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INTRODUCTION

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Hawai'i, a string of high and low islands stretching 1,900 km across the Central Pacific, has long captured the imagination of ornithologists. The Hawaiian Islands are the most isolated archipelago in the world, and as a result, were one of the last places on the planet to be populated (Fig. 1). The islands range from 25 million year-old Kure, at the extreme northwest end of the archipelago, to Hawai'i, the largest, southernmost, and the youngest island at less than 1 million years old (Fig. 2; Stearns 1966, Carson and Clague 1995). The climate varies dramatically from arid, tropical seashores receiving less than 26 cm (10 in) of precipitation on the leeward slopes of the main islands, to the windward peaks of the Alaka'i Swamp on Kaua'i, where it is not uncommon for torrential rains to drop 52 cm (20 in) in a day, or to record 1,152 cm (450 in) in a single year. The tropical lowland areas contrast dramatically with the high altitude, alpine ecosystems, and stone deserts, where it freezes every night. The landscape is as varied as it is dynamic. The tropical environments at sea level contrast dramatically with the snow capped peaks of Mauna Loa and Mauna Kea, which reach more than 4,000 m in height above sea level and more than 9,000 m from their base in the ocean from which they were born (Stearns 1966, Carson and Clague 1995). The Hawaiian archipelago is extremely dynamic, with Loihi Seamount, an incipient island, presently going through the birthing process at a depth of 950 meters 30 km off the southern coast of Hawai'i (Carson and Clague 1995).

Polynesians first reached the Hawaiian archipelago about 500 AD, and Europeans not until Captain James Cook's third voyage of discovery in 1778. With a little imagination and use of early voyagers' and naturalists' notes, one can create in the mind's eye a pre-Polynesian Hawai'i (Rothschild 1893–1900, Henshaw 1902a; Kirch 1982a, 1985). In these presettlement islands, millions of seabirds nested not only on offshore islets, isolated cliff faces, and barren subalpine areas where they are found today, but on the beaches and in adjacent forests, bringing tons of nitrates and phosphates from the sea. The transport of nutrients from marine environments by birds has significant impact on terrestrial environments, resulting in increased plant growth and increases in those species that depend on plants for habitat and food (Polis and Hurd 1996, Ryan and Watkins 1989; Anderson and Polis 1998, 1999). As one moved inland, numerous species of geese, including ten that we know were flightless, grazed in the open grasslands. The forests must have been alive with various species of Hawaiian honeyeaters, honeycreepers, owls, and hawks, flightless species (such as rail and ibis), and a variety of large-billed finches. The dawn song chorus of this ghost avifauna will never again be heard, but one can dream.

Captain Cook's third voyage of discovery did not contribute greatly to our ornithological knowledge of the islands. Only 11 species and subspecies were described based on specimens collected during Cook's voyage, all from Kaua'i and Hawai'i (Medway 1981). The first comprehensive characterizations of Hawaiian birds were the almost simultaneous publications by Rothschild (1893–1900) and Wilson and Evans (1890–1899). These detailed descriptions of Hawaiian birds were augmented by the careful documentation of the natural history and ecology of these birds by Henshaw (1902a,b) and Perkins (1893, 1901, 1903). These works established a foundation from which all current Hawaiian ornithology is measured. In this monograph, we hope to provide another milestone of information on the avifauna of the Hawaiian Islands and the surrounding Pacific area, from which during the next century ornithologists might measure future changes in this avifauna. And most certainly there will be changes.

Historical changes to the Hawaiian avifauna started early, and only 100 years after Cook's exploration of the islands there were reports of species that had apparently gone extinct (Perkins 1903). At the turn of the century, R. C. L. Perkins (as cited in Munro 1944:69) wrote:

> "When I first arrived in Kona, the Great Ohia trees, at an elevation of 2,500 feet, were a mass of bloom and each of them was literally alive with hordes of Crimson 'Apapane and Scarlet 'I'iwi; while continually crossing from the top of one great tree to another, the 'Ō'ō could be seen on the wing sometimes six or eight at a time .... The 'Amakihi was numerous in the same trees but less conspicuous and occasionally one of the long billed *Hemignathus*. Feeding on the fruit of the Ieie could be seen the Hawaiian Crow commonly and the 'Ō'ū in great abundance. The picture of this noisy, active, and often quarrelsome assembly

