Performance Progress Report
Developing the Pacific Islands Ocean Observing System (PacIOOS)
Cooperative Agreement # NA16NOS0120024
Performance Period: December 1, 2020 through May 31, 2021

Submitted June 2021 by:
Melissa Iwamoto, Principal Investigator and Director
Pacific Islands Ocean Observing System
School of Ocean and Earth Science and Technology, University of Hawai'i at Manoa

This report covers activities conducted during the tenth 6-month performance period of what is now a 7-year cooperative agreement with NOAA's approval of our 24-month no-cost extension request. PacIOOS' estimated operating budget from NOAA IOOS for the fiscal year was $4,260,602.67.

1.0 Progress and Accomplishments

REGIONAL GOVERNANCE AND MANAGEMENT SYSTEM

Convene PacIOOS Governing Council Executive Committee meeting; Original completion date: May 2021. ***Status:*** *Complete. In early May, members came together virtually for their annual meeting. In a 2-session video conference, PacIOOS leadership provided the most recent programmatic updates and an overview of the anticipated budget. Committee members discussed examples on how to incorporate Indigenous knowledge and community-led conservation into ocean observing, and shared regional nuances of Justice, Equity, Diversity, and Inclusion (JEDI) within the Pacific Islands and how to advance it.*

Additional activities for the governance and management subsystem that are not mentioned within the other subsystems but that highlight regional observing system success and occurred during this reporting period include the following:

- *Along with other groups at the School of Ocean and Earth Science and Technology (**SOEST**), PacIOOS participated in the nationwide Unlearning Racism in Geoscience (**URGE**) initiative, coordinated by the National Science Foundation and Woods Hole Oceanographic Institution. The program encourages labs, departments, and professionals in the geosciences to form discussion groups to deepen the community's knowledge of the effects of racism, and develop, share, and discuss anti-racist policies and strategies to enable lasting change within institutions. Work will continue on the deliverables drafted during this program with a wider group within PacIOOS and SOEST.*

OUTREACH, STAKEHOLDER ENGAGEMENT, AND EDUCATION SUBSYSTEM

Pivot as necessary to achieve objectives of PacIOOS capacity building and stakeholder engagement meetings/workshops; Original completion date: May 2021. ***Status:*** *Delayed. Due to pandemic travel restrictions, planned on-site regional capacity building workshops have*

been cancelled or delayed. Instead, funds are being used to create a new capacity building position within the Micronesia Conservation Trust, a regional entity with strong grass-roots ties. In addition, a series of webinars are planned revolving around regional water quality issues. The objective to conduct outreach and engagement and build capacity in the Insular Pacific has been included in our extended work plan within the NOAA-approved no cost extension.

Follow-up on DBCP PI-4 and OceanObs'19 synergies & collaborations; Original completion date: Ongoing. ***Status:*** *Ongoing. One collaborative partnership resulting from the DBCP PI-4 workshop is between PacIOOS and the Global Drifter Program funded out of the NOAA Climate Program Office and implemented by the Lagrangian Drifter Laboratory at Scripps Institution of Oceanography. Together we are strategizing locations for various types of wave buoys across the Pacific Islands. M. Iwamoto presented the planned process for developing this strategy at the DBCP PI-5 virtual workshop in early June 2021.*

Continue to seek additional funding to support ocean observing in the region and address stakeholder needs; Original completion date: Ongoing. ***Status:*** *Ongoing. PacIOOS collaborated with AOOS, NANOOS, and Sofar Ocean to develop a proposal to respond to the NSF Convergence Accelerator BAA for Track E: Blue Economy. PacIOOS also provided letters of collaboration and support for several other proposals that hope to advance ocean observing in the region. PacIOOS is also collaborating with Palau National Weather Service Office for support from the Green Climate Fund for increasing modeling capacity.*

