Progress Report for
Enhancing NANOOS: The Pacific Northwest IOOS Regional Association
#NA08NOS4730290

1 June – 30 November, 2008

This progress report describes activities carried out in support of enhancing the Northwest Association of Networked Ocean Observing Systems (NANOOS). This report was compiled by Jan Newton, NANOOS Executive Director (ED), Eric Shulenberger, and David Martin, NANOOS President (P) and PI for this grant. Newton and Martin together form the NANOOS Leadership, in consultation with the NANOOS Governing Council (GC) and its Executive Committee (EXCOM).

1) Project Summary

The goal of this project is to foster and enhance Pacific Northwest (PNW) Regional Partnerships to grow constituencies and develop and implement governance structures and business plans that will permit official federal certification of NANOOS as the PNW Regional Association and thus allow for the eventual installation and long-term maintenance of a PNW Regional Coastal Ocean Observing System (RCOOS).

Specific NANOOS Objectives of the work are to:

1) **Continue to identify and engage the full and expanding spectrum of stakeholders** having significant interests in the waters of the Pacific Northwest to ensure their views and opinions are fully recognized and taken into account in all aspects of planning, science and governance, and that this partnership building effort takes advantage of their scientific, economic, social, cultural and operational expertise.
2) **Proactively engage the regional ocean science community** in this partnership-building project to ensure their expertise helps guide the eventual design and evaluation of the system. This approach will ensure the PNW Regional IOOS evolves to take advantage of new knowledge and technology as they are developed.
3) **Obtain input about sub-regional scale oceanographic concerns** by engaging with local stakeholders to ensure these factors are addressed at the Regional level. NANOOS will work within these smaller groups to build a sense of community and partnerships at the sub-regional scale and then translate this into strong regional partnerships through larger gatherings and workshops.
4) **Implement the results of the consensus agreement on the overall process to evolve the Governance structure for a Pacific Northwest Regional Association**.
5) **Develop and implement a Business Plan** in consonance with Ocean.US criteria to guide NANOOS budget formulation, involvement of users, all aspects of linkages between observations and products, research and development decisions, training, and alternate funding opportunities.
6) **Strengthen international and inter-Regional partnerships** by engaging with Canadian colleagues and other western Regional Association efforts to build bridges to these efforts and ensure seamless integration of these efforts.

7) **Continue to engage at the national level** to ensure the PNW activities of NANOOS are fully supportive of the national effort to implement and maintain an IOOS.

2) Progress and accomplishments

To achieve the seven NANOOS Objectives are listed above, NANOOS Leadership interact with the NANOOS Governing Council, its Executive Committee (elected Officers and Chairs), and three Standing Committees (Data Management and Communication = DMAC; User Products Committee = UPC; Education and Outreach = E&O). Key highlights of NANOOS progress and accomplishments for this period that cumulatively address the objectives are chronologically listed below, with the requested additional programmatic updates at the end. This report encompasses efforts funded by this RA grant as well as our RCOOS grant, since all of these NANOOS activities are necessarily highly integrated.

- **NANOOS co-hosts California Current Ecosystem Based Management Workshop** - NANOOS collaborated with AOOS, CeNCOOS, and SCOOS in co-sponsoring a workshop with NOAA and the Pacific States Marine Fisheries Commission on "Regional Associations: Needs and Inputs for IEAs" held 2-3 June in Portland, OR. The goal of the workshop was to discuss how the regional associations can best participate in the application of Integrated Ecosystem Assessments to Regional Management Problems, both as an information client and as a data/model supplier. Newton was on the workshop's Steering Committee, attended the workshop for NANOOS, and invited participation of fisheries mangers and scientists from the NANOOS region. The workshop was well-attended and provided good cross-cutting information to the federal, tribal, state, local, and academic participants involved.

- **NOAA's Regional Status Assessment of NANOOS** - NANOOS participated in NOAA's Regional Status Assessments held in Seattle at APL-UW for three west coast Regional Associations on 4 June. Martin, Newton, and DMAC Chair Steve Uczekaj (Boeing) participated in the day-long assessment. Newton presented information requested by NOAA's IOOS Director, Dr. Zdenka Willis, according to their presentation template, followed by questions and discussion with by Dr. Willis and key NOAA staff. A follow-up letter by Dr. Willis indicated appreciation for the briefing and the efforts they saw NANOOS engaged in and relayed continued commitment by NOAA IOOS toward NANOOS.

