PacIOOS
PACIFIC ISLANDS OCEAN OBSERVING SYSTEM

Operations Guide

April 2022

Table of Contents

Introduction

PacIOOS is the Pacific regional system within the U.S. Integrated Ocean Observing System (IOOS) and is charged with providing sustained coastal and ocean observations and timely information access for improved decision-making and understanding of ocean state. The PacIOOS region includes the State of Hawaiʻi, the territories of Guam and American Samoa, the Commonwealth of the Northern Mariana Islands, the Republic of Palau, the Republic of the Marshall Islands, the Federated States of Micronesia, and the U.S. Minor Outlying Islands in the Pacific. As a regional component of IOOS, PacIOOS focuses on the recognized subsystems of IOOS: observing, modeling and analysis, data management and cyberinfrastructure, engagement, and governance and management.

The core vision, mission, guiding principles, thematic areas, 5-year strategic outlook, and 5-year strategic goals and objectives are detailed in the PacIOOS Strategic Framework (2018-2022). This guiding document was developed during a 2-year engagement effort with partners, collaborators, staff, researchers, and the broader PacIOOS community.

The PacIOOS Strategic Framework is complemented by three documents:

1. A **10-year Outlook**, previously referred to as a 10-year Build Out Plan, a document that describes a detailed vision for advancing coastal and ocean observing throughout the Pacific Islands region;
2. A **Data Management System Reference Manual**, a document detailing how PacIOOS stores, transports, assures quality assurance and quality control (QA/QC), and delivers PacIOOS-related data to users; and,
3. An **Operations Guide** (this document) that details overarching policies and procedures employed across the system to guide execution.

The collection of these four documents, known in IOOS parlance as the **Strategic Operations Plan,** detail the who, what, why, and how of PacIOOS activities. These core documents are updated every 5 years with input from PacIOOS staff, researchers, partners, collaborators, funders, and stakeholders. The PacIOOS Governing Council plays a significant role of input/feedback/approval during this process. Over the course of the five-year planning cycle, long-range strategic objectives are defined, refined, and adopted to ensure the investments made by the system generate real and lasting value to the Pacific Islands region.

Membership and Governing Council

Membership Policy

Organizations may formally participate in the governance activities of PacIOOS once they become Parties to the **Memorandum of Agreement** (MOA). The Parties agree to communicate and participate in the development of PacIOOS in a way that promotes growth and success of the program. Parties can nominate and vote on a representative to the PacIOOS Governing Council (the Council). The Council members have the greatest level of participation in the governing activities of PacIOOS.

Governing Council

PacIOOS has adopted a unique model of representation and governance. To ensure all stakeholders within the region have a representative voice in the long and short-range investments of the system, seats on the PacIOOS Council are apportioned between the territories, the Commonwealth, the State of Hawaiʻi, and the three nations within the Pacific Islands domain based on distribution of population. In addition, given that many stakeholders within the region have interests that span beyond the borders of a single nation or state, additional seats are set aside for representatives of pan-regional agencies/programs to join those members on the Council whose interests are geographically specific.

The membership of the Council is composed of executive leadership (or their designees) of international, federal, territorial, state, and local agencies, academic and research institutions, private entities, industry, and non-governmental organizations that are party to the MOA. When there is an open seat in a geographic jurisdiction, each MOA signatory organization from that sub-region is eligible to nominate a representative from their organization as a candidate for the Council. Partners from within that same jurisdiction vote to select a single nominee as the next representative for the PacIOOS Governing Council.

Council members provide general oversight and policy guidance, adopt implementing documents and strategic plans, and advise on major decisions for PacIOOS. Over a three-year term, Council members work with PacIOOS staff, through annual meetings, individual discussions, and through a five-member Executive Committee to review region-wide needs and priorities from all stakeholders and determine annual guidance to the program on implementation, as well as long-term strategic planning.

At each PacIOOS Governing Council meeting and its Executive Committee meeting (each meet once per year), PacIOOS staff members present the latest updates of engagement and partner development strategies and efforts. Every other year, the Council elects a new Executive Committee. During these meetings, the Council discusses representation of the region in various ways, including composition of the Executive Committee and the broader Council and who else to reach out to as potential MOA partners. These discussions are often in terms of sector and expertise, including Indigenous representation. In this manner, the Council members help assure broad representation of stakeholder considerations.

Conflict of Interest

All members of the Governing Council will declare any conflict of interest he or she may have and will recuse him or herself from voting if they believe they have or are determined to have a conflict of interest. A conflict of interest occurs when a member or a member's direct family member stands to benefit personally or professionally from a programmatic funding, partnership, or business decision. Providing full disclosure and excusing oneself from voting in matters determined to be a conflict of interest is the responsibility of each member, and serves to protect the interests of PacIOOS, its employees, Council members, offices, and members.

Accountability and Liability

The University of Hawaiʻi at Mānoa (UH Mānoa) is the organizational and fiscal sponsor of PacIOOS. UH Mānoa, as a part of the University of Hawaiʻi System, is an agency within the State of Hawaiʻi. As such, all employees of PacIOOS, whether hired through the University of Hawaiʻi, or the Research Corporation of the University of Hawaiʻi (RCUH), are employees of the State of Hawaiʻi, and their actions while under the employ of the state are seen as activities taken by the State of Hawaiʻi, with associated liability and self-insurance protections provided to employees as allowed for in university policy under Hawaiʻi Revised Statutes. All actions taken by PacIOOS employees are assessed and reviewed annually through established employee evaluation requirements—ensuring supervisors of record (within PacIOOS and the University of Hawaiʻi) are engaged in the ongoing activities of staff and afforded to authority to hold staff accountable for actions, while also promoting and rewarding successes.