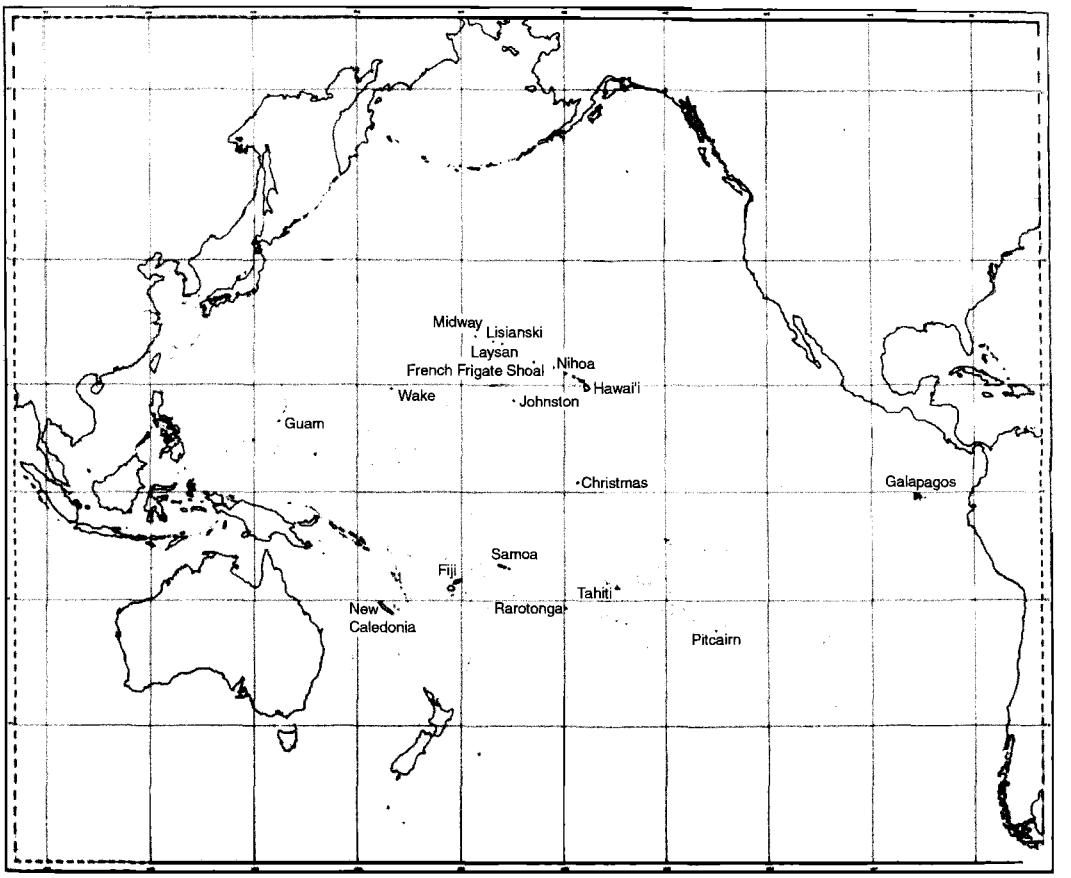

FIGURE 1. The Hawaiian archipelago and other major islands in the Pacific Ocean.

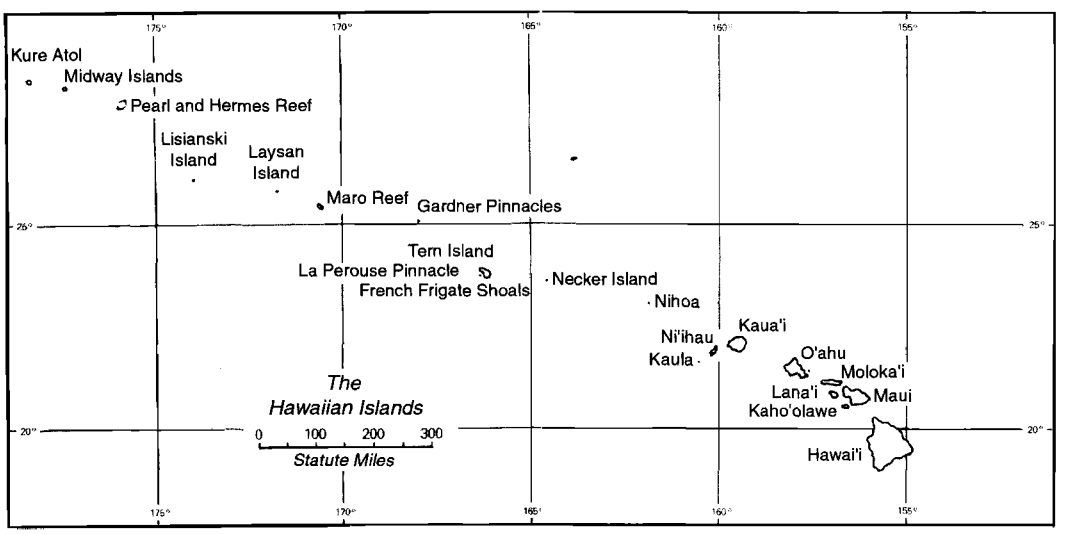

FIGURE 2. The Hawaiian Islands. Detailed maps of individual islands can be found in the chapters that follow.

of birds, many of them brilliant colors, was one never to be forgotten. After the flowering of the Ohia was over, the great gathering naturally dispersed, but even then the bird population was very great."

By 1930 however, things had changed greatly when Munro (1944:68) stated:

"Since civilization came to the Hawaiian Islands, the experience of the native perching birds has been tragic. My conclusions after the survey (1936–1937) were that 25 species have a fair chance of survival, while 30 species were gone or likely to become extinct."

Today native birds are almost absent from the remaining lowland forests of Kona. In their place is an eclectic group of alien species, the result of a large number of planned and unplanned releases (see Moulton et al. *this volume*). Today, only the 'Elepaio (*Chasiempis sandwichensis*), Hawai'i 'Amakihi (*Hemignathus virens*), 'I'iwi (*Vestiaria coccinea*), and 'Apapane (*Himatione sanguinea*) can be seen reliably, and these not in all areas. The large-billed finches, honeyeaters (species once ubiquitous), 'Ō'ū (*Psittirostra psittacea*), and 'Ōma'o (*Myadestes obscurus*) are gone, while the 'Ākepa (*Loxops coccineus*), 'Akiapōlā'au (*Hemignathus munroi*), and Hawai'i Creeper (*Oreomystis bairdi*) occur in vanishingly small numbers in fewer than five isolated pockets of native forest. At this writing, the number of free-flying 'Alalā (*Corvus hawaiiensis*) can be counted on one hand.

The true magnitude of these losses would, however, not be known until the pioneering research of the husband-and-wife team of Storrs Olson and Helen James (James and Olson 1991, Olson and James 1991). They documented the extinction of at least 50% of the Hawaiian avifauna prior to the first use of the Linnean System to describe a Hawaiian species. One hundred nine endemic species are known to have occurred in the Hawaiian Islands, 35 of which (32%) are still extant. Nineteen additional taxa were extant in the 18th century, and 55 (50%) are known only from the fossil and subfossil record (Table 1).

Reasons for losses of many Hawaiian bird species have been well documented, including the destruction of habitat (Cuddihy and Stone 1990) and taking of birds (van Riper and van Riper 1982, Banko et al. *this volume*, Hu et al. *this volume*, van Riper and Scott *this volume*), predatory mammals (Tomich 1969, Kramer 1971, Atkinson 1977), introduced birds (Schwartz and Schwartz 1949, Lewin 1971, Lewin and Lewin 1984, Mountainspring and Scott 1985), and diseases (Warner 1968, van Riper et al. 1986, Atkinson et al. 1993a,b,c, 1995; Jarvi et al. *this volume*, Shehata et al. *this volume*). The combined effect of these losses has been summarized in papers by Scott et al. (1986), van Riper and van Riper (1985), Ralph and van Riper (1985), Freed et al. (1993), and van Riper and Scott (*this volume*).

