

## NORTHWESTERN HAWAIIAN ISLANDS

The Northwestern Hawaiian Islands (NWHI) extend approximately 1,600 kilometers (1,000 miles) from Ni‘ihau and Kaua‘i to Kure Atoll in the north. They consist of ten main atoll systems, each of which has one or more islands. The total number of islands varies as storms and climate change affect the presence of some small, sandy islands. These islands and atolls are remnants of earlier volcanic high islands in the Hawaiian chain that pre-date the Main Hawaiian Islands (MHI) in the southeast. Most of the NWHI islands, except those in the extreme southeast, have little vertical relief and only sandy soils with little forest development. This reduced habitat variability means there are far fewer natural habitats and lower species diversity than found in the MHI. However, there is a high abundance of endemic species and other significant animal populations in the region because of the less intensive historical human impact. Six species of plants in the NWHI are federally protected under the Endangered Species Act (ESA). The rocky islands in the southeast make excellent nesting areas for some cliff-nesting and other seabirds. Laysan Island has a large euryhaline lake that helps support the endemic and endangered Laysan ducks as well as some possibly unique aquatic fauna. Laysan and Nihoa also have extant populations of three other endemic birds that are endangered (Laysan finch, Nihoa finch, and Nihoa millerbird).

All of the islands support large nesting populations of various seabird species. In total, approximately 14 million individuals from 18 species of seabirds nest in the NWHI (‘akē‘akē (*Oceanodroma castro* [band-rumped storm petrel]), noio (*Anous minutus* [black noddy]), ka‘upu (*Phoebastria nigripes* [black-footed albatross]), blue-gray noddy (*Procelsterna cerulean*), Bonin petrel (*Pterodroma hypoleuca*), ‘ā (*Sula leucogaster* [brown booby]), noio-kōhā (*Anous stolidus* [brown noddy]), ‘ou (*Bulweria bulwerii* [Bulwer’s petrel]), Christmas shearwater (*Puffinus nativitatis*), ‘ua‘u (*Pterodroma sandwichensis* [Hawaiian petrel]), pākakala (*Sterna lunata* [gray-backed tern]), ‘iwa (*Fregata minor* [great frigatebird]), mōlī (*Phoebastria immutabilis* [Laysan albatross]), ‘ā (*Sula dactylatra* [masked booby]), ‘ā (*Sula sula* [red-footed booby]), koa‘e ‘ula (*Phaethon rubricauda* [red-tailed tropicbird]), ‘ewa‘ewa (*Sterna fuscata* [sooty tern]), ‘ua‘u kani (*Puffinus pacificus* [wedge-tailed shearwater]), manu-o-Kū (*Gygis alba* [white tern]), and koa‘e kea (*Phaethon lepturus* [white-tailed tropicbird])). The area is significant for having the majority of the worldwide breeding population of Laysan albatross (93%), black-footed albatross (95%), Bulwer’s petrels and Bonin petrels, and 25 percent of the worldwide population of wedge-tailed shearwaters. Many endemic terrestrial arthropods and land snails also occur in the NWHI. Many of the islands serve as nesting or pupping grounds for honu (*Chelonia mydas agassizi* [green sea turtles]) and ‘Īlio-holo-i-ka-uaua (*Monachus schauinslandi* [Hawaiian monk seals]), both of which are protected by the ESA. Marine habitat here is dominated by atoll reef systems and thus differs from the MHI, which mostly have fringing coral reefs. The NWHI have extensive atoll formations with large lagoons and patch reef complexes separated from the open ocean in many areas. Many endemic marine species occur only in the NWHI. The communities here are also less impacted by humans and invasive species and are dominated by large numbers of predatory sharks and jacks and a higher diversity of stony

corals than in the MHI. Significant cultural resources in the form of Native Hawaiian archaeological sites and historic ship and airplane wrecks occur in the area.

