Papahānaumokuākea Research and Conservation Fund

2020 Program Report

Established by Congress in 2018, the Papahānaumokuākea Research and Conservation Fund (PRCF) is a partnership between NFWF and NOAA to support conservation of the Monument and to advance a vision of increased awareness of its value to the health of our global ocean and its interconnectedness, both culturally and biologically, to the main Hawaiian islands.

In 2021, Hawai'i and the nation commemorate the 15th anniversary of the Monument's designation and the 5th anniversary of its expansion. This report celebrates some of the projects and collaborations that are working to understand and preserve this special place held in the public trust.

Cover: Nihoa as seen from aboard the Polynesian voyaging canoe Hikianalia |Brad Ka'aleleo Wong, OHA

Investment priorities for PRCF were established by a multi-stakeholder advisory committee and funding is provided through the NOAA Office of National Marine Sanctuaries and a generous donation by Marc and Lynne Benioff.

This report celebrates the efforts and preliminary results of the work of over **50** researchers, students, technicians and educators supported by these grants to better our understanding of Papahānaumokuākea, protect its resources, and share it with the world.

Our Goals

Protect the Monument's Unique Habitats and Species from Human and Environmental Threats

Foster the Cultural Connection to the Monument and Enhance the Appreciation, Understanding and Stewardship of its Resources

Increase Capacity for Management in a Remote Setting through Innovation, Coordination and Direct Investment

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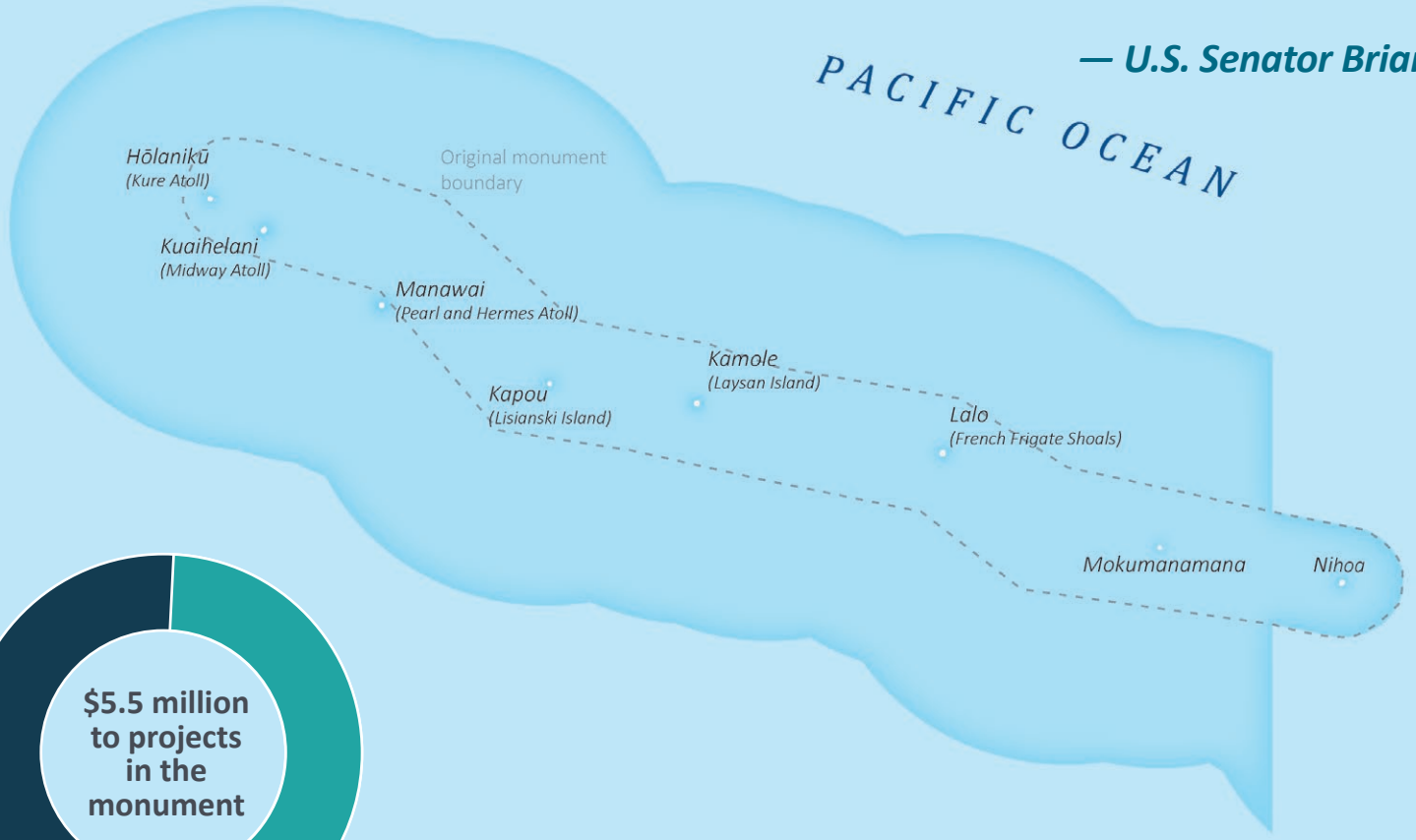
Left: Technicians work to remove derelict nets from reefs| PMDP
Right: Monk seals rest on the Monument's shorelines | NOAA