While many species have succumbed to extinction (Table 1), major steps have been taken recently to save Hawai'i's endangered species. The U.S. Fish and Wildlife Service has established two national wildlife refuges (Hakalau Forest and Kona Forest National Wildlife Refuges) on the island of Hawai'i with a primary objective of protecting endangered forest birds. Combined, these preserves total nearly 16,194 ha (40,000 acres). The National Park Service has eliminated goats (*Capra hircus*) and sheep (*Ovis aries*) from Hawai'i Volcanoes and Haleakalā National Parks. In addition, large acreages are now pig- (*Sus scrofa*) free in that park. Similar-

TABLE 1. BIRDS KNOWN FROM FOSSIL RECORDS OR KNOWN TO BREED IN THE HAWAIIAN ISLANDS

Group	Species known		Species extant	Endangered species	Populations	
	Fossil	Historic			≤50	51–500
Seabirds	1	22	22	2	2	1
Herons	0	1	0	0	0	0
Ibises	2	0	0	0	0	0
Waterfowl	10–11	3	3	3	0	0
Hawks	2	1	1	1	0	0
Rails	10	4	2	2	0	0
Stilts	0	1	1	1	0	0
Owls	4	1	1	0	0	0
Crows	3	1	1	1	1	0
Honeyeaters	0	6	1	1	1	0
Oldworld Flycatchers	0	1	1	0	0	0
Oldworld Warblers	0	1	1	1	0	0
Hawaiian Thrushes	0	6	2	1	0	1
Honeycreepers	13	31	20	9	4	3

Notes: Information on fossil birds includes only those records assigned species status (James and Olson 1991, Olson and James 1991). Additional species are being described. Historical status is based on several sources (Scott et al. 1989, Stone 1989, and Pyle 1997). In the last 11 years three species have become extinct: Kaua'i 'Ō'ō (*Moho braccatus*), Kāma'o (*Myadestes myadestinus*), and Oloma'o (*Myadestes lanaiensis*) based on the standard of extinct until proven extant (Diamond 1987). The 'I'iwi (*Vestiaria coccinea*) is declining in numbers and is disappearing from areas formerly occupied. The numbers of two other species have decreased to less than 50 individuals. Species with less than 50 and 500 censused individuals are provided as indicators of jeopardy. The effective population size for these species is unknown but likely to be one-half to one-quarter censused population size (Primack 1993). For the 29 species listed by the U.S. Fish and Wildlife Service as endangered, 8 continue to decline, 6 are of unknown status, and 15 are stable in numbers (USFWS 1996a).

TABLE 2. CHECKLIST OF THE BIRDS OF HAWAII

Symbols for status

R = Resident native species; normal does not leave islands: Re = Resident, endemic species, not extinct; Rx = Resident, endemic species, presumed extinct; Res = Resident; indigenous species, subspecies is endemic; Hawaiian; Ri = Resident; indigenous species, Hawaiian form is not endemic.
A = Alien introduced species; resident; normally does not leave the islands: Al = Alien; long established and breeding since before 1940; An = Alien, new introduced since 1950; apparently established; Ax = Alien; formerly long established and breeding for more than 25 years, but now no longer present in Hawaii.
E (or T) immediately preceding the genus name designates a species or subspecies currently listed as Endangered (or Threatened) on the Federal List of Endangered species.
B = Breeding species in Hawaii, native, most individuals leave Hawaii when not breeding: Bo = Breeder, species breeds only in Hawaii; Bes = Breeder, species also breeds elsewhere; Hawaiian subspecies breeds only in Hawaii; Bi = Breeder, Hawaiian form also breeds elsewhere.
V = Visitor species, breeds elsewhere, occurs in Hawaii when not breeding: Vc = Visitor, common migrant to Hawaii; Vr = Visitor, regular migrant to Hawaii in small numbers; Vo = Visitor, occasional to frequent migrant to Hawaii; Vs = Visitor, accidental straggler to Hawaii; Vd = Visitor, accidental straggler to Hawaii, recorded in Hawaii only as dead remains.

Common name	Scientific name	Status
GREBES	***PODICIPEDIDAE***	
Pied-billed Grebe	*Podilymbus podiceps*	Ri
Horned Grebe	*Podiceps auritus*	Vs
Red-necked Grebe	*Podiceps grisegena*	Vs
Eared Grebe	*Podiceps nigricollis*	Vs
ALBATROSSES	***DIOMEDEIDAE***	
Laysan Albatross	*Phoebastria immutabilis*	Bi
Black-footed Albatross	*Phoebastria nigripes*	Bi
Short-tailed Albatross	*E-Phoebastria albatrus*	Vo
PETRELS, SHEARWATERS	***PROCELLARIIDAE***	
Northern Fulmar	*Fulmarus glacialis*	Vo
Kermadec Petrel	*Pterodroma neglecta*	Vs
Herald Petrel	*Pterodroma arminjoniana*	Vs
Murphy's Petrel	*Pterodroma ultima*	Vs
Mottled Petrel	*Pterodroma inexpectata*	Vo
Juan Fernandez Petrel	*Pterodroma externa*	Vo
(Hawaiian Petrel)—Dark-rumped Petrel	*E-Pterodroma phaeopygia sandwichensis*	Res
White-necked Petrel	*Pterodroma cervicalis*	Vo
Bonin Petrel	*Pterodroma hypoleuca*	Bi
Black-winged Petrel	*Pterodroma nigripennis*	Vo
Cook's Petrel	*Pterodroma cookii*	Vs
Stejneger's Petrel	*Pterodroma longirostris*	Vd
Bulwer's Petrel	*Bulweria bulwerii*	Bi
Jouanin's Petrel	*Bulweria fallax*	Vs
Streaked Shearwater	*Calonectris leucomelas*	Vs
Flesh-footed Shearwater	*Puffinus carneipes*	Vo
Wedge-tailed Shearwater	*Puffinus pacificus chlororhynchus*	Bi
(New Zealand Shearwater)—Buller's Shearwater	*Puffinus bulleri*	Vs
Sooty Shearwater	*Puffinus griseus*	Vr
Short-tailed Shearwater	*Puffinus tenuirostris*	Vo
Christmas Shearwater	*Puffinus nativitatis*	Bi
(Newell's Shearwater)—Townsend's Shearwater	*T-Puffinus auricularis newelli*	Be
Little Shearwater	*Puffinus assimilis*	Vs
STORM-PETRELS	***HYDROBATIDAE***	
Wilson's Storm-Petrel	*Oceanites oceanicus*	Vs
Fork-tailed Storm-Petrel	*Oceanodroma furcata*	Vs
Leach's Storm-Petrel	*Oceanodroma leucorhoa*	Vr
(Hawaiian or Harcourt's Storm-Petrel)—Band-rumped Storm-Petrel	*Oceanodroma castro*	Bi
(Sooty Storm-Petrel)—Tristram's Storm-Petrel	*Oceanodroma tristrami*	Bi
TROPICBIRDS	***PHAETHONTIDAE***	
White-tailed Tropicbird	*Phaethon lepturus*	Ri
Red-billed Tropicbird	*Phaethon aethereus*	Vs
Red-tailed Tropicbird	*Phaethon rubricauda rothschildi*	Bi