Collaborate with NOAA OCM, other partners, and coastal management stakeholders to implement Data Ocean Sharing Initiative; Original completion date: May 2021. ***Status:*** *In progress. Building on regional collaboration efforts, NOAA, EPA, and PacIOOS are collaborating with coastal managers to: 1) assess and characterize data needs in the region; and 2) identify implementation projects to address those data needs. This work builds on a 2019 national data review, a 2020 regional survey, and current collaborations with local coastal managers. The project is currently talking with coastal managers to identify capacity, technology, and data gaps and then focusing on goals and actions to address data challenges. One such project has already begun. Beginning in August 2020, PacIOOS partnered with the USGS Western Geographic Science Center on a project to identify locations of current and future areas of coral reef resilience in Guam and American Samoa. This effort maps overlapping environmental conditions associated with reef resistance to change or recovery from disturbance. The objectives of this project are to: 1) identify the locations of conditions supporting coral reef habitat suitability and survivability under multiple climate scenarios; and 2) engage with coastal managers to identify where resilience-based management strategies or restoration activities could be suitable. This project receives funding from the Pacific Islands Climate Adaptation Science Center (PI-CASC).*

Ongoing outreach with stakeholders and partners to ensure meeting ocean data needs; Original completion date: Ongoing. ***Status:*** *Ongoing. Outreach and stakeholder engagement with partners is ongoing via e-mail, phone calls, and video conferences. Stakeholder meetings and in-person community outreach and education efforts remained on hold due to covid restrictions. Specific activities during this reporting period are listed below.*

Outreach Efforts

- *PacIOOS continues to publish and distribute monthly e-newsletters; more than 110 new contacts were added to the newsletter mailing list, the majority of which signed up through the subscription form on the PacIOOS website. A total of 2472 recipients receive monthly updates. Highlighting PacIOOS data users and their specific use cases helps to illustrate the breadth of our stakeholders.*
- *Increased public awareness and interest for PacIOOS through media and website news releases, as well as media coverage by collaborators and partners, including the support of water quality monitoring efforts at Ma'alaea Harbor, Maui, through PacIOOS nearshore sensor loaner program; and equipping tiger sharks with a new generation of environmental tracking devices to have them serve as mobile "oceanographers;" advertisement of job opening at PacIOOS and associated efforts to advertise the position widely; providing data access to regional tsunami models for various areas in Guam; reauthorization of the Coordinated Ocean Observations and Research Act .*
- *During this reporting period, the PacIOOS website was visited by over 74K users and had more than 218K sessions.*
- *Page views for the PacIOOS wave buoys alone totaled at over 362K for this reporting period. Data of CDIP website stats and NDBC website stats, data requests, and RSS requests are currently not available.*
- *PacIOOS' Facebook page has more than 1,545 likes; Twitter following increased to over 540 followers.*

Stakeholder Engagement

- *Engaged via video conferences with stakeholders from various sectors to discuss collaborations, including agency partners (e.g., NOAA, USACE, Palau Office of Climate Change), non-profit organizations (e.g., South Kohala Clean Water Initiative, Mālama Maunalua), and other programs and partners (e.g., Hawai'i Sea Grant, Pacific Disaster Center, UH Coastal Geology Group, PI-CASC, The Pacific Community).*
- *Developed a brief video tutorial, a public presentation, and a press release as part of the public release of the West Maui wave run-up forecast.*
- *Virtual outreach with congressional staffers in Washington, D.C.*

Collaborative Efforts, Events and Conferences

- *Provided virtual presentation to high school students participating in Indigenous ocean monitoring cohort for Hawai'i; wave modeling presentation at Pacific Training Desk; Atmospheric Modeling presentation at the Water Resources Research Center Tropical Islands Water Conference; video submission to the Ocean Visions 2021 Summit.*
- *Participation in NOAA's Regional Collaboration Network Workshop.*
- *Online participation with NOAA Pacific Regional Outreach Group (PROG), State of Hawai'i Ocean Resources Management Plan (ORMP) Working Group, IOOS Outreach Committee, IOOS monthly meetings, IOOS Association Policy Committee, IOOS Association DEI working group, and the IOOS Spring Meeting Series.*
- *Mentoring of undergraduate college students and high school students by water quality team to support sensor and buoy programs.*

OBSERVING SUBSYSTEM

Maintain and operate 7 HFR stations in Hawai‘i, real-time surface currents data available online; Original completion date: Ongoing. **Status:** *Ongoing. Focus continues to be on operations and maintenance of 7 HFR stations on O‘ahu and Hawai‘i Island. Significant effort has gone into maintaining access to the sites, particularly Ka‘ena, Kapolei, and Kaka‘ako during this reporting period. Issues are due to change in staffing, management, renewal of expiring permits, and in the case of Kaka‘ako, the transfer of the park where the HFR station is located from the State to a county agency. Required maintenance for the two Hawai‘i Island HFR continues to be challenging due covid travel restrictions.*
http://www.pacioos.hawaii.edu/currents-category/obs/

