TITLE PAGE (Proposal Cover Sheet)

Proposal submitted to the Coastal Services Center,
National Oceanographic and Atmospheric Administration (NOAA),
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Pursuant to FY 2008 Integrated Ocean Observing System
Regional Association Support

PacIOOS Regional Association Support 2008-2011

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2. Project Summary

a. Project Name/Title

PacIOOS Regional Association Support 2008-2011

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e. Brief Project Summary including objectives and intended benefits

Hawaii and the U.S.-affiliated Pacific islands require a Regional Association to participate in, and benefit from, the U.S. national Integrated Ocean Observing System (IOOS). Planning for a Pacific Islands Integrated Ocean Observing System (PacIOOS) has begun, and the work proposed under this Cooperative Agreement (CA) between SOEST and NOAA seeks to transition PacIOOS into a fully functional Regional Association. In a separate grant, NOAA has funded SOEST to lead development of a Hawaii-Pacific Ocean Observing and Information System (HI-POOIS) to provide operational products that assist stakeholders concerned with the safety, cleanliness, productive capacity, and resiliencey of Hawaii's coastal ocean and shoreline.

HI-POOIS is focused on the south shore of Oahu and will be a demonstration of a regional IOOS that can be extended to the rest of the Hawaiian Islands and throughout the insular Pacific. The purpose of this CA is to transition PacIOOS to a functioning Regional Association, starting with the Hawaiian Islands. This will be accomplished by the development of a governance structure and business plan—the substance of which will be determined based on consultation with other functioning Regional Associations, Pacific partners/stakeholders, and administrators of NFRA and IOOS. The successful organization, and continued development and outreach, of the PacIOOS will facilitate the successful transfer of data products and information from HI-POOIS to end-users and promote the further development of sub-regional ocean observing and information systems throughout the insular Pacific. This effort will be heavily leveraged by State of Hawaii, SOEST and UH Sea Grant College programs in ocean observing, coastal zone management, and outreach and education.

f. Partners

A full list of current and potential partners and stakeholders can be found in Appendices 1 and 2. Partners include federal, state, and local governmental agencies, nongovernmental organizations, commercial, private, and industry representatives from the United States of America, the State of Hawaii, the Republic of Palau, the Republic of the Marshall Islands, the Federated States of Micronesia, the Territory of Guam, the Territory of American Samoa, and the Commonwealth of the Northern Marianas Islands.

In 2007, the State of Hawaii adopted a "Hawaii Ocean Resources Management Plan" (ORMP). The priorities of that plan (see Appendix 1a) were identified through public consultation and the efforts of many individuals, agencies and organizations identified in Appendix 1c. The goals of the Hawaii ORMP are consistent with those of HI-POOIS (Appendix

1b), and will be partially implemented through HI-POOIS. The P.I. of this proposal and the HI-POOIS grant is a member of the Hawaii ORMP Policy Group, which is the ORMP executive oversight group composed of State Agency and County Directors and chaired by the State Director of the Office of Planning. This executive policy group, and the many stakeholders that it represents and consults with, will be key to transitioning PacIOOS to a functioning Regional Association, starting with the Hawaiian Islands.

3. Project Description

a. Goals and Objectives

The Regional Association (RA) of the Pacific Integrated Ocean Observing System (PacIOOS) covers a vast area of the globe—spanning six time zones across the Pacific Ocean, distributed over a surface area larger than the continental United States, and with coastlines exceeding 2500 km. Hawaii alones constitutes nearly 1/5th of the entire area of the U.S. EEZ.