TABLE 2. CONTINUED

Common name	Scientific name	Status
BOOBIES	***SULIDAE***	
(Blue-faced Booby)—Masked Booby	*Sula dactylatra personata*	Ri
Brown Booby	*Sula leucogaster plotus*	Ri
Red-footed Booby	*Sula sula rubripes*	Ri
CORMORANTS	***PHALACROCORACIDAE***	
Pelagic Cormorant	*Phalacrocorax pelagicus*	Vs
FRIGATEBIRDS	***FREGATIDAE***	
Great Frigatebird	*Fregata minor palmerstoni*	Ri
Lesser Frigatebird	*Frigata ariel*	Vs
HERONS, EGRETS	***ARDEIDAE***	
Great Blue Heron	*Ardea herodias*	Vs
Great Egret	*Ardea alba*	Vs
Snowy Egret	*Egretta thula*	Vs
Little Blue Heron	*Egretta caerulea*	Vo
Cattle Egret	*Bubulcus ibis*	An
(Green-backed Heron)—Green Heron	*Butorides virescens*	Vs
Black-crowned Night-Heron	*Nycticorax nycticorax hoactli*	Ri
IBISES	***THRESKIORNITHIDAE***	
White-faced Ibis	*Plegadis chihi*	Vs
GEESE, DUCKS	***ANATIDAE***	
Fulvous Whistling-Duck	*Dendrocygna bicolor*	Ri
(White-fronted Goose)—Greater White-fronted Goose	*Anser albifrons*	Vs
Emperor Goose	*Chen canagica*	Vo
Snow Goose	*Chen caerulescens*	Vs
Canada Goose	*Branta canadensis*	Vo
(Nēnē)—Hawaiian Goose	*E-Branta sandvicensis*	Re
Brant	*Branta bernicla*	Vo
(Whistling Swan)—Tundra Swan	*Cygnus columbianus*	Vs
Gadwall	*Anas strepera*	Vs
(European Wigeon)—Eurasian Wigeon	*Anas penelope*	Vs
American Wigeon	*Anas americana*	Vr
Mallard	*Anas platyrhynchos*	Al, Vo
(Koloa)—Hawaiian Duck	*E-Anas wyvilliana*	Re
Laysan Duck	*E-Anas laysanensis*	Re
Blue-winged Teal	*Anas discors*	Vo
Cinnamon Teal	*Anas cyanoptera*	Vs
Northern Shoveler	*Anas clypeata*	Vc
Northern Pintail	*Anas acuta*	Vc
Garganey	*Anas querquedula*	Vo
Green-winged Teal	*Anas crecca*	Vr
Canvasback	*Aythya valisineria*	Vs
Redhead	*Aythya americana*	Vs
Common Pochard	*Aythya ferina*	Vs
Ring-necked Duck	*Aythya collaris*	Vo
Tufted Duck	*Aythya fuligula*	Vs
Greater Scaup	*Aythya marila*	Vo
Lesser Scaup	*Aythya affinis*	Vr
Harlequin Duck	*Histrionicus histrionicus*	Vs
Surf Scoter	*Melanitta perspicillata*	Vs
Black Scoter	*Melanitta nigra*	Vs
Long-tailed Duck	*Clangula hyemalis*	Vs
Bufflehead	*Bucephala albeola*	Vo
Common Goldeneye	*Bucephala clangula*	Vs
Hooded Merganser	*Lophodytes cucullatus*	Vs
Common Merganser	*Mergus merganser*	Vs
Red-breasted Merganser	*Mergus serrator*	Vs
Ruddy Duck	*Oxyura jamaicensis*	Vs
HAWKS, EAGLES	***ACCIPITRIDAE***	
Osprey	*Pandion haliaetus*	Vo
Black Kite	*Milvus migrans*	Vs
Steller's Sea-Eagle	*Haliaeetus pelagicus*	Vs

