Captures of protected species in New Zealand recreational fisheries

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25 June 2020

Department of Conservation Project BCBC2019-07a

This presentation is of provisional work, final results may differ.

Introduction

Protected species

Introduction

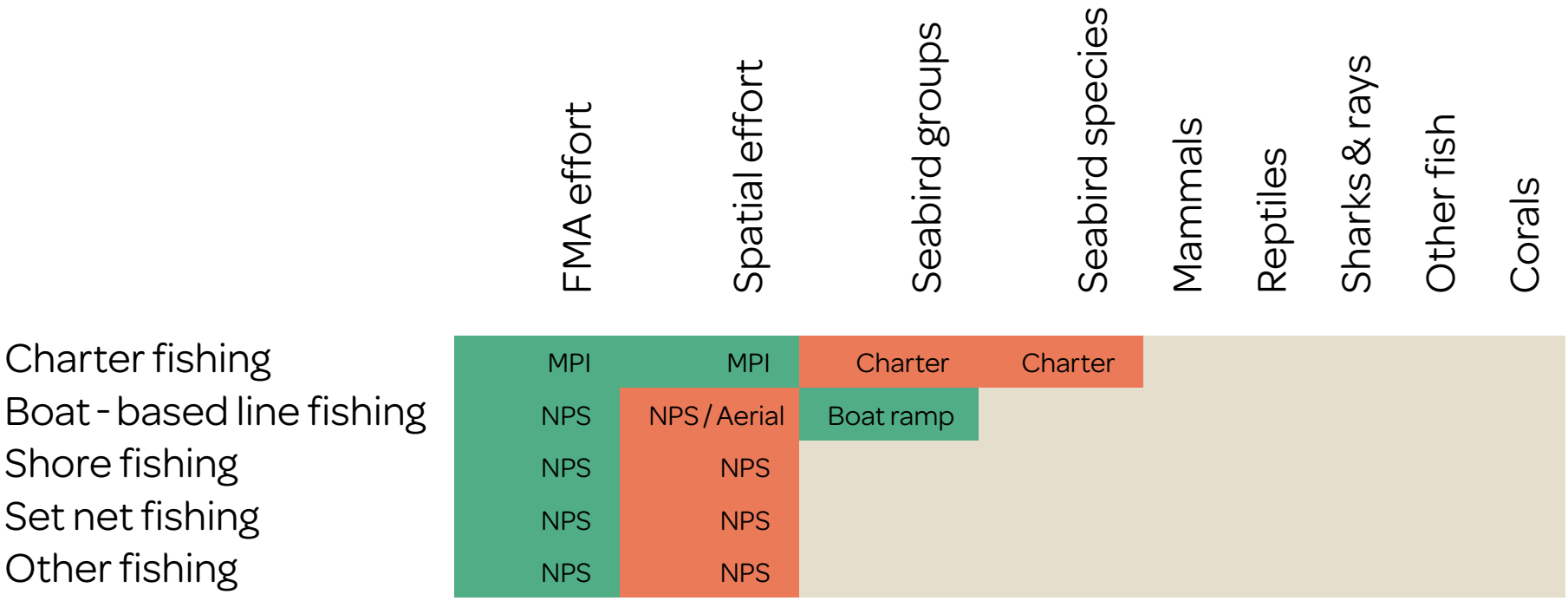
- All seabirds (apart from black-backed gull)
- All marine mammals
- All marine reptiles
- Some sharks (including great white shark)
- Some fish (spotted black grouper, giant grouper)
- Some corals (including black corals)

How we know about recreational fishing

Introduction

- Boat ramp surveys have been conducted by NIWA for MPI. Fishers are asked about their catch as they return to the ramps
- Aerial surveys allow total fishing effort to be estimated
- The National Panel Survey (NPS) asks fishers about their fishing throughout the year
- Charter fishers provide statutory returns to MPI

Available data on protected species



Northland recreational fishers catching juvenile great white sharks a worry for DoC

19 Mar, 2020 9:00am

4 minutes to read

Efforts underway to free orca trapped in cray pot line in Whangārei Harbour

24 Dec, 2019 7:53am

2 minutes to read

Set net blamed for death of endangered Hector's dolphin

APR 7, 2015 • SOURCE: 1 NEWS

Experts are blaming recreational set net fishing for a dead Hector's dolphin found in Akaroa Harbour.

Sources of unstructured data

Introduction

- Bird banding database
- Marine mammal stranding database
- Birds New Zealand beach patrol database
- DOC hotline
- Shark sightings

Previous boat ramp study of seabird captures

- 763 boatramp interviews carried out during 2007–08
- 47% of fishers recalled witnessing a bird being caught at some stage in the past
- There were 21 seabirds reported caught on the day of the interview (0.22 captures per 100 hours of fishing)
- From this rate, there were estimated to be 11 500 (95% c.i.: 6600 to 17 200) bird captures per year in FMA 1
- Three of the 21 captured birds were reported to have died

Seabird captures on charter vessels

Introduction

- Observers on 57 charter trips during 2007–08 recorded seabird captures
- A capture rate of 0.36 (95% c.i.: 0.09 to 0.66) birds per 100 fisher hours was recorded

Boat ramp survey

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“Did you catch any birds with your fishing gear today?”

