Construction of tori lines for domestic tuna longline vessels

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Published by
Department of Conservation
Head Office, PO Box 10-420
Wellington, New Zealand

This report was commissioned by Science & Research Division for Conservation Services Levy project 95/3006

ISSN 1171-9834

Reference to material in this report should be cited thus:

Nelson, D.I., 1998
Construction of tori lines for domestic tuna longline vessels. *Conservation Advisory Science Notes No. 201*, Department of Conservation, Wellington.

Keywords: tuna longline fishers, seabird bycatch, seabird scaring, tori lines

Abstract

In March and April 1996, I visited 12 ports throughout New Zealand and contacted the skippers of 54 domestic tuna longline vessels. I provided 43 of the skippers with seabird-scaring tori lines constructed specifically for the size and speed of their vessels. The average cost of materials per tori line was $148. These tori lines were well received, and the feedback to date has been positive. I also spoke to the fishers about other ways of reducing the incidence of seabird bycatch and listened to their views on issues relating to the accidental capture of seabirds by tuna longliners.

l. Introduction

Within New Zealand's 200 m Exclusive Economic Zone (EEZ) a proportion of the regular feeding areas for seabird populations overlap with commercial longline fishing grounds.This is likely to result in the accidental capture of seabirds by fishing vessels.

For albatross species, the primary area of concern extends from the south of the Chatham Rise (12 to 250 nautical miles offshore) to the southern areas of the South Island, such as the Snares, Puysegur Bank and the Fiordland Trench.

The area of concern for the petrel species is the Chatham Rise area north up to the Bay of Plenty (12 to 180 nautical miles offshore).

Commercial fishing vessels targeting bluefin tuna, bigeye tuna, albacore tuna and swordfish have been using surface longline fishing methods inside the EEZ since 1962. It is highly likely that incidental seabird bycatch has occurred since then. However, the extent of seabird bycatch associated with longline fishing was first documented by a Tasmanian scientist, Nigel Brothers, in the late 1980s.

1.1 FISHING OPERATIONS ABOARD A DOMESTIC TUNA LONGLINER

Domestic longline vessels normally set one to four lines every twenty four hours, and the majority of these lines are set between 2000 hours and 0300 hours.

Most of these vessels range in length from about 12 to 25 metres. The longlines will vary from 300 to 1200 hooks per set and cover a distance of 10 to 60 km. Total setting time varies from 2 to 6 hours depending on factors such as sea and wind conditions, crew numbers, the number of hooks set and the depth targeted. The usual depths targeted range from 90 to 280 metres.

The hauling of lines lasts from 3 to 6 hours. The vessel steams back along the longline, which is then grappled and winched on board. Bait and unwanted species of fish are either discarded into the vessel's wake, or placed in a bin for disposal at a later time (usually after the hauling operation, when the vessel is steaming again).

1.2 INCIDENTAL/ACCIDENTAL CAPTURE OF SEABIRDS

When longline setting does commence seabirds try to retrieve the bait. The frenzied behaviour of the seabirds has been observed by many fishers who watch as the birds attack each other as they fight for the same bait, regardless of whether the sought-after morsel sinks beyond reach during the attack.

Albatrosses have been observed hovering 100 to 200 metres astern of the vessel and waiting for other birds to dive and retrieve the baited hooks. They then steal the bait from the smaller bird.

If a seabird is caught during longline setting it is dragged beneath the surface and drowned. It is nearly impossible for a vessel to go astern once setting has commenced without risking entanglement or total loss of longline gear. During hauling it is also common to see seabirds fighting over the upcoming bait and catch. However, during hauling of a longline, the seabirds are usually swimming rather than diving from above.

1.3 AVOIDING SEABIRD BYCATCH

Conservationists and concerned fishers have endeavoured to address the problem without compromising the economic viability of fishing operations.

At the forefront of research into bycatch mitigation methods has been the use of a tori line (also referred to as a seabird scarecrow). A tori line is a system of side streamers attached to a 130 metre (or longer) length of rope which runs from a high point on the aft of the fishing vessel, over the top of the area where fishing baits enter the water, and down into the sea.The drag of the end of the rope in the water keeps the aerial section of the tori line under tension. The streamers attached to this airborne portion flap about, deterring seabirds from diving on the baited hooks before they have a chance to sink.