With respect to liability protection, at a minimum, the Attorney General of the State of Hawaiʻi as provided that the University shall be responsible for damages or injury caused by the University's agents, officers, and employees in the course of their employment to the extent that the University's liability has been determined by a court or otherwise agreed to by the University, and the University shall pay for damages and injury to the extent permitted by law.

Members of the PacIOOS Governing Council are volunteers who agree, through the non-binding execution of the PacIOOS MOA, to advise the program on strategic planning, execution, and evaluation. Prior to each in-person Council meeting, members sign waivers of liability protection from the State of Hawaiʻi and, if traveling, submit paperwork that establishes them as uncompensated project volunteers. The opinions, votes, and recommendations offered by the Council are, by the very nature of its organization through the MOA, non-binding, and are reviewed and adopted by the PacIOOS employees as appropriate in the execution of their duties as employees of the State of Hawaiʻi, while ensuring consistency of action with the program goals laid out in existing cooperative agreements with the National Oceanic and Atmospheric Administration (NOAA).

Personnel Management

System Leadership
The PacIOOS Office is co-located within the University of Hawaiʻi at Mānoa School of Ocean and Earth Science and Technology (SOEST) and is managed by the PacIOOS Director. The PacIOOS Office functions as the official representative of PacIOOS and is responsible for ensuring the sustained operation of PacIOOS components and systems. The Office includes a director (as defined below), deputy director, operations coordinator, communications coordinator, sub-regional liaisons, and administrative/support staff, as appropriate.

The director of PacIOOS is a salaried position, funded through the PacIOOS cooperative agreement with the NOAA IOOS Program Office, responsible for the management, supervision, and execution of the PacIOOS enterprise. The director is the Principal Investigator of record for PacIOOS funding. The director reports to the leadership of SOEST and receives guidance from the Governing Council. The director, along with the chair of the Governing Council, are the two representatives from PacIOOS to the Board of the IOOS Association.

Staff Assessment
All staff and executive leadership of PacIOOS are employees of the State of Hawaiʻi, through the Research Corporation of the University of Hawaiʻi (RCUH) . For all RCUH employees, annual performance reviews are conducted. Continued participation in PacIOOS, and employment with the program, are dependent upon responsible execution of the job duties incumbent to the position they hold.

https://www.rcuh.com/wp-content/uploads/2017/06/3.410-RCUH-12-Month-Needs-Based-Performance-Eval_041819.pdf

Faculty members of the University of Hawaiʻi (UH), engaged with PacIOOS as co-Investigators, are subject to annual review prior to their receipt of tenure, and then participate in post-tenure reviews to gauge productivity, performance, and impact. Faculty partners participate in the PacIOOS program at the mutual consent of both the individual and the Principal Investigator (PacIOOS Director). Faculty members who do not maintain the highest standards of performance and accountability can and have been separated from PacIOOS following established internal UH process and procedures.

Equipment Management

All equipment purchased by PacIOOS is owned and managed by the University of Hawaiʻi, an agency of the State of Hawaiʻi. All equipment is managed under State of Hawaiʻi inventory control guidelines including:

a) annual certification of equipment location;
b) annual certification of equipment value; and
c) application of inventory control barcode to all equipment.

All equipment owned by PacIOOS is the responsibility of the individual faculty partner charged with operating the equipment. As part of the State of Hawaiʻi, University, and PacIOOS inventory management best practices, each faculty member maintains digital records of equipment performance, history, location, and utilization, including but not limited to:

a) instrument deployment details (location, date/time, status, data frequency);
b) service records (date, repair reason, calibration coefficients);
c) instrument location, including shipping logs (deployed, in-transit, in lab);
d) instrument serial number; and,
e) instrument insurance records (including current value and replacement cost).

Manufacturer Guidelines

All assets owned and/or operated by PacIOOS are calibrated, operated, and maintained in accordance with manufacturing guidelines and/or national IOOS program guidelines, when available. These assets include high frequency radar, near shore water quality sensors, water quality buoys, wave buoys, and gliders.

High Frequency Radar
NOAA IOOS and the High Frequency Radar (HFR) steering team have developed standard operating procedures for HFR. PacIOOS follows these guidelines.

http://www.pacioos.hawaii.edu/wp-content/uploads/2016/08/SCCOOS-BestPractices.pdf

Datawell Waverider Buoys
PacIOOS operates Waverider Buoys (MKIII and DWR4) throughout the region. PacIOOS follows the standard operating procedures outlined in the National Wave Plan (p. 31) and in the Datawell manuals:

https://cdn.ioos.noaa.gov/media/2017/12/wave_plan_final_03122009.pdf
http://www.pacioos.hawaii.edu/wp-content/uploads/2016/08/mk3.pdf
http://www.pacioos.hawaii.edu/wp-content/uploads/2020/07/Cert_Datawell_DWR4_2020.pdf

Near shore water quality sensors
PacIOOS operates Sea-Bird Scientific SBE 16plus V2, SBE 37SMP, and WET Labs ECO-FLNTUS

sensor packages throughout the region. PacIOOS staff provide operations and maintenance as recommended in the following manuals:

http://www.pacioos.hawaii.edu/wp-content/uploads/2016/08/16plusV2_rs232_011.pdf
http://www.pacioos.hawaii.edu/wp-content/uploads/2016/08/3en.pdf
http://www.pacioos.hawaii.edu/wp-content/uploads/2016/08/37SMP_RS232_020.pdf

Water Quality Buoys
PacIOOS operates Yellow Springs Instruments (YSI) EMM-68 buoys and YSI EXO2 Sonde sensors. PacIOOS staff and partners also perform all operations, calibration, and maintenance as recommended in the YSI manuals.

http://www.pacioos.hawaii.edu/wp-content/uploads/2020/07/Cert_EXO-User-Manual.pdf

https://www.ysi.com/file%20library/documents/manuals/069300-ysi-6-series-manual-revj.pdf

Gliders
PacIOOS and University of Hawaiʻi staff operate one Seaglider to support ocean model validation and assessment. Operations follow standard procedures for the construction, deployment, data collection, retrieval, and maintenance of the glider as referenced below.

https://hahana.soest.hawaii.edu/seagliders/manuals/manuals.php

Export Control
Due to the international nature of PacIOOS activities, program staff and faculty leadership are likely to encounter federal regulations that impose access, dissemination, or participation restrictions on the use and/or transfer of commodities, technical data, or the provision of services subject to U.S. export controls for reasons of national security, foreign policy, anti-terrorism, or non-proliferation. The scope of export-controlled items is very broad and includes, but is not limited to, equipment, software code, materials, and technical data.

