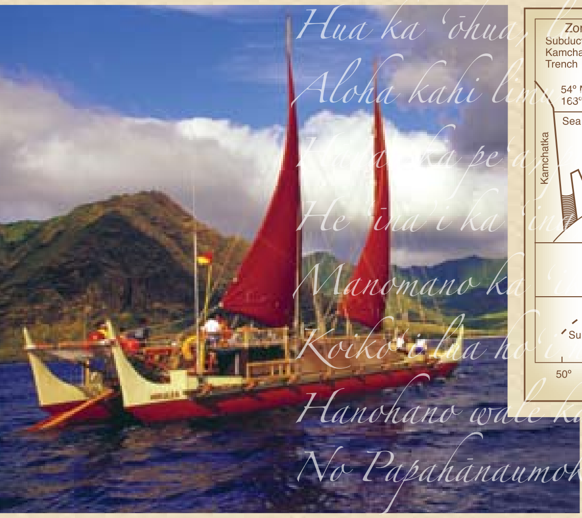
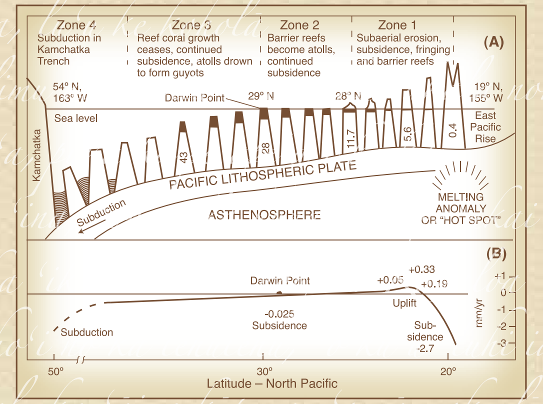
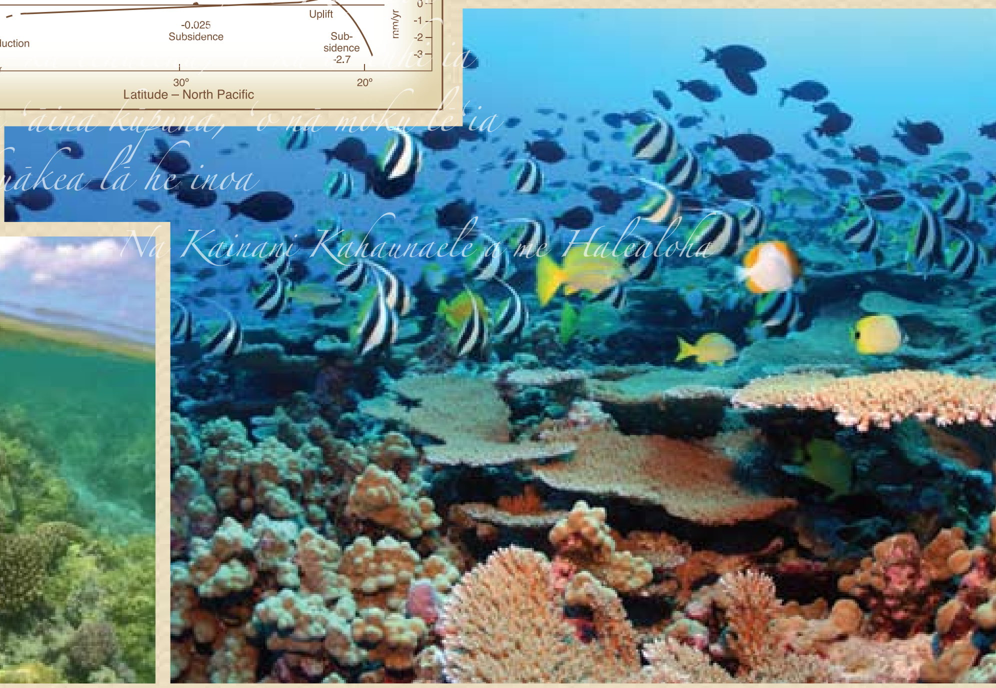
3.

Mālamalama ka lā nui a Kāne puka i Haʻehaʻe
ʻApakau ke kukuna i ka ʻili kai o nā kai ʻewalu
He ʻike makawalu kaʻu e ʻanoʻi nei,
ʻO nā au walu o Kanaloa Haunawela noho i ka moana nui
He Huʻakai ka makani o Lehua ʻau i ke kai
Kūʻonoʻono ka lua o Kūhaimoana i ke kapa ʻehukai o Kaʻula
ʻO Kū i ka loulu, ulu aʻe ke aloha no Nihoa moku manu
Manu o kū i ka ʻāhui, he alakaʻi na ka lāhui
ʻO Hinapūkoʻa
ʻO Hinapūhalakoʻa
ʻO Hina kupukupu
ʻO Hinaikamalama
Hua ka ʻōhua, [illegible] ke kōlolā
Aloha kahi lim[illegible] noho i uka
Hoʻa [illegible] ka peʻa [illegible]
He ʻīnaʻi ka ʻī[illegible] kai
Manomano ka [illegible]
Koikoʻi ka ho[illegible] ia
Hanohano wale ka ʻāina kūpuna, ʻo nā moku leʻia
No Papahānaumokuākea lā he inoa

Na Kainani Kahaunaele a me Halealoha







Justification for Inscription on the World Heritage List

3. Justification for Inscription on the World Heritage List

Papahānaumokuākea Marine National Monument is nominated as a mixed cultural and natural heritage site with a cultural landscape under criteria (iii), (vi), (viii), (ix) and (x).

Pale anemone crab (Photo: Susan Middleton & David Liittschwager)

3.a Criteria Under Which Inscription Is Proposed

Criterion iii: to bear a unique or at least exceptional testimony to a cultural tradition or to a civilization, which is living or which has disappeared.

Peopling of Polynesia and the marae-ahu-heiau Ritual System

All Polynesian cultures have a shared history and descend from an Ancestral Polynesian Culture, which developed in a Western Polynesian homeland sometime in the mid-later first millennium BC (Green 1986; Kirch 1984; Kirch and Green 1987, 2001). As Polynesians voyaged and settled the remote parts of Eastern Polynesia from this Western homeland, isolation led to marked social change, particularly after inter-archipelago long-distance voyaging ceased in the 15th century.

The *marae-ahu-heiau* complex found throughout Eastern Polynesia refers to ceremonial sites, often monumental in size, where individuals and communities had structured relationships with the ancestors and gods and where socio-political rites were carried out (Green 1993). There is growing evidence that ritual sites were also used for astronomical reckoning in order to link the lunar calendar with the agricultural calendar and seasonal festivals (Kirch 2004a, 2004b). The *marae-ahu-heiau* ritual architecture found throughout Eastern Polynesia has a court – either a pavement or an enclosure, with representations of the gods (upright stones, sculptures, etc.) and an *ahu* (altar). That these types of religious sites throughout Eastern Polynesia have a shared morphology and use demonstrates the common ancestry of all Eastern Polynesian religions and religious architecture.

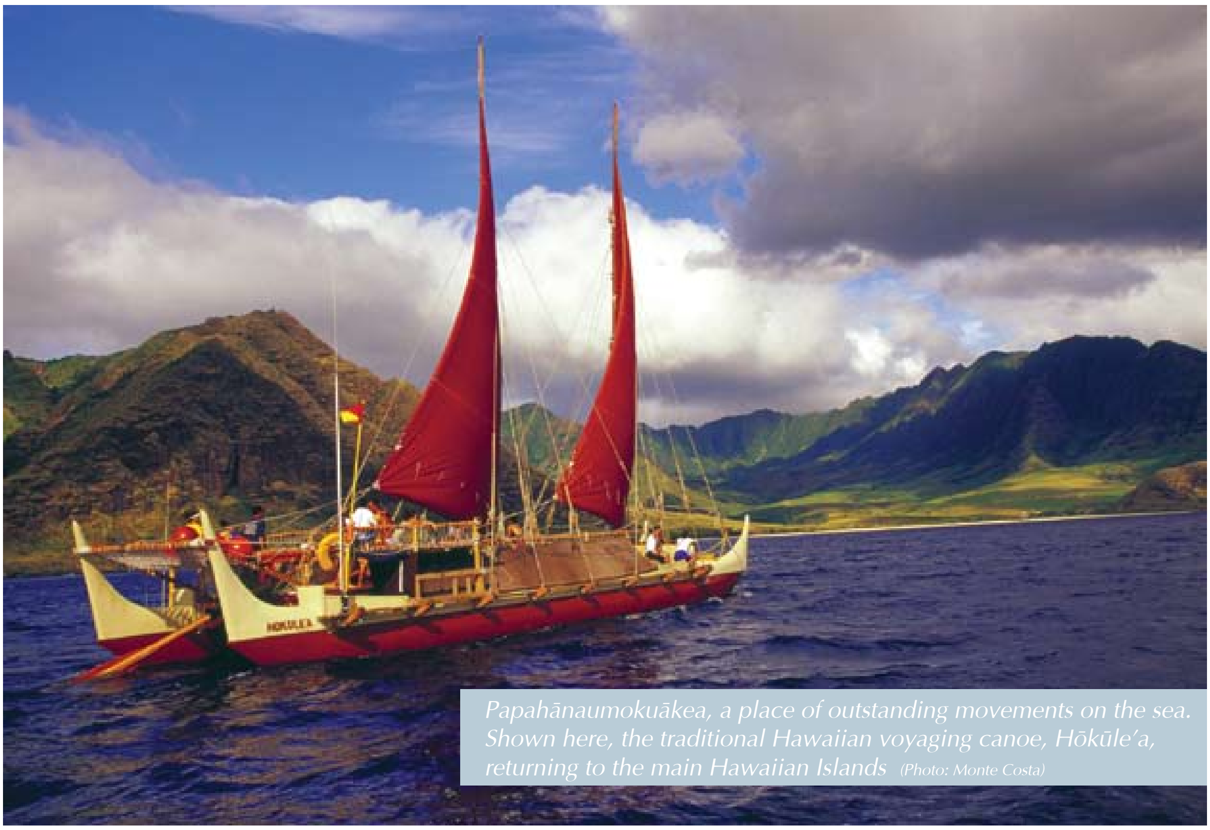
"The Last Frontier: The Pacific Islands were the most difficult and therefore the last places on earth to be reached by humans. With that settlement, humankind finally reached the end of the habitable world."

