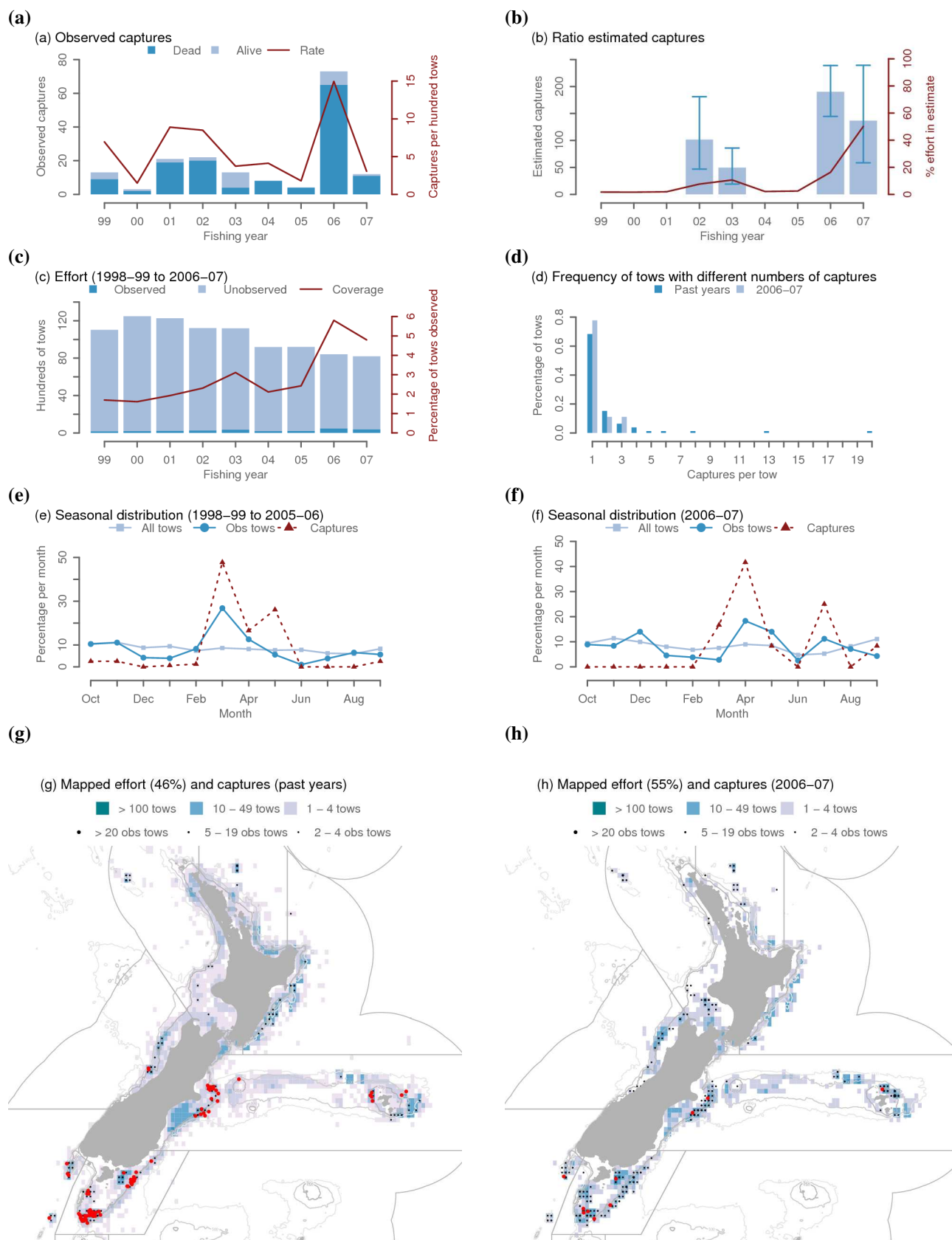


Figure 72: All bird captures in other middle depth trawl fisheries. (a) Observed captures, (b) Ratio estimated captures, with 95% bootstrap confidence intervals, (c) Effort and observed effort, (d) Histogram of the number of captures per tow, (e, f) Monthly distributions of effort, observations and captures, (g, h) Mapped effort and captures from past years (showing annual averaged effort and observations, but all captures) and from 2006–07.

3.19.20 Other middle depth trawl, all mammals, New Zealand EEZ

In 2006–07 there were 2 observed captures.

Table 138: Summary by year with 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.

	Tows	No. obs	% obs	Captures	Rate	Estimated captures	% eff. in est.
2006–07	8194	393	4.8	2	0.51	17 (2 - 40)	50.1
2005–06	8410	488	5.8	5	1.02	12 (5 - 21)	16.3
2004–05	9192	223	2.4	11	4.93	11 (11 - 11)	2.4
2003–04	9185	194	2.1	0	0.00	0	2.1
2002–03	11 181	348	3.1	1	0.29	7 (1 - 19)	10.6
2001–02	11 217	259	2.3	3	1.16	18 (3 - 38)	7.6
2000–01	12 262	236	1.9	8	3.39	8 (8 - 8)	1.9
1999–00	12 482	201	1.6	0	0.00	0	1.6
1998–99	11 023	187	1.7	4	2.14	4 (4 - 4)	1.7

Table 139: Species caught by area with numbers of animals captured, dead and necropsied.

	WCSI7			STEW5			CHAT4			WCNI9		
	c.	d.	n.	c.	d.	n.	c.	d.	n.	c.	d.	n.
2006–07												
New Zealand fur seal	-	-	-	2	2	0	-	-	-	-	-	-
2005–06												
New Zealand fur seal	-	-	-	2	2	0	2	1	0	1	1	0
2004–05												
New Zealand fur seal	9	9	0	-	-	-	-	-	-	1	1	0
Common dolphin	1	1	0	-	-	-	-	-	-	-	-	-
2002–03												
New Zealand fur seal	-	-	-	1	1	0	-	-	-	-	-	-
2001–02												
New Zealand fur seal	-	-	-	2	1	1	-	-	-	-	-	-
New Zealand sea lion	-	-	-	1	1	1	-	-	-	-	-	-
2000–01												
New Zealand fur seal	7	7	0	1	1	0	-	-	-	-	-	-
1998–99												
New Zealand fur seal	2	2	0	-	-	-	2	2	0	-	-	-

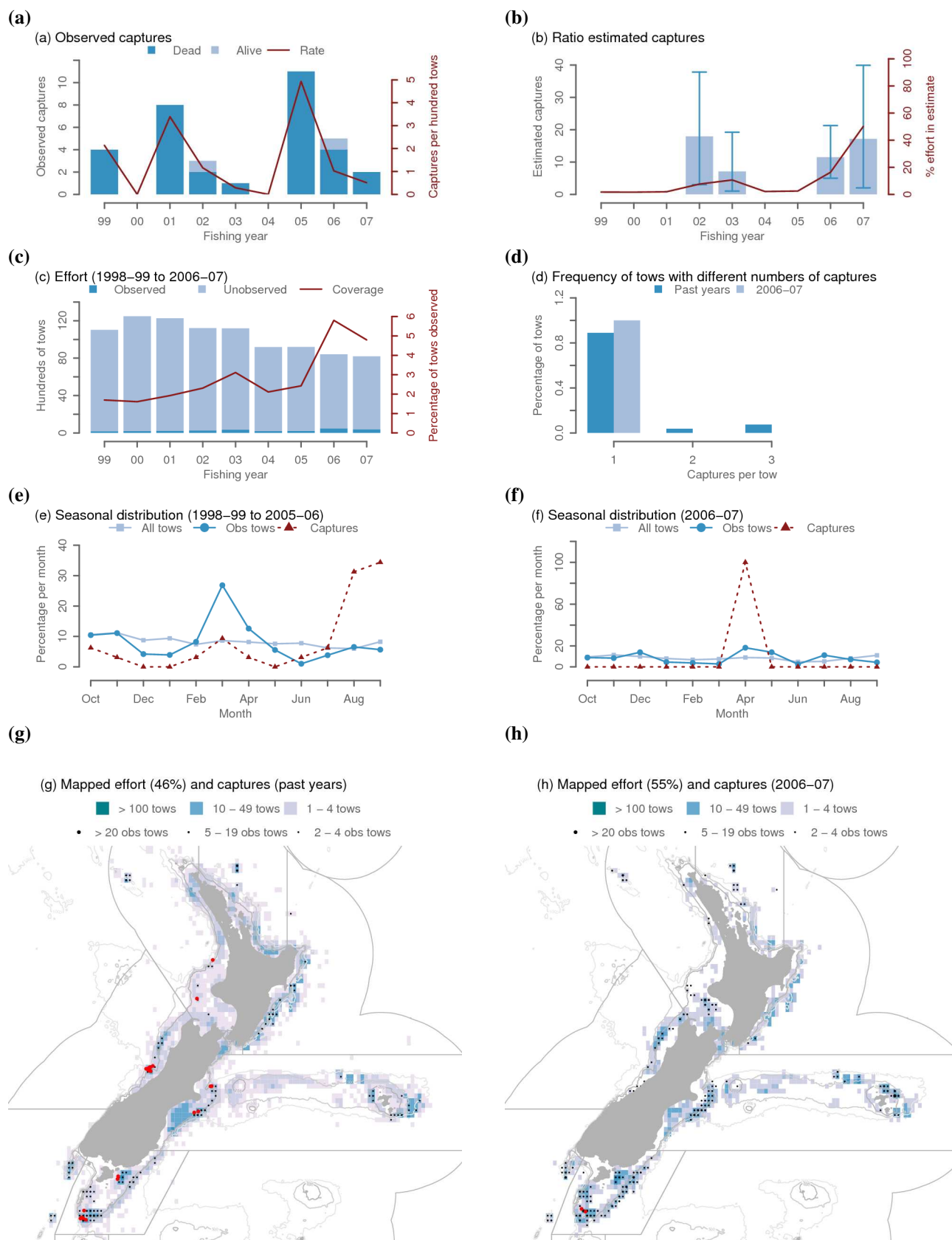


Figure 73: All mammal captures in other middle depth trawl fisheries. (a) Observed captures, (b) Ratio estimated captures, with 95% bootstrap confidence intervals, (c) Effort and observed effort, (d) Histogram of the number of captures per tow, (e, f) Monthly distributions of effort, observations and captures, (g, h) Mapped effort and captures from past years (showing annual averaged effort and observations, but all captures) and from 2006–07.

3.20 Surface longline captures

3.20.1 Domestic surface longline, all birds, New Zealand EEZ

In 2006–07 there were 31 observed captures.

Table 140: Summary by year with number of hooks, number of hooks observed, percentage of hooks observed, number of observed captures, capture rate per ten thousand hooks, total estimated captures with 95% confidence intervals, and percentage of hooks included in the estimate.

	Hooks	No. obs	% obs	Captures	Rate	Estimated captures	% eff. in est.
2006–07	2 253 202	169 592	7.5	31	1.83	409 (266 - 571)	99.6
2005–06	3 062 409	88 143	2.9	22	2.50	598 (326 - 904)	91.5
2004–05	3 038 211	140 844	4.6	8	0.57	155 (63 - 262)	83.5
2003–04	6 212 260	393 749	6.3	25	0.63	329 (148 - 541)	89.7
2002–03	8 869 423	241 779	2.7	1	0.04	2 (1 - 4)	5.6
2001–02	10 154 145	242 476	2.4	91	3.75	4489 (2826 - 6500)	84.3
2000–01	9 161 530	431 784	4.7	38	0.88	1090 (722 - 1500)	95.9
1999–00	7 460 027	38 458	0.5	34	8.84	34 (34 - 34)	0.5
1998–99	5 742 935	173 683	3.0	5	0.29	5 (5 - 5)	8.0

Table 141: Species caught by area with numbers of animals captured, dead and necropsied.

