



E Ho'omana'ō Mau I Nā Manu Nahele O Hawai'i – Always Remember The Forest Birds Of Hawai'i

This poster is dedicated to Ka'ō'ōmauloa Barboza and all of Hawai'i's children, who deserve a forest full of birds!

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The art on this poster was created by Caren Loebel-Fried, an award-winning artist and author who carved a block, pulled a print from it, and colored it by hand. The teacher's guide on the back of this poster was written by Dr. Sheila Conant, a leading ornithologist in Hawai'i. The poster was designed by Helga Jervis of Helgaraphics and printed by Valenti Print Group in Honolulu.

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Ho'olau kanaka i ka leo o nā manu.

Life is made happy by the voices of many birds.

Indeed, when the first people came to Hawai'i, the islands supported more than 130 different kinds of native seabirds, waterbirds, and forest birds. Most of these birds were found nowhere else in the world. But over time, more than half of our native birds have gone extinct due to loss of habitat, disease, and predation by introduced mammals.

The best-known and most diverse group of Hawaiian birds is the forest birds of which there are several families. All of Hawai'i's forest birds are endemic, found only in the Hawaiian Islands.

Native Hawaiian Forest Bird Families

Family	Description	Representative Species	Status
Corvidae	Crows and Ravens	'Alalā	At least 3 species; 'Alalā still exists; 2 are extinct
Mohoidae	Hawaiian Honeyeaters	'Ō'ō, Mamo, Kioea	At least 6 species; all are extinct
Turdidae	Hawaiian Thrushes	'Ōma'ō, Puaiohi, Kāma'ō	6 species; 'Ōma'ō and Puaiohi still exist; 4 are extinct
Monarchidae	Old World Flycatchers	'Elepaio	3 species; all still exist
Fringillidae, Subfamily Drepanidinae	Hawaiian Honeycreepers	'I'iwi, 'Apapane, 'Ākohekohe, 'Amakihi, 'Akiapōlā'au, 'Akialoa, Palila	At least 58 species; 17 species still exist; 41 are extinct
Accipitridae	Hawks, Eagles, and Allies	'Io	3 species; 'Io still exist; 2 are extinct (an eagle and a small hawk)
Strigidae	Owls	Pueo	5 species; Pueo still exists; 4 are extinct
Anatidae	Geese and Ducks	Moa Nalo	7 forest species; most were flightless; all are extinct (does not include Nēnē, Koloa, and Laysan Duck, which still exist and are not forest birds)
Plataleidae	Ibises	Moloka'i Flightless Ibis	3 species; all are extinct
Rallidae	Crakes and Rails	Laysan Rail	At least a dozen forest species; all are extinct

Meet the Honeycreepers

The Hawaiian Honeycreepers, a group that includes at least 58 species, is considered by most biologists to be the most spectacular example of adaptive radiation in birds. Adaptive radiation is the evolution of many different species from a single ancestral colonizing species. The evolution of the different species is driven by adaptation to environmental factors, in the case of the Honeycreepers, primarily food sources. The Honeycreepers exhibit a spectacular array of plumage colors and bill shapes, and each species feeds on a specific combination of foods, including nectar and pollen from flowers, fruits and seeds, and invertebrates such as spiders and caterpillars. The honeycreeper ancestral species was probably a migratory finch related to the introduced House Finch.

Flightless Birds

Hawai'i also had many species of flightless birds, including geese, ducks, cranes, rails, and ibises. Some of these birds are referred to as "fossil" birds, but are technically "subfossils" because their bones have not yet turned to stone. "Fossil" birds in Hawai'i are all known from ancient bones found in lava tubes, sinkholes, sand dunes, and high-altitude scrubland sites.

Hawai'i's flightless birds were largely forest dwellers. The larger species (geese and ducks) were probably grazers and browsers. For example, the extinct Moa Nalo – large, goose like-ducks – ate ferns and other native plants. The smaller species (cranes, rails, and ibises) probably fed mostly on invertebrates taken on the forest floor. All of the flightless birds were probably eaten by the early Hawaiians, and also by the pigs and dogs they kept for food.

Birds of Prey

Along with the Pueo (Hawaiian Short-Eared Owl) and 'Io (Hawaiian Hawk), Hawai'i had at least six additional birds of prey: four owls, an eagle, and a second small hawk, which are now extinct. The extinct owls were "stilt" owls, so called because they had long legs and strong feet and claws for catching and holding bird prey. All of these birds ate other birds, including forest birds. Other than the Pueo and 'Io, these birds of prey are known only as "fossil" birds and may have gone extinct when their sources of food, such as flightless birds, went extinct.

Feathered Splendor

Hawaiian forest birds were celebrated in Hawaiian culture and utilized for many purposes. Specialists called *kia manu* (bird catchers) used a variety of methods to capture the birds. These methods included smearing a sticky substance – such as breadfruit sap or sap from the fruit of

the pāpala kēpau – on branches of trees near nectar-rich flowers. The *kia manu* may have imitated their calls to attract the birds to the sticky branch, and then waited for birds to land and become stuck.

