STATEMENT FOR THE RECORD BY

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

HEARING ON

HCR 36/HR 31 REQUESTING THE UNIVERSITY OF HAWAI'I TO WORK WITH THE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION AND DEPARTMENT OF EDUCATION TO CREATE A CORAL REEF ADVISORY TEAM OF YOUTH

BEFORE THE

HIGHER EDUCATION SUBCOMMITTEE
AGRICULTURE AND ENVIRONMENT SUBCOMMITTEE

SENATE OF THE THIRTY-FIRST LEGISLATURE OF THE STATE OF HAWAI'I

March 30, 2022

Chair Donna Mercado Kim, Vice Chair Michelle N. Kidani, and members of the Higher Education Subcommittee, Chair Mike Gabbard, Vice Chair Clarence K. Nishihara, and members of the Agriculture and Environment Subcommittee, thank you for the opportunity to testify regarding the HCR 36/HR 31 Requesting the University of Hawai'i to work with the National Oceanic and Atmospheric Administration and Department of Education to create a coral reef advisory team of youth. We thank the Subcommittee for recognizing the threats to coral reefs and for empowering youth to become stewards for coral restoration and recovery.

Overview of U.S. Coral Reef Ecosystems

Coral reef ecosystems play an outsized role in the health of our ocean; they occupy less than one percent of the planet's surface area but support an estimated 25 percent of all marine species.[1] Healthy coral reefs provide culturally and economically valuable ecosystem services to the American public such as food, opportunities for recreation and tourism, coastal protection and resilience, and raw materials used to create bio-pharmaceutical products. These services are valued at approximately $9.8 trillion globally,[2,3] including $8.5 billion for Southeast Florida

[1] Burke, L., D. Bryant, J. McManus, and M. Spalding. 2008 Reefs at Risk, World Resources Institute (WRI): 56p.
[2] Costanza, R. et. al. Changes in the global value of ecosystem services. Global Environmental Change. 2014; 26: 152-158.
[3] deGroof, R., et al. Global estimates of the value of ecosystems and their services in monetary units. 2012; 1(1): 50-61.

coral reefs[4] and $9.7 billion for Hawai'i coral reefs.[5] It is also important to recognize the cultural significance of healthy coral reefs to the indigenous peoples, who were the original stewards of these resources, and to the many people who depend on corals for their livelihoods, recreation, and sense of place.

Coral reef ecosystems confront multiple, compounding stressors on a global scale. Pollution, fishing impacts, and the climate-induced impacts of coral bleaching and ocean acidification have destroyed or severely damaged many of the world's reefs. In 2004, NOAA listed two Caribbean reef coral species as threatened under the Endangered Species Act. NOAA listed twenty additional Indo-Pacific and Caribbean reef coral species as threatened in 2014, and coral reefs subsequently experienced unprecedented losses during the third global bleaching event between 2014 and 2017, the third such event in recent decades.

NOAA is involved in monitoring the status of corals in Hawai'i through its National Coral Reef Monitoring Program (NCRMP). The NCRMP employs a holistic approach to its monitoring, looking at not only the corals and algae, but also the fish, climate, and socioeconomics of corals. Biological and climate monitoring occurs every three years (last completed in FY19), while socioeconomic monitoring occurs every five to seven years (last completed in FY20). These surveys are compared to historical data to assess the current state of the reefs on a 0-100% scale. The Main Hawaiian Islands coral reefs are in fair condition (71% overall score), but conditions in these locations are moderately impacted or have declined moderately. Benthic cover is highly impacted, and coral populations are impaired. Fish are moderately to very impacted. As is common in populated areas, reef fish populations are depleted, indicated by relatively small sizes of fishery species and low overall fish biomass. Climate change is negatively affecting the coral reefs of Hawai'i via thermal stress and ocean acidification, both of which are already moderately impacting the islands. Human connections to the reef are good, which means communities have awareness about the reefs and engage in behaviors that protect reef ecosystems. These conditions show that the Main Hawaiian Islands are moderately impacted overall compared to their historical baseline but suggest that Hawaiian coral reefs are struggling against threats such as overfishing and climate change.

