

Papahānaumokuākea Marine National Monument
Agency Report to the Reserve Council
June – August 2022

Agency: NOAA/NOS/ONMS/PMNM

Presented by: Athline Clark, Superintendent

Date: August 31, 2022

Agency Accomplishments & Recent Activities

Education, Outreach and Mokupāpapa Discovery Center Highlights

Mokupāpapa Report Report

MDC welcomed nearly **8,231** visitors from the opening of our facility in June to August. Special highlights included a dynamic field trip of fifty-two 2nd and 3rd graders from Keonepoko, one of the more remote and underserved schools on the island. The center also hosted our first community event for a new Hawaiian language and culture based STEAM school celebrating its first high school graduate. MDC educators also hosted the University of Hawai'i Hilo (UHH) introductory corals class to present on island formation, the importance of coral to PMNM, and coral bleaching. As part of the visit, students were introduced to NOAA's Coral Reef Watch as a tool to monitor coral heat stress across time. The re-establishment of a long-time educational relationship with United Hawai'i College, connecting high school students in Japan with PMNM during their English intensive visit to Hilo (virtual lessons until 2023).



Educator Justin Umholtz uses the Liquid Galaxy exhibit as part of an introduction to PMNM for high school students visiting from Canada. (Credit: Virginia Branco/NOAA)



(Left) Teachers discuss ideas for using high resolution time series banners of coral reefs as a teaching tool for virtual surveys. (Right) Shared work at Mokuola Marine Science Education Center during the field day.

Bishop Museum Premieres New Exhibit on Taxonomy, Featuring PMNM's New Species

On July 21, the Bishop Museum held a private opening of a new exhibit, "Taxonomy: Our Lives Depend On It". The exhibit featured a display on new species of algae collected by PMNM's deep reef rebreather team, highlighting PMNM's practice of selecting formal scientific epithets for new species in 'Ōlelo Hawai'i (Hawaiian language). The exhibit is an interactive, multimedia exhibition that highlights the science of taxonomy – the identification and naming of plants and animals – and the important role it plays in our everyday lives. The exhibit will remain on public display until Feb. 19, 2023.



*(L) PMNM research ecologist Randy Kosaki and Univ. of Hawai'i phycologist Dr. Alison Sherwood pose next to *Psaromenia laulamaula*, a new species of algae they described from PMNM's deep reefs. PMNM rebreather divers discovered this and many other new species on deep dives to depths of 60-100 m in PMNM. (R) PMNM rebreather collaborator and curator of the exhibit, Dr. Richard Pyle, counts zoological specimens with seven year old Isaac Copus.*

PMNM/ONMS Staff Collaborate on Hawai'i Climate Change Teacher Workshop

After six months of collaborative planning, the ambitious E Kū Ana Ka Paia: Workshop for Building Climate Change Resilience successfully brought together 60 middle and high school teachers from Hawai'i, Maui, Moloka'i, O'ahu, and Kaua'i July 13-15th. The workshop was held simultaneously at three NOAA facilities: the NOAA Inouye Regional Center on O'ahu; the Hawaiian Islands Humpback Whales NMS Visitor Center on Maui; and the Mokupāpapa Discovery Center for PMNM on Hawai'i Island. The three-day workshop was synchronized across sites, setting a shared foundation while localizing activities and content to best fit each island. Multiple NOAA line offices participated in the workshop as well as USGS, Sea Grant, NPS, City, County, University, and local partners. The workshop was created with the intent to provide tangible NOAA-based climate change classroom activities, reflect a Hawaiian cultural worldview, provide locally relevant climate change resources, explore student engagement opportunities, and build an active Hawai'i Educator Climate Change Community of Practice. Teachers were active creators in this experience, and were able to access curriculum development funding through [HOPE: The Hawai'i Online Portal for Education](#) in order to build or locally adapt climate change units for their classrooms.



Top Left: Hawai'i participants learn a sea level rise shoreline impact exercise. (Credit: Justin Umholtz/NOAA).