Upgrade Hawai‘i HFR stations and retune/test UH HFR for FCC certification; Original completion date: Ongoing. *UH HFR experimental license has been renewed through June 1, 2026 (form FCC 405), allowing continued operation. Application for frequency allocation to the new ITU bands has been submitted and is pending (form FCC 442).*

Site visits, permitting, and deployment of new HFR sites in Guam and CNMI; Original completion date: May 2021. **Status:** *Delayed. Everything that can be done in advance of shipping and deploying has been completed. This milestone has been delayed due to covid restrictions and included in objectives of the 24 month no-cost extension for this award.*

Maintain operations of Waverider buoys in Hawai‘i, Mariana Islands, American Samoa, and the Marshall Islands, real-time wave data and associated products online; Original completion date: Ongoing**. *Status:** Ongoing. This was a busy period for the PacIOOS wave buoy team. Four wave buoys (Majuro, Waimea, Mokapu, and Hilo) parted from their moorings at different times, and others needed to be swapped for routine maintenance. The team redeployed the Pauwela, Maui buoy in mid-January, just in time for a large winter swell. In March, Waimea buoy was redeployed and Lana‘i buoy was swapped. Hanalei Bay, Kaua‘i buoy was redeployed in May. Our partner in Guam also redeployed the Ipan buoy in May. Mooring recovery efforts were undertaken for WETS and Kāne‘ohe buoys with the Hawai‘i Natural Energy Institute in April and May. http://www.pacioos.hawaii.edu/waves-category/buoy/*

Hire new wave buoy technician; Original completion date: November 2020. ***Status:** In progress. Hiring plans were delayed as we awaited changes in travel restrictions in the region. During the reporting period, the position description was drafted and submitted and approved by RCUH, widely posted, and the team is in the final stages of selecting a candidate. The objectives for this hire have been included in the NOAA-approved no cost extension for this award.*

Purchase new wave buoys and related equipment; Original completion date: Feb 2021. ***Status:** Delayed. Seven new wave buoys and seven new acoustic releases have been ordered, and are currently en route to HNL, ETA August 2021. This milestone is also included in the approved no cost extension.*

Determine new locations for new wave buoys, obtain necessary permits, and deploy new wave buoys; Original completion date: May 2021. ***Status:*** *Delayed. Due to the delay in the hiring process described above, these milestones are all also included in the approved no cost extension.*

Maintain operations of nearshore water quality sensors, data online; Original completion date: Ongoing. ***Status:*** *Ongoing. PacIOOS currently has 5 near shore sensors operational in Hawai'i (4 on O'ahu, 1 on Maui), and 4 operational in the Insular Pacific (American Samoa, the Federated States of Micronesia, the Republic of the Marshall Islands, and Guam). Partners on the islands other than O'ahu are key to keeping these sensors operational and data flowing. The partners maintaining sensors in the Insular Pacific have been impacted to various degrees due to covid. The team has found alternative partners and other work arounds when necessary to continue maintaining the sensors. Dynamic graphs and map viewers are on the PacIOOS website. http://www.pacioos.hawaii.edu/water-category/sensor/*

Continue Water Quality Sensor Partnership Program, data online; Original completion date: Ongoing. ***Status:*** *Ongoing. The PacIOOS Water Quality Sensor Partnership Program (WQSPP) continues to be popular with partners and the PacIOOS Governing Council. The program currently has three sensors deployed (Dausokele Estuary in Pohnpei, Ma'alaea Harbor in Maui, and Babeldaob, Palau). The Pohnpei project is with a local non-profit organzation, Conservation Society of Pohnpei, who is monitoring sediment run-off from key watersheds onto the coastal coral reef habitat. The Palau project is with a local non-profit organization, Ebiil Society, who is monitoring water quality downstream of a terrestrial/forest restoration site. The Ma'alaea Harbor project is with the Maui Nui Marine Resource Management Council to monitor how tides, wind, and swell affect water quality in this highly used local harbor. The sensor is rotating to new sites within the harbor every ~30 days. All WQSPP data of completed projects are now available on the PacIOOS website under archival sites:* http://www.pacioos.hawaii.edu/water/sensor-archive/