Boat ramp survey

- Carried out between October 2017 and September 2018 by NIWA, for MPI
- A total of 51 295 fishers were interviewed as they returned to boat ramps
- Primary goal in FMA 1 was the estimation of the recreational take of key fish species
- Conducted along with an aerial survey
- For the first time, fishers were asked about seabird captures

Fishers asked about seabird captures, by FMA

Boat ramp survey

FMA	Fishers	Fishing hours	Captures	Capture rate
1	33 537	120 566	420	0.35
2	1 818	8 085	8	0.10
3	1 999	6 830	7	0.10
5	574	1 227	3	0.24
7	2 789	8 502	5	0.06
8	1 509	5 190	12	0.23
9	1 420	4 728	0	0.00
All	43 646	155 130	455	0.29

The capture rate is the number of seabirds caught per 100 hours of fishing

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Largely rod and line fishing

Boat ramp survey

Method	Fishers	Fishing hours	Captures	Capture rate
Rod and bait	33 536	122 041	390	0.32
Rod and lure	3 937	12 946	41	0.32
Trolling	2 121	9 340	23	0.25
Longline	802	2 000	1	0.05
Diving	2 225	4 156	0	0.00
Bottom gear	684	3 838	0	0.00
Net	186	524	0	0.00
Bottom line	29	124	0	0.00
Gathering	103	102	0	0.00
Mixed	10	36	0	0.00
Shore fishing	13	22	0	0.00
All	43 646	155 130	455	0.29

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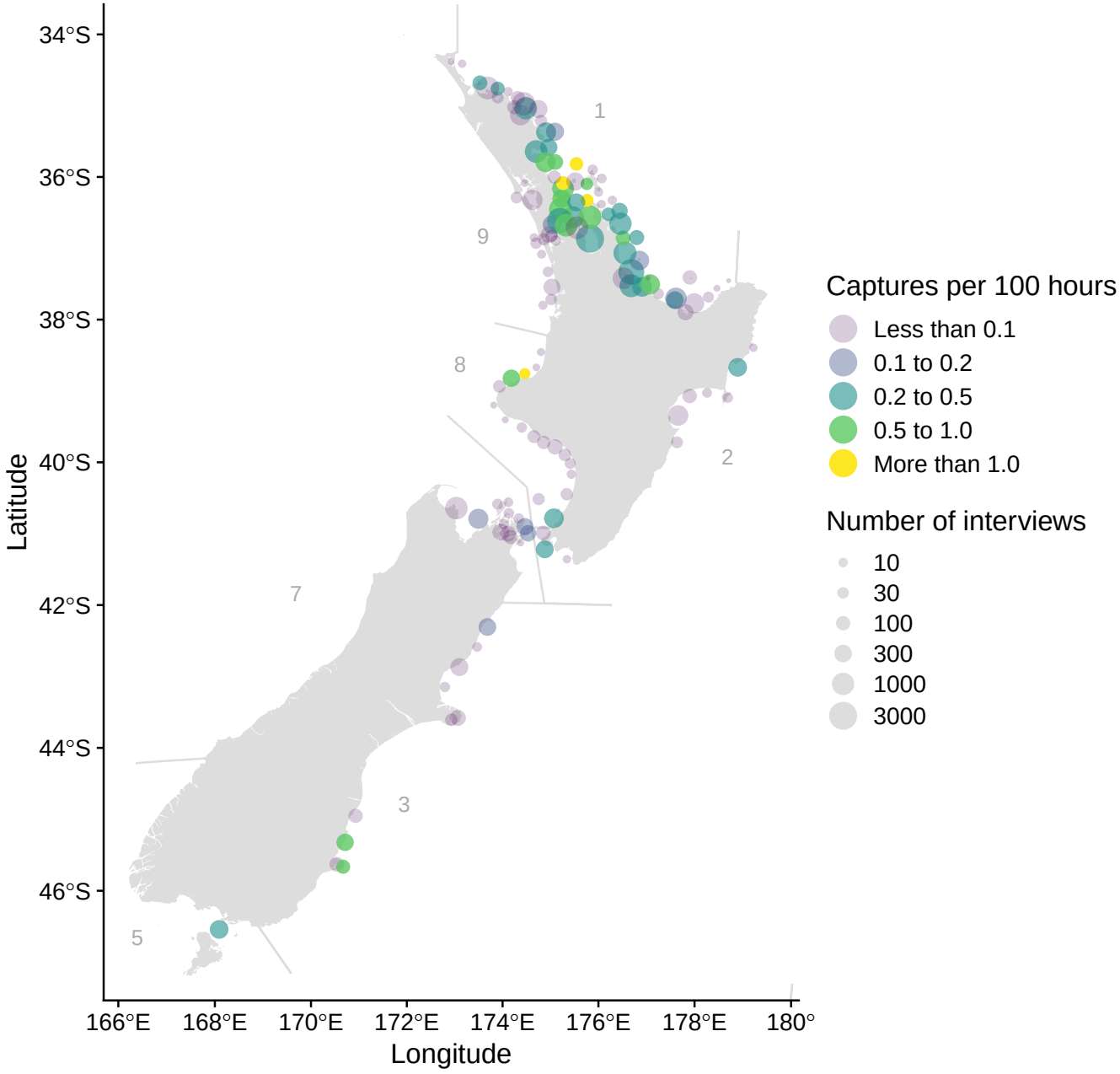