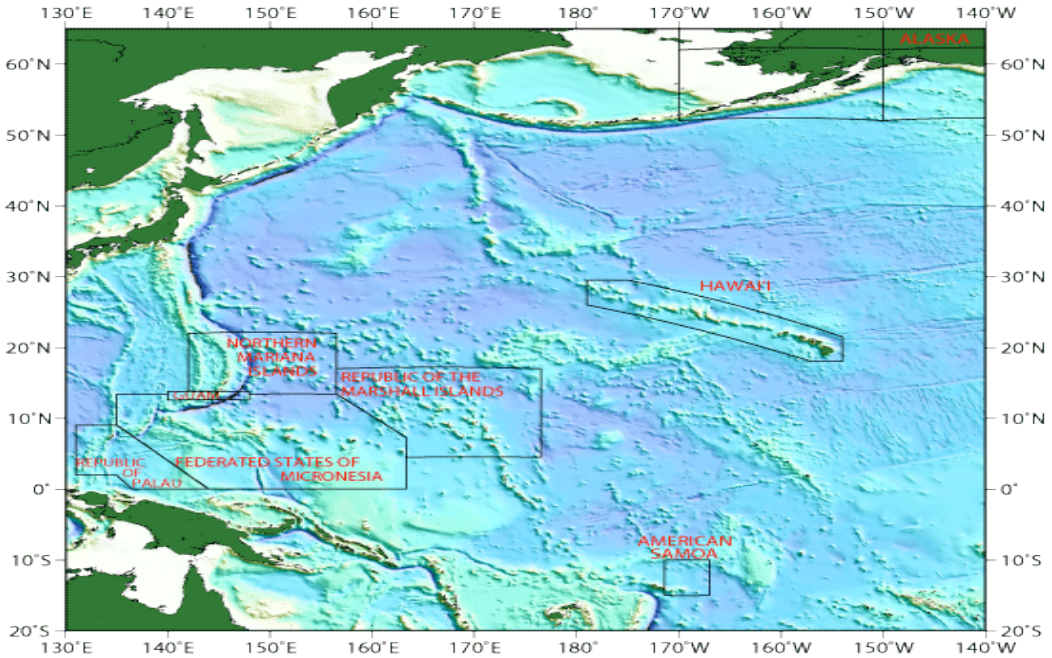

Figure 1: Constituent members and spatial distributions of the sub-regions comprising the PacIOOS Regional Association.

The island constituents of the PacIOOS RA can be geo-politically classified into four sub-regions: the State of Hawaii, the U.S Flag Islands of the South Pacific (American Samoa) and Western Pacific (Guam and the Commonwealth of the Northern Mariana Islands) as well as the U.S.-affiliated Pacific Islands (Federated States of Micronesia, the Republic of Palau, and the Republic of the Marshall Islands). Each of these sub-regional island groups is distinct in terms of their respective governments, geography, cultural norms, societal structure, economies, and infrastructural development needs—making it uniquely challenging, though critically important to IOOS goals, to identify and engage stakeholders, integrate data streams, and produce seamless needs-based ocean observing products.

The Pacific region is the largest, most diverse, and arguably most challenging region identified by IOOS. The extreme geographic extent and remoteness of island locations, coupled with a variety of local and federal governance and economic realities present both significant opportunities and challenges to addressing the general decline of ecosystem health throughout the U.S. Pacific. Nonetheless, this region has demonstrated the ability to surmount many of the challenges to regional coordination and collaboration. Initial efforts under PacIOOS have seen the development of a critical mass of institutional partners and individuals working together on large, regional efforts and site-based local initiatives. Our primary objective is to build upon those regional and local successes to transition PacIOOS into a fully functional Regional Association. Success in reaching this objective requires effectively achieving the following three goals, the strategy for which is described in the body of this proposal:

1. Ensure broad engagement of key stakeholders and partner institutions,
2. Identify critical information needs, and
3. Establish appropriate oversight, coordination and implementation mechanisms.

b. Background

The National Oceanic and Atmospheric Administration Coastal Services Center (NOAA/CSC) recognized the rich diversity of constituents in the Pacific region and the unique challenge of integrating the needs of such a vast region into the larger United States Integrated Ocean Observing System (IOOS) and identified the Pacific Islands as a priority for regional IOOS development in fiscal year 2005. Preliminary development of PacIOOS—including the identification of regional needs and initial engagement of stakeholders—began in 2003 through the efforts of the University of Hawaii School of Ocean and Earth Science and Technology (SOEST). With targeted resource support from NOAA/CSC, the East West Center (EWC) initiated formal development of PacIOOS in 2005.

Following the initial organization of the whole of the Pacific RA, development of the sub-regional infrastructure of PacIOOS began in 2007 with NOAA/CSC funding for a Hawaii sub-regional ocean observing and information system through SOEST. The title of the funded proposal is "Developing the Hawaii-Pacific Ocean Observing and Information System (HI-POOIS)". Over the three years of this first sub-regional project, a sequence of information product streams will be developed, enabled, and set into operational mode for the use of PacIOOS partners and stakeholders identified in both the Hawaii sub-region and the larger PacIOOS RA. It is intended that this sub-regional effort and the product streams derived from it be used as a model for the continued expansion of the ocean observing and information system infrastructure in the remaining three PacIOOS sub-regions.

Following the appointment of Brian Taylor as Dean of SOEST in July 2006, and award of the HI-POOIS grant to SOEST to begin October 2007, staff at the EWC requested that SOEST take the lead for the PacIOOS RA coordination grant in its current third year of funding.

