

# Globally Important Bird Areas in the Hawaiian Islands: Final Report

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3 of the 17 globally Important Bird Areas in Hawai'i, from top to bottom:  
Lehua Islet  
Hanawā Natural Area Reserve, Maui  
Hanalei National Wildlife Refuge, Kauai  
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## INTRODUCTION TO THE IMPORTANT BIRD AREAS PROGRAM

The Important Bird Areas (IBA) Program is a global effort developed by BirdLife International, a global coalition of partner organizations in more than 100 countries, to assist with identification and conservation of areas that are vital to birds and other biodiversity. The IBA Program was initiated by BirdLife International in Europe in the 1980's. Since then, over 8,000 sites in 178 countries have been identified as Important Bird Areas, with many national and regional IBA inventories published in 19 languages. Hundreds of these sites and millions of acres have received better protection as a result of the IBA Program.

As the United States Partner of BirdLife International, the National Audubon Society administers the IBA Program in the U.S., which was launched in 1995 (see <http://www.audubon.org/bird/iba/index.html>). Forty-eight states have initiated IBA programs, and more than 2,100 state-level IBAs encompassing over 220 million acres have been identified across the country. Information about these sites will be reviewed by the U.S. IBA Committee to confirm whether they qualify for classification as sites of continental or global significance.

Important Bird Areas may include sites for breeding, foraging, or migrating birds, may include public or private lands, and may be protected or unprotected. To qualify as an IBA, sites must support birds that fall into one of the following four categories:

- Species of conservation concern (e.g. threatened and endangered species)
- Restricted-range species that are vulnerable because they are not widely distributed
- Species that are vulnerable because their populations are concentrated in one habitat type or biome
- Species, or groups of similar species (such as seabirds, waterfowl, and shorebirds), that are vulnerable because they occur at high densities due to their congregatory behavior

IBAs have no legal distinction and do not directly affect the actual status or use of lands, but it is hoped that the IBA program will enhance conservation of sites in several ways. The IBA identification process provides a scientifically-based means of cataloging the most important sites for birds throughout the country and the world, and the use of a hierarchical classification system further helps to prioritize conservation efforts. The identification of IBAs is an important step in larger bird conservation initiatives and promoting positive actions to safeguard vital bird habitats. Conservation actions at IBAs reflect the unique circumstances of each site (e.g., size, location, and ownership). Public areas may be conserved by open-space acquisition, changes in land use practices, and by working with land managers to improve management for key species. Private lands may be conserved through public-private partnerships such as easements, habitat conservation plans and safe harbor agreements, and through landowner education.

## IDENTIFYING IMPORTANT BIRD AREAS IN HAWAII

The United States is unique among BirdLife partners in that the IBA Program is implemented on a state-by-state basis, with coordination of state-based efforts at the national level via Audubon's national IBA office. Audubon has taken this state-based approach in order to maximize the effectiveness of IBAs since they must be initiated and implemented locally.

Identification of Important Bird Areas in the Hawaiian Islands began in August 2006 with establishment of a Hawaii IBA Technical Committee, lead by Bruce Casler, then of the National Audubon Society's Waimea Valley Audubon Center. The committee was composed of experts on the conservation, ecology, distribution, and natural history of Hawaiian birds and broader conservation issues. The following people served as members of the Hawaii IBA Technical Committee: David Leonard and Fern Duvall of the Hawaii Division of Forestry and Wildlife, Holly Freifeld, Beth Flint, Jack Jeffrey, and Mike Silbernagle of the U.S. Fish and Wildlife Service, Ron Walker of the Hawaii Audubon Society, Rob Shallenberger of the Nature Conservancy of Hawaii, Bruce Casler, and Eric VanderWerf.

An organizational meeting of the Hawaii IBA Technical Committee was held in early 2007. A preliminary list of potential sites was generated at that meeting, which was further discussed and revised by the committee via email over the next few months, then provided to Audubon's National IBA office. In June 2007, Eric VanderWerf was contracted to be the Hawaii IBA coordinator by National Audubon Society. Responsibilities of the Hawaii IBA coordinator included: compiling data and completing nomination forms for each of the potential sites; coordinating with the Hawaii IBA Technical Committee to review the data and nomination forms; entering and managing data about Hawaii IBAs in the Audubon IBA database and making them available to the public through the Audubon website; developing GIS maps of the IBAs; coordinating with the National IBA office to have these sites reviewed by the U.S. IBA Technical Committee; and summarizing the work in a final report.

In many cases, state IBA Technical Committees first develop state-specific IBA criteria and then identify sites that qualify as state-level IBAs based on those criteria. These sites are then evaluated using global and continental IBA criteria, and sites potentially meeting these prescribed thresholds are proposed as globally or continentally significant. In the case of Hawaii, however, the goal as directed by Audubon was to immediately identify sites that were globally significant, so sites were selected as Important Bird Areas based on criteria about global bird populations that had already been developed by Audubon (Appendix 1). Because Hawaii has so many endemic species, endangered species, and large breeding colonies of seabirds, many sites in Hawaii qualify as globally important. Sites in Hawaii thus have been considered only at the global level for now, but it is still possible to develop state-specific selection criteria that might result in identification of additional sites that support bird populations that are important to Hawaii in particular.

## SUMMARY OF IMPORTANT BIRD AREAS IN HAWAII

**Locations and General Descriptions.** The 17 IBAs identified in Hawaii are located on all but two of the Hawaiian Islands (Table 1). The largest island, Hawai'i, had the most IBAs (5), followed by Kaua'i (3), O'ahu (3), Maui (2), Moloka'i (1), and Lana'i (1). The Northwestern Hawaiian Islands were grouped into a single IBA that encompasses all 10 islands, atolls, and exposed reefs (Nihoa, Necker, Gardner Pinnacles, French Frigate Shoals, Laysan, Lisianski, Maro Reef, Pearl and Hermes, Midway, Kure), as well as the offshore waters between the islands.