## **OVERVIEW**

### ***Geology and Oceanography***

The total coastline of all islands in the NWHI measures approximately 50 kilometers (30 miles) and total land area, excluding Midway Atoll, is about 8 square kilometers (3.1 square miles). The age of the various islands and atolls ranges from 7.2 million year old Nihoa to 27.7 million year old Midway Atoll. Because of the age of the islands, they have undergone extensive erosion and subsidence of their basaltic rock foundations. Only Mokumanamana Island (Necker), Nihoa, La Perouse Pinnacle, and Gardner Pinnacles have substantial exposed basaltic rock substrate. Further to the northwest, the islands consist of sandy substrates derived from reef formations overlaying the original basalt. There are about 2,220 square kilometers (860 square miles) of coral reefs in State waters around the NWHI, and about 6,300 square kilometers (2430 square miles) of reef in Federal Exclusive Economic Zone waters around the atolls and reefs that are part of Hawai'i (i.e., not including Midway Atoll and the submerged banks). Therefore, approximately 26 percent of the coral reefs of these areas are under State jurisdiction and management.

### ***Climate***

Rainfall and temperature are more consistent across and within these islands because of their small size. The winter season brings much larger sea swell. Precipitation averages about 50 to 75 centimeters (20 to 30 inches) per year.

### ***Land and Water Use***

All of the land in the NWHI is part of the Hawaiian Islands National Wildlife Refuge (HINWR), except Midway Atoll, which is managed as a separate National Wildlife Refuge, and Kure Atoll which is managed by the Hawai'i Department of Land and Natural Resources as a State Seabird Sanctuary. All the islands are part of the County of Honolulu, except Midway Atoll which is not part of the State of Hawai'i at all as it is a territory of the U.S. government. Waters out to ten fathoms (18.3 meters) deep around most of the islands (except to 20 fathoms deep around Mokumanamana Island (Necker)) are also part of the HINWR, so there is unique Federal-State co-management of the inshore waters. Federal waters from three miles (five kilometers) offshore to 50 miles (80 kilometers) offshore are part of the NWHI Coral Reef Ecosystem Reserve managed by the National Oceanic and Atmospheric Administration (NOAA).

### ***Human Landscape***

There is no real resident population besides a few HINWR staff on Sand Island at Midway, Laysan Island, and Tern Island at French Frigate Shoals. Historical occupation of Tern Island and Green Island at Kure Atoll by the Coast Guard, and Midway Atoll by the Navy, ended in the past 20 years, but left various environmental problems. Archaeological sites point to pre-historical occupation of Mokumanamana Island (Necker) and Nihoa. The principal economic driving forces in the NWHI today are

bottomfishing (one-third of the State's bottomfish come from the NWHI), the Wildlife Refuge and Coral Reef Ecosystem Reserve operations, and scientific research.

## **ISLAND AND ATOLL SUMMARIES**

The following are brief summaries of the various island and atoll systems, from north to south.

***Kure Atoll***, at the northwestern end of the archipelago, is the world's northernmost coral atoll. About ten kilometers (six miles) in diameter and one square kilometer (0.4 square miles) in land area, Kure is a typical atoll comprising one major island, Green Island, and one or more smaller, intermittent sand spits. Maximum elevation is six meters (20 feet). It has about 32,375 hectares (80,000 acres) of reef habitat. Kure is approximately 2,100 kilometers (1,300 miles) northwest of Honolulu. The U.S. Coast Guard closed the LORAN navigation station on Green Island and left the site in 1992. Since then, the atoll has only been occupied during National Marine Fisheries Service (NMFS) and State of Hawai'i summer field camps. Kure Atoll is managed as a State of Hawai'i Seabird Sanctuary. Bird and dolphin surveys, marine debris removal, and invasive vegetation control and native plant species replanting are the main management actions. Rats were eradicated from the island in the past. Introduced big-headed ants and scale insects are a potential threat as are introduced invasive plants. Toxic chemicals have been detected that are likely from the Coast Guard occupation. Hawaiian grouper are more abundant here in shallow water than in other parts of the NWHI. A large group of spinner dolphins lives in the atoll.

***Midway Atoll***, located approximately 2,040 kilometers (1,270 miles) northwest of Honolulu, consists of two major islands (Sand and Eastern), small sand islets, and a fringing coral reef. It is about ten kilometers (six miles) in diameter and 6.5 square kilometers (2.5 square miles) in land area. Maximum elevation is four meters (12 feet). It has about 36,000 hectares (89,000 acres) of reef habitat. Midway was discovered in 1859 and claimed by the United States. Since that time, there have been considerable activities that have resulted in significant alteration of the physical environment. Projects have included blasting a ship channel through the coral reef, the installation in 1902 of a cable station (which led to the introduction of various species of plants and animals and the importation of an estimated 9,000 tons of topsoil for use in gardening), and the construction of an airport in 1935 by Pan American Airways. Midway also played a critical role in WWII. USFWS established the Midway Atoll National Wildlife Refuge as an overlay refuge in 1988 through a cooperative agreement with the U.S. Navy, and the atoll was transferred from the Navy to USFWS in 1996. Midway is managed as the Midway Atoll National Wildlife Refuge and is not technically part of the State of Hawai'i. The world's largest breeding colony of mōlī (Laysan albatross) nests here, as does the second largest colony of ka'upu (black-footed albatross). The Refuge also contains important habitat for the monk seal, green sea turtle, large numbers of migratory seabirds, and a variety of coastal strand plants. The Refuge waters support numerous species of nearshore and other coral reef species, as well as pelagic fish, marine mammals, and sea turtles. The Refuge is currently closed to visitation.