In close consultation with the University of Hawaiʻi Office of Export Controls (OEC), all PacIOOS activities that involve potential exports are screened and managed to ensure compliance with U.S. laws and regulations. Exports include:

- Shipment of equipment/supplies or transmission of data and information out of the U.S.;
- Releasing or transferring information about a controlled item to a foreign person;
- Transferring registration, control, or ownership of certain controlled items to a foreign person; and,
- Use of controlled technology on behalf of, or for the benefit of, any foreign person or entity, either in the U.S. or abroad.

Data Quality

PacIOOS is responsible for providing a wide array of data to the public. These data are used in numerous ways, and PacIOOS therefore recognizes the need to ensure all these data are of known quality and that this quality measure is made available to the user. In data management terms this is referred to as quality assurance (QA) and quality control (QC).

The difference is somewhat subtle, but QC is generally used to describe the equations or steps undertaken to evaluate the data, typically after the data have been collected. For example, checks to ensure measurements are in a certain reasonable range. QA on the other hand refers to a set of activities designed to ensure that the data meet specific requirements. Another way to describe this is QA procedures are usually process-oriented while QC is product-oriented.

The PacIOOS data management system provides data to the public from two different sources: data from PacIOOS-funded faculty partners (local data) and data from external sources. The external data sources are varied, and include data provided from partners, State, and Federal data servers.

The following definitions are used to delineate the different "states" of data, since these determine in some regards the type of QC applied.

Real-time data: Data transferred from a sensor package to the PacIOOS data servers at the same frequency the data are collected, with virtually no latency. Data may not arrive instantaneously but are sufficiently timely to make real-time decisions. Example: Wave height is determined by wave buoys every half hour. Data are transferred to the PacIOOS servers every half hour, immediately after the calculation is made, with latency of less than 4 minutes by the time the data are available on our servers. Real time data is ideal for operational decision making.

Near real-time data: Data transferred from a sensor package to the PacIOOS data servers at a frequency that is less than the frequency the data are collected, with latency on the order of hour(s) or a few days. The time of collection and collection frequency are preserved in the data transfer, but data are only made available after some delay. Example: water quality data are collected by PacIOOS sensors every four minutes but are transferred to the PacIOOS servers once per hour.

Historical data: Data are transferred from a sensor package to PacIOOS servers at frequencies significantly less than the frequency of data collection, on the order of weeks/months, with latency of at least one month. Historical data are not usable for real-time or near-real time decision-making. The data are made available only as a public reference for historical conditions. Historical data are for limited amounts of time and are from close-ended data set collections (*i.e.*, not part of an ongoing or continuous instrument time series or are one-time discrete measurements).

***Citizen science data*:** Data that are collected by members of the public who are not trained scientists, often in cooperation with a non-profit, education, or science program. These data are collected by volunteers and have limited quality control. Measurements are used to assess general conditions for public awareness raising and educational opportunities.

Quality Assurance

PacIOOS relies on faculty partners to provide the best practices for QA on specific instruments. These investigators are internationally recognized scientists with a great deal of experience making *in-situ* and remote sensing observations in their field. All instruments are deployed and maintained by their research groups, and they advise the Data Management Group (DMG) as to quality assurance steps.

PacIOOS serves real-time and near real-time raw data provided by federal agencies, IOOS data assembly centers (*e.g.*, Coastal Data Information Program (CDIP), HFR), and from external groups (*e.g.*, State of Hawai'i Department of Health) that perform their own QA/QC according to international best practices and standards. PacIOOS plans to run future PacIOOS glider missions through the Glider data assembly center (DAC).

PacIOOS does not serve real-time or near-real-time data from external partners who do not perform QA/QC. PacIOOS currently serves historical data without documented QC from internal sources (gliders) and external partners, including citizen science groups.

For all external partners providing data to PacIOOS, the PacIOOS DMG screens the provider to ensure the provider is an authoritative source (*i.e.*, government agency, contractor providing data for regulatory agency operations, a university research center), and is maintaining the observational equipment that collects the original source data according to published manufacturer standards and in-line with scientific best practices.

Quality Control

The data QC procedures for real-time and near real-time data collected and served by PacIOOS are divided into real-time (RT) checks and delayed mode (DM) analyses. Raw data are processed using automatic checks and given flags depending on certain criteria. In the case that a variable has a Quality Assurance/Quality Control of Real-Time Oceanographic Data (QARTOD) specific check, those are either used, or a timeline is detailed below for the adoption of the check by PacIOOS. Regardless of whether variables have QARTOD guidelines or not, PacIOOS performs data QC using standard scientific data checks determined by the science teams within the PacIOOS component groups.

In the case of PacIOOS-collected, real-time and near real-time data, QC procedures are performed when the data are converted from their native form into netCDF for the data services (*e.g.*, during the processing from a raw signal off an RS-232 port to a file on a shore-side machine). In all cases, the resulting data values are either deleted (*e.g.*, a signal at report time is garbled off the instrument and cannot be resolved), or files are flagged with the level of QC applied, with data viewers indicating flagged data when displayed. Note that data are

usually aggregated into files at some set interval, while measurements are made at higher frequencies. Data are never changed or modified, but flags are given to let users know the quality.

