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# Assessment of the risk of commercial fisheries to New Zealand seabirds, 2006–07 to 2012–13: Supplementary information

New Zealand Aquatic Environment and Biodiversity Report 162

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ISSN 1179-6480 (online)
ISBN 978-1-77665-110-8 (online)

**November 2015**

New Zealand Government

*Growing and Protecting New Zealand*

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## 1. OVERVIEW

This supplementary information presents a summary of population and distributional data for the 70 species included in the risk assessment of the impact of fishing-related mortalities on seabirds breeding in the New Zealand region (Richard & Abraham 2015). For each seabird species included in the risk assessment, the demographic parameters used were the New Zealand population size, the age at first reproduction, and the survival rate. For species for which no demographic estimates were available, values from proxy species were used, as indicated with a reference to the data source. Distributional data are presented as maps of the at-sea distribution of each species, with separate maps for the non-breeding and breeding distributions. The distribution of non-breeders was derived from existing maps published by NABIS (National Aquatic Biodiversity Information System) and Birdlife International. A single distribution map was generated when the breeding season extended throughout the year. Included in the distributional maps are data of any incidental captures in commercial trawl, longline and set-net fisheries between the 2006–2007 and 2012–2013 fishing years, recorded by fisheries observers.

A detailed description of the methods used to derive the data presented here is provided in Section 2 of the risk assessment (Richard & Abraham 2015).

## 2. SPECIES DATA

### S.1 Gibson's albatross (*Diomedea antipodensis gibsoni*)

| | | |
|---|---|---|
| Population (NZ) | 4792 pairs [2014] | Elliott & Walker (2014), Baker & Jensz (2014) |
| Age at first reproduction | 10 to 12 years | de L. Brooke (2004) |
| Survival rate | 93.8 to 98.5% [1996] | Croxall & Gales (1998) |
| | 96 to 98% [1997] | Walker & Elliott (1999) |
| | 95.9 ± 0.6% [2004] | Agreement on the Conservation of Albatrosses and Petrels (ACAP) (2010) |

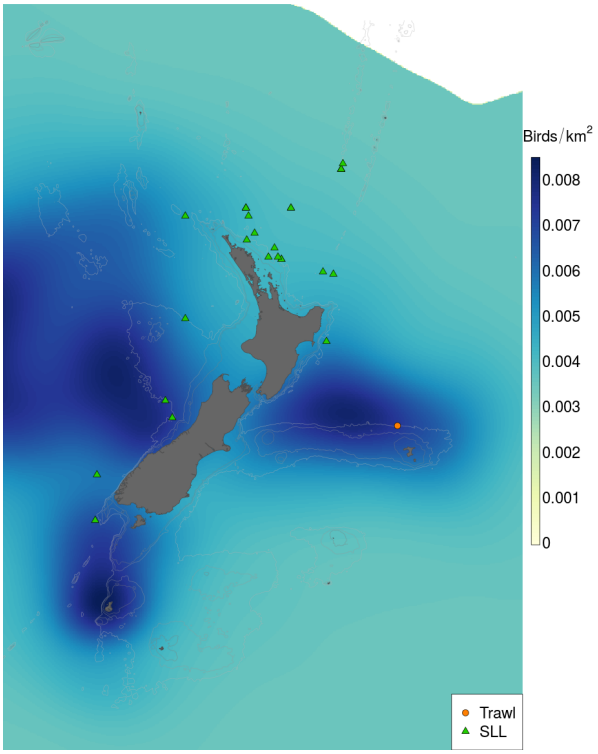



**Figure S-1: Relative density of Gibson's albatross (*Diomedea antipodensis gibsoni*). The breeding season runs throughout the year, hence a single distribution map was created. Also shown are incidental captures recorded by observers between the 2006–07 and 2012–13 fishing years in trawl and surface-longline (SLL) fisheries.**

## S.2 Antipodean albatross (*Diomedea antipodensis antipodensis*)

| | | |
|---|---|---|
| Population (NZ) | 3320 pairs [2014] | G. Elliot (pers. comm.) |
| Age at first reproduction | 10 to 13 years [1997] | Walker & Elliott (2002) |
| Survival rate | 95.7 ± 0.7% [2004] | Walker & Elliott (1999) |

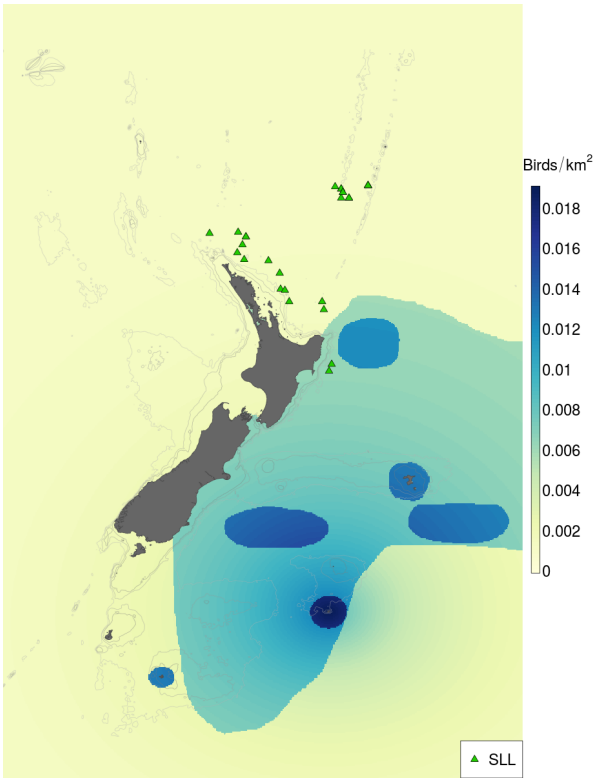



**Figure S-2: Relative density of Antipodean albatross (*Diomedea antipodensis antipodensis*). The breeding season runs throughout the year, hence a single distribution map was created. Also shown are incidental captures recorded by observers between the 2006–07 and 2012–13 fishing years in surface-longline (SLL) fisheries.**

## S.3 Southern royal albatross (*Diomedea epomophora*)

| | | |
|---|---|---|
| Population (NZ) | 7886 pairs [2008] | Agreement on the Conservation of Albatrosses and Petrels (ACAP) (2010) |
| Age at first reproduction | 8.5 to 10.6 years | Robertson (1993) |
| Survival rate | 94.9 ± 0.8% [2001] | Agreement on the Conservation of Albatrosses and Petrels (ACAP) (2010) |

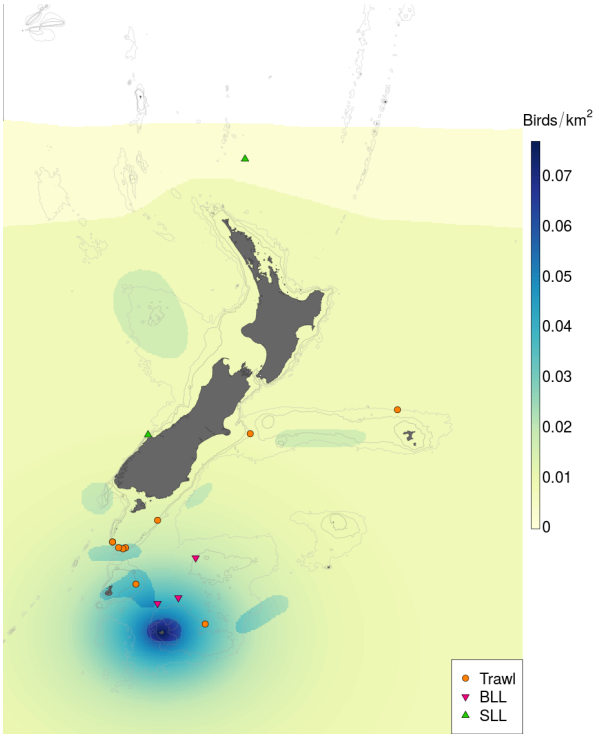



**Figure S-3: Relative density of southern royal albatross (*Diomedea epomophora*). The breeding season runs throughout the year, hence a single distribution map was created. Also shown are incidental captures recorded by observers between the 2006–07 and 2012–13 fishing years in trawl, surface-longline (SLL), and bottom-longline (BLL) fisheries.**

## S.4 Northern royal albatross (*Diomedea sanfordi*)

| | | |
|---|---|---|
| Population (NZ) | 5832 pairs [2003] | Agreement on the Conservation of Albatrosses and Petrels (ACAP) (2010) |
| Age at first reproduction | 8.5 to 10.6 years | Robertson (1993) |
| Survival rate | 95.2% [1993] | Agreement on the Conservation of Albatrosses and Petrels (ACAP) (2010) |
| | 94.6 ± 1.5% [1993] | Agreement on the Conservation of Albatrosses and Petrels (ACAP) (2010) |

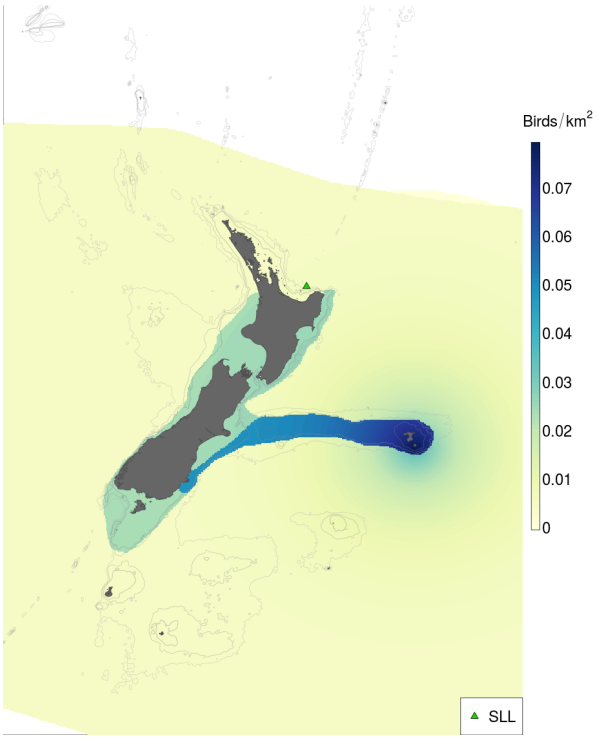
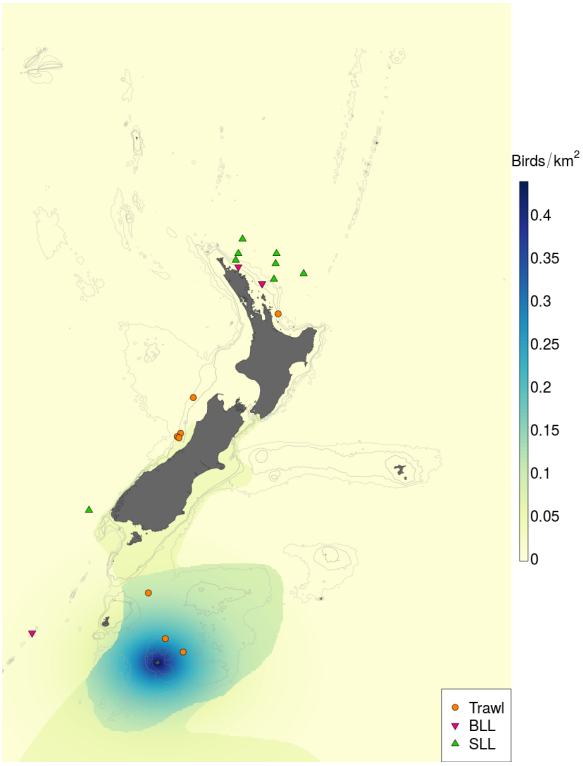



**Figure S-4: Relative density of northern royal albatross (*Diomedea sanfordi*). The breeding season runs throughout the year, hence a single distribution map was created. Also shown are incidental captures recorded by observers between the 2006–07 and 2012–13 fishing years in surface-longline (SLL) fisheries.**

## S.5 Campbell black-browed albatross (*Thalassarche impavida*)

| | | |
|---|---|---|
| Population (NZ) | 21 000 pairs [1998] | Agreement on the Conservation of Albatrosses and Petrels (ACAP) (2010) |
| Age at first reproduction | 10 (6 – 13) years [1995] | Waugh et al. (1999) |
| Survival rate | 94.5% [1996] | Agreement on the Conservation of Albatrosses and Petrels (ACAP) (2010) |

**(a) Breeding distribution**




**(b) Non-breeding distribution**

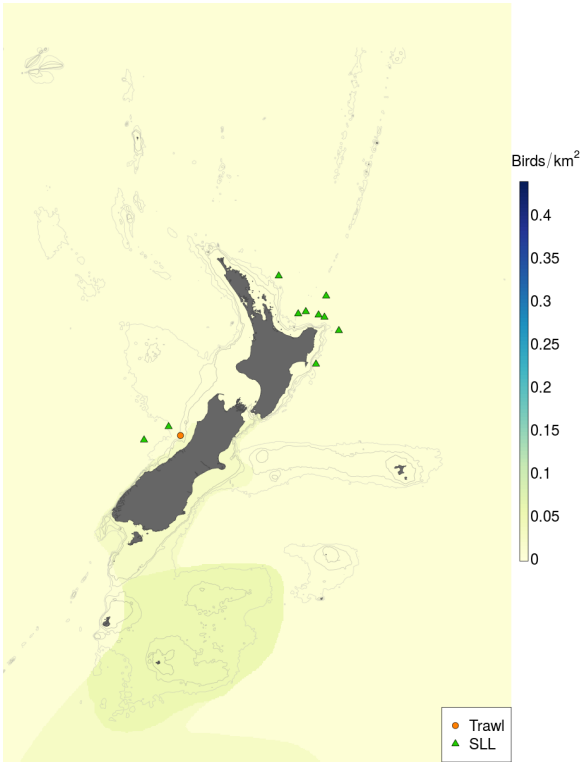



**Figure S-5: Relative density of Campbell black-browed albatross (*Thalassarche impavida*). The breeding season runs from August to May. Also shown are incidental captures recorded by observers between the 2006–07 and 2012–13 fishing years in trawl, surface-longline (SLL), and bottom-longline (BLL) fisheries.**

## S.6 New Zealand white-capped albatross (*Thalassarche steadi*)

| | | |
|---|---|---|
| Population (NZ) | 96 018 (95% c.i.: 85 882 – 106 260) pairs | Richard et al. (2015) |
| Age at first reproduction | 12 years [2011] | Southern Buller's albatross as proxy, Francis & Sagar (2012) |
| Survival rate | 96% [2011] | Francis (2012) |

**(a) Breeding distribution** **(b) Non-breeding distribution**

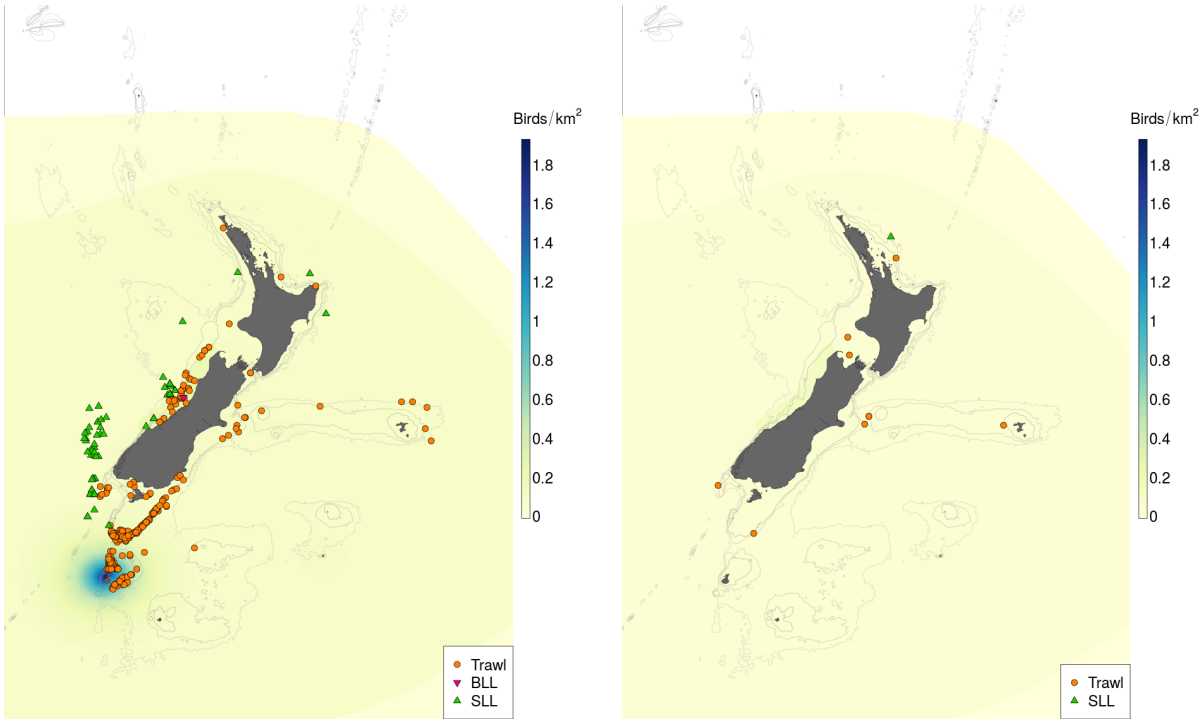
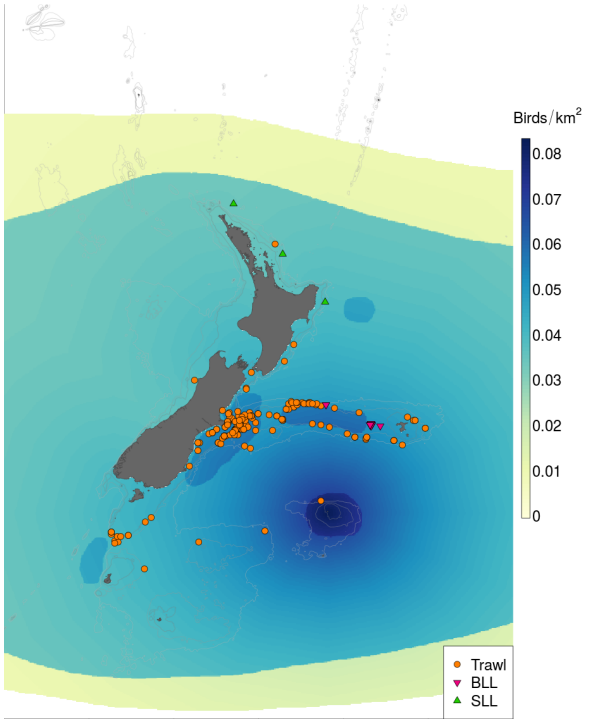



**Figure S-6: Relative density of New Zealand white-capped albatross (*Thalassarche steadi*). The breeding season runs from November to August. Also shown are incidental captures recorded by observers between the 2006–07 and 2012–13 fishing years in trawl, surface-longline (SLL), and bottom-longline (BLL) fisheries.**

## S.7 Salvin's albatross (*Thalassarche salvini*)

| | | |
|---|---|---|
| Population (NZ) | 33 000 to 41 000 pairs [2014] | Baker et al. (2014) |
| Age at first reproduction | 12 years [2011] | Southern Buller's albatross as proxy, Francis & Sagar (2012) |
| Survival rate | 96.7% [2011] | Sagar et al. (2011) |

**(a) Breeding distribution**




**(b) Non-breeding distribution**

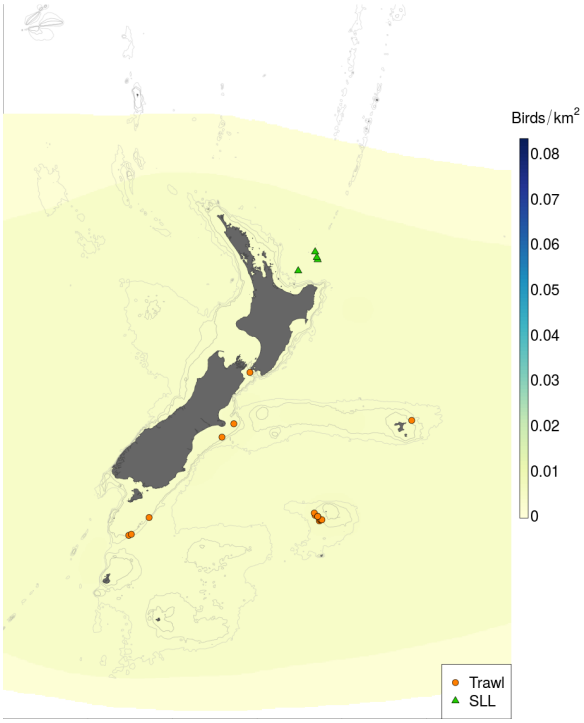



**Figure S-7: Relative density of Salvin's albatross (*Thalassarche salvini*). The breeding season runs from September to March. Also shown are incidental captures recorded by observers between the 2006–07 and 2012–13 fishing years in trawl, surface-longline (SLL), and bottom-longline (BLL) fisheries.**

## S.8 Chatham Island albatross (*Thalassarche eremita*)

| | | |
|---|---|---|
| Population (NZ) | 5247 pairs [2007] | Birdlife International (2009) |
| Age at first reproduction | 12 years [2011] | Southern Buller's albatross as proxy, Francis & Sagar (2012) |
| Survival rate | 96.7% [2011] | Salvin's albatross as proxy, Sagar et al. (2011) |

**(a) Breeding distribution**

**(b) Non-breeding distribution**

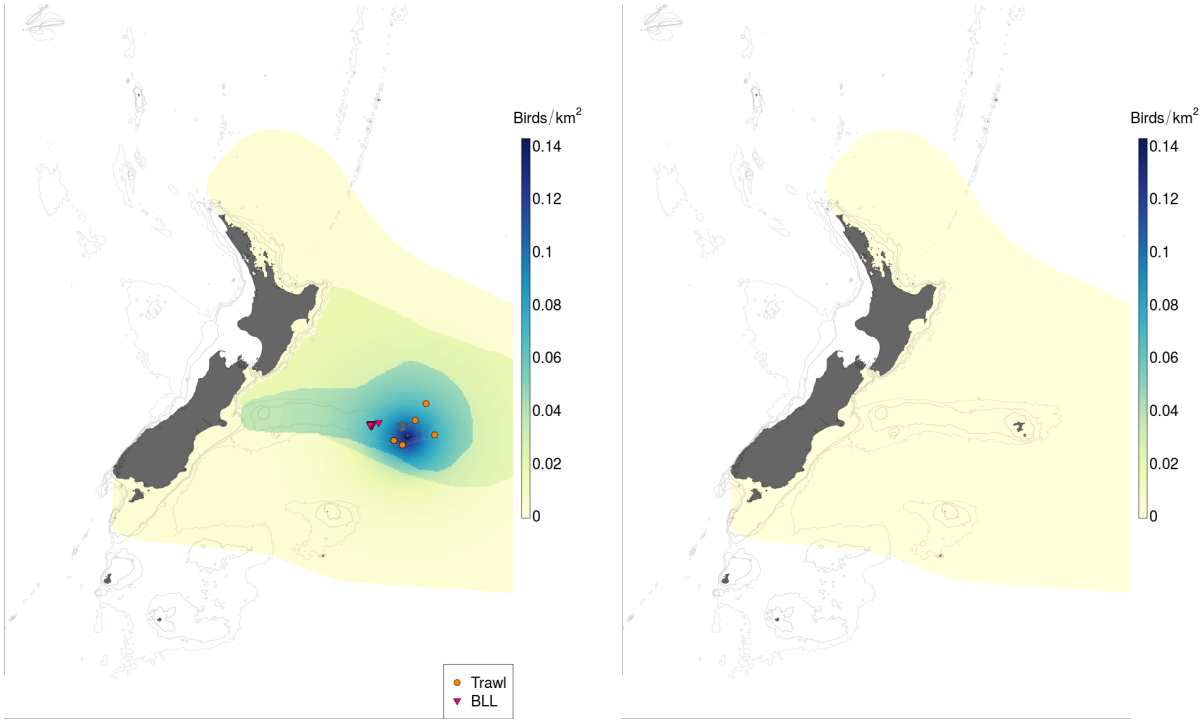



**Figure S-8: Relative density of Chatham Island albatross (*Thalassarche eremita*). The breeding season runs from August to May. Also shown are incidental captures recorded by observers between the 2006–07 and 2012–13 fishing years in trawl and bottom-longline (BLL) fisheries.**

## S.9 Grey-headed albatross (*Thalassarche chrysostoma*)

| | | |
|---|---|---|
| Population (NZ) | 6600 pairs [1997] | Agreement on the Conservation of Albatrosses and Petrels (ACAP) (2010) |
| Age at first reproduction | 7 to 13 years | Schreiber & Burger (2001) |
| Survival rate | $95.3 \pm 0.9\%$ ($N = 225$) [1996] | Waugh et al. (1999) |

**(a) Breeding distribution** **(b) Non-breeding distribution**

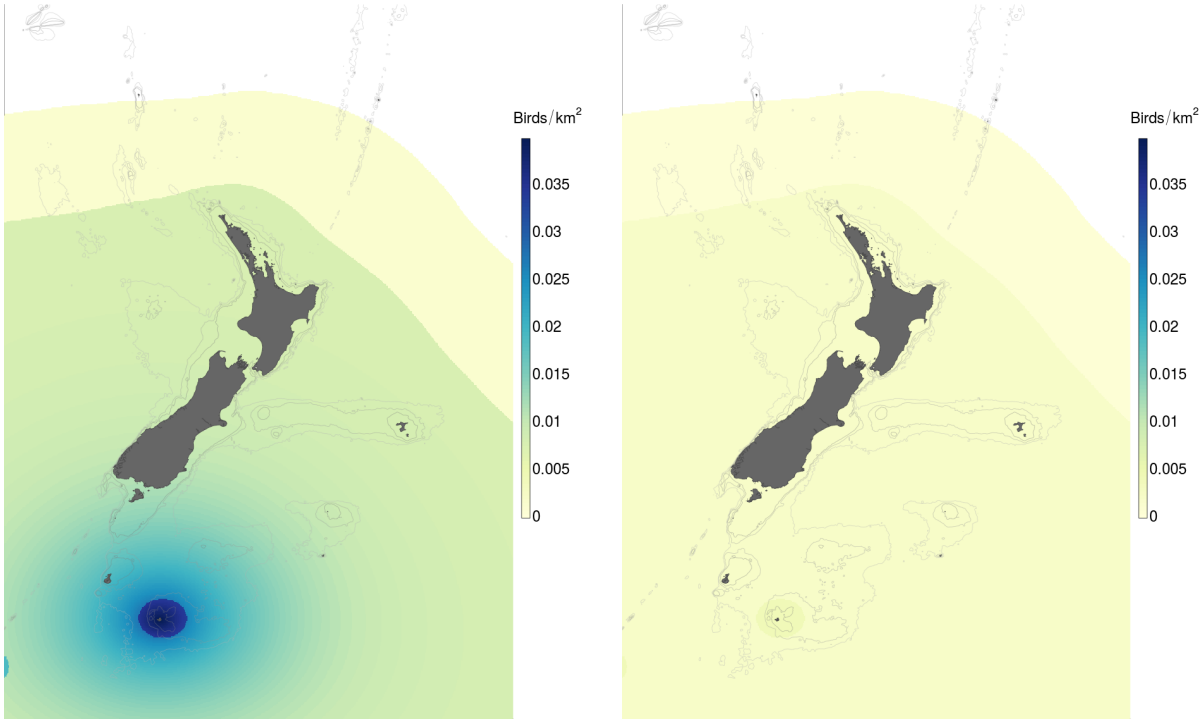



**Figure S-9: Relative density of grey-headed albatross (*Thalassarche chrysostoma*). The breeding season runs from September to May. No incidental capture was recorded by observers between the 2006–07 and 2012–13 fishing years in trawl, surface-longline (SLL), bottom-longline (BLL), and set-net (SN) fisheries.**

## S.10 Southern Buller's albatross (*Thalassarche bulleri bulleri*)

| | | |
|---|---|---|
| Population (NZ) | 13 625 pairs [2002] | Sagar & Stahl (2005) |
| Age at first reproduction | 12 years [2011] | Francis & Sagar (2012) |
| Survival rate | 93 to 98% [2011] | Francis & Sagar (2012) |

