Review of *Conservation and Management Measure to mitigate the impact of fishing for highly migratory fish stocks on seabirds* (CMM 2018-03)

(SC-EB-WP-06, SC-EB-WP-10-11 & SC-EB-IP-26-30)

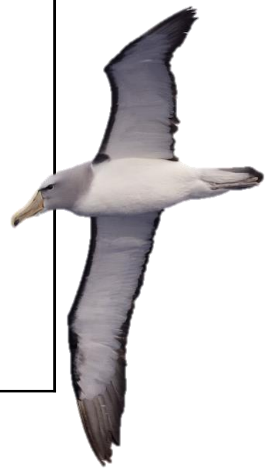


9 Aug 2024

Background to the review of CMM 2018-03

Species	IUCN status	Breeds in WCPO	Forages in WCPO	$N_{breeding\ pairs}$	Trend
Antipodean Albatross	EN	✓	✓	8,654	↓
Northern Royal Albatross	EN	✓	✓	4,261	↓
Indian Yellow-nosed Albatross	EN		✓	33,988	↓
Grey-headed Albatross	EN	✓	✓	80,633	↓
Westland Petrel	EN	✓	✓	6,223	↔
Southern Royal Albatross	EN/VU	✓	✓	6,347	↓
Wandering Albatross	VU	✓	✓	10,072	↓
Short-tailed Albatross	VU	✓	✓	889	↑
Salvin's Albatross	VU	✓	✓	58,563	↓
White-chinned Petrel	VU	✓	✓	1,317,278	↓
Black Petrel	VU	✓	✓	5,456	↔

Updated extract of SC18-EB-WP-03



WCPFC19 noted a global decline in specific ACAP seabird population trends, which are vulnerable to threats posed by longline fisheries in the WCPO, ultimately, catalysing the review of CMM 2018-03

Background to the review of CMM 2018-03

WCPFC19 agreed to conduct a review of CMM 2018-03 in 2023 and 2024 whereby new bycatch mitigation studies would be evaluated with respect to bycatch mitigation effectiveness and compared against current ACAP Best Practices.

Review purpose (as per SC19): *"To ensure that effective mitigation methods are required and applied across the Convention Area where there is bycatch risk to vulnerable seabirds from longline fishing."*

Review scope (as per SC19):

I. The spatial extent of required mitigation methods

II. The Southern Hemisphere mitigation options and specifications

III. The Northern Hemisphere mitigation options and specifications

WCPFC20 noted that New Zealand will lead informal intersessional meetings with interested CCMs to review the latest scientific evidence on seabird bycatch mitigation and gather views.

Review process during 2023-24

Dec 23: Collation of relevant papers (SharePoint)

Feb 24: 1st informal intersessional meeting (online)

May 24: 2nd informal intersessional meeting (online)

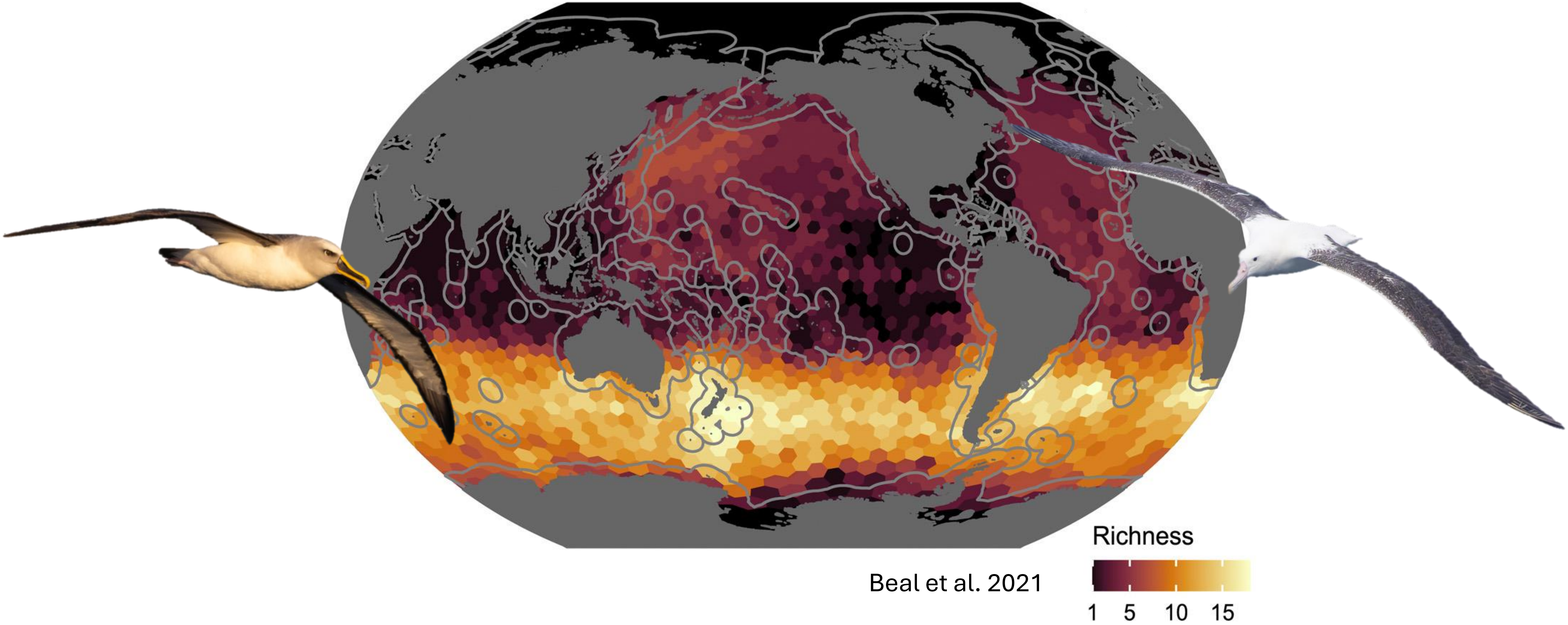
Jul 24: Collation of evidence presented, and views communicated into potential management options

Aug 24: Presentation of potential management options at SC20

Sep 24: Further discussion at TCC20

Dec 24: Further discussions at WCPFC21

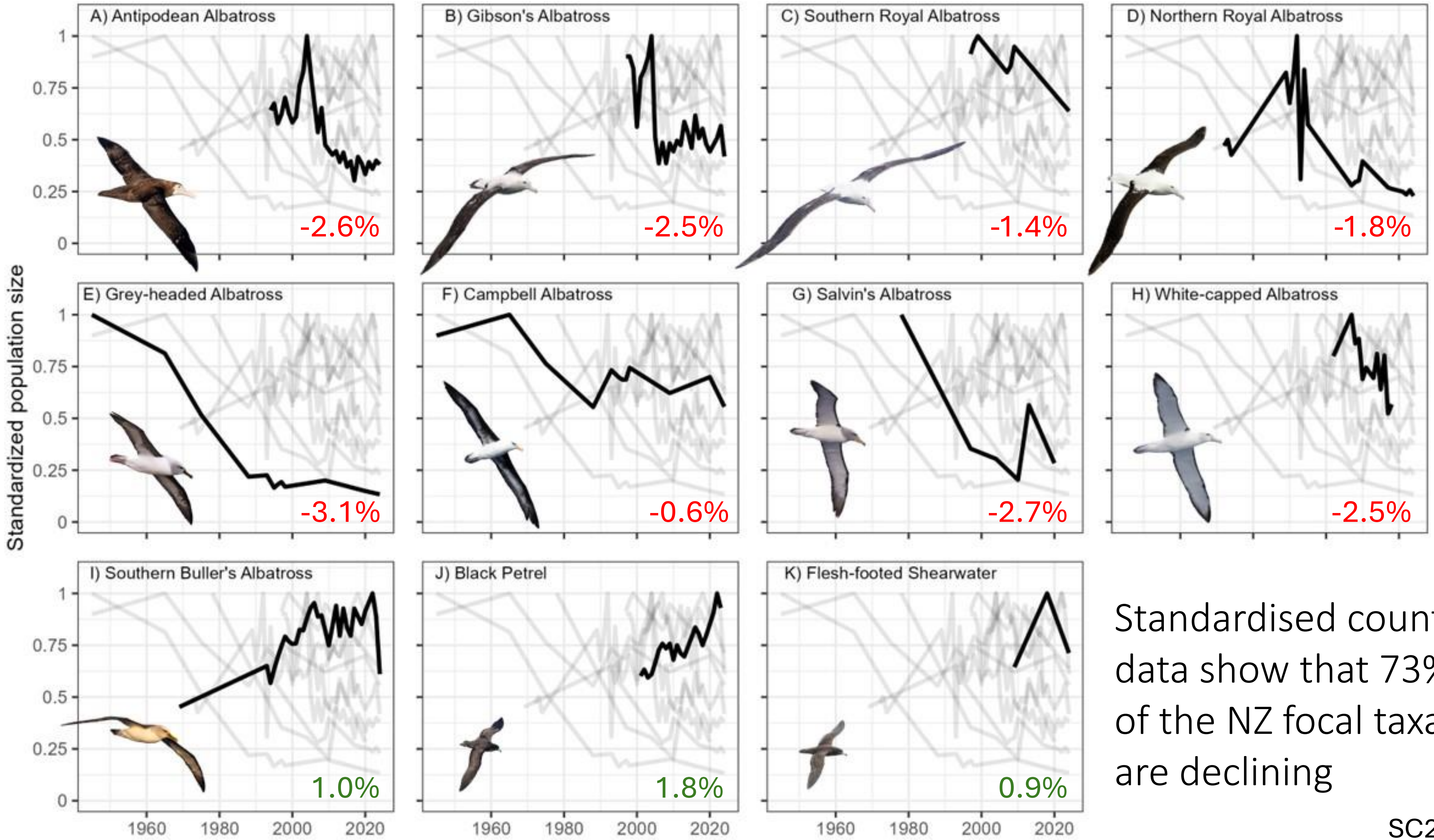
The WCPO - particularly the Southern Ocean around NZ - is a seabird hotspot