For all real-time and near real-time data streams provided by PacIOOS three standard QC checks are presently performed, in order, prior to data being made publicly available:

1. **Syntax check:** Test determines if received data message contains the proper structure without any indicators of flawed transmission such as parity errors.
2. **Timing/gap check:** Test determines that the most recent data point has been measured and received within the expected time window and has a correct and readable timestamp.
3. **Location test:** Check that information received from the proper location. For most of the PacIOOS assets this test is passed since they are fixed moorings.
4. **Gross range check:** All variables have been assigned a valid range. This was determined through consultation with the faculty partner responsible for deployment and maintenance. The netCDF files contain a range attribute based on this number. Additionally, the netCDF files contain global attributes that contain the PI name and contact information, the appropriate technician, and the calibration sheet number (if appropriate) used to come up with the valid range. (It should be noted that many netCDF services and viewers will treat flagged "out of range" data as missing).

In addition to automated gross range checks, water quality data collected by PacIOOS near shore sensors (NSS) and through water quality buoys (WQB) are manually examined daily and manual climatology and spike tests are performed, with data that fall outside the expected or accepted range flagged, and associated warnings transmitted to the user via the data viewers, when data are accessed.

The QC procedures for the data from the animal-borne satellite tags are slightly different than the above QC procedures. These data are manually examined daily before they are made publicly available. Positional accuracy of shark tracks is evaluated by knowing the quality of the initial satellite-derived positional fixes, which are then further refined through the application of various movement models that eliminate erroneous positions.

QC Procedures are not performed on historical data, as such data are not available for real-time and near real-time decision making, is for historical reference only, and is delivered to PacIOOS machines at infrequent and highly latent intervals. However, prior to accepting historical data in to the PacIOOS data system the DMG and PacIOOS leadership closely examine the QA procedures of each provider, through direct discussion and data review. All providers of historical data to PacIOOS employ scientifically sound QA procedures, in-line with manufacturer specifications and scientific best practices.

QC Procedures are not performed on citizen science data; however, all such data are flagged accordingly, and user discretion is advised. These data are typically at least 1 week old before

they reach PacIOOS servers. More often, data are several weeks to months old before they are uploaded to the database from which PacIOOS checks for new data (on a weekly basis).
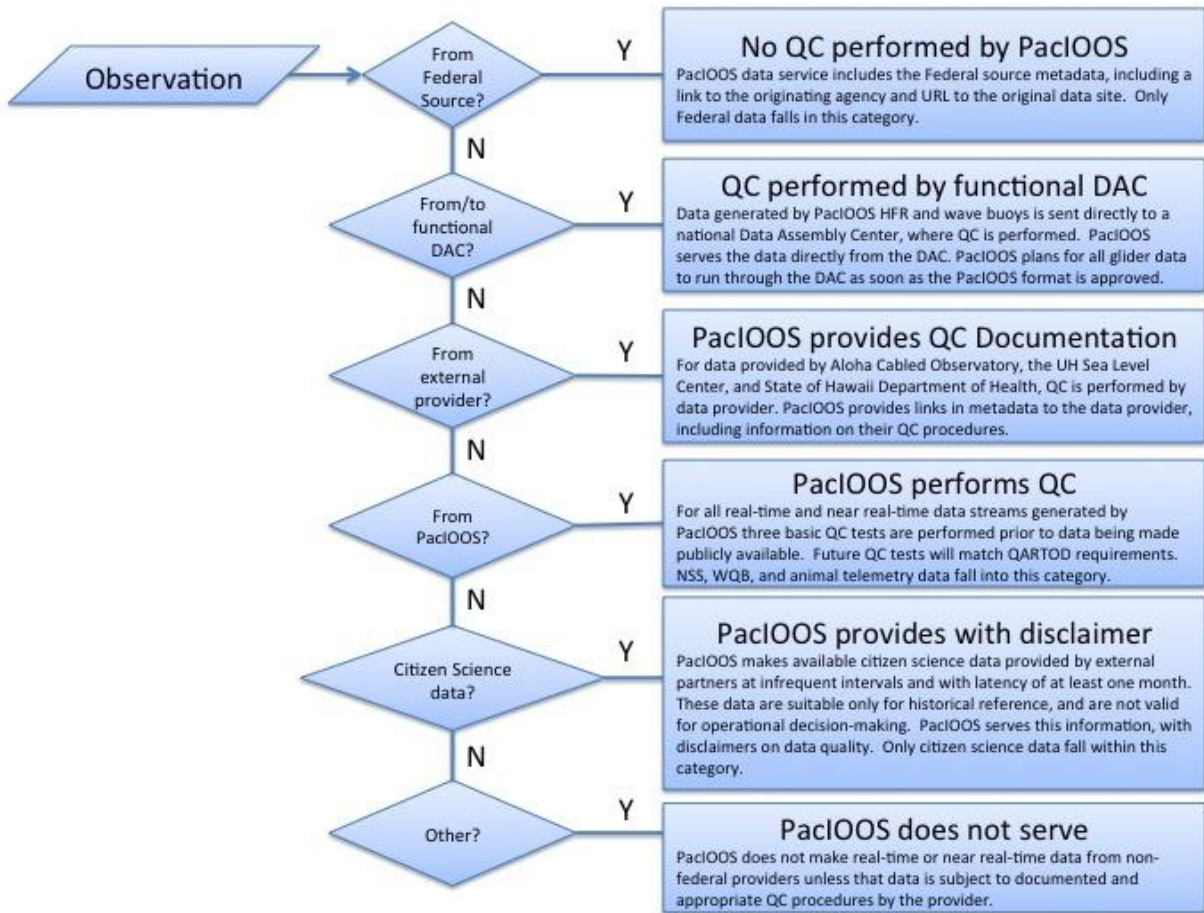

Figure 1: Schematic of data flow through the PacIOOS DMS detailing the source of QC.