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Largely snapper fishing

Boat ramp survey

Method	Fishers	Fishing hours	Captures	Capture rate
Snapper	27 380	97 891	328	0.34
General	5 440	18 861	47	0.25
Kingfish	2 042	7 716	33	0.43
Kahawai	905	2 183	19	0.87
Tarakihi	729	2 989	13	0.43
Blue cod	2 330	6 593	10	0.15
Gamefish	1 166	6 995	4	0.06
Gurnard	744	3 090	1	0.03
Rock lobster	1 026	4 492	0	0.00
Shellfish and kina	1 406	1 843	0	0.00
Hāpuku	303	1 444	0	0.00
Bluenose	175	1 032	0	0.00
All	43 646	155 130	455	0.29

Largely “petrel & shearwater”

Boat ramp survey

Taxon	FMA						
	1	2	3	5	7	8	All
Albatross	7		5	1		2	15
Gannet	32						32
Gull	31	1	2	1	1	6	42
Penguin	3						3
Petrel	225	4			2		231
Shag	38	2			2	3	45
Tern	19	1					20
Unidentified	65			1		1	67
All	420	8	7	3	5	12	455

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Largely released alive

Boat ramp survey

Capture	Hook	Outcome	
Caught in net		Alive	2
Hooked, externally	Not removed	Alive	4
	Removed	Alive	72
Hooked, beak / gizzard	Not removed	Alive	11
	Removed	Alive	74
	Removed	Dead	1
Tangled		Alive	261
		Dead	6
Unknown			24
All			455

Data issues

Boat ramp survey

- The form only allowed for a single incident to be recorded per fisher, interviewers were instructed to assign other captures to other fishers in the group
- In 46 cases, multiple captures were reported that had the same number of captures as the number of fishers, with all the details being the same
- Of the 7 seabirds reported as dead, 6 were repeated captures (unkown species, tangled) in a single group

Estimated seabird captures

This presentation is of provisional work, final results may differ.

Method

Estimated seabird captures

The boat ramp survey can be used to estimate seabird captures from boat-based recreational line-fishing, by FMA and method ("Line" or "Longline"), from the product of the following terms:

- An estimated seabird capture rate (seabirds caught per 100 hours fishing)
- Number of hours of fishing per trip
- Total fishing effort during 2017–18