Develop template and implement data interpretation products for relevant WQSPP data sets; Original completion date: May 2021. ***Status:*** *Complete/Ongoing. During this reporting period, PacIOOS finalized the templates for and implemented data interpretation outreach materials for the WQSPP. Specfically, two flyers for WQSPP projects were developed to provide a high-level analysis for the involved non-profit organizations. These were finalized with the respective partners, provided to them, and are on the PacIOOS website under a new "Interpretation" tab on the respective webpages for the archived sites. The template will continue to be used for relevant WQSPP data sets in the future.*

Maintain operations of Hawai'i Island water quality buoys, data online; Original completion date: Ongoing. **Status**: Ongoing. *The Pelekane Bay buoy is in the water and reporting in near real time. Hilo Bay buoy is currently out of the water for maintenance and repairs; it will be redeployed at the end of June 2021. Data are transmitted hourly and available on the PacIOOS website:* http://www.pacioos.hawaii.edu/water/wqbuoy-pelekane/ http://www.pacioos.hawaii.edu/water/wqbuoy-hilo/

Ongoing covid response continues to affect training of students (including those that work on PacIOOS projects) within the UH Hilo boating program. Faculty at UH Hilo continue to push for a full-time hire for the boating safety program to increase training of students and agency partners (e.g., offering Motorboat Operator Certification Course training), which would benefit the ocean science/observing community greatly on Hawai'i Island.

Two 3-month glider runs; Original completion date: May 2021. ***Status:*** *Delayed. The PacIOOS Seaglider was received from Huntington Ingalls at the end of the last reporting period. The team bench tested it in January 2021, and all sensors and control systems passed a functions test. The Seaglider base station, modem/phone lines, and satellite communication/ARGOS accounts were established during this reporting period. Running glider missions is one of the objectives included in the NOAA-approved no cost extension for this award.*

Additional activities not mentioned above that highlight regional observing system successes and occurred during this reporting period include the following:

- *Continued partnership with numerous NOAA and American Samoa partners to maintain the MAPCO2 buoy in Fagatele in the National Marine Sanctuary of American Samoa. Travel restrictions due to covid delayed servicing by PacIOOS, and the buoy stopped collecting data and needs to be serviced. PacIOOS and AOML conducted online training sessions with local partners to build local capacity for recovering, refurbishing, and redeploying the buoy and mooring. Online lessons included conducting dive operations to recover the buoy and existing mooring, refurbishing the buoy, programming the replacement instruments (which arrived Pago Pago in April 2021), and communicating with NOAA partners at PMEL who manage satellite communications and data QA/QC. Remotely training local personnel for this buoy refurbishment is a first for both PacIOOS and AOML. All is ready in American Samoa for the buoy and mooring recovery and our partners are awaiting a weather window for a June 2021 recovery.*
- *Continued maintenance of the weather station at the entrance of Honolulu Harbor.* http://www.pacioos.hawaii.edu/weather/obs-honolulu/
- *In April 2021, signed a new MOA with the State of Hawai'i Department of Health, Clean Water Branch (CWB) to deploy and maintain three water quality sensors in Ke'ehi Lagoon, O'ahu. The team has deployment designs and has been assisting CWB with permits.*

DATA MANAGEMENT SUBSYSTEM

Complete PacIOOS DMAC server migration; Original completion date: March 2021. ***Status:*** *Delayed.* **New target completion date:** May 2022. *DMAC staff continue to migrate PacIOOS servers from a single server to a stack of servers running Virtual Machines (VM). The plan is to take advantage of VM management and parse different services to different VM's, thus eliminating single points of failure. The team has successfully migrated the main services, i.e., the PacIOOS website, THREDDS, and ERDDAP. The final service to move is DataTurbine, which PacIOOS uses to manage real-time data from various in-situ platforms. This step has been delayed due to time availability of the contractor as he navigates personal challenges during the pandemic. The PacIOOS DMAC team is on hold until the contractor work is complete. This task is a key objective remaining for our NOAA-approved no cost extension work plan.*

Identify and ingest new biological data sets with regional partners; Original completion date: May 2020. ***Status:*** *Complete/Ongoing. No new data sets finalized during this reporting period, but PacIOOS continued to work with the local Pacific Islands Fisheries Science Center (PIFSC) and the IOOS Program Office to identify and publish new data to OBIS. Staffing turnover at PIFSC has impacted progress.*

Additional activities for the data management subsystem that are not mentioned within the other subsystems but that highlight regional observing system success and occurred during this reporting period include the following:

