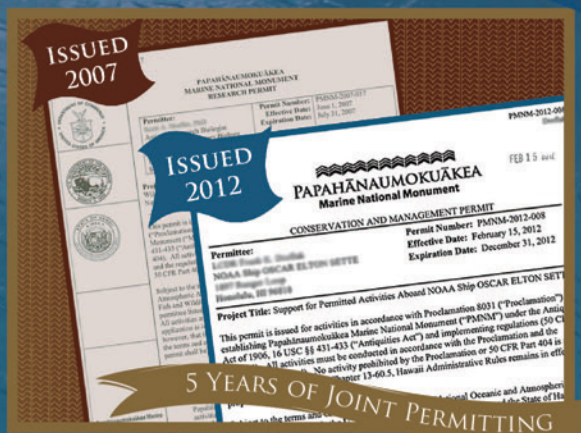
PAPAHĀNAUMOKUĀKEA
Marine National Monument

BATTLE OF MIDWAY 70TH ANNIVERSARY

1942



5 YEARS OF JOINT PERMITTING

2007

1940's 1950's 1960's 1970's 1980's 1990's 2000's 2010's

1973

40 YEARS OF TURTLE MONITORING

PERMITTED ACTIVITIES
2012 ANNUAL REPORT

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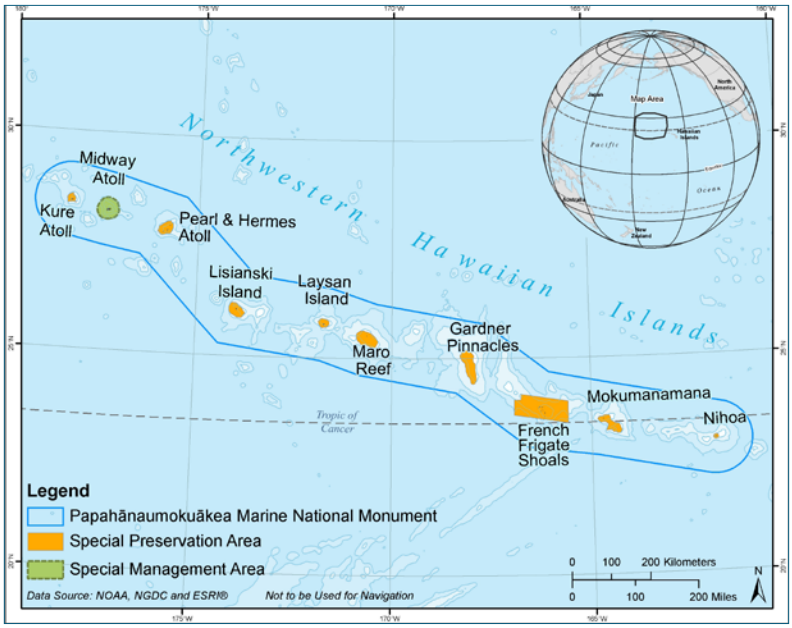
INTRODUCTION

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 Interior through the U.S. Fish and Wildlife Service (USFWS), and the State of Hawaii 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 to ensure that both cultural and natural resources are protected in a manner aligned with and with reverence to the Native Hawaiian culture. This unique management partnership of PMNM allows for the protection of the entire ecosystem, from remote sub-tropical islands to the deep sea.



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, Hawaiian Islands National Wildlife Refuge, Battle of Midway National Memorial, managed by the U.S. Department of 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 include State of Hawaii 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 seascape in the world. This honor cumulates over one hundred years of protections for the area, starting with protections of Midway Atoll in 1903, when President Theodore Roosevelt sent the Marines to stop the slaughter of seabirds at Midway Atoll (see timeline of protection, pg.6-7).

Despite the continued protection of the NWHI, and the area's relative isolation in the Pacific, significant threats to habitats and wildlife exist resultant from human activities occurring beyond Monument boundaries. Issues such as global climate change, sea level rise, ocean acidification, marine and terrestrial alien species, vessel groundings, and marine debris continue to be major concerns. 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.

In 2012, the Monument permitting process enabled scientists, managers and Native Hawaiian researchers 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 approaches. This year also marks significant benchmark anniversaries and milestones for events associated with the Monument: the 70th Anniversary of the Battle of Midway, 40 consecutive field seasons for the Marine Turtle Research Program, and the 5th Anniversary of the joint permitting system

between the Co-Trustees.

The 70th Anniversary for the Battle of Midway

June 4-7, 2012 marked the 70th anniversary of the Battle of Midway, considered the most decisive U.S. victory and referred to as the turning point of World War II in the Pacific. In June 1942, American intelligence tipped off the U.S. forces of an imminent attack by the Japanese Imperial Navy. The U.S. Pacific Fleet was able to intercept and defeat the Japanese invasion fleet bound for Midway Atoll. Though much of the Battle of Midway occurred 100 to 200 miles to the north, an intense air battle was waged directly over and around the atoll. Midway Atoll was designated as a National Memorial to the Battle of Midway in 2000.

The 40th consecutive field season for the Marine Turtle Research Program

Since 1973, Dr. George Balazs has led NOAA's Pacific Islands Fisheries Science Center's Marine Turtle Research Program through 40 consecutive field seasons at French Frigate Shoals to count nesting females and conduct research on the Hawaiian green sea turtle (honu). Dr. Balazs is a worldwide authority on sea turtles and initiated the first systematic tagging and monitoring study of green sea turtles. This long-term monitoring survey and other studies have provided valuable information on sea turtle biology and ecology. This research, spanning decades, is the longest running data set on green sea turtle research in the world and has been crucial to turtle population recovery.

The 5th anniversary of the joint permitting system between NOAA, USFWS and the State of Hawai'i

This year marked the 5th anniversary of the interagency joint permitting process among Co-Trustees, which has been used in the co-management of Papahānaumokuākea. The Co-Trustees developed and agreed to operate according to terms and institutional relationships set in a memorandum of agreement (MOA) (State of Hawai'i et al., 2006). The approach demands coordination by the Co-Trustees as well as collaboration with stakeholders to effectively manage with an ecosystem approach. Pursuant to the MOA, the Monument Management Board (MMB) promotes coordinated management of the Monument at the field level. The MMB includes a broader range of representatives from the Co-Trustees, specifically, State of Hawai'i DLNR, Division of Aquatic Resources; State of Hawai'i DLNR, Division of Forestry and Wildlife; USFWS, Hawaiian and Pacific Islands National Wildlife Refuge Complex; USFWS, Pacific Islands Fish and Wildlife Office; NOAA, Office of National Marine Sanctuaries; NOAA, National Marine Fisheries Service; and the Office of Hawaiian Affairs (OHA). Through coordination of effort, which includes the joint permitting process, the Co-Trustees, working together with interagency partners such as U.S. Coast Guard, Department of Defense, and Environmental Protection Agency seek to provide comprehensive protection that is as interconnected as the ecosystem itself.

Foreground Nai'a Ahuna, Native Hawaiian born on Midway along with Battle of Midway veteran (background) Sergeant Edgar Fox solemnly honor the Japanese and Americans lives lost during a lei ceremony on Midway's lagoon. Photo by: Dallas Nagata White

Turtle researcher Tammy Summers takes observational data on green sea turtles at East Island, French Frigate Shoals. ESA permit #15685. Photo by: NOAA/NMFS Marine Turtle Research Program

Members of the co-managing agencies at work during the biennial permits workshop December 3, 2012 at Camp Mokulē'ia, O'ahu. Photo by: Hoku Johnson/NOAA

Timeline of Ecosystem Protections

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.

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

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

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

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.

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

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 nm.

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.

2010's

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.

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

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).

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.

The codifying regulations in 50 CFR Part 404 provide further details and rules to manage access and use of Monument resources. 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 no longer 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 our website at: http://www.papahanaumokuakea.gov/resource/ship_reporting.html.

In addition to the Monument's ship reporting requirements, all activities and exercises of the 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 experts. In order to inform the public about activities proposed within the NWHI, permit applications are posted on the Monument website (http://www.papahanaumokuakea.gov/) for public review and notification. In addition to agency review, all permit applications must meet applicable Findings (aka 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.

In order for any project to be permitted, it must meet both federal National Environmental Policy Act (NEPA) and State of Hawai'i Environmental Policy Act (HEPA) requirements. In addition to the permit requirements of the Monument, several other federal and state permits and/or consultations are required for much of the work conducted in the NWHI. For example, all personnel working with threatened or endangered species must have an endangered species permit. Anyone proposing to handle bird species

must obtain one or more permits from the USFWS Division of Migratory Bird Management. Scientists working with marine mammals must obtain one or more permits from the NOAA NMFS Office of Protected Resources. Proposed activities with the potential to effect potential or known historical or cultural sites require a concurrence of no adverse effect from the State of Hawai'i Historic Preservation Division and consultations with OHA as well as other interested Native Hawaiian individuals and organizations, pursuant to the National Historic Preservation Act (NHPA). Consultations may also be necessary under the U.S. Endangered Species Act (ESA), Environmental Protection Agency (EPA) regulations, or the Essential Fish Habitat provision of the Magnuson-Stevens Fishery Conservation and Management Act.

Following the Monument review process, 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 and Monument regulations, and that comply with MMB agency mandates and policies. All 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.

Presidential Proclamation 8031

PERMITTING CRITERIA

Findings of Presidential Proclamation 8031 that must be met before a permit is granted:

- 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.

Types of Permits Issued

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 activities 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 terrestrial and marine archaeological research.

Dr. Randy Kosaki investigates a deep ledge at Pearl and Hermes Atoll. Photo by: Greg McFall

Conservation and Management

Conservation and management permits are for activities that make up the general management of PMNM. This may include activities such as 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 enabling 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 detections.

USFWS Biological Technician Greg Schubert guides Native Hawaiian Plan focus-group participants through Hale O Lā'au Kama'āina, Midway Atoll National Wildlife Refuge's native plant nursery. Photo by: Pua Kamaka/NOAA

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 education with schools and community groups. Permits are considered for activities that have clear educational or public outreach benefits and that promote "bringing 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.

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 the entry of vessels for the purpose of applying and transferring knowledge of traditional navigation techniques 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.

A kūpe'e adornment is weaved at Midway House during the Native Hawaiian Plan: Midway Meeting. Photo by: Blane Benevedes/NOAA

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 Midway Atoll National Wildlife Refuge Visitors Services Plan.

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.