**(a) Breeding distribution** **(b) Non-breeding distribution**

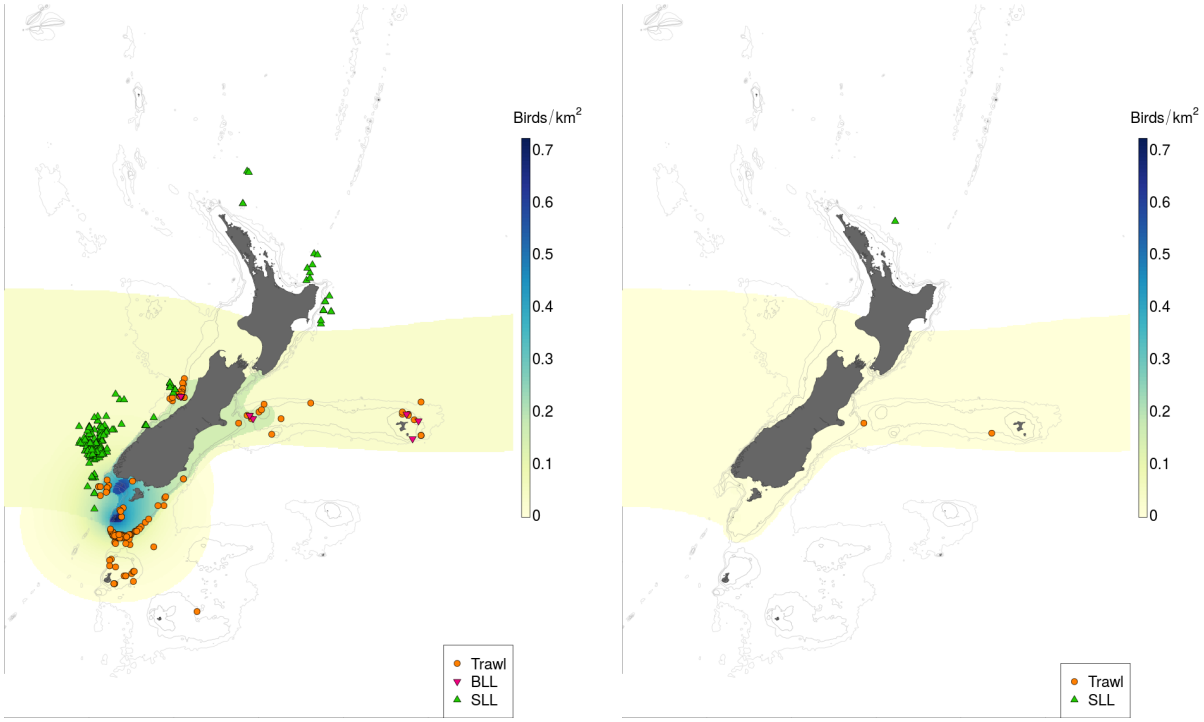
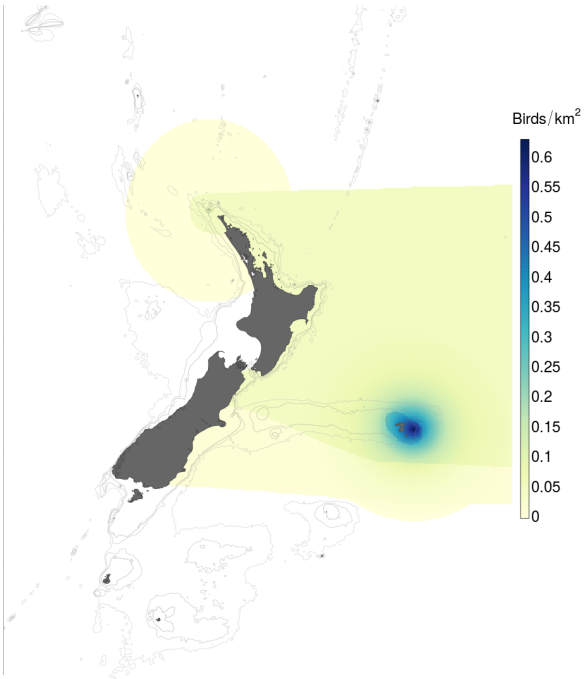



**Figure S-10: Relative density of southern Buller's albatross (*Thalassarche bulleri bulleri*). The breeding season runs from January to September. Also shown are incidental captures recorded by observers between the 2006–07 and 2012–13 fishing years in trawl, surface-longline (SLL), and bottom-longline (BLL) fisheries.**

## S.11 Northern Buller's albatross (*Thalassarche bulleri platei*)

| | | |
|---|---|---|
| Population (NZ) | 16 346 pairs [2008] | Agreement on the Conservation of Albatrosses and Petrels (ACAP) (2010) |
| Age at first reproduction | 12 years [2011] | Southern Buller's albatross as proxy, Francis & Sagar (2012) |
| Survival rate | 93.5 (93 – 98)% [2011] | Southern Buller's albatross as proxy, Francis & Sagar (2012) |

**(a) Breeding distribution**




**(b) Non-breeding distribution**

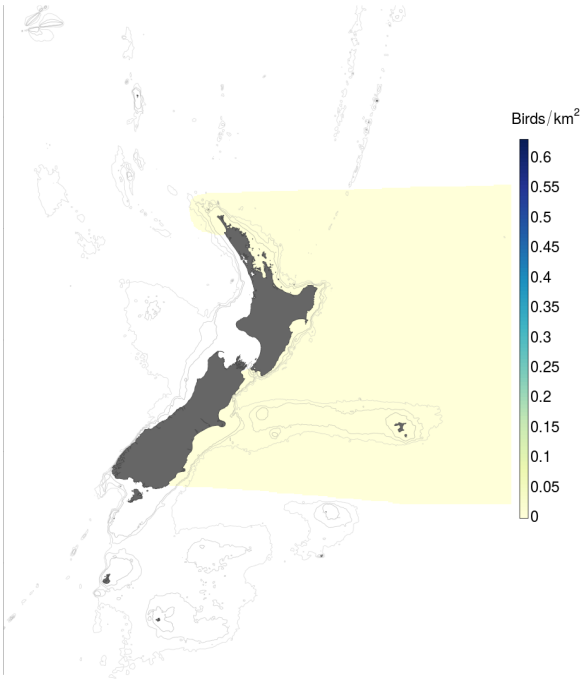



**Figure S-11: Relative density of northern Buller's albatross (*Thalassarche bulleri platei*). The breeding season runs from October to June. No incidental capture was recorded by observers between the 2006–07 and 2012–13 fishing years in trawl, surface-longline (SLL), bottom-longline (BLL), and set-net (SN) fisheries.**

## S.12 Light-mantled sooty albatross (*Phoebetria palpebrata*)

| | | |
|---|---|---|
| Population (NZ) | 6770 to 6900 pairs | Taylor (2000a) |
| Age at first reproduction | 12 years | de L. Brooke (2004) |
| Survival rate | 96 to 98% [1997] | Gibson's albatross as proxy, Walker & Elliott (1999) |

**(a) Breeding distribution**

**(b) Non-breeding distribution**

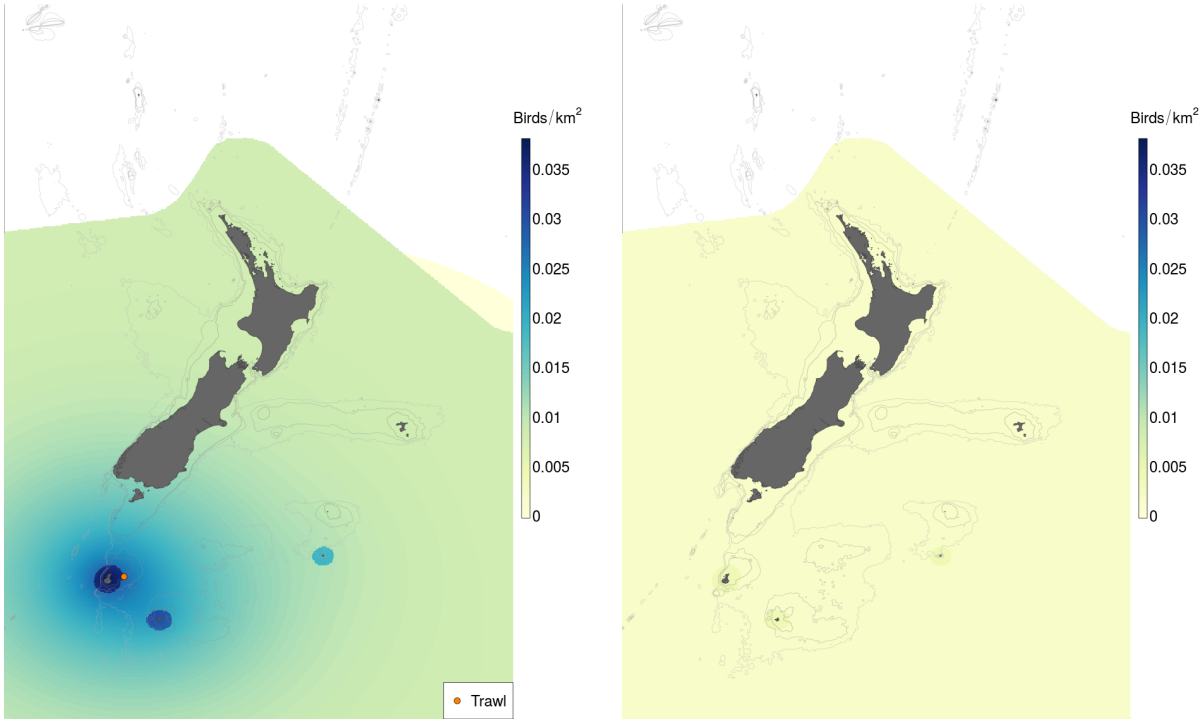



**Figure S-12: Relative density of light-mantled sooty albatross (*Phoebetria palpebrata*). The breeding season runs from September to June. Also shown are incidental captures recorded by observers between the 2006–07 and 2012–13 fishing years in trawl fisheries.**

## S.13 Northern giant petrel (*Macronectes halli*)

| | | |
|---|---|---|
| Population (NZ) | 2567 pairs [1993] | Agreement on the Conservation of Albatrosses and Petrels (ACAP) (2010) |
| Age at first reproduction | 6 to 10 years | Trivelpiece & Trivelpiece (1998) |
| Survival rate | 92.3% | de L. Brooke (2004) |
| | 88 to 93% [1981] | Agreement on the Conservation of Albatrosses and Petrels (ACAP) (2010) |
| | 88% [2003] | Agreement on the Conservation of Albatrosses and Petrels (ACAP) (2010) |

**(a) Breeding distribution**

**(b) Non-breeding distribution**

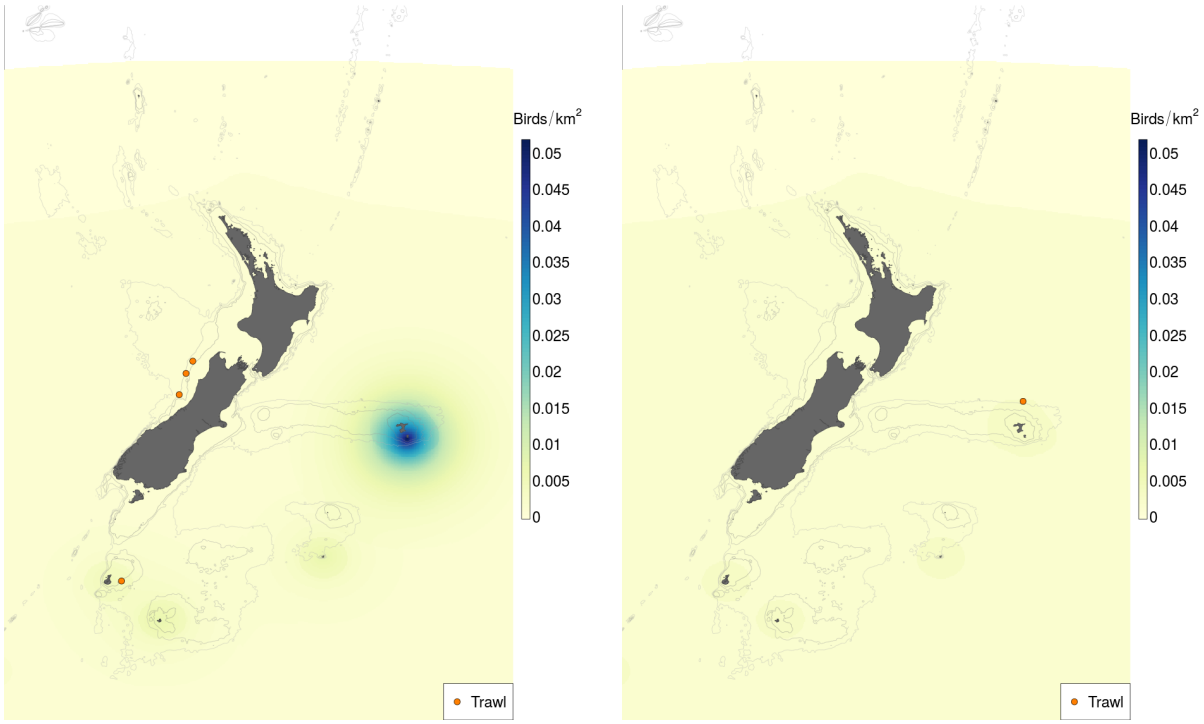



**Figure S-13: Relative density of northern giant petrel (*Macronectes halli*). The breeding season runs from August to February. Also shown are incidental captures recorded by observers between the 2006–07 and 2012–13 fishing years in trawl fisheries.**

## S.14 Grey petrel (*Procellaria cinerea*)

| | | |
|---|---|---|
| Population (NZ) | 50 000 pairs [2010] | Walker et al. (2015) |
| Age at first reproduction | 7 years | Barbraud et al. (2009) |
| Survival rate | 90 to 97% | White-chinned petrel as proxy, Dillingham & Fletcher (2008) |

**(a) Breeding distribution** **(b) Non-breeding distribution**

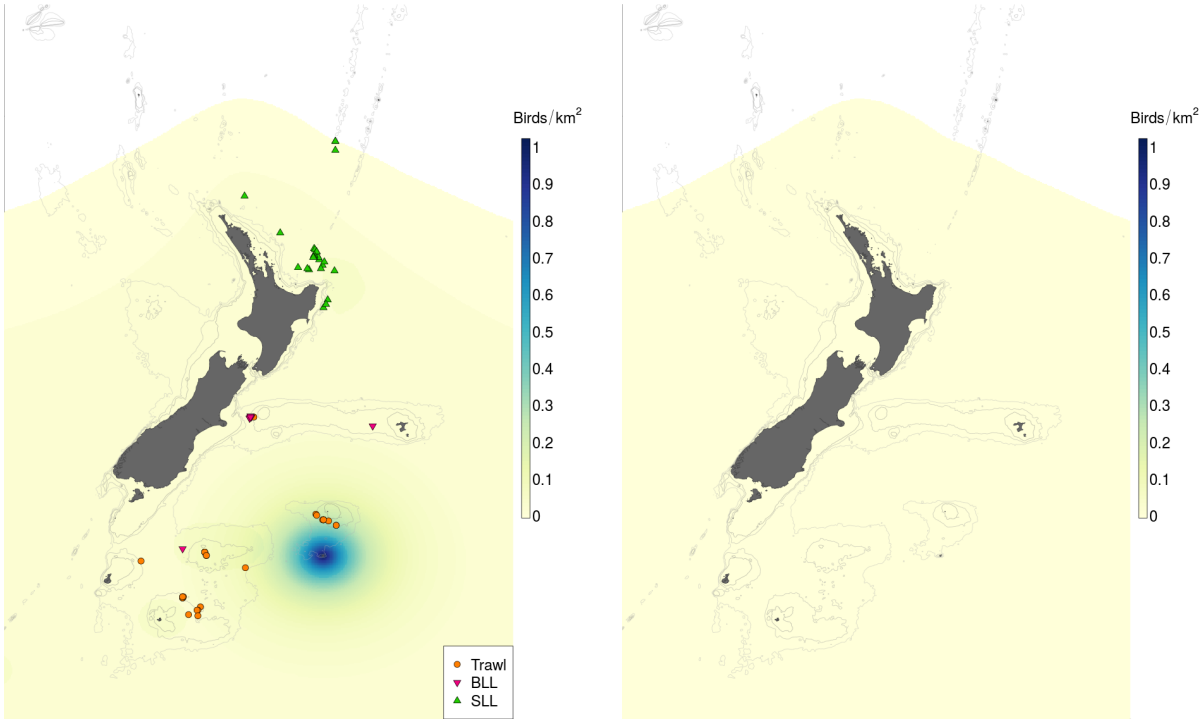
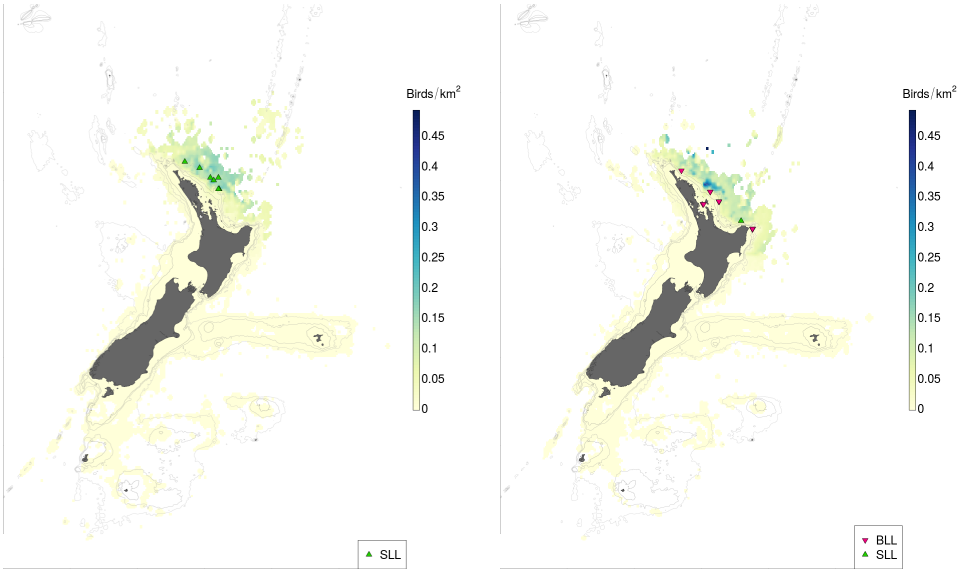



**Figure S-14: Relative density of grey petrel (*Procellaria cinerea*). The breeding season runs from February to November. Also shown are incidental captures recorded by observers between the 2006–07 and 2012–13 fishing years in trawl, surface-longline (SLL), and bottom-longline (BLL) fisheries.**

## S.15 Black petrel (*Procellaria parkinsoni*)

| | | |
|---|---|---|
| Population (NZ) | 4627 (95% c.i.: 1972 – 9777) pairs | Richard & Abraham (2015) |
| Age at first reproduction | 6.6 ± 0.2 years [2010] | Bell et al. (2011) |
| Survival rate | 95% | Walker et al. (2015) |

**(a) Pre-egg laying (Oct–Nov)** **(b) Incubation (Dec–Jan)**




**(c) Chick rearing (Feb–May)**

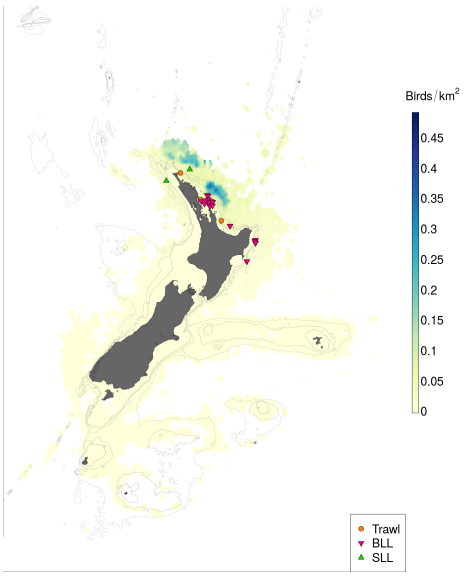



**Figure S-15: Relative density of black petrel (*Procellaria parkinsoni*). The breeding season runs from October to May. Also shown are incidental captures recorded by observers between the 2006–07 and 2012–13 fishing years in trawl, surface-longline (SLL), and bottom-longline (BLL) fisheries.**

## S.16 Westland petrel (*Procellaria westlandica*)

| | | |
|---|---|---|
| Population (NZ) | 4000 pairs [2008] | Agreement on the Conservation of Albatrosses and Petrels (ACAP) (2010) |
| Age at first reproduction | 6.5 years [2002] | Waugh et al. (2006) |
| Survival rate | 90 to 97% | White-chinned petrel as proxy, Dillingham & Fletcher (2008) |

**(a) Breeding distribution**

**(b) Non-breeding distribution**

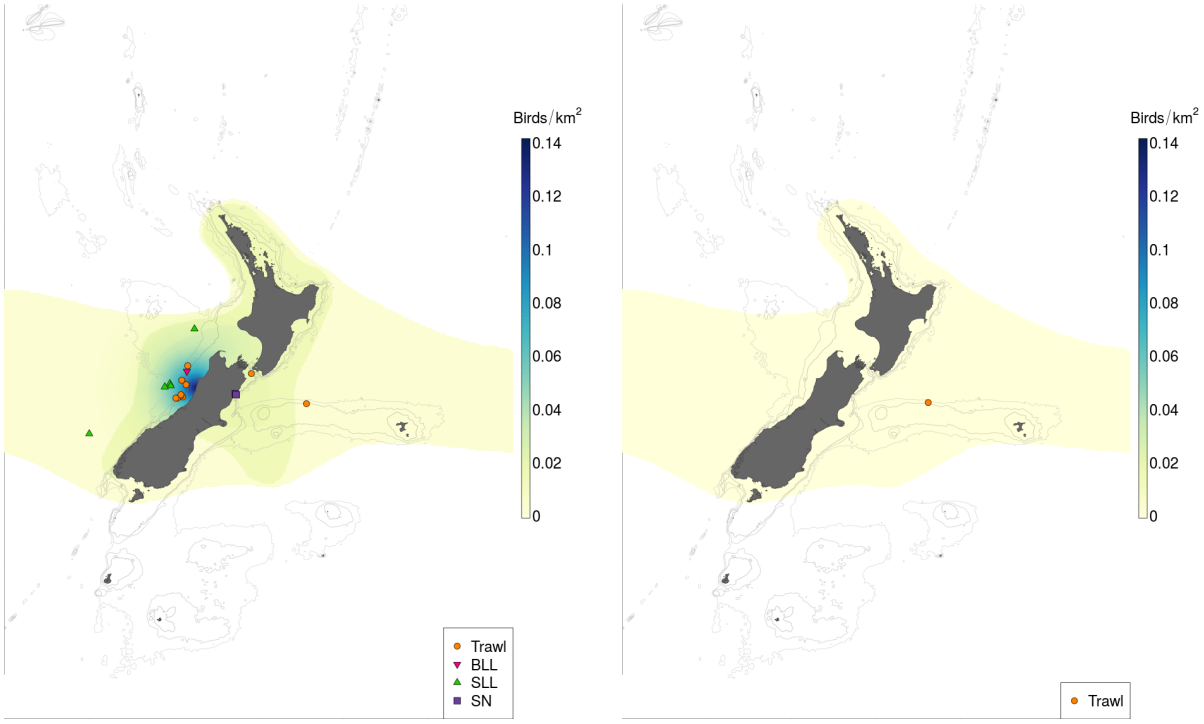
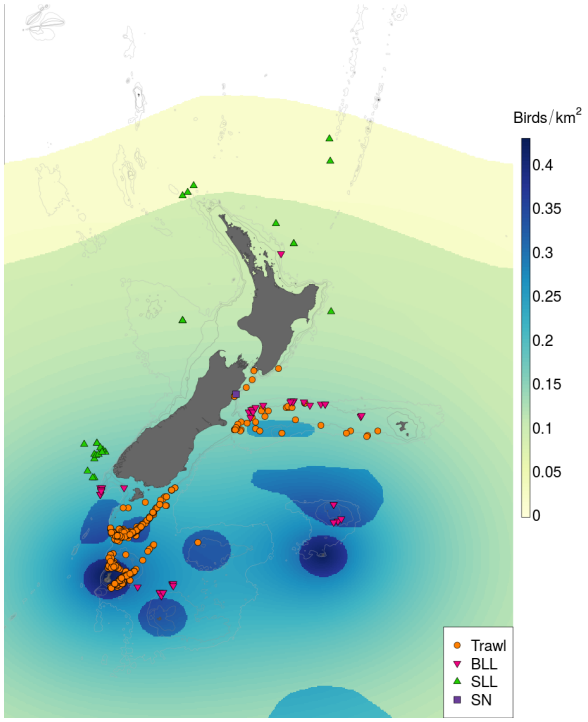



**Figure S-16: Relative density of Westland petrel (*Procellaria westlandica*). The breeding season runs from March to December. Also shown are incidental captures recorded by observers between the 2006–07 and 2012–13 fishing years in trawl, surface-longline (SLL), bottom-longline (BLL), and set-net (SN) fisheries.**

## S.17 White-chinned petrel (*Procellaria aequinoctialis*)

| | | |
|---|---|---|
| Population (NZ) | 168 725 pairs | Birdlife International (2012) |
| Age at first reproduction | 6.5 years | Schreiber & Burger (2001) |
| Survival rate | 90 to 97% | Dillingham & Fletcher (2008) |

**(a) Breeding distribution**




**(b) Non-breeding distribution**

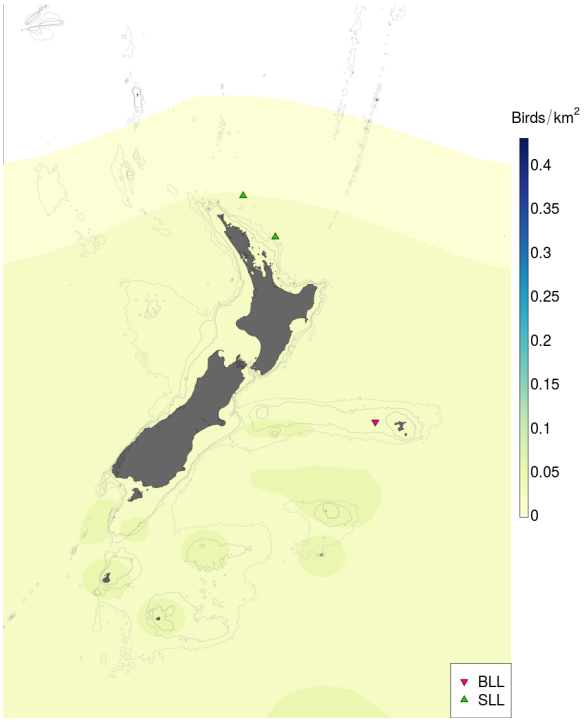



**Figure S-17: Relative density of white-chinned petrel (*Procellaria aequinoctialis*). The breeding season runs from October to May. Also shown are incidental captures recorded by observers between the 2006–07 and 2012–13 fishing years in trawl, surface-longline (SLL), bottom-longline (BLL), and set-net (SN) fisheries.**

## S.18 Flesh-footed shearwater (*Puffinus carneipes*)

| | | |
|---|---|---|
| Population (NZ) | 10 000 pairs [2013] | Walker et al. (2015) |
| Age at first reproduction | 4 to 9 years [1973] | Bradley et al. (1999) |
| Survival rate | 94% | Walker et al. (2015) |

