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For information about the
National Wildlife Refuge System
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Hakalau Forest

National Wildlife Refuge

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'Iwi in native mint

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Bright flashes of red, yellow and orange forest birds flit through heavy mists, pausing to sip nectar from an 'ohi'a lehua or pry a succulent caterpillar from a branch.

Welcome to Hakalau Forest National Wildlife Refuge, the land of many perches...

Common 'amakihi male in akala

Welcome

Welcome to the home of the *Hawai'i* 'akepa, 'akiapola'au, 'i'iwi and 'elepaio . . . small, colorful and unique forest birds with magical names and songs. Once common enough to be used for food, lei and feather capes of Hawai'i's royalty, these birds struggle to survive in today's world.

Hakalau Forest National Wildlife Refuge, with 38,030 acres divided into two units on the island of Hawai'i, was created in 1985 to protect endangered forest birds and their rainforest habitat. Located on the windward slope of Mauna Kea and the leeward slope of Mauna Loa, the refuge supports a diversity of native birds and plants equalled only by one or two other areas in Hawai'i.



This blue goose, designed by J.N. "Ding" Darling, has become the symbol of the National Wildlife Refuge System.



Providing Essential Habitat

Hakalau Forest Refuge contains some of the finest remaining stands of native montane rain forest in Hawai'i. The slopes below 4,000 feet receive very high rainfall – over 250 inches annually! Bogs, fern patches and scrubby 'ohi'a forest dominate these stands which are dissected by numerous deep gulches.

Closed-canopy Forest



Rainfall decreases to about 150 inches at elevations above 4,500 feet, where majestic *koa* and red-blossomed 'ohi'a trees form a closed-canopy forest. A wide variety of common trees, shrubs and ferns occur here.

Non-native Grassland

Further upslope, above 6,000 feet, rainfall decreases to less than 100 inches annually. The native 'ohi'a/koa forest merges with non-native grasslands, once forested with giant majestic *koa*, but decimated by 200 years of cattle grazing, logging and fires. Alien grasses were introduced as forage for cattle and are now the dominant vegetation.

Montane Rainforest



Sunlit clearing within Hakalau Forest
USFWS/Richard C. Wass

Protecting Endangered Species

Hawai'i's unique native species evolved from a few individuals that found their way across thousands of miles of ocean by chance. They evolved without hooved grazers and no mammalian predators. With the arrival of humans and the introduction of thousands of new species, Hawai'i's native plants and animals suffered great losses.

Within Hakalau Forest National Wildlife Refuge, nine of fifteen native bird species are listed as endangered. Sadly, seven species that were part of Hakalau's bird community when Captain James Cook landed on the island in 1778 have become extinct.



Akiala'a
(now extinct)

Light phase 'io



A Haven for Endangered Birds

Four of the six endangered forest birds – the *'akiapola'au*, the *Hawai'i 'akepa*, the Hawai'i creeper and the *'io* – are often seen or heard within the Hakalau Forest Unit. A fifth endangered forest bird, the *'ou*,

may still inhabit the lower elevations, although the bird has not been seen for many years. The Kona Forest Unit hosts the only remaining wild population of *'alala* or Hawaiian crow. Small populations of the *Hawai'i 'akepa*, Hawai'i creeper and *'akiapola'au* can be found there. The *'io* is common.

Hawai'i 'akepa



'Akiapola'au

The rare *'akiapola'au* occurs in only a few areas of upper elevation forest on the Big Island. Skill and luck are required to find this bird anywhere within its range. The *'akiapola'au* feeds on insect larvae living under the bark of trees. Its bill is one of the most unusual in the honeycreeper family. The lower bill is short, straight and stout.

With mouth agape, it is used to chisel (woodpecker style) holes in tree bark. The upper bill is long, curved and slender; an ideal tool to probe, pierce and pull prey from the hole. The male *'akiapola'au* is brilliant yellow with a black mask; the female is dull green with a less distinctive mask and a slightly shorter bill.