Google Streetview Mapping Team in action on Midway using the Google Trike. The crew captured nearly a terabyte of data spanning 52 miles of road and paths over four days. Photo by: Richard H. Batcheldor, Jr./NWReflections

Two protected species, masked boobies and green sea turtles share a space on the beach. Photo by: Mark Sullivan/NOAA

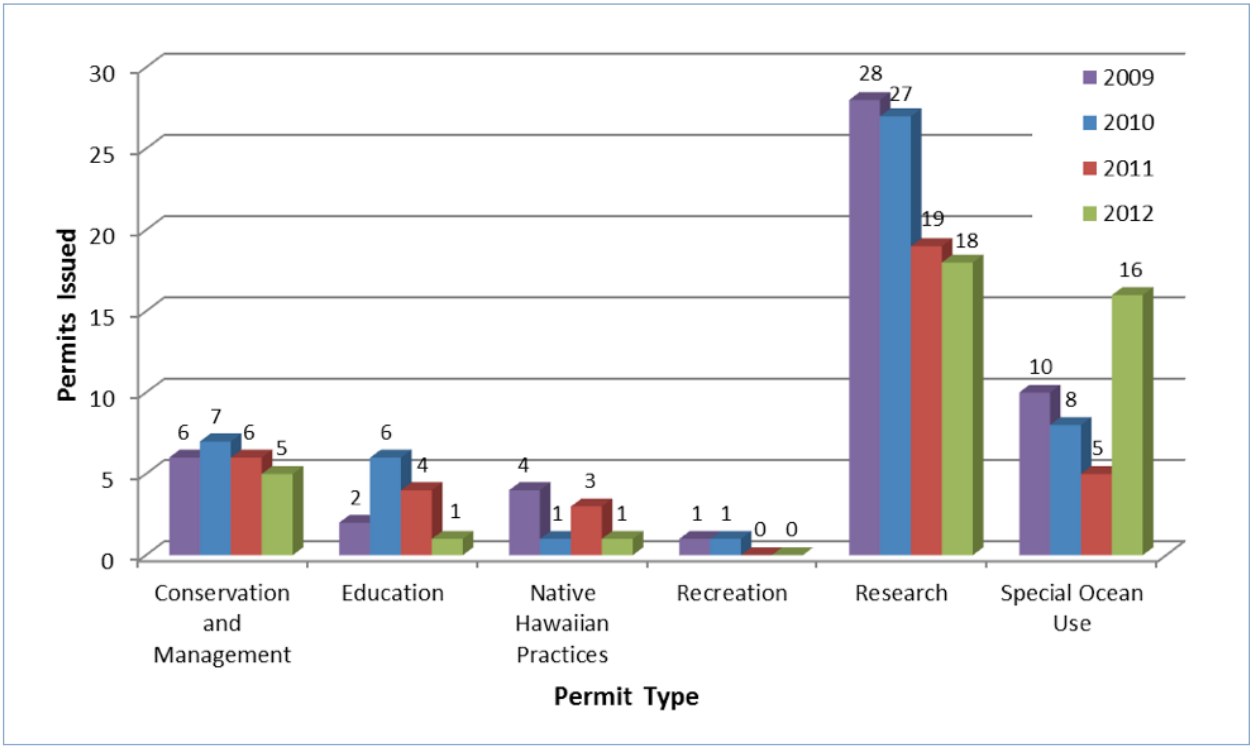
2012 PERMITTED ACIVITIES

CONDUCTED WITHIN THE MONUMENT

Permits Issued in 2012

In 2012, 57 permit applications were received. Of these applications, 41 met the permitting criteria, successfully completed the environmental review process, and were issued. At different stages of the permitting process, 11 applications were withdrawn by the respective applicant. One application was denied.[1] The remaining four applications were significantly early in submission, and were evaluated during the 2013 review calendar year. Figure 1 displays a comparison of the number of permits by type, issued from 2010-2012.

Figure 1. Number of Monument permits issued from 2009-2012 by permit type.

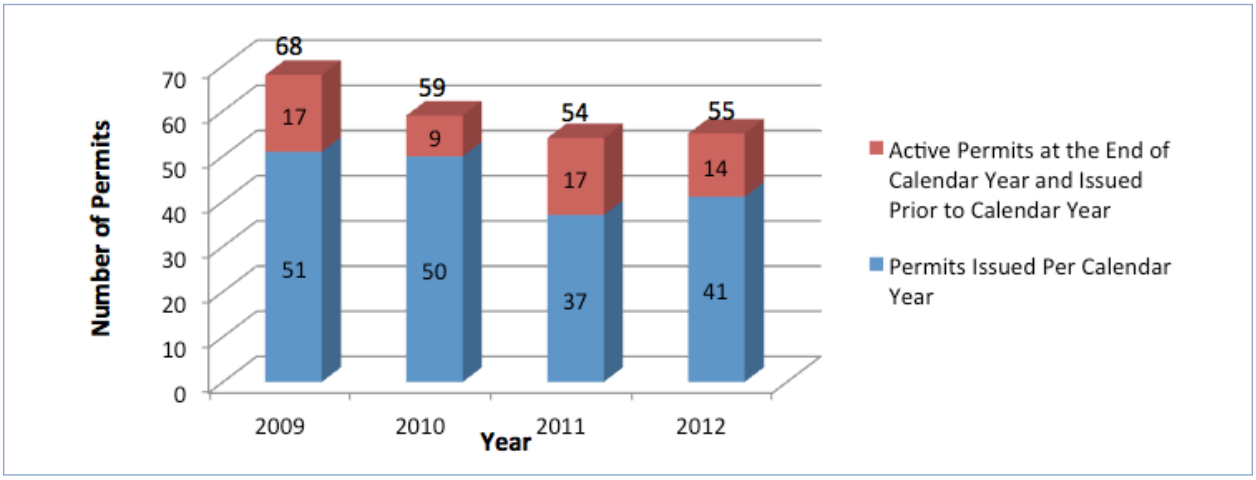


Hawaiian monk seal and Hawaiian green sea turtle at French Frigate Shoals. ESA permit #10137-7. Photo by: Mark Sullivan/NOAA

It is important to keep in mind that the Monument Co-Trustees grant both single and multi-year permits. In calendar year 2012 the Monument permitting system tracked 55 permits; 14 of which were issued and active prior to 2012, and 41 that were issued in 2012 (Figure 2). All active permits, regardless of year issued, were monitored for permitting and reporting requirements in 2012. Multi-year permits are specifically for projects that must span two or more calendar years to complete the project objective and that occur outside State of Hawai'i waters (defined as 0-3 nautical miles from emergent land, excluding Midway Atoll). 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)).

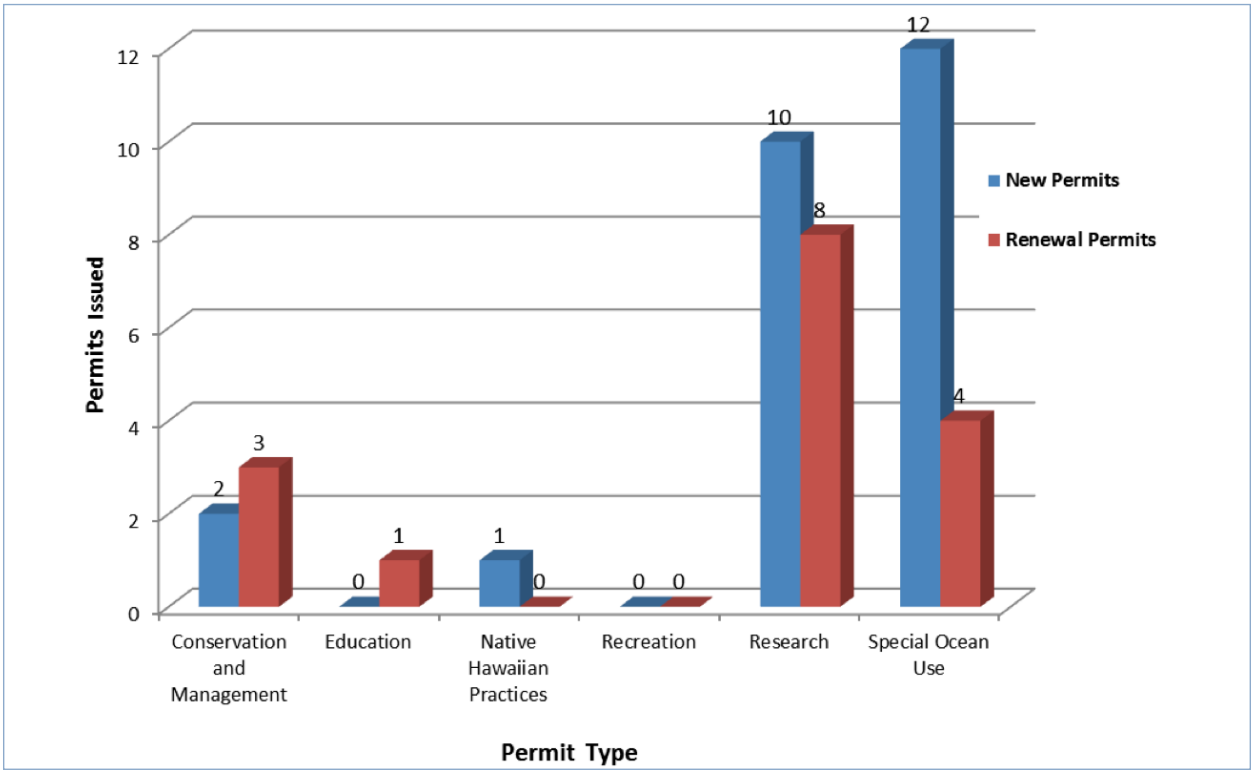
[1] Due to a significant reduction in operational funding for Midway Atoll, the USFWS was forced to reduce its staff at Midway Atoll National Wildlife Refuge which resulted in USFWS being unable to support the proposed activity. Therefore the proposed activity was denied as it could not meet the following permit criteria: "The activity can be conducted with adequate safeguards for the resources and ecological integrity of the Monument"

Figure 2. Number of Monument permitted activities per calendar year 2009-2012.



Since 2010, the number of new and renewal permits issued has been reported and tracked by the MMB. 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). Figure 3 shows the number of new versus renewal Monument permits issued in 2012. In order for a permit application to be considered a renewal, it must have been a previously permitted project activity. Both new and renewal applications undergo the same rigorous joint-permitting review process. Single-year, multi-year, new and renewal permit metrics are used to summarize and track Monument permits.

Figure 3. New and renewal permits in 2012 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. Midway Atoll operates a small functioning airport. Funding constraints and other infrastructure limitations within USFWS closed the airstrip at Tern Island within French Frigate Shoals in 2011. Thus the only location equipped to accept aircrafts within the Monument is Midway Atoll. Table 1 indicates the number of permitted flights that occurred to and from the Monument in 2009-2012. There was a 14% decrease in the total number of flights in the Monument within the past two years (2011-2012), a 38% decrease in the total number of flights in the last three years (2010-2012) and a 66% decrease in the total number of flights in the last four years (2009-2012).

