IUCN Conservation Outlook Assessment 2017 **(archived)**
Finalised on 09 November 2017

Please note: this is an archived Conservation Outlook Assessment for Papahānaumokuākea. To access the most up-to-date Conservation Outlook Assessment for this site, please visit https://www.worldheritageoutlook.iucn.org.

Papahānaumokuākea

SITE INFORMATION

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

Site description:
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

2017 Conservation Outlook

Good

World Heritage values and other biodiversity values have remained stable or improved since inscription 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. Many of the current threats identified rank as low and are isolated to specific areas within the site such as visitor impacts and airplane strikes. Of the high ranked threats only one 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. Nearly half the threats are low threats to the overall health of the site.
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. 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.

Current state and trend of VALUES

Low Concern
Trend: Stable

World Heritage values have remained stable or improved since inscription. Sea level rise will gradually change the landscape, but has not had a significant effect since inscription. 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 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.

Overall THREATS

High Threat

The most significant threats, particularly those associated with climate change, are long term. Many of the threats identified rank as low are isolated to specific areas within the site, including 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 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, 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.

Overall PROTECTION and MANAGEMENT

Mostly Effective

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.

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 Tracking Tool, which incorporates indicators and activities defined in relation to priorities identified in the management plan.
The site is actively managed and has shown significant recovery from some of the key threats due to the efforts to address invasive terrestrial species and to remove marine debris.
Biological research is highly effective and ongoing when weather allows 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 the next 5 years and is tied directly to the management framework for the site. 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 is exploring ways to use telepresence technologies such as real-time video transmission, underwater video cameras, virtual field trips, and website interfaces for educational purposes.
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 Hawai’i and the Office of Hawaiian Affairs, which carries out the day-to-day management and coordination of Monument activities. However, capacity for implementation of monument management activities varies among the three co-trustees, both in terms of finances and human resources. There is a high level of staff training and development, however, additional training should be conducted between co-managing agencies to ensure that they are all aware of each other's requirements and mandates. There is also a strong component of the site management that considers this stakeholder input into the overall management of the site.
Compared to other sites globally, this site is well financed, however, the funds to maintain and improve critical infrastructure are lacking.

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.
The site is also a world leader in collaboration with other larger marine protected areas across the globe and co-convened for the Big Ocean initiative. 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.

FULL ASSESSMENT

Description of values

Values

World Heritage values

▶ **Illustrating example of island hotspot progression**
Criterion:(vii)

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**
Criterion:(ix)

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 bio-geographical processes**
Criterion:(ix)

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

Criterion:(ix)

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

Criterion:(x)

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 (World Heritage Committee, 2010).

► Largest tropical seabird rookery in the world

Criterion:(x)

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,
NT) (World Heritage Committee, 2010).

Assessment information

Threats

Current Threats

High Threat

Most of the current threats were rated as high threat, which largely impact on 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

High Threat
Inside site, widespread(15-50%)
Outside site

In 29 March 2011, the Japan Tsunami washed over large portions of the islands and atolls of PMNM. On Midway 110,000 Black foot 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

Low Threat
Inside site, localised(<5%)

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

Very High Threat
Inside site, widespread(15-50%)
Outside site

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 in 2017 (Papahānaumokuākea Marine National Monument, 2017).

► Temperature extremes

High Threat
Inside site, widespread(15-50%)
Outside site

Coral reef ecosystems in PMNM are very likely to change as a result of changing ocean chemistry and increasing ocean heat content [high

confidence]. While warmer sea temperatures may benefit some of the Monument's reefs, degradation due to reduced calcification and increasing frequency of bleaching and disease events (Wagner and Polhemus, 2016). 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

High Threat
Inside site, localised(<5%)
Outside site

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

High Threat
Inside site, widespread(15-50%)
Outside site

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

High Threat
Inside site, widespread(15-50%)
Outside site

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). 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). 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

High Threat
Inside site, localised(<5%)

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).