Beal et al. 2021

For instance, 77% (17/22) albatross species depend on the WCPO

New Zealand seabirds are showing concerning declines

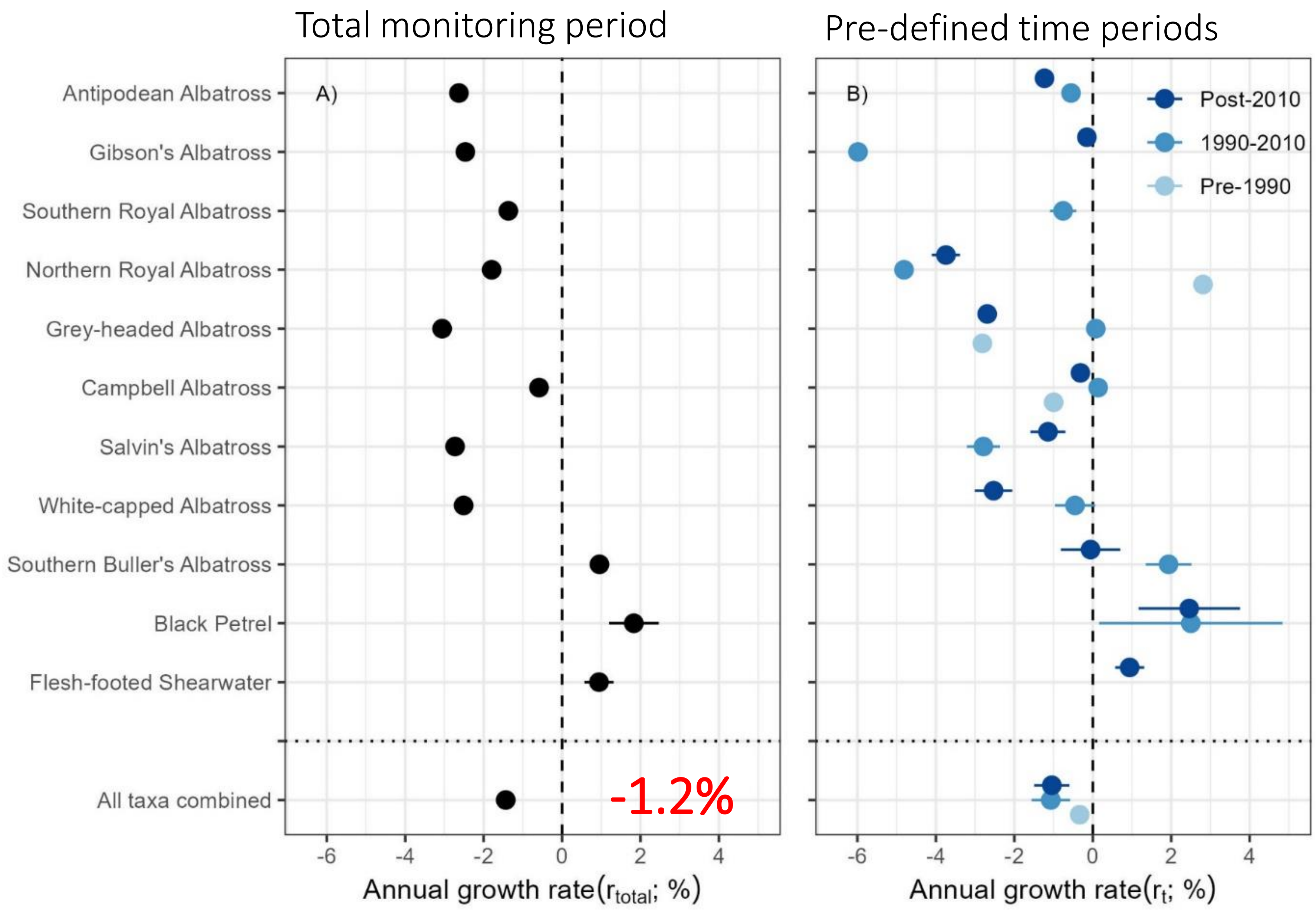


Figures show p/a decline across full time period

Standardised count data show that 73% of the NZ focal taxa are declining

SC20-EB-WP-10

These declines have not been reduced in recent years



Estimates based on Bayesian Poisson GLMMs fitted to NZ count data

$r_{pre\text{-}1990}$ = -0.3%

$r_{1990\text{-}2010}$ = -1.1%

$r_{post\text{-}2010}$ = -0.8%

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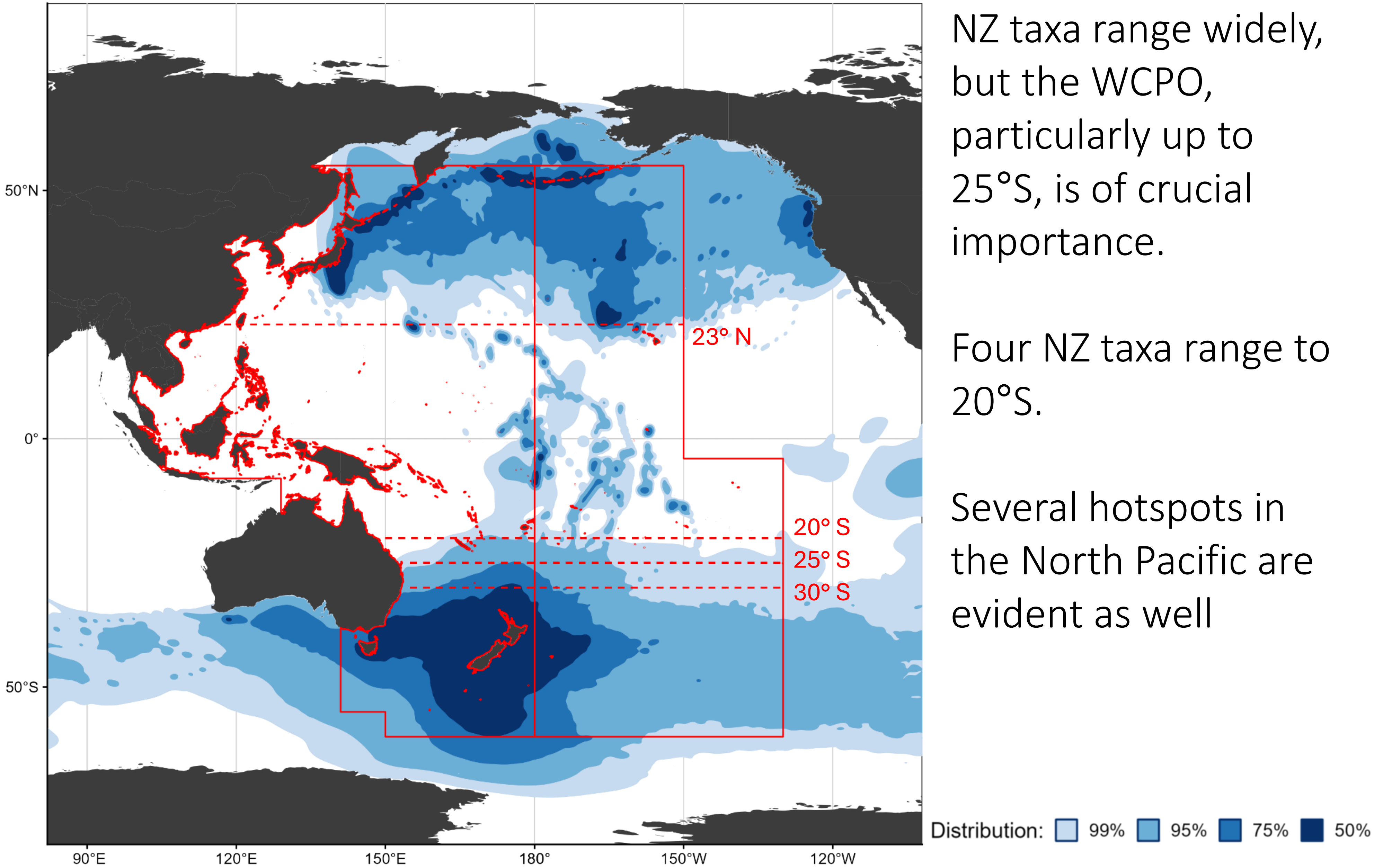
Overall seabird distribution

Kernel UD output based on 1,734 tracks of 14 taxa across the WCPO, while accounting for tag loss, tag type, population size, and temporal representativeness

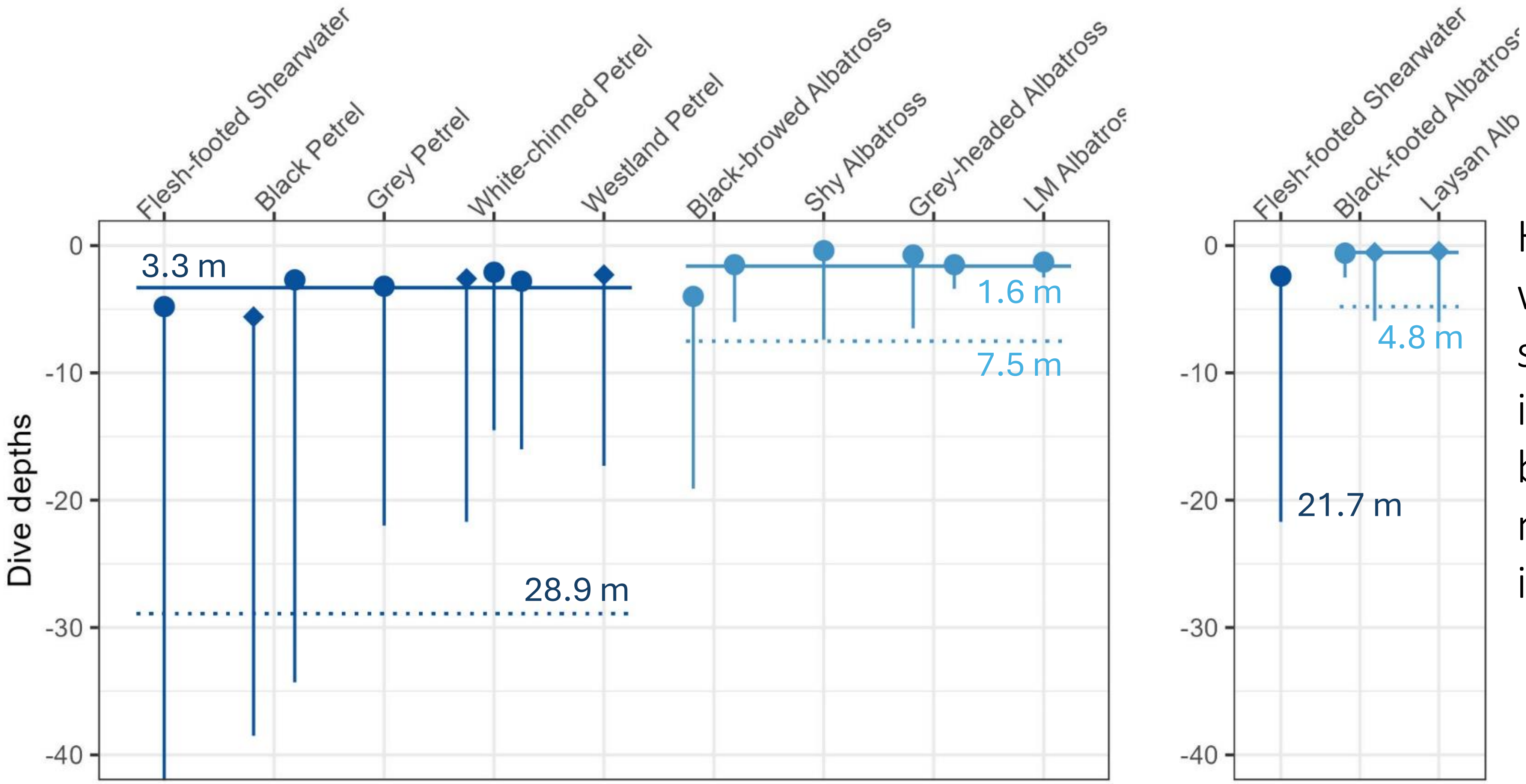


NZ taxa range widely, but the WCPO, particularly up to 25°S, is of crucial importance.

Four NZ taxa range to 20°S.

Several hotspots in the North Pacific are evident as well

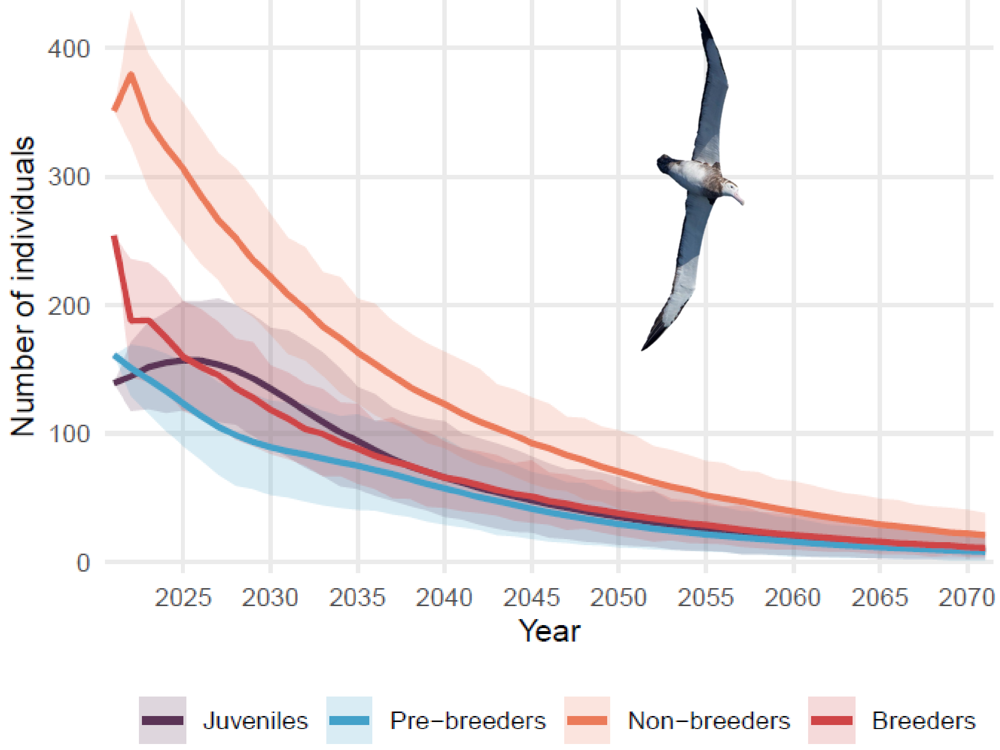
Seabirds in both hemispheres can dive to considerable depths

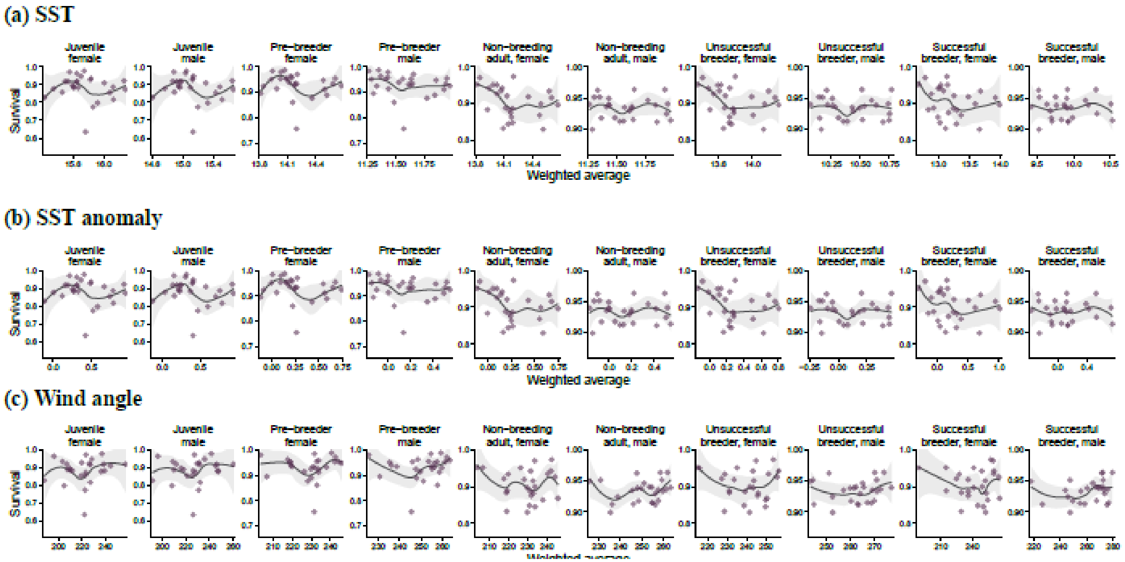


Horizontal as well as vertical space use have important bycatch mitigation implications

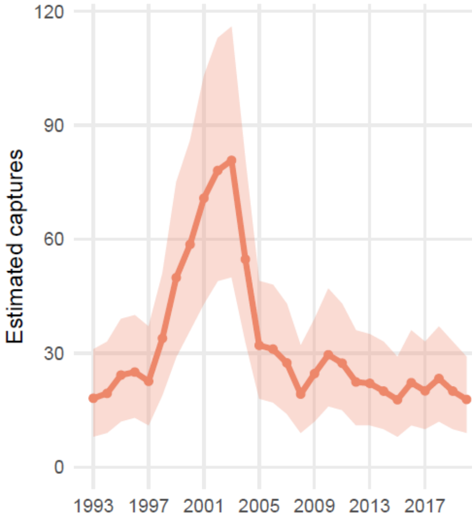
SC20-EB-IP-29

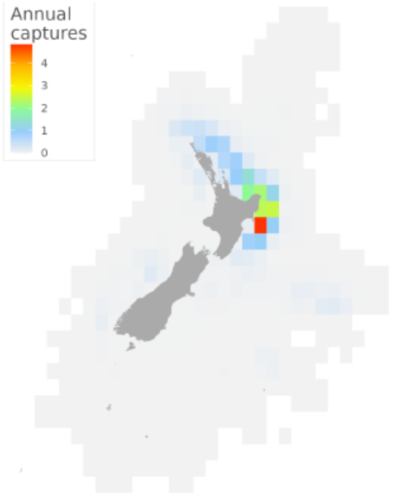
Antipodean Albatross multi-threat risk assessment





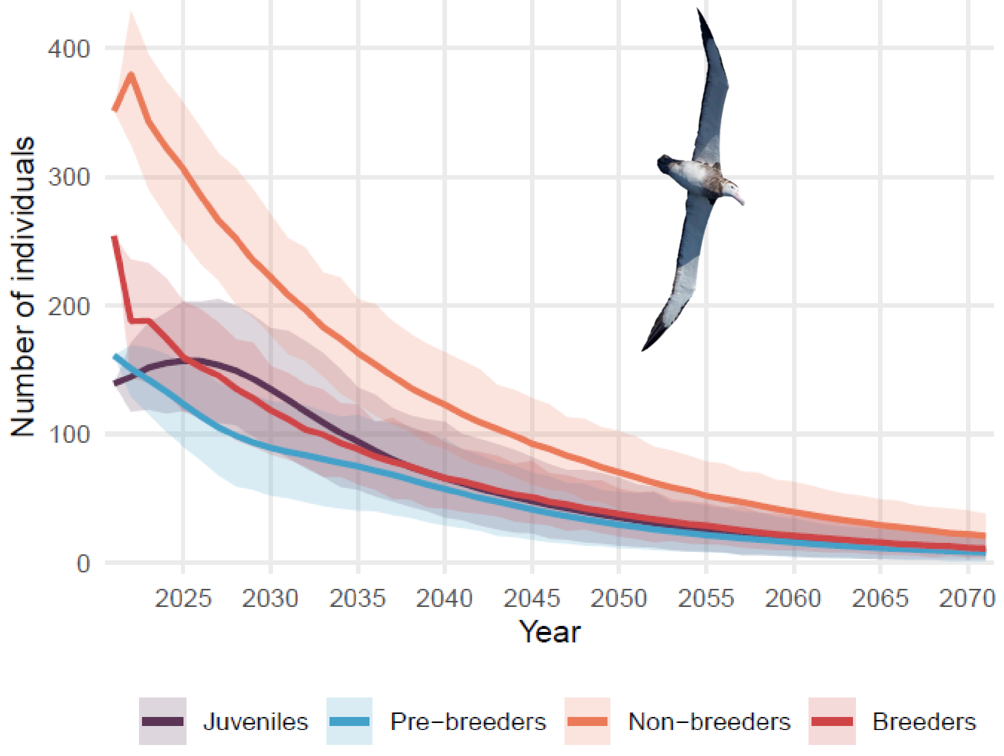
- Antipodean Albatross is predicted to face global extinction by 2070
- This decline cannot be explained by climate change impacts or domestic NZ bycatch