Table 1. The number of permitted flights to and from the Monument, in 2009 through 2012.

Airport/Airstrip Location	2009	2010	2011	2012
French Frigate Shoals	13	11	0	0
Midway Atoll	87	61	51	55

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. Any further authorized entry of the vessel is counted as a second vessel entry, for the purposes of reporting. Table 2 provides the number of vessel entries and exits, as well as the number of individual vessels used during the years 2009-2012. The majority of resource management actions and research are supported by several well-equipped NOAA ships that are utilized by more than one project activity and enter the Monument on more than one occasion during the year. The limited amount of marine vessels utilized ensures that all commanding officers/captains and crew are well versed with all Monument vessel compliance measures and rules to protect Monument resources.

Table 2. The number of permitted vessel entries into the Monument, from 2009 through 2012.

	2009	2010	2011	2012
Vessel Entries and Exits	19	19	22	12
Individual Vessels Used	8	6	8	5

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 locations authorized 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 in 2010, 2011 and 2012. 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 77 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 2010-2012.

	2010			2011			2012		
Island / Atoll	**Min**	**Max**	**Average**	**Min**	**Max**	**Average**	**Min**	**Max**	**Average**
Nihoa	0	6	<1	0	11	<1	0	12	<1
Mokumanamana	0	10	1	0	12	<1	0	3	<1
French Frigate Shoals	1	16	7	0	11	3	3	23	7
Laysan Island	6	18	8	6	11	3	7	27	8
Lisianski Island	0	2	<1	0	8	<1	0	20	<1
Pearl and Hermes Atoll	0	4	1	0	7	2	0	20	1
Midway Atoll	69	88	80	59	77	69	66	97	77
Kure Atoll	0	13	3	0	13	5	6	28	7
TOTAL			**100**			**83**			**100**

Table 3.2 Total amount of person-use days for each island and atoll in 2010-2012.

Island / Atoll	2010	2011	2012
Nihoa Island	79	99	100
Mokumanamana	26	53	8
French Frigate Shoals	2,669	2,911	2,459
Laysan Island	3,114	2,622	2,942
Lisianski Island	160	269	141
Pearl and Hermes Atoll	242	659	271
Midway Atoll	29,133	25,066	28,119
Kure Atoll	1,225	2,121	2,446
TOTAL	**36,648**	**33,800**	**36,486**

Permitted Versus Actual Visitation Records

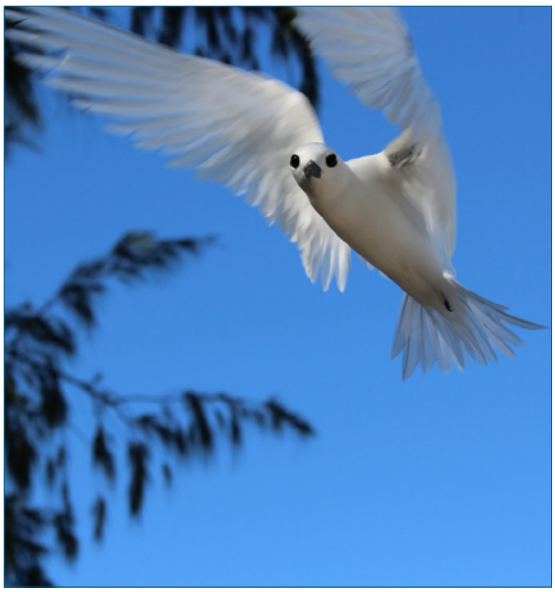
Often, the number of individuals permitted to access the Monument and conduct activities is not reflective of the actual number of people who conducted work in the Monument. For example, conservation and management permits authorize personnel with qualifications necessary to conduct activities; however the actual number of individuals who worked in the Monument to complete the conservation and management activity are often less than the amount permitted. In other instances, special ocean use permittees may have visitor cancellations, 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 2012, 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
Conservation & Management	394	210
Education	56	17
Native Hawaiian Practices	15	10
Research	221	59
Recreation*	-	-
Special Ocean Use	654	166
TOTAL	**1,340**	**462**

* 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.).

Giant trevally at Lisianski. Photo by: Greg McFall/NOAA

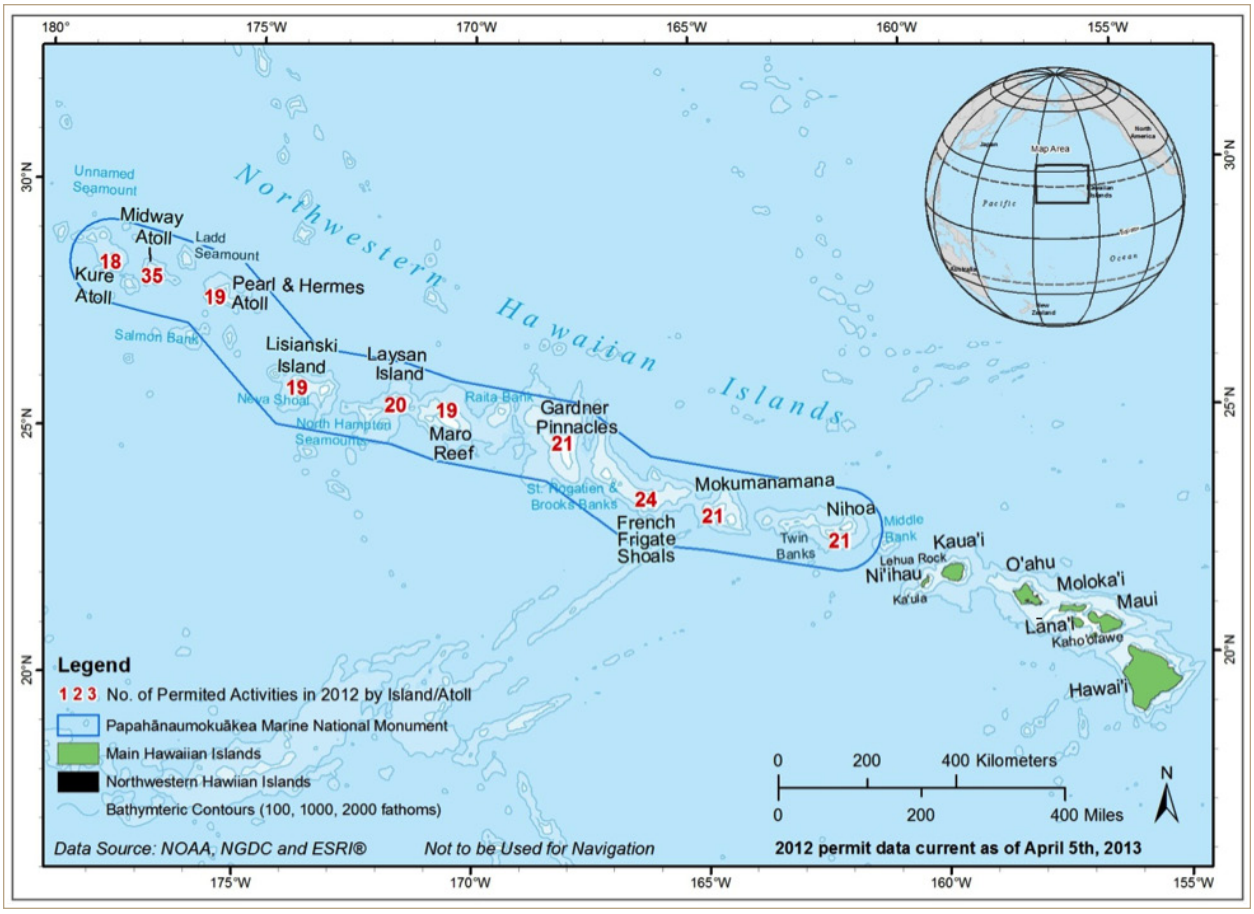


White tern in flight. Photo by: Blane Benevedes/NOAA

Locations of Permitted Activities

The map in Figure 4 indicates locations at which permitted activities occurred in 2012. Of the 41 permits issued, many allowed for work to be conducted at multiple locations. Thus, for example, a single permit may have included work only at French Frigate Shoals, or it may have allowed for visits to all islands and atolls.

Figure 4. Locations of 2012 permitted activities. The number of permitted projects at each island or atoll is indicated in red.



Conservation and Management

Summary

Five conservation and management permits were issued in 2012 (Table 5). Two permits were issued for the operation of research vessels in support of separately permitted activities: One to conduct maritime heritage conservation and management activities and another for Hawaiian monk seal (ʻĪlioholoikauaua) conservation. One conservation and management permit is issued annually, pending a stringent review process, to the Monument Co-Trustee agencies for conservation and management activities conducted within the Monument (including, for example, the operation and maintenance of field stations and camps at French Frigate Shoals, Laysan Island and Midway Atoll; marine debris removal activities; and invasive and endangered species monitoring). A conservation and management permit of this nature is necessary for coordinated management of Monument resources.

Table 5. Affiliations of conservation and management permittees and permitted projects in 2012.

Conservation and Management Permittee Affiliation	Number of Permits Issued	Permitted Conservation and Management Projects
Monument Co-Trustees	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 *Hiʻialakai*
NOAA National Ocean Service Office of National Marine Sanctuaries	1	• Maritime Heritage Conservation and Management Activities
NOAA National Marine Fisheries Service Office of Protected Resources	1	• Removal of Predatory Sharks from French Frigate Shoals

Table 6 below outlines the 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.

Reports of management activities can be found online at http://papahanaumokuakea.gov/management/managers_reports.html.

Table 6. Activities conducted under the conservation and management Monument Co-Trustee permit in 2012, for the Department of Commerce, National Oceanic and Atmospheric Administration, the Department of the Interior, U.S. Fish and Wildlife Service, and the State of Hawai'i, Department of Land and Natural Resources.

