Papahānaumokuākea

2020 Conservation Outlook Assessment

SITE INFORMATION

Country: United States of America (USA)
Inscribed in: 2010
Criteria: (iii) (vi) (viii) (ix) (x)

Papahānaumokuākea is a vast and isolated linear cluster of small, low lying islands and atolls, with their surrounding ocean, roughly 250 km to the northwest of the main Hawaiian Archipelago and extending over some 1931 km. The area has deep cosmological and traditional significance for living Native Hawaiian culture, as an ancestral environment, as an embodiment of the Hawaiian concept of kinship between people and the natural world, and as the place where it is believed that life originates and to where the spirits return after death. On two of the islands, Nihoa and Makumanamana, there are archaeological remains relating to pre-European settlement and use. Much of the monument is made up of pelagic and deepwater habitats, with notable features such as seamounts and submerged banks, extensive coral reefs and lagoons. It is one of the largest marine protected areas (MPAs) in the world. © UNESCO

SUMMARY

World Heritage values and other biodiversity values have remained stable overall since inscription and Papahānaumokuākea staff are engaging in effective management to reduce those local threats which it can mitigate and to preserve those conservation values which make the site internationally unique. Low level threats such as visitor impacts are isolated to specific areas within the site and able to be mitigated against with targeted management. Of the high ranked threats only coral disease is not actively managed as the threat is little understood and actions to combat the threat of marine disease are minimal. Of the very high ranked threats, some are from activities that occur outside of the site such as marine debris, rising ocean temperatures and other climate related impacts and are being addressed through management actions and planning to the extent possible at the site level, as well as through collaboration with other large marine protected areas around the world. Most threats are high or very high threats to the overall status of the site's values.

The highest potential threats to the site are from impacts outside the boundaries of the site regionally or globally such as climate change, invasive species and marine debris. Strict protocols are in place to manage for and anticipate introductions from alien species, and an eradication programme will begin for invasive house mice on Midway Atoll in 2021. The climate change impacts are also being planned for but are difficult to manage. The most significant threats, particularly those associated with climate change, are long term and likely to occur over decades but have the potential to greatly alter the landscape at this site where the
islands low-lying and sea level rise could have profound effects on habitat.
FULL ASSESSMENT

Description of values

Values

World Heritage values

▶ Illustrating example of island hotspot progression

The property provides an illustrating example of island hotspot progression, formed as a result of a relatively stationary hotspot and stable tectonic plate movement. Comprising a major portion of the world’s longest and oldest volcanic chain, the scale, distinctness and linearity of the manifestation of these geological processes in Papahānaumokuākea are unrivalled and have shaped our understanding of plate tectonics and hotspots (World Heritage Committee, 2010).

▶ Multitude of habitats and species assemblages

The large area of the property encompasses a multitude of habitats, ranging from 4,600 m below sea level to 275 m above sea level, including abyssal areas, seamounts and submerged banks, coral reefs, shallow lagoons, littoral shores, dunes, dry grasslands and shrublands and a hypersaline lake. The size of the archipelago, its biogeographic isolation as well as the distance between islands and atolls has led to distinct and varied habitat types and species assemblages (World Heritage Committee, 2010).

▶ Remarkable example of ongoing evolutionary and biogeographical processes

The size of the archipelago, its biogeographic isolation as well as the distance between islands and atolls has led to distinct and varied habitat types and species assemblages. Papahānaumokuākea constitutes a remarkable example of ongoing evolutionary and bio-geographical processes, as illustrated by its exceptional ecosystems, speciation from single ancestral species, species assemblages and very high degree of marine and terrestrial endemism. For example, a quarter of the nearly 7,000 presently known marine species in the area are endemic. Over a fifth of the fish species are unique to the archipelago while coral species endemism is over 40% (World Heritage Committee, 2010).

▶ Unique reef ecosystems

Because of its isolation, scale and high degree of protection the property provides an unrivalled example of reef ecosystems which are still dominated by top predators such as sharks, a feature lost from most other island environments due to human activity (World Heritage Committee, 2010).

▶ Endangered and vulnerable species

The terrestrial and marine habitats of Papahānaumokuākea are crucial for the survival of many endangered or vulnerable species the distributions of which are highly or entirely restricted to the area. This includes the endangered Hawaiian Monk Seal (Neomonachus schauinslandi, EN), and four endemic bird species: Laysan Duck (Anas laysanensis, CR), Laysan Finch (Telespiza cantans, VU), Nihoa Finch (Telespiza ultima, CR), and Nihoa Millerbird (Acrocephalus familiaris, CR). The Statement of Outstanding Universal Value also includes six species of endangered plants such as the Fan Palm (Pritchardia remota) (World Heritage Committee, 2010).

▶ Largest tropical seabird rookery in the world

With 5.5 million sea birds nesting in the monument every year and 14 million residing in it seasonally it is collectively the largest tropical seabird rookery in the world, and includes 99% of the world’s Laysan Albatross (Phoebastria immutabilis, NT) and 98% of the world’s Black-footed Albatross (Phoebastria nigripes,
Assessment information

Current Threats

Most of the current threats were rated as high threat, which largely impact the OUV of the property through pollution (marine debris, lead paint, vessel grounding, landfill) and climate change/weather (tsunami, sea level rise, rising ocean temperature). Eradication of invasive alien species – a threat that was also considered to be high threat – requires a long term monitoring and management plan. Strict protocols are in place to manage for and anticipate introductions from alien species. While the potential for vessel strikes from vessels permitted to be operating in the site do exist, vessel strikes from vessels passing outside the boundaries of the site are limited by the International Maritime Organization’s designation of the site as a Particularly Sensitive Sea Area. The climate change impacts are also being planned for but are difficult to manage given the global influences that are driving this change.

Earthquakes/ Tsunamis

(Tsunamis)

In 29 March 2011, the Japan Tsunami washed over large portions of the islands and atolls of PMNM. On Midway 110,000 Black footed and Laysan Albatross chicks were killed representing 22% of the seabird population. An additional 500-600 Black-foot Albatross chicks were killed at Kure Atoll. Tens of millions of dollars in structural damage were also done to Midway Atoll. (Honolulu Star Advertiser, 2011)

Flight Paths

(Airport runway at Midway Atoll)

Aircraft landing at Midway Atoll or Tern Island pose certain risks to wildlife and other resources, including bird strikes, introduction of alien species, aircraft crashes, and fuel spills. Certain management practices, such as requiring night landings and runway sweeps during albatross season at Midway or runway sweeps during any landing at Tern, as well as alien species inspections, minimize these risks.