The Northwestern Hawaiian Islands are the mostly uninhabited northwestern three quarters of the Hawaiian Archipelago stretching 1,350 miles. They are completely encompassed within the Papahānaumokuākea Marine National Monument and include coral islands, seamounts, banks, and shoals. The coral reefs of the Northwestern Hawaiian Islands are assessed as in fair condition (76% overall score). Benthic cover has declined moderately and coral populations are fair. Populations of reef fish and sharks are in very good condition, likely due to the lack of fishing

[4] Johnson, GM, VR Leeworthy, FW Bell, and MA Bonn. (2001). *Socioeconomic Study of Reefs in Southeast Florida Final Report. Final Report for Broward County, Palm Beach County, Miami-Dade County, Florida Fish and Wildlife Conservation Commission, and NOAA.*

[5] NOAA. (2013). *Summary Report The Economic Value of U.S. Coral Reefs*.

pressure in these remote areas. Coral reefs in the Northwestern Hawaiian Islands have experienced temperature stress and ocean acidification, however, and the overall climate condition is assessed as critical. These results indicate that even remote areas are not refugia from the effects of climate change.

NOAA's Youth Engagement in Hawai'i

Office of Education

NOAA recognizes the importance of youth voices in activities and discussions aimed at addressing climate change and its impacts. As NOAA works to build a Climate Ready Nation - a thriving Nation whose prosperity, health, safety, and continued growth benefit from and depend upon a shared understanding of and collection action on climate change - the agency recognizes the essential role that youth play in this effort. Through various grants programs and student opportunities, NOAA's Office of Education (OEd) works to empower and equip youth with the knowledge and skills to take action against some of the major issues impacting their communities. These programs have successfully collaborated with the University of Hawai'i on these priorities. NOAA supports the creation of a coral reef advisory team of youth to further this work.

Environmental Literacy Program (ELP)

OEd has worked with the University of Hawai'i through its grant programs such as the Environmental Literacy Program (ELP). ELP awarded the University of Hawai'i with funding to implement a three-year project to engage Maui County high school educators and students in learning about the impacts of climate change, including ocean acidification impacts on coral reefs and marine life, and how their communities can better prepare for, respond to, and recover from those impacts. Using NOAA's expertise and resources, the project is empowering over 200 youth to reason about the ways that human and natural systems interact globally and locally, participate in civic processes, and translate their knowledge and skills into actions that increase resilience within their communities.

Hawai'i Bay Watershed Education and Training (B-WET)

The Hawai'i Bay Watershed Education and Training (B-WET) program has a long history of working with the Hawai'i Institute of Marine Biology (HIMB) in the University of Hawai'i system on coral education projects for youth. B-WET projects focus on topics like Indigenous local knowledge, climate change, earth sciences, resilience, coral reef ecology, and conservation, and promote experiential learning primarily for grades K-12. Currently, B-WET is funding Mālama Maunalua to partner with the University of Hawai'i's HIMB, Paiko Lagoon Wildlife Sanctuary and the Maunalua Fishpond Heritage Center to implement a project designed to teach 1,000 K-12 students about the cultural significance, ecological importance, and threats that face their watershed, as told through impacts on coral reefs. Students take part in an outdoor camp in the Maunalua watershed incorporating classroom educational principles into an inquiry-based

scientific, restoration, and cultural experience. In addition, students, teachers, and the community are assisting HIMB in testing climate resilient corals that were outplanted in Maunalua Bay.

José E, Serrano Educational Partnership Program with Minority Serving Institutions and Ernest F. Hollings Scholarship Program

OEd has also supported students attending the University of Hawai‘i through the José E. Serrano Educational Partnership Program with Minority Serving Institutions (EPP/MSI) Undergraduate Scholarship Program and the Ernest F. Hollings Undergraduate Scholarship Program. Both programs provide undergraduate students with a two-year academic scholarship and paid full-time internships at NOAA to get hands-on scientific research experience and training. Participants study various topics, such as the impact of human activities on corals. One of the major goals of both programs is to support the training and graduation of students and develop their skills to increase their eligibility to join the workforce in NOAA-related fields.

Citizen Science

Finally, OEd supports citizen science by helping to manage a community of practice and representing the agency in broader efforts. NOAA has partnered with the University of Hawai‘i on citizen science projects. For example, the Hui O Ka Wai Ola (Association Of The Living Waters) is a group of water quality champions that is dedicated to measuring and sharing the status of Maui Nui's ocean water. Volunteers test for salinity, pH, temperature, organic nutrients, dissolved oxygen, and total suspended sediment to measure coastal waters for coral reef-harming pollutants. The findings are compared to the Department of Health Clean Water Branch water quality limits to keep communities informed.