Hawai'i 'Akepa

The 'akepa is an insect-eating bird with a short, straight bill. The male is blaze orange and the female is grey-green with tinges of yellow or orange



on the breast. Using its crossed bill to open leaf buds, the 'akepa feeds on insects and spiders found among the leaves and flowers at the very top of 'ohi'a trees. It is the only Hawaiian honeycreeper that always nests in tree cavities. Although endangered, it is regularly observed within the Hakalau Forest Unit.

Hawai'i Creeper

Both male and female Hawai'i creepers are olive green. They are lighter underneath and have a short, straight bill and black mask.



Creepers, often found in family groups or in loose flocks of mixed species, call softly to one another while flitting from tree to tree. Creeping up and down *koa* and 'ohi'a tree trunks and along the underside of larger branches, this bird feeds on insects living under the loose bark. The creeper is relatively common in the upper forested areas of the Hakalau Forest Unit but rare in the Kona Forest Unit.

'Io

The largest endangered forest bird in Hawai'i is the 'io or Hawaiian hawk. It is frequently seen soaring high above the tree canopy in search of birds, large insects, mice and rats. The 'io occurs in two color phases: light-phase birds have a pale breast with dark streaks and a dark back. Dark-phase birds are all dark brown.



While color does not indicate age or sex, younger birds tend to be paler. The female is larger than the male.

The 'io population has increased during recent years. Rarely seen in the 1960s and 1970s, hawks are now frequently observed from the coast to the tree line on

mountain slopes. Many Hawaiian families believe the 'io to be their guardian spirit ('aumakua).



'Alala

The endangered 'alala, or Hawaiian crow, occurs on the forested western slopes of Mauna Loa at mid-elevations within the Kona Forest Unit. It is similar in size and color to the common crow but has a thicker bill. Fruit, nestlings, seeds and insects are its main foods. Very few 'alala still

exist in the wild, but more than 40 birds are within captive propagation centers on the Big Island and Maui. Once threats to their existence have been reduced in their native habitats, offspring of captive birds may be released to the wild.

Other Endangered Birds

The 'ōu, a finch-billed honeycreeper with a yellow head, was last sighted on the Big Island in 1986. This extremely rare bird feeds on forest fruits and aids in the dispersal of native seeds.

The *nene* (Hawaiian goose), the State bird of Hawai'i, was reintroduced to the refuge in 1996 and is frequently seen in the upper elevation pastures where it feeds on grasses, seeds and berries. At least three generations of *nene* have been raised at Hakalau Forest.



Nene

The *koloa* (Hawaiian duck) is often seen on stockponds and wetlands, and 'alae ke'oke'o (Hawaiian coot) are observed occasionally on refuge ponds.



Koloa

Common Native Birds

Two nectar feeding members of the honeycreeper family, the scarlet 'apapane and the orange-red 'i'iwi, abound in the forest canopy where 'ohi'a lehua blossoms are plentiful. The 'i'iwi, with its long, orange bill is easily distinguished from the 'apapane, which has a short, black bill and white feathers under the tail. The 'i'iwi's "squeaky hinge" call can be heard throughout the forest when the birds are present.

'Apapane



'Iiwi

The common 'amakihi is also a honeycreeper. It feeds mostly on insects but frequently takes nectar from flowers. The male is yellow with a black mask and a moderately long, black, curved bill. Female and young 'amakihi are olive green with a paler mask. This species commonly forages within lower to mid levels of the forest canopy.



'Amakihi

The 'elepaio is a small brown and white flycatcher. This curious bird actively flits from tree to tree in the understory, picking insects from the vegetation and catching them in the air. It can be heard calling its own name "ele-pa-yo" in its squeaky "rubber ducky"-like voice.



'Elepaio

The 'oma'o (Hawai'i thrush) is found throughout the forested areas of the Hakalau Forest Unit.

