Focal Species: Hawaiian Water birds:

- Hawaiian Coot or ʻAlae keʻokeʻo (*Fulica alai*)
- Hawaiian Gallinule or ʻAlae ʻUla (*Gallinula galeata sandvicensis*)
- Hawaiian Stilt or Aeʻo (*Himantopus mexicanus knudseni*)

Synopsis: These three waterbirds use a variety of wetlands, but habitat loss and degradation have reduced their range and abundance. The Hawaiian Coot is considered a full species, while the gallinule and stilt are subspecies of North American taxa. The coot and stilt are widespread and relatively numerous, but the more secretive gallinule is found on only two islands and is thought to have a smaller population. Habitat protection and management are keys to recovery of these species. They nest on the ground or in low wetland vegetation, where they are vulnerable to non-native predators, so predator control also is important to increase reproduction.

Hawaiian Coot, Gallinule, and Stilt (left to right). Photos Eric VanderWerf

Geographic region: Hawaiian Islands
Group: Water birds
Federal Status: Endangered (coot, gallinule, and stilt)
State status: Endangered (coot, gallinule, and stilt)
IUCN status: Vulnerable (coot only, gallinule and stilt NA)
PIF/ABC score, rank: 17/20, 18/20, 18/20, At-risk
Watch List 2007 Score: Red (coot, gallinule, and stilt)
Climate Change Score: Moderate (coot, gallinule, and stilt)

Status: The Hawaiian Coot, Hawaiian Gallinule, and Hawaiian Stilt are all listed as endangered under the U.S. Endangered Species Act (ESA) and by the state of Hawaii. The Hawaiian Coot is considered vulnerable by the IUCN. The Hawaiian Gallinule and Hawaiian Stilt are subspecies of the Common Gallinule and Black-necked Stilt of North America, respectively, and thus are not specifically considered by the IUCN. The Hawaiian Gallinule was formerly called the Hawaiian Moorhen, but in a recent taxonomic revision the North American and Eurasian forms were split and the North American form was renamed the Common Gallinule (Chesser et al. 2011), though under the ESA it is still listed as the Hawaiian Common Moorhen (*Gallinula chloropus sandvicensis*; USFWS 2011).

Population Sizes and Trends: The primary method used to monitor abundance of these species and other wetland birds is the biannual state-wide waterbird counted administered by the Hawaii Division of Forestry and Wildlife (DOFAW). The survey is conducted twice a year, in winter and summer, and covers most of the wetlands known to support waterbirds on each island (except Ni'ihau). Additional surveys are conducted monthly by USFWS staff at each national wildlife refuge.

Hawaiian Coot – The average number of Hawaiian Coots observed during the biannual state-wide waterbird count has averaged about 2,000 from 1997-2006, but numbers have fluctuated between 1,500 and 2,800 (USFWS 2011). The population trend has been increasing over the past 30 years (USFWS 2011, Reed et al. 2011), but numbers are still lower than historical estimates.

Hawaiian Gallinule – An average of 287 Hawaiian Gallinules were observed during the biannual state-wide waterbird count from 1998-2007 but numbers have fluctuated between about 100 and 450 (USFWS 2011). However, these numbers are not accurate and are best viewed as an index; the actual population size probably is higher, but it is difficult to estimate because of the species secretive habits and preference for densely vegetated wetlands. The population trend is thought to be increasing or stable (USFWS 2011, Reed et al. 2011).

Hawaiian Stilt – Based on the biannual Hawaiian waterbird counts from 1998-2007, the Hawaiian stilt population averaged 1,484 birds, but fluctuated between approximately 1,100 and 2,100 birds (USFWS 2011). The population trend has been increasing over the past 30 years (USFWS 2011, Reed et al. 2011), but numbers are still lower than historical estimates.

Range: All three species have patchy distributions because they are restricted to scarce wetland habitats. For distribution maps see USFWS (2011).

