



Photo: Jack Jeffery

## Raptors

### 'Io

*Buteo solitarius*

#### SPECIES STATUS:

Federally listed as Endangered

State listed as Endangered

State recognized as Endemic

NatureServe Heritage Rank G2 – Imperiled

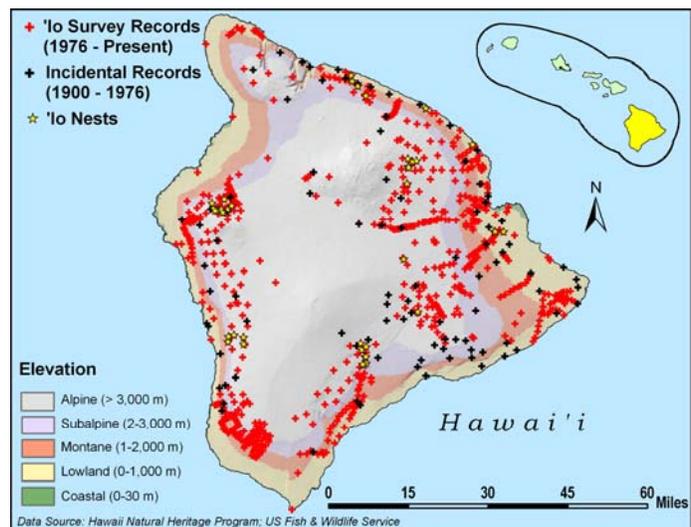
IUCN Red List Ranking – Near Threatened

Hawaiian Hawk Recovery Plan - USFWS 1984

**SPECIES INFORMATION:** The 'io, or Hawaiian hawk, is the only broad-winged hawk (Family: Accipitridae) known to have colonized Hawai'i. 'Io are considered 'aumākua, or family gods by Native Hawaiians. Similar to many birds of prey, females are larger than males, and often weigh approximately 25 percent more than males. Also similar to many *Buteos*, two color morphs, light and dark, occur in 'io populations. Prior to the arrival of Polynesians, 'io may have exclusively preyed on birds, including now extinct flightless ibis (Family: Threskiornithidae) and rails (Family: Ralliade). Its diet now includes non-native insects, birds and rodents, as well as native insects and birds. 'Io are socially monogamous and limited data indicates individuals form long-term pair-bonds and defend territories year-round. Nest construction is protracted, beginning up to two months before the first egg is laid, and continuing into the nestling period. Both sexes contribute to nest-building. Based on recent studies, clutch size is nearly always one, although historically clutches of two and three were reported. Both sexes incubate, although females perform most of the brooding of nestlings; males provide most of the food to chicks and female. Both adults feed fledglings, which are dependent on adults for up nine months.

**DISTRIBUTION:** 'Io occur on the island of Hawai'i from sea level to 1,700 meters (5,600 feet) elevation. Historic range appears similar to current distribution. Fossil evidence indicates the species historically occurred on Kaua'i, Moloka'i, and O'ahu.

**ABUNDANCE:** Based on an island-wide survey in 1993, the 'io population was estimated at 1,600 birds. Based on a survey conducted in 1998, the population was estimated at 1,223 birds. Trends are difficult to determine because of varying census methodology, but the population appears stable.



**LOCATION AND CONDITION OF KEY HABITAT:** ‘Io occur in lowland non-native forests, urban areas, agricultural lands, pasturelands, and high elevation native forests with both intact and degraded understory. Although ‘io nests have been located in a number of non-native trees, including eucalyptus (*Eucalyptus* spp.), ironwood (*Casuarina equisetifolia*), mango (*Mangifera indica*), coconut palm (*Cocos nucifera*), and macadamia (*Macadamia integrifolia*), of 51 nests, 86 percent occurred in native trees, with 80 percent being in ‘ōhi‘a (*Metrosideros polymorpha*). During the winter, ‘io have been reported in subalpine māmane-naio forest (*Sophora chrysophylla* - *Myoporum sandwicense*), suggesting some seasonal movements. Because of the species’ use of a wide variety of habitats and a lack of historical population data, key habitat variables are difficult to determine.

**THREATS:** ‘Io are likely susceptible to the same factors that threaten other native Hawaiian birds, including: loss and degradation of habitat, predation by introduced mammals, and disease. For ‘io populations, the following are of particular concern:

- Shooting, trapping and harassment. Harassment of nesting birds and shooting of adults may be the most significant threat to ‘io, although the level of harassment and shooting is difficult to assess.
- Contaminants or toxins. Although little recent evidence exists, the presence of organophosphates was noted in a bird recovered from a macadamia orchard. Although it is believed that secondary poisoning resulting from the consumption of rats poisoned with diphacinone poses little threat, however, further study is necessary.
- Disease. Early naturalists observed ‘io with pox-like lesions. Currently, disease does not appear to threaten the species and because their range includes low-elevation habitats, ‘io may be immune to avian malaria (*Plasmodium relictum*) and avian pox (*Poxvirus avium*).

**CONSERVATION ACTIONS:** ‘Io likely have benefited from management activities designed to conserve other endangered birds on the island of Hawai‘i including fencing, ungulate and small mammal control, forest restoration, and habitat monitoring. In addition to these efforts, future actions specific to the protection of ‘io populations may include the following:

- Protection and management of foraging and nesting habitat, including native and non-native forests.
- Enforcement of laws prohibiting the harassment, shooting, or trapping of the species.

**MONITORING:** Regular island-wide population surveys are necessary to determine population trends for this species. This information is needed to assess the efficacy of habitat management efforts.

**RESEARCH PRIORITIES:** Currently, a study is underway to determine variation in reproductive success across a variety of habitats. Additional research priorities specific to ‘io include the following:

- Quantify the habitat characteristics of occupied versus unoccupied areas, and assess the effects of changes in vegetation coverage on the distribution of the ‘io.
- Quantify the mortality related to nest disturbance, poaching, and secondary poisoning.
- Evaluate the effects of pesticides on ‘io.
- Conduct life history studies to quantify the population structure, dispersal patterns, survivorship, and nesting phenology and success.

**References:**

- Clarkson KE, Laniawe LP. 2000. Hawaiian hawk (*Buteo solitarius*). In *The Birds of North America*, No. 523 (Poole A, Gill F, editors). Philadelphia, (PA): The Academy of Natural Sciences; and Washington DC: The American Ornithologists' Union.
- Hawai'i Natural Heritage Program [Hawai'i Biodiversity and Mapping Program]. 2004. Natural diversity database. University of Hawai'i, Center for Conservation Research and Training. Honolulu, HI.
- Klavitter JL. 2000. Survey methodology, abundance, and demography of the endangered Hawaiian hawk: is delisting warranted? MS Thesis, Seattle: University of Washington.
- NatureServe. 2003. Downloadable animal data sets. NatureServe Central Databases. Available at: <http://www.natureserve.org/getData/vertinvertdata.jsp> (August 10, 2005).
- Scott JM, Mountainspring S, Ramsey FL, Kepler CB. 1986. Forest bird communities of the Hawaiian islands: their dynamics, ecology and conservation. Lawrence, (KS): Cooper Ornithological Society.