Progress Report for
Enhancing
Northwest Association of Networked Ocean Observing Systems (NANOOS)
#NA05NOS4731124

1 December – 31 May, 2009

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) 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). Other key NANOOS staff are Amy Sprenger (Education and Outreach Specialist and Eric Shulenberger.

Per NOAA anticipatory guidance concerning the eventual combining of RA Planning and RCOOS awards, NANOOS begins to implement this NOAA-desired end-state by collating the progress reports for this grant (which was executed on a no-cost extension through 31 May 2009) with the funded follow-on RA Planning grant (#NA08NOS4730290 - for which a Progress Report is being simultaneously submitted separately) while also noting outcomes from the NANOOS RCOOS grant that were enabled/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 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 above seven NANOOS Objectives, NANOOS Leadership interacts 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.

➢ **Leveraging NSF's Coastal Margin Observations and Prediction 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 acts as UW's Education and Outreach Coordinator for CMOP and is coordinating these education efforts 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. Also, Newton is the lead PI on a $0.5M proposal to the Murdock Charitable Trust for an observing sensor array (surface and profiling moorings plus a glider) off the WA coast.

➢ **NANOOS attends Regional IOOS Coordination and NFRA meeting** –Martin and Shulenberger attended this annual meeting 1-4 December in Baltimore, MD. Martin presented the NANOOS responses to the NOAA slide template prepared by Newton concerning RA progress and status review. Both joined discussions on performance metrics and other matters.

➢ **IOOS and Oceans 2010** – Martin is the Technical Chair for the Oceans 2010 meeting to be held in Seattle during September 2010. He attended planning meetings on 11 December and 8 April in Seattle. Martin is working to develop IOOS sessions for this important meeting.

- **NANOOS participation at AGU–** Several scientists involved in NANOOS presented talks and posters using NANOOS data, models, or products at the American Geophysical Union meeting in San Francisco during 15-19 December.

- **NANOOS and CMOP technology incubation –** Martin attended the Research Incubation Group meeting of CMOP on 12 January in Seattle at APL-UW. These two efforts complement each other. NANOOS defines where technology development is needed. As new technologies are developed within CMOP, these can be incorporated and become operational within NANOOS.

- **New "Ocean Acidification" Theme Page on NANOOS web** – Real-time data on ocean acidification status off Cape Elizabeth, WA is now available, with supporting text and other resources, from the NANOOS home page. Newton, Martin, and Janet Olsonbaker (APL-UW NANOOS web specialist) met with Drs. Richard Feely and Chris Sabine (NOAA) at NOAA-PMEL Sand Point, Seattle on 16 January and 13 February to scope its development and review the content.

- **NANOOS logo artist moves to Alaska** – Tom Guthrie, a Tsimshian tribal member and long-time APL-UW employee, moved with his family back to Alaska to be near his ancestral lands. Tom drew the beautiful and meaningful NANOOS logo in 2003. See http://www.nanoos.org/about_nanoos/about_the_logo.php. NANOOS gave Tom a commemorative wall plaque honoring him for his contribution to our identity at a farewell luncheon on 30 January at APL-UW in Seattle. We miss Tom!

- **NANOOS invited to NOAA West Coast HAB Summit** – Martin and Newton on behalf of NANOOS, were invited by NOAA and the states of California, Oregon, and Washington to the West Coast Regional Harmful Algal Bloom Summit held 10-12 February in Portland, OR. They attended the meeting along with several other representatives of the NANOOS RCOOS. The workshop discussed ways to advance regional coordination for predicting and mitigating the environmental, economic, and human health impacts of harmful algal blooms (HABs) on the west coast. NANOOS is working on a HAB theme page to highlight regional efforts and knowledge regarding HABs.

- **Ocean Observing briefings**
  - US Navy: Martin briefed RDML Handy (CNO 87), Director Submarine Warfare, regarding IOOS and NANOOS at his visit to APL-UW on 25 February. They discussed ocean observations, both research and operational.
  - APL-UW Advisory Board: Martin briefed the APL-UW Advisory Board on 12 March regarding APL's role in ocean observing via NANOOS and other projects.
  - Homeland Security: Martin briefed RDML Jerry Ellis, Curriculum Chair for Undersea Warfare at the Naval Post Graduate School, former Oceanographer of the Navy on his visit to APL-UW on 19 March. They discussed ocean observing in the context of homeland security.

- **NANOOS invited to collaborate with POST** – NANOOS was to join the Pacific Ocean Shelf Tracking (POST) Management Board in discussions on opportunities for collaboration

with existing acoustic tracking efforts in Puget Sound and areas in which POST might focus future activities to compliment these efforts. Martin attended the meeting held on 18 March at NOAA NW Fishery Science Center in Seattle. Newton has been working with John Payne of POST to assess areas of common work to pursue as funding allows.

- **NANOOS engaging estuarine crowd -** Newton gave a talk regarding NANOOS' work on estuarine observing to the Pacific Estuarine Research Society (PERS) at their Annual Meeting on 2-4 April in Bellingham, WA. The society involves both scientists and regional resource managers from the along the Pacific coast, including Canada. Its international parent organization CERF (Coastal and Estuarine Research Federation) will be holding its Biennial Meeting in Portland during November 2009. Many IOOS sessions and talks are planned and several members of NANOOS were key planners of this meeting, including Antonio Baptista, CERF 2009 Program Chair.

- **NANOOS and Citizen Science** – Sprenger and Newton, on behalf of NANOOS, attended the "Spectrum of Citizen Science Workshop" sponsored by COSEE-Ocean Learning Communities, Washington Sea Grant, the Pt. Townsend Marine