Conservation Services Programme

Seabird Medium-Term Research Plan

DRAFT

1. Purpose

The Conservation Services Programme (CSP) undertakes research to understand and address the effects of commercial fishing on protected species in New Zealand fisheries waters (for further details see the [CSP Strategic Statement](#)).

This CSP seabird medium term research plan (CSP seabird plan) outlines a five-year research programme to deliver on the seabird population research component of CSP as well as providing guidance on priority fisheries for seabird-focused observer coverage and mitigation development.

It has been developed as part of the work of the CSP Research Advisory Group ([CSP RAG](#)) and will be used by the Group as a tool to develop and prioritise seabird-focused research proposals. These proposals will subsequently be used in the development of CSP Annual Plans and any other relevant delivery mechanisms.

Seabird population research that falls outside the scope and mandate of CSP is not included in this plan.

2. Guiding objectives and risk framework

This plan is guided by the relevant objectives of CSP and the National Plan of Action – 2020 to reduce the incidental catch of seabirds in New Zealand Fisheries ([NPOA-Seabirds](#)). These are summarised in Table 1.

Risk referred to in the guiding objectives is the risk of commercial fisheries to New Zealand seabird populations. For the purposes of the implementation of the NPOA-Seabirds, and of this plan, risk estimation will primarily be based on the findings of Edwards et al (2023) and any future updates of that approach. Edwards et al (2023) compare estimated bycatch in New Zealand commercial trawl, longline, and setnet fisheries to a Population Sustainability Threshold (PST) for the majority of seabird taxa breeding in New Zealand.

As the CSP mandate covers all commercial fishing methods, this plan will also consider species for which risk from any other commercial fisheries has been identified. For the purposes of this plan, the expert-opinion based qualitative risk assessment by Rowe (2013) will be the primary assessment for fisheries not included by Edwards et al (2023).

Whilst consideration of the indirect effect of fishing on seabirds (and other protected species) falls within the scope of CSP, for simplicity this plan is restricted to consideration on direct effects.

3.   Data requirements

Addressing the relevant CSP and NPOA-Seabirds five-year objectives summarised in Table 1 requires the availability of certain seabird population information. In order to accurately estimate fisheries risk to seabirds using the approach of Edwards et al (2023), and measure change in risk in response to fisheries management, the following seabird population inputs are required:

- number of annual breeding pairs (N_{BP});

- proportion of adults breeding in a given year (P_B);

- age at first reproduction (A);

- annual adult survival rate (S_A); and

- spatial distribution.

A summary of existing relevant literature has been produced for the [CSP RAG]. This plan describes a research programme to fill knowledge gaps and obtain updated estimates for the seabird population inputs listed above for higher risk seabird taxa and/or where current estimates are most uncertain.

The guiding objectives from both the NPOA-Seabirds and CSP relate to populations. The taxonomy of some seabirds remains uncertain, even at the species level. In order to understand population level risk, it is important to understand which breeding sites represent distinct populations, whether at a formal subspecies level (e.g., Gibson's and Antipodean albatross) or not. Where taxonomic experts are uncertain, or in disagreement, conducting further taxonomic work is required to meet the guiding objectives.

Other sources of information, particularly around estimation of capture rates in fisheries, is also of great importance in accurately estimating risk. This information is generally best obtained via vessel observation programmes. This plan provides guidance on which fisheries contribute most uncertainty in estimates of risk to seabirds. Obtaining additional information on capture rates in these fisheries is thus of greatest importance in developing robust risk estimates.

This plan also summarises which fisheries contribute the most risk to seabirds and are thus of greatest priority in ensuring effective mitigation strategies are available.

4.   Current risk and uncertainty

Table 2 lists all seabird taxa that have a mean risk ratio exceeding 0.01 (see Edwards et al 2023). Table 2 also identifies risk from commercial fisheries other than those considered by Edwards et al (2023), where the risk for any seabird taxon was found to be moderate or higher by Rowe (2013).