*– **K. R. Howe**, in Vaka Moana ("Ocean Sailing Canoes"): Voyages of the Ancestors, the Discovery and Settlement of the Pacific. Hawai'i is the most isolated archipelago in the world, and one of the last two, if not the last, Pacific island chains to be reached by humans.*

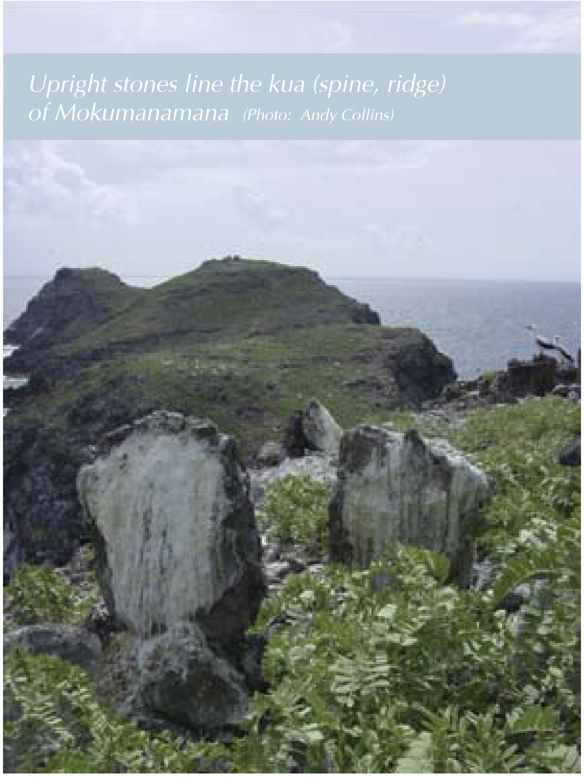
The 45 shrines of Nihoa and Mokumanamana, built sometime between

1000 and 1700 AD consist of well-paved terraces and platforms with single uprights or more commonly, rows of uprights. In the Hawaiian Archipelago, they show rare shared connections to other Eastern Polynesia cultures that use lines of uprights to represent the gods, namely the Society Islands and Tuamotu Islands of Central Eastern Polynesia (Green 1996; Emory 1928). They are the only *heiau* in the Hawaiian Archipelago, apart from a few exceptions found in remote high-altitude zones (Mauna Kea and Haleakalā), that incorporate these elements. The Papahānaumokuākea ceremonial sites demonstrate both the common ancestry for all Eastern Polynesian religions and ritual architecture (Graves and Sweeney 1993), as well as the diversity in religious architecture that developed as socio-political institutions diverged through time and Eastern Polynesian cultures became more isolated and regionally focused after 1450 AD.

Other facets of the material culture in Papahānaumokuākea clearly demonstrate cultural affinities to Central Eastern Polynesia. These include exceptionally detailed stone figures that lack counterparts in stone or wood figures found in Hawaiʻi (Cleghorn 1988), but resemble sculpted *kiʻi* (god figures) recovered from the Marquesas Islands in Central Eastern Polynesia (Chavaillon and Olivier 2007). The layout of temples at Nihoa and Mokumanamana is hypothesized to relate to the observations of celestial phenomena used to coordinate the lunar and agricultural calendars, similar to ritual sites documented in both Mangareva (Central Eastern Polynesia) (Kirch 2004a; McCoy 2008) and elsewhere in Hawaiʻi (Kirch 2004a; McCoy 2008). Thus, the archaeological landscapes of Nihoa and Mokumanamana demonstrate ties to earlier ancestral cultures to the West, yet aspects of their form and layout also provide exceptional examples of how the Native Hawaiian culture evolved, adapted and changed in its relative isolation. The Papahānaumokuākea cultural and marine landscape has importance on a world-wide scale as a rare undisturbed example of the long-term history of settlement, evolution and change in the Oceanic Island region.



Papahānaumokuākea, a place of outstanding movements on the sea. Shown here, the traditional Hawaiian voyaging canoe, Hōkūleʻa, returning to the main Hawaiian Islands (Photo: Monte Costa)



Upright stones line the kua (spine, ridge) of Mokumanamana (Photo: Andy Collins)

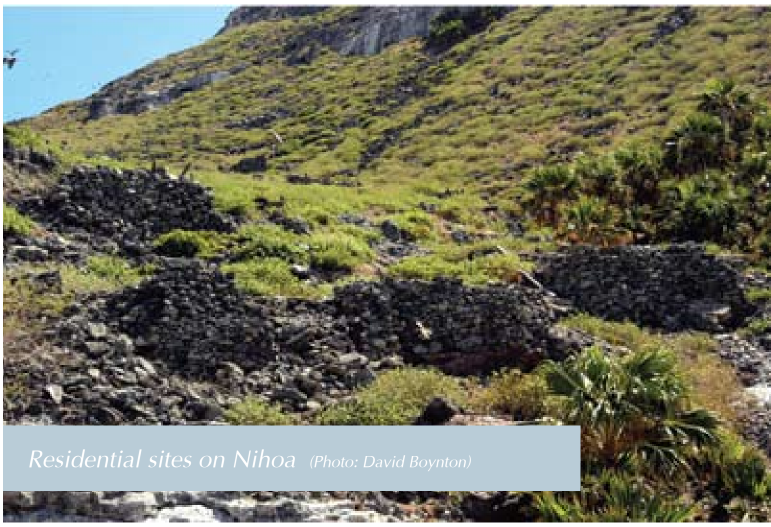
Intact Cultural-Marine Landscape

Skill in voyaging enabled not only discovery, but also continued use of remote regions that lacked basic resources for sustenance. Despite a dearth of fresh water, these islands were important residential and ceremonial sites for a resilient pre-contact Hawaiian community. Nihoa and Mokumanamana feature rare, intact archaeological landscapes of residential sites, agricultural terraces, and ceremonial complexes from settlements where Native Hawaiians resided between 1000-1700 AD (Cleghorn 1988). A diverse range of ancient site types are well represented, including habitation terraces and rock shelters, some of substantial size and expert architecture, extensive terraces for dryland agriculture, and a plethora of shrines and *heiau/marae* for ritual activities. Survey and excavation have recovered artifacts suggesting that a range of activities were carried out by pre-contact Native Hawaiians on these islands. These include daily domestic activities (cooking, food preparation and storage, manufacture of stone tools and fishing gear), subsistence activities (fishing and collecting marine resources, cultivating dryland crops), and ritual activities (including burial of the dead). Native Hawaiians presently use the area as a navigational testing ground and to perform varied rituals in the ceremonial landscape.

The lack of intensive use or development in Papahānaumokuākea has left these archaeological landscapes in remarkably pristine condition. In pre-contact Hawai‘i, settlements extended from the coast to the interior island regions in generally pie-shaped patterns termed *ahupua‘a*, which encompassed resources of both the land and the ocean (Kirch 1985). Most cultural landscapes within the Hawaiian Islands, particularly those situated near the coast, have been detrimentally affected by modern development. Papahānaumokuākea is arguably the only place in the Hawaiian Islands with a fully intact pre-contact archaeological landscape where the full suite of site types are preserved, coupled with a near to pristine natural marine environment. As such, it represents an exceptional treasure to the worldwide community and to descendant Native Hawaiians who continue to have a living cultural connection with these land and sea resources.

Mystery Islands and Adaptations to Remote Island Environments

Papahānaumokuākea is particularly significant in this context because Nihoa and Mokumanamana are both “Mystery Islands” – the once-inhabited but now abandoned outposts at the farthest reaches of Polynesian migration – which have been integral in describing how Polynesia



Residential sites on Nihoa (Photo: David Boynton)

Papahānaumokuākea "… completes the cycles we have in all of our stories. We always have these cycles in our stories… the sun rising at Kumukahi [Hawai'i Island] and then setting way over in the West [Papahānaumokuākea]."

*– **Pualani Kanaka'ole Kanahele** during the re-commencement of the ancient Summer Solstice voyage to Mokumanamana. She says of the significance of cultural practitioners visiting Papahānaumokuākea: "We're completing the cycle of the sun. And then the new cycles begin…. When we go back to Hawai'i, we begin the cycle of rebirth all over again."*

was purposefully (rather than accidentally peopled, as was suggested earlier in the 20th century). Archaeological studies have been highly influential in understanding how sustained inter-archipelago and

The islands and atolls in Papahānaumokuākea represent minute wayfinding targets in the vast Pacific Ocean (Photo: PMNM)

inter-island voyaging were required to sustain human life on Polynesian Mystery Islands (Diamond 2005; Weisler 1994, 1995, 1997, 2002). As Weisler (1996: 627) notes, "so-called Mystery Islands," with their marginal ecological conditions and isolation taxed the capabilities of Polynesian colonization to the physical and social limits. They document not only how Polynesians settled marginal places with minimal resources but offer an example of a remarkable achievement in the history of human life: how humans adapted to some of the most isolated and extreme living conditions on earth.

In archaeological or anthropological terms, Nihoa and Mokumanamana have a fully "transported" and human modified landscape, with the remains of hundreds of stone masonry features and earthen and rubble fill terraces. Despite these islands' remote character and marginal resources (e.g., lack of fresh water, materials for building, food, anchorages) deep-sea sailing canoes and wayfinding expertise transported people and resources from the main Hawaiian Islands to these Mystery Islands. Such efforts are thought to have been expended because of Mokumanamana's spiritual significance as the boundary between the realm of the living and the realm of the afterlife.

