



PACIFIC ISLANDS

CLIMATE ADAPTATION SCIENCE CENTER

PI-CASC University Consortium
2023 Annual Report (Year 4)

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ADMINISTRATIVE DETAILS

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PURPOSE AND OBJECTIVES

The PI-CASC University Consortium partners with the administrative staff, faculty, and overall capacity of the University of Hawai‘i Sea Grant College Program (Hawai‘i Sea Grant) to leverage synergistic outcomes in carrying out the CASC mission and vision. In this fourth year of our host agreement, consortium activities have illustrated the benefits of this partnership, particularly through research funding of PI-CASC Graduate Scholars in connection with Sea Grant-funded peer-reviewed and refereed research projects focused on climate adaptation, among other endeavors described within this report.

The consortium, hosted at the University of Hawai‘i at Mānoa (UHM), has brought an innovative, dual competition approach to the CASC Network’s Climate Adaptation Postdoctoral (CAP) program and used a number of inter-agency agreements (IAAs) to facilitate partnerships between federal agencies while moving funding for several faculty hires in support of PI-CASC efforts. These new positions include: a faculty coordinator for the Pacific Regional Invasive Species and Climate Change (Pacific RISCC) management network; the creation of a critical liaison position to build capacity and partnerships across federal agencies and universities; the establishment of a joint hire with Hawai‘i Sea Grant for a GIS specialist; and continued support for climate extension services based at the University of Hawai‘i at Hilo (UHH).

Critical to addressing place-based needs and capacity building for the future, the University of Guam (UOG) has continued and expanded their innovative “flip the script” Climate Adaptation for Resource Management (CARM) program, while the University of Hawai‘i at Hilo (UHH) has broadened their efforts to aid ongoing community adaptation through ever-stronger personal ties to community networks, including through the Manager Climate Corps (MCC) program. During this reporting cycle, the consortium funded 17 university-based research projects through our host agreement, supporting graduate student stipends and professional development opportunities through our Graduate Scholars, MCC, and CARM programs (see [Appendix A](#)). UHM co-administered funding for 15 additional university-based projects funded through USGS cooperative agreements (project solicitations), with six more graduate students, who participated in our Graduate Scholars cohort. The consortium continued an innovative approach of using interagency agreements to bring supplemental USGS funding into the university to support PI-CASC initiatives, including support for graduate student researchers on three additional projects. In all, the consortium supported 25 graduate students, two postdoctoral researchers, and four new undergraduates in the 2023 Summer Undergraduate Research Fellowship (SURF) program.

Several PI-CASC personnel were recognized for their leadership this year, including: Deputy Director Dr. Brad Romine appointed as one of five commissioners on the City & County of Honolulu Climate Change Commission; Farron Taijeron, a CARM student, recognized by the Guam legislature for his conservation work; three graduate scholars given symposium oral presentation awards; two scholars earned awards in a science photo contest; and one scholar selected as the featured artist for the local Hawai‘i Conservation Conference.

ORGANIZATION AND APPROACH

Table 1. Personnel funded by PI-CASC Consortium Cooperative Agreement and their roles

Name	Institution	Title	Role/Responsibilities	FTE
Dr. Bradley Romine	UH Mānoa	University Consortium Deputy Director	Award co-PI, assists the director in consortium coordination	.50
Dr. Romina King	U of Guam	University Lead UOG	Leads and coordinates PI-CASC activities at UOG	.10
Scott Laursen	UH Hilo & UH Mānoa	Climate Adaptation Extension Specialist	Coordinates co-production project development through MCC activities	.50
John Borja	U of Guam	Guam Communications Coordinator	Leads and facilitates communications for UOG member	.25
Dr. Rachel Lentz	UH Mānoa	Communications Specialist; Undergraduate Research Coordinator	Coordinates communications efforts for consortium/organizes SURF program	.60
Una Ching	UH Mānoa	Administrative Officer	Human Resources and travel coordinator	.10
Fiscal Support	UH Hilo		Fiscal administration of PI-CASC funding	.20

Table 2. Personnel contributing extramurally funded support to PI-CASC efforts

Name	Institution	Title	Role/Responsibilities	FTE
Dr. Darren Lerner	UH Mānoa	Consortium Director	Award PI, administers PI-CASC program, oversees consortium efforts,	0.30
Élyse Larsen	UH Mānoa	Program Manager	Administrative and fiscal support including processing federal research funding	0.15
Dr. Romina King	U of Guam	University Lead UOG	Coordinates PI-CASC UOG efforts; liaises with local/USAPI natural resource managers	0.20
Dr. James Beets/Dr. Jon Price	UH Hilo	University Lead UHH	Coordinates PI-CASC UHH activities	0.10
Scott Laursen	UH Hilo & UH Mānoa	Climate Adaptation Extension Specialist	Coordinates co-production project development through MCC activities	0.50*
Dr. Hal Richman	UH Mānoa	IT Specialist	IT support for consortium and USGS PI-CASC personnel	0.05
Katy Hintzen	UH Mānoa	Climate Adaptation Liaison	Co-production and community engagement	0.25
Dr. Elizabeth Lenz	UH Mānoa	Graduate Scholar Program Coordinator	Leads DEI efforts, works with Deputy Director to oversee PI-CASC Scholars activities, and assists with communications	0.15
Patrick Grady	UH Mānoa	GIS Specialist	Oversees GIS tools and development and supports ongoing needs in information technology	0.75*
Max Sundovsky	UH Mānoa	RMI Extension Specialist	Climate extension services	0.05
Kelley Tagarino	UH Mānoa	American Samoa Extension Specialist	Climate extension services	0.05
Dr. Alyssa Anderson	UH Mānoa	CAP Fellow	Hawaiian Translation Specialist	0.10

*Funding provided by federal PI-CASC through IAA to Hawai'i Sea Grant and focused on PI-CASC activities

Consortium Operations

PI-CASC is administered by Hawai‘i Sea Grant at UH Mānoa within the School of Ocean and Earth Science and Technology (SOEST). This enables substantial leveraging of office and meeting space and personnel time, including from the University Consortium Director, fiscal officers, and other administrative and extension personnel. This is particularly helpful with the additional capacity needed to meet the requirement that UHM run fiscal management and administration of all funding awards deriving from the USGS PI-CASC federal solicitation to University of Hawai‘i system and PI-CASC consortium researchers.