In September of 2007, 27 months into the 36-month EWC grant, SOEST will assume responsibility for coordinating the PacIOOS RA.

c. Audience

The users for ocean observing products are spread across a wide range of governmental agencies, nongovernmental organizations, private sector and public enterprises, the media, recreational communities, as well as residents of and visitors to the insular territories/states/nations that comprise the domain of the PacIOOS RA. Despite the inherent diversity among these groups and their expansive array of interests, this audience is asking for increasingly focused, innovative, and highly accurate products upon which to base decision-making, planning, user safety, and future cultural and community emphasis. In all cases, stakeholders and researchers recognize that dynamic and frequently updated products—designed for and responsive to the needs of the individual stakeholder—can provide ocean observing product end-users with an improved basis for decision making and planning. A partial list of engaged and identified stakeholders in the PacIOOS RA is shown in Appendices 1 and 2.

d. Approach

Where opportunities arise, we plan to leverage existing planning activities and resources in order to maximize funding opportunities and ensure coordination of PacIOOS planning with related ocean, environmental and climate programs. Examples of current and recent planning efforts that will be built upon include:

- NOAA, which is providing funding to UH Sea Grant to develop a regional research and information plan for Hawaii and the U.S.-affiliated Pacific islands associated with the PacIOOS RA. UH Sea Grant's capabilities to facilitate discussions among the broad range of insular Pacific stakeholders are being utilized to help identify and prioritize

critical resource management problems and associated research and information needs necessary for practical solutions. The proposed work will result in the establishment of a regional planning/coordination effort that represents input from a broad range of Pacific stakeholders in the region, development of a research and information plan for the U.S.-affiliated Pacific that prioritizes actions according to management-critical needs, development of coordination mechanisms for effective technology and information transfer to appropriate users, and the establishment of an ongoing platform for coordination, collaboration and resource sharing among participants.

- A second regional effort that will be leveraged is a research needs assessment report supported by The U.S. Geological Survey (USGS) Pacific Island Ecosystems Research Center (PIERC). PIERC collaborated with Dr. Maria Haws of UH Sea Grant to commission a needs assessment for the U.S.-affiliated Pacific Islands in 2005 that focused on research and management needs for natural resource management in the context of USGS capabilities. This work involved collaborators from each Pacific island group including representatives from UH Sea Grant, NOAA, The Nature Conservancy (TNC), Marine and Environmental Research Institute of Pohnpei (MERIP), College of the Marshall Islands, Palau Conservation Society and several private environmental consultants.

In additional, the recent funding and current development of HI-POOIS as a Hawaiian sub-regional association of PacIOOS necessitates the formation of a workable governance structure and business plan for the Hawaiian sub-region. It is essential that these organizational plans enable the stakeholders and researchers of the Hawaiian sub-region to effectively provide

meaningful, timely, and accurate data products that will assist local interests as well as state and federal authorities in the realization of the IOOS goals (as described in Ocean.US reports and planning documents) and the initial PacIOOS goals including:

1) **Preserving healthy marine and coastal ecosystems** with an emphasis on providing information to support effective management of the unique ecosystems and resources that are vital to the livelihood of the Pacific Island communities. This focus addresses the need to facilitate the effective, sustainable management of fisheries, including both commercially-important marine species such as tuna as well as coastal and near-shore fisheries for subsistence, cultural, and commercial purposes;

2) **Predict weather and climate and supporting adaptation of climate variability and change** with implications for: mitigating climate-related natural hazards to ensure public safety and protect community infrastructure; supporting economic development in critical climate-sensitive sectors such as fisheries, tourism, and agriculture; and ensuring safe navigation and transportation;

3) **Mitigating hazards (risk management)** including support for incident response, maritime safety and disaster management preparedness, response and recovery related to both natural and human-induced threats. This focus addresses the hazards mitigation needs of resource managers and planners including development of integrated vulnerability assessment and risk management programs.

The development of a successful governance structure and business plan for the Hawaii sub-region of PacIOOS would, akin to the ocean observing and information system plan being developed by HI-POOIS, provide a model of successful organizational practices that can be

exported from the Hawaiian sub-region to the remaining three sub-regions of PacIOOS to facilitate their emergence as strong, problem-focused, constituent-driven sub-regional ocean observing systems.

Being in the initial stages of development, PacIOOS (and HI-POOIS) benefit from the experiences had, and achievements made by, other RA's throughout the nation during the formation of their governance structure and business plans. The PacIOOS leadership team and Hawaii Coordinator will work closely with other successfully incorporated RA's to determine how best to facilitate the emergence of a governance structure and business plan for the Hawaii sub-region. Additionally, the PacIOOS leadership team, Hawaii and U.S. Pacific Island Coordinators, Pacific Liaisons, and Education/Outreach Specialists will conduct a feasibility study for the individual governance and business plans for the remaining three PacIOOS sub-regions.