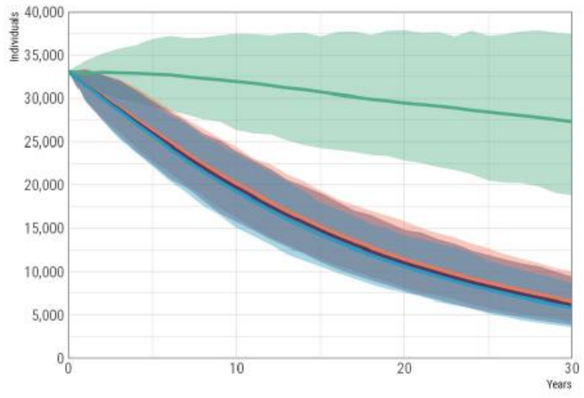
SC20-EB-IP-26

Antipodean Albatross multi-threat risk assessment

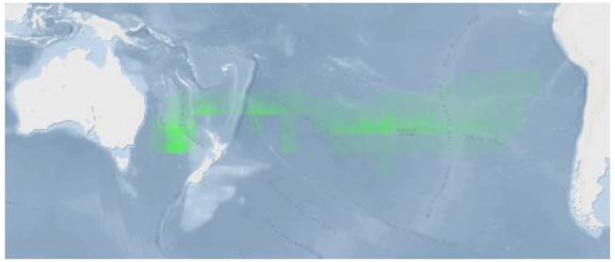


- Antipodean Albatross is predicted to face global extinction by 2070
- This decline cannot be explained by climate change impacts or domestic NZ bycatch
- The most likely explanation for this decline is bycatch in the High Seas

(a) Population size



(c)



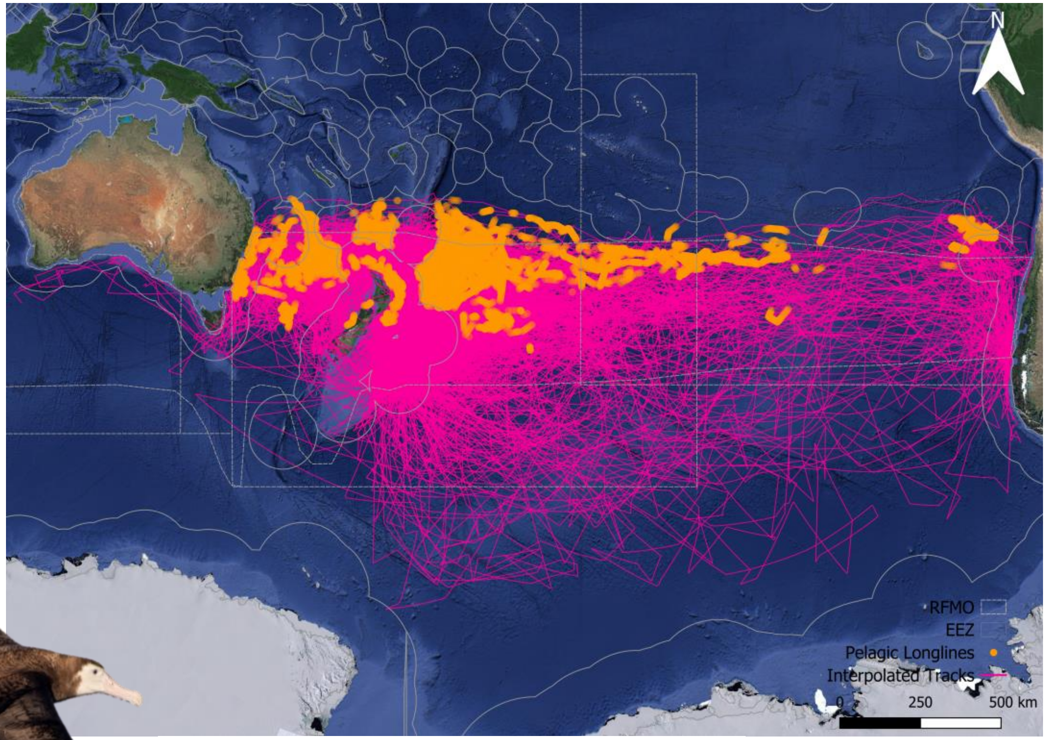
Key overlap areas with high seas fleets

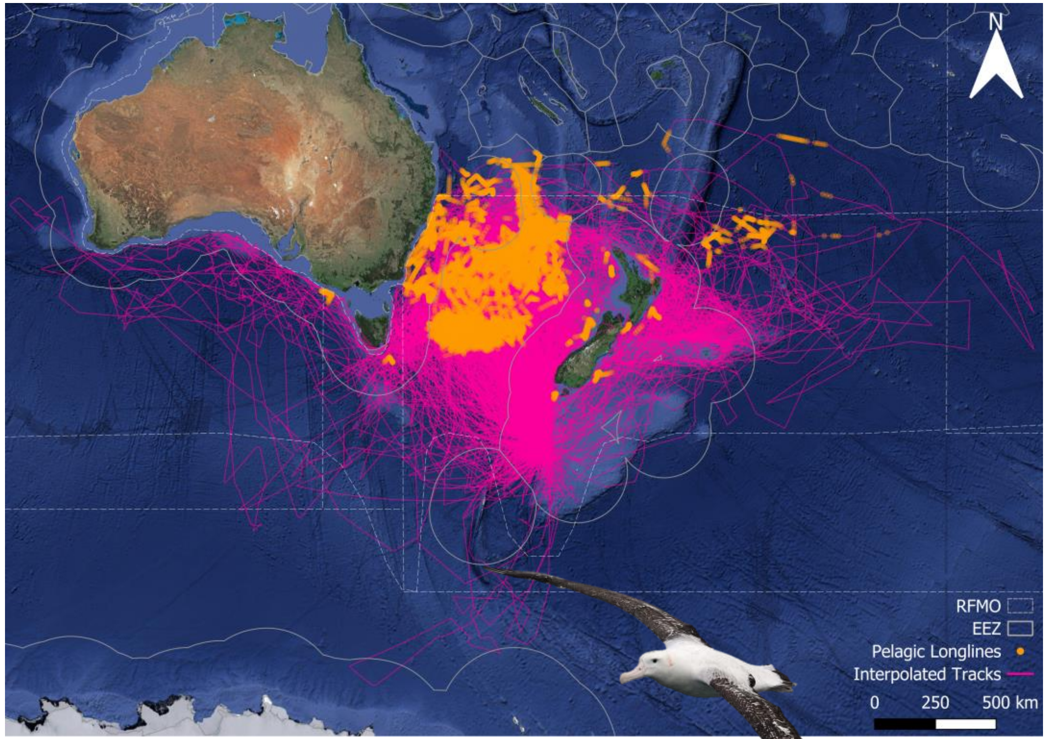
(d) Fatalities from overlap

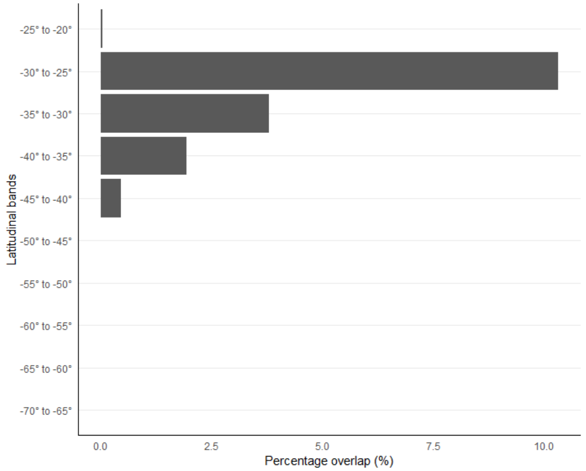
Class	Female	Male	Total
Non-breeding adult	513	412	926
Unsuccessful breeder	109	12	120
Successful breeder	259	144	403
Total	881	568	1,449

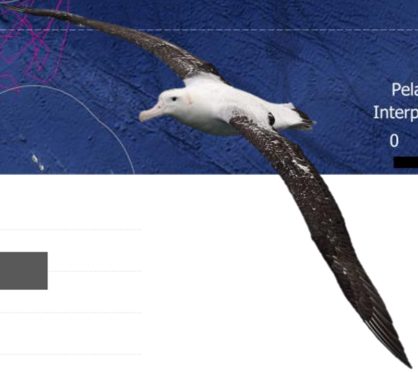
SC20-EB-IP-26

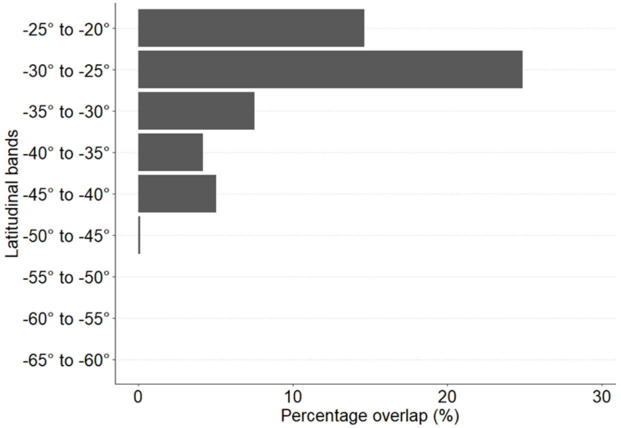
Overlap of Antipodean and Gibson's Albatross with commercial pelagic longline fishing effort











Overlap with pelagic longlines and thus implicit risk increases with decreasing latitude

SC20-EB-WP-10

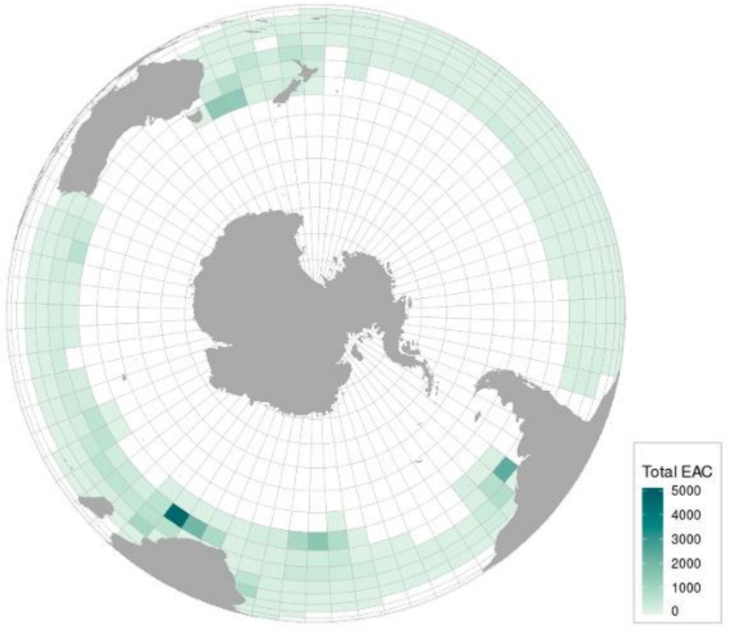
Overview of longline mortality estimates

- Globally: 50,000-75,000 seabirds annually (Anderson *et al*. 2011)*
- Southern Hemisphere: 39,000-43,000 petrels and albatross annually (JP, SAF, AUS & NZ data only; Abraham *et al*. 2019)*
- Southern Hemisphere: 12,000-25,000 petrels and albatrosses annually (NZ data only; Edwards *et al*. 2023; multi-country update for CCSBT in progress)*
- WCPFC: 11,000-25,000 seabirds annually (Peatman *et al*. 2019)*#

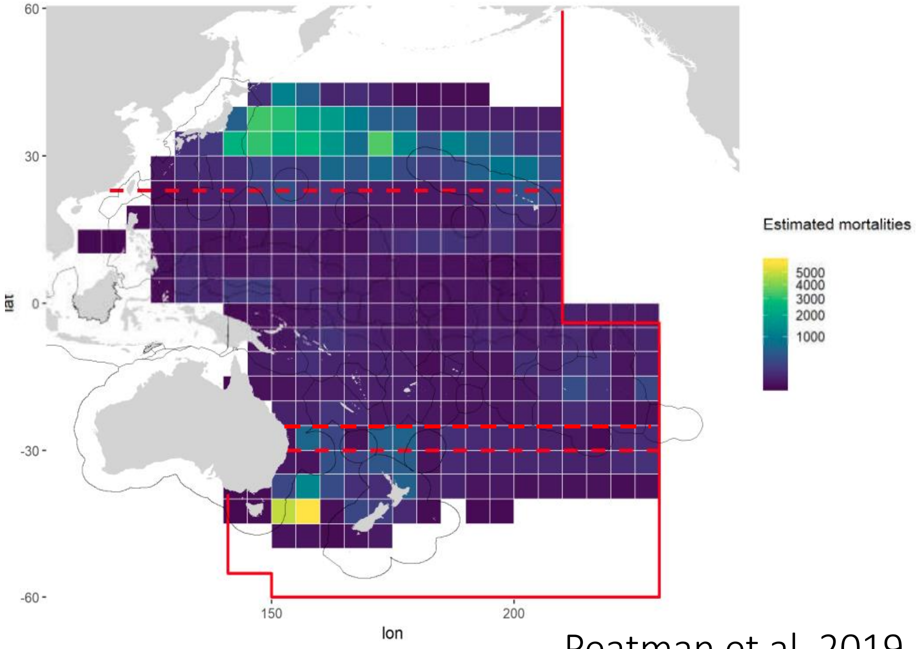
These estimates align in magnitude with the declines observed, at least at NZ colonies

*Estimates have a range of varying caveats and shortcomings, and all are subject to poor observer coverage, and sometimes limited tracking data, challenging comparisons and inferences.

#Poor observer coverage prevented a meaningful repeat of Peatman *et al*. 2019 for the review of CMM 2018-03



Abraham et al. 2019

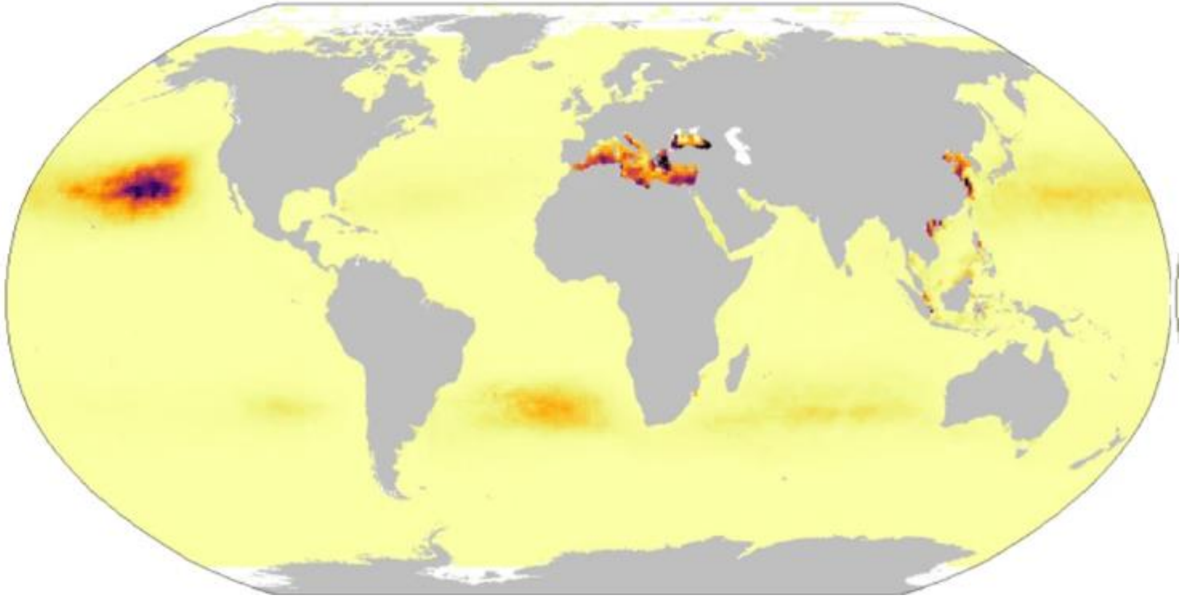


Peatman et al. 2019

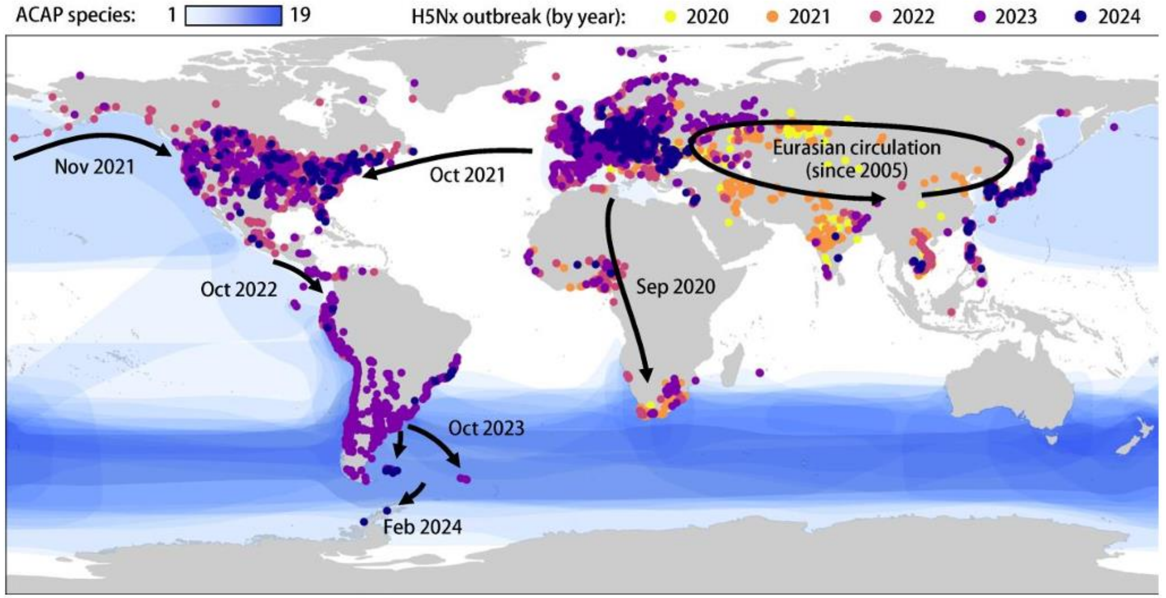
Seabird bycatch in pelagic longline fisheries is the most likely and most manageable driver of declines