This robin-sized bird has a dark brown back and a light gray breast.

Although common on the refuge, its subdued coloration makes it difficult to spot, but its loud "grrrack" and "whistled trill" calls can be heard for long distances in the forest. The 'oma'o feeds on native fruits and berries.

The *pueo* (Hawaiian short-eared owl) is listed by the State as endangered on Oahu. It is commonly seen during daylight hours soaring over open areas in search of rodents, insects and small birds.

'Oma'o



Pueo

Rare Plants and Mammals

Rare Plants

Twenty-nine rare plant species have been identified on the refuge and adjacent lands. Twelve are currently listed as endangered, including one lobelia species with only two or three plants known to exist in the wild. One species, a mint, *Phyllostegia brevidens*, was thought to be extinct until it was rediscovered on the refuge in 1990.



Lobelia (*Cyanea shipmanii*)



Hawaiian hoary bat

Hawai'i's only native land mammal, the 'opé'apé'a, or Hawaiian hoary bat, also calls Hakalau Forest home. These elusive creatures are nocturnal insectivores. Little is known about their life history or habitat preferences.

Restoring Habitat through Effective Management

The goal of Hakalau Forest NWR management is to promote the recovery of endangered forest birds and their habitat. Current efforts are focused in three areas:

Hawaiian rainforests are lush, beautiful, and vulnerable to nonnative plant and animal disturbances. To improve forest health, grazing by domestic cattle has been eliminated. Management units of 500 to 2,000 acres are fenced to exclude wild cattle and pigs. These animals are removed from the refuge by drives, hunting and trapping.

Alien plants are controlled through use of herbicides, hand grubbing, mechanical removal and prescribed burns. Gorse, a thorny relative of Scotch broom, once covered about 500 acres in the upper reaches of the refuge. After extensive work, this area is almost free of the weed. Control efforts are also directed at Florida blackberry, banana poka and English holly.

Seedlings and cuttings of native trees, shrubs and ferns are propagated on the refuge and planted in former pastures and forest clearings to restore native habitat. Alien plant and animal removal encourages natural regeneration in areas that already support native trees and shrubs.



USFWS



With the help of hundreds of volunteers, more than 250,000 *koa* seedlings have been planted on Hakalau Forest NWR since 1987. Many of these trees are now more than 25 feet tall. In 1997, attention shifted from planting *koa* to other native trees that make up the rainforest community. Since that time, 14,000 *'ohi'a* seedlings and thousands of other natives such as *mamane*, *'olapa*, *'ohelo*, *pilo*, *kolea*, *na'io* and *pukiawe* have been propagated in Hakalau Forest's greenhouse and outplanted on the refuge. Six species of rare and

endangered plants, totaling more than 1,200 seedlings and including the extremely rare *haha*, known from only 2-3 individuals in the wild, have been planted in protected areas.

Monitoring the Health of Native Plant and Animal Populations

The health of native plant and animal populations and their responses to management efforts are routinely monitored. Research is important to determine the best methods for reversing the decline of native plants and animals. Partners such as the University of Hawai'i, the U.S. Geological Survey, the U.S. Forest Service, the State Division of Forestry and Wildlife, The Nature Conservancy of Hawai'i and Keauhou Bird Conservation Center are conducting research and providing valuable information for managing refuge resources.

Improving Forest Health

Restoring the Native Forest



Alien Species

Learning from the Past to Protect the Future

Much of Hawai'i's native lowland habitat was degraded following the Polynesians' arrival over a thousand years ago. In the late 1700's, European explorers brought cattle, goats and European pigs to the islands, and hundreds of additional alien plants, animals and insects were subsequently introduced.



Grazing and Logging

Most lowland plants seen today like the orchid, ginger and plumeria are aliens or nonnative. Mosquitoes, wasps, mongooses, cats and rats are other examples of animal introductions that have had detrimental impacts on Hawaiian habitat and native species.