NOAA Collaboration: Pacific Islands Climate Emergency Teachers Workshop

After months of planning and collaboration, ONMS educators Isabel (Bel) Gaoteote Halatuituia (NMSAS) and Justin Umholtz (PMNM) joined NOAA educators from Fisheries and the Office of Coastal Management to facilitate 5th-12th grade teachers from Guam, CNMI, Hawai'i and American Samoa in a three day virtual workshop focused on engaging students in climate change and community resilience activities. The three days were filled with cross-cultural sharing, inspiring speakers including Nicole Yamase and local youth climate champions, on-the-ground project examples

provided by local teachers, and extensive networking with climate related local NGOs and NOAA programs. Content experts introduced teachers to the NOAA Data in the Classroom modules, providing in-depth demonstrations on how NOAA sea level rise and coral data tools can be applied to their regions for student investigations. Overall, 134 teachers pre-registered for the workshop and will receive resources, 70 people attended the exhibitor showcase session, and 53 teachers attended the full three days. Post workshop survey participants indicated they intend to apply what they learned to their classes, with most teachers serving 100-200 students per year. Teachers continue to have access to resources through a Hawai'i Department of Education hosted [workshop website](#).



NOAA colleagues join to make the workshop a success. (Opening day screenshot/NOAA)

Tracking North Pacific Albatrosses to Understand Fishery Interactions

On June 16th, as part of the [National Marine Sanctuaries Webinar Series](#) and the Mokupāpapa Third Thursday by the Bay Lecture Series, Rachael Orben, Assistant Professor (Senior Research) with Oregon State University shared her research on the novel radar detecting biologging devices used to identify albatross-vessel encounters within and surrounding Papahānaumokuākea. The data will help scientists and managers better understand the impacts of fisheries on albatrosses in the North Pacific. There were 512 scientists, educators, students, and families registered for the webinar with 237 attending. Understanding what drives the interactions between albatross and fisheries operations can offer resource managers new perspectives on strategies to reduce negative encounters, thereby promoting ocean management and albatross conservation. These talks are supported by the National Marine Sanctuary Foundation through a grant from the National Fish and Wildlife Foundation.



Dr Orben studies fishing interactions with albatross species across the Pacific (Credit: Rachael Orben/OSU)

MDC Collaborations: Robotics and Deep Ocean Exploration

On July 19, MDC staff met with Megan Cook, Ocean Exploration Trust (OET) Director of Education and Outreach to discuss future collaborations, and a new deep-sea exhibit. MDC partners Christian Wong, Executive Director of the Hawai'i Science and Technology Museum (HSTM); and University of Hawai'i (UH) Hilo Assistant Professor Dr. John Burns, the developer of the Multiscale Environmental Graphical Analysis (MEGA) Lab, also participated. OET, John Burns, and HSTM are existing partners with MDC, but with the new HSTM Kenyon K. Beals Robotics Center, the MEGA Lab, and the upcoming Deep Ocean Exploration exhibit additions to the facility, this was an excellent time to connect our partners together to leverage the opportunities and learning experiences available, and enhance career pathways for local students on Hawai'i Island. In addition to sharing resources, plans include connecting the local robotics network to OET ship-to-shore visits with engineers and scientists, and developing pathways toward OET engineering internships, especially while the E/V Nautilus expeditions are in the Pacific. The MEGA Lab will also employ its new high tech space at MDC to engage the public during live ROV dives and other interactions with the E/V Nautilus team during expeditions.



Left: Megan Cook, Christian Wong and Andy Collins discuss robotics. Right: Megan Cook and Andy Collins meet virtually with Dr. John Burns in the developing Mega Lab. (Credits: Justin Umholtz/NOAA)

Get Into Your Sanctuary Day Celebrated in Rural Native Hawaiian Community

PMNM staff, along with Ko Olina Resort and other community partners, hosted a Get Into Your Sanctuary Day Celebration at Mā'ili Beach Park in Wai'anae on August 6, 2022. More than 150 people enjoyed activities including a beach cleanup, marine debris art show, and ocean education and sustainability activities. The event celebrated the 50th Anniversary of the National Marine Sanctuary System, including Papahānaumokuākea Marine National Monument, and the Year of the Limu.