TABLE 2. CONTINUED

Common name	Scientific name	Status
Northern Harrier	*Circus cyaneus*	Vs
Gray Frog-Hawk	*Accipiter soloensis*	Vs
('Io)—Hawaiian Hawk	*E-Buteo solitarius*	Re
Rough-legged Hawk	*Buteo lagopus*	Vs
Golden Eagle	*Aquila chrysaetos*	Vs
FALCONS	***FALCONIDAE***	
Merlin	*Falco columbarius*	Vs
Peregrine Falcon	*E-Falco peregrinus*	Vo
FRANCOLINS, OLD WORLD QUAIL, TURKEY	***PHASIANIDAE***	
Chukar	*Alectoris chukar*	Al
Gray Francolin	*Francolinus pondicerianus*	An
Black Francolin	*Francolinus francolinus*	An
Erckel's Francolin	*Francolinus erckelii*	An
Japanese Quail	*Coturnix japonica*	Al
Red Junglefowl	*Gallus gallus*	Al
Kalij Pheasant (Green Pheasant, Common Pheasant)—	*Lophura leucomelanos*	An
Ring-necked Pheasant	*Phasianus colchicus*	Al
Common Peafowl	*Pavo cristatus*	Al
Wild Turkey	*Meleagris gallopavo*	Al
NEW WORLD QUAIL	***ODONTOPHORIDAE***	
California Quail	*Callipepla californica*	Al
Gambel's Quail	*Callipepla gambelii*	Al
RAILS, GALLINULES, COOTS	***RALLIDAE***	
Laysan Rail	*Porzana palmeri*	Rx
Hawaiian Rail	*Porzana sandwichensis*	Rx
(Hawaiian Gallinule)—Common Moorhen	*E-Gallinula chloropus sandvicensis*	Res
(American Coot)—Hawaiian Coot	*E-Fulica alai*	Res
American Coot	*Fulica americana*	Vs
CRANES	***GRUIDAE***	
Sandhill Crane	*Grus canadensis*	Vs
PLOVERS	***CHARADRIIDAE***	
(Gray Plover)—Black-bellied Plover	*Pluvialis squatarola*	Vr
(Lesser or American Golden-Plover)—Pacific Golden-Plover	*Pluvialis fulva*	Vc
Mongolian Plover	*Charadrius mongolus*	Vs
Common Ringed Plover	*Charadrius hiaticula*	Vs
Semipalmated Plover	*Charadrius semipalmatus*	Vo
Killdeer	*Charadrius vociferus*	Vs
Eurasian Dotterel	*Charadrius morinellus*	Vs
STILTS	***RECURVIROSTRIDAE***	
(Hawaiian Stilt)—Black-necked Stilt	*E-Himantopus mexicanus knudseni*	Res
SANDPIPERS, WADERS	***SCOLOPACIDAE***	
Greater Yellowlegs	*Tringa melanoleuca*	Vs
Lesser Yellowlegs	*Tringa flavipes*	Vr
Wood Sandpiper	*Tringa glareola*	Vs
Solitary Sandpiper	*Tringa solitaria*	Vs
Willet	*Catoptrophorus semipalmatus*	Vs
Wandering Tattler	*Heteroscelus incanus*	Vc
(Siberian Tattler, Polynesian Tattler)—Gray-tailed Tattler	*Heteroscelus brevipes*	Vs
Spotted Sandpiper	*Actitis macularia*	Vs
Whimbrel	*Numenius phaeopus*	Vs
Bristle-thighed Curlew	*Numenius tahitiensis*	Vr
Far Eastern Curlew	*Numenius madagascariensis*	Vs
Hudsonian Godwit	*Limosa haemastica*	Vs
Bar-tailed Godwit	*Limosa lapponica*	Vo
Marbled Godwit	*Limosa fedoa*	Vs
Ruddy Turnstone	*Arenaria interpres*	Vc
Red Knot	*Calidris canutus*	Vs
Sanderling	*Calidris alba*	Vo

TABLE 2. CONTINUED

Common name	Scientific name	Status
Semipalmated Sandpiper	*Calidris pusilla*	Vs
Western Sandpiper	*Calidris mauri*	Vo
Red-necked Stint	*Calidris ruficollis*	Vs
Little Stint	*Calidris minuta*	Vs
Long-toed Stint	*Calidris subminuta*	Vs
Least Sandpiper	*Calidris minutilla*	Vo
Baird's Sandpiper	*Calidris bairdii*	Vs
Pectoral Sandpiper	*Calidris melanotos*	Vr
Sharp-tailed Sandpiper	*Calidris acuminata*	Vr
Dunlin	*Calidris alpina*	Vr
Curlew Sandpiper	*Calidris ferruginea*	Vs
Buff-breasted Sandpiper	*Tryngites subruficollis*	Vs
Ruff	*Philomachus pugnax*	Vo
Short-billed Dowitcher	*Limnodromus griseus*	Vo
Long-billed Dowitcher	*Limnodromus scolopaceus*	Vr
Common Snipe	*Gallinago gallinago*	Vo
Pin-tailed Snipe	*Gallinago stenura*	Vs
Wilson's Phalarope	*Phalaropus tricolor*	Vo
Red-necked Phalarope	*Phalaropus lobatus*	Vs
Red Phalarope	*Phalaropus fulicaria*	Vs
JAEGERS, GULLS, TERNS, NODDIES	***LARIDAE***	
South Polar Skua	*Stercorarius maccormicki*	Vs
Pomarine Jaeger	*Stercorarius pomarinus*	Vr
Parasitic Jaeger	*Stercorarius parasiticus*	Vs
Long-tailed Jaeger	*Stercorarius longicaudus*	Vs
Laughing Gull	*Larus atricilla*	Vo
Franklin's Gull	*Larus pipixcan*	Vs
Black-headed Gull	*Larus ridibundus*	Vs
Bonaparte's Gull	*Larus philadelphia*	Vo
Mew Gull	*Larus canus*	Vs
Ring-billed Gull	*Larus delawarensis*	Vo
California Gull	*Larus californicus*	Vs
Herring Gull	*Larus argentatus*	Vo
Slaty-backed Gull	*Larus schistisagus*	Vs
Western Gull	*Larus occidentalis*	Vs
Glaucous-winged Gull	*Larus glaucescens*	Vo
Glaucous Gull	*Larus hyperboreus*	Vs
Black-legged Kittiwake	*Rissa tridactyla*	Vs
Gull-billed Tern	*Sterna nilotica*	Vs
Caspian Tern	*Sterna caspia*	Vs
Great Crested Tern	*Sterna bergii*	Vs
Sandwich Tern	*Sterna sandvicensis*	Vs
Common Tern	*Sterna hirundo*	Vs
Arctic Tern	*Sterna paradisaea*	Vo
Little Tern	*Sterna albifrons*	Vs
Least Tern	*Sterna antillarum*	Vo
Gray-backed Tern	*Sterna lunata*	Bi
Sooty Tern	*Sterna fuscata oahuensis*	Bi
Whiskered Tern	*Chlidonias hybridus*	Vs
Black Tern	*Chlidonias niger*	Vs
(Common Noddy)—Brown Noddy	*Anous stolidus pileatus*	Ri
(Hawaiian Noddy, White-capped Noddy)—Black Noddy	*Anous minutus melanogenys*	Res
Blue-gray Noddy	*Procelsterna cerulea saxarilis*	Ri
(Common Fairy-Tern, Fairy Tern)—White Tern	*Gygis alba rothschildi*	Ri
AUKLETS, PUFFINS	***ALCIDAE***	
Cassin's Auklet	*Ptychoramphus aleuticus*	Vs
Parakeet Auklet	*Aethia psittacula*	Vd
Horned Puffin	*Fratercula corniculata*	Vs
Tufted Puffin	*Fratercula cirrhata*	Vd