A description of each site, its ornithological significance, and conservation issues at each site can be viewed at < <http://iba.audubon.org/iba/stateIndex.do?state=US-HI> >. The 17 IBAs can be divided into three general categories: 1) Upland sites in the mountains of the main islands; 2) Wetland and coastal sites in the lowlands of the main islands; and 3) remote islets and atolls. Most of the upland sites qualified for global IBA status based on populations of endemic Passerines, many of which are endangered, although some upland sites also contain important breeding populations of endangered seabirds, such as the Kaua`i Uplands, Haleakalā, and Lāna`ihale. The coastal and wetland sites qualified for global IBA status based on endemic waterbirds such as Hawaiian Coot and Hawaiian Duck, concentrations of migratory shorebirds such as Bristle-thighed Curlew and Pacific Golden Plover, and Kīlauea Point also qualified based on large numbers of several seabirds. The endangered Nene or Hawaiian Goose was a qualifying species for several upland and coastal sites due to its ability to use a variety of habitat types. Lehua Islet and the Northwestern Hawaiian Islands qualified for global IBA status based on large numbers of a variety of seabirds, and the Northwestern Hawaiian Islands also supported four endemic species that are endangered, the Laysan Duck, Laysan Finch, Nihoa Finch, and Nihoa Millerbird.

The only Hawaiian Islands on which no IBAs were identified are Kaho`olawe and Ni`ihau. Kaho`olawe was used as a bombing range by the U.S. Navy for several decades after World War II and has been severely impacted. It currently supports only a small number of relatively common seabird species, but revegetation efforts are underway and predators including feral cats and mice may be eradicated in the future (Kaho`olawe Island Reserve Commission 2004). A variety of seabirds may recolonize Kaho`olawe naturally once the threats have been sufficiently ameliorated, and the island could serve as a suitable reintroduction site. The southern portion of Ni`ihau contains several shallow playa lakes that support large numbers of endangered Hawaiian Coots and Stilts in some years, but no surveys have been conducted in this area during the last 10 years due to lack of access to this privately-owned island. It is likely that Ni`ihau still supports seasonal concentrations of endangered waterbirds during the winter months when these playa lakes fill with water, but lack of current information on habitat conditions and waterbird numbers makes it difficult to support nomination of these lakes as an IBA at this time.

The list of 17 sites in Hawaii identified here as globally Important Bird Areas is similar to a list of 16 nationally important sites in Hawai`i identified by the American Bird Conservancy (ABC 2003). Four sites identified here were not included on the ABC list, Lehua Islet, Moloka`i Forests, Lāna`ihale, and Kīlauea Point National Wildlife Refuge. Conversely, three sites in Hawaii identified as nationally important by ABC did not qualify as globally important during the identification process prescribed by Audubon: Kakahai`a National Wildlife Refuge on Moloka`i, Hulē`ia National Wildlife Refuge on Kaua`i, and Kawainui Marsh on Oahu. Kakahai`a National Wildlife Refuge was created to protect habitat for endangered waterbirds, particularly the Hawaiian Stilt, but it has since become dry and overgrown with invasive alien plants. It no longer provides suitable habitat for stilts or other wetland birds and does not currently support any native bird species. Hulē`ia National Wildlife Refuge and Kawainui Marsh do provide suitable habitat for waterbirds, including the endangered Hawaiian Stilt, Hawaiian Coot, Hawaiian Common Moorhen, and Hawaiian Duck, but the number of each species present at each site was not large enough to meet the criteria prescribed for global significance by the National Audubon Society.

**Key Bird Species.** The 17 sites identified in Hawaii qualified for inclusion as globally Important Bird Areas based on a total of 53 bird species (Table 2). This total includes 30 taxa endemic to the Hawaiian Islands at the species or subspecies level, 19 species that are indigenous breeders in Hawaiian Islands, and four species that are non-breeding migrants in the Hawaiian Islands. Twenty-nine of the species are listed as threatened or endangered under the U.S. Endangered Species Act, two species are candidates for listing, and 15 species are considered birds of conservation concern by the U.S. Fish and Wildlife Service (2002). Table 2 also includes eight species that may be extinct, several of which are also listed under the U.S. Endangered Species Act. According to threat criteria defined by the International Union for the Conservation of Nature, 11 of the species are considered critically endangered, 10 are endangered, 11 are vulnerable, three are near threatened, three are extinct, and one is extinct in the wild (IUCN 2007).

The Northwestern Hawaiian Islands qualified as a globally significant IBA based on the most species (26), including three endemic Passerines, the endemic Laysan Duck, four migratory shorebirds, and 18 indigenous seabirds. The Kaua`i Forests and Uplands site had the second most qualifying species, 14, followed by Haleakalā on Maui and Hāmākua Forests, Mauna Loa-Kīlauea Forests, and Ka`ū Forests on Hawai`i, with 10 species each. Lāna`ihale had only a single qualifying species, the Hawaiian Petrel.

Several of the IBAs in Hawai`i may harbor species that are possibly extinct, some of which are still listed as endangered under the U.S. Endangered Species Act (Table 2). The Hawaiian Crow or `Alalā is almost certainly extinct in the wild, but a captive breeding program has been established that contains over 50 individuals (U.S. Fish and Wildlife Service 2003), and several potential reintroduction sites are located in the Kona and Ka`ū Forest IBAs. Surveys have been conducted to search for several other very rare species, but the status of some species remains poorly known (Reynolds and Snetsinger 2001, U.S. Fish and Wildlife Service 2006). Some species are probably extinct, such as the Kākāwahie or Moloka`i Creeper and the Kaua`i `Ō`ō, but additional surveys are needed to better ascertain whether other species are still extant, and the validity of some species observations, such as Nukupu`u and O`ahu `Alauahio, has been questioned (Shallenberger and Pratt 1978, Pyle and Pratt 2000). The last known Po`ouli died in captivity before a mate could be obtained for captive breeding, but it is possible that a few individuals still exist in the wild (VanderWerf et al. 2006). Species that are possibly extinct or extinct in the wild were not considered in whether a site qualified for IBA status because their existence is not certain, but all areas in Hawaii that may contain possibly extinct species were included in one the identified IBAs, so even though these possibly extinct species were not considered explicitly, they have not “fallen through the cracks.”