	AREA1			AREA3		
	captured	dead	necropsied	captured	dead	necropsied
2006–07						
Grey petrel	7	6	7	-	-	-
Gibson's albatross	5	5	5	-	-	-
Black-browed albatross	3	2	1	-	-	-
Flesh-footed shearwater	3	0	0	-	-	-
Seabird large	3	3	0	-	-	-
Antipodean albatross	2	2	2	-	-	-
Wandering albatross	2	1	0	-	-	-
Grey-faced petrel	1	1	1	-	-	-
Campbell albatross	1	1	1	-	-	-
Buller's albatross	1	1	1	-	-	-
Cape pigeon	1	0	0	-	-	-
White-capped albatross	1	1	1	-	-	-
Albatross (unidentified)	1	0	0	-	-	-
2005–06						
Grey petrel	7	7	7	-	-	-
Flesh-footed shearwater	4	0	0	-	-	-
Wandering albatross	3	1	1	-	-	-
Black-browed albatross	2	2	0	-	-	-
Campbell albatross	1	1	1	1	1	1
Buller's albatross	-	-	-	2	1	1
Pacific albatross	1	1	1	-	-	-
White-capped albatross	-	-	-	1	1	1

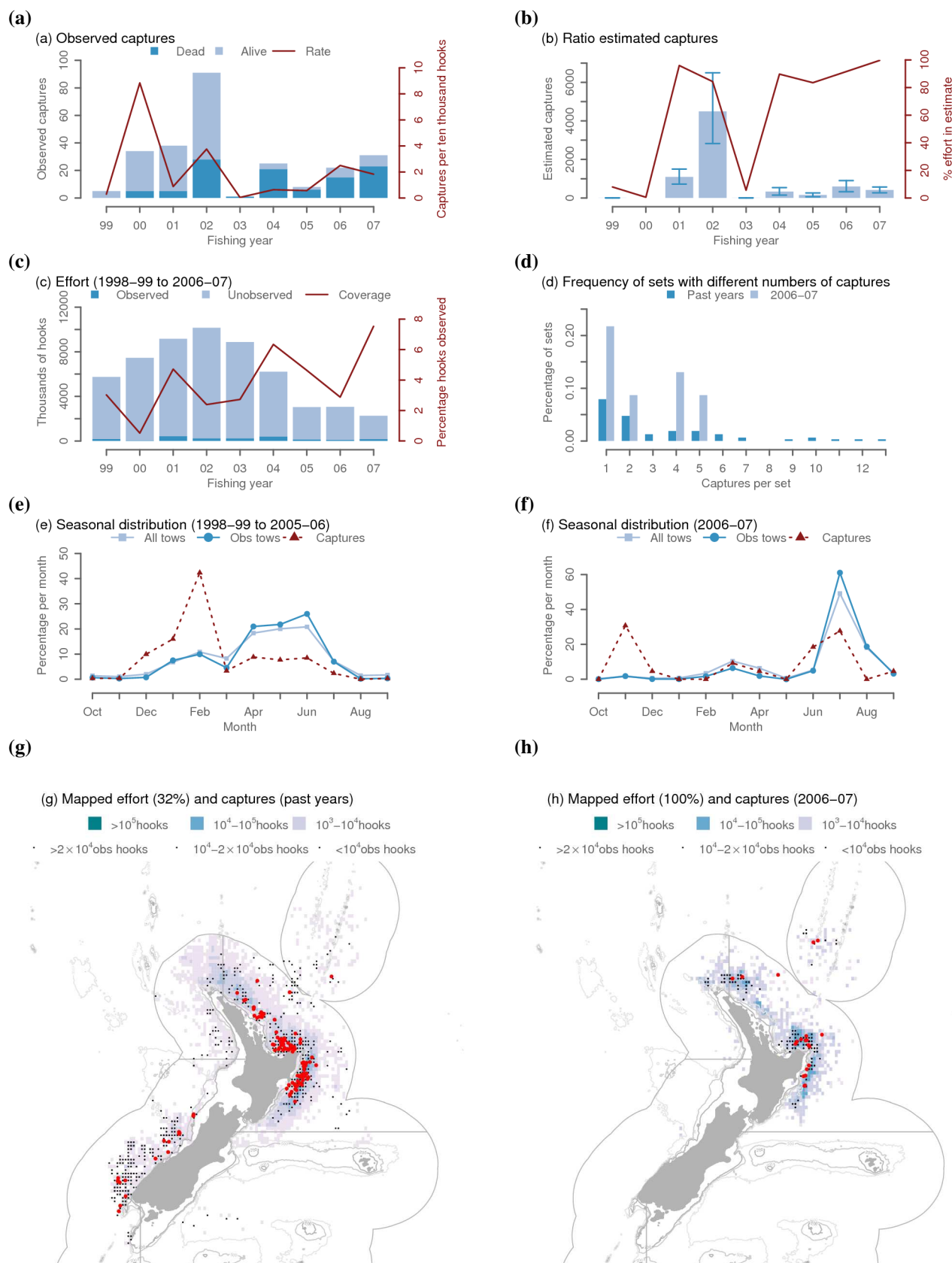


Figure 74: All bird captures in the domestic surface longline fishery. (a) Observed captures, (b) Ratio estimated captures, with 95% bootstrap confidence intervals, (c) Effort and observed effort, (d) Histogram of the number of captures per tow, (e, f) Monthly distributions of effort, observations and captures, (g, h) Mapped effort and captures from past years (showing annual averaged effort and observations, but all captures) and from 2006–07.

3.20.2 Domestic surface longline, all mammals, New Zealand EEZ

In 2006–07 there were 2 observed captures.

Table 142: Summary by year with number of hooks, number of hooks observed, percentage of hooks observed, number of observed captures, capture rate per ten thousand hooks, total estimated captures with 95% confidence intervals, and percentage of hooks included in the estimate.

	Hooks	No. obs	% obs	Captures	Rate	Estimated captures	% eff. in est.
2006–07	2 253 202	169 592	7.5	2	0.12	26 (2 - 64)	99.6
2005–06	3 062 409	88 143	2.9	4	0.45	132 (35 - 266)	91.5
2004–05	3 038 211	140 844	4.6	3	0.21	58 (3 - 132)	83.5
2003–04	6 212 260	393 749	6.3	33	0.84	200 (84 - 350)	89.7
2002–03	8 869 423	241 779	2.7	30	1.24	59 (48 - 71)	5.6
2001–02	10 154 145	242 476	2.4	15	0.62	117 (69 - 175)	84.3
2000–01	9 161 530	431 784	4.7	13	0.30	27 (15 - 45)	95.9
1999–00	7 460 027	38 458	0.5	0	0.00	0	0.5
1998–99	5 742 935	173 683	3.0	0	0.00	0	8.0

Table 143: Species caught by area with numbers of animals captured, dead and necropsied.

	AREA3			AREA1		
	captured	dead	necropsied	captured	dead	necropsied
2006–07						
New Zealand fur seal	-	-	-	2	0	0
2005–06						
New Zealand fur seal	-	-	-	4	0	0
2004–05						
New Zealand fur seal	-	-	-	3	0	0
2003–04						
New Zealand fur seal	29	1	0	1	0	0
Pilot whale	1	0	0	1	0	0
Whale	-	-	-	1	0	0
2002–03						
New Zealand fur seal	30	1	0	-	-	-
2001–02						
New Zealand fur seal	15	0	0	-	-	-
2000–01						
New Zealand fur seal	13	0	0	-	-	-

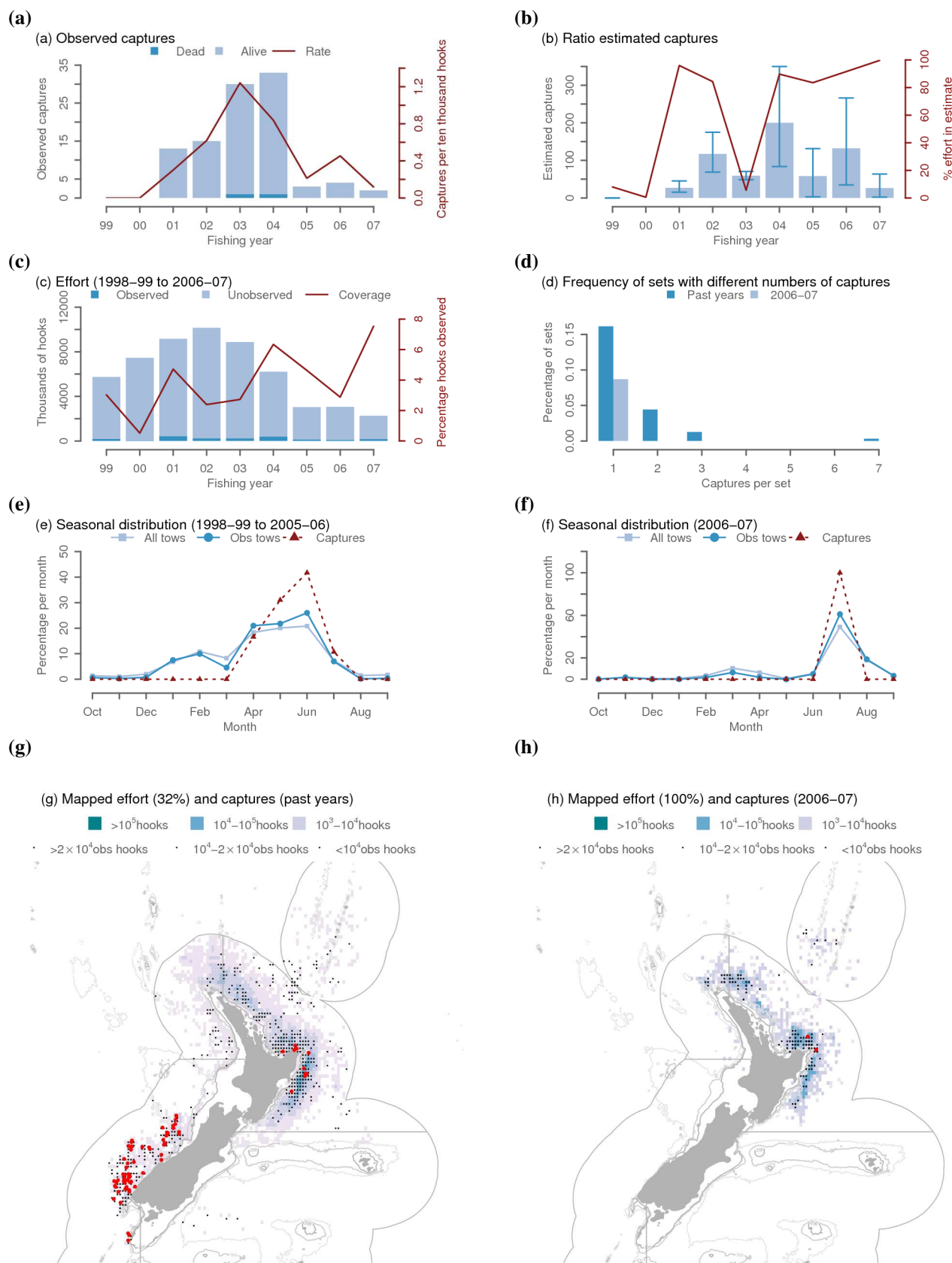


Figure 75: All mammal captures in the domestic surface longline fishery. (a) Observed captures, (b) Ratio estimated captures, with 95% bootstrap confidence intervals, (c) Effort and observed effort, (d) Histogram of the number of captures per tow, (e, f) Monthly distributions of effort, observations and captures, (g, h) Mapped effort and captures from past years (showing annual averaged effort and observations, but all captures) and from 2006–07.

3.20.3 Domestic surface longline, turtles, New Zealand EEZ

In 2006–07 there was 1 observed capture.

Table 144: Summary by year with number of hooks, number of hooks observed, percentage of hooks observed, number of observed captures, capture rate per ten thousand hooks, total estimated captures with 95% confidence intervals, and percentage of hooks included in the estimate.

	Hooks	No. obs	% obs	Captures	Rate	Estimated captures	% eff. in est.
2006–07	2 253 202	169 592	7.5	1	0.06	13 (1 - 39)	99.6
2005–06	3 062 409	88 143	2.9	0	0.00	0	91.5
2004–05	3 038 211	140 844	4.6	2	0.14	20 (2 - 59)	83.5
2003–04	6 212 260	393 749	6.3	1	0.03	40 (1 - 122)	89.7
2002–03	8 869 423	241 779	2.7	0	0.00	0	5.6
2001–02	10 154 145	242 476	2.4	3	0.12	154 (3 - 349)	84.3
2000–01	9 161 530	431 784	4.7	3	0.07	59 (3 - 145)	95.9
1999–00	7 460 027	38 458	0.5	0	0.00	0	0.5
1998–99	5 742 935	173 683	3.0	0	0.00	0	8.0

Table 145: Capture events with details of species, number caught, area code, observer identification and necropsy identification (where available).

Date	Species	#	Area	Obs.	Aut.
27/03/2007	Leatherback turtle (<i>Dermochelys coriacea</i>)	2	Area 1	LBT	
23/05/2005	Leatherback turtle (<i>Dermochelys coriacea</i>)	1	Area 4	LBT	
23/03/2004	Turtle	1	Area 1	TLE	
27/02/2002	Turtle	1	Area 1	TLE	
27/02/2002	Turtle	1	Area 1	TLE	
10/11/2001	Turtle	1	Area 1	TLE	
12/05/2001	Turtle	1	Area 3	TLE	
25/03/2001	Turtle	1	Area 1	TLE	
24/02/2001	Turtle	1	Area 1	TLE	