TABLE 2. CONTINUED

Common name	Scientific name	Status
SANDGROUSE	***PTEROCLIDIDAE***	
Chestnut-bellied Sandgrouse	*Pterocles exustus*	An
DOVES	***COLUMBIDAE***	
Rock Dove	*Columba livia*	Al
(Chinese Dove, Lace-necked Dove)—Spotted Dove	*Streptopelia chinensis*	Al
(Barred Dove)—Zebra Dove	*Geopelia striata*	Al
Mourning Dove	*Zenaida macroura*	An
PARAKEETS	***PSITTACIDAE***	
Rose-ringed Parakeet	*Psittacula krameri*	An
CUCKOOS	***CUCULIDAE***	
Common Cuckoo	*Cuculus canorus*	Vs
Yellow-billed Cuckoo	*Coccyzus americanus*	Vs
BARN OWLS	***TYTONIDAE***	
Barn Owl	*Tyto alba*	An
TYPICAL OWLS	***STRIGIDAE***	
(Hawaiian Owl)—Short-earned Owl	*Asio flammeus sandwichensis*	Res
NIGHTHAWKS	***CAPRIMULGIDAE***	
Common Nighthawk	*Chordeiles minor*	Vs
SWIFTLETS	***APODIDAE***	
(Uniform, Island or Gray Swiftlet)—Guam Swiftlet	*Aerodramus bartschi*	An
KINGFISHERS	***ALCEDINIDAE***	
Belted Kingfisher	*Ceryle alcyon*	Vs
HONEYEATERS	***MELIPHAGIDAE***	
ʻŌʻōʻāʻā—Kauaʻi ʻŌ ʻō	*E-Moho braccatus*	Re
Oʻahu ʻŌʻō	*Moho apicalis*	Rx
(Molokaʻi ʻŌʻō)—Bishop's ʻŌʻō	*Moho bishopi*	Rx
Hawaiʻi ʻŌʻō	*Moho nobilis*	Rx
Kioea	*Chaetoptila angustipluma*	Rx
CROWS	***CORVIDAE***	
(ʻAlalā)—Hawaiian Crow	*E-Corvus hawaiiensis*	Re
MONARCH FLYCATCHERS	***MONARCHIDAE***	
ʻElepaio	*Chasiempis sandwichensis*	
{Kauaʻi ʻElepaio}—	*C. s. sclateri*	Re
{Oʻahu ʻElepaio}—	*C. s. ibidis*	Re
{Hawaiʻi ʻElepaio}—	*C. s. sandwichensis, ridgwayi, bryani*	Re
LARKS	***ALAUDIDAE***	
(Eurasian Skylark)—Sky Lark	*Alauda arvensis*	Al, Vs
SWALLOWS	***HIRUNDINIDAE***	
Barn Swallow	*Hirundo rustica*	Vs
TITS	***PARIDAE***	
(Japanese Tit, Yamagara)—Varied Tit	*Parus varius*	Ax
BULBULS	***PYCNONOTIDAE***	
Red-vented Bulbul	*Pycnonotus cafer*	An
Red-whiskered Bulbul	*Pycnonotus jocosus*	An
OLD WORLD WARBLERS	***SYLVIIDAE***	
(Uguisu)—Japanese Bush-Warbler	*Cettia diphone*	Al
Millerbird	*Acrocephalus familiaris*	
{Laysan Millerbird}—	*A. f. familiaris*	Rx
{Nihoa Millerbird}—	E-*A. f. kingi*	Re
THRUSHES, SOLITAIRES	***TURDIDAE***	
(Shama Thrush)—White-rumped Shama	*Copsychus malabaricus*	Al
(Large Kauaʻi Thrush)—Kāmaʻo	*E-Myadestes myadestinus*	Re
(Oʻahu Thrush)—ʻĀmaui	*Myadestes woahensis*	Rx
Olomaʻo	*Myadestes lanaiensis*	
{(Molokaʻi Thrush)—Molokaʻi Olomaʻo}—	*E-M.l. rutha*	Re

