

**Papahānaumokuākea Marine National Monument**  
**Agency Report to the Reserve Advisory Council**  
February 16 - April 30, 2019

**Agency:** NOAA/NOS/ONMS/ONMS/PMNM

**Presented by:** Athline Clark, Superintendent

**Date:** June 6, 2019

**Agency Accomplishments & Recent Activities**

***Agency Coordination***

**PMNM Scientists and Collaborators Submit Major 4-Year, \$2.4M Research Grant Proposal**

On February 13, 2019, PMNM scientists, along with collaborators from the USFWS, Bishop Museum, and the Hawai‘i Institute of Marine Biology submitted a 4-year, \$2.4 million proposal to conduct deep coral reef research in American Samoa (including study sites in NMSAS). Mesophotic coral ecosystems (MCEs) are among the most poorly explored marine habitats on the planet. NOAA’s National Centers for Coastal Ocean Science (NCCOS) solicited proposals under the Deep Coral Reef Ecosystem Studies (Deep-CRES), a highly competitive program intended to advance understanding of MCEs. If funded, PMNM’s scientific rebreather divers will be a core part of the deep reef exploration team. PMNM Deputy Superintendent Randy Kosaki is a co-PI on the proposal. Contact: [randall.kosaki@noaa.gov](mailto:randall.kosaki@noaa.gov).

***Constituency Building & Outreach***

**PMNM helps emerging Native Hawaiian maritime leaders chart their courses**

On February 17, PMNM Native Hawaiian Program Specialist Kalani Quiocho and Permit Specialist Pua Borges met with Kānehūnāmoku Voyaging Academy’s (KVA) Hālau Holomoana program participants to talk about their personal career paths and the various careers at NOAA. The KVA is a non-profit organization that aims to perpetuate traditional Hawaiian navigation and provides educational leadership opportunities for primarily Native Hawaiian and local students to advance in contemporary maritime careers. Hālau Holomoana, a Native Hawaiian culture- and wa‘a- (traditional outrigger canoe) based maritime vocational program for high school students seeks to develop leaders educated in the rich maritime and voyaging cultural heritage of their ancestors.

On March 18, PMNM staff hosted 15 students of the KVA Hālau Holomoana program and five of their instructors at the NOAA Daniel K. Inouye Regional Center (NOAA IRC). The visit included a tour of the NOAA IRC facilities, the Pacific Tsunami Warning Center, diver lockers, small boats and the NOAA Ship, Oscar Sette. The PMNM staff also presented about their unique career paths and encouraged the students to strive for their goals and enjoy the journey.

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*The Kānehūnāmoku Voyaging Academy tours the NOAA Ship, Oscar Sette (Credit: Jennifer Crawford).*

**PMNM engages in The Purple Prize with the Purple “Banana” Foundation**

On February 23, Native Hawaiian Program Specialist Kalani Quiocho was a guest speaker for The Purple Prize, which is an indigenous innovation competition hosted by the Purple Mai‘a (Banana) Foundation. The Purple Prize brings together people across sectors to build technology solutions that create value for land and people. Purple Prize projects are forces for sustainability and systems-change and are the foundation of a local technology sector rooted in Kanaka Maoli (Native Hawaiian) values. Kalani demonstrated how traditional Hawaiian knowledge, culture and worldview inform the conception, design and creation of management plans, education materials, and research for PMNM. Through this presentation the tech-savvy crowd explored Hawaiian concepts of space, time, and epistemology, or the philosophy of knowledge and our relationship to knowledge. Contact: [kalani.quiocho@noaa.gov](mailto:kalani.quiocho@noaa.gov)

For more information visit [www.purpleprize.com](http://www.purpleprize.com)

### **PMNM is captured by the Smithsonian Institution's National Museum of Natural History**

On February 25, interviews of PMNM Deputy Superintendent Randy Kosaki and Native Hawaiian Program Specialist Kalani Quiocho were videotaped by the Smithsonian Institution to be included in an exhibit about Papahānaumokuākea that highlights its natural and cultural heritage. The Smithsonian and partners also interviewed former PMNM Superintendent 'Aulani Wilhelm; captured Kaumakaiwa Kanaka'ole chanting the well-known Hawaiian creation chant, Kumulipo; and recorded Kainani Kahaunaele teaching the next generation the name chant of Papahānaumokuākea that she and Halealoha Ayau composed in 2007 called Mele no Papahānaumokuākea. The exhibit weaves the natural and cultural genealogies together with the message that we are all connected to nature and our existence depends on it. The video display will go live in the National Museum of Natural History on the National Mall in June 2019.