**Land Ownership.** Some of the Important Bird Areas in the Hawaiian Islands encompass lands owned and managed by a single entity, such as Hanalei, Kīlauea Point, James Campbell, Pearl Harbor, and Keālia Pond National Wildlife Refuges. The boundaries of these IBAs were easy to define because in the habitat important to birds coincided with the land parcel. The Northwestern Hawaiian Islands IBA also consists of a single management unit, the Papahānaumokuākea Marine National Monument, though it is jointly administered by the State of Hawaii, the U.S. Fish and Wildlife Service, and the U.S. National Oceanic and Atmospheric

Administration. In most other cases, however, the IBA boundaries were based on biological considerations rather than land ownership and parcel boundaries. Bird habitats do not necessarily coincide with political units, and an effort was made to identify and include all lands in each area that contain the biological elements important to birds. For example, the Haleakalā IBA includes not only Haleakalā National Park, but also Hanawī State Natural Area Reserve, The Nature Conservancy of Hawaii's Waikamoi Preserve, and adjacent State and private lands that also contain important habitat. Similarly, Hakalau Forest National Wildlife Refuge forms the centerpiece of the Hāmākua Forests IBA, but the IBA also includes adjacent State and private lands that support part of the significant bird populations in that area. The proportional land ownership of each IBA is summarized in Table 3.

**Threats.** Alien species are the most serious threat to birds and Important Bird Areas in the Hawaiian Islands, in terms of both the number of sites where they constitute a threat and the severity of the threat they pose (Table 4). All 17 Important Bird Areas in Hawaii are affected by a variety of invasive alien species, including alien plants, alien animals, and feral domestic animals.

Alien and feral animals threaten birds in a variety of ways, including predation on adults and nests, destruction and degradation of habitat by grazing and browsing, dispersing seeds of alien plants, preventing regeneration of native forest, and as vectors of disease. Rats, particularly black or ship rats (*Rattus rattus*), prey on virtually all birds in Hawai'i and are the most serious predators on nests of many forest birds (Atkinson 1977, VanderWerf and Smith 2002). Mongoose (*Herpestes auropunctatus*) and feral cats (*Felis catus*) are the most serious predators on many ground-nesting birds such as Nene, Hawaiian Coots, Hawaiian Stilts, Hawaiian Common Moorhen, Hawaiian Ducks, Hawaiian Petrels, Newell's Shearwater, and other seabirds. Mongoose do not currently occur on Kaua'i, and it is no coincidence that Kaua'i supports the largest populations of Nene and Newell's Shearwater. Feral cats are a threat to birds in 15 of the 17 IBAs; only the remote Northwestern Hawaiian Islands and Lehua Islet are free of feral cats. Feral cats also carry Toxoplasmosis, which can be fatal to the Hawaiian Crow or 'Alala. Predation by feral dogs (*Canis familiaris*) is less frequent, but can be locally very serious, particularly on ground-nesting seabirds that are not able to flee quickly. Barn Owls are not native to Hawai'i, and are known to prey on a variety of birds, including seabirds such as Newell's Shearwater and Hawaiian Petrel and a variety of forest birds. Feral Mallards (*Anas platyrhynchos*) pose a threat to Hawaiian Ducks in particular through hybridization (USFWS 2005). Alien birds such as the Japanese White-eye (*Zosterops japonicus*) and Japanese Bush-warbler (*Cettia diphone*) may compete for food with native birds, but this is not well-documented.

Feral pigs (*Sus scrofa*) are common in most areas in Hawai'i and degrade habitat by rooting in the understory, spreading the seeds of invasive alien plants, and creating breeding sites for non-native mosquitoes that transmit disease. Hollowed trunks of tree ferns toppled by feral pigs are the primary breeding site for mosquitoes in some areas. Feral cattle (*Bos taurus*), sheep (*Ovis aries*), and goats (*Capra hircus*) occur in many areas, and their grazing and browsing can seriously damage native vegetation and their trampling can cause erosion and damage the root system of native plants. Damage from feral sheep and goats has been particularly severe in many dry forests, such as on leeward Haleakalā, portions of the Alaka'i Plateau, and in the Kona

and Ka`ū areas of Hawai`i. Mouflon sheep (*Ovis musimon*) were deliberately established to provide sport hunting on the island of Hawai`i, where their browsing has severely damaged dry forest habitat of the Palila and other birds (USFWS 2006).

The alien southern house mosquito (*Culex quinquefasciatus*) poses an important indirect threat to forest birds by transmitting alien diseases, primarily avian malaria (*Plasmodium relictum*) and avian pox virus (*Poxvirus avium*), to which many forest birds have little immunity (Atkinson et al. 1995, van Riper et al. 2002, VanderWerf et al. 2006). The malaria parasite and mosquito larvae do not develop well at colder temperatures, so abundance of most forest birds is higher above 1,500 meters elevation, and several endangered species, such as `Ākiapolā`au, Maui Parrotbill, Hawai`i Creeper, and `Ākepa occur only above 1,500 meters (Scott et al. 1986). Nectarivorous species like `Iiwi and `Apapane that move altitudinally in search of flowering trees can be exposed to mosquito-borne diseases when they descend.