2. Objective

In February 1996 I was contracted to:

- Contact as many skippers of domestic tuna longliners as possible.

- Design and build tori lines for as many domestic tuna longline vessels as possible. Each tori line was to be custom-made and optimised for the individual vessel.

- Advise skippers on the use of tori lines and other techniques that may reduce seabird bycatch rates.

- Listen to and note the skippers' comments with regards to seabird bycatch issues.

Whilst there were some fishers who had already implemented some bycatch mitigation methods of their own initiative, the Department of Conservation wished to encourage all fishers in this fishery to reduce incidental seabird bycatch without compromising fishing efficiency.

The Department of Conservation contracted the New Zealand Fishing Industry Board to undertake this project.

During visits to 12 ports, I spoke to 54 skippers of longline vessels, mostly in the North Island. I measured up each of their vessels and manufactured a customised tori line for 43 of these.

3. Tori lines

3.1 CONSTRUCTION MATERIALS

All SBT longline vessels fishing within New Zealand's EEZ have been required to use a tori line since 1991. Anecdotal evidence has suggested that many vessels have either avoided using tori lines, or have used tori lines which were unlikely to deter birds from diving on baits. One of the objectives of this project was to show fishers that a tori line could be easy to construct, easy to use, and effective in deterring seabirds.

The tori lines provided to vessels were constructed in accordance with the principles suggested by Duckworth and Wells (1995).

It was anticipated that with regular use the tori lines being provided to fishers would not last more than 1 or 2 fishing seasons. Because of this, emphasis was placed on producing a tori line which could be easily repaired or copied by domestic fishers. As far as was possible materials which were in common use by domestic fishers were used, as follows.

Forward portion of tori line backbone: 7 mm autolining rope with pre-manufactured swivels wrapped around the line at 1.2 metre spacings. This material was chosen for several reasons: Most of the domestic vessels are small with only a handful of crew; few have spare winches to use for deploying tori lines; 7 mm rope is easy to deploy and retrieve by hand; the presence of pre-manufactured swivels removed the need to splice swivels into the rope and

this saved on construction costs and reduced the number of potential breakage points.

Rear portion of tori line backbone: 8 mm polypropylene was used for the portion of backbone rear of the streamers.

Streamers: 3 mm sekiyama cord inside 6 mm urethane plastic spaghetti tubing. These materials are not well known to domestic fishers but it was decided that their proven effectiveness in deterring seabird bycatch justified their use.

Swivels: The first swivel (a few metres astern of the vessel) was a heavy-duty 16 mm brass swivel (breaking strain of 1500 kg). The second swivel (connecting the forward and rear portions of the tori line backbone) was a BL No. 2 half stainless steel, half brass 11 mm swivel with a breaking strain of 350 kg. It was intended that the 2nd swivel would be the weakest point in the tori line. If a snag did occur in the rear portion of the tori line then the forward portion and side streamers should be left intact and easily repaired.

Crimps: B size (2.45 to 2.61 mm) mono crimps were used on the side streamers.

The cost of materials per tori line averaged $148.00.

3.2 DESIGN

All of the tori lines provided to skippers had the same basic design. However, within this design, the spacing of various components varied. Each tori line was made up of the following parts:

1. A short length of 8 mm polypropylene rope, long enough to reach from the point on the vessel where the tori line was going to be towed from to a point a few metres astern of the vessel.

2. The 16 mm brass swivel, joining the 8 mm polypropylene rope to the 7 mm auto lining rope.

3 A length of 7 mm auto lining rope for the aerial section of the tori line and 8 mm polypropylene rope for the section in the water. The total length of backbone depended on the vessel's setting speed, and ranged from 130 to 150 m.

4. Side streamers. The number and spacing of side streamers varied according to the longline setting speed of the vessel. The length of each pair of side streamers varied in accordance with the height of the tori line tow point, the speed at which the vessel set its longline and the location of the streamers on the tori line.

5. 11 mm swivel, to join 7 mm autolining rope and trailing 8 mm polypropylene rope.