In addition to summarising the risk from commercial fisheries for each seabird taxon, Table 2 provides both the International Union for Conservation of Nature and Natural Resources (IUCN) Red List of Threatened Species classification and the New Zealand Conservation Status (NZCS; Robertson et al 2021) for each taxon. It should be noted that for several taxa the IUCN classification is for a higher taxonomic level (all are at global species level), and for yellow-eyed penguin (mainland) the NZCS is also at species level.

A summary of the key sources of uncertainty in the risk estimates of Richard et al (2020) for the seabird taxa with low or high-risk scores is provided in Table 3. The coefficient of variation (CV) is provided for each taxon as a measure of the overall uncertainty of each species' risk estimate.

The uncertainty in risk arises from uncertainty in a range of parameters. Of relevance to planning seabird population research is the uncertainty around parameters A, S_A, N_{BP} and P_B (see Section 3 above). The population research component of this plan is focussed on obtaining better estimates of those parameters, which contribute most uncertainty in risk estimates. It also provides a plan to conduct baseline population monitoring for at risk taxa to allow measurement of risk over time in response to fisheries management actions, spatial tracking to identify areas of fisheries overlap for potential management, and taxonomic determination.

Whilst this plan is centred on the outputs of Edwards et al (2023), more detailed quantitative modelling to assess fisheries risk has been completed for some taxa. These assessments are listed in Table 4. This plan does not attempt to summarise the findings and recommendations from these assessments, but the findings should be taken into consideration by the CSP RAG in prioritising research proposals for these taxa.

To prioritise where mitigation strategies are developed, annual deaths predicted by Edwards et al (2023) for species at higher risk are used. Fishery breakdowns have been tabulated and colour coded in this plan to assist in prioritisation of observer coverage and mitigation projects.

5.   Population research plan

As well as providing information on sources of uncertainties in current risk estimates, Table 3 provides the CSP seabird population research response to obtain better information required to meet the relevant NPOA-Seabirds and CSP objectives. The CSP research response has been developed to achieve the following outputs:

- total population estimates for seabird taxa which have both considerable uncertainty in their risk ratio, as measured by the CV, and considerable uncertainty arising from current N_{BP} estimate, or where initial work has indicated a potential decline;

- annual mark-recapture studies to estimate population parameters, including S_A, for those seabird taxa which have both considerable uncertainty in their risk ratio, as measured by the CV, and considerable uncertainty arising from the current S_A estimate, where there are existing studies in place, or where new studies are logistically easy and relatively low cost;

- investigation of feasibility for establishing annual mark-recapture studies to estimate population parameters, including S_A, for those seabird taxa which have both considerable uncertainty in their risk ratio, as measured by the CV, and considerable uncertainty arising from the current S_A estimate, where there are no existing studies in place, or where breeding sites are logistically difficult to access with higher associated cost;

- tracking studies for seabird taxa where little or no information exists and/or those taxa at particularly high risk where more detailed tracking information can inform spatial fisheries management responses;

- taxonomic investigation to clarify species taxonomy and understand which breeding sites represent distinct populations;

- routine population monitoring for all seabird taxa at medium or higher relative risk according to the methods of Edwards et al (2023), or for species where the risk assessment may be underestimated; and

- routine population monitoring for all seabird taxa at moderate or higher relative risk from fisheries other than those assessed by Edwards et al (2023) (Rowe, 2013) and with a New Zealand Conservation Status of Threatened.

In order to plan a five-year research programme to deliver the CSP research response described in Table 3, some operational principles were used:

- studies on highest risk species prioritised for earlier years;

- annual grouping of projects by location, in order to maximise cost effectiveness, for example;

  o conduct mark-recapture and tracking studies together, and time total population estimates to coincide with these where appropriate;

  o routine monitoring (of whole population or a sample, as appropriate and feasible for the taxon) at three to five-year intervals, or annually for species demonstrating a decline in population or of particular concern;

  o aim to leverage from existing studies;

  o prioritise taxonomic and review projects in early years as these are relatively low cost and may result in finding current risk estimates are under-estimated for potential new taxa; and

  o conduct periodic review of annualised studies or review CSP research response when it is envisaged that substantial new information will be available.

These principles were used to develop a five-year research plan, summarised in Table 5.