In the current proposal, the U.S. Pacific Islands Coordinator, Pacific Liaisons and staff from the PacIOOS/HI-POOIS data management and outreach teams will work with the six PacIOOS regional representatives to conduct meetings in the six Pacific regions outside of Hawaii. The purpose of these workshops will be to build upon the work done in the previous project period, which collected information on regional needs for data and data products. Exchange of information between the PacIOOS team and stakeholders on the types of data products and preferred product delivery/access method will take place, as well as how to best establish a connection between local data collectors and the PacIOOS network.

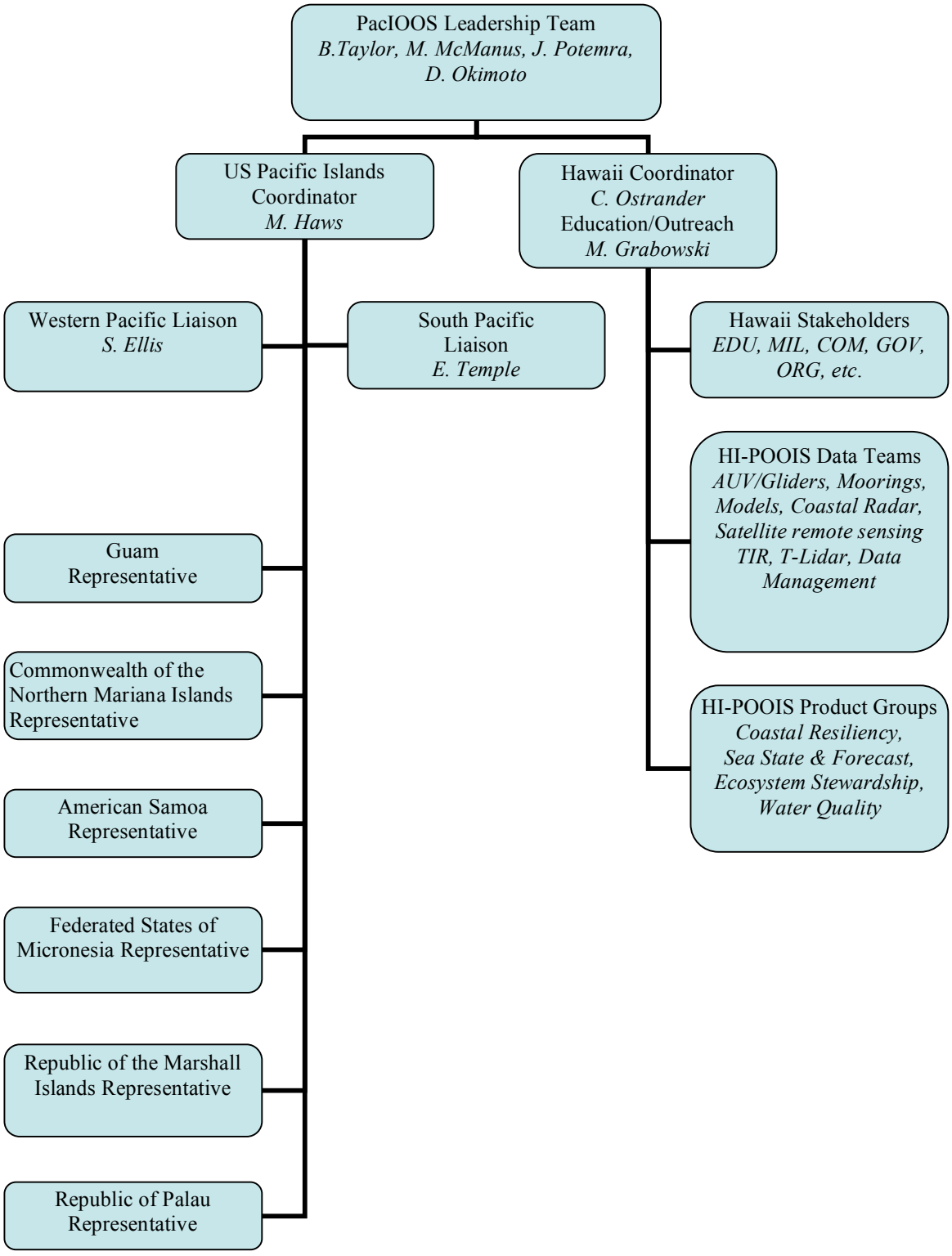

Figure 2: Chart showing the current organizational structure of the PacIOOS RA

e. Benefits

The users of ocean observing products are spread across all levels of government, the ocean recreation and commerce communities, the hotel and tourism industry, the media, residents and visitors, and nongovernmental organizations. The formalization of PacIOOS as a fully functional Regional Association (with broad stakeholder engagement and critical oversight development) would facilitate dialogue between stakeholders and investigators and the transfer of end-user designed products from the PacIOOS Hawaiian sub-regional observing and information system (HI-POOIS) to both stakeholders and the public. Products currently being developed for PacIOOS by HI-POOIS include:

a. State-wide ocean and coastal state forecasts using nested model output;
b. Barbers Point and Honolulu Harbor wave & water level conditions;
c. Mamala Bay circulation, wave state, wind, and precipitation including the following user interfaces:
    i. Search and rescue vectors,
    ii. Pollution dispersion,
    iii. Most efficient route vectors;
d. Waikiki Beach circulation and wave state updated several times hourly, including difference maps showing developing conditions;
e. State-wide beach and nearshore safety conditions (www.hawaiibeachsafety.org);
f. Near real-time water quality and plume dispersion data/maps for Waikiki and Honolulu coastal waters;
g. Marine inundation forecasts;
h. Coastal vulnerability maps based on sea-level rise scenarios;
i. Highly resolved Hawaii sea-level rise time series;
j. Acoustic monitoring and near-real time forecasts of the movement and congregation of marine mammals near Oahu;
k. Times, locations and quantities of congregating predatory fish (tunas, marlins, sharks) near Oahu.

These products, being developed as a proof-of-concept focused on the south shore of Oahu, could be extended throughout Hawaii. It is not yet known which of these activities would be best applied to the larger PacIOOS region, but this will be determined through the proposed effort.

For the Hawaii sub-region, these projects will be instrumental in bringing about the following community benefits:

1. **Increased Offshore Safety**: Ocean hazards are highly variable in space and time and the requirements for real-time offshore hazard warnings are substantial. Moreover, when search and rescue missions are mounted these variable conditions must be taken into account for such missions to be most effective. Monitoring products available from PacIOOS will serve local needs to this end, as well as serve commercial interests that rely on accurate surface current information to plan safe and cost-effective surface shipping routes.

2. **Greater Nearshore Safety**: Improved warnings of coastal nearshore hazards are needed for a host of recreational user groups. Dangerous wave conditions and associated currents are a perpetual reality along beaches, reefs and rocky coasts, at harbor entrances and within harbors. Numerous successful lawsuits have claimed inadequate warnings of hazards, and improvements in this regard will find immediate application among emergency responders and ocean safety personnel.

3. **Improved Community Resiliency**: Improving community resiliency is best achieved by the development and application of products related to high waves, high tides, heavy rainfall, severe storms, and rising sea level associated with climate change. Such products will serve insular agencies and stakeholders concerned with highway overtopping, wave impacts on coastal structures, wave run-up and high water level related erosion events, dangerous beach conditions, and probability forecasts of future hazard zones under higher sea level.

4. **Enhanced Water Quality**: Coastal communities, especially those that derive economic and social livelihoods from the sea, are especially sensitive to events that can affect the local water quality. These events, including sewage and oil spills, ballast water discharge, and polluted terrestrial runoff are oftentimes noted after their impact has been felt by the populace. Data, delivered in near-real time, can mitigate the problem caused by delays between initial identification of potential water quality altering events and the resultant implementation of water quality alerts and mitigation efforts.

5. **Effective Marine Ecosystem Stewardship**: Instrument arrays and fish tags to track pelagic fish and cetacean populations are useful in producing forecasts of marine population fluctuations due to human influence (fishing, tourism, pollution), environmental variability, and long-term climate change).

f. Milestones

1.1 Broaden the engagement with stakeholders in Hawaii and the U.S.-affiliated Pacific islands.

1.2 Establish a governance structure for the Hawaiian sub-region of PacIOOS and perform a feasibility study for the formation of sub-regional governance structures for American Samoa; Guam and the Commonwealth of the Northern Mariana Islands; and the Republic of Palau, Federated States of Micronesia, and the Republic of the Marshall Islands.

1.3 Establish a business plan for the Hawaiian sub-region of PacIOOS and undertake a feasibility study for an appropriate business plan for each of the remaining three PacIOOS sub-regions.

1.4 Conduct a series of meetings with U.S.-affiliated Pacific stakeholders by the U.S. Pacific

Coordinator, Pacific liaisons, and staff from the PacIOOS data management and outreach teams, to provide technical assistance and exchange information on PacIOOS needs and products. Work with them to demonstrate how to access and apply National Backbone and PacIOOS products for their purposes, as well as to make their own products available to the region and nation.