Get Into Your Sanctuary Day raises awareness about the natural and cultural importance of our national marine sanctuaries and marine national monuments and ways we can protect these spectacular places. Several local organizations participated, including Papahānaumokuākea Marine Debris Project, Boys and Girls Clubs of Wai'anae and Nānākuli, 'Ewa Limu Project, Waimanalo Limu Hui, Kua'āina Ulu 'Auamo, Keiki O Ka 'Āina, Kuleana Coral, Parley for the Oceans, and 808 Cleanups.

The marine debris art show featured artists on site, including Susan Scott, Mark Cunningham, and PMNM staff member Kahi Fujii. Crowds enjoyed displays of unique art made from marine debris, much like that collected during the beach cleanup. Participants in the cleanup collected more than 200 pounds of debris from the beach and park.

The 'ōlelo no'eau (Hawaiian proverb) "A'ohē hana nui ke alu 'ia" translates to "No task is too big when done together by all." We can all make a difference collectively to mālama (care for) our world oceans.



Left: Students from the Wai'anae coast participate in beach and park clean-up while artists set up marine debris artwork at right. (Credit: Allison Yamakawa & Malia Evans/NOAA).



Left: Community members create their own artwork with limu stamps that highlight endemic marine algae found in PMNM. Right: Partner organizations share the importance of limu in Hawaiian culture as we celebrate Year of the Limu (Credit: Athline Clark/NOAA)



Stunning artwork created from marine debris by Susan Scott, Mark Cunningham, Kahi Fujii and Pua Borges (Credit: Allison Yamakawa & Malia Evans/NOAA).

PMNM Scientist To Be Featured in Responsible Fishing PSA

On Aug. 12, PMNM Research Ecologist Randy Kosaki was filmed alongside champion skin diver and spearfisher Kimi Werner for a “Fish Pono” PSA. In Hawai‘i, “pono” means to do what is right or proper. The “Fish Pono” campaign, spearheaded by PMNM RAC research member Dr. Mark Hixon, is aimed at encouraging fishers to fish responsibly and to avoid excessive take of herbivores, which are known to confer resilience on coral reefs. Other watermen filmed for the PSA included master navigator Nainoa Thompson and legendary surfer and water safety expert Brian Keaulana.



Kimi Werner (L) and Randy Kosaki (R) filmed for PSA. Photo: Paul Atkins, Moana Productions.

Holu Lalo: A Strategy for Enhancing Resilience of French Frigate Shoals Atoll

On August 18, as part of the [National Marine Sanctuaries Webinar Series](#) and the Mokupāpapa Third Thursday by the Bay Lecture Series, Kiloaulani Ka'awa-Gonzales, an E. Gordon Grau Fellow with UH Sea Grant, provided a biocultural overview of Lalo (French Frigate Shoals) and shared the progress of NOAA Region, PMNM and our climate collaborators to identify priority climate stressors as well as adaptive management options. Kiloaulani also shared the remaining process to establish a comprehensive and collaborative strategy to maintain and enhance the resilience of terrestrial and marine habitats at Lalo. There were 337 scientists, educators, students, and families registered for the webinar with 153 attending.



Images denoting some of the iconic species as well as species stressors such as the old retaining wall at Tern Island. (Credits NOAA)

Kenyan K. Beals Community Robotics Center Grand Opening

On August 20, over 375 people gathered to honor the memory of local robotics mentor Kenyan K. Beals and to officially open the Kenyan K. Beals Community Robotics Center at Mokupāpapa Discovery Center. The center is a joint project with the Hawai'i Science and Technology Museum in Hilo, and is partially supported through funding from HELCO (Hawaiian Electric and Light Company), where Kenyan K. Beals was employed as a community outreach specialist. Though Kenyan has passed, his family was present for the dedication, and noted that teaching robotics was one of his passions and he would be proud to see the opening today. The robotics center supports training and development for VEX Robotics and other robotics competitions; is a community space to learn about robotics, electronics, engineering, and coding; and supports robotics teams across Hawai'i Island. Robots and remotely operated vehicles are increasingly used in ocean exploration, mapping, and even restoration, and this facility will be inspiring the next generation of marine researchers and explorers.