Investing in Management|2018-2020

Through this public-private partnership, the Papahānaumokuākea Research and Conservation Fund has leveraged more than $5.5 million for conservation in the Monument, advancing cost-effective and innovative adaptations for remote research and conservation solutions prioritized by managers and a Hawai'i-based Advisory Committee.

"The research and conservation fund has been key to providing us with the resources and management we need to protect and learn from Papahānaumokuākea. Together, the public and private sectors are helping us better understand and conserve the monument and our ecosystem."

— U.S. Senator Brian Schatz, Hawai'i



Measures of Impact|2018-2020

Papahānaumokuākea Research and Conservation Fund (PRCF) grantees are achieving remarkable outcomes to improve the natural habitats of the Monument and to build stronger awareness of its cultural importance. Noteworthy accomplishments included:

- PRCP grantees have conducted extensive research missions to the Monument that led to the discovery of **10 NEW SPECIES UNIQUE TO THESE ATOLLS**.

- PRCF grantees have cleared more than **300,000 POUNDS OF MARINE DEBRIS** littering more than 1,000 acres. These cleanup actions have also saved countless bird, fish and wildlife species such as the albatross, monk seal and sea turtle.

- PRCF grantees have **EDUCATED 100S OF KEIKI** throughout Hawai'i about the Monument by conducting outreach events in elementary, intermediate and high school campuses across the islands.

- **THOUSANDS OF VISITORS**, both in Hawai'i and across the nation, now can experience the wonders of the Monument through new exhibits at the Bishop Museum, Mokupāpapa Discovery Center, Waikīkī Aquarium, Aquarium of the Pacific, National Museum of the American Indian, and Hatfield Marine Science Center made possible with funding from the PRCF.

- Educational articles and videos about the Monument were **FEATURED IN 14 NATIONAL AND LOCAL PUBLICATIONS** including the Washington Post, 60 Minutes, Science, Voice of the Sea, Big Biology Podcast, Kilo i'a Magazine, STAR Advertiser, Hawai'i News Now, Ke Ola Magazine.

"We still have much to learn about this very special place, but our work to date has shown that conservation investments can generate immediate benefits even in these remote marine habitats."

— Jeff Trandahl, executive director and CEO of NFWF

Conserving Papahānaumokuākea

Many of the atolls throughout the monument that are critical to wildlife are comprised of sand collected on the highest peaks of undersea mountains. This makes them extremely susceptible to environmental stressors like sea level rise and severe weather events. The Monument offers a unique opportunity to study changes in the environment as human based threats are greatly reduced – beach erosion from storms or coral bleaching events in a warming ocean can be important “natural” recovery baselines for managers around the world.

PRCF projects are working to understand these impacts and give managers the information they need to conserve the wildlife and habitat of this extraordinary place.

Above: The maze at Pearl and Hermes Reef (Manawai) | PMDP
Right: Seawall Remnant at Tern Island (Lalo) | NOAA

PRCF Projects | What do you do when its GONE?

Losing Lalo habitats

Lalo (French Frigate Shoals), is a group of atolls, and one of the most important areas in the Monument for protected species. The coral reefs that surround the atolls provide the basis of a food web and protection for critical nesting and haul out beaches for sea birds, sea turtles, and monk seals.

Managers were concerned that recent large-scale bleaching events could impact corals and that rising sea levels was reducing available beach area. The first grant of the PRCF supported a multi-disciplinary effort to better understand how Lalo functions as a system and provide managers with the information needed to guide strategies to prepare and adapt to a changing climate.