TABLE 2. CONTINUED

Common name	Scientific name	Status
{(Lāna'i Thrush)—Lāna'i Oloma'o}—	*M. l. lanaiensis*	Rx
(Hawai'i Thrush)—'Ōma'o	*Myadestes obscurus*	Re
(Small Kaua'i Thrush)—Puaiohi	*E-Myadestes palmeri*	Re
BABBLERS	***TIMALIIDAE***	
Greater Necklaced Laughing-thrush	*Garrulax pectoralis*	Al
Gray-sided Laughing-thrush	*Garrulax caerulatus*	Al
(Melodious Laughing-thrush, Chinese Thrush)—Hwamei	*Garrulax canorus*	Al
(Pekin Nightingale, Japanese Hill-robin)—Red-billed Leiothrix	*Leiothrix lutea*	Al
WHITE-EYES	***ZOSTEROPIDAE***	
(Mejiro)—Japanese White-eye	*Zosterops japonicus*	Al
MOCKINGBIRDS	**MIMIDAE**	
Northern Mockingbird	*Mimus polyglottos*	Al
STARLINGS, MYNAS	***STURNIDAE***	
European Starling	*Sturnus vulgaris*	Vs
Common Myna	*Acridotheres tristis*	Al
PIPITS	***MOTACILLIDAE***	
Olive-backed Pipit	*Anthus hodgsoni*	Vs
Red-throated Pipit	*Anthus cervinus*	Vs
American Pipit	*Anthus rubescens*	Vs
EMBERIZIDS	***EMBERIZIDAE***	
Yellow-faced Grassquit	*Tiaris olivacea*	An
Saffron Finch	*Sicalis flaveola*	An
(Brazilian Cardinal)—Red-crested Cardinal	*Paroaria coronata*	Al
Yellow-billed Cardinal	*Paroaria capitata*	Al
Savannah Sparrow	*Passerculus sandwichensis*	Vs
Snow Bunting	*Plectrophenax nivalis*	Vs
CARDINALS	***CARDINALIDAE***	
(American or Kentucky Cardinal)—Northern Cardinal	*Cardinalis cardinalis*	Al
MEADOWLARKS, GRACKLES	***ICTERIDAE***	
Western Meadowlark	*Sturnella neglecta*	Al
Great-tailed Grackle	*Quiscalus mexicanus*	Vs
FINCHES	**FRINGILLIDAE**	
CARDUELINE FINCHES	**CARDUELINAE (subfamily)**	
(Linnet)—House Finch	*Carpodacus mexicanus*	Al
Common Redpoll	*Carduelis flammea*	Vs
(Green Singing-Finch)—Yellow-fronted Canary	*Serinus mozambicus*	An
(Canary)—Common Canary	*Serinus canaria*	Al
HAWAIIAN HONEYCREEPERS	**DREPANIDINAE (subfamily)**	
FINCH-BILLED HONEYCREEPERS	***PSITTIROSTRINI (tribe)***	
Laysan Finch	*E-Telespiza cantans*	Re
Nihoa Finch	*E-Telespiza ultima*	Re
'Ō'ū	*E-Psittirostra psittacea*	Re
Lāna'i Hookbill	*Dysmorodrepanis munroi*	Rx
Palila	*E-Loxioides bailleui*	Re
Lesser Koa-Finch	*Rhodacanthis flaviceps*	Rx
Greater Koa-Finch	*Rhodacanthis palmeri*	Rx
(Grosbeak Finch)—Kona Grosbeak	*Chloridops kona*	Rx
Maui Parrotbill	*E-Pseudonestor xanthophrys*	Re
SLENDERBILLED HONEYCREEPERS	***HEMIGNATHINI (tribe)***	
Hawai'i 'Amakihi	*Hemignathus virens*	
{Hawai'i 'Amakihi}—	*H. v. virens*	Re
{Maui 'Amakihi}—	*H. v. wilsoni*	Re
O'ahu 'Amakihi	*Hemignathus flavus*	Re
Kaua'i 'Amakihi	*Hemignathus kauaiensis*	Re

TABLE 2. CONTINUED

Common name	Scientific name	Status
(Lesser 'Amakihi)—'Anianiau	*Hemignathus parvus*	Re
(Green Solitaire)—Greater 'Amakihi	*Hemignathus sagittirostris*	Rx
Lesser 'Akialoa	*Hemignathus obscurus*	Rx
Greater 'Akialoa	*Hemignathus ellisianus*	
{Kaua'i 'Akialoa}—	*H. e. procerus*	Rx
{O'ahu 'Akialoa}—	*H. e. ellisianus*	Rx
{Lana'i 'Akialoa}—	*H. e. lanaiensis*	Rx
Nukupu'u	*Hemignathus lucidus*	
{Kaua'i Nukupu'u}—	*E- H. l. hanapepe*	Re
{O'ahu Nukupu'u}—	*H. l. lucidus*	Rx
{Maui Nukupu'u}—	*E-H. l. affinis*	Re
'Akiapōlā'au	*E-Hemignathus munroi*	Re
(Kaua'i Creeper)—'Akikiki	*Oreomystis bairdi*	Re
(Olive Green Creeper)—Hawai'i Creeper	*E-Oreomystis mana*	Re
(O'ahu Creeper)—O'ahu 'Alauahio	*E-Paroreomyza maculata*	Re
(Moloka'i Creeper)—Kākāwahie	*Paroreomyza flammea*	Rx
(Maui Creeper)—Maui 'Alauahio	*Paroreomyza montana*	
{Maui 'Alauahio}—	*P. m. newtoni*	Re
{Lana'i 'Alauahio}—	*P. m. montana*	Rx
(Kaua'i Ākepa)—'Akeke'e	*Loxops caeruleirostris*	Re
'Ākepa	*Loxops coccineus*	
{O'ahu 'Ākepa}—	*L. c. wolstenholmei*	Rx
{Maui 'Ākepa}—	*E-L. c. ochraceus*	Re
{Hawai'i 'Ākepa}—	*E-L. c. coccineus*	Re
RED AND BLACK HONEYCREEPERS	***DREPANIDINI (tribe)***	
Ula-'ai-hawane	*Ciridops anna*	Rx
'I'iwi	*Vestiaria coccinea*	Re
Hawai'i Mamo	*Drepanis pacifica*	Rx
(Perkins Mamo)—Black Mamo	*Drepanis funerea*	Rx
(Crested Honeycreeper)—'Ākohekohe	*E-Palmeria dolei*	Re
'Apapane	*Himatione sanguinea*	
{Laysan Honeycreeper}—	*H. s. freethii*	Rx
{'Apapane}—	*H. s. sanguinea*	Re
Po'ouli	*E-Melamprosops phaeosoma*	Re
OLD WORLD SPARROWS	***PASSERIDAE***	
(English Sparrow)—House Sparrow	*Passer domesticus*	Al
WAXBILLS, MANNIKINS	***ESTRILDIDAE***	
Red-cheeked Cordonbleu	*Uraeginthus bengalus*	An
Lavender Waxbill	*Estrilda caerulescens*	An
Orange-cheeked Waxbill	*Estrilda melpoda*	An
(Red-eared Waxbill)—Black-rumped Waxbill	*Estrilda troglodytes*	An
Common Waxbill	*Estrilda astrild*	An
(Strawberry Finch, Red Munia)—Red Avadavat	*Amandava amandava*	Al
African Silverbill	*Lonchura cantans*	An
(Ricebird, Spotted Munia)—Nutmeg Mannikin	*Lonchura punctulata*	Al
Tricolored Munia	*Lonchura malacca*	Al
Chestnut Munia	*Lonchura atricapilla*	An
Java Sparrow	*Padda oryzivora*	An