The main personnel change this year was in April 2023 when John Borja stepped back from his communications lead position to pursue his local role as the Guam communications coordinator, decreasing his FTE with PI-CASC from 0.75 to 0.25. We are currently conducting a search for a full-time PI-CASC consortium communications lead.

Our growing team continues to meet virtually on a monthly basis, inclusive of general staff meetings (federal and consortium), leadership meetings (federal and consortium leads at UOG and UHM), and communication team meetings. Other gatherings and discussions are planned for specific topics *ad hoc*, such as website management and professional development workshop planning. The PI-CASC consortium director and PI-CASC regional administrator meet weekly.

RESULTS

PI-CASC University Consortium efforts toward enhancing climate-related cultural partnerships, providing locally necessary actionable science, and supporting future regional climate science capacity often overlap, encouraging a broad, holistic presentation of our activities. Ultimately, the consortium strives to serve its Pacific communities and partners, while contributing to the missions of the CASC network and the USGS through the strengths and innovation of the university enterprise.

PI-CASC has continued facilitating a robust portfolio of research projects focused on actionable science across the Pacific region, most designed and produced through partnerships between researchers, relevant community organizations, and local natural and cultural resource managers. Beyond the Hawaiian Islands and Guam, a dozen projects were active during the current year in the Federated States of Micronesia (four), the Republic of the Marshall Islands (two), the Republic of Palau (two), and American Samoa (four). Hawai'i Sea Grant extension agents on-site in FSM, RMI, and American Samoa support local networking and partnerships, and provide climate extension services aligned with PI-CASC's mission.

Research supported cooperatively through the USGS and consortium includes developing online tools for managers and cultural practitioners, improving climate projection techniques, assessing climate impacts on important local species, using cultural knowledge systems to enhance ecological and community resilience, exploring management implications of climate change effects on fluvial, riparian, and coastal ecosystems, monitoring and restoring the health of native forest ecosystems, and more.

Strong partnerships were developed through several of the research projects. For example, Dr. Shimi Rii and her post-doctoral fellow Dr. Kaleolani Hurley were aided by relationships established with Hawai'i Sea Grant, Mālama Loko Ea Foundation and the project advisory group of geochemists, physical oceanographers, resource managers, and non-profit organizations, like Kua'āina Ulu 'Auamo, shaping the overall project design and outcomes of their eDNA research at He'eia fishpond on O'ahu. In American Samoa, Dr. Chris Shuler and his PI-CASC Graduate Scholar Annie Chien developed fruitful partnerships with the South Pacific Regional Environment Programme, the American Samoa Department of Commerce, the American Samoa Power Authority, and the National Park of American Samoa, while upgrading and populating web data portals and training student interns in data curation and organization to build future maintenance capacity.

Increasingly, more federal agencies are undertaking critical boundary spanning work in climate adaptation, nationally and across the Pacific, highlighting inter-organizational communication and collaboration. Katy Hintzen's climate adaptation services liaison position builds synergistic relationships among partners and stakeholders, advancing community adaptation and resilience to climate variability and promoting programmatic partnership development for PI-CASC and the entire CASC network. Focusing on PI-CASC's goal of cooperative efforts between science organizations, Hintzen is connecting the CASC and National Sea Grant College Program networks, through in-person meetings, forums, and workshops. (See: [Major engagements with partners](#) for more details.)

PI-CASC UOG lead Dr. Romina King continues to play an essential role supporting PI-CASC's mission across the Pacific region. She participated as a chapter author on the [Fifth National Climate Assessment](#)

(NCA5, *in prep*), working with the author team to integrate trends and impacts found in other regional chapters, and with Caribbean authors to identify issues facing both small-island areas. As a principal investigator, King was awarded a \$5 million grant from the U.S. Department of Agriculture to work with forestry managers and local farmers to produce climate-smart commodities through environmentally friendly and sustainable practices. An ongoing multi-agency partnership she is involved with, using NASA technology to map Guam's coral reefs, has brought numerous opportunities for outreach to local officials and the public, including sharing technology and data analysis techniques on using drones, GIS, and remote sensing.

The university consortium has the lead in supporting student involvement in research, funding students directly through our host agreement and including students from USGS-funded projects in professional development opportunities offered by the consortium's Graduate Scholar program. PI-CASC has seen a dramatic increase in student participation, in part through the formalization of this program coordinated by Dr. Beth Lenz. Twenty-five students made up our Graduate Scholars cohort this year, participating in a variety of program activities, including: an improv workshop to enhance public speaking skills; research presentations in creative public venues (e.g. [Nerd Night](#)); a story mapping workshop to create interactive displays of their research; a panel of professionals to discuss career pathways; and [Kūlana Noi'i](#) training to explore best practices in community-engaged science.

On Hawai'i Island, the Graduate Scholars are engaged through Scott Laursen's coordination of the MCC program, centered around knowledge co-production. Through MCC, the students develop and conduct their research in close conjunction with natural and cultural resource managers and community networks. This fiscal year, the 2020-2023 cohort of MCC students finished their projects (with three of the five already having defended their master's theses by this summer) which explored early warning systems for mosquitoes, promoting resilience in community reforestation efforts, adaptation of the intertidal zone, optimizing forest restoration for future drought, and the effects of changing reefscales on the neurotoxin menace of ciguatera. A new MCC cohort with three projects began in fall 2022 and are currently conducting summer field research with community partners on monitoring bird and mosquito abundances, climate resilient forest restoration, and sea-level rise effects on coastal wastewater infrastructure.

On Guam, the creative CARM program remains a success as a continuing educational opportunity for natural and cultural resource managers, bolstering professional capacity for Guam and the region. The first fellow to graduate from the CARM program defended in fall of 2022, with another scheduled to finish fall 2023. A new fellow from Palau is in the process of onboarding to join the original cohort.

PI-CASC continues to participate in the CASC CAP fellow's program and employs a novel approach of a dual competition to select PIs and postdoctoral researchers from within the consortium universities. For the first CAP postdoc cohort, Future of Fire, we brought together a collaborative of researchers to co-mentor the postdoc, Dr. Alyssa Anderson, in an interdisciplinary effort. Now finished, Anderson has transitioned to a formal position within PI-CASC, as an extension specialist serving the Pacific Drought Knowledge Exchange (PDKE), a collaborative network that grew out of several projects PI-CASC funded on drought in the Pacific. The newly selected Future of Aquatic Flows CAP fellow will begin in fall 2023. PI-CASC's novel selection process may serve as a model for other regional CASCs.