Other Polynesian Mystery Islands have seen archaeological research and have intact prehistoric archaeological remains (Henderson-Pitcairn; the Phoenix-Line Islands, Norfolk Islands, and the Kermadecs). However, among these, those in Papahānaumokuākea stand apart from the rest. They not only have the highest density of ritual and ceremonial sites among the Mystery Islands, but they have unique ritual sites documenting both the evolution of Polynesian societies and their shared past connections to ancestral cultures in the West. They are also, significantly, the only Mystery Islands with a living descendant community that currently uses and has strong ties to the islands' cultural and natural resources.

"It is the edge of the Hawaiian universe…"

*– **Halealoha Ayau**, Hawaiian cultural practitioner on why Papahānaumokuākea is a place of such fundamental importance to the Native Hawaiian people and culture."*

Criterion vi: to be directly or tangibly associated with events or living traditions, with ideas, or with beliefs, with artistic and literary works of outstanding universal significance.

Native Hawaiian culture continues to evolve in great part through the perpetuation of a rich oral tradition. Genealogies and cultural meanings are still passed down through *oli* (chant) and *mele* (song), as are histories, natural resource management knowledge, philosophies, and medicinal and spiritual knowledge. Papahānaumokuākea is the spiritual, physical, or practical site of a host of traditions that are central to Native Hawaiian culture and understanding.

The World of Gods and Spirits

Papahānaumokuākea is considered a sacred area, from which Native Hawaiians believe all life springs, and to which spirits return after death. The longest recorded traditional Hawaiian chant, the Kumulipo (source of deep darkness), recounts how all life forms came and evolved out of the primordial darkness, called Pō.

Unlike the Maori *iwi* (tribes) of *Aotearoa* (New Zealand), Native Hawaiian genealogies in their homeland do not begin with the naming of the canoe on which their ancestors arrived, but instead establish a familial relationship with the creation of the land they inhabit, the Hawaiian Islands. Oral histories of the generations of Hawaiians extend back more than 900 generations, linking all Hawaiians to Wākea (sky father) and Papa (earth mother), to the first living creatures of land and sea, and to the elements themselves (Kameʻeleihiwa 2007).

Blowing a conch shell and chanting, Hawaiian practitioners greet their ancestors (kūpuna), give thanks, and ask their permission to land on Nihoa and Mokumanamana (Photo: Naʻalehu Anthony)

The Kumulipo tells of the births of the universe's first life forms, considered to be gods by Native Hawaiians, beginning with the deep darkness of night and the coral polyp, continuing with emergence of the archipelago's various plants and animals, and ending with the birth of Native Hawaiians.

The Kumulipo describes the Hawaiian universe as being comprised of two worlds: Pō, the deep darkness reserved for gods and spirits, and Ao, the realm of light where the living reside. Native Hawaiians believe that Mokumanamana represents the boundary between these two worlds. In astronomical terms, this boundary crosses the Tropic of Cancer, which runs across Mokumanamana.

Native Hawaiians also believe that when people die, their spirits travel to portals, called *leina* in Hawaiian, located on each main Hawaiian Island. From these portals, spirits embark on a journey out of Ao, and into the west, to Pō. Once again, this spirit realm of Pō is represented by the islands and their surrounding waters located to the northwest of Mokumanamana.

As the boundary between Pō and Ao, Mokumanamana today serves as a critical place for ongoing Native Hawaiian cultural research into the significance of celestial movements, particularly during major solar events such as the summer solstice. Native Hawaiian tradition holds that a person's shadow is the physical manifestation of their spirit. Therefore, Hawaiian ceremonies are held during periods of the day when the shadow cannot be seen, and power is therefore concentrated in the body: the transitions at dusk and dawn, and at noon. The sun hangs overhead the longest on the summer solstice, June 21, along the Tropic of Cancer, making Mokumanamana a powerful place to hold summer solstice ceremonies.

In 2007, renowned Native Hawaiian cultural practitioner and researcher Pualani Kanahele and a group of cultural practitioners called *Ha'ae Wale Hānauna Lolo* visited Mokumanamana to study the relationship between the island's *heiau*, or shrines, and the path of the sun during the summer solstice. Native Hawaiian cultural researchers are committed to continuing this research, as well as to conducting other studies, on both Nihoa and Mokumanamana. These research opportunities are important to the maintenance and continued growth of strong bonds between Native Hawaiians and the Northwestern Hawaiian Islands.

In addition, Native Hawaiians rely on access to Nihoa and Mokumanamana to conduct ceremonial rites associated with the deities connected with these places, such as Kāne, the god of life and fresh water, and Kanaloa, the god of the deep ocean.

One of the The Last-Remaining Places of Abundance ('Āina Momona)

The natural integrity of Papahānaumokuākea is exceptional. In a Pacific and Hawaiian context, this integrity is of paramount cultural importance, particularly in comparison to the largely degraded terrestrial and marine ecosystems in the main Hawaiian Islands. Terrestrial, and particularly marine environments, that remain relatively lightly affected by humans, with high rates of endemism and life that is unique to the Hawaiian Archipelago, are crucial to an indigenous understanding of the important relationships between ocean and land; between living things in a unique, fragile and induplicable ecosystem; and particularly between humankind and the natural world. These understandings, central to the Native Hawaiian world-view, are passed down through oral histories and traditions, but require a living, physical manifestation to have more than abstract or historical meaning. Papahānaumokuākea serves a critical function today for Native Hawaiians who are seeking ways to not only reconnect and expand their cultural practices, but also ways to improve degraded natural environments in the main Hawaiian Islands, to which their cultural practices are intrinsically linked.

A Green Turtle or honu glides above Acropora (Table Coral)
(Photo: James Watt)

Papahānaumokuākea provides Native Hawaiians and the broader public a region to observe and learn from that is nearly pristine and unspoiled. This example can teach valuable lessons in conservation that can be applied to the archipelago's main islands (see Section 2.a) and beyond, to other places that seek to integrate indigenous knowledge of sustainable management practices with current Western paradigms of conservation. In particular, islands such as Nihoa and Mokumanamana offer examples of how the ancestors of Native Hawaiians implemented their traditional knowledge to sustain their presence on remote islands with fragile environments.

In this living classroom, Hawaiian practitioners are learning by comparison about how their environments in the main Hawaiian Islands have been altered. For example, on the July 2008 Educators of Oceania research cruise to Papahānaumokuākea, Hawaiian practitioners conducted surveys of reef habitat to help determine traditional Hawaiian indicators of change to the main Hawaiian Islands' reefs. Papahānaumokuākea also provides the potential to be an inspirational example of how to integrate indigenous and Western management practices, providing a model for other culturally and ecologically invaluable properties (see Section 5).

Hawaiian Voyaging and Wayfinding (Non-Instrument Navigation)

Today, Papahānaumokuākea serves a critical role in two significant, living, Native Hawaiian traditions: voyaging and wayfinding. The voyaging route between Kaua'i and Nihoa is used today, as it has been for generations, as a major training and testing ground for novice navigators studying modern Hawaiian wayfinding aboard traditional, double-hulled Hawaiian voyaging canoes.

This route is the only one from the main Hawaiian Islands where neither the launching point nor the target destination is visible for an extended period during the course of the voyage, thereby offering a close simulation of a long-distance voyage without the added




One of Hawai'i's last-remaining places of abundance: intact coral reef ecosystems, plentiful wildlife, and viewscapes unchanged for centuries (Photos: James Watt)

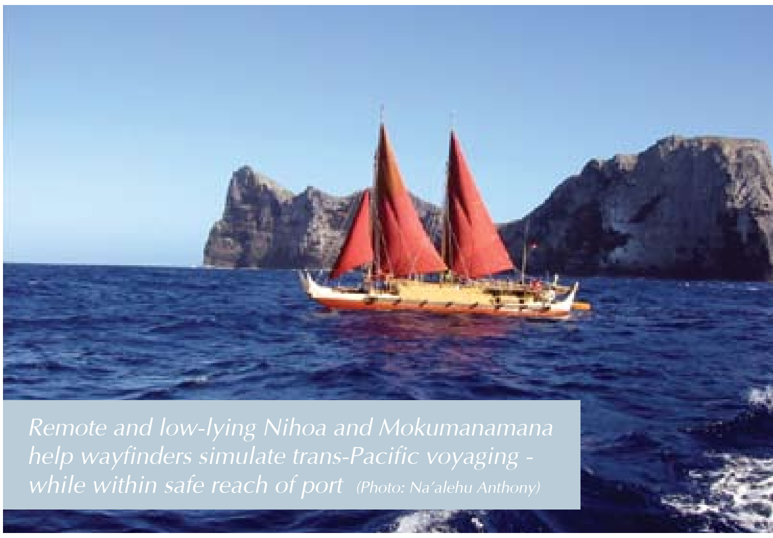
Just as in ancient times, Papahānaumokuākea is the proving ground today for apprentice Hawaiian wayfinders (non-instrument navigators) (Photo: PVS)

dangers of testing endurance. It is also the only voyaging route that offers this simulation while being close enough to the main Hawaiian Islands to ensure safety and access to provisions. These characteristics make this route "the ideal training platform" for novice Hawaiian wayfinders, according to Nainoa Thompson, Master Hawaiian Navigator. Today, novice Hawaiian wayfinders are considered ready to attempt navigation of a long-distance voyage after they have successfully guided a voyage from Kaua'i to Nihoa, with a possible additional leg to Mokumanamana. The roundtrip from Kaua'i to Mokumanamana can be completed within four days, compared to a 30-day, one-way voyage from Hawai'i to Tahiti (Kālepa Babayan 18 June 2008, personal communication; Dennis Chun 19 June 2008, personal communication; and Nainoa Thompson 4 October 2008, personal communication).