Invasive alien plants threaten forest birds by displacing native plants needed for nesting and foraging, and often grow in monocultures that reduce floristic diversity and food availability. In addition, alien trees with fleshy fruits may attract nest predators such as rats into the forest canopy, where they may prey on bird nests (VanderWerf and Smith 2002). The list of alien plants that threaten native forest habitats in Hawaii is lengthy, but some of the most serious and invasive alien plants are strawberry guava (*Psidium cattleianum*), fire tree (*Myrica faya*), *Miconia calvescens*, *Tibouchina urvilleana*, and Christmasberry (*Schinus terebinthifolius*).

In coastal wetlands, invasive alien plants degrade habitat quality by encroaching and choking wetlands and require regular control through prescribed burning, water level fluctuation, and mechanical clearing. Some of the most serious invasive plants in wetlands are California grass (*Brachiaria mutica*), saltwort (*Batis maritima*), mangrove (*Rhizophora mangle*), and Indian fleabane (*Pluchea indica*). Plantations of non-native trees, such as Eucalyptus, silk oak (*Grevillea robusta*), and Japanese tsugi pine (*Cryptomeria japonica*), are a threat in some areas, such as Ka`ū and Hāmākua on Hawai`i and on O`ahu, by spreading into adjacent native forest areas.

Global climate change and related sea level rise are very serious threats in terms of severity (Table 4). The direct effects of climate change may be obvious mainly on low-lying islands and at coastal sites through rises in sea level, but the indirect effects of climate change are likely to be ubiquitous. The Northwestern Hawaiian Islands and the many seabirds they support are likely to be most seriously affected by rising sea level due to their low stature. Even small rises in sea level would seriously impact these islands, and increased frequency and severity of storms that are also predicted to occur with climate change would exacerbate the rise in sea level. Coastal wetlands, including Hanalei, James Campbell, Pearl Harbor, and Keālia Pond National Wildlife Refuges are also vulnerable to climate change. Each of these sites lies less than five meters above current sea level. Sea level rise and surge from more frequent and intense storms could inundate freshwater and brackish coastal wetlands needed by waterbirds.

Climate change also poses a serious threat to many endemic Hawaiian forest birds because it may exacerbate the threat from disease by allowing by allowing alien mosquitoes to increase in distribution (Benning et al. 2002, Harvell et al. 2002). The parasite that causes avian malaria

does not develop in birds below 13° Celsius (C) (55° Fahrenheit (F)), and maximum malaria transmission occurs where mean ambient summer temperature is 17° C (63° F) (LaPointe 2000). Between 13° and 17° C (55° and 63° F), malaria transmission is sporadic and usually associated with warmer periods, such as El Niño events (Feldman et al. 1995). According to the Intergovernmental Panel on Climate Change (IPCC 2007), the global average surface warming following a doubling of carbon dioxide concentrations is likely to be in the range of 2° C to 4.5° C, with a best estimate of about 3° C, and is very unlikely to be less than 1.5° C. Benning et al. (2002) used GIS simulation to show that an increase in temperature of 2° C (3.6 ° F) would raise the 17° C (63° F) isotherm by 300 m (984 ft). This would result in an 85 percent decrease in the land area on Kaua`i where malaria transmission currently is only periodic. Loss of such a large proportion of suitable habitat would likely result in severe declines and perhaps extinction of some endemic forest bird species, such as the `Akikiki and `Akeke`e (Still et al. 1999). Increases in summertime temperatures and malaria prevalence have been reported on Hawaii Island (Freed et al. 2005), and increases in the altitude of the heat-trapping inversion layer have already been detected in Hawai`i (Cao et al. 2007).

## CONCLUSIONS AND RECOMMENDATIONS

All of the sites in Hawaii identified as Important Bird Areas were already known to be important, and this process did not reveal any big surprises. The land comprising most sites is largely protected from development, and at least a portion of all sites already receives some level of management that benefits bird populations and bird habitat. However, in island ecosystems like those in Hawai`i, simply protecting habitat from development is not sufficient for ensuring conservation. All sites still face serious threats that require active management, and most areas could benefit substantially from improved management. Further recognition of the significance of these sites as IBAs can help to enhance awareness of their conservation needs.

The fact that so many sites in Hawaii qualify as globally significant demonstrates the important place Hawai`i has in global biodiversity, and also the responsibility we all share in helping to maintain that diversity. The precarious status of so many Hawaiian species indicates that our shared responsibility is not being adequately met and underscores the need for improved stewardship. This improvement must begin locally, but local efforts would be aided by greater recognition at the national and global levels of the challenges involved in conserving the Hawaiian avifauna and the habitats on which it depends. It is hoped that information in this report about bird populations and threats will be useful, and that landowners and managers will use identification of lands as Important Bird Areas as additional justification in obtaining conservation funding.

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Table 1. List of 17 Important Bird Areas in the State of Hawai`i, including the size and bird species for which each area qualifies as an IBA.