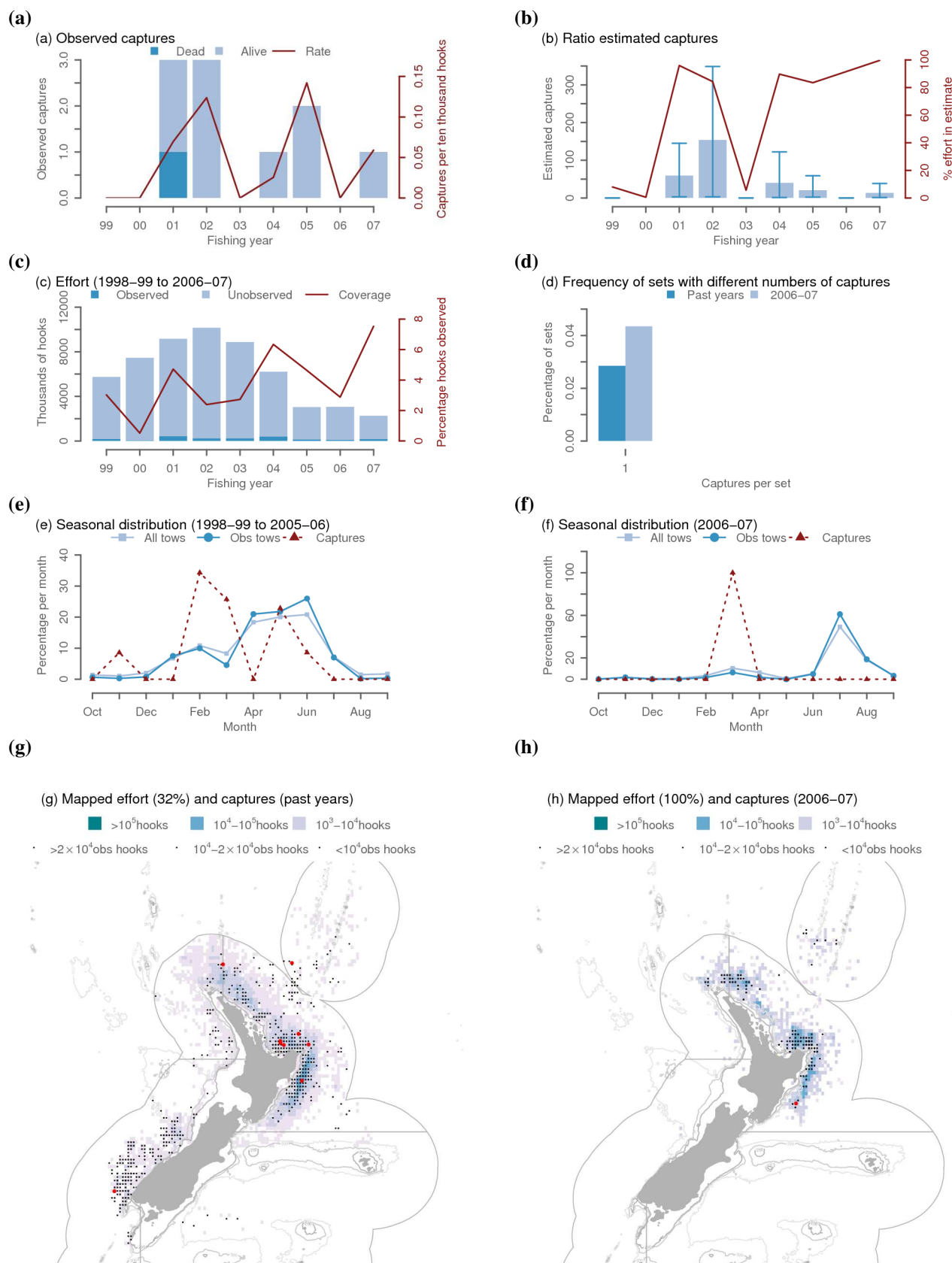


Figure 76: Turtle captures in the domestic surface longline fishery. (a) Observed captures, (b) Ratio estimated captures, with 95% bootstrap confidence intervals, (c) Effort and observed effort, (d) Histogram of the number of captures per tow, (e, f) Monthly distributions of effort, observations and captures, (g, h) Mapped effort and captures from past years (showing annual averaged effort and observations, but all captures) and from 2006–07.

3.20.4 Charter surface longline, all birds, New Zealand EEZ

In 2006–07 there were 98 observed captures.

Table 146: Summary by year with number of hooks, number of hooks observed, percentage of hooks observed, number of observed captures, capture rate per ten thousand hooks, total estimated captures with 95% confidence intervals, and percentage of hooks included in the estimate.

	Hooks	No. obs	% obs	Captures	Rate	Estimated captures	% eff. in est.
2006–07	1 381 210	755 342	54.7	98	1.30	176 (154 - 201)	100.0
2005–06	608 610	539 977	88.7	15	0.28	17 (16 - 18)	100.0
2004–05	638 584	562 825	88.1	33	0.59	37 (36 - 39)	100.0
2003–04	1 170 033	1 070 716	91.5	46	0.43	50 (48 - 51)	99.9
2002–03	1 912 452	1 638 676	85.7	114	0.70	135 (131 - 140)	100.0
2001–02	722 236	675 683	93.6	76	1.12	80 (79 - 81)	98.7
2000–01	599 918	597 334	99.6	15	0.25	15 (15 - 15)	97.4
1999–00	826 093	755 312	91.4	40	0.53	42 (41 - 42)	97.5
1998–99	1 102 846	1 068 927	96.9	79	0.74	81 (80 - 82)	99.4

Table 147: Species caught by area with numbers of animals captured, dead and necropsied.

	AREA3			AREA1		
	captured	dead	necropsied	captured	dead	necropsied
2006–07						
Buller's albatross	49	34	34	-	-	-
White-capped albatross	28	27	24	-	-	-
Grey petrel	-	-	-	10	10	10
Gibson's albatross	2	2	2	1	1	1
White-chinned petrel	3	3	3	-	-	-
Campbell albatross	1	1	1	1	1	1
Antipodean albatross	-	-	-	1	1	1
Salvin's albatross	-	-	-	1	1	1
Sooty shearwater	1	0	0	-	-	-
2005–06						
Buller's albatross	10	4	4	-	-	-
Southern royal albatross	1	0	0	-	-	-
Campbell albatross	-	-	-	1	1	1
White-capped albatross	1	1	1	-	-	-
Antipodean albatross	-	-	-	1	1	1
White-chinned petrel	1	1	0	-	-	-
2004–05						
Buller's albatross	19	6	6	-	-	-
Campbell albatross	-	-	-	4	4	4
White-capped albatross	3	2	2	-	-	-
Southern giant petrel	-	-	-	2	2	2
White-chinned petrel	2	2	2	-	-	-
Grey petrel	-	-	-	2	2	2
Albatross (unidentified)	1	0	0	-	-	-

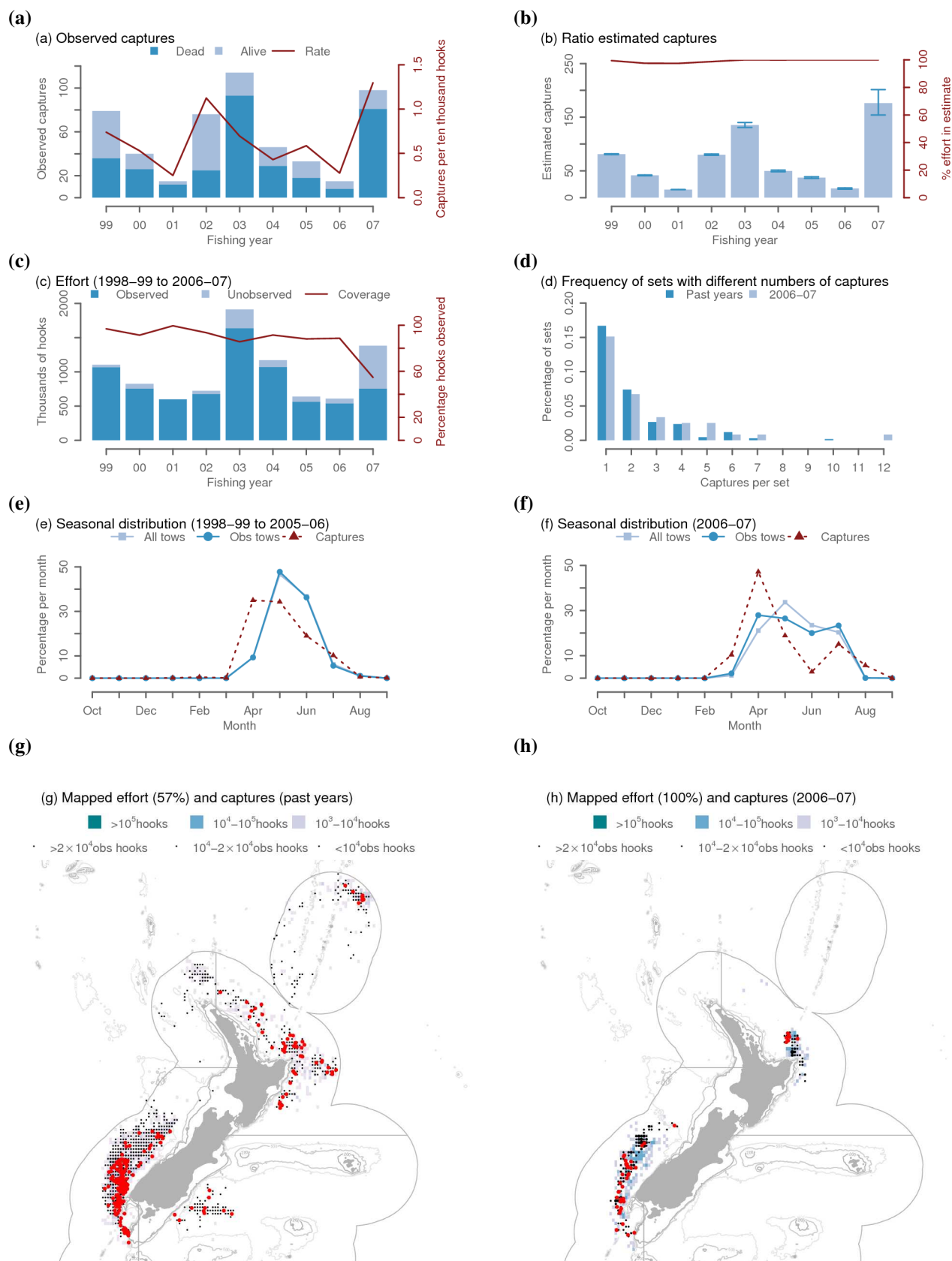


Figure 77: All bird captures in the charter surface longline fishery. (a) Observed captures, (b) Ratio estimated captures, with 95% bootstrap confidence intervals, (c) Effort and observed effort, (d) Histogram of the number of captures per tow, (e, f) Monthly distributions of effort, observations and captures, (g, h) Mapped effort and captures from past years (showing annual averaged effort and observations, but all captures) and from 2006–07.

3.20.5 Charter surface longline, all mammals, New Zealand EEZ

In 2006–07 there were 8 observed captures.

Table 148: Summary by year with number of hooks, number of hooks observed, percentage of hooks observed, number of observed captures, capture rate per ten thousand hooks, total estimated captures with 95% confidence intervals, and percentage of hooks included in the estimate.

	Hooks	No. obs	% obs	Captures	Rate	Estimated captures	% eff. in est.
2006–07	1 381 210	755 342	54.7	8	0.11	14 (9 - 21)	100.0
2005–06	608 610	539 977	88.7	8	0.15	9 (8 - 10)	100.0
2004–05	638 584	562 825	88.1	18	0.32	20 (19 - 21)	100.0
2003–04	1 170 033	1 070 716	91.5	11	0.10	12 (12 - 13)	99.9
2002–03	1 912 452	1 638 676	85.7	27	0.16	29 (28 - 30)	100.0
2001–02	722 236	675 683	93.6	29	0.43	31 (30 - 31)	98.7
2000–01	599 918	597 334	99.6	31	0.52	31 (31 - 31)	97.4
1999–00	826 093	755 312	91.4	44	0.58	47 (46 - 48)	97.5
1998–99	1 102 846	1 068 927	96.9	104	0.97	108 (107 - 109)	99.4

Table 149: Species caught by area with numbers of animals captured, dead and necropsied.

	AREA3			AREA2			AREA1			AREA4		
	c.	d.	n.	c.	d.	n.	c.	d.	n.	c.	d.	n.
2006–07												
New Zealand fur seal	7	1	0	-	-	-	1	0	0	-	-	-
2005–06												
New Zealand fur seal	8	0	0	-	-	-	-	-	-	-	-	-
2004–05												
New Zealand fur seal	16	2	0	-	-	-	1	0	0	-	-	-
Whale	1	0	0	-	-	-	-	-	-	-	-	-
2003–04												
New Zealand fur seal	10	1	0	-	-	-	-	-	-	-	-	-
Whale	-	-	-	-	-	-	-	-	-	1	0	0
2002–03												
New Zealand fur seal	26	0	0	-	-	-	-	-	-	-	-	-
Porpoise	-	-	-	-	-	-	1	0	0	-	-	-
2001–02												
New Zealand fur seal	28	0	0	1	0	0	-	-	-	-	-	-
2000–01												
New Zealand fur seal	30	3	0	-	-	-	-	-	-	-	-	-
Whale	1	0	0	-	-	-	-	-	-	-	-	-
1999–00												
New Zealand fur seal	39	3	0	3	0	0	-	-	-	-	-	-
Dusky dolphin	1	0	0	-	-	-	-	-	-	-	-	-
New Zealand sea lion	1	0	0	-	-	-	-	-	-	-	-	-
1998–99												
New Zealand fur seal	101	6	0	1	0	0	-	-	-	-	-	-
Dusky dolphin	1	0	0	-	-	-	-	-	-	-	-	-
Whale	1	0	0	-	-	-	-	-	-	-	-	-