Planning and Assessment

PacIOOS employs a variety of processes and people to guide programmatic priority setting and decision-making. PacIOOS is designed to be stakeholder-driven, operating in a continuous effort to meet the needs of widely distributed and diverse communities throughout the Pacific.

Data collection, assessment, and adoption of system priorities are built upon an inclusive, iterative, and bottom-up stakeholder input process. Initial engagement of stakeholders was extensive, both geographically and programmatically. PacIOOS engages many levels of Federal, State, and local/regional government, ocean recreation and commerce sectors, the hotel and tourism industry, nongovernmental organizations, the media, community, and indigenous groups, as well as residents throughout the PacIOOS region. Input is gathered at community and in-person meetings, workshops, training sessions, focus groups, through webinar and web-based feedback services, online surveys, and through review of strategic plans, prioritization documents, needs assessments compiled by partner organizations at local, regional, and federal levels. Engagement is ongoing with all partners, throughout all states of the strategic planning process and beyond. Through these ongoing and diverse modes of engagement, PacIOOS maintains a strong, diverse, and engaged user base that provides regular input on needs and priorities within their cohorts and contributes critical assessment on the effectiveness of the regional system in satisfying user needs.

Several PacIOOS staff lead efforts to engage stakeholders and ensure a continuous feedback loop with program staff, regional partners, and the IOOS program office. In addition to the Honolulu-based staff, PacIOOS hires and/or contracts liaisons to manage extension and stakeholder engagement work outside Hawai'i. PacIOOS has liaisons in Guam, the Federated States of Micronesia, the Marshall Islands, and American Samoa. Liaison hires are pending in Palau and the CNMI. The liaisons ensure regular engagement, stakeholder feedback, and input into the short-term annual priority setting as well as the long- term strategic planning.

Strategic Planning & Priority Setting

PacIOOS, through its Governing Council and rich stakeholder engagement process, executes annual work-plans that are designed to meet the long-range goals and objectives of the PacIOOS 5-year Strategic Framework, 10-year Outlook, DMS Reference Manual, and this Operations Guide. These documents, collectively known as the *Strategic Operational Plan*, are adopted by the Governing Council, and reviewed annually to ensure that the organization is focused on relevant, appropriate, and timely activities while still maintaining its focus on large-scale goals and objectives tied to the national observing enterprise. The goals, objectives, and recommended actions represent a collection of expressed needs, gathered over years and geographies, carefully matched with the capabilities of the PacIOOS faculty partners, staff, and the Council to create a cost-effective, operational ocean observing system.

Several factors are taken into consideration when prioritizing annual allocation or resources within the organization. PacIOOS leadership evaluate funding levels, progress toward strategic plan goals/objectives, and existing program capabilities along with partner support for

activities, and the potential impact of an investment to individuals, organizations, and populations. The results of these comparisons are presented to the Executive Committee of the Governing Council who then provides guidance on the balancing of resources and priority setting for the most efficient and effective operations.

Funding the System

As part of the U.S. IOOS enterprise, PacIOOS annually engages with the IOOS program office to determine the maximum amount of federal funds, awarded as the result of a competitive review process, available to PacIOOS for the continuation of annual operations and development of new capabilities. The IOOS Program has been a steady and consistent financial supporter of PacIOOS, and it can be expected that PacIOOS will continue to receive a share of the federal funds allocated to the IOOS program through the federal budget process. However, long-term federal support for IOOS and PacIOOS is not guaranteed, and uncertainties in future federal funding preclude PacIOOS from planning for and relying solely on IOOS support to maintain and expand operations in the region. Maintaining a diverse portfolio of partners to complement IOOS funding is an essential to PacIOOS' fiscal health. PacIOOS leadership has and continues to successfully solicit funding from federal, state, local, private, and international partners to support new PacIOOS operations and sustain existing capacities. As this support has increased, core staff have expanded at a rate commensurate with overall funding growth to ensure smooth operation and continued opportunity to grow.

PacIOOS relies on significant annual support to provide for basic operations (system maintenance, upgrades/replacement of inventory, salary support for personnel) and allow for successful execution of our strategic initiatives. To date, IOOS and other partners have provided such support; however, it is prudent for PacIOOS to explore additional means of obtaining annual funding for basic operations, including developing, evaluating, and adopting pay-for-use services built upon the existing PacIOOS data infrastructure, licensing of PacIOOS-developed technology to industry, and contract use of mobile PacIOOS assets for data acquisition.

Annual Evaluation

In addition to annually reviewing the priority of activities with respect to stakeholder needs and interests, PacIOOS evaluates the effectiveness, efficiency, and impact of each component within the system. This assessment informs a decision-making process that determines additional investment, sustainment, or retirement of observing assets and/or services.

Several factors are considered in the evaluation of each component area. These guiding questions required PacIOOS to evaluate criteria such as: demonstrated level of need or use; uniqueness of service; potential for a positive, significant impact; reasonable use of financial and human resources; ability to integrate into existing regional and national networks; level of customer utility and number of identified users; balance of partner contributions; level at which partners rely on the component area for operations; cost of operations and maintenance; and performance record. An evaluation of component areas using these criteria allows PacIOOS to select which projects to continue or discontinue. For more detail on this internal evaluation process, please review https://www.frontiersin.org/articles/10.3389/fmars.2019.00111/full.

Safety

At the center of PacIOOS' core values are a commitment to providing a safe and inclusive environment for our employees. All PacIOOS personnel uphold the Code of Conduct of SOEST, our host institution.