7.   Mitigation priorities

Table 6 summarises the annual seabird deaths for seabirds listed in Table 2 by the fisheries assessed in Edwards et al (2023). Seabird taxa are listed in priority of risk category, and fisheries are ranked for each species by colour according to their contribution to total annual deaths. Those fisheries contributing most annual deaths should be considered highest priority for ensuring mitigation strategies are developed.

8.   References

Edwards, C.T.T.; Peatman, T.; Goad D.; Webber, D.N. (2023). Update to the risk assessment for New Zealand seabirds. New Zealand Aquatic Environment and Biodiversity Report No. 314. 66 p.

Fisheries New Zealand. 2020. *Aquatic Environment and Biodiversity Annual Review 2019–20*. Compiled by the Aquatic Environment Team, Fisheries Science and Information, Fisheries New Zealand, Wellington New Zealand. 765 p.

Richard, Y.; Abraham, E.R.; Berkenbusch, K. 2020. Assessment of the risk of commercial fisheries to New Zealand seabirds, 2006-07 to 2016-17. *New Zealand Aquatic Environment and Biodiversity Report 237*. 57 p.

Robertson, H.A.; Baird, K.; Elliott, G.P.; Hitchmough, R.A.; McArthur, N.; Makan, T.D.; Miskelly, C.M.; O'Donnell, C.J.F.; Sagar, P.M.; Scofield, R.P.; Taylor, G.A.; Michel, P. 2021. Conservation status of birds in Aotearoa New Zealand, 2021. New Zealand Threat Classification Series 36. Department of Conservation, Wellington. 47 p.

Rowe, S. 2013: Level 1 risk assessment for incidental seabird mortality associated with fisheries in New Zealand's Exclusive Economic Zone. DOC Marine Conservation Services Series 10. Department of Conservation, Wellington. 58 p.

Tables

Table 1. Guiding objectives (relevant to this plan).

Objective type	Objective		
NPOA-Seabirds Vision	New Zealanders work towards zero fishing-related seabird mortalities		
NPOA-Seabirds Goals	Avoiding Bycatch Effective bycatch mitigation practices are implemented in New Zealand fisheries	Healthy Seabird Populations Direct effects of New Zealand fishing do not threaten seabird populations or their recovery	Research and Information Information to effectively manage direct fisheries effects on seabirds is continuously improved
NPOA-Seabirds Objective	1. Ensure all New Zealand commercial fishers are using practices that best avoid the risk of seabird bycatch, enabled by appropriate regulations	3. Research, monitoring and management actions are prioritised for seabird populations of particular concern and their risk ratios reduce 4. The number of fishing-related mortalities is decreasing towards zero	5. Research is undertaken to improve bycatch mitigation across sectors, especially where there are high bycatch rates and no known effective mitigation (note: mitigation may include spatial and temporal closures) 6. Monitoring programmes for New Zealand commercial fisheries are designed and implemented to provide statistically robust information to assess progress towards the NPOA Seabirds 2020's objectives 7. Observation and monitoring methods are researched, developed and implemented across all sectors 8. A research programme provides information to reduce uncertainty in estimates of risk to seabirds from fishing across all sectors
CSP Objectives			
A	Proven mitigation strategies are in place to avoid or minimise the adverse effects of commercial fishing on protected species across the range of fisheries with known interactions		
B	The nature of direct adverse effects of commercial fishing on protected species is described		
C	The extent of known adverse direct effects of commercial fishing on protected species is adequately understood.		
E	Adequate information on population level and susceptibility to fisheries effects exists for protected species populations identified as at medium or higher risk from fisheries		

Table 2. Seabird taxa at risk from commercial fishing. L2 risk– mean risk ratio (and risk category) based on Fisheries New Zealand (2020), risk value: VH = very high, H = high, M = medium, L = low, N = negligible; other fishery – fisheries other than those considered by Richard et al (2020) which pose moderate or higher risk; L1 risk – Rowe (2013); IUCN Threat – IUCN Red List 2021; NZ Threat – T = Threatened, AR = At Risk, NT = Not Threatened Robertson et al (2021). * = assessed at species level. Taxa in bold have been assessed by quantitative modelling (Table 4). [Threat status change 2021: Red – worse, yellow – no change, green – better]