The connection between Native Hawaiian voyaging and Papahānaumokuākea is not limited to the training of navigators. Traditional, double-hulled Hawaiian voyaging canoes have traveled throughout Papahānaumokuākea in recent years. In 2004, *Hōkūle'a* sailed from Kaua'i all the way to Kure Atoll and back as part of the educational "Navigating Change" voyage (see Section 2.b). Moreover, the five existing and two under-construction Hawaiian voyaging canoes will continue to serve as the traditional vessels to deliver cultural practitioners to Nihoa and Mokumanamana for religious ceremonies. The use of traditional canoes offers an opportunity to maintain a level of cultural integrity that is appropriate for these ceremonies. In two separate voyages in 2003 and 2005, the voyaging canoes *Hōkūle'a* and *Hōkūalaka'i* brought the cultural protocol group *Nā Kupu'eu Paemoku* to Nihoa and Mokumanamana for ceremonial purposes.

Criterion viii: to be outstanding examples representing major stages of earth's history, including the record of life, significant on-going geological processes in the development of landforms, or significant geomorphic or physiographic features

The 1,931 kilometer long string of islands, atolls, and banks in Papahānaumokuākea Marine National Monument form a major portion of the Hawaiian-Emperor Archipelago, the world's longest and oldest volcanic chain (Grigg 1997), and an unparalleled example of sequential volcanic hotspot island formation and evolution. Each of the islands in the Hawaiian-Emperor Archipelago began as a submarine volcano on the ocean floor. This volcanic "hot spot," currently located near the island of Hawai'i, the southernmost Hawaiian Island, has been active for at least 80 million years. Gradual tectonic movement of the Pacific plate to the northwest carries each emerging island slowly away from the hotspot, creating a chain of volcanic islands.

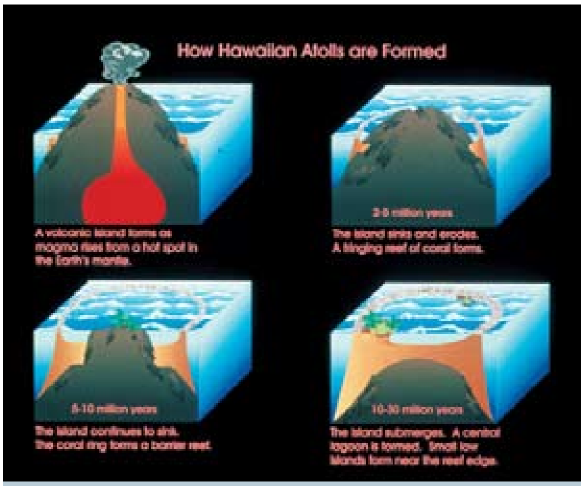


Remote and low-lying Nihoa and Mokumanamana help wayfinders simulate trans-Pacific voyaging - while within safe reach of port (Photo: Na'alehu Anthony)

Papahānaumokuākea's islands, atolls and associated submerged banks comprise a classic geomorphologic sequence illustrating what can happen in an island's middle and late age—with eroded high islands, near-atolls with volcanic pinnacles jutting from surrounding lagoons, true ring-shaped atolls with circular rims and central lagoons, secondarily raised atolls, and submerged banks, rich with marine life, where islands once stood.

Coral reef and then atoll formation proceed in parallel with an island's formation and senescence. When a submarine volcano rising from a seafloor hotspot reaches the level of the photic zone, where sunlight is present, coral reefs begin to form. As the islands are transported by plate motion to the north and northwest, these reefs continue to grow around the island margin, and the islands themselves are moved off the hotspot and begin to erode and subside. Eventually the volcanic core disappears altogether, and the classic ring-shaped atoll is left behind.

Papahānaumokuākea encompasses the northernmost three-quarters of the Hawaiian Archipelago. The oldest of these, Kure, is estimated to be ~27 million years old, whereas Nihoa, the youngest within Papahānaumokuākea, is estimated to be 7.2 million years old, and is the closest to the active volcanic hotspot at Kīlauea in the main Hawaiian Islands,



Model of Hawaiian atoll formation
(Patti Gallagher-Jones/FWS)

(Rubin 2001). Nowhere else in the world is this progression illustrated in such an unambiguous and linear fashion (Figure 3.1).

As one moves up the Northwestern Hawaiian chain from southeast to northwest, the islands clearly and dramatically illustrate the stages in the volcanic island growth cycle, containing all stages of island/atoll/seamount progression. At Papahānaumokuākea's relatively younger southwestern end, Nihoa and Mokumanamana are volcanic in nature, the eroded peaks of much larger islands that are mostly subsided and now form the basis for large banks that ring the emergent land. Moving northwest, French Frigate Shoals represents a site where only La Pérouse Pinnacle, a steep-sided basalt sea stack, still exists above sea level in the middle of the original volcano that forms the foundation for the surrounding atoll. Gardner Pinnacles are steep basalt sea stacks surrounded by an extensive bank, where coral growth did not keep pace with the island's subsidence. Moving further northwest, one encounters islands that are true atolls, rings of coral reef that outline what were once large land masses, long since eroded. Drilling projects on Midway in the late 1960s confirmed that these islands were built above the sea by lava flows that were subsequently weathered and partially truncated

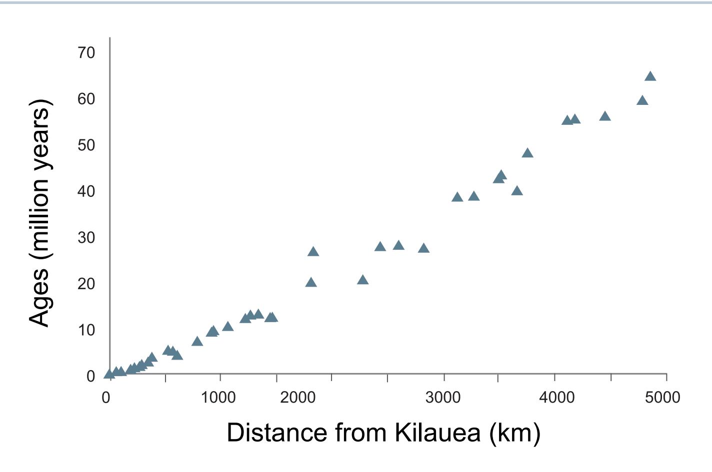
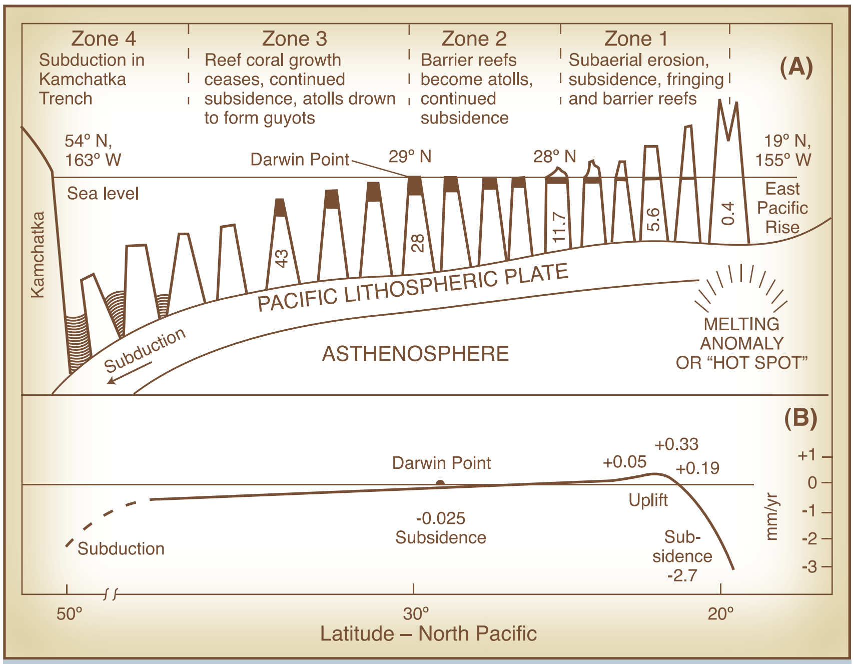


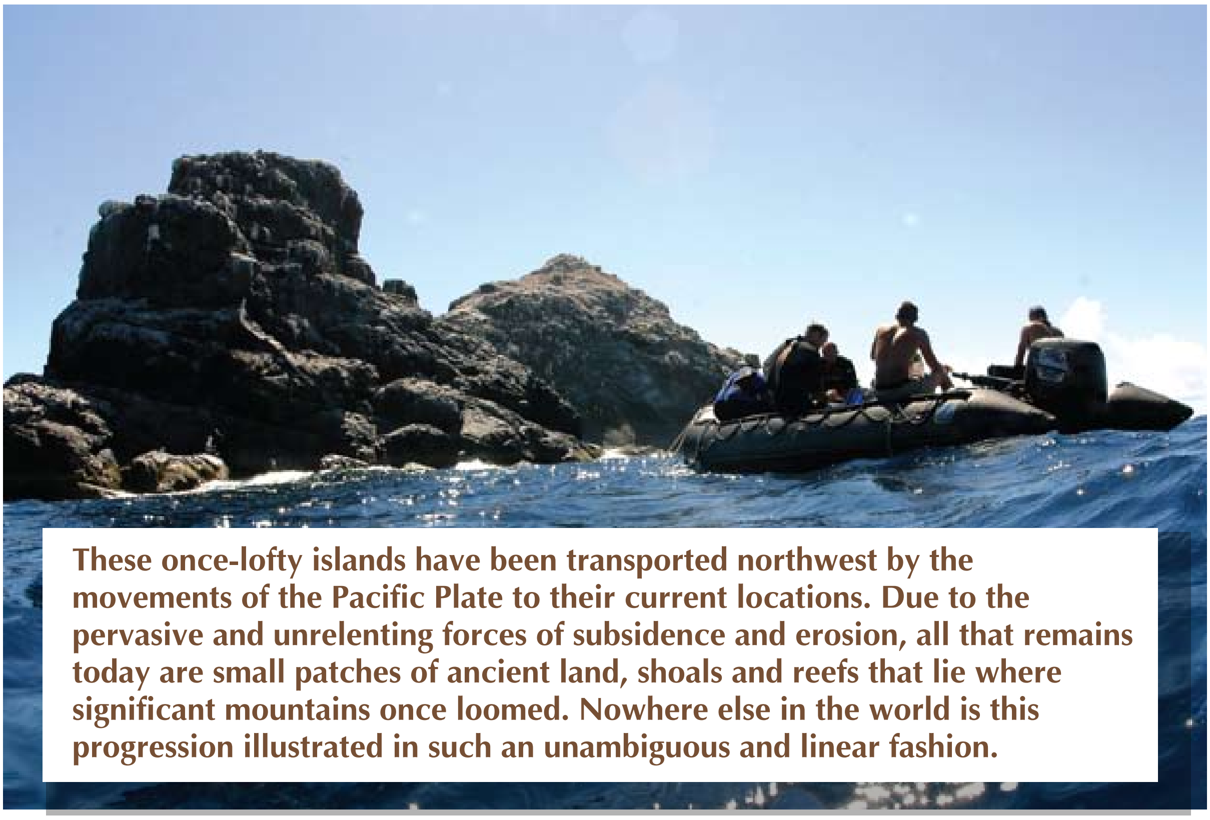
Figure 3.1: *Age of volcanoes within the Hawaiian Archipelago*
(Data: Clague and Dalrymple (1987))



Model of volcanic island growth progression, from island to atoll to seamount
(Richard Grigg)

in pre-Miocene time, submerged and covered by successive layers of limestone left behind from coral growth (Ladd et al. 1976).