***Pearl and Hermes Reef***, is a low coral atoll made up of as many as eight islets, five of which are permanent. The reef encloses an elliptical lagoon, approximately 32 kilometers by 18 kilometers (20 miles by 11 miles) in size and has 0.3 square kilometers (0.1 square miles) of land area. Maximum elevation is three meters (ten feet). It has about 121,400 hectares (300,000 acres) of reef habitat. The reef was unknown prior to 1822 when two British whaling ships, the *Pearl* and the *Hermes*, ran aground there on the same day. These wrecks were likely discovered in 2004. Beginning in 1902, Japanese feather poachers came to the NWHI and illegally took thousands of albatross, but the true extent of their poaching is not known. From 1926 to 1930, fishing operations for pearl oysters led to the construction of several buildings on the atoll's Southeast Island. This base was abandoned in October 1931 and U.S. forces destroyed the buildings during World War II. The atoll is unoccupied except for NMFS and USFWS summer field camps. Significant seabird, green sea turtle, and monk seal nesting or pupping occur here. About 160,000 seabirds from 17 species nest here, including about 20 percent of the world population of ka'upu (black-footed albatross). The Atoll is also an important nesting site for Tristram's storm-petrels. NMFS has removed over 300 tons of marine debris from the beaches and reefs over the past few years. Pearl oysters were historically far more common here than anywhere else in Hawai'i and have recovered somewhat from the overfishing. The HINWR is currently trying to remove invasive *Verbesina* weed here. Populations of Laysan finch introduced to provide another population to reduce the risk of extinction of the species on its native island of Laysan do well here, but have evolved different anatomy to deal with different food sources.

***Lisianski Island***, is a low, sandy island measuring approximately 1.6 kilometers (one mile) long and one kilometer (0.6 mile) wide, with a land area of 1.5 square kilometers (0.6 square miles). Maximum elevation is 12 meters (40 feet). It lies near the north edge of Neva Shoal, a large area varying in depth to 18 meters (60 feet). It has about 125,400 hectares (310,000 acres) of reef habitat. The island was discovered in 1805 by Capt. Urey Lisianski, a Russian explorer. During the same period, Lisianski was visited by expeditions harvesting fish, turtles, guano, bêche-de-mer (sea cucumbers), and sharks, as well as monk seals. More concentrated exploitation of the island took place during the period 1904-10 by Japanese feather poachers, but this activity was apparently halted by 1911. Mice and rabbits denuded the island of vegetation. Subsequent visits to Lisianski appear to have been limited. The atoll is unoccupied except for NMFS and USFWS summer field camps. There is significant seabird nesting including the largest bonin petrel colony in the world.

***Laysan Island***, the largest land area in the NWHI at four square kilometers (1.6 square miles), is a coral-sand island enclosing a hyper-saline lake of about 0.5 square kilometers (0.2 square miles) in area. The island is about three kilometers (two miles) long and 1.6 kilometers (one mile) wide and is partially surrounded by a fringing reef. Maximum elevation is 12 meters (40 feet). It has about 40,500 hectares (100,000 acres) of reef habitat. The first well-documented visit was by the Russian ship *Moller* in 1828. The biota of the island remained relatively undisturbed until the late 19th century. By the turn of the century, the activities of sealers and guano miners had seriously affected the Laysan monk seal population, nearly eliminating it. These activities were followed in