(Left) The Beals family stands with a plaque honoring Kenyan. (Right) The opening ceremony was packed with community supporters and local robotics team members. (Credits: Andy Collings/NOAA)

Research and Field Operations

PMNM Field Team Attends eDNA Sampling and Filtration Workshop

On July 9, PMNM Field Team members Brian Hauk, Keo Lopes, and Jason Leonard attended an environmental DNA (eDNA) Sampling and Filtration Workshop hosted by the University of Hawai'i's Zoology Ph.D. candidate Patrick Nichols. Attendees ran through collection and water filtration protocols which included hands-on practice and discussion on completing the techniques in the field. These skills and techniques will be used on future missions in Papahānaumokuākea to gather valuable data regarding the presence of *Chondria tumulosa* and better assist with resource protection, research, and management for the monument.

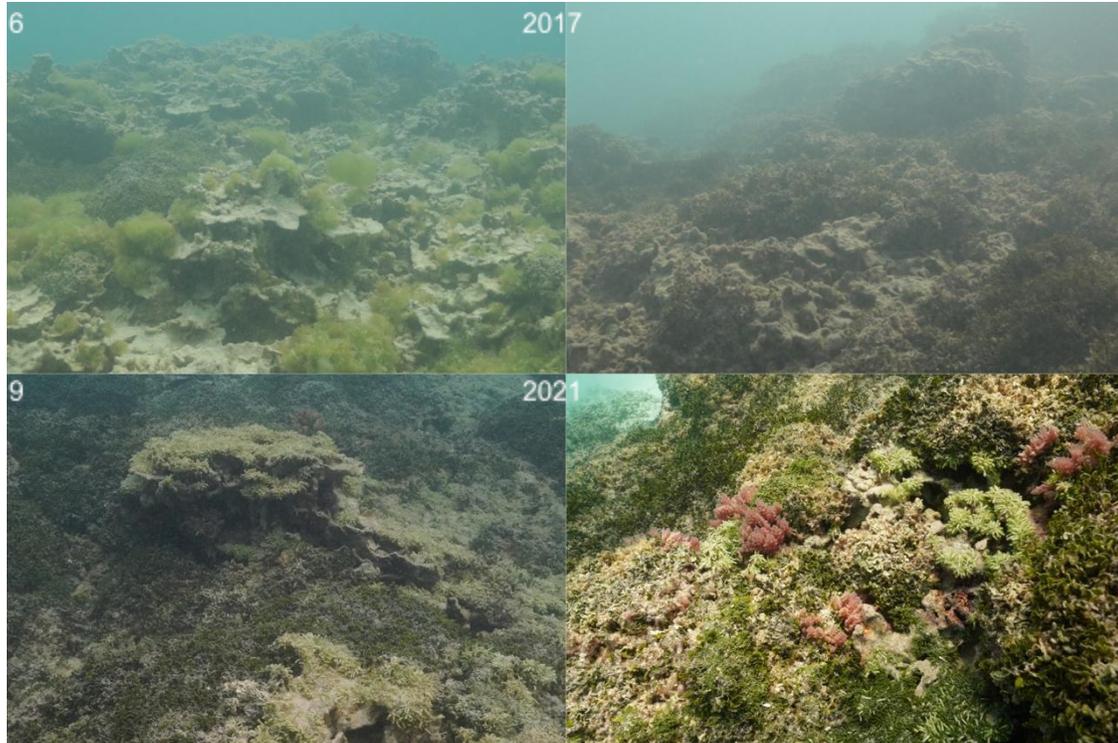


Photo: PMNM Field Team members Brian Hauk and Keo Lopes at eDNA Filtration Workshop (J. Leonard/NOAA).