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*Smithsonian Institution's National Museum of Natural History interviews (left to right) PMNM Deputy Superintendent Randy Kosaki, Native Hawaiian Program Specialist Kalani Quiocho, and former PMNM Superintendent 'Aulani Wilhelm (credit: Siobhan Starrs/Smithsonian Museum of Natural History).*

### **PMNM Seabird Data Collaboration**

On February 28 and March 1, PMNM Marine Scientist Jonathan Martinez participated in the 2019 Pacific Seabirds Group meeting in Hawaii. Three datasets and the collaborations from them will support the State of the Monument Report (condition report), future management planning, and the evaluation of the significance of protections to the expanded area. Large proportions of Pacific Seabirds nest in the PMNM and forage across the Pacific throughout their life spans. Researchers in Alaska, the West Coast and Asia have data on these species outside of the monument and coordination and collaboration at meetings like these can help achieve ONMS goals.

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### **PMNM Participates in Bishop Museum's Discovery Day**

Bishop Museum's Discovery Day is an annual event that brings the Oahu community together for a fun-filled day of discovering all things science. Papahānaumokuākea Marine National Monument staff and volunteers spent the day teaching kids and families about limu (algae, sea grass, and seaweed), showcasing two deep-sea species of limu found in the Monument, including a new species of Dictyota as well as a species of Halymenia.

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Link to Discovery Day: <https://www.bishopmuseum.org/fall-in-love-with-science-discovery-day>



*Left: PMNM staff, Alyssa Miller, showing keiki (children) how to use PMNM limu stamps to create their own limu cards.  
Right: Volunteers, Judith Cucco and Randy Wong, interacting with keiki (Credits: Jennifer Crawford).*

### **Closing Event For Schmidt Ocean Institute's Artist-At-Sea Exhibit**

On Thursday, March 21st Mokupāpapa Discovery Center co-hosted with Schmidt Ocean Institute (SOI) and the National Marine Sanctuary Foundation, a closing event for SOI's Artist-at-Sea Exhibit. The exhibit featured more than 50 pieces of artwork created by local artists who participated on science expeditions aboard Falkor, SOI's research vessel. More than 15,000 visitors had the opportunity to see the exhibit during the three months it was on display, and 45 people attended the closing event. Brief presentations were given by PMNM Superintendent Athline Clark, SOI's Director of Media Communications Carlie S. Wiener, Ph.D., and Tiare Holm, Hawai'i Director, National Marine Sanctuary Foundation. Contact: [andy.collins@noaa.gov](mailto:andy.collins@noaa.gov)



*PMNM Superintendent Athline Clark presents during the Schmidt Ocean Institute Artist-at-Sea Exhibit closing event at Mokupāpapa Discovery Center, Hilo, Hawai' (Credit: Andy Collins).*

### **Kamakakūokalani Center of Hawaiian Studies visits the NOAA Inouye Regional Center**

On March 25, a Hawaiian Studies class from the University of Hawai'i at Mānoa Kamakakūokalani Center of Hawaiian Studies visited the NOAA Daniel K. Inouye Regional Center. The course is entitled, "Strategies in Hawaiian Resource Use," and aims to analyze diverse land and water use strategies of Hawai'i, from traditional Hawaiian, scientific and economic perspectives. Course topics include traditional Hawaiian methods, modern development, threatened ecosystems, eco-tourism and scientific research. PMNM staff hosted 20 university students and their instructor, Kekuewa Kikilo PhD, who was a former Native Hawaiian Program Coordinator for PMNM. As the predecessor of Kalani Quiocho, the current Native Hawaiian Program Specialist, Kekuewa is also Kalani's former mentor and Hawaiian Studies professor. The visit included a tour of the NOAA IRC facilities and focused presentations on how PMNM continues to incorporate culture and traditional Hawaiian methods in the design and management of PMNM.

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### **PMNM Native Hawaiian Program Voyages to NMSAS for Cultural Exchange**

From April 8-15, PMNM Native Hawaiian Program Specialist Kalani Quiocho visited American Samoa to support and participate in the first ever Fautasi Heritage Symposium, co-hosted by the National Marine Sanctuary of American Samoa (NMSAS) and the American Samoa Historic Preservation Office. It was held at the Tauese P.F. Sunia Ocean Center. The two-day symposium highlighted Samoan heritage of the fautasi watercraft and included perspectives about Hawaiian canoe heritage to carry an overall message that the canoe is the vessel that contains our cultural values and continues to empower our communities in the Pacific. Through this exchange, and having culture at the forefront, PMNM and NMSAS staff were able to discuss ways that our sites could support one another. We experienced firsthand this cultural exchange by meeting with NMSAS partners such as the National Park of American Samoa and the village community of Aunu'u Island, which is part of the NMSAS Aunu'u Sanctuary Unit.