**(a) Breeding distribution** **(b) Non-breeding distribution**

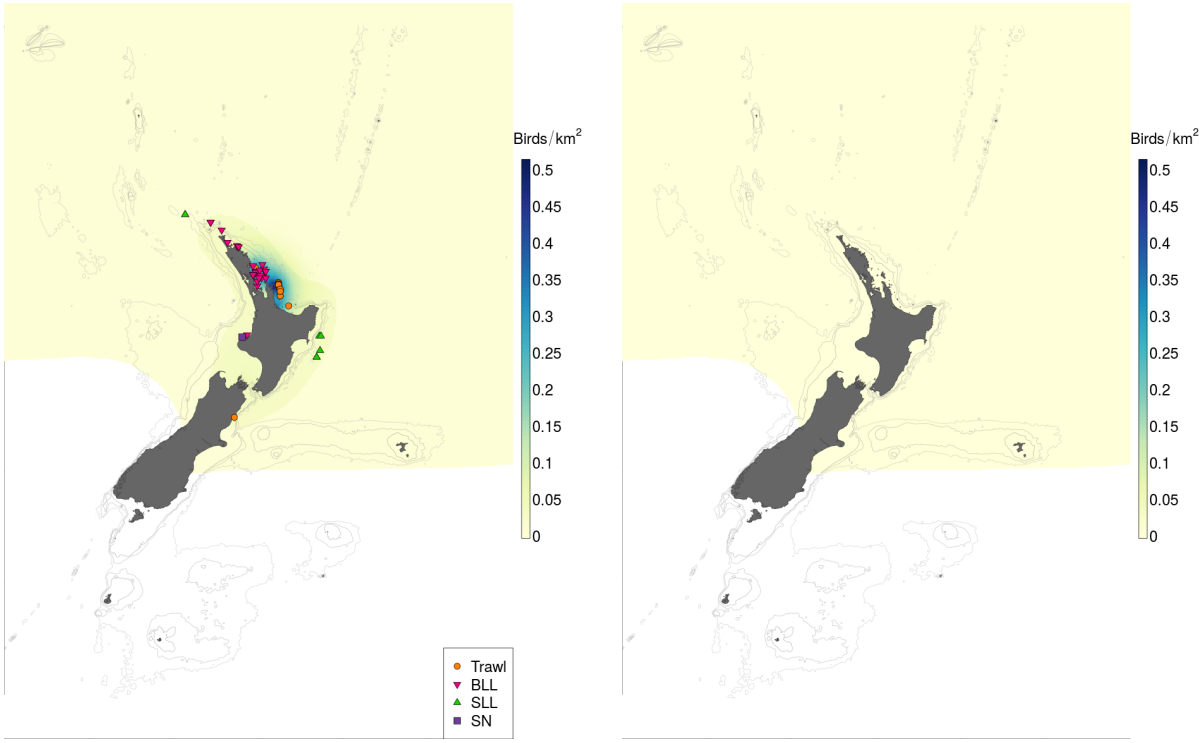
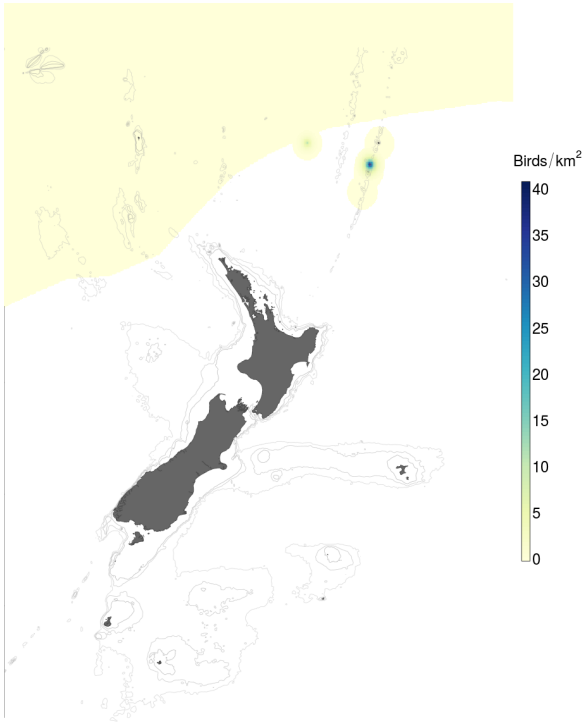



**Figure S-18: Relative density of flesh-footed shearwater (*Puffinus carneipes*). The breeding season runs from October to May. Also shown are incidental captures recorded by observers between the 2006–07 and 2012–13 fishing years in trawl, surface-longline (SLL), bottom-longline (BLL), and set-net (SN) fisheries.**

## S.19 Wedge-tailed shearwater (*Puffinus pacificus*)

| | | |
|---|---|---|
| Population (NZ) | 52 500 to 60 000 pairs | Taylor (2000b) |
| Age at first reproduction | 4 years | Schreiber & Burger (2001) |
| Survival rate | 93.1 (88.9 – 95.8)% [1999] | Hutton's shearwater as proxy, Cuthbert & Davis (2002) |

**(a) Breeding distribution**




**(b) Non-breeding distribution**

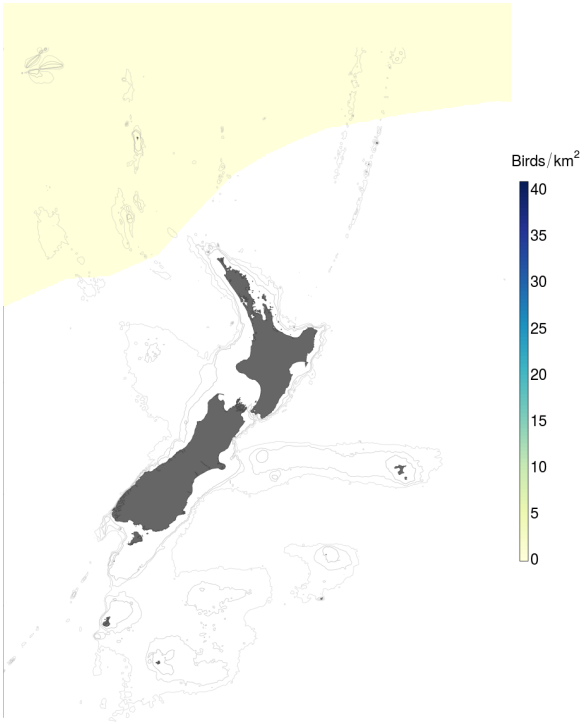
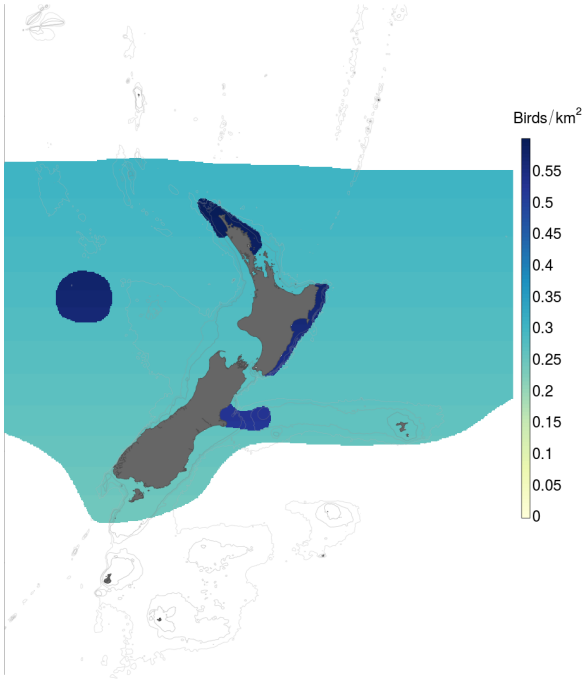



**Figure S-19: Relative density of wedge-tailed shearwater (*Puffinus pacificus*). The breeding season runs from October to May. No incidental capture was recorded by observers between the 2006–07 and 2012–13 fishing years in trawl, surface-longline (SLL), bottom-longline (BLL), and set-net (SN) fisheries.**

## S.20 Buller's shearwater (*Puffinus bulleri*)

| | | |
|---|---|---|
| Population (NZ) | 200 000 pairs | de L. Brooke (2004) |
| Age at first reproduction | 4 to 9 years [1973] | Bradley et al. (1999) |
| Survival rate | 92% | Short-tailed shearwater as proxy, de L. Brooke (2004) |

**(a) Breeding distribution**




**(b) Non-breeding distribution**

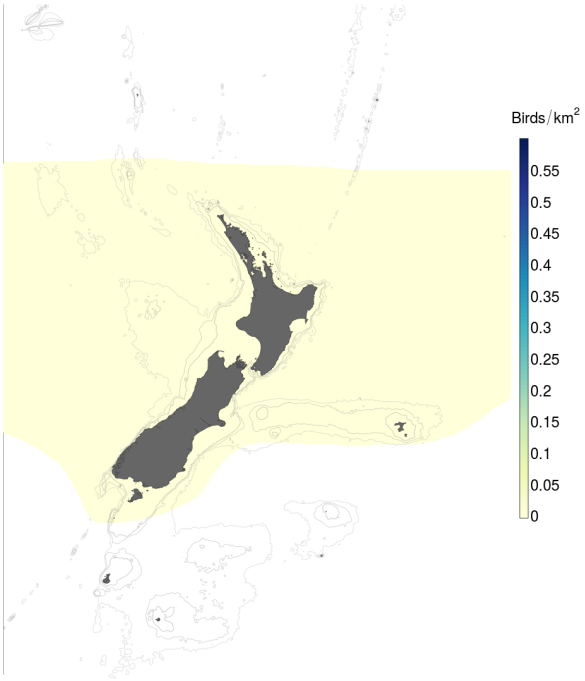



**Figure S-20: Relative density of Buller's shearwater (*Puffinus bulleri*). The breeding season runs from September to May. No incidental capture was recorded by observers between the 2006–07 and 2012–13 fishing years in trawl, surface-longline (SLL), bottom-longline (BLL), and set-net (SN) fisheries.**

## S.21 Sooty shearwater (*Puffinus griseus*)

| | | |
|---|---|---|
| Population (NZ) | 5 000 000 pairs | Taylor (2000b) |
| Age at first reproduction | 5 to 7 years | de L. Brooke (2004) |
| Survival rate | 86 to 97.9% [2005] | Clucas et al. (2008) |

**(a) Breeding distribution**

**(b) Non-breeding distribution**

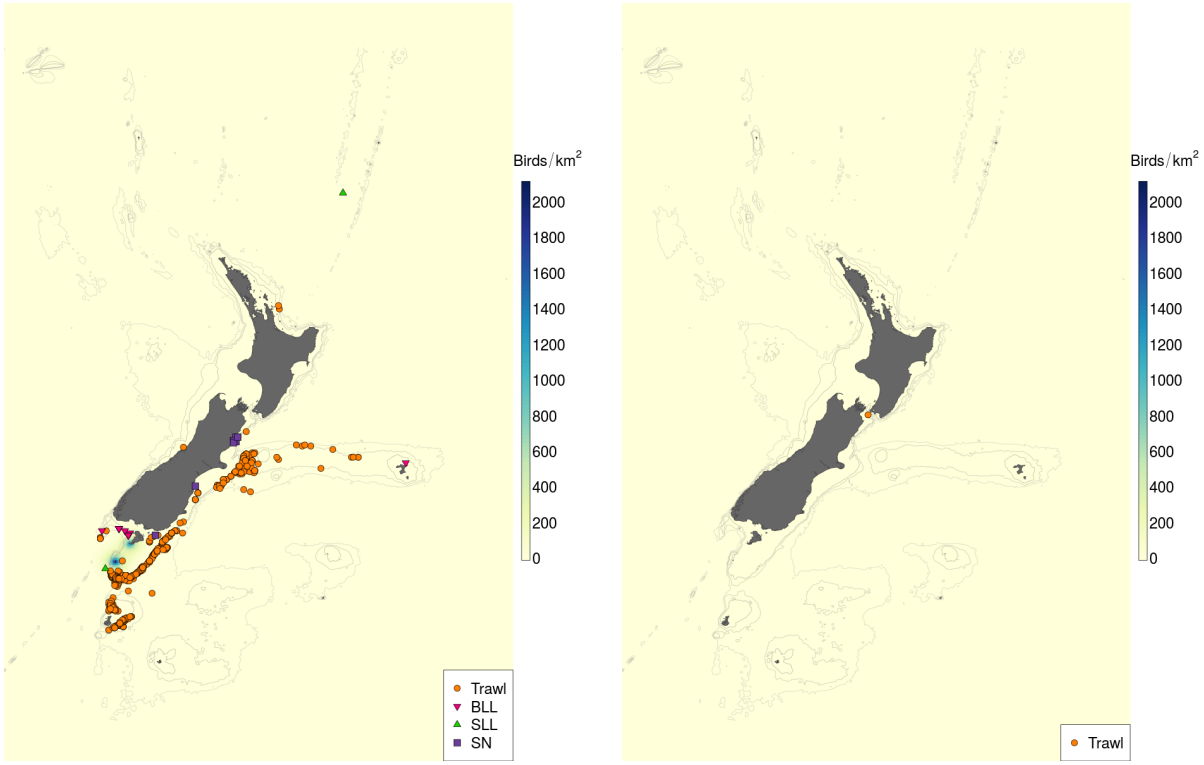



**Figure S-21: Relative density of sooty shearwater (*Puffinus griseus*). The breeding season runs from October to May. Also shown are incidental captures recorded by observers between the 2006–07 and 2012–13 fishing years in trawl, surface-longline (SLL), bottom-longline (BLL), and set-net (SN) fisheries.**

## S.22 Fluttering shearwater (*Puffinus gavia*)

| | | |
|---|---|---|
| Population (NZ) | 20 000 to 200 000 pairs | Taylor (2000b) |
| Age at first reproduction | 4 to 6 years | Hutton's shearwater as proxy, Waugh et al. (1999) |
| Survival rate | 93.1 (88.9 – 95.8)% [1999] | Hutton's shearwater as proxy, Cuthbert & Davis (2002) |

**(a) Breeding distribution** **(b) Non-breeding distribution**

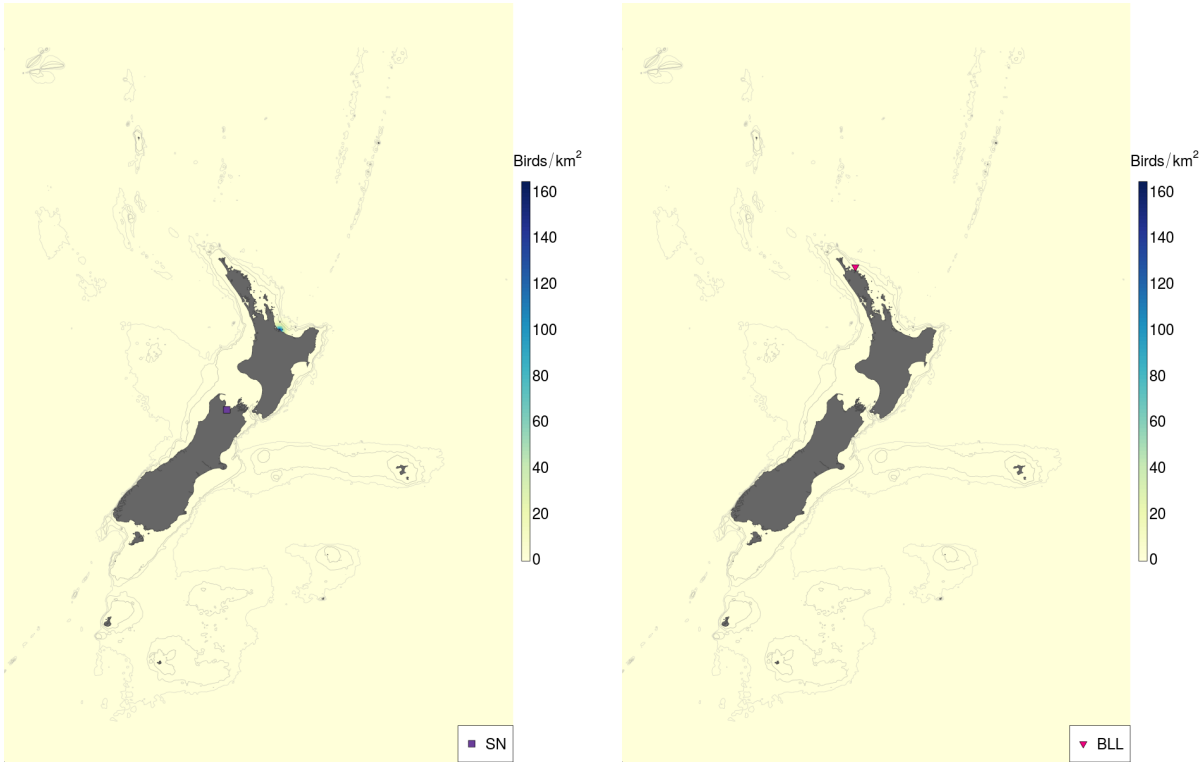
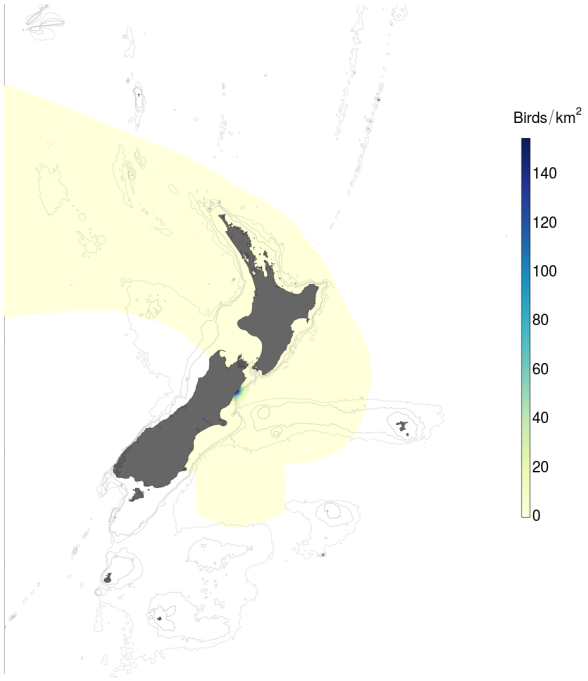



**Figure S-22: Relative density of fluttering shearwater (*Puffinus gavia*). The breeding season runs from July to February. Also shown are incidental captures recorded by observers between the 2006–07 and 2012–13 fishing years in bottom-longline (BLL) and set-net (SN) fisheries.**

## S.23 Hutton's shearwater (*Puffinus huttoni*)

| | | |
|---|---|---|
| Population (NZ) | 94 000 pairs | Taylor (2000a) |
| Age at first reproduction | 4 to 6 years | Waugh et al. (1999) |
| Survival rate | 93.1 (88.9 – 95.8)% [1999] | Cuthbert & Davis (2002) |

**(a) Breeding distribution**




**(b) Non-breeding distribution**

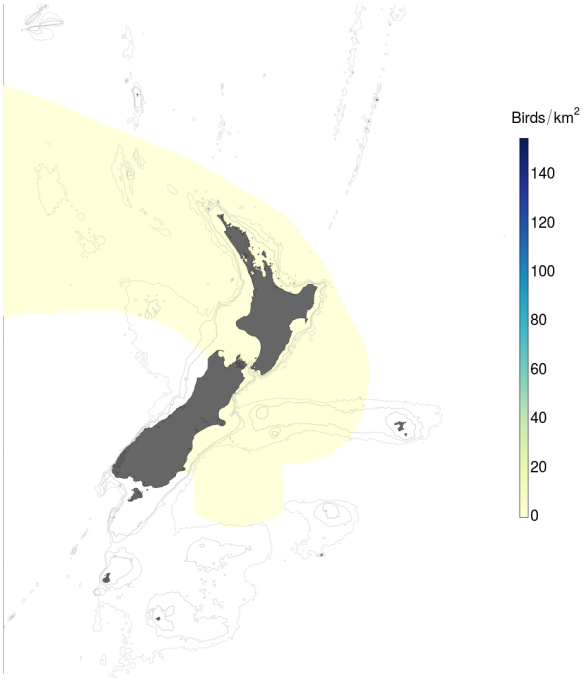
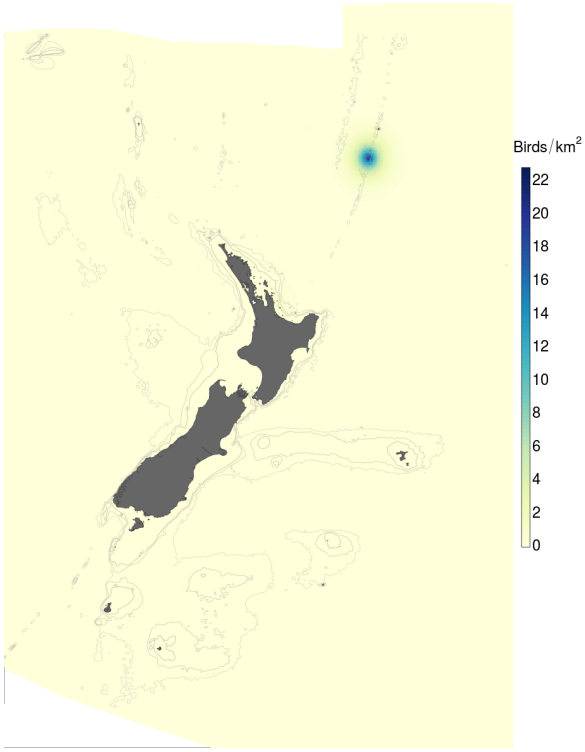



**Figure S-23: Relative density of Hutton's shearwater (*Puffinus huttoni*). The breeding season runs from September to April. No incidental capture was recorded by observers between the 2006–07 and 2012–13 fishing years in trawl, surface-longline (SLL), bottom-longline (BLL), and set-net (SN) fisheries.**

## S.24 Little shearwater (*Puffinus assimilis*)

| | | |
|---|---|---|
| Population (NZ) | 100 000 to 220 000 pairs | Taylor (2000a) |
| Age at first reproduction | 4 to 6 years | Hutton's shearwater as proxy, Waugh et al. (1999) |
| Survival rate | 93.1 (88.9 – 95.8)% [1999] | Hutton's shearwater as proxy, Cuthbert & Davis (2002) |

**(a) Breeding distribution**




**(b) Non-breeding distribution**

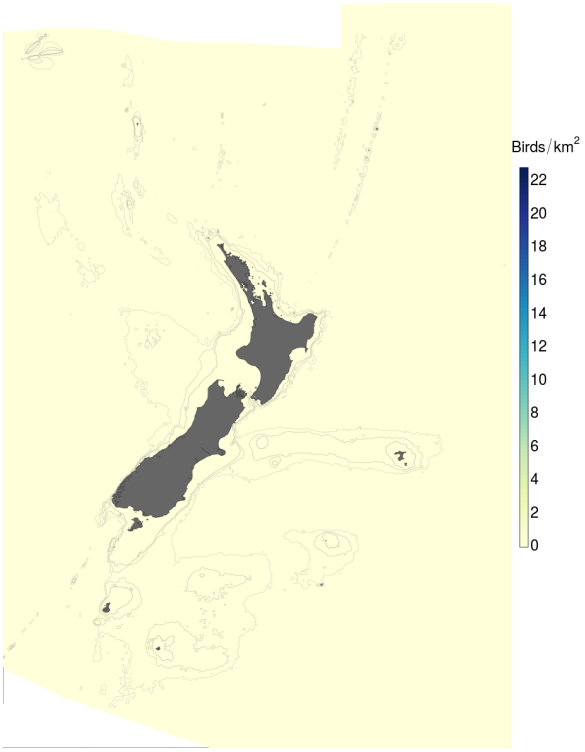
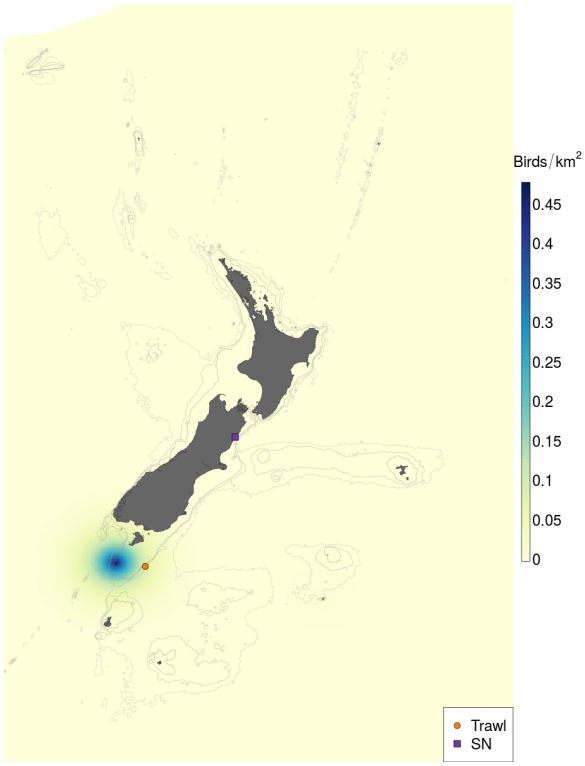



**Figure S-24: Relative density of little shearwater (*Puffinus assimilis*). The breeding season runs from April to November. No incidental capture was recorded by observers between the 2006–07 and 2012–13 fishing years in trawl, surface-longline (SLL), bottom-longline (BLL), and set-net (SN) fisheries.**

## S.25 Snares Cape petrel (*Daption capense australe*)

| | | |
|---|---|---|
| Population (NZ) | 8420 pairs | de L. Brooke (2004) |
| Age at first reproduction | 6 years<br>3 to 5 years [1968] | Schreiber & Burger (2001)<br>Beck (1969) |
| Survival rate | 77.1 to 93.9% [1987] | Sagar et al. (1996) |

**(a) Breeding distribution**




**(b) Non-breeding distribution**

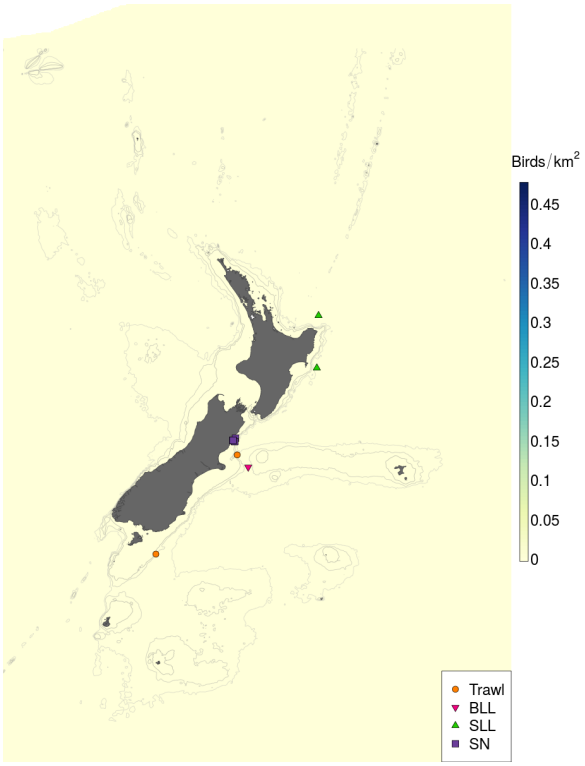



**Figure S-25: Relative density of Snares Cape petrel (*Daption capense australe*). The breeding season runs from November to February. Also shown are incidental captures recorded by observers between the 2006–07 and 2012–13 fishing years in trawl, surface-longline (SLL), bottom-longline (BLL), and set-net (SN) fisheries.**

## S.26 Fairy prion (*Pachyptila turtur*)

| | | |
|---|---|---|
| Population (NZ) | more than 1 000 000 pairs | Taylor (2000b) |
| Age at first reproduction | 4 to 5 years | Schreiber & Burger (2001) |
| Survival rate | 84% | de L. Brooke (2004) |

**(a) Breeding distribution** **(b) Non-breeding distribution**

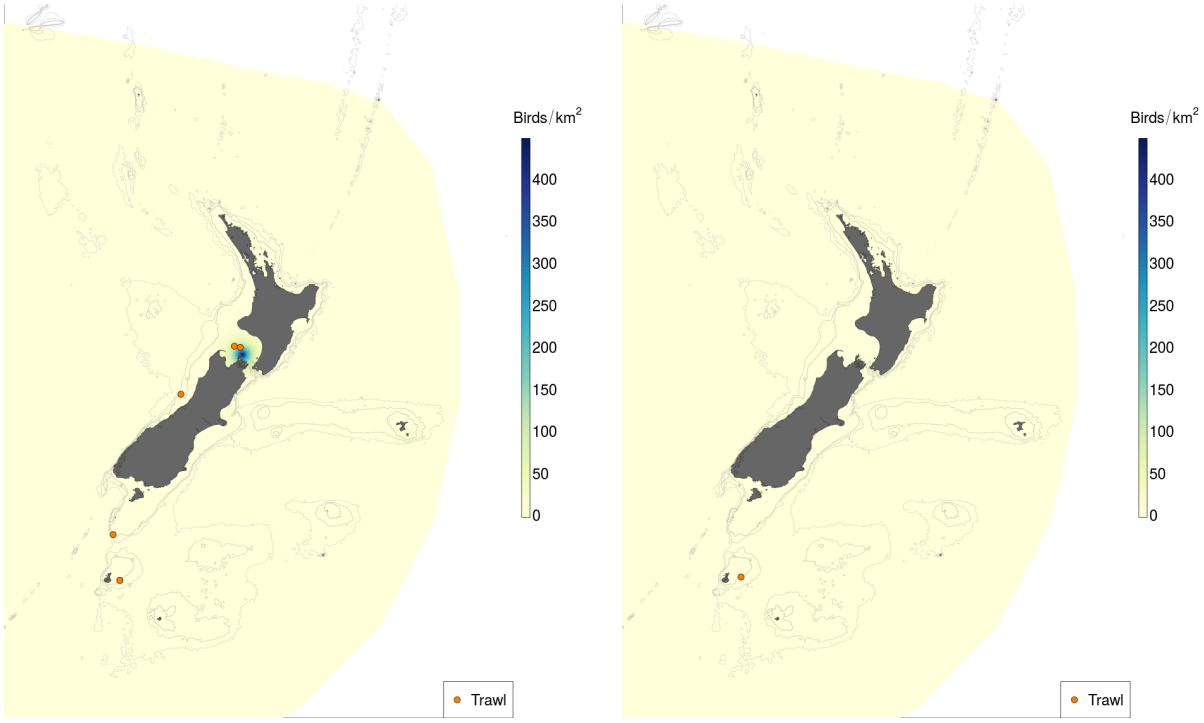



**Figure S-26: Relative density of fairy prion (*Pachyptila turtur*). The breeding season runs from March to January. Also shown are incidental captures recorded by observers between the 2006–07 and 2012–13 fishing years in trawl fisheries.**