OUTREACH

Published articles

Please see [Appendix B](#) for journal and technical publications from PI-CASC authors this fiscal year.

Presentations and workshops

Personnel, researchers, and students with PI-CASC conducted and/or presented at a number of events throughout the year (see [Appendix C](#)). Highlights of our hosting contributions are as follows.

The first annual Hawai'i Climate Week in January 2023 was a collaboration of PI-CASC and other climate-related entities including the Hawai'i State Climate Commission, Hawai'i Sea Grant College Program, Pacific RISA, the East-West Center, the US Forest Service, and the USDA. As one of many events that week, the 2023 Hawai'i Climate Adaptation Science Summit afforded PI-CASC the opportunity to reach out to the Hawai'i community, sharing research we have supported and hearing from regional resource managers, community organization leaders, graduate students, and government agency representatives about science applications and needs. Over two days, presentations centered on actionable science addressing drought and wildfire in Hawai'i, integrated watershed science from our Pacific Islands-Alaska CASC (PI-AK) collaboration, and sea-level rise science and tools. Moderated panels were also convened for each theme, as well as one highlighting early career participants (all graduate students), which was particularly inspiring. The summit drew 50-100 in-person and about 80 virtual attendees each day, and posted session recordings note 20-100 views since the event.

The national CASC network returned to an in-person Early Career Workshop, in October 2022 in Albuquerque, New Mexico. The workshop assembled graduate students, post-docs, and early career faculty to: build skills and knowledge focused on the development of actionable climate science; increase understanding of science ethics in working with community partners; and expand peer and mentor networks to support a future career in climate adaptation science. Accompanying six Graduate Scholars, Drs. Brad Romine and Rachel Lentz organized and facilitated sessions on science communications and research ethics in working with diverse stakeholders, for which Katy Hintzen presented.

Another professional development opportunity offered to PI-CASC graduate scholars was a series of hybrid workshops on story maps led by GIS specialist Patrick Grady and Graduate Scholar coordinator Beth Lenz. The workshops introduced students to this powerful, interactive online science communication tool for presenting their research and other stories to public audiences in a visually engaging way.

Our monthly seminar series, "[A Slice of PI-CASC](#)," continued for another year with eight hybrid science-to-management presentations on innovative coastal mapping techniques and agroforestry, ridge-to-reef management strategies, fishpond restoration, and much more. With in-person and online audiences, the seminars regularly drew 60 to 100 attendees, and online recordings note another 40 - 170 views each, with a few new views of each added every month.

PI-CASC continued its annual sponsorship of the UOG Regional Conference on Island Sustainability (CIS), and coordinated three interactive pre-conference GIS/remote sensing workshops in partnership with NASA Guam EPSCoR to demonstrate and share resources and datasets using geographic techniques.

During the CIS main conference, PI-CASC also hosted a session, titled “Science for Climate Action,” showcasing research on climate science and impacts on rainfall, coral reefs, and fisheries.

Major engagements with partners

PI-CASC personnel regularly engage with community organizations, natural and cultural stewards, county, state and federal agencies, students, researchers, and land and sea grant extension agents.

Katy Hintzen hosted a pre-forum workshop at the 2022 National Adaptation Forum that brought together participants from Sea Grant and Land Grant programs and Climate Adaptation Science Centers to identify and prioritize opportunities for collaboration across the networks. It is increasingly important that accumulated experiences of these boundary-spanning institutions be shared through information exchange and collaboration to maximize impacts. Hintzen also conducted network-wide needs assessments for both the Sea Grant and CASC networks to establish the current state of regional relationships, priorities, and needs related to climate adaptation research and extension.

Scott Laursen, along with representatives from the Hawai‘i Volcanoes National Park (HAVO) and the Volcano School of Arts and Sciences, led a local team for the National Park Services’ Parks in Every Classroom (PEC) program, which promotes equity-centered climate change education. The collaboration organized place-based professional development opportunities for local teachers, including an in-person workshop in HAVO in January 2023, the first of its kind for the PEC network. Laursen also lent his voice to a community planning committee convened by The Nature Conservancy to develop a community action plan for Kealahou Bay, on Hawai‘i Island, meant to provide guidance incorporating centuries of adaptive knowledge on relationship-based and sustainable resource management.

Through a long-standing partnership with the Hawai‘i state government, Dr. Brad Romine co-authored an update to a state-wide [Sea Level Rise Vulnerability and Adaptation Report](#), summarizing progress and needs in addressing impacts to coastal environments and communities that depend on them. As a member of the City & County of Honolulu Climate Change Commission, he co-lead an update of, and presentation on, a [climate change brief](#), providing the latest scientific information to elected officials, staff, and community.

A particularly fun pair of outreach events were the first annual Community Climate Fairs, one in Honolulu in May and one in Hilo in June, sponsored by the Hawai‘i Climate Commission. On O‘ahu, children and adults alike were charmed by PI-CASC personnel presenting a demo of beach erosion and the damage that sea walls engender. On Hawai‘i Island, PI-CASC partnered with Mauna Kea Watershed Alliance to give hundreds of participants free native tree saplings, and offered to add their planting locations (and growth stats) to a custom-designed GIS map to track their future success.

Websites and social media

PI-CASC’s website continues to be a vital resource to the consortium and its audiences, updated regularly with performance improvements, news and events, new projects, resources, and opportunities. Website analytics illustrate an increase in usage over the reporting period to date (10/1/22 - 7/12/23), up 114% from the previous nine months, with a total of more than 11,000 users over 16,000 sessions. Not surprisingly, most users are from the U.S. and Guam, but others hail from countries around the world. PI-

CASC personnel also continued to assist two partners--PDKE and Pacific RISCC--by drafting and updating pages to enable their web presence and information dissemination.