- *During this performance period, over 229,665 unique visitors (via direct external access to our servers) accessed more than 49.28 million pages in our servers (TDS, ERDDAP) and transferred over 23.31TB of data.*
- *The PacIOOS Data Catalog is now serving new high-resolution tsunami hazard maps for the Agat Coast and Agat Marina on the southwest shore of the island of Guam developed by Professor Kwok Fai Cheung, Department of Ocean and Resources Engineering at SOEST and PacIOOS co-investigator, along with his team. The Non-hydrostatic Evolution of Ocean WAVEs (NEOWAVE) regional tsunami models are categorized by earthquake magnitude and subduction zone. The data products include nearshore hazard maps of surge, drawdown, and currents for potential advisory and warning-level tsunamis from sources at the Mariana, Nankai, Philippine, and New Guinea subduction zones.*

MODELING, ANALYSIS, AND PRODUCT DEVELOPMENT SUBSYSTEM

Maintain wave (WaveWatch III and SWAN) models for Hawai‘i, Mariana Islands, and Samoan Islands; Original completion date: Ongoing. ***Status:*** *Ongoing. All models are currently operational. During this reporting period, NOAA implemented changes to their modeling system that were not widely announced. Our modeling team was caught off-guard when the NOAA modeling system was replaced with an upgrade of GFS, and our PacIOOS high-resolution models were down for two weeks as the team scrambled to recode our model runs utilizing the new system.* *http://www.pacioos.hawaii.edu/waves-category/model/*

Maintain 6-day high-water level forecasts; tailored using ongoing feedback (e.g., multiple thresholds); forecasts available online; Original completion date: Ongoing. ***Status:*** *Ongoing. Continued ongoing maintenance of data streams. Pago Pago HSL forecast continues to be offline due to continued challenges that NOAA is facing to fix the tide gauge. The Malakal HSL forecast is experiencing glitches in the observed piece of the plot, due to issues with the real-time data aquisition of the tide gauge managed by the UH Sea Level Center. This is being investigated with partners.* *http://www.pacioos.hawaii.edu/shoreline-category/highsea/*

Maintain wave run-up forecasts; tailored using ongoing feedback; forecasts available online; Original completion date: Ongoing. ***Status:*** *Ongoing. Continued ongoing maintenance of data streams required for the wave run-up forecasts was a significant effort this reporting period, due to how NOAA implemented their upgrades in GFS (described above). Only after the regional WaveWatch III and SWAN models were back up and running, could the team re-code our acquisition of those model outputs needed for our wave run-up forecasts. As a result, these*

forecast were offline for 3-5 weeks. PacIOOS also continues to refine forecasts with user feedback and collaborating with partners to obtain on-the-ground validation during predicted events. Enhancements for the North Shore and Waikīkī wave run-up forecasts were made, with thresholds established based on local input and community scientist photos used for calibration. See the Examples tab for each forecast for details.
http://www.pacioos.hawaii.edu/shoreline-category/runup/

Support the delivery of the new wave run-up forecast for West Maui; Original completion date: May 2021. ***Status:*** *Complete. PacIOOS continued to supplement support for the PacIOOS Coastal Resilience Grant project for West Maui, especially in terms of communications and data management. The forecast, with 12 distinct regions along West Maui (from Honolua Bay in the north to Palalaua Wayside Park in the south), went live on June 2, 2021. Community stakeholder and partner outreach and consultations occurred during the development of this tool. The team conducted two webinars upon its release. Additional communications efforts are highlighted above. Ongoing operational activities will include the continued evaluation of new community scientist photo evidence for calibration of the three impact thresholds in each of the 12 regions and maintenance to address data/input stream glitches (examples highlighted above).*
http://www.pacioos.hawaii.edu/shoreline-category/runup-westmaui/

Maintain harbor surge forecast; tailored using ongoing feedback/new inputs; forecast available online; Original completion date: Ongoing. ***Status:*** *Ongoing. The Hale'iwa Harbor Surge forecast was down for part of this reporting period due to the NOAA GFS issues described above. The forecast has been re-coded to account for the changes in the data stream from NOAA, and the forecast is again operational. http://www.pacioos.hawaii.edu/shoreline-category/harborsurge/*