## S.27 Antarctic prion (*Pachyptila desolata*)

| | | |
|---|---|---|
| Population (NZ) | 100 000 to 1 000 000 pairs | Taylor (2000b) |
| Age at first reproduction | 5 to 6 years | de L. Brooke (2004) |
| Survival rate | 84% | Fairy prion as proxy, de L. Brooke (2004) |

**(a) Breeding distribution**

**(b) Non-breeding distribution**

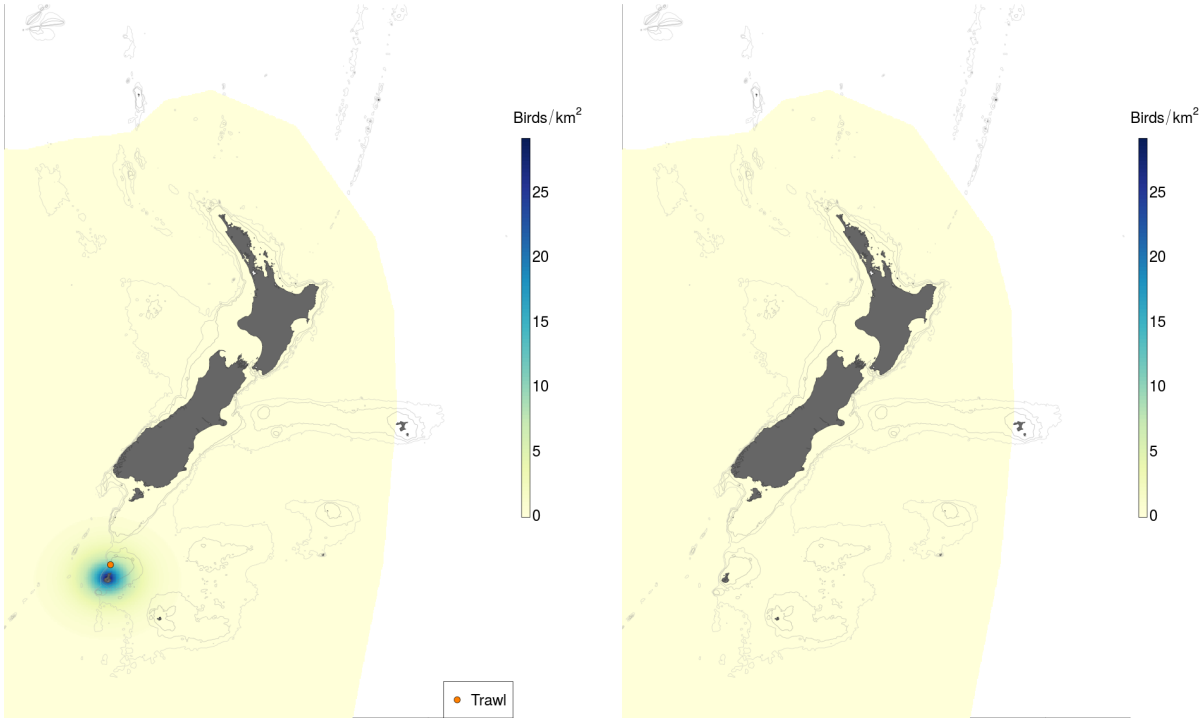
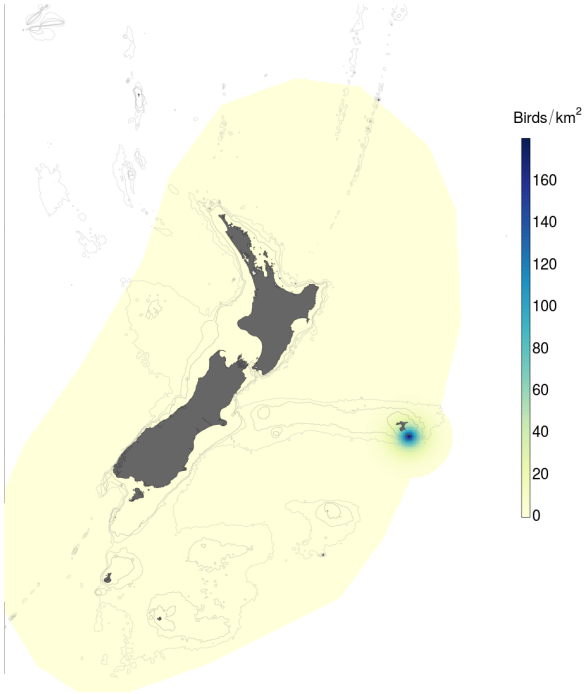



**Figure S-27: Relative density of Antarctic prion (*Pachyptila desolata*). The breeding season runs from November to March. Also shown are incidental captures recorded by observers between the 2006–07 and 2012–13 fishing years in trawl fisheries.**

## S.28 Broad-billed prion (*Pachyptila vittata*)

| | | |
|---|---|---|
| Population (NZ) | 1 000 000 pairs | de L. Brooke (2004) |
| Age at first reproduction | 4 to 5 years | Fairy prion as proxy, Schreiber & Burger (2001) |
| Survival rate | 84% | Fairy prion as proxy, de L. Brooke (2004) |

**(a) Breeding distribution**




**(b) Non-breeding distribution**

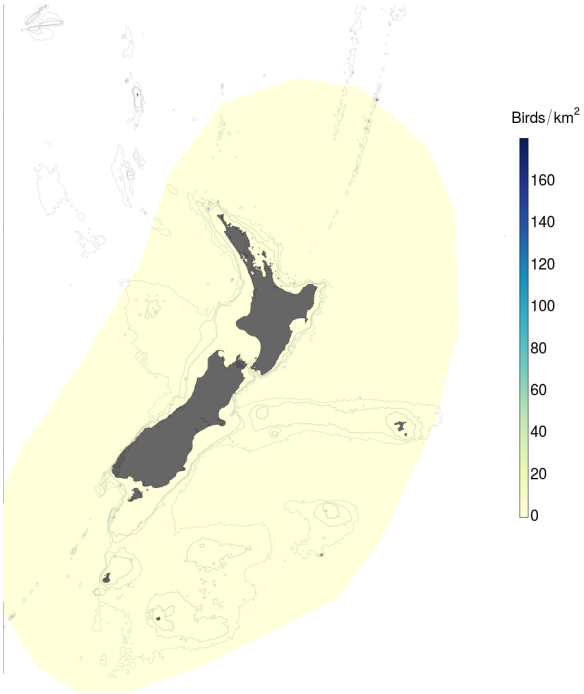
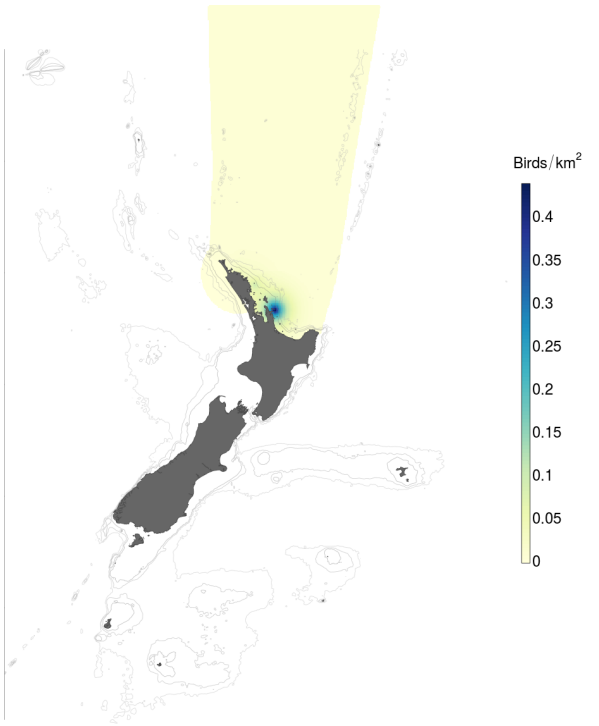



**Figure S-28: Relative density of broad-billed prion (*Pachyptila vittata*). The breeding season runs from February to January. No incidental capture was recorded by observers between the 2006–07 and 2012–13 fishing years in trawl, surface-longline (SLL), bottom-longline (BLL), and set-net (SN) fisheries.**

## S.29 Pycroft's petrel (*Pterodroma pycrofti*)

| | | |
|---|---|---|
| Population (NZ) | 2000 to 3000 pairs [1998] | Taylor (2000a) |
| Age at first reproduction | 6 to 7 years | Grey-faced petrel as proxy, Schreiber & Burger (2001) |
| Survival rate | 94% | Grey-faced petrel as proxy, Marchant & Higgins (1990) |

**(a) Breeding distribution**




**(b) Non-breeding distribution**

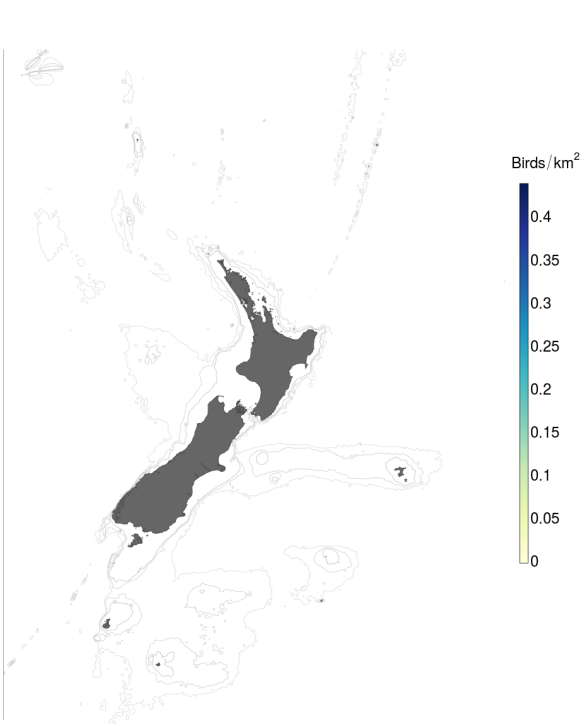
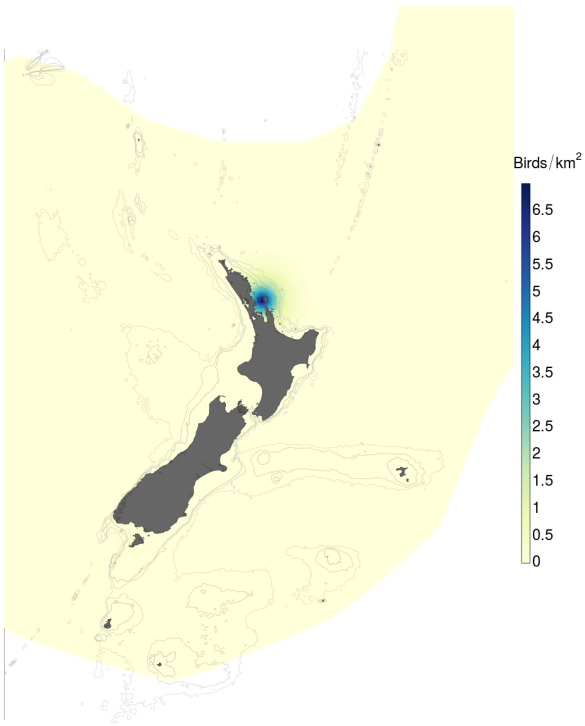



**Figure S-29: Relative density of Pycroft's petrel (*Pterodroma pycrofti*). The breeding season runs from October to April. No incidental capture was recorded by observers between the 2006–07 and 2012–13 fishing years in trawl, surface-longline (SLL), bottom-longline (BLL), and set-net (SN) fisheries.**

## S.30 Cook's petrel (*Pterodroma cookii*)

| | | |
|---|---|---|
| Population (NZ) | 50 000 to 60 000 pairs | Taylor (2000a) |
| Age at first reproduction | 6 to 7 years | Grey-faced petrel as proxy, Schreiber & Burger (2001) |
| Survival rate | 94% | Grey-faced petrel as proxy, Marchant & Higgins (1990) |

**(a) Breeding distribution**




**(b) Non-breeding distribution**

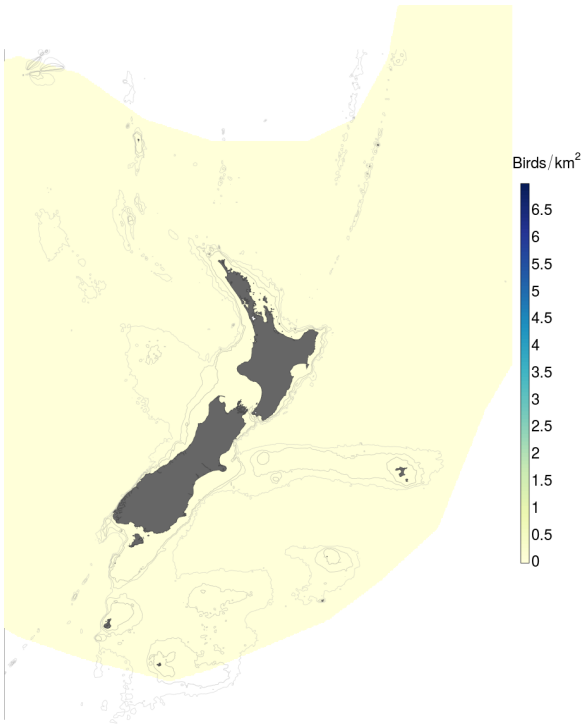
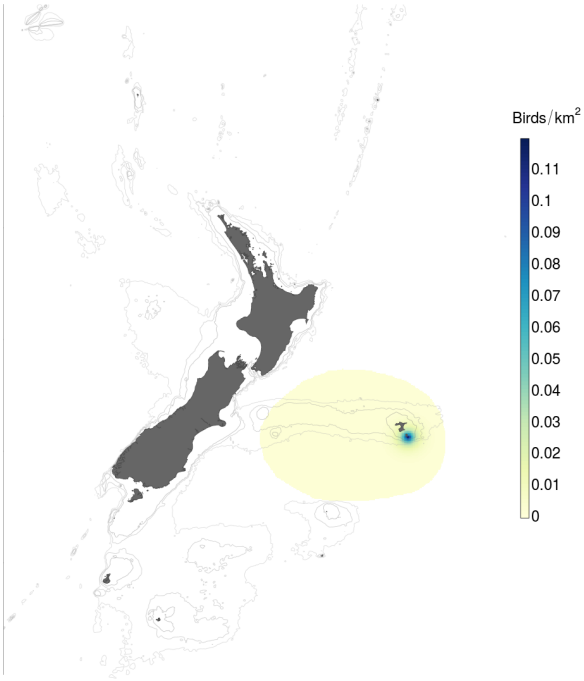



**Figure S-30: Relative density of Cook's petrel (*Pterodroma cookii*). The breeding season runs from September to April. No incidental capture was recorded by observers between the 2006–07 and 2012–13 fishing years in trawl, surface-longline (SLL), bottom-longline (BLL), and set-net (SN) fisheries.**

## S.31 Chatham petrel (*Pterodroma axillaris*)

| | | |
|---|---|---|
| Population (NZ) | 250 pairs [2009] | Birdlife International (2012) |
| Age at first reproduction | 6 to 7 years | Grey-faced petrel as proxy, Schreiber & Burger (2001) |
| Survival rate | 94% | Grey-faced petrel as proxy, Marchant & Higgins (1990) |

**(a) Breeding distribution**




**(b) Non-breeding distribution**

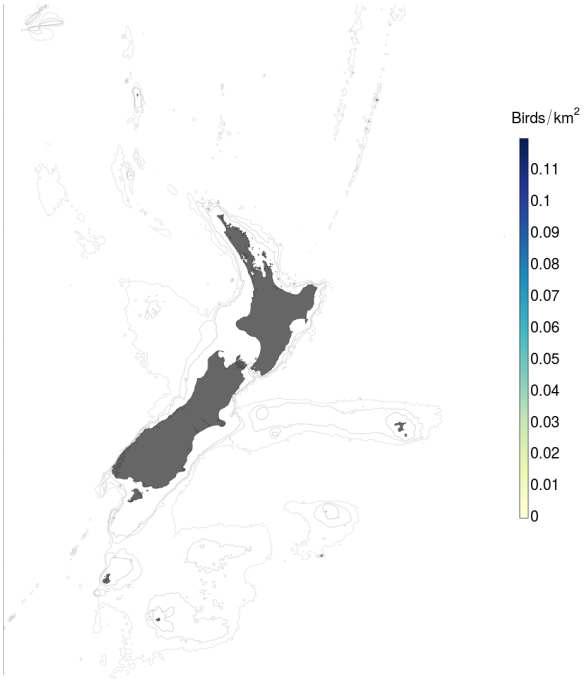



**Figure S-31: Relative density of Chatham petrel (*Pterodroma axillaris*). The breeding season runs from November to June. No incidental capture was recorded by observers between the 2006–07 and 2012–13 fishing years in trawl, surface-longline (SLL), bottom-longline (BLL), and set-net (SN) fisheries.**

## S.32 Mottled petrel (*Pterodroma inexpectata*)

| | | |
|---|---|---|
| Population (NZ) | 300 000 to 400 000 pairs [1999] | Taylor (2000b) |
| Age at first reproduction | 6 to 7 years | Grey-faced petrel as proxy, Schreiber & Burger (2001) |
| Survival rate | 94% | Grey-faced petrel as proxy, Marchant & Higgins (1990) |

**(a) Breeding distribution**

**(b) Non-breeding distribution**

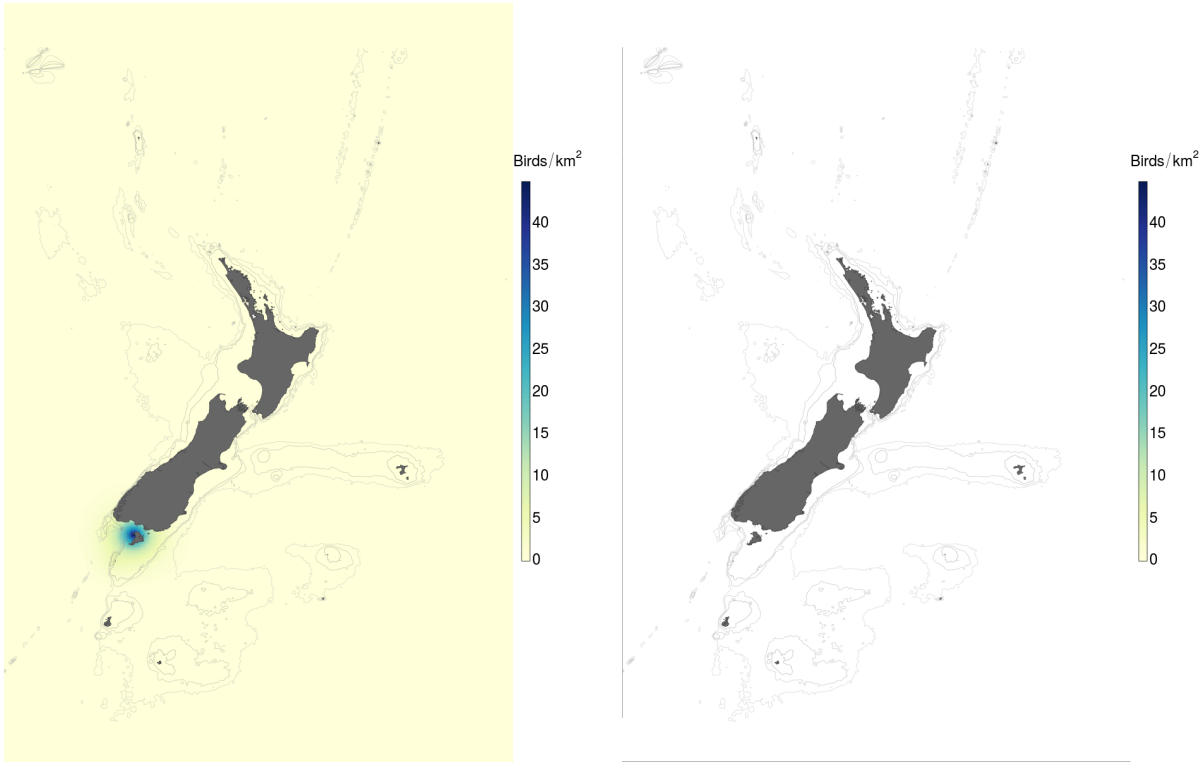
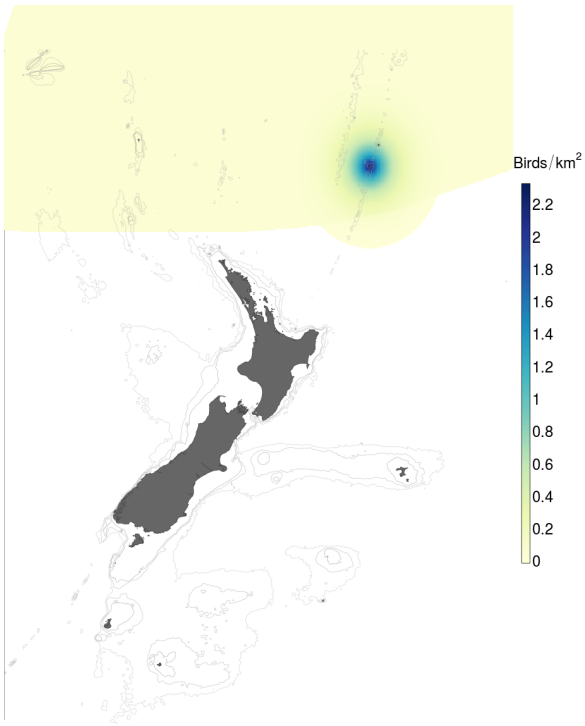



**Figure S-32: Relative density of mottled petrel (*Pterodroma inexpectata*). The breeding season runs from October to May. No incidental capture was recorded by observers between the 2006–07 and 2012–13 fishing years in trawl, surface-longline (SLL), bottom-longline (BLL), and set-net (SN) fisheries.**

## S.33 White-necked petrel (*Pterodroma cervicalis*)

| | | |
|---|---|---|
| Population (NZ) | 50 000 pairs [1988] | Taylor (2000a) |
| Age at first reproduction | 6 to 7 years | Grey-faced petrel as proxy, Schreiber & Burger (2001) |
| Survival rate | 94% | Grey-faced petrel as proxy, Marchant & Higgins (1990) |

**(a) Breeding distribution**




**(b) Non-breeding distribution**

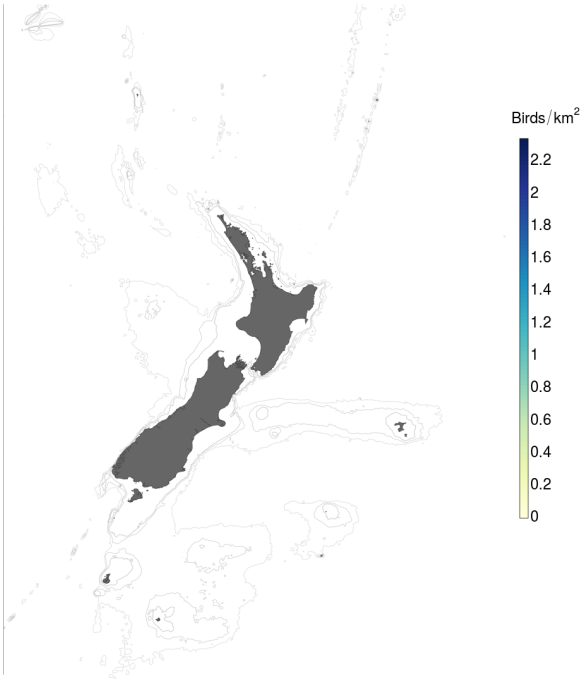



**Figure S-33: Relative density of white-necked petrel (*Pterodroma cervicalis*). The breeding season runs from October to May. No incidental capture was recorded by observers between the 2006–07 and 2012–13 fishing years in trawl, surface-longline (SLL), bottom-longline (BLL), and set-net (SN) fisheries.**

## S.34 Kermadec petrel (*Pterodroma neglecta*)

| | | |
|---|---|---|
| Population (NZ) | 5000 to 7000 pairs | Taylor (2000b) |
| Age at first reproduction | 6 to 7 years | Grey-faced petrel as proxy, Schreiber & Burger (2001) |
| Survival rate | 94% | Grey-faced petrel as proxy, Marchant & Higgins (1990) |

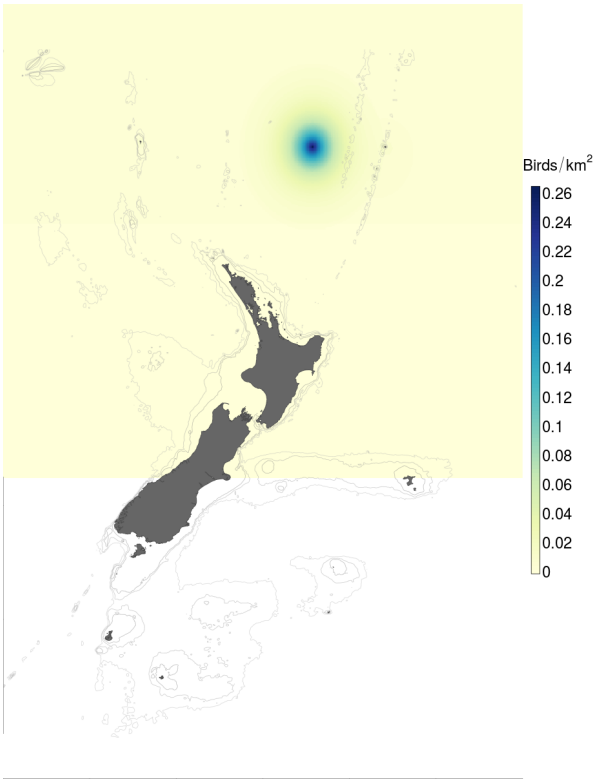
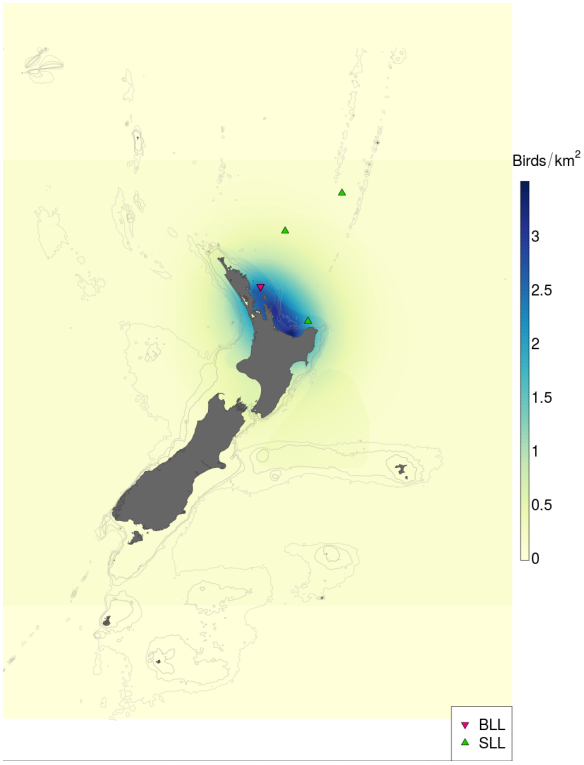



**Figure S-34: Relative density of Kermadec petrel (*Pterodroma neglecta*). No incidental capture was recorded by observers between the 2006–07 and 2012–13 fishing years in trawl, surface-longline (SLL), bottom-longline (BLL), and set-net (SN) fisheries.**

## S.35 Grey-faced petrel (*Pterodroma macroptera*)

| | | |
|---|---|---|
| Population (NZ) | 200 000 to 300 000 pairs | Taylor (2000b) |
| Age at first reproduction | 6 to 7 years | Schreiber & Burger (2001) |
| Survival rate | 94% | Marchant & Higgins (1990) |