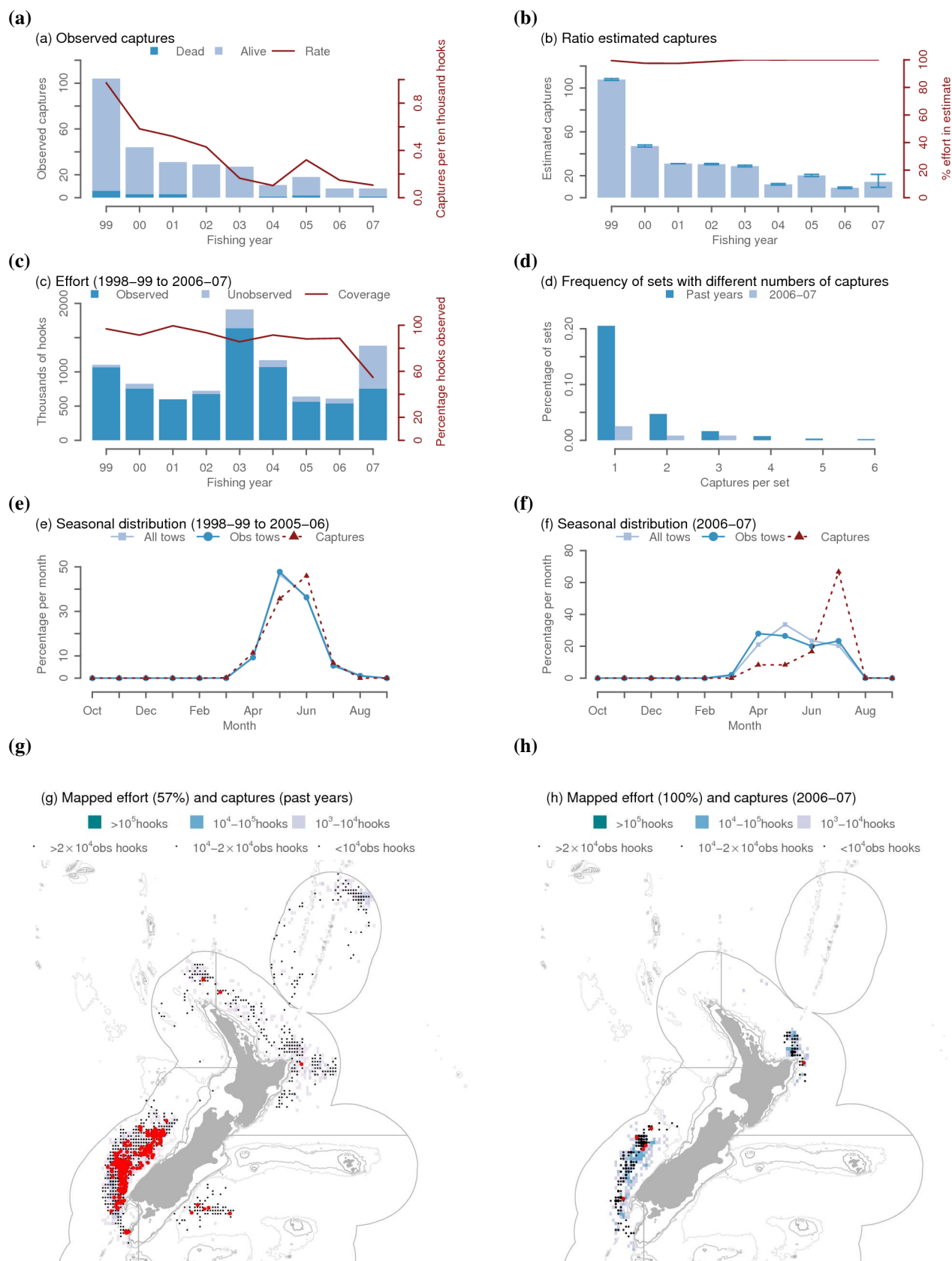


Figure 78: All mammal captures in the charter surface longline fishery. (a) Observed captures, (b) Ratio estimated captures, with 95% bootstrap confidence intervals, (c) Effort and observed effort, (d) Histogram of the number of captures per tow, (e, f) Monthly distributions of effort, observations and captures, (g, h) Mapped effort and captures from past years (showing annual averaged effort and observations, but all captures) and from 2006–07.

3.20.6 Charter surface longline, turtles, New Zealand EEZ

In 2006–07 there were no observed captures.

Table 150: Summary by year with number of hooks, number of hooks observed, percentage of hooks observed, number of observed captures, capture rate per ten thousand hooks, total estimated captures with 95% confidence intervals, and percentage of hooks included in the estimate.

	Hooks	No. obs	% obs	Captures	Rate	Estimated captures	% eff. in est.
2006–07	1 381 210	755 342	54.7	0	0.00	0	100.0
2005–06	608 610	539 977	88.7	0	0.00	0	100.0
2004–05	638 584	562 825	88.1	0	0.00	0	100.0
2003–04	1 170 033	1 070 716	91.5	0	0.00	0	99.9
2002–03	1 912 452	1 638 676	85.7	0	0.00	0	100.0
2001–02	722 236	675 683	93.6	0	0.00	0	98.7
2000–01	599 918	597 334	99.6	0	0.00	0	97.4
1999–00	826 093	755 312	91.4	0	0.00	0	97.5
1998–99	1 102 846	1 068 927	96.9	1	0.01	1 (1 - 1)	99.4

Table 151: Capture events with details of species, number caught, area code, observer identification and necropsy identification (where available).

Date	Species	#	Area	Obs.	Aut.
04/02/1999	Turtle	1	Area 1	TLE	

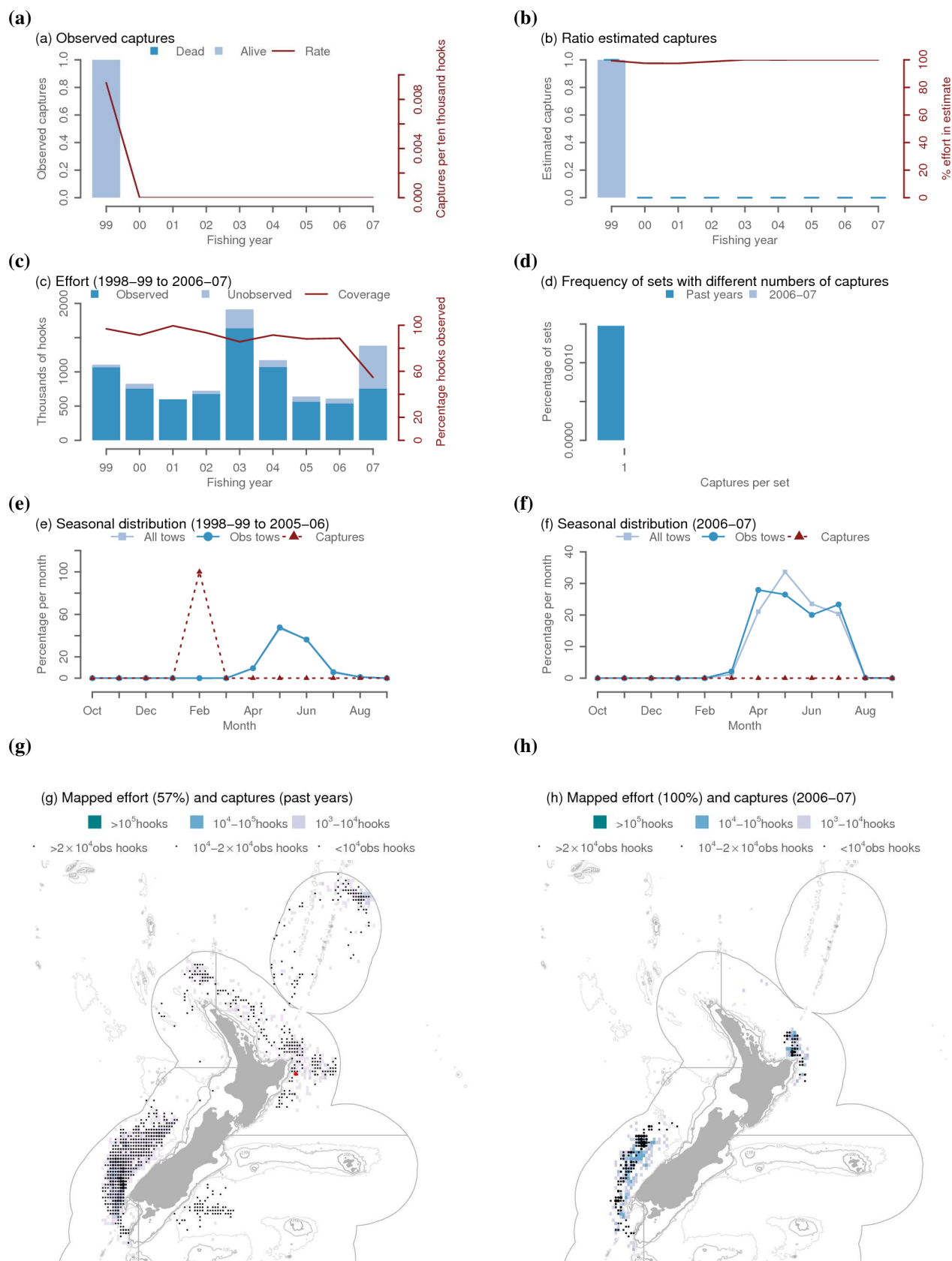


Figure 79: Turtle captures in the charter surface longline fishery. (a) Observed captures, (b) Ratio estimated captures, with 95% bootstrap confidence intervals, (c) Effort and observed effort, (d) Histogram of the number of captures per tow, (e, f) Monthly distributions of effort, observations and captures, (g, h) Mapped effort and captures from past years (showing annual averaged effort and observations, but all captures) and from 2006–07.

3.20.7 Australian charter surface longline, all birds, New Zealand EEZ

In 2006–07 there were 58 observed captures.

Table 152: Summary by year with number of hooks, number of hooks observed, percentage of hooks observed, number of observed captures, capture rate per ten thousand hooks, total estimated captures with 95% confidence intervals, and percentage of hooks included in the estimate.

	Hooks	No. obs	% obs	Captures	Rate	Estimated captures	% eff. in est.
2006–07	84 820	30 985	36.5	58	18.72	130 (92 - 177)	100.0
2005–06	16 550	8676	52.4	0	0.00	0	52.4

Table 153: Species caught by area with numbers of animals captured, dead and necropsied.

	AREA1		
	captured	dead	necropsied
2006–07			
Albatross (unidentified)	33	32	0
Wandering albatross	17	0	0
White-chinned petrel	2	2	2
Grey petrel	2	2	2
Black-browed albatross	1	1	0
Grey-faced petrel	1	1	1
Petrel (unidentified)	1	1	0
Sooty shearwater	1	1	1

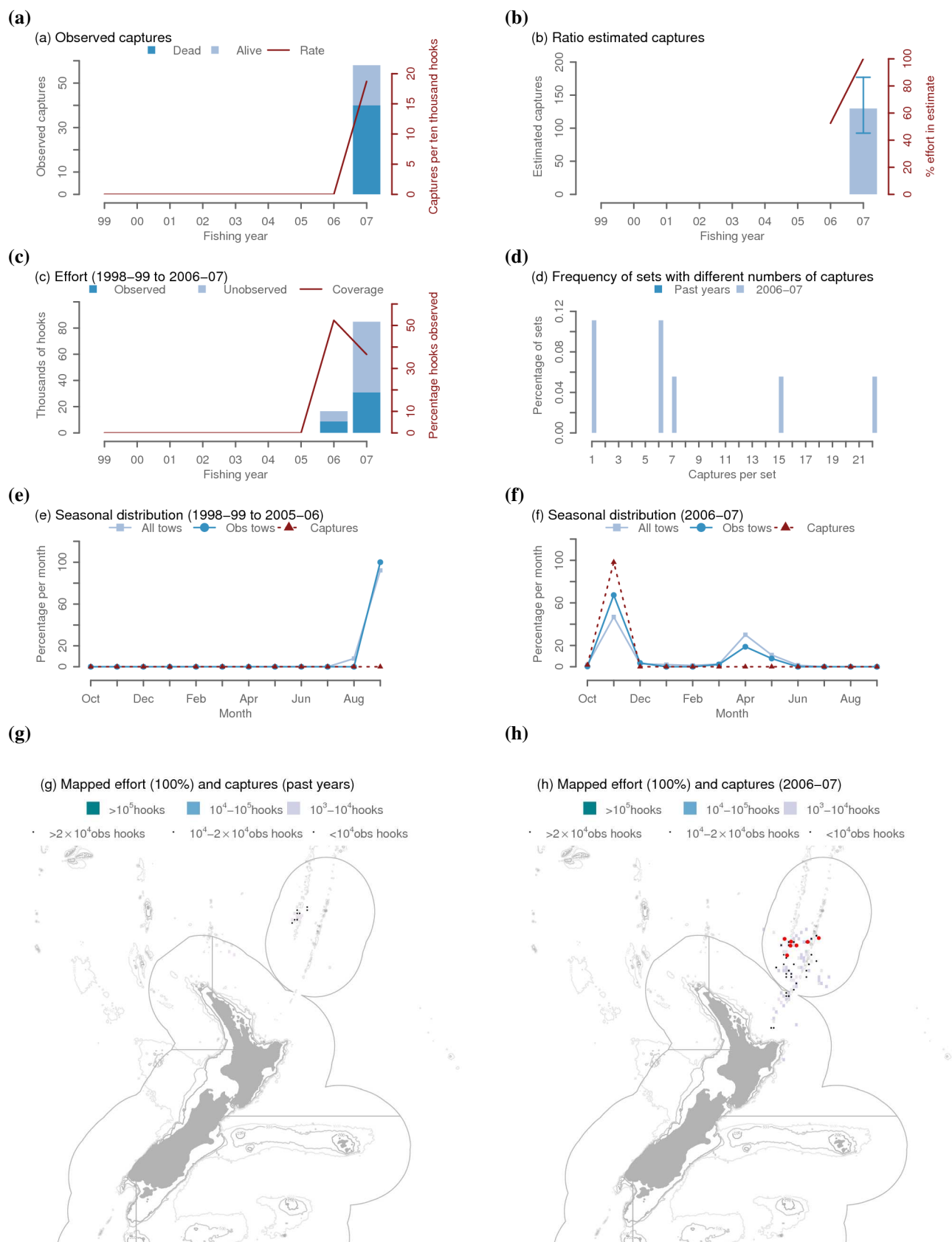


Figure 80: All bird captures in Australian charter surface longline. (a) Observed captures, (b) Ratio estimated captures, with 95% bootstrap confidence intervals, (c) Effort and observed effort, (d) Histogram of the number of captures per tow, (e, f) Monthly distributions of effort, observations and captures, (g, h) Mapped effort and captures from past years (showing annual averaged effort and observations, but all captures) and from 2006-07.

3.20.8 Australian charter surface longline, turtles, New Zealand EEZ

In 2006–07 there was 1 observed capture.

Table 154: Summary by year with number of hooks, number of hooks observed, percentage of hooks observed, number of observed captures, capture rate per ten thousand hooks, total estimated captures with 95% confidence intervals, and percentage of hooks included in the estimate.