Papahānaumokuākea includes a unique example of an atoll at the critical "Darwin Point," the northernmost threshold for coral reef existence (Grigg 1982). Kure Atoll is the northernmost coral reef in the world and has reached the latitude at which coral growth rates, which decrease in cooler temperatures, are matched by the rate of subsidence of the island. North of the Darwin Point, reefs can no longer grow fast enough to counteract subsidence, and along with the underlying platforms become seamounts and guyots that eventually disappear into the ocean depths at the northern end of the Hawaiian-Emperor chain (Grigg 1997). Papahānaumokuākea includes 30 submerged banks and guyots, and many of these may already be too deep to re-emerge at sea level through coral growth.



These once-lofty islands have been transported northwest by the movements of the Pacific Plate to their current locations. Due to the pervasive and unrelenting forces of subsidence and erosion, all that remains today are small patches of ancient land, shoals and reefs that lie where significant mountains once loomed. Nowhere else in the world is this progression illustrated in such an unambiguous and linear fashion.

3.b Statement of Outstanding Universal Value

Covering a vast area in one of the world's most isolated archipelagos, Papahānaumokuākea Marine National Monument encompasses a significant expanse of low-laying islands and atolls, predator dominated coral reef ecosystems, and marine and terrestrial flora and fauna that show significant patterns of enhanced speciation with numerous endemic and endangered species. It is a unique seascape, rich in ecological, geological and cultural heritage.

The islands and atolls of Papahānaumokuākea comprise an important prototype and outstanding example of ongoing geologic processes and the clearest illustration of 'hotspot' island progression in the world. The sheer isolation of these islands and waters causes Papahānaumokuākea to function as an intact miniature evolutionary universe. It contains innumerable excellent examples of ecological and biological evolutionary processes (such as dramatic examples of adaptive radiation) that continue undisturbed, resulting in very high rates of endemism. The region provides a crucially important habitat for the conservation of many endangered or threatened species of global concern. Papahānaumokuākea is also a sacred cultural landscape, a region of deep cosmological and traditional significance to the living Native Hawaiian culture that contains a host of intact and significant archaeological sites. The entire region provides a largely undisturbed ancestral environment, whose preservation both illuminates and embodies the Hawaiian concept of the literal and spiritual kinship of all things in the natural world, including man, and represents the site where life originates and the place where spirits return after death.

Criterion iii: Papahānaumokuākea's remarkable archaeology and significant ritual sites (heiau) bear exceptional testimony to the shared historical origins of all Polynesian societies, and to the growth and expression of a culture that evolved from the last and most difficult wave of cross-Pacific Polynesian migration. As the only Mystery Islands (once-inhabited but now abandoned outposts at the farthest reaches of Polynesian migration) that continue a cultural association with their indigenous people, the islands of Nihoa and Mokumanamana can reveal much about cultural resilience in a changing environment.

Criterion vi: Papahānaumokuākea, as an associative cultural landscape, represents core elements of Native Hawaiian cosmology


(Photo: Andy Collins)

and tradition. The islands northwest of the Tropic of Cancer are believed to lie within the region of primordial darkness from which life originates and to which it returns. For a culture that considers nature and civilization to be part of a genealogical whole, Papahānaumokuākea offers a "place of abundance" to reconnect with an ancestral environment, and its seas are also a traditional and contemporary testing ground for the revitalized art of Polynesian wayfinding.

Criterion viii: The string of islands in Papahānaumokuākea, 1,931 kilometers long, comprise a classic, important and unparalleled example of later stages of island and atoll evolution. The archipelago has provided some of the most compelling confirmation of current theories of global plate tectonic movements.

Criterion ix: Papahānaumokuākea is a spectacular example of evolution in isolation, which results in enhanced speciation and a phenomenally high degree of endemism in both the marine and terrestrial flora and fauna. The coral reef ecosystems of Papahānaumokuākea also represent one of the world's last apex predator dominated ecosystems, a community structure characteristic of coral reefs prior to significant human exploitation.

Criterion x: The region is home to, and a crucial refuge for, many endangered, threatened, and endemic species, including critically endangered marine mammal, bird, and plant species for whom it is the last or only refuge anywhere on earth. Papahānaumokuākea is also the largest tropical seabird rookery in the world.

Integrity
Papahānaumokuākea is a nearly pristine marine ecosystem, which allows biological and ecological processes and systems to continue undisturbed, to a degree seen in few other places on earth. It includes all key areas and ecosystems that are needed to maintain ecological integrity and the long-term conservation of its unique diversity. Papahānaumokuākea is also a complete and intact cultural and maritime landscape that is in continuous use by its cultural descendants, Native Hawaiians. Its densely scattered, well-preserved and varied archaeological sites have been subject to very few human disturbances.

Authenticity
The authenticity of Papahānaumokuākea lies in the continuing strong association of the landscape with the cosmology and oral traditions of Native Hawaiians, the embodiment of an ancestrally pristine and spiritually meaningful marine environment, and the perpetuation of customary practices such as wayfinding.

Requirements for protection and management
Papahānaumokuākea is protected by a significant federal and state legal regime, including an extensive management plan; enforcement, surveillance, and monitoring activities; and severe restrictions on access. Tourism is restricted to limited numbers at only one site, on Midway Atoll. The area is managed to provide opportunity for significant input and advice from key stakeholders and has a long history of public engagement.


(Photo: James Watt)

3.c Comparative Analysis

The inscription of Papahānaumokuākea Marine National Monument would contribute to a balanced and representative World Heritage List. While oceans comprise 70% of the earth's surface, the World Heritage List represents relatively few coastal, marine and small island natural sites. The World Heritage Marine Programme identified that out of the 800-plus sites inscribed on the World Heritage List, only about 4% have significant marine components. Significant marine sites with an associative cultural landscape are currently absent from the List. None of the approximately 30 tropical World Heritage sites, and none of the 25 mixed World Heritage sites, represents an associative cultural landscape with marine components, although several sites are currently being proposed.

As recognized by the UNESCO World Heritage Global Strategy (Paragraphs 54-58 of the Operational Guidelines, 2005), natural and mixed sites are priorities for future inscription in the World Heritage List. In addition, in 2007, IUCN identified a gap in the World Heritage List's representation of sites in the Pacific, relating to marine systems, as well as cultural landscapes (IUCN 2007). The recent ICOMOS Thematic Study, "Cultural Landscapes of the Pacific Islands" explores cultural landscapes of the Pacific as rich in associative value and a priority for future site inscription. This study identifies "movement of peoples" and "storied places that explain origin and development" as particularly strong themes in the Pacific region. Papahānaumokuākea is discussed as an example of a site that would meet this description (Smith and Jones 2007). In concert with IUCN and ICOMOS, The World Heritage: Pacific 2009 Programme reflects a concerted effort to encourage and facilitate the inscription of more Pacific sites, stating that despite

> "extraordinary cultural and biological diversity and richness, the Pacific is the most under-represented sub-region."

Global Comparison of World Heritage sites - Biology

The majority of sites with tropical marine components on the World Heritage List are managed for their terrestrial biodiversity, rather than their marine component (Hillary et al. 2003). Of the more than 400 atolls and reef islets in the world, only three have been inscribed as World Heritage sites: East Rennell, Aldabra, and Atol da Roca, which are all raised atolls. World Heritage sites that include marine and/or cultural components (New Caledonia Lagoons, Galapagos, Great Barrier Reef, Cocos Island, the Gulf of California, Hawai'i Volcanoes National Park, Tongariro National Park, Tubbataha Reef in the Philippines) have been successfully established by only a few nations in Oceania, and no World Heritage sites currently include coral reef components of the central deep Pacific.

Marae shrines on Nihoa (Photo: Kekuewa Kikiloi)

navigational testing path from Kaua'i to Nihoa, and on to Mokumanamana, is the only one available to Native Hawaiians today.

Many other voyaging nations and cultures, from Vikings to Greeks to Tahitians to Maori, continue to use models of traditional voyaging vessels to conduct cultural ceremony, much as Native Hawaiians do in Papahānaumokuākea and elsewhere. For Native Hawaiians, who continue to chart tens of thousands of miles on voyaging canoes, navigational knowledge is often place-specific, and the integral training can only be done in home waters, where novice navigators can apply some of their life experience in environmental observations and associations. Moreover, the cultural ceremonies and protocol associated with Nihoa, Mokumanamana and the other atolls up the chain, can only happen off of those shores where appropriate respect can be paid to their ancestors, in their particular spiritual, natural and geological manifestations.