Hawaiian Coot - Hawaiian Coots currently are found on all the larger Hawaiian Islands except Kahoʻolawe, but breeding is restricted to relatively few sites (USFWS 2011). They occur primarily in coastal plain wetlands below 400 meters (1,320 feet) elevation. On Kaua'i, coots are found at many locations (USFWS 2011), but the largest concentrations are at Hanalei National Wildlife Refuge (NWR), the Kaua'i Lagoons golf course, Waitā Reservoir, and fragmented wetlands on the Mānā Plain. Coots may move seasonally between Kauaʻi and Niʻihau in response to water level changes in Niʻihau's ephemeral lakes, with over 900 birds counted on Ni`ihau in particularly wet years. On Oʻahu, most coots are found in coastal wetlands along the northern, eastern, and southern sides of the island, with large concentrations at the Ki`i Unit of James Campbell (NWR), the Kahuku aquaculture ponds, Kuilima wastewater treatment plant, Ka`elepulu Pond and Hāmākua Marsh State Waterbird Sanctuary in Kailua, Pearl Harbor NWR, and the Hawai`i Prince Golf Course. Smaller number are found on interior reservoirs such as Lake Wilson, Nuʻuanu Reservoir, and Salt lake. On Maui, the majority of coots occur at Keālia Pond NWR and Kanahā Pond State Wildlife Sanctuary, with smaller numbers at various sugar cane settling ponds. On Molokaʻi, most coots occur at the Kaunakakai and Maunaloa Wastewater Reclamation Facilites and at Ohiapilo Pond Bird Sanctuary. A small number of coots are found at the Lānaʻi City wastewater treatment plant. On the island of

Hawai‘i, coots are found primarily at ‘Aimakapā and ‘Ōpae‘ula ponds and the Kona wastewater treatment ponds on the Kona Coast, and Waiākea and Loko Waka ponds in Hilo.

Hawaiian Gallinule - Hawaiian Common Gallinules currently are found only on the islands of Kaua`i and O`ahu, with each island supporting roughly half the total population, but historically Hawaiian Gallinules occurred on all the main Hawaii Islands except Lāna‘i and Kaho‘olawe (USFWS 2011). They occur in densely vegetated wetlands, usually below 125 meters (410 feet) elevation. On Kaua‘i, the largest populations occur in the Hanalei and Wailua river valleys, and in irrigation canals on the Mānā Plains of southwestern Kaua‘i. On O‘ahu, the species is widely distributed with most birds found on the northern and eastern coasts between Hale‘iwa and Waimanalo; smaller numbers occur at Pearl Harbor and the leeward coast at Lualualei Valley.

Hawaiian Stilt - Hawaiian Stilts currently occur on all the main Hawaiian Islands except Kaho‘olawe. They occur primarily in wetlands below 200 meters (660 feet) elevation. On Kaua‘i, stilts are found in large river valleys including Hanalei, Wailua, and Lumaha‘i, on the Mānā Plains, and at reservoirs and former sugarcane settling ponds near Līhue and Waimea. Hawaiian Stilts move seasonally between Kaua‘i and Ni‘ihau in response to water level changes in Ni‘ihau’s ephemeral lakes. On O‘ahu, the largest numbers are found on the northern and eastern coasts, including James Campbell NWR, Turtle Bay Wastewater Treatment Plant, the Kahuku aquaculture ponds, Nu‘upia ponds at Marine Corps Base Hawai’i in Kāne‘ohe, Ka`elepulu Pond and Hāmākua Marsh State Waterbird Sanctuary in Kailua, the Waiawa and Honouliuli units of Pearl Harbor NWR, and Pouhala Marsh State Waterbird Sanctuary. On Maui, the majority of coots occur at Keālia Pond NWR and Kanahā Pond State Wildlife Sanctuary, with smaller numbers at various sugar cane settling ponds. On Moloka‘i, most stilts occur at the Kaunakakai Wastewater Reclamation Facility and at Ohiapilo Pond. On Lāna‘i, a population of stilts occurs at the Lāna‘i City wastewater treatment ponds. On the island of Hawai‘i, the largest numbers of stilts occur on the Kona coast at ‘Aimakapā Pond, the Kealakehe sewage treatment plant, at ‘Ōpae‘ula Pond and at the Cyanotech ponds at the Hawaii Energy Lab.

Essential Biology: All three species are found in a variety of wetland habitats, including freshwater marshes and ponds, coastal estuaries and ponds, artificial reservoirs, kalo or taro (*Colocasia esculenta*) lo’i or patches, irrigation ditches, sewage treatment ponds, and golf course ponds, but they differ somewhat in their habitat preferences. Hawaiian Coots often use more open wetlands with deeper water. Hawaiian Stilts favor shallower water for foraging and are more tolerant of higher salinity. Hawaiian Gallinules are more secretive and prefer wetlands and marshes with dense emergent and shoreline vegetation (Desrochers et al. 2008). Nests are built on the ground or in low wetland vegetation, where they are vulnerable to non-native predators and flooding from fluctuating water levels.