Seabird capture rate

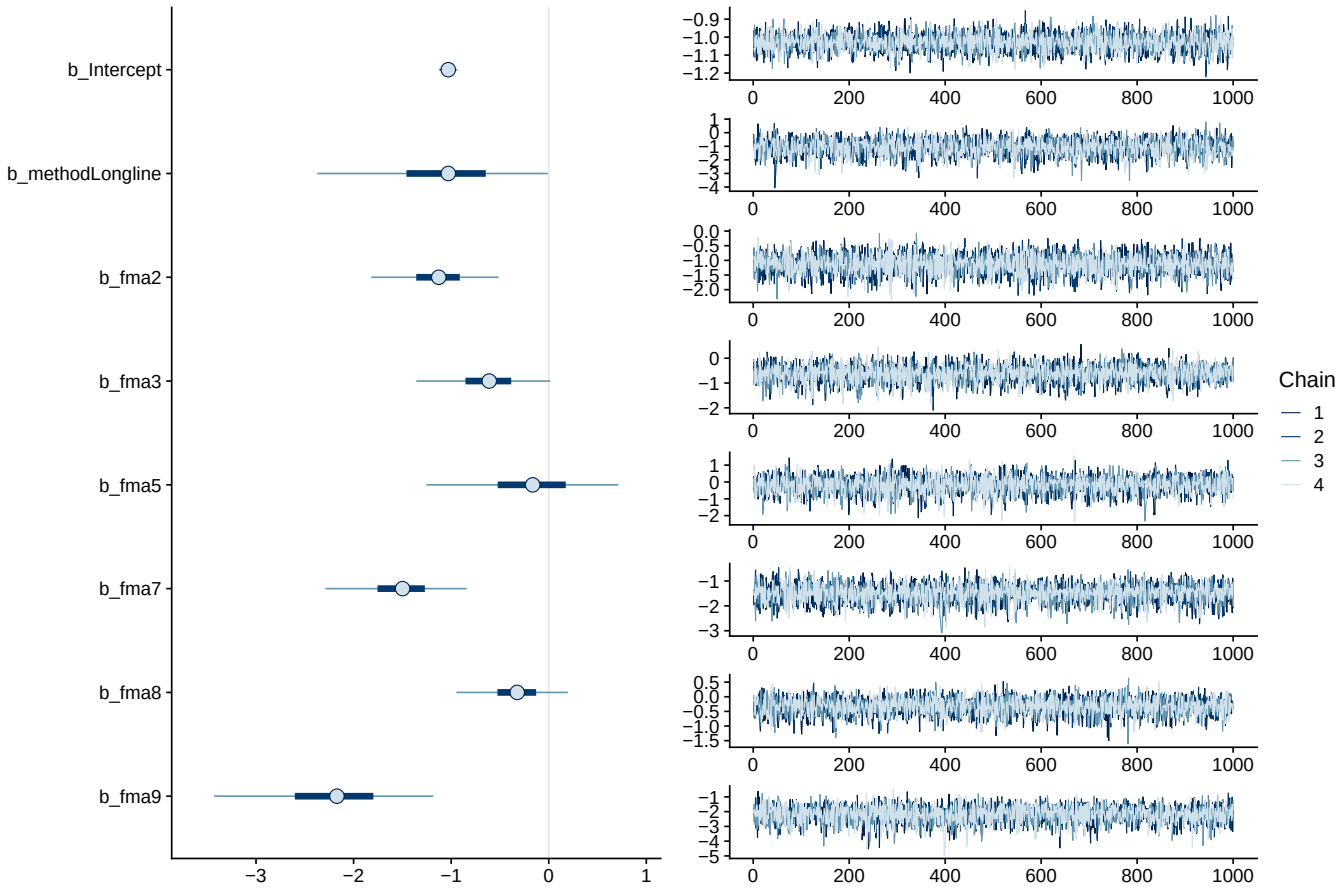
Estimated seabird captures

- Use a generalised linear model
- Assume that seabird captures are proportional to length of time fishing
- Draw the captures from a Poisson distribution, with a rate that varies with FMA and with method
- The model was fitted using Bayesian methods, using BRMS, with Normal(0, 1) priors, and 4000 samples taken from the posterior distribution of the capture rate by FMA and method

```
capture  ~ offset(log(hours)) + method + fma
```

Seabird capture rate, model summary

Estimated seabird captures



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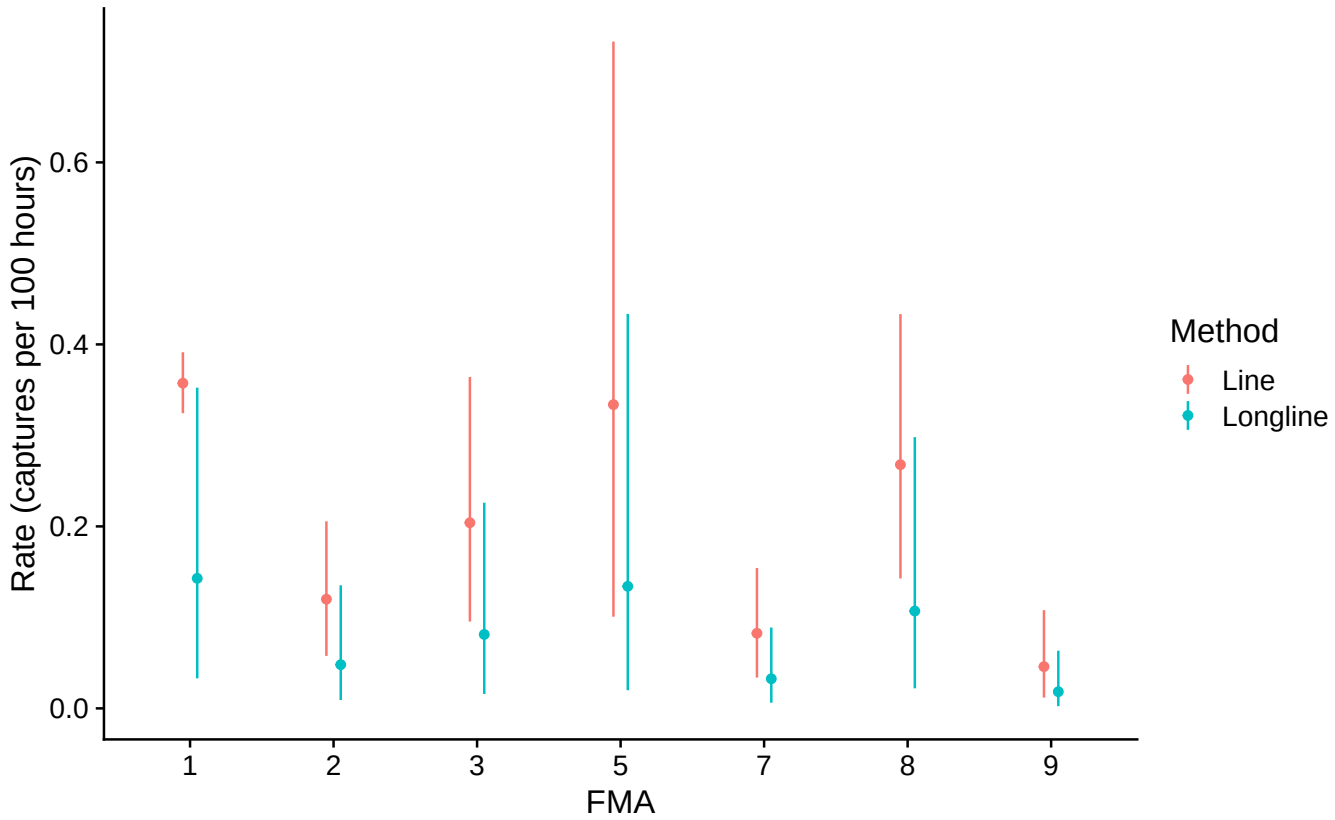
Seabird capture rate