Water Pollution

(Marine debris)

The major form of marine pollution both inside and outside of Papahānaumokuākea Marine National Monument boundaries is marine debris. As with many marine ecosystems around the world, marine debris is a constant threat to certain components of the ecosystems of the site (Selkoe et al., 2008). Although no commercial or recreational fishing is permitted in Papahānaumokuākea waters, derelict fishing nets and gear, plastics and other ocean-borne debris are concentrated by ocean currents and wash up on the reefs and beaches of the islands. Entanglement in marine debris has been identified as a major threat to the endangered Hawaiian Monk Seal. Debris entanglement also threatens sea turtles, seabirds, cetaceans and coral reef organisms. Approximately 100,000 pounds of marine debris collected from the reefs and beaches of Kure and Midway over the last six years were shipped to Honolulu for disposal in 2017 (Papahānaumokuākea Marine National Monument, 2017).

Temperature extremes

(Rising ocean temperatures)

Coral reef ecosystems in PMNM are very likely to change as a result of changing ocean chemistry and increasing ocean heat content [high confidence]. Elevated temperature extremes which occur above the coral bleaching temperature threshold can cause mass coral bleaching and potential mortality. High latitude coral reefs such as in the Monument with relatively lower annual temperatures are highly vulnerable to coral bleaching (Wagner and Polhemes, 2016). The waters of the Monument have much
lower calcification and fewer available calcifying minerals than other coral reefs in the Pacific and are more vulnerable to ocean acidification. As climate change progresses, changing ocean chemistry (also known as ocean acidification) is very likely to reduce the ability of some corals, calcareous algae, phytoplankton, and invertebrates to calcify their shells and skeletons (Wagner and Polhemus, 2016).

Other (Coral disease)

The incidence of diseases affecting marine organisms is increasing globally, but the factors contributing to disease outbreaks remain poorly understood. The overall average prevalence of coral disease is quite low in the Northwestern Hawaiian Islands as compared to other coral reef areas (Aeby, 2006). Recent studies have begun to document these disease baselines in corals and other associated marine animals such as fish and sea turtles. In 2011, one site previously surveyed and monitored at French Frigate Shoals (FFS) had seen a significant reduction in the density of Acropora cytherea due to colonies dying from one of the growth anomalies and ‘white syndrome’ associated with the diseases found in the Northwestern Hawaiian Islands. Most other monitored sites have not seen significant reductions in densities of corals to date (Steven, 2012).

Shipping Lanes (Vessel groundings)

Hazards to shipping and other forms of maritime traffic such as shallow submerged reefs and shoals are inherent in the Northwestern Hawaiian Islands. The region is exposed to open-ocean weather and sea conditions year-round, punctuated by severe storm and wave events in winter. Hence vessel groundings and the release of fuel, cargo, and other items would pose real threats to the Northwestern Hawaiian Islands (Selkoe et al., 2008). This threat is greatly reduced by the national and international maritime management measures in effect for this site. Historically, there have been numerous spills and shipwrecks in the property, and a few in more recent times. In April 2008, a designation by the International Maritime Organization (IMO), declared the waters of Papahānaumokuākea a “Particularly Sensitive Sea Area” (PSSA), implemented a mandatory ship reporting system and expanded and consolidated existing Areas To Be Avoided (ATBA) into four larger ATBAs (Papahānaumokuākea, 2012).

Habitat Shifting/ Alteration (Increased frequency and intensity of hurricanes and sea level rise due to climate change)

Projected sea level rise, combined with likely increases in storm and wave energy, indicate that there is a high likelihood of inundating low-lying islands within the property and increasing coastal erosion on all islands over the next 50-100 years [high confidence] (Wagner and Polhemus, 2016). Between 2009-2018 sea level has increased by as much as 10 mm in the southeastern portions of the Monument. Beach and coastal strand habitats are very likely to be lost as a result of sea level rise, storm inundation, and erosion with significant implications for endangered species that rely on these habitats for nesting and breeding, including monk seals, sea turtles, and seabirds (Wagner and Polhemus, 2016). On Oct. 3, 2018, Hurricane Walaka transited through the French Frigate Shoals as a category 4 hurricane with sustained winds of up to 125 mph and East island was 95% eroded, due to storm surge from Hurricane Walaka and nearby Trig island was also lost due to intensified wave activity, both of which serve as important habitat for the Hawaiian green turtle, Hawaiian monk seal and seabirds. Habitat dislocation has interfered with the level of pupping and nesting for months (Papahānaumokuākea Marine National Monument News, 2018). Papahānaumokuākea’s globally important bird population are at risk from the loss and degradation of habitat, changes in prey availability, and direct impacts from changes in environmental conditions, particularly increasing land surface temperatures (Wagner and Polhemus, 2016).
Industrial/ Military Effluents
(Land fill contaminants from former military use at Kure and Midway Atolls and French Frigate Shoals)

Uncharacterized, unlined landfills remain on some of these islands. Kure Atoll and French Frigate Shoals both have point sources of PCBs due to former U.S. Coast Guard LORAN stations. While the Coast Guard has mounted clean-up actions at Kure Atoll, elevated levels of contamination remain in island soils, nearshore sediment, and biota. The Navy also left landfills behind on Midway Atoll. Studies have shown that soil can constitute up to 30% of the material a bird consumes, and hence soil contamination from the above substances is a substantial threat to the bird populations (Hui and Beyer, 1998; Beyer et al., 1994). A 2016 remediation project was done at Kure Atoll to relocate carbon-treated contaminated soil from low elevation areas and is expected to minimize the future hazard of release through storms or erosive activities. Additionally, a 2018 study by the U.S. Environmental Protection Agency detected PCBs, PAHs, lead and other contaminants in soil and porewater at Tern Island at French Frigate Shoals from legacy dump activities. In 2018, Hurricane Walaka removed cement and sediment covering a former dump site and exposed potentially hazardous materials (Papahānaumokuākea Marine National Monument News, 2018).

Other Activities
(Research and conservation activities both on land and nearshore)

Permits may be issued in one of six permit categories: research, education, conservation and management, Native Hawaiian practices, special ocean use, and recreation. The Monument Co-Trustees grant both single- and multi-year permits. In calendar year 2019, the monument permitting team tracked 39 activities, 25 of which were authorized and active prior to 2019. (Papahānaumokuākea Marine National Monument, 2019). All active permits, regardless of year issued, were monitored for permitting and reporting requirements in 2019. Of the permitted activities, research and conservation and management received the most permits. Human presence is necessary to carry out resource management objectives and conduct necessary scientific and cultural research. Effectively tracking monument permits and the associated number of permitted vessel and permit related aircraft entries within the monument allows for accurate reporting of levels of human presence. The only location equipped to accept aircraft within the monument is Midway Atoll. In 2019, there was a total number of 34 permitted flights to and from the monument which is a 10 percent decrease from 2018. Permitted vessel entries and exits are defined as any instance in which a vessel is permitted to enter the monument to conduct authorized activities and subsequently exits the monument. For reporting purposes, any further authorized entry of the same vessel is counted as a second vessel entry. In 2019, there were a total number of 18 permitted vessel entries into the monument done by a total of 10 permitted vessels (Papahānaumokuākea Marine National Monument, 2019).

