

Penguin diving behaviour and ecosystem monitoring



An unspoiled harbour fringed with native forest at the far south of Stewart Island/Rakiura, is home to a small colony of yellow-eyed penguins/hoiho. DOC scientists attached tiny dataloggers to eight of these penguins to record the depth, length and shape of their dives during one feeding trip in the sea nearby.

Hoiho (*Megadyptes antipodes*) from this site—Port Pegasus/Pikihatiti—often descended to 80 metres and travelled along the seabed, foraging for small fish and squid. Similar diving behaviour was also reported for hoiho living at other relatively unmodified sites on the Otago coast and on Codfish Island/Whenua Hou (off Stewart Island).

By contrast, in places with more human activity (like Foveaux Strait), hoiho made shorter foraging trips and shallower dives. These differences could be used to monitor the health of coastal ecosystems where hoiho live.

Study site



Map of New Zealand and its subantarctic islands showing where hoiho live (in orange) and the study site at Port Pegasus/Pikihatiti, Stewart Island/Rakiura.

Department of
Conservation
Te Papa Atawhai



Datalogger tracking

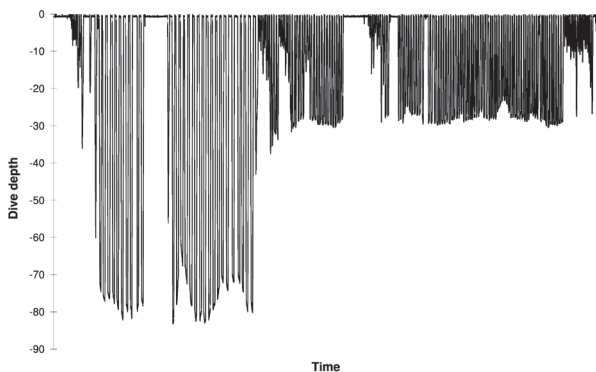
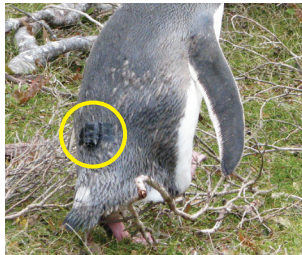
Port Pegasus/Pikihati is one of a handful of near-pristine shallow harbours in New Zealand. It attracts few visitors because of its remote location and unpredictable weather.

We timed our study for November (in 2011) to coincide with the breeding season. While incubating eggs or caring for chicks, hoiho forage in the sea close to their nests, so their diving patterns are likely to reflect the health of the ecosystem in their local area.

Late afternoon was the most common time for foraging, and hoiho made an average of 16 dives per hour, with each dive lasting about 2 minutes. Half of all dives went below 3 metres to an average maximum depth of 61 metres.

Dataloggers

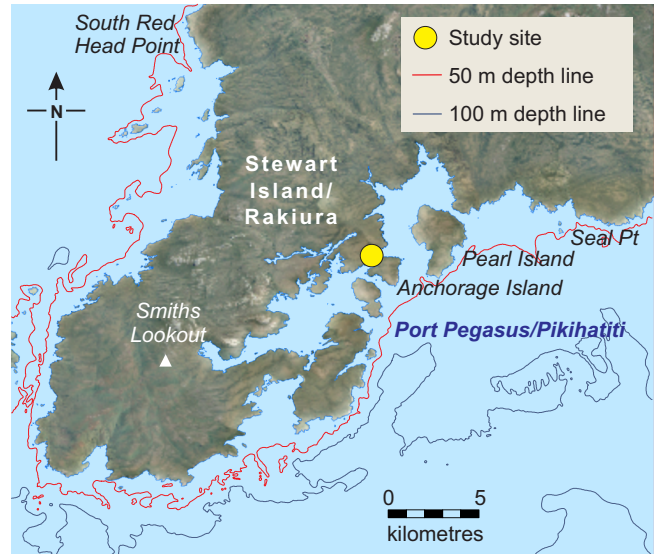
A datalogger taped onto the back of a hoiho. The small device records the time and depth of each dive for up to 15 hours and is easy to remove without damaging the feathers. Recorded data is uploaded and analysed after retrieval.



Profile of individual hoiho dives during a 12–14-hour foraging trip. This penguin dived to 80 metres for the first half of the dive and to 20–30 metres for the second half of the dive.

What's next?

These results could be used to assess the connection between the depth profiles of hoiho dives and the ecological health of their location. To explore and validate this connection, we would need to use other methods to measure the health of each site, looking for differences between the near-pristine sites and those with more human activity.



Map of southern Stewart Island with 50 metre (red) and 100 metre (blue) depth contours shown. Hoiho do not dive below 80 metres, so probably stay relatively close to the shore.

Bottom diving

Diving to the bottom (rather than catching fish near the surface) takes more energy, so why do hoiho do it?

It could be because the chance of catching a fish is higher near the bottom. Fish that live at depth are spread more evenly and are less influenced by changes in the ocean (e.g. from El Niño) than species that live in shallower waters.

But hoiho have their limits. The parts of southern New Zealand where the sea floor drops away rapidly, suit Fiordland crested penguins (*Eudyptes pachyrhynchus*, pictured right) better because they forage closer to the surface. Hoiho are not found in these places.



Photo: © Janice McKenna

Find out more

Read the full publication: Diving behaviour of yellow-eyed penguins, Port Pegasus/Pikihati, Stewart Island/Rakiura, New Zealand

<http://dx.doi.org/10.1080/03014223.2014.908931>

This project is part of the National Marine Reserves Monitoring and Reporting programme, funded by DOC's partnership with Air New Zealand.

New Zealand Government

Published by:
Department of Conservation
Marine Ecosystems Team, Science and Policy
PO Box 10420, Wellington 6143, New Zealand
July 2015

Editing and design:
Publishing Team, DOC National Office

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