



By Land and by Sea

THE WIDESPREAD THREAT OF FERAL CATS ON HAWAIIAN WILDLIFE

By Steven C. Hess, Ph.D.



Courtesy of Steven C. Hess

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High on the slopes of Hawaii's Mauna Loa volcano, National Park Service biologists recently discovered the mangled remains of three band-rumped storm-petrels (*Oceanodroma castro*), Hawaii's rarest seabird. Discovered at the end of the nesting season in the fall of 2010, the birds had been depredated by feral cats. Band-rumped storm-petrels are a candidate endangered species, but because of their extreme rarity, little is known about them (Slotterback 2002). Often, the only time these small nocturnal birds are seen ashore is after they have been killed by feral cats, the predominant predator in the harsh alpine environment of the storm-petrel's nesting grounds.

This recent case is just one of many that point to the severe impact that non-native domestic cats are having on Hawaiian wildlife. Although there are no hard numbers on cat populations, clearly many thousands of cats dwell on each of the Hawaiian Islands, ranging across all habitat types—from the ocean to alpine zones, from rainforests to deserts.

The first domestic cats (*Felis catus*) did not arrive in the Hawaiian Islands until Europeans “found”

the remote archipelago in 1778. Never having seen domestic cats, native Hawaiian people must have been fascinated by the tame predatory mammals that served as mousers on ocean-voyaging ships (Tomich 1986). Cats were taken from the ships and quickly escaped into the wild, where there was no other similarly sized competitor. Feral cats ultimately became the most widespread *de facto* apex predator throughout Hawaii.

The first known written record of “wild cats” came from the remote wilderness of Kilauea on the Island of Hawaii (Brackenridge 1841). They soon became famously abundant in Honolulu, where Mark Twain described seeing “companies of cats, regiments of cats, armies of cats ...” (Twain 1872). The effects of these armies on native wildlife soon became apparent. In 1903, English naturalist R.C.L. Perkins wrote: “On Lanai, in walking up a single ravine, I counted the remains of no less than twenty-two native birds killed by cats.” Many of the bird species Perkins observed on Lanai are now extinct, as is more than half of Hawaii's native avifauna. Although cats are not solely responsible for these extinctions, they nonetheless have played a significant role and continue to decimate Hawaii's remaining endemic wildlife, not only by direct predation, but also by carrying lethal pathogens.

A Mounting Toll on Rare Species

In the dry subalpine woodlands of Mauna Kea, 11 percent of the nests of endangered palila (*Loxioides bailleui*) are now depredated each year by feral cats (Hess *et al.* 2004). That percentage may not seem extreme, but the toll extends. Adult females are also killed on their nests, likely explaining the skewed sex ratio in this forest bird, which is not adapted to mammalian predation. Moreover, the nestling development period for the typical two-chick brood is 25 days, nearly twice the length of continental species (Banko *et al.* 2002). This leaves nestlings vulnerable to predation for nearly a month. The compounded effects of cat predation may be one of the most easily managed threats to the continued existence of palila, which are currently in a precipitous eight-year population



Credit: USGS

The dismembered bits of endangered palila chicks mark the visit of a feral cat. Palila are endemic passerines that live in dry subalpine woodlands of Mauna Kea, where feral cats depredate about 11 percent of palila nests each year.

decline largely related to habitat loss and drought (Leonard *et al.* 2008, USGS unpublished data).

The endangered Hawaiian petrel (*Pterodroma sandwichensis*) faces similar threats. Extirpated from remote alpine nesting grounds on Mauna Kea, Hawaiian petrels now exist only in small colonies on Mauna Loa and other islands, where these seabirds are vulnerable to depredation by cats (Simons and Hodges 1998). The loss of an adult petrel can be particularly devastating to local populations because of the species' delayed maturity. Individuals must attain five to six years of age before breeding. They hatch out single squabs, which must be fed for as long as 90 days. Petrels locate their nests in burrows below barren lava, unprotected and exposed to the vagaries of cats while adult petrels forage far off the coasts of Alaska and Canada (Adams 2007).

Predation by cats on these two endangered bird species has been well documented with remote camera images and videography. Researchers have also used telemetry to study the home ranges and activity patterns of cats—and the results are ominous. A study of radio-collared cats on Mauna Kea shows that males can range up to eight square miles, rivaling the largest home range of cats anywhere in the world (Hess and Banko 2006). Most of these long-range wanderings occur at night, when birds are settled on their nests and therefore more vulnerable to predation.

The Unseen Threat of Disease

Less conspicuous but potentially as harmful as direct predation are the effects of cat-borne toxoplasmosis on a host of native wildlife. Fatal toxoplasmosis has occurred in the endangered nene or Hawaiian goose (*Branta sandvicensis*), the critically endangered Hawaiian crow (*Corvus hawaiiensis*), and the red-footed booby (*Sula sula*) (Work *et al.* 2000, 2002). Cat feces that wash into the ocean may also cause fatal toxoplasmosis in marine mammals (see article on page 62). Toxoplasmosis has caused the death of at least one endangered Hawaiian monk seal (*Monachus schauinslandi*) on the coast of Kauai (Honnold *et al.* 2005), and research shows that *T. gondii* oocysts can sporulate in seawater and infect seal and dolphin species (Lindsay *et al.* 2003).

It is impossible to know the extent of cat-related infection and mortality in marine mammals around the vast waters of the Hawaiian Islands, or even in the terrestrial wildlife on Hawaii's relatively small land area. Yet the National Park Service, U.S.



Courtesy of Dan Goltz



Credit: Dan Goltz

Geological Survey, and other federal and state agencies working in Hawaii are so concerned about the potential disease and predation impacts of feral cats that they are beginning to install predator-proof fences and are considering the removal of cats from smaller islands. Such steps may be the last best hope for the rare native birds of Hawaii. ■

A researcher attaches a transmitter to an anesthetized feral cat (top) that will later be tracked (above) as part of a movement and home range study on Mauna Kea. The study found that the mean home range for feral cats at the site was the second largest reported in the literature. The home range for one male cat was 2,050 hectares, and 610 hectares for a female.

This article has been reviewed by subject-matter experts.



To see a full bibliography and additional resources about feral cats in Hawaii, go to www.wildlife.org.