Tourism/ visitors/ recreation
(Wildlife Disturbance at Midway Atoll)

Midway Atoll continues to have the highest concentration of human presence, sustaining an average population of 45-50 individuals necessary to operate Midway facilities and support the small number of visitors at the site (pers. comms. 2017).

Housing/ Urban Areas
(Lead paint on old buildings at Midway Atoll and asbestos at French Frigate Shoals)

Some of the buildings on Midway date to 1903, with most of them dating to the period between 1939 and 1993, when the atoll was used as a U.S. Navy base. Studies conducted by the U.S. Fish and Wildlife Service and others between the late 1980s and 2009 showed that Laysan albatross chicks exhibited symptoms of lead toxicity, which causes their wings to droop and prevents them from developing the ability to fly and forage for food, leading to death. The studies found their exposure is likely related to ingestions of lead-based paint chips and soil contaminated with the chips, which the birds often pick up and place into their nests. One study estimated that eliminating the chick mortality from lead poisoning
would increase the Laysan population at Midway in 50 years by as many as 360,000 birds over the projected population size without lead-based paint removal. (U.S. Fish and Wildlife Service, 2011).

▶ **Invasive Non-Native/ Alien Species**

(Invaders, plant, insect and marine species)

In the past, several of the islands and atolls of Papahānaumokuākea have been heavily inundated by terrestrial alien species. Both Midway Atoll and Laysan Island have incurred multiple introductions, some of which transformed the landscapes. Some of the most invasive introductions were intentional during the days of guano mining, such as vegetation, rats, and rabbits that caused extensive damage. To date, rats and rabbits have been successfully exterminated in Papahānaumokuākea, but various other alien species still plague the inhabited islands and atolls. The number of alien land plants in Papahānaumokuākea varies from only three introduced at Nihoa, to 249 introduced at Midway Atoll. Numerous efforts have been made to eradicate and restore the emergent lands to their native conditions, particularly at Laysan Island and Midway Atoll. Other management and restoration efforts are undertaken annually during the late spring through mid-fall field season. To prevent further importation of invasive plants, animals, and insects, mandatory quarantine protocols are enforced for any visitors to all the islands of Papahānaumokuākea, with the exception of Midway Atoll (Papahānaumokuākea Marine National Monument, 2009). On Sand Island invasive mouse predation has occurred among nesting Laysan albatross (U.S. Fish & Wildlife Service, 2018).

In 2006 a total of nine established marine non-indigenous species were known in the Monument (Godwin et al., 2006). As of March 2020, findings from the marine alien species inventory project have now documented that there are potentially 61 non-indigenous species in the Monument. These non-indigenous species consist of two cryptogenic species of red algae, three species of fish and 56 species of marine invertebrates (Tsuda, et al., 2015, Godwin, et al., 2020). Alien species may be introduced accidentally, such as with vessel discharge, marine debris, or aquaculture, or intentionally, as in the case of a few species of snappers, grouper, and algal species (PIFSC-CRED unpublished data.). To date, none of these species has caused significant problems in Papahānaumokuākea Marine National Monument. However, there are a variety of marine invasive species, particularly five species of algae in the main Hawaiian Islands, which if transported to the Papahānaumokuākea, could cause significant changes in species composition. In 2019, expansive algal mats of a species later identified as Chondria tumulosa, were found covering large areas of reef environments at Pearl and Hermes Atoll. The red alga was observed to form large, thick algal mats that were smothering corals and coral reefs with few other reef species surviving below the mats. The pervasiveness of this alga remains a significant threat to biosecurity in Monument waters (National Marine Sanctuaries, 2019).

**Potential Threats**

In addition to the currently known invasive alien species, there is the potential for additional non-native species to be introduced, from the main Hawaiian Islands or elsewhere in the world. Climate change is also expected to further damage the OUV of the property, through ocean acidification.

▶ **Ocean acidification**

(Ocean acidification)

Ocean acidification, resulting from elevated CO2 levels that occur in conjunction with climate change, would have multiple impacts to coral reef ecosystems, including decreased abundance of aragonite (a major building block for coral reefs) and the dissolution of coral substrate and structures (Vitousek, 1994). These effects lead to pronounced decreases in coral growth rates (Hoegh-Guldberg, 2005). Ocean acidification does not only affect submerged reefs; it would similarly affect the carbonate-based island atolls, further expediting the natural subsidence of these islands and atolls.

▶ **Storms/Flooding**

(Natural disasters including hurricanes)

Natural disasters, such as the recent Hurricane Walaka, pose a high potential threat to multiple values
of the site. On Oct 3, 2018, Hurricane Walaka transited through French Frigate Shoals as a category 4 hurricane with sustained winds of up to 125 mph. Overnight East Island eroded to nearly 5% of its previous size. This island an important habitat for green sea turtles, the endangered Hawaiian Monk Seal and seabirds. As of fifteen months later, the island still cannot support the same level of pupping and nesting for these protected species as it has previously. The same hurricane also nearly completely destroyed the coral reefs at French Frigate Shoals. Corals older than hundred years were destroyed overnight and the habitat complexity that coral reefs provide was removed to leave only pavement and rubble behind. Little to no associated coral reef species including fish and other invertebrates remain as of assessments in 2019 (IUCN Consultation, 2020).

Overall assessment of threats

The most significant threats, particularly those associated with climate change, are long term. Many of the low level threats are isolated to specific areas within the site, including the airport runway and wildlife disturbance at Midway Atoll, as well as land fill contaminants from former military use at some of the Atolls. Of the high ranked threats, including invasive alien plant and insect species, coral disease, coral bleaching and threats from lead paint on buildings at Midway Atoll affecting some bird species, only the threat of marine diseases is not actively managed as the threat is little understood and actions to combat this threat are minimal. Of the very high ranked threats, including marine debris, some are from activities that occur outside of the site and are being addressed through management actions and planning.

The highest potential threats to the site are from impacts outside the boundaries of the site regionally or globally such as climate change, natural disasters, invasive alien species, vessel strikes, hazardous cargo and marine debris. Strict protocols are in place to manage for and anticipate introductions from alien species. While the potential for vessel strikes from vessels permitted to be operating in the site do exist, vessel strikes from vessels passing outside the boundaries of the site are limited by the International Maritime Organization’s designation of the site as a Particularly Sensitive Sea Area. The climate change impacts are also being planned for but are difficult to manage given the global influences that are driving this change.

Protection and management

Assessing Protection and Management

Management system

Management aims, objectives and jurisdictions are laid out in the Monument Management Plan, which includes strategic objectives and detailed thematic action plans that address priority needs. It is important that these efforts are sustained with the aim to increase streamlining, including mechanisms for supporting Monument activities, stakeholder participation and outreach (IUCN, May 2010).