Grazing and rooting by cattle and pigs has given a competitive edge to alien grasses and shrubs that have replaced native Hawaiian plants within the upper portions of the refuge. Below this pasture area, the native tree canopy is still intact, but invasive weeds such as blackberry, Christmas berry, guava, banana poka and English holly have replaced the native understory. Native habitat loss was accelerated by efforts to create more pasture land through bulldozing and burning, and by logging mature *koa* and *'ohi'a* trees for timber and fence posts.



Diseases

Habitat loss is only one of the factors responsible for diminishing populations of native birds. Diseases carried by alien birds and spread by introduced mosquitoes, competition from alien birds and insects for food and space, and the introduction of predators such as rats, cats and mongooses are also responsible for severe population declines.

PSI/WS

Rainforest

*Photos from top left:
'Apapane with mosquito; banana poka;
cattle on refuge; mongoose*



Hakalau Forest National Wildlife Refuge

- Gravel Road
- - - Dirt Road
- Stream
- Internal Fence
- Refuge Boundary
- Upper Maulua Tract (Public Access)



South 10 miles to Saddle Road

Visiting the Refuge

Maulua Tract

The Maulua Tract of Hakalau Forest National Wildlife Refuge is open to the public on a limited basis for wildlife-dependent activities such as birdwatching, hiking and photography. Permission is required prior to entering Upper Maulua. Contact the refuge office in Hilo for current information on visiting days and opportunities.

The Maulua Tract can be reached from Hilo via the Saddle Road (Highway 200), the Mauna Kea Summit Road and Keanakolu Road. A four-wheel-drive vehicle is required for the 40-mile trip, which takes almost 2 hours each way.

The most recent addition to Hakalau Forest NWR is the former Pua 'Akala Ranch, which includes a koa house built in 1883 by brothers D.H. and E.G. Hitchcock, owners of the Hitchcock and Company Sugar Plantation. Vacationers, surveyors, cattle hunters and other guests



traveled from Hilo by mules and horses to visit this "Planters' Retreat," most often to hunt but also to gather native 'akala and 'ohelo berries. Some of these early visitors kept a log book of their adventures and frequently mentioned their hunting trips and the enjoyable meals of roast beef and pork, potatoes, taro, rice, biscuits and pie!

The seven-room cabin's walls are thick vertical planks of koa wood, logged and milled at the site. The roof is corrugated metal. Battens and wooden shingles were added to the walls to keep out the cold winds and rain.

The cabin and an outbuilding will be listed on the National Register of Historic Places. As funding permits, the Fish and Wildlife Service will document the history of the house and the many people who visited it, so that its messages from the past are not lost.

A second unit of Hakalau Forest NWR was created in 1997 with the purchase of a 5,300-acre parcel of native forest in South Kona. The Kona Forest Unit was established to provide habitat for the endangered 'alala, or Hawaiian crow, as well as other endangered and native plants and animals. Management planning has been initiated. The unit is currently closed to public access.

Kona Forest Unit

Pua 'Akala House,
1883

Location: 10
Upper Maulua, Maui Forest
National Wildlife Refuge

Owner: Pua 'Akala
Cabin, 1883

Height: 10
Wildlife viewing:
USFWS, Hilo, HI



Pua 'Akala Cabin



**More Wildlife Viewing
on the Big Island**

The following areas on the Big Island are accessible to the public by car or foot travel. Before you travel to a particular area, check with the Hawai'i State Department of Land and Natural Resources to see if special permission is needed to enter. Drive with caution and heed posted speed limits. If you park on road shoulders, be sure to pull off the road as far as possible. When hiking, take care not to step on any plants.