**(a) Breeding distribution**




**(b) Non-breeding distribution**

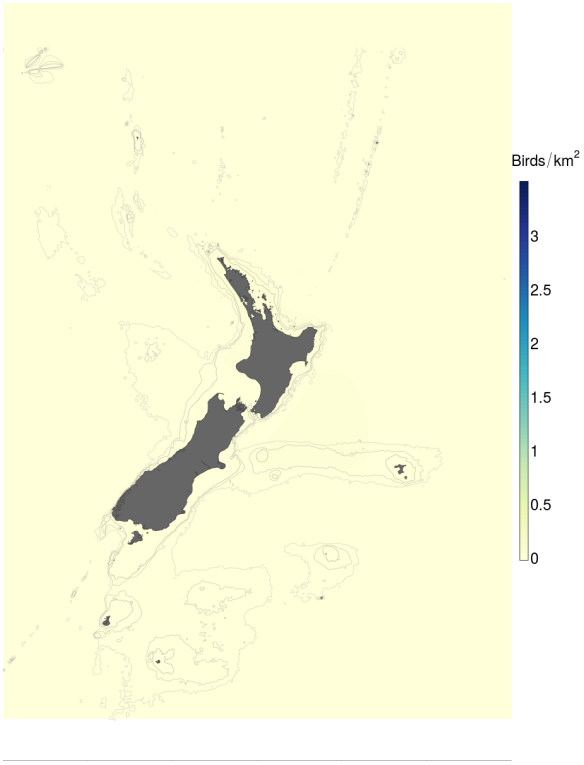



**Figure S-35: Relative density of grey-faced petrel (*Pterodroma macroptera*). The breeding season runs from March to January. Also shown are incidental captures recorded by observers between the 2006–07 and 2012–13 fishing years in surface-longline (SLL) and bottom-longline (BLL) fisheries.**

## S.36 Chatham Island taiko (*Pterodroma magentae*)

| | | |
|---|---|---|
| Population (NZ) | 17 pairs [2010] | Birdlife International (2012) |
| Age at first reproduction | 6 to 7 years | Grey-faced petrel as proxy, Schreiber & Burger (2001) |
| Survival rate | 94% | Grey-faced petrel as proxy, Marchant & Higgins (1990) |

**(a) Breeding distribution**

**(b) Non-breeding distribution**

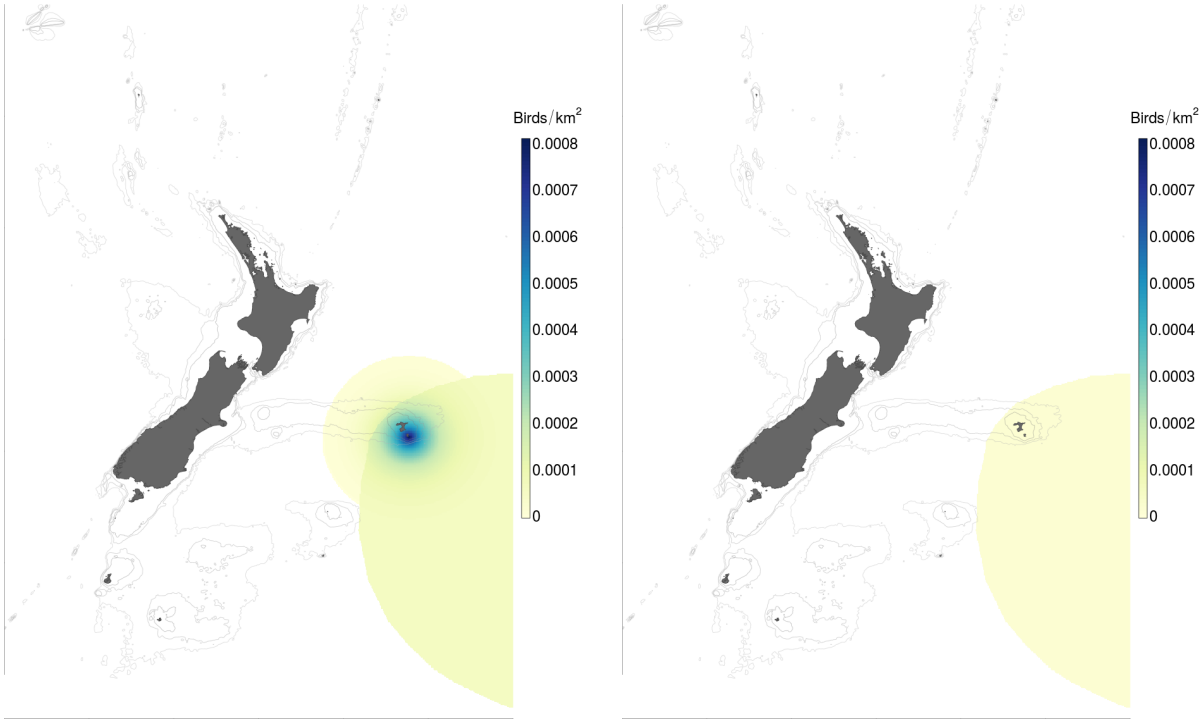
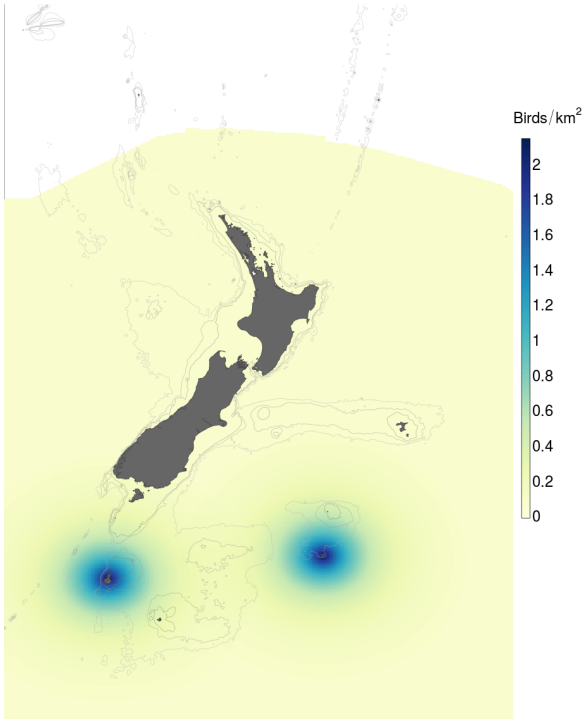



**Figure S-36: Relative density of Chatham Island taiko (*Pterodroma magentae*). The breeding season runs from September to May. No incidental capture was recorded by observers between the 2006–07 and 2012–13 fishing years in trawl, surface-longline (SLL), bottom-longline (BLL), and set-net (SN) fisheries.**

## S.37 White-headed petrel (*Pterodroma lessonii*)

| | | |
|---|---|---|
| Population (NZ) | 200 000 pairs | de L. Brooke (2004) |
| Age at first reproduction | 5.5 years | Schreiber & Burger (2001) |
| Survival rate | 94% | Grey-faced petrel as proxy, Marchant & Higgins (1990) |

**(a) Breeding distribution**




**(b) Non-breeding distribution**

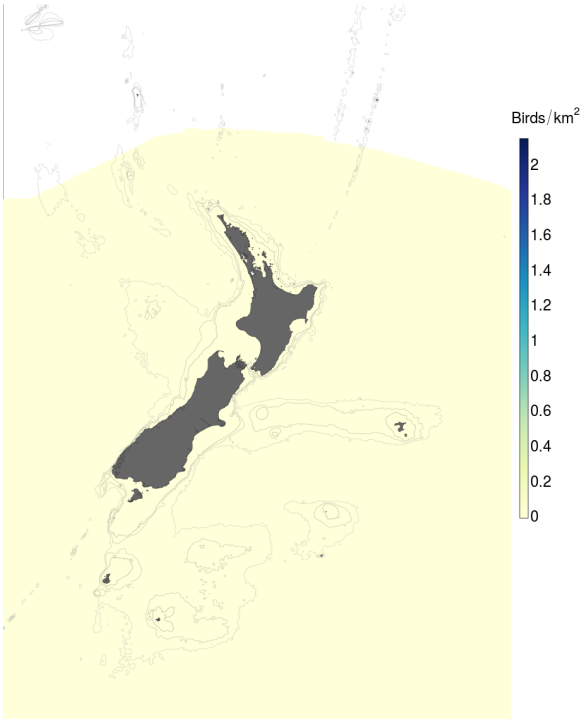
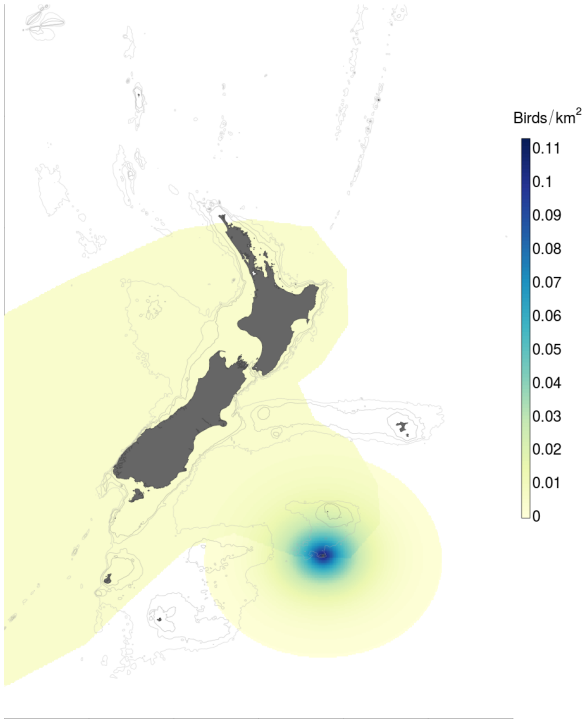



**Figure S-37: Relative density of white-headed petrel (*Pterodroma lessonii*). The breeding season runs from November to June. No incidental capture was recorded by observers between the 2006–07 and 2012–13 fishing years in trawl, surface-longline (SLL), bottom-longline (BLL), and set-net (SN) fisheries.**

## S.38 Soft-plumaged petrel (*Pterodroma mollis*)

| | | |
|---|---|---|
| Population (NZ) | 1000 to 9999 pairs | Taylor (2000b) |
| Age at first reproduction | 6 to 7 years | Grey-faced petrel as proxy, Schreiber & Burger (2001) |
| Survival rate | 94% | Grey-faced petrel as proxy, Marchant & Higgins (1990) |

**(a) Breeding distribution**




**(b) Non-breeding distribution**

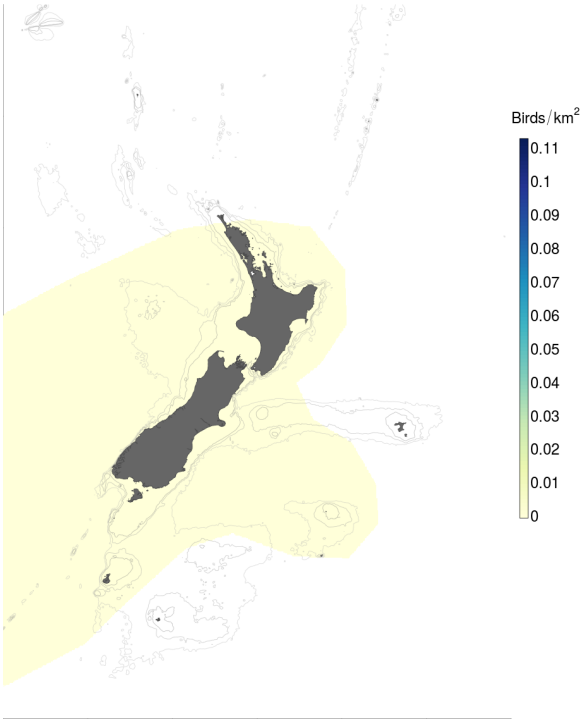



**Figure S-38: Relative density of soft-plumaged petrel (*Pterodroma mollis*). The breeding season runs from August to May. No incidental capture was recorded by observers between the 2006–07 and 2012–13 fishing years in trawl, surface-longline (SLL), bottom-longline (BLL), and set-net (SN) fisheries.**

## S.39 Common diving petrel (*Pelecanoides urinatrix*)

| | | |
|---|---|---|
| Population (NZ) | 300 000 to 2 150 000 pairs | Taylor (2000b) |
| Age at first reproduction | 2 to 3 years | de L. Brooke (2004) |
| Survival rate | 75 to 87% | Schreiber & Burger (2001) |

**(a) Breeding distribution**

**(b) Non-breeding distribution**

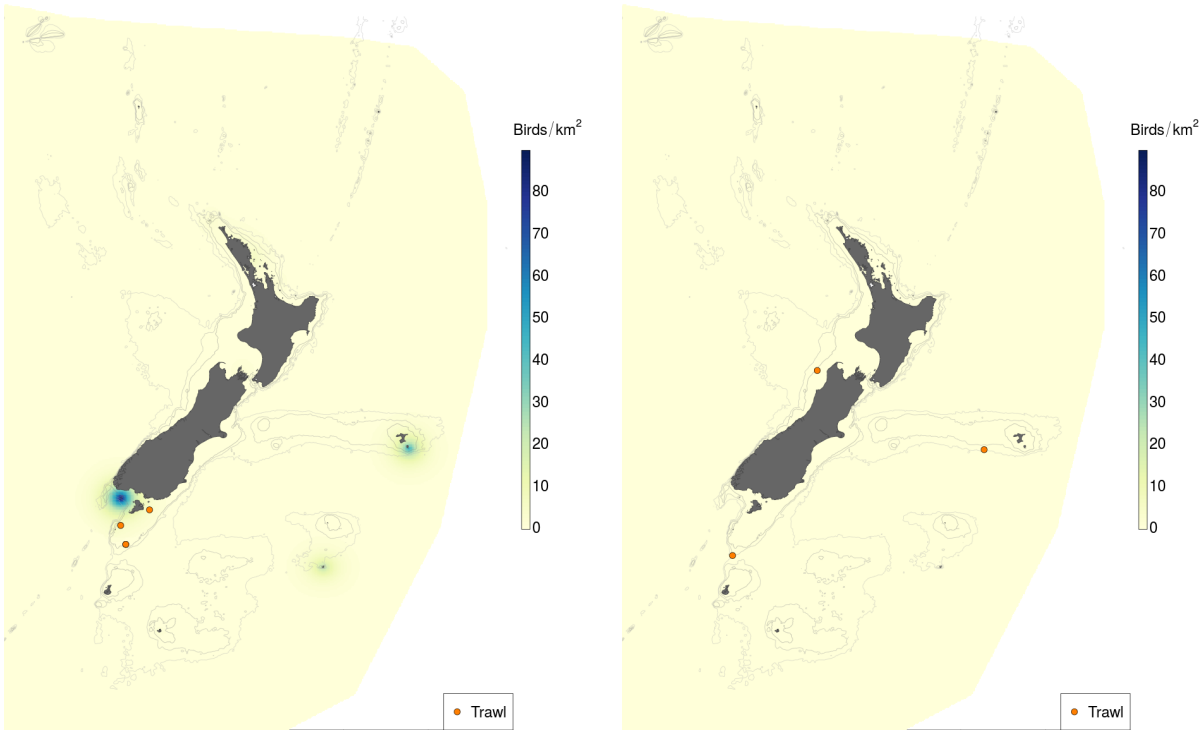



**Figure S-39: Relative density of common diving petrel (*Pelecanoides urinatrix*). The breeding season runs from September to March. Also shown are incidental captures recorded by observers between the 2006–07 and 2012–13 fishing years in trawl fisheries.**

## S.40 South Georgia diving petrel (*Pelecanoides georgicus*)

| | | |
|---|---|---|
| Population (NZ) | 64 pairs [1998] | Taylor (2000b) |
| Age at first reproduction | 2 to 3 years | Common diving petrel as proxy, de L. Brooke (2004) |
| Survival rate | 75 to 87% | Common diving petrel as proxy, Schreiber & Burger (2001) |

**(a) Breeding distribution**

**(b) Non-breeding distribution**

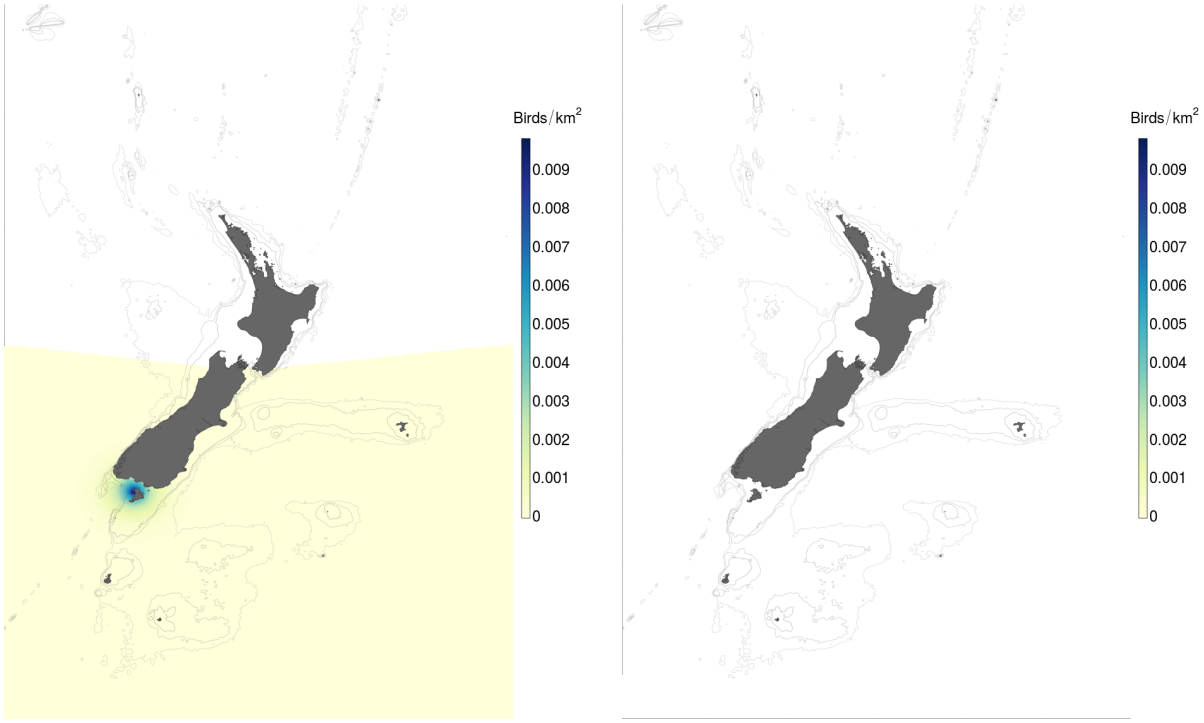



**Figure S-40: Relative density of South Georgia diving petrel (*Pelecanoides georgicus*). The breeding season runs from September to February. No incidental capture was recorded by observers between the 2006–07 and 2012–13 fishing years in trawl, surface-longline (SLL), bottom-longline (BLL), and set-net (SN) fisheries.**

## S.41 New Zealand white-faced storm petrel (*Pelagodroma marina*)

| | | |
|---|---|---|
| Population (NZ) | more than 1 000 000 pairs | Taylor (2000b) |
| Age at first reproduction | 4 to 5 years<br>more than 3 years | Several species as proxy, Croxall (1987)<br>de L. Brooke (2004) |
| Survival rate | 90% | Several species as proxy, Croxall (1987) |

**(a) Breeding distribution**

**(b) Non-breeding distribution**

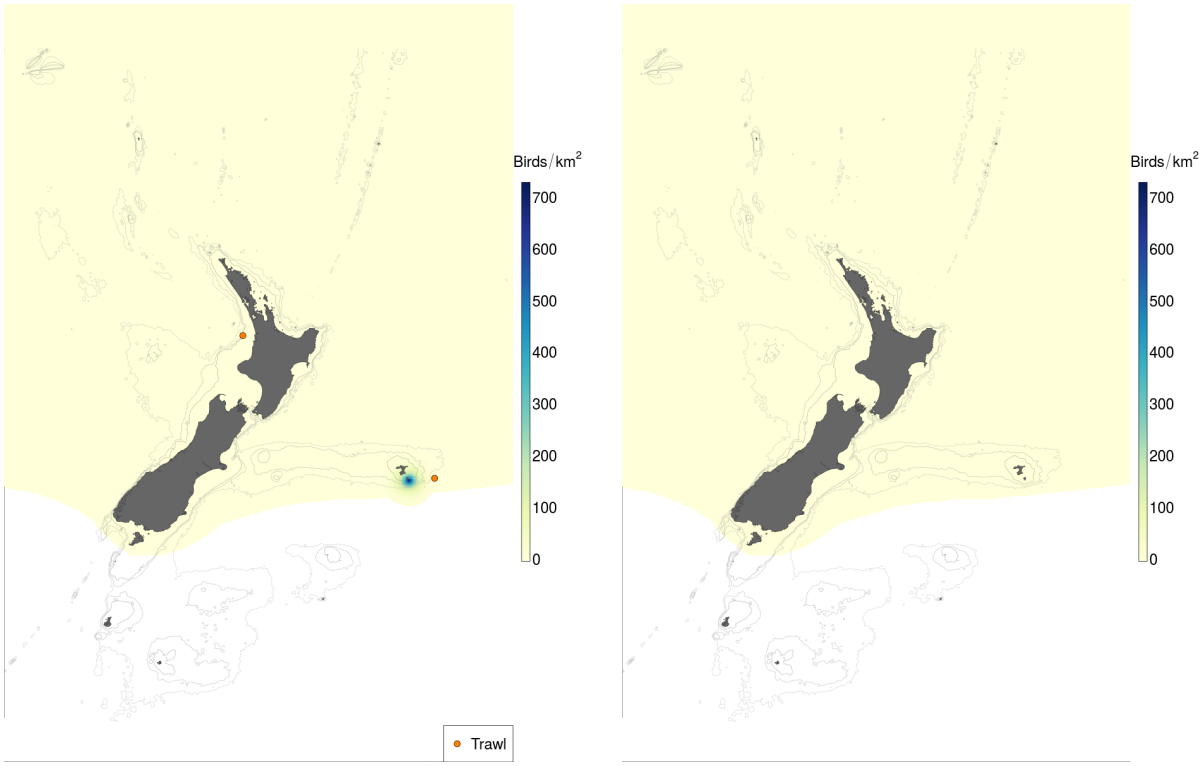
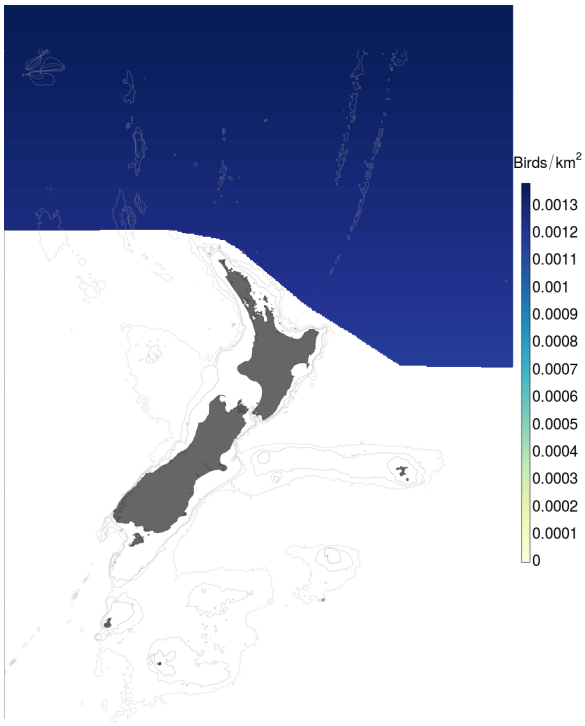



**Figure S-41: Relative density of New Zealand white-faced storm petrel (*Pelagodroma marina*). The breeding season runs from September to April. Also shown are incidental captures recorded by observers between the 2006–07 and 2012–13 fishing years in trawl fisheries.**

## S.42 White-bellied storm petrel (*Fregetta grallaria*)

| | | |
|---|---|---|
| Population (NZ) | 1000 pairs | Taylor (2000a) |
| Age at first reproduction | 4 to 5 years | Several species as proxy, Croxall (1987) |
| Survival rate | 90% | Several species as proxy, Croxall (1987) |

**(a) Breeding distribution**




**(b) Non-breeding distribution**

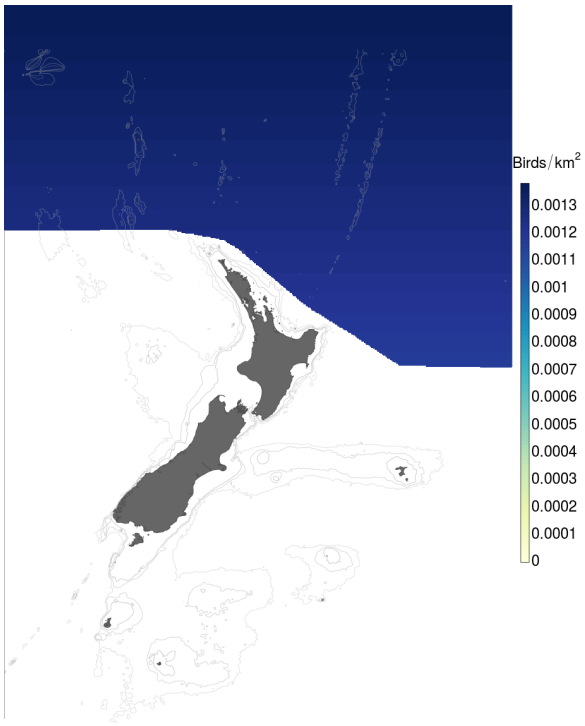
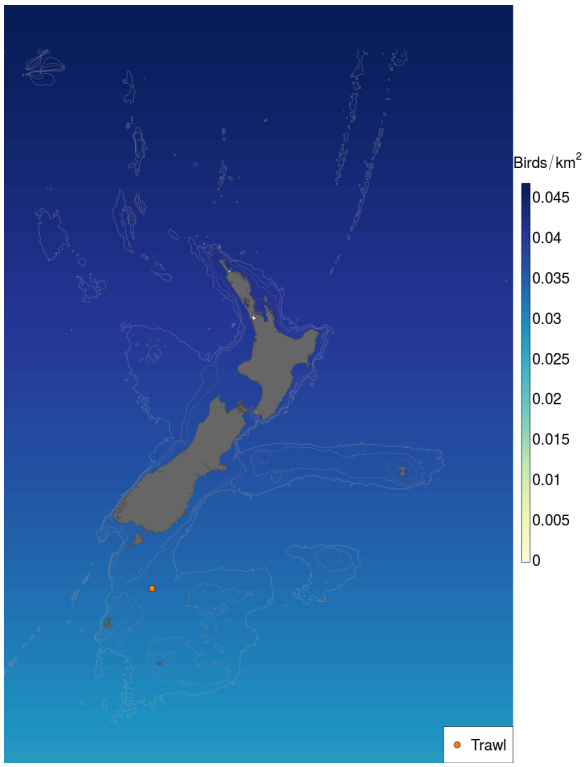



**Figure S-42: Relative density of white-bellied storm petrel (*Fregetta grallaria*). The breeding season runs from April to August. No incidental capture was recorded by observers between the 2006–07 and 2012–13 fishing years in trawl, surface-longline (SLL), bottom-longline (BLL), and set-net (SN) fisheries.**

## S.43 Black-bellied storm petrel (*Fregetta tropica*)

| | | |
|---|---|---|
| Population (NZ) | 50 000 to 100 000 pairs | Taylor (2000b) |
| Age at first reproduction | 4 to 5 years | Several species as proxy, Croxall (1987) |
| Survival rate | 90% | Several species as proxy, Croxall (1987) |