► Other Activities

Low Threat
Inside site, localised(<5%)

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 2015, the most recent year for which there is a published permit report, the Monument permitting program tracked 60 permits, 39
of which were issued and active prior to 2015. All active permits, regardless of year issued, were monitored for permitting and reporting requirements in 2015. Of the permitted activities, research and conservation and management received the most permits. Monument staff track access to the atolls and islands by a variety of metrics including number of people permitted access and actual numbers that have performed permitted activities; minimum, maximum and average person-use days on each island/atoll per year; and total amount of person use day for each island/atoll per year. Records indicate that 153 people received permits for research, but only 78 performed research activities. In contrast, 549 people were authorized to do conservation or management work, but only 260 actually engaged in such activities. The total number of person/days for all islands/atolls for 2015 was 23,317. This contrasts with a reported high of 36,648 person-days in 2010 (Papahānaumokuākea Marine National Monument, 2015).

► Tourism/ visitors/ recreation

Low Threat
Inside site, localised(<5%)
Outside site

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

High Threat

Inside site, localised(<5%)

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). Lead paint remediation is ongoing (pers. comms., 2017).

► Invasive Non-Native/ Alien Species

High Threat
Inside site, widespread(15-50%)

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 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)

Potential Threats

High Threat

In addition to the currently known invasive alien species, there is the potential for further species to be introduced, which are currently present in other main Hawaiian Islands. Climate change is also expected to further damage the OUV of the property, through ocean acidification.

► Other

Very High Threat
Inside site, widespread(15-50%)

A total of 11 marine alien fish, invertebrates and algae species have been recorded in the Northwestern Hawaiian Islands. 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 5 species of algae) in the main Hawaiian Islands, which if transported to the Papahānaumokuākea Marine National Monument, could cause significant changes in species composition.

► Ocean acidification

High Threat
Inside site, widespread(15-50%)
Outside site

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-Guldber,g 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.

Protection and management

Assessing Protection and Management

► Relationships with local people

Highly 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 Commerce) and two branches within the Department of Land and Natural Resources (State of Hawaii). It has recently been expanded to include a representative of the state of Hawaii's Office of Hawaiian Affairs. In addition, other stakeholder roups including the Monument's Native Hawaiian Cultural Working Group and the NWHI Coral Reef Ecosystem Reserve Advisory Council (RAC). A new cultural resources management plan for the Monument is currently being prepared. The RAC formally advises 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.

► Legal framework

Mostly Effective

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.

► Enforcement

Mostly Effective

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).
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.

► Integration into regional and national planning systems

Highly Effective

The site has 'sister site' agreements with other large Pacific Marine Protected Areas (MPAs) such as the Phoenix Islands. IUCN recently highlighted 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, and 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 and World Heritage Site 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.

▶ Management system

Mostly Effective

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 Department of Land and Natural Resources (DLNR); 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 has improved markedly in recent years, 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. Fish & Wildlife Service (FWS), and the State of Hawai'i (represented by the Department of Land & Natural Resources)) has provided the indigenous communities' views, a cultural lens and a fully vested role in management activities and decisions. The seven co-managing agencies recently signed a new Memorandum of Agreement (MOA) that guides agency roles and how the Monument Management Board (MMB) operates, ensuring that federal, state, and indigenous interests are fairly represented and actively participate in management. 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 agencies awareness and a chance to provide input on management activities. Only obligated to meet quarterly, the MMB has met dozens of times over the past year to address issues associated with the recent expansion, revise the MOA, and to act efficiently in drafting revised and new management plans for the original and expanded Monument areas in accordance with President Obama's

proclamation. PMNM's management regime is recognized as a proven functional and constructive model for large, multi-stakeholder MPAs around the world. While managing under this multi-agency regime is complicated, and not every agency is satisfied all the time. But the management regime brings all the 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 (pers. comms, 2017).

► Management effectiveness

Highly Effective

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 Tracking Tool, which incorporates indicators and activities defined in relation to priorities identified in the management plan (IUCN, 2010). The site is actively managed and has shown significant recovery from some of the key threats due to the efforts to address invasive terrestrial species and to remove marine debris.
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 RAC members.
As noted above, the co-Trustees meet regularly and are becoming more familiar with each other's organizational cultures and management priorities. The permit system is working effectively. Habitat restoration efforts are making progress. The new visitor center (Mokupāpapa Discovery Center) in Hilo is open and is hosting more visitors. A cultural resources working group is making great progress in developing a plan that sets research, education and partnership priorities.

