Project update: Hōiho nest camera study **Mel Young, PhD Candidate, University of Otago**

The aim of this study is to determine interindividual differences in foraging trip duration, investment in pair-bond maintenance, and the timing and frequency of chick provisioning in yellow-eyed penguins/hōiho (*Megadyptes antipodes*) on the Otago coast over two seasons.

In the 2016/17 breeding season, 21 Bushnell Trophy Cam Essential E2 nest cameras were placed adjacent to selected hōiho nests on the Otago coast, ranging from Kātiki Point to Long Point/Irahuka. Timestamps were synchronised to determine foraging trip departure and arrival times, time of changeover between adults, the frequency and timing of feeding events, and any behaviours that may reduce the frequency of feeding events, including display between mated pairs, or interference from other penguins. Hōiho productivity is affected by food quality and quantity, but little is known about individual chick provisioning strategies relative to their diet (which are being analysed concurrently).

At almost all the nests observed, it was possible to determine the exact age of both chicks, as the eggs could be seen pipping. Birds were differentiated on camera by individual markings or bands, and transponder numbers or bands were checked when the camera batteries and SD cards were changed. Most of the feeding exchanges were facing the camera, and when the parent bird had its back to the camera it was possible to deduce feeding exchange events from its posture. Each chick was measured at least twice during the guard stage during checks for avian diphtheria, and it was possible to determine when chicks acquired their secondary down from the camera observations. As chicks became more mobile in the later part of the guard stage, the nest was no longer the focal point for feeding exchanges, and as a result, the cameras were no longer effective at capturing feeding information past 30 days of age.

Several different data logging options were investigated, with the most practical being logging events and times in Microsoft Excel. So far 14/21 cameras have been logged. Unfortunately, there is no easy way to automate this procedure, with each camera taking 1-2 days to manually log. Several problems were encountered with the equipment setup. Rechargeable batteries were used in most of the cameras, but were less effective than alkaline batteries, and required more maintenance for charging and replacement. Three of the cameras had faulty timestamp settings, making the interpretation of photographs impossible. All three faulty cameras have been replaced under warranty and tested prior to use in 2017/18. Two of the camera lenses and sensors became encased in dust, and as a result, could not trigger when the birds were active.

Stoats, ferrets, cats, sheep, mice, rats, hedgehogs, possums, fur seals, black-backed gulls, red-billed gulls and tītī were observed in close proximity to all penguin nests, however adult hōiho mounted a defence response to only the seabirds encountered (including non-breeding male and juvenile hōiho), and one adult hedgehog which appeared to eat spilled food around the nest. Interestingly, more nests failed due to non-breeding male hōiho interference than any other cause (3 nests), with avian diphtheria being observed intermittently (2 nests failed). Two nests observed at the same site were assumed to have been predated by stoats, with stoats being seen on camera at the nest, but the predation events were not seen. Three chicks went missing at three nests, with the camera not capturing these events. The presence of predators in close proximity to penguin nests has resulted in the establishment of mustelid trapping at two breeding sites for the 2017/18 season.

The next step is to continue to use the nest cameras in the 2017/18 breeding season, to continue to log the feeding events, and to present the results in a peer-reviewed journal article.