- No evidence of climate change impacts (yet), at least on NZ species
- Virtually all NZ breeding sites have been cleared of invasive predators, and where they persist, they are successfully managed
- No evidence of plastic impacts in the Southern WCPO (yet)
- No HPAI impacts in the Southern WCPO (yet)

Plastic density



Clark et al. 2023



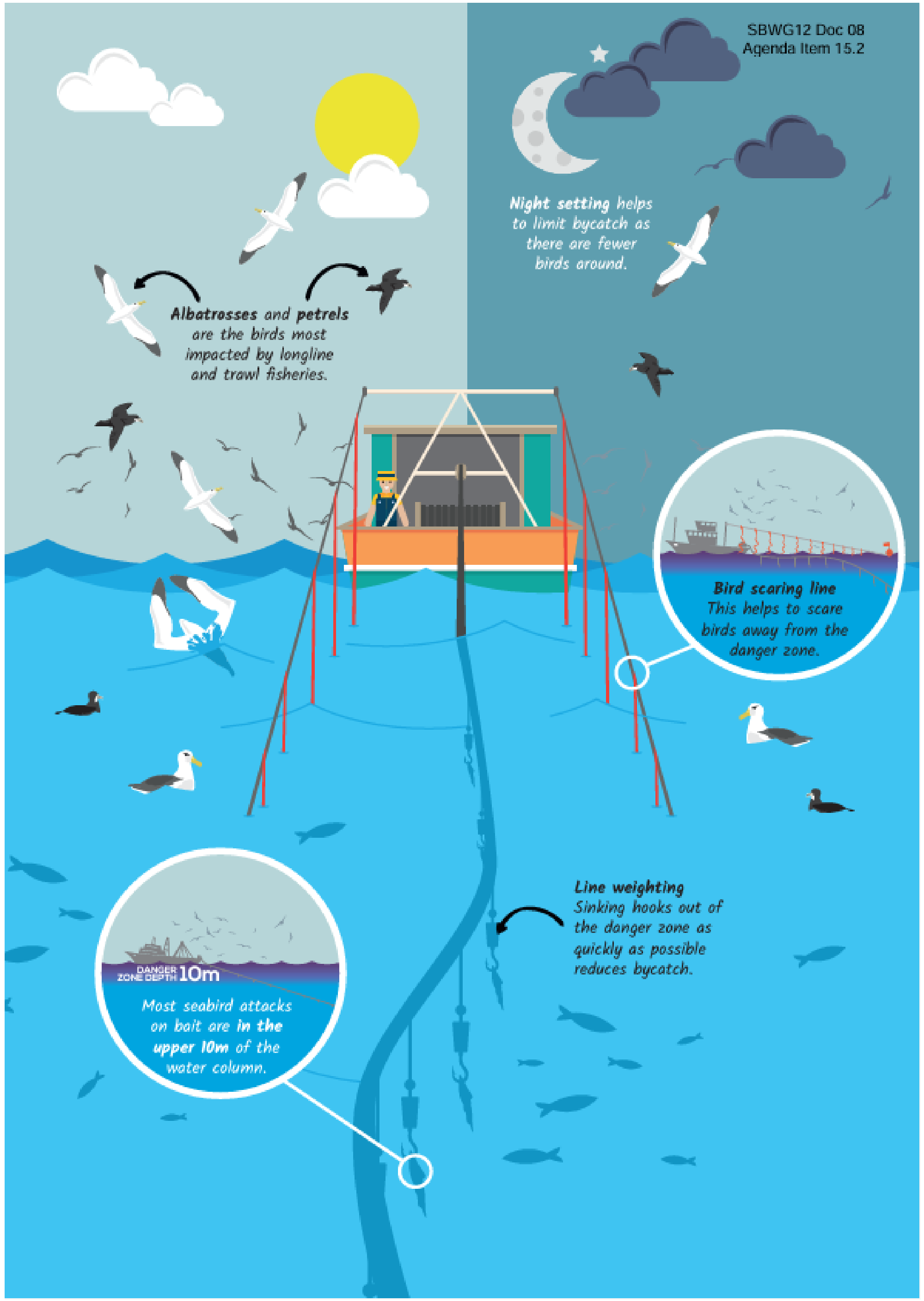
Sarafini et al. in prep

Recommendations of SC-EB-WP-10

- *Notes* the analysis of New Zealand albatross and petrel populations, showing significant, long-term, population declines, most likely caused for some species by bycatch in commercial pelagic longline fisheries.
- *Notes* the analyses of the distribution of 11 New Zealand albatross and petrel taxa, the distribution of three Northern Hemisphere albatross taxa, and fine-scale tracking of Antipodean and Gibson's albatross, which all show an extensive coverage within the WCPO. These analyses highlight:
  - Key areas of importance in Southern Hemisphere waters up to 25°S around New Zealand, the Tasman Sea, and the South Pacific east of New Zealand (but several vulnerable taxa frequent waters further north up to 20°S); and
  - Key areas of importance in Northern Hemisphere waters around the Japanese and Hawaiian seabird colonies, east of Japan and the Kuril Islands, the Bering Sea, south of the Aleutians and some core areas in the central North Pacific.
- *Notes* that the majority of tracked Antipodean and Gibson's albatross overlapped with commercial pelagic longline fishing effort, including in areas with reduced (25°-30°S) or no mandatory bycatch mitigation requirements (20°-25°S).

Solutions to seabird bycatch in commercial pelagic longline fisheries exist

- A variety of mitigation methods have been proven to reduce bycatch to negligible levels.
- These mitigation methods have been developed over decades.
- Effective use of proven mitigation methods can allow seabird populations to recover.
- However, CMM 2018-03 includes suboptimal specifications of effective methods and several ineffective methods



Ineffective mitigation methods

Blue dyed bait:

- Hypothesised to make bait less visible to seabirds
- There is limited evidence for the effectiveness, particularly when fish bait is used
- Not been proven effective in the WCPO
- Other bycatch mitigation methods (e.g., tori lines) are proven to be (vastly) more effective
- May decrease target catch rate
- Perceived as impractical and can stain target catch

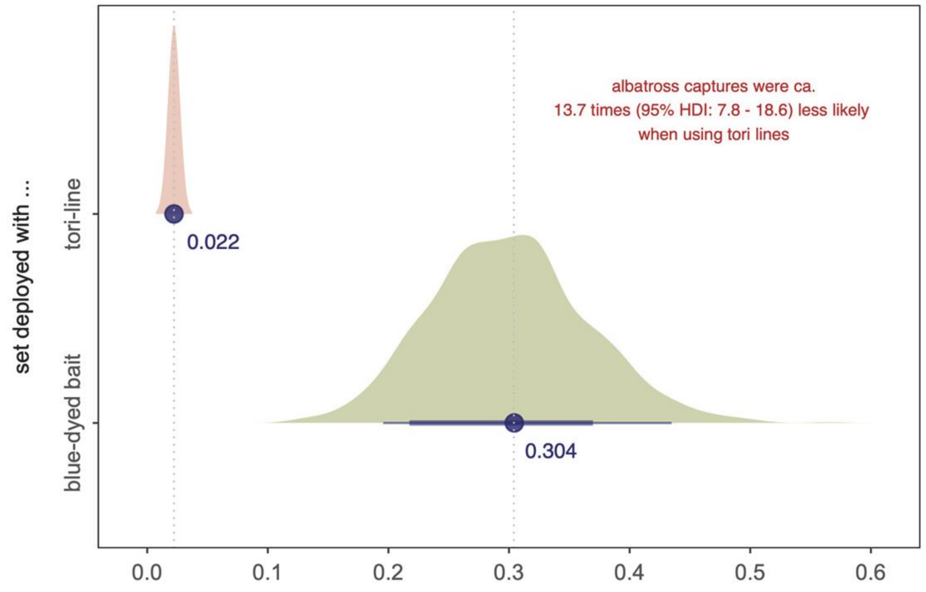


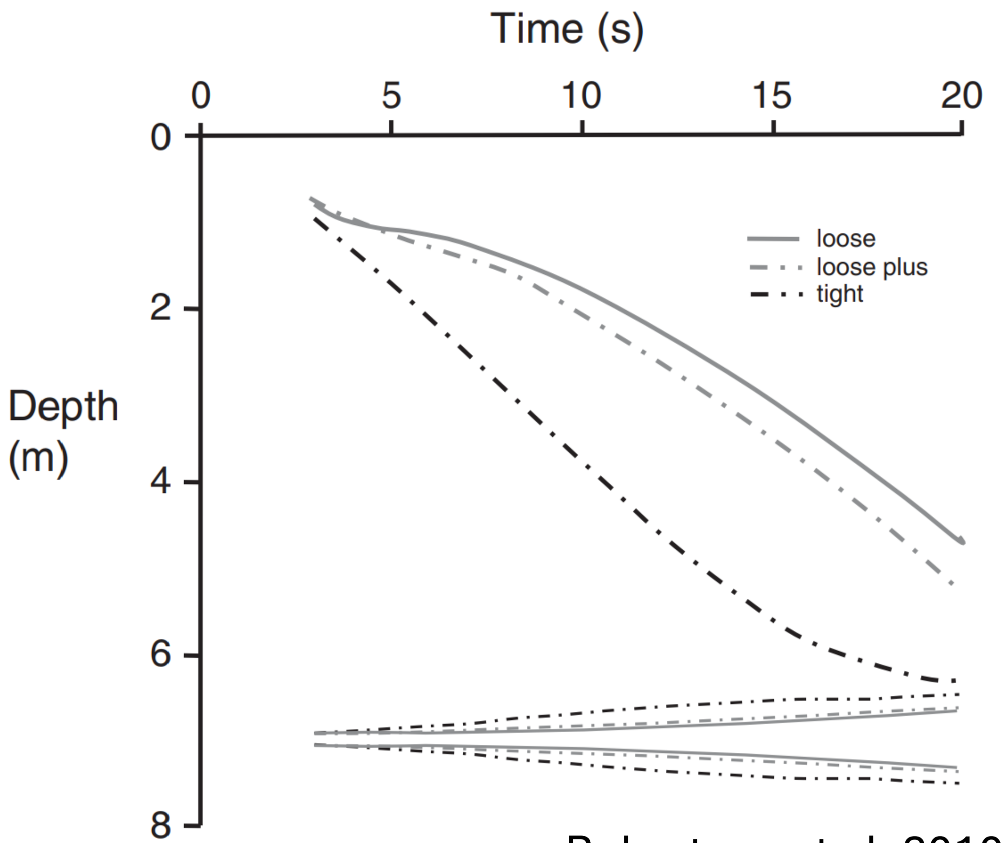
Fig. 2. Bait is completely thawed and dyed blue by soaking in a large tub with dissolved blue food coloring to achieve regulatory-required darkness

Gilman et al. 2003, Cocking et al. 2008, Gilman et al. 2007, 2008, Ochi et al. 2011, Gilman et al. 2022, ACAP 2023

Ineffective mitigation methods

Deep setting line shooter:

- Deploy mainlines at speeds faster than vessel speed, removing tension, allowing mainlines to enter the water immediately astern of the vessel
- Variation in tension and propeller turbulence slow sink rates of hooks, causing seabird bycatch risk to <u>increase</u>
- No clear evidence based on robust sample sizes supporting the effectiveness of line shooters in reducing seabird bycatch exists



Robertson et al. 2010

Ineffective mitigation methods

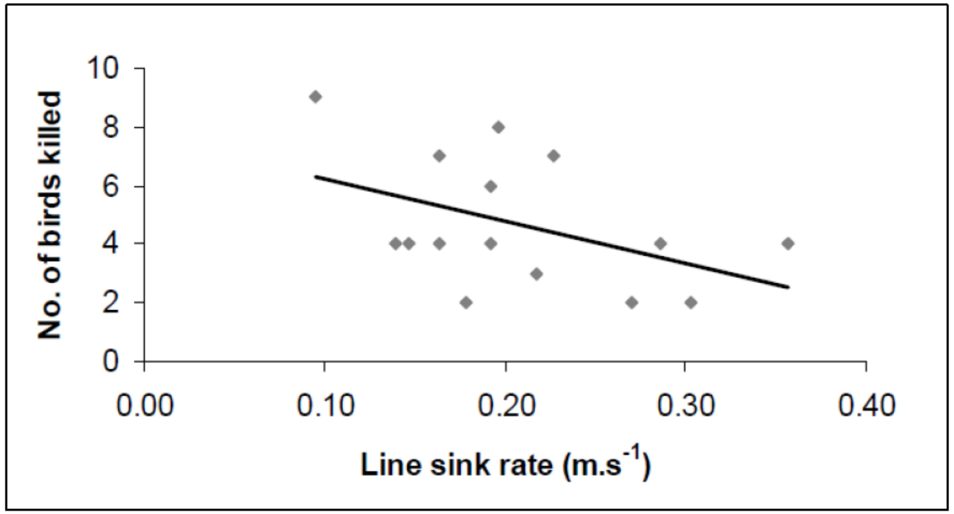
Management of offal discharge:

- Offal discharge can attract seabirds to vessels, putting them at risk
- No current evidence supports offal discharge as an effective primary mitigation method during setting
- Strategic offal management can condition birds to attend vessels, causing risk to increase
- However, offal discharge management is one of few options to reduce bycatch during hauling
- Offal discharge management is still relevant as a common-sense operational practice.