Researchers from the University of Hawai‘i and Bishop Museum used core samples and measurements taken by drones of the Lalo atolls to understand the shape of the atolls through time and develop predictive models to understand future habitat loss.

The research team used deep water sensors on the reefs, predator studies, and 3D habitat mapping to understand connections between deep and shallow reef areas and how changes in one habitat might affect the other.

In 2018, as these research efforts were underway, Hurricane Walaka cut a path through the monument. The storm caused extensive damage to both shallow and deep-water coral reefs at Lalo and destroyed a primary monk seal and sea turtle beach.

Researchers quickly pivoted to mapping the destruction and analyzing historical data to understand the impacts. This unintended baseline has increased understanding of recovery in natural conditions and elevated the need for discussion about proactive management of Lalo.

In April of 2021, members of the Monument Management Board agreed to explore proactive management options at Lalo and prioritize recommendations for cooperative conservation of this important place.

Above: Aerial photo shows before and after Hurricane Walaka of East island | University of Hawai‘i

Right: Seabirds, sea turtles, monk seals and use these atolls to nest and rest, and nearby reefs to feed | NOAA

PRCF Projects | This stuff is EVERYWHERE

One of the most remote areas in the world is still vulnerable to human threats

Plastic trash and derelict fishing gear from throughout the Pacific is captured on the atolls that make up the Monument. Floating nets and plastic debris threaten both terrestrial and marine species through entanglement and ingestion.

The Papahānaumokuākea Marine Debris Project, with support from the PRCF, is collecting and removing debris to reduce threats and to better understand accumulation rates and impacts to wildlife and habitats. To date these efforts have already removed **over 300,000 pounds of marine debris** through shoreline clean ups and in-water net removal.

Still, this massive effort cannot keep pace with the estimated accumulations rates. PRCF is helping to bridge this gap by testing innovation across the project to increase efficiencies. Investments have piloted the use of drones in place of diver surveys to identify gear and prioritize areas for removal. New technologies for in-water marine debris removal and hauling mechanisms are being tested to move beyond the limits of traditional methods.

Innovations have extended to research efforts on marine debris using technology such as satellite tags on nets to track movement, as well as photomosaics to evaluate reef recovery from net damage over time. This information coupled with enhanced assessment of current debris and accumulation rates will help managers understand the true cost/benefit ratio of these efforts and plan the appropriate scale and frequency to minimize impact to habitats, fish, and wildlife from this chronic threat.

In the most recent effort of 2021, the project expanded beyond standard removal efforts to concentrate on hurricane debris at Lalo and make modifications to the existing sea wall. Having a trained team with the right tools, allowed management to reduce harm to nesting and resting animals that were becoming trapped behind an exposed sea wall as a result of eroding beaches.

Right: Debris on Lisianski island | PMDP
Above: “Manpower” to haul heavy nets | PMDP

Creating Cultural Connections

Increasing general knowledge and stewardship of the Papahānaumokuākea Marine National Monument and its cultural and ecological significance globally is a critical step in the management of the Monument. Education and awareness is a part of each of the projects under the PRCF, reaching schools, museums, social media, and even the Washington Post.

Above: Ka ‘Umeke Ka‘eo Public Charter School students perform an opening ceremony at Mokupāpapa‘s | NOAA
Right: Media engagement brings Papahānaumokuākea science to a broader public | HI Civil Beat


THE SHARK CHASERS
Exploring one of nature's biggest mysteries on a remote Pacific island
SEARCHER


HAWAIIAN CORAL REEF MUSEUM
BY
UH HILO MEGA LAB

PRCF Projects | Remote Learning – Pre 2020

Long before the global pandemic made video conferencing and distance learning the "new normal," PRCF grants have helped managers and educators overcome the challenge of bringing a remote location to the public.

Papahānaumokuākea protects a living bio-cultural landscape sacred to Native Hawaiians, yet its remote location and inaccessibility make it harder to connect people to their role in its stewardship. Usually research projects culminate in peer-reviewed published papers and our grantees are no exception with 14 publications to date. But all PRCF grantees are also required to make connections from their work both to managers of the monument and to the public.