1909 to 1910 by intensive harvesting of bird skins and feathers by the Japanese, who carried out an additional poaching raid in 1915. Since that time, visits to Laysan have primarily been those of survey parties and scientific expeditions. The island has been occupied continuously since 1991 by USFWS volunteers attempting to eradicate invasive weeds and during the summer months by a NMFS field camp. The whole island is designated as critical habitat for endangered plants. Endangered and endemic Laysan ducks and finches occur naturally only on the island (though a group of Laysan ducks was recently introduced outside its native range to Midway Atoll, and Laysan finches were introduced to Pearl and Hermes Atoll). About two million individuals from 17 seabird species nest on the island. Laysan has the State's biggest nesting colonies of mōlī (Laysan albatross) and ka'upu (black-footed albatross) (Midway has the largest colonies in all of the NWHI). Laysan also has the largest colonies of 'ua'u kani (wedge-tailed shearwaters) and Christmas shearwaters and a significant colony of koa'e 'ula (red-tailed tropicbirds). Revegetation with native plants is currently occurring as well as efforts to remove invasive *Verbesina* and *Cenchrus* weeds. It is the northernmost area where *Acropora* corals occur in the NWHI.

**Maro Reef** is an irregular reef network with no distinct atoll or fringing reef. It is approximately 19 kilometers by ten kilometers (12 miles by six miles) in size. It has about 202,300 hectares (500,000 acres) of reef habitat. There is only a small awash rock and no terrestrial wildlife. Marine areas have unique reef development with no consistent fringing reef, only intertwined reef spurs radiating out and encompassing several relatively isolated lagoons. High vertical relief and algal cover on the reefs are also atypical for the NWHI. Few monk seals or sea turtles occur or give birth here because of the lack of haul-out spots. There are unusually large populations of galapagos and other sharks that seem to occupy some of the predatory niche occupied by ulua at the other atolls.

**French Frigate Shoals**, a crescent shaped coral atoll about 19 kilometers by 28 kilometers (12 miles by 18 miles) in size, is open to the west and partially enclosed by a crescent-shaped reef to the east. The largest land area in the shoals is Tern Island; a number of smaller islets are scattered along the westerly reef of the crescent. There are two exposed volcanic rocks called La Perouse Pinnacles. Total land area is about 0.3 square kilometers (0.1 square miles); maximum elevation is 36 meters (120 feet) at La Perouse Pinnacle. It has about 93,000 hectares (230,000 acres) of reef habitat. The shoals were discovered by the French in 1786 and claimed by the United States in 1859. In 1882, a vessel chartered by a U.S. company visited the atoll and departed with a cargo of shark (flesh, fins, and oil), turtle (shells and oil), bêche-de-mer (sea cucumber), and bird down. During the 1930s, the U.S. Navy used the area extensively for training exercises. Following the Battle of Midway during World War II, an airbase was established on Tern Island, and construction of a LORAN navigation station was begun in 1944 on East Island. When the airbase was closed in 1946, fishermen from Hawai'i began to use the facilities. The East Island LORAN navigation station was in operation until 1952. At that time a new LORAN navigation station at Tern Island was activated and was operated by the USCG until mid-1979. The USFWS have occupied the facility since that date with a small staff, which is augmented by other agencies and private

projects throughout the year. It has the highest breeding populations of monk seals and green sea turtles and the highest coral diversity in the NWHI. There is a landfill that is contaminated with Poly-Chlorinated Biphenols (PCBs) and lead that has been proposed for removal from Tern Island. Reconstruction of the seawall is a priority ongoing project as the dilapidated wall can trap and harm seals and other wildlife. This is the only spot in the NWHI where all 18 species of seabirds known to nest in the NWHI nest.

***Gardner Pinnacles*** has a total land area of 0.03 square kilometers (0.01 square miles) and a maximum elevation of 57 meters (190 feet). It has about 242,800 hectares (600,000 acres) of reef habitat. The two volcanic rocks serve as roosting and breeding sites for smaller populations of 12 species of seabirds, including blue-gray noddies. A few monk seals haul out there. Coral diversity is high but abundance is low because of the lack of shallow water habitat and the predominance of high wave energy from the exposure to the open sea on all sides.

