 <p data-bbox="231 533 470 571">Agreement on the Conservation of Albatrosses and Petrels</p>	<p data-bbox="555 241 1385 324"><b>Eleventh Meeting of the Seabird Bycatch Working Group</b></p> <p data-bbox="667 347 1385 385"><i>Edinburgh, United Kingdom, 15 - 17 May 2023</i></p> <p data-bbox="513 459 1372 555"><b>Sink rates of line weighting configurations in the New Zealand snapper longline fishery</b></p> <p data-bbox="534 577 1353 660"><b><i>Dave Goad, Zak Olsen, Shaun Lee, Janice Molloy, Tiffany Plencner &amp; Igor Debski</i></b></p>
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**Attachment:** Goad, D. & Olsen Z. 2022. Measuring sink rates of a range of line weighting configurations in the snapper longline fishery. BCBC2021-03 final report prepared by Vita Maris for the New Zealand Department of Conservation, Wellington. 18 p. [Available for download here.](#)

## SUMMARY

The introduction of domestic mitigation standards for demersal longliners and subsequent changes to regulation have resulted in increased attention on sink times to depth and the depth of hooks at the end of the aerial extent of bird scaring lines. Previous work has shown that sink times to depth vary with gear setup, position on line, and environmental conditions. However, for a given gear setup, times to depth for the slowest sinking part of the line show much less variation within and between sets.

We report on a project focussed on the New Zealand shallow water demersal longline fleet, predominantly targeting snapper. It consists of small vessels which fish in depths typically less than 150 m, and manually clip pre-baited hooks with 60 cm long branchlines onto monofilament mainlines. Weights and floats are attached at varying spacings depending on, for example, seabed type and target species. The fleet employ a range of gear setups, and many vessels have faster-sinking variations for use at high bycatch-risk times. However, most vessels generally have no accurate measure of hook depth at the end of the bird scaring line for different gear configurations, and operators typically have limited time to experiment with variations to gear setup and bird scaring line design.

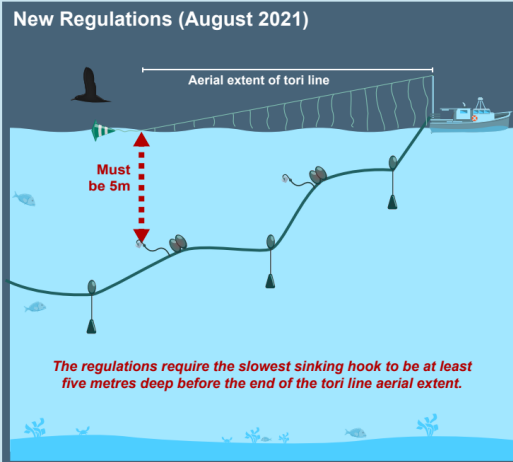
We tested a range of gear configurations which reflect the variation across the fleet using an experimental approach without hooks (this allowed for more rapid testing and avoided any elevated seabird bycatch risk during trials). The configurations varied in external weight mass, weight spacing, use of floats, setting speed, line tension and backbone diameter. Time depth recorders were deployed midway between weights to measure the sink profile of gear, and to estimate the depth at given bird scaring line aerial extents.

A range of gear configurations were found that achieved the required sink depth and this was communicated to fishers through an infographic (attached). Recognising that the results found during trials may vary from those under commercial operations, for example with changing environmental conditions, the infographic focused on describing the guiding principles for achieving improved sink rate so that individual operators could adapt the findings to their operation.

Work is currently underway to expand this approach to other target fisheries including floated demersal longline methods targeting bluenose and ling in deeper water.

GUIDING PRINCIPLES FOR IMPROVING SINK RATE **INFOGRAPHIC**

# Keep seabirds from accessing hooks



- Three guiding principles to improve tori line aerial extent**
1. Increase the height of your tori pole
  2. Increase drag to hold up longer tori lines
  3. Make aerial sections lightweight so they are easier to hold up  
*The recommended aerial section of tori line is 3 mm dyneema with light streamers.*
- If this still doesn't provide enough aerial extent, reduce weight spacing and / or use larger weights.

**Five guiding principles to help sink your line closer astern**

1. Reduce the distance between weights
2. Increase line tension  
*More tension on the line speeds up sink rate for hooks midway between weights*
3. When setting in shallow water, reduce weight spacing  
*Lines sink slower in shallow water because weights hit the bottom earlier, so there is less weight pulling the line down. In very shallow water, or with large weight spacing, a weight may even hit the bottom before the next one is clipped on.*
4. Increase line weighting on thicker backbone  
*Thicker backbone sinks slower, so requires more weight to keep a good sink rate*
5. Reduce setting speed  
*Hooks will sink closer to the boat and reduce the aerial extent required. However, during high-risk periods tori line aerial extent must always reach at least 50m.*

**Tables for estimating required tori line aerial extent (m)**

Look up your gear set-up in the tables below to estimate the aerial extent required to protect hooks up to a depth of five metres. Numbers will vary between boats so this should only be used as a guide.

Green = recommended aerial extent, use a 5m pole    Orange = difficult to achieve, use a 7m pole    Grey = not recommended

**Floating / eggs**

Gear set-up		Speed (knots)			
weight	spacing	4	5	6	7
3kg	50m	70	85	95	115
3kg	75m	80	95	105	125
3kg	100m	110	135	160	190
3kg	150m	124	155	185	215
5kg	50m	50	65	75	90
5kg	75m	60	75	90	105
5kg	100m	75	93	110	130
5kg	150m	125	155	180	215
7kg	50m	40*	50	60	75
7kg	75m	55	70	80	95
7kg	100m	80	100	120	140
7kg	150m	105	130	155	180

**Droppers / bommies**

Gear set-up		Speed (knots)			
weight	spacing	4	5	6	7
2kg	25m	65	80		
2kg	50m	92	115		
2kg	75m	100	130		
2kg	100m	130	160		
4kg	25m	35*	45*	55	65
4kg	50m	55	70	85	100
4kg	75m	75	95	105	125
4kg	100m	90	115	145	165
4kg	150m	115	145	180	208
6kg	50m	40*	55	65	75
6kg	75m	50	65	80	90
6kg	100m	65	80	95	110
6kg	150m	95	120	130	150

**Hard down / just weights**

Gear set-up		Speed (knots)			
weight	spacing	4	5	6	7
1kg	12m	55	70		
1kg	25m	65	80		
1kg	50m	70	85		
1kg	75m	85	105		
2kg	25m	40*	45*	55	65
2kg	50m	55	70	80	95
2kg	75m	70	90	105	125
4kg	25m	30*	40*	45*	55
4kg	50m	40*	50	60	75
4kg	75m	60	75	90	100
4kg	100m	70	90	105	122
4kg	150m	110	140	170	195

\* During high-risk periods tori line aerial extent must always reach at least 50m.

These guidelines are based on trials conducted with a free-wheeling hydraulic drum with 2.2 mm mono backbone, lead weights, 150 mm diameter hard floats on 3.6 m rope droppers, with TDRs clipped midway between weights. For the floating setup, two egg floats were clipped on midway between weights.