

**Progress Report for
Enhancing
Northwest Association of Networked Ocean Observing Systems (NANOOS)
#NA08NOS4730290
1 December 2009 – 30 May, 2010**

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 and David Martin, NANOOS President; the co-PIs for this grant. Newton and Martin, in consultation with the NANOOS Governing Council and its Executive Committee, execute the activities of this award. Per NOAA anticipatory guidance concerning the eventual combining of RA Planning and RCOOS awards, NANOOS begins to implement this NOAA-desired end-state by submitting progress reports for this grant while noting outcomes from the NANOOS RCOOS grant that were enabled and accelerated by collaborative resource allocations from these complimentary Planning Grant efforts.

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 a governance structure and business plan that permit official federal certification of NANOOS as the PNW Regional Association and allow for the 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 Governance structure for NANOOS.**
- 5) **Develop and implement a Business Plan** 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 above seven NANOOS Objectives, NANOOS Leadership interacts with the NANOOS Governing Council, its Executive Committee (elected Officers and Standing Committee 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 listed below, with reports from each of the three standing committees and the requested additional programmatic updates following. 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.

Major activities:

- **NANOOS Annual Governing Council Meeting** – Held in Portland, OR, at the Oregon State Building (courtesy of DOGAMI), the NANOOS Governing Council assembled for its annual in person meeting on 24 May. It was attended by 31 individuals representing 23 member institutions. NOAA IOOS Director Zdenka Willis attended the meeting and gave a presentation on IOOS status and directions. The all-day meeting included briefings from all 3 NANOOS Standing Committees (DMAC, User Products, E&O), proposed changes to the NANOOS MOA, and discussion of the Y5-10 NANOOS RCOOS proposal priorities and process. A new (expanded) Executive Council was elected with sector representation from academia, federal, state, and tribal governments, industry, and non-profit organizations.
- **NANOOS attends NFRA Board meeting and Hill Visits** – Martin, Newton, and Mike Kosro (OSU) attended this semi-annual meeting 17-18 February in Washington, DC. In addition to giving input to the NFRA-IOOS national plan document, NANOOS secured 18 letters of support from various stakeholder members in the PNW region and Newton produced a 2-pager of NANOOS highlights for Congressional members and staffers. These materials were presented by Kosro and Newton personally to all members of the OR and WA delegations. Martin and Newton also participated in other key meetings arranged by NFRA.
- **NANOOS is awarded 1-yr “bridge” proposal for RCOOS support and development** – NANOOS will receive \$1.7M for its fourth year of operation of its RCOOS. The funds will be distributed among seven regional partners and cover observations, DMAC, user products and modeling, and education and outreach activities.
- **NANOOS Tri Committee Meeting** – The three standing committees of NANOOS (DMAC, UPC, E&O) meet regularly to share progress and prioritize activities. During this period, the “Tri-Committee” met over 1-2 April in Beaverton, OR, attended by 25 participants with good representation from all three committees. Discussion included how to prioritize and implement

the products and services our members and stakeholders request. Plans were made for all five user-specified focus areas of NANOOS: maritime operations; ecosystem impacts (including HABS, hypoxia, ocean acidification, regional fisheries; coastal hazards, and climate change.

Other activities:

➤ **NANOOS input to OOI planning** – At the invitation of Jack Barth and Bob Collier (OSU) representing NSF’s Ocean Observing Initiative (OOI), on 14-15 January 2010, Newton participated in an OOI planning meeting in the Dean’s conference room at UW. Newton presented a short summary of NANOOS’ observing assets, DMAC, outreach and our willingness to work jointly on avenues for synergies and collaboration.

➤ **NANOOS participates in Ocean Acidification workshop** – On 30-31 March, 50 participants (government and university scientists, fishermen, shellfish aquaculturists, conservationists, Native Americans, and U.S. Congressmen) gathered at the University of Washington in Seattle for the Puget Sound Ocean Acidification Workshop to discuss recently documented evidence of ocean acidification in Puget Sound, biological responses of economically and ecologically important marine species to this threat, and gaps in ocean acidification research and monitoring capabilities in Puget Sound. Newton was invited to present and lead a discussion for an overall monitoring strategy for ocean acidification; she presented existing capability through NANOOS assets as well as NANOOS’ data delivery system, NVS. The event was co-organized by Marine Conservation Biology Institute, Sustainable Fisheries Partnership, the University of Washington and the National Oceanic and Atmospheric Administration, with funding provided by The Bullitt Foundation, The Peach Foundation, and The Educational Foundation of America.

➤ **NANOOS supports 3rd Annual Global Marine Renewable Energy Conference** – Martin, Newton, and Amy Sprenger represented NANOOS at the GMREC in Seattle on 14-15 April at Bell Harbor International Convention Center. Amy staffed a booth with NANOOS outreach materials. Newton and Martin attended and gave input to the session that highlighted IOOS, in a talk given by NOAA IOOS’ Jack Harlan. Harlan emphasized the ability of IOOS to supply data to this user group.