Scientists Document Seven Years of Recovery After 2014 Mass Coral Bleaching

On July 21, PMNM and University of Hawai'i at Hilo MEGA Lab scientists published a study documenting seven years of successional changes in the benthic community after a mass coral bleaching and mortality event at Kapou (Lisianski Island) in 2014. Formerly characterized by very high (>85%) coral cover, the mass bleaching event resulted in nearly 100% coral mortality. In subsequent years, a series of algal communities colonized the dead coral, and 3D volumetric analyses using photogrammetry documented the gradual erosion of the reef structure. New coral recruits were observed during annual surveys following the bleaching event.

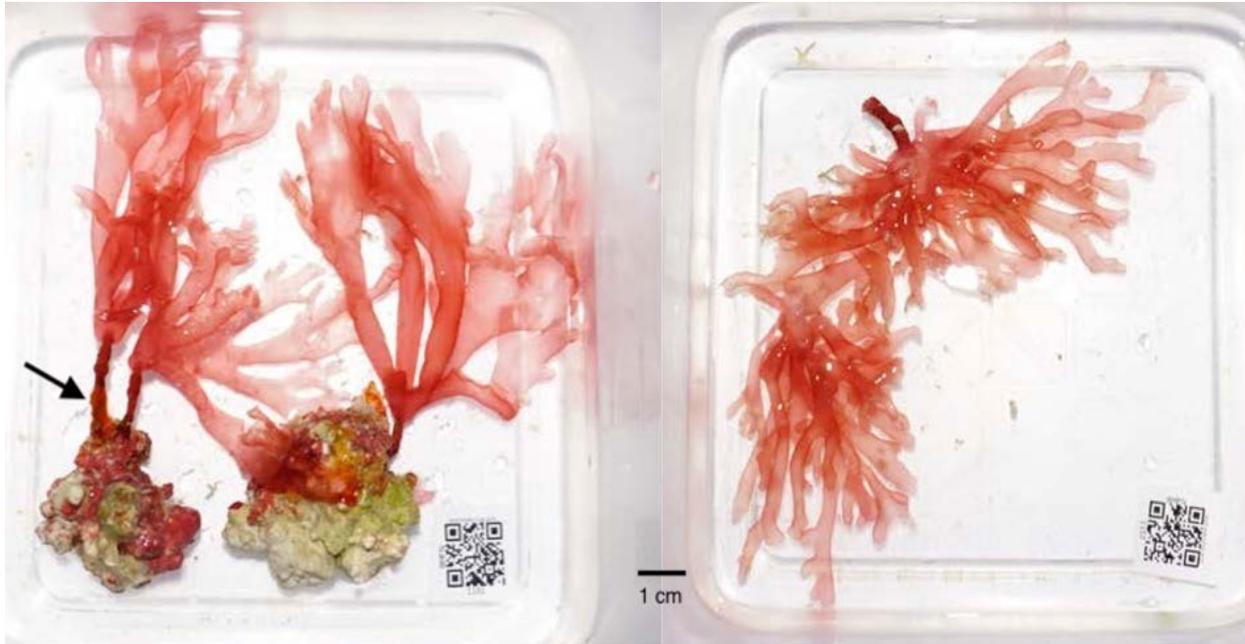
Fukunaga A., Burns J.H.R., Pascoe K.H., and Kosaki R.K. 2021. A remote coral reef shows macroalgal succession following a mass bleaching event. Ecological Indicators 142: <https://doi.org/10.1016/j.ecolind.2022.109175>



Kapou (Lisianski) site photos showing changes in algal communities over time following the 2014 mass coral bleaching and mortality event.