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*Top Left: PMNM Native Hawaiian Program Specialist Kalani Quioco (far right) with Fautasi Heritage Symposium participants at the Tauese P.F. Sunia Ocean Center (credit: Nerelle Que). Top Right: Samoa high school students participating in a break out group during the Fautasi Heritage Symposium at the Tauese P.F. Sunia Ocean Center (credit: Kalani Quioco). Bottom Left: Fautasi Heritage Symposium speakers (left to right): PMNM Native Hawaiian Program Specialist Kalani Quioco, David J. Herdrich (FEMA), Dr. Michaela Howells (University of North Carolina), and ONMS PIR Maritime Heritage Coordinator Dr. Hans Van Tilburg (credit: Nerelle Que). Bottom Right: Fautasi heads out of Pago Pago Harbor towards the race starting line (credit: Kalani Quioco).*

## **Education**

### **PMNM Staff Participates in Three Career Day Events to Promote Marine Science**

On November 7 and 16, 2018, and February 20, 2019, Resource Protection Manager Brian Hauk presented to several groups of preschoolers and elementary school students at Parent Participation Preschool (PPNS), Haleiwa Elementary and Ahuimanu Elementary schools at three different career day events reaching 150 students and teachers. Mr. Hauk spoke about Papahānaumokuākea Marine National Monument and what it's like to work as a marine biologist exploring the deep "mesophotic" reefs of the Pacific Region's National Marine Sanctuaries and Monuments utilizing closed circuit rebreather technology. He highlighted the discoveries made thus far and the need to protect fragile marine ecosystems such as those found in the National Marine Sanctuaries Program.

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*From left to right: Brian Hauk poses with potential future marine scientists (Credit: Ahuimanu Elementary); preschoolers at PPNS watch closely as Hauk explains CCR functionality (Credit: Tiffany Nishikawa); sixth graders at Haleiwa Elementary school prepare to listen to a presentation on careers in Marine Science (Credit: Nami-Anne Dolan).*

### **MDC Presents on Deep Sea Exploration in PMNM at Hawai‘i Volcanoes National Park**

MDC/NMSF Educator Justin Umholtz spoke to 103 visitors at Hawai‘i Volcanoes National Park’s (HVNP) “After Dark in the Park” program. The presentation focused on the recent *E/V Nautilus* expedition into PMNM to map and explore largely unknown seamounts north of Lalo (French Frigate Shoals) and ‘Onūnui / ‘Onūiki (Gardener Pinnacles) within the 2016 Monument boundary expansion. The presentation included stories of the mission, technology, and discovery highlights, as well as the larger context of NOAA OER Deep Sea Exploration through CAPSTONE. The audience left with PMNM deep sea resources posters and links to the OceanExplorer.NOAA.gov and NautilusLive.org live streams and extensive online resources. Contact: [justin.umholtz@noaa.gov](mailto:justin.umholtz@noaa.gov)



*Ranger Dean Gallagher closes the program, acknowledging the growing cross-agency relationship between MDC and HVNP staff. (Credits: Janice Reddick)*

### **PMNM Scientist Gives Invited Lecture in a University of Hawai‘i Zoology Class**

On April 15, Deputy Superintendent Randy Kosaki gave a guest lecture to approximately 40 upper division students in a Department of Zoology class (Zool. 450, Natural History of the Hawaiian Islands). Kosaki covered exploration of mesophotic coral ecosystems using advanced dive technologies, as well as the discoveries resulting from this exploration. Contact: [randall.kosaki@noaa.gov](mailto:randall.kosaki@noaa.gov)

### **PMNM Scientist Participates in Google Hangout Presentation to a Virginia Elementary School**

On April 22, Deputy Superintendent Randy Kosaki participated in a Google Hangout presentation and discussion on the natural history of PMNM with five classes of fifth graders at Algonkian Elementary School in Sterling, Virginia. The students dissected albatross boluses from Midway Atoll and found squid beaks and an abundance of plastic trash in their diets. Contact: [randall.kosaki@noaa.gov](mailto:randall.kosaki@noaa.gov)

### **Mokupāpapa Discovery Center (MDC) Report for February 16 - April 30, 2019**

Mokupāpapa Discovery Center hosted 13,332 people during this time. Highlights include:

- High school students participating in an introduction to intertidal invertebrates
- MDC held two craft nights with over 120 people participating
- MDC staff continues to partner with a local “Zero Waste” community organization working to educate the public to eliminate waste and reduce the community’s ecological footprint
- MDC’s successful partnership with The Marine Mammal Center through the Nā Kokua o Ke Kai marine science program this academic year has engaged over 500 middle school students during a formative time in their lives. The 10-lesson NGSS-connected curriculum and corresponding educational activities offered at MDC and Ke Kai Ola Monk Seal Hospital in Kona inspires students to research the Hawaiian Monk seal and engage in efforts to protect and ensure the future of endangered species
- Educators provided an immersive experience while utilizing the Liquid Galaxy platform to teach about the geological formation of the Hawaiian archipelago
- In addition to observing fish behaviors in reef ecosystems, students used replica skulls and jaws of Hawai‘i based species to infer feeding behaviors and prey preferences. They rounded out their understanding from a geologic perspective, virtually participating in the emergence of islands at the Hawaiian hotspots, observed island erosion

and subsidence, and watched the eventual transformation to coral atolls and coral dominated ecosystems. Through these activities, students gained a greater understanding of the importance of PMNM and the unique ecosystems protected with its boundaries.

