

**Papahānaumokuākea Marine National Monument**  
**Agency Report to the Reserve Council**  
December 10, 2020 – March 23, 2021

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

**Presented by:** Athline Clark, Superintendent

**Date:** March 24, 2021

**Agency Accomplishments & Recent Activities**

***Agency Coordination***

**Potential Marine Debris Items from Lost Shipping Containers Washing Ashore in PMNM**

Thousands of shipping containers have been lost in the vicinity of PMNM in the last four months, and efforts have been made to locate these containers utilizing satellite imagery and oceanographic modeling. On February 18, field camp staff on Kure Atoll began reporting suspicious marine debris along the shoreline and staff on Midway reported similar items starting on February 26. These items included brand new Crocs with plastic display hangers, Wilson volleyballs, Disney sippy cups still in their packaging, packages of what appears to be the “slime” kids play with, latch-seal mason jars, medical respirator masks, drinking straws, bicycle helmets and unopened groceries. Field staff at both locations found these Crocs, volleyballs and sippy cups suggesting they had similar origins. Most items had small gooseneck barnacles growing indicating they had been floating in the open ocean before washing inshore. These events come less than three months after the *Maersk Eindhoven*, *MSC Aries*, *Maersk Essen* and the *One Apus* lost 260, 41, 732, and 1,816 containers respectively in the Central Pacific Ocean near PMNM. Sources: [Freightwaves.com](https://www.freightwaves.com) & USCG. For more information, contact [Brian.Hauk@noaa.gov](mailto:Brian.Hauk@noaa.gov).



*Photos of some of the items washing ashore at Midway Atoll which match the description of similar items being found at Kure Atoll (Photo: USFWS)*

## Exploring Innovative Ways to Meet Future Mission Requirements through Technology

On February 19, staff from the Hawaiian Islands Humpback Whale NMS, NMS of American Samoa, PMNM and the Pacific Islands Region met with CEO Jordan Cousino of Cardinal Point Captains, Inc. to discuss a new Autonomous Underwater and Surface Vehicle (AUSV) technology. The Ocean Aero “Triton” vehicle provides a dual-modality capability that can perform both surface and subsurface surveillance and research operations for months at a time and is currently being used by both the Department of Defense and the Department of Homeland Security. Although further information will need to be gathered, including the potential for proof-of-concept tests in the Pacific as well as funding sources, the technology appears promising for unmanned use in our remote locations. For additional information, contact [Eric.Roberts@noaa.gov](mailto:Eric.Roberts@noaa.gov)



*PIR staff meeting with CPC CEO Jordan Cousino (Credit: Eric Roberts/NOAA)*

## Constituency Building and Outreach

### PMNM Presents at National Association for Interpretation (NAI) Conference

On March 3, PMNM Education Coordinator Andy Collins and MDC Educator Justin Umholtz presented at the NAI Sierra Pacific Regional Conference, “Resilient Interpretation – Adapting to Our New World.” Over 220 NAI members from across the region provided virtual video tours of their sites with additional commentary on how they have adopted virtual interpretive strategies. The pre-recorded video was followed up with a live panel discussion and question and answer period. Workshop videos will be available on the [NAI youtube channel](#) shortly. The PMNM contribution can be viewed via [google drive](#). For more information, contact [Andy.Collins@noaa.gov](mailto:Andy.Collins@noaa.gov).