McNamara et al. 1999, Cherel et al. 1999, Rexer-Huber & Parker 2019, WCPFC-SC19-EB-IP-21

Branch line weighting

- Allows hooks to sink more rapidly beyond the reach of seabirds providing a highly effective mitigation option
- Studies have found no or little effect on target catch
- A faster sink rate (ideally 0.5 m/s) reduces the window of availability of baited hooks to seabirds and thus achieves greater effectiveness

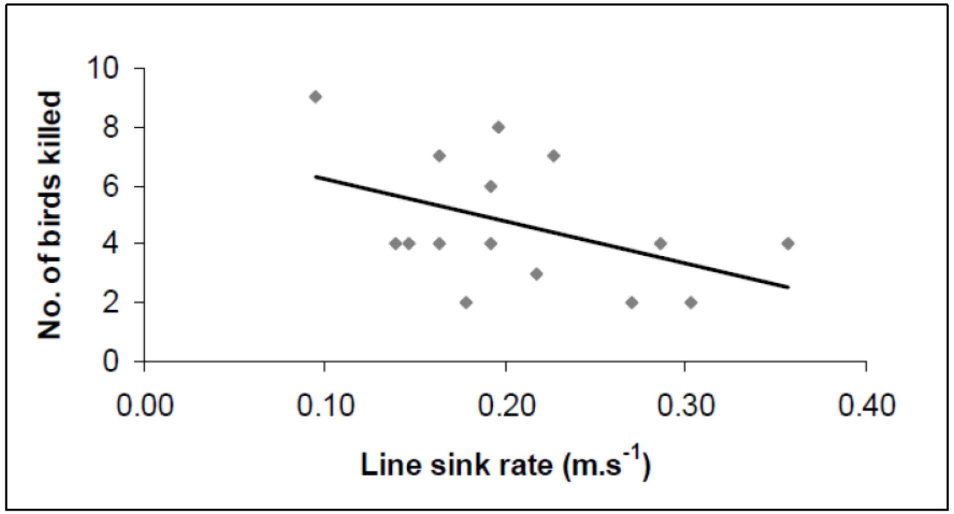


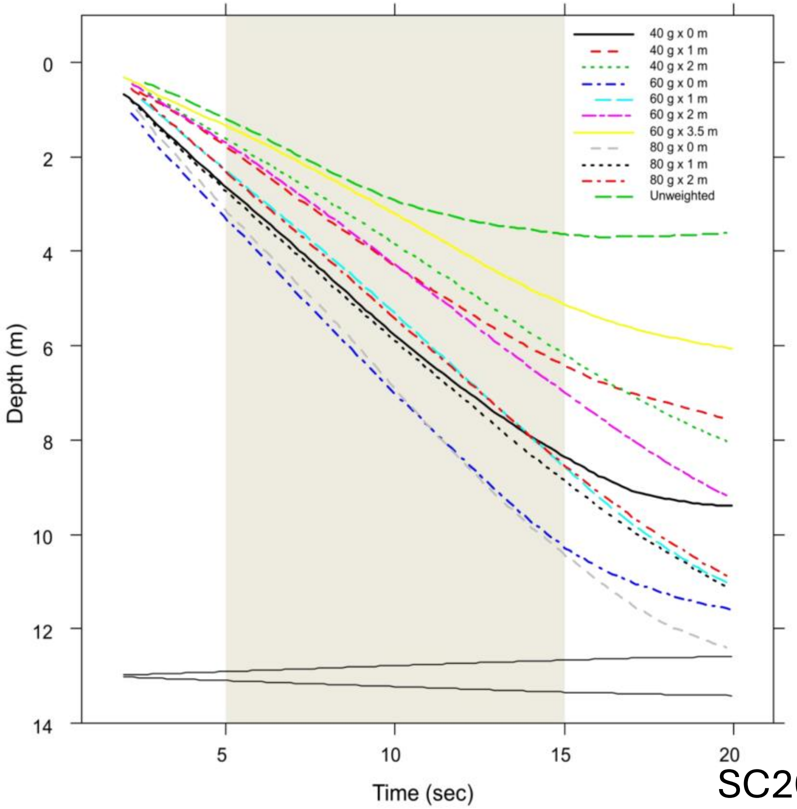
Change in BPUE	Location	Source
-91 to -93%	Hawai'i	Boggs et al. 2001
-69%	North Pacific	Ochi et al. 2013
-61%	Brazil	Santos et al. 2016
-75%	Brazil	Gianuca et al. 2011
-59%	Uruguay	Jimenez et al. 2013
-61%	Uruguay	Jimenez et al. 2019

Branch line weighting

- Allows hooks to sink more rapidly beyond the reach of seabirds providing a highly effective mitigation option
- Studies have found no or little effect on target catch
- A faster sink rate (ideally 0.5 m/s) reduces the window of availability of baited hooks to seabirds and thus achieves greater effectiveness
- New evidence shows that mitigation performance can be improved through modification of current specifications in CMM 2018-03, particularly by ensuring weights are ≤2 m from the hook
- While safety concerns exist, advice and options, particularly in the form of sliding weights, to improve crew safety are available

Petersen et al. 2008



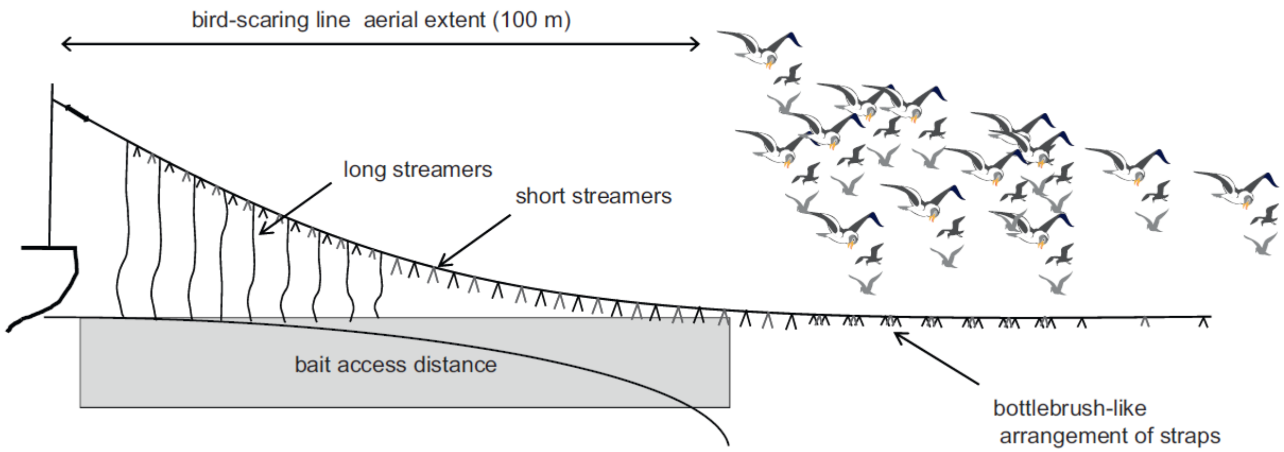


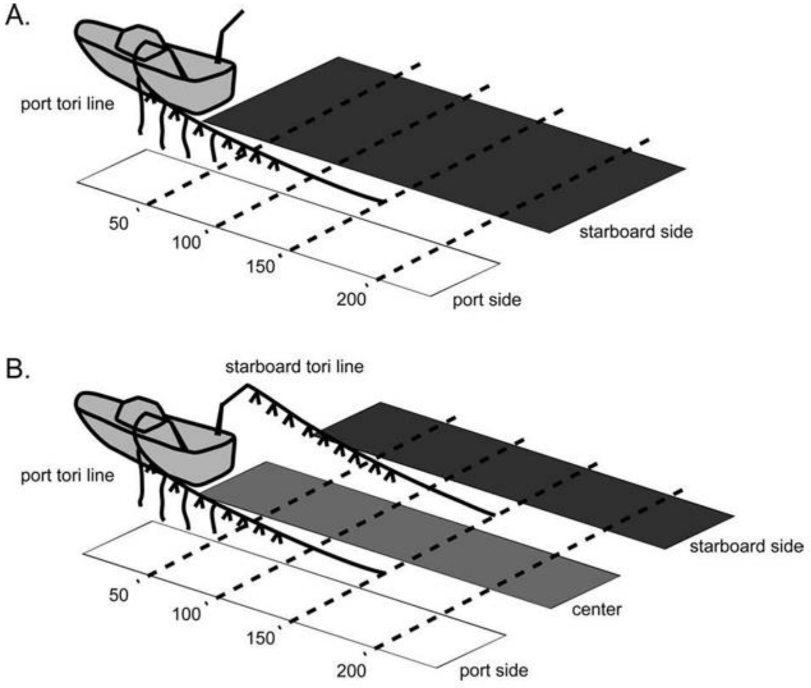
Barrington et al. 2016

SC20-EB-WP-06

Tori lines

- Tori lines prevent seabirds from accessing hooks during setting
- Tori lines come in different specifications





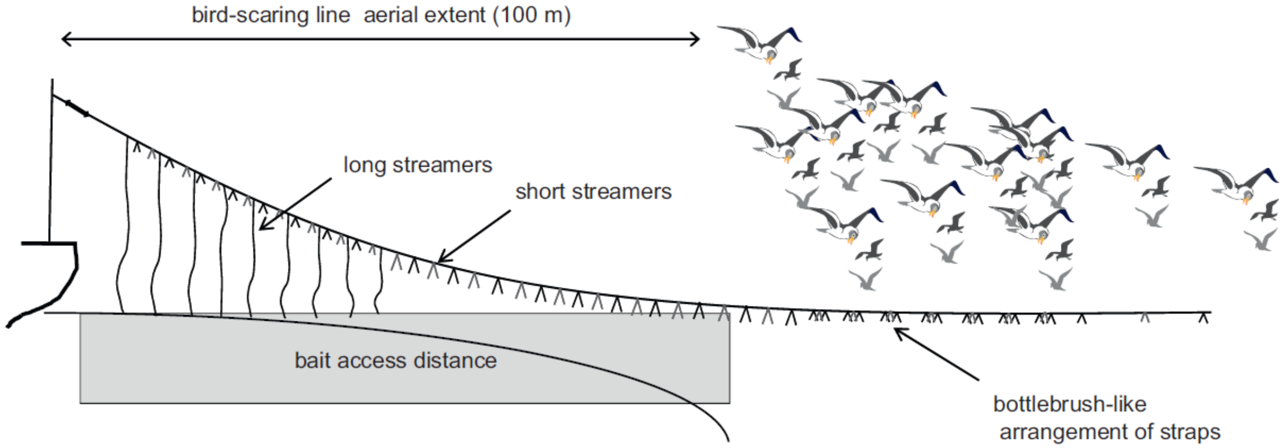
Tori lines

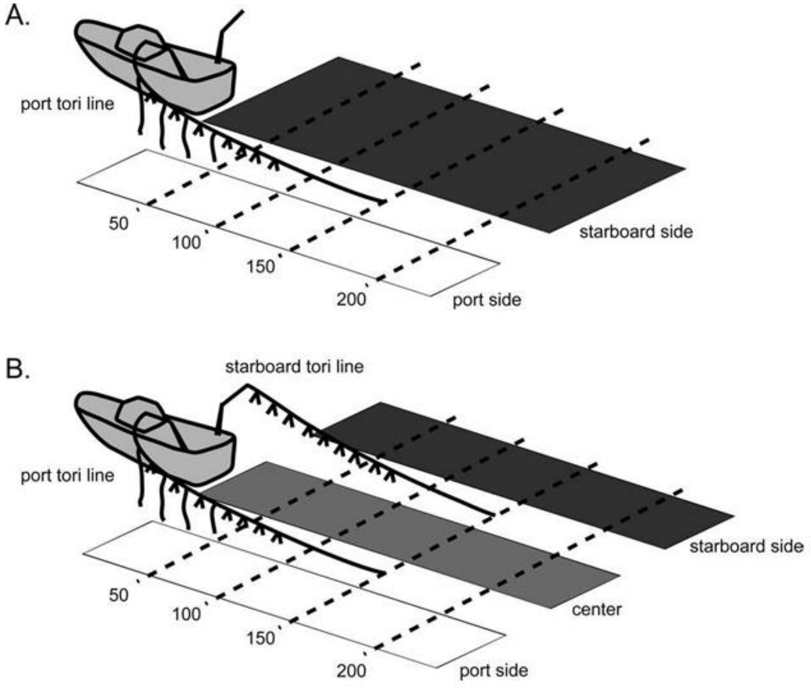
- Tori lines prevent seabirds from accessing hooks during setting
- Tori lines come in different specifications
- Evidence from around the world illustrates their efficacy
- All evidence shows that tori lines do not decrease target catch rate, and can increase it

Change in BPUE	Location	Source
-36%	Australia	Brothers 1991
-79 to -93%	Hawai'i	McNamara 1999
-84%	South Africa	Peterson et al. 2008
-64%	Brazil	Mancini et al. 2009
-67%	South Africa	Rollinson et al. 2017
-85%	Southwest Atlantic	Domingo et al. 2017
-57%	Uruguay	Jimenez et al. 2019
-51%	New Zealand	Meyer & MacKenzie 2022
-93%	Hawai'i	Gilman et al. 2022

Tori lines

- Tori lines prevent seabirds from accessing hooks during setting
- Tori lines come in different specifications
- Evidence from around the world illustrates their efficacy
- All evidence shows that tori lines do not decrease target catch rate, and can increase it
- Pairing tori lines further improves efficacy
- Tori lines must have the <u>**right specifications**</u> to function and must be monitored and maintained as entanglement can occur
- However, adjustments can be made to CMM 2018-03 specifications to reduce entanglement issues (e.g., make swivels and length of in-water section optional)





SC20-EB-WP-06

Tori line specifications in the Southern Hemisphere (South of 25° S)

Specifications	CMM 2018-03 requirements		ACAP Best Practice	
Vessel size	≥35 m	<35 m	≥35 m	<35 m
# tori lines	1-2	1-2	1-2	1-2
Long streamers	• Colourful • Intervals <5 m • Swivels • reach sea surface in calm conditions	Optional: • Colourful • Intervals <5 m for first 75 m • Swivels optional • Reach sea surface in calm conditions (but first 15 m may be modified	• Colourful • Intervals <5 m • Swivels • reach sea surface in calm conditions	Optional: • Colourful • Intervals <5 m for first 75 m • Swivels optional • Reach sea surface in calm conditions (but first 15 m may be modified
Short streamers	• Colourful • >1 m length • <1 m intervals	• Colourful • >1 m length • <1 m intervals	• Colourful • >1 m length • <1 m intervals	• Colourful • >1 m length • <1 m intervals
Aerial extent	≥100 m	≥75 m	≥100 m	≥75 m
Tori line length	>200 m	Sufficient to maintain aerial extent	>200 m	Sufficient to maintain aerial extent
Deployment height	>7 m	>6 m	>8 m	>6 m
Deployment location	If using 1: windward of sinking baits, if using 2: at opposite sides of deployment line	If using 1: windward of sinking baits, if using 2: at opposite sides of deployment line	If using 1: windward of sinking baits, if using 2: at opposite sides of deployment line	If using 1: windward of sinking baits, if using 2: at opposite sides of deployment line

Tori line specifications in the Northern Hemisphere (North of 23° N)

Specifications	CMM 2018-03 requirements		ACAP Best Practice	
Vessel size	≥24 m	<24 m	≥35 m	<35 m
# tori lines	0-2	0-2	0-2	0-2
Long streamers	Optional: • Intervals <5 m • Swivels optional • As close to water as possible	Optional: • Intervals <5 m • Swivels optional • As close to water as possible	Required: • Colourful • Intervals <5 m • Swivels required • Reach sea surface in calm conditions	Optional: • Colourful • Intervals <5 m • Swivels optional • Reach sea surface in calm conditions
Short streamers	• >0.3 m length • <1 m intervals	Optional: • >0.3 m length • <1 m intervals	• Colourful • >1 m length • <1 m intervals	Required: • Colourful • >1 m length • <1 m intervals
Aerial extent	Over sinking hooks	Over sinking hooks	≥100 m	≥75 m
Tori line length	≥100 m	NA	≥200 m	Sufficient to maintain aerial extent
Deployment height	≥5 m from where line enters water	≥5 m from where line enters water	>8 m	>6 m
Deployment location	If using 1: windward of sinking baits, if using 2: at opposite sides of deployment line	If using 1: windward of sinking baits, if using 2: at opposite sides of deployment line	If using 1: windward of sinking baits, if using 2: at opposite sides of deployment line	If using 1: windward of sinking baits, if using 2: at opposite sides of deployment line

Tori lines

Small vessels tori line specifications have been subject to intensive study (Katsumata et al. 2015, Goad & Debski 2017, Ochi 2022, Ochi 2023) as was a requirement in CMM 2018-03:

- Initially, result suggest that streamer-less tori lines are as effective as small streamer tori lines
- Yet, experiments were confounded by varying, suboptimal aerial extents
- BPUE under all tori line treatments in experiments were still high
- There appears little compelling evidence to consider streamer-less tori lines, or small-streamer tori lines with suboptimal aerial extents, an effective mitigation method
- Achieving adequate aerial extent in small vessels can be challenging. Yet, NZ has proven feasibility, but vessel/hull/superstructure material remains a challenge.

