Trials using shark liver oil to deter seabirds from eating bait during long-line fishing, Leigh, New Zealand

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SUMMARY

Off the coast of New Zealand, small quantities of shark liver oil dripped onto the water surface behind a fishing boat deterred pelagic seabirds from taking bait on long-line hooks.

BACKGROUND

Longline fisheries throughout the world have frequent and often fatal interactions with seabirds. In New Zealand, seabirds follow longline fishing boats and dive to consume bait from hooks but in the process, can get hooked themselves and drown. Significant losses are recorded each year for particular species, and effective mitigation initiatives are needed. The best people to develop deterrents to birds can be the fishermen themselves – yet lack of communication between the science community and fishermen has hindered experimental testing to identify effective solutions to minimise seabird interactions leading to deaths.

For years, a New Zealand fisherman, Alex Aitken had been dripping shark liver oil into the water to deter seabirds from pursuing baits on his longlines. Shark offal is a waste product from the shark bycatch in the snapper longline fishing industry. He prepares the pungent oil from school shark *Galeorhinus galeus* livers by pulping them, boiling and sieving the extract, or alternately, freezing the livers, cutting them finely then covering them with salt and leaving them to process for a couple of days, then sieving to extract the oil. Having extracted the oil, this is then dripped onto the water surface behind the fishing boat.

Recently the scientific community became alerted to its potential when he won an international competition run by SEO/BirdLife International in 2003, organised to raise awareness of the seabird bycatch problem in longline fisheries, and identify initiatives that could reduce bycatch. Scientific testing of this technique was required to assess its potential as a mitigation technique (Pierre & Norden in review)

ACTION

Marine scientists from the Department of Conservation (New Zealand) worked with the fisherman, Alex Aitken, to test his shark liver oil concoction and look at its effect on the number of birds that followed the boat, the species, and the number of dives that they made into the water in pursuit of pilchard bait. Oil was dripped from a simple plastic container onto the water surface behind the boat at a rate of between 70-120 ml/minute. Comparisons were made with two 'control' substances delivered in the same way – Canola oil (a vegetable oil) and seawater.

Trials were carried out offshore from the town of Leigh, northeast New Zealand, in waters frequented by the globally vulnerable black petrel *Procellaria parkinsoni* and other small shearwaters and petrels. Several trials were undertaken each lasting 15 minutes.

CONSEQUENCES

Both the number of dives the birds made after pilchard baits, and the total number of seabirds following the vessel dramatically and significantly reduced within minutes after the shark oil was introduced to the water. In comparison, canola oil and seawater did not lead to reductions in numbers of dives. The majority of birds following the boat were flesh-footed shearwaters *Puffinus carneipes*.

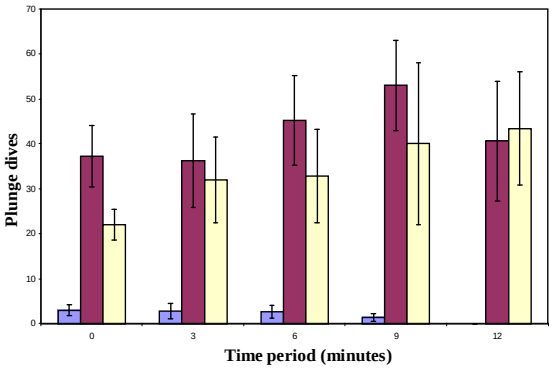

Figure 1. Number of birds diving on pilchard baits over time (treatments: blue = fish oil, red = vegetable oil, yellow = sea water).

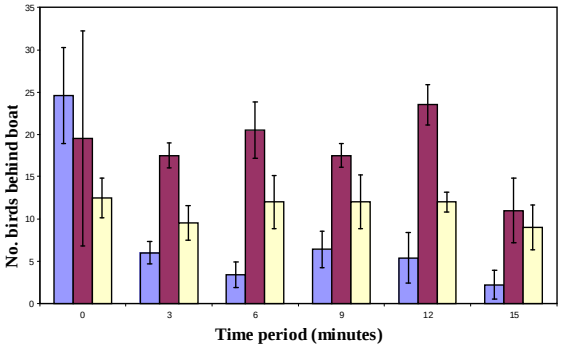

Figure 2. Number of birds behind the vessel over time (treatments: blue = fish oil, red = vegetable oil, yellow = sea water).

Other seabirds were Buller's shearwater *Puffinus bulleri*, and white-faced storm petrel *Pelagodroma marina*. Graphs comparing the three different treatments (shark oil, canola oil and seawater) on bird diving frequency and numbers of birds following the vessel are given in Figures 1 and 2).

Further testing of the effect of shark oil as a deterrent on seabirds will be undertaken on different bird assemblages, particularly including albatrosses (Diomedidae). If effective, the technique has the potential to be deployed in fisheries with relatively high reported bycatch of albatross species such as Chatham Island albatross *Diomedia eremita* and white capped albatross *Diomedea steadi*. Further work should also investigate the potential for birds to become habituated to shark oil, and its application to other fishing methods.

REFERENCES

Pierre, J.P. & Norden, W.S. (in review) Reducing seabird bycatch in longline fisheries using a natural olfactory deterrent. *Canadian Journal of Fisheries and Aquatic Sciences*.