	Hooks	No. obs	% obs	Captures	Rate	Estimated captures	% eff. in est.
2006–07	84 820	30 985	36.5	1	0.32	2 (1 - 5)	100.0
2005–06	16 550	8676	52.4	1	1.15	1 (1 - 1)	52.4

Table 155: Capture events with details of species, number caught, area code, observer identification and necropsy identification (where available).

Date	Species	#	Area	Obs.	Aut.
09/11/2006	Leatherback turtle (<i>Dermochelys coriacea</i>)	1	Area 1	LBT	
07/09/2006	Leatherback turtle (<i>Dermochelys coriacea</i>)	1	Area 1	LBT	

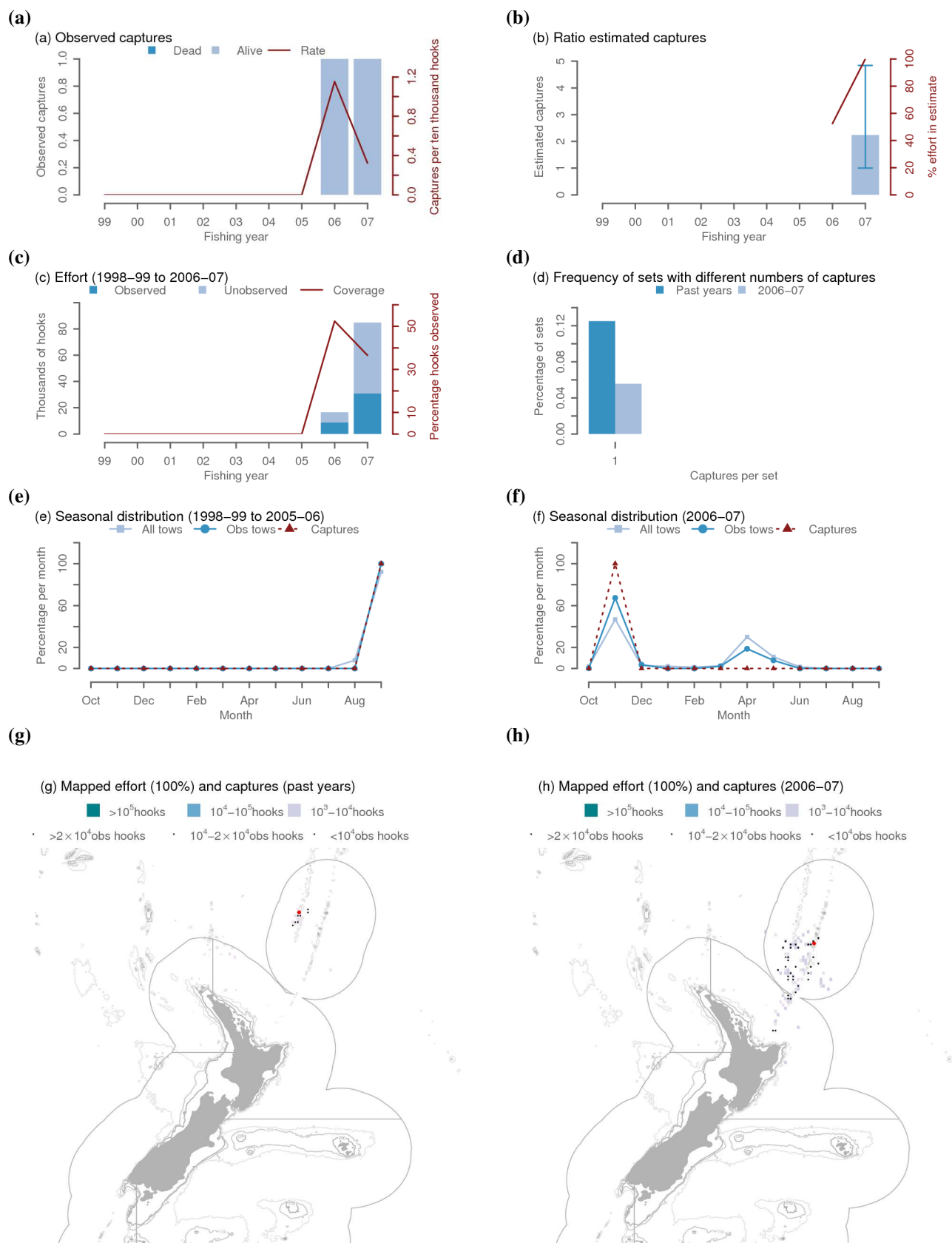


Figure 81: Turtle captures in Australian charter surface longline. (a) Observed captures, (b) Ratio estimated captures, with 95% bootstrap confidence intervals, (c) Effort and observed effort, (d) Histogram of the number of captures per tow, (e, f) Monthly distributions of effort, observations and captures, (g, h) Mapped effort and captures from past years (showing annual averaged effort and observations, but all captures) and from 2006-07.

3.21 Bottom longline captures

3.21.1 Ling longline, all birds, New Zealand EEZ

In 2006–07 there were 51 observed captures.

Table 156: Summary by year with number of hooks, number of hooks observed, percentage of hooks observed, number of observed captures, capture rate per ten thousand hooks, total estimated captures with 95% confidence intervals, and percentage of hooks included in the estimate.

	Hooks	No. obs	% obs	Captures	Rate	Estimated captures	% eff. in est.
2006–07	16 900 158	2 179 707	12.9	51	0.23	812 (333 - 1433)	87.0
2005–06	16 222 501	3 599 075	22.2	29	0.08	116 (79 - 158)	78.0
2004–05	21 544 721	2 645 620	12.3	18	0.07	111 (55 - 176)	85.5
2003–04	24 741 780	5 698 560	23.0	57	0.10	195 (131 - 287)	91.7
2002–03	19 702 549	11 299 295	57.3	266	0.24	374 (354 - 397)	90.7
2001–02	27 995 371	7 547 517	27.0	427	0.57	1113 (900 - 1370)	86.8
2000–01	29 114 743	5 033 144	17.3	505	1.00	1421 (1245 - 1613)	51.4
1999–00	32 473 273	3 606 478	11.1	202	0.56	1835 (1248 - 2495)	92.6
1998–99	35 831 754	3 060 232	8.5	90	0.29	608 (447 - 783)	78.4

Table 157: Species caught by area with numbers of animals captured, dead and necropsied.

	CHAT4			PUYS5			STEW5			EAST2		
	c.	d.	n.	c.	d.	n.	c.	d.	n.	c.	d.	n.
2006–07												
Salvin's albatross	22	22	16	-	-	-	-	-	-	-	-	-
Chatham albatross	12	12	10	-	-	-	-	-	-	-	-	-
White-chinned petrel	-	-	-	11	11	10	-	-	-	-	-	-
Cape pigeon	2	0	0	-	-	-	-	-	-	-	-	-
Prion (unidentified)	-	-	-	1	1	0	-	-	-	-	-	-
Albatross (unidentified)	1	1	0	-	-	-	-	-	-	-	-	-
Sooty shearwater	-	-	-	1	1	1	-	-	-	-	-	-
Grey petrel	1	1	1	-	-	-	-	-	-	-	-	-
2005–06												
White-chinned petrel	10	8	8	-	-	-	3	3	3	-	-	-
Cape pigeon	2	0	0	-	-	-	1	1	1	-	-	-
Sooty shearwater	-	-	-	-	-	-	3	3	1	-	-	-
Northern giant petrel	-	-	-	-	-	-	2	0	0	-	-	-
Chatham albatross	2	2	2	-	-	-	-	-	-	-	-	-
Wandering albatross	-	-	-	-	-	-	-	-	-	2	0	0
Salvin's albatross	1	1	1	-	-	-	-	-	-	-	-	-
White-capped albatross	-	-	-	-	-	-	1	0	0	-	-	-
Albatross (unidentified)	1	1	1	-	-	-	-	-	-	-	-	-
Common diving petrel	-	-	-	-	-	-	-	-	-	1	0	0

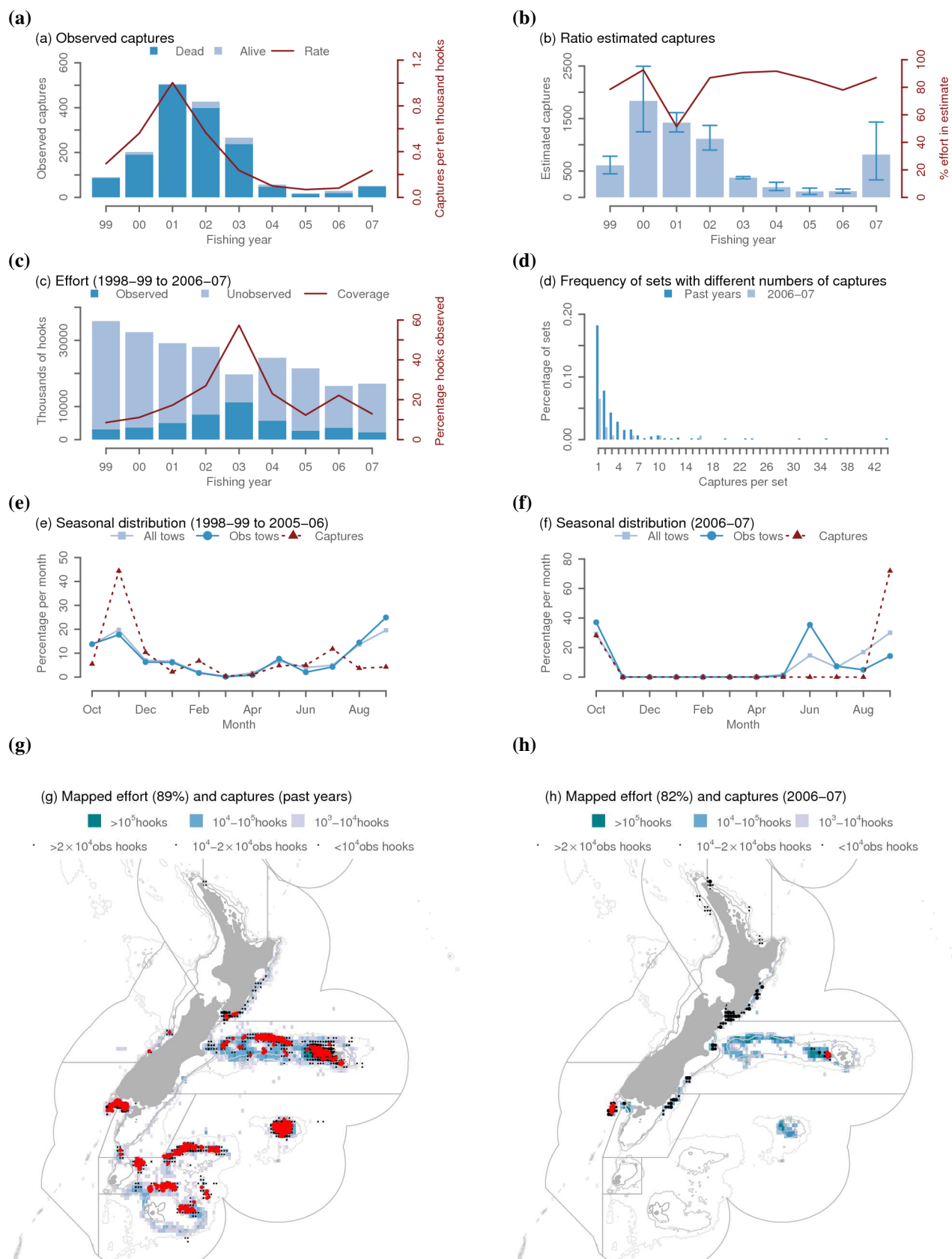


Figure 82: All bird captures in the ling longline fishery. (a) Observed captures, (b) Ratio estimated captures, with 95% bootstrap confidence intervals, (c) Effort and observed effort, (d) Histogram of the number of captures per tow, (e, f) Monthly distributions of effort, observations and captures, (g, h) Mapped effort and captures from past years (showing annual averaged effort and observations, but all captures) and from 2006-07.

3.21.2 Ling longline, all mammals, New Zealand EEZ

In 2006–07 there were no observed captures.

Table 158: Summary by year with number of hooks, number of hooks observed, percentage of hooks observed, number of observed captures, capture rate per ten thousand hooks, total estimated captures with 95% confidence intervals, and percentage of hooks included in the estimate.

	Hooks	No. obs	% obs	Captures	Rate	Estimated captures	% eff. in est.
2006–07	16 900 158	2 179 707	12.9	0	0.00	0	87.0
2005–06	16 222 501	3 599 075	22.2	0	0.00	0	78.0
2004–05	21 544 721	2 645 620	12.3	0	0.00	0	85.5
2003–04	24 741 780	5 698 560	23.0	0	0.00	0	91.7
2002–03	19 702 549	11 299 295	57.3	3	0.00	4 (3 - 6)	90.7
2001–02	27 995 371	7 547 517	27.0	1	0.00	3 (1 - 6)	86.8
2000–01	29 114 743	5 033 144	17.3	0	0.00	0	51.4
1999–00	32 473 273	3 606 478	11.1	1	0.00	9 (1 - 27)	92.6
1998–99	35 831 754	3 060 232	8.5	0	0.00	0	78.4

Table 159: Capture events with details of species, number caught, area code, observer identification and necropsy identification (where available).