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 • Battle of Midway Commemoration Activities • Seabird Tissue Archival and Monitoring Project (STAMP) • Vessel Support for Conservation and Management Activities Aboard M/V *Searcher* • Vessel Support for Conservation and Management Activities Aboard M/V *Kahana* • Monitoring French Frigate Shoals Green Turtle Populations
USFWS, Pacific Islands Fish and Wildlife Office	• Nihoa Millerbird Translocation Project
NOAA, National Marine Fisheries Service Office of Protected Resources	• Removal of Aggressive Monk Seal from Midway Atoll (Translocated to the University of California, Santa Cruz) • Marine Debris Cleanup and Recovery Project • Operation of Hawaiian Monk Seal Field Stations and Hawaiian Monk Seal Monitoring Activities • Repatriation of Cremated Juvenile Monk Seal Remains
NOAA, Office of National Marine Sanctuaries	• Midway Tide Gauge Station Operation and Maintenance • Monument Management Plan Meeting at Midway Atoll for Native Hawaiian Plan • Vessel Support for Conservation and Management Activities Aboard M/V *Searcher* • Vessel Support for Conservation and Management Activities Aboard M/V *Kahana*
State of Hawai'i Department of Land and Natural Resources, Division of Forestry and Wildlife	• Management, Operation, and Maintenance of Kure Atoll Field Station • Installation of water catchment system at Kure Atoll Field Station

Sea Turtle Research and Monitoring in the Northwestern Hawaiian Islands

Sea turtles basking on the beach at East Island, French Frigate Shoals. ESA permit #15685. Photo by: NOAA/NMFS Marine Turtle Research Program

This year marked the 40th consecutive field season for research of the threatened Hawaiian green turtles at East Island, French Frigate Shoals. Although five species of sea turtle occur in the NWHI, the Hawaiian green sea turtle is the most prevalent. More than 90% of the Hawaiian green sea turtle population nests at French Frigate Shoals. This population has been extensively studied, beginning in 1973 when Dr. Balazs initiated annual nesting surveys. Now monitoring is a collaborative effort between the Marine Turtle Research Program at NOAA Fisheries Pacific Islands Fisheries Science Center (PIFSC) and the USFWS.

Hawaiian green turtle monitoring is a key activity under the Monument Management Plan. The annual census of nesting females is essential to gather data on population nesting trends. Individual Hawaiian green sea turtles are tagged and measured, or if the turtle was previously tagged, the tag information is recorded. In 2012, the Marine Turtle Research Program conducted activities, over the course of 28 days, in order to count, tag, identify, measure and assess the overall health of over 400 nesting sea turtles. Tag and recapture data helps scientists answer questions regarding the species' life history (such as growth rates and nesting frequency) and distribution throughout the Hawaiian Archipelago. Researchers also collect data on Hawaiian green sea turtle health, including recording evidence of fibropapillomatosis, a debilitating disease that causes tumors that can affect swimming, vision, feeding and potentially cause death.

Also in 2012, Dr. Kyle Van Houtan from PIFSC published a paper highlighting evidence that endangered hawksbill turtles (ʻea) do in fact occur in the NWHI in effect tripling the distribution and habitat range of hawksbill turtles in Hawaiʻi.[2] Because the nesting season for hawksbill turtles (is later than that of Hawaiian green sea turtles), with peak activity from August – October, separate or innovative monitoring efforts are needed.

Biological field technician Irene Nurzia Humburg making observations of sea turtles near the East Island field camp, French Frigate Shoals. ESA permit #15685. Photo by: NOAA/ NMFS Marine Turtle Research Program

[2] Van Houtan, K.S., Kittinger, J.N., Lawrence, A.L., Yoshinaga, C., Born, V.R., and A. Fox. 2012. Hawksbill sea turtles in the NWHI. Chelonian Conservation and Biology 11:117-121.

A Warbird Lost and Found in Papahānaumokuākea

In June of 2012, a team of NOAA divers from the Pacific Islands Fisheries Science Center Coral Reef Ecosystem Division were conducting marine debris surveys in PMNM and came across an exciting discovery – a sunken aircraft site in the Midway Atoll lagoon. This find is the third aircraft documented to date in PMNM and the second at Midway Atoll.

While archival records describe more than 70 potential aircraft losses within the Monument, this is the first aircraft discovered that was stationed at Midway Atoll to defend against the Japanese attack in 1942. Keo Lopes, part of that NOAA marine debris team, discovered and reported the site.

“It just so happens that [the discovery] coincided with the 70th anniversary of the Battle of Midway, so it was kind of a somber feeling…knowing that a lot of lives were lost in the battle,” said Lopes. Delving into archival research, the team, led by PMNM maritime archaeologist Dr. Kelly Gleason, determined that the plane was one that crashed into the lagoon at Midway Atoll during a squall in February of 1942. The pilot of the plane, Lt. Charles W. Somers, Jr., survived and went on to have a distinguished career as an aviator in the United States Marine Corps.

Of the 19 Brewsters that took off from Eastern Island during the Battle of Midway, only four returned and of those, only two were operable. Far less maneuverable than the Japanese Zero fighter planes, the Brewster Buffalo was commonly referred to as a "flying coffin." The sunken aircraft at Midway provides a glimpse into a fascinating era of aviation history, and serves as a reminder of the sacrifice of World War II aviators like Colonel Charles W. Somers, Jr., who fought for our freedom against great odds during the Battle of Midway. These men bravely entered into combat despite knowing that they were heavily outmatched against the Japanese.

The team involved in the July 2012 expedition that documented the site included PMNM Maritime Heritage Coordinator Kelly Gleason, Cathy Green (both with NOAA's Office of National Marine Sanctuaries), Bert Ho (National Park Service Submerged Resources Center) and Jason Raupp (Flinders University). Filmmaker Stephani Gordon (Open Boat Films) and biologist Susie Holst (NOAA Coral Reef Conservation Program) rounded out the multidisciplinary efforts. Work to interpret this site and its role in the broader heritage of the Pacific is ongoing and research continues to provide more information about this aircraft and the compelling story of its pilot, Col. Charles W. Somers, Jr. Monument researchers hope to conduct more fieldwork at the site in the summer of 2014.

Brewster F2A-3 Buffalo. Photo by: U.S. Naval History and Heritage Command


Maritime archaeologists Kelly Gleason and Bert Ho examine the propeller blades at the sunken aircraft site. Photo by: Stephani Gordon/Open Boat Films

USFWS Laysan Camp Evacuated

On November 3, 2012 the USFWS Laysan Island camp was evacuated, resulting in a camp closure lasting more than three weeks for the first time in 16 years. The decision to evacuate all personnel on island was due to a medical emergency involving the lead USFWS field supervisor on-island, therefore it was deemed unsafe for the volunteers and Nihoa Millerbird technicians to continue without direct field oversight. Preparations to close down camp included properly shutting down critical systems and securing structures and camp supplies to prevent wildlife entrapment hazards. The camp closure process was strategically implemented to allow for a quick start-up upon plans for USFWS staff to return in March 2013. The absence of USFWS personnel resulted in lost data for all biological monitoring, set-backs in the invasive plant removal program, and damage to camp infrastructure.

Native plants and wildlife dominate a recovered landscape on Laysan Island within Hawaiian Islands National Wildlife Refuge. Photo by: James Watt

The Native Hawaiian Plan: Midway Meeting

The Native Hawaiian Plan: Midway Meeting was conducted from November 6-12, 2012, and brought together Native Hawaiian cultural practitioners and co-managing agency personnel to further develop the Native Hawaiian Plan while experiencing the cultural and natural resources of Midway Atoll from cultural perspectives. It was accomplished through a place-based, experiential meeting with cultural researchers that utilized site visits (mākaʻikaʻi), work projects (hana), prayer (pule), and discussion (kūkākūkā) on Midway Atoll. Participants represented all inhabited islands of Hawaiʻi except Niʻihau and Lānaʻi and a range of traditional disciplines and professional backgrounds.

The first three days were spent on trips (huakaʻi) throughout the islands—Sand Island and Eastern Island—shorelines, lagoon, and reefs of Midway. Activities provided participants with an opportunity to explore land and seascapes (ʻāina[3]) that they had never seen before, to find similarities and differences

Participants planting native plants to improve native seabird habitats at Midway Atoll. Photo by: ʻAulani Wilhelm/NOAA

Cultural researchers at Eastern Island, Midway Atoll during site visit. Photo by: Blane Benevedes/NOAA

Mōlī, the traditional Hawaiian tattoo implement. The needle of this mōlī was crafted by practitioner Kalehua Krug out of the humeral bone of the Laysan albatross, which is also known as mōlī, on Midway Atoll during the Native Hawaiian Plan: Midway Meeting. Photo by: Blane Benevedes/NOAA

[3] Defined in the *Hawaiian Dictionary* as "Land, earth. Cf. *ʻai, to eat*…" (Pukui & Ebert, 1986), ʻāina has broader connotations that are not limited to "land," per se, but is indicative of the function of place to people.

between Midway and their respective lands and seascapes at home, and to relate to the place through the lens of their individual background and experiences. The participants also took part in a series of natural resource management (mālama ʻāina)[4] activities, including planting variable lovegrass or bunch grass (kāwelu) to improve native seabird habitats, and removing invasive golden crownbeard. The group even pulled up from the shoreline and identified a Japanese fishing vessel, abandoned or lost as a result of the 2011 Japan tsunami.

Native Hawaiian Plan meeting participants welcome the first rays of the rising sun with E Ala E. Photo by: Kealakai Kanakaole

They were also given ample time to explore Midway and to pursue their interests on-island. For example, ʻUmi Kai, a master craftsman and cultural practitioner, found a swordfish bill (nuku aʻu) at the Midway Atoll National Wildlife Refuge Visitor Center and crafted it into a traditional Hawaiian dagger (pāhoa). He then presented it to the Visitor's Center, where it has since been incorporated into the cultural interpretation of the atoll.

Aside from their cultural assessment and spiritual connections and experiences, the participants met to discuss the Native Hawaiian Plan at Midway House, where they went into detail on a lot of the topics covered in community focus-group meetings. Comments provided by the Midway Meeting focus-group are being incorporated in the Native Hawaiian Plan, along with other focus-group participant feedback.

Tern Island Storm Damage: December 9, 2012

During the early morning hours on December 9, 2012 a USFWS employee and volunteers stationed at the Tern Island station within Hawaiian Islands National Wildlife Refuge experienced a major storm event producing tornado-like winds. Volunteer Mike Johns was out early that morning and recalls the signs of the storm with a rapid temperature drop and shift in wind direction. "I began to worry that something was off. Then the sky just opened up and dumped the heaviest rain I've ever heard, as if the building was sitting beneath a massive waterfall," recounted Johns. After the worst of the storm passed, staff members assessed the damage. The walls in the common room and four bedrooms, including Johns' room, were completely blown out. The boathouse was leveled. The tractor shed had gaping holes in its concrete walls and solar panels were torn from the braces on the roof. Thankfully everyone escaped serious physical injury. With the exception of one building and some water tanks, the entire field station (barracks, boathouse and storage sheds) were damaged beyond repair.