Social media followings have also increased as the communications team has pushed out more highlights, notices and monthly thematic content via Facebook, Instagram, and Twitter, including coordinating with the National CASC office on some thematic campaigns. For example, as of June, Instagram and Twitter accounts show increases in followers of 38% and 45%, respectively, compared with our last report. PI-CASC's social media strategy has also continued to network and collaborate with partners by reciprocally sharing each other's content on our platforms, and we have added a new LinkedIn account to expand to new audiences. With virtual offerings for hybrid events still proving very popular, we have continued to post zoom recordings on our [PI-CASC YouTube channel](#), which now houses almost 50 recordings of webinars, science summit sessions, PI-CASC activity videos, and program information sessions.

Products and tools

PI-CASC delivers actionable science by supporting research that generates knowledge and information to improve the ability of local managers and decision-makers to affect positive change. We also develop, and support partners to develop, products and tools for the betterment of the community and the region.

Begun by a PI-CASC team during the last fiscal year, the [Pacific Island Sea Level Rise Project Explorer](#) was revised and finalized in the fall of 2022, and its roll-out was included in the 2023 Hawai'i Science Summit during the Sea-level Rise Science session facilitated by Dr. Brad Romine and Heather Kerkering. The tool is an interactive online information platform designed to promote sharing of results on research activities across the Pacific Basin associated with sea-level rise and adaptation to its impacts. Centralizing this data in a convenient tool will help avoid effort duplication and encourage collaboration in tackling this existential threat to the Pacific Islands.

The Pacific Drought Knowledge Exchange (PDKE) is an important example of PI-CASC's role in assisting partners in product development and dissemination. A key part of PDKE's mission is delivering important climate information to community partners and decision makers. Alongside their tailored climate change, climate variability, and drought (CCVD) [portfolios](#), the PDKE team has worked with stakeholders and research managers to develop informational [factsheets](#) for Hawai'i and Guam on topics like drought, fire, climate projections, and impacts of El Niño. PI-CASC CAP fellow Dr. Alyssa Anderson translated the factsheets for Hawai'i into the Hawaiian language, and Patrick Grady's website support helped to disseminate all the products to the broader community.

PI-CASC funded projects also generate science information products through researcher and user collaborations. For example, Dr. Chris Shuler's project in American Samoa began with revitalizing an existing GIS-web portal and populating it with climate pertinent datasets, followed by upgrading the American Samoa Environment Data Portal and increasing its available data sets from tens to hundreds. A new MCC project with Graduate Scholar Ihilani Kamau is producing data summaries of water quality at Kahalu'u Bay, on Hawai'i Island, that have been shared with the director of the Kahalu'u Bay Education Center.

NEXT STEPS

As of July 2023, PI-CASC has seven FY23 awards in process at USGS and the university consortium which should be initiated in the next few months, and associated Graduate Scholars will be offered opportunities for professional development through workshops and symposia as we initiate a new cohort.

The PI-CASC at UHM will again leverage and expand research funding and support for graduate students working on climate adaptation science by identifying appropriate research projects funded through Hawai'i Sea Grant's 2023 competitive research cycle to pair them with. We will again engage undergraduate students through the SURF program in summer 2024, building on the success of the previous years with new opportunities to engage students in climate research and increase their understanding of actionable science and community engagement.

The three new MCC projects begun in fall 2022 will continue to leverage community partnerships to explore the critical issues of mosquito abundance in native forests, sea-level rise impacts on coastal wastewater infrastructure, and improving forest resilience.

The PI-CASC consortium will continue its innovative work and partnership with the AK CASC for the next phase of the PI-AK collaboration. While planning for continued research collaboration, the partnership looks to deepen relationship building, community engagement, and Indigenous knowledge sharing.

PI-CASC will continue to expand climate extension services in the region, further leveraging our partnership with Hawai'i Sea Grant, replete with decades of experience in extension work, and providing an example for the CASC network. Katy Hintzen will continue her work developing and coordinating partnerships, extension, and outreach activities throughout our region, and nationally between the CASC and Sea Grant College Program networks with a particular focus on reciprocal and equitable partnerships between communities, researchers, and resource stewards. Dr. Brad Romine will continue, along with his administrative role for the consortium, to provide climate extension services in Hawai'i and the Pacific Islands through long-standing cooperation with state and county governments in Hawai'i and his recent Climate Commission appointment.

PI-CASC will continue to implement next steps identified in the Sea-Level Rise Adaptation Science Dialogues in 2021. In the coming year, we aim to establish and expand the network of researchers and practitioners through further dialogues and information sharing, while also continuing to update the Pacific Islands Sea Level Rise Project Explorer tool.

UOG's CARM program will increase its engagement with professional fellows, seeking more candidates from across the western Pacific by working with local natural resource agencies. In addition, the program is expanding to allow workers to take college-level courses that do not require enrolling into a graduate program.

APPENDICES

Appendix A: Research Projects

Table 1: Graduate student research supported by funds from the consortium five-year agreement during the reporting period.

Start/End dates	Title	PI	Graduate Student	University
2/22 - 1/24	Enhancing social-ecological resilience and ecosystem services through restoration of coastal agroforestry systems	Leah Bremer	Tressa Hoppe	UHM*
2/22 - 1/24	Integrating social and cultural considerations into planning and community-based monitoring to reach marine conservation goals	Mehana Vaughan	Kapono Gaughen	UHM*
2/22 - 1/24	Resource habitat mapping and diet characterization of native and non-native mullet species to inform adaptive management in He'eia Fishpond	Shimi Rii	Sheldon Rosa	UHM*
2/22 - 1/24	Genetic assessment of giant clam stocks in American Samoa	Rob Toonen	Paolo Marra-Biggs	UHM*
8/22 - 1/24	Using natural capital accounting to embed climate impacts into routine decision-making	Kirsten Oleson	Louis Chua Bing Chao	UHM*
2020 - 2023	Equity in natural resource management in the Pacific: A case study from southern Guam	Romina King	Marybelle Quinata	UOG (CARM)
2019 - 2023	Biochar as a mitigation tool for soil rehabilitation in Guam's badlands and savannah grasslands	Mohammad Golabi	Patrick Keeler	UOG (CARM)