Estimated seabird captures



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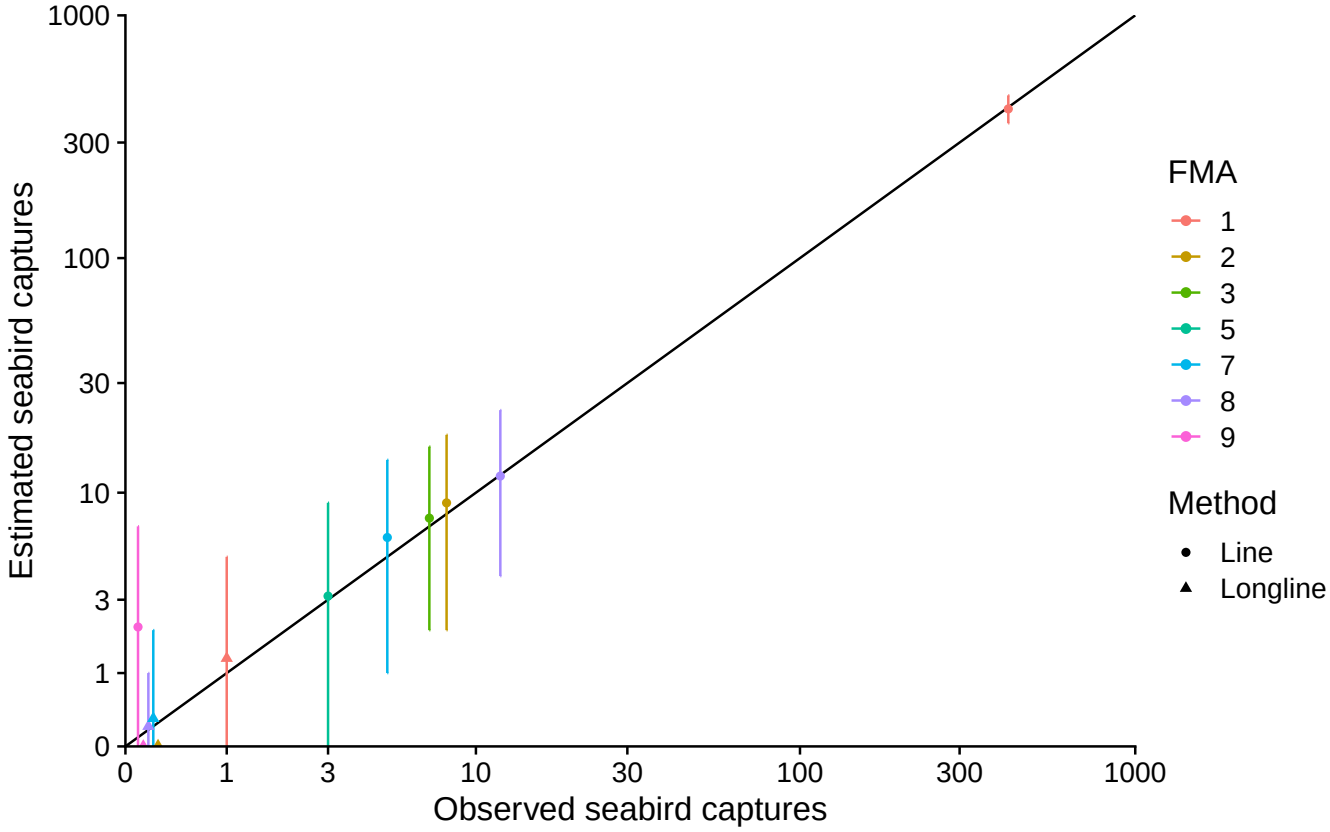
Recreating the boat ramp data