- Staff celebrated Earth Day with special temporary exhibits and the screening of *Our Planet, part 1*



*MDC Educators Justin Umholtz and Malia Evans lead students through a series of kilo (observation), tidepool exploration, and a discussion on the importance of invertebrates in intertidal ecosystems. (Credits: United Hawai'i College)*



*Michael Caban shows students the strong, beak-like teeth of an uhu (parrotfish) while another student examines a prehistoric megalodon fossil shark tooth (Credit: Virginia Branco/NOAA).*



*First graders from Keaukaha Elementary learn about native animals living in PMNM (Credits: Virginia Branco and Justin Umholtz/NOAA).*



*Local elementary students enjoy making and wearing their hats of animals who live in PMNM (credits: Virginia Branco/NOAA).*

### ***Research & Field Operations***

#### **NOAA Ship *Hi'ialakai* to be Laid Up for FY19; *Ranier* Considered as Replacement**

On February 27-28, PMNM Deputy Superintendent Randy Kosaki attended a meeting at NOAA's Marine Operations Center in Newport, OR, to examine the feasibility of bringing NOAA ship *Ranier* to Hawai'i this summer to support diving-intensive missions displaced from NOAA ship *Hi'ialakai*. While in winter dry-dock, *Hi'ialakai* was found to have significant corrosion problems in numerous tanks and other below-deck compartments, forcing cancellation of this year's PMNM research cruise schedule within the Hawaiian Archipelago. *Ranier's* davits can be modified to launch and recover *Hi'ialakai's* 8 m and 10 m dive boats, and a containerized recompression chamber can be craned aboard. NOAA ships are the only way that PMNM scientists can access the NWHI. PMNM's sole FY2018's cruise to the NWHI was canceled due to mechanical breakdowns, and by Summer 2019, it will have been two years since PMNM scientists have conducted field monitoring and research.

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*NOAA ship *Ranier* tied up at MOC-P in Newport, OR (Credit: Randy Kosaki).*

#### **PMNM Intern Completes MS Degree Using PMNM RAMP Cruise Data**

On April 9, University of Hawai'i at Hilo student and former PMNM intern Kailey Pascoe defended her MS thesis at UH Hilo. Pascoe learned basic coral reef survey techniques by taking QUEST (Quantitative Underwater Ecological Survey Techniques), a for-credit undergraduate summer class offered by UH Hilo. PMNM scientists attend QUEST as guest lecturers, and subsequently select the top two students as paid interns on PMNM's annual Reef Assessment and Monitoring Program (RAMP) cruises. Pascoe served as an intern on 2015 and 2017 cruises and based her MS thesis on coral disease data collected on those expeditions. PMNM scientist Randy Kosaki served as chief scientist on those cruises, and as a member of Pascoe's thesis committee.

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*Example of partial mortality on a colony of Montipora coral. The area contained within the solid black line is old mortality discolored by algal overgrowth. The area between the dashed black line and the solid black line is fresh mortality, and the area outside of the dashed line is live coral (Credit: Kailey Pascoe).*

### **PMNM Scientists and Interns Publish Paper on 3D Modeling of Coral Reef Habitats**

On April 18, the International Society for Photogrammetry and Remote Sensing published the peer-reviewed article, “3D Habitat Complexity of Coral Reefs in the Northwestern Hawaiian Islands is Driven by Coral Assemblage Structure.” PMNM collaborator Dr. John Burns (Univ. of Hawai‘i at Hilo) was the lead author. PMNM intern Kailey Pascoe and 2018 PMNM Hollings Scholar Briana Craig were co-authors, along with PMNM scientists Atsuko Fukunaga and Randy Kosaki. Until recently, the field of coral reef ecology lacked practical technology capable of quantifying the complex three-dimensional structure of aquatic habitats. Structure-from-Motion (SfM) 3D photogrammetry is now being incorporated into PMNM’s coral reef monitoring and mesophotic coral ecosystem characterizations.

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The article can be downloaded at:

<https://www.int-arch-photogramm-remote-sens-spatial-inf-sci.net/XLII-2-W10/61/2019/> .

### **Calendar:**

- Saturday, June 8 - World’s Ocean Day, Ko Olina, Oahu 4-9 PM
- July 9-11 - Hawai‘i Conservation Conference, Honolulu, Oahu
- August 2-4 - Get into Your Sanctuary Day
- Saturday, September 21 - International Coastal Cleanup, TBD