**(a) Breeding distribution**




**(b) Non-breeding distribution**

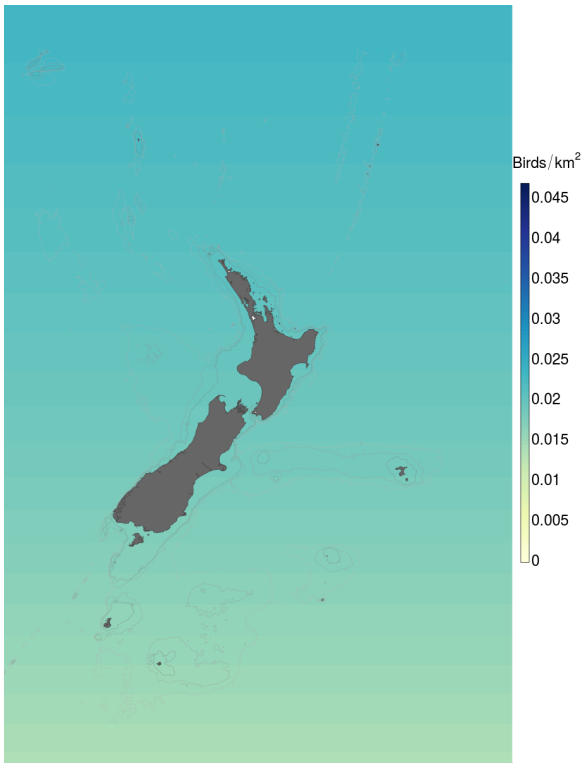
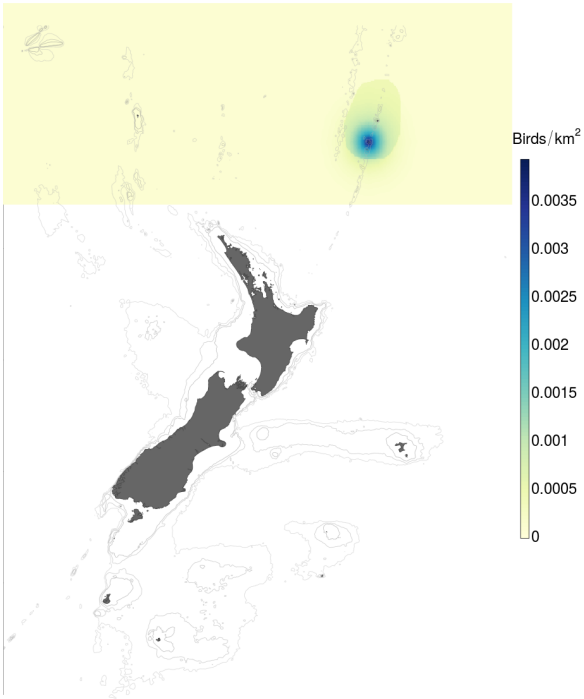



**Figure S-43: Relative density of black-bellied storm petrel (*Fregetta tropica*). The breeding season runs from October to May. Also shown are incidental captures recorded by observers between the 2006–07 and 2012–13 fishing years in trawl fisheries.**

## S.44 Kermadec white-faced storm petrel (*Pelagodroma marina albiclunis*)

| | | |
|---|---|---|
| Population (NZ) | fewer than 100 pairs | Taylor (2000a) |
| Age at first reproduction | 4 to 5 years<br>more than 3 years | Several species as proxy, Croxall (1987)<br>de L. Brooke (2004) |
| Survival rate | 90% | Several species as proxy, Croxall (1987) |

**(a) Breeding distribution**




**(b) Non-breeding distribution**

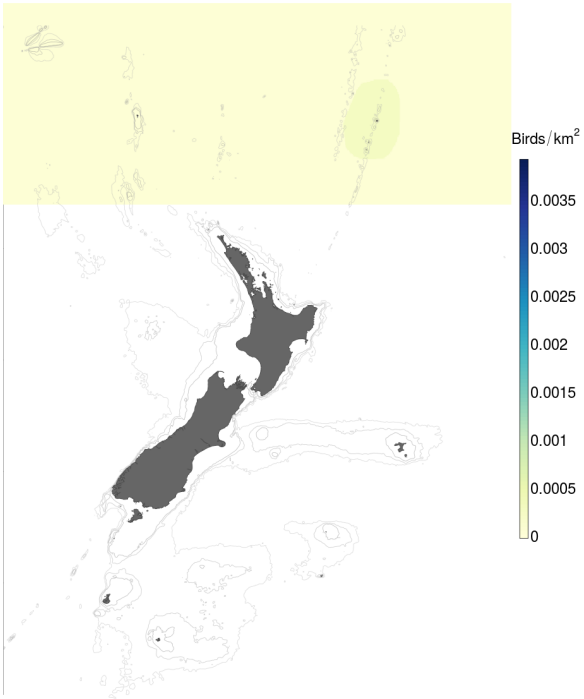



**Figure S-44: Relative density of Kermadec white-faced storm petrel (*Pelagodroma marina albiclunis*). The breeding season runs from June to December. No incidental capture was recorded by observers between the 2006–07 and 2012–13 fishing years in trawl, surface-longline (SLL), bottom-longline (BLL), and set-net (SN) fisheries.**

## S.45 New Zealand storm petrel (*Oceanites maorianus*)

| | | |
|---|---|---|
| Population (NZ) | 20 to 1000 pairs | |
| Age at first reproduction | 4 to 5 years | Several species as proxy, Croxall (1987) |
| Survival rate | 90% | Several species as proxy, Croxall (1987) |

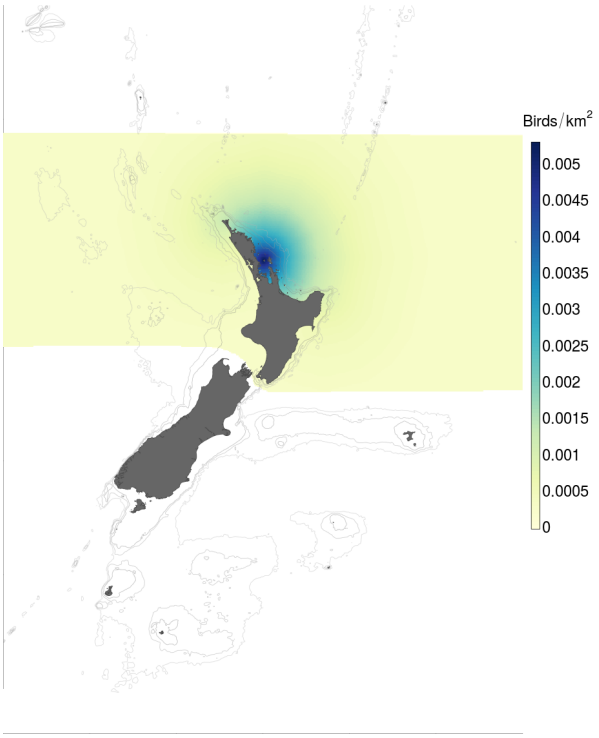



**Figure S-45: Relative density of New Zealand storm petrel (*Oceanites maorianus*). No incidental capture was recorded by observers between the 2006–07 and 2012–13 fishing years in trawl, surface-longline (SLL), bottom-longline (BLL), and set-net (SN) fisheries.**

## S.46 Yellow-eyed penguin (*Megadyptes antipodes*)

| | | |
|---|---|---|
| Population (NZ) | 1700 to 2420 pairs | Taylor (2000a) |
| Age at first reproduction | 2 to 3 years | Schreiber & Burger (2001) |
| Survival rate | 87% | Schreiber & Burger (2001) |

**(a) Breeding distribution** **(b) Non-breeding distribution**

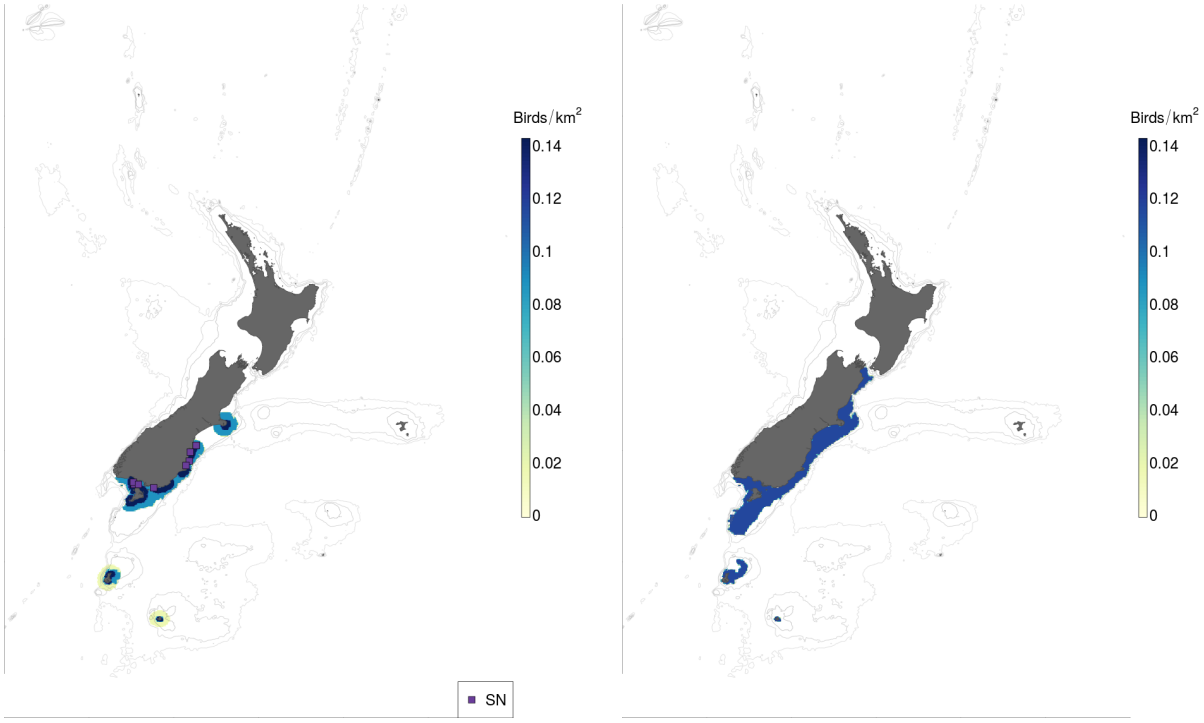
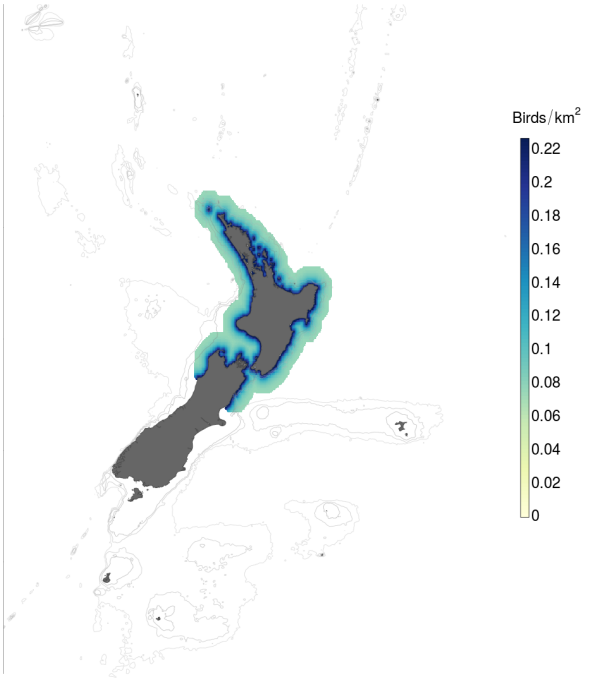



**Figure S-46: Relative density of yellow-eyed penguin (*Megadyptes antipodes*). The breeding season runs from August to April. Also shown are incidental captures recorded by observers between the 2006–07 and 2012–13 fishing years in set-net (SN) fisheries.**

## S.47 Northern little penguin (*Eudyptula minor*)

| | | |
|---|---|---|
| Population (NZ) | 5000 to 10 000 pairs [1984] | Taylor (2000b) |
| Age at first reproduction | 2 to 3 years | Schreiber & Burger (2001) |
| Survival rate | 83% | Sidhu et al. (2007) |

**(a) Breeding distribution**




**(b) Non-breeding distribution**

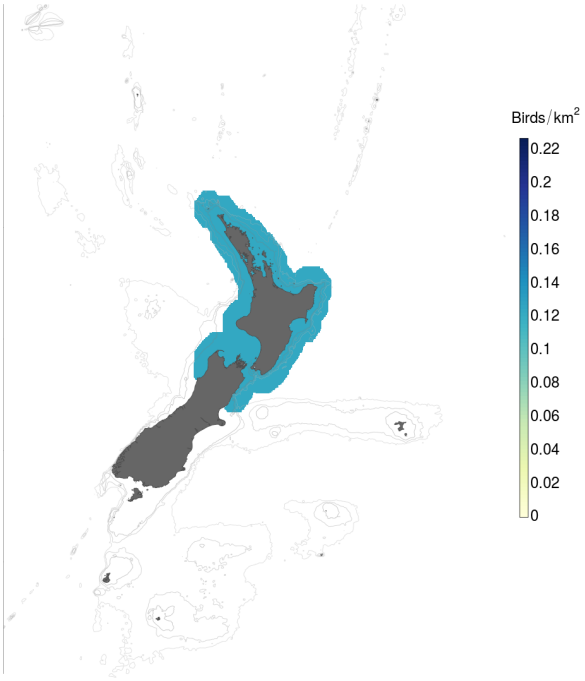



**Figure S-47: Relative density of northern little penguin (*Eudyptula minor*). The breeding season runs from July to February. No incidental capture was recorded by observers between the 2006–07 and 2012–13 fishing years in trawl, surface-longline (SLL), bottom-longline (BLL), and set-net (SN) fisheries.**

## S.48 White-flippered little penguin (*Eudyptula minor*)

| | | |
|---|---|---|
| Population (NZ) | 2200 pairs [1998] | Taylor (2000a) |
| Age at first reproduction | 2 to 3 years | Schreiber & Burger (2001) |
| Survival rate | 83% | Sidhu et al. (2007) |

**(a) Breeding distribution**

**(b) Non-breeding distribution**

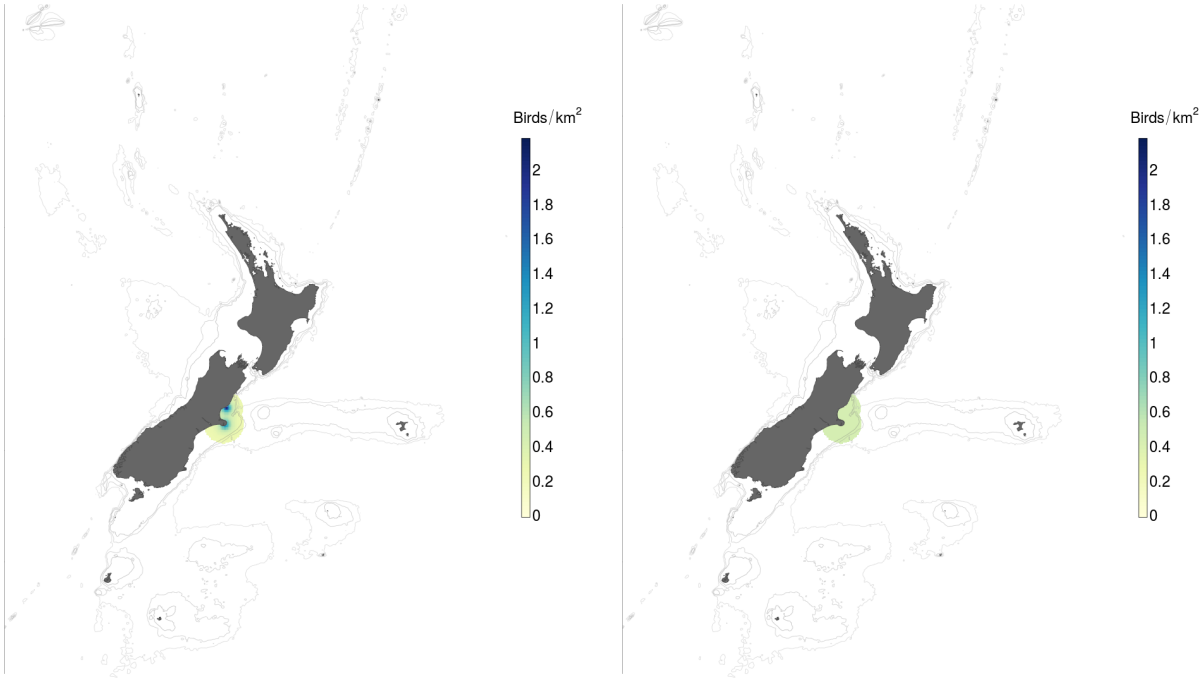
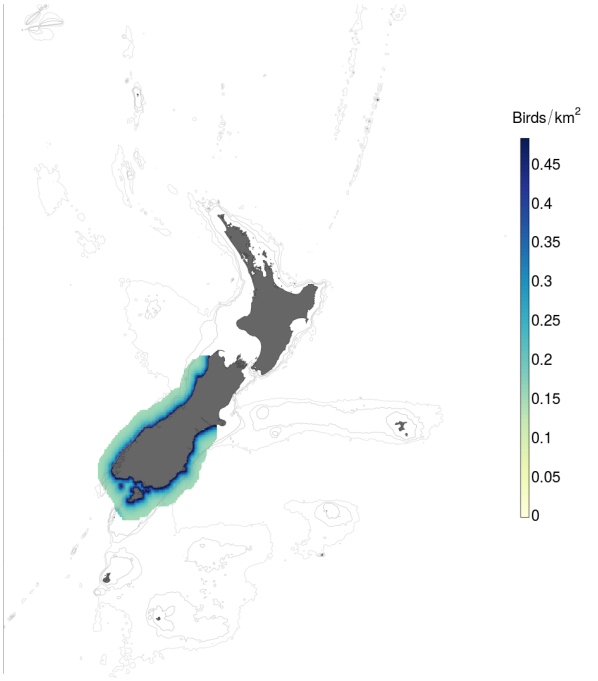



**Figure S-48: Relative density of white-flippered little penguin (*Eudyptula minor*). The breeding season runs from July to February. No incidental capture was recorded by observers between the 2006–07 and 2012–13 fishing years in trawl, surface-longline (SLL), bottom-longline (BLL), and set-net (SN) fisheries.**

## S.49 Southern little penguin (*Eudyptula minor*)

| | | |
|---|---|---|
| Population (NZ) | 5000 to 10 000 pairs [1984] | Taylor (2000b) |
| Age at first reproduction | 2 to 3 years | Schreiber & Burger (2001) |
| Survival rate | 83% | Sidhu et al. (2007) |

**(a) Breeding distribution**




**(b) Non-breeding distribution**

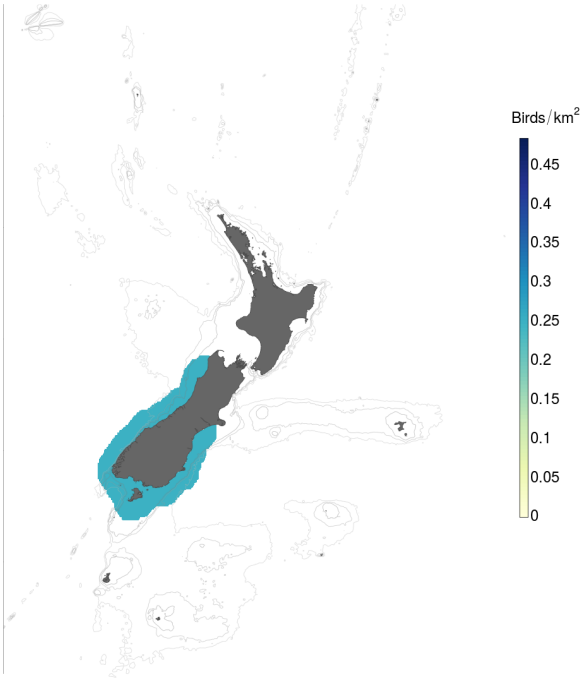
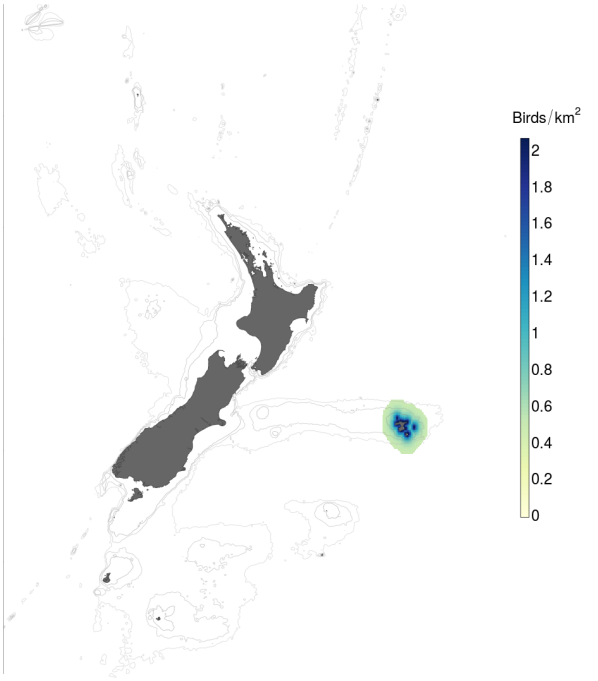



**Figure S-49: Relative density of southern little penguin (*Eudyptula minor*). The breeding season runs from July to February. No incidental capture was recorded by observers between the 2006–07 and 2012–13 fishing years in trawl, surface-longline (SLL), bottom-longline (BLL), and set-net (SN) fisheries.**

## S.50 Chatham Island little penguin (*Eudyptula minor*)

| | | |
|---|---|---|
| Population (NZ) | 5000 to 10 000 pairs [1984] | Taylor (2000b) |
| Age at first reproduction | 2 to 3 years | Schreiber & Burger (2001) |
| Survival rate | 83% | Sidhu et al. (2007) |

**(a) Breeding distribution**




**(b) Non-breeding distribution**

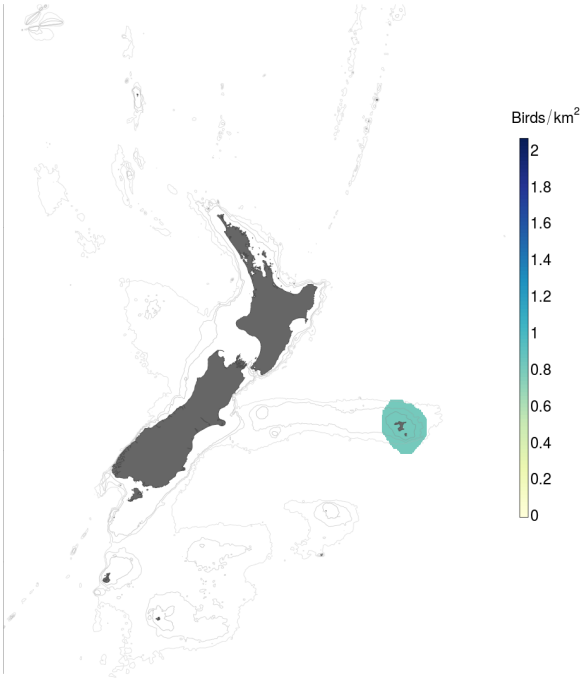
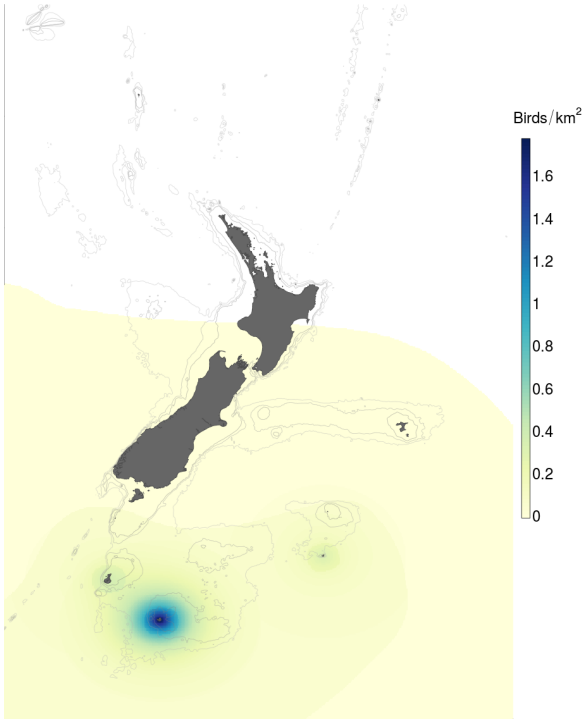



**Figure S-50: Relative density of Chatham Island little penguin (*Eudyptula minor*). The breeding season runs from July to February. No incidental capture was recorded by observers between the 2006–07 and 2012–13 fishing years in trawl, surface-longline (SLL), bottom-longline (BLL), and set-net (SN) fisheries.**

## S.51 Eastern rockhopper penguin (*Eudyptes chrysocome filholi*)

| | | |
|---|---|---|
| Population (NZ) | 38 961 to 58 500 pairs | Taylor (2000a) |
| Age at first reproduction | 4.7 years | Moseley's rockhopper penguin as proxy, Guinard et al. (1998) |
| Survival rate | 84 ± 1.1% [1995] | Northern rockhopper penguin as proxy, Guinard et al. (1998) |

**(a) Breeding distribution**




**(b) Non-breeding distribution**

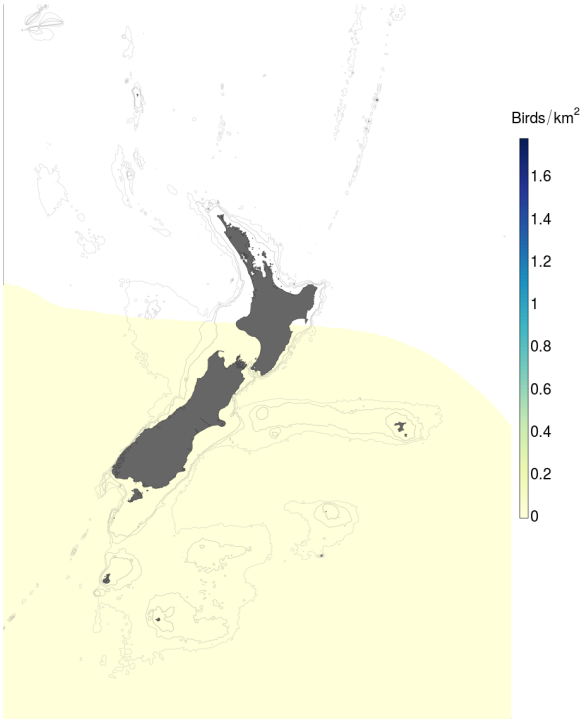



**Figure S-51: Relative density of eastern rockhopper penguin (*Eudyptes chrysocome filholi*). The breeding season runs from October to May. No incidental capture was recorded by observers between the 2006–07 and 2012–13 fishing years in trawl, surface-longline (SLL), bottom-longline (BLL), and set-net (SN) fisheries.**

## S.52 Fiordland crested penguin (*Eudyptes pachyrhynchus*)

| | | |
|---|---|---|
| Population (NZ) | 3000 pairs | Roots (2006) |
| Age at first reproduction | 3 to 4 years<br>5 to 6 years | Schreiber & Burger (2001)<br>Marchant & Higgins (1990) |
| Survival rate | 84 ± 1.1% [1995] | Northern rockhopper penguin as proxy, Guinard et al. (1998) |

