Northwestern Hawaiian Islands Passerines

Photo: Sheila Conant, USFWS

Nihoa Millerbird

Acrocephalus familiaris

SPECIES STATUS:
Federally listed as Endangered
State listed as Endangered
State recognized as Endemic
NatureServe Heritage Rank G1—Critically imperiled
IUCN Red List Ranking—Critically endangered
Northwestern Hawaiian Islands Passerines Recovery Plan —USFWS 1984

SPECIES INFORMATION: The Nihoa millerbird is an obligate insectivore endemic to Nihoa Island in the Northwestern Hawaiian Islands. The Nihoa millerbird and its congener, the Laysan millerbird, are the only known Old World warblers (subfamily Sylviinae) known to have colonized the Hawaiian Archipelago. The Laysan subspecies, discovered first, was named "millerbird" because of its fondness for feeding on large miller moths (Family Noctuidae). Although the Laysan subspecies was driven to extinction by 1923 after European rabbits (*Oryctolagus cuniculus*) were introduced to Laysan in 1903, the Nihoa millerbird has persisted. Nihoa millerbirds are small (about 13 centimeters, or about five inches, in length), drably colored, and highly active due to their insectivorous habits. Male and female Nihoa millerbirds have similar plumage, but differ in size, with males being slightly larger than females. Nihoa millerbirds feed exclusively on insects and larvae, especially moths and caterpillars (Lepidoptera), gleaned from shrubs and bunchgrass tussocks. Like most insectivores, Nihoa millerbirds are territorial, and display a high degree of year-to-year territory fidelity. During breeding season, both sexes construct nests and incubate eggs.

DISTRIBUTION: Nihoa millerbirds are restricted to the approximately 63 hectares (156 acres) area of Nihoa Island. Of those 63 hectares, approximately 40 hectares (100 acres) are considered suitable habitat for millerbird territories. With a mean territory size estimated at 0.2 - 0.4 hectares (0.5-1 acres), Nihoa Island can support, on average, between 100 and 200 millerbird territories.

ABUNDANCE: The U.S. Fish and Wildlife Service has conducted transect surveys at Nihoa Island during most years since 1967. Based on these surveys, the average population size over that time period has been estimated as 386 ± 218 (SD) birds. The high degree of uncertainty (wide confidence intervals) associated with the estimates indicate that millerbirds maintain a clumpy, irregular spatial distribution. The 1996 population size estimate was 155, within the typical range of variation observed since the 1960s. Density estimates have averaged ten birds per hectare (25 per acre).

LOCATION AND CONDITION OF KEY HABITAT: Nihoa millerbirds reside year-round on the steep-sided, rocky, and shrub-covered island of Nihoa. Maximum elevation is 277 meters (839 feet), with steep cliffs on three of the island's four sides. Nihoa's vegetation community

comprises about 25 species of plants; the four most abundant are (in descending order of abundance): the shrub *Chenopodium oahuense*, the shrub *Solanum nelsonii*, the shrub *Sida fallax*, and the bunchgrass *Eragrostic variabilis*. Millerbirds are found throughout the island's 32 to 40 hectares (80 to 100 acres) of optimal habitat, and in suboptimal habitat as well. Millerbirds have not been observed to congregate at, or drink from, Nihoa's five to seven small freshwater seeps. The entire range of this species occurs within the Hawaiian Islands National Wildlife Refuge.

THREATS: Limiting factors for Nihoa millerbirds are primarily weather (i.e., drought and storms), variations in food supply (typically due to weather), and availability of appropriate nest sites. Nihoa finches have been observed breaking and eating millerbird eggs, but the incremental mortality attributable to this behavior has not been estimated. Additional threats include:

- Invasive alien plants. Habitat quality could be degraded by weed invasions. The millerbird diet of mature and larval insects depends on the abundance of native plant populations, which could be adversely affected by competition with invasive alien plants such as *Miconia calvescens* or *Clidemia hirta*.
- Invasive alien arthropods. Preferred food insects could be suppressed by competition with, or predation by, introduced arthropods, which might not be attractive or palatable to millerbirds.
- Arthropod irruptions. Nihoa is currently experiencing an irruption of a native grasshopper, reducing island plant cover to unusually low levels. Although this sort of fluctuation could be natural, irruptions of non-prey species could lead to declines in population levels of preferred prey species. When irruptions occur among prey species, even though millerbirds are obligate insectivores, a transient excess of prey could cause a boom in the millerbird population which would subsequently prove unsustainable.
- Population size. Small populations are plagued by a variety of potentially irreversible problems that fall into three categories: demographic, stochastic, and genetic; the former are usually most problematic. Demographic factors include skewed sex ratios and stochastic factors include natural disasters. Habitat fragmentation exacerbates demographic and genetic problems.
- Introduced mammals. The risk of rat (*Rattus* spp.) introduction via transport (i.e., ships, planes) is of concern as rats are known to have decimated passerine populations in the NWHI in the past as a result of shipwrecks.

CONSERVATION ACTIONS: Nihoa millerbird persistence requires that the integrity of the island's small, remote ecosystems be maintained. This requires excluding and removing any introduced non-native plants, insects, passerine birds, avian disease, and mammalian and reptilian land animals. Quarantine measures and visitation restrictions in place for researchers appear to be controlling the rate of new introductions, but species that do become established may be extremely difficult to eradicate. Thus, rigorous statewide reduction or elimination of non-native invertebrates and plants introductions through stricter quarantine and reduction of ship groundings are necessary. In addition to these efforts, future management specific to the recovery of Nihoa millerbirds may include the following:

- Aggressive weed control and native plant restoration to stabilize habitat quality.
- Monitoring and, when warranted, aggressive control of unstable arthropod populations.
- Prevent the introduction of rats and other possible predators.

MONITORING: Continue current program of transect counts and habitat monitoring. This information is needed to assess population trends and the efficacy of habitat management.

RESEARCH PRIORITIES: More research is needed on best quarantine techniques, best methods for early detection of alien species, and best eradication methods. Current knowledge suggests that Nihoa millerbird reproduction may be driven by variable external environmental factors, such as rainfall, but knowledge of breeding behavior and demographics is limited. The millerbird population is small, and the extirpation of the Laysan subspecies suggests an urgent need to establish another population. If Nihoa millerbirds were translocated to another site such as Laysan Island, the small size of the Nihoa population would require that the removal of millerbirds from Nihoa not jeopardize the source population. Thus translocation should be attempted only during high-population years. Research priorities specific to Nihoa millerbirds include the following:

- Additional demographic studies to further refine estimates of population structure, dispersal, survivorship, nesting phenology and success, and other life history and behavioral characteristics.
- Further study of translocation techniques and habitat restoration on target islands. Keeping insectivorous passerines alive for translocation is extremely difficult, but known techniques could be refined using non-endangered closely related species. Native plant and arthropod communities on Laysan would need to be substantially improved before attempting Nihoa millerbird translocation.

References:

Morin M, Conant S. 2002. Laysan millerbird (*Acrocephalus familiaris familiaris*) and Nihoa millerbird (*Acrocephalus familiaris kingi*). *In* The Birds of North America, No. 302 (Poole A, Gill F, editors.). Philadelphia, (PA): The Academy of Natural Sciences; and Washington DC: the American Ornithologists' Union.

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