➤ **Other NANOOS/IOOS briefings:**

- Newton was invited to speak about NANOOS at the monthly meeting of Marine Technology Society at UW in Seattle on 21 January. Her talk was well received by many in local ocean observing industry as well as participants from Canada.
- Newton was invited to a reception for Dr. Jane Lubchenco, Administrator of NOAA, sponsored by the College of the Environment, School of Aquatic and Fishery Sciences, and hosted by the Program on the Environment, on 22 February in Seattle. She had the opportunity to give Dr. Lubchenco a copy of the newly produced NFRA IOOS RA national plan document.
- Martin met at Bangor Submarine base with Bob Winokur, Technical Director for the Oceanographer of the Navy, to discuss NANOOS/IOOS and passive ocean acoustics in May.
- Newton provided a slide showing joint IOOS – OOI observing resources to John Delaney (UW) and Jack Barth for their major presentations on OOI at Westport,

WA, to enable them to provide the public and stakeholders with a consolidated view of how federal dollars are being leveraged for a comprehensive system.

- Newton was invited to give a keynote address on IOOS and NANOOS for the NortekUSA's 5th Annual Users Symposium, held in Seattle at the Edgewater Hotel 19-21 May. The three keynotes were given by Tim Cowles on OOI, Richard Dewey on VENUS, and Jan Newton on NANOOS/IOOS. In the PNW, all three of these observatories actively share information, data and strategies.

➤ **NANOOS, IOOS, and Oceans 2010** – Martin, as a Co-chair of the Technical Committee for Oceans 2010 that will be held in Seattle, WA in September 2010, established sessions for both research and operational systems accepting contributions from national and international contributors. A special session for Operational Ocean Observing Systems will be chaired by Newton to include regional and national IOOS activities. Zdenka Willis, Newton, and Martin discussed how to highlight IOOS and RA activities at Ocean Sciences and other venues.

➤ **NANOOS participation at Ocean Sciences** – Several scientists involved in NANOOS presented talks and posters using NANOOS data, models, or products at the Ocean Sciences conference in Portland, OR, during 21-25 February.

NANOOS Standing Committee updates:

➤ **NANOOS DMAC** - Chaired by Steve Uczekaj (The Boeing Company) this committee, composed of members from Boeing, OHSU, UW, OSU, and DOGAMI, has weekly “tag-up” calls to achieve consistent work efforts for NANOOS DMAC. In addition, Uczekaj participates in regular IOOS Regional DIF Implementation (RDI) team conference calls.

The DMAC group, working with individuals from UPC and E&O, continues to play a key role in support of the NANOOS Visualization System (NVS) and as such significant progress was made in expanding the data that is available in NVS. Among the key contributions achieved in NVS during the past six months include the addition of forecasts and model output to the NVS data sets. These include meteorological forecasts from the NAM model, sea level forecasts derived from the NOAA Co-Ops, wave forecasts, derived from NCEP's WaveWatch III model, and temperature and salinity derived from CMOP model. During this period, gridded data overlays were also added to NVS. These data include HF-Radar and X-Band Radar. Additionally overlays from remote sensor data from NOAA CoastWatch and Modis are now available as well.

During this period additional data sets were added from assets operated by various NANOOS partners. These data sets include: Climate Station Papa, Far-offshore buoy from Environment Canada, and a Port Angeles buoy from ICM-Mobilisa. These data sets have not been available to the public or IOOS before.

A THREDDS data service was added at OHSU. This THREDDS data service allows for the efficient transfer of data from the large historical repository of in-situ observations at CMOP. Work also continued on the experimental ERDDAP data aggregation service to provide data from all NANOOS data services, including UW and OHSU SOS services and THREDDS services at OSU and OHSU.

On a National level, NANOOS is one of 2 regions to participate in the creation of the IOOS Registry, Catalogue, Viewer (RCV) application. NANOOS data sources are being used during RCV development to test the data ingestion and DIF standards verification.

The DMAC group obtained an Apple Developers License. This license gives NANOOS the ability to create and distribute iPhone and iPad applications in the Apple iTunes App Store. An iPhone version of NVS was created and posted on the App Store. The NVS app allows for the browsing all NANOOS observing assets on your iPhone or iPod Touch. The most recent data from these assets can then be displayed or a plot of the last 7 days can be created.

NANOOS DMAC was also well represented at the NFRA Product Developers workshop held in Anne Arbor Michigan.