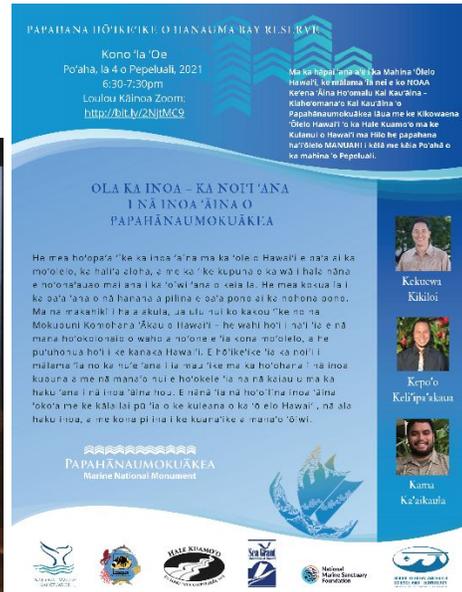
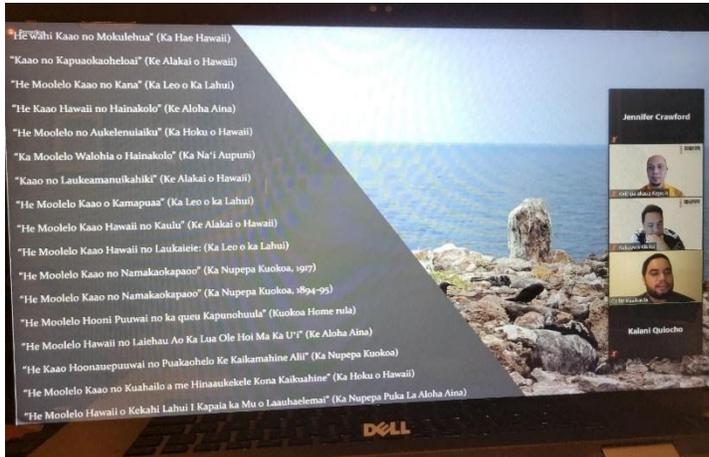


Andy Collins discusses some of our virtual strategies as part of the prerecorded video created for the NAI conference (Credit: Andy Collins/NOAA)

**Education**

**Hanauma Bay Webinar Talks for Mahina ‘Ōlelo Hawai‘i – Hawaiian Language Month**

During the month of February, PMNM partnered with the Hanauma Bay Education Program and Hale Kuamo‘o Hawaiian Language Center at the University of Hawai‘i at Hilo to celebrate Mahina ‘Ōlelo Hawai‘i – Hawaiian Language Month. These 4 weekly talks highlighted the importance of historical Hawaiian language literature and the innovative applications of ‘Ōlelo Hawai‘i to mālama natural and cultural resources of Papahānaumokuākea and Hawai‘i nei. Recordings of these presentations can be found on [Hanauma Bay’s YouTube page](#). For more information, contact [Jennifer.Crawford@noaa.gov](mailto:Jennifer.Crawford@noaa.gov).



February 4<sup>th</sup> – “Ola Ka Inoa – Examining the Legacies of Inoa ‘Āina for Papahānaumokuākea.”

Pictured left from top to bottom: Kepo‘o Keli‘ipa‘akaua, Kekuewa Kikilo'i, and Kama Ka‘aikaula. Kama referencing different mo‘olelo, or stories, used in his research to rediscover ancestral place names. (Photo: Jennifer Crawford/NOAA)

Pictured right: Event flyer created in ‘Ōlelo Hawai‘i (Credit: Malia Evans/NOAA and Kamalani Johnson/UH-Hilo)

**PMNM Scientist Gives Invited Lecture for Univ. of Hawai‘i Dept. of Botany Class**

On March 1, PMNM Research Coordinator Randy Kosaki gave a guest lecture to approximately 40 upper division college students in a Dept. of Botany class (Bot. 450, Natural History of the Hawaiian Islands). Kosaki covered exploration of mesophotic coral ecosystems using advanced dive technologies, as well as the discoveries of high rates of endemism and numerous new species of algae resulting from this exploration. For more information, contact [Randall.Kosaki@noaa.gov](mailto:Randall.Kosaki@noaa.gov)