2019 - 2023	Working with managers to mitigate the impacts of drought and wildfire	Christine Fejeran, Abby Frazier	Farron Taijeron	UOG (CARM)
2019 - 12/22	Comparing arbuscular mycorrhizal diversity among different life stages of <i>Intsia bijuga</i> (Colebr.) Kuntze in Guam's Limestone Forests	Alexander Kerr	Charles Paulino	UOG (CARM)
2022 - 2024	Development of improved tools to monitor bird abundance and detect climate-change related invasion by mosquitoes into Hakalau Forest NWR	Patrick Hart	Josephine Tupu	UHH (MCC)
2022 - 2024	How do you know what to plant where? Developing a climate-resilient restoration approach that combines functional, climate, and geographic data	Rebecca Ostertag, Jon Price	Konapiliahi Dancil	UHH (MCC)
2022 - 2024	Predicting sea-level rise impacts to coastal wastewater infrastructure and water quality for adaptive planning and increased coastal habitat resilience	Tracy Wiegner	Ihilani Kamau	UHH (MCC)
2020-2022	He ala 'ae kai – The path near the sea: Climate inflictions upon intertidal	John Burns	Lauren Kaponu	UHH (MCC)
8/20 - 4/22	Development of an early warning system for climate-change related invasion by mosquitoes into Hakalau Forest NWR	Patrick Hart	Stephanie Mladinich	UHH (MCC)
8/20 - 7/23	Optimizing forest restoration techniques to increase endangered species habitat and mitigate future drought: Kanakaleonui Bird Corridor	Jon Price	Amberly Pigao	UHH (MCC)

8/20 - 2023	How will changing reefscapes affect the prevalence of ciguatera on Hawaiian reefs?	Tim Grabowski	Nikola Rodriguez	UHH (MCC)
8/20 - 2023	Understanding plants of the past to inform community reforestation efforts in the future: A place-based approach for promoting resilience in the Pu'uwa'awa'a Community-Based Subsistence Forest Area, North Kona, Hawai'i	Jon Price	David Russell	UHH (MCC)

* PI-CASC is funding the Graduate Scholars on these projects, leveraging the research activities funded by Hawai'i Sea Grant.

Table 2: University-based research funded through USGS cooperative agreements during the reporting period with grant management support from the consortium and incorporating students in consortium graduate student programs where listed.

Start/End dates	Title	PI	Graduate Student	University
8/22 - 7/24	Unlocking resilience drivers to inform Pacific coral reef management	Megan Donahue	Jessica Glazner	UHM
8/22 - 1/24	Using Oral Histories of Marshallese and Yapese Voyaging to Support the Development of Community Engagement for Sustainable Sea Transport	Joe Genz	Jerolynn Myazoe, Shania Tamagyongfal	UHH
8/22 - 7/25	Increasing Agroforestry Inventory and Monitoring Capacity and Climate Change Resilience across the Pacific through High-resolution Imagery and Artificial Intelligence	Ryan Perroy	TBD	UHH
9/22 - 8/24	Extreme weather driven changes in flow regime and their impacts on amphidromous species in Hawaiian streams	Yinphan Tsang		UHH

8/21 - 8/23	Field surveys for vanishing species: Closing data gaps to save biodiversity (endemic land snails) in the face of a changing climate	John Price		UHH
8/21 - 8/22	Ecological and socio-cultural responses to transplanting coral to enhance reef resilience on O‘ahu.	Crawford Drury		UHM
6/22 - 5/25	Developing a Pacific Mangrove Monitoring Network (PACMAN) in response to sea-level rise	Richard MacKenzie	Maybeleen Apwong	UHH
8/21 - 8/23	Effect of extreme tidal events as future sea-level rise scenarios on He‘eia fish communities for ahupua‘a restoration	Shimi Rii	Kaleonani Hurley (post-doc)	UHM
9/21 - 8/23	Linking models to outcomes: How do Hawai‘i stakeholders use and contribute to land-to-sea ecosystem service analysis	Clay Trauernicht	TBD	UHM
9/21 - 8/23	Coral response to land-to-ocean freshwater flux: A ridge-to-reef perspective	John Burns	Walter Boger	UHH
9/21 - 8/24	A collaborative approach to enhancing data availability and adaptation capacity: Developing the AS climate and GIS data portal	Chris Schuler	Annie Chien	UHM
10/21 - 9/23	Making regional climate model output for Hawai‘i more accessible to a diverse user community	Tom Giambelluca		UHM
6/21 - 6/24	Using cutting-edge NASA technology to assess coral reef bleaching events and measure recovery rates of dominant coral taxa at priority reef areas in Guam and the CNMI	Romina King		UOG

6/21 - 10/23	Sea Level Rise Viewer for American Samoa: A co-developed visualization and planning tool	Phil Thompson	Carla Baizeau	UHM
5/21 - 5/23	Preliminary investigation of machine learning and advanced statistical approaches to improve projections of future climate in Hawai'i	Tom Giambelluca	Yusuke Hatanaka	UHM
2/21 - 1/23	Future of fire in the PI: Towards a national synthesis for wildland fire under a changing climate	Christian Giardina	Alyssa Anderson (post-doc)	USFS, UHM
7/21 - 7/24	Impact of extreme events on native and nonnative fauna on HI stream ecosystem	Yinphan Tsang		UHM

Table 3: Projects funded through interagency agreements to bring additional federal funds to support PI-CASC USGS and consortium initiatives with grant management support from the consortium and incorporating students in consortium graduate student programs where listed.

Start/End dates	Title	PI/Co-I	Graduate Scholar	IAA Partners
3/22 - 2/24	Building capacity for the Pacific Regional Invasive Species Climate Change (RISCC)	Darren Lerner		USGS/NOAA /USFWS/ UHM
9/20 - 9/23	Increasing climate extension services in the Pacific Islands Climate Adaptation Science Center	Darren Lerner		USGS/NOAA /UHM
8/20 - 7/22	Examining how ridge-to-reef governance in Palau can enhance coastal food security in a changing climate	Darren Lerner, Kirsten Oleson	Michelle Harangody	USGS/NOAA /UHM*

8/20 - 7/22	Connecting ecosystems from mountain to the sea with changing climate	Darren Lerner, Yinphan Tsang	Maxime Gayte, Yu-Fen Huang	USGS/NOAA /UHM*
8/20 - 7/22	Generating a shoreline inventory for Hawai'i Island to increase resilience in the face of rising sea levels	Darren Lerner, Ryan Perroy	Aloha Kaponu	USGS/NOAA /UHM*