4. Conversations with the skippers

4.1 SKIPPER OPINIONS AS TO WHAT FACTORS I NFLUENCE SEABIRD BYCATCH RATES

During my conversations with fishers I discussed a variety of methods which had been suggested for reducing seabird bycatch rates (night setting, attaching small weights near hooks, thawing bait, etc.). Many of the fishers had experimented with some of these techniques. They frequently offered their opinions as to which methods they thought were effective. As time progressed I was able to pass on to other fishers the suggestions that had been made by those that I talked to earlier.

The following factors were thought by the fishers to influence rates of seabird bycatch. As would be hoped, many of these factors have already been identified by researchers. They are arranged in order according to approximately how frequently fishers mentioned them:

1. The location that the vessel was fishing (area). Regional `hotspots' for seabird bycatch such as Puysegur Bank and the East Cape exist.

2. The sea and wind conditions. Setting downwind may reduce rates of seabird bycatch, as some fishermen have found that albatrosses have greater difficulty diving on to bait if they have to fly with the wind to do so. Setting downwind may not be possible for all designs of vessel.

   It was suggested that seabird activity is reduced in certain bad weather conditions, but few of the vessels favour fishing in bad weather.

3. How and when old bait or offal is disposed of. There are some fishers who keep bait, offal or unwanted fish species onboard the vessel in fish bins until the hauling operation is completed, and dispose of the un wanted contents after the vessel has begun steaming again instead of throwing it back into the sea as they bring the longline in. The lack of food eventually discourages seabirds from congregating in such large numbers during a time when they are at risk of being caught on the upcoming longline.

4. Moon phase and deck lighting. Fishers stated that during fishing at night, seabirds were more likely to attempt to seize baits when the moon was providing a lot of light. Some attempted to reduce the amount of artifi cial light being given off by the vessel. One method of reducing lighting at night time whilst still allowing sufficient lighting for crew to work safely and efficiently is to place a guard or shield on the outer side of the vessel which deflects the lighting needed for the crew to work back towards the area they are working in. For setting the longline, the lighting does not require as much intensity as for working the gear during the hauling operation.

Most skippers that I spoke to said that, regardless of seabird bycatch issues, it was their usual procedure to set longlines at night, as this allowed the crew time to sleep before hauling in the gear 6-8 hours later.

5. The rate at which the baited hooks sank. If bait is thawed it sinks faster than bait that is still frozen. Many fishers also check that the bait is attached properly to increase sinking rate and to ensure that a high percentage of bait does enter the water. An example is, when using squid as bait, the hook should be attached through the top of the mantle to reduce the possibility of air being caught inside it. Some fishers place small weights halfway along their branch lines to enable the bait to sink faster and to attain a desired depth of sinking for targeting tuna.

6. The vessel's hull shape and size. The birds are hesitant to make contact with a vessel. Because of this, less birds are hooked on hauling if the bait comes up alongside the vessel. If snoods are longer than the length of the vessel then they are more likely to surface away from the vessel.

7. The ability of crew to cast baited hooks away from the vessel's wake (turbulence from the vessel's propeller can return the baited hooks to the surface again). At least one vessel was using a bait deployment line. A bait deployment line is a length of monofilament 15 to 20 metres long, one end of which is attached to the railings or bulwarks on the side of the vessel, while the other end trails in the water. Baited hooks thrown over the deployment line slide down its length and are guided away from turbulence. This prevents the baited hooks returning to the surface again and allows a faster sinking rate.

4.2 FISHERS' COMMENTS ON TORI LINES

Some skippers had previously tried using tori lines which they had constructed themselves. They frequently found these to be of little benefit in deterring seabirds. However, discussions revealed that many of the tori lines which they had used had basic design flaws such as:

1. Some had just a line without streamers.

2. Some had lines with plastic strapping which didn't hang downwards, therefore allowing birds to fly under them.

3. Some had employed the use of buoys which dived and became entangled with the mainline.

The feedback regarding the tori lines which were provided as part of this project has been very positive. Many skippers have been pleasantly surprised by the tori line performance and some of the skippers I was unable to contact, have asked how they could arrange to get a tori line. There is a need for the work carried out in this project to be followed up.