Hawaiian Coot – The Hawaiian Coot is a dark gray to black rail (Rallidae) with white undertail coverts. It is smaller than the American Coot (*F. americana*) and has a larger, more bulbous frontal shield above the bill. The bill and frontal shield are white in most Hawaiian Coots, with a small percentage having a brick red to brown shield and a maroon subterminal ring at the tip of the bill, similar to the American Coot. Coots have large feet with lobed toes, unlike the webbed feet of ducks. Calls include a variety of loud clucks.

Hawaiian Coots occur in a variety of wetland types, including natural marshes and ponds, artificial reservoirs, kalo or taro (*Colocasia esculenta*) lo'i or patches, irrigation ditches, sewage treatment ponds, and golf course ponds. They are most common in low elevation wetlands that have both open water and emergent vegetation (Brisbin et al. 2002, USFWS 2011). They prefer freshwater but are often found in brackish wetlands. Hawaiian Coots are generalist feeders, obtaining food from the water surface, by diving to the bottom, picking in mud, sand, and shallow water, and grazing on upland grassy sites near wetlands. Foods eaten include algae, leaves and seeds of a variety of aquatic plants, various invertebrates including snails, crustaceans, insects and their larvae, tadpoles, and small fish (USFWS 2011). They usually forage in water less than 30 cm (12 in) deep, but can dive below the surface up to about 120 cm (48 in).

The nesting season is primarily in late winter and spring but may vary depending on water levels, and nests have been found in all months (Shallenberger 1977, Byrd et al. 1985, Engilis and Pratt 1993). The nest is a platform built of aquatic vegetation and may be floating in open water, anchored to emergent vegetation, or in clumps of vegetation on the shoreline. Small islands may be preferred if available (USFWS 2011). Clutch size averages 5 eggs but ranges from 3-10. Eggs hatch after 25 days and the chicks are able to swim and forage as soon as their down has dried (Shallenberger 1977, Byrd et al. 1985, Brisbin et al. 2002). Hawaiian Coots may gather in large flocks outside the nesting season and may move large distances, even among islands, in search of food and preferred water levels (Engilis and Pratt 1993, Dibben-Young 2010, USFWS 2011). There is limited information on survival of adults or juveniles.

Hawaiian Gallinule – The Hawaiian Gallinule is a dark gray to black rail (Rallidae) with white undertail coverts, white stripes on the flanks, yellow legs with long, unlobed toes, and a bright red frontal shield and bill with a yellow tip. It differs slightly from the North American Common Gallinule in having a reddish blush on the front of the legs (USFWS 2011).

Hawaiian Gallinules prefer freshwater wetlands with water depth less than 1 meter (3.3 feet) and dense emergent and shoreline vegetation (USFWS 2011). Moorhens are secretive and shy, foraging in dense emergent or floating vegetation. Foods eaten include algae, grasses, plant seeds, aquatic insects and their larvae, and mollusks, but they are opportunistic and diet may vary among habitats (Shallenberger 1977).

Nesting occurs year round but is concentrated from March-August and may depend on water levels (Shallenberger 1977, Byrd and Zeillemaker 1981). Nests are built in areas of dense aquatic vegetation and are formed from emergent plants bent over into a platform. Clutch size averages 5 eggs and eggs hatch after 19-22 days. Chicks are precocial and can walk and swim within a few hours of hatching but are dependent on their parents for cover and finding food for several weeks. Pairs have been observed with broods of 2-7 chicks, with an average of 4.4 (Smith and Polhemus 2003), but there is no information on survival of chicks to maturity or adult survival. Hawaiian Gallinules are territorial and defend an area of wetland ranging in size from 0.09-0.24 ha (0.22-0.60 acres; Smith and Polhemus 2003). Hawaiian Gallinules cannot fly for about 25 days each year when they are molting, usually from June-September, increasing their vulnerability to predation (DesRochers et al. 2009). Gallinules are more sedentary than coots, but some dispersal occurs in spring among wetlands, and probably islands, in response to water levels and has been documented with banded birds (Engilis and Pratt 1993, Dibben-Young 2010).