Just a few of the ways PRCF is reaching beyond published papers include:

- Support for reporter Nathan Eagle of the HI Civil Beat resulted in three stories on the work being done in the monument and a special web-story on the predator work with multi-media.
- Video talks from Limu researchers on Voice of the Sea through a partnership with UH Sea Grant.
- Project result talks to the Marine Management Board and participation in planning committees to connect the research to the decision-makers.
- Summary of results via photos and video provided to the Hawaiian community through a partnership with the Office of Hawaiian Affairs and to an estimated 6,000 visitors at the SOEST Open House biannual event.
- Adapted results data for educational materials made available to local schools in Hawai'i as well as across the U.S. affiliated Pacific Islands via the Pacific Resources for Education and Learning (PREL).
- The MEGA Lab at UH has developed virtual reality applications for the public to explore the underwater world of coral reefs. The MEGA Lab also hosts the Coral Health Atlas that provides 360 panoramic video and 3D reef models to engage students. Multiple K-12 programs on Hawai'i Island and Maui have already used the website for class projects and a display is currently being created to bring this product to the Bishop Museum.

Left: Hawaiian Coral Reefs by Mega Lab | University of Hawai'i
Above: Sharing from the E/V Nautilus with students | NOAA

PRCF Projects | The Place Hawai'i Shares with the World

What's in a name? "*Ulva*" says it's algae – "*ohiohilulu*" says it's Hawaiian.

While Papahānaumokuākea is one of the few places that is a World Heritage site of both cultural and ecological global significance, its first and deepest roots are with the Hawaiian people. Managers of the Monument realize that it is a resource they are preserving for many – but it is also uniquely Hawaiian and they look for ways to preserve the spirit of this place. One important way that PRCF grantees have been supporting this spirit is through language.

In a place where so much is unexplored, new species are being found on almost every cruise. Scientists at the University of Hawai'i are collaborating with traditional Hawaiian nomenclature experts and the Papahānaumokuākea National Marine Monument in developing Hawaiian species names for new species of culturally important limu (macroalgae).

In this way the name of the new species *Martensia lauhiekoeloa* (pictured right), elevates the Hawaiian designation and location but also has meaning: Lau (leaf) + Hie (attractive, dignified, noble) + Koelo (to stream, flutter wave; to trail behind, as the train of a gown). Which turns dry nomenclature into beautiful illustration.

Allowing Hawaiians to experience the Monument in person is also critically important to maintaining their connection to it. PRCF grants have helped three Native Hawaiian students to experience field experience in the Monument from 2018-2021 and complete their graduate degrees at UH Mānoa.

The National Marine Sanctuaries Foundation created a film with a series of interviews from the Monument's Native Hawaiian Program Specialist Kalani Quiocho. The film, that premiered at the National Museum of the American Indian in Washington, D.C., provided insight into indigenous principles, philosophies, and the relationship between people and place.

The Foundation will also bring managers and researchers from Hawai'i to Washington D.C. for a special panel during Capitol Hill Oceans Week and will continue to create platforms through events and exhibits to celebrate both the cultural and living resources of the monument to a local, visiting, and broader public.

Right: Algae described as resembling the elegant train of a Holokū dress in the European Journal of Phycology | Greg McFall, NOAA

Above: Kammie Tavares, Chip Fletcher, Tiffany Anderson, Kristian McDonald, Haunani Kane | UH Mānoa

Exploration and Innovation in Remote Areas

Papahānaumokuākea Marine National Monument is the largest contiguous marine protected area in the United States. It is extremely remote, about 841 miles from Oahu as the bird flies and at depths to 150 meters as the fish swims. The Monument's size and remoteness creates unique challenges for management and conservation.

Above: Tiny atolls scattered across a vast ocean | PMDP
Right: Terrestrial and marine habitats teeming with life | J.Watt, NOAA

PRCF Projects | Knowledge is Power

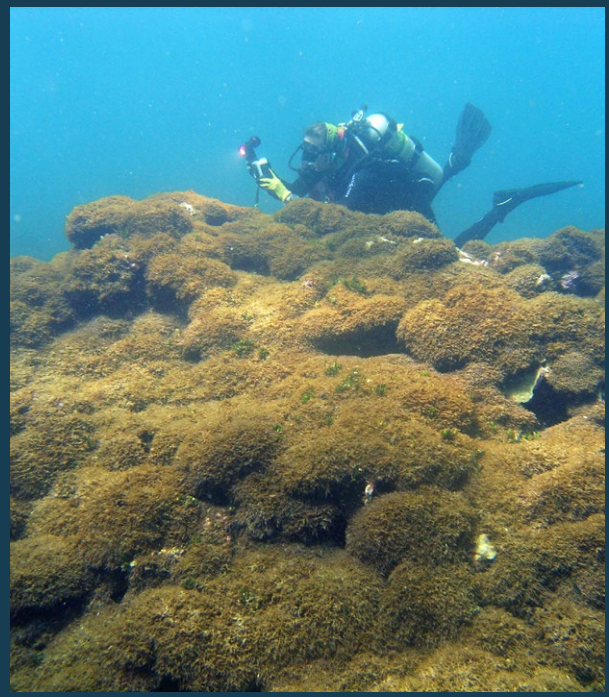
You can't manage what you don't know you have, or what you don't understand. Through investments in tools and applied research the PRCF is putting knowledge into the hands of managers.