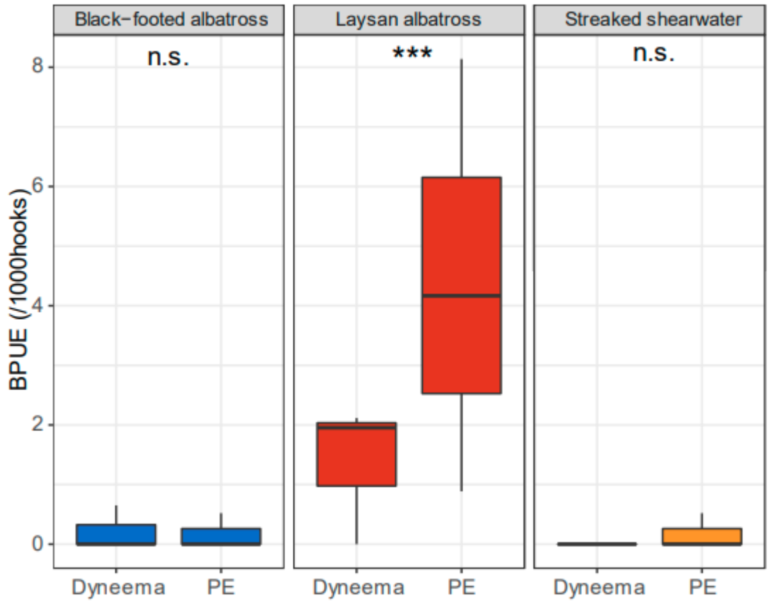
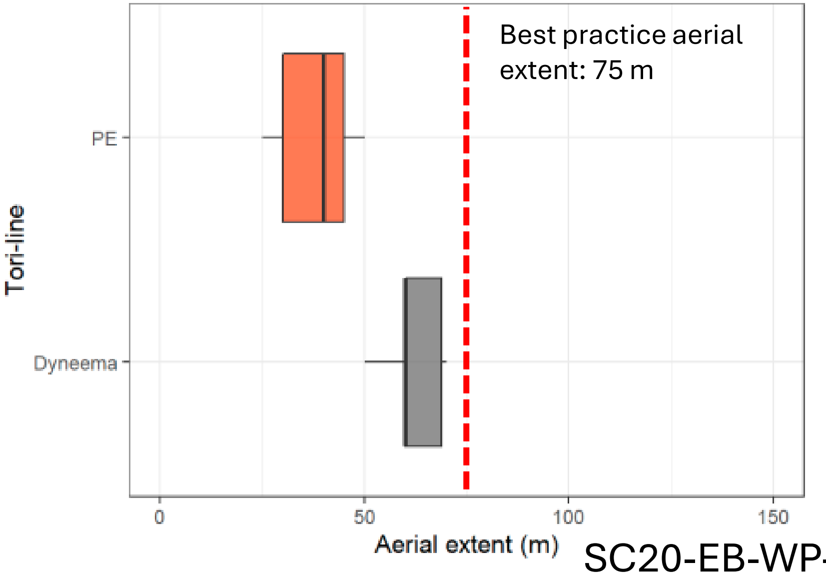


Figure 5 Bycatch rate (BPUE) for each tori-line recorded in the bycatch mitigation effectiveness experiment. Asterisks indicate for significant testing in BPUE between tori-lines using the generalized linear model, and *** denotes p < 0.001.

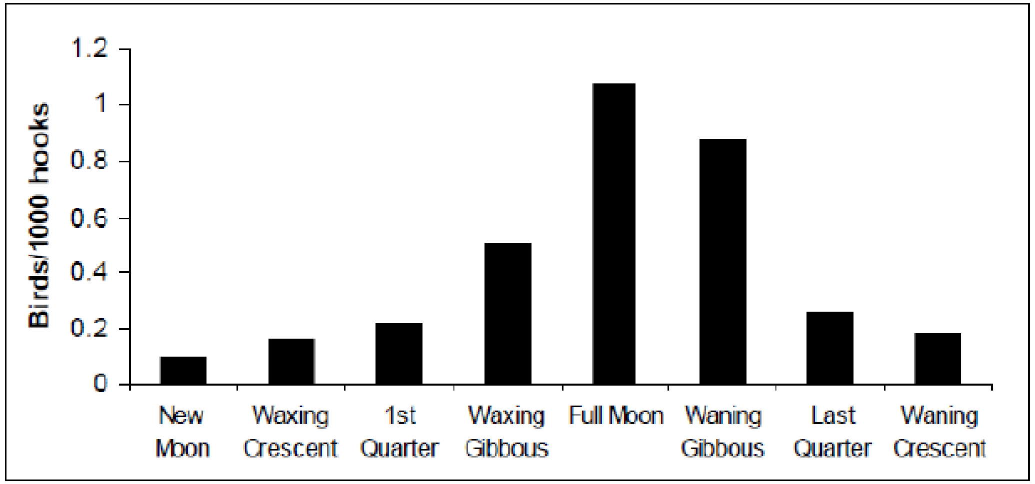


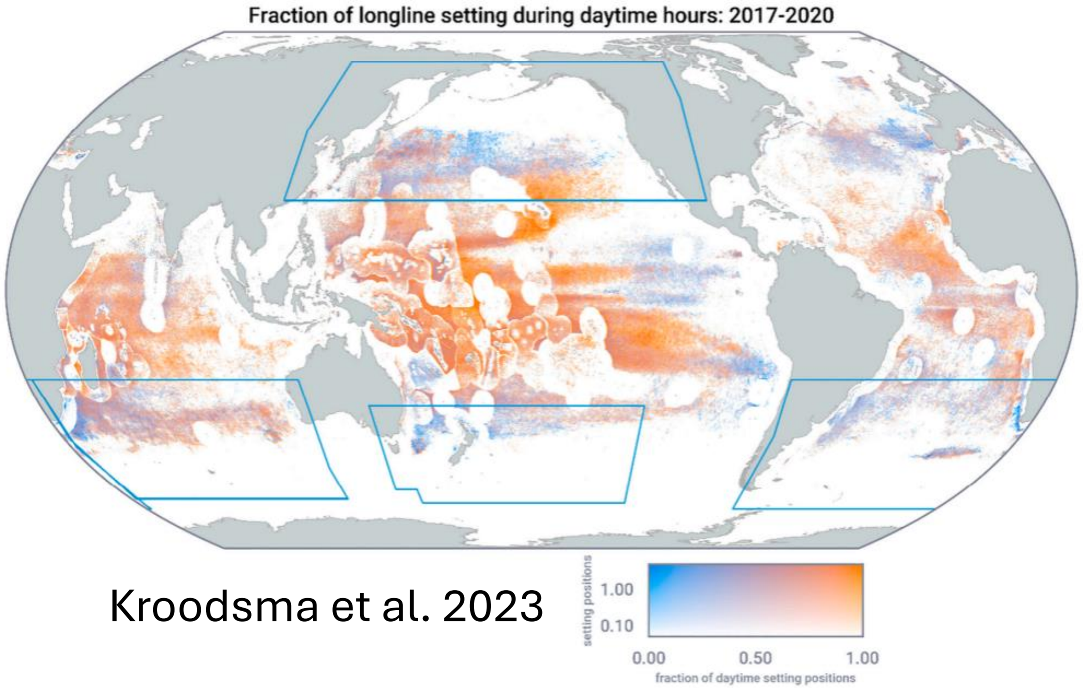
SC20-EB-WP-06

Night setting

- Many seabirds are less active at night
- However, some seabirds are still active at night and the effectiveness of night setting is greatly reduced during moon-lit nights
- CMM 2018-03 specifications align with ACAP advice
- Globally, the implementation of night setting has been found to be limited and straddling set continue to be a challenge, potentially due to reporting/specification challenges

Petersen et al. 2008



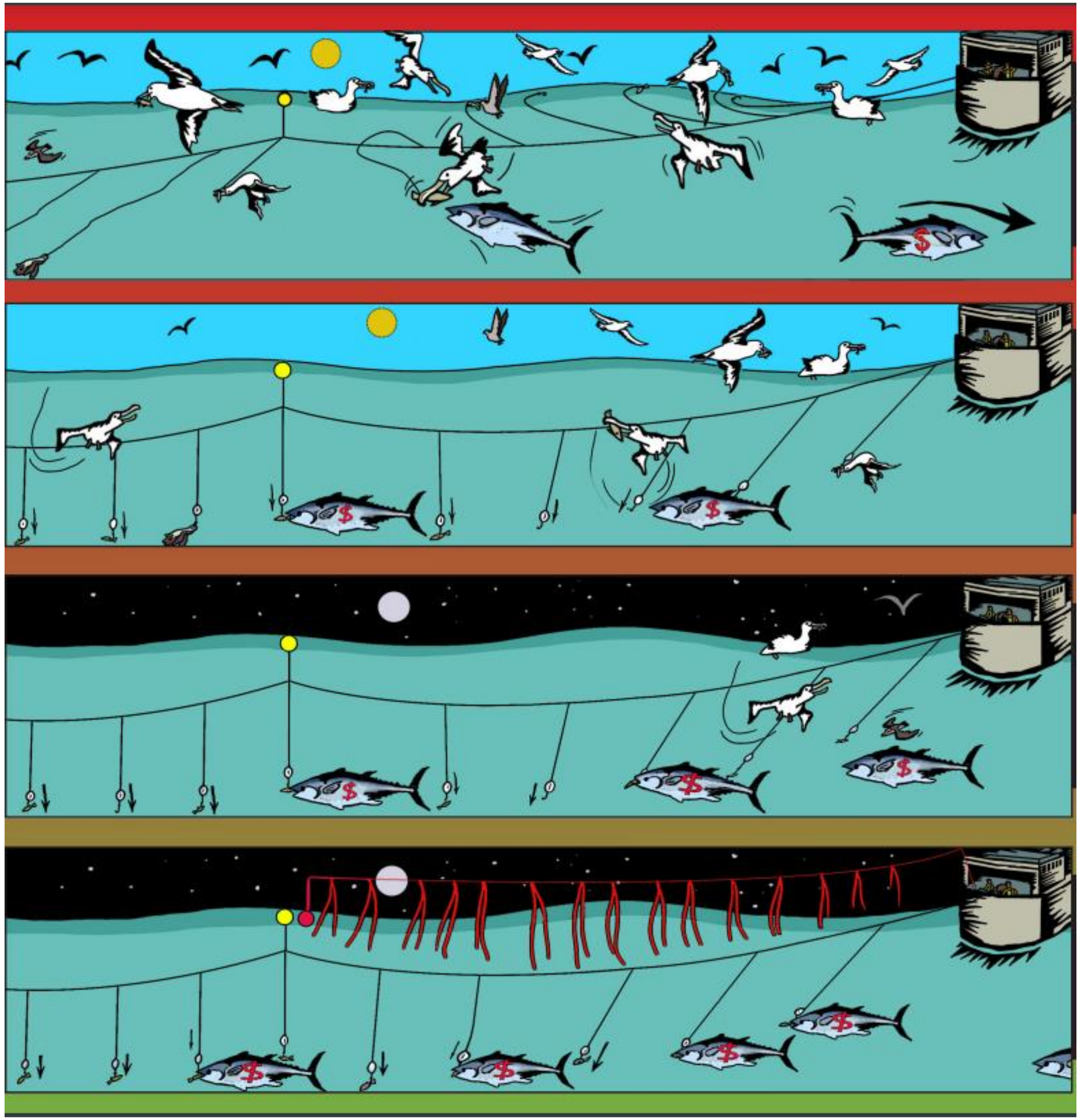


Kroodsma et al. 2023

Combinations of different bycatch mitigation methods

Branch line weighting, tori lines and night setting have each been demonstrated to be effective but have limitations when used alone.

- There is a period of time when hooks are accessible to birds even when branch lines are weighted.
- Night setting used alone is less effective at reducing seabird bycatch for nocturnally active birds and during bright moon light conditions.
- Bird scaring lines used alone can rarely protect baited hooks beyond the aerial extent of the line.