Estimated seabird captures



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Fishing hours per trip

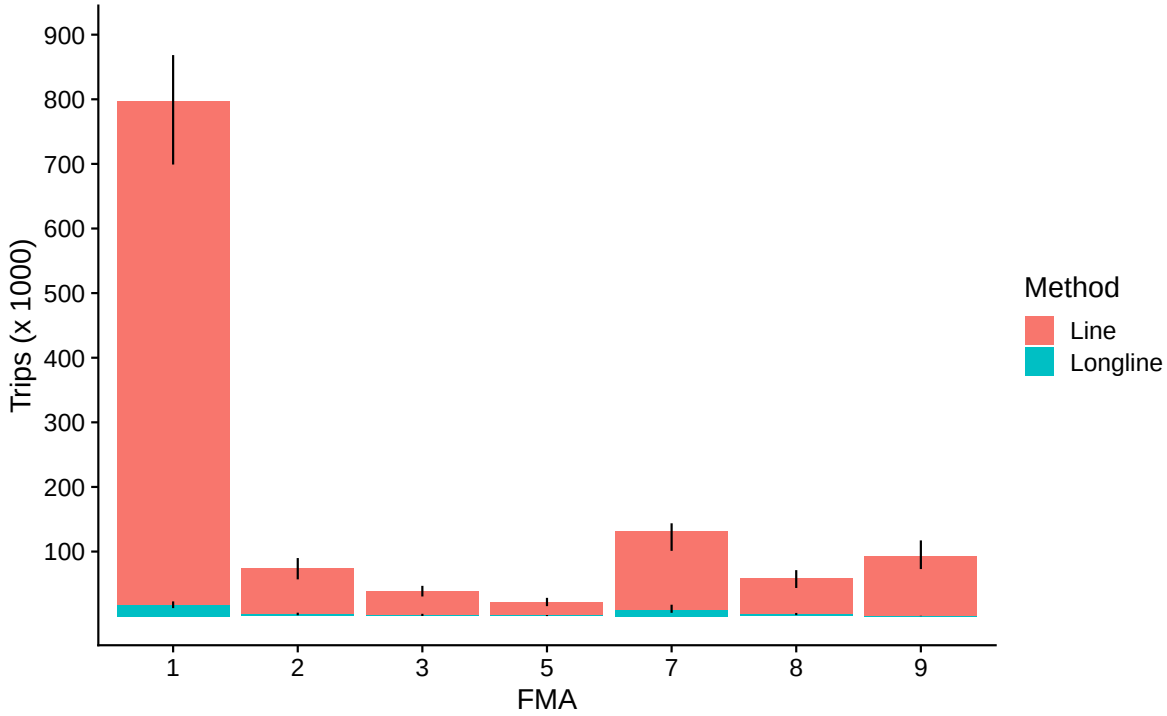
Estimated seabird captures

From the boat ramp data, take 4000 bootstrap samples of the mean number of hours spent fishing, using each method, during each trip. The mean hours per trip were:

- 3.79 (CV:0.008) for line fishing
- 2.53 (CV: 0.01) for longline fishing

Number of trips during 2017–18

Estimated trips by method and FMA were provided by NRB. Samples weer generated from log-normal distributions with the same mean and CV.



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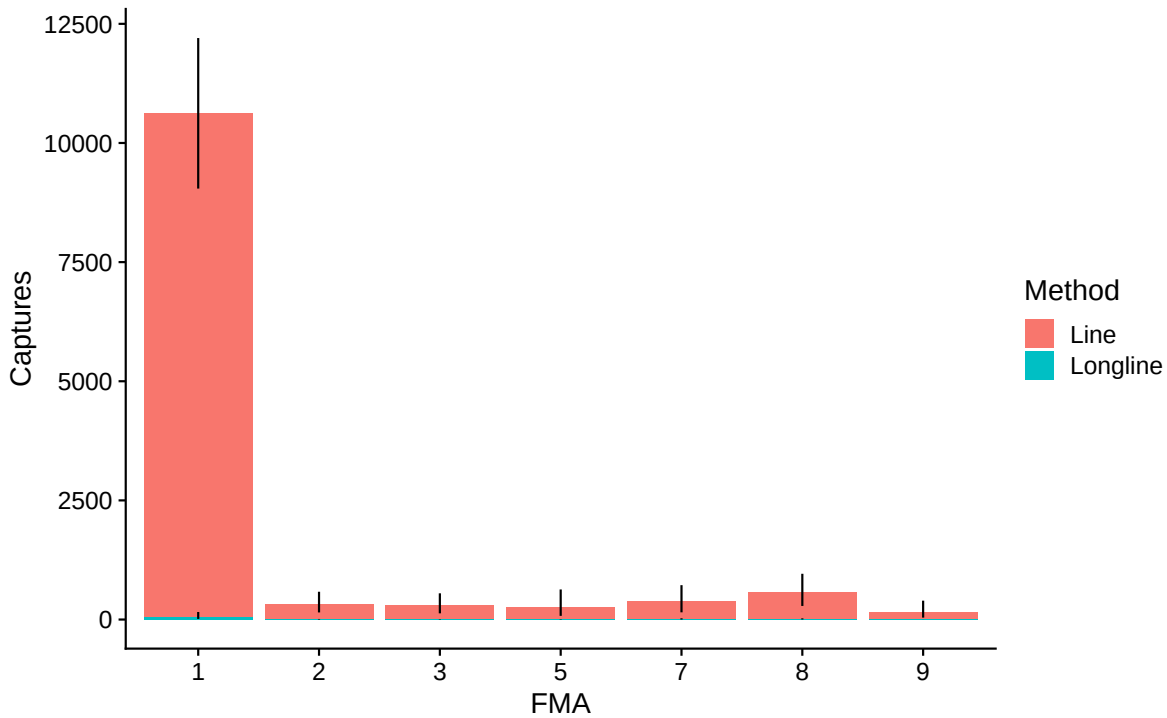
Estimated seabird captures during 2017–18

Total estimated seabird captures from small boat line and longline fishing of 12 656 (95% c.i.: 11 037 to 14 438).