Even though manned submersibles and remotely operated vehicles have conducted hundreds of surveys of the Monument's deep-water geology and biology, these deeper habitats remain less characterized and understood than shallow-water habitats, by the managers in charge of conserving them. The University of Hawai'i is creating the first online catalog and map of PRCF deep-sea species and habitats from video surveys to provide unprecedented access to this environment.

This deep-sea animal identification guide will standardize animal records from over 280 submersible dives and provide an interactive web map for both management and public users to explore the deep sea in the Monument.

Discovering more about a new species can be exciting, but it is also essential for managers. Cruises to the Monument in 2019 raised the alarm of a "new" nuisance algae that seemed to be growing in mats, covering everything with deadly consequences. Unfortunately, this algae was poorly understood, leaving managers unequipped to deal with it. How does it spread? Were further restrictions necessary?

The College of Charleston in collaboration with scientists at the University of Hawai'i will help managers understand and mitigate the effects of the invasive-like algae at Manawai (Pearl and Hermes Atoll) in the Monument by investigating the distribution, growth rate, and impact to marine life while developing mitigation and prevention strategies in the event a more proactive control is needed. Physiological and oceanographic data will help model invasive algal distributional patterns across the archipelago, provide a better understanding of the causes and consequences of this algal outbreak, and the efficacy of best management practices and mitigation efforts.



Left: Species at depth now part of an online catalog |HURL
Above: Invasive algae grows in mats and smothers coral | University of Hawai'i

Tracking coral reef predator movements and foraging habits offers researchers insight to the food web across deep and shallow waters. The use and availability of acoustic monitoring will increase knowledge of the largely unexplored deeper waters and informs management plans for species across differing habitats, crucial for species that move around such a vast and remote area.

PRCF Projects | Getting Help from the Locals

When scientists needed to understand the habitat needs and threats in an area over 1,380 miles long and 841 miles away, they decided to enlist the local wildlife.

University of Hawai'i researchers aboard the Searcher tagged several top predators, like tiger sharks, in 2018 and left acoustical receivers at shallow and deep depths for over a year to understand how connected the different habitats and food webs are in these remote systems.

Researchers received unexpected insight into predator short- and long-term responses to a highly-destructive hurricane. Tagged predators survived Hurricane Walaka and continued similar habitat use in the post-hurricane period to that observed before the storm, suggesting that atoll habitats remain ecologically important even immediately after destruction of coral cover.

Data also showed predators such as ulua and sharks were able to survive and resume normal ecological processes such as spawning, suggesting they were able to find alternate food sources despite the enormous loss of reef fish biomass and thus reduced prey availability. Researchers are examining stable isotope data for clues on whether prey come from predominantly reef or non-reef sources in the aftermath of such dramatic changes in coral habitats and associated fish assemblages.

The researchers at Oregon State University are also enlisting wildlife in their effort to study threats, this time from humans. They are using radar-detecting tracking devices on breeding black-footed and Laysan albatrosses at Midway Atoll National Wildlife Refuge to determine the frequency of vessel encounters and potential drivers of albatross-fisheries interactions both within and outside the Papahānaumokuākea Marine National Monument.

This novel approach to research and monitoring in remote systems will enhance bycatch mitigation efforts by U.S. fisheries managers, evaluate the occurrence of illegal fishing within protected waters, and promote conservation goals for albatross populations.