Through these programs and activities, NOAA has seen the impact that youth and student voices can have and the meaningful work that young people can accomplish. OEd’s programs and activities would benefit from working with the University of Hawai‘i to create a coral reef advisory team of youth. The agency has many resources to offer and an established partnership with the institution to help achieve this goal and further push its work with youth to address climate change impacts at a higher level.

Hawai’i Sea Grant

Based at the University of Hawai’i, Hawai’i Sea Grant is part of a network of 34 federal-university partnership programs that comprise the National Sea Grant College Program. For over 50 years, Hawai’i Sea Grant has conducted research, outreach, and education focused on serving Hawaiian communities, including programming on Hawai’i’s coral reefs. Hawai’i Sea Grant employs and/or supports multiple coral and educational experts, and the Hawai’i Sea Grant Center of Excellence in Marine Science Education is dedicated to building partnerships that enhance marine science education at all levels (Kindergarten through graduate school and in the public community). From February 2018 through January 2020, Hawai’i Sea Grant educated

over 650,000 students through K-12 programming and over 1.8 million people through informal educational programs. For example, Hawai'i Sea Grant's Hanauma Bay Education Program hosts visiting school groups and organizes marine and conservation related evening presentations for the public. In operation for over 30 years, it is a successful example of balancing the needs of the expanding tourism industry with the conservation of natural resources and education of students and the public about the importance of conservation.

NOAA's Work on Coral Reef Ecosystems in Hawai'i

NOAA's Coral Reef Watch Program

NOAA's National Environmental Satellite, Data, and Information Service (NESDIS) established the Coral Reef Watch (CRW) program in 2000. The program began after many years of refining the satellite-based observations from NOAA's GOES, POES, and JPSS satellites with in-situ observations to ensure the sensitivity of the models were accurately detecting conditions that could lead to coral reef bleaching. NOAA leveraged the knowledge of the world-class coral reef scientists at the University of Hawai'i and the Hawai'i Institute of Marine Biology to help refine the models. For more than 20 years, NOAA CRW has utilized remote sensing, and modeled and *in situ* data to observe, predict, and report to its users on the coral reef environment worldwide. In Hawai'i, CRW has observed that the onset of the El Niño Southern Oscillation usually leads to conditions that result in coral bleaching events in the Northwest Hawaiian Islands and eventually the Main Hawaiian Islands. CRW monitors the ENSO/La Niña to provide the only global early warning system of coral reef ecosystem physical environmental changes. The award winning documentary *Chasing Coral* featured the work of CRW and the work of coral reef scientists in Hawai'i.

NESDIS continues to refine CRW by collaborating with natural resource managers and scientists worldwide. CRW works with the State of Hawai'i Division of Aquatic Resources, which hosts a Coral Bleaching reporting page that provides the public with an opportunity to participate in reporting coral bleaching events. The NOAA Coral Reef Information System (CoRIS) provides a trove of key documents that are readily available on the internet for student research and education on the state of corals as well as strategies for preserving coral ecosystems. CRW has co-sponsored workshops and seminars to spread the knowledge of how to apply data from its satellites to natural resource management. Some of this content is available online. NESDIS also hosts a Regional Climate Service Director in Hawai'i who is available to work with interested scientists and youth.

NOAA looks forward to the joint work between NOAA and the youth of the State of Hawai'i envisioned by this bill.

Coral Reef Conservation Program

Established in 2000, the Coral Reef Conservation Program fulfills NOAA's responsibilities under the Coral Reef Conservation Act of 2000 and Executive Order 13089 on Coral Reef Protection. The Program brings together expertise from across NOAA and other partners, including federal managers, state and territorial governments, academic institutions, nongovernmental organizations, and community groups. The primary purpose of these cross-cutting multi-sector collaborations is to improve the scientific understanding of coral reef ecosystems for more effective ecosystem management, conservation, and restoration. The Program works in American Samoa, the Commonwealth of the Northern Mariana Islands, Florida, Guam, Hawai'i, Puerto Rico, and the U.S. Virgin Islands. The Program also monitors coral reefs in the Northwestern Hawaiian Islands, the Pacific Remote Island Areas, and Flower Garden Banks National Marine Sanctuary in the Gulf of Mexico, and supports capacity-building efforts in international areas in the Caribbean and Pacific.