Comparison to Other Mystery Islands

Mystery Islands are remote islands with extreme environments that exhibit evidence of Polynesian settlement but were abandoned by the time of Western contact. There are at least 25 of these islands: Nihoa and Mokumanamana in Hawai'i; Pitcairn and Henderson of the Pitcairn group; Howland in the Phoenix Islands; Washington, Fanning and Christmas in the Northern Line Islands and Malden in the central group; Palmerston and Suwarrow in the Cook Islands; the sub-tropical islands of the Kermadecs, and Norfolk Island (Irwin 1992). Mystery Islands have world-wide significance. Understanding in a regional context how increasingly isolated communities on smaller remote islands, such as Nihoa and Mokumanamana or Pitcairn and Henderson, were able to remain connected to larger high islands with more diverse resources, such as the main Hawaiian Islands or Mangareva, has significance to other regions such as the Mediterranean, where inter-island communication was an essential activity in the past to ensure the movements of goods and people to sustain life on both the isolated islands and the relevant mainlands (see DiPiazza and Pearthree 2001a, b; Rolett 2002; Weisler 1997; and see Cherry 1985 for the Mediterranean).

Nihoa and Mokumanamana are distinctive within the Mystery Island group in a number of ways. Other Mystery Islands in Eastern Polynesia have intact settlement landscapes, but none has the high density and intact preservation of ritual sites that Nihoa and Mokumanamana possess, nor do they have the marae shrines that exhibit the adaptation of Eastern Polynesian culture. Nihoa and Mokumanamana are also unique among Mystery Islands for the maintenance of a living cultural connection.

Comparison to Other Archaeological Sites

Listed on the National Register of Historic Places, Nihoa and Mokumanamana possess a combined 141 archaeological sites, making them some of the densest scatters of prehistoric structural sites in Hawai'i. In addition, these islands feature archaeological landscapes that contain original materials that largely have not been subject to the anthropogenic disturbances (invasive species, development, etc.) very common among the main Hawaiian Island sites. The view planes of the islands' religious sites – an element that is critical in Hawaiian culture – are also undisturbed, an extremely rare condition in Hawai'i, where telescopes, coastal and urban development, and diverted freshwater, among other things, have adversely altered most religious sites and their surrounding environments. Moreover, the stone upright sites on Nihoa and Mokumanamana are a rare style of *heiau* in the Hawaiian Archipelago, otherwise found only atop the extinct volcanoes of Mauna Kea on Hawai'i Island, and at the top of Haleakalā on Maui.

As a whole, Papahānaumokuākea plays a critical role in understanding the nature of Polynesian migration and settlement in the Pacific. All of the islands of Papahānaumokuākea were either empty at the time of first Western contact or abandoned, having been occupied some time prior (Kirch 1988a). All of the islands of Papahānaumokuākea are small, geographically isolated, and lacking sufficient resources to allow self-sustainability or demographic stability (in initial and later stages of colonization). These environmental limitations are thought to be the main reasons why interaction was so vital to these regions (Irwin 1990, 1992: 174-180).

3.d Integrity and Authenticity

Cultural

Cultural Authenticity

Papahānaumokuākea continues to be considered a spiritual place of the gods for Native Hawaiians and is valued for its pristine wilderness of terrestrial and marine habitats. As noted above, oral histories and archaeology indicate the extensive length of time that Native Hawaiians have experienced and respected Papahānaumokuākea. Oral histories provide interpretations of still existing natural resources and phenomena in terms of ancestral voyages and origin stories specific to Papahānaumokuākea. The concepts of the reciprocity exchange of *hānai a 'ai* (to care for and eat from) and "*nānā i ke kumu*" ("look to the source") also help to express the *kuleana* (privilege and responsibility) for Native Hawaiians to protect, honor and give back to Papahānaumokuākea, its natural resources, and its spiritual significance.

There is a continuing, centuries-old Hawaiian protocol of protecting these sites and offering gifts to the place and spirits, as part of the reciprocal nature of the Native Hawaiian culture. Since the time of European contact with the islands, the region has continued to mainly be used for resource harvesting and perpetuation of cultural and religious traditions by Native Hawaiians.

Papahānaumokuākea continues to be a preeminent location for experiencing and understanding seascape (inclusive of the islands connected by the sea) *hō'ailona* (signs, omens in nature) that occur in pristine environments. These *hō'ailona* often come to Native Hawaiians via the natural forms taken by their ancestors who have pertinent advice to give them from the spiritual world. They come in many potential forms, such as encounters with sharks or giant trevally; cloud forms rising in welcoming or foreboding shapes over sacred sites; the ocean suddenly making a distinctive color or surface change that bespeaks a warning or a benevolent presence; a normally high-soaring bird skimming the ocean surface and flying directly toward a person, etc. Many believe that anyone, if they are open to the experience and appropriately inspired by the situation and location, can receive *hō'ailona*. In Papahānaumokuākea, because of its pristine beauty and direct, unimpeded links to Native Hawaiians' spiritual, historical and ancestral origins, these *hō'ailona* are distinct, regular and available for the culturally and spiritually aware mind to interpret and understand. It is partly because of these experiences that Native Hawaiians value the

Mokumanamana's upright stones silhouetted by the sunset. The upright stones line the 'spine' of the island and are oriented to the movements of the sun across the year (Photo: Kekuewa Kikiloi) unparalleled opportunities provided by the islands, atolls, reefs, ocean and atmosphere of Papahānaumokuākea to not only reconnect with and learn from their past, but better prepare for their future.

Native Hawaiian knowledge and practice

The authenticity of Papahānaumokuākea's significant role in Native Hawaiian culture stems from several lines of evidence:

(1) Oral traditions – Native Hawaiian customs have been passed down over multitudes of generations through oral traditions, including *mo'olelo* (stories), *mele* (songs), place names and *mo'okū'auhau* (genealogies);

(2) Historical record – after Western contact, scholars both Native Hawaiian and non-Native recorded a wide range of Hawaiian traditions in journals, books and Hawaiian language newspapers and periodicals, dozens of which were published between 1834 and 1948;

(3) Existing community knowledge – modern day oral history projects conducted over the years with *kūpuna* have also preserved many Native Hawaiian traditions.

Specific examples of evidence from the historical record and oral history projects that document the Native Hawaiian people's close relationship to Papahānaumokuākea can be found below in the discussion on authenticity. These include verbatim quotes from 18th and 19th century newspapers and periodicals, reports of the Board of Genealogy of Hawaiian Chiefs, the Bishop Museum on-line Mele Index, oral histories, traditional stories, early explorer's journals (including Captain James Cook's), and manuscripts of *mele* (song), *oli* (chant), and *pule* (prayer).

Many oral traditions about the NWHI recount voyages through these islands, from the times of antiquity to present day. As recorded in oral histories, Native Hawaiians and their gods have traveled up and down Papahānaumokuākea throughout the past two millennia. Cultural practitioner William Ailā says that part of the reason Papahānaumokuākea is so revered and cherished by Native Hawaiians is "because many different navigators came through. Pele from the north. Others from Kahao'olawe. Others from Ni'ihau. Many different groups came here, settled here, on many different courses and canoes...Many of us have connections through our genealogies, or who used to fish up there. It's about us, and our connection to our ancestors who also looked at the same stars, who also voyaged to this place" (William Ailā 18 June 2008, personal communication).

The migration *mo'olelo* (story) about Pele, the revered volcano goddess, lists the many islands she visited as she traveled from her home in Tahiti to the Hawaiian Archipelago. As Pele is one of the most important Hawaiian gods, a host of different stories describe her arrival in the Hawaiian Islands, with several mentioning her plan to travel to Mokumanamana and her actual visit to Nihoa (Beckwith 1951; Westervelt 1916).

The name Papahānaumokuākea itself pays tribute to the two gods who are most widely attributed to the parenting of the Hawaiian Islands and the Native Hawaiian people: Papahānaumoku, the goddess of the earth, and Wākea, the god of the sky. Descriptions of their union are found in such sources as the epic creation chant the Kumulipo, below, as well as a number of other published materials, many dating back to the 19th century (Kaiaikawaha 1835; Malo 1839; Kamakau 1865; Fornander 1918). For example, in his 1839 book *Mo'olelo Hawai'i*, Hawaiian scholar David Malo noted that all Native Hawaiians, commoners and chiefs alike, were descended from Papa and Wākea. In 1835, another Hawaiian scholar, named Kaiaikawaha, documented a version of the Papa and Wākea creation story that lists the birth of a number of islands after Nihoa. The names provided may be the ancient names of the Northwestern Hawaiian Islands.

Eia na aina i hanau mai ai maloko mai o ke kanaka i puka mai ai. O Papahanau moku ka wahine o ka Hanau – Akea ke kane, moe laua, ko ka laua keiki, a hanau mai ka laua hiapo he pohaku o Kahikiku, oia ka mua,

hanau mai kona hope o Kahikimoe,
o kona hope o Kahikiikeapaapanuu,
o kona hope o Kahikiikeapaapalani,
o kona hope o Kahaula,
o kona hope o Puula,
o kona hope o Puukanukanu,
o kona hope o Waiauau,
o kona hope o Waiakaka,
o kona hope o Waialea,
o kona hope o Aleauli,
o kona hope Aleakea,
o kona hope o Kahaula,
o kona hope o Kapili,
o kona hope o Kamuku,
o kona hope o Kamukuikahahane,
o kona hope o Ulunui,
o kona hope o Melemele,
o kona hope o Hakulauai,
o kona hope o Polapola,
o kona hope Hawaiiku,
o kona hope o Hawaiiliiliakanaka,
o kona hope o Hawaii,
o kona hope o Maui,
o kona hope o Kanaloa,
o kona hope o Nanai,
o kona hope o Molokai,
o kona hope o Oahu,
o kona hope o Kauai,
o kona hope o Niihau,
o kona hope o Molokai,
o kona hope o Oahu,
o kona hope o Kauai,
o kona hope o Niihau,
o kona hope o Kaula,
o kona hope o Mokupapapa,
o kona hope o Nihoa,
o kona hope o Haena,
o kona hope o Haenaku,
o kona hope o Hanamoe,
o kona hope o Haenaala,
o kona hope o Haenaae,
o kona hope o Haenamauhoalalaiahiki,
o kona hope o Laloiho,
o kona hope o Laloae,
o kona hope o Lalohele,
o kona hope Lalokona,
o kona hope o Lalohoaniani,