Island	Important Bird Area	Size (ha)	Qualifying Bird Species
10 Islands	Northwestern Hawaiian Islands	362,061,000	26: Laysan Duck, Bonin Petrel, Bulwer's Petrel, Wedge-tailed Shearwater, Christmas Shearwater, Short-tailed, Laysan, and Black-footed Albatross, Tristram's Storm-petrel, Bristle-thighed Curlew, Wandering Tattler, Ruddy Turnstone, Pacific Golden Plover, Gray-backed Tern, Sooty Tern, Brown Noddy, Black Noddy, Blue-gray Noddy, White Tern, Red-tailed Tropicbird, Masked Booby, Red-footed Booby, Great Frigatebird, Nihoa Millerbird, Laysan Finch, Nihoa Finch
Lehua Islet	Lehua Islet	117	5: Laysan Albatross, Black-footed Albatross, Wedge-tailed Shearwater, Newell's Shearwater, Red-tailed Tropicbird
Kaua`i	Kaua`i Forests and Uplands	77,420	14: Nene, Hawaiian Petrel, Band-rumped Storm-petrel, Newell's Shearwater, White-tailed Tropicbird, `Elepaio, Puaiohi, Kaua`i `Amakihi, `Anianiau, Nukupu`u, `Akikiki, `Akeke`e, `I`iwi, `Apapane
Kaua`i	Kīlauea Point National Wildlife Refuge	82	6: Nene, Red-tailed Tropicbird, Red-footed Booby, Wedge-tailed Shearwater, Newell's Shearwater, Laysan Albatross
Kaua`i	Hanalei National Wildlife Refuge	371	5: Nene, Koloa, Hawaiian Moorhen, Hawaiian Coot, Hawaiian Stilt
O`ahu	O`ahu Uplands	39,704	4: `Elepaio, O`ahu `Amakihi, `I`iwi, `Apapane
O`ahu	James Campbell National Wildlife Refuge	66	6: Koloa, Hawaiian Moorhen, Hawaiian Coot, Hawaiian Stilt, Pacific Golden-Plover, Bristle-thighed Curlew
O`ahu	Pearl Harbor NWR	25	5: Koloa, Hawaiian Moorhen, Hawaiian Coot, Hawaiian Stilt, Pacific Golden-Plover
Moloka`i	Moloka`i Forests	12,295	4: Hawaiian Petrel, Hawai`i `Amakihi, `I`iwi, `Apapane
Lana`i	Lana`i hale		1: Hawaiian Petrel
Maui	Haleakalā	46,602	10: Nene, Hawaiian Petrel, Maui Parrotbill, Hawai`i `Amakihi, Nukupu`u, Maui `Alauahio, `I`iwi, `Akohehoke, `Apapane, Po`ouli
Maui	Keālia Pond National Wildlife Refuge	280	4: Koloa, Hawaiian Coot, Hawaiian Stilt, Pacific Golden Plover
Hawai`i	Mauna Kea mamane-naio forests	21,142	6: `Elepaio, Palila, Hawai`i `Amakihi, `Akiapola`au, `I`iwi, `Apapane

Hawai`i	Hāmākua Forests	51,168	10: Nene, `Io, `Elepaio, `Oma`o, Hawai`i `Amakihi, `Akiapola`au, Hawai`i Creeper, `Akepa, `I`iwi, `Apapane
Hawai`i	Mauna Loa-Kīlauea Forests	109,068	10: Nene, `Io, `Elepaio, `Oma`o, Hawai`i `Amakihi, `Akiapola`au, Hawai`i Creeper, `Akepa, `I`iwi, `Apapane
Hawai`i	Kona Forests	65,266	8: Nene, `Io, `Elepaio, Hawai`i `Amakihi, Hawai`i Creeper, `Akepa, `I`iwi, `Apapane
Hawai`i	Ka`ū Forests	44,145	10: Nene, `Io, `Elepaio, `Oma`o, Hawai`i `Amakihi, `Akiapola`au, Hawai`i Creeper, `Akepa, `I`iwi, `Apapane

Table 2. Key bird species for which sites in the Hawaiian Islands qualified as Important Bird Areas.

Common Name	Scientific Name	Status <sup>1</sup>	USA Threat Level <sup>2</sup>	IUCN Threat Level <sup>3</sup>	Sites (criteria)
Black-footed Albatross	<i>Phoebastria nigripes</i>	I	BCC	E	NWHI (A1), Lehua Islet (A1)
Laysan Albatross	<i>Phoebastria immutabilis</i>	I	BCC	V	NWHI (A1), Kīlauea Point (A1), Lehua Islet (A1)
Short-tailed Albatross	<i>Phoebastria albatrus</i>	I	E	V	NWHI (A1)
Hawaiian Petrel	<i>Pterodroma sandwichensis</i>	E	E	V	Haleakalā (A1), Kaua`i (A1), Lāna`ihale (A1), Moloka`i (A1)
Bonin Petrel	<i>Pterodroma hypoleuca</i>	I			NWHI (A4ii)
Bulwer's Petrel	<i>Bulweria bulwerii</i>				NWHI (A4ii)
Wedge-tailed shearwater	<i>Puffinus pacificus</i>	I			NWHI (A4ii), Kīlauea Point (A4ii), Lehua Islet (A4ii)
Christmas Shearwater	<i>Puffinus nativitatus</i>	I			NWHI (A4ii)
Newell's Shearwater	<i>Puffinus auricularis newelli</i>	E		E	Kaua`i (A1), Kīlauea Point (A1), Lehua Islet (A1)
Band-rumped Storm-Petrel	<i>Oceanodroma castro</i>	I	C		Kaua`i (B4ii)
Tristram's Storm-petrel	<i>Oceanodroma tristrami</i>	I	BCC	NT	NWHI (A1)
White-tailed Tropicbird	<i>Phaethon lepturus</i>	I			Kaua`i (A4ii)
Red-tailed Tropicbird	<i>Phaethon rubricauda</i>	I			NWHI (A4ii), Kīlauea Point (A4ii), Lehua Islet (A4ii)
Masked Booby	<i>Sula dactylatra</i>	I			NWHI (A4ii)
Red-footed Booby	<i>Sula sula</i>	I			NWHI (A4ii), Kīlauea Point (A4ii)
Great Frigatebird	<i>Fregata minor</i>	I			NWHI (A4ii)
Hawaiian Goose or Nene	<i>Branta sandvicensis</i>	E	E	V	Haleakalā (A1), Hāmākua (A1), Hanalei (A1), Ka`ū (A1), Kaua`i (A1), Kīlauea Point (A1), Kona (A1), Mauna Loa (A1)
Hawaiian Duck or Koloa	<i>Anas wyvilliana</i>	E	E	E	Hanalei (A1), James Campbell (A1), Keālia Pond (A1), Pearl Harbor (A1)
Laysan Duck	<i>Anas laysanensis</i>	E	E	CR	NWHI (A1)
Hawaiian Hawk or `Io	<i>Buteo solitarius</i>	E	E	NT	Hāmākua (A1), Ka`ū (A1), Kona (A1), Mauna Loa (A1)
Hawaiian Common Moorhen	<i>Gallinula chloropus sandvicensis</i>	E	E		Hanalei (B1), James Campbell NWR (B1), Pearl Harbor (B1)
Hawaiian Coot	<i>Fulica alai</i>	E	E	V	Hanalei (A1), James Campbell (A1), Keālia Pond (A1), Pearl Harbor (A1)
Pacific Golden-Plover	<i>Pluvialis fulva</i>	M	BCC		NWHI (A4i), James Campbell (A4i), Keālia Pond (A4i), Pearl Harbor (A4i)
Hawaiian Stilt	<i>Himantopus mexicanus knudseni</i>	E	E		Hanalei (B1), James Campbell (B1), Keālia Pond (B1), Pearl Harbor (B1)
Wandering Tattler	<i>Heteroscelus incanus</i>	M			NWHI (A4i)
Bristle-thighed Curlew	<i>Numenius tahitiensis</i>	M	BCC	V	NWHI (A1), James Campbell (A1)
Ruddy Turnstone	<i>Arenaria interpres</i>	M			NWHI (A4i)
Gray-backed Tern	<i>Sterna lunata</i>	I			NWHI (A4ii)
Sooty Tern	<i>Sterna fuscata</i>	I			NWHI (A4ii)
Brown Noddy	<i>Anous stolidus</i>	I			NWHI (A4ii)
Black Noddy	<i>Anous minutus</i>	I			NWHI (A4ii)
Blue-gray Noddy	<i>Procelsterna cerulea</i>	I	BCC		NWHI (A4ii)