- **West Coast Regional Association Synthesis -** As part of the NOAA Regional Status Assessment, NANOOS worked with the other two west coast RAs to compile a synthesis highlighting their coordination and cooperation. Newton presented the synthesis as the lead-off talk at the Regional Status Assessment meeting. The networking has paid off to all of the RAs and was specifically appreciated by Dr. Willis and the NOAA IOOS staff.

- **Homeland Security coordination** - Martin participated in the Department of Homeland Security's Science and Technology Stakeholders meeting in Washington, D.C. during June. He briefed the Acting Head of the DHS Maritime Domain Awareness (MDA) Branch on IOOS and its importance to Homeland Security efforts.

➢ **NANOOS Education and Outreach Committee** - This vital NANOOS committee met regularly over the period via teleconference calls on 13 June, 8 August, 18 September, and 25 November. Amy Sprenger, NANOOS Education and Outreach (E&O) Coordinator, worked with Dr. Mike Kosro, E&O Committee Chair, and Newton to organize the agenda and action item follow-through. Specific focus has been on evaluation of the emerging NANOOS website (in collaboration with NANOOS DMAC Committee), identification of key user products (in collaboration with NANOOS User Products Committee), and focus on future training activities to be held during 2009. The Committee also endorsed and provided feedback to Amy for several outreach activities she completed during this period, including:

- Meeting with COSEE Pacific Partnerships staff, to discuss ongoing collaboration on ocean science curriculum development for community college classrooms and professional development opportunities for community college level ocean science instructors.
- Meeting with South Slough National Estuary Research Reserve education staff, to discuss ongoing collaboration.
- Attending the Northwest Association Marine Educators (NAME) Conference (June 2008, Friday Harbor, WA) to present a workshop "Using Ocean Observing Data in the Classroom." Amy was elected to the Board of NAME as Washington State Director.
- Attending the National Marine Education Association's Conference (July 2008, Savannah, GA) to present NANOOS education materials.
- Planning to attend the IOOS storytelling workshop. IOOS is sponsoring a "storytelling" workshop with the RA education and outreach coordinators. Sprenger and Craig Risien (OSU, NANOOS UPC and DMAC committees) will be attending on behalf of NANOOS. The workshop will focus on how to develop compelling messages for a variety of audiences and will provide an opportunity for all the RAs to work together on a project that would both serve the needs of their individual RAs as well as developing an effective network of educators.
- Collaboration with Risien and others with Hatfield Marine Science Center on workshops on using near and real time data, to be held in 2009.

➢ **SeaKeepers and NANOOS** - Newton discussed with John Englander, CEO of the International SeaKeepers Society, the potential for synergies between NANOOS and the SeaKeepers Society on 16 June.

➢ **NANOOS represented at "West Coast Center for Oceans and Human Health's Research and Outreach Strategy Workshop"** - This workshop was held 20 June in Seattle. Newton and Dr. Antonio Baptista (OHSU, NANOOS GC Member) represented NANOOS. The West Coast Center for Oceans and Human Health (WCC-OHH) is one of three national NOAA Centers of Excellence that concentrate on oceans and human health issues. The WCC-OHH focuses on advances in early warning systems, seafood benefits and risks and improved assessments of ecosystem change and its effects on human health. Based at the Northwest Fisheries Science Center in Seattle, it relies on partners in Washington, Oregon and California. The WCC-OHH is committed to building a strategy for future research and outreach based on identified constituent priorities and needs. The goal of the workshop was for participants to learn more about WCC-OHH and provide guidance for its future direction. Workshop information will

be used to shape the Center's science action plan and to define critical areas for programmatic growth. Newton and Baptista stressed the utility of NANOOS DMAC and E&O capabilities and there was good interest in working synergistically together on this.

- **New NANOOS website rollout** – In mid-July, the NANOOS web team (APL-UW) rolled out the new version of the NANOOS web portal. The functionality of the web has been greatly improved and more links to real-time data are easily accessed. There is also content on NANOOS, IOOS, ocean observing, and how products may be used. The NANOOS DMAC, UPC, and E&O committees, as well as Governing Council members, gave input to and will continue to review and make suggestions for improvements to the site.

- **Puget Sound Federal Caucus Executive Meeting -** Martin and Newton were invited to participate in the Puget Sound Federal Caucus Executive Meeting on 22 July in Seattle. They presented information to regional federal agency leadership on the IOOS and NANOOS RCOOS efforts and led discussion on increasing participation from local federal agencies in NANOOS. The current limitation from federal conflict-of-interest regarding the NANOOS Governing Council has hampered participation but ways to work around this were discussed.