Creating a fully inclusive program that values and supports safety and diversity requires continued effort with input from all members of the PacIOOS team. Whether PacIOOS personnel are in the workplace, on field operations, or on travel, PacIOOS leadership prioritizes consistent progress towards a safe workplace and building a culture which values accessibility, justice, diversity, equality, and inclusion.

PacIOOS leadership, alongside SOEST and University of Hawai'i leadership, condemns discrimination and harassment in any form. We are committed to promoting social justice and equality in all forms, always.

Sexual Harassment

It is the policy of the University of Hawai'i, SOEST, RCUH, and PacIOOS to maintain a workplace environment in which all employees can work with security, dignity, and freedom from sexual harassment by anyone, including supervisors, fellow employees, customers, consultants, subcontractors, or suppliers. Sexual harassment is illegal under the Civil Rights Act of 1964.

We require all PacIOOS employees (including supervisors) to comply with Equal Employment Opportunity (EEO) and Affirmative Action Program requirements to ensure the workplace is free from all forms of discrimination. Staff participate in EEO/Sexual Harassment training and education programs at least once every two years. Training is made available to all PacIOOS employees (e.g., regular status, temporary, intermittent, student, etc.) and supervisors.

Workplace Violence

It is the policy of the University of Hawai'i, SOEST, RCUH, and of PacIOOS to provide a safe work environment for all employees and individuals in the workplace. PacIOOS maintains zero tolerance for violence in the workplace. "Violence" is defined to include physically harming another; shoving; pushing; harassment; verbal, written, or physical intimidation; coercion; brandishing weapons; and threats or talk of violence. This policy also includes horseplay (e.g., even the talk of violence or joking about violence will not be tolerated) where another individual feels threatened by such talk.

If anyone displays any violence in the workplace or threatens violence in the workplace, they may be subject to immediate disciplinary action (including possible termination from employment).

All PacIOOS employees attend Workplace Violence Prevention training at least once every two (2) years.

Lab and Workplace Safety

In concert with the Environmental Health and Safety Offices (EHSO) for UH Mānoa and UH Hilo, PacIOOS works to promote safe campus and field working environments through adherence to established safety programs, guidelines, and polices. All PacIOOS operations must adhere to federal, state, territory, and campus safety requirements for laboratory work, hazardous materials, occupational safety, and environmental compliance. Any unsafe workplace equipment, condition, or activity should be immediately reported to PacIOOS leadership.

Published policies and resources include:
https://www.hawaii.edu/ehso/lab-safety/
https://hilo.hawaii.edu/uhh/ehso/lab_safety.php
https://www.uog.edu/life-at-uog/safety-security.php
https://www.hawaii.edu/ehso/occupational-health-safety-reference-materials/
https://www.hawaii.edu/ehso/hazardous-materials-management/
https://hilo.hawaii.edu/uhh/ehso/hazmat_management.php
https://www.hawaii.edu/ehso/regulated-waste-disposal-at-uh-manoa-guidance-and-references/

PacIOOS personnel required to undergo specific safety training will be identified by their supervisor and/or PacIOOS leadership. Continuation of employment may require training and re-training at regular intervals, as required by law and/or policy.

https://www.hawaii.edu/ehso/training/

Field Operations

PacIOOS personnel operate motor vehicles and small watercraft under the auspices of the University of Hawaiʻi and RCUH policies and procedures. All such equipment is regularly maintained and serviced to ensure optimal operations and maximum safety of occupants. Vehicle and watercraft operators and occupants are subject to UH and RCUH policies and procedures regarding operator certification, vehicle/vessel operation, allowable occupants, vehicle/vessel use, and state and federal safety guidelines.

https://www.rcuh.com/wp-content/uploads/2017/05/2.405-Automobiles-Employees-and-Authorized-Users.pdf

https://www.rcuh.com/wp-content/uploads/2020/02/2.404-Utilizing-and-Chartering-Marine-Vessels-updated-02.20.20.pdf

https://www.rcuh.com/wp-content/uploads/2020/02/2.403-Watercraft-Aircraft-Helicopter-Bus-Services-updated-02.20.20.pdf

SCUBA and Scientific Diving

PacIOOS personnel regularly conduct scientific dives to deploy, service, and recover observing equipment. Scientific diving performed by PacIOOS personnel is done under the auspices of the UH Mānoa Dive Safety Program and the UH Hilo Dive Safety Program. In some circumstances, additional and complimentary dive safety oversight is provided by a partner or host organization (e.g., University of Guam Dive Safety Program; NOAA Dive Safety Program, etc.).

Any scientific diving on University of Hawaiʻi vessels must comply with the University-National Oceanographic Laboratory System (UNOLS) Research Vessel Safety Standards. Diving done from chartered vessels must comply with UH Dive Safety and RCUH vessel chartering policies. The PacIOOS Director and faculty partners are responsible for working with the UH Dive Safety office (and any other cognizant dive safety authorities) to gain dive plan approval for required operations.

Any PacIOOS employee or faculty partner who participates in scientific diving must be authorized as a UH Scientific Diver. In most cases, this requires employees to successfully complete the UH Scientific Diver Qualification Course (SDQC).

Safety Checklists

In addition to following UH and RCUH policies and procedures, all PacIOOS personnel who operate motor vehicles, small watercraft (including the PacIOOS Kilo Kai small boat), and trailers must complete and submit to the PacIOOS Director the appropriate safety checklist(s) each time they conduct field work.

Familiarization CHECKLIST for PacIOOS Employees on any Seagoing Vessel

PRE-MISSION
CHECK THE CONDITION OF THE FOLLOWING REQUIRED SAFETY EQUIPMENT
Upon boarding, request a familiarization tour of the vessel from the Operator In Charge.
Items to identify onboard AND ensure you understand how to operate **(BOLD items below are mandatory)**.
***If you find/learn of a lack of safety equipment onboard the vessel, TAKE CHARGE OF YOUR SAFETY, even if this means cancelling vessel operations for the day. Do not venture out to sea until safety shortcomings are adequately addressed.
Contact PacIOOS Operations Coordinator with safety concerns and for help acquiring safety equipment/supplies.