Mesophotic Red Algae from PMNM Receives Ōlelo Hawai‘i Species Epithet

On July 27, research scientists from the PMNM, the Univ. of Hawai‘i, and the College of Charleston published the description of a new species of red algae discovered by PMNM Research Ecologist Randy Kosaki on mixed gas rebreather dives between 260 and 330 ft. depth at Lalo (French Frigate Shoals) and Kapou (Lisianski). Working with PMNM’s Cultural Working Group, the scientists conferred the name *Gibsmithia punonomaewa* upon this species. The species epithet is a combination of several words in ‘Ōlelo Hawai‘i (Hawaiian language). “Pūnono”, meaning “gorgeously red”, is representative of this alga’s most striking feature – its color. From its anchored base, the alga stands upright making it one of the taller algae in this habitat. “Māewa,” which means “swaying, as something with an anchored base, as seaweed,” reflects this alga’s graceful and elegant hula-like moves in the ocean’s current. Most species of *Gibsmithia* are from shallow reefs, and *G. punonomaewa* represents the first report of an exclusively mesophotic species in this genus. The publication is available online at <https://www.tandfonline.com/doi/full/10.1080/00318884.2022.2093540?src=> .

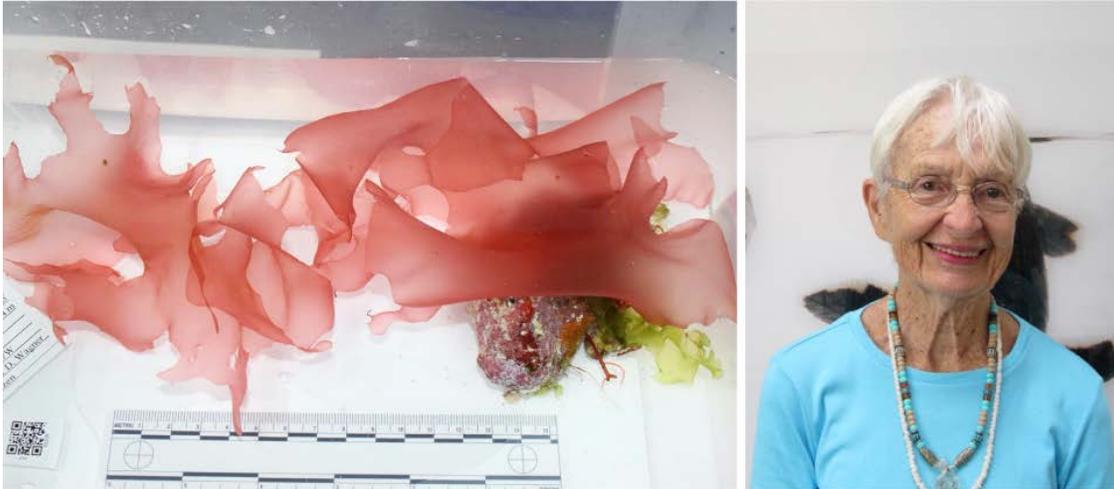


Gibsmithia punonomaewa, a new species of red algae discovered on the deep (mesophotic) reefs of PMNM. The thick stem-like stipe (arrow) deposits growth rings similar to those of some vascular plants and can be used to age the alga.

New Red Alga Named After Long-Time Council Member Laura Thompson

On August 3, research scientists from PMNM, the University of Hawai'i, and the College of Charleston described a new species of red algae previously collected by PMNM's rebreather divers between 230 and 280 ft. depth at Manawai (Pearl and Hermes Atoll) and Kapou (Lisianski Is.). The new alga, *Croisettea kalaukapuae*, was named after NWHI Reserve Advisory Council founding member Laura Thompson. Kalaukapu, "to hold the leaf sacred," was Laura's Hawaiian middle name bestowed by her grandmother. Beyond Laura's work on behalf of the NWHI and PMNM, she was an advocate for protecting all of the natural and cultural resources of Hawai'i. Laura is also the mother of voyaging canoe Hōkūle'a's master navigator, Nainoa Thompson. Laura Thompson passed away in August 2020.