Date	Species	#	Area	Obs.	Aut.
09/09/2003	Pilot whale (<i>Globicephala melas</i>)	1	CHAT4	PIW	
14/12/2002	Pilot whale (<i>Globicephala melas</i>)	1	SUBA6	PIW	
18/10/2002	New Zealand fur seal (<i>Arctocephalus forsteri</i>)	1	SUBA6	FUR	
17/01/2002	Pilot whale (<i>Globicephala melas</i>)	1	CHAT4	PIW	

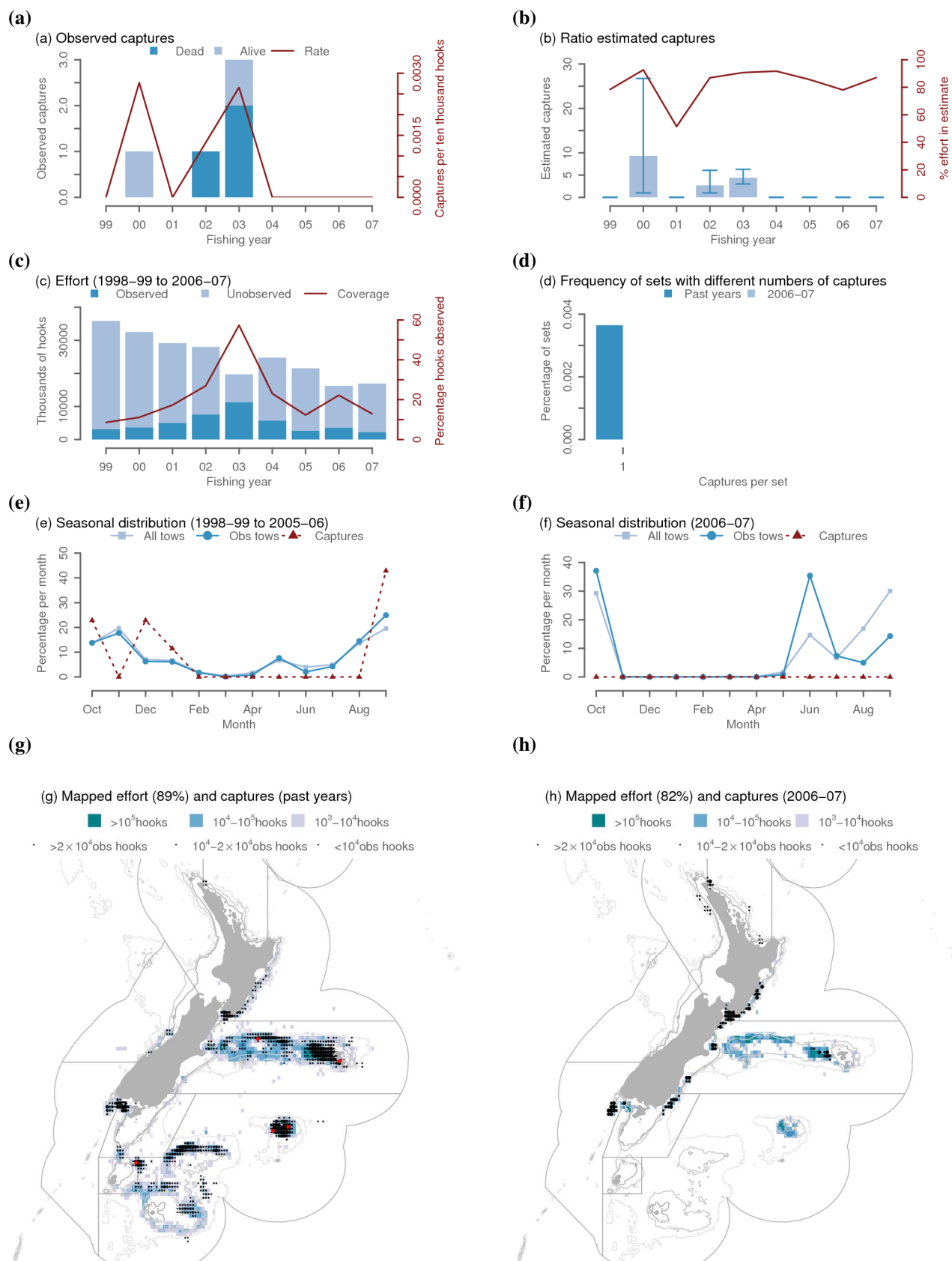


Figure 83: All mammal captures in the ling longline fishery. (a) Observed captures, (b) Ratio estimated captures, with 95% bootstrap confidence intervals, (c) Effort and observed effort, (d) Histogram of the number of captures per tow, (e, f) Monthly distributions of effort, observations and captures, (g, h) Mapped effort and captures from past years (showing annual averaged effort and observations, but all captures) and from 2006-07.

3.21.3 Snapper longline, all birds, New Zealand EEZ

In 2006–07 there were no observed captures.

Table 160: Summary by year with number of hooks, number of hooks observed, percentage of hooks observed, number of observed captures, capture rate per ten thousand hooks, total estimated captures with 95% confidence intervals, and percentage of hooks included in the estimate.

	Hooks	No. obs	% obs	Captures	Rate	Estimated captures	% eff. in est.
2006–07	10 344 640	63 650	0.6	0	0.00	0	0.6
2005–06	11 694 638	125 894	1.1	12	0.95	1114 (178 - 2395)	98.3
2004–05	11 531 586	264 404	2.3	12	0.45	521 (143 - 1077)	98.3
2003–04	12 254 888	221 073	1.8	10	0.45	538 (222 - 949)	97.1
2002–03	13 722 067	0	0.0	0		0	0.0
2001–02	15 372 878	0	0.0	0		0	0.0
2000–01	17 336 728	44 049	0.3	26	5.90	26 (26 - 26)	0.3
1999–00	16 510 012	0	0.0	0		0	0.0
1998–99	14 984 633	0	0.0	0		0	0.0

Table 161: Species caught by area with numbers of animals captured, dead and necropsied.

	NORTH1		
	captured	dead	necropsied
2005–06			
Petrel (unidentified)	6	0	0
Buller's shearwater	4	0	0
Black petrel	2	2	2
2004–05			
Flesh-footed shearwater	9	4	4
Seabird small	1	0	0
Gannet	1	0	0
Black petrel	1	1	1
2003–04			
Flesh-footed shearwater	3	1	1
Black petrel	2	1	1
Fluttering shearwater	1	1	1
Petrel (unidentified)	1	1	0
Seabird	1	1	0
Pied shag	1	1	1
Gannet	1	0	0
2000–01			
Flesh-footed shearwater	12	12	12
Grey petrel	11	11	11
Buller's shearwater	2	2	2
Fluttering shearwater	1	1	1

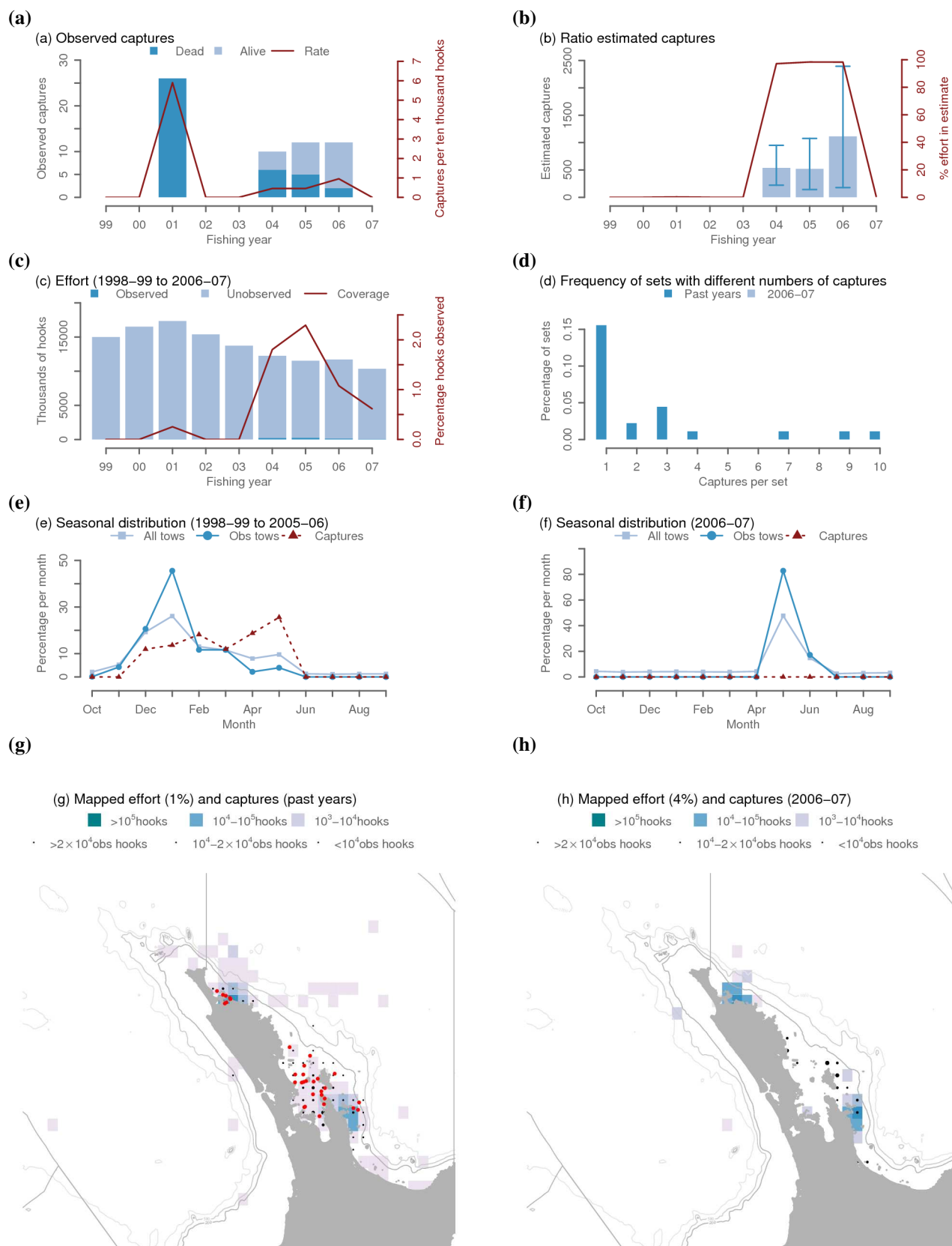


Figure 84: All bird captures in the snapper longline fishery. (a) Observed captures, (b) Ratio estimated captures, with 95% bootstrap confidence intervals, (c) Effort and observed effort, (d) Histogram of the number of captures per tow, (e, f) Monthly distributions of effort, observations and captures, (g, h) Mapped effort and captures from past years (showing annual averaged effort and observations, but all captures) and from 2006–07.

3.21.4 Bluenose longline, all birds, New Zealand EEZ

In 2006–07 there were 7 observed captures.

Table 162: Summary by year with number of hooks, number of hooks observed, percentage of hooks observed, number of observed captures, capture rate per ten thousand hooks, total estimated captures with 95% confidence intervals, and percentage of hooks included in the estimate.

	Hooks	No. obs	% obs	Captures	Rate	Estimated captures	% eff. in est.
2006–07	7 487 163	92 718	1.2	7	0.75	308 (77 - 591)	55.3
2005–06	6 150 791	56 900	0.9	0	0.00	0	30.4
2004–05	5 315 543	9955	0.2	0	0.00	0	0.2
2003–04	3 328 650	0	0.0	0		0	0.0
2002–03	1 899 774	0	0.0	0		0	0.0
2001–02	1 703 985	0	0.0	0		0	0.0
2000–01	2 157 384	171 709	8.0	3	0.17	11 (3 - 21)	30.9
1999–00	2 122 207	0	0.0	0		0	0.0
1998–99	1 799 663	0	0.0	0		0	0.0

Table 163: Capture events with details of species, number caught, area code, observer identification and necropsy identification (where available).

Date	Species	#	Area	Obs.	Aut.
08/08/2007	Indian yellow-nosed albatross (<i>Thalassarche carteri</i>)	1	EAST2	XSL	XYN
07/08/2007	Southern cape pigeon (<i>Daption capense</i>)	1	EAST2	XCP	XCC
19/12/2006	White-chinned petrel (<i>Procellaria aequinoctialis</i>)	1	NORTH1	XWC	
11/12/2006	Black petrel (<i>Procellaria parkinsoni</i>)	2	NORTH1	XBP	
08/12/2006	Black petrel (<i>Procellaria parkinsoni</i>)	2	NORTH1	XBP	
20/06/2001	Cape pigeon (<i>Daption spp.</i>)	2	EAST2	XCP	XCP
16/06/2001	Sooty shearwater (<i>Puffinus griseus</i>)	1	EAST2	XSH	XSH