- ☐ **Life Jackets (one PFD per person; each with light and whistle)**
- ☐ **Throw Ring (Type IV)**
- ☐ **Fire Extinguisher (fully charged Type B-I)**
- ☐ **Trauma/First Aid Kit**
- ☐ **1 VHF Marine Radio (a 2nd handheld VHF recommended)**
- ☐ **Cell Phone (satellite phone required if out of cell range)**
- ☐ Adequate dock/working lines
- ☐ Anchor with adequate rode and working line
- ☐ Paddles
- ☐ Visual Distress Signals (3 day/night red flares)
- ☐ Sound Signaling Device (i.e. 1 or more air, electric or battery powered horns)
- ☐ EPIRB
- ☐ GPS
- ☐ Compass (handheld okay)
- ☐ Waterproof chart or electronic chart covering the operations area

If vessel is supporting dive operations:
- ☐ Dive Float
- ☐ Oxygen Kit - check O2 psi
- ☐ Dive Flag for vessel
- ☐ Diver Recall (or alternate method discussed)
- ☐ AED (optional)
- ☐ Dive Binder (with Pre- and Post-Dive Checklists, Dive Tables)

POST-MISSION
CLEAN/HELP MANAGE SAFETY EQUIPMENT
- ☐ Properly rinse all safety equipment (PFDs, trauma kit, flare kit, oxygen kit, etc.).
- ☐ Dry and store safety equipment appropriately. (Do not leave first aid kit, flare kit, oxygen kit or PFDs in the boat due to sun/heat concerns).

Checklist Completed by: _____   Operator In Charge: _____
                          Signature / Date   Signature / Date

TRAILERING CHECKLIST– PacIOOS/SLR Vehicle Use

PRE-MISSION
- ☐ Trailer hitch:
  - o Correct size 'ball' on truck hitch used for the size of trailer tongue
  - o Locked with a pin, bolt or trailer lock
- ☐ Tow chains crossed and attached:
  - o Ensure chains are not too low to ground (twist chains, if necessary, to provide adequate ground clearance)
- ☐ All trailer lights working:
  - o Brake lights
  - o Turn signals
  - o Running lights
- ☐ Inspect tire sidewalls & tread for general condition, cracking (evidence of dry rot) and scuffs.
- ☐ Gauge trailer tire air pressure PSI and adjust if necessary. Also gauge the spare tire. Inflate to max PSI listed on tire wall.
Underinflation is the No. 1 cause of trailer tire failure.
- ☐ Check that all wheel bearings are appropriately lubricated (grease or oil filled - Kilo Kai trailer has oil filled bearings).
- ☐ **(If towing a boat…)** Boat properly secured to the trailer:
  - o Bow **trailer winch strap** tight and secured in locked position.
  - o Bow **trailer safety chain/turnbuckle/strap** tight and secured.
  - o Aft ratchet straps tight and secured (or belly/aft strap added).
Trailer winch strap and bow safety chain/turnbuckle/strap should remain secured until trailer is backed INTO the water.
- ☐ **(If towing a boat…)** Engine supports locked out for transport, as appropriate.
- ☐ **(If towing a boat…)** VHF antenna lowered for vessel trailering/transport.

POST-MISSION
- ☐ **(If towing a boat…)** Thoroughly rinse the entire trailer (lights, tires, fenders, front and backside of wheels, brakes, axles, bunks, winch, spare tire and trailer tongue). Rinse underside of boat hull while rinsing trailer.
- ☐ **(If towing a boat…)** Thoroughly rinse the rear end of the towing vehicle: tires, wheel wells, front and backside of wheels, brakes, axle, undercarriage, hitch, bumper, etc.
- ☐ Uncouple trailer from truck hitch.
- ☐ Uncouple lights, chains, trailer tongue from truck hitch.
- ☐ **(If towing a boat…)** Release tension/strain from bow winch strap.
- ☐ **Carefully inspect wheels for any new issues** that may have developed.
  - o Tires: Bulges? Scrapes/scuffs from curb rash?
  - o Rims/Hubs: Grease splatter?
  - o Report all new issues.

Notify PacIOOS of any trailer issues or discrepancies found during operations or through shutdown inspection.

Checklist Completed by: _____   Operator In Charge: _____
　　　　　　　　　　　　　　Signature / Date　　　　　　　　　　　　　　　　　　　　　　　Signature / Date

Kilo Kai Trailering Checklist

TRAILERING CHECKLIST– PacIOOS Vessel, Kilo Kai

PRE-MISSION
☐ Trailer hitch:
    o Correct size 'ball' on truck hitch used for the size of trailer tongue
    o Locked with a pin, bolt or trailer lock
☐ Tow chains crossed and attached:
    o Ensure chains are not too low to ground (twist chains, if necessary, to provide adequate ground clearance)
☐ All trailer lights working:
    o Brake lights
    o Turn signals
    o Running lights
☐ Inspect tire sidewalls & tread for general condition, cracking (evidence of dry rot) and scuffs.
☐ Gauge trailer tire air pressure PSI and adjust if necessary. Also gauge the spare tire. Inflate to max PSI listed on tire wall.
Underinflation is the No. 1 cause of trailer tire failure.
☐ Check that all wheel bearings are appropriately lubricated (grease or oil filled - Kilo Kai trailer has oil filled bearings).
☐ Boat properly secured to the trailer:
    o Bow **trailer winch strap** tight and secured in locked position.
    o Bow **trailer safety chain/turnbuckle/strap** tight and secured.
    o Aft ratchet straps tight and secured (or belly/aft strap added).
Trailer winch strap and bow safety chain/turnbuckle/strap should remain secured until trailer is backed INTO the water.
☐ Engine supports locked out for transport, as appropriate.
☐ VHF antenna lowered for vessel trailering/transport.