**Mokupāpapa Discovery Center (MDC) Report**

## Understanding Marine Biodiversity in PMNM Webinar a Success!

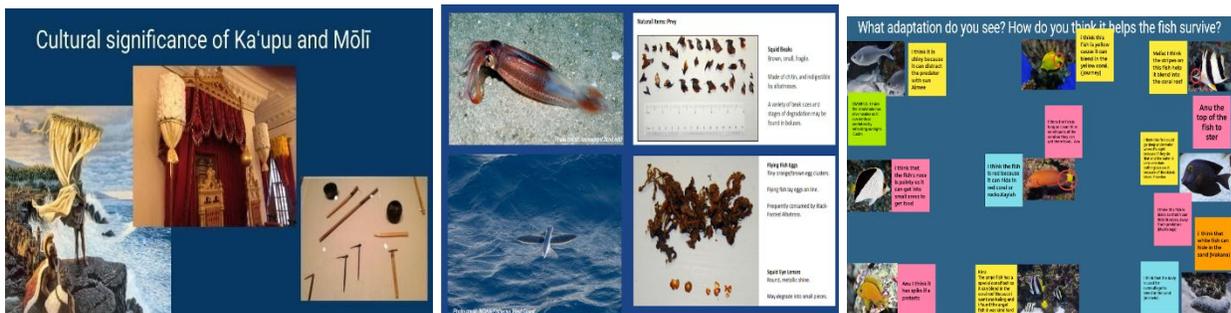
On February 18, as part of the [National Marine Sanctuaries Webinar Series](#) and Mokuapāpapa’s Third Thursday by the Bay Lecture Series, NOAA PMNM Research Coordinator Dr. Randy Kosaki enthralled 417 webinar attendees in his presentation: *Understanding Marine Biodiversity in the Papahānaumokuākea Marine National Monument*. Dr. Kosaki introduced participants to the high rate of endemism in the Hawaiian archipelago and especially within PMNM. He covered new species discovered through rebreather dives in the mesophotic reef zones of the monument, where the field team found high reef fish endemic rates, including 100 percent endemism at Hōlanikū (Kure Atoll). While new species continue to be named and described for publication in cooperation with the PMNM Native Hawaiian Cultural Working Group, Dr. Kosaki is eager to continue exploration and research of these unique habitats. If you are interested in being a guest presenter or would like more information about this webinar series, please contact [Andy.Collins@noaa.gov](mailto:Andy.Collins@noaa.gov).



Left: An example of one of the new algal species given a Hawaiian language species epithet by PMNM Native Hawaiian Program Specialist Kalani Quiocho. Middle: Dr. Kosaki on one of the PMNM expeditions. Right: All of the fish pictured here at 300 ft. at Hōlanikū (Kure Atoll) are endemic to Hawai‘i. (Credits: left: Danimal Wagner/NOAA and JIMAR middle: Ray Boland/NOAA, right: Rich Pyle/Bishop Museum,)

## Mokuapāpapa Hosts First Virtual Voyage of Discovery Program Class

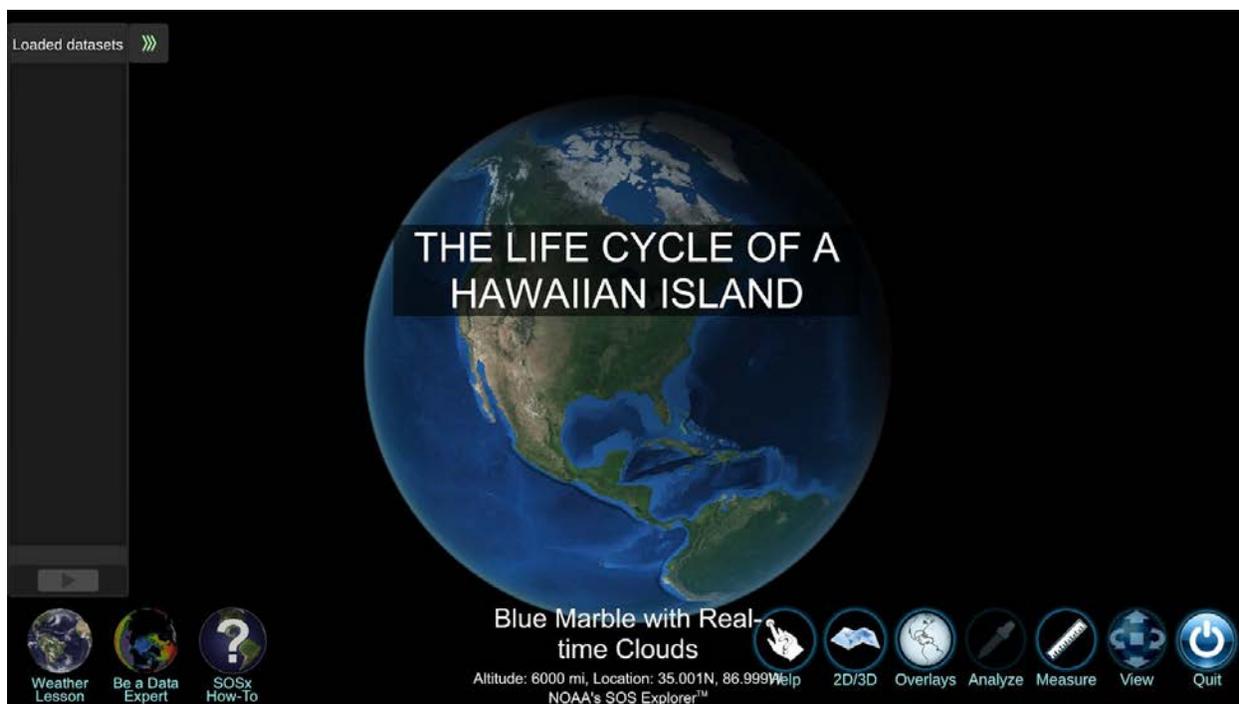
On February 12, Mokuapāpapa Discovery Center (MDC) educators Malia Evans and Justin Umholtz spent the morning with 20 fourth graders from Kea‘au Elementary sharing two virtual lessons as part of the newly launched MDC Virtual Voyage of Discovery Program (VVD). The VVD program emphasizes an interdisciplinary, interactive approach with a TEK foundation (traditional ecological knowledge) to the lessons. Drawing on the Kumulipo, or Hawaiian Creation Chant as inspiration, students used kilo, the Hawaiian practice of deep observation, to build an understanding of reef fish evolution and adaptations. With the help of a Jamboard, students posted their own hypothesis related to specific traits or behaviors they observed. The class also dove into the lives of the Mōlī (Laysan albatross) and Ka‘upu (black-footed albatross), grasping the impacts of marine debris through virtual bolus dissections. For more information, contact [Justin.Umholtz@noaa.gov](mailto:Justin.Umholtz@noaa.gov)