➤ **NANOOS User Products Committee (UPC) meeting** - Chaired by Jonathan Allan (Oregon Department of Geology and Mineral Industries) this committee is composed of members from Boeing, OHSU, UW, OSU, NANOOS E&O, OR Sea Grant, and NOAA. NANOOS UPC chair Allan participates in weekly “tag-up” calls of a smaller sub-group comprised of members of DMAC, UPC and Web development in order to achieve consistent work efforts and improvements to products that are being developed through the synergy between these three groups.

The NANOOS UPC/DMAC sub-working group continues to play a key role both in terms of providing ongoing support for the NANOOS Visualization System (NVS) and through continued enhancements to its overall usability and functionality. This UPC/DMAC synergy has been a key element in the overall success of the NVS platform and has resulted in continued progress and expansion of new datasets that previously were inaccessible to the public-at-large as well as enhancements to data viewing and querying in NVS.

Future improvements include: the development of a sliding time bar that will enable the user to both view, plot and download historical data, the implementation of unit consistency and unit conversion across the board, and the ability to compare and plot multiple variables. Work is continuing on an experimental NERDDAP data aggregation service that blends the ERDDAP framework with NANOOS packaging and identified priorities.

Aside from continued enhancements to NVS, the NANOOS UPC/DMAC sub-working group is also exploring developing a Tsunami Evacuation Map interface for the iPhone or iPod Touch.

➤ **NANOOS Education and Outreach Committee** – Chaired by Mike Kosro (OSU) and staffed by Amy Sprenger (APL-UW) and Sarah Mikulak (APL-UW), this committee composed of members from CMOP, OR and WA Sea Grant, OSU, Hood Canal Salmon Enhancement Group, Ocean Inquiry Project, PBNERR, and COSEE, has quarterly as well as ad hoc meetings.

Work during this period has primarily been completed by Sprenger and Mikulak, with guidance and help from EOC members. The focus of NANOOS EOC has been in 3 areas: 1) Formal education w/ K-12 teachers 2) Informal education and 3) Outreach to stakeholders. Sprenger has been continuing to develop resources to support formal educators (those working w/in the

classroom) to bring ocean science and NANOOS data into the classroom. Sprenger has presented to teachers and informal educators at a number of regional and local workshops including the WA Science Teachers Association annual conference, “Storming the Sound” conferences for north and central Puget Sound educators, and two BWET (NOAA’s Bay Watershed Education Training grant program) workshops for educators. Sprenger is working on an upcoming full day workshop this summer in Florence, OR and the fall OR Science Teachers Association annual meeting.

Sarah Mikulak officially became NANOOS staff in February, 2010 and since then has been working on informal education projects and outreach for NANOOS. Mikulak is developing a prototype interactive computer exhibit that will feature real time data from NANOOS. The modular exhibit is focusing on the seasonal trends in temperature, salinity, chlorophyll and dissolved oxygen within Puget Sound. In March, 2010, Newton, David Jones (UW), Sprenger, and Mikulak attended a progress meeting with Intellicheck Mobilisa at UW APL about the on-going exhibit design project. Mikulak presented the to-date exhibit prototype, which will be propagated throughout the NANOOS region.

In terms of outreach, NANOOS continues to exhibit and/or present on NANOOS at gatherings attended by individuals/groups of NANOOS stakeholders and users. Ed & Outreach committee member Craig Risien (OSU) put up a NANOOS display at the Oregon Coalition for Educating Anglers meeting, which was held on 6 March 2010, in Newport Or. Risien presented on NANOOS history, mission, goals and organizational structure. In addition, the presentation described in detail the products currently provided that are of interest to members of the recreational and commercial fishing communities. These include SST and surface current forecast information for Oregon, plots of satellite derived SST and CHLA and the NANOOS Visualization System. Approximately 70 people were present for this presentation.

Sprenger staffed an exhibit for IOOS/NANOOS at the International Ocean Renewable Energy Conference held in Seattle in April, 2010. In May, 2010, NANOOS published the second edition of its newsletter, the “NANOOS Observer”. Sprenger and Eric Shulenberger (UW) contributed to this effort. In addition, NANOOS started its own Facebook® page as an additional way to engage individuals in timely news of related to NANOOS, IOOS and ocean observing.

Other ongoing education and outreach efforts include the continued support of the Real Time Water Quality Data website for Shellfish Growers (led by Cathy Angell at NERRS). Sprenger and Mikulak are working with NANOOS DMAC and UPC to create more “theme pages” for the NANOOS website. The theme page about hypoxia in the PNW developed by Mikulak during the summer of 2009 was put up on the NANOOS portal during the winter of 2010. Upcoming theme pages in progress include coastal hazards and HABS.