***Mokumanamana Island (Necker Island)***, about 1.4 kilometers (0.7 miles) long by 0.2 kilometers (0.2 miles) wide, is a rocky, J-shaped island consisting of two parts connected by a low isthmus. Total land area is 0.6 square kilometers (0.07 square miles) and maximum elevation is 82 meters (276 feet). It has about 153,800 hectares (380,000 acres) of reef habitat. Its European discovery is credited to a French navigator, La Perouse, in 1786, but prehistoric habitation of the island was noted about 1879 by one of the early landing parties. Ships periodically visited the island during the mid- and late-1800s, but heavy seas often thwarted landings. During the period of feather poaching by the Japanese early in the 20th century, patrol vessels visited Mokumanamana Island, but no evidence of harassment of the birdlife was seen. The whole island is designated as critical habitat for three endemic endangered plants. Nine insects are endemic to the island as are one trap-door spider and one land snail. About 60,000 seabirds from 16 species nest or roost on the island. There is a large colony of blue-gray noddies. Observations of seals at the island suggest that the species has occurred there regularly for at least a century, although likely for much longer. Mokumanamana Island is uninhabited and only rarely visited by humans. Both Mokumanamana and Nihoa have low coral diversity (less than 20 species) because of high wave action and scour.

***Nihoa Island***, the easternmost point of the NWHI, is a precipitous remnant of a volcanic peak, about 450 meters (1,500 feet) long and ranging in width from roughly 90 to 320 meters (300 to 1,000 feet). Total land area is 0.6 square kilometers (0.3 square miles); maximum elevation is 269 meters (903 feet). It has about 57,500 hectares (142,000 acres) of reef habitat. Nihoa was discovered by Europeans in 1779, though, like Necker Island, there is evidence of prehistoric human occupation. Over the years, difficulties in landing on the steep slopes of Nihoa have restricted visits and may explain why feather poachers did not attempt to exploit the island. During the 1960s, military personnel occupied Nihoa briefly. This island is rarely visited and only by USFWS staff, other researchers, and Native Hawaiians on cultural expeditions. The whole island is designated as critical habitat for endangered plants including three species endemic to the island. Endemic Nihoa millerbird and endemic Nihoa finch are both ESA listed. Over 500,000 seabirds nest on the island. The island supports the largest known colony of ‘ou

(Bulwer's petrel) in the world. It also supports the largest Hawaiian colonies of 'iwa (great frigatebirds), 'ā (brown boobies), 'ā (red-footed boobies), noio (black noddies), blue-gray noddies, noio-kōhā (brown noddies) and manu-o-Kū (white terns). There are at least 17 insects, six ticks and mites, a trap-door spider, and six land snails endemic to just this island. Recent outbreaks of the grasshopper *Schistocerca* are a concern for endangered plants and the birds and invertebrates that rely on this habitat.

### **SPECIES AND HABITATS OF IMPORTANCE**

Laysan, Lisianski, Necker, and Mokumanamana Islands are the most important islands for arthropods, seabirds, the endangered passerines (Laysan finch, Nihoa finch, and Nihoa millerbird), and Laysan duck. Data on seabird numbers is available through the Federal Pacific Seabird Monitoring Database. Green sea turtles and monk seals have their largest reproductive groups at French Frigate Shoals. Data are maintained by NMFS Pacific Islands Fisheries Science Center. Critical habitat for the monk seal was designated by NMFS in 1988 out from shore to 20 fathoms around the named islands (from Nihoa to Kure).

For marine species there is a peak in diversity of species in the middle of the NWHI, near French Frigate Shoals. The extreme north has cooler water temperatures that may limit some coral species and geographic isolation that may limit dispersal and recruitment of some species. The middle islands are also closer to Johnston Atoll and other Central Pacific Islands that may serve as stepping stones for recruitment of species from the south. In particular, some fishes and acroporid corals appear to exist in the NWHI for this reason. Abundance of species is good in most places, and historical damage from recent human occupation on Kure, Midway, and French Frigate Shoals is now reduced with the removal of military and Coast Guard facilities. A few endemic marine species only occur in the NWHI. They are: *Synchiropus kinmeiensis* (a dragonet fish) which has been collected from Maro Reef through Kure Atoll; *Scorpaenopsis pluralis* (a scorpionfish), known only from the holotype (original described specimen) collected off Laysan; *Epigonus devaneyi* (a deep water cardinalfish) which has been found from Necker Island to Maro Reef; and *Nerita plicata*, a shallow water snail that is found only in the NWHI. Biological data are gathered by USFWS, NMFS, National Ocean Service, and DAR research programs as well as collaborative research cruises among these agencies.

### **SUMMARY OF KEY THREATS TO SPECIES AND HABITATS**

Many general threats to native wildlife are discussed in Chapter 4 (Statewide Conservation Needs) and Chapter 5 (Marine Conservation Needs). Threats more acute or specific to the NWHI are listed below.