Hawaiian Stilt – The Hawaiian Stilt is a tall (40 cm, 16 in), slender, black and white shorebird with very long pink legs and a thin black bill. Females are more brownish on the back than males, and immatures have more white on the face and sides of the neck. The bill, legs, and tail are slightly longer than in the North American Black-necked Stilt (Robinson et al. 1999), and it also has more black on the face and sides of the neck (the juvenile is more similar in appearance to the North American form).

Hawaiian Stilts are opportunistic feeders that take a variety of prey from shallow water and mudflats. Food items documented include insects, polychaete worms, crustaceans, tadpoles, and small fish (USFWS 2011). They prefer water less than 13 cm (5 in) for foraging, though they sometimes forage in grassy areas adjacent to wetlands. Such shallow wetlands are often ephemeral, forming after heavy rains and varying seasonally, and movements by stilts among wetlands and among islands are thought to be driven by searching for preferred feeding conditions (Engilis and Pratt 1993, Reed et al. 1994, 1998b).

Hawaiian Stilts nest on bare exposed ground, often mudflats, sometimes interspersed with low vegetation. The nest is a simple scrape, sometimes with small stones around the edge. Islands may be preferred for nesting if available (Shallenberger 1977, USFWS 2011). Hawaiian Stilts are territorial during the breeding season, with the distance between nests ranging from 16-over 80 m (53-262 feet; Coleman 1981, Robinson et al. 1999). The nesting season extends from February-August but varies among years, perhaps depending on water levels (USFWS 2011). The clutch size is 3-4 eggs, which hatch after about 24 days (Coleman 1981, Chang 1990). The chicks are precocial and leave the nest within 24 hours but remain with their parents for several months. Hatching and fledging success vary among sites and years, with most failures caused by predation and flooding (Chang 1990, USFWS 2011). Robinson et al. (1999) estimated that 2.18 eggs hatched per nest and 0.93 chicks fledged per successful nest. Reed et al. (1998a) estimated survival of first-year birds to be 0.53-0.60 and survival of second year birds to be 0.80.

Primary Threats:

The two most serious threats to all endemic Hawaiian waterbirds are loss and degradation of wetland habitat and predation by non-native animals. Several other factors have contributed to waterbird population declines and continue to be detrimental, some of which are more species-specific as noted below.

- Habitat loss and degradation. Filling, dredging, and draining of wetlands in Hawaii has greatly reduced the amount of habitat available for Hawaii's waterbirds and thus limited their distribution and abundance. In the last 110 years, approximately 31 percent of coastal plain wetlands have been lost (USFWS 2011). A shift from wetland agriculture to other crops also has reduced the amount of wetland habitats. Many of the wetlands that remain have been degraded by the factors below.
- Predators. Hawaiian waterbirds are threatened by a variety of non-native predators. Feral dogs (*Canis familiaris*), feral cats (*Felis silvestris*), and small Indian mongooses (*Herpestes auropunctatus*) prey on adults and young. Predation by rats (*Rattus* spp.), Cattle Egrets (*Bulbulcus ibis*), and Barn Owls (*Tyto alba*) has been documented on eggs or chicks. Bullfrogs (*Rana catesbeiana*) were documented to be important predators on Hawaiian Stilt chicks at James Campbel NWR (Eijzenga 2004). These predators are pervasive in wetland habitats throughout Hawai'i, but mongooses do not occur on Lāna'i. Mongooses have been captured recently on Kaua'i but may not be established yet; preventing them from becoming established is of the highest priority. Native predators

include the Black-crowned Night Heron (*Nycticorax nycticorax*) and Short-eared Owl or Pueo (*Asio flammeus*), which prey on chicks.