Here are the lands that were born from which the people emerged. Papahānaumoku the mother of birthing – Wākea the husband, they mated, and their children were begotten, and born was their first child a rock named Kahikikū, he was the first,

*born next was **Kahikimoe [Tahiti]**,*
born next was Kahikiike'āpaapanu'u,
born next was Kahikiike'āpaapalani,
born next was Pu'ulā,
born next was Pu'ukanukanu,
born next was Wai'au'au,
born next was Waiakāka,
born next was Waiale'a,
born next was Ale'auli,
born next was Ale'akea,
born next was Kaha'ula,
born next was Kapili,
born next was Kamuku,
born next was Kamukuikahahane,
born next was Ulunui,
born next was Melemele,
born next was Hakulauai,
*born next was **Polapola [Bora Bora]**,*
born next was Hawai'ikū,
born next was Hawai'imoe,
born next was Hawai'iala,
born next was Hawai'ikapakūkehoa,
born next was Hawai'ili'ili'iakānaka,
*born next was **Hawai'i**,*
*born next was **Maui**,*
*born next was **Kanaloa** [Kaho'olawe],*
*born next was **Nāna'i [Lāna'i]**,*
*born next was **Moloka'i**,*
*born next was **O'ahu**,*
*born next was **Kaua'i**,*
*born next was **Ni'ihau**,*
born next was Ka'ula,
born next was Mokupapapa,
born next was Nihoa,
born next was Hā 'ena,
born next was Hā'enakū
born next was Hā('e)namoe,
born next was Hā'enaala,
born next was Hā'enaa'e,
born next was Hā'enamauhoalālāiahiki,
born next was Laloiho,
born next was Laloa'e,
born next was Lalohele,
born next was Lalokona,
born next was Laloho'ānini,
born next was Kamole,

o kona hope o Kamole,
o kona hope o Manawainui,
o kona hope o Manawailani,
o kona hope o Manawaihiki,
o kona hope o Kuaihelani,
o kona hope Holaniku.

Oia na keiki moku i hanau mai ai.

born next was Kapou,
born next was Kapouhe'eua,
born next was Kapouhe'elani,
born next was Manawainui,
born next was Manawailani,
born next was Manawaihiki,
born next was Kuaihelani,
born next was Hōlanikū.

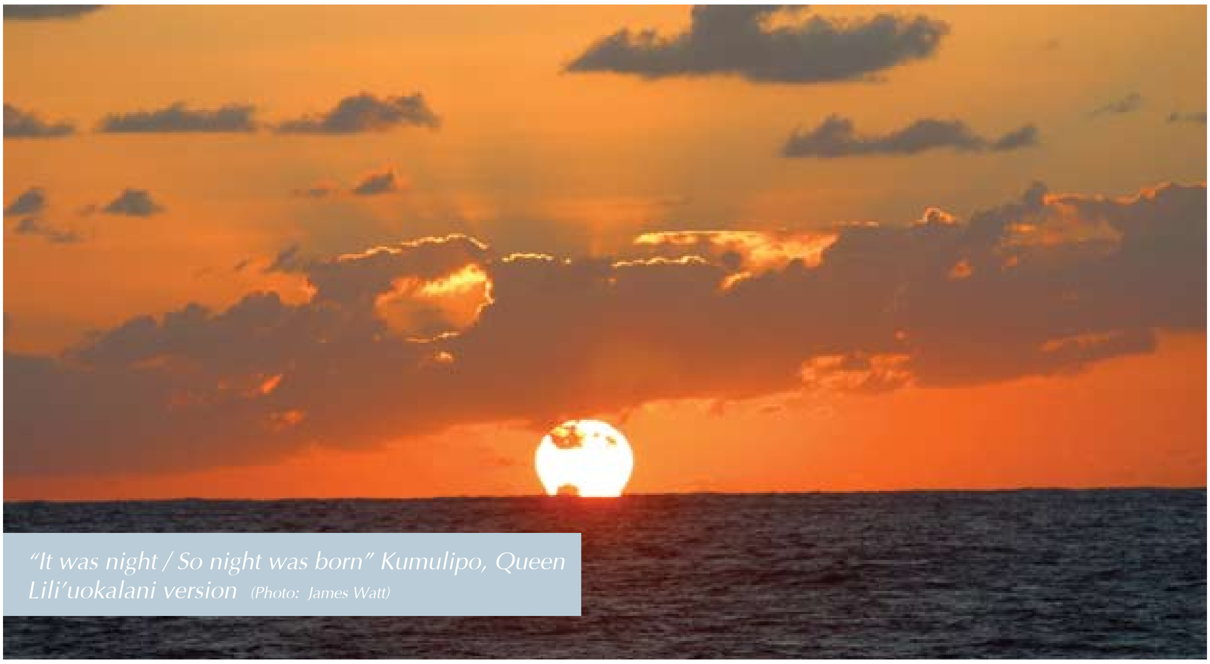
These are the islands that were born.

Excerpt and translation provided by Kekuewa Kikiloi.

About 50 Hawaiian language newspapers and periodicals were published between 1834 and 1948. This body of archival literature has provided, and will continue to provide, invaluable documentation regarding Native Hawaiian traditions in the Northwestern Hawaiian Islands. For example, the six-part serial "He wahi Kaao no Mokulehua," printed in the Hawaiian language newspaper "Ka Hoku O Ka Pakipika" in 1861 through 1862 relays a story of a man named Mokulehua who visits the islands west of Nihoa and Mokumanamana. The story provides a list of places he visited, with names that may be ancient, forgotten names for islands in Papahānaumokuākea.

The predominant Native Hawaiian creation story, the Kumulipo, exemplifies the fundamental importance of Papahānaumokuākea to the Hawaiian belief system. At more than 2,000 lines long, the Kumulipo was first chanted to honor the 18th century chief Kalaninui'īamamao, and has been passed down through the generations of the highest ranking Native Hawaiian chiefs. Multiple interpretations exist surrounding the exact translations, and multiple editions were written in the 19th century. King David Kalākaua commissioned the publication of a version of the chant as a pamphlet in 1889, and his sister, Queen Lili'uokalani, later translated it into English.

The Kumulipo (source of deep darkness) tells the history of how all life forms came and evolved from the region of Pō, in Papahānaumokuākea, beginning with the coral polyp – the building block for all life. Through a series of eight more *wā* (stages), came the various life forms of the earth, culminating with the birth of man.



"It was night / So night was born" Kumulipo, Queen Lili'uokalani version (Photo: James Watt)

After Western contact with the Hawaiian Archipelago, which brought with it Western customs and viewpoints, the region continued to be important to the evolving Hawaiian culture. Some of the highest-ranking Hawaiian royalty of the 19th century visited the Northwestern Hawaiian Islands, including Queen Kaʻahumanu, King Kamehameha IV, and King David Kalākaua (Department of Hawaiian and Pacific Studies, Bishop Museum 2002). In 1822, Queen Kaʻahumanu visited Nihoa, which was said to be the source of Kauaʻi's life-giving rain, with her husband, King Kaumualiʻi, chief of Kauaʻi. They rediscovered historic evidence of prior habitation, as the Queen had learned from *oli* (chant) and *mele* (song) passed down through the generations (Rauzon 2001). King Kamehameha IV (Alexander Liholiho) formally annexed Nihoa for the Hawaiian Kingdom in 1857, starting the process of formally claiming most of the NWHI. In 1885, Queen Liliʻuokalani and her two-hundred-person entourage landed on Nihoa to study the palms, wildlife and artifacts on the island (Bishop, in Emory 1928).

Recent efforts to document the oral histories of today's Native Hawaiian *kūpuna* provide further evidence of the Native Hawaiian people's continuous relationship with Papahānaumokuākea. In 2003, Kepā Maly produced a comprehensive oral history project that contained excerpts from 130 interviews he conducted with Native Hawaiian *kūpuna* over 28 years. Maly's interviews with Kāwika Kapahulehua, a late kupuna from Niʻihau and first captain of *Hōkūleʻa*, revealed that the people from this island continued to voyage to Papahānaumokuākea into at least the late 19th century to fish and gather other resources. In addition, Reriotérai Tava and Moses Keale documented additional connections between the Niʻihau people and Nihoa in the 1989 book "Niʻihau: The Traditions of an Hawaiian Island." They recorded Niʻihau traditions that indicate families from the island voyaged to Nihoa to fish and collect leaves, wood and grass for cordage. The connection between Niʻihau and Nihoa is so well preserved that the people of the island still remember the exact time of year and type of wind that was used to sail from Niʻihau to Nihoa (Maly 2003; Tava and Keale 1989). Moreover, Native Hawaiian commercial fishermen continued to access the Northwestern Hawaiian Islands throughout the 20th century (Maly 2003), and apprentice traditional wayfinders continue to be tested by the navigational practical exam of "pulling Nihoa from the sea" (Nainoa Thompson 4 October 2008, personal communication).

Cultural Integrity

Archaeological sites

The archaeological sites on both Nihoa and Mokumanamana retain their original designs, materials, and workmanship. Their settings on remote islands in the expansive Pacific Ocean distinguish the sites from any others in Hawaiʻi and in the world. In such remote settings, the sites remain virtually untouched, and human disturbance is minimal. In comparison, all known sites in the main Hawaiian Islands have been negatively affected by some combination of land use change, invasive species, cattle ranching, feral ungulates, and other anthropogenic disturbances.

Though impacted by the ravages of wind, rain, sea spray and time, as well as natural disturbances by nesting birds and overgrowth by endemic plants, the cultural sites on Nihoa and Mokumanamana retain many of their original attributes in a setting free from most human disturbances. The majority of the sites on both islands that are known to have existed are still there, and are in good condition and in their original locations. No buildings or other unrelated elements have affected the visual or metaphysical planes of these sites. Furthermore, under multiple layers of protections (each site has been protected within the Hawaiian Islands National Wildlife Refuge since 1909, has been listed on the National Register of Historic Places as Island Archaeological Districts since 1988, and is now protected within Papahānaumokuākea Marine National Monument), their integrity will be preserved to the full extent of federal and state authority.

These almost untouched cultural sites show little to no anthropogenic change since the time of their building and use. On Nihoa, some of the sites have slightly deteriorated in the form of wall collapse; however the degree of deterioration does not detract from the overall integrity of the archaeological sites. Thirteen of the sites have been impacted by archaeological excavations carried out in the 1920s. On Mokumanamana, some of the sites are slightly deteriorated, and four sites have been impacted from what may be bomb craters, probably a result of practice bombing during World War II. Fortunately, based on prior, thorough documentation of the sites, current archaeologists recognize that these impacts are isolated and minimal, particularly because the island is so dense with archaeology; more than 40 sites have not been integrally compromised.

Papahānaumokuākea preserves a significant part of the natural ecosystem—with preserved viewplanes and no noise pollution—in which Native Hawaiian forbearers practiced their culture for hundreds of years. In being one of the last remaining places of abundance, or *'āina momona*, Papahānaumokuākea has become critical to the maintenance of specific traditional Native Hawaiian knowledge and practices.

Repairs: To date, no repairs have been made on the archaeological sites on Nihoa and Mokumanamana. Current regulatory measures ensure that repairs would be performed using culturally appropriate techniques and protocols to honor the sites.

Natural

Natural Integrity

As detailed throughout this application, the integrity of Papahānaumokuākea's marine environment is nearly pristine, with minimal disturbances. Though some terrestrial environments still bear the imprints of mankind, they also showcase the resiliency of many native species and the potential for restoration through human endeavors. The property includes all the key areas and ecosystems necessary to maintain its ecological integrity and the long-term conservation of its remarkable and unique terrestrial and marine diversity, and it is of sufficient size to maintain associated biological and ecological processes. The property still displays intact ecosystems, with a significant number and diversity of apex predators. The in situ conservation of numbers of endangered species is sustained through active management and restoration of their habitats.

Marine biota

While the vast majority of marine biota is thriving within Papahānaumokuākea, there is one species that is of great concern. Even after years of conservation and active management and recovery efforts, the Hawaiian Monk Seal population remains in decline. The current decline is thought not to be mainly human induced, but instead due to alterations in the environment, and habitat loss of preferred breeding grounds from global climate change and sea level rise. For the past two decades a concerted effort has been made to save the Hawaiian Monk Seal. Multiple federal and state entities, along with nongovernmental organizations, private sector entities, and countless individuals in local communities have worked to recover the species. These efforts have not been sufficient to prevent the continued decline in the species, however without these efforts, the situation would likely be much worse. Several key actions are currently underway to address current and potential threats to the Hawaiian Monk Seal in attempts to alter the trajectory of the population and move the species towards recovery. A detailed Recovery Plan has been established and is being implemented through several management strategies and activities and is detailed in Section 5.

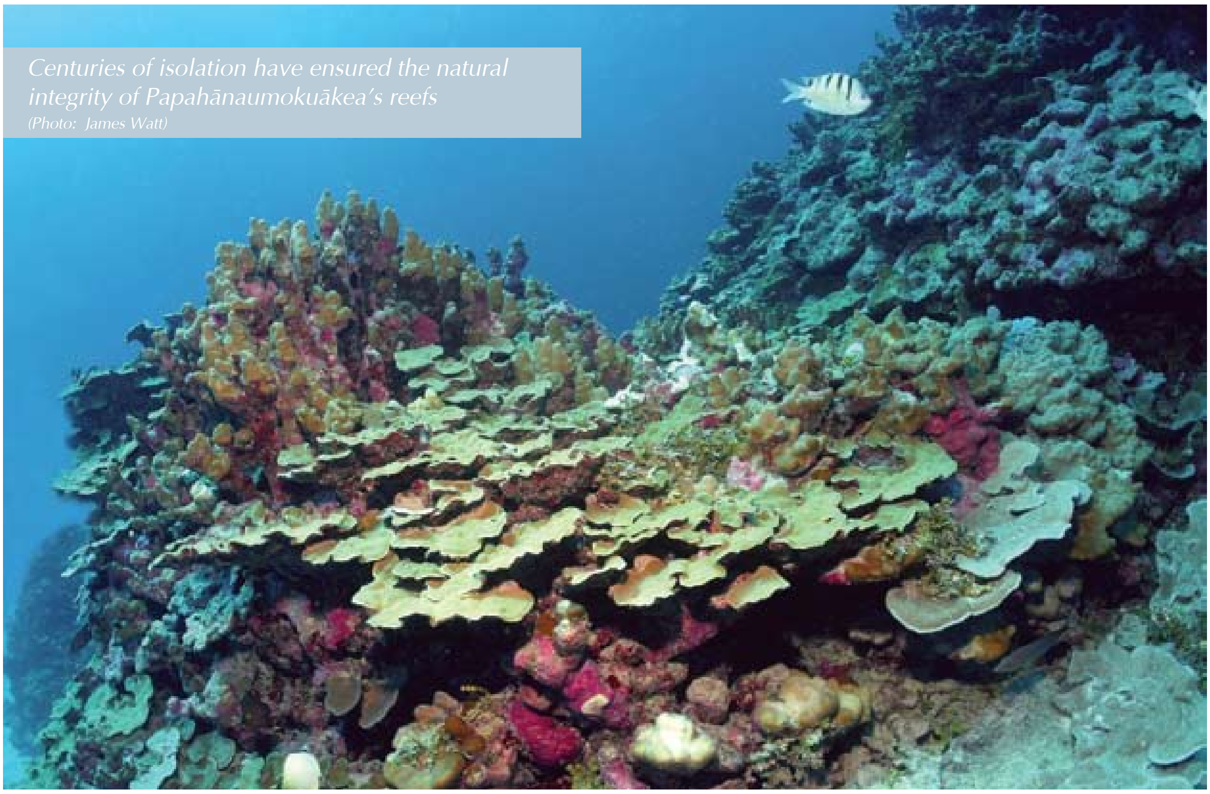
Another concern for the marine sector of Papahānaumokuākea is the presence of invasive species. There are a total of 11 documented alien marine invertebrate, fish and algal species in the NWHI, with the highest concentrations occurring in the harbor at Midway Atoll. Although there are a limited number of marine alien species present, none thus far have caused significant disruptions to the surrounding ecosystem. While the remoteness and relative inaccessibility of the NWHI has helped to prevent the introduction of some alien species to the area, these islands are vulnerable to introductions through a variety of activities. Therefore, stringent regulations and protocols are in effect to reduce the chance of alien species introductions (see Section 5).

Other threats to the marine ecosystem are further detailed in Section 4, and are mainly a result of broader influences originating outside of the boundaries of Papahānaumokuākea that eventually affects shallow water resources. Most notable among these are stresses resulting from marine debris and large-scale environmental effects such as climate change and ocean acidification. While preliminary studies have not shown significant effects thus far to shallow water marine communities, continued research is necessary to understand how the marine and terrestrial ecosystems will respond to these large-scale events.

Terrestrial biota

As noted in Section 2.b "History of Development", the terrestrial ecosystems of the Northwestern Hawaiian Islands suffered significant perturbations at the turn of the last century and again during World War II. However, over the last fifty years, the focus has been on recovery and restoration of the previously altered environments. While the history of human impact and alteration of the islands was at one time significant, the actual impact footprint is minimal compared to most other places on earth. Several species of endemic plants and animals are in fact thriving. Development activities have been limited to small-scale conversions of abandoned Coast Guard buildings at French Frigate Shoals and Kure Atoll following the closure and removal of many of the of Navy and Coast Guard facilities. Development at Midway Atoll has been restricted as well; plans are underway to remodel existing facilities to accommodate the new Visitor Services program (see MMP Volume IV).

Preventing the importation and establishment of alien invasive species, removing those already at the site, and restoring species lost to previous alien introductions are the biggest challenges of terrestrial stewardship in Papahānaumokuākea. There have been several intentional and non-intentional anthropogenic introductions of non-native plants and animals since the islands and atolls of Papahānaumokuākea were first discovered by humans. As many as 125



Centuries of isolation have ensured the natural integrity of Papahānaumokuākea's reefs
(Photo: James Watt)

species of alien insects and spiders have been found on these islands, and some of them, particularly ants, are extremely destructive. Discussions on the impacts of non-native animals and plants are presented in greater detail in Section 4.

Significant efforts are underway to restore native biota on several of the islands and multiple recovery plans are in place for a variety of species including seabirds, shorebirds and plants. The following list highlights some of the terrestrial restoration and remediation efforts:

- Rats and rabbits, introduced to some of the islands centuries ago, were responsible for significant impacts to the terrestrial environment. Through intensive eradication efforts by multiple state and federal entities, all rats and rabbits have been successfully removed from the NWHI.
- A 12-year eradication project at Laysan Island successfully removed an invasive sandbur. Active restoration is underway and has reestablished a number of other plants and animals that were lost after the introduction of rabbits.
- Contaminants causing the mortality of endangered Laysan finches were identified and removed from Laysan Island beaches.
- Clean-up and remediation efforts have been undertaken by the Navy and Coast Guard at Midway Atoll, Kure Atoll and French Frigate Shoals.
- Invasive ironwood trees have been successfully eradicated from Eastern Island (Midway Atoll).
- Intensive invasive weed eradication, native plant restoration, and propagation programs are ongoing at Midway and Kure Atolls.
- Multiple species are recovering and thriving (see Section 4 for details of specific species trends).

In addition to these efforts, strict protocols are in place to combat further introduction of alien species. Section 5 further discusses the numerous protective management and regulatory measures currently in place to protect this remote and special region.

Through concerted efforts to address current and potential threats to the Hawaiian Monk Seal, biologists hope to move the species toward recovery (Photo: James Watt)