

Janet Kear and A. J. Berger, *The Hawaiian Goose: An Experiment in Conservation*. Vermillion, South Dakota: Buteo Books, 1980. Pp. 154, illustrations, figures, maps, appendices, index. \$30.00.

The geese were confused, buffeted, and thrown wildly off course by the storm that confronted them. After struggling for hours, they finally gave in. Determined only to fly, they moved swiftly with the wind, too exhausted to maintain the heading that would take them south to their wintering grounds. Instead they were carried southwest. When the storm abated, they found themselves alone above a vast, throbbing ocean.

Geese are strong fliers and can rest at sea. When they renewed their migration south, they flew automatically and eventually sighted land. It was not continental hills they found, but an archipelago of islands that Polynesians would one day, far in the future, call Hawaii.

*The Hawaiian Goose* describes the birds that evolved from that troubled flock of Canada Geese and places them in the unique geological and biological setting that is Hawaii. The book is far more than a treatise on geese, however. It is an account of man's interactions with an island eco-

system, and how human activities have severely stressed a natural environment. It is also a detailed look at the intensive efforts required to rescue an endangered species.

The book begins with a brief account of the origins of the Hawaiian Islands, and how they were populated by the progenitors of today's endemic birds. The discussion unfortunately neglects continental drift, thus excluding at least 50,000,000 years of Hawaiian geological history represented by the submerged Emperor Seamounts, the oldest of which arose 70,000,000 years ago, presumably over the hot spot now occupied by Mauna Loa and Kilauea. This means that much of Hawaii's biota could have an origin more ancient than the islands upon which it currently resides.

The *nene*, as the Hawaiians called the Hawaiian Goose, was commonly kept in Hawaiian villages, although several were given to Captain Cook when he landed at Kealahou Bay. Noisy in captivity, they apparently functioned as watchdogs in addition to their use as food and a source of feathers for *kahili*.

When the *nene* was first described by European biologists, it was found to be very different from typical geese. By remaining in Hawaii, that errant flock had to adapt themselves to an entirely new set of environmental conditions. They were no longer aquatic, but upland grazers that foraged over the dry grasslands and shrublands that grew upon Hawaii's lava slopes. Thus, their legs were longer and more powerful than those of other geese, and the webbing between the toes was highly reduced. No longer migratory, they showed a 16 percent reduction in the wing bones and muscles. More subtle changes also took place: they lost much of their fear of terrestrial predators and much of their resistance to avian disease, living as they did in an environment originally devoid of these stresses. When the islands were discovered by man, many of these adaptations began to work against the *nene*.

The number of *nene* in the islands when Captain Cook arrived is estimated to have been about 25,000, restricted primarily to the upper slopes of Hawaii and, perhaps, Maui. It is clear from recent paleontological work, however, that these geese, and a number of additional flightless species that survived well into Polynesian times, originally ranged throughout the main islands, and that their distributions and populations were severely restricted by early Hawaiians (Olson and James 1982, *Prodromus of the fossil avifauna of the Hawaiian Islands. Smithsonian Contributions to Zoology* 365:1-59). Hunting, the alteration of the original landscape by early Hawaiian agriculture, and the stress of such introduced

predators as pigs and rats proved fatal to the flightless geese and severely restricted the *nene*. The stresses that began with Polynesian man increased greatly with the arrival of Europeans. Kear and Berger describe the rapid decline in *nene* numbers as they competed for food with cattle, goats, and sheep, and were subjected to predation by cats, dogs, mongoose, and man, and other losses due to introduced avian diseases. By 1949 only thirty wild geese remained. Fortunately thirteen additional *nene* were held in captivity, eleven under the care of Mr. Herbert Shipman in Hilo.

Well over half the book deals with the efforts in Hawaii and England to save Hawaii's largest surviving native bird from extinction. It is a fascinating story. Serious attempts to help the species were initiated in 1949 when a small, captive flock was established in new facilities at Pohakuloa, Hawaii, with Mr. Shipman's birds. A "pair" of *nene* was sent to Peter Scott at his Wildfowl Trust in Slimbridge, England, the following year. Unfortunately both birds laid eggs, so a gander was quickly sent to form a ménage à trois which proved highly successful.

The two propagation programs, under Ah Fat Lee at Pohakuloa (who is given scant credit in the book) and Sir Peter Scott at Slimbridge, were ultimately successful in breeding *nene*, although many obstacles (inbreeding, diet, disease) had to be overcome. But captive breeding is not in itself the salvation of a species; it must be reintroduced into its former wild haunts. Captively-reared *nene* from Pohakuloa were first released in 1960. By 1978, 1,761 *nene*, including birds flown to Hawaii from England, had been released in Haleakala National Park, Maui, and in Hawaii Volcanoes National Park and specially created *nene* reserves elsewhere on the Big Island. Birds again bred in the wild on both islands.

*The Hawaiian Goose* concludes by asking some valid questions. What role does captive propagation play in protecting endangered species? Has the *nene* program, involving so many agencies (Hawaii Division of Fish and Game, U.S. Fish and Wildlife Service, U.S. National Park Service, the Wildfowl Trust, and others) and people, been successful? Although the book lucidly demonstrates that captive propagation has a valuable role to play in aiding threatened species, especially when a last ditch effort is required, it is unable to answer the second question. Ultimate success is only achieved when wild populations can sustain themselves. When the book was written, no one knew how well the released birds were doing; Kear and Berger asked for field studies. Recent research suggests that wild *nene* are not maintaining themselves, and that, in addition to ongoing captive breeding, they will require increased management efforts in their wild haunts if they are to survive.

The book thus ends before the outcome of its subject could be known. Even so, I recommend it to anyone interested in the conservation of endangered species, especially those on islands.

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