The NOAA Coral Program is proud of its work (both direct and in partnerships) to help reduce the threats to Hawai'i's coral reefs, including land-based sources of pollution, excess fishing, and climate change. The program provides the best available science and tools for coral conservation across the state, including a number of programs, science for biological and oceanographic monitoring of Hawai'i's reefs including both the main Hawaiian Islands and remote atolls, and socio-cultural surveys to better understand the links between corals and communities. Through strong partnerships with Hawai'i's Division of Aquatic Resources and the Hawai'i Division of Conservation and Resource Enforcement (DOCARE), the NOAA Coral Program has helped the state monitor its reef and conduct restoration projects (both mauka and makai) throughout the islands, with particular emphasis on West Maui and West Hawai'i, as well as state-wide initiatives, such as Makai Watch and Eyes of the Reef. The NOAA Coral Program also partners with the University of Hawai'i, The Nature Conservancy, Conservation International, and Hawai'i Institute of Marine Biology to fund and implement a number of projects to help with management, rules and regulations, conservation and restoration of coral reefs.

The program also is an active contributor to the education of our next generation of local scientists and resource managers. Outreach and education are central to achieving our conservation goals. NOAA's Coral Reef Conservation Program (CRCP), in partnership with the Department of Interior, coral jurisdictions, and NOVA University, funds and manages the Coral Reef Management Fellowship program that places highly qualified young professionals within local managing agencies. In Hawai'i, the National Coral Reef Management Fellow is embedded within Hawai'i's Division of Aquatic Resources. In addition, CRCP is part of a broader NOAA engagement in Hawai'i across line offices and programs, including with the Office of National Marine Sanctuaries, Pacific Islands Regional Office, and Pacific Islands Fisheries Science Center. Together, we have an active presence in yearly science fairs, outreach programs, and development of formal educational materials that are in use in Hawai'i's classrooms.

National Marine Fisheries Service

A partnership between University of Hawai'i (UH) and NOAA Fisheries would enhance science, technology, engineering, and math (STEM) teachers' and students' knowledge and exposure to available careers in scientific research and the use of applied science for marine resource management. Such a partnership would localize kindergarten through 12th grade curricula and hands-on exercises while preserving national education guidelines. NOAA Fisheries support could include: 1) training teachers on coral reef science and management for their target student and community audience, and 2) enhancing the Partnerships for Reform through the investigative Science and Math programs curricula related to coral reefs. Experiential learning helps develop students' abilities and skills to ask targeted questions, think critically, problem solve, and apply research towards the questions asked.

To achieve the above, NOAA Fisheries would first assess its available coral reef science and management tools, form working groups to organize this effort, and coordinate program implementation with the University of Hawai'i. NOAA Fisheries' Ambassador outreach programs would further complement this effort through staff presentations on marine topics, community engagement, and career opportunities to classrooms. Finally, teachers may sign up for marine focused presentations and pre-made classroom kits from NOAA Fisheries' available inventory of educational materials.

Conclusion

Thank you again for the invitation to testify. NOAA appreciates the Subcommittees' recognition of the threats to coral reefs and looks forward to supporting the empowerment of Hawaiian youth to become stewards for coral restoration and recovery.

HCR-36
Submitted on: 4/13/2022 2:54:31 PM
Testimony for HRE on 4/19/2022 2:00:00 PM

Submitted By	Organization	Testifier Position	Testify
Ted Bohlen	Testifying for Hawai‘i Reef and Ocean Coalition	Support	Written Testimony Only

Comments:

The Hawai‘i Reef and Ocean Coalition **STRONGLY SUPPORTS** HCR36!

We need to engage and educate young minds who can help save the coral from the human-caused challenges of ocean warming and acidification, sediments, nutrients, other polluted runoff, over-fishing (especially of herbivores), and chemical sunscreens.

Please pass this resolution!

Mahalo!

Hawai‘i Reef and Ocean Coalition (by Ted Bohlen)

HCR-36
Submitted on: 4/14/2022 11:50:52 AM
Testimony for HRE on 4/19/2022 2:00:00 PM

Submitted By	Organization	Testifier Position	Testify
Lisa Bishop	Testifying for Friends of Hanauma Bay	Support	Written Testimony Only

Comments:

Friends of Hanauma Bay supports HCR36 as a means to facilitate the creation of curricula and initiatives to further youth education, research, and engagement about coral reef conservation and restoration.