The boathouse which stored boats and equipment was severely damaged. Photo by: Abram Fleishman/USFWS

Although they had been through a traumatic event, the USFWS staff remained on island for 10 additional days to search for and assist wildlife, secure storm debris and fortify structures as much

[4] Meaning to care (mālama) for the land (ʻāina), mālama ʻāina describes the reciprocal relationship that Native Hawaiians have with ʻāina, which they culturally view as ancestors that feed and care for them.

as possible to prevent further harm to wildlife. They also repaired communication systems and salvaged critical data including biological reports from computers and hard files. Unfortunately, hundreds of dead or dying birds were all around the island, many were humanely euthanized by staff a staff member. Most of the injury to wildlife was due to flying debris.

The cost to replace these critical components to Tern Island totals more than $5.8 million. One challenge is that this monetary figure could grow depending on the amount of time the island is unoccupied this winter season allowing infrastructure to go unmaintained and possibly creating further damage.

The communal living area of the barracks on Tern Island within Hawaiian Islands National Wildlife Refuge was completely destroyed by tornado strength winds.
Photo by: Mike Johns/USFWS

Kure Atoll Bunkhouse Construction

The DLNR staff and volunteers engaged in conservation and management activities on Kure now have a new bunkhouse. Construction of the four bedroom bunkhouse started in the summer of 2012 and was completed later that year by DLNR staff, volunteers, and U.S. Coast Guard (USCG) members.

The bunkhouse consists of treated lumber, measures 16 feet by 32 feet, and in addition to the four bedrooms, includes a living area. It was built atop the existing USCG generator building foundation and is elevated to allow for storage and potential tsunami wash up. Additionally, it was built to withstand wind-loads of up to 75 mph. Other important features include solar panels for electricity and a 500-gallon water catchment system.

Kure Atoll, located approximately 1,000 miles past Kauai and Niʻihau, was returned to the State of Hawaiʻi in 1993 after serving as a USCG LORAN Station. Designated as a State Wildlife Sanctuary, the State of Hawaiʻi is responsible for the conservation and management of this atoll, which is home to 23 threatened and endangered species. Management efforts focus on seabird research and monitoring; habitat restoration, including an ambitious eradication project aimed at the removal of the invasive plant golden crownbeard Hawaiian monk seal monitoring and disentanglement (in conjunction with NOAA NMFS); spinner dolphin (naiʻa) studies; marine debris removal; education and outreach, (with the Kure Atoll Conservancy); and the building of place-based traditional ecological knowledge. The bunkhouse will continue to provide the critical infrastructure necessary to continue to effectively manage this remote atoll.

Completed Kure Bunkhouse. Photo by: Cynthia Vanderlip/DLNR DOFAW

EDUCATION

Summary

One education permit was issued in 2012 (Table 7). This permit was issued to develop multimedia resources needed for a proposed distance learning course offered to undergraduates at the University of Hawai‘i as well as a continuing education course at Windward Community College.

Table 7. Affiliations of education permittees and permitted projects in 2012.

Education Permittee Affiliation	Number of Permits Issued	Permitted Education Projects
University of Hawai‘i, Hawai‘i Institute of Marine Biology	1	• Development of Multimedia Resources for Distance Learning Courses and Marine Exchange Programs *

Education Highlights

Connecting Students with Science through Multiple Modes of Inquiry

Dr. Judy Lemus, a science education specialist at the Hawai‘i Institute of Marine Biology at the University of Hawai‘i, has taught science education and led outreach programs for over 20 years. Dr. Lemus combines science experience and knowledge with a deep respect for Native Hawaiian generational knowledge of the environment, to create holistic learning opportunities that integrate both Hawaiian and Western modes of inquiry into science instruction.

In August 2012, a pair of educators (Carlie Wiener and Megan Onuma) under the direction of Dr. Lemus, traveled to the Monument to gather (video recordings and photographs) needed for a proposed distance learning course offered to University of Hawai‘i undergraduates and a Windward Community College continuing education course. Photographs and video footage taken will also be used for three ocean science communication courses that will be taught through Hawai‘i Community College continuing

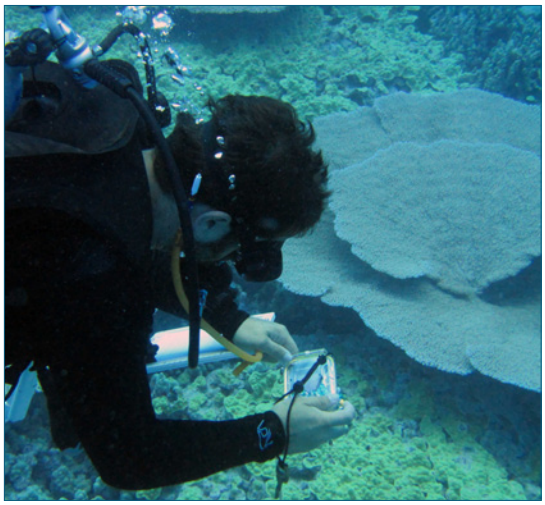
RAMP survey team on their first day of operations at French Frigate Shoals. Photo by: Megan Onuma

Ship crew and scientists lower the deep water EAR (ecological acoustic monitor) into the water. Photo by: Carlie Wiener

education, Kapiʻolani Community College, and UH Mānoa during the 2013-14 school year. Hundreds of photographs and hours of film were generated that will be used to support these courses as well as existing outreach and education programs. Updated photographs for important research reports and other related materials were also obtained. The various media collected was used to produce blogs, science outreach videos and other web presence materials.

While at the Monument, Dr. Lemus' team held several press releases and two live radio shows, sharing with the world information about research occurring on the Reef Assessment and Monitoring Program 2012 expedition. Dr. Lemus' team was also able to link to ten schools throughout the State of Hawaiʻi. This allowed students to have direct interactions with scientists live from the Monument. These students were given a rare look into the everyday lives of scientists and research at the Monument. The scientists answered many questions during these virtual in-person classroom visits - potentially inspiring the next generation of scientists to conduct research in the Monument.

Birds that spend most of their lives flying all over the Pacific Ocean come back to nest on Tern Island. Photo by: Carlie Wiener



Research diver surveying coral at PMNM. Photo by: Megan Onuma

Meg Duhr-Schultz, U.S Fish & Wildlife Service refuge manager for Tern Island bands a booby chick with volunteer. Photo by: Carlie Wiener

NATIVE HAWAIIAN PRACTICES

Summary

One Native Hawaiian practices permit was issued in 2012 (Table 8). This permit was for a renewal activity that involved assessing and examining near shore ecosystems of Papahānaumokuākea by using traditional ecological knowledge gathered from communities in the Main Hawaiian Islands.

Table 8. Affiliations of Native Hawaiian Practice permittees and permitted projects in 2012.

Native Hawaiian Practices Permittee Affiliation	Number of Permits Issued	Permitted Native Hawaiian Practices Projects
Na Maka o Papahānaumokuākea & Conservation International	1	Using Traditional Ecological Knowledge to Examine Nearshore Ecosystems

Native Hawaiian Practices Highlights

Integrating Native Hawaiian Culture and Western Scientific Research of Nearshore Ecosystems

In September 2012, Native Hawaiian practitioners and scientific researchers traveled together to the remote shorelines of French Frigate Shoals, Mokumanamana and Nihoa to monitor the rocky intertidal ecosystems of the lower three island/atoll areas of the NWHI. Traveling aboard the M/V *Searcher*, the one-of-a-kind interdisciplinary group conducted monitoring activities, collected scientific samples, recorded weather observations, conducted cultural protocol, and gathered algae (limu), limpets (‘opihi), and other intertidal species to taste. This effort began in 2009 and has proved a successful mechanism for cultural practitioners and western scientists to monitor, side by side, and observe change over time. Dr. Chris Bird of Texas A&M University-Corpus Christi’s Biology Department has noted such a change, observing that in 2011 “the high density of recruits that we saw in June 2010, didn’t all survive. Basically more ‘opihi settle on the shore than the habitat could sustain. In 2010 we saw lots of small one-month old ‘opihi (300 per m^2); this year [in 2011] there was less 1.5 year old ‘opihi (50 per m^2).”

‘Opihi line the rocky shorelines of Papahānaumokuākea. Photo by: Hoku Johnson/NOAA

From a Native Hawaiian cultural perspective, “honoring these places through mele (song) and oli (chant), and providing hoʻokupu (gifts) is important,” said Shauna Kehaunani Springer, the Principle Investigator for the Native Hawaiian Practices permit on the trip, “When you mālama the resources, the resources care for you.” The group also utilized all five senses when measuring ecosystem health through recording observations of the surrounding environment nightly, and tasting small quantities of the most abundant intertidal species including limu and ʻopihi, “You are forced to observe your environment while working in the wave-swept, often dangerous intertidal zone, so recording visual observations is a no-brainer,” said Hoku Johnson, NOAA ONMS’s coordinator of the expedition, “Additionally, through tasting the resource, one gains instant insight into the health of the ecosystem and the similarities and differences between the NWHI and their home community.” The group tasted limu at the three different island/atoll areas and collectively noted that the flavor of the limu collected was saltier than the same species in the Main Hawaiian Islands. “In old Hawaiʻi, daily observations, appropriate cultural protocol, and careful observation of the kapu system dictated where people gathered, what they ate, and how they lived,” said Springer, “It’s important to continue these practices in order to keep our natural resources sustainable and healthy for future generations.”

Team members count and measure ʻopihi, limu and other intertidal species. La Perouse Pinnacle, French Frigate Shoals. Photo by: Hoku Johnson/NOAA

Intertidal monitoring team members monitoring the rocky intertidal shoreline in between waves at Mokumanamana. Photo by: Dean Tokishi

The relationships established through these types of interdisciplinary partnerships and the perspectives gained are invaluable to both the individual participants and the communities they represent. This effort was summed up well by Ilysa Iglesisas, a researcher attending the 2011 expedition, who noted that “each participant brought their own unique background to Papahānaumokuākea, and perhaps the most important answers I got from this trip is the interconnectedness of subtidal marine systems with the intertidal zone and the connections each of us has to the ocean and to each other.”

RECREATION

Summary

Under Monument regulations (50 CFR Part 404), recreation activities are permitted in PMNM only within the Midway Atoll Special Management Area (MASMA). No recreation permits were issued in 2012. A single recreation permit (issued in 2010 to the USFWS) was active in 2012 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 separately permitted individuals the opportunity to discover, enjoy, appreciate, protect and honor the unique natural, cultural and historic resources of the Monument. This permit allowed visitors going to MASMA via aircraft under the direction of the VSP to conduct recreational activities. These activities include 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 2012, a total of 271[5] individuals visited Midway under the direction of the Midway Atoll VSP.

Volunteers plant native plants to create seabird habitat on Midway Atoll National Wildlife Refuge. Photo by: Kerry Glass/USFWS

Sooty terns. Photo by: Wayne Levin

Although there are some paved roads, transportation on Midway Atoll is primarily by foot or bicycle. Photo by: USFWS

[5] 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.).

