PAPAHĀNAUMOKUĀKEA
Marine National Monument

He Hoʻi ka Pōʻai i ka Piko

The Circle Returns to Its Source

PERMITTED ACTIVITIES 2013 ANNUAL REPORT

Contents

Introduction

Presidential Proclamation 8031 (Proclamation), issued by President George W. Bush on June 15, 2006, set aside the Northwestern Hawaiian Islands (NWHI) as the Papahānaumokuākea Marine National Monument (also known as "PMNM" or "Monument"), creating one of the world's largest marine protected areas, managed to protect ecological and cultural integrity. The Monument is administered jointly by three Co-Trustee agencies – the Department of Commerce through the National Oceanic and Atmospheric Administration (NOAA), the Department of the Interior through the U.S. Fish and Wildlife Service (USFWS), and the State of Hawai'i through the Department of Land and Natural Resources (DLNR) (collectively, the Co-Trustees). The Co-Trustee agencies work in close collaboration and consultation with the Office of Hawaiian Affairs (OHA) to ensure that both cultural and natural resources are protected in a manner aligned with Native Hawaiian resource management best practices. The day-to-day management of the Monument is overseen by a seven-member Monument Management Board (MMB) comprised of two sub-agencies of each Co-Trustee, plus the Office of Hawaiian Affairs. This unique management partnership of PMNM allows for the protection of the entire ecosystem, from remote sub-tropical islands to the deep sea, as well as areas of cultural significance.

The Monument includes a number of existing federal conservation areas: the Northwestern Hawaiian Islands Coral Reef Ecosystem Reserve, managed by the U.S. Department of Commerce through NOAA; Midway Atoll National Wildlife Refuge (MANWR), Hawaiian Islands National Wildlife Refuge (HINWR) and the Battle of Midway National Memorial, managed by the U.S. Department of the Interior through the USFWS. These designated areas remain in place within the Monument, subject to their applicable laws and regulations in addition to the provisions of the Proclamation. The Monument also includes State of Hawai'i lands and waters, managed by the State through the DLNR. There are two State designated conservation areas that predated Monument designation: the Northwestern Hawaiian Islands Marine Refuge and the Kure Atoll State Wildlife Sanctuary, which remain subject to their applicable State laws and regulations. Inscription of the Monument as a World Heritage site in 2010 added to the genealogy of protection and recognition of the NWHI, as the only mixed natural/cultural site in the United States. This honor cumulates over one hundred years of government safeguarding the area, starting in 1903, when President Theodore Roosevelt sent the U.S. Marines to stop the slaughter of seabirds at Midway Atoll (see timeline of protection, pg. 8-9).

Opposite A seabird soars over Nihoa, the southeastern-most island in the Monument, approximately 250 kilometers from Ni'ihau. Photo by Wayne Levin

Ko Hawai‘i Pae ‘Āina
Hawaiian Archipelago

N
W E
S

Miles 0 50 100 200
Kilometers 0 100 200 400

DEPTH (m)
0
-4000
-8000

180°W 175°W 170°W 165°W 160°W 155°W
30°N 25°N 20°N

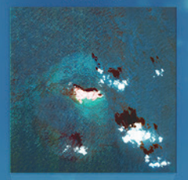
Midway Atoll
Pihemanu

Lisianski Island
Papa‘āpoho

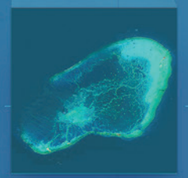
Maro Reef
Ko‘anako‘a

French Frigate Shoals
Kānemiloha‘i

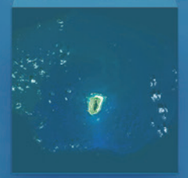
Nihoa



Kure Atoll
Mokupāpapa



Pearl & Hermes Atoll
Holoikauaua



Laysan Island
Kauō

Gardner Pinnacles
Pūhāhonu

Mokumanamana

Tropic of Cancer

Kaua‘i
Lehua Rock
Ni‘ihau
Ka‘ula
O‘ahu
Moloka‘i
Maui
Lāna‘i
Kaho‘olawe
Hawai‘i
Lō‘ihi

Underlaid bathymetry imagery is a composite of data from the University of Hawai‘i School of Ocean and Earth Science and Technology's Hawai‘i Mapping Research Group, Hawai‘i Undersea Research Laboratory, and NOAA's Pacific Islands Benthic Habitat Mapping Center.

Northwestern Hawaiian Islands imagery boxes includes copyright material of DigitalGlobe, Inc., All Rights Reserved; and of Space Imaging LLC.

Main Hawaiian Islands overlaid satellite imagery is Landsat 7 copyright material of Earthstar Geographics LLC.

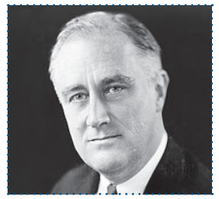
This map was created July 2014

Timeline of Ecosystem Protections

1900's 1910's 1920's 1930's 1940's 1950's 1960's 1970's 1980's 1990's 2000's 2010's

1903
In response to U.S. Navy reports that large numbers of seabirds were being slaughtered for feathers and eggs, President Theodore Roosevelt signs Executive Order No. 199A, placing Midway Atoll under control of the Navy.

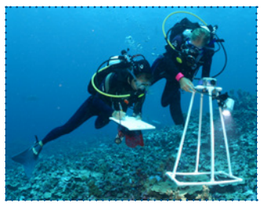
1909
President Theodore Roosevelt issues Executive Order No. 1019 creating the Hawaiian Islands Bird Reservation around islands from Nihoa Island to Kure Atoll, to further protect these islands and their resources.



1940
President Franklin D. Roosevelt signs Presidential Proclamation No. 2416 changing the name of the Hawaiian Islands Bird Reservation to the Hawaiian Islands National Wildlife Refuge, managed by the USFWS and broadening refuge purposes to protect all wildlife.

1988
President Ronald Reagan signs legislation assigning stewardship responsibilities for Midway Atoll to the USFWS.

1993
The State of Hawai'i Board of Land and Natural Resources designates Kure Atoll a State Seabird Sanctuary, now the Kure Atoll State Wildlife Sanctuary.



1976
The Tripartite agreement among the State of Hawai'i, U.S. Fish & Wildlife Service, and NOAA Fisheries provides a framework for extensive ecological research in the NWHI beginning in 1976. From October 1976 to September 1981, the agencies, along with the University of Hawaii Sea Grant Program, survey the islands, banks, reefs, shelves, seamounts and overlying waters within the 200-nautical mile Fishery Conservation Zone and amass data on the various marine and land inhabitants. Two major symposia covering the joint efforts are held at the University of Hawai'i at Manoa in 1979 and 1983. The proceedings of these symposia contain the results of more than 100 research projects.

1996
President William Clinton issues Executive Order No. 13022, transferring Midway Atoll management responsibilities from the U.S. Navy to the USFWS.

2000 and 2001
President William Clinton issues Executive Order No. 13158, directing the development of a plan to protect the NWHI coral reef ecosystem, and calls for public participation in the design of additional protection measures for the NWHI. As a result of public comments and negotiations between President Clinton and Congress, the 2000 Amendments to the National Marine Sanctuaries Act authorized creation of a NWHI Reserve. President Clinton issued Executive Orders No. 13178 and No. 13196 in December 2000 and January 2001, creating the NWHI Coral Reef Ecosystem Reserve to include areas adjacent to state waters extending seaward to approximately 50 nautical miles.

2005
Hawai'i State Governor Linda Lingle signs regulations establishing the NWHI Marine Refuge, which includes all state waters extending three miles seaward from any coastline between and including Nihoa Island and Kure Atoll, but excluding Midway Atoll. This designation allows for the management and long-term conservation of marine resources within State waters.

2006
President George W. Bush signs Presidential Proclamation 8031, establishing the NWHI Marine National Monument with contiguous boundaries to include the NWHI Coral Reef Ecosystem Reserve, the Midway National Wildlife Refuge, the Hawaiian Islands National Wildlife Refuge, the Battle of Midway National Memorial, Kure Atoll Wildlife Sanctuary, and the Hawai'i State NWHI Marine Refuge. The Monument designation promotes coordinated management of the unique resources within the NWHI region.

2008
The International Maritime Organization (IMO), a specialized agency of the United Nations, designates the Monument as a Particularly Sensitive Sea Area (PSSA). This designation allows for the implementation of a ship reporting system, aka CORAL SHIPREP, requiring all transiting vessels with the intent to enter a U.S. port or place of a certain size to notify when entering and exiting Monument boundaries; other international transiting vessels are recommended by the IMO to avoid Monument waters or participate in the reporting system. The Monument is the second marine protected area in the United States to receive PSSA designation. It joins ten (now 12) other PSSAs worldwide, including the Florida Keys, the Great Barrier Reef and the Galapagos.

2010
Delegates to the United Nations Educational, Scientific and Cultural Organization's (UNESCO's) 34th World Heritage Convention in Brasilia, Brazil unanimously vote to inscribe the Monument as one of only 26 (now 29) mixed (natural and cultural) World Heritage Sites in the world.

Monument Permitting Program

Overview

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 a direct result of human activities occurring beyond Monument boundaries. These include climate change, sea level rise, ocean acidification, marine and terrestrial alien species, vessel groundings and marine debris. 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. Similarly, this process enables scientists, managers and Native Hawaiian researchers and cultural practitioners to accomplish a number of activities focused on resource protection, habitat conservation, management and further integration of Hawaiian cultural knowledge and practices with maintstream research and management approaches.

Presidential Proclamation 8031

PMNM's permitting program is designed to manage and minimize human impact, ensuring the protection of the Monument's natural, cultural, and historic resources. In accordance with Presidential Proclamation 8031 and codifying regulations in 50 CFR Part 404, all activities in the Monument, with limited exceptions, require a permit. Activities are either prohibited (not allowed), exempted (no permit is needed), or regulated (must be considered through the Monument's joint-permitting process).

Above A view of Laysan Island. Photo by Mark Royer/Hawai'i Institute of Marine Biology

Prohibited activities include:

- Exploring for, developing, or producing oil, gas or minerals within the Monument;
- Using or attempting to use poisons, electrical charges or explosives in the collection or harvest of a Monument resource;
- Introducing or otherwise releasing an introduced species from within or into the Monument; and
- Anchoring on or having a vessel anchored on any living or deal coral with an anchor, anchor chain or anchor rope.

Exempted activities include:

- Response to emergencies threatening life, property or the environment;
- Law enforcement purposes;
- Activities and exercises of the Armed Forces (including the U.S. Coast Guard); and
- Passage without interruption.

Any vessel or persons passing through PMNM without interruption does not constitute a permitted activity, however domestic vessel notification must be provided prior to entering and leaving the Monument. Notification of entry must be provided at least 72 hours, but not more than one month, prior to the entry date. Notification of departure from the Monument must be provided within 12 hours of leaving. For more information regarding the Monument's ship reporting requirements, please see http://www.papahanaumokuakea.gov/resource/ship_reporting.html.

In addition to the Monument's ship reporting requirements, all activities and exercises of the U.S. Armed Forces must be carried out in a manner that avoids, to the extent practicable and consistent with operational requirements, adverse impacts on Monument resources and qualities.