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White Tern	<i>Gygis alba</i>	I			NWHI (A4ii)
Kaua`i`O`o	<i>Moho braccatus</i>	X	E	EX	
Hawaiian Crow or `Alala	<i>Corvus hawaiiensis</i>	X	E	EW	
`Elepaio	<i>Chasiempis sandwichensis</i>	E	E,BCC	E	Hāmākua (A1), Ka`ū (A1), Kaua`i (A1), Kona (A1), Mauna Kea (A1), Mauna Loa (A1), O`ahu Uplands (A1)
Kama`o	<i>Myadestes myadestinus</i>	X	E	EX	
`Oma`o	<i>Myadestes obscurus</i>	E	BCC	V	Hāmākua (A1), Ka`ū (A1), Mauna Loa (A1)
Puaiohi	<i>Myadestes palmeri</i>	E	E	CR	Kaua`i (A1)
Nihoa Millerbird	<i>Acrocephalus familiaris</i>	E	E	CR	NWHI (A1)
Laysan Finch	<i>Telespyza cantans</i>	E	E	V	NWHI (A1)
Nihoa Finch	<i>Telespyza ultima</i>	E	E	CR	NWHI (A1)
`O`u	<i>Psittirostra psittacea</i>	X	E	CR	
Palila	<i>Loxioides bailleui</i>	E	E	E	Mauna Kea (A1)
Maui Parrotbill	<i>Pseudonestor xanthophrys</i>	E	E	CR	Haleakalā (A1)
Hawai`i`Amakihi	<i>Hemignathus virens</i>	E	BCC		Haleakalā (A4ii), Hāmākua (A4ii), Ka`ū (A4ii), Kona (A4ii), Mauna Kea (A4ii), Mauna Loa (A4ii), Moloka`i (A4ii)
O`ahu `Amakihi	<i>Hemignathus flavus</i>	E	BCC	V	O`ahu Uplands (A1)
Kaua`i`Amakihi	<i>Hemignathus stejnegeri</i>	E	BCC	V	Kaua`i (A1)
`Anianiau	<i>Hemignathus parvus</i>	E	BCC	V	Kaua`i (A1)
Nukupu`u	<i>Hemignathus lucidus</i>	X	E	CR	Haleakalā (A1)
`Akiapola`au	<i>Hemignathus munroi</i>	E	E	E	Hāmākua (A1), Ka`ū (A1), Mauna Loa (A1)
`Akikiki or Kaua`i Creeper	<i>Oreomystis bairdi</i>	E	C	CR	Kaua`i (A1)
Hawai`i Creeper	<i>Oreomystis mana</i>	E	E	E	Hāmākua (A1), Ka`ū (A1), Kona (A1), Mauna Loa (A1)
O`ahu `Alauahio	<i>Paroreomyza maculata</i>	X	E	CR	
Kakawahie or Moloka`i Creeper	<i>Paroreomyza flammea</i>	X	E	EX	
Maui `Alauahio	<i>Paroreomyza montana</i>	E	BCC	E	Haleakalā (A1)
`Akeke`e	<i>Loxops caeruleirostris</i>	E	BCC	E	Kaua`i (A1)
`Akepa	<i>Loxops coccineus</i>	E	E	E	Hāmākua (A1), Ka`ū (A1), Kona (A1), Mauna Loa (A1)
`I`iwi	<i>Vestiaria coccinea</i>	E	BCC	NT	Haleakalā (A1), Hāmākua (A1), Ka`ū (A1), Kaua`i (A1), Kona (A1), Mauna Kea (A1), Mauna Loa (A1), Moloka`i (A1), O`ahu Uplands (A1)
`Apapane	<i>Himatione sanguinea</i>	E	BCC		Haleakalā (A4ii), Hāmākua (A4ii), Ka`ū (A4ii), Kaua`i (A4ii), Kona (A4ii), Mauna Kea (A4ii), Mauna Loa (A4ii), Moloka`i (A4ii), O`ahu Uplands (A4ii)
`Akohekohe or Crested Honeycreeper	<i>Palmeria dolei</i>	E	E	CR	Haleakalā (A1)
Po`ouli	<i>Melamprosops phaeosoma</i>	X	E	CR	Haleakalā (A1)

<sup>1</sup> E = endemic to the Hawaiian Islands; I = indigenous to the Hawaiian Islands; M = non-breeding migrant in the Hawaiian Islands; X = possibly extinct (not counted in species total for IBA qualification purposes).