*Snapshots of the slides and Jamboard activities from the lessons (left). Winged Ambassador Curriculum (and [a new webpage](#)) with bolus analysis guides and other great resources (center and right). (Credits: Malia Evans and Justin Umholtz/NOAA)*

### **New Science on a Sphere Explorer PMNM - focused Tour Going Public**

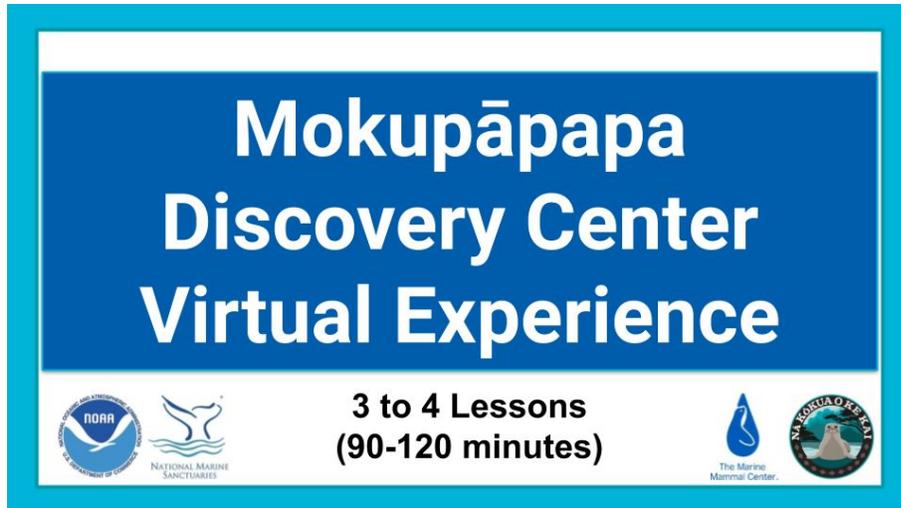
Science on a Sphere Explorer (SOSx) exhibits across the nation will soon be loading a new tour called “The Life Cycle of a Hawaiian Island.” The interactive tour takes participants on a journey from island formation at the Hawaiian hotspot through the transformation to coral atolls like Hōlanikū (Kure Atoll). The tour highlights basic plate tectonics and expands the user’s understanding of the Hawaiian archipelago to include the Northwestern Hawaiian Islands. The tour also helps participants understand the cultural and natural resources that make this area unique and worth protecting as PMNM. Educator Justin Umholtz created this tour in collaboration with other PMNM colleagues and with technical support from Hilary Peddicord and Eric Hackathorn from the Boulder, Colorado-based Science on a Sphere team. Work is underway to get a version of the tour onto the free SOSx mobile app that is currently opened by 25,000 users monthly. For more information, contact [Justin.Umholtz@noaa.gov](mailto:Justin.Umholtz@noaa.gov)