Common name	Scientific name	L2 risk	Other fishery	L1 risk	IUCN Threat status	NZ Threat status
Southern Buller's albatross	*Thalassarche bulleri bulleri*	1.19 (VH)			Near threatened*	AR Declining
Salvin's albatross	*Thalassarche salvini*	0.69 (H)			Vulnerable	T Critical
New Zealand white-capped albatross	*Thalassarche steadi*	0.50 (H)			Near threatened	AR Declining
Black petrel	*Procellaria parkinsoni*	0.49 (H)	Hand line / Purse seine light / Troll	Moderate / Moderate / Moderate	Vulnerable	T Vulnerable
Westland petrel	*Procellaria westlandica*	0.38 (H)			Endangered	AR Uncommon
Chatham Island albatross	*Thalassarche eremita*	0.27 (M)			Vulnerable	AR Uncommon
Flesh-footed shearwater	*Ardenna carneipes*	0.22 (M)	Hand line / Purse seine light	Moderate / Moderate	Near threatened	AR Relict
Northern Buller's albatross	*Thalassarche bulleri platei*	0.19 (M)			Near threatened*	AR Uncommon
Gibson's albatross	*Diomedea antipodensis gibsoni*	0.16 (H)			Endangered *	T Critical
Antipodean albatross	*Diomedea antipodensis antipodensis*	0.16 (M)			Endangered *	T Critical
White-chinned petrel	*Procellaria aequinoctialis*	0.09 (L)			Vulnerable	NT
Southern royal albatross	*Diomedea epomophora epomophora*	0.08 (L)			Vulnerable	T Vulnerable
Northern giant petrel	*Macronectes halli*	0.08 (L)			Least concern	AR Recovering
Campbell black-browed albatross	*Thalassarche impavida*	0.05 (L)			Vulnerable	AR Uncommon
Yellow-eyed penguin (mainland)	*Megadyptes antipodes*	0.04 (N)			Endangered	T Endangered*
Yellow-eyed penguin (subantarctic)	*Megadyptes antipodes*	0.04 (N)			Endangered	T Endangered
Spotted shag	*Stictocarbo punctatus*	0.04 (L)			Least concern	T Vulnerable
Northern royal albatross	*Diomedea sanfordi*	0.04 (L)			Endangered	T Vulnerable
Light-mantled sooty albatross	*Phoebetria palpebrata*	0.03 (L)			Near threatened	Vulnerable
Grey-headed albatross	*Thalassarche chrysostoma*	0.03 (L)			Endangered	T Vulnerable
Grey petrel	*Procellaria cinerea*	0.02 (N)			Near threatened	AR Relict
Snares Cape petrel	*Daption capense australe*	0.02 (L)			Least concern *	AR Uncommon
Otago shag	*Leucocarbo chalconotus,*	0.01 (N)			Vulnerable *	T Increasing
Buller's shearwater	*P uffinus bulleri*	0.01 (N)			Vulnerable	AR Declining
New Zealand king shag	*Leucocarbo carunculatus*	0.01 (L)	Trap & Pot	Moderate	Vulnerable	T Endangered
Little black shag	*Phalacrocorax sulcirostris*	0.01 (N)			Least concern	AR Uncommon
Fiordland crested penguin	*Eudyptes pachyrhynchus*	0.01 (N)			Near threatened	AR Declining
New Zealand white-faced storm petrel	*Pelagodroma marina maoriana*	<0.01 (N)	Purse seine light	Moderate	Least concern *	AR Relict
North Island little shearwater	*Puffinus assimilis haurakiensis*	<0.01 (N)	Purse seine light	Moderate	Least concern*	AR Recovering
Chatham Island shag	*Leucocarbo onslowi*	<0.01 (N)	Trap & Pot	Moderate	Critically endangered	T Vulnerable
New Zealand storm petrel	*Fregetta maoriana*	<0.01 (N)	Purse seine light	Extreme	Critically endangered	T Vulnerable
Pitt Island shag	*Stictocarbo featherstoni*	<0.01 (N)	Trap & Pot	High	Endangered	T Vulnerable
Pycroft's petrel	*Pterodroma pycrofti*	<0.01 (N)	Purse seine light	Moderate	Vulnerable	AR Recovering