- **Ocean Research and Resources Advisory Board** - Martin and Newton were invited to brief the Ocean Research and Resources Advisory Board (ORRAP) during their meeting in Washington State on 5 August. Newton gave a lunchtime presentation from the local RA perspective, regarding challenges faced and lessons learned from NANOOS.

- **EPA Administrator and ship visit the other Washington -** Following an oceanographic and water quality cruise on the EPA's Ocean Survey Vessel (OSV) Bold, public tours and a VIP Reception and ship tour were held for EPA Administrator Stephen Johnson, EPA Regional Administrator Elin Miller, Congressman Jay Inslee, members of the Puget Sound Partnership, and other invited guests on 20 August at Pier 66 in Seattle. Martin and Newton attended the reception, representing NANOOS. Newton hosted one of the tour's stations, and explained to the VIP's how NANOOS is working with regional observing and outreach programs to maximize observing infrastructure capability and information exposure. NANOOS E&O staff also hosted a tour station on 19 August for the public. Newton had participated in the 4-day cruise on the OSV Bold, collecting more data for a Puget Sound timeseries that UW's PRISM posts access to via NANOOS. The OSV Bold is typically stationed on the east coast, but made a west coast tour this summer.

- **Ocean Acidification** - Newton attended a symposium held at Friday Harbor Laboratories on 25 August on the issue of Climate Change and Ocean Acidification. Newton informed the participants regarding the utility of NANOOS DMAC capability in helping to expose existing and future data regarding coastal and acidification conditions along the Pacific coast. Newton has been following up with Drs. Richard Feely and Chris Sabine (NOAA) on making existing data available over the NANOOS web portal.

- **NANOOS coordination with NOAA HAZMAT** - Martin and other NANOOS investigators from the APL UW participated in discussions with NOAA HAZMAT about use of NANOOS-

developed technologies and tools to meet NOAA's needs during August.

➢ **Coordination with Ocean.US** Martin hosted Dr. Steve Piotrowicz, the Deputy Director of Ocean.US, during his visit to Seattle in September, and discussed regional and national IOOS matters.

➢ **IOOS business in Washington DC** - During September, Martin participated in a number of IOOS discussions in Washington, D.C., including:

- Visiting the NOAA IOSS Office to continue liaison with the Director and her staff on regional/national IOOS efforts.
- Visiting the Office of Naval Intelligence (ONI) to discuss the importance of regional and national IOOS capabilities in improving the Navy's abilities in Maritime Domain Awareness (MDA) with ONI's analytical branch.
- Visiting the Naval/National Ice Center to discuss regional/national IOOS activities with a special focus on (1) Arctic Ocean observation capabilities and (2) possible efforts to rescue USN data on sea ice which might be relevant to global change.

➢ **IOOS data highlighted at EPOC Session** - For the 55th Eastern Pacific Ocean Congress held in the Stanford Sierra Camp, Fallen Leaf Lake, California on 23-26 September, Newton, Steve Ramp (CeNCOOS Executive Director), Steven Bograd (NOAA), and Loo Botsford (UCD), worked to provide a session "Oceanographic insights and products for societal use" to describe the application of oceanographic information to, or the development of oceanographic products for, specific societal goals. Some of the papers were a result of ocean observing systems, and focused on a wide range of scales, from the California Current Large Marine Ecosystem to more regional marine and estuarine environments. Newton is the out-going President of EPOC.

➢ **Ocean temperature forecast helps tuna fishers find catch, conserve fuel** - NOAA posted a press release about a regional success story from OSU, aided by NANOOS funding, where modeled ocean temperature output is being utilized by tuna fishers to save on fuel. The project is a collaboration of many entities, but shows the payback that IOOS, and especially regional programs, can give. For the story, go to:
http://www.noaanews.noaa.gov/stories2008/20081014_tunamodel.html

➢ **IOOS and West Coast Governor's Agreement** - IOOS was mentioned as a part of the West Coast Governor's Agreement regarding ocean issues. The West Coast Governor's Agreement Action Team, who will implement the plan, met in Seattle on 27 October and invited Newton to be on a Stakeholder's Panel, representing NANOOS and IOOS. Jan presented perspectives on how the West Coast IOOS Regional Associations should be starting points of contact for evaluating actions with respect to outreach, modeling, data products, and ocean observing capabilities.