All other activities not prohibited or exempted must be authorized by a Monument permit signed by all three Co-Trustee agencies. Permit applications are reviewed by managers, scientists and other experts within the Co-Trustee agencies and by Native Hawaiian cultural specialists through an agency review

Right NOAA rebreather divers Daniel Wagner and Randy Kosaki conduct coral, algae and fish surveys at 200 feet at Laysan Island. Photo by Greg McFall/ NOAA

process. In order to inform the public about activities proposed within the NWHI, permit applications are posted on the Monument website (http://www.papahanaumokuakea.gov/permit/applicationrev.html) for public review and notification. In addition to agency review, all permit applications must meet applicable Findings (i.e. permit criteria) listed in the Proclamation in order to be approved by the Monument Co-Trustees. For a list of all Findings in the Proclamation, please see the inset box on the next page. For activities proposed within the NWHI State Marine Refuge, permit applications must also be approved by the State of Hawai'i Board of Land and Natural Resources.

All issued permits contain a Permitted Activity Description, including information on the number of permitted personnel; Permitted Activity Locations; and General Terms and Conditions that satisfy Proclamation 8031, Monument regulations, and MMB agency mandates and policies. Issued permits also specify the requirements for compliance with quarantine protocols to avoid introduction of alien species, and list prohibited activities such as the disturbance of cultural sites or historic artifacts. Special Conditions may also be applied to particular permits, placing additional restrictions on activities in order to minimize impacts to Monument resources.

Permitting Criteria

The Monument's permitting criteria are the Findings defined in Proclamation 8031. All permit applications must meet the applicable Findings prior to the issuance of a permit:

- The activity can be conducted with adequate safeguards for the resources and ecological integrity of the Monument.
- The activity will be conducted in a manner compatible with the management direction of the Proclamation, considering the extent to which the conduct of the activity may diminish or enhance Monument resources, qualities, and ecological integrity; any indirect, secondary, or cumulative effects of the activity; and the duration of such effects.
- There is no practicable alternative to conducting the activity within the Monument.
- The end value of the activity outweighs its adverse impacts on Monument resources, qualities, and ecological integrity.
- The duration of the activity is no longer than necessary to achieve its stated purpose.
- The applicant is qualified to conduct and complete the activity and mitigate any potential impacts resulting from its conduct.
- The applicant has adequate financial resources available to conduct and complete the activity and mitigate any potential impacts resulting from its conduct.
- The methods and procedures proposed by the applicant are appropriate to achieve the proposed activity's goals in relation to their impacts to Monument resources, qualities, and ecological integrity.
- The applicant's vessel has been outfitted with a mobile transceiver unit approved by NOAA Office of Law Enforcement and complies with the requirements of Proclamation 8031.
- There are no other factors that would make the issuance of a permit for the activity inappropriate.

In addition to the ten general Findings above there are additional specific Findings that are required for Special Ocean Use, Native Hawaiian Practices, and Recreation permit applications.

Types of Permits

Permit applications may be issued in one of six permit categories, if Co-Trustees find that the activity: 1) is research designed to further the understanding of Monument resources and qualities; 2) will further the educational value of the Monument; 3) will assist in the conservation and management of the Monument; 4) will allow Native Hawaiian practices; 5) will allow a special ocean use; or 6) will allow recreational activities.

Research

Research permits are for activities that enhance the understanding of PMNM's resources and improve resource management decision-making. The types of activities that may be conducted under research permits include biological inventories, ecosystem-based research, habitat characterization, restoration investigations and archaeological research.

Education

Education permits are for activities that further the educational value of the Monument. These activities may assist a broader audience in understanding the ecosystems within the Monument, share lessons learned in resource management with outside partners, promote Native Hawaiian knowledge and values, or aid in outreach with schools and community groups. Permits are considered for activities that have clear educational or public outreach benefits and that aim to "bring the place to the people," rather than the people to the place. Examples of education projects include teacher-at-sea programs, distance learning projects and university field classes.

Conservation and Management

Conservation and management permits are for activities that enable the general management of PMNM. These activities may include field station operations, marine debris removal, development and maintenance of infrastructure, and long-term resource monitoring programs such as monitoring of endangered species, seabird populations and terrestrial native plant communities. Conservation and Management permits also provide a mechanism for response and follow-up to urgent events in the Monument that may not have been anticipated, such as vessel groundings, coral bleaching episodes and invasive species outbreaks.

Native Hawaiian Practices

Native Hawaiian practice permits are for activities that constitute Native Hawaiian cultural practices. Activities under this permit must be noncommercial, deemed appropriate and necessary by traditional standards, benefit the NWHI and Native Hawaiian community, perpetuate traditional knowledge, and restrict the consumption of harvested resources from the Monument. Examples of permitted activities include application of traditional non-instrument navigation techniques on Native Hawaiian voyaging canoes and conducting ceremonies at historic cultural sites on Nihoa or Mokumanamana. Permit conditions and guidelines are developed by the Co-Trustees and OHA in consultation with the Native Hawaiian Cultural Working Group and the broader Native Hawaiian community.

Special Ocean Use

Special Ocean Use permits are for activities related to commercial ocean uses, including ecotourism or documentary filmmaking, that have a net benefit to the Monument. Special ocean use is defined as any activity or use of the Monument to generate revenue or profits for one or more of the persons associated with the proposed activity, and will not destroy, cause the loss of, or injure Monument resources. Special ocean use proposals involving activities outside of the Midway Atoll Special Management Area must be for educational or research purposes and directly benefit conservation and management of the Monument.

Recreation

Recreation permits are for activities conducted for personal enjoyment and are limited to occur only within the Midway Atoll Special Management Area. Recreation activities must not result in the extraction of Monument resources or be involved in a fee-for-service transaction. Examples of activities that may be permitted include snorkeling, wildlife viewing and kayaking. Restrictions may be placed on recreation permits in accordance with the MANWR Visitor Services Plan.

Left Researchers conduct intertidal surveys on Nihoa. Photo by Shauna Kehaunani Springer/Conservation International

Below Wisdom's chick was banded with two temporary bands on February 24, 2013 by biologists on Midway Atoll National Wildlife Refuge for monitoring purposes. Photo by John Klavitter/USFWS

2013 Permitted Activities

Top New species of red alga discovered by NOAA divers. Photo by Greg McFall/NOAA

Above A group of feeding killer whales was encountered on May 21, 2013 approximately 60 km southeast of Pearl and Hermes Atoll. Photo by Justin Garver under NMFS permit 15240

Right Wisdom returns to Midway Atoll National Wildlife Refuge to resume her chick rearing duties on February 8, 2013. Photo by John Klavitter/ USFWS

Common elements of activities conducted in 2013 are captured in the Hawaiian saying (reflected on the cover), *he hoʻi ka pōʻai i ka piko*[1], translated to mean "the circle returns to its source." The suite of activities conducted by managers, cultural practioners, community members and researchers were filled with new discoveries, enabled by the work of years passed, traditions rekindled where circumstance allowed, and extraordinary happenings made possible by nature's propensity for renewal inspite of a cycle of negative impact. The following excerpts from activities that occurred in 2013 captures just a few of the remarkable things that occurred:

Wisdom's Legacy Continues

One of the world's oldest known birds, returned to Midway to mate and rear another chick.

Mesophotic Discoveries

NOAA researchers discovered new deep-water algae species and observed new or unknown fish species.

Orca sightings

NOAA researchers encountered a group of feeding killer whales (*Orcinus orca*) on May 21, 2013 approximately 60 km southeast of Pearl and Hermes Atoll.

[1] Hawaiian phrase courtesy of kahuna pule Eleanor Makita of Kona, Hawai'i via Kumu Hula Cody Pueo Pata.

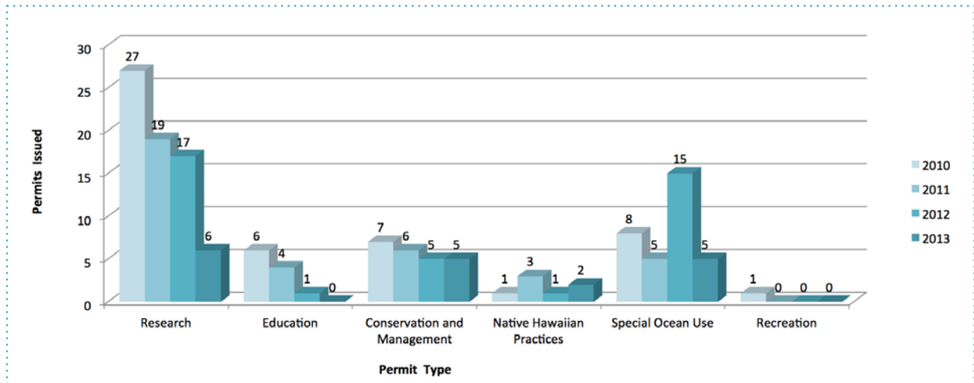
Nihoa's living culture

Native Hawaiian cultural practitioners on Nihoa greeted the Polynesian waʻa kaulua (double-hulled canoe) *Hikianalia.*

Permits Issued in 2013

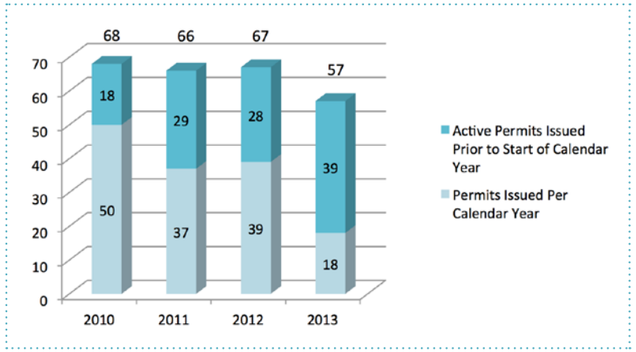
In 2013, 18 permits were issued. Of these, two applications received in 2012 were issued and 26 permit applications were received in 2013 Of the 26 applications received in 2013, 16 met the permitting criteria, successfully completed the environmental review process and were issued permits. At different stages of the permitting process, eight applications were withdrawn by the respective applicant. The remaining two applications were reassigned for continued processing in 2014. Figure 1 displays a comparison of the number of permits by type, issued from 2010-2013.

Figure 1. Number of Monument permits issued from 2010-2013 by permit type.



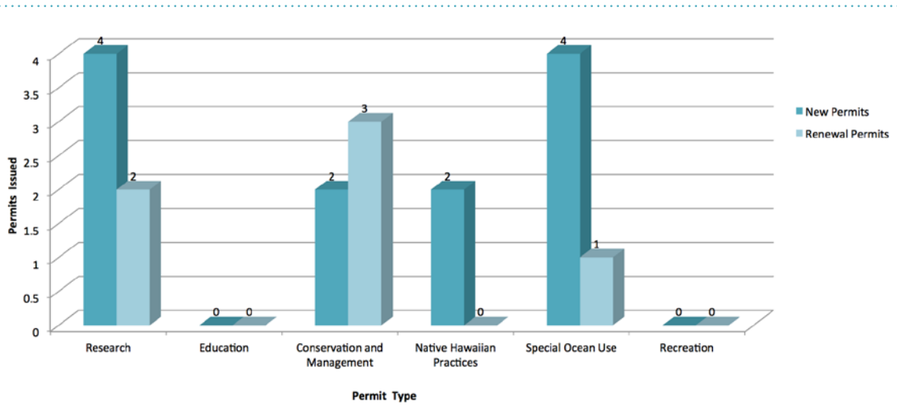
The Monument Co-Trustees grant both single and multi-year permits. In calendar year 2013 the Monument permitting system tracked 57 permits, 39 of which were issued and active prior to 2013 (Figure 2). All active permits, regardless of year issued, were monitored for permitting and reporting requirements in 2013. Multi-year permits are specifically for projects that must span two or more calendar years to complete the project objective. In accordance with Hawai'i Administrative Rules, the duration for a Monument permit in State waters is limited to no longer than one year from the date of issuance (HAR Title 13 § 60.5-6). Multi-year permits that extend beyond one year and no longer than five years may be issued for activities that occur outside of State of Hawai'i waters (defined as 0-3 nautical miles from emergent land, excluding Midway Atoll).