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Spatial variation in captures

Estimated seabird captures

- Use a CAR model, restricted to FMA1
- Smooths the capture rate, by adjacent areas
- Draw the captures from a Poisson distribution, with a rate that varies with FMA and with method
- The model was fitted using Bayesian methods, using BRMS

```
capture ~ offset(log(hours)) + method + car(adjacency, gr=
```

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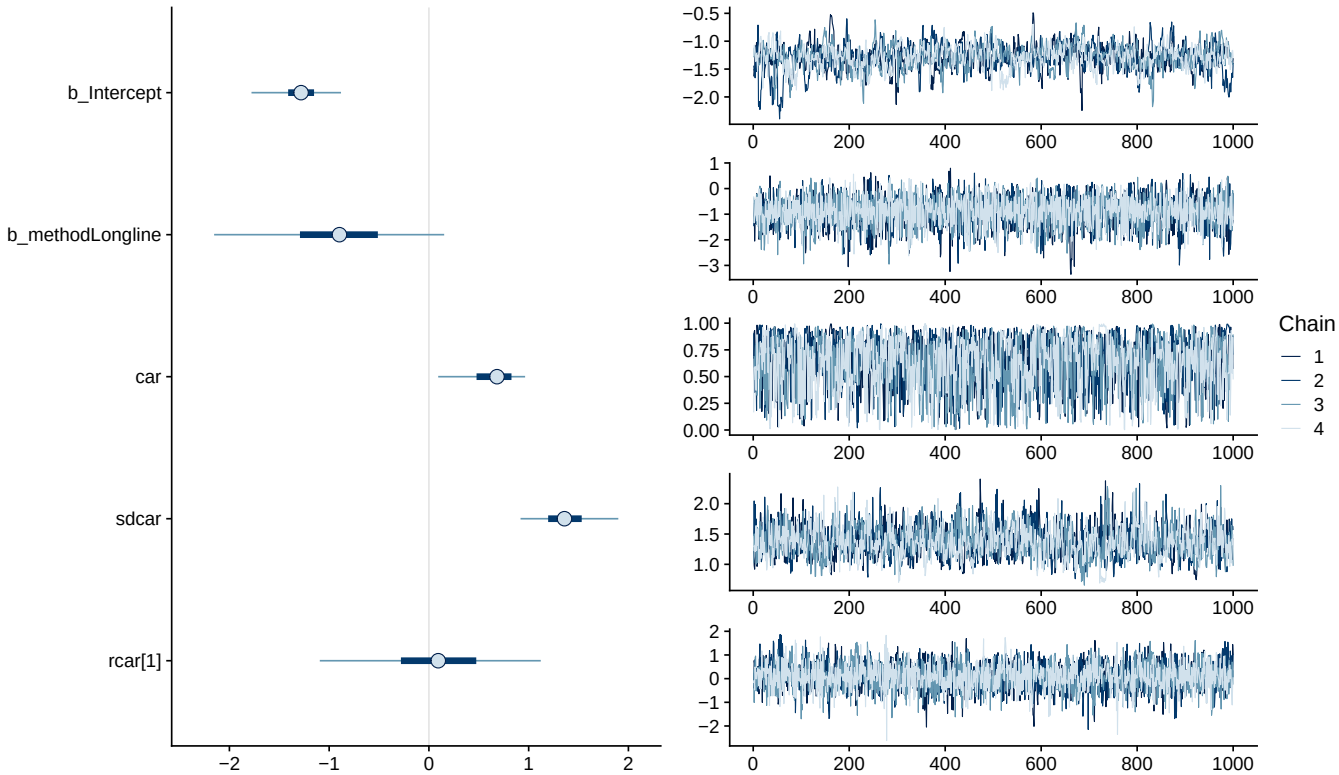
Seabird capture rate, model summary