- Altered hydrology. Modifications to wetland habitats for flood control, agriculture, or to make them suitable as municipal water sources may compromise their value as habitat for wetland birds.
- Non-native invasive plants. Several species of invasive alien plants can reduce value of wetland habitat for waterbirds, particularly California grass (*Urochloa mutica*), water hyacinth (*Eichornia crassipes*), mangrove (*Rhizophora mangle*), and Indian fleabane (*Pluchea indica*).
- Avian diseases. Avian botulism is a paralytic disease caused by ingestion of a toxin produced by the bacteria *Clostridium botulinum*. Botulism outbreaks occur regularly in Hawaiian wetlands, and often are triggered by anaerobic conditions in warm water with decomposing vegetation and invertebrates. Birds can be treated if detected early, but outbreaks sometimes cause substantial mortality.
- Environmental contaminants. Fuel and oil spills in or near wetland habitats are a threat to Hawaiian waterbirds.
- Human disturbance and hunting. The Hawaiian Stilt, Hawaiian Gallinule, and Hawaiian Coot were popular game birds until hunting was prohibited in 1939, and hunting contributed to population declines.
- Climate change. Hawaiian waterbirds are vulnerable to climate change, particularly rising sea level, because they occur primarily in low-lying coastal wetlands. Rising water levels and storm surge could flood nests and inundate nesting areas. Incursions of salt water into freshwater wetlands appear to diminish habitat suitability.

Conservation Actions to Date: The Hawaiian Gallinule was declared an endangered species by the Federal government in 1967, and the Hawaiian Coot and Hawaiian Stilt were added to the Federal endangered species list in 1970. All three species also are considered endangered by the State of Hawai'i. Many important wetlands have been legally protected by several agencies and organizations, including: six national wildlife refuges managed by the U.S. Fish and Wildlife Service at Hanalei and Hulē'ia on Kaua'i, James Campbell and Pearl Harbor on O'ahu, Kakahai'a on Moloka'i, and Keālia Pond on Maui; State waterbird sanctuaries managed by the Hawai'i Division of Forestry and Wildlife at Kawai'ele on Kaua'i, Kawainui Marsh, Hamakua Marsh, Paiko Lagoon, and Pouhala Marsh on O'ahu, and Kanahā Pond on Maui; 'Aimakapā Pond managed by the National park Service on Hawaii; and Nu'upia Ponds at Marine Corps Base Hawai'i and Niuli'i Pond at Lualualei Naval Magazine. Several private landowners also manage wetlands for the benefit of Hawaiian waterbirds, including Kamehameha Schools, Kaelepulu Wetland Preserve in Kailua, and the Midler family on Kaua'i. These wetlands are managed to varying degrees to provide habitat conditions favored by waterbirds through actions including water level control, removal of non-native plants, and prescribed burning. Non-native predators are controlled at many sites, including all the national wildlife refuges, many of the State Waterbird Sanctuaries, Nu'upia Ponds, and at additional sites such as Ohiapilo and the Kaunakakai Wastewater Treatment Plant on Moloka'i. Artificial nesting islands have been created to

Hawaiian Coot nest on artificial island, Moloka'i. Photo A. Dibben-Young

provide further protection from predators at Pearl Harbor NWR, Kaelepulu, and Marine Corps Base Hawaii, and at Kaunakakai Wastewater Treatment Plant using bodyboards. Several planning efforts and partnerships have been undertaken to improve and coordinate protection and management of wetlands, including the Pacific Coast Joint Venture and Chevron (Ducks Unlimited 2006, USFWS 2011). Habitat restoration is currently underway at several sites, notably Kawainui Marsh on Oahu and the Mānā Plain on Kaua'i, both of which have great potential to support large numbers of waterbirds. An attempt was made to re-establish Hawaiian Gallinules on Molokai by releasing six marked birds at Kakaha'ia NWR in 1983, but no birds have been observed there since 1986 when five were shot for food (Dibben-Young 2011). The sixth bird was recovered by USFW personnel. Various research has been conducted, some of which remains unpublished and difficult to obtain, on habitat requirements, movements, breeding biology, and conservation of Hawaii's endangered waterbirds (see references).

Planning/Research Needs:

- Further analyze existing data from the State waterbird count from 1950 to present to estimate population size and trend for each species on each island. Population estimates and trends were produced by the USFWS (2011) using data from 1976-2008, but more recent and longer-term estimates are needed. Reed et al. (2011) used a modeling approach to estimate population trends from 1956-2007, which exposed problems with missing data that precluded analysis of coots and stilts on Kaua'i. However, it should be possible to improve estimates of population size and trend by using other methods that can include all available data.
- Improve survey methods and recording form used in the biannual state-wide waterbird survey. Guidance was developed by the USFWS in 2005 to help improve consistency, but further refinements are needed, including review of wetlands that are included (and excluded).
- Improve survey methods for the Hawaiian Gallinule. Research has shown that playbacks increase the detectability of gallinules and result in more accurate population estimates (Desrochers et al. 2008), but this methodology has not yet been incorporated into the biannual waterbird count. Alternatively, a correction factor could be developed and applied to data collected using the current methods.
- Conduct long-term demographic studies to determine basic reproductive biology, population trends, survival rates, longevity, and limiting factors.
- Improve relations with private landowners of Ni'ihau and restore access to conduct waterbird surveys and assess populations.