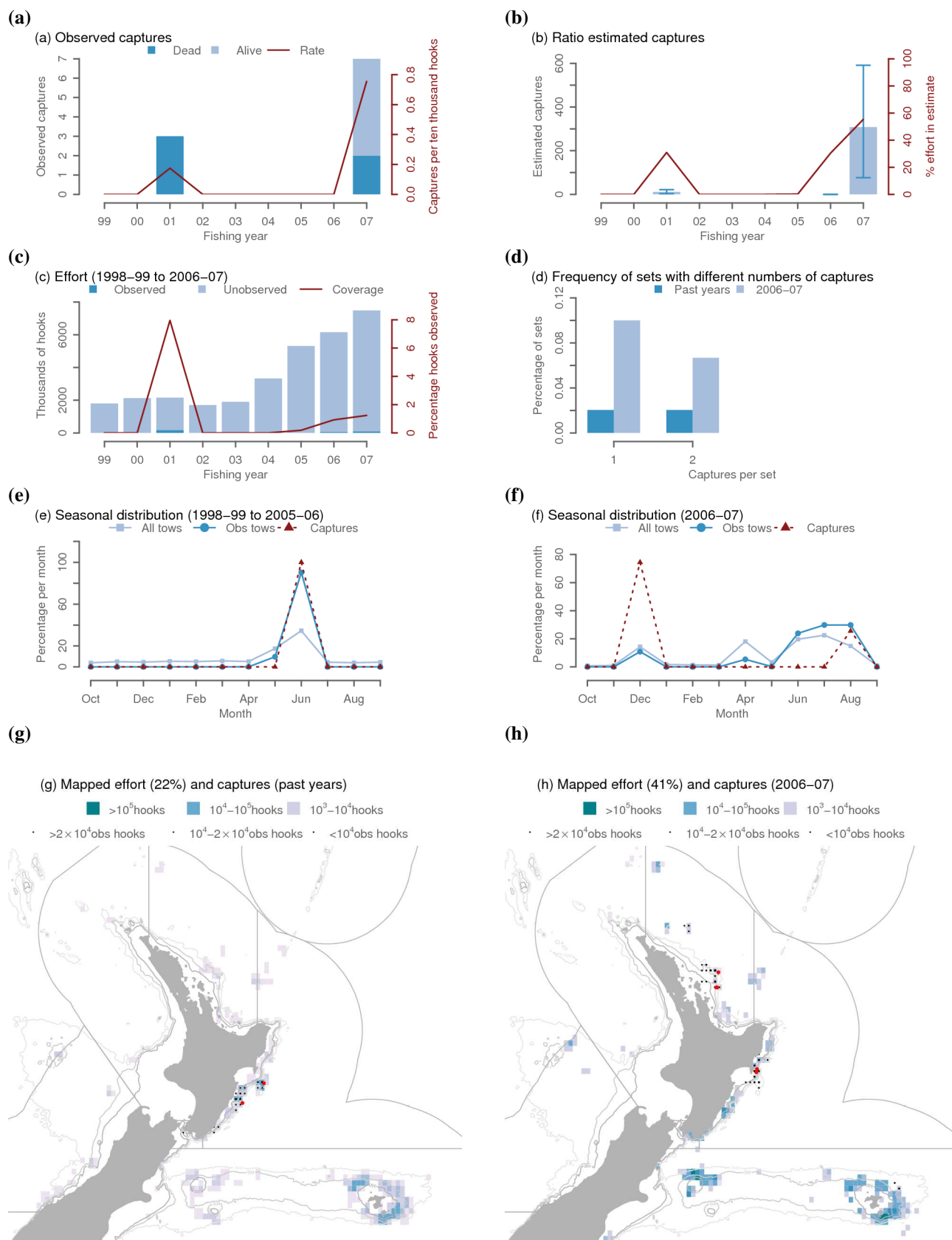


Figure 85: All bird captures in the bluenose longline fishery. (a) Observed captures, (b) Ratio estimated captures, with 95% bootstrap confidence intervals, (c) Effort and observed effort, (d) Histogram of the number of captures per tow, (e, f) Monthly distributions of effort, observations and captures, (g, h) Mapped effort and captures from past years (showing annual averaged effort and observations, but all captures) and from 2006-07.

3.21.5 Bluenose longline, all mammals, New Zealand EEZ

In 2006–07 there were no observed captures.

Table 164: Summary by year with number of hooks, number of hooks observed, percentage of hooks observed, number of observed captures, capture rate per ten thousand hooks, total estimated captures with 95% confidence intervals, and percentage of hooks included in the estimate.

	Hooks	No. obs	% obs	Captures	Rate	Estimated captures	% eff. in est.
2006–07	7 487 163	92 718	1.2	0	0.00	0	55.3
2005–06	6 150 791	56 900	0.9	1	0.18	37 (1 - 130)	30.4
2004–05	5 315 543	9955	0.2	0	0.00	0	0.2
2003–04	3 328 650	0	0.0	0		0	0.0
2002–03	1 899 774	0	0.0	0		0	0.0
2001–02	1 703 985	0	0.0	0		0	0.0
2000–01	2 157 384	171 709	8.0	1	0.06	4 (1 - 10)	30.9
1999–00	2 122 207	0	0.0	0		0	0.0
1998–99	1 799 663	0	0.0	0		0	0.0

Table 165: Capture events with details of species, number caught, area code, observer identification and necropsy identification (where available).

Date	Species	#	Area	Obs.	Aut.
30/05/2006	New Zealand fur seal (<i>Arctocephalus forsteri</i>)	1	EAST2	FUR	
15/06/2001	New Zealand fur seal (<i>Arctocephalus forsteri</i>)	1	EAST2	FUR	

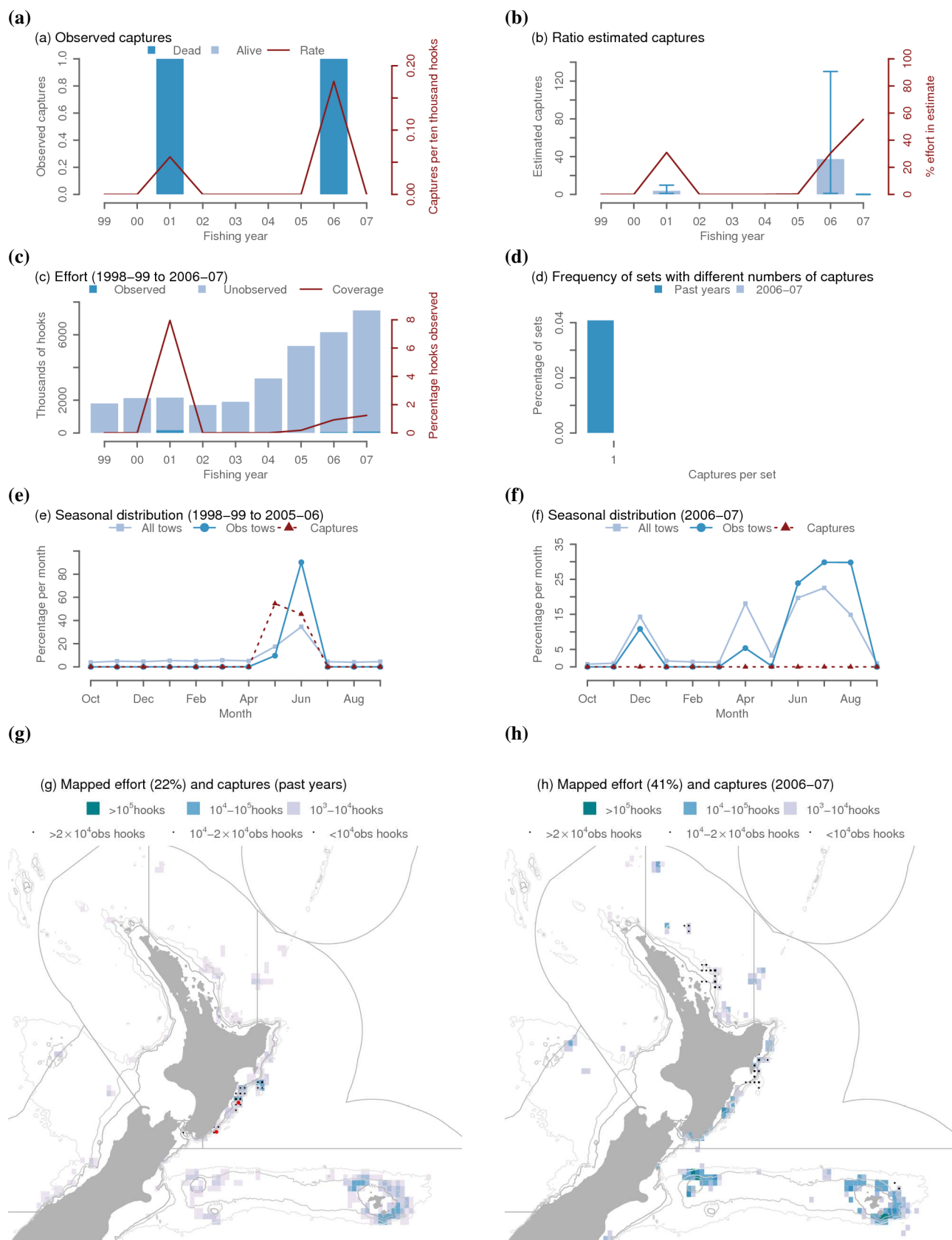


Figure 86: All mammal captures in the bluenose longline fishery. (a) Observed captures, (b) Ratio estimated captures, with 95% bootstrap confidence intervals, (c) Effort and observed effort, (d) Histogram of the number of captures per tow, (e, f) Monthly distributions of effort, observations and captures, (g, h) Mapped effort and captures from past years (showing annual averaged effort and observations, but all captures) and from 2006-07.

3.21.6 Other longline, all birds, New Zealand EEZ

In 2006–07 there were no observed captures.

Table 166: Summary by year with number of hooks, number of hooks observed, percentage of hooks observed, number of observed captures, capture rate per ten thousand hooks, total estimated captures with 95% confidence intervals, and percentage of hooks included in the estimate.

	Hooks	No. obs	% obs	Captures	Rate	Estimated captures	% eff. in est.
2006–07	3 432 890	8130	0.2	0	0.00	0	0.2
2005–06	3 057 709	40 590	1.3	0	0.00	0	27.6
2004–05	3 449 083	7949	0.2	0	0.00	0	0.2
2003–04	3 124 415	0	0.0	0		0	0.0
2002–03	2 428 946	9000	0.4	0	0.00	0	0.4
2001–02	1 952 098	0	0.0	0		0	0.0
2000–01	2 415 512	0	0.0	0		0	0.0
1999–00	2 171 657	0	0.0	0		0	0.0
1998–99	2 871 143	36 966	1.3	2	0.54	3 (2 - 4)	1.8

Table 167: Capture events with details of species, number caught, area code, observer identification and necropsy identification (where available).

Date	Species	#	Area	Obs.	Aut.
15/05/1999	Grey petrel (<i>Procellaria cinerea</i>)	2	SUBA6	XGP	XGP

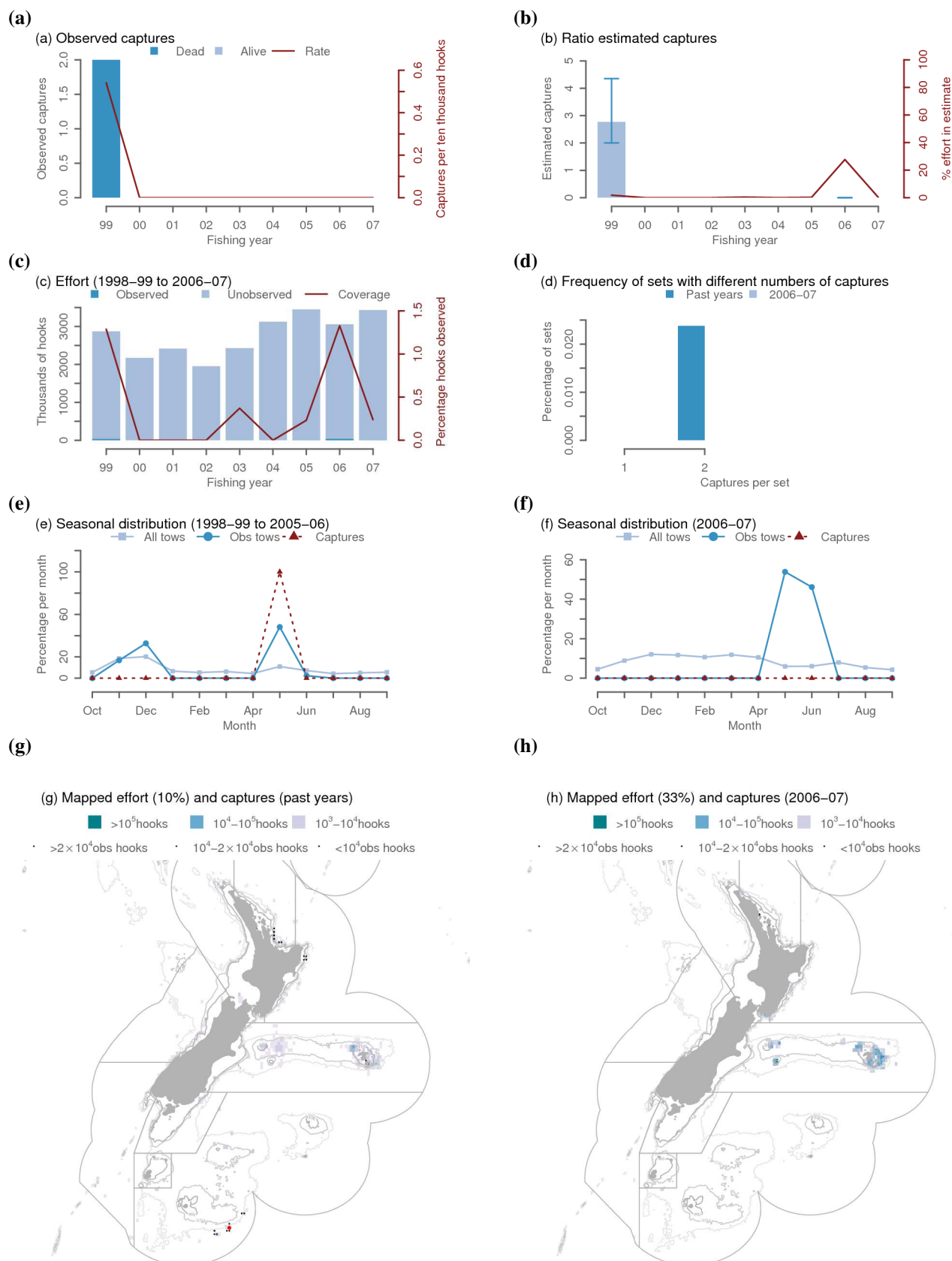


Figure 87: All bird captures in other longline fisheries. (a) Observed captures, (b) Ratio estimated captures, with 95% bootstrap confidence intervals, (c) Effort and observed effort, (d) Histogram of the number of captures per tow, (e, f) Monthly distributions of effort, observations and captures, (g, h) Mapped effort and captures from past years (showing annual averaged effort and observations, but all captures) and from 2006-07.