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<sup>2</sup> E = endangered; T = threatened; C = candidate for listing; BCC = bird of conservation concern (U.S. Fish and Wildlife Service 2002).

<sup>3</sup> CR = critically endangered; E = endangered; V = vulnerable; NT = near threatened; EX = extinct; EW = extinct in the wild (IUCN 2006).

Table 3. Land ownership of Important Birds Areas in the Hawaiian Islands, in hectares (ha) and as a percentage.

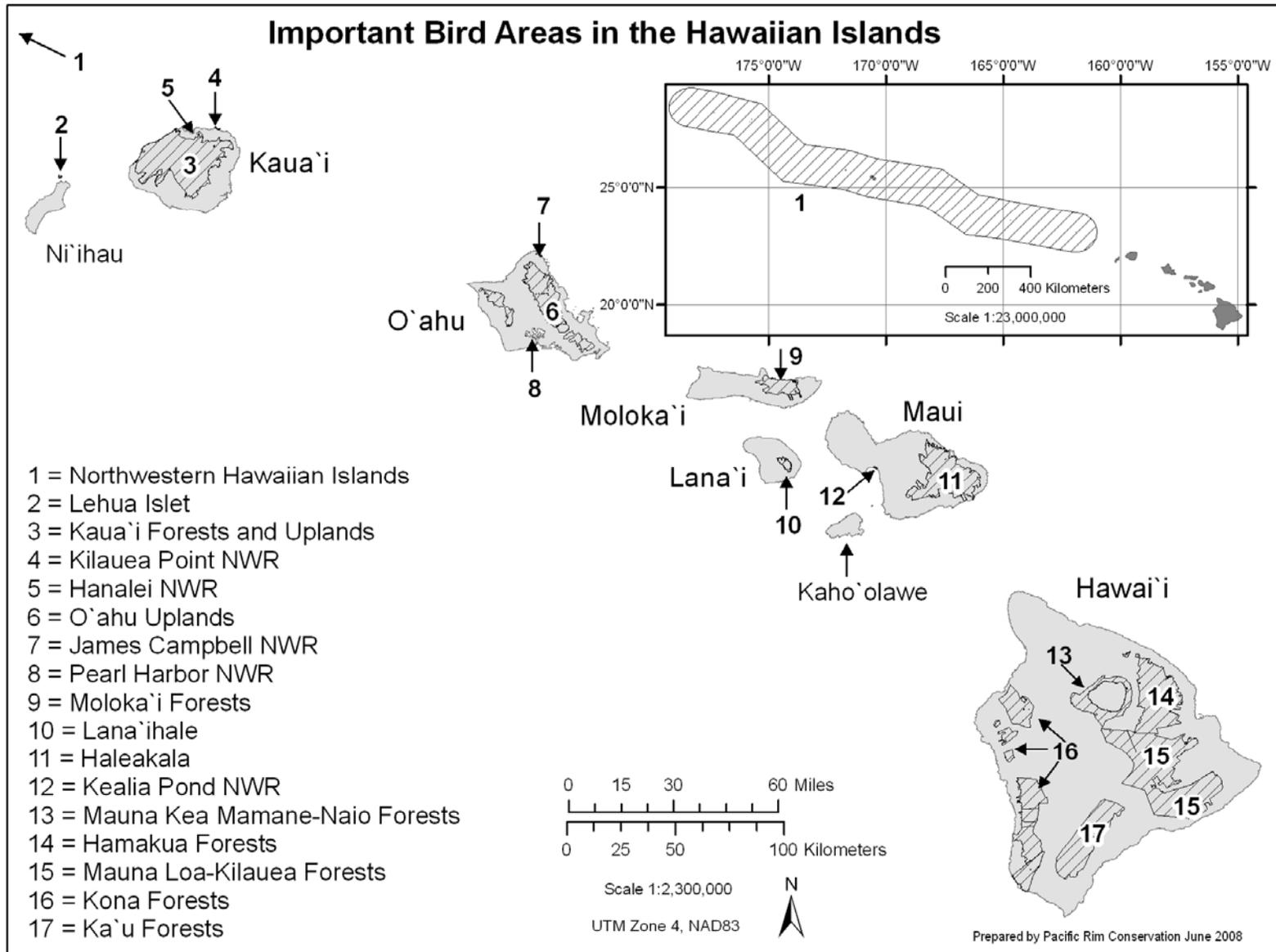
<b>Important Bird Area</b>	<b>Federal ha (%)</b>	<b>State ha (%)</b>	<b>County ha (%)</b>	<b>Private ha (%)</b>
Northwestern Hawaiian Islands	362,060,919 (>99%)	81 (<1%)	0	0
Lehua Islet	117 (100%)	0	0	0
Kaua`i Forests and Uplands	0	45,689 (62%)	0	28,530 (38%)
Kīlauea Point N.W.R.	82 (100%)	0	0	0
Hanalei N.W.R	371 (100%)	0	0	0
O`ahu Uplands	4,714 (12%)	11,883 (30%)	1,609 (4%)	21,498 (54%)
James Campbell N.W.R	66 (100%)	0	0	0
Pearl Harbor N.W.R	25 (100%)	0	0	0
Moloka`i Forests	2,951 (24%)	5901 (48%)	0	3,443 (28%)
Lana`ihale	0	0	0	2,195 (100%)
Haleakalā	11,869 (26%)	29,496 (63%)	0	5,237 (11%)
Keālia Pond N.W.R	0	0	0	280 (100%)
Mauna Kea Mamane-Naio Forests	0	21,142 (100%)	0	0
Hāmākua Forests	13,145 (26%)	28,687 (56%)	0	9,336 (18%)
Mauna Loa-Kīlauea Forests	31,135 (28%)	69,568 (63%)	0	9,365 (9%)
Kona Forests	2,166 (3%)	38,753 (60%)	0	24,347 (37%)
Ka`ū Forests	11,478 (26%)	29,781 (67%)	0	2,886 (7%)
Total All Areas Combined	362,139,038 (>99)	279,981 (<.1%)	1,609 (<.1%)	107,117 (<.1%)
Total without NWHI	78,119 (17%)	279,900 (60%)	1,609 (0.3%)	107,117 (23%)