*The tour opening image as the narrative begins. (Photo: Justin Umholtz/NOAA)*

### **New Virtual Middle School Field trip to Mokupāpapa Discovery Center**

PMNM has long collaborated with the Hawaiian Monk Seal hospital Ke Kai Ola, a facility in Kailua-Kona, run by The Marine Mammal Center (TMMC). Over the last four years, MDC educators worked with TMMC staff to create a successful curriculum annually serving approximately 450 students from middle schools across Hawai‘i Island. With the pandemic, TMMC and MDC were joined by Mark Manuel and Shanelle Naone of the PIR NOAA Marine Debris Program to transform the field trip to Mokupāpapa Discovery Center into an entirely virtual experience. Although reporting will not be complete until May 2021, another 450 middle school students are committed to participate. Longer term benefits include the potential to significantly increase the number of students served by this now virtual program. For more information, contact [Justin.Umholtz@noaa.gov](mailto:Justin.Umholtz@noaa.gov)



*The opening slide of the teacher presentation for the virtual field trip. (Credit: Wendy Marks/TMMC)*

### **Let PMNM Take You On a Coral Reef Scavenger Hunt**

We are happy to announce the upcoming availability of a fun kid-friendly 15 minute video where MDC aquarist and educator Michael Caban teaches beginners the basics of coral reef ecosystems in Hawai‘i. Michael brings viewers along on a swim through one of his favorite reefs, searching out different marine organisms and sharing their Hawaiian and common English names as well as their roles. As we swim, Michael introduces the topics of coral bleaching and good stewardship practices along the way. The video will also serve as part of a virtually-based coral lesson series focused on the Hawaiian archipelago that is still in development. For more information, contact [Justin.Umholtz@noaa.gov](mailto:Justin.Umholtz@noaa.gov)

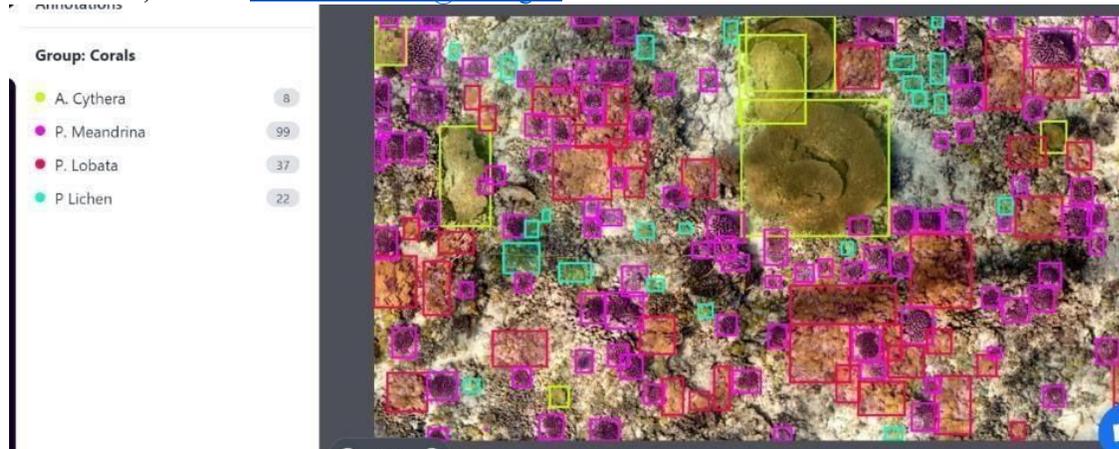


*Michael spots a honu emerging from behind a large school of juvenile fish (Photo: Michael Caban and Justin Umholtz/NOAA)*