➢ **NANOOS DMAC completes Phase 1** - Funded from both the NANOOS RCOOS and this RA contract, the NANOOS Data Management and Communications (DMAC) committee announced the successful completion of phase 1 DMAC Initial Operating Capability (IOC) on

October 29, 2008. NANOOS' team of industry and university partners including Boeing, Oregon Health and Science University, Oregon State University and University of Washington launched a set of core DMAC services onto the NANOOS web portal test server to provide standardized access to northwest regional ocean observation and modeling data.

The NANOOS core DMAC IOC includes a Discovery Web Service for searching and registering data and services within NANOOS, an internal Data Integration Service for collecting regional observations into multiple repositories, an active Sensor Observation Service (SOS) data product providing access to regional core observation data (salinity, temperature, wave height, currents) by area and timeframe, two Web Mapping Service (WMS) data products for accessing model data including sea color, one OpenDAP data product for accessing Princeton Oceanographic Model (POM) data, a comprehensive community-maintained Asset List for the Northwest Region, and a Web Portal containing a NANOOS Service Explorer application.

The NANOOS Service Explorer is a web portal application which connects to the Discovery Web Service for displaying NANOOS services by area, timeframe and core data. Users interface with the NANOOS Service Explorer to browse information on available NANOOS services. Applications interface with the Discovery Web Service to search and retrieve information on available NANOOS services such as the NANOOS DMAC SOS service.

Northwest regional and national ocean observation efforts are actively connecting to the NANOOS DMAC SOS service including a NANOOS Flash Map application for retrieving and plotting data from the SOS, a NANOOS shellfish grower's data product, and a National NOAA OpenIOOS Real-Time Data Mapping application. In addition, the NANOOS DMAC SOS service software will be made available for download from the NANOOS website through an open source license allowing other regional efforts to re-use this code to stand-up their own SOS service.

➢ **Northwest Straits Commission focus on oceans** - The Northwest Straits Commission held its 9th Annual Marine Resources Committee training conference on 8 November in Port Angeles, WA. They invited Newton to give a talk on the issue of ocean acidification and what should be done from a local perspective. Among other items, Newton highlighted the monitoring and informational dissemination aspects that NANOOS is engaging in over this topic.

➢ **NANOOS display at National Science Teachers Association Conference** - Amy Sprenger, NANOOS E&O Coordinator, represented NANOOS at the National Science Teachers Association (NSTA) Area Conference in Portland, OR, on 20-22 November. Her NANOOS booth received great feedback over the 3 days much teacher interaction from the thousands of teachers who came to this conference. Amy spoke with over 300 people at the booth. Amy compiled long list of educators interested in staying informed on Ocean Observing: 100+ names and emails. Summary of feedback from those visiting the booth:

- Teachers loved the NANOOS logo, it was a great draw. Amy handed out 600+ NANOOS stickers.
- Teachers are interested in using regional data in the classroom; they thought it would be a good "grab" to engage students.

- Teachers want to be able to contribute data; many teachers asked how they and their students could contribute to NANOOS data.

Amy will be working with E&O and other committees for follow-up on this significant sampling of teacher needs and interests.

➢ **NANOOS User Products Committee (UPC) meeting -** The NANOOS UPC met on 20 November in Beaverton, OR at the OHSU facility. Chaired by Jonathan Allan (OR State Dept of Geology and Mineral Industries), nine UPC members met and heard NANOOS DMAC and Website updates. The bulk of the very fruitful and targeted meeting was spent in discussion on products and the NANOOS visualization tool/explorer (NVS). Several (9) action items were identified and will be used to guide forward progress. Newton also used this forum to share recent NOAA plans and documents and specifically, to obtain feedback on the NOAA proposed metrics for RA maturity and input for the presentation NANOOS will give at the Baltimore NFRA-IOOS Conference in December.

➢ **NANOOS participation at AGU planned -** Several talks and posters from the NANOOS region using NANOOS data, models, or products will be presented many of the scientists involved in NANOOS at the American Geophysical Union meeting in San Francisco in early December.

➢ **Leveraging NSF's "Coastal" STC -** Throughout the reporting period, Martin remained deeply involved with a complimentary research ocean observing effort in the Pacific Northwest, the NSF-funded Science and Technology Center (STC) for Coastal Margin Observation and Prediction (CMOP), which NANOOS leverages heavily in the areas of DMAC and Education and Outreach. Newton was recently appointed as UW's Education and Outreach Coordinator for CMOP and will be coordinating this with NANOOS.