5-Year Conservation Goals:

- Continue protection and management of important wetland habitats.
- Increase the number and distribution of wetlands in Hawaii that are useful to waterbirds.
- Re-establish a breeding population of Hawaiian Gallinules on Maui and Moloka`i.
- Produce current and accurate estimates of population size and trend of each species on each island.
- Develop more effective methods to reduce predation and explore the use of predator–proof fences.

Conservation Actions:

- Habitat Restoration.
    - Continue efforts to manage wetland habitat and hydrology on the Mānā Plain of Kaua'i, where wetlands were drained historically for sugar cane production.
    - Continue management of Kawainui Marsh on O'ahu. This large wetland is recognized as a Ramsar site but currently supports few native waterbirds and is largely choked with alien plants.
- Predator Control.
    - Prevent establishment of mongooses on Kaua'i and Lāna'i using all available methods. Improve biosecurity at airports and seaports.
    - Construct predator-proof fences at Kanahā Pond on Maui and at James Campbell, Honouliuli, and Waiawa National Wildlife Refuges on O'ahu to increase nesting success of waterbirds and eliminate the need for continual predator control. Before fence construction, each site will require a scoping and feasibility study to determine the optimum size and placement of a fence and the estimated cost, a cost-benefit analysis comparing other forms of management, and regulatory compliance.
    - Develop improved methods of controlling bullfrogs and invasive fishes.
- Translocation. Translocate Hawaiian Gallinules to Maui and Moloka`i in order to re-establish additional breeding populations and decrease the risk of extinction.

Summary and Estimated Costs of Conservation Actions, 2013-2017:

Conservation Action	Year(s)	Annual cost	Total Cost
Habitat management at Mānā Plain, Kaua'i	1-5	$300,000	1,500,000
Habitat management at Kawainui Marsh, Oahu	1-5	$300,000	1,500,000
Prevent establishment of mongooses on Kaua'i and Lāna'i	1-5	$150,000	$750,000
Construct and maintain a predator-proof fence at Kanahā Pond, Maui	1-5		$1,000,000
Construct and maintain a predator-proof fence at James Campbell NWR, O'ahu	1-5		$1,000,000
Construct and maintain a predator-proof fence at Honouliuli NWR, O'ahu	1-5		$1,000,000
Construct and maintain a predator-proof fence at Waiawa NWR, O'ahu	1-5		$1,000,000
Establish Hawaiian Gallinule populations on Maui and Moloka'i	2-5	$150,000	$600,000
Analyze existing survey data to determine current population size and trend for all 3 species	1-2	$20,000	$40,000
Develop improved methods for surveying Hawaiian Moorhens using playbacks	1-2	$15,000	$30,000

Potential Partners: U.S. Fish and Wildlife Service-Refuges, Hawaii Division of Forestry and Wildlife, Department of Hawaiian Home Lands, Ducks Unlimited, Pacific Coast Joint Venture, Kamehameha Schools, Kaelepulu Wetland Preserve.

Ancillary Species: The endangered Hawaiian Duck or Koloa (*Anas wyvilliana*) and the endangered Nēnē or Hawaiian Goose (*Branta sandvicensis*) occur in some of the same wetlands on Kauai and would benefit from the same actions. Predator exclusion or control could render some wetlands suitable for reintroduction of the endangered Laysan Duck (*Anas laysanensis*). Numerous species of migratory waterfowl and shorebirds use the same habitats that are important to the endemic Hawaiian waterbirds. Some of the more common migrants are Northern Pintail (*Anas acuta*), Northern Shoveler (*Anas clypeata*), American Wigeon (*Anas americana*), Lesser Scaup (*Aythya affinis*), Pacific Golden Plover (*Pluvialis fulva*), Wandering Tattler (*Tringa incanus*), Bristle-thighed Curlew (*Numenius tahitiensis*), Ruddy Turnstone (*Arenaria interpres*), and Sanderling (*Calidris alba*).

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