- Habitat degradation from non-native vegetation (*Cenchrus*, *Verbesina*);
- Unknown factors leading to decline in monk seals, especially at French Frigate Shoals, possibly related to changes in ocean productivity;
- Pollution (PCB and lead contamination on Tern Island; PCB's, pesticides, and copper at Kure);
- Marine debris;

- Introduced species on land or in water (historically, rabbits on Laysan and rats on Kure; currently, *Schistocerca* grasshoppers on Nihoa, along with at least 80 other introduced insect species);
- Seabirds and marine mammals are threatened by longline fishery interactions outside State jurisdiction;
- Climate change leading to loss of islands from storms and sea-level change and alteration to food webs;
- Natural disasters.

## **NWHI STRATEGIES**

In addition to the statewide strategies identified in association with the seven conservation objectives in Chapter 4 (Statewide Conservation Needs) (main bullet), additional NWHI specific strategies include the following (sub-bullet):

- Maintain, protect, manage, and restore native species and habitats in sufficient quantity and quality to allow native species to thrive.
  - Implement Recovery Plans for honu (green sea turtle) and monk seal;
  - Collaborate with Federal government and encourage residents to take steps that would reduce factors leading to climate change;
  - Develop and/or implement recovery plans for threatened and endangered species on NWHI;
  - Establish year round presence on Kure with expanded research, management, and education activities;
  - Develop access and monitoring plan for the Marine Managed Areas (MMAs);
  - Mitigate pollution at Kure atoll.
- Combat invasive species through a three-tiered approach combining prevention and interdiction, early detection and rapid response, and ongoing control or eradication.
  - Decrease acres dominated by invasive, non-native vegetation and insects;
  - Monitor for non-native marine algae and respond if detected.
- Develop and implement programs to obtain, manage, and disseminate information needed to guide conservation management and recovery programs.
  - Improve dissemination of research and data regarding native species populations and habitat condition;
  - Conduct surveys and inventories for invertebrates in currently managed areas;
  - Better understand the population dynamics and important ecological factors explaining declines in Hawaiian monk seals in some areas, especially at French Frigate Shoals. Research feeding ecology, distribution, life history and threats.
- Strengthen existing and create new partnerships and cooperative efforts.
  - Coordinate with U.S. government to implement coordinated protections for marine species in an MMA in the NWHI and resolve fishing issues there;
  - Enhance partnerships with Federal enforcement agencies including the USCG and NOAA Office of Law Enforcement.

- Support policy changes aimed at improving and protecting native species and habitats.
  - Determine whether the marine areas are best protected by a Federal refuge, State refuge, and/or National Marine Sanctuary designation;
  - Secure adequate funding for management of the MMA(s);
  - Assess ways to support increased enforcement capacities, including cross-deputization between Federal (including military) and State agencies.

## **PLANS AND TOOLS TO AID MANAGEMENT**

Management plans and tools exist to address some of the threats listed in the Summary of Key Threats to Species and Habitats section. Many apply to the entire marine ecosystem and thus are placed here.

- The Hawaiian Islands National Wildlife Refuge. Management Plan. Fish and Wildlife Service (1986);
- The Western Pacific Fisheries Management Council has Fisheries Management Plans that guide fishing for Bottomfish and Seamount Fisheries, Precious Corals, Crustaceans, Coral Reef Ecosystems, and Pelagic species. Available at: [www.wpcouncil.org](http://www.wpcouncil.org);
- Species Conservation Plans prepared by the USFWS and NMFS, including the Regional Seabird Conservation Plan (2005), U.S. Pacific Islands Regional Shorebird Conservation Plan (2004), the Draft Revised Recovery Plan for the Laysan Duck (2004); the Northwestern Hawaiian Islands Passerines Recovery Plan (1984); Recovery Plan for the Hawaiian Monk Seal (2004); and Recovery Plans for the U.S. Pacific populations of the green sea turtle, hawksbill sea turtle, leatherback turtle, loggerhead turtle, and olive ridley turtle (1998);
- The Northwestern Hawaiian Islands Coral Reef Ecosystem Reserve has an operations plan. Available at: <http://www.hawaiiireef.noaa.gov/documents/welcome.html>;
- NOAA Coastwatch uses a variety of satellite remote sensing datasets in an effort to better monitor and analyze the central Pacific Ocean. Information and data available at: <http://coastwatch.nmfs.hawaii.edu/>;
- NOAA's Coral Reef Information System (CoRIS) is designed to be a single point of access to NOAA coral reef information and data products, especially those derived from NOAA's Coral Reef Conservation Program. Information and data available at: <http://www.coris.noaa.gov/>.