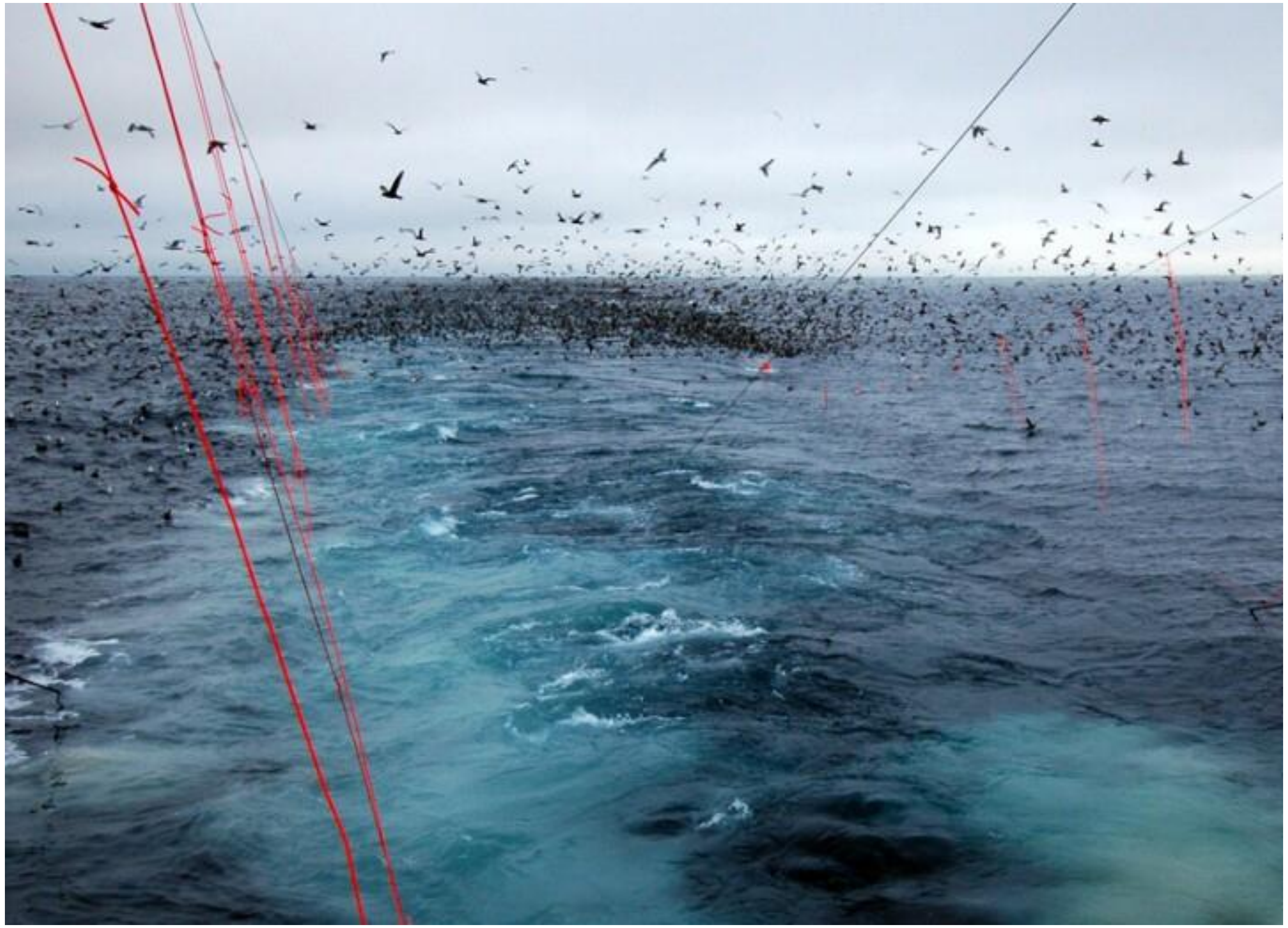


Combinations of different bycatch mitigation methods

Branch line weighting	Night setting	Tori line	Change in BPUE	Location	Source
	✓	✓	-65%	New Zealand	Duckworth 1995
	✓	✓	-92%	Australia	Klaer & Polacheck 1998
	✓	✓	-78%	South Africa	Melvin et al. 2013
	✓	✓	-91%	South Africa	Melvin et al. 2014
	✓	✓	-95%	Uruguay	Jimenez et al. 2019
✓		✓	-94%	South Africa	Melvin et al. 2013
✓		✓	-81%	South Africa	Melvin et al. 2014
✓		✓	-100%	North Pacific	Ochi et al. 2013
✓		✓	-62%	Brazil	Gianuca et al. 2011
✓		✓	-100%	Uruguay	Jimenez et al. 2019
✓	✓		-100%	Uruguay	Jimenez et al. 2019
✓	✓	✓	-100%	South Africa	Melvin et al. 2014
✓	✓	✓	-100%	Uruguay	Jimenez et al. 2019

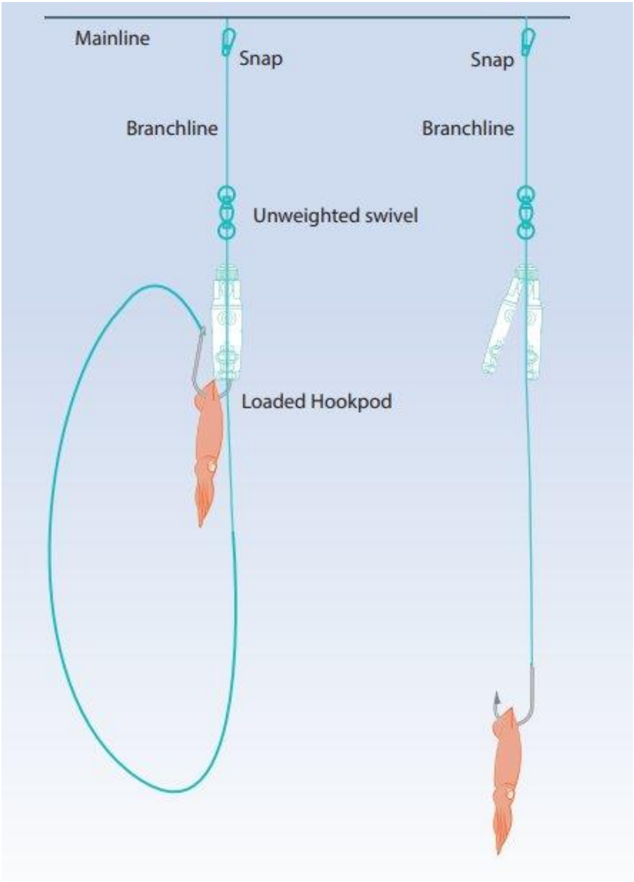
Further considerations of combining mitigation methods

- Combining mitigation methods has increased target catch rates
- Using branch line weighting together with tori lines reduces changes for entanglement



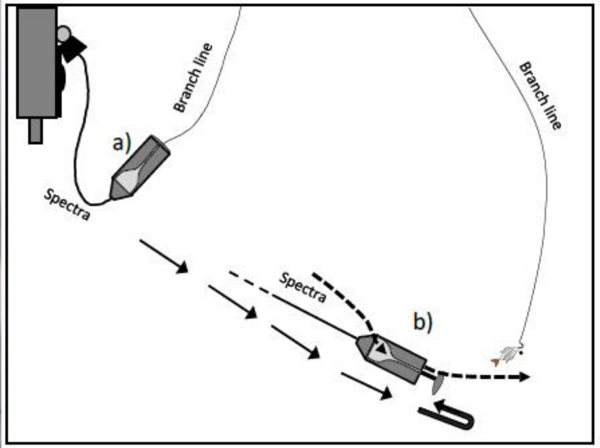
Hook-shielding devices

- Shield the hook until a certain depth is reached
- Have lower bycatch rates than any other bycatch mitigation measure
- Can be used without other mitigation options
- Generally, do not decrease target catch rates
- Have practical considerations, including costs ($10), entanglement potential, and training requirements
- Two devices are currently approved in CMM-2018-03: Hookpod LED (Sullivan et al. 2018) and Hookpod Mini (Goad et al. 2019)
- No new devices have been developed since the adoption of CMM 2018-03

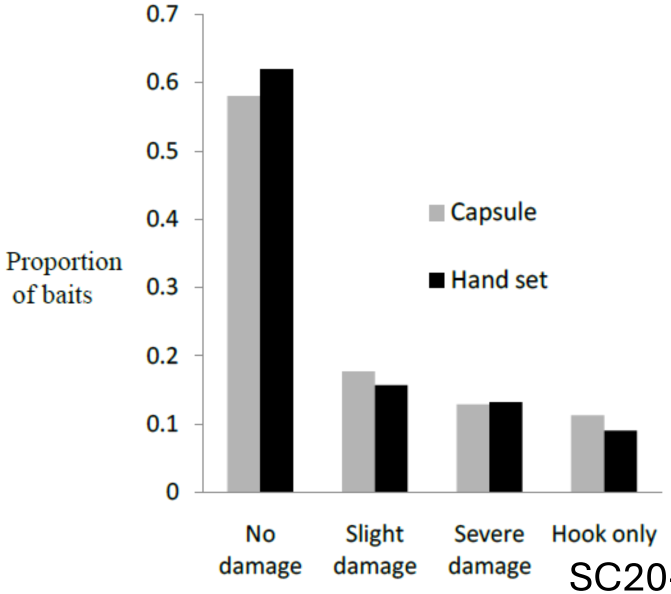


Underwater bait setters

- Set bait automatically below the dive depth of seabirds
- Reduce seabird bycatch substantially, to a similar extent as hook-shielding devices
- Do not increase bait loss
- Do not reduce target catch rates
- Are considered practical, but expensive
- Are currently not listed as an accepted bycatch mitigation method in CMM 2018-03

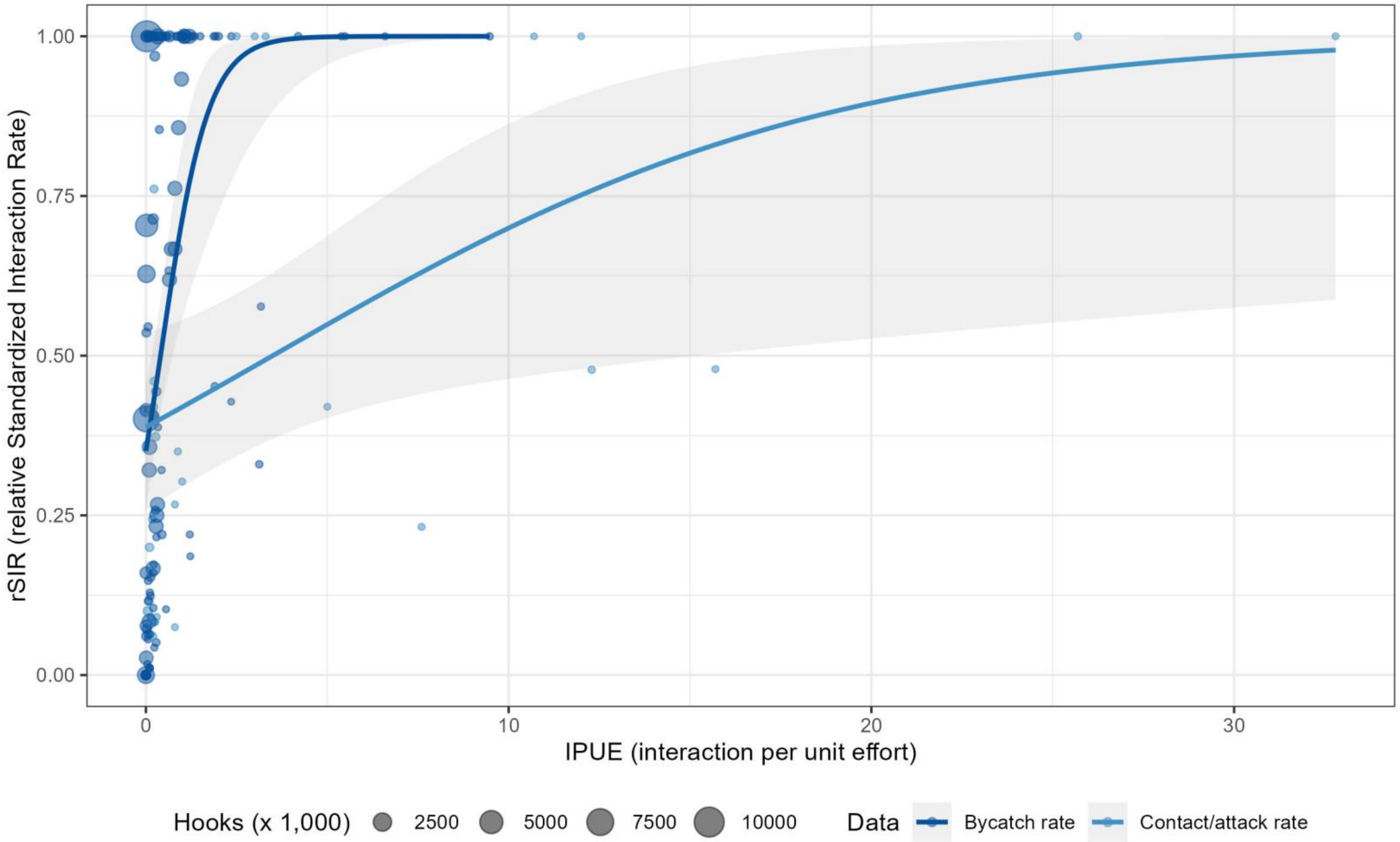


Robertson et al. 2015, 2018



Relative effectiveness of mitigation methods

- We calculated the relative Standardised Interaction Rate (*rSIR*)
- *rSIR* represents a value between 0 and 1 in which 1 is the worst performing and 0 is the best performing, but relationship between *IPUE* and *rSIR* is non-linear

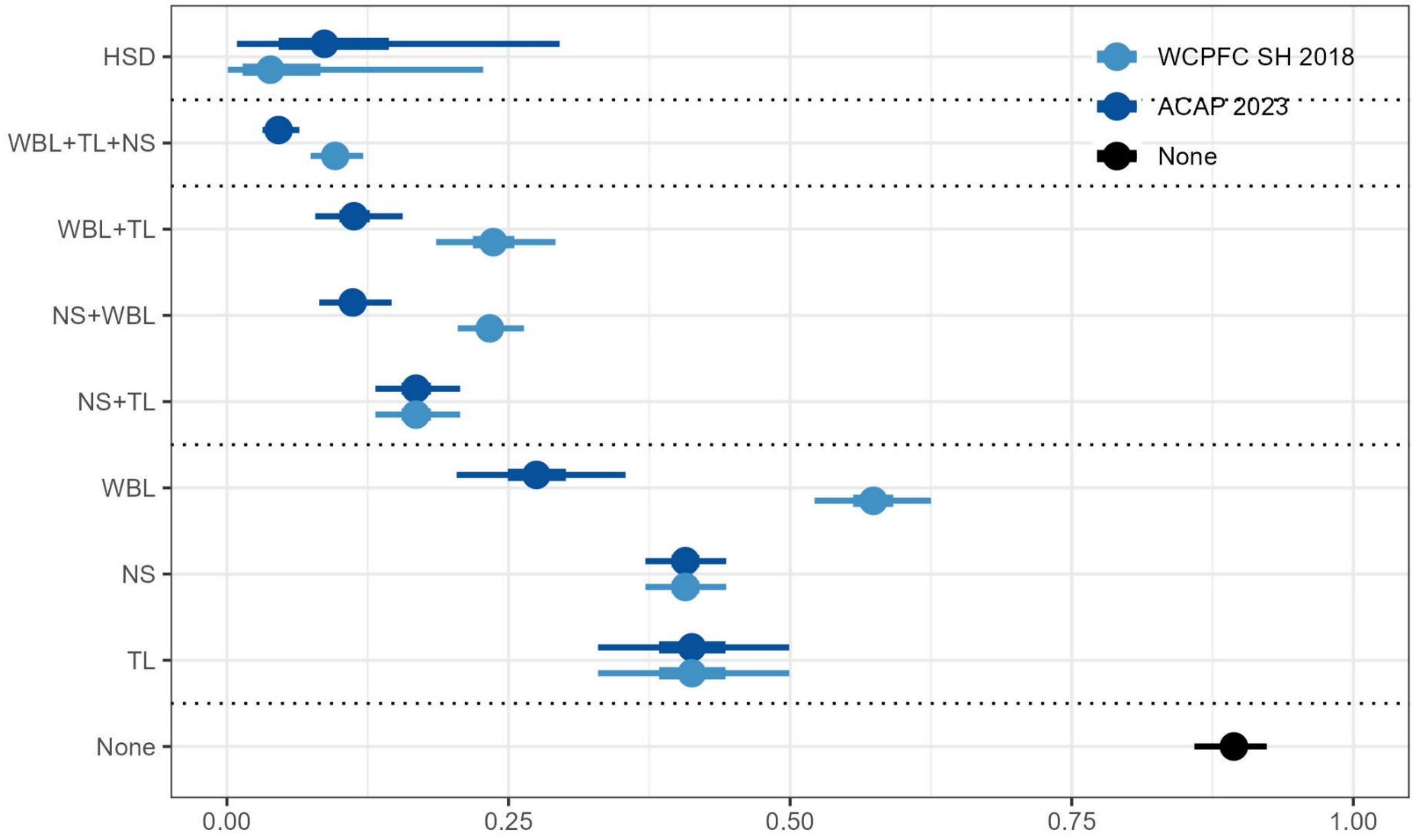


Relative effectiveness of mitigation methods

- We calculated the relative Standardised Interaction Rate (*rSIR*)
- *rSIR* represents a value between 0 and 1 in which 1 is the worst performing and 0 is the best performing, but relationship between *IPUE* and *rSIR* is non-linear
- Subsequently, we fitted Bayesian GLMs to these values and a matrix of mitigation options and estimated *rSIR* per method per specification while accounting for sample sizes and incorporating uncertainty