## Research & Field Operations

### PMNM Scientists Submit Coral Reef Artificial Intelligence Grant Proposal

On March 5, PMNM scientists Randy Kosaki and Atsuko Fukunaga submitted a funding proposal to the NOAA Information Technology Incubator Program. If funded, the proposal will support development of an Edge AI system in which coral identification algorithms are processed locally on a device deployed in the field. The camera system can be carried by a diver and will identify coral species, percent cover, and colony size in real-time. Initial annotation of benthic images will be conducted in collaboration with Dr. John Burns and the MEGA Lab (Multi-scale Environmental Graphical Analysis Lab) at the University of Hawai'i at Hilo. The annotated images will then be used to train the neural network. For more information, contact [Randall.Kosaki@noaa.gov](mailto:Randall.Kosaki@noaa.gov)



*Sample annotated benthic image with coral colonies identified (John Burns, Univ. of Hawai'i).*

### PMNM Staff Prepare ONMS Small Boats for Field Season

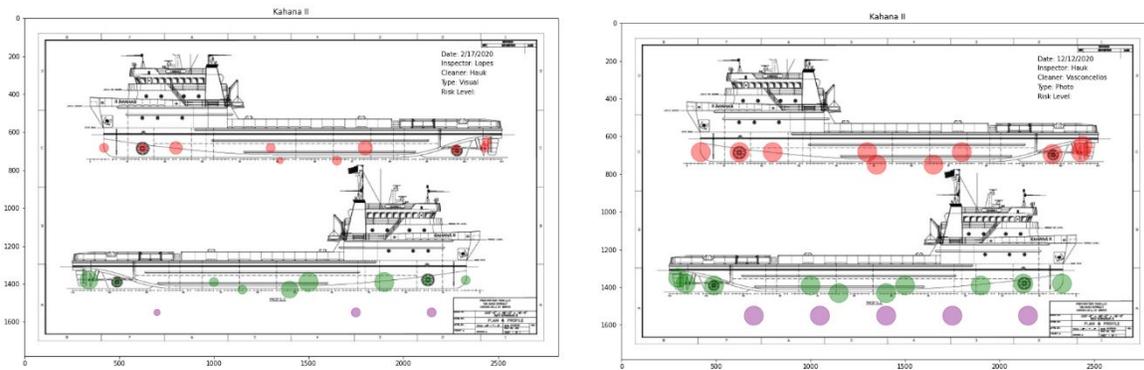
On March 5, NOAA Corps officer Luke Evancoe, PMNM/JIMAR Resource Protection Specialist Brian Hauk and PMNM/JIMAR Field Logistics Technician Keolohilani Lopes Jr. conducted mandatory annual small boat examinations (ASBEs). These annual inspections are required for all of PMNM boat assets and they signal a future return to the field for the PMNM. As a result of mandatory telework, most of the field equipment has been sitting idle for about a year and a thorough inspection will generate a much-needed repair list in order to get all the boats ready for the upcoming field season which will depart in less than four months. For more information, contact [Keolohilani.lopes@noaa.gov](mailto:Keolohilani.lopes@noaa.gov).



*Images: (Left) Brian Hauk (near) and Luke Evancoe (Far) inspect the starboard sponson of one of the PMNM Safeboats (photo: Keo Lopes). (Right) Keo Lopes applies grease to the steering controls of PMNM's 11m Ambar boat.*

### **PMNM Develops Hull Inspection Program (HIP) with Graphical Outputs**

PMNM/JIMAR Field Logistics Technician Keolohilani Lopes Jr. and PMNM/JIMAR Resource Protection Specialist Brian Hauk created the beta version of the Hull Inspection Program (HIP), that catalogs and graphically displays all future hull inspections. By utilizing Google Collaboratory coding tool from the Google Suite of products, Mr. Lopes was able to use a simple python code based on Mr. Hauk's hull fouling scores to create this shareable cataloging system. This tool will allow users to answer questions like, "How well did a particular commercial diving operator do on a specific vessel and/or what niche (trouble) areas did operators historically miss?" This is just one more tool to fight against the invasion of alien species into the PMNM. For information on the hull inspection program contact [Brian.Hauk@noaa.gov](mailto:Brian.Hauk@noaa.gov). Any technical questions can be directed to [Keolohilani.Lopes@noaa.gov](mailto:Keolohilani.Lopes@noaa.gov).