Summary

A total of 18 research permits were issued. Table 9 lists research permits issued for each organization or institution, together with project titles. Research permits were issued to Co-Trustee agency personnel and university researchers to conduct work on seabirds, fish, corals, marine mammals and algae; as well as work for monitoring the Comprehensive Test Ban Treaty.

Table 9. Affiliations of Research permittees and permitted projects in 2012.

Research Permittee Affiliation	Number of Permits Issued	Permitted Research Project Titles
Hawai'i Institute of Marine Biology, University of Hawai'i at Mānoa	9	• Assessing Health and Community Structure of Corals on Shallow-water Reefs • Coral Disease Research on *Acropora cytherea* • Coral Reef Bioerosion Rates as Indicators of Community Response to Ocean Acidification • Establishing Baseline Physical Parameters at Select Reef Sites • Genetic Surveys to Address the Level of Isolation Between Shallow and Deep Reef Ecosystems • Marine Acoustic Surveys and Deployment of Ecological Acoustic Recorders (EARs) • Monitoring Incidence, Growth Rates, and Genetic Relatedness of Coral Diseases within Nearshore Reefs • Quantifying the Movements and Feeding Habits of Top Predators • Documenting the Biodiversity and Ecology of Nearshore Basaltic Reefs
NOAA National Ocean Service Office of National Marine Sanctuaries	4	• Documenting the Biodiversity of Deep Reefs and the Occurrence of Alien/ Invasive Species Using Conventional and Technical SCUBA Diving Technology • Marine Debris Study within Midway Atoll Special Management Area* • Pacific Reef Assessment and Monitoring Program

Research Permittee Affiliation	Number of Permits Issued	Permitted Research Project Titles
NOAA National Ocean Service Office of National Marine Sanctuaries, Papahānaumokuākea Marine National Monument	4	• Species Inventory Update and Determination of Abundance of Alien Marine Invertebrate Species Associated With Natural and Man Made Habitats Within the Monument
Sandia National Laboratories	2	• Comprehensive Test Ban Treaty, Infrasound Station Installation and Monitoring at Midway Atoll • Maintenance and Operation of a Radionuclide Aerosol Sampler/Analyzer (RASA) on Midway Atoll to Monitor the Comprehensive Test Ban Treaty
Hawai'i Pacific University, Oceanic Institute	1	• Analysis of Carbonate Chemical Make-up of Waters Surrounding Atoll Systems
Institute for Marine and Antarctic studies	1	• Seabird Plastic Ingestion Study on Midway Atoll
University of California, Santa Cruz and San Jose State University	1	• Foraging Ecology of 'iwa (Great Frigatebird)

* Research project was not conducted in 2012 as permittee was unable to access PMNM.

Research Activities by Location

Islands and atolls with the highest levels of permitted research activities in 2012 included Midway Atoll and French Frigate Shoals. Laysan Island, Lisianski Island, Pearl and Hermes Atoll, Kure Atoll, and Non-emergent banks and reefs, including Maro reef, saw the lowest levels of research activities.

Research Projects: Physical or Biological Collection Activities, Catch and Release Surveys, and Instrumentation Devices

The research projects permitted in 2012 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. Table 10 below lists all catch and release and observational research conducted, as well as all biological or physical samples collected in 2012. Of the 18 research permits issued, 17 of these involved either catch and release, observational or collection activities. Catch and release activities involved the use of satellite tagging devices attached to top predators found within the Monument. Observational activities entailed survey transects or cameras and are often the basis of much of the scientific work conducted in the Monument. Collection activities requiring the removal of specimens utilized the minimum sample size necessary to complete the project and satisfy statistical significance.

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 in effective resource management in the face of climate change and other global threats to Monument resources. One permitted project was for the monitoring and compliance of the Comprehensive Nuclear-Test Ban Treaty. Table 11 below lists temporary instruments installed in 2012 for specific permitted research projects.

Table 10. The observational, catch and release, and collection activities that occurred under research permits in 2012 as reported by the permitees.

Permitted Research Project	Catch and Release or Observational Research	Biological or Physical Samples Collected
Terrestrial Sampling of Endemic Hawaiian Moths in Papahānaumokuākea		• 2 caterpillars
Plastic Ingestion of Black-Footed Albatross and Laysan albatross		• 32 Laysan albatross boluses • 36 black-footed albatross boluses • 32 unidentified albatross boluses
Monitoring of Laysan and Black-footed Albatross from Midway Atoll, French Frigate Shoals and Laysan Island		• 110-220 mL Laysan albatross stomach oil • 110-220 mL black-footed albatross stomach oil • 64-102 Laysan albatross body contour feathers • 62-93 black-footed albatross body contour feathers • 21 mL Laysan albatross blood • 21 mL black-footed albatross blood
Monitoring of Red-footed, Brown, and Masked Boobies from Midway Atoll and French Frigate Shoals		• 20 masked booby diet samples • 15 red-footed booby diet samples • 38-57 masked booby body contour feathers • 28-42 red-footed booby body contour feathers • 14 mL masked booby blood • 8 mL red-footed booby blood
Quantifying the Movements and Feeding Habits of Top Predators	• 6 giant trevally tagged • 4 bluefin trevally tagged • 2 wavyback tuna tagged	• 1 alga tissue sample (500 g)
Foraging Ecology of Great Frigatebird		• 15 great frigatebird diet samples • 42 great frigatebird body contour feathers • 8 mL great frigatebird blood

Permitted Research Project	Catch and Release or Observational Research	Biological or Physical Samples Collected
Maintenance and Operation of a Radionuclide Aerosol Sampler/Analyzer (RASA) on Midway Atoll to Monitor the Comprehensive Nuclear-Test Ban Treaty		• 365 filter air samples (5 oz sample size)
Documenting the Biodiversity of Deep Reefs Using Conventional and Technical SCUBA Diving Technology	• 25, 25-meter transect surveys • 26 benthic video recordings	• 162 Algae • 16 Coral • 7 Cyanobacteria • 2 Hydroid • 4 Sponge
Marine Acoustic Surveys and Deployment of Ecological Acoustic Receivers (EARs)	• 9 ecological surveys • 9 passive acoustic surveys	
Coral Disease Research on *Acropora cytherea* and Genetic Surveys to Address the Level of Isolation Between Shallow and Deep Reef Ecosystems		• 182 table coral colony biopsies (3 cm sample size)
Coral Reef Bioerosion Rates as Indicators of Community Response to Ocean Acidification		• 105 rubble samples (125 cm^3)
Pacific Reef Assessment and Monitoring Program	• 3 photos of whole feather duster worm (new alien species record) • 59, 25 meter coral transect surveys • 94, 30 meter fish transect surveys	• 1 whole Bryozoan (New alien species record)
Analysis of Carbonate Chemical Make-up of Waters Surrounding Atoll Systems		• 33.02 g of seawater
Genetic Surveys to Address the Level of Isolation Between Shallow and Deep Reef Ecosystems		• 32 whole fish

Permitted Research Project	Catch and Release or Observational Research	Biological or Physical Samples Collected
Documenting the Biodiversity and Ecology of Nearshore Basaltic Reefs		• 415 black/yellow foot limpets • 76 marine snails • 30 rock boring urchins • 45 crabs • 700 algae • 100 false limpets
Quantifying the Movements and Feeding Habits of Top Predators	• 5 Galapagos sharks tagged • 7 giant trevally tagged	• 14 giant trevally muscle biopsies • 5 Galapagos muscle biopsies • 4 Millet seed butterflyfish • 3 three-spot chromis • 4 soldierfish • 2 Manybar goatfish

Table 11. The following table describes the remote monitoring instruments installed under research permits in 2012.

Permitted Research Project	Instruments Installed for Remote Monitoring
Quantify the Movements and Feeding Habits of Top Predators	• 3 acoustic receivers and moorings installed • 43 acoustic receivers maintained and repaired • 54 acoustic receivers removed
Co-Trustee Conservation and Management Activities in PMNM	• Replaced one water temperature sensor in the water level sensor well
Maintenance and Operation of a Radionuclide Aerosol Sampler/ Analyzer (RASA) on Midway Atoll to Monitor the Comprehensive Test Ban Treaty	• Installed the RASA system
Marine Acoustic Surveys and Deployment of Ecological Acoustic Recorders (EARs)	• Installed 4 deep EARs
Establishing Baseline Physical Parameters at Select Reef Sites	• Installed and removed 2 YSI multiparametric instruments during two separate cruises • Installed and removed 3 packages composed by standalone RBR environmental sensors during two separate cruises
Coral Reef Bioerosion Rates as Indicators of Community Response to Ocean Acidification	• Installed 25 bioerosion blocks • Removed 84 bioerosion blocks

Study Reveals Link Between Algae and Sharks on Healthy Coral Reefs

After analyzing nearly 600 samples of algae and fish from the NWHI, researchers were able to shine some light on the importance of benthic algae (algae attached to the seafloor) to food webs and fish populations in the NWHI. The study found that benthic algae represent nearly two-thirds of production in Monument marine ecosystems. “Benthic algae were found to support a majority of the fish production in this coral reef ecosystem,” said Anna Hilting, lead author and oceanographer with NOAA’s National Centers for Coastal Ocean Science (NCCOS). “Even some coastal tunas, such as the kawakawa, were partially dependent on primary productivity occurring on the reef bottom.” Bottom-dwelling algae make up the base of the food web. Herbivores such as spectacled parrotfish (uhu uliuli (supermale) or uhu ‘ahu‘ula (initial phase)) and convict tang (manini) graze on benthic algae. They are consumed by larger fish such as giant trevally (ulua) and are in turn eaten by larger predators like sharks (manō).

Collected species included bottom-dwelling algae, planktonic algae, herbivorous surgeonfishes, bottom-feeding predators such as goatfishes and wrasses, apex predators such as jacks and groupers and several types of sharks, including 14-foot long tiger shark. Large predators such as sharks and jacks were equipped with electronic tags and released unharmed after biopsy samples were collected. Tissue biopsies smaller than the size of pencil eraser were collected and analyzed for carbon and nitrogen stable isotope signatures. This then was used to determine food web structure and whether benthic algae, planktonic algae or both were supporting reef productivity.