Left: Tiger shark tagged for tracking | University of Hawai'i
Above: Laysan Ibatross equipped to help enforcement| Orben

PRCF | Our 2020 Grants

Papahānaumokuākea Marine Debris Project
Marine Debris Removal from Papahānaumokuākea Marine National Monument (HI)
Mitigate hazards to protected species and coral reef habitat of Papahānaumokuākea Marine National Monument through large-scale marine debris removal from the coral reefs and shorelines. Project will remove an estimated 240,000 pounds of derelict fishing gear and plastics, restoring 1,300 acres of coral reef habitat and 400 acres of shoreline habitat.
Grant Amount: $299,629

University of Hawai'i
Responding to Invasive Species and Hurricane Walaka Impacts in the Papahānaumokuākea (HI)
Increase conservation and management capacity for mitigating the impacts of an invasive species outbreak and hurricane damage at two locations in Papahānaumokuākea Marine National Monument. Project will evaluate the potential management/ control options for the invasive red alga outbreak at Pearl and Hermes Atoll and recommend monitoring and management actions for reefs and island habitats at French Frigate Shoals damaged by Hurricane Walaka.
Grant amount: $299,891

Oregon State University
Equipping Albatross with Radar-Detecting Tags to Monitor Fishing Around Papahānaumokuākea (HI)
Deploy radar-detecting tracking devices on breeding blackfooted and Laysan albatrosses at Midway Atoll National Wildlife Refuge to determine the frequency of vessel encounters and potential drivers of albatross-fisheries associations within and outside the Papahānaumokuākea Marine National Monument. Project will allow managers to infer and mitigate the potential bycatch risk to breeding albatrosses, thus furthering conservation goals for the species, and increase monitoring of illegal fishing.
Grant Amount: $216,904

University of Hawai'i at Mānoa
Discovering Deepwater Habitats and Species in the Papahānaumokuākea Marine National Monument (HI)
Establish an online catalog of deep-sea habitats and species of the Papahānaumokuākea Marine National Monument to increase management understanding of the resources of these remote environments. Project will combine animal records from 284 submersible dives conducted in deep-sea habitats into a single, standardized dataset and create an animal identification guide and interactive web map.
Grant Amount: $122,460

National Marine Sanctuary Foundation
Community Engagement Programing for Papahānaumokuākea Marine National Monument Discovery Center (HI)
Provide dedicated cultural programming at the Mokupāpapa Discovery Center and other Hawaii based education centers to nurture and strengthen connections with the remote ocean wilderness of Papahānaumokuākea Marine National Monument. Project will create exhibits, host public outreach events and use social media to highlight the ecological and cultural resources of the Monument and spotlight the work that is being supported to protect them.
Grant Amount: $200,491

College of Charleston
Understanding the Impacts of the Invasive Alga to Support Management of Papahānaumokuākea (HI)
Understand and mitigate the effects of the invasive alga at Pearl and Hermes Atoll in the Papahānaumokuākea Marine National Monument. Project will determine its current distribution in the Monument, ecological impact on diversity at multiple scales, assess its population dynamics, describe and model its physiological characteristics in cooperation with oceanographic phenomena, and develop best management practices for removal.
Grant Amount: $120,000

FOR ADDITIONAL INFORMATION ABOUT THE PAPAHĀNAUMOKUĀKEA RESEARCH AND CONSERVATION FUND, PLEASE CALL: 202-857-0166 OR VISIT: WWW.NFWF.ORG

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https://www.nfwf.org/programs/hawaii-conservation-program/papahanaumokuakea-research-and-conservation-fund

PAPAHĀNAUMOKUĀKEA MARINE NATIONAL MONUMENT IS ADMINISTERED JOINTLY BY FOUR CO-TRUSTEES – THE DEPARTMENT OF COMMERCE, THE DEPARTMENT OF THE INTERIOR, THE STATE OF HAWAIʻI, AND THE OFFICE OF HAWAIIAN AFFAIRS. THE DAY-TO-DAY MANAGEMENT OF THE MONUMENT IS OVERSEEN BY A SEVEN-MEMBER MANAGEMENT BOARD: NOAA'S OFFICE OF NATIONAL MARINE SANCTUARIES, NOAA FISHERIES, U.S. FISH AND WILDLIFE SERVICE NATIONAL WILDLIFE REFUGES AND ECOLOGICAL SERVICES, STATE OF HAWAIʻI DIVISION OF AQUATIC RESOURCES AND DIVISION OF FORESTRY AND WILDLIFE, AND THE OFFICE OF HAWAIIAN AFFAIRS. CO-MANAGEMENT TAKES ALL AGENCIES WORKING TOGETHER, AND ALL HAVE UNIQUE EXPERTISE TO BRING TO THE TABLE.

PHOTOGRAPHY: NOAA (P.1), NOAA (P.2), NOAA (P.23). All other images are project photos or as referenced.

WEBSITES:
HI Civil Beat - East Island Memorial
HI Civil Beat - The Shark Chasers
HI Civil Beat - The Last Wild Place
Voices of the Sea

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