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5. REFERENCES

- Abraham, E.R. (2008). Evaluating methods for estimating the incidental capture of New Zealand sealions. *New Zealand Aquatic Environment and Biodiversity Report, No. 15*. 25 p.
- Baird, S.J. (2004a). Incidental capture of seabird species in commercial fisheries in New Zealand waters, 2000–01. *New Zealand Fisheries Assessment Report 2004/58*. 63 p.
- Baird, S.J. (2004b). Incidental capture of seabird species in commercial fisheries in New Zealand waters, 2001–02. *New Zealand Fisheries Assessment Report 2004/60*. 51 p.
- Baird, S.J. (2005a). Incidental capture of *Phocarctos hookeri* (New Zealand sea lions) in New Zealand commercial fisheries, 2001–02. *New Zealand Fisheries Assessment Report 2005/8*. 17 p.
- Baird, S.J. (2005b). Incidental capture of *Phocarctos hookeri* (New Zealand sea lions) in New Zealand commercial fisheries, 2002–03. *New Zealand Fisheries Assessment Report 2005/9*. 13 p.
- Baird, S.J. (2005c). Incidental capture of New Zealand fur seals (*Arctocephalus forsteri*) in commercial fisheries in New Zealand waters, 2000–01. *New Zealand Fisheries Assessment Report 2005/11*. 34 p.
- Baird, S.J. (2005d). Incidental capture of New Zealand fur seals (*Arctocephalus forsteri*) in commercial fisheries in New Zealand waters, 2001–02. *New Zealand Fisheries Assessment Report 2005/12*. 33 p.
- Baird, S.J. (2005e). Incidental capture of New Zealand fur seals (*Arctocephalus forsteri*) in commercial fisheries in New Zealand waters, 2002–03. *New Zealand Fisheries Assessment Report 2005/13*. 35 p.
- Baird, S.J. (2005f). Incidental capture of seabird species in commercial fisheries in New Zealand waters, 2002–03. *New Zealand Fisheries Assessment Report 2005/2*. 50 p.
- Baird, S.J. (2008a). Incidental capture of cetaceans in commercial fisheries in New Zealand waters, 1994–95 to 2005–06. *New Zealand Aquatic Environment and Biodiversity Report, No. 21*. 29 p.
- Baird, S.J. (2008b). Incidental capture of New Zealand fur seals (*Arctocephalus forsteri*) in longline fisheries in New Zealand waters, 1994–95 to 2005–06. *New Zealand Aquatic Environment and Biodiversity Report, No. 20*. 21 p.
- Baird, S.J.; Doonan, I.J. (2005). *Phocarctos hookeri* (New Zealand sea lions) in New Zealand commercial fisheries during 2000–01 and in-season estimates of captures during squid trawling in SQU 6T in 2002. *New Zealand Fisheries Assessment Report 2005/17*. 18 p.
- Baird, S.J.; Griggs, L.H. (2004). Estimation of within-season chartered southern bluefin tuna (*Thunnus*

- maccoyi*) longline seabird incidental captures, 2002. *New Zealand Fisheries Assessment Report 2004/42*. 15 p.
- Baird, S.J.; Griggs, L.H. (2005). Estimation of within-season chartered southern bluefin tuna (*Thunnus maccoyi*) longline seabird incidental captures, 2003. *New Zealand Fisheries Assessment Report 2004/1*. 15 p.
- Baird, S.J.; Smith, M.H. (2007). Incidental capture of seabird species in commercial fisheries in New Zealand waters, 2003–04 and 2004–05. *New Zealand Aquatic Environment and Biodiversity Report, No. 9*. 108 p.
- Baird, S.J.; Smith, M.H. (2008). Incidental capture of seabird species in commercial fisheries in New Zealand waters, 2005–06. *New Zealand Aquatic Environment and Biodiversity Report, No. 18*. 124 p.
- Cochran, W.G. (1977). Sampling techniques (Third ed.). John Wiley & Sons, New York.
- Conservation Services Programme. (2008). Summary of autopsy reports for seabirds killed and returned from observed New Zealand fisheries: 1 October 1996 – 30 September 2005, with specific reference to 2002/03, 2003/04, 2004/05. *DOC Research & Development Series 291*. 110 p.
- Davison, A.C.; Hinkley, D.V. (Eds.). (1997). Bootstrap methods and their application. Cambridge University Press.
- Department of Internal Affairs. (2006). Fisheries (Incidental bycatch of seabirds by trawl vessels 28m+) notice 2006. *New Zealand Gazette 12 January 2006*: 31–34.
- Du Fresne, S.P.; Grant, A.R.; Norden, W.S.; Pierre, J.P. (2007). Factors affecting cetacean bycatch in a New Zealand trawl fishery. *DOC Research & Development Series 282*. 18 p.
- IUCN. (2008). 2008 IUCN Red List of threatened species. Retrieved 5 May 2009, from <http://www.iucnredlist.org>
- MacKenzie, D.; Fletcher, D. (2008). Characterisation of seabird captures in commercial trawl and longline fisheries in New Zealand 1997/98 to 2003/04. Final Research Report for research project ENV2004/04. (Unpublished report held by Ministry of Fisheries, Wellington).
- Manly, B.F.J. (1992). The design and analysis of research studies. Cambridge University Press.
- Manly, B.F.J.; Seyb, A.; Fletcher, D.J. (2002a). Bycatch of fur seals (*Arctocephalus forsteri*) in New Zealand fisheries, 1990/91–1995/96, and observer coverage. *DOC Science Internal Series 41*. 40 p.
- Manly, B.F.J.; Seyb, A.; Fletcher, D.J. (2002b). Bycatch of sea lions (*Phocarctos hookeri*) in New Zealand fisheries, 1987/88–1995/96, and observer coverage. *DOC Science Internal Series 42*. 40 p.
- Manly, B.F.J.; Seyb, A.; Fletcher, D.J. (2002c). Longline bycatch of birds and mammals in New Zealand fisheries, 1990/91–1995/96, and observer coverage. *DOC Science Internal Series 43*. 40 p.
- Middleton, D.A.J.; Abraham, E.R. (2007). The efficacy of warp strike mitigation devices: Trials in the 2006 squid fishery. Final Research Report for research project IPA2006/02. (Unpublished report held by Ministry of Fisheries, Wellington).
- Ministry of Fisheries. (2008). Research database documentation. Retrieved 5 May 2009, from <http://tinyurl.com/fdbdoc>
- Mormede, S.; Baird, S.J.; Smith, M.H. (2008). Factors that may influence the probability of fur seal capture in selected New Zealand fisheries. *New Zealand Aquatic Environment and Biodiversity Report, No. 19*. 42 p.

- Robertson, G.; McNeill, M.; Smith, N.; Wienecke, B.; Candy, S.; Olivier, F. (2006). Fast sinking (integrated weight) longlines reduce mortality of white-chinned petrels (*Procellaria aequinoctialis*) and sooty shearwaters (*Puffinus griseus*) in demersal longline fisheries. *Biological Conservation* 132: 458–471.
- Roe, W.D. (2007). Necropsy of marine mammals captures in New Zealand fisheries in the 2005–06 fishing year. *New Zealand Aquatic Environment and Biodiversity Report, No. 11*. 24 p.
- Roe, W.D. (2009). Necropsy of marine mammals captures in New Zealand fisheries in the 2006–07 fishing year. *New Zealand Aquatic Environment and Biodiversity Report, No 29*. 32 p.
- Smith, M.H.; Baird, S.J. (2005). Factors that may influence the level of mortality of New Zealand sea lions (*Phocarctos hookeri*) in the squid (*Nototodarus* spp.) trawl fishery in SQU 6T. *New Zealand Fisheries Assessment Report 2005/20*. 35 p.
- Smith, M.H.; Baird, S.J. (2007a). Estimation of the incidental captures of New Zealand sea lions (*Phocarctos hookeri*) in New Zealand fisheries in 2003–04, with particular reference to the SQU 6T squid (*Nototodarus* spp.) trawl fishery. *New Zealand Fisheries Assessment Report 2007/7*. 32 p.
- Smith, M.H.; Baird, S.J. (2007b). Estimation of the incidental captures of New Zealand sea lions (*Phocarctos hookeri*) in New Zealand fisheries in 2004–05, with particular reference to the SQU 6T squid (*Nototodarus* spp.) trawl fishery. *New Zealand Aquatic Environment and Biodiversity Report, No. 12*. 31 p.

A. APPENDIX

In any given year, particular area and fishery strata are included in the ratio estimates only if there was sufficient observer coverage (see Section 2.8). This appendix contains 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 168: Effort included in ratio estimates for trawl fisheries.

	Inshore	Deep	Hoki	Hake	Ling	Squid	Scampi	SBW	Pelagic	Other
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	15.4	30.9	8.1	15.7	6.8	34.8	25.4	6.2
% 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 COOK8 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

Table 168: Effort included in ratio estimates for trawl fisheries.

	Inshore	Deep	Hoki	Hake	Ling	Squid	Scampi	SBW	Pelagic	Other
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	
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 169: Effort included in ratio estimates for surface and bottom longline fisheries.

	Surface longline			Bottom longline			
	Domestic	Charter	Australian	Ling	Snapper	Bluenose	Other
2006–07							
Effort (hooks)	2 280 642	1 381 210	84 820	17 020 458	10 446 540	7 508 683	3 462 880
% observed	7.4	54.7	36.5	12.8	0.6	1.2	0.2
% eff. in est.	99.6	100.0	100.0	86.8	0.0	55.3	0.0
Areas in est.	AREA 1 AREA 4	AREA 1 AREA 3	AREA 1	CHAT4 COOK8 EAST2 NORTH1 PUYS5 STEW5 WCNI9		EAST2 NORTH1	
2005–06							
Effort (hooks)	3 062 409	608 610	16 550	16 222 501	11 694 638	6 150 791	3 057 709
% observed	2.9	88.7	52.4	22.2	1.1	0.9	1.3
% eff. in est.	91.2	100.0	0.0	78.0	98.2	30.2	27.6
Areas in est.	AREA 1	AREA 1 AREA 3		CHAT4 COOK8 EAST2 STEW5	NORTH1	EAST2	NORTH1
2004–05							
Effort (hooks)	3 038 211	638 584	0	21 544 721	11 531 586	5 315 543	3 449 083
% observed	4.6	88.1	-	12.3	2.3	0.2	0.2
% eff. in est.	83.1	100.0	-	85.5	98.3	0.0	0.0
Areas in est.	AREA 1	AREA 1 AREA 3		CHAT4 NORTH1 PUYS5 STEW5 SUBA6	NORTH1		

Table 169: Effort included in ratio estimates for surface and bottom longline fisheries.

	Surface longline			Bottom longline			
	Domestic	Charter	Australian	Ling	Snapper	Bluenose	Other
2003–04							
Effort (hooks)	6 212 260	1 170 033	0	24 741 780	12 254 888	3 328 650	3 124 415
% observed	6.3	91.5	-	23.0	1.8	0.0	0.0
% eff. in est.	89.6	99.2	-	91.7	97.1	0.0	0.0
Areas in est.	AREA 1 AREA 3	AREA 3 AREA 4		CHAT4 PUYS5 SQUAK6 STEW5 SUBA6 WCSI7	NORTH1		
2002–03							
Effort (hooks)	8 869 423	1 912 452	0	19 702 549	13 722 067	1 899 774	2 428 946
% observed	2.7	85.7	-	57.3	0.0	0.0	0.4
% eff. in est.	5.6	100.0	-	90.6	0.0	0.0	0.0
Areas in est.	AREA 2 AREA 3	AREA 1 AREA 3 AREA 4		CHAT4 COOK8 EAST2 STEW5 SUBA6			
2001–02							
Effort (hooks)	10 154 145	722 236	0	27 995 371	15 372 878	1 703 985	1 952 098
% observed	2.4	93.6	-	27.0	0.0	0.0	0.0
% eff. in est.	87.0	100.0	-	86.8	0.0	0.0	0.0
Areas in est.	AREA 1 AREA 3	AREA 2 AREA 3 AREA 4		CHAT4 STEW5 SUBA6			
2000–01							
Effort (hooks)	9 161 530	599 918	0	29 114 743	17 336 728	2 157 384	2 415 512
% observed	4.7	99.6	-	17.3	0.3	8.0	0.0
% eff. in est.	98.9	100.0	-	51.4	0.0	30.9	0.0
Areas in est.	AREA 1 AREA 3 AREA 4	AREA 2 AREA 3		COOK8 EAST2 PUYS5 SQUAK6 STEW5 SUBA6		EAST2	
1999–00							
Effort (hooks)	7 460 027	826 093	0	32 473 273	16 510 012	2 122 207	2 171 657
% observed	0.5	91.4	-	11.1	0.0	0.0	0.0
% eff. in est.	0.0	100.0	-	92.6	0.0	0.0	0.0
Areas in est.		AREA 1 AREA 2 AREA 3 AREA 4		CHAT4 PUYS5 SQUAK6 STEW5 SUBA6			
1998–99							
Effort (hooks)	5 742 935	1 102 846	0	35 831 754	14 984 633	1 799 663	2 871 143
% observed	3.0	96.9	-	8.5	0.0	0.0	1.3
% eff. in est.	7.7	99.2	-	78.4	0.0	0.0	1.8
Areas in est.	AREA 2 AREA 3	AREA 1 AREA 2 AREA 3		CHAT4 SUBA6			SUBA6