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Fencing to Protect Hawaiian Petrels from Feral Cats: A Progress Update

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ABSTRACT: On Hawaii Island, within Hawai'i Volcanoes National Park, remnant nesting colonies of Hawaiian petrels, or 'Ua'u, persisting in subalpine lava flows of Mauna Loa are threatened by feral cats. Trapping has not fully protected these approximately 60 known nests. In some years, cats have killed multiple petrels over the protracted breeding season. To create a core area free from cat predation, the Natural Resources Management Division of Hawai'i Volcanoes National Park, with support from multiple partners, is constructing a 5.5-mile-long barrier fence around the largest known colony. Project planning began in 2009, and fence construction started in 2013. Our design, modified from an Australian fence, is skirted to the substrate at the bottom and rolled over at the top to form a springy, outward-facing arc. Work to date includes finalizing the route, helicoptering in fencing materials and gear to the 9,000+ foot elevation site, pulverizing a narrow work corridor along the fence route (most of it on rough, aa lava), installing approximately 3,900 posts, and attaching visibility marking tape to alert flying petrels. We anticipate needing 1-2 additional work seasons to complete the fence. Ongoing petrel nest monitoring will help us assess response of the colony. Additionally, recently-installed interpretive panels inform park visitors of the conservation needs of this elusive bird.

KEY WORDS: *Felis catus*, fence, feral cat, Hawaiian petrel, *Pterodroma sandwichensis*, 'Ua'u, vertebrate pest control, wildlife management

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INTRODUCTION

Endangered endemic Hawaiian petrels, or 'Ua'u (*Pterodroma sandwichensis*) nest in remnant colonies on the islands of Maui, Kauai, Lanai, and Hawaii. Recent work suggests these colonies are genetically and behaviorally distinct (Welch et al. 2012, Wiley et al. 2012), highlighting the conservation value of each. On Hawaii Island, these petrels nest in naturally occurring cracks and crevices on sparsely vegetated lava flows. The only known nesting colonies are located on the subalpine ($\geq 9000'$) slopes of Mauna Loa within Hawai'i Volcanoes National Park (HAVO).

Feral cats are the primary known threat to Hawaiian petrels within HAVO. Of 263 carcasses recorded between 1990 and 2013, 170 (65%) were judged cat kills based on the distinctive carcass "signature" left by feral cats. Video, scat, and necropsies confirm cat presence and predation (Hess et al. 2007, Judge et al. 2012).

The park has trapped feral cats near and within petrel colonies since 1994, although personnel and funding shortages have limited or curtailed trapping in some years. The remote and rugged terrain on Mauna Loa, necessitating helicopter access to some colonies, exacerbates challenges inherent in feral cat control. Despite trapping improvements such as telemetry units that signal a tripped trap and thus, allow trapping over extended time periods, catch rate is low: e.g., 0.0002/night (2 cats in 7661 trap-nights) in 2011-13 (HAVO, unpubl.).

RESEARCH APPROACH AND KEY FINDINGS

Because of continued cat ingress, HAVO determined it needed to take additional measures to fully protect its core petrel population. In 2001, the park proposed a large-scale barrier fence. Years of planning and field testing ensued. Design feasibility and bird strike concerns had to be addressed first. All predator enclosure pens in the park are based on a design trialed and used against cats by the Arid Recovery Project in Roxby Downs, South Australia (Moseby and Read 2006). Key design elements include a 6-ft-high fence covered with 1-inch hex mesh, with a skirt to prevent digging underneath and a floppy arc at the top to prevent climbing over. While keeping these key elements intact, we modified the structural design and used slightly different materials to accommodate our uneven, rough terrain and highly corrosive, volcanic environment. Fence visibility marker trials conducted in 2003 suggested that white tape applied in linear fashion alerted flying birds to the fence (Swift 2004).

In 2004, HAVO constructed a small-scale predator-proof fence encircling 13 acres of N n habitat, to assess construction feasibility and material durability. No ingress or depredation by cats, mongooses, dogs, or pigs has been observed in the following 10 years (HAVO, unpubl.). A second enclosure completed in 2013 protects an additional 10 acres of N n habitat and allowed the HAVO fence crew to further refine the design. The fence now under construction on Mauna Loa will be HAVO's largest small mammal enclosure to date. When finished,

it will protect 640 acres of Hawaiian petrel nesting habitat.

The park spent the last 6 years securing funding, conducting NEPA compliance, refining fence route and design, and planning construction logistics. The fence ranges from 8,200' to 9,800' elevation and spans predominantly aa and some pahoehoe lava flows. The harsh terrain and extreme environmental conditions present constant challenges to construction, which is largely confined to the petrel non-breeding season to limit disturbance.

In 2013, the first year of construction:

- HAVO fence crew helicoptered scores of sling loads containing building materials and camping gear to the site
- The entire 5.5-mile route was pulverized with sledge hammers to stabilize the substrate
- Over 3,900 posts were installed
- Two strands of white marking tape were affixed to the posts (at the top and mid-height) along the route to alert birds to the new posts and pre-condition them to the future fence.

We anticipate fence completion in two additional work seasons. Ongoing petrel nest monitoring will help us assess response of the colony to the fence. Recently-installed interpretive panels at two popular locations elsewhere in the park inform visitors of the conservation needs of this elusive bird.

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