Estimated seabird captures



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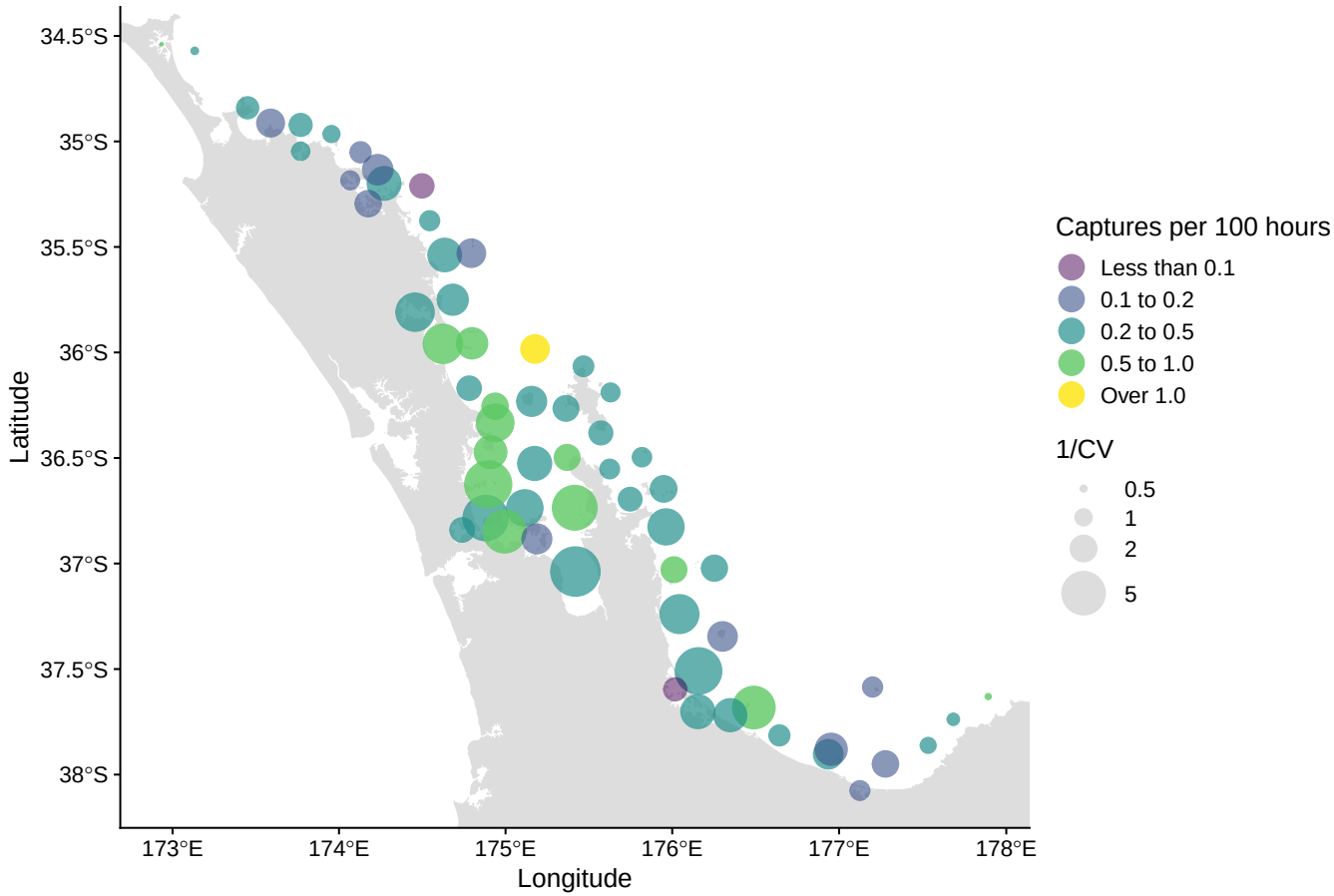
Seabird capture rate

Estimated seabird captures



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National Panel survey

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Characterisation survey

National Panel survey

- There were 1847 responses to the NPS characterisation survey
- 1203 fishers answered the question relating to seabirds ("During the last fishing year have seabirds disrupted your fishing activity?")
- 295 (24.5%) of fishers answered "yes"

Nature of the interaction

National Panel survey

Of 404 responses to this question (people could answer multiple times):

- 33 selected “By becoming entangled in your lines”
- 55 selected “By taking a baited hook and needing to be unhooked”

Data issues

National Panel survey

- Data provided by MPI were not linked to the fishers' responses through the year
- Low participation in the characterisation survey
- A single question was asked about fishing throughout the year, which would make analysis difficult
- Questions were across multiple incidents

Discussion

Distribution of recreational fishing

Discussion

- To analyse impact using a risk framework requires a distribution of recreational fishing
- This is only available from the aerial survey, and was last updated from 2011–12 data
- Not available for general recreational fishing, and not routinely produced as an output of the recreational surveys
- Recommend that maps of annual hours of recreational fishing, by method, are generated

Consistent reporting

Discussion

- Require reporting of captures that are linked to effort (to allow reporting of rates)
- Recommend reporting of individual captures, and from individual fishing trips
- Collect the same information from all surveys, and via ad hoc reporting, such as when people ring the DOC hotline

Improving reporting

Discussion

- Best information is from the boat ramp survey (because of the scale), but this is limited to boat fishing
- The NPS diary survey allows, in principle, for reporting to be obtained from representative fishing methods
- Extend to include all protected species
- Self-reporting methods (such as a fishing diary app) could extend the reach
- Roving surveys may be needed to reach, for example, kontiki fishers on beaches were shark captures have been known to occur

Self reporting

Discussion

- The NPS indicates that reporting from around 1000 fishers resulted in around 100 seabird captures reported annually
- Any self - reporting should aim for at least that scale to be useful
- Challenges include representivity (methods such as set net and kontiki fishing may have different demographics from rod and line fishing)
- Data are more valuable if fishing effort is recorded, even if there are no captures

Self reporting

Discussion

- Any self - reporting will require fishers to be motivated
- In addition, self - reporting could be used for reporting captures, even if the effort is not reported
- For species like Hector's dolphin, people are likely to be worried about the implications of reporting a captures

Recommendations of Hartill and Thompson (2006)

Discussion

- Focus on developing standards and an interface for collecting self - reporting data
- The same interface could support data from fishing competitions, ramp surveys, club records, fishing diaries, government applications
- Consider data governance and ownership issues from the start, with a focus on open data

Summary

Discussion

- Around 10 000 seabird captures or interactions annually in FMA1, with uncertain mortality
- Spatial risk assessment will require distributions of recreational fishing effort
- No quantified data sources are available for any protected species, other than seabirds
- Improvements to data collection will be needed to understand the extent and impact of these captures