Notes: This table is modified from Robert Pyle's 1997 checklist of the birds of Hawaii. In all cases we have deferred to the American Ornithologist Union's 1998 Checklist of North American birds and the 42nd Supplement to the Checklist (AOU 2000) for common and scientific names and sequence of families and species. We have added macrons, diacritical marks, and glottal stops to all common names as indicated by Pyle (1997). Subspecies of resident species known to occur in the islands are indicated in brackets. Common names in parentheses are those commonly used in Hawai'i but not accepted by the AOU Check-list.

ly, The Nature Conservancy has pursued an aggressive control program for alien species that threaten the viability of native species populations and the ecological integrity of native Hawaiian ecosystems and established several large biological reserves. While the Sierra Club, Native Plant Society, Hawaii Audubon Society, and a number of state and federal agencies have all taken actions on behalf of Hawai'i's native flora and fauna, despite their efforts and extensive research efforts in the last 25 years (Banko et al. *this volume,* Steiner *this volume*), populations and species of native birds continue to be lost. Nonnative birds species comprise a large part of the current avifauna (Table 2).

If there is to be any hope of retaining even a majority of the currently endangered and threatened native Hawaiian species, more aggressive efforts are needed to seriously reduce agents known to be detrimental to native species (Smith 1985, 1989; Cuddihy and Stone 1990, Stone 1989, Banko et al. *this volume,* Scott and van Riper *this volume*). Despite widespread documentation of the impact of feral cats (*Felis catus*) on birds (Eberhard 1954, van Aarde 1978, Jehl and Parkes 1982, Tomkins 1985, Churcher and Lawton 1987, van Reusenburg and Bester 1988, Bloomer and Besler 1992, Seto and Conant 1996, Athens 1997, Radunzel et al. 1997), there are currently no cat control programs in place for passerine species and only limited efforts on behalf of seabirds (Hodges and Nagata *this volume*). Likewise, while the impact of rats (*Rattus* spp.) on Hawai'i's avifauna has yet to be fully documented, Atkinson's (1977) correlational study was suggestive, as was the extinction of five populations of native birds on Big South Cape Island in New Zealand shortly after the arrival of the roof rat (*Rattus rattus*; Atkinson 1985). Studies in New Zealand (Atkinson and Bell 1973) and elsewhere have shown the strong positive response of native species when nonnative rats are eliminated (Radunzel et al. 1997). In spite of this evidence, predator control programs are rare and are not being implemented over areas large enough to elicit a population response by native species. The elimination of rats from Midway Island is an exception (R. Shallenberger, pers. comm.).

In the absence of management activities to control or eliminate known causes of mortality to Hawaiian avifauna over areas comparable to the size of the distributional area of the threats, individuals will die, populations will be lost, and species will continue to go extinct. For some threats (e.g., predators, ungulates), known control techniques (e.g., Taylor and Katahira 1988, Katahira et al. 1993) only need be applied at a scale that is meaningful (the distributional area of a population or species). For others, such as avian malaria and avian pox, new techniques such as genetic engineering of disease resistant birds and introduction of sterile male mosquitoes must be developed and applied.

A first step to buy time and simultaneously to restore populations of other endemic Hawaiian species (plants and invertebrates) would be to restore the composition and structure of higher elevation xeric and mesic forest habitats on Maui and Hawai'i by eliminating alien animals and plants (e.g., rats, cats, ungulates, and fountain grass) from these areas. These recovered and restored habitats would act as refugia from avian diseases so prevalent at lower elevations.

The idea for this book came during informal discussions at the 67th annual meeting of the Cooper Ornithological Society in Hilo, Hawai'i, in April 1997. During that meeting there were 47 presentations on natural history, ecology and taxonomy of Hawaiian birds. We invited selected authors of those presentations to submit manuscripts for consideration in a peer reviewed book on the birds of Hawai'i. To fill gaps in topics covered we solicited eight additional manuscripts. There was a high degree of redundancy in references cited among authors. Because of this we chose to create a combined literature cited.

Common and scientific names of birds follow the 7th edition of the American Ornithologists Union Check-list (AOU 1998). Quentin Tomich's *Mammals in Hawaii* (Tomich 1986) was our reference for mammal names. For flowering plants we relied on *Manual of the Flowering Plants of Hawai'i* (Wagner et al. 1990 a,b). "Pronunciation of Hawaiian names is aided by the use of a reversed apostrophe (‘), to indicate the glottal stop, a stopping of sound, as between the vowell sounds in oh-oh in English; and by macrons over vowels—ā, ē, ī, ō, ū—which denote long stress. An asterisk preceding a place name indicates that pronunciation is uncertain" (Armstrong 1983:231). The orthography follows the revised and enlarged *Hawaiian Dictionary* (Pukui and Elbert 1986). For place names we followed the revised and enlarged *Place Names of Hawaii* (Pukui et al. 1976). When names could not be located there the spelling in the *Atlas of Hawaii* (Armstrong 1983) was followed.

This monograph includes 35 papers, most of which were presented at the 67th meeting of the Cooper Ornithological Society in Hilo, Hawai'i, in April 1997. Each paper has been peer reviewed by the editors and at least one outside reviewer. We have grouped the 35 chapters in

this book into six sections, each introduced with a historical review. Taken together, they report on the state of our knowledge concerning the Hawaiian avifauna at the end of the 20th century.

Hopefully, this synthesis volume will assist in some small way to help preserve the unique avifauna of Hawai'i and the Pacific islands so that future generations will be able to observe and hear some of the incredible sights and sounds that we have been privileged to experience during our short 'tour of duty' researching one of the most unique avifaunas on this planet.

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