Mahalo for the opportunity to testify in support of this resolution.

'With Aloha,

Lisa Bishop

President

Friends of Hanauma Bay

to facilitate the creation of curricula and initiatives to further youth education, research, and engagement about coral reef conservation and restoration

HCR-36
Submitted on: 4/15/2022 12:02:02 PM
Testimony for HRE on 4/19/2022 2:00:00 PM

Submitted By	Organization	Testifier Position	Testify
Dana Keawe	Individual	Support	Written Testimony Only

Comments:

Support

HCR-36
Submitted on: 4/16/2022 7:09:26 AM
Testimony for HRE on 4/19/2022 2:00:00 PM

Submitted By	Organization	Testifier Position	Testify
chris shuler	Individual	Support	Written Testimony Only

Comments:

As a water quality researcher working for the University of Hawaii I recognize the importance coral ecosystems play to our state's wellbeing. I appreciate the state's interest in creating frameworks that can be used to appropriately and effectivly mange these resources and educate our citizens about their importance. I support this bill as it appears that it will promote this goal

HCR-36
Submitted on: 4/18/2022 9:30:03 AM
Testimony for HRE on 4/19/2022 2:00:00 PM

Submitted By	Organization	Testifier Position	Testify
Lupita Ruiz-Jones	Individual	Support	Written Testimony Only

Comments:

I am writing in support of HCR36/HR31: REQUESTING THE UNIVERSITY OF HAWAII TO WORK WITH THE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION AND DEPARTMENT OF EDUCATION TO CREATE A CORAL REEF ADVISORY TEAM OF YOUTH.

High school and college students are at a critical place in their development as stewards of the land and sea. Here in Hawai'i the youth are surrounded by the ocean and engagement with the ocean is the primary source of joy for many. Hawai'i's future is dependent on the values and critical thinking skills of the current local youth. Engaging the youth in discussions of climate change will start a cascade with the potential of creating a society here that is smart about coping with climate change in the islands. The University of Hawaii and NOAA are major stakeholders; the youth will learn from experts, while the experts will expand their creativity at solution brainstorming by learning from the youth. As a new college professor here I see the strong emotions the youth can have about the projections of the future and also the potential they have at brainstorming creative solutions.

I think this bill is a first step in empowering the youth to create a future with a healthy environment and healthy communities ~ yay!

Mahalo for your time~*

UNIVERSITY OF HAWAI'I SYSTEM
Legislative Testimony

LATE

Testimony Presented Before the
Senate Committee on Higher Education and
Senate Committee on Agriculture and Environment
Tuesday, April 19, 2022 at 2:00 p.m.
By
Bonnie Irwin
Chancellor
University of Hawai'i at Hilo

HCR 36 – REQUESTING THE UNIVERSITY OF HAWAII TO WORK WITH THE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION AND DEPARTMENT OF EDUCATION TO CREATE A CORAL REEF ADVISORY TEAM OF YOUTH.

Chairs Kim and Gabbard, Vice Chairs Kidani and Nishihara, and members of the committees:

Mahalo for this opportunity to submit this testimony of the University of Hawai'i at Hilo (UH Hilo) on HCR 36 which proposes the University work with the National Oceanic and Atmospheric Administration (NOAA) and the Department of Education (DOE) to create a Coral Reef Advisory Team of Youth. HCR 36 specifically references the Partnership for Reform through Investigative Science and Math Program (PRISM), which is an initiative that began as a partnership between UH Hilo and Hawai'i island K-8th grade schools.

The UH Hilo School of Education and Tropical Conservation Biology and Environmental Science Program were the lead units in developing PRISM, which was done through a three-year grant from the National Science Foundation (NSF). The PRISM program has not been operational since the NSF funding ended in 2010, however, the materials developed through the project and contact at UH Hilo remain available for teachers across the state who still use the curriculum resources.

UH Hilo supports efforts to involve youth in the conservation and management of natural resources. Restarting the PRISM program will require additional funding and staffing. We recommend removing the reference to the PRISM program in the resolution.

Mahalo for the opportunity to provide testimony and considering our recommendation.