*Funded through IAA: "Building Capacity for Graduate Scholars Program in the Pacific Islands Climate Adaptation Science Center" between USGS and NOAA Sea Grant

Appendix B: Publications

Publication year: 2023 (printed and in press)

Alkins, K.C., Gaido, C.L., Reguero, B.G., & Storlazzi, C.D. (in press). Projected coastal flooding extents and depths for 1-, 20-, and 100-year return interval storms and 0.00, +0.25, +0.50, +1.00, +1.50, +2.00, and +3.00 meter sea-level rise scenarios in the Hawaiian, Mariana, and American Samoan Islands: *U.S. Geological Survey data release*, doi:10.3133/xxxxxxx (IP-151173)

Drexler, J.Z., Raine, H., Jacobi, J.D., House, S., Lima, P., Haase, W., Dibben-Young, A., & Wolfe, B. (in press). A prioritization protocol for coastal wetland restoration on Molokaʻi, Hawaiʻi. *Front. Environ. Sci*

Fortini, L.B., Kaiser, L.R., Perkins, K.S., Xue, L., & Wang, Y. (2023). Estimating the impact of climate and vegetation changes on runoff risk across the Hawaiian landscape. *Conservation* 3, 291-302. doi: 10.3390/conservation3020020

Genz, J.H., Bardwell-Jones, C., Coffman, M., Dey, D., Defngin, Feinberg, A.R., Haʻo, C., Huke, H., Joab, T., Kabutaulaka, T., Kelen, A.J., Kirch, P.V., LaBriola, M., Ledua, S., Masterson, I., Mawyer, A., Morris, T., Myazoe, J., Nuttall, P., Pfalzgraf, F., Raigetal, H.L., & Tamagyonfal, S. (2023) “Voyaging in the Pacific,” *Teaching Oceania* 8, ed. Joseph Genz. Honolulu: Center for Pacific Islands Studies, University of Hawaiʻi at Mānoa.

Honolulu Climate Change Commission. (2023). *Climate Change Brief 2023*. (Report for Office of Climate Change, Sustainability, and Resiliency). <https://www.resilientoahu.org/climate-change-commission/#guidance>

Storlazzi, C.D., Reguero, B.G, Gaido, C.L., Alkins, K.C., Lowrie, C., Nederhoff, K.M., Erikson, L.H., O’Neill, A.C., & Beck, M.W. (in press). Forecasting Storm-Induced Coastal Flooding for 21st Century Sea-Level Rise Scenarios in the Hawaiian, Mariana, and American Samoan Islands: *U.S. Geological Survey Data* (Report 2023–xxxx), xx p., doi: ofr2023xxxx (IP-151075)

Publication year: 2022

Erikson, L.H., Herdman, L., Flahnerty, C., Engelstad, A., Pusuluri, P., Barnard, P.L., Storlazzi, C.D., Beck, M., Reguero, B., & Parker, K. (2022). Ocean wave time-series data simulated with a global-scale numerical wave model under the influence of projected CMIP6 wind and sea ice fields: *U.S. Geological Survey data release*, doi:10.5066/P9KR0RFM

Faccenda, K. (2022). Updates to the Hawaiian grass flora and selected keys to species: Part 1. *Bishop Museum Occasional Papers* 148, 41-98.

Fortini, L.B., Kaiser, L.R., Xue, L., & Wang, Yaping. (2022) Bioclimate variables dataset for baseline and future climate scenarios for climate change studies in Hawaiʻi. *Data in Brief* 45, 108572. doi: 10.1016/j.dib.2022.108572

Frazier, A.G., Giardina, C.P., Giambelluca, T.W., Brewington, L., Chen, Y.-L., Chu, P.-S., et al. (2022). A century drought in Hawaiʻi: Geospatial analysis and synthesis across hydrological, ecological, and socioeconomic scales. *Sustainability* 14 (19), 12023. doi: 10.3390/su141912023

Gerken, T., Wiegner, T.N., & Economy, L.M. (2022). A comparison of soil *Staphylococcus aureus* and fecal indicator bacteria concentrations across land uses in a Hawaiian watershed. *J. Environ. Qual.* 2022, 1-14. doi: 10.1002/jeq2.20380

Longman, R.J., Frazier, A.G., Giardina, C.P., Parsons, E.W., & McDaniel, S. (2022). The Pacific Drought Knowledge Exchange: A co-production approach to deliver climate resources to user groups. *Sustainability* 14, 10554. doi: 10.3390/su141710554

Marra-Biggs, P., Fatherree, J., Green, A., & Toonen, R.J. (2022). Range expansion and first observation of *Tridacna noae* (Cardiidae: Tridacninae) in American Sāmoa. *Ecology and Evolution*. doi: 10.1002/ece3.9635

North Shore Coastal Resilience Working Group (2022). *Adaptive Coastal Management Recommendations, Actions, and Strategies*. Surfrider Foundation.
<https://hawaii.surfrider.org/northshoreworkinggroup/>

State of Hawai‘i Department of Land and Natural Resources, Office of Conservation and Coastal Lands (Romine co-author). (2022). *Sea Level Rise Vulnerability and Adaptation Report* (Response to Act 32, 2017 Regular Session). <https://climate.hawaii.gov/hi-adaptation/climate-change-reports/>

Appendix C: Presentations

Table 1: Workshops/forums/webinars hosted by PI-CASC and partners

Date	Event	Presenter(s)	Audience(s)
8/10/23	SURF Symposium	Sarah Blichfeldt, Avery Bower, Noah Harris, Kolea Praywell	PI-CASC, SURF mentors, friends and family
7/23	Meet the experts: Exploring various careers in climate adaptation	Beth Lenz (facilitator)	PI-CASC Graduate Scholars
7/1/23	Kūlana Noi‘i training	Katy Hintzen	SURF students, PI- CASC Scholars, Hawai‘i Sea Grant Rappa Fellows
6/6/23	SURF Orientation	Rachel Lentz, Brad Romine	SURF students and mentors
5/17/23	Pacific RISCC Webinar: Prioritization of restoration needs for seabirds in the U.S. Tropical Pacific	Lindsay Young	Pacific RISCC network, Public
5/10/23	Thesis defense: Shifts in carbon export from a Hawaiian watershed due to climate change	Walter Boger	UH Hilo/TCBES community, public
5/10/23	Territorial Climate and Infrastructure Workshop: breakout session on invasive species	Elliott Parsons (facilitator)	Regional experts on biosecurity
5/4/23	Thesis defense: Understanding plants of the past to inform community reforestation efforts in the future: A place-based approach for promoting resilience in the Pu‘uwa‘awa‘a Community-Based Subsistence Forest Area, North Kona, Hawai‘i	David Russell	UH Hilo/TCBES community, public