Management responsibilities rest with four co-trustees: the State of Hawai‘i, through the Governor; the State Office of Hawaiian Affairs; the U.S. Department of the Interior, through the Fish and Wildlife Service (FWS); and the U.S. Department of Commerce, through the National Oceanic and Atmospheric Administration (NOAA). While each agency still has its own staff, budget, statutory authorities, and organizational philosophy and structure, inter-agency communication, collaboration, and cooperation are sustained, and PMNM is now an internationally recognized model of large scale, complex MPA management. The addition of the Office of Hawaiian Affairs (OHA) as a fourth Co-Trustee (joining NOAA, U.S. FWS, and the State of Hawai‘i has provided the inclusion of Kanaka Oiwi (Native Hawaiian) perspectives, cultural input, and a fully vested role in management activities and decisions. The co-managing agencies have signed a new Memorandum of Agreement (MOA) that guides agency roles and the operations of the Monument Management Board (MMB), ensuring that federal, state, and indigenous interests are fairly represented and with active participation in management. With representation by
seven sub-divisions of the co-trustee agencies, the MMB strives to achieve consensus on all
management decisions, and with very few exceptions, has accomplished this over the past decade,
despite dealing with a number of thorny and potentially divisive issues. The agencies have implemented
an “early and often” communications protocol, which provides all seven co-managing agencies
awareness and a chance to provide input on management activities. Only obligated to meet quarterly,
the MMB reportedly meets dozens of times per year to address pressing issues. While managing under
this multi-agency regime is complicated, and not every agency is satisfied all the time, the management
regime brings appropriate partners to the table on an equal basis with the ultimate goal of conserving
and protecting the natural and cultural resource of the place, and upholding the OUV for which PMNM
was inscribed as the United States’ first mixed World Heritage site (IUCN Consultation, 2017). The
Native Hawaiian plan (cultural resource plan) includes sections on access, research, integration,
partnerships and education and will likely gain official status imminently (IUCN Consultation, 2020).

Effectiveness of management system

Highly Effective

The Monument Management Plan contains 22 action plans. The outputs and outcomes of several of
these action plans have been internally evaluated by teams including staff and Reserve Advisory
Council members. There is a GIS database incorporating research data, habitat classifications, species
distributions, cultural sites and data, a spatial bibliography of published literature and information on
activities carried out under permit in the monument. Importantly, this system includes an evaluation
program which tracks implementation and effectiveness of priority management actions identified in the
management plan (IUCN, 2010). The degree to which the tool is consistently being used to guide
management and provide input into management plan updates is unclear. The site is delinquent in
completing 5 year management plan reviews as committed to in the original Management Plan. The
site is actively managed and has shown recovery from some of the key threats due to the efforts to
address invasive terrestrial species and to remove marine debris despite ongoing challenges in these
areas. For example, successful broad-scale efforts to remove the invasive weed Verbesina encelioides
were conducted at Kure Atoll and Midway Atoll. A project to eradicate predatory house mice at Midway
Atoll is in preparatory stages. Additionally, plans for addressing invasive algae at Pearl and Hermes and
assessing damage of islands and coral reefs at French Frigate Shoals are being developed but have yet
to be initiated. It is recognized that addressing marine invasive species is highly complex and more
difficult than control and eradication on land (IUCN Consultation, 2020).

As noted above, the MMB meets regularly and agencies have become more familiar with each other’s
organizational cultures and management priorities. The permit system is working effectively. Habitat
restoration efforts are making progress. The visitor center (Mokupāpapa Discovery Center) in Hilo
has been open and operating since it shifted locations several years ago. While it has been forced to close
due to COVID-19 in 2020, the staff is working to offer online content to continue its educational mission.
A Native Hawaiian Cultural Working Group is making great progress in developing a plan that sets
research, education and partnership guidelines. The continued commitment of the Native Hawaiian
community to engage in education, management, research and field activities is noteworthy and sets it
apart from its peers.

Boundaries

Highly Effective

In August 2016, President Obama announced the expansion of the boundaries of the monument from 50
nautical miles (87.4 km) to 200 nautical miles (370.4 km) within federal waters. The total area under
management increased from 139,318 square miles (36,083 square km to 582,578 square miles (1,508,870
square km). However, the World Heritage designation boundaries remain the same. Access to/through
the site is very strictly controlled and there are four designated 50 nautical miles wide Areas to be Avoided
(ATBAs) by ship traffic. All vessels must notify Federal authorities if they come within 10 nautical miles
(~20km) of the property’s outer boundaries (ICOMOS, 2010). The Papahānaumokuākea Particularly
Sensitive Sea Area (PSSA) has the same boundaries as the Monument, and four Areas to be Avoided
(ATBA) have also been adopted by the International Maritime Organization (IMO), each extending out 50
nautical miles or 92.6 km from the centre of islands or atolls (IUCN, 2010). The boundaries of the site
are all located in the ocean, but nevertheless have been clearly defined, demarcated on navigational
charts and communicated widely. The boundaries are well documented and effective.
Integration into regional and national planning systems

Mostly Effective

The site has ‘sister site’ agreements with other large Pacific Marine Protected Areas (MPAs) in Rapa Nui and the Phoenix Islands. The sister site agreement between the Governments of the United States of America and Kiribati on the management of Papahānaumokuākea Marine National Monument and Phoenix Islands Protected Area respectively, has been highlighted by IUCN which encouraged State Parties to continue and, as possible, expand on this collaboration (IUCN, 2010). Recognizing the need to learn from each other, site managers from the world’s largest MPAs met on December 6, 2010 in Honolulu and launched Big Ocean: A Network of the Worlds Large-Scale Marine Managed Areas. Co-convened by the Papahānaumokuākea Marine National Monument and World Heritage Site and the Phoenix Islands Protected Area under a bi-lateral “sister-site” relationship, this historic, inaugural meeting produced the first ever Managers’ Communiqué on the importance, contributions and needs of large-scale MPAs. The overall purpose of the Big Ocean network is straightforward: to provide a forum for communication and networking through which professional managers of large-scale MPAs can work together to be more efficient and effective in their management efforts (Big Ocean website, 2012). Member sites are currently all of 14 established large-scale MPAs worldwide. Big Ocean members convened in Honolulu in 2016 in conjunction with the IUCN World Conservation Congress and and recently celebrated 20 years in large scale ocean protection (Big Ocean, 2020). Although the support and engagement in Big Ocean by the site has diminished over the years, Papahānaumokuākea continues to serve on the planning team to guide the network.