**(a) Breeding distribution**

**(b) Non-breeding distribution**

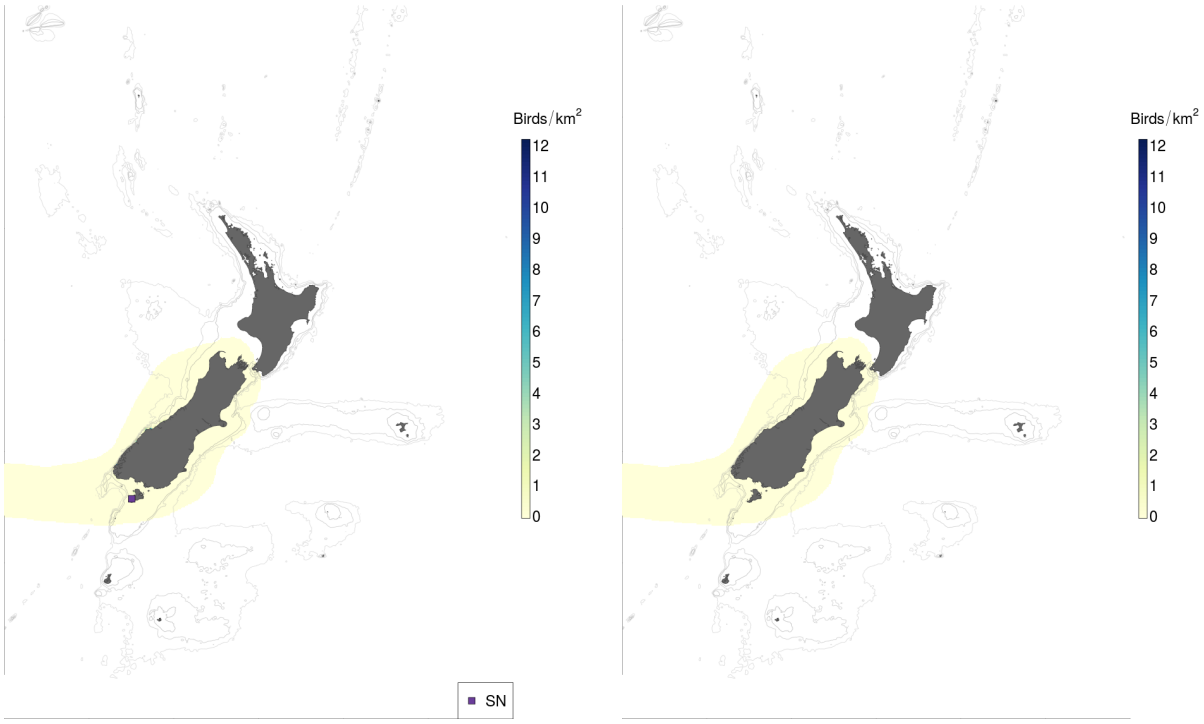
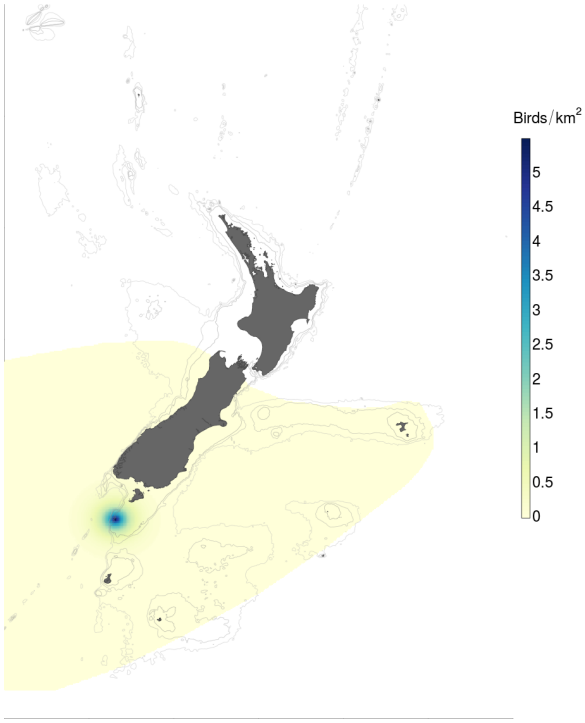



**Figure S-52: Relative density of Fiordland crested penguin (*Eudyptes pachyrhynchus*). The breeding season runs from July to March. Also shown are incidental captures recorded by observers between the 2006–07 and 2012–13 fishing years in set-net (SN) fisheries.**

## S.53 Snares crested penguin (*Eudyptes robustus*)

| | | |
|---|---|---|
| Population (NZ) | 30 000 pairs | Roots (2006) |
| Age at first reproduction | 5 to 6 years | Roots (2006) |
| Survival rate | 84 ± 1.1% [1995] | Northern rockhopper penguin as proxy, Guinard et al. (1998) |

**(a) Breeding distribution**




**(b) Non-breeding distribution**

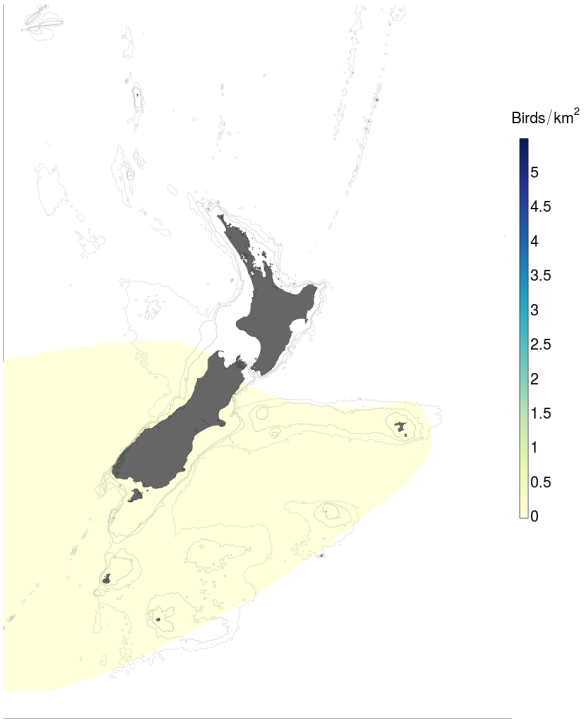
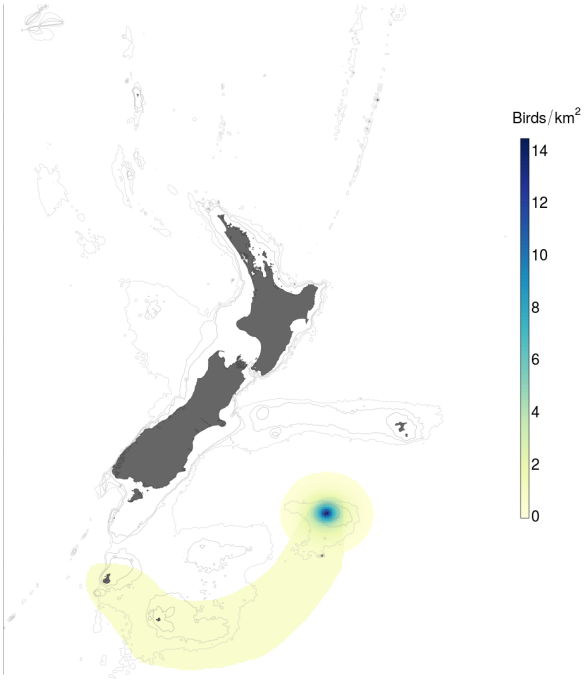



**Figure S-53: Relative density of Snares crested penguin (*Eudyptes robustus*). The breeding season runs from September to February. No incidental capture was recorded by observers between the 2006–07 and 2012–13 fishing years in trawl, surface-longline (SLL), bottom-longline (BLL), and set-net (SN) fisheries.**

## S.54 Erect-crested penguin (*Eudyptes sclateri*)

| | | |
|---|---|---|
| Population (NZ) | 81 000 (77 000 – 85 000 ) pairs | Taylor (2000a) |
| Age at first reproduction | 5 to 6 years | Fiordland crested penguin as proxy, Roots (2006) |
| Survival rate | 84 ± 1.1% [1995] | Northern rockhopper penguin as proxy, Guinard et al. (1998) |

**(a) Breeding distribution**




**(b) Non-breeding distribution**

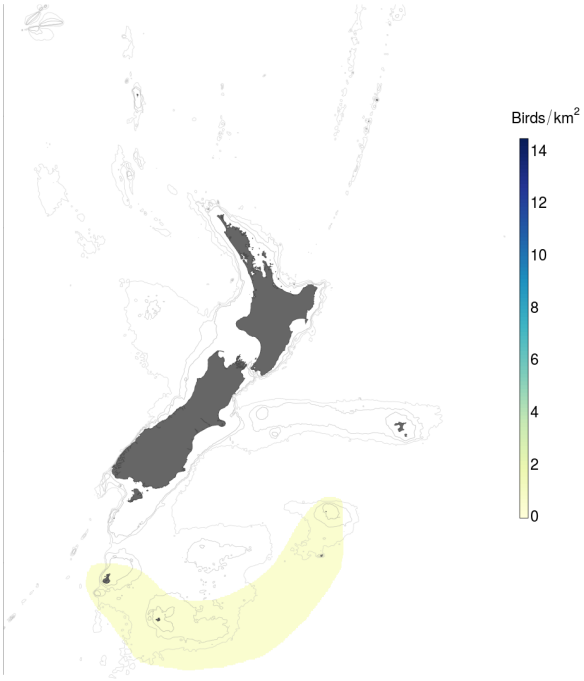
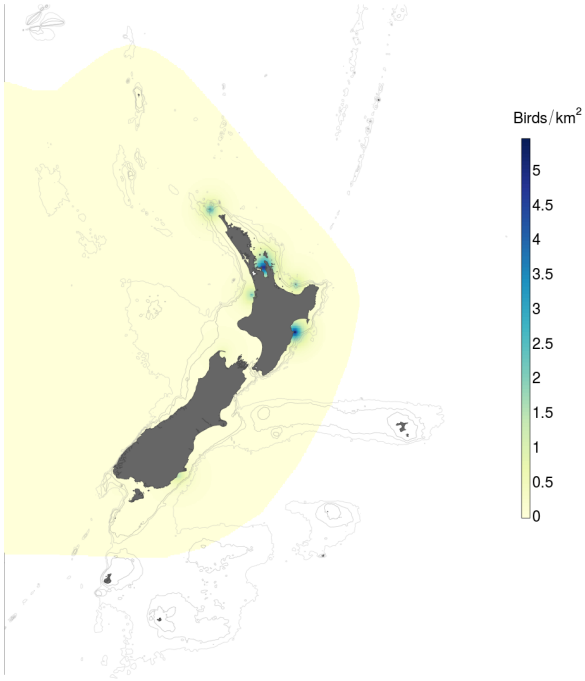



**Figure S-54: Relative density of erect-crested penguin (*Eudyptes sclateri*). The breeding season runs from September to March. No incidental capture was recorded by observers between the 2006–07 and 2012–13 fishing years in trawl, surface-longline (SLL), bottom-longline (BLL), and set-net (SN) fisheries.**

## S.55 Australasian gannet (*Morus serrator*)

| | | |
|---|---|---|
| Population (NZ) | 46 004 pairs [1981] | Wodzicki et al. (1984) |
| Age at first reproduction | 3 to 7 years | Schreiber & Burger (2001) |
| Survival rate | 94% | Northern gannet as proxy, Schreiber & Burger (2001) |

**(a) Breeding distribution**




**(b) Non-breeding distribution**

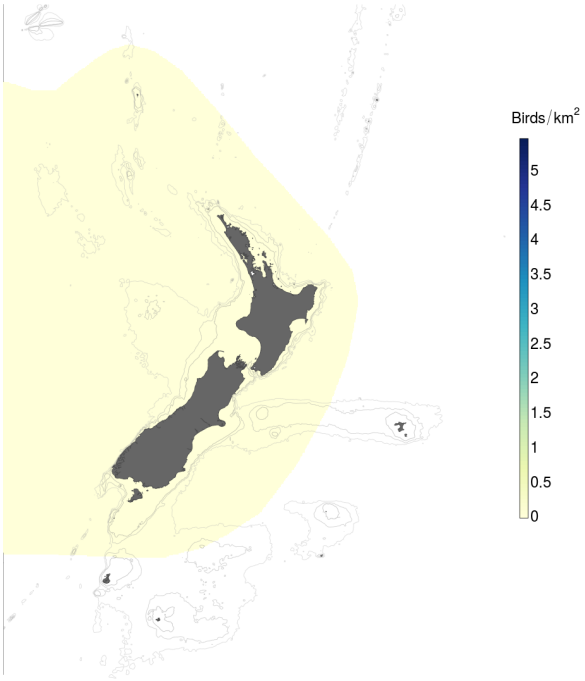



**Figure S-55: Relative density of Australasian gannet (*Morus serrator*). The breeding season runs from August to March. No incidental capture was recorded by observers between the 2006–07 and 2012–13 fishing years in trawl, surface-longline (SLL), bottom-longline (BLL), and set-net (SN) fisheries.**

## S.56 Masked booby (*Sula dactylatra*)

| | | |
|---|---|---|
| Population (NZ) | 240 pairs | Veitch et al. (2004) |
| Age at first reproduction | 2 to 4 years | Schreiber & Burger (2001) |
| Survival rate | 85% [1979] | Harris (1979) |

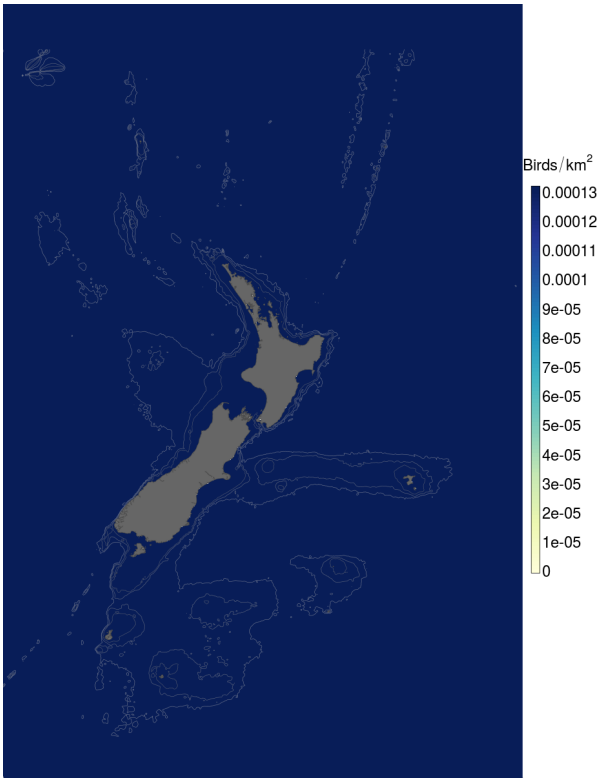



**Figure S-56: Relative density of masked booby (*Sula dactylatra*). No incidental capture was recorded by observers between the 2006–07 and 2012–13 fishing years in trawl, surface-longline (SLL), bottom-longline (BLL), and set-net (SN) fisheries.**

## S.57 Pied shag (*Phalacrocorax varius varius*)

| | | |
|---|---|---|
| Population (NZ) | 6400 pairs [2013] | Bell (2013) |
| Age at first reproduction | more than 2 years | Schreiber & Burger (2001) |
| Survival rate | 87.8 (85.9 – 89.7)% | European shag as proxy, Harris et al. (1994) |

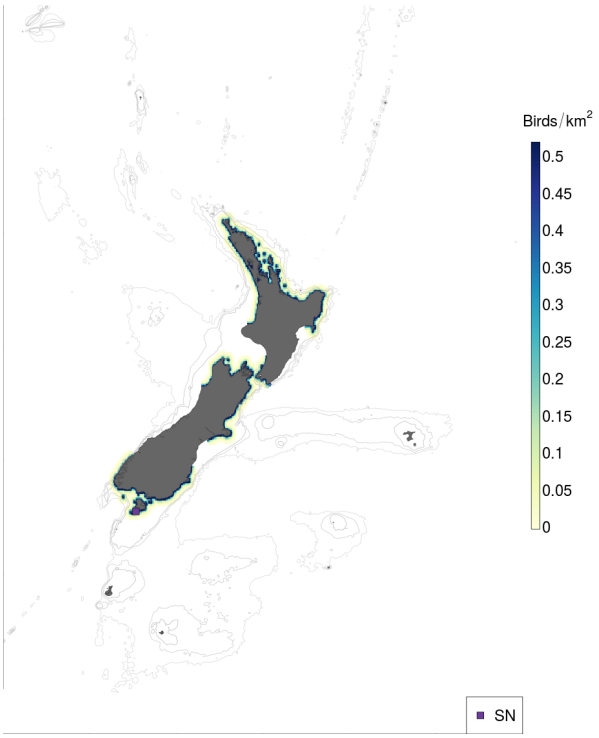
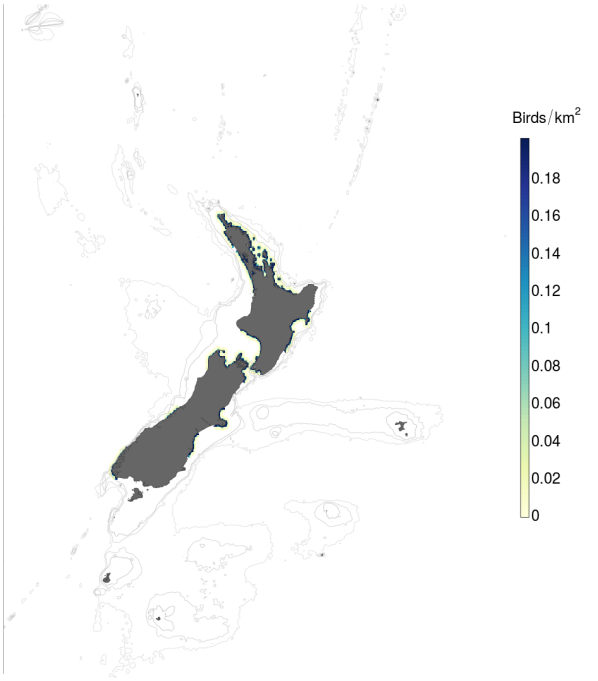



**Figure S-57: Relative density of pied shag (*Phalacrocorax varius varius*). Also shown are incidental captures recorded by observers between the 2006–07 and 2012–13 fishing years in set-net (SN) fisheries.**

## S.58 Little black shag (*Phalacrocorax sulcirostris*)

| | | |
|---|---|---|
| Population (NZ) | 1500 pairs | Walker et al. (2015) |
| Age at first reproduction | 2 years | Pied shag as proxy |
| Survival rate | 87.8 (85.9 – 89.7)% | European shag as proxy, Harris et al. (1994) |

**(a) Breeding distribution**




**(b) Non-breeding distribution**

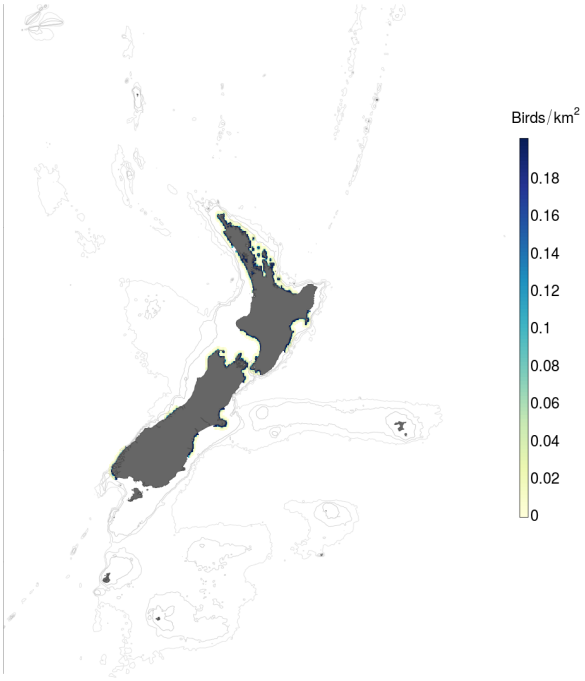
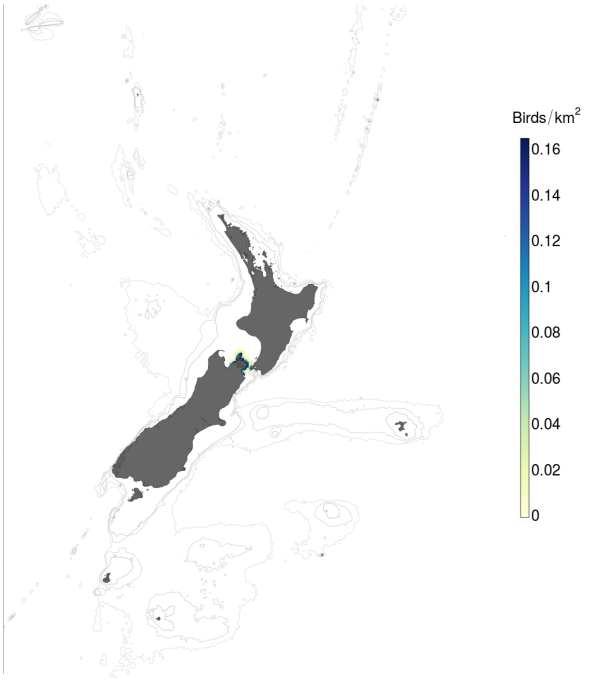



**Figure S-58: Relative density of little black shag (*Phalacrocorax sulcirostris*). The breeding season runs from October to December. No incidental capture was recorded by observers between the 2006–07 and 2012–13 fishing years in trawl, surface-longline (SLL), bottom-longline (BLL), and set-net (SN) fisheries.**

## S.59 New Zealand king shag (*Phalacrocorax carunculatus*)

| | | |
|---|---|---|
| Population (NZ) | 102 to 126 pairs [2002] | Birdlife International (2012) |
| Age at first reproduction | more than 3 years | Black shag as proxy |
| Survival rate | 87.8 (85.9 – 89.7)% | European shag as proxy, Harris et al. (1994) |

**(a) Breeding distribution**




**(b) Non-breeding distribution**

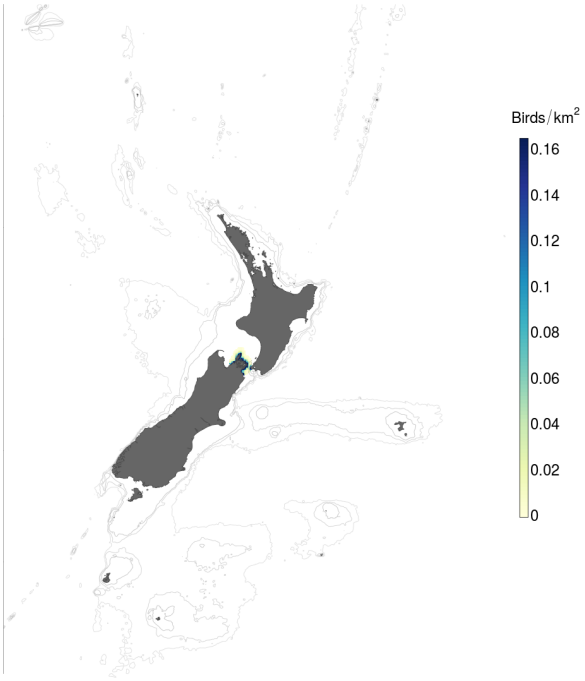



**Figure S-59: Relative density of New Zealand king shag (*Phalacrocorax carunculatus*). The breeding season runs from March to October. No incidental capture was recorded by observers between the 2006–07 and 2012–13 fishing years in trawl, surface-longline (SLL), bottom-longline (BLL), and set-net (SN) fisheries.**

## S.60 Stewart Island shag (*Phalacrocorax chalconotus*)

| | | |
|---|---|---|
| Population (NZ) | 2075 to 2482 pairs [2011] | Lalas & Perriman (2012) |
| Age at first reproduction | more than 3 years | Black shag as proxy |
| Survival rate | 87.8 (85.9 – 89.7)% | European shag as proxy, Harris et al. (1994) |

**(a) Breeding distribution** **(b) Non-breeding distribution**

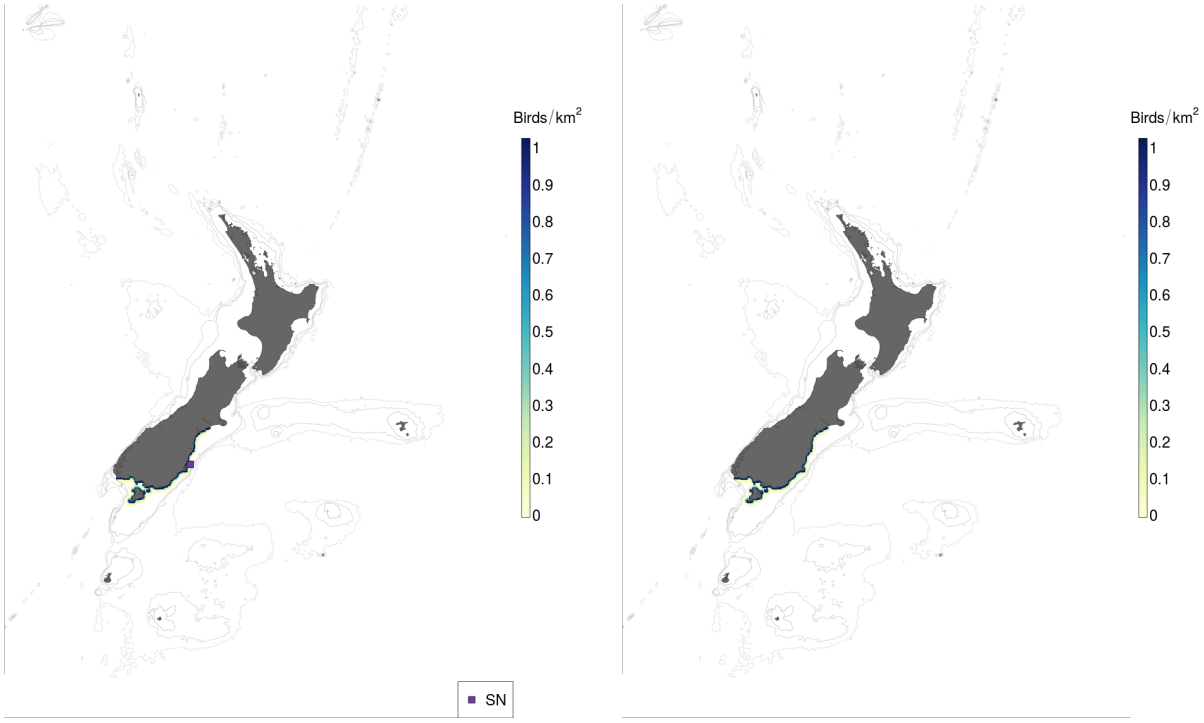
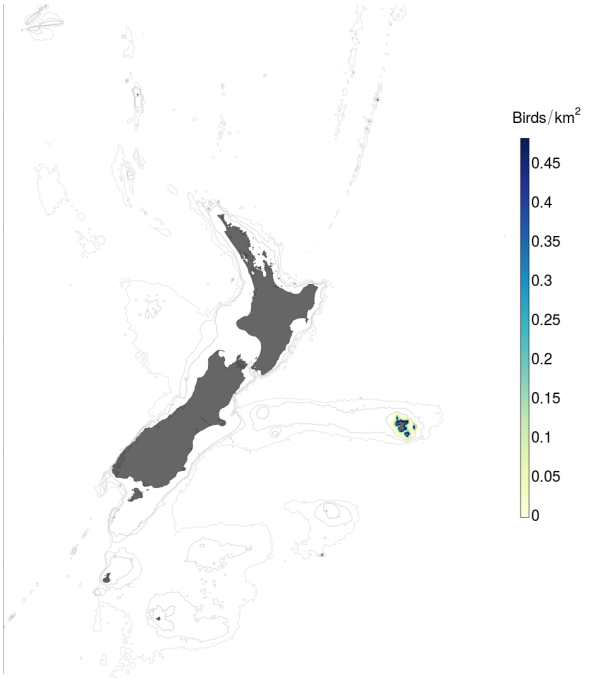



**Figure S-60: Relative density of Stewart Island shag (*Phalacrocorax chalconotus*). The breeding season runs from August to March. Also shown are incidental captures recorded by observers between the 2006–07 and 2012–13 fishing years in set-net (SN) fisheries.**

## S.61 Chatham Island shag (*Phalacrocorax onslowi*)

| | | |
|---|---|---|
| Population (NZ) | 357 pairs [2011] | Birdlife International (2012) |
| Age at first reproduction | more than 3 years | Black shag as proxy |
| Survival rate | 87.8 (85.9 – 89.7)% | European shag as proxy, Harris et al. (1994) |

**(a) Breeding distribution**




**(b) Non-breeding distribution**

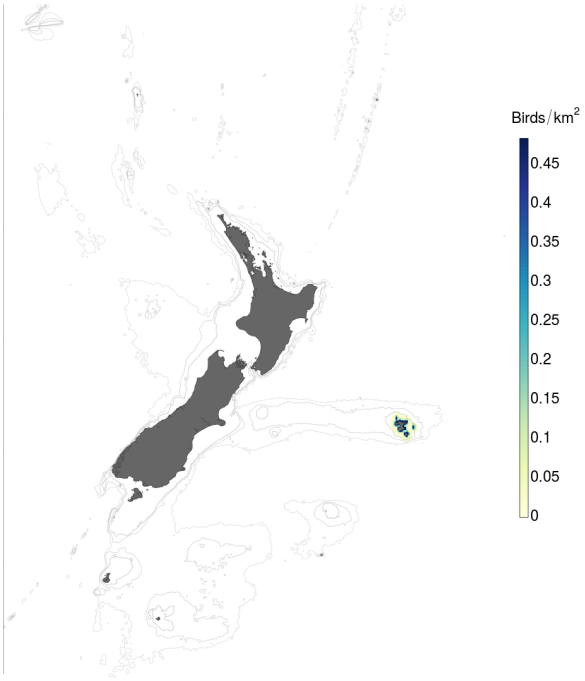
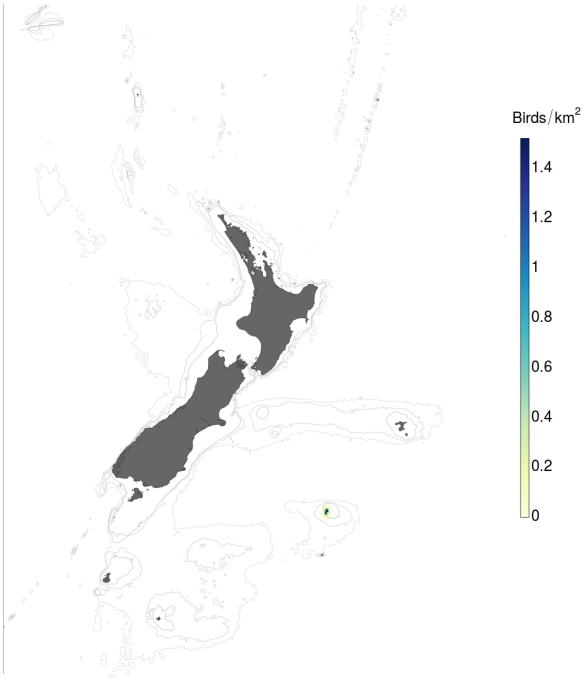