Table 3. Risk uncertainty due to underlying parameters and CSP research response for species at low or higher risk according to Fisheries New Zealand (2020). Values are the percentage reduction in the 95% confidence interval of the risk ratio that occurs when the parameter is set to its arithmetic mean. See Richard et al (2020) for full details. The parameters are: annual potential fatalities in trawl, bottom longline, surface longline and set-net fisheries (TWL, BLL, SLL, SN, respectively); age at first reproduction (A); adult survival (S_A); the number of annual breeding pairs (N_{BP}); and the proportion of adults breeding (P_B). CSP research response: M-R = Mark-recapture study to estimate demographic parameters including SA; Pop Est = total population estimate; Monitor = routine monitoring of population trend; Track = collecting spatial tracking information; Taxonomy = requires taxonomic investigation. Y = yes (required). I = investigate feasibility. P = pending completion of current research projects. Taxa in bold have been assessed by quantitative modelling (Table 4). * Uncertainty around risk ratio parameters is assessed at species level.

Common name	RiskCV	Risk parameter								CSP research response				
		TWL	BLL	SLL	SN	A	S_A	N_{BP}	P_B	M-R	Pop Est	Monitor	Track	Taxonomy
Black petrel	0.36	0	0	0	0	0	0	33	0		Y	Y		
Salvin's albatross	0.19	26	5	4	4	10	14	0	0	Y		Y	Y	
Westland petrel	0.50	52	4	1	0	1	0	1	0			Y		
Flesh-footed shearwater	0.29	36	2	2	2	6	0	0	1			Y	P	
Southern Buller's albatross	0.29	24	1	1	0	3	15	7	2	Y		Y		
Gibson's albatross	0.30	5	5	28	4	1	10	4	7	Y		Y		
New Zealand white-capped albatross	0.27	33	3	2	3	4	15	3	4	Y		Y	P	
Chatham Island albatross	0.33	12	28	3	1	2	0	9	2			Y		
Northern Buller's albatross	0.28	7	3	4	0	2	19	8	2	P		Y		P
Yellow-eyed penguin (mainland)	0.50	15	9	3	28	2	1	1	3		Y	Y	Y	Y
Antipodean albatross	0.31	11	4	29	1	1	1	9	4			Y		
Northern giant petrel	0.79	24	17	1	3	3	18	5	2	I		Y	Y	
Otago shag	0.37	50	11	8	11	5	7	4	4			Y	Y	
Spotted shag	0.45	19	4	5	6	1	0	31	0		Y			Y
Yellow-eyed penguin (subantartic)	0.49	14	11	2	29	2	0	4	2	Y	Y	Y	Y	Y
White-chinned petrel	0.27	9	6	2	2	9	11	19	6	Y	Y			P
Campbell black-browed albatross	0.49	19	5	5	0	0	0	27	0		Y			
Northern royal albatross	0.82	39	13	3	3	1	9	17	2		Y			