Of recent concern to the marine planning system of the site, the Western Pacific Regional Fishery Management Council (WPFMC) sent a letter to President Trump on May 8, 2020, in response to Trump’s executive order promoting American seafood competitiveness and economic growth. In the letter signed by council chairman Archie Taotasi Soliai and WPFMC executive director Kitty Simonds, the council asked the president to “please consider lifting the fishing restrictions in the Pacific marine national monuments and allowing America’s fishermen to fish again in the US EEZ (exclusive economic zone)….“ The State of Hawaiʻi, through its Department of Land and Natural Resources has protested the recommendation. No official decision has been announced (IUCN Consultation, 2020). This vulnerability to de-gazettement or significant reduction in protections are due to the inadequate protections offered by the Antiquities Act upon which the Monument was established. This legal vulnerability should be fully researched and vetted to identify all possible alternatives to strengthening protections of the marine resources (see more below).

Relationships with local people

Mostly Effective

The Monument Management Board, originally included representatives of two agencies within the Fish and Wildlife Service (Department of Commerce); two agencies within the National Oceanic and Atmospheric Administration (Department of the Interior), two branches within the Department of Land and Natural Resources (State of Hawaii) and the Office of Hawaiian Affairs. In addition, active stakeholder groups include the Monument’s Native Hawaiian Cultural Working Group (CWG), the Kure Atoll Conservancy (KAC), the Friends of Midway Atoll National Wildlife Refuge (FOMA) and the NWHI Coral Reef Ecosystem Reserve Advisory Council (RAC). The CWG has played a major role in the development of a cultural resources management plan for the Monument, currently in preparation. The RAC formally advises the Office of National Marine Sanctuaries co-managing agency for the Northwestern Hawaiian Islands Coral Reef Ecosystem Reserve. RAC membership includes native Hawaiians, fishers, ecosystem researchers, and others. Military representatives are non-voting participants. There is a strong component of site management that values stakeholder input into the overall management of the site.

While these participatory mechanisms are laudable there are several goals and objectives in the site management plan that call for increased participation in several areas: education; historic resources; other Friends groups; cultural resource management, access, and training; ship-based outreach and education etc. These should be reviewed, with gaps and ways to address them identified so they can be fulfilled. In addition, in the past substantial time and resources were invested in by NOAA’s office of National Marine Sanctuaries to meet with communities on all islands and solicit input and purposely grow local stakeholder engagement. It has been several years since such activities have occurred (IUCN
Legal framework

A significant legal and management framework is in place to limit access, manage uses and monitor vessel activities within the site. The Monument Permit System is the primary management mechanism. The permit system covers access for research, education, management activities, cultural practices, recreation, and special ocean uses. Enforcement is regular and effective, however, because of its size and remoteness, it is difficult to monitor all marine activities. While the remote location of the Northwestern Hawaiian Islands has helped to protect them, it also provides a potential source of cover for those interested in exploiting the area illegally. Illegal access to the monument, discharge, dumping, and poaching are particular causes of concern. While the establishment of the Monument provides an additional layer of protection to the area, protections remain difficult to enforce. Historically, enforcement has relied on occasional U.S. Coast Guard over-flights and vessel patrols, as well as reports passed along by fishermen, researchers, and agency personnel working in the area. Now Monument managers are investigating the potential of remote surveillance techniques e.g. satellites, radar, and vessel monitoring systems to inform on-the-water law enforcement officers of potential violations as well.

As mentioned above, of recent concern to the marine planning system of the site, the Western Pacific Regional Fishery Management Council (WPFMC) sent a letter to President Trump on May 8, 2020, in response to Trump’s executive order promoting American seafood competitiveness and economic growth. Although the Hawaii Department of Land and Natural Resources, a Papahānaumokuākea co-managing agency, has protested the recommendation no official decision has been announced (IUCN Consultation, 2020). This vulnerability to de-gazettement or significant reduction in protections are due to the inadequate protections offered by the Antiquities Act upon which the Monument was established. This legal vulnerability should be fully researched and vetted to identify all possible alternatives to strengthening protections of the marine resources (see more below). This same vulnerability does not exist for terrestrial resources as other enabling laws and regulations apply. However, for marine resources it should be strongly encouraged that the Monument Management Board consider completing the Sanctuary designation process under the National Marine Sanctuaries Act (the process that was interrupted when the Monument was established by Proclamation) to strengthen the legal framework and regulations to protect marine natural, cultural and historical resources (IUCN Consultation, 2020). The NMSA also has income generating provisions that can aid in more adequately financing its management priorities.

Law enforcement

Despite the continued protection of the NWHI and the area’s relative isolation in the Pacific, significant global threats to the Monument’s ecosystem exist. Many of these threats are direct results of human activities occurring beyond Monument boundaries. The Monument’s stringent permitting process is the first line of defense against many of these threats. The permitting process allows for managing, monitoring and reporting activities to evaluate and mitigate cumulative impacts. At the same time, this process enables scientists, managers and Native Hawaiian researchers and cultural practitioners to accomplish activities focused on resource protection, habitat conservation, management and further integration of Hawaiian cultural knowledge and practices with mainstream research and management approaches (Papahānaumokuākea Marine National Monument, 2015).

In accordance with Presidential Proclamation 8031, all activities in the Monument, with limited exceptions, require a permit. Activities are prohibited (not allowed), exempted (no permit is needed), or regulated (must be considered through the Monument’s joint permitting process). Prohibited activities include exploration for oil, minerals or gas within the Monument; use of explosives, electrical charges or poisons in the collection of resources; releasing or introducing an alien invasive species in the Monument; and anchoring on any live or dead coral. Exemptions include responses to emergencies, law enforcement purposes, activities of the Armed Services [including the U.S. Coast Guard], and passage without interruption approaches (Papahānaumokuākea Marine National Monument, 2015).

Any vessel or person passing through PMNM without interruption does not constitute a permitted activity. However, domestic vessel notification must be provided prior to entering and upon leaving the Monument. For U.S. flag vessels with onboard e-mail capability, notification is required upon entering
and exiting the reporting area (area extending 10 miles out and entirely around the Monument boundary). For domestic vessels less than 300 gross tons without e-mail capability, entry must be provided at least 72 hours, but not more than one month, prior to entering PMNM, and notification of departure from the Monument must be provided within 12 hours of leaving (Papahānaumokuākea Marine National Monument, 2015). Foreign flag vessels have no such requirement (IUCN Consultation, 2020).

The expansion of the boundaries of the Monument in 2016 increases the potential for illegal foreign fishing in particular. The U.S. Coast Guard’s patrolling capacity is constrained by budgets and other patrolling priorities. Enforcement will require sightings of illegal fishing by other ships or patrol planes, or other technologies such as satellites and drones that are currently in very limited use.