Sprenger and Mikulak continue to work with the NFRA Education and Outreach Council, participating in the monthly conference calls. In April, 2010 the NFRA EOC, including Sprenger and Mikulak, worked together to submit a full proposal to the NOAA informal/nonformal environmental literacy grant opportunity to fund the development of interactive computer exhibits focusing on sea level change and ocean acidification using IOOS data and visualizations. In addition, the NSF-funded group, COSEE NOW, has been working closely

with NFRA EOC members and has been supporting the professional development of the OOS education community through webinars on exhibit design and using ocean data in education. Sprenger and Mikulak have participated in each of these webinars and continue to interact with the OOS education community on projects that have developed out of these webinars.

E&O Presentations:

Sprenger, A. Eyes on Washington Waters, Bringing Ocean Observing Data Into the Classroom. Washington Science Teachers Association, March 12-14, 2010, Everett, WA.

Sprenger, A, and Stahr, F. Bringing Ocean Researchers, Students and Marine Volunteers Together Through Field Research. Ocean Sciences 2010, ASLO/AGU/TOS, February 22-26, 2010, Portland, OR. (*invited*)

McDonnell, J., C. Parsons, S. Lichtenwalner, H. Clark, R. Lyons, L. Bovitz, C. Ripberger, S. Mikulak. *Building Effective Partnerships Among Scientists, Educators and Informal Science Institutions*. **Oral Presentation**. Ocean Sciences Meeting. February 2010. Portland, OR.

Mikulak, S., S. Rowe, N. Hunter, and C. Orrico. *Ocean Observing Data and Science Center Visitors: Creating Motivation and Relevance*. **Poster Presentation**. Ocean Sciences Meeting. February 2010. Portland, OR.

➤ **Ongoing IOOS-related activity:**

➤ ***NANOOS participation in NFRA and IOOS***

- Newton and Martin participate in the monthly NFRA Board phone conferences.
- Newton participates in NFRA Executive Committee teleconference calls and meetings.
- Sprenger participates in the NFRA-IOOS led Education and Outreach teleconferences.

➤ ***NANOOS participation in ACT***

- Newton is the Co-Chair of the Stakeholders Council of the Alliance for Coastal Technologies (ACT). As such, she routinely participates in the regularly scheduled Board meetings and teleconference calls, when possible, and will attend the next ACT Board meeting in Ann Arbor MI on 3-4 June.

➤ ***NANOOS integrations with CMOP***

- Martin, Eric Shulenberger (UW), and Newton continue to coordinate activities between the NSF-funded Science and Technology Center (STC) for Coastal Margin Observation and Prediction (CMOP) and NANOOS. NANOOS leverages CMOP in the areas of coastal observations, DMAC, and Education and Outreach.

➤ ***NANOOS programmatic status updates***

- RA organizational structure:
 - *Changes:* One new member organization was added to NANOOS this period: University of Oregon.
- Planning and implementation:

- *Progress made towards the development of the business plan:* NANOOS has a Business Plan which was adopted at the NANOOS Governing Council meeting on 25 June 2009. It is posted on the NANOOS website.
- *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 top four regional priorities: Maritime Operations; Ecosystem Impacts; Regional Fisheries; Coastal Hazards. The NANOOS User Products Committee and Education and Outreach Committees are vital to this effort since there are many stakeholders on these committees. The process for this selection was described in our first RCOOS proposal (FY2007-9), which is posted on the NANOOS website.
- *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 to NOAA IOOS and its membership. It is posted on the NANOOS website. 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, continues to implement the regional data management system in accordance with the schedule presented in the RCOOS grant. Progress has been satisfactory during this period.

○ Stakeholder engagement:

NANOOS continues to actively engage with our stakeholders in numerous ways, via their participation on our Governing Council, Standing Committees, targeted theme pages on our web, and via the specific activities, reported throughout this document.

3) Scope of work – We had no changes to our statement of work. We neither anticipate changes to our statement of work, nor problems in meeting objectives of this effort.

4) Leadership personnel – Eric Shulenberger (UW) will be increasing his work focus on CMOP and as of 30 May will not work directly for NANOOS. We thank Eric for his contributions to date and will continue working with him on the interface of CMOP and NANOOS. This will allow more investment in NANOOS web and outreach activities, which have been curtailed due to less budget allocated for the RCOOS award, than anticipated. Sarah Mikulak officially became NANOOS staff in February, 2010 and since then has been working on informal education projects and outreach for NANOOS.

5) Budget analysis – Given institutional time lags in fiscal reporting, NANOOS continues to be adequately balanced in terms of budget expenditures and allotted time. Specifically, at the end of this reporting period, 12/01/09 through 05/30/10, NANOOS has expended 45% of its anticipated expenditures in support of this project while we have expended 69% of our allotted time. We started the RA grant period conservatively, due to uncertainties in funding level of the RCOOS award. Now that NANOOS knows this award value, we can plan to expend the remainder in an appropriate time period, increasing our web and outreach activities expenditures.