► Implementation of Committee decisions and recommendations

Mostly Effective

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 (pers. comms., 2014). Interpretive programs are being developed at both the Mokupāpapa Visitor Center in Hilo, Hawaiʻi and at the Volcanoes National Park visitor center. Planning for collaborative outreach programs is underway (pers. comms., 2014). b) Develop a 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 cultural heritage specialist was hired and has organized an interagency team to develop a cultural resources management plan in conjunction with the Office of Hawaiian Affairs and the Cultural Working Group. e) 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 of plants does not disturb archaeological sites. Limited plans to address this issue have been developed to date (pers. comms., 2014). f) 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 (pers. comms., 2014). d) 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, but the cultural resource management plan being developed identifies cultural research priorities within the Monument. Documentation is ongoing but access depends on scheduling of research voyages. Ensure no military training activities take place on Nihoa and Mokumanamana islands. No military training activities are taking place on these islands (pers. comms., 2014).

► Boundaries

Highly Effective

In August 2016, President Obama announced the expansion of the boundaries 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 (36,0832 sq km to 582,578 square miles (1,508,870 sq

km). 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.

► Sustainable finance

Mostly Effective

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). At this time (mid-2017), it is not clear what impacts the proposed federal budget cuts might have on Monument management.

► Staff 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.

▶ Sustainable use

Highly Effective

There is no sustainable use allowed

▶ Education and interpretation programs

Highly Effective

The Mokupāpapa Discovery Center (MDC) managed by NOAA was created to interpret the nature, culture, and history of the Northwestern Hawaiian Islands. 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 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 (pers. comms. 2014). In addition to the Centers there are other education programs. One such program is Navigating Change. Navigating Change is an education and environmental stewardship program that incorporates traditional knowledge with western science to inspire the next generation of conservation leaders. Through studying the differences between the Main Hawaiian Islands and the uninhabited islands, atolls and marine ecosystems in Papahānaumokuākea Marine National Monument, students gain a better understanding of human impacts and are empowered to restore and protect our unique natural spaces. The Navigating Change Program brings non-profit, private, and government agencies together to help facilitate these outdoor restoration excursions for students across Hawai'i. Each year a restoration site is identified and elementary students in the surrounding community address the restoration needs for that site, using the Navigating Change Curriculum as a guide. Sites are chosen for their safety, educational value, historical significance, and the potential for community support.

► Tourism and visitation management

Highly Effective

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 is exploring ways to use telepresence technologies such as real-time video transmission, underwater video cameras, virtual field trips, and website interfaces for educational purposes (USFWS Midway Atoll National Wildlife Refuge website, Nov 2012). In 2017, a few veterans travelled to Midway to participate in services commemorating the 75th anniversary of the Battle of Midway.

► 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 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 the next 5 years and is tied directly to the management framework for the site. (Papahānaumokuākea website, Nov 2012). A Cultural Resources Management Plan that identifies research priorities is currently being developed.

Overall assessment of protection and management

Mostly Effective

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.
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 Tracking Tool, which incorporates indicators and activities defined in relation to priorities identified in the management plan.
The site is actively managed and has shown significant recovery from some of the key threats due to the efforts to address invasive terrestrial species and to remove marine debris.
Biological research is highly effective and ongoing when weather allows 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 the next 5 years and is tied directly to the management framework for the site. 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 is exploring ways to use telepresence technologies such as real-time video transmission, underwater video cameras, virtual field trips, and website interfaces for educational purposes.
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 Hawai’i and the Office of Hawaiian Affairs, which carries out the day-to-day management and coordination of Monument activities. However, capacity for implementation of monument management activities varies among the three co-trustees, both in terms of finances and human resources. There is a high level of staff training and development, however, additional training should be conducted between co-managing agencies to ensure that they are all aware of each other's

requirements and mandates. There is also a strong component of the site management that considers this stakeholder input into the overall management of the site.
Compared to other sites globally, this site is well financed, however, the funds to maintain and improve critical infrastructure are lacking.
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.
The site is also a world leader in collaboration with other larger marine protected areas across the globe and co-convened for the Big Ocean initiative. 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.