Implementation of Committee decisions and recommendations

The following recommendations were made by the Committee and include an associated response: a) That research and awareness-raising should consider the geological linkages with the Hawaii Volcanoes National Park and World Heritage property. Both sites are working collaboratively together on this awareness raising effort (IUCN Consultation, 2014). Interpretive programs are being developed at both the Mokupāpapa Visitor Center in Hilo, Hawai‘i and at the Volcanoes National Park visitor center. Planning for collaborative outreach programs is underway and has occurred at least temporarily in 2018 when the Volcanoes National Park visitor center was inaccessible due to safety concerns from recent eruptions and the two centers were co-located. b) Develop response plans for the property related to climate change. A report, Climate Change Vulnerability Assessment for the Papahānaumokuākea Marine National Monument, was completed in 2016 (Wagner and Polhemus, eds). c) Ensure the management system achieves an equitable balance between the protection of cultural and natural attributes with the support of a cultural heritage specialist. A NOAA cultural heritage specialist was hired and is developing a cultural resources management guidance document in conjunction with the Office of Hawaiian Affairs and the Native Hawaiian Cultural Working Group. d) In order to address the fragility of, and disruption to, the archaeological remains from plants and animals, put in place deterrents to ensure burrowing animals or plants do not disturb archaeological sites. Limited plans to address this issue have been developed to date (IUCN Consultation, 2014). An initial cultural overview report was completed by FWS in 2019. The report includes an inventory of impacts, both general and specific, to cultural resources, including archaeological sites, on the islands of Nihoa and Mokumanamana (Nohopapa Hawai‘i, 2019). e) Develop monitoring arrangements to monitor the impact of natural processes on the archaeological resources. Monitoring of the archaeological resources is still infrequent, but documentation of the natural processes on these resources has been increased (IUCN Consultation, 2014; Nohopapa Hawai‘i 2019). f) Provide clear documentation of the physical cultural resources based on the outcomes of the current archaeological investigations. Published data on the outcomes of the current archaeological research is still limited. Documentation is ongoing but access depends on scheduling of research voyages. g) Ensure no military training activities take place on Nihoa and Mokumanamana islands. No military training activities are taking place on these islands (IUCN Consultation, 2014).

Sustainable use

There is no sustainable use allowed

Sustainable finance

Compared to other sites globally, this site is well financed, however, the funds to maintain and improve critical infrastructure are lacking. The Papahānaumokuākea Marine National Monument Management Plan (2008) provides long-term guidance for management decisions over a 15-year horizon and sets forth desired outcomes, with strategies and activities to reach those outcomes, including the agencies’ best estimate of future needs. These estimates are sometimes above current budget allocations. However, they are included primarily for strategic planning and program prioritization purposes. All funding for current and possible future activities of Papahānaumokuākea Marine National Monument is subject to the budgeting and appropriations processes of the Federal and State governments (Papahānaumokuākea Marine National Monument, 2008). The loss of federal ship resources in 2018 has
dramatically impacted management, research and outreach access to the Monument (IUCN Consultation, 2020).

**Staff capacity, training, and development**  Mostly Effective

Capacity for implementation of monument management activities varies among the co-trustees, both in terms of finances and human resources. There is a high level of staff training and development and an increasing awareness among management agencies of each other’s requirements and mandates. Decreases in budgets have contributed to a decrease of investment in staff across multiple program areas. The loss of staff charged with Native Hawaiian cultural resource protection and community engagement is notable, as is the lack of engagement of qualified former staff and researchers who could be engaged by the management agencies to carry out critical functions as prioritized in the management plan (IUCN Consultation, 2020). However, while funding from some agencies may have decreased, increases in funding from other co-managing agencies have occurred to support Native Hawaiian community engagement (IUCN Consultation, 2020).

**Education and interpretation programs**  Highly Effective

The Mokupāpapa Discovery Center (MDC) managed by NOAA was created to interpret the nature, culture, and history of Papahānaumokuākea. Located on the waterfront in downtown Hilo, MDC is free and open to the public, and features a large-scale wall map, interactive displays and kiosks, three-dimensional models, submersible mock-up, immersive theater, salt-water aquarium, colorful graphic panels with interpretive text in both Hawaiian and English, beautiful photographs from the NWHI, a giant coral reef mural, and several life-size models of NWHI wildlife. Partnerships with entities like the Waikīkī Aquarium, and the Bernice Pauahi Bishop Museum play a significant role in the mission to bring the monument to the people. Individually the various interpretive centers, and education programs focusing on the site are outstanding, but greater and more featured collaborations are still needed (IUCN Consultation, 2014). In addition to the Centers there are other education programs. While the education program has been highly successful for the past decade, as program budgets have reduced so has investment in education programs (IUCN Consultation, 2020), such as the Navigating Change program which has been put on hold due to funding and other constraints. Therefore this is something that should be noted and assessed going forward.

**Tourism and visitation management**  Highly Effective

‘Midway Atoll National Wildlife Refuge is the only area of the monument where recreational activities are permitted. Access was previously controlled by issuing special ocean use permits. However, the Midway Atoll Visitor Program closed in 2012, and no visitor access is currently available. USFWS will evaluate when and if this activity will be able to resume based on a number of logistical and financial factors.’ (IUCN Consultation, 2020). Nonetheless, Midway Atoll can be considered as the “window” to Papahānaumokuākea Marine National Monument, even though its remoteness makes it difficult to bring educational groups to the atoll. In 2017, a few veterans traveled to Midway to participate in services commemorating the 75th anniversary of the Battle of Midway. In addition the site has a strong track record of public outreach in conjunction with research trips, marine and terrestrial, to the site which draws media and public attention.

**Monitoring**  Mostly Effective

Monitoring of permitted activities is ongoing and happens at various sites throughout the site on an annual basis. The Monument publishes an annual report on permit monitoring. Focused research on genetic connectivity, coral health and population structure, and apex predator tracking which compares populations in the main and Northwestern Hawaiian Islands has been highly productive with several hundred publications produced.

**Research**  Highly Effective

Biological research is highly effective and ongoing when weather allows for access. The research and monitoring of archaeological sites remains limited. A Natural Resources Science Plan was published in April 2011 to guide the research agenda over the course of the next 5 years and is tied directly to the
IUCN World Heritage Outlook: https://worldheritageoutlook.iucn.org/
Papahānaumokuākea - 2020 Conservation Outlook Assessment

management framework for the site. (Papahānaumokuākea website, Nov 2012). A review and update of the plan is overdue. Similarly a maritime heritage research and management plan was also developed and is overdue to be reviewed and updated. A Cultural Resources Management Plan that identifies research priorities is currently being developed.

Overall assessment of protection and management

The overall protection and management of the site is mostly very effective. Monitoring is ongoing and happens at various sites throughout the site on an annual basis. The site is actively managed and has shown recovery from some of the key threats due to the efforts to address invasive terrestrial species and to remove marine debris. There is a GIS database incorporating research data, habitat classifications, species distributions, cultural sites and data, a spatial bibliography of published literature and information on activities carried out under permit in the monument. Importantly, this also includes a Management Plan evaluation system, which tracks implementation and effectiveness of priorities identified in the management plan.