Table 4. Level 3 Risk Assessments

Species	Citation and Link
Black petrel	Bell, E.A., Sim, J.L., Scofield, P., Francis, C. 2011b: Population parameters of the black petrels (Procellaria parkinsoni) on Great Barrier Island (Aotea Island), 2009/10. Research report for Department of Conservation, Wellington
	Francis, R.I.C.C.; Bell, E.A. 2010: Fisheries risks to the population viability of black petrel (Procellaria parkinsoni). New Zealand Aquatic Environment and Biodiversity Report No. 51. Ministry of Agriculture and Forestry, Wellington.
Southern Buller's albatross	Francis, R.I.C.C. & Sagar, P.M. 2011: Modelling the effect of fishing on southern Buller's albatross using a 60-year dataset. New Zealand Journal of Zoology, DOI:10.1080/03014223.2011.600766
	Fu, D.; Sagar, P. (2016). The 2014 demographic assessment of the Snares Islands population of Southern Buller's albatross (*Diomedea bulleri bulleri*). New Zealand Aquatic Environment and Biodiversity Report No. 165. 40 p.
Gibson's albatross	Francis, R.I.C.C., Elliot, G., Walker, K. 2015: Fisheries risk to the viability of Gibson's wandering albatross *Diomedea gibsoni*. New Zealand Aquatic Environment and Biodiversity Report. No 152. 48p.
White-capped albatross	Francis, R.I.C.C. 2012: Fisheries Risks to the Population Viability of White-capped Albatross *Thalassarche steadi*. New Zealand Aquatic Environment and Biodiversity Report. No. 104. 24 p.
Antipodean albatross	Richard, Y. 2021. Integrated population model of Antipodean Albatross for simulating management scenarios. Technical Report prepared for Department of Conservation. Dragonfly Data Science. 31p.
	Edwards, C.T.T.; Roberts, J.O.;Walker, K.; Elliott, G. 2017. Quantitative modelling of Antipodean wandering albatross. New Zealand Aquatic Environment and Biodiversity Report No. 180. 32 p.

Table 5. Five-year CSP seabird research plan. M-R = Mark-recapture study to estimate demographic parameters including S_A; Pop est = population estimate; (Sat) Track = spatial (satellite) tracking project; Taxonomy = requires taxonomic investigation; GBI = Aotea/Great Barrier Island; LBI = Hauturu/Little Barrier Island. Key current or planned Crown-funded work is indicated.

Common name	2024/25	2025/26	2026/27	2027/28	2028/29	notes
Southern Buller's albatross	M-R Snares Breeding success Snares Adult sat-tracking Snares	M-R Snares (incl juv marking) Breeding success Snares Adult and Juv sat tracking Snares Pop est Snares	M-R Snares (incl juv marking) Breeding success Snares Juv sat tracking Snares IPM	M-R Snares (incl juv marking) and review	Solander pop est	
Salvin's albatross	Pop est Bounties Breeding success Bounties Juv sat tracking and marking Western Chain (Crown)	Pop est and M-R Western Chain Assess future M-R feasibility Western Chain Adult sat tracking Western Chain (Crown)	TBC	TBC	TBC	Potential cost saving synergies with other work at Bounties may provide opportunities
New Zealand white-capped albatross	M-R Disappointment Adult sat and GLS track Disappointment (Crown) Breeding success Disappointment	Pop est and M-R Disappointment	Pop est and M-R Disappointment	Pop est and M-R Disappointment Juv sat track Disappointment		
Black petrel	M-R GBI and at-sea Adult GPS, GLS and TDR tracking (Crown)	M-R GBI Adult GLS tracking (Crown) Demographic model	M-R GBI Demographic model	M-R GBI Pop est LBI	Pop est GBI	
Westland petrel	M-R and breeding success Juv sat track Adult GPS track (Crown)	M-R and breeding success (Crown)	M-R and breeding success Pop est	M-R and breeding success Pop est		
Chatham Island albatross		Pop est Adult sat track M-R and breeding success	Pop est Adult sat track M-R and breeding success			
Flesh-footed shearwater	M-R at two sites	Demographic modelling	Demographic modelling	M-R dependent on model results	Pop est at key sites	
Northern Buller's albatross	Pop est Motuhara (Crown) Juv track Motuhara (Crown)		Adult sat track Motuhara	Full census (drone/ground)	Full census (drone/ground)	

Table 5 (continued)