Cabrera FP, Huisman JM, Spalding HL, Kosaki RK, Smith CM, Sherwood AR. Further studies on Hawaiian Kallymeniaceae (Rhodophyta) reveal pseudocryptic diversity in the genus *Croisettea*. *Phycologia* [10.1080/00318884.2022.2096823](https://doi.org/10.1080/00318884.2022.2096823)



(L) *Croisettea kalaukapuae*, n. sp., collected at Kapou (Lisianski Island), 85 m. (photo: D. Wagner, NOAA). (R) Laura Kalaukapu Low Lucas Thompson (1925-2020), founding NWHI Reserve Advisory Council member (photo: A. Collins, NOAA).

PMNM Staff Support Multi-Agency research in Kuaihelani (Midway Atoll)

From July 12-28, PMNM staff supported NFWF funded research and conducted a myriad of experiments and data collection. These experiments included “lethality trials” that tested the effectiveness of various treatments to kill *Chondria tumulosa*, oceanographic sampling, environmental DNA collections, 3D structure from motion reef models, population genetic sample collections, and over 150 visual inspections to determine the extent and coverage of this alga. Other findings included the documentation and confirmation of another alien alga at Kuaihelani, *Acanthophora spicifera*, which had not been officially documented until a tip from a FWS volunteer alerted PMNM staff to the location. A major invasive outbreak of *Chondria* was first noted at neighboring Manawai (Pearl and Hermes Atoll) in 2019 and discovered at Kuaihelani in 2021. “Team Chondria” consisted of researchers from the College of Charleston (Taylor Williams) and the University of Hawaii (Mario Kaluhiokalani) along with PMNM staff members Keolohilani Lopes Jr. and Brian Hauk. ONMS provided a small boat and equipment for in-water survey efforts. The team trained FWS staff and volunteers to identify *Chondria tumulosa* as well as other commonly misidentified species. PMNM staff worked directly with FWS managers to survey key areas of concern in order to better inform management decisions. FWS also provided in-kind support throughout the operation which greatly increased the effectiveness of the mission.



Images: (Top, Left) Close-up on *Chondria tumulosa* thalli being separated for lethality trials [photo credit: Heather Spalding], (Top, Right) Lethality trial set showing dessicated fragments subjected to full sun, partial shade and control treatments (photo credit: Brian Hauk). (Bottom, Left) Using a Pulse-Amplitude-Modulation (PAM) chlorophyll fluorometer to determine viability of fragment trials [photo credit: Keo Lopes Jr.], (Bottom, Right) *Acanthophora spicifera* is a new alien algae record for PMNM [photo credit: Brian Hauk]



Images: (Left) Team *Chondria* poses in front of Refuge office with Deputy Refuge Manager Eldridge Naboa [photo credit: Jon Plissner], (Center) *Porites lobata* coral head with overgrowth of *C. tumulosa* [photo credit: Brian Hauk], (Right) FWS Refuge Manager and staff attempt to identify algae specimens [photo credit: Brian Hauk]

Policy & Programs

2022 Pacific Islands Region Summer Intern Symposium

On July 28th three interns with Papahānaumokuākea presented on the work they are doing for the monument. Two interns, Kara Murphy and Allison Yamakawa are with Hollings Preparatory program and Caroline Edmunds is a Hollings Scholar shared with NMFS. The symposium highlighted the work of all NOAA summer interns in the Pacific Region. Kara Murphy is developing a 360 virtual tour for the monument's Mokupāpapa Discovery Center in Hilo, and Allison Yamakawa is developing World Heritage content to feature the monument on Google's Art's and Culture UNESCO virtual exhibits page. Caroline Edmunds is working on a project around coral husbandry at the Waikīkī Aquarium under the mentorship of Dr. Randy Kosaki. A recording of the symposium can be found here: <https://www.youtube.com/watch?v=PrpjMIGjXH4&feature=youtu.be>



Hollings Scholar Caroline Edmunds presents her summer internship coral husbandry work with Waikīkī Aquarium under the mentorship of Dr. Randy Kosaki.