Biological research is highly effective and ongoing when weather and ship resources allow for access. The research for the archaeological sites is still limited. A Natural Resources Science Plan was published in April 2011 to guide the research agenda over the course of 5 years and is tied directly to the management framework for the site. It is overdue for review and update however is still largely accurate and relevant. Midway Atoll serves as the “window” to Papahānaumokuākea Marine National Monument, but its remoteness makes it difficult to bring educational groups to the atoll. In keeping with the Monument’s goal of bringing the place to the people rather than the people to the place, the site continues to explore and test ways to use telepresence technologies such as real-time video transmission, underwater video cameras, virtual field trips, and website interfaces for educational purposes. It also utilizes research trips to generate media and public attention and develop new content for educational programs. Partnerships with entities like the Waikīkī Aquarium play a significant role in the mission to bring the monument to the people. However, more collaboration on education and interpretive programs between the agencies is needed.

Management aims, objectives and jurisdictions are laid out in a Monument Management Plan, which includes strategic objectives and detailed thematic action plans that address priority needs. There are clear and effective governance arrangements including a Monument Management Board, composed of representatives of NOAA, FWS, the State of Hawaiʻi and the Office of Hawaiian Affairs, which carries out the day-to-day management and coordination of Monument activities. Compared to other sites globally, this site is well financed, however, the funds to maintain and improve critical infrastructure are lacking. Capacity for implementation of monument management activities varies among the co-trustees, both in terms of finances and human resources. Investments in Native Hawaiian cultural resource management and engagement have diminished in some agencies, but enhanced in others. There is a high level of staff training and development, however, integration between co-managing agencies could be improved to ensure awareness between each other’s requirements and mandates.

The recently enlarged boundaries are well documented and effective. The boundaries of the property are all located in the ocean, but nevertheless have been clearly defined, demarcated on navigational charts and communicated widely. A significant legal and management framework is in place to limit access, manage uses and monitor vessel activities within the site. Enforcement is regular and effective, however, the site is remote and expensive to enforce. Recent pressure to lift the fishing restrictions in the Pacific marine national monuments, including within the site, is of concern to the conservation of its values, although no official decision has been made as of the time of writing. Limits to the protections of marine natural and cultural resources under the Antiquities Act that established the monument are of concern and should be addressed. The site is also a world leader in collaboration with other larger marine protected areas across the globe through which professional managers of large-scale MPAs can work together to be more
efficient and effective in their management efforts.

#### Assessment of the effectiveness of protection and management in addressing threats outside the site

The overall effectiveness of protection is highly or mostly effective. Threats to the site emanating outside its boundaries include marine debris, hazardous cargo, future exploration and mining, military operations, illegal, unregulated and unreported (IUU) fishing, commercial fishing, anchor damage, vessel strikes and invasive alien species (IUCN Evaluation Report, May 2010). Plans are in place to address threats from both within and outside of the site, to the extent that data exists to address these threats.

#### Best practice examples

The Papahānaumokuākea Natural Resources Science Plan (Science Plan) published in April 2011, is one of a number of “step-down” plans called for in the Management Plan. The Science Plan aims to facilitate the Management Plan’s goal for understanding and interpreting the NWHI, and to provide the information required to support management actions, such as managing threats, permitting activities, and evaluating the effectiveness of management efforts. Among the threats to Monument resources, the direct and indirect effects of climate change, including increased ocean temperature, sea level rise, changing weather patterns, and ocean acidification, are significant, cross-cutting concerns. Current science suggests that climate change is likely to have profound effects on the NWHI’s ecosystems and protected species; thus, understanding climate change impacts and adaptation options is reflected throughout the Science Plan. Additionally, the Monument offers a unique opportunity to understand climate variability and its impacts in the absence of confounding factors, such as human uses and pressures. The Science Plan aims to use this advantage to inform broader management efforts to support ecosystem resilience. Overall, this Science Plan establishes a research and monitoring framework, and a prioritized list of research activities, to inform management of the Monument’s natural resources.

### State and trend of values

#### Assessing the current state and trend of values

**World Heritage values**

#### Illustrating example of island hotspot progression

Typical geological processes of erosion and accretion occur as extensions of the Hawaiian Archipelago. Sea level rise will gradually change the landscape, and has increased in the southeastern portion of the Monument over the last 10 years by 10 mm (IUCN Consultation, 2020), but has not had a significant effect since inscription. More collaboration and outreach to showcase the unique nature of the evolution of the Hawai’ian archipelago with links to Hawai’i Volcanoes National Park is needed. IUCN has recommended that research and awareness raising should consider the geological linkages with the Hawai’i Volcanoes National Park and this World Heritage property (IUCN, 2010).

#### Multitude of habitats and species assemblages

The marine ecosystems of PMNM are still in exceptionally good health compared to most other sea areas in the world, in large part due to historically low and presently strictly limited human use of the area. However, recent significant damages from Hurricane Walaka to terrestrial and marine habitats have impacted numerous species, however the extent of the damage is as yet unquantified. Sea level has also increased in the southeastern portion of the Monument over the last 10 years by 10 mm (IUCN Consultation, 2020). Long term global climate change impacts could have significant effects on the
evolution and development of terrestrial, fresh water, coastal and marine ecosystems and communities of plants and animals (Wagner and Polhemus, 2016).

- **Remarkable example of ongoing evolutionary and biogeographical processes**

  Research continues to uncover the unique biodiversity and bio-geographic attributes of the Monument. Long term global climate change impacts could have significant effects on the evolution and development of terrestrial, fresh water, coastal and marine ecosystems and communities of plants and animals. Climate change and its resultant effects are now major criteria determining research priorities (Wagner and Polhemus, 2016).

- **Unique reef ecosystems**

  Papahānaumokuākea’s reefs are remote, nearly pristine and thus represent one of the last remaining intact large-scale predator dominated coral reef ecosystems. Significant hurricane damage to French Frigate Shoals has resulted in the loss of localized unique reef ecosystems. Invasive algae have deteriorated portions of reefs at Pearl and Hermes Atoll and may persist with few species surviving below the mats. Other reef ecosystems are expected to be stable from pre-inscription conditions. The prevalence of coral disease is low in the Northwestern Hawaiian Islands, and 61 introduced or potentially introduced marine invertebrate species have been found there compared to 287 in the main Hawaiian Islands (IUCN Evaluation, 2010; IUCN Consultation, 2020).

- **Endangered and vulnerable species**

  The site is a significant natural habitat for in-situ conservation of biological diversity. The relative remoteness, strict control over access and consistent monitoring help insure minimal human impact on resources and natural processes other than global processes such as climate change (IUCN Evaluation Report, May 2010). The endangered Hawaiian Monk Seal has experienced a positive trend from 2013-2018 with a median estimated growth rate of 2% a year. It is estimated that 32% of the current seal population is attributed to management interventions (IUCN Consultation, 2020). The Hawaiian population of green turtles has been monitored for more than 30 years, following the cessation of harvesting in the 1970s, and has shown a steady recovery from its depleted state (Balas and Chaloupka 2004a) with a 2015 estimate of 5.4% (Balazs et al. 2015). However, pupping and nesting habitats for both of these species has been significantly reduced in the Monument as a result of damage from Hurricane Walaka and the long-term impacts are not yet clear.