Maintain ROMS circulation models for Hawai'i, Mariana Islands, and Samoan Islands; Original completion date: Ongoing. ***Status:*** *Ongoing. PacIOOS ROMS is available for various areas and grid sizes in Hawai'i, the Mariana Islands, and Samoa. We are collaborating with GFDL to develop regional MOM6 capability for Hawai'i.*
http://www.pacioos.hawaii.edu/currents-category/model/

Observation analysis impacts for ROMS running operationally; Original completion date: Ongoing. ***Status:*** *Ongoing. We assess the impact of every observation used to perform the daily analysis: we examine transport, Eddy Kinetic Energy (EKE), and isopycnal depth in HI; transport and EKE in Guam.*

Observation forecast impacts for ROMS running operationally; Original completion date: Ongoing. ***Status:*** *Ongoing. We now have an experimental setup that quantifies how each observation improved (or degraded) the forecast for a particular metric. Currently, we are using the transport metric in Hawai'i.*

Development of coupled physical/biogeochemical model for Hawai'i; Original completion date: Ongoing. ***Status:*** *Ongoing. Model development of a coupled ROMS/COBALT model is complete, allowing for a seamless integration of physical and biogeochemical parameters. A manuscript on this work has been published. The goal is to incorporate the ecosystem output into*

PacIOOS' daily ocean modeling forecasts; however, the *assimilation of biogeochemical data is a significant hurdle on which we continue to work. We are collaborating with partners in CenCOOS on the work they are doing to incorporate biogeochemical data assimilation. We have received funding from NOAA MAPP to perform a suite of projections through the end of the century to examine the impacts of climate change on the fisheries around Hawai'i. Initial model results for the time period 2010-2017 have shown that the availability of light is the most significant driver in the seasonal cycle of organisms around Hawai'i.* *http://www.pacioos.hawaii.edu/new-tools/new-comprehensive-ecosystem-model-hawaii/*

Model data and products (including Ala Wai Plume Forecast) online; Original completion date: Ongoing. ***Status:*** *Ongoing. All forecasts and data output are available via the PacIOOS website. A student is working to develop a neural network approach to forecast streamflow in the Ala Wai canal based on previous rainfall, previous streamflow, and rain forecast. By having a streamflow prediction, we aim to improve the predictions for brown water.* *http://www.pacioos.hawaii.edu/currents-category/model/*, *http://www.pacioos.hawaii.edu/water/model-plume-alawai/*

RESEARCH AND DEVELOPMENT SUBSYSTEM

Transmitting tags (including ocean profiling tags) deployed on pelagics (sharks) throughout the year; Original completion date: Ongoing. ***Status:*** *Ongoing. Currently five (5) tiger sharks tagged off O'ahu, are equipped with ocean temperature profiling satellite tags and reporting in near real-time. UH sanctions responding to covid inhibited full completion of this milestone during this fiscal year; therefore, this objective is included in the NOAA-approved 24-month no cost extension for this award. http://www.pacioos.hawaii.edu/projects/sharks/*

Maintain land-based receivers for shark tags throughout the year; Original completion date: Ongoing. ***Status:*** *Ongoing. Currently 3 land-based receivers ("Motes") are deployed on O'ahu, and 2 are deployed on Maui, to collect and forward data from tagged sharks. This reporting period focused on re-securing access to all land-based mote locations. Additional Motes funded through a subaward from NERACOOS (ONR funding) have been received, and work is ongoing to finalize site permitting for deployment on Hawai'i Island.*

Continue to assist the IOOS ATN DAC with data ingest of ocean profiles from telemetered animals; Original completion data: Ongoing. ***Status:*** *Ongoing. The PacIOOS researchers and data management team are working with the tag manufacturer to iron out details pertaining to quality control (QC). They are close to a machine-to-machine solution for transferring oceanographic data into publicly accessible databases.*

2.0 Scope of Work

No changes to the project scope of work are anticipated. Remaining objectives/deliverables are included in the NOAA-approved no cost extension.

3.0 Personnel and Organizational Structure

No major personnel changes during this reporting period.

4.0 Budget Analysis

Spending for this award is on track with projected program expenditures. The University of Hawai‘i Office of Research Services submitted a semi-annual financial report for the period ending March 31, 2021, through Grants Online. That report shows total receipts of $11,018,679.24. As of June 1, 2021, internal budget tracking shows expenditures of $11,400,348.93, representing a drawdown of 74.71% of the Federal funding for this now 7-year award (with the NOAA-approved no cost extension).