Apex predators such as tiger sharks are at the top of the food web in Papahānaumokuākea. They are dependent on bottom-dwelling algae as the base of the food web.
Photo by: James Watt, left; Greg McFall/NOAA, right

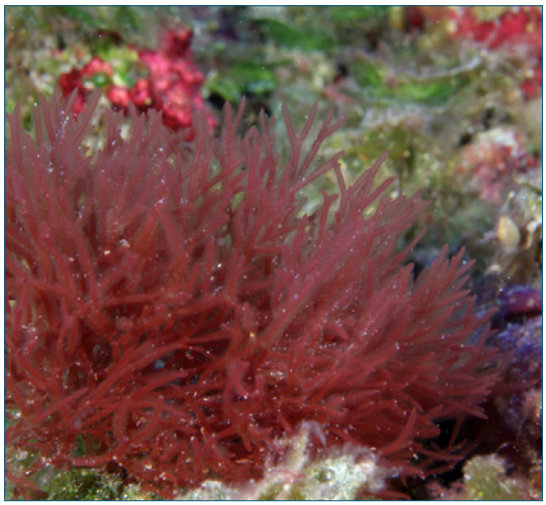
These findings have immediate implications for management of healthy coral reef resources and the restoration of unhealthy reefs. Since the NWHI ecosystems were found to be heavily dependent on benthic algae, any impacts to other such reefs and their algae – like damage from coral bleaching, pollution, bottom trawling or other human-induced threats – could trickle up the food web. NOAA-ONMS Deputy Superintendent of Papahānaumokuākea Dr. Randall Kosaki said the study demonstrates the importance of keeping reefs healthy. "Anything affecting native algal species, such as sedimentation, dredging or the spread of non-native invasive algae, will ultimately impact the abundance of commercially and ecologically important fishes, such as snappers or jacks," Kosaki said. "Taking care of the reef itself will help to ensure healthy fish populations."

Remote and healthy coral reefs like those in the NWHI are unique because they are dominated by high numbers of apex predators, the large carnivorous fishes such as sharks, jacks and snappers that feed on smaller fishes and invertebrates. Such reefs also have healthy populations of algae. Interestingly, a separate research expedition to PMNM last year brought back several new species of algae, highlighting that while algae are essential for NWHI ecosystems, there is still much to learn about them.

This study was a collaborative effort between NOAA's NCCOS and ONMS. The findings of scientists Anna Hilting, Carolyn Currin and Dr. Randall Kosaki were published in the scientific journal *Marine Biology*.[6]

Giant trevally like these photographed at Pearl and Hermes Atoll, eat smaller herbivores and are in turn eaten by larger predators like sharks. Photo by: Kyle Nakamoto/Hawaii Skin Diver

Researchers obtain a tissue sample from a tiger shark in Papahānaumokuākea Marine National Monument; the shark was released unharmed afterwards. Photo by: Robert Schwemmer/NOAA



Bottom-dwelling algae, like this new species of red alga are the base of the food web that supports top predators like tiger sharks. Photo by: Greg McFall/NOAA

[6] Hilting, A.K., Currin, C.A., and R.K. Kosaki. 2013. Evidence for benthic primary production support of an apex predator–dominated coral reef food web. Marine Biology 160:1681-1695.

Understanding the Foraging Ecology of Hawaiian Seabirds

Since 2002, Dr. Scott Shaffer and his team at the Institute of Marine Sciences at the University of California Santa Cruz, have been studying Laysan albatross (mōlī) and black-footed albatross (ka`upu) at Tern Island, French Frigate Shoals. Together they have tracked the behavior and distribution of more than 300 individuals of each species during the breeding and post-breeding periods. Over the years the technology to track the birds has changed with equipment now being smaller, lighter and more accurate devices that sample more frequently. This technology allows them to re-create a bird's path as it travels hundreds or even thousands of kilometers in a single trip that normally lasts 1-14 days. Each bird's distribution and foraging ecology is mapped using temporally matched satellite remote sensing data.

Black-footed albatross at Midway Atoll National Wildlife Refuge. Photo by: Scott Shaffer

Dr. Shaffer is now combining the strength of his team's at sea monitoring program with long-term demographic monitoring conducted by the Pacific Islands Climate Change Cooperative (PICCC). Together, they are trying to determine how albatross reproductive success (chicks fledged per eggs laid) and foraging behaviors will change in response to changing oceanic conditions and El Niño Southern Oscillation (ENSO) events. Preliminary results suggest that albatross are impacted more by ENSO events because they travel farther during the most time-constraining periods of breeding – when brooding small chicks.

Similar studies on albatross at Midway Atoll (since 2007) and Laysan Island (since 2011) focus on habitat partitioning between colonies and population demography. These studies provide information to resource managers on species specific albatross foraging range and overlaps with commercial fishing and possible takes as by-catch. This may reveal to resource managers which populations are capable of buffering the impacts of changing ocean conditions and influence management activities.

In addition to long-term studies on albatross, Dr. Shaffer examines habitat use of the Monument by sympatric species of red-footed and masked boobies. Both booby species breed at Tern Island (and elsewhere), but there are distinct differences between them. Masked boobies are larger, nest on the ground, and lay two eggs whereas red-footed boobies are smaller, nest in trees and lay a single egg. In 2009, they began tracking both species using GPS loggers and have found profound differences in habitat use of the Monument waters despite feeding on similar prey. Masked boobies forage almost exclusively within the Monument whereas more than 40% of red-footed booby foraging habitat lies outside of the Monument. Red-footed boobies conduct longer trips and travel further away from their nests compared to masked boobies. Both booby species should be considered sentinels of the health of the Monument because they are truly one guild of seabirds that rely heavily on the NWHI for nesting and feeding habitat.

Nesting masked booby. Photo by: Melinda Conners

Summary

Sixteen special ocean use permits were issued in 2012 (see Table 12 below). Eight permittees aimed to conduct filming activities for documentaries, television programs or briefing videos to further "bring the place to the people." One permittee sought to paint and draw sketches of various scenes and wildlife of PMNM. One permittee sought to raise funds through the sale of Monument items. Another permittee aimed to collect photographs of albatross for a book project. One permittee collected images to be featured on Google's Streetview program. The remaining four special ocean use projects all provided an opportunity for visitors to briefly experience the extent and beauty of the Monument, and give back to these resources by means of limited and supervised volunteer work on Midway Atoll.

Table 12. Affiliations of Special Ocean Use permittees and permitted projects in 2012.

Special Ocean Use Permittee Affiliation	Number of Permits Issued	Permitted Special Ocean Use Projects
British Broadcasting Corporation	1	• Filming for the British Broadcasting Corporation (BBC) "Survival" Wildlife Documentary
Freelance Photographer	1	• Literary Production on Midway Atoll's Albatross
Friends of Midway Atoll (FOMA)	1	• Sale of Monument Items
Future Planet Films Ltd.	1	• Filming of 'Plastic Oceans' Documentary on Midway Atoll
Galapagos Travel	1	• Galapagos Travel Natural History and Wildlife Tour to Midway Atoll
Glacialis Productions	1	• Filming Activities at Midway Atoll for "1000 Days for the Planet" Documentary
Individual Artist	1	• Creating Art Work to Promote the Native Hawaiian Cultural Significance of Papahānaumokuākea
NOAA-NOS/ONMS	1	• Google Earth Project at Midway Atoll National Wildlife Refuge
NWReflections, LLC	1	• Filming and Photography at Midway Atoll National Wildlife Refuge
Oahu Nature Tours	1	• O'ahu Nature Tours on Midway Atoll*
Pacific Rim Conservation and Pacific Seabird Group	1	• Pacific Seabird Group Visit to Midway Atoll
Palikū Documentary Films, DBA moe aku productions LLC	1	• High Definition Filming for a Cultural Briefing Video for Papahānaumokuākea Marine National Monument
Parthenon Entertainment Ltd.	1	• High Definition Filming for a Wildlife Television Documentary
Wildlife and Nature Travel	1	• Wildlife and Nature Travel Tour to Midway Atoll

Special Ocean Use Permittee Affiliation	Number of Permits Issued	Permitted Special Ocean Use Projects
Wyland Foundation	2	• Promoting Public Awareness of Papahānaumokuākea Marine National Monument

* Special Ocean Use project was not conducted in 2012.

Special Ocean Use Revenue Reported

Each permittee issued a special ocean use (SOU) permit is required to "submit an annual report not later than December 31 of each year which describes activities conducted under that permit and revenues derived from such activities during the year". (50 CFR 404.11.f (2006)). In 2012, there were 21 SOU permitted projects conducted within the Monument. Several of these SOU permits were issued prior to the start of calendar year 2012. Of these 21 SOU permits, four were issued to conduct ecotourism projects. In total, these four ecotourism companies reportedly generated gross revenue (before any costs or expenses were deducted) of $809,324 and net revenue of $71,081 in 2012. The remaining five SOU permitted projects in 2012 developed an outreach or educational product (e.g. film, photography and literary publications) and these reported a $0 revenue generation. Revenue presented here and gathered from permittee reports do not represent the dollar amount received by the Monument or individual agencies comprising the MMB.

Special Ocean Use Highlights

Wyland and Dr. Earle Find Hope and Wisdom in the Northwestern Hawaiian Islands

The renowned artist Wyland along with oceanographer and National Geographic explorer-in-residence Dr. Sylvia Earle travelled to Midway Atoll in January 2012. While there, Wyland and Dr. Earle immersed themselves in the beauty of Midway Atoll. They dove off the atoll's inner and outer reefs where they had the opportunity to photograph and take video footage of beautiful coral, schools of fish and top predators. "We had many incredible encounters with a wide variety of marine life," Wyland states. "Our first dive, we were greeted by great reef sharks, many schools of fish, and over 200 big-eyed jacks and trevally fish that were bigger than us. They swam like a tornado around us. Then a 17-foot giant manta ray swam straight towards us as I photographed it directly overhead. When we surfaced, we [Dr. Sylvie Earle] both looked at each other said, 'That was on my list of top 10 dives.' "

While there, Wyland covered the entry wall to Charlie Barracks on Midway Atoll with a mural and provided entertainment as residents watched the artist work throughout the day. The scene depicted features an endangered Hawaiian monk seal, a Hawaiian green sea turtle and a larger than life Laysan albatross mating pair in the middle of a dance ritual.

Living legends – oceanographer, explorer, and "hero for the planet" Dr. Sylvia Earle, and "Wisdom", the oldest known living Laysan albatross at least 60 years old share a moment together at Midway Atoll National Wildlife Refuge. Photo by: Susan Middleton

This expedition, called "Searching for Wisdom" promoted environmental education, raised awareness of critical issues and illuminated the success stories that have helped wildlife thrive in the ocean and island marine ecosystems of the NWHI. “We can’t go back to the way things were, but we can make things better than they are,” Earle said. Video technology and social media was utilized extensively during the trip to engage the next generation of natural resource stewards. Students from Jefferson Elementary School and Mililani High School were able to ask Dr. Earle, Wyland and USFWS staff questions and shared conservation ideas through two teleconferences. These same students helped Wyland paint two murals during the 2012 Hawaiian Conservation Conference.