- **Largest tropical seabird rookery in the world**

  The most recent data regarding population dynamics of the seabird colonies within the site suggest that this value is of low concern on the basis that most seabird species have recovered somewhat from previous human disturbance as well as current predation and bycatch impacts and are still recovering. As such, substantial and persistent population declines are not expected for most species in the near future (IUCN Consultation, 2020). The 2016 expansion of the marine reserve brought an additional 442,760 m² of seabird habitat under protection from threats associated with commercial long-line fishing (IUCN Consultation, 2020), which is especially significant given the foraging range of the seabirds which comprise this value. Threats from invasive mice are also prevalent as predation of nesting albatross on Sand Island at Midway Atoll by the introduced house mice (Mus musculus) has been observed since 2015 and has resulted in the loss of 42 adults and 70 abandoned nests in 2015/2016 breeding season and 242 adults, 1,218 bitten birds and 994 abandoned nests and site locations in 2016/2017 breeding season amounting to a 6 fold increase of affected birds (USFWS 2019). However a mouse eradication programme, implemented by the USFWS, will commence at Midway Atoll in an attempt to eliminate the threat of mouse predation there (IUCN Consultation, 2020).
Summary of the Values

Assessment of the current state and trend of World Heritage values

Most World Heritage values have remained stable or improved since inscription, however some have deteriorated. Typical geological processes of erosion and accretion occur as extensions of the Hawaiian Archipelago. Long term global climate change impacts could have significant effects on the evolution and development of terrestrial, fresh water, coastal and marine ecosystems and communities of plants and animals. The site's unique reef ecosystems and the species assemblages which comprise them have been recently impacted by invasive algae and Hurricane Walaka which have caused deterioration in some areas, at least in the short term with the long term implications currently unknown. The site remains a significant natural habitat for in-situ conservation of biological diversity, as proven by the positive trends in endangered and vulnerable species, such as the Hawaiian monk seal and the Hawaiian population of green turtles, due to management interventions in the site. The relative remoteness, strict control over access and consistent monitoring help insure minimal human impact on resources and natural processes other than global processes such as climate change, and associated impacts such as invasive species and natural disasters.

Additional information

Benefits

Understanding Benefits

Importance for research

Research on ecological processes, connectivity, habitat and biodiversity. Understanding the mechanisms that link PNMM populations (and where applicable main Hawaiian Islands) at various scales. Documenting, maintaining and restoring diversity includes the discovery and description of new species, identifying the spatial distribution of habitats critical for the survival of native species, etc.

Factors negatively affecting provision of this benefit:
- Climate change: Impact level - Very High. Trend - Increasing

Pollution through marine debris. Climate change is leading to an increase ocean temperatures, which is contributing to ocean acidification and coral bleaching.

History and tradition, Cultural identity and sense of belonging

Identify and prioritize scientific and Native Hawaiian cultural needs that can be accomplished through anthropological, archaeological, historical and Hawaiian cultural methods. The historic sites of Nihoa and Mokumanamana represent the most pristine and extensive collection of cultural sites within the Hawaiian archipelago and are being used as a training ground for cultural practitioners who wish to continue to practice such cultural protocols as can only be rediscovered in Papahānaumokuākea.

Summary of benefits

The terrestrial and marine habitats of Papahānaumokuākea are crucial for the survival of many endangered or vulnerable species the distributions of which are highly or entirely restricted to the area. This includes the endangered Hawaiian Monk Seal, four endemic bird species (Laysan Duck, Laysan Finch, Nihoa Finch and Nihoa Millerbird), and six species of endangered plants such as the Fan Palm (World Heritage Committee, 2010). Because of its isolation, scale and high degree of protection the World Heritage site provides an unrivaled example of reef ecosystems that are still dominated by top predators such as sharks, a feature lost from most other island environments due to human activity (World Heritage...
Committee, 2010). The size of the archipelago, its biogeographic isolation as well as the distance between islands and atolls has led to distinct and varied habitat types and species assemblages. Papahānaumokuākea constitutes a remarkable example of on-going evolutionary and bio-geographical processes, as illustrated by its exceptional ecosystems, speciation from single ancestral species, species assemblages and very high degree of marine and terrestrial endemism. For example, a quarter of the nearly 7,000 presently known marine species in the area are endemic. Over a fifth of the fish species are unique to the archipelago while coral species endemism is over 40% (World Heritage Committee, 2010). It is composed of terrestrial and marine areas that have special national and international significance in terms of research and understanding of conservation, ecology, history, science education, culture, archaeology and aesthetics. Papahānaumokuākea also has great historic, cultural and spiritual significance for Native Hawaiians.

### Projects

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<th>№</th>
<th>Organization</th>
<th>Brief description of Active Projects</th>
<th>Website</th>
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<tr>
<td>1</td>
<td>University of Hawaii and other academic institutions</td>
<td>Researchers from multiple institutions provide the necessary information on population dynamics, genetic connectivity, identification of new species, and to understand impacts from climate change on the site.</td>
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<td>2</td>
<td>US FWS</td>
<td>US FWS continues efforts to remove alien plants at Nihoa and Midway Atoll and where possible re-vegetate with native species. They have also increased survival of two endangered birds by moving some of the breeding pairs from their one isolated island to colonies on additional islands with great success. At Tern Island - FFS, and Midway Atoll they continue to monitor seabirds.</td>
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<td>3</td>
<td>NOAA</td>
<td>NOAA continues to monitor Hawaiian monk seal populations, coral reefs, mesophotic reefs, and sea turtle populations to look for creative management strategies to increase the declining populations of these species and ecosystems. They also continue to support annual marine debris removal efforts, coral reef monitoring programs and characterization of both nearshore and deep reef areas. They have an extensive outreach program in the Main Hawaiian Islands to support ‘Bringing the place to the people and not the people to the place”. They are also a lead agency for the development of a Native Hawaiian plan for the site. They were the lead agency on the development of an interagency climate change vulnerability analysis for the site.</td>
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<td>4</td>
<td>State of Hawaii</td>
<td>State of Hawaii continues to actively work to remove invasive plant species and restore habitat by revegetating with native species at Kure Atoll. DLNR also manages a translocated population of the endangered Laysan Duck, and monitors seabirds, turtles and Hawaiian monk seals and other species at Kure Atoll.</td>
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<td>5</td>
<td>Office of Hawaiian Affairs</td>
<td>OHA manages the Native Hawaiian Cultural Working Group is the co-lead for the development of the Native Hawaiian Plan. “A cornerstone of this effort has been the direct involvement of cultural practitioners in policy, management, education, and research. This biocultural approach has led to more effective management of the monument and serves as a model for conservation around the world” (Kikiloi, et al., 2017).</td>
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