A few skippers did express concerns regarding particular aspects of the use of the tori lines provided. These included:

1. The height of the tow point being too great for convenient retrieval.

2. The number of crew available to undertake the deployment and retrieval of the tori line as well as perform the fishing operational functions.

3. The risk of entanglement.

4. The need for more tension on the line so that the airborne section would be longer.

These concerns can be addressed easily if:

1. A lazy line is connected to the tori line which can be pulled down and then winched in.

2. A power or hand winch is used to deploy and retrieve the tori line.

3. A bait deployment line is used in conjunction with the tori line.

4. A small windy buoy is attached to the seaward end of the tori line (this may increase the risk of entanglement though).

4.3 FISHERS' RESPONSE TO THIS PROJECT

Listed below are the key concerns expressed by fishers during the project:

1. A belief that domestic SBT longline fishers have the same seabird bycatch problems as foreign SBT longline vessels.

2. A belief that money being collected from domestic tuna longliners in the form of Conservation Services Levies was being spent researching issues unrelated to longlining.

3. A belief that other domestic fisheries kill more birds than domestic tuna longliners and yet are not being levied to pay for research.

Despite these reservations most skippers were keen to participate in this project.

4.4 FISHERS' ACCOUNTS OF SEABIRD BYCATCH

Nearly all of the fishers that I spoke to claimed to have less than five incidents a year of seabirds being killed. They stated that the birds which they did catch were mostly caught during longline hauling, and that the majority were released alive. The species caught were not albatrosses or mollymawks, but most commonly muttonbirds.

Although concerned about the decline in certain seabird populations, fishers claim that the domestic tuna longline fishery made up a very small proportion of the New Zealand fisheries which catch seabirds.

Despite this the fishers agreed that seabirds did take a significant number of baits, and so welcomed deterrents of any kind which might reduce this bait loss.

5. Conclusions

The distribution of tori lines was well received and the feedback which I received was generally positive.

The suggestion of other ways to avoid seabird bycatch was well received and fishers frequently contributed their own ideas on this subject.

Observations and problems were easily discussed, but trying to ascertain information on the numbers and type of seabird species that were caught was difficult.

There is a need for the work carried out in this project to be followed up before the 1997 fishing season begins and for fishers' comments about the tori lines provided to be collated and assessed.

6. Acknowledgements

I would like to extend my gratitude and appreciation to the licence holders, skippers and fishers with whom I dealt during the distribution of the tori lines. Their cooperation enabled me to achieve the objectives that I had set and the information collected from them has enabled me to correlate this report with relevance to surface longline operating procedures, their own observations of seabird behaviour, their own methods of reducing incidental seabird bycatch, and the practicality of implementing strategies suggested by parties not directly involved or not familiar with tuna surface longline fishing operations on a day-to-day basis.

I would like to thank Kim Duckworth from the New Zealand Fishing Industry Board for sharing his extensive knowledge and for supplying the information necessary regarding tori line specifications which were based on his own research work in the field.

There are also several acknowledgements due to various people who enabled me to complete my work in the field by supplying information of benefit to the objectives set for me by the Department of Conservation and the New Zealand Fishing Industry Board: Andrew Branson (NZFIB), Janice Molloy (DoC), John Holdsworth (MAF), Soo Wells (Tuna Advisory Council) and Richard Cade (NZFIB).

7. Bibliography

Brothers, N. and Foster, A. (1995). An assessment of causes and solutions in Australia's domestic tuna longline fishery. *Tasmanian parks and wildlife services.*

Duckworth, K. and Wells, M. (1995). Reduce your catch (advice to fishermen on how to not catch seabirds). *Seafood NZ* November 1995, p 48-49.

Murray, TE., Bartle, J.A., Kalish, S.A. and Taylor, P.R. (1993). Incidental capture of seabirds by Japanese southern bluefin tune surface longline vessels in New Zealand waters (1998-1992). *Bird Conservation International 3:* 181-210.

Murray,T.E., Bartle, J.A., Greaves, J.J., Taylor, PR. and Molloy, J. (1992). Seabird bycatch by southern fishery longline vessels in New Zealand waters. *New Zealand Fisheries Review Document.*

Tennyson, A. (1990). Seabirds in strife. Carnage among the ocean wanderers. *Forest and Bird.*