**Reducing seabird bycatch in longline fisheries using a natural olfactory deterrent**

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**Abstract**

Longline fisheries throughout the world have frequent and often fatal interactions with seabirds. We experimentally tested one possible solution to seabird–fisheries interactions that was proposed by a New Zealand longline fisherman. This involved dripping school shark *Galeorhinus galeus* liver oil on the ocean surface behind fishing vessels. We tested the efficacy of shark liver oil in reducing the numbers of seabirds attending fishing vessels and the number of dives seabirds executed in pursuit of pilchard *Sardinops neopilchardus* baits. We conducted trials in northern New Zealand where seabird assemblages include the globally vulnerable black petrel *Procellaria parkinsoni*. Shark liver oil was effective in reducing both seabird numbers and dives on baits, compared to canola oil and seawater control treatments. Comparisons of seabird responses to shark liver oil and vegetable oil suggest that shark liver oil acts as an olfactory or chemesthetic deterrent for seabirds. Further work should include testing the oil with additional seabird species and investigating active ingredients and habituation of seabirds to the oil in order to assess wider opportunities for long-term use of shark liver oil to reduce seabird bycatch.

**Keywords:** Longline fishing; Olfaction; Mitigation; Seabirds; New Zealand

**Article Outline**

1. [Introduction](http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6V5X-4J84SWT-4&_user=10&_coverDate=07%2F31%2F2006&_rdoc=1&_fmt=full&_orig=search&_cdi=5798&_sort=d&_docanchor=&view=c&_searchStrId=936652758&_rerunOrigin=google&_acct=C000050221&_version=1&_urlVersion=0&_userid=10&md5=4ec18ddf55f6074245a2a815e6c2ef54#SECX1)

2. [Methods](http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6V5X-4J84SWT-4&_user=10&_coverDate=07%2F31%2F2006&_rdoc=1&_fmt=full&_orig=search&_cdi=5798&_sort=d&_docanchor=&view=c&_searchStrId=936652758&_rerunOrigin=google&_acct=C000050221&_version=1&_urlVersion=0&_userid=10&md5=4ec18ddf55f6074245a2a815e6c2ef54#SECX2)

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3.1. [Preliminary tests](http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6V5X-4J84SWT-4&_user=10&_coverDate=07%2F31%2F2006&_rdoc=1&_fmt=full&_orig=search&_cdi=5798&_sort=d&_docanchor=&view=c&_searchStrId=936652758&_rerunOrigin=google&_acct=C000050221&_version=1&_urlVersion=0&_userid=10&md5=4ec18ddf55f6074245a2a815e6c2ef54#SECX11)

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Fig. 1. Map of New Zealand and the study region (shown by the black square). Open squares, preliminary trials; closed circles, trials under longline fishing conditions. KI, Kawau Island; LBI, Little Barrier Island.

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Fig. 2. Numbers of all seabirds: (a) attending the vessel and (b) diving during each sampling period of preliminary trials using shark liver oil (open bars), vegetable oil (dark grey bars) and seawater (light grey bars).

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