Table 4. Summary of threats affecting 17 Important Bird Areas in the Hawaiian Islands.

Threat	Number of Sites	Severity <sup>1</sup> (avg±SD)	Comments
Alien and feral animals (other than birds)	17	8.7±1.4	Rats, mongoose, mouflon sheep, axis deer, bullfrogs, feral cattle, sheep, and goats
Alien plants	17	8.2±2.0	Numerous species
Feral cats	15	7.4±1.5	All sites except remote islands
Mosquito-borne diseases	8	9.5±0.9	Avian malaria and pox virus
Feral pigs	8	8.5±0.8	Primarily in wet and mesic forests
Climate change	7	9.9±0.4	Increasing temperatures leading to mosquito expansion
Forest grazing	7	7.1±2.4	By domestic cattle and feral sheep and goats
Alien birds	6	7.5±1.6	Predation by Barn Owls, hybridization by feral Mallards with Hawaiian Ducks
Sea level rise	5	9.2±0.8	NWHI and coastal wetlands
Development and urbanization	5	6.0±1.9	Habitat destruction, residential development, light attraction
Avian botulism	4	4.5±1.3	All wetland sites
Human disturbance	4	3.0±0.8	Aircraft, vehicles, human foot traffic
Feral dogs	3	7.0±1.0	Predation on ground-nesting birds
Fire	3	5.0±1.7	Arson, military training, vehicle traffic
Agricultural development	2	6.5±2.1	Hanalei NWR, Kona forests
Logging, deforestation	2	6.5±0.7	Logging of koa
Infrastructure	1	8	Utility lines, towers, Kaua`i
Drought	1	8	Keālia Pond NWR
Overfishing	1	5	NWHI
Pollution	1	5	NWHI; marine debris, plastics, contaminants
Water diversions	1	5	Keālia Pond NWR
Plantation forestry	1	4	Primarily <i>Eucalyptus</i> and silk oak
Hurricanes	1	4	NWHI
Wind towers	1	3	Lāna`ihale

On a scale from 1 (lowest) to 10 (highest). Values are average±standard deviation calculated from the scores at all sites where that factor was considered a threat.

Figure 1. Map of the Hawaiian Islands showing the locations of Important Bird Areas.



## APPENDIX 1. IMPORTANT BIRD AREA CRITERIA

The information needed to support the nomination of an IBA at the continental or global level is a reliable estimate of the number of birds of a particular species at a site, in a season, in a year. It is important to have species-specific count data in all cases. Moreover, for conservation planning purposes we need to know the seasonal importance of a site and the species occurring there, rather than just the count of birds in a given year. Because the conservation value of a site may change significantly over time due to changes in land use, threats, or ownership, it is important to report counts of birds in a particular year rather than as an average over a number of years. It is important that the identification of an IBA be based on relatively current data. In order to qualify as an IBA at the global or continental level, the data in a site nomination generally should be no more than 10 years old. In Hawaii, the only quantitative information available for some species is more than 20 years old, and this has been provisionally accepted, but more current information is urgently needed. Additional surveys have been conducted for several endemic and endangered forest birds, but for some species the only quantitative information is provided by Scott et al. (1986), based on surveys conducted in the late 1970s and early 1980s.

## GLOBAL CRITERIA

A1 - Species of Global Conservation Concern. This includes species classified as “Critical”, “Endangered”, “Vulnerable”, and “Near-Threatened” according to IUCN/SSC 1994, BirdLife International 2000 & 2004, and USFWS 2002.

A2 - Assemblage of Restricted-range species

A3 - Assemblage of Biome-restricted species

A4i -  $\geq 1\%$  biogeographic population of a waterbird simultaneously;  $\geq 5\%$  over a season

A4ii -  $\geq 1\%$  global population of a seabird or terrestrial species simultaneously;  $\geq 5\%$  over a season

A4iii -  $\geq 20,000$  waterbirds/  $\geq 10,000$  seabirds [*not currently applied in the U.S.*]

A4iv - aerial bottleneck where  $\geq 5\%$  North American population of a migratory waterbird or  $\geq 5\%$  global population of a migratory seabird or terrestrial species passes during a season

## CONTINENTAL CRITERIA

B1- Species of Continental Conservation Concern

B2- [Not applicable at regional level]

B3- Assemblage of individuals/species concentrated in a Bird Conservation Region

B4i-  $\geq 1\%$  flyway/subspecies population of a waterbird simultaneously;  $\geq 5\%$  over a season

B4ii-  $\geq 1\%$  biogeographic (N. Am.) population of a seabird or terrestrial species simultaneously;  $\geq 5\%$  over a season

B4iv- aerial bottleneck where  $\geq 5\%$  flyway/subspecies population of a migratory waterbird, or  $\geq 5\%$  N. Am. population of a seabird or terrestrial species passes during a season