5/2/22	Slice of PI-CASC: Climate change, larval mosquito habitat, and riparian corridors: Potential pathways to mosquito invasion and malaria transmission at Hakalau Forest National Wildlife Refuge	Dennis LaPointe	Public
4/14/23	Thesis defense: Pockets and pathways to invasion: developing improved mosquito monitoring methods in high elevation forests on Hawai'i Island	Stephanie Mladinich	UH Hilo/TCBES community, public
4/14/23	“Science for Climate Action” session at UOG Conference for Island Sustainability	Romina King, Heather Kerkering, Brandon Bukunt, Myeong-Ho Yeo, Rachael Keighan, Brett Taylor	2023 Conference for Island Sustainability participants, public
4/12/23	Pacific RISCC Webinar: Changing climate and wildfire in Hawai'i	Michael Walker, Clay Trauernicht, Emma Yuen	Pacific RISCC network, public
4/12/23	Pre-UOG 2023 Conference on Island Sustainability Workshops (3) on GIS	Romina King, Dong Won Lee, Jose Edgardo Aban,	Conference participants, public
4/4/23	Slice of PI-CASC: Pacific RISCC & Micronesian Regional Biosecurity Perspectives	Elliott Parsons, Glenn Dulla	Public
3/31/23	TCBES 2023 Symposium (Day 2): Developing climate resilient restoration techniques for Hawai'i's lowland wet forests	Konapiliahi Dancil	UH Hilo/TCBES community, public
3/7/23	Slice of PI-CASC: Applying science to coastal management in Hawai'i: Examples of adaptation and visions of the future	Dolan Eversole	Public
2/7/23	Slice of PI-CASC: Lessons of drought in Hawai'i shared through storytelling	Katie Kamelamela, Paul Higashino, Maggie Pulver	Public

1/10&11/23	2023 Hawai'i Climate Adaptation Science Summit	Invited guests, PI-CASC researchers, managers, Alaska guests, students, government representatives	Researchers, managers, Alaska guests, students, government representatives, public
1/25/23	Pacific RISCC Webinar: Future climate in Hawai'i: What global climate models, climate downscaling, and observations tell us	Thomas Giambelluca	Pacific RISCC network, public
12/19/22	Pacific RISCC Webinar: Climate change aggravates over half of pathogenic diseases	Tristan McKenzie	Pacific RISCC network, public
12/9/22	Thesis defense: Sea-level rise impacts upon 'Opihi habitat at Kalaemanō, Hawai'i	Lauren Kaponu	UH Hilo/TCBES community, public
12/6/22	Slice of PI-CASC: Decoding Natural Assemblages: Applying eDNA in Indigenous Resource Management towards a resilient He'eia	Shimi Rii, Kaleolani Hurley, Hi'ilei Kawelo, Brenda Asuncion	Public
12/1/22	Thesis defense: Seedling-enemy ecology in a Pacific Island limestone forest	Charles "CJ" Paulino	UOG community
11/29/22	Thesis defense: Machine learning based statistical downscaling for rainfall on Hawaiian Islands	Yusuke Hatanaka	UHM community
11/16/22	Pacific RISCC Webinar: The Resist-Accept-Direct framework for climate adaptation	Helen Sofaer	Pacific RISCC network, public
11/1/22	Slice of PI-CASC: Examining how ridge-to-reef governance in Palau can enhance coastal food security in a changing climate	Kirsten Oleson, Michelle Harangody, Staci Lewis, Joyce Beouch	Public
10/20/22	Pacific RISCC Webinar: Hybrid ecosystems and forest restoration: Lessons from Hawai'i	Rebecca Ostertag	Pacific RISCC network, public

10/4/22	Slice of PI-CASC: Supporting community-based agroforestry restoration in a changing climate	Leah Bremer, Zoe Hastings, Maile Wong	Public
9/28/22	Pacific RISCC Webinar: Hawaiian forest bird conservation	Megan Laut, Stanton Enomoto	Pacific RISCC network, public
9/6/22	Slice of PI-CASC: Coral response to land-to-ocean freshwater flux: a ridge-to-reef perspective	John Burns	Public

Table 2: Presentations by PI-CASC or funded personnel at other events

Date	Event	Presenter(s)	Title
8/6-11/23	Ecological Society of America Conference	Alyssa Anderson	Session: The Future of Fire: Sociocultural and biophysical contexts for fire stewardship under climate change
7/24-26/23	IOA-LSAMP Annual Student Conference	Shania Tamagyongfal, Jerolynn Myazoe	“Weaving oral histories of Yapese navigation in re-establishing community engagement and voyaging networks for sustainable sea transport” “Advancing climate change adaptation in the Marshall Islands through oral histories of voyaging interaction networks”
7/4&5/23	Hawai‘i Ecosystems Meeting	Christian Giardina, Alyssa Anderson, Ryan Longman,	“The Pacific Drought Knowledge Exchange” “Insights from Hawaiian language newspapers on wildfire and drought” “The frontier of climate science in Hawai‘i”
6/29/23	Hawai‘i Conservation Conference Session: New tools, data sources, and approaches for managing climate impacts in Hawai‘i	Ryan Longman, Alyssa Anderson	“Improving access to climate data and information for conservation professionals in Hawai‘i and USAPI” “Insights from Hawaiian language newspapers on drought and fire”