None	Night setting	Weighted branch lines		Tori lines		Hook-shielding devices		UBS	Blue-dyed bait	Line shooter	SS+BC+WBL	*n*hooks (x 1,000)	Ocean basin(s)	Reference
	ACAP = WCPFC	ACAP	WCPFC SH/NH	ACAP = WCPFC SH[1,2]	WCPFC NH[2]	ACAP	WCPFC SH/NH	ACAP	WCPFC NH	WCPFC NH	WCPFC NH			
	✓		✓			✓						34	S Atlantic	Baker & Candy 2014
✓	✓											**461**	**S Pacific**	**Baker & Wise 2005**
✓		✓			✓				✓			**6**	**N Pacific**	**Boggs 2001**
					✓							**109**	**S Pacific**	**Brothers 1991**
					✓				✓			**241**	**N Pacific**	**Chaloupka *et al.* 2021, E Gilman pers. comm. 2024**
			(✓)						✓			**1**	**S Pacific**	**Cocking *et al.* 2008**
✓				✓								103	S Atlantic	Domingo *et al.* 2017
✓	✓			(✓)								**2,436**	**S Pacific**	**Duckworth 1995**
✓	✓			(✓)								**2,866**	**S Pacific**	**Gales *et al.* 1998, Klaer & Polacheck 1998, Brothers *et al.* 1999**
			✓ (& ✓)	✓								156	S Atlantic	Gianuca *et al.* 2011
			✓			✓	✓					82	S Atlantic	Gianuca *et al.* 2021
									✓		✓	**50**	**N Pacific**	**Gilman *et al.* 2003, 2007**
	(✓)	✓	✓								✓	**9,064**	**N Pacific**	**Gilman *et al.* 2008**
✓									✓		✓	**22,515**	**N Pacific**	**Gilman *et al.* 2016**

Southern Hemisphere *rSIR* estimates



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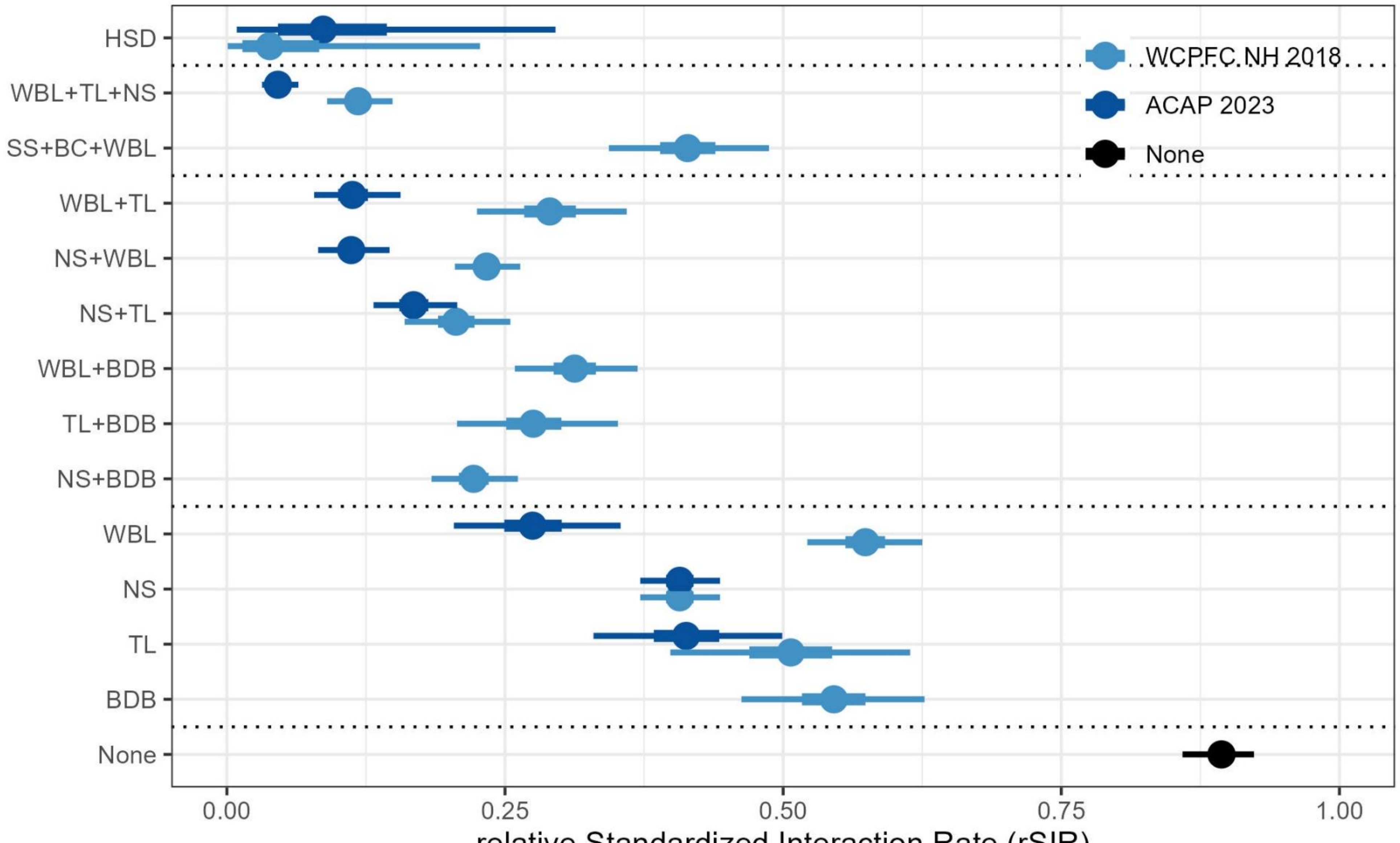
Northern Hemisphere *rSIR* estimates



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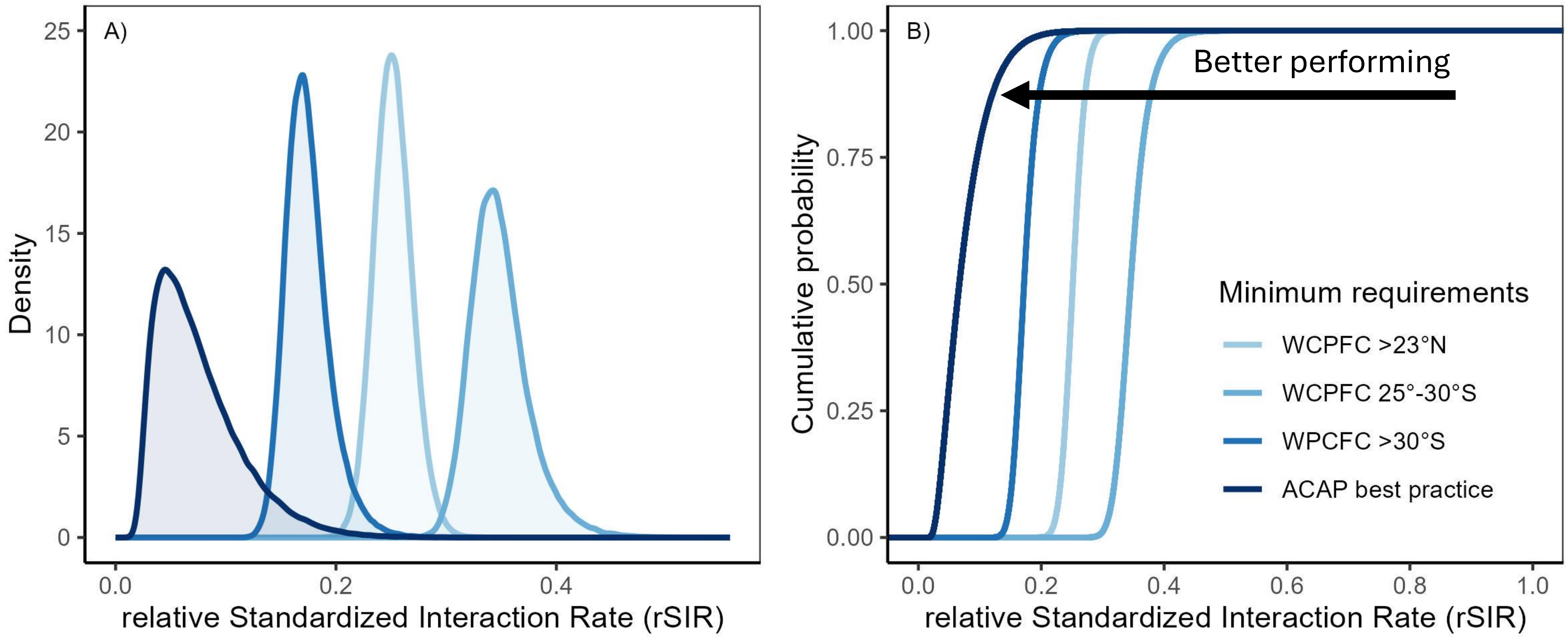
Performance and uncertainty across specifications

- Relative improvements of 61% for the area south of 30°S, 81% for the area 25°-30°S, and 73% for the area north of 23°N could be achieved by amending CMM 2018-03 specs
- Challenges of uncertainty can be overcome by assessing stochastic dominance (decision analytical tool), which show that ACAP best practice is the rational choice when valuing bycatch reduction only.

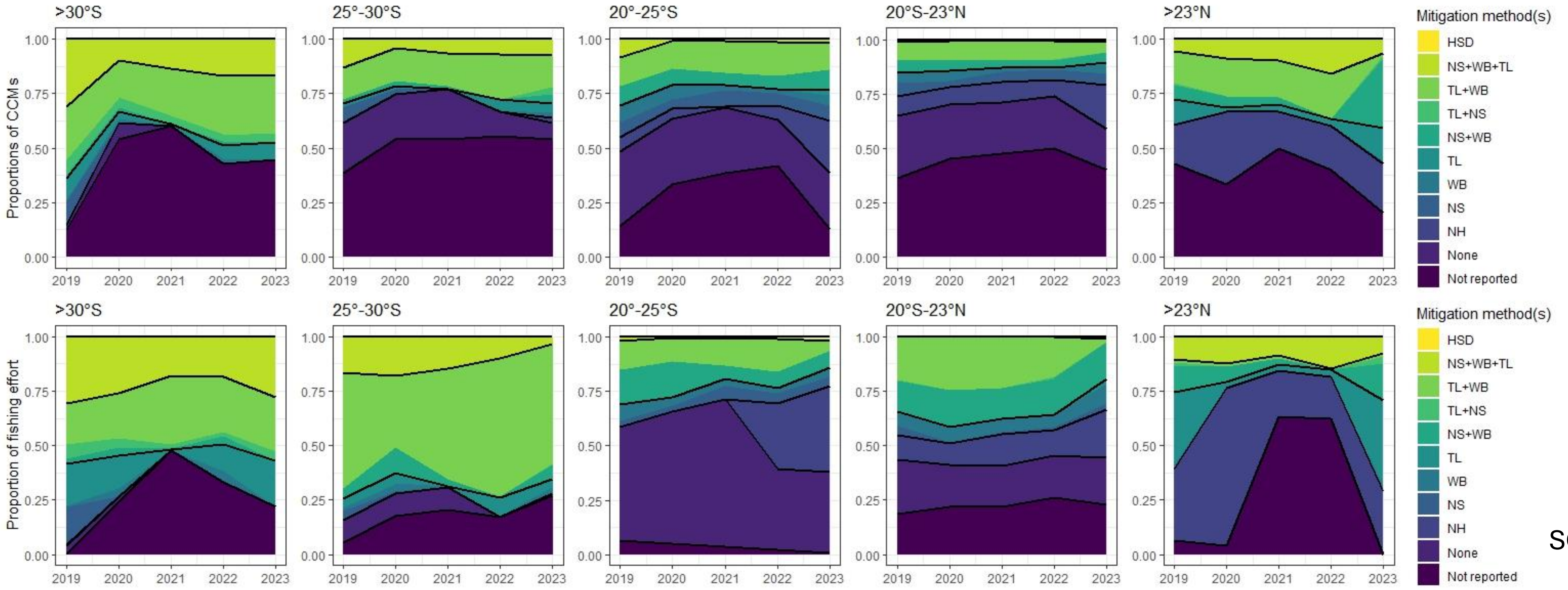


Recommendations of SC-EB-WP-11

- *Notes* the analysis of the performance of seabird mitigation methods for commercial pelagic longline fisheries using relative standardised interaction rates, which demonstrated the poor performance of some seabird mitigation methods (e.g., blue-dyed bait) and the need to improve specifications of other seabird mitigation methods (e.g., current branch line weighting and Northern Hemisphere tori line specifications).
- *Notes* the ranking of individual seabird bycatch mitigation methods under ACAP best practice specifications, from best to worst performing (based on relative standardised interaction rates): 1) hook-shielding devices, 2) weighted branch lines, 3) night setting, and 4) tori lines, and notes the ranking of combinations of two out of three Southern Hemisphere mitigation methods: 1) weighted branch lines with tori lines, 2) weighted branch lines with night setting, and 3) tori lines with night setting.
- *Notes* that this analysis shows that the use of ACAP best practice could improve the performance of seabird bycatch mitigation methods by 61% for the area South of 30°S, 81% for the area between 25°S and 30°S,and 73% for the area North of 23°N.

Observed seabird bycatch mitigation use

- Branch line weighting is the most observed method (20-71% depending on latitude)
- 69% of effort in 25°-30°S already uses 2/3 mitigation methods
- Use of 3/3 is not uncommon (24% S of 30°S and 12% 25°-30°S)
- Fishing effort, and thus impact on seabirds, in Paragraph 4 Exemptions remains negligible



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Recommended management options

Tori line specifications:

1. *Require* the same aerial extent in Southern Hemisphere and Northern Hemisphere (75 m for small vessels (<24m) and 100 m for large vessels (>24m)).
2. *Require* streamers on both large and small vessel tori lines.
3. *Amend* the current requirement for the use of swivels to attach streamers to be optional in the Southern Hemisphere.
4. *Amend* the current requirement for a minimum 200m length (i.e. 100m in-water section) to a requirement to have an in-water section which creates sufficient drag.
5. *Encourage* targeted capacity support and design innovation to address challenges of achieving aerial extent where tori poles are difficult to use due to hull material.
6. *Encourage* the use of paired tori lines for large vessels

Night setting specifications:

7. *Clarify* vessel log reporting and observer reporting requirements for night setting.

Branch line weighting specifications:

8. *Require* the following branch line weighting specifications for both Hemispheres:
    - ≥40 g within 0.5 m of the hook
    - ≥60 g within 1 m of the hook
    - ≥80 g within 2 m of the hook
9. *Specify* that all branch lines must be weighted when applying this method.

Recommended management options

Mitigation method options:

10. Include approved underwater bait setters as a stand-alone mitigation method in addition to the stand-alone option of using hook-shielding devices.

11. Remove blue-dyed bait, deep setting line shooters, and management of offal discharge as primary mitigation methods.

12. Encourage all vessels to adopt effective offal management, such that offal and discards should not be discharged during line setting. During line hauling, offal and used baits should preferably be retained or discharged on the opposite side of the vessel from that on which the line is hauled. All hooks should be removed and retained on board before discards are discharged from the vessel.

Recommended management options

Effective combinations of mitigation methods:

13. In the area 25°S to 30°S, *require* the combined use of tori lines, branch-line weighting, and night setting, or hook shielding devices or underwater bait setters as stand-alone options.
14. In the area south of 30°S, *require* the combined use of tori lines, branch line weighting, and night setting or hook shielding devices or underwater bait setters as standalone options.
15. In the area 23°N -25°S, in particular the area 20°S -25°S – *encourage* use of effective mitigation options, and targeted capacity building to support the implementation of mitigation methods.
16. *Strengthen* mitigation requirements for the area north of 23°N by improving the specifications of current options and removing ineffective options.