Wyland paints a mural on Midway Atoll National Wildlife Refuge. Photo by: Susan Middleton

Dr. Sylvia Earle and Wyland bring to the table different talents and knowledge, one embedded in the sciences the other specialized in the arts. By blending their skills and wisdom they make a powerful dynamic duo to help bring awareness to the state of our oceans. They have already worked in tandem on numerous educational projects. Footage from their trip was included in Wyland’s documentary Blues Planet: Sounds that was showcased at the 2012 Hawai‘i International Film Festival. Speaking to natural resource management accomplishments and through the additional protection provided by PMNM, according to Dr. Earle, Midway Atoll National Wildlife Refuge should be a "model for the world."

Native Hawaiian Artist Honors Papahānaumokuākea Through Art

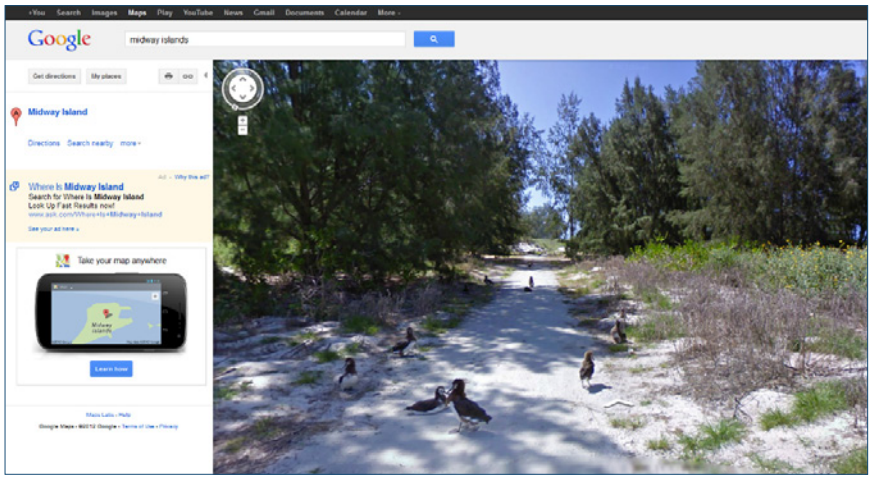
Solomon Enos is a Native Hawaiian artist born and raised on the West side of O‘ahu, in Makaha Valley. In September 2012, he traveled to the Monument to gain experiences to incorporate into a series of artworks and murals. While at the Monument, Enos worked to, “produce an authentic body of work that will honor the depth and breadth of Native Hawaiian culture and its expression in the NWHI for generations to come from a Native Hawaiian perspective.” While there, he was able to create 16-1x1 foot panels with acrylic paint onboard the NOAA ship Hi‘ialakai. They are a translation of Enos’ experiences at the Monument and his deepened understanding of how his ancestors viewed their place in the natural world. “Our ancestors knew that in order to take care of your family you’ve gotta take care of the environment. Healthy land is healthy people. Healthy ocean is healthy people. Those are the little gems of wisdom our kūpuna have to offer the global community.” These works are yet another way to fulfill the Monument’s mission to "bring the place to the people" as they were born (hānau) in the place of their inspiration and subject matter. Each piece created at the Monument contains a human form and speaks of our impact on the environment.

Selection of works from "The Realm of Pō: Paintings created on a journey to Papahānaumokuākea" by Native Hawaiian Artist Solomon RH Enos.

Bringing "The Place to the People" with Google Streetview

Internet users can now virtually stroll among the millions of seabirds and various historic sites on Midway Atoll using Google Streetview (www.google.com/maps). In a project spearheaded by ONMS, a team, consisting of Monument staff member, Kalewa Correa, and Google Streetview Asia/Pacific's Alex Starns and Evan Rappaport, spent two weeks on Midway Atoll in the summer of 2012, capturing more than 9,200 panoramic images of 60 different natural and historic sites along 21 miles of roads and paths on the island. The Monument teamed up with Internet-giant Google to use digital imagery and Web technology to bring PMNM to a broader audience in a way never done before, making good on our commitment to "bring the place to the people."

Midway Atoll boasts the largest nesting colonies of Laysan and black-footed albatrosses in the world, and supports the first successfully reintroduced population of endangered Laysan ducks - the most endangered waterfowl in the Northern Hemisphere. Midway's birds are heavily represented in each image and everywhere one turns on Streetview. In a world that is becoming ever more reliant on "virtual" experiences, Google Streetview of Midway Atoll brings users to the Monument while also spreading the word about how important it is to preserve it.



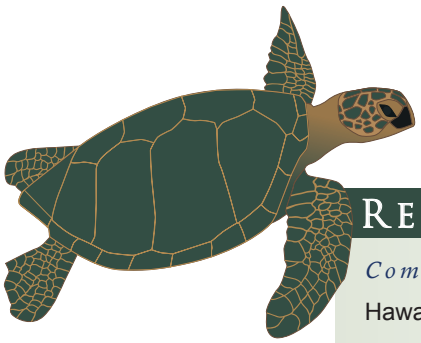
Screenshot of Midway Atoll on Google Streetview.
Photo by: Google Maps

Using the Google Trike, Kālewa Correa captured images across the island. Photo by: Richard H. Batcheldor, Jr./NWReflections

Google Streetview Mapping Team in action on Midway. Photo by: Virginia Branco/NOAA

Species Mentioned in the Permitted Activities

2012 Annual Report



Reptiles

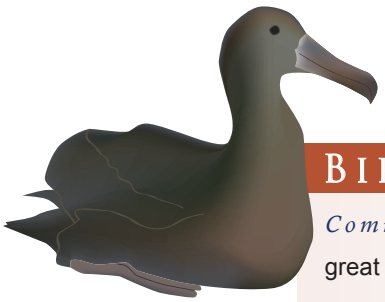
Common	*Hawaiian*	*Scientific*
Hawaiian green sea turtle	honu	*Chelonia mydas*
Hawksbill turtle	ʻea	*Eretmochelys imbricata*

Marine Mammals

Common	*Hawaiian*	*Scientific*
Hawaiian monk seal	ʻĪlioholoikauaua	*Monachus schauinslandi*
spinner dolphin	naiʻa	*Stenella longirostris*

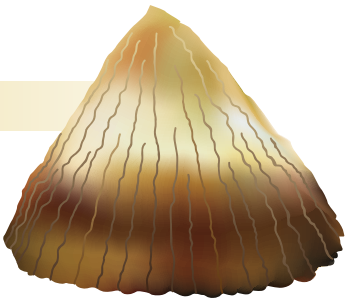
Fish

Common	*Hawaiian*	*Scientific*
shark	manō	*Carcharhinus galapagensis*
manta ray	hāhālua	*Manta birostris*
wrasse	hīnālea	*Labridae*
soldierfish	ʻūʻū	*Myripristis*
goatfish	kūmū, weke, moano, munu, and others	*Mullidae*
giant trevally	ulua aukea	*Carnax ignobilis*
wavyback tuna	kawakawa	*Euthynnus affinis*
bluefin trevally	ʻōmilu	*Caranx melampygus*
Millet seed butterflyfish	lauwiliwili	*Chaetodon miliaris*
spectacled parrotfish	uhu uliuli (supermale) uhu ʻahuʻula (initial phase)	*Chlorurus perspicillatus*
convict tang	manini	*Acanthurus triostegus*



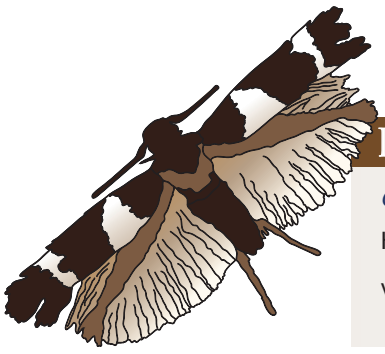
Birds

Common	Hawaiian	Scientific
great frigate bird	‘iwa	*Fregata minor palmerstoni*
black-footed albatross	ka‘upu	*Diomedia nigripes*
Laysan albatross	mōlī	*Diomedia immutabilis*
masked booby	‘ā	*Sula dactylatra personata*
red-footed booby	‘ā	*Sula sula rubripes*
brown booby	‘ā	*Sula leucogaster plotus*



Invertebrates

Common	Hawaiian	Scientific
limpet (black foot)	‘opihi makaiauli	*Cellana exarata*
limpet (yellow foot)	‘opihi ‘ālinalina	*Cellana sandwicensis*
false limpet	‘opihi ‘awa	*Siphonaria normalis*
rock boring urchin	‘ina	*Echinometra mathaei & E. oblonga*
feather duster worm	kio po‘apo‘ai	*Sabellastarte santijosephi*



Plants & Insects

Common	Hawaiian	Scientific
Hawaiian moth		*Hyposmocoma*
variable lovegrass	kāwelu	*Eragrostis variabilis*

Puka Mai ka Lā i Kumukahi

PUKA MAI KA LĀ I KUMUKAHI LĀ ʻEĀ
The sun bursts forth at Kumukahi

A WELO ANA I LEHUA LĀ ʻEĀ
And sets at Lehua

HE WAIALOHA KA MAKANI LĀ ʻEĀ
The wind is the Waialoha wind

ʻO HAWAIʻILOA KE ALAHULA LĀ ʻEĀ
Hawaiʻiloa is the frequented pathway

I HŌLANI KE KUʻINA, I HŌLANIKŪ
Joining at Hōlani, at Hōlanikū

Kumukahi is the easternmost point in the Hawaiian chain and Lehua is a small islet off the coast of Niʻihau. In many mele (chants), these points are used to encompass the expanse of the Hawaiian Islands. Waialoha is the name of one the winds of Nihoa, the Northwestern Hawaiian Island closest to Niʻihau, and is referenced as a welcoming, refreshing breeze on an island where such comforts are scarce. Hawaiʻiloa is the channel between Nihoa and Mokumanamana, the second of the Northwestern Hawaiian Islands. It represents the connection that our kūpuna (ancestors) once had to Papahānaumokuākea and the desire to reawaken those alahula (frequented pathways). In the moʻokūʻauhau that was preserved by Lahainaluna student, Kaiaikawaha, Hōlanikū (believed to be Kure Atoll) is the last of the islands and thus the chant ends at Hōlanikū.

Sunrise at La Perouse. Photo by: Dean Tokishi

In an effort to maintain the voice of the stories submitted by Papahānaumokuākea permittees, we have chosen to minimally edit those sections (starting on pp. 25).

Thanks to the following individuals who contributed to this year's Permitted Activities Report: Dr. Judy Lemus; Kehaunani Springer & Dr. Christopher Bird; Dr. Scott Shaffer; Dr. Sylvia Earle & Wyland; and Solomon Enos.