➢ **Leveraging Observing Assets -** Throughout the reporting period, Martin and Newton continued to engage with a separately-funded local company in the Pacific Northwest in the design, development, and eventual deployment of a number of state-of the-art profiling ocean observing buoys for Puget Sound monitoring the long-term support of which will come from NANOOS.

➢ **NANOOS participation in NFRA and IOOS**

- Newton and Martin participated in the monthly NFRA Board phone calls
- Martin participated in the NFRA Executive Committee teleconference calls and meetings.
- Sprenger participated in the NFRA-IOOS led Education and Outreach calls.
- Martin and Newton participated in the NOAA Regional Assessment, as described in detail earlier in this report.

➢ **<u>NANOOS programmatic updates</u>**

- RA organizational structure
    - <u>Changes</u>: Several new member organizations were added to NANOOS this period, listed here with their Governing Council representatives. These are: Pacific Ocean Shelf Tracking (POST; John Payne), Northwest Research

Associates (Dr. Joan Oltman-Shay), and Washington State Department of Fish and Wildlife (WDFW; Teresa Tsou).

- Planning and implementation
    - Progress made towards the development of the business plan: NANOOS has a draft Business Plan, enclosed in the Briefing Book at the NOAA Regional Status Assessment. We anticipate it will be made final at the next NANOOS Governing Council meeting in early 2009.

    - Progress toward defining regional observing system priorities: The NANOOS Governing Council has defined the PNW regional observing system priorities; we continue to work with stakeholders to refine information needs regarding the priorities. The NANOOS RCOOS effort is directed toward addressing information needs about the priorities. NANOOS User Products Committee and our Education and Outreach Committee are vital to this effort.

    - Progress toward development of an observing system design for the region: The design phase is completed and we are in the implementation phase. NANOOS has presented its observing system conceptual design; the RCOOS effort is directed toward implementing it, as funding allows.

    - Progress toward regional data management: NANOOS DMAC, funded from both the NANOOS RCOOS and this RA contract, announced the successful completion of phase 1 DMAC Initial Operating Capability (IOC) on October 29, 2008. See earlier bullet regarding DMAC Committee efforts.

- Stakeholder engagement
    - Shellfish growers:

    Significant improvements, based on user survey feedback, were made to the NANOOS – NERRS Real-time Water Quality data portal for Shellfish Growers over this period. This included more data plotting capability, more sites, more flexibility in display options. NANOOS and NERRS will be working with the Pacific Coast Shellfish Grower's Association evaluating these changes in the next period.

    - Marine educators:

    NANOOS has made increased efforts to reach out to marine educators and to develop lesson plans that utilize local data and meet regional teaching needs. Marine educators throughout the region have worked with the NANOOS E&O Coordinator and E&O Committee. We will be releasing lesson plans and other content early in the next period.

    - Web Portal Development:

    The new NANOOS Web Portal had its public release in July 2008. The portal's design allows for continual updates as new DMAC infrastructure, such as data registry and search, and also new environmental sensors, become available. An

additional focus of the portal is education and outreach. NANOOS has been actively engaged with stakeholders to evaluate the new site.

Based on user input, the NANOOS Visualization System (NVS) will expand to include all of NANOOS territory from Washington to Oregon to Northern California. Both the NANOOS User Products and Education and Outreach Committees help to track the stakeholder needs on web usage.

3) Scope of work - We anticipate neither changes to our statement of work, nor problems in meeting objectives of this multi-year funded effort.

4) Leadership personnel - Dr. Eric Shulenberger recently joined the Applied Physics Laboratory, University of Washington. Eric brings a wealth of experience with observing systems, having experience with a premier long-term oceanographic ecological observation and monitoring program, the California Co-operative Oceanic Fisheries Investigations. He will be working with Martin and Newton part-time for NANOOS.

5) Budget analysis

NANOOS remains well-balanced in terms of budget expenditures and allotted time. Specifically, for the period 06/01/2008 through 11/30/2008, NANOOS expended 2% of its anticipated expenditures in support of this project; while we have used 17% of our anticipated time. The main reason for this is that we have a no-cost extension on the initial NANOOS RA Planning Grant (Progress Report submitted separately) and we have focused on those resources during this reporting period.