

GLOBAL RE-INTRODUCTION PERSPECTIVES

Re-introduction case-studies from around the globe



**Edited by
Pritpal S. Soorae**



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Cover photo: Clockwise starting from top-left:

- Formosan salmon stream, Taiwan
- Students in Madagascar with tree seedlings
- Virgin Islands boa

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Re-introduction of the nēnē, a remote island goose, Hawai`i, USA

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Introduction

The nēnē or Hawaiian goose (*Branta sandvicensis*) is endemic to Hawai`i and listed as endangered by the Federal government and the State of Hawai`i. It is classified vulnerable on the IUCN Red List 2002 and listed in Appendix I of CITES (UNEP-WCMC database 2002). Nēnē are the sole surviving species of a diverse assemblage of mostly flightless geese that evolved from a single resident population of Canada geese (Banko *et al.*, 1999 & Paxinos *et al.*, 2002). Subfossil remains of nēnē have been found on most of the main Hawaiian islands, although historically, nēnē were documented only on Hawai`i Island (Olson and James, 1991 & USFWS, 2004). Nēnē were reduced to a single known wild population of some 30 individuals by 1995. To date, nēnē re-introductions have occurred on Hawai`i (1960 to present), Maui (1962 to present), Kaua`i (1985 and 1991 - 2000), and Moloka`i (2001 - 2004). The first re-introductions of nēnē in Hawai`i were the result of breeding efforts of Sir Peter Scott at the Severn Wildlife Trust, Slimbridge, England (now the Wildfowl and Wetlands Trust), the Territory of

Hawai`i, and Mr. Herbert C. Shipman, Kea`au, Hawai`i (Banko *et al.*, 1999). Smaller scale captive -breeding efforts are currently maintained by the Zoological Society of San Diego.



Nēnē or Hawai`ian goose (*Branta sandvicensis*) © National Park Service

Goals

- Goal 1: Re-establish and manage a meta-population consisting of island and district populations.
- Goal 2: Promote natural movements to connect populations.
- Goal 3: Re-introduce nēnē to

lowland breeding habitat.

Success Indicators

- Indicator 1: Stable or increasing populations on more than one island.
- Indicator 2: Seasonal movement and natural genetic exchange between at least some populations.
- Indicator 3: Breeding in lowland habitats.

Project Summary

Feasibility: Nēnē inhabit wetlands and coastal areas but they are the most terrestrial of geese and are strongly associated with open-country shrub-lands and grasslands and sparsely-vegetated lava fields. There is little information on habitat conditions before human contact (1,000 years ago), although lowland areas were quickly transformed by humans and introduced rats, whereas sub-alpine and alpine areas were least affected. Pollen analyses indicate the loss of many native shrubs and trees from lowland areas. Historically (since 1778), introduced ungulates altered habitats to varying degrees on all islands, and lowland habitats were heavily invaded by alien plants. Early naturalists noted that nēnē nested mainly in remote lowland areas during fall and winter then moved to upland shrub-grasslands with fledglings. Nēnē are generalists in feeding habits and habitat use; thus, they are attracted to highly modified habitats, such as golf courses, pastures, and roadsides. Grasses, fruits, and other plant foods comprise the diets of goslings and adults. The reproductive strategy of the nēnē is typical of arctic-nesting geese, but nēnē nest mainly in fall and winter when day lengths are short. Females fatten significantly before laying and fast during incubation, although they feed more often than other species and lose less weight. Nevertheless, access to lush grass and other vegetation critically affects nesting success. Eggs are relatively large, clutches are smaller than congeners, and incubation is long (30 days). Goslings develop slowly, and nēnē are most vulnerable to mongooses and other introduced predators during the nesting season. Although parents defend against predators, females often nap during incubation, increasing their vulnerability to surprise attack.

Once hunted, nēnē now are fully protected under the ESA and state laws. As the Hawai'i State Bird, nēnē are widely appreciated by the public, although some poaching occurs. On Kaua'i, although it is not a major problem at this point, some farmers do consider them a pest as they eat their corn and sometimes their lettuce plants. Despite sometimes raiding gardens, nēnē are not considered agricultural pests on Hawai'i or Maui Islands. They do, however, present strike hazards near



Fitting a leg band © National Park Service

airports. Private landowners sometimes agree to Safe Harbor agreements with state and federal authorities that allow certain levels of take in exchange for rights to pursue economically value land use practices that will also show a net benefit to nēnē.

Implementation: Nēnē are relatively docile and easy to transport and maintain in captivity. Survival of captive-reared and released individuals is influenced by climatic conditions (particularly in drought years), age at release, and method of release. To date, releases of captive-bred birds have not lead to a self-sustaining wild population (Black *et al.*, 1997). Prolonged droughts cause nēnē to disperse widely in search of food and appears to lead to an increase in adult mortality. A small scale translocation project was recently initiated on Hawai'i Island to encourage strategic movements away from drought-affected areas to wetter or specially managed areas. Preliminary results suggest that birds can be moved to new locations in order to establish new movement patterns. Inter-island translocations are problematic because nēnē may carry different strains of malarial parasites (*Plasmodium relictum*) from one island to another. Risks of transporting diseases can be minimized by monitoring blood parasites during a short quarantine period.

Post-Release Monitoring: Monitoring remote or scattered populations is difficult, but the social nature of nēnē generally makes it possible to count birds in accessible flocking areas. Finding people who can regularly survey populations is a serious challenge to monitoring programs. A statewide network of volunteers has not been established for this purpose; however, some agencies routinely monitor numbers and reproductive activity. Annual summaries of nēnē surveys have been informally undertaken by the Nēnē Action Working Group, which is planning to regularly publish results. Banding has been a priority in some areas to aid in annual surveys, and there are plans to increase banding efforts in all areas. In addition, the Nēnē Action Working Group hopes to increase consistency in monitoring between islands. A new study will investigate movement patterns and habitat use of nēnē on Hawai'i Island using satellite radio telemetry, which will improve survey protocols.

Major difficulties faced

- Losses of eggs, goslings, and adults to introduced predators.
- Human-caused losses of birds such as traffic collisions, wind towers, and golf balls.
- Attraction of birds to grassy areas near airports, roadsides, and other areas of high human activity.
- Loss of birds due to deterioration of habitat and climactic extremes, such as drought and excessive rain.
- Complacency in managing habitat, controlling predators, and monitoring populations due to the expediency of releasing supplemental birds through captive propagation.
- Lack of a genetic management strategy for re-introduction and translocation and possible effects of inbreeding depression.

- Inconsistent monitoring efforts and data collection methods makes the compilation and interpretation of information from different sources difficult.

Major lessons learned

- Reducing losses to predators is expensive but critical; preventing mongoose establishment on Kaua`i is extremely important.
- Nēnē are difficult to exclude from hazardous areas (e.g., roadsides) and not always easy to attract to managed areas.
- A variety of areas must be available for populations to use, and birds must become acquainted with alternative sites when conditions in their primary range deteriorate.
- Alternative strategies (e.g., irrigation, supplemental feed, stringent predator control) are necessary in some areas to minimize egg loss and gosling mortality during the breeding period and adult mortality during droughts.

Success of project

Highly Successful	Successful	Partially Successful	Failure
	√		

Reasons for success/failure:

- Nēnē have expanded their range and are found on islands where they were rare or absent historically; however, they are absent from or not nesting in many lowland areas where they were once found.
- Some populations are increasing even without stringent predator control; however, most populations would decline without occasional releases of birds.
- Sufficient information about nēnē ecology is known to recover the species; however, nēnē management is given low priority due to competition with many other compelling conservation problems in Hawai`i .

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