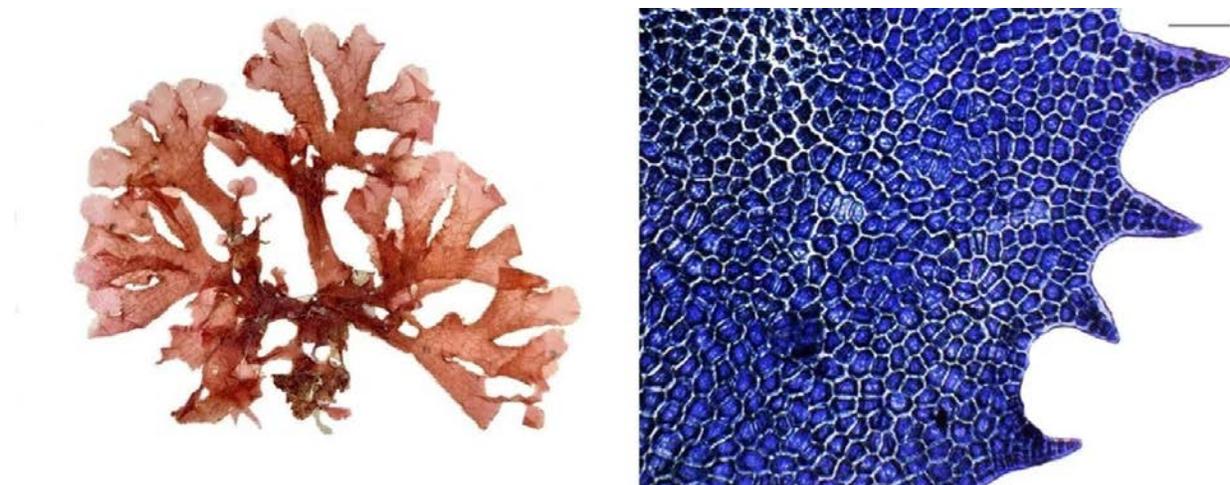
Images: (Left and Right) Two test data graphical outputs for the new Hull Inspection Program (HIP)

### PMNM Scientist Wins Outstanding Reviewer Award

On January 19, JIMAR PMNM Ecological Research Statistician Atsuko Fukunaga was selected for the 2020 Outstanding Reviewer Award for the journal Diversity (<https://www.mdpi.com/journal/diversity>). Diversity is an international and interdisciplinary peer-reviewed journal on the science of biodiversity. Three winners were selected for the quantity, timeliness and quality of their reviews. For more information, contact [Atsuko.Fukunaga@noaa.gov](mailto:Atsuko.Fukunaga@noaa.gov)

### University of Hawai'i and PMNM Scientists Describe New Species of Mesophotic Algae

On December 21, research scientists from the University of Hawai'i, PMNM, and other institutions named a new species of red algae from the NWHI. *Haraldiodophyllum hawaiiense* was described from specimens collected at Holaniku (Kure Atoll), Manawai (Pearl and Hermes Atoll), and Salmon Bank by PMNM rebreather divers Randy Kosaki, Brian Hauk, Jason Leonard, and Keolohilani Lopes Jr. Depths ranged between 82 and 93 m (270 to 307 ft.). Morphological analyses and molecular phylogenetic analyses of the *rbcL* and *CO1* genes placed the alga in the genus *Haraldiodophyllum*, and confirmed that it did not correspond to any known species. In addition, the genus *Haraldiodophyllum* had not been previously recorded in Hawaiian waters. The paper, "*Haraldiodophyllum hawaiiense* sp. nov. (Delesseriaceae, Rhodophyta): a new mesophotic genus record from the Hawaiian Islands" (M. Paiano, J. Huisman, F. Cabrera, H. Spalding., R. Kosaki, and A. Sherwood) was published in the journal *Algae*. The open access article is available at : <https://doi.org/10.4490/algae.2020.35.11.5> . For more information, contact [Randall.Kosaki@noaa.gov](mailto:Randall.Kosaki@noaa.gov).



*(Left) Holotype specimen of Haraldiphyllum collected by Brian Hauk. (Right) Surface view of blade (stained with anilene blue to highlight cell wall structure structure), showing polygonal cells and dentate margin that is characteristic of this species. Scale bar = 100 μm Photos: Monica Paiano, Univ. of Hawai'i Dept. of Botany*