**Figure S-61: Relative density of Chatham Island shag (*Phalacrocorax onslowi*). The breeding season runs from September to February. No incidental capture was recorded by observers between the 2006–07 and 2012–13 fishing years in trawl, surface-longline (SLL), bottom-longline (BLL), and set-net (SN) fisheries.**

## S.62 Bounty Island shag (*Phalacrocorax ranfurlyi*)

| | | |
|---|---|---|
| Population (NZ) | 120 pairs [2005] | Birdlife International (2012) |
| Age at first reproduction | more than 3 years | Black shag as proxy |
| Survival rate | 87.8 (85.9 – 89.7)% | European shag as proxy, Harris et al. (1994) |

**(a) Breeding distribution**




**(b) Non-breeding distribution**

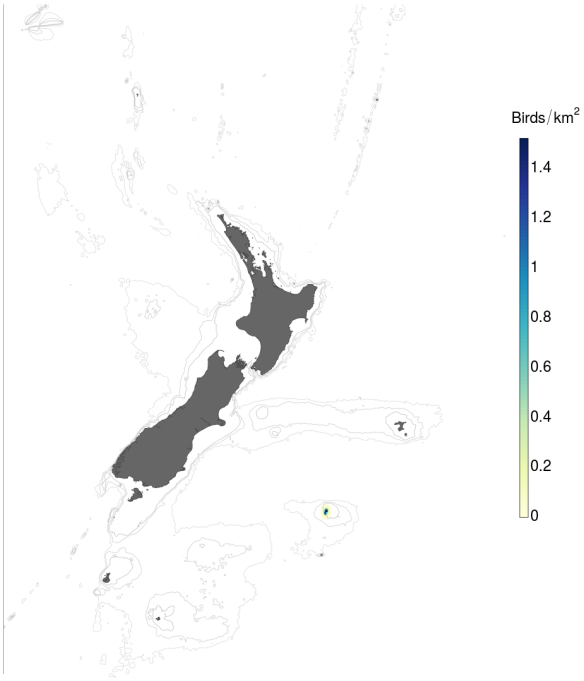
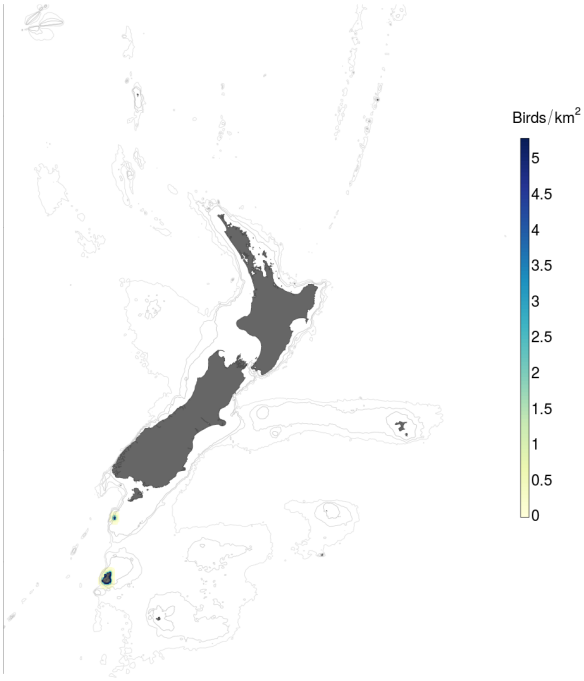



**Figure S-62: Relative density of Bounty Island shag (*Phalacrocorax ranfurlyi*). The breeding season runs from October to December. No incidental capture was recorded by observers between the 2006–07 and 2012–13 fishing years in trawl, surface-longline (SLL), bottom-longline (BLL), and set-net (SN) fisheries.**

## S.63 Auckland Island shag (*Phalacrocorax colensoi*)

| | | |
|---|---|---|
| Population (NZ) | more than 1366 pairs [2011] | Birdlife International (2012) |
| Age at first reproduction | more than 3 years | Black shag as proxy |
| Survival rate | 87.8 (85.9 – 89.7)% | European shag as proxy, Harris et al. (1994) |

**(a) Breeding distribution**




**(b) Non-breeding distribution**

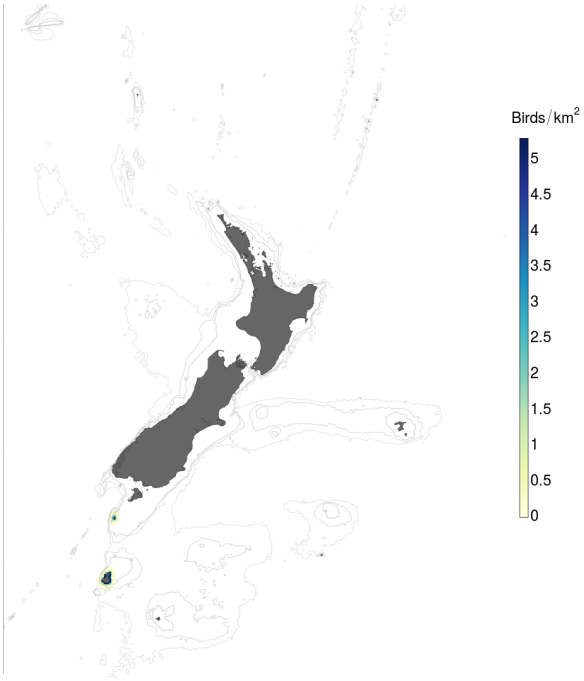
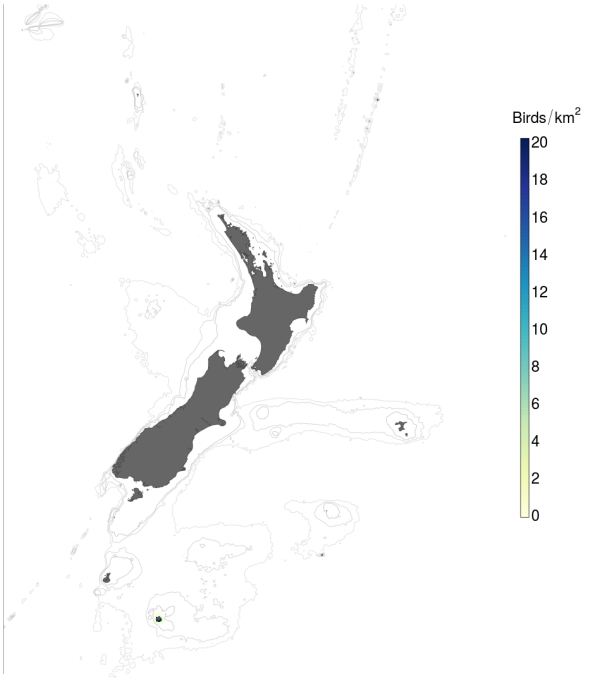



**Figure S-63: Relative density of Auckland Island shag (*Phalacrocorax colensoi*). The breeding season runs from November to March. No incidental capture was recorded by observers between the 2006–07 and 2012–13 fishing years in trawl, surface-longline (SLL), bottom-longline (BLL), and set-net (SN) fisheries.**

## S.64 Campbell Island shag (*Phalacrocorax campbelli*)

| | | |
|---|---|---|
| Population (NZ) | 2000 pairs [1975] | Birdlife International (2012) |
| Age at first reproduction | more than 3 years | Black shag as proxy |
| Survival rate | 87.8 (85.9 – 89.7)% | European shag as proxy, Harris et al. (1994) |

**(a) Breeding distribution**




**(b) Non-breeding distribution**

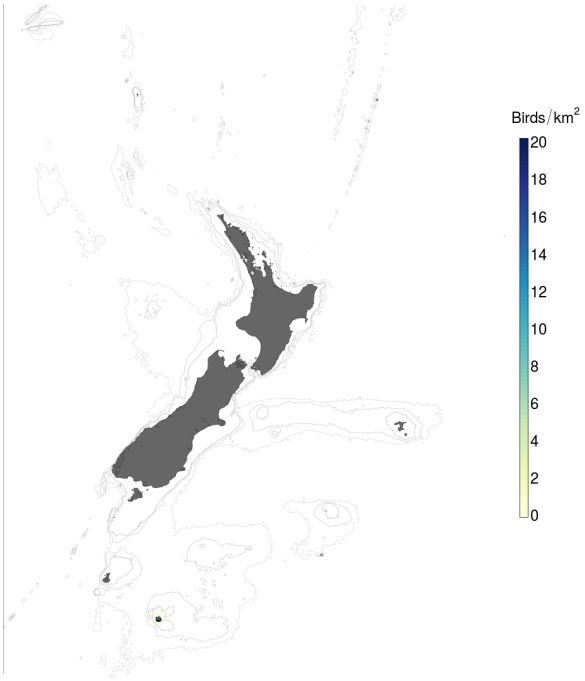



**Figure S-64: Relative density of Campbell Island shag (*Phalacrocorax campbelli*). The breeding season runs from November to February. No incidental capture was recorded by observers between the 2006–07 and 2012–13 fishing years in trawl, surface-longline (SLL), bottom-longline (BLL), and set-net (SN) fisheries.**

## S.65 Spotted shag (*Phalacrocorax punctatus*)

| | | |
|---|---|---|
| Population (NZ) | 10 000 to 30 000 pairs | Taylor (2000b) |
| Age at first reproduction | 2 years | Schreiber & Burger (2001) |
| Survival rate | 87.8 (85.9 – 89.7)% | European shag as proxy, Harris et al. (1994) |

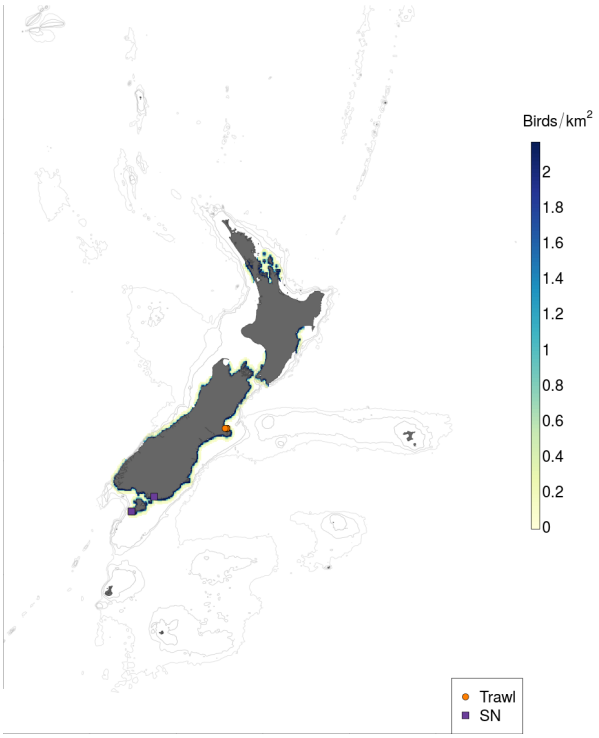
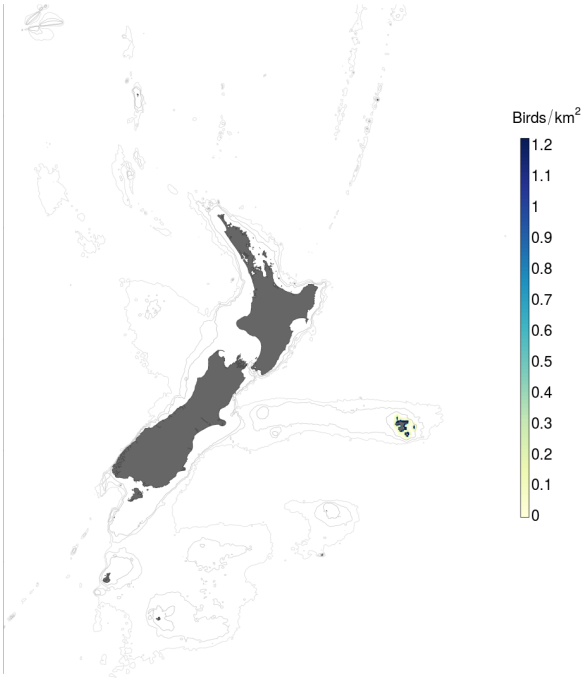



**Figure S-65: Relative density of spotted shag (*Phalacrocorax punctatus*). Also shown are incidental captures recorded by observers between the 2006–07 and 2012–13 fishing years in trawl and set-net (SN) fisheries.**

## S.66 Pitt Island shag (*Phalacrocorax featherstoni*)

| | | |
|---|---|---|
| Population (NZ) | 669 pairs [1997] | Taylor (2000a) |
| Age at first reproduction | more than 3 years | Black shag as proxy |
| Survival rate | 87.8 (85.9 – 89.7)% | European shag as proxy, Harris et al. (1994) |

**(a) Breeding distribution**




**(b) Non-breeding distribution**

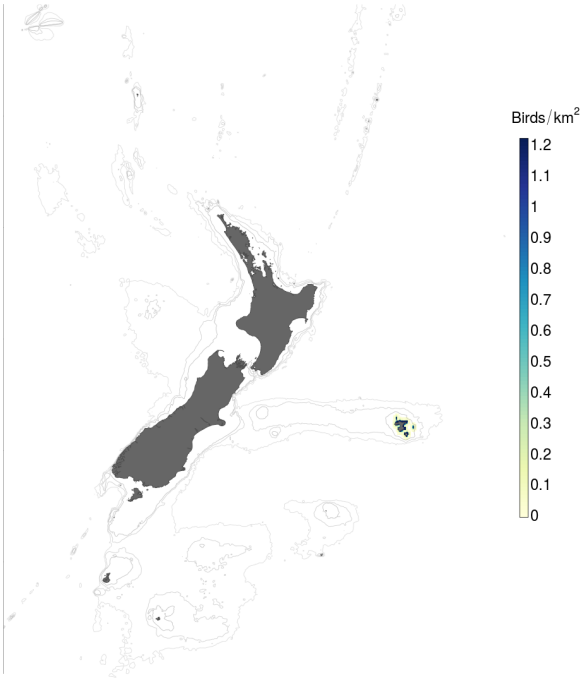
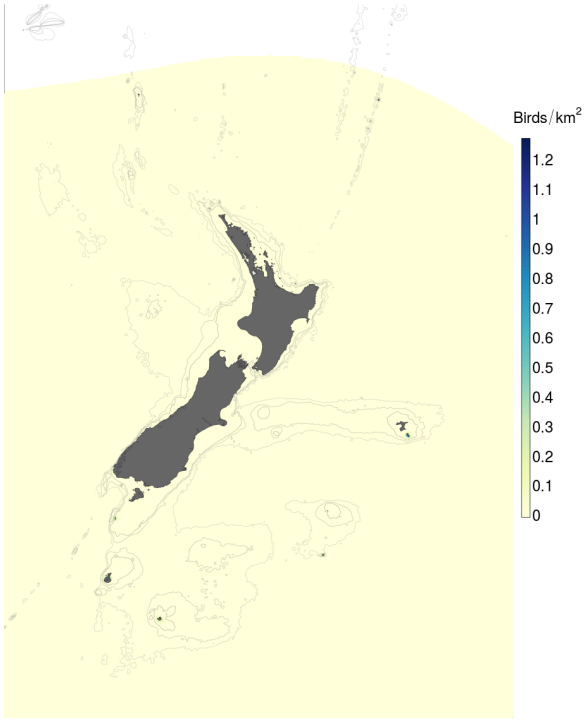



**Figure S-66: Relative density of Pitt Island shag (*Phalacrocorax featherstoni*). The breeding season runs from September to February. No incidental capture was recorded by observers between the 2006–07 and 2012–13 fishing years in trawl, surface-longline (SLL), bottom-longline (BLL), and set-net (SN) fisheries.**

## S.67 Subantarctic skua (*Catharacta antarctica lonnbergi*)

| | | |
|---|---|---|
| Population (NZ) | 450 to 470 pairs | Wilson (2006) |
| Age at first reproduction | 8.03 $\pm$ 0.21 years ($N = 96$) [1996] | Young (1998) |
| Survival rate | 93.8 (91 – 97)% [1965] | Wood (1971) |

**(a) Breeding distribution**




**(b) Non-breeding distribution**

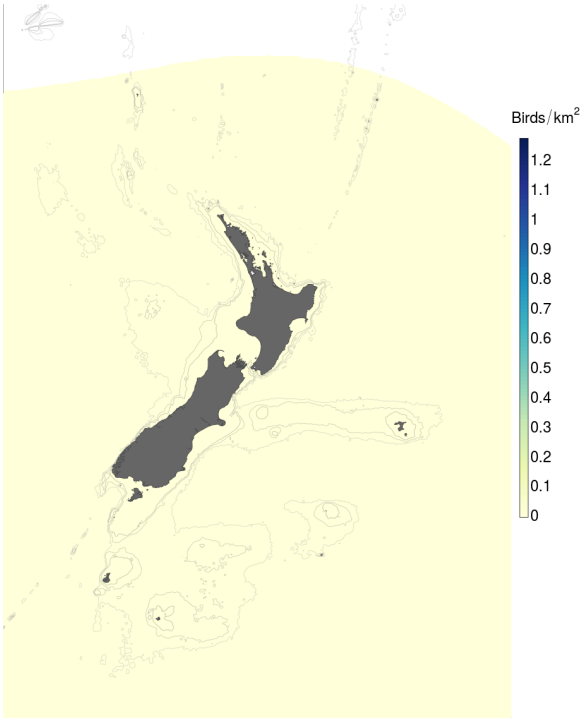
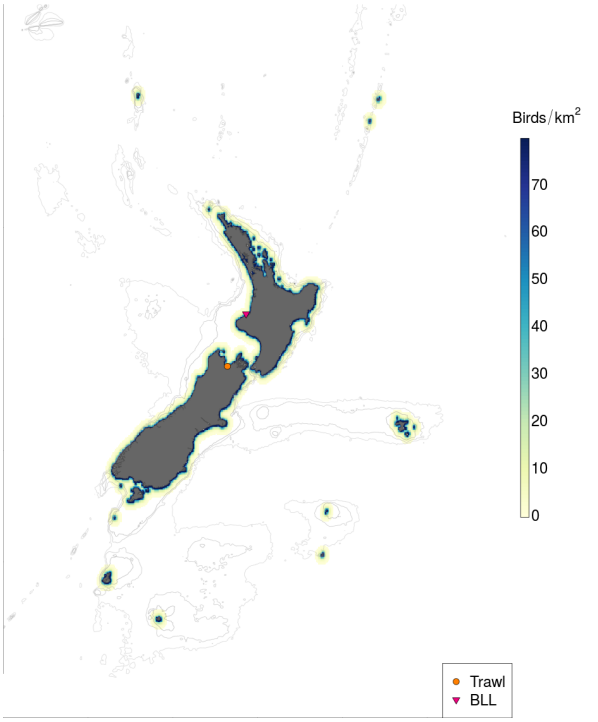



**Figure S-67: Relative density of subantarctic skua (*Catharacta antarctica lonnbergi*). The breeding season runs from September to February. No incidental capture was recorded by observers between the 2006–07 and 2012–13 fishing years in trawl, surface-longline (SLL), bottom-longline (BLL), and set-net (SN) fisheries.**

## S.68 Black-backed gull (*Larus dominicanus*)

| | | |
|---|---|---|
| Population (NZ) | more than 1 000 000 pairs | Taylor (2000b) |
| Age at first reproduction | 4 years | Schreiber & Burger (2001) |
| Survival rate | 81% | Schreiber & Burger (2001) |

**(a) Breeding distribution**




**(b) Non-breeding distribution**

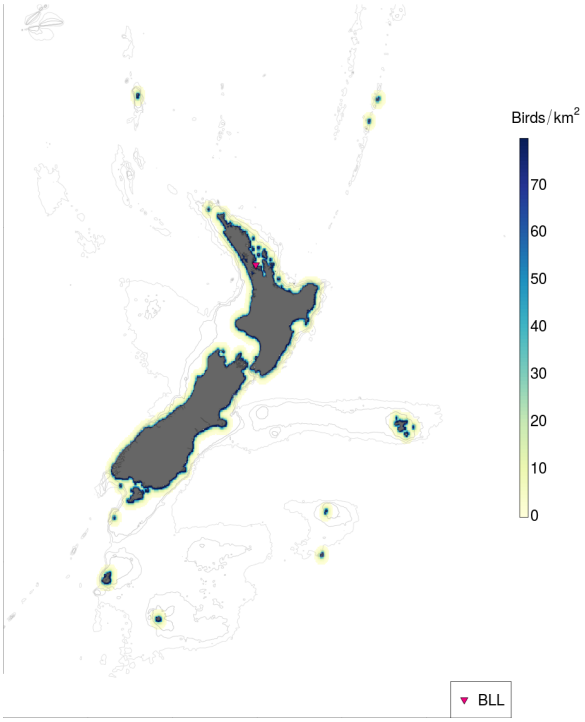
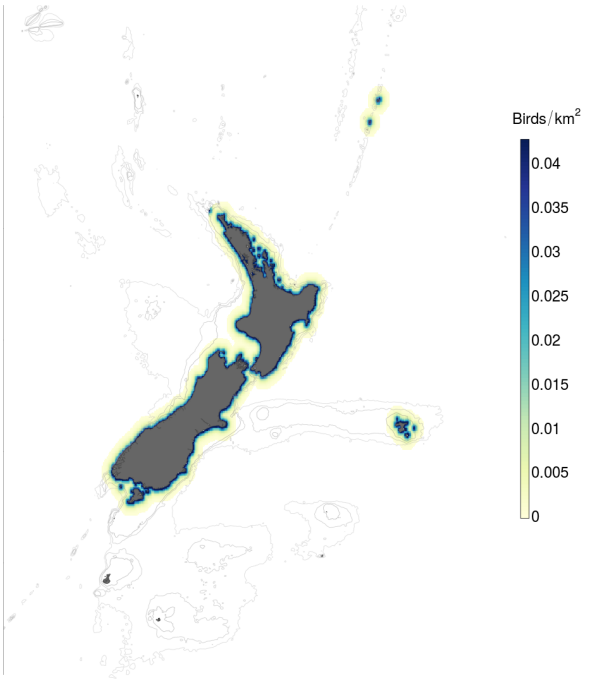



**Figure S-68: Relative density of black-backed gull (*Larus dominicanus*). The breeding season runs from September to March. Also shown are incidental captures recorded by observers between the 2006–07 and 2012–13 fishing years in trawl and bottom-longline (BLL) fisheries.**

## S.69 Caspian tern (*Sterna caspia*)

| | | |
|---|---|---|
| Population (NZ) | 1000 pairs [1992] | Taylor (2000b) |
| Age at first reproduction | 2 to 4 years | Schreiber & Burger (2001) |
| Survival rate | 87 to 91%<br>89% [1980] | Schreiber & Burger (2001)<br>Gill & Mewaldt (1983) |

**(a) Breeding distribution**




**(b) Non-breeding distribution**

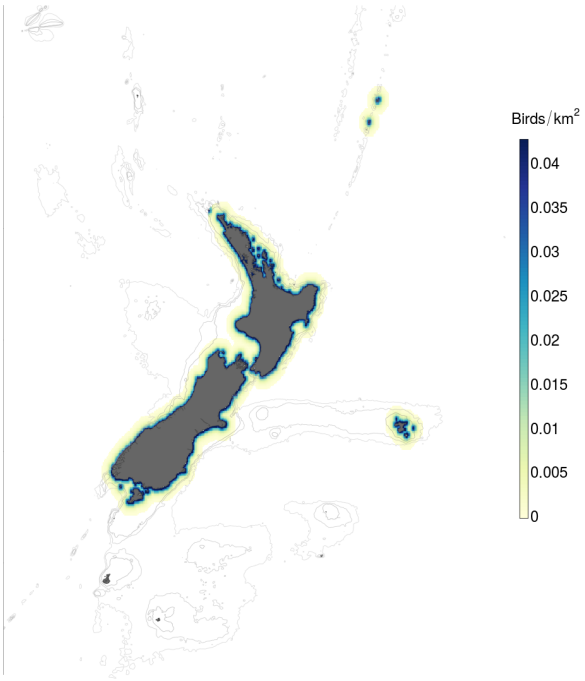
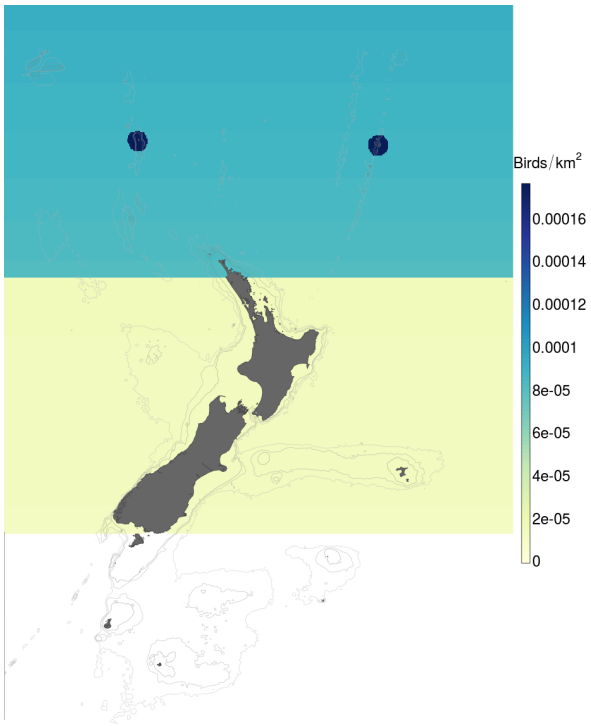



**Figure S-69: Relative density of Caspian tern (*Sterna caspia*). The breeding season runs from September to January. No incidental capture was recorded by observers between the 2006–07 and 2012–13 fishing years in trawl, surface-longline (SLL), bottom-longline (BLL), and set-net (SN) fisheries.**

## S.70 Common white tern (*Gygis alba*)

| | | |
|---|---|---|
| Population (NZ) | 60 to 100 pairs | Taylor (2000b) |
| Age at first reproduction | 3 to 5 years | Schreiber & Burger (2001) |
| Survival rate | 78 to 83% | Bridled tern as proxy, Schreiber & Burger (2001) |

**(a) Breeding distribution**




**(b) Non-breeding distribution**

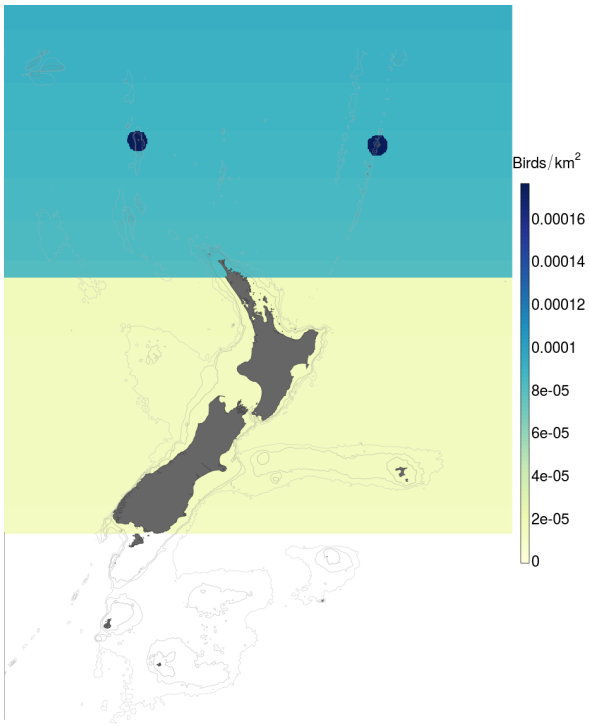



**Figure S-70: Relative density of common white tern (*Gygis alba*). The breeding season runs from September to April. No incidental capture was recorded by observers between the 2006–07 and 2012–13 fishing years in trawl, surface-longline (SLL), bottom-longline (BLL), and set-net (SN) fisheries.**

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