6/28/23	Hawai‘i Conservation Conference	Emily Sesno, Heather Kerkering, Rachel Lentz, Beth Lenz, Scott Laursen, John Borja, Mari-Vaughn-Johnson	“PI-CASC immersive climate adaptation education and training: Elementary to professional”
6/28/23	Hawai‘i Conservation Conference	Judith Drexler and co-authors	“A prioritized plan for coastal wetland restoration on Moloka‘i, Hawai‘i”
6/25/23	Hawai‘i Conservation Conference	Ihilani Kamau, Tracy Wiegner, Steven Colbert	“Kailua-Kona water quality: Hot spots of sewage indicators”
6/17/23	1 st Annual Hawai‘i Community Climate Fair	Scott Laursen, Patrick Grady, Kamuela Plunkett	PI-CASC booth partnered with Mauna Kea Watershed Alliance
6/6/23	South Kohala Coastal Partnership Webinar Series	Elliott Parsons	“Exploring the nexus of climate change and invasive species with the Pacific RISCC”
5/23	Briefings for US Indo-Pacific Command (INDOPACOM), the Office of the Assistant Secretary of Defense, Office of the Assistant Secretary of the Army, Office of the Assistant Secretary of the Navy, and Strategic Environmental Research and Development Program	Curt Storlazzi	“Consistent Projections of Future Coastal Flooding due to Climate Change and Sea-level Rise to Evaluate Risk and Guide Prioritization for Adaptation”
5/20/23	1 st Annual O‘ahu Community Climate Fair	Brad Romine, Rachel Lentz, Beth Lenz	PI-CASC booth on Shifting Shorelines
5/3/23	Wastewater Alternative and Innovations’ Virtual Town Hall	Steven Colbert, Tracy Wiegner, Ihilani Kamau	“Sewage at the Kailua-Kona shoreline and reef: Update to the community”

4/11/23	UOG 14th Regional Conference on Island Sustainability	Jose Edgardo Aban, Romina King	“Remote sensing and GIS applications on Guam”
4/11/23	UOG 14th Regional Conference on Island Sustainability	Dong Won Lee, Romina King	“LIDAR data sets of Tumon Bay”
4/7/23	3rd Annual UOG STEM Conference	John Borja, Keanno Fausto	“Research experience as a drone pilot”
4/4/23	Nerd Nite Honolulu	Annie Chien	“What is a data portal, and why won't she shut-up about it?”
4/4/23	Nerd Nite Honolulu	Carla Baizeau	“Rising up to sea-level rise”
4/4/23	Nerd Nite Honolulu	Paolo Marra-Biggs	“Bohemian behemoths: Kinks in the animal kingdom”
3/31/23	TCBES Symposium	Walter Boger	“Developing climate resilient restoration techniques for Hawai‘i’s lowland wet forests”
3/21/23	Pacific Fire Exchange Talk Story Tuesday	Alyssa Anderson	“Informing contemporary wildfire science from historical Hawaiian language newspapers”
3/2/23	University of Guam Charter Day (CNAS Cooperative Extension and Outreach Festival)	John Borja, Keanno Fausto	PI-CASC, NASA Guam EPSCoR, NASA Guam Space Grant joint booth on fluid lensing
2/25/23	Hui Malama Loko I‘a Retreat (hosted by Kua‘āina Ulu ‘Auamo)	Shimi Rii	“Using eDNA in fishpond management”
2/16/23	22 nd East-West Center International Graduate Student Conference	Annie Chien	“A collaborative approach to enhancing data availability and adaptation capacity: Developing the American Samoa Climate and GIS Data Portal”

2/7/23	Kamehameha Schools 8 th grade visit to Hawai'i Institute of Marine Biology	Shimi Rii	2 workshops on "eDNA applications in fishpond management"
1/25/23	2023 Service Learning, Youth, and Community Preparedness Summit (Guam)	Romina King, John Borja, Keanno Fausto	"The value of Guam's coral reefs" "UOG's Drone Corps program"
1/17/23	"Welcome Back Tritons" UOG Fañomnakan 2023 Event	John Borja, Keanno Fausto	PI-CASC, NASA Guam EPSCoR, NASA Guam Space Grant joint booth on fluid lensing
1/23	Briefing for US National Academies of Science, Engineering, and Medicine	Curt Storlazzi	"Tipping points in future tropical Pacific Island sustainability"
12/6-7/22	Computational Archaeology and Seafaring Theory workshop, Stanford university	Joseph Genz, Shania Tamagyongfal, Jerolynn Myazoe	"Cultural revitalization of wave navigation in the Marshall Islands" "Oral Histories of Yapese, Marshallese, and Pohnpeian voyaging to develop models of community engagement to implement sustainable sea transport for climate change adaptation" "Community-based research"
11/18&19/22	Hawai'i Cattlemen's Council Convention Annual Meeting	Ryan Longman, Cherry Heu, Derek Ford	"The Hawai'i Rangeland Information Portal (H-RIP)"
11/14/22	Hawai'i Rare Plant Restoration Group Quarterly Meeting	Elliot Parsons	"Incorporating climate change into invasive species management with the Pacific RISCC"
11/10/22	North American Invasive Species and Management Association Conference	Elliott Parsons	"Pacific RISCC: Expanding the network and next steps"
10/25-27/22	5 th National Adaptation Forum	Katy Hintzen, Renee Collini, Lannette Rangel, Mike Langston, Sean Bath	"Bridging the bridges: Opportunities between federal boundary spanners"

10/11-13/22	CASC Early Career Workshop	Brad Romine, Rachel Lentz, Katy Hintzen	“Engaging Diverse Stakeholders” “Science Communication”
10/12/22	CASC Early Career Workshop	Walter Boger	“Carbon exports in a Hawaiian river under a changing climate” (poster)
10/12/22	CASC Early Career Workshop	Annie Chien	“Indigenous data sovereignty through the implementation of the American Sāmoa Climate Data Portal” (poster)
10/12/22	CASC Early Career Workshop	Kevin Faccenda	“New invasive plants pose wildfire risks in Hawai‘i” (poster)
10/12/22	CASC Early Career Workshop	Stephanie Mladinich	“Pockets and pathways to invasion” (poster)
10/12/22	CASC Early Career Workshop	CJ Paulino	“Estimating plant pathogen and herbivore diversity to understand seedling community dynamics” (poster)
10/8/22	STARBASE STEM Day at the Agana Shopping Center, Guam	John Borja, Keanno Fausto	PI-CASC, NASA Guam EPSCoR, NASA Guam Space Grant joint booth on fluid lensing
10/22	Hawai‘i Drought Monitoring and Knowledge Exchange Workshop Series (four dates and locations)	Abby Frazier, Ryan Longman	“Hawai‘i Drought Resources and Research” “The Pacific Drought Knowledge Exchange”