Common name	2024/25	2025/26	2026/27	2027/28	2028/29	notes
Gibson's albatross	M-R and breeding success Adams Full census Juv track Adams (Crown) Adult track Disappointment (Crown)	M-R and breeding success Adams Pop est Disappointment	M-R and breeding success Adams Pop est Disappointment	M-R and breeding success Adams Pop est Disappointment	IPM	
Antipodean albatross	M-R and breeding success Full census	M-R and breeding success	M-R and breeding success	M-R and breeding success		
White-chinned petrel	M-R Antipodes	M-R Antipodes M-R Adams	M-R Antipodes M-R Adams Adult sat track Adams	M-R Antipodes Pop est Campbell Adult GLS track Campbell M-R Adams Adult sat track Adams	Pop est Campbell Adult GLS track Campbell	
Southern royal albatross	Pop est Campbell Pop est Enderby M-R Campbell Breeding success Campbell (Crown) Adult sat track Campbell and Enderby (Crown) GLS track Campbell (Crown)	Pop est Campbell Pop est Enderby M-R Campbell Breeding success Campbell (Crown) GLS track Campbell (Crown)	Pop est Campbell Pop est Enderby M-R Campbell Breeding success Campbell (Crown)	M-R Campbell	M-R Campbell Demographic model	
Northern giant petrel	Juv sat track Campbell and Motuhara (Crown)	Adult sat track Motuhara (Crown)		Pop est Campbell	Pop est Campbell	
Campbell black-browed albatross	Pop est Breeding success (Crown) Adult sat-track (Crown)	Pop est Breeding success	Pop est Breeding success			
Yellow-eyed penguin (mainland)	Rakiura adult track	Mainland juvenile (Crown) Mainland juvenile fisheries overlap (Crown)	Northern population pop est Northern population M-R (demographics)			

Yellow-eyed penguin (subantarctic)	Campbell adult track Campbell juvenile track Campbell chick sat track Campbell pop est	Campbell adult track Campbell Fisheries overlap	Auckland distribution survey/pop est Auckland adult track Auckland juvenile track Auckland breeding success	Auckland distribution survey/pop est Auckland adult track Auckland juvenile track Auckland breeding success	Auckland distribution survey/pop est Auckland adult track Auckland juvenile track Auckland breeding success M-R Auckland / demographic model	
Spotted shag	Fisheries overlap (Northern pop)	Pop est northern pop	Pop est (one region) GPS track (one colony in region)	Pop est (one region) GPS track (one colony in region)	Pop est (one region) GPS track (one colony in region)	

Table 5 (continued)

Common name	2024/25	2025/26	2026/27	2027/28	2028/29	Notes
Northern royal albatross	Juv track Taiaroa Head (collab) Pop est (Crown)			Full census (drone/ground)	Full census (drone/ground)	Potential further tracking in collaboration at Taiaroa Head
Light-mantled sooty albatross	Breeding success Campbell (Crown)		Pop est Adams	Pop est Adams Pop est Campbell	Pop est Campbell	
Grey-headed albatross	Pop est Breeding success (Crown)	Pop est Breeding success Adult sat-track (Crown)	Pop est Breeding success			
Grey petrel				Pop est Antipodes	Pop est Antipodes	Potential for pop est at Campbell dependent on other work
Snares cape petrel		TBC	TBC	TBC	TBC	Opportunities to leverage other projects at Snares and Chathams will be sought.
Otago shag				GPS track		Synergies will be sought with spotted shag research
New Zealand king shag					Pop est mainland	
Chatham Island shag				Pop est Chathams		
Pitt Island shag				Pop est Chathams		

Table 6. Annual deaths by fishery group for species identified with low through very high L2 risk (Edwards et al 2023) to aid in prioritisation of mitigation efforts.. Seabird taxa are listed in priority of risk category, and fisheries are ranked for each species by colour according to their contribution to total annual deaths

Table 6a. Trawl fisheries.