POST-MISSION
☐ Thoroughly rinse the entire trailer (lights, tires, fenders, front and backside of wheels, brakes, axles, bunks, winch, spare tire and trailer tongue). Rinse underside of boat hull while rinsing trailer.
☐ Thoroughly rinse the rear end of the towing vehicle: tires, wheel wells, front and backside of wheels, brakes, axle, undercarriage, hitch, bumper, etc.
☐ Uncouple lights, chains, trailer tongue from truck hitch.
☐ Release tension/strain from bow winch strap. Uncouple trailer from truck hitch.
☐ **Carefully inspect wheels for any new issues** that may have developed.
    o Tires: Bulges? Scrapes/scuffs from curb rash?
    o Rims/Hubs: Grease splatter?
    o Report all new issues.

Notify PacIOOS of any trailer issues or discrepancies found during operations or through shutdown inspection.

Checklist Completed by: _____   Operator In Charge: _____
                  Signature / Date   Signature / Date

START-UP CHECKLIST – PacIOOS Vessel, Kilo Kai

CHECK THE CONDITION OF THE FOLLOWING REQUIRED SAFETY EQUIPMENT
- ☐ Life Jackets (one PFD per person; each with light and whistle)
- ☐ Throw Ring (Type IV)
- ☐ Fire Extinguisher (fully charged Type B-I)
- ☐ Trauma/First Aid Kit
- ☐ Visual Distress Signals (3 day/night red flares)
- ☐ Sound Signaling Device (i.e. 1 or more air, electric or battery powered horns)
- ☐ 1 VHF Marine Radio (a 2nd handheld VHF recommended)
- ☐ Cell Phone (satellite phone required if out of cell range)
- ☐ EPIRB
- ☐ GPS
- ☐ Compass (handheld okay)
- ☐ Waterproof chart or electronic chart covering the operations area
- ☐ Paddles
- ☐ Adequate dock/working lines
- ☐ Anchor with adequate rode and working lines

If vessel is supporting dive operations:
- ☐ Dive Float
- ☐ Oxygen Kit - check O2 psi
- ☐ Dive Flag for vessel
- ☐ Diver Recall (or alternate method discussed)
- ☐ AED (optional)
- ☐ Dive Binder (with Pre- and Post-Dive Checklists, Dive Tables)

ELECTRONICS
- ☐ Turn ON all power switches (order: battery selector switches, main circuit breaker, and panel switches).
- ☐ Turn on all electronics and ensure they are working properly (GPS/Sounder, radio, navigation lights, horn).
- ☐ **Turn off Sounder!** (Transducer may overheat if out of the water very long)

ENGINE
- ☐ Check fuel amount.
- ☐ Check engine oil level on dipstick.
- ☐ Inspect Racor fuel-water separators for bad fuel or the presence of water.
- ☐ Pump/Prime the fuel bulbs.
- ☐ Turn the ignition to ON and ensure all warning lights are working.
- ☐ Briefly START engines (~1 second) to ensure engines turn over before departing to boat launch (coxswain's discretion).
- ☐ Raise and lock out engines for transport, as appropriate.

TRAILER
- ☐ Complete the *Trailering Checklist*.

OPEN FLOAT PLAN
- ☐ Notify designated Shore Contact to 'open' your Float Plan. Provide updated weather and any changes to plan.

Checklist Completed by: _____ Operator In Charge: _____
                        Signature / Date   Signature / Date

SHUTDOWN CHECKLIST– PacIOOS Vessel, Kilo Kai

CLOSE FLOAT PLAN
☐   Notify Shore Contact upon arriving at the dock/ramp to "close" Float Plan.

SAFETY EQUIPMENT
☐   Properly rinse all safety equipment (PFDs, trauma kit, flare kit, oxygen kit, etc.).
☐   Dry and store safety equipment appropriately. (Do not leave first aid kit, flare kit, oxygen kit or PFDs in the boat due to sun/heat concerns).

ENGINE
☐   Lower engines ALL THE WAY down for storage (be careful not to hit trailer bunk).
☐   Flush engines: Use lower unit "ear muffs' and run with SALT-AWAY. Using the hose flushing port is permissible when boat will be used the very next day. DO NOT RUN THE ENGINE when using the flushing port.
☐   Thoroughly rinse the entire engine – top to bottom (cowling, leg, underside of motor, prop/hub, steering equipment, mounting bracket, etc.). Do not get water down the top vent of the cowling.
☐   Complete Kilo Kai onboard logbook entries: record engine hours use, the day's events, and additional comments.

POWER DOWN
☐   **Turn off ALL electronics with each item's on/off switch (GPS, VHF radio, etc.)**
☐   Then, turn off ALL power switches (order: individual switches in the panel, battery selector switches, main breaker bar).
☐   Lower VHF antenna for trailering and storage.

VESSEL
☐   Thoroughly rinse entire vessel: collars, rails, deck. Rinse the bottom of hull when rinsing trailer.
☐   If wet, rinse dock/working lines and hang to dry. If anchor was deployed or got wet, rinse and flake out anchor rode to dry. It will be your responsibility to re-stow all lines once DRY to prevent UV degradation.
☐   Check ALL compartments for water and thoroughly dry them (forward and aft compartments & console).

TRAILERING
☐   Complete trailering checklist.

Notify PacIOOS of any safety equipment or mechanical issues or discrepancies found during operations or through shutdown inspection.

Checklist Completed by: _____   Operator In Charge: _____
                                                     Signature / Date   Signature / Date