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

Mostly Effective

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 the first 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 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

Low Concern
Trend:Stable

Sea level rise will gradually change the landscape, but has not had a significant effect since inscription. More collaboration and outreach to showcase the unique nature of the evolution of the Hawaiian archipelago with links to Volcanoes National Park is needed. IUCN recently recommended that research and awareness raising should consider the geological linkages with the Hawaii Volcanoes National Park and this World Heritage property (IUCN, 2010).

► Multitude of habitats and species assemblages

Low Concern
Trend:Stable

The marine ecosystems of PMNM are in exceptionally good health compared

to most other sea areas in the world, in large part due to historically low and presently strictly limited use of the area. However, 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 bio-geographical processes

Low Concern
Trend:Stable

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

Low Concern
Trend:Stable

Papahānaumokuākea’s reefs are remote, nearly pristine and thus represent one of the last remaining intact large-scale predator dominated coral reef ecosystems. The prevalence of coral disease is low in the Northwestern Hawaiian Islands, and only a handful of introduced marine invertebrate species have been found there
compared to 287 in the main Hawaiian Islands (IUCN Evaluation, 2010).

► Endangered and vulnerable species

Low Concern
Trend:Stable

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). However, there is some concern about certain species, such as the Hawaiian monk seal. Despite recovery efforts, seal populations have exhibited an overall decline of ~4% per year for the last

two decades. However, the observed decline in the seal population in the Northwestern Hawaiian Islands has in recent years been mitigated by an increase in seals in the Main Hawaiian Islands (Parish et al., 2012). 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).

► Largest tropical seabird rookery in the world

High Concern
Trend:Stable

The last complete inventory of Northwestern Hawaii Islands (NWHI) breeding populations was done between 1979 and 1984 (Fefer et al. 1984). Population trends since then have been derived from more intensive monitoring at three islands. Population trends in the NWHI are stable or increasing for most species, but there is concern for a few, especially the albatrosses. The conservation status of seabirds in Hawai‘i was assessed as part of the North American Waterbird Conservation Plan. Eleven of the 21 species were classified as highly imperilled or of high conservation concern at the broad scale of the plan. At the regional scale (Pacific Islands), 6 species were included in these highest concern categories: Laysan, black-footed, and short-tailed albatrosses; Christmas shearwater; Tristram’s storm-petrel; and blue noddy. (Papahānaumokuākea Management Plan, 2008).

Summary of the Values

► Assessment of the current state and trend of World Heritage values

Low Concern

Trend: Stable

World Heritage values have remained stable or improved since inscription. Sea level rise will gradually change the landscape, but has not had a significant effect since inscription. 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 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.

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.

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 property provides an unrivalled 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

Compilation of active conservation projects

№	Organization/ individuals	Project duration	Brief description of Active Projects

1	University of Hawaii and other academic institutions	Researchers from multiple institutions provide the necessary information on population dynamics, identification of new species, and to understand impacts from climate change on the site.
2	US FWS	US FWS continues efforts to remove alien plants at Laysan Island and Midway Atoll and 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, Laysan Island and Midway Atoll they continue to monitor seabirds.
3	NOAA	Continues to monitor Hawaiian monk seal populations, coral reefs, Mesopheric 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 the lead agency for the development of a Maritime Heritage plan and a Native Hawaiian research plan for the site. They have also taken the lead on the development of an interagency climate change plan for the site.
4	State of Hawaii	State of Hawaii continues to activity work to remove invasive plant species and monitor seabirds and Hawaiian monk seals at Kure Atoll.
5	Office of Hawaiian Affairs	OHA manages the Native Hawaiian Cultural Working Group and is working with NOAA as the lead for the development of the Native Hawaiian cultural resources management plan.

Compilation of potential site needs

№	Site need title	Brief description of potential site needs	Support needed for following years
1	UH and other academic institutions, NOAA, USFWS, OHA and Bishop Museum	Additional archaeological research	
2	OHA and NOAA	Additional compilation of Native Hawaiian chants, stories and legends of the site	

№	Site need title	Brief description of potential site needs	Support needed for following years
3	NOAA, US Coast Guard and the State Department	All possible methods to address increasing marine debris	
4	NOAA, US Army Corps of Engineers	Sea level rise scenario planning and mitigation	
5	UH and other academic institutions, NOAA	Marine disease impacts and potential mitigation measures	

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