Species	Deepwater	Large Freezer	Large Fresher	Mackerel	Scampi	Small inshore (17-28m)	Small inshore (less than 17m)	Southern Blue Whiting	Squid
Southern Buller's albatross	0	215	0	2	65	50	3	0	150
Salvin's albatross	21	553	37	2	175	740	29	2	22
New Zealand white-capped albatross	7	292	33	11	142	968	259	0	583
Black petrel	0	0	1	0	1	30	21	0	0
Westland petrel	0	13	0	0	1	37	2	0	0
Chatham Island albatross	17	4	3	0	0	0	0	0	0
Flesh-footed shearwater	0	2	0	0	46	41	23	0	0
Northern Buller's albatross	2	30	3	0	62	2	0	0	0
Gibson's albatross	0	0	0	0	0	0	0	0	0
Antipodean albatross	0	0	0	0	0	0	0	0	0
White-chinned petrel	2	206	1	11	130	8	6	0	558
Southern royal albatross	3	6	0	0	0	0	0	0	9
Northern giant petrel	0	8	0	0	0	0	0	0	0
Campbell black-browed albatross	0	14	0	0	4	2	2	2	0
Yellow-eyed penguin	0	0	0	0	0	0	0	0	0
Spotted shag	0	0	0	0	0	0	202	0	0
Northern royal albatross	0	0	0	0	0	0	0	0	0
Light-mantled sooty albatross	0	0	0	0	0	2	0	0	0
Grey-headed albatross	0	0	0	0	0	0	0	0	0
Grey petrel	0	1	0	0	2	1	1	9	1
Snares Cape petrel	0	5	0	0	0	0	3	3	0
Otago shag	0	0	0	0	0	0	0	0	0
Buller's shearwater	0	0	0	0	0	25	0	0	0
New Zealand king shag	0	0	0	0	0	0	0	0	0
Little black shag	0	0	0	0	0	0	0	0	0
Fiordland crested penguin	0	0	0	0	0	0	0	0	0

Table 6b. Bottom longline fisheries.

Species	Large Autoline with IWL	Large Autoline Small Autoline (LIN, RIB)	Small Autoline	Small Manual (heavy)	Small Manual (light)	Small Manual (LIN, RIB)	Large Autoline with IWL
Southern Buller's albatross	0	3	0	0	0	0	7
Salvin's albatross	1	9	33	0	0	1	7
New Zealand white-capped albatross	0	1	0	0	0	0	28
Black petrel	0	0	0	0	54	69	0
Westland petrel	0	0	0	0	3	1	31
Chatham Island albatross	1	0	25	0	0	0	0
Flesh-footed shearwater	0	0	0	0	5	201	0
Northern Buller's albatross	0	2	1	16	0	0	0
Gibson's albatross	0	0	0	0	0	0	0
Antipodean albatross	0	0	0	0	0	0	0
White-chinned petrel	19	280	154	4	6	0	82
Southern royal albatross	1	0	0	0	0	0	3
Northern giant petrel	0	0	0	0	0	3	0
Campbell black-browed albatross	0	0	0	7	0	0	0
Yellow-eyed penguin	0	0	0	0	0	0	0
Spotted shag	0	0	0	0	0	0	0
Northern royal albatross	0	0	0	0	0	0	0
Light-mantled sooty albatross	0	0	0	0	0	0	0
Grey-headed albatross	0	0	0	0	0	0	0
Grey petrel	0	13	7	0	0	5	7
Snares Cape petrel	0	0	0	0	0	0	0
Otago shag	0	0	0	0	0	0	0
Buller's shearwater	0	0	0	0	0	26	0
New Zealand king shag	0	0	0	0	0	0	0
Little black shag	0	0	0	0	0	0	0
Fiordland crested penguin	0	0	0	0	0	0	0

Table 6c. Surface longline fisheries.

Species	Large SLL	Small SLL (tuna and swordfish)	SN (unclassified)
Southern Buller's albatross	0	192	0
Salvin's albatross	0	7	0
New Zealand white-capped albatross	0	225	1
Black petrel	0	60	2
Westland petrel	0	35	2
Chatham Island albatross	0	0	0
Flesh-footed shearwater	0	26	4
Northern Buller's albatross	0	34	0
Gibson's albatross	0	35	0
Antipodean albatross	0	34	0
White-chinned petrel	0	115	6
Southern royal albatross	0	11	0
Northern giant petrel	0	0	0
Campbell black-browed albatross	0	19	0
Yellow-eyed penguin	0	0	10
Spotted shag	0	0	13
Northern royal albatross	0	3	0
Light-mantled sooty albatross	0	0	0
Grey-headed albatross	0	1	0
Grey petrel	0	18	0
Snares Cape petrel	0	0	0
Otago shag	0	0	1
Buller's shearwater	0	0	0
New Zealand king shag	0	0	0
Little black shag	0	0	0
Fiordland crested penguin	0	0	2