Figure 2. Number of Monument permitted activities per calendar year 2010-2013.



Since 2010, the number of new and renewal permits issued has been reported and tracked by the MMB (Figure 3 below). In order for a permit application to be considered a renewal, the proposed activity must have been a previously permitted project activity in the NWHI. This metric provides a quick estimate of the number of new projects permitted (note that permits requesting renewal of activities with a new principal investigator are counted as "new" permits). Both new and renewal applications undergo the same rigorous joint-permitting review process. Single-year, multi-year, new and renewal metrics are used to summarize and track Monument permits.

Figure 3. New and renewal permits in 2013 by permit category.



Levels of Human Presence

Effectively tracking Monument permits allows for accurate reporting of levels of human presence. The level of human presence in the Monument is strictly managed and continually evaluated to monitor and mitigate for cumulative impacts. Human presence is necessary to carry out resource management objectives and conduct necessary scientific and cultural research. Tracking the number of permitted aircraft and vessel entries is one method of measuring the level of human presence.

Currently, the only location equipped to accept aircrafts within the Monument is Midway Atoll. Funding constraints and other infrastructure limitations within USFWS closed the airstrip at Tern Island within French Frigate Shoals in 2011. Since 2010, there has been a 68 percent decrease in flights to and from the Monument.

Table 1. The number of permitted flights to and from the Monument, in 2010 - 2013.

Airport/Airstrip Location	*2010*	*2011*	*2012*	*2013*
French Frigate Shoals	11	0	0	0
Midway Atoll	61	51	55	38

Permitted vessel entries and exits are defined as any instance in which a vessel is permitted to enter the Monument to conduct authorized activities and subsequently exits the Monument. For reporting purposes, any further authorized entry of the same vessel is counted as a second vessel entry.

Table 2. The number of permitted vessel entries into the Monument, from 2010 - 2013.

	2010	*2011*	*2012*	*2013*
Vessel Entries and Exits	19	22	12	16
Individual Vessels Used	6	8	5	6

All commanding officers/captains and crew of permitted vessels are well versed with vessel compliance measures and rules to protect the Monument. In accordance with Monument regulations, all vessel effluent discharge and anchoring is highly regulated within the Monument and, in many areas, prohibited. Authorized vessels must have an operating vessel monitoring system on board at all times within the Monument to pinpoint the vessel's location to law enforcement officers if needed. Vessels are also required to have passed a hull and rodent inspection prior to receiving a Monument permit. Permits for authorized vessels may often restrict speed, in addition to discharge, anchoring and authorized locations within the Monument.

Another metric to account for the level of human presence is the number of people on land. Due to the fragility and remote nature of these islands and atolls, any human presence has the potential to impact resources. Table 3.1 provides the minimum, maximum and average number of people recorded on land per day on each island or atoll in the Monument from 2010 - 2013. The total number of person-use days measures individual presence per island or atoll in the Monument and is shown in Table 3.2. Person-use days are calculated based

on the number of individuals on site each day. For example, five authorized personnel staying for three nights on Nihoa would equal 15 total person-use days at Nihoa. Midway Atoll continues to have the highest concentration of human presence, sustaining an average population of 40 individuals necessary to operate Midway facilities and contract workers for environmental remediation.

Table 3.1. The minimum, maximum and average person-use days at each island and atoll in 2010-2013.

	2010			2011			2012			2013		
Island / Atoll	**Min**	**Max**	**Average**	**Min**	**Max**	**Average**	**Min**	**Max**	**Average**	**Min**	**Max**	**Average**
Nihoa	0	6	<1	0	11	<1	0	12	<1	0	12	<1
Mokumanamana	0	10	<1	0	12	<1	0	3	<1	0	4	<1
French Frigate Shoals	1	16	7	3	14	7	3	24	7	0	16	3
Laysan Island	6	18	8	4	15	7	6	27	8	0	27	5
Lisianski Island	0	2	<1	0	8	<1	0	20	<1	0	7	<1
Pearl and Hermes Atoll	0	4	<1	0	7	1	0	20	<1	0	7	<1
Midway Atoll	69	88	79	59	77	68	66	97	76	43	69	55
Kure Atoll	0	13	3	0	20	5	6	28	6	6	13	7
Total			**97**			**88**			**97**			**71**

Table 3.2. Total amount of person-use days for each island and atoll in 2010-2013.

Island / Atoll	2010	2011	2012	2013
Nihoa	79	99	102	91
Mokumanamana	26	53	10	8
French Frigate Shoals	2,669	2,910	2,631	1,283
Laysan Island	3,114	2,622	3,139	1,850
Lisianski Island	160	269	141	86
Pearl and Hermes Atoll	242	365	271	233
Midway Atoll	29,133	25,066	28,119	20,254
Kure Atoll	1,225	2,121	2,452	2,797
Total	**36,648**	**33,505**	**36,865**	**26,602**

Locations of Permitted Activities

The map in Figure 4 indicates locations at which permitted activities occurred in 2013. Of the 57 active permits, many allowed for work to be conducted at multiple locations. Thus, for example, a single permit may have allowed activities only at French Frigate Shoals, or it may have authorized activities at all islands and atolls.

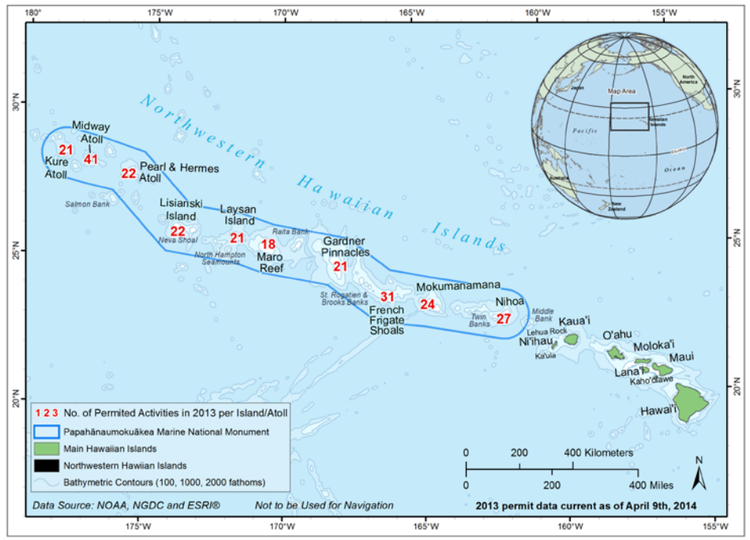


Figure 4. Locations of 2013 permitted activities. The number of permitted projects at each island or atoll is indicated in red.

Permitted Versus Actual Visitation Records

Often, the number of individuals permitted to access the Monument and conduct activities is not reflective of the actual number of people who conducted work in the Monument. For example, conservation and management permits authorize personnel with qualifications necessary to conduct specific conservation and management activities; however the actual number of individuals who worked in the Monument to complete the conservation and management activity is often less than the amount permitted. In other instances, special ocean use permittees may have visitor cancellations, thereby further lowering the number of people who actually enter the Monument. Table 4 shows the difference in the number of permitted individuals compared to the actual number of individuals who took part in a permitted activity.

Table 4. Number of individuals permitted in 2013, compared to the actual number of people who conducted permitted activities in the Monument by permit type.

Permit Type	Number of People Permitted	Actual Number of People Who Performed Permitted Activities
Research	132	40
Education	35	0
Conservation & Management	409	215
Native Hawaiian Practices	47	10
Special Ocean Use	435	13
Recreation*	100	0
Total	**1,158**	**278**

*Individuals conducting acitivities under the USFWS recreation permit under the Visitors Services Program were authorized to enter the Monument under another permit category to conduct activities (i.e., Research, Special Ocean Use, etc.).

Details of 2013 Permitted Activities

RESEARCH

A total of five research permits were issued in 2013. Research permits were issued to Co-Trustee agency personnel, university researchers and other research organizations in Hawai'i to conduct work on seabirds, fish, corals, marine mammals, algae, and ocean areas within PMNM. Table 5 lists research permits issued for each organization or institution, together with project titles.

Table 5. Affiliations of Research permittees and permitted projects in 2013.

Research Permittee Affiliation	Number of Permits Issued	Permitted Research Projects
University of Hawai'i at Mānoa, Hawai'i Institute of Marine Biology	1	• Assessing health and community structure of corals on shallow-water reefs
NOAA, National Marine Fisheries Service, Pacific Islands Fisheries Science Center, Coral Reef Ecosystem Division	2	• Videographic surveys of coral reef fishes using baited remote underwater stereo-video systems • Pacific Reef Assessment and Monitoring Program (RAMP)
Hawai'i Pacific University	1	• Analysis of carbonate chemical make-up of waters surrounding atoll systems
Liquid Robotics, Inc.	1	• Deploying a wave powered unmanned autonomous marine robot
Institute for Marine & Antarctic Studies/Plastic Oceans Foundation	1	• Seabird plastic ingestion study on Midway Atoll

Research projects permitted in 2013 included a variety of activities aimed at monitoring ecosystem dynamics, studying the genetic connectivity of marine organisms, monitoring the presence or absence of cetaceans, or tracking the movements of top predators. While five new research permits were issued in 2013, 23 permits were issued in prior years and remained valid. Of these, two involved collection activities. Collection activities requiring the removal of whole specimens (as opposed to extracting tissue and leaving the organism in situ) utilized the minimum sample size necessary to complete the project and satisfy statistical significance.

Table 6 describes these observational, catch and release, and collection activities.

Table 6. Observational, catch and release, and collection activities that occurred in 2013.