## **MANAGEMENT NEEDS**

### ***Current Management of Species and Habitats***

The following section addresses the current management actions and future needs of key species and habitats of the NWHI. Future needs are being considered by all agencies with management authority over NWHI wildlife. Currently managed areas consist of a State Seabird Sanctuary, Federal wildlife refuge, and a Federal reserve. Hawaii's Comprehensive Wildlife Conservation Strategy recognizes the importance of the ongoing actions in these managed areas and considers these actions a priority.

In addition to currently managed areas, other conservation actions for NWHI are being considered. Revisions to catch limits, areas, and methods are being considered by DAR. The entire system of State Marine Managed Areas is also being reviewed to ensure consistency in designated use and purpose and to consider adding to or modifying current Marine Managed Areas. The Hawaiian Islands National Wildlife Refuge in the NWHI is developing an updated management plan for terrestrial and marine areas. The State is moving forward with plans to manage State waters in the NWHI as a Marine Refuge. The NWHI Coral Reef Ecosystem Reserve is being considered for conversion to a National Marine Sanctuary that could include co-management with Department of Land and Natural Resources (DLNR) in State waters. A bill in Congress proposes setting aside the entire NWHI area as a new form of Federal managed area called a National Marine Refuge. The discussion of future management needs is also highlighted within each current managed area.

***Kure Atoll State Seabird Sanctuary (260 acres), DOFAW***

***Species:*** Ka'upu (black footed albatross), mōlī (Laysan albatross), spinner dolphin.

***Habitats:*** Coastal system. Marine ecosystems including shallow coral reef, sandy beach, and rocky habitats.

***Current Management:*** Limited access, invasive introductions control and precautions, native vegetation replanting, bird, monk seal, dolphin and marine debris monitoring. Marine debris removal.

***Future Needs:*** Additional monitoring, year round presence. Develop management plan.

***Hawaiian Islands National Wildlife Refuge (620,000 acres), USFWS***

***Species:*** Laysan finch, Laysan duck, Nihoa millerbird, Nihoa finch, 18 seabirds, Hawaiian monk seals, green sea turtles, endemic coral reef organisms including some endemic only to NWHI, pelagic fishes, bottomfishes, sandy habitat organisms, spinner dolphins, and other marine mammals.

***Habitats:*** Coastal system, wetlands, hypersaline lake. Marine ecosystems.

***Current Management:*** Limited access, limited take, strict quarantine procedures to limit the immigration or emigration of non-native species or diseases, invasive species control and removal, endangered species monitoring, translocation, and range expansion; native species reintroduction, seabird monitoring and research (especially at Laysan and Tern Islands), coral reef monitoring and research. NMFS conducts research and monitoring on green sea turtles and monk seals and leads a multi-partner effort to remove marine debris from the beaches and reefs of the NWHI, collaboration with other marine researchers, and research and education.

***Future needs:*** Update management plan. Coordinate actions with the State and the Coral Reef Reserve or Sanctuary, and additional monitoring.

***NWHI Marine Refuge, DAR Proposed***

**Species:** Hawaiian monk seals, green sea turtles, endemic coral reef organisms including some endemic only to NWHI, pelagic fishes, bottomfishes, sandy habitat organisms, spinner dolphins, and other marine mammals.

**Habitats:** Marine ecosystems.

**Current Management:** Limited access and take, no anchoring or any other activities that can damage coral, and no discharge of pollutants.

**Future needs:** Develop and implement a management plan.

#### ***NWHI Coral Reef Ecosystem Reserve, NOAA***

**Species:** Hawaiian monk seals, green sea turtles, endemic coral reef organisms including some endemic only to NWHI, pelagic fishes, bottomfishes, sandy habitat organisms, spinner dolphins, and other marine mammals.

**Habitats:** Marine ecosystems.

**Current Management:** Operation plan in place. Limited access and take, no anchoring or any other activities that can damage coral, and no discharge of pollutants.

**Future needs:** Possible transition to a National Marine Sanctuary.

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