'Oma'o



Kipuka 21

This small, beautiful island of rain forest vegetation amid lava flows is easily accessible along the Saddle Road (Highway 200). Pull off the north side of the roadway between mile posts 21 and 22. Walk across the lava flow to the edge of the forest and search the tree canopy for *'iwi*, *'apapane*, *'amakihiki*, *'oma'o* and *'elepaio*. Look for red blossoms in the *'ohi'a* trees and watch carefully for nectar feeding birds.

Pu'u O'o Trail

The *Pu'u O'o* Trail intersects with the Saddle Road between mile posts 22 and 23. Park at the *Pu'u O'o* trailhead sign marking the entrance to the trail heading south across the jumbled lava.



Forested *kipuka*, islands of vegetation, dot the barren landscape and are habitat for common and endangered forest birds. One to two miles down the trail, walk into the *kipuka* to see common native forest birds – Hawai'i *'akepa*, *'akiapola'au*, Hawai'i creeper, and *'io*. *Nene* also nest in the area and are sometimes seen flying overhead. About a half mile east of the *Pu'u O'o* Trail, Powerline Road works its way three to four miles through *kipuka* of various sizes. Most of the common native forest birds can be seen along this road as well as an occasional endangered bird.

Pu'u La'au

Approximately 40 miles from Hilo on the Saddle Road. Turn right at the Kilohana Hunter Check Station, the *Pu'u La'au* road heads up Mauna Kea to the north. This gravel and dirt road is only accessible by four-wheel drive or by foot. The road climbs to 8,000 feet on the southwest side of Mauna Kea into the *Mamane-Naio* dry forest habitat which is home to several forest bird species. Watch for *pueo* gliding low over the slopes and the Mauna Kea race of *'elepaio* in the *mamane* and *naio* trees.



Palila

*Hawai'i
Volcanoes
National Park*

One of the larger members of the honeycreeper family, the endangered *palila* is found only on the upper slopes of Mauna Kea between the elevation of 6,500 and 9,000 feet. It is mostly gray on the back with a white belly, yellow head and black bill. The *palila* is a "finch-billed" honeycreeper that feeds mostly on the seeds, flowers and young leaves of *mamane* trees.

Mauna Loa Road. Take Highway 11 to Mauna Loa Road and continue 10 miles to the Mauna Loa summit trailhead. All the common native forest birds are found in the area, although densities are low.

Bird Park



*Thurston Lava
Tube/Kilauea Iki
Trail*

The one-mile loop trail in the Bird Park (Kipuka Pu'au) features native plants found nowhere else. Native birds are uncommon but exotic birds such as the house finch, northern cardinal, Japanese white-eye, kalij pheasant, melodious laughing-thrush and red-billed leiothrix are often observed.

Trails lead through both of these interesting areas that are home to native forest birds. *'Apapane* are usually abundant and *'oma'o* are common.



'Akiapola'au

Above: Kalij pheasant
Background: Kipuka on Saddle Road

Kaloko-Honokohau National Historic Park, Kona

The Aimakapa and Kaloko Ponds are home to many waterbirds, including the Hawaiian coot, Hawaiian stilt, and migrants such as shovelers, pintails and scaup. Check with the park office for viewing tips and access rules. Shorebirds, including ruddy turnstones, wandering tattlers and golden plovers, may be seen from the beachwalk trail.

Waiakea Pond, Hilo

Inland from Hilo Bay is a large pond where migrant water birds and shorebirds are frequently seen. Picnic sites and large grassy areas are available for public enjoyment.

Lokoaka Pond, Keaukaha, Hilo

Take Kalaniana'ole Avenue past Hilo Harbor and watch for the large pond on the right. Migrant water birds and shorebirds are frequently seen in this area.

If you would like more information about the National Wildlife Refuge System, contact the refuge or check the Fish and Wildlife Service website at <http://www.fws.gov>. If you would like to learn more about Hakalau Forest National Wildlife Refuge or would like to serve as a volunteer, please contact the refuge directly.

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Aiea at 'ohi'a blossom
Above left: Hawaiian stilt

'Iwi in native mix

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