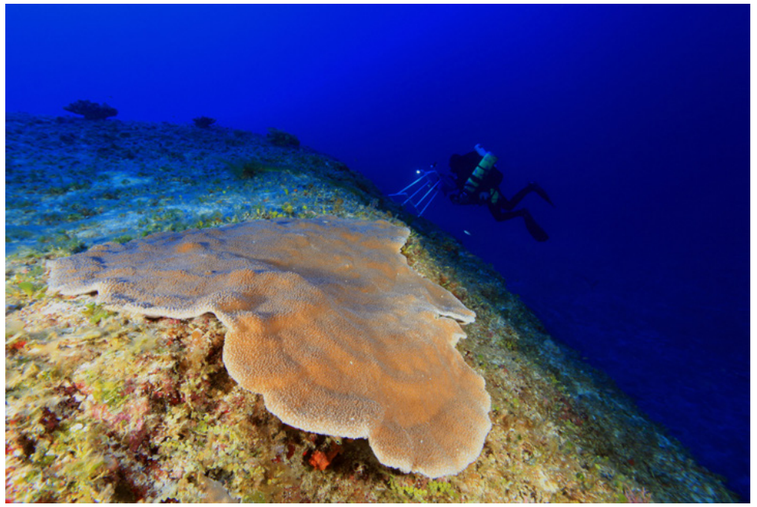
Permitted Research Project	Catch and Release or Observational Research	Biological or Physical Samples Collected
Sediment Sampling on Lisianski Island to Determine Historical Ecology	None recorded	• 245-258 cm bs sediment • 162 cm bs bone • 74 cm bs shells • coral rocks • 142 cm bs sediment and bone • 5 drift logs • Whole kukui nut shell
Collection of Adult and Larval Moths to Conduct Species Descriptions and DNA Analysis of Their Evolutionary Relationships	None recorded	• 23 moth larval cases
Monitoring of Laysan and Black-footed albatross from Midway Atoll, French Frigate Shoals and Laysan Island	• 25 GLS tags recovered • 11 GPS tags deployed • 28 GLS tags deployed"	• 45 Laysan albatross feathers • 33 Black-footed albatross feathers"
Documenting the Biodiversity of Deep Reefs Using Conventional and Technical SCUBA Diving Technology (permit issued in 2012)	None recorded	• 1 of ~10 cm^2 Bicolor gorgonian • 8 of ~15 cm^2 Brown alga • 1 of ~10 cm^2 Bryozoan • 23 of ~15 cm^2 Green alga • 1 of ~20 cm^2 Hydroid • 1 of ~10 cm^2 Plate coral • 35 of ~15 cm^2 Red alga • 2 of ~10 cm^2 Sponge • 1 of ~5 cm^2 Sponge
Analysis of Carbonate Chemical Make-up of Waters Surrounding Atoll Systems	None recorded	• 9.75 liters of seawater
Genetic Surveys to Address the Level of Isolation Between Shallow and Deep Reef Ecosystems (permit issued in 2012)	None recorded	• 8 whole Hawaiian chromis • 36 whole Hawaiian dascyllus • 18 whole Masked angelfish • 27 whole Russet angelfish • 14 whole Yellow Eyed Kole • 36 Yellow striped squirrelfish
Seabird Plastic Ingestion Study on Midway Atoll	None recorded	• 40 Laysan Albatross feathers • 7 Bonin Petrel feathers • 40 Ingested plastic from Laysan Albatross • 7 Ingested plastic from Bonin Petrel"

Other research activities involved the use of temporary devices to remotely monitor habitat variations, such as temperature, salinity, changes in sedimentation, and organism recruitment. These instruments are essential to obtaining long-term ecological data necessary for effective resource management in the face of climate change and other global threats to the Monument. Table 7 describes the temporary instruments installed or deployed in 2013.

Table 7. Remote monitoring instruments installed under research permits in 2013.

Permitted Research Project	Instruments Installed for Remote Monitoring
Pacific Reef Assesment and Monitoring Program	• installed 24 Autonomous Reef Monitoring Structures (ARMS) • installed 50 Bioerosion Monitoring Units (BMUs) • installed 75 Calcification Accretion Units (CAUs) • installed 43 Subsurface Temperature Recorders (STRs) • removed 31 ARMS • removed 66 CAUs • removed 22 STRs • removed 3 Ecological Acoustic Recorders (EARs) • removed 2 anchors • remove 1 WTR (Wave and Tide Recorder)

Right This old growth coral colony on a reef at Laysan Island is something not often seen – it could be several hundred years old. Photo by Mark Royer/Hawai'i Institute of Marine Biology



Left NOAA rebreather diver Daniel Wagner on a deep reef at Laysan Island. Photo by Greg McFall/NOAA

Above Table coral (*Acropora cytherea*) is common throughout the tropical Pacific and at Johnston Atoll, but in Hawai'i its distribution is limited to French Frigate Shoals and neighboring atolls. Photo by Greg McFall/NOAA

Research Highlights

Mesophotic Diving Leads to New Discoveries in Northwestern Hawaiian Islands and Johnston Atoll

From May 24 to June 8, researchers made an expedition to the Northwestern Hawaiian Islands (NWHI) and Johnston Atoll to explore biological diversity and connectivity between the two sites. Approximately 860 miles (1,390 km) southwest of Honolulu, Johnston was included in the expedition because it is regarded as a key "stepping stone" for a number of central and south Pacific marine species to colonize the NWHI.

The team visited Nihoa, Mokumanamana, French Frigate Shoals, and Laysan Island within Papahānaumokuākea and then Johnston Atoll National Wildlife Refuge in the Pacific Remote Islands Marine National Monument. Conducting research dives on deep coral reefs below 200 feet ('mesophotic reefs') at both sites, scientists collected samples of fish, corals, other invertebrates, and algae for population genetics analysis; surveyed deep coral reefs and associated reef fish communities; searched for invasive alien species of coral and algae; and conducted archaeological surveys of the *Howland*, a late 1800s whaling ship that wrecked at Johnston Atoll.

Scientists returned with specimens of new species of deep-water algae from the NWHI and the first recorded specimens of black coral from Johnston Atoll. They also saw and photographed more than 20 species of fishes never before recorded in the NWHI, and 15 species of fishes never before recorded at

Right School of jacks stretching from the bottom in 200 feet of water to the surface at Johnston Atoll. Photo by Greg McFall/ NOAA

Johnston Atoll. The findings represent an increase in the known biodiversity of Hawaiian coral reefs, and provides insights into how Johnston Atoll contributes to the diversity of reefs in Hawai'i.

This expedition marked NOAA's first full deployment of closed-circuit rebreathers on a research cruise. Rebreathers recycle the gases that divers breathe, removing carbon dioxide and actively managing oxygen levels, allowing for extended dive times and more efficient decompression at depths not accessible using conventional SCUBA.

"Every deep dive we do, we're visiting a reef that no human being has ever laid eyes on," said Dr. Daniel Wagner, PMNM Research Specialist. "It's the closest I'll get to walking on the moon."

Scientifics from NOAA Office of National Marine Sanctuary's PMNM and Gray's Reef National Marine Sanctuary, UH, HIMB, and the Bernice P. Bishop Museum participated in the expedition.

Intertidal Monitoring Team Uses New Monitoring Methods

During a 12-day expedition to PMNM in August, researchers conducted traditional intertidal monitoring transects as well as a new rapid assessment mobile application to count 'opihi[2] along the rocky shorelines of Nihoa, Mokumanamana, and French Frigate Shoals.

Developed by Christopher Bird, Ph.D. from Texas A&M University Corpus Christi, the mobile application (app) allowed team members to count the number of 'opihi within their outstretched arms along a given stretch of shoreline and record the numbers, along with GPS-derived latitude and longitude, into the Android app.

"The app pinpoints our location with GPS and tracks what we found and where we found it," said Bird. "This will be used to help scientists assess how 'opihi populations vary over time, and measure their genetic diversity."

At both Mokumanamana and Nihoa, 'opihi counts ranged in the tens of thousands, compared to the 3,000 found at La Perouse Pinnacles, French Frigate Shoals. While not as abundant as previously thought, 'opihi makaiauli (Hawaiian blackfoot 'opihi, *Cellana extrata*) and 'opihi 'ālinalina (Hawaiian yellowfoot 'opihi, *Cellana sandwicensis*) at La Perouse Pinnacles were larger in size, with higher and more peaked shells as compared to the same species at other survey sites.

Also for the first time this year, the team extracted DNA from 'opihi and other

Left Blackfoot 'opihi in a tidepool at Nihoa. Photo by Hoku Johnson/NOAA

[2] The term commonly used throughout Hawai'i to refer to Hawaiian limpets in general.

Above The team counts ʻopihi at Mokumanamana while Dr. Chris Bird (right) enters the data into his self-made Android app. Photo by Kehau Springer

Right Researchers collect intertidal monitoring data at La Perouse Pinnacles. Photo by Hoku Johnson/NOAA

species while on-site (previously, tissue samples were taken back to a land-based lab for processing). Isolating DNA in-situ yields a much longer strand of DNA, providing more genes for analysis. From this, researchers can gather insight into how well these intertidal species adapt to climate change. This research on the genetic differences of ʻopihi will lead to a better understanding of how human harvesting affects populations and how ʻopihi move around different geographic areas.

Each year since its initial trip in 2009, the team selected to conduct this research within PMNM has been a mix of western scientists, Native Hawaiian cultural practitioners and community leaders. In addition to collecting quantitative scientific data, the team collects observational data on general weather patterns and changes in patterns both in the sky and in the ocean. Doing this on repeat trips allows participants to note differences in rainfall patterns and abundance of different intertidal species like limu[3] (seaweeds) and hāʻukeʻuke (shingle urchins, *Colobocentrotus atratus*). An emphasis on maintaining cultural connections with PMNM, which holds sacred significance to Native Hawaiians, has always been a goal of this group. As an added benefit for both people and place has been the ability for a number of Native Hawaiian community leaders and cultural practitioners to re-establish a genealogical connection to a place that was inhabited by their ancestors.

[3] The term commonly used throughout Hawai'i to refer to seaweed in general.

EDUCATION

No education permits were issued in 2013. A single education permit was issued in 2012 and remained valid in 2013, in support of the development of multimedia resources for distance learning courses and marine exchange programs. No permitted personnel accessed the Monument under this permit category.

Above Long-time USFWS volunteer Barb Mayer conducts a Skype session between Tern Island staff and Blanche Pope Elementary students . Photo by Wesley Byers/ NOAA

CONSERVATION AND MANAGEMENT

Five conservation and management permits were issued in 2013 (Table 8).

Table 8. Affiliations of conservation and management permittees and permitted projects in 2013.

Conservation and Management Permittee Affiliation	Number of Permits Issued	Permitted Conservation and Management Projects
Monument Co-Trustees[4]	1	• Co-Trustee conservation and management activities
NOAA, Office of Marine and Aviation Operations	2	• Support for permitted activities aboard NOAA Ship *Oscar Elton Sette* • Support for permitted activities aboard NOAA Ship *Hi'ialakai*
NOAA, Pacific Marine Environmental Laboratory	1	• Deploying autonomous CTD profiling instruments in deep water in Papahānaumokuākea Marine National Monument
NOAA, National Marine Fisheries Service	1	• Selective removal of predatory sharks near Hawaiian monk seal pupping sites of French Frigate Shoals

Right On April 7, 2013, a nine-member team from the Pacific Islands Fisheries Service Center Coral Reef Ecosystem Division successfully removed a 23.5-ft fishing vessel from the shoreline of Eastern Island, Midway Atoll. The vessel, confirmed as lost during the March 2011 Japan tsunami event, was towed to Midway's Sand Island. Photo by NOAA

[4] See Table 6 (next page) for a detailed list of activities that occurred under the 2013 Co-Trustees Permit.