Bird feathers (*hulu*) were used to make 'ahu 'ula (capets and cloaks), *mahiolo* (feather helmets), *kāhili* (feather standards for royalty), and *lei* (garlands worn around the neck or head). The unparalleled beauty of Hawaiian feather artifacts shows how important forest birds were in Hawaiian culture. Most of the brilliant red feathers we see in these artifacts came from the 'I'iwi. The Mamo provided some yellow feathers, but the Hawai'i Island 'Ō'ō was the most important source of yellow feathers. In addition, its black and white tail feathers and wing feathers were used in the construction of *kāhili*.

Other forest birds, such as the 'Alalā (Hawaiian Crow), Pueo, and 'Io, were 'aumākua (guardian spirits) to Hawaiian families.

Silent Forests

As on many oceanic islands, when humans settled in the Hawaiian Islands, they changed the environment to make it suitable for human occupation. Habitat for native plants and animals was lost.

Many species of large flightless geese and ducks, as well as several seabird species, were an important source of protein (other than seafood) for the early Hawaiians. The bones of these birds have been found in cooking pits and middens (mounds or deposits containing shells, animal bones, and other refuse that indicates a site of a human settlement). It is quite possible that the flightless birds were driven to extinction by hunting, as has been the case with flightless birds on many other islands in the world.

Every civilization also brings useful plants and animals with it when colonizing a new area. The Hawaiian settlers from other Polynesian islands brought kalo (taro), 'ulu (breadfruit), chickens, pigs, dogs, and the Polynesian rat. Although most plants used in agriculture do not become invasive, many animals do, and today we see feral chickens and feral pigs in great numbers.

Species and habitat loss continues to this day, and modern technology has accelerated the process tremendously. People arriving from continents also brought plants and animals to Hawai'i – lots of them! Many introduced organisms have become invasive, including strawberry guava, miconia, fountain grass, mongooses, and two additional species of rats. The rats and mice that arrived from the continents eat native Hawaiian plants, birds, and eggs. Feral cats are predators of virtually all species of native Hawaiian birds. Feral dogs and unleashed pets are capable of killing an entire colony of ground-nesting birds.

After World War II, hunting and fishing became popular in the United States, and Hawai'i was no exception.

Unfortunately, many species of hoofed animals, including axis deer, black-tailed deer, and mouflon sheep, were introduced to Hawai'i for hunting. Along with the sheep, goats, and cattle (brought by early European explorers) and pigs (brought by Polynesians and Europeans) that now live in native forests, the animals introduced for hunting roam free in great numbers, destroying forests and driving native plants, birds, and invertebrates to extinction.

Perhaps the most serious threat to Hawaiian forest birds is introduced diseases, namely avian pox and avian malaria. Since the mosquito vector for these diseases was introduced in the late 1800s (probably from a water barrel on a whaling ship), disease has played an enormous role in forest bird extinctions from the late 1800s up to the present. Avian pox probably came with the first chickens. It causes tumor-like lesions on the legs, feet, bills, and around the eyes of Hawaiian forest birds, impairing the birds' ability to forage, eat, and ultimately survive.

We don't know when avian malaria arrived. It is deadly to most Hawaiian forest birds. Infected birds become anemic and lethargic, and die of low blood-oxygen levels. One or two native bird species may be developing tolerance or resistance to these diseases, but many are not. As sea surface and air temperatures rise, the distribution of mosquitoes, currently limited by temperature, will spread to higher elevations, bringing disease to the last refuge of our rarest and most endangered forest birds.

Shocking Statistics

- ✦ At least 106 species of native Hawaiian forest birds are known to science. Several of them are known only from "fossil" bones left behind in lava tubes, sinkholes, sand dunes, and high-altitude scrublands.
- ✦ At least 81 species of native Hawaiian forest birds are probably extinct.
- ✦ 20 species of native Hawaiian forest birds are listed as endangered species. Some of these birds are probably extinct.
- ✦ Even though the Hawaiian Islands make up less than 0.2 percent of the total land mass in the United States, endangered Hawaiian forest birds represent 20 percent (one-fifth) of nation's listed endangered and threatened birds.

Ka Manu 'Ō'ō

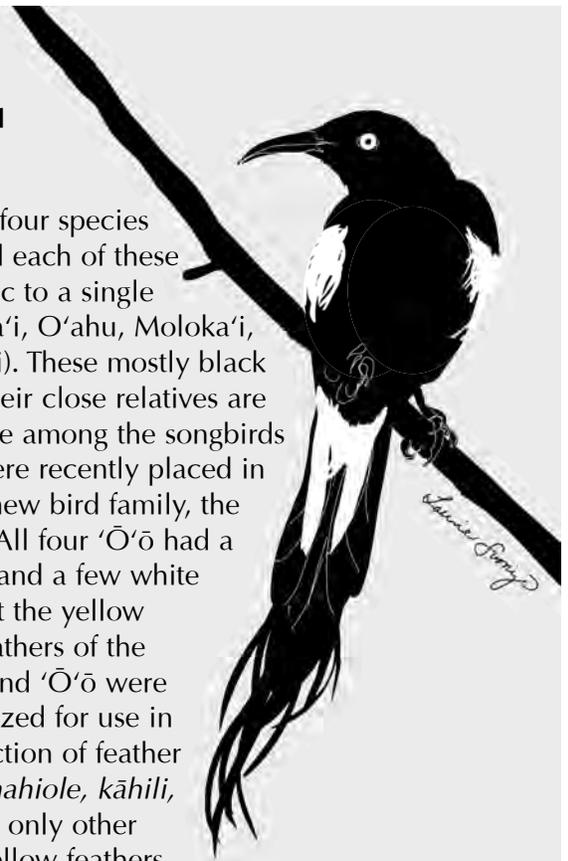
There were four species of 'Ō'ō, and each of these was endemic to a single island (Kaua'i, O'ahu, Moloka'i, and Hawai'i). These mostly black birds and their close relatives are so distinctive among the songbirds that they were recently placed in their own, new bird family, the Mohoidae. All four 'Ō'ō had a few yellow and a few white feathers, but the yellow shoulder feathers of the Hawai'i Island 'Ō'ō were the most prized for use in the construction of feather 'ahu 'ula, mahiole, kähili, and lei. The only other source of yellow feathers was the Mamo, a Honeyeater endemic to the Big Island, but the Mamo's feathers were not used nearly as much as those of the 'Ō'ō.

'Ō'ō were also known for their hauntingly beautiful, song. No other Hawaiian forest bird that we know of had such a loud, melodious and complex song. The male and female of a mated pair would often sing duets.

'Ō'ō went extinct in historical and more recent times due to a combination of factors, including loss of habitat, disease, and predation, probably by rats who likely took eggs and chicks from the tree cavities in which 'Ō'ō nested. We do not know what role the collection of bird feathers may have played in the decline of the 'Ō'ō. The last species of 'Ō'ō to go extinct was the Kaua'i 'Ō'ō (also known as the 'Ō'ō 'Ā'ā). It was last detected in the Alaka'i on Kaua'i in the 1980s. Its relatives – the O'ahu, Moloka'i, and Hawai'i 'Ō'ō – went extinct in the late 1800s or first decades of the 1900s.

Ho'ola'i nā manu i ke aheahe. The birds poise quietly in the gentle breeze.

Said of those who are at peace with the world, undisturbed and contented.



What Can You Do To Help Hawaiian Forest Birds?

- ✿ Learn more about them, and teach others.
- ✿ Incorporate information about Hawaiian forest birds in your lesson plans, arts and crafts projects, and performing arts.
- ✿ Hold a bird festival at your school or in your community.
- ✿ Go on a bird-watching hike.
- ✿ Participate in a service trip and help protect our forests by removing weeds and planting native trees.
- ✿ Clean your boots and gear after hiking to prevent the spread of weeds and other harmful hitchhikers.
- ✿ Join a Hawaiian wildlife organization and volunteer.
- ✿ Never release unwanted cats, dogs, birds, or other animals into the wild, and keep your pet cats indoors.
- ✿ Do your part to slow global warming by reducing your use of fossil fuels.
- ✿ Help prevent the spread of mosquitoes and avian diseases by not leaving standing water on your land.
- ✿ Write a letter to the editor of your newspaper, and ask your elected officials to increase funding for native species conservation and habitat protection.

Poster Artwork

The art on this poster was created by Caren Loebel-Fried, who carved a block, pulled a print from it, and colored it by hand. The art was made for *Ka Manu 'Ō'ō*, a storybook about a young boy named Manu who meets an 'Ō'ō bird in a dream. The beautiful bird teaches Manu about her family of birds, where they lived, what they ate, and how Hawaiian people in the old days used their feathers. Manu discovers that the O'ahu 'Ō'ō once lived close to him and how the arrival of humans changed the land. The 'Ō'ō with her melodious voice, tells Manu how people can protect the environment and prevent more plants and animals from being lost forever. When Manu wakes up, he is sad about the loss of his friend the 'Ō'ō bird, but he remembers all that his friend taught him. With the knowledge he gained in his dream, Manu will teach his family and friends about conserving our native Hawaiian species and their habitats.

Ka Manu 'Ō'ō will be published soon.

For More Information

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CDs and DVDs

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- "Listen to the Forest" by Eddie and Myrna Kamae. 2010.
- "Voices of Hawaii's Birds" by Hawai'i Audubon Society. 2009.



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