



# Improving tori line performance in small-vessel longline fisheries

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*Te Papa Atawhai*

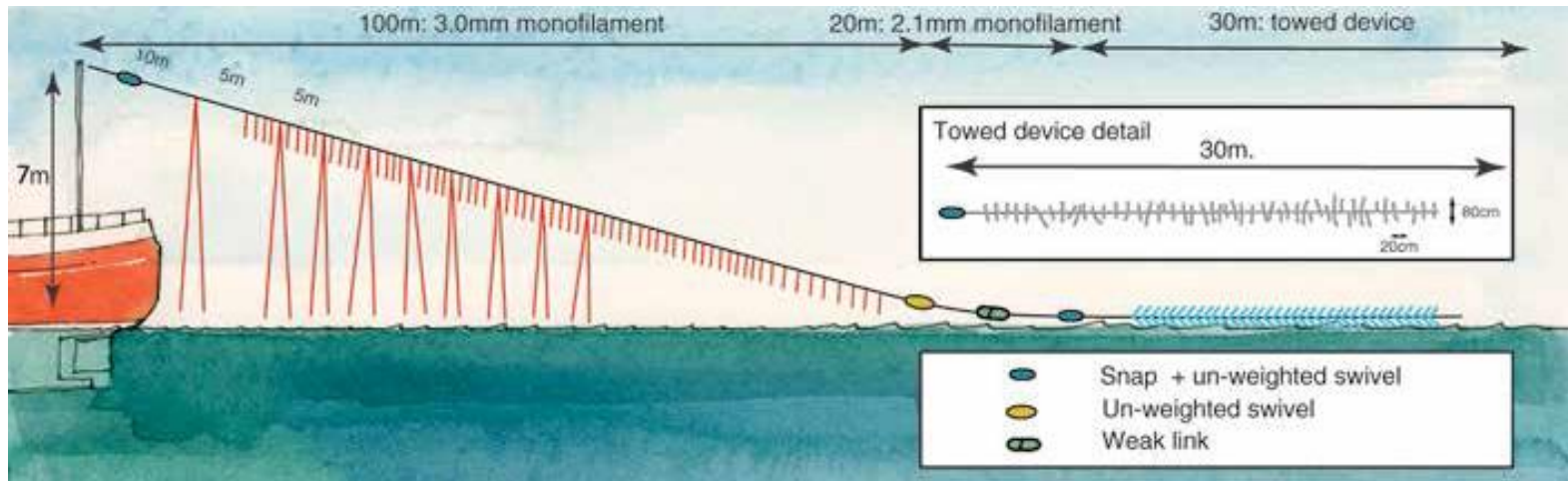
# Tori lines

- One of the most thoroughly tested seabird bycatch reduction methods
- Proven to be effective (in combination with line weighting and night setting) in reducing seabird bycatch in both trawl and longline fisheries.
- Requirement of CMM 2015-03.





# Best Practice for vessels <35m



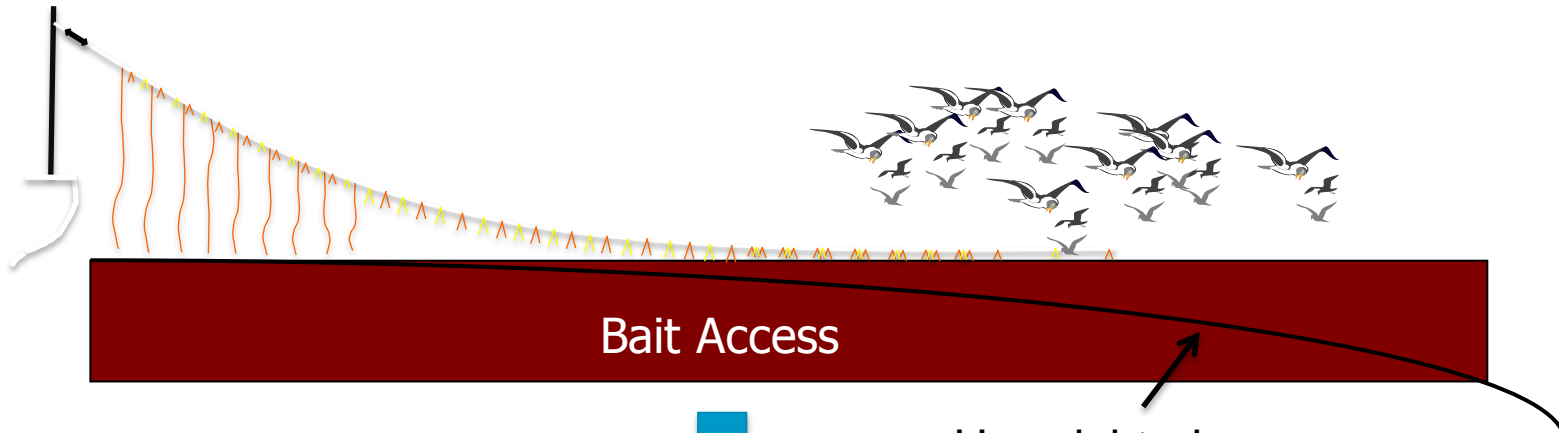
Examples of optimal streamer lines for pelagic longline fisheries (designs taken from (a) Gianuca *et al.*, 2011 and (b) Domingo *et al.*, 2011).

# Considerations for small vessels tori lines

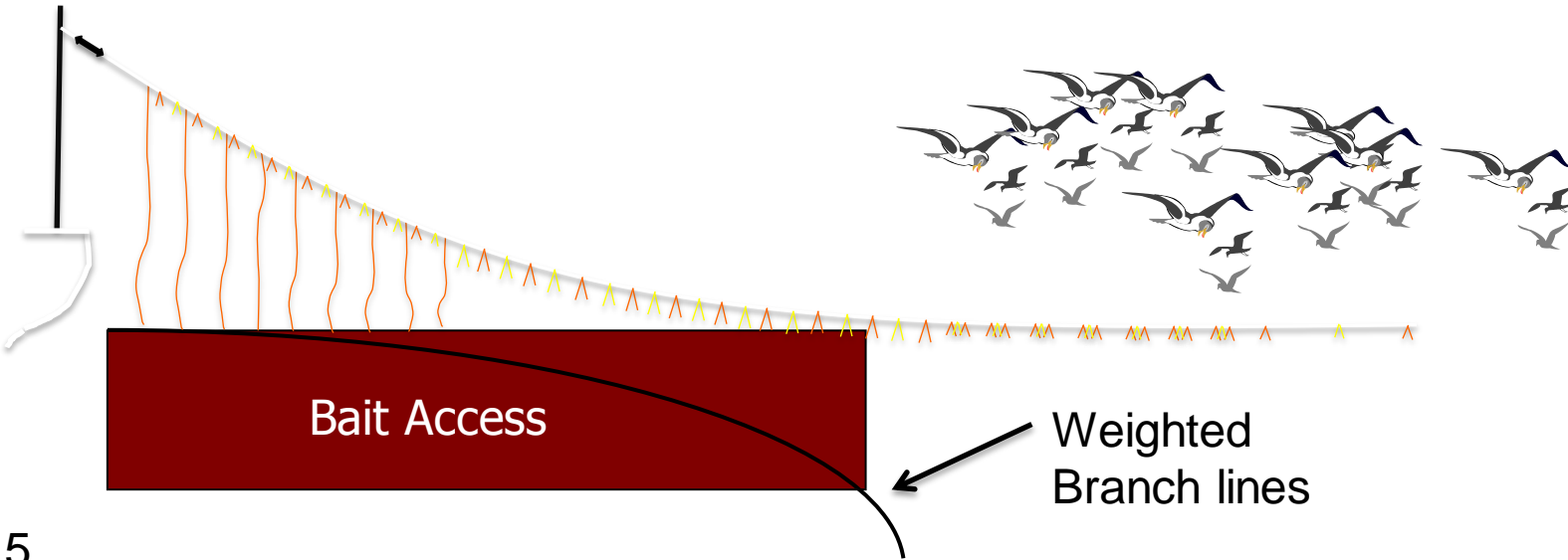


- Aerial extent:
  - setting speeds
  - height of attachment point
  - drag

# Optimal aerial extent of tori line



Unweighted  
Branch lines



Bait Access

Weighted  
Branch lines



# Considerations for small vessels tori lines



- Aerial extent:
  - setting speeds
  - height of attachment point
  - drag
- Tangling – in water and during storage
- Crew safety

# Study objective

- To develop improved tori lines that are specifically optimized for safe and effective use on small vessels.





# At sea testing

- Worked with vessel operators to identify issues & possible solutions
- Trials at seas on 4 different fishing vessels

Vessel trials (3 vessels):

- 7 designs on Vessel A
  - 8 designs on Vessel B
  - 7 designs on Vessel C
- Principle measure of effectiveness = aerial extent



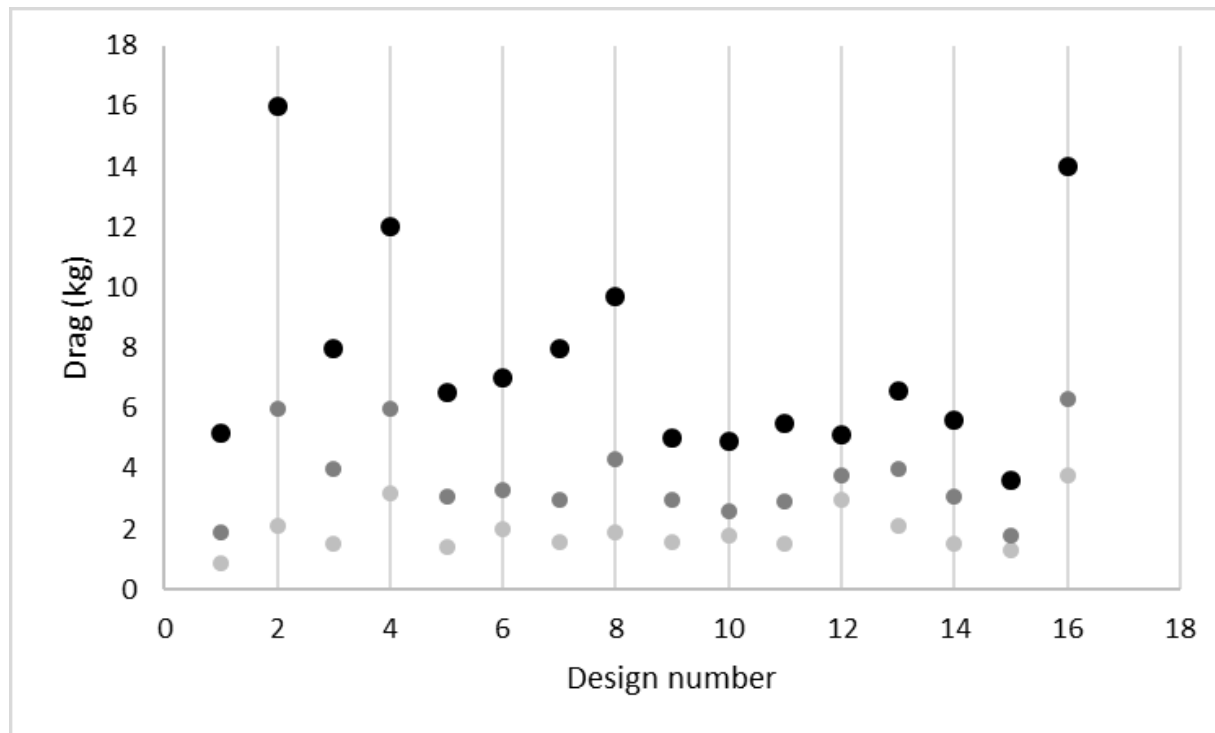




# Results at sea

## Preliminary drag testing:

- Most designs tested did not generate sufficient drag for 70m aerial extent
- Low speeds worst



# Revised designs

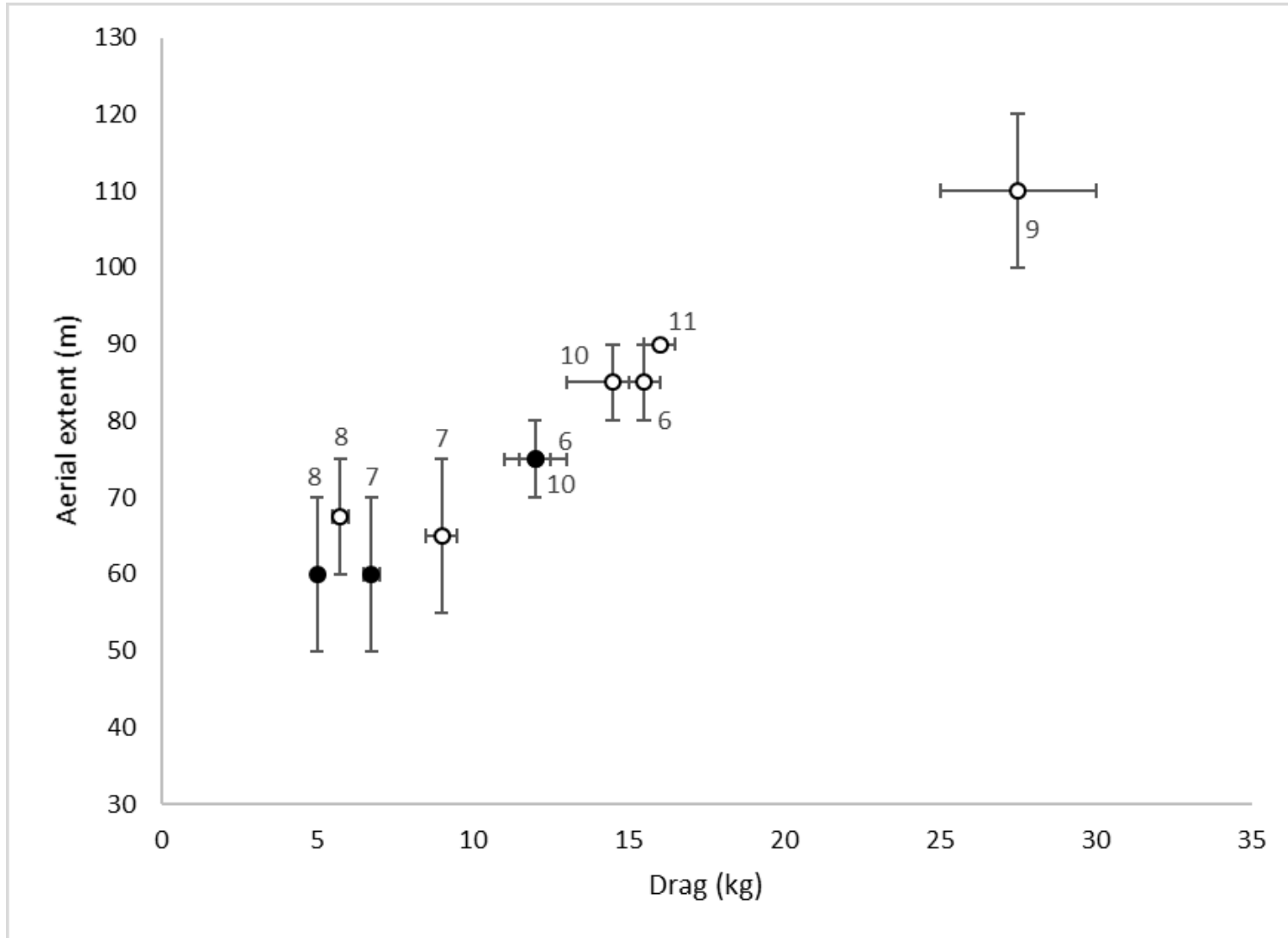


Figure 7. Tori line 8 showing the large road cone comprising the in-water section and the splash it created at 4 knots. The rope used to measure aerial extent (marked with floats at 5-m intervals) is visible on the left.





# Revised designs





# Storage and attachment





# Recommended baseline for tori line designs

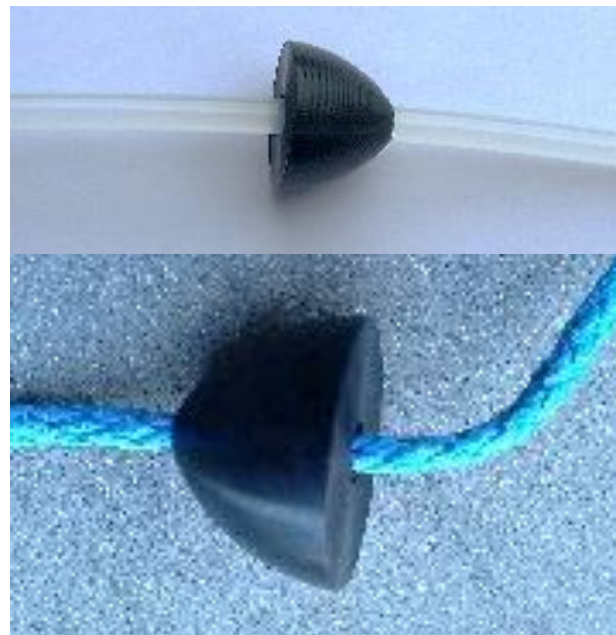
- Backbone: 3mm diameter Dyneema, with 70m+ aerial extent section
- Streamers: single long lightweight streamers (5mm) placed at 3.5m intervals (starting at 5m to avoid tangling with fishing gear)
- Pole: 52mm fibretube pole to deploy tori line at 6m+ height.
- Weak links for safety and operational reasons e.g. attaching tori line to pole.
- In water section: monofilament least prone to tangling (adding small cones to create more drag if required)





# Key new materials

- Thin plastic tubing (5mm) = ideal lightweight material
- Small and large manufactured plastic cones – provided easily modified drag



# Summary

- Best practice tori line designs with streamers are viable on small vessels.
- There are endless design options that meet best practice guidelines.
- Further research is warranted, including at-sea trials under a range of weather conditions.
- We are very keen to work with member scientists on comparative studies.





# Recommendations

- note the tori line options reported here, developed especially for small longline vessels, and recognise that they may be useful for vessel operators to implement practical and effective tori lines to meet current required specifications.
- consider these tori line designs during the review or development of any updated tori line specifications, as will be required for the review of specifications set out in CMM 2015-03.

# Acknowledgements

- Skippers and crew of the test vessels
- Fisheries Inshore NZ
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# Questions?



Photo: Phillip Griffin