Table 9 below outlines activities permitted under the conservation and management Monument Co-Trustee permit. Reports of activities conducted under this permit are logged and monitored in the same manner as activities conducted under separate permits, and all reports are shared among Co-Trustee agencies in order to facilitate cooperative management of all Monument resources. A conservation and management permit of this nature is necessary for coordinated management of Monument resources.

Table 9. Activities conducted under the conservation and management Monument Co-Trustee permit in 2013, for NOAA, USFWS and DLNR.

Co-Managing Agency	Activities Conducted
USFWS, Hawaiian and Pacific Islands National Wildlife Refuge Complex	• Management, operation, and maintenance of Midway Atoll Field Station • Management, operation, and maintenance of Laysan Island Field Station • Management, operation, and maintenance of Tern Island Field Station (French Frigate Shoals) • Tern Island clean-up operations • FAA Henderson Airfield seawall repairs and taxiway paving at Midway Island • Midway amateur radio operations • Verbesina removal at Midway Atoll • Bulky dump restoration at Midway Atoll • Lead-based paint remediation at Midway Atoll • Seabird Tissue Archiving and Monitoring Project (STAMP) – tissue archiving • Transfer of albatross remains to David Hyrenbach of the Hawai'i Pacific University • M/V *Kahana* field support missions • M/V *Ocean Ranger* and barge Midway transport
USFWS, Pacific Islands Fish and Wildlife Office	• Nihoa Millerbird translocation project • Collection of Lisianski soil samples • M/V *Searcher* field support missions
NOAA, National Marine Fisheries Service	• Marine debris removal (CRED) • Deployment and retrieval of oceanographic instruments (CRED) • Pacific Islands Science Center (PIFSC) sea turtle monitoring at French Frigate Shoals • Cetacean cruise • Monk seal field camps/population assessment at French Frigate Shoals
NOAA, Office of National Marine Sanctuaries	• Midway tide gauge station operation and maintenance • Japan tsunami marine debris response at Midway • Transfer of items collected on Midway to cultural practitioners for educational and cultural purposes • Transport and installation of batteries for Tern Island tide gauge station • Vessel Support for conservation and management activities aboard M/V *Searcher* • Monument Management Board meeting at Midway Atoll • Native Hawaiian plant experts collaborate with USFWS staff at Midway in support of removal of invasive species at Midway Atoll • Monument Communications Team meeting at Midway Atoll • Cultural practitioners compose traditional Hawaiian chants and songs utilizing their experience at Midway Atoll
State of Hawai'i Department of Land and Natural Resources, Division of Forestry and Wildlife	• Management, operation, and maintenance of Kure Atoll Field Station • Winged Ambassador tagging event at Kure Atoll

Above A pair of Nihoa Millerbirds on Laysan Island. Photo by Megan Dalton/ABC

Conservation and Management Highlights

Nihoa Millerbird Breeds Successfully on Laysan Island

The ulūlu, commonly referred to as the Nihoa Millerbird (*Acrocephalus familiaris kingi*) is extremely rare and endemic to the NWHI. Historically, there were two populations of Millerbirds in what is now the HINWR within PMNM, one on Laysan Island and one on Nihoa. The Laysan Millerbird (*Acrocephalus familiaris familiaris*), along with the Laysan Rail (*Porzana palmeri*) and Laysan Honeycreeper (*Himatione sanguinea freethi*), went extinct in the early 20th Century when the island was denuded by non-native rabbits and livestock.

In a collaborative effort to increase the total population size and reduce the risk of extinction, USFWS and the American Bird Conservancy (ABC) translocated 50 Millerbirds in 2011 and 2012 from Nihoa to establish a second population on Laysan Island. As of May 2013, the population on Laysan Island more than doubled to over 120 Millerbirds, inclusive of 71 adults and 50 hatch-year birds with more nests still active.

Close observation of the translocated Millerbirds, recently named ulūlu niau by the PMNM Native Hawaiian Cultural Working Group's Nomenclature Subcommittee, has yielded significant new scientific information about the species, such as details of breeding chronology, and a still-emerging picture of how young birds mature and enter the breeding population. All of this information is important in assessing the progress toward population establishment on Laysan and is valuable in the overall conservation and management of the species. The overwhelming success to date indicates that Laysan has suitable habitat and food resources to support the resourceful and adaptable Millerbirds.

Left Millerbird fledgling with crest raised while practicing his male song. Photo by Megan Dalton/ABC

Above Millerbird chicks in nest on Laysan Island. Photo by Michelle Wilcox/ABC

Right Wisdom with chick on February 16, 2013. Photo by John Klavitter/USFWS

Wisdom's Legacy Continues

One of the world's oldest known birds, affectionately known as "Wisdom", returned once again to MANWR to mate and rear a chick. Wisdom, a mōlī (Laysan albatross, *Diomedia immutabilis*), is at least 62 years old. USFWS Biologist Pete Leary observed the newly hatched chick on February 3, 2013 as Wisdom's mate gently cared for their newest progeny. The chick fledged (developed wing feathers large enough for flight) in June.

Biologist Chandler Robbins clasped an aluminum band around Wisdom's ankle in 1956 when Sand Island was an active U.S. Naval Air Station and densely populated by people. After Midway became a National Wildlife Refuge in 1988, Robbins returned at the age of 81 to continue his work, discovering the tag he placed on Wisdom more than 30 years prior. Although Wisdom's nesting habitat is well cared for, both mōlī and ka'upu (Black-footed albatross, *Diomedia nigripes*), face many threats from ingestion of floating plastics, exposure to contaminants, and the risk of entanglements or hooking to fishing lines and lures. Wisdom continues to be a symbol of hope and inspiration for the health and longevity of seabird species dependent upon the health of the ocean and nesting habitat for their survival.

Tern Island Faces Challenges

The Tern Island Field Station, a unit of HINWR located at French Frigate Shoals was closed in 2013. Staffed and operated by the USFWS year-round since 1979, a variety of issues forced Refuge staff to make the difficult decision to close the remote field station, a site that supported decades of seabird monitoring, habitat restoration, resource protection, and interagency efforts to protect and recover ʻilioholoikauaua (Hawaiian monk seal, *Monachus schauinslandi*), honu (the Hawaiian green sea turtle, *Chelonia mydas*), as well as the ʻea (Hawskbill turtle, *Eretmochelys imbricate*).

Factors leading to closure of the field station included inadequate staff and monetary resources due to flat and declining FWS budgets and a severe weather event in late 2012 that damaged operations facilities, an extensive deferred maintenance backlog, and growing transportation and logistics costs to access and operate the remote field station.

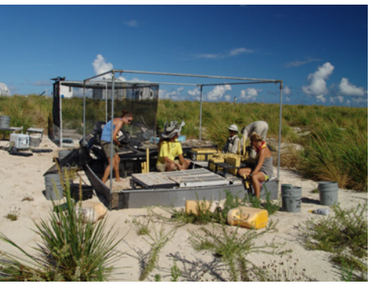
In the spring of 2013, a small team of one USFWS staff and four volunteers spent three months preparing the island for long-term closure. The team's priorities were to clean-up debris from the December 2012 storm, stabilize the remaining infrastructure and equipment, remove existing marine debris and mitigate entrapment hazards on island. After the team departed in May, 2013, year-round maintenance of the systems required to support a biological research station ceased necessitating total replacement if the field station is re-opened at a later time.

The closure of Tern Island has negatively impacted Monument managers' ability

Left One of nine female honu that became entrapped in Tern's degraded seawall in recent years. She was released back into Monument waters without incident, but with the island unstaffed now and in the future, similarly entrapped turtles will likely perish. Photo by USFWS

to protect the resources at French Frigate Shoals. Without year-round staff on island, seabird, Hawaiian monk seal, and sea turtle monitoring efforts will no longer provide a consistent time-series of data collection. In addition, the potential risks to resources that are likely to occur, such as entrapment hazards, degradation of infrastructure, and trespassing vessels will be unknown and undocumented. Entrapment hazards, which are especially prevalent within sections of the island's World War II era metal seawall and storm damaged infrastructure are of particular concern for managers.

Managers will monitor the islands, to the extent possible, with the resources at hand. However, until the USFWS is able to re-open and staff Tern Island, management efforts will occur on a sporadic and opportunistic basis.



Top Restored native habitat on Laysan Island. Photo by Michele Kuter/USFWS

Above USFWS staff and volunteers dismantle native plant propagation structures on Laysan Island. Photo by USFWS

Right The endangered and endemic Laysan Finch. Photo by Michele Kuter/USFWS

Laysan Island Faces Challenges

In September 2013, Laysan Island's biological field station, a part of the HINWR, closed after a dedicated presence of more than 25 years, due to flat and declining budgets resulting in inadequate monetary and staffing resources necessary to maintain employee and volunteer health and safety on site. The closure required a 10-day on-island mission to remove wildlife entrapment hazards, dismantle infrastructure such as plant nurseries and old water catchment systems, and close the facility.

A one-year closure is estimated to set back the progress of invasive species removal efforts by a minimum of five years. In addition, the closure has interrupted a 10-year multi-island albatross study and created gaps in long-term data sets for monitoring ʻiwa (Great Frigatebird, *Fregata minor palmerstoni*), ʻā (Red-footed Booby, *Sula sula rubripes*), ʻewaʻewa (Sooty Tern, *Onychoprion fuscatus*), endangered Laysan duck (*Anas laysanensis*), and ʻekupuʻu (Laysan finch, *Telespiza cantans*) populations. This data is important to understanding how avian island species react to changes in the environment (e.g., climate change, invasive plant removal, winter storms, drought, and tsunamis) and help the USFWS monitor its management actions.

Habitat quality is paramount to the health and survival of life on Laysan Island. The island is home to a range of bird species including seabirds, migratory shorebirds and land birds. These include the kioea (Bristle-thighed curlew, *Numenius tahitiensis*), kōlea (Pacific Golden Plover, *Pluvialis fulva*), ʻūlili (Wandering Tattler, *Tringa incana*), ʻakekeke (Ruddy Turnstone, *Arenaria interpres*), and three endangered landbirds (Laysan finch, Laysan duck, and Nihoa Millerbird). In addition, Laysan Island serves as a safe pupping location for the critically endangered Hawaiian monk seal and serves as an important nesting location for Hawaiian green sea turtles.

Cetacean Survey Yields Many Sightings

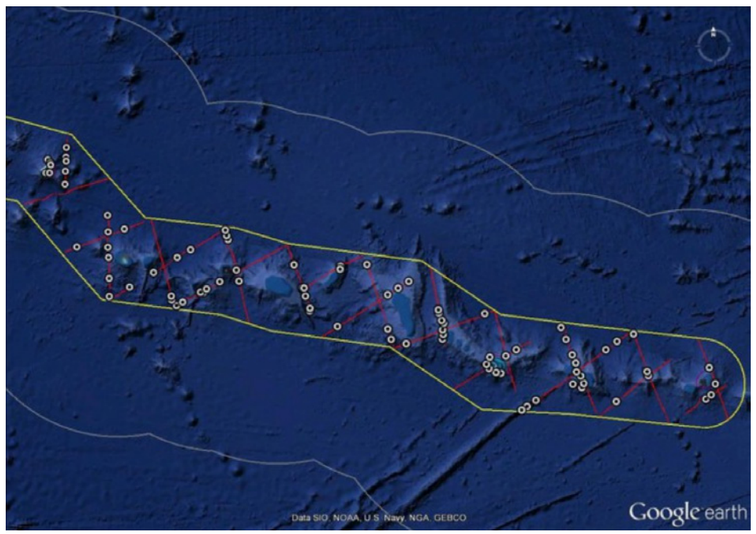
One of the key missions of NOAA Fisheries Pacific Island Region is to improve understanding of the distribution, abundance and ecology of whales and dolphins in the central and western Pacific Ocean. Such research informs critical decisions on the management of fisheries and other human activities to promote the conservation of these cetacean populations.

Below Bottlenose dolphins emerge from the swell approximately 30 km northeast of French Frigate Shoals. Photo by Andrea Bendlin/NOAA under PIFSC permit 15240

Various efforts have taken place since 2007 to gather more information on cetaceans in PMNM. In 2013, the Papahānaumokuākea Associated Cetacean Ecology Survey (PACES) took place May 7–June 5 aboard the NOAA Ship *Oscar Elton Sette*. PACES was led by NOAA Pacific Islands Science Center (PIFSC) Cetacean Research Program in conjunction with scientists from NOAA Southwest Fisheries Science Center, Scripps Institute of Oceanography, University of Hawai'i (UH), and several contractors. The 13-member PACES team carried out numerous integrated operations, including visual observations, acoustic monitoring, photo-identification, biopsy sampling, satellite tagging, small boat surveys and oceanography. Of particular interest was learning more about the NWHI stock of false killer whales (*Pseudorca crassidens*), as well as other species that likely also have discrete stocks within PMNM.

In its entirety, 91 cetacean groups were sighted by the visual observers and 120 groups were detected by the passive acoustics team. These sightings and detections encompass at least 15 species, and a variety of supplemental information (photo-identification images, biopsy samples, satellite-tracked movements and oceanographic data) was collected for many of the sighted individuals (Figure 5). The data gathered during each cetacean survey is critical to meeting the Monument Management Plan (the Plan) goals of determining the status of cetacean populations and verifying and managing potential threats over the life of the Plan. Data collected are also critical to updating the stock assessments for each species .

Figure 5. Sightings of cetaceans during all PACES 2013. Map covers the PMNM (yellow boundary) from Pearl and Hermes in the west to Nihoa Island in the east. *Map courtesy of NOAA Fisheries PIFSC.*



Sea Turtle Monitoring Continues

The Hawaiian green sea turtle, commonly referred to as honu, is listed as threatened under the Endangered Species Act. The Hawaiian population forages throughout the archipelago; however, more than 90 percent nest at French Frigate Shoals, with the majority of these nests on East Island. Nighttime nesting surveys of honu have been conducted at East Island for more than 40 years. This data record is the product of cooperation between UH, NOAA PIFSC Marine Turtle Research Program, and USFWS.

In 2013, the annual nighttime nesting surveys could not be conducted due to unsafe conditions at French Frigate Shoals. In addition, the year-round presence of USFWS ended following the 2012 storm that destroyed much of the island's support structures (see "Tern Island Faces Challenges"). However, NOAA PIFSC took advantage of an opportunity to conduct daytime surveys throughout the Monument during the July 2013 cruise aboard NOAA Ship *Oscar Elton Sette*. The daytime surveys were the first conducted since 2007.

In total, 18 site surveys were conducted on 12 islands in eight locations. A total of 46 probable nest sites and 1,202 pits were observed. French Frigate Shoals showed more digs (pits + nests) than any other location surveyed, demonstrating that this site continues to be an important habitat for the honu. While nighttime nesting surveys are still the preferred option because it allows for a first-hand account of honu digging their pits and laying their eggs, the 2013 daytime survey provided a valuable alternative to collect data on sea turtle nesting activities in the NWHI and to maintain the long-term data record on this species.

Above Hawaiian green sea turtles haul out onto the shore at French Frigate Shoals, where more than ninety percent of the state's green sea turtles come to nest. Photo by Andy Collins/NOAA

Above The Marine Debris Team (clockwise from upper right: James Morioka, Kerrie Krosky, Kristen Kelly, Tomoko Acoba, Kevin O'Brien, Kerry Reardon, Edmund Coccagna, Joao Garriques and Russell Reardon) poses on April 18 atop the large, 13,795-kg pile of derelict fishing gear and plastic debris collected during their 21-day mission at Midway Atoll. Photo by Edmund Coccagna/NOAA

Team Removes 14 Metric Tons of Marine Debris from Midway Atoll

From March 28 to April 18, 2013, a nine-member team from NOAA's PIFSC Coral Reef Ecosystem Division (CRED) conducted surveys and removal efforts at MANWR. The team collected nearly 14 metric tons (13,795 kg) of derelict fishing gear and plastic debris.

Removal efforts were conducted in-water, with tow-divers visually surveying reefs for derelict fishing gear, as well as on-shore via shoreline sweeps, on all three of Midway's islands: Sand Island, Spit Island and Eastern Island. The team also conducted a pilot study of accumulation rates of marine debris in nearshore waters and along shorelines at Midway Atoll, continued to test protocols for assessment of benthic injuries related to marine debris, and surveyed for debris items potentially related to the Japan tsunami event of March 2011.

"Just about anything you can imagine that humans use in their day-to-day lives, you can find it washed up on the beaches," says Joao Garriques, a member of the CRED marine debris team, in reference to shoreline surveys at Midway Atoll. "You just can't predict what you might find up there, 1,200 miles from the nearest city."

All debris found was collected and transported to the seaplane tarmac on Sand Island, where it will be staged until it can be transported by ships returning from the Monument (depending on space availability) for proper disposal on O'ahu. On Sand Island, the debris was sorted and tallied by category. Table 10 (below) describes the top 20 types, by quantity, of debris that accumulated and was removed from the shorelines of Midway Atoll in 2013.

Table 10. Marine Debris collected at Midway Atoll in 2013.

Debris Type	Collections	Percent of Total
Plastic Fragments	30,492	52.57%
Oyster Aquaculture Spacers (unconfirmed ID)	5,705	9.84%
Bottle Caps	4,781	8.24%
Buoys/Floats, Hard Plastic	2,822	4.87%
Buoys/Floats, Foam	2,278	3.93%
Beverage Bottles	2,214	3.82%
Rope/Net, Small (<0.01 m3)	1,813	3.13%
Containers/Bottles, Other	1,340	2.31%
Cigarette Lighters	1,249	2.15%
Foam Fragments	1,114	1.92%
Plastics, Other	1,000	1.72%
Personal Care Products	980	1.69%
Slippers	886	1.53%
Trap Cones, Eel/Hagfish	377	0.65%
Plastic Toys	349	0.60%
Clothing/Shoes	200	0.34%
Rope/Net, Medium (0.01-0.12 m3)	124	0.21%
Plastic Baskets	117	0.20%
Plastic Utensils	83	0.14%
Rubber Fragments	79	0.14%

In addition to the debris listed above, other items collected were: toilet seats, golf clubs, plastic swords, umbrella handles, soccer balls, truck tires, a snowboard boot, a bowling ball, a fireman's helmet, a 15-m plastic pipe, a traffic barrier, and a 23.5-ft fishing boat that was confirmed as lost in the 2011 Japan tsunami event.

"The amount of plastics in the environment up here is pretty alarming," says James Morioka, a member of the CRED marine debris team, after witnessing the amount of debris present on the shoreline of Eastern Island after only 10 months of accumulation since the last marine debris mission at Midway Atoll ended in July 2012.

Top Kevin O'Brien disentangles a Laysan Albatross chick from a piece of derelict fishing net on April 10 on Eastern Island, Midway Atoll. Photo by NOAA

Above Russell Reardon removes a large derelict fishing net from the reef at Midway Atoll on March 31. Photo by James Morioka/ NOAA

Message in a Bottle Found at Kure Atoll Inspires Albatross Name

Below Photo of Rumi's elementary class, which accompanied the letter in a bottle that washed ashore at Kure Atoll.

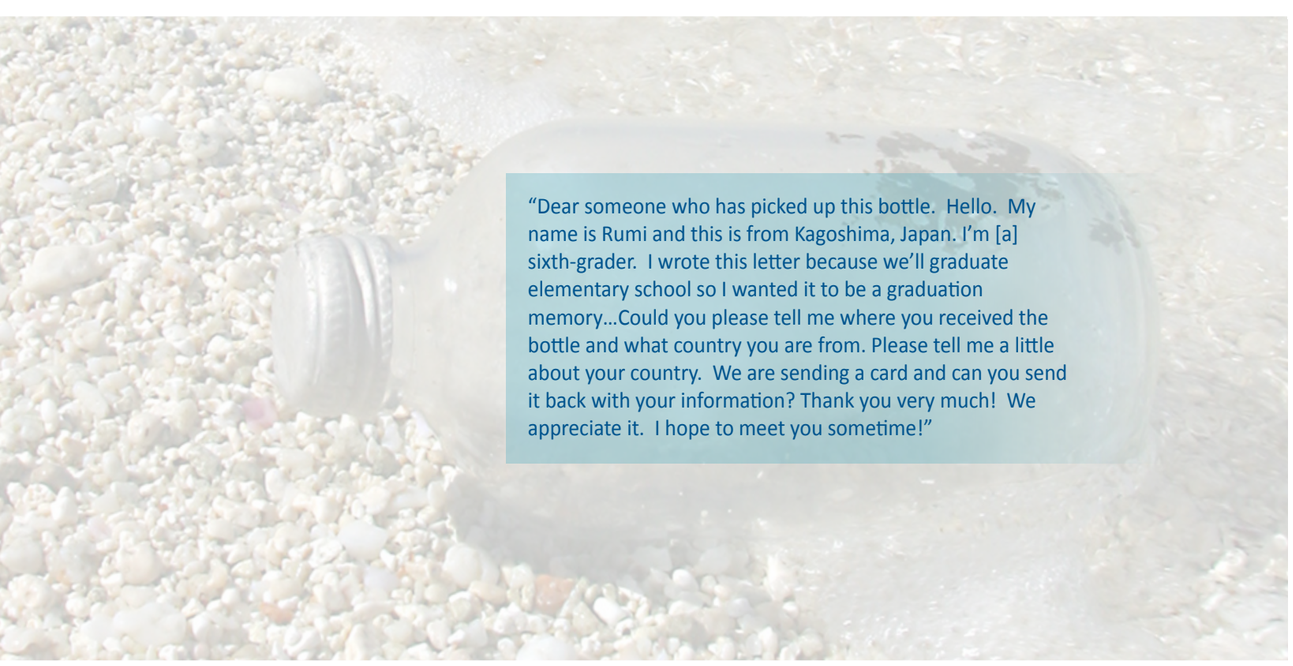
Bottom Photo by James Watt.

On January 5, a message and photo sealed in a bottle was found on the beach at Kure Atoll by Illana Nimz, a biological technician stationed there. The message, written by a young woman named Rumi, was one of many released from the shores of Japan in 2006 as part of a grade school class project.

"The message had Rumi's home address, so I sent her a letter with my email address and the Kure Atoll State Wildlife Sanctuary website listed so she may contact me and see what people are doing on Kure Atoll," said Nimz.

Kure Atoll State Wildlife Refuge is a part of the State of Hawai'i and managed by DLNR, which has staff stationed year-round at Kure Atoll to gather data, remove invasive species and marine debris, and protect endangered wildlife.

"Since then, we have been emailing and sharing pictures; I attempt to write in Japanese and she replies in excellent English," continues Nimz. "It has been so much fun to have a new friend in Japan through the most random connection of a message in a bottle, and I hope I get to meet her one day!". The original message, offered in both Japanese and English, read:



Left A Black-Footed Albatross, like the one pictured here, was named after Rumi, a Japanese schoolgirl that sent a message in a bottle that washed ashore at Kure Atoll. Photo by DLNR

Shortly after Nimz contacted Rumi, Kure Atoll field camp members chose a black-footed albatross to name in her honor. In early November, DLNR staff received data reflecting Rumi's flight patterns, which were collected as part of the Winged Ambassadors program, a partnership between the DLNR Division of Forestry and Wildlife (DOFAW), Hawai'i Pacific University (HPU), the United States Geological Survey (USGS), and Oikonos Ecosystem Knowledge. Patterns have shown that albatross tagged further south on the Hawaiian archipelago tend to forage northeast, while albatross tagged at Kure Atoll, like "Rumi," tend to forage northwest towards Japan.

Rumi the human is now a college sophomore studying social science at her local university. She intends to become an elementary school teacher and is eager to teach her future students about Kure Atoll. She recently wrote, "We had only limited hope, but Ilana sent me a letter. I was deeply moved with my friends! I want to go to Hawai'i someday."

The message in a bottle and Rumi the black-footed albatross are both reminders of our global relationships. In Nimz's words, "Opening the letter and seeing the class picture was incredible, a little time capsule that had floated around the ocean for six years, and containing the potential of a new friendship." The Pacific Ocean serves not only as an expanse of water, but also as a means of building international connections through our shared natural resources.

NATIVE HAWAIIAN PRACTICES

Two Native Hawaiian Practices permits were issued in 2013 (see Table 11). One permit, issued to Nā Maka o Papahānaumokuākea supported a project entitled *Nā Moʻolelo o Papahānaumokuākea Project*, the purpose of which was to document historical and cultural activitiesthrough interviews with community members from Kauaʻi and Niʻihau. The other was issued to the Polynesian Voyaging Society as part of their Mālama Honua World Wide Voyage to provide a training ground for apprentice navigators and to visit the Monument prior to leaving the State of Hawaiʻi on the World Wide Voyage.

Table 11. Affiliations of Native Hawaiian Practice permittees and permitted projects in 2013.

Native Hawaiian Practices Permittee Affiliation	Number of Permits Issued	Permitted Native Hawaiian Practices Projects
Nā Maka o Papahānaumokuākea	1	• Nā Moʻolelo o Papahānaumokuākea Project
Polynesian Voyaging Society	1	• Apprentice navigator training sails to Nihoa aboard a traditional voyaging canoe, *Hikianalia*

Native Hawaiian Practices Highlights

Nā Moʻolelo o Papahānaumokuākea Project

In September, cultural practitioners with the nonprofit Nā Maka o Papahānaumokuākea (Nā Maka) traveled to Nihoa to explore and understand previously documented historical and cultural activities, brought to light through interviews with community members from Kauaʻi and Niʻihau. This trip allowed participants to spend time on Nihoa and re-connect to the place only known to them previously through stories passed down from kūpuna (ancestors). Two of the 14 participants, Keala Kai and Presley Wann, have a direct lineal connection to Nihoa through their great-grandfather Alexander Hailama, a known resident of both Kauaʻi and Nihoa in the early 1900s.

"It just felt so right to be here because of our connection to our tūtū Hailama and his ʻohana (family) that lived on Nihoa," said Wann.

Activities included observations of the ocean, island and sky. "Observing a place is important," said Pelika Bertelmann, trip leader and one of the founders of Nā Maka. When we understand the entire ecosystem and how everything interacts, the natural cycles of place can guide our decisions to manage and care for a place. This is only possible when your eyes, ears, and minds are open to allowing the place to communicate its needs." noted Bertelmann.

Above Native Hawaiian cultural practitioners working on Nihoa, which holds many cultural sites significant to Native Hawaiians. Photo by Jamie Makasobe

While on Nihoa, the group documented the following observations:

> *September still holds Nihoa in Kauwela[5] with some signs of moving into Hoʻoilo[6]. At sunrise, Makaliʻi (Pleiades)is at its zenith directly overhead right before the sun rises alerting our kilo[7] of the oncoming rise of Makaliʻi at sunset in a couple of months. Birds are at a minimum but still in residence ... the calm before the storm of birds migrating for winter. The island hasn't blossomed yet awaiting the storms and rain of Hoʻoilo but the heat has lessened from summer so moisture is not completely sucked away from the plants at this time (yet not cool and wet enough to start shooting new growth and fruit). The ocean can still be calm but waves and surge are present enough to keep you alert and weary. Hāʻukeʻuke (shingle urchin) and other invertebrates are spawning or getting ready to spawn. The shorelines are still in their Kauwela state but show signs of tremendous growth because of the increase of rain and wave action (causing a brackish mix that usually will start some limu to sprout), but the growth will not be extensive until wave consistency and rain consistency begin.*

[5] Kauwela is modernly interpreted as summer ("the warm Kau") and presumably received its name from the traditional season Kau. The Hawaiian calendar contains 12 months and divides the year in half; six months in Kau (the "dry season" also referred to as Makaliʻi) and six months in Hoʻoilo (the "wet season"). References: Handy, Handy, Pukui (1991); Kamakau (200); Kepelino (2007); Malo (1951)
[6] Hoʻoilo is modernly interpreted as winter (the "wet season"). References: Handy, Handy, Pukui (1991); Kamakau (200); Kepelino (2007); Malo (1951)
[7] Astrologer; seer; observer. Reference: Pukui/Elbert, Hawaiian Dictionary (2003).

Above Native Hawaiian cultural practitioners looking out at double hulled sailing canoe *Hikianalia* as it approaches Nihoa. Photo by Jamie Makasobe

Apprentice Navigators Sail To Nihoa Aboard Hikianalia

In September, the waʻa kaulua *Hikianalia* left the shores of Hanalei, Kauaʻi with six apprentice navigators training in their first challenge of deep-sea non-instrument navigation. Their objective was to find the island of Nihoa, approximately 63 acres in size, located roughly 118 nautical miles northwest of Niʻihau; a feat comparative to finding Mānana (Rabbit Island) off the Waimānalo coast from Kohala, Hawaiʻi. For apprentice navigators, the experience of being away from the light pollution near the main Hawaiian Islands is an important factor in understanding how the voyagers of old would find land and also to practice the art of traditional wayfinding.

In addition to training young navigators, the Polynesian Voyaging Society master wayfinders aimed to sail to Nihoa out of respect for and acknowledgment of the connection between the NWHI and the main Hawaiian Islands prior to leaving Hawaiʻi on Mālama Honua, the World Wide Voyage (www.hokulea.com).

The crew consisted of four of the five pwo (master navigator) from Hawaiʻi: Nainoa Thompson, Bruce Blankenfeld, Shorty Bertelmann, and Kalepa Baybayan, who served mostly as regular crew and mentors on this voyage in order to give the best experience to their apprentice haumāna (students).

"Finding Nihoa for the first time was a moment that we will remember forever," said Jenna Ishii, one of the apprentice navigators. The experience gained by each

During the trip, the group spotted *Hikianalia*, a Polynesian waʻa kaulua (traditional voyaging canoe), as she approached Nihoa and offered a gesture of aloha with the blowing of the pū (conch shell) and oli (welcome chant) as the waʻa approached.

"To be on island and to greet her (*Hikianalia*) – Hawaiʻi to Hawaiʻi – was special," said Bertelmann. "When was the last time a native Hawaiian was on Nihoa and a waʻa (canoe) came around the corner? We don't even know."

"Journeys like this are so important for ourselves, our people, and our place. Because once you remove Hawaiʻi from this special place, it is no longer Hawaiʻi," said Bertelmann. "Experiencing this special place through the eyes of our ancestors - combined with the arrival of *Hikianalia* - was truly an opportunity for native Hawaiians to feed places like Nihoa with who we are, as Hawaiians, and our lives as they exist today."

Left Two navigators training apprentice navigators on voyage to Nihoa in September 2013. Photo by Kaleomanuiwa Wong

Above Keala Kai sounds the pū (conch shell) to greet the navigators aboard the *Hikianalia* as she approaches Nihoa. Photo by Jamie Makasobe

Right A view approaching Nihoa from aboard the *Hikianalia*. Photo by Randy Kosaki/NOAA

crew member, both young and old, will help with each individual's successive voyage."

As the crew watched Niʻihau disappear, they let the stars, moon, wind and swells direct them toward Nihoa. Hokupaʻa (the North Star) and the star line Ka Lupe a Kawelo (the Great Square of Pegasus) were prominent throughout the night, making it easy for them to stay the course. The four pwo on board implemented a strict no sleeping rule until the island had been found and as morning approached, the exhausted apprentices scanned the horizon for Nihoa hoping that their course line had been accurate.

Approaching the island, *Hikianalia* was greeted with oli by individuals from Nā Maka o Papahānaumokuākea on Nihoa to document historical and cultural activities. This was likely the first greeting from people on Nihoa to a waʻa in several hundred years, making it a very special occasion for all that were involved.

SPECIAL OCEAN USE

Four Special Ocean Use (SOU) permits were issued in 2013 (see Table 12 below). Two SOU permits were issued to develop film products; one for the National Geographic Channel series "Wild Hawaiʻi" and the other for Palikū Films to produce a PMNM cultural briefing video in high definition. Another permit was issued to allow for the sale of non-living anthropogenic items and science photographs from Kure Atoll to raise funds for the Kure Atoll Conservancy, and the fourth SOU permit was for recording spatial imagery of islands and atolls for Google Street View and UNESCO World Heritage galleries.

Table 12. Affiliations of Special Ocean Use permittees and permitted projects in 2013.

Special Ocean Use Permittee Affiliation	Number of Permits Issued	Permitted Special Ocean Use Projects
Pangolin Pictures, National Geographic Channel	1	• Filming wildlife sequences for a National Geographic Channel series, "Wild Hawaiʻi"
NOAA, Office of National Marine Sanctuaries & USFWS, Hawaiian and Pacific Islands National Wildlife Refuge Complex	1	• Record spatial imagery of islands and atolls for Google Street View and UNESCO World Heritage galleries
Kure Atoll Conservancy	1	• Kure Atoll Conservancy (KAC) sale of Monument items
Palikū Films, LLC*	1	• High definition filming for a cultural briefing video for Papahānaumokuākea Marine National Monument

Special Ocean Use Revenue Reported

Each permittee that receives an SOU permit is required to "submit an annual report not later than December 31 of each year that describes activities conducted under that permit and revenues derived, by the permittee, from such activities during the year" (50 CFR 404.11.f). In 2013, four SOU projects were conducted within the Monument. No SOU revenue was reportedly generated in 2013.

*PMNM access did not occur under this permit in 2013. The departure date of the trip was scheduled to occur in October and cancelled due to the Government Shutdown. The project was successfully completed using previously obtained footage.

Top A red-footed booby rests atop the camera during filming of National Geographic's *Wild Hawaii: Secrets of the Deep*. Photo by Daniel Kwiatkowski/Pangolin Pictures

Above Monk seals rest along a rocky shoreline within PMNM. Photo by Andrew Seestedt/ Pangolin Pictures

Right Filming sea turtles for National Geographic's *Wild Hawaii: Secrets of the Deep*. Photo by Erica Zienowicz/Pangolin Pictures

Special Ocean Use Highlights

National Geographic and Pangolin Pictures Film "Wild Hawai'i: Secrets of the Deep"

Cameraman Paul Atkins and Associate Producer Daniel Kwiatkowski spent 14 days filming at French Frigate Shoals for a National Geographic special showcasing the wildlife of the Hawaiian Islands. They filmed a variety of seabirds including terns[9], all varieties of ʻā (boobies), ʻiwa (great frigatebird), mōlī (Laysan albatross), and kaʻupu (black-footed albatross). They captured instances of the ʻiwa stealing food and fledglings from other birds as well as footage of NOAA Hawaiian Monk Seal Research Program scientists conducting wildlife surveys and conservation measures.

Their primary mission, however, was to bring one of the most impressive dramas of the Monument to the people in high definition—the story of mōlī and kaʻupu fledglings leaving the island for the first time and facing the handful of tiger sharks (*Galeocerdo cuvier*) that have learned to travel miles out of their way to prey on them.

Adult mōlī and kaʻupu are massive, majestic birds; their fledglings, by contrast, are quite large but noticeably awkward and unskilled at flight take-offs and landings. The film follows young mōlī and kaʻupu from birth to the time they fledge and leave their parents. Once on their own, the adolescent seabirds must learn how to feed themselves and how to fly. In a final coming of age challenge, they land upon the water where hungry tiger sharks await.

[9] There is no known Hawaiian term for tern seabirds in general. Specific references include noio for noddy tern (*Anous minutus melanogenys*), manu o kū for white tern (*Gygis alba*) and ʻewaʻewa for sooty tern (*Onychoprion fuscatus*).

Showcasing the wonder and drama of the natural world while protecting these places and respecting the traditional knowledge and ways of native peoples is a mission of Pangolin Pictures and National Geographic, especially when the stories come from remote or inaccessible places.

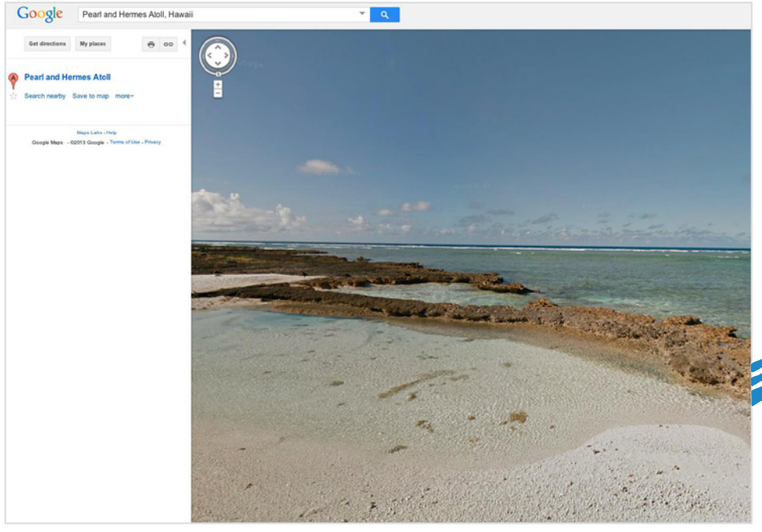
Street View – Northwestern Hawaiian Islands Go Live on Google Street View

The first 360-degree panoramic images from five new locations within PMNM are now live on Google Maps. Internet users can now virtually visit Tern Island and East Island at French Frigate Shoals, Laysan Island, Lisianski Island and Pearl and Hermes Atoll. To virtually visit PMNM through Google Street View, visit

http://www.papahanaumokuakea.gov/news/google_streetview.html

During July 2013, PMNM staff from NOAA and the USFWS spent a week capturing thousands of panoramas of the incredible features in the Monument, covering 20 miles on foot using the Google Street View Trekker. This effort focused on five of the primary emergent land masses in the NWHI, which are also part of the HINWR.

PMNM has collaborated with Google to use digital imagery and web technology to bring PMNM to a broader audience and expand PMNM's efforts to "bring the place to the people." In 2012, Google Street View went live with imagery of MANWR. In total, more than ten thousand images across 41 miles have been captured from within the Monument.



Left Screenshot of Pearl and Hermes Atoll on Google Streetview. Credit: Google Maps

Above Kālewa Correa captures 3D spatial imagery with the Google Street View Trekker and a hand-held GPS on East Island at French Frigate Shoals. Photo by Ty Benally/USFWS

"The goal of collecting this imagery was to show the world how special and important the remote islands and atolls of the Northwestern Hawaiian Islands are, in turn inspiring the next generation of conservationists and supporters," said Kālewa Correa, NOAA's Mokupāpapa Discovery Center manager and project leader. "We hope that bringing the Monument to the people through Google Street View will reach a larger audience but with minimal environmental impact, helping to preserve this amazing place for the future."

Monument managers also plan to use the imagery as an assessment tool to capture the present conditions and health of the NWHI.

"This was an exciting project," said USFWS Specialist Ty J. Benally, who took part in the 2013 mapping expedition. "This imagery enables resource managers to initiate discussion and planning, without actual access to the islands, and helps locate conservation sites where efforts are most needed. In fact, turtle biologists have already utilized Google Street View imagery of Midway to determine where to look for turtles and see which beaches were closed in preparation for their research."

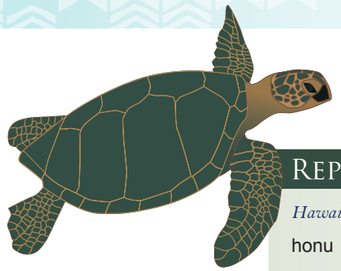
RECREATION

While recreation activities are permitted in PMNM within Midway Atoll Special Management Area (MASMA) only (50 CFR Part 404), no recreation permits were issued in 2013. A single recreation permit issued in 2010 to the USFWS was active in 2013 authorizing USFWS to administer the Visitor Services Program (VSP) at Midway Atoll, in accordance with USFWS refuge system requirements. The VSP is designed to offer visitors and those permitted under another permit category the opportunity to discover, enjoy, appreciate, protect and honor the unique natural, cultural and historic resources on Midway Atoll. The Midway Atoll VSP permit allows people visiting Midway Atoll under a separate permit category to conduct recreational activities such as wildlife observation and photography, environmental education and interpretation, participation in habitat restoration, non-wildlife dependent beach use (e.g. swimming, snorkeling), non-wildlife related outdoor sports (e.g. volleyball, bicycling, jogging), and amateur radio use. In 2013, a total of xxx[8] individuals visited Midway under the direction of the Midway Atoll VSP.

Left The USFWS 2010 recreation permit allowed individuals visiting Midway Atoll under separately permitted activities in 2013 to engage in recreational activities, such as photographing wildlife. Here, Kahi Fujii photographs black-footed albatross while on Midway Atoll under a Conservation and Management permit. Photo by Toni Parras/ NOAA

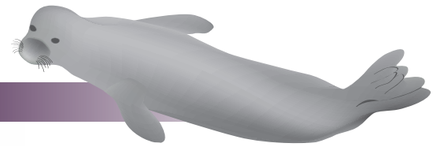
[8] Individuals conducting activities under the USFWS recreation permit under the Visitors Services Program were authorized to enter the Monument under another permit category to conduct activities (i.e., Research, Special Ocean Use, etc.).

Species Mentioned in the Permitted Activities 2013 Annual Report



Reptiles

Hawaiian	*Common*	*Scientific*
honu	Hawaiian green sea turtle	*Chelonia mydas*
ʻea	Hawksbill turtle	*Eretmochelys imbricata*

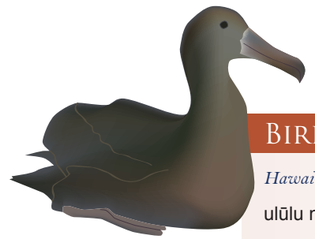


Marine Mammals

Hawaiian	*Common*	*Scientific*
	pygmy sperm whale	*Kogia breviceps*
	dwarf sperm whale	*Kogia sima*
ʻĪlioholoikauaua	Hawaiian monk seal	*Monachus schauinslandi*
	killer whales	*Orcinus orca*
	sperm whale	*Physeter macrocephalus*
	false killer whale	*Pseudorca crasidens*
	striped dolphin	*Stenella coeruleoalba*
	beaked whale	*Ziphiidae*

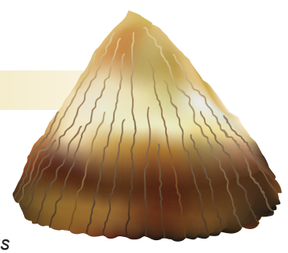
Fish

Hawaiian	*Common*	*Scientific*
	Russet Angelfish	*Centropyge potteri*
kole	Yellow Eyed Tang	*Ctenochaetus strigosus*
	Tiger Shark	*Galeocerdo cuvier*
	Masked Angelfish	*Genicanthus personatus*
ʻala'ihi	Yellow Stripped Squirrelfish	*Holocentrus ensifer*
	Hawaiian Dascyllus	*Pomacentridae albisella*



Birds

Hawaiian	*Common*	*Scientific*
ulūlu niau	Laysan Millerbird	*Acrocephalus familiaris familiaris*
ulūlu	Nihoa Millerbird	*Acrocephalus familiaris kingi*
	Laysan Duck	*Anas laysanensis*
ʻakekeke	ruddy turnstone	*Arenaria interpres*
mōlī	Laysan albatross	*Diomedia immutabilis*
kaʻupu	black-footed albatross	*Diomedia nigripes*
ʻiwa	great frigate bird	*Fregata minor palmerstoni*
	Laysan Honeycreeper	*Himatione sanguinea freethi*
kioea	bristle-thighed curlew	*Numenius tahitiensis*
ʻewaʻewa	sooty tern	*Onychoprion fuscatus*
kolea	Pacific golden plover	*Pluvialis fulva*
	Laysan Rail	*Porzana palmeri*
ʻā	blue-footed booby	*Sula nebouxii*
ʻā	red-footed booby	*Sula sula rubripes*
ʻekupuʻu	Laysan Finch	*Telespiza cantans*
ʻūlili	wandering tattler	*Tringa incana*



Invertebrates

Hawaiian	*Common*	*Scientific*
ʻopihi makaiauli	limpets (black foot)	*Cellana exarata*
ʻopihi ʻālinalina	limpets (yellow foot)	*Cellana sandwicensis*
hāʻukeʻuke	shingle urchin	*Colobocentrotus atratus*
pōhaku puna	plate coral	*Porites rus*

» Hawaiian phrase courtesy of kahuna pule Eleanor Makita of Kona, Hawai'i via Kumu Hula Cody Pueo Pata.
Front cover photo by NOAA/Holo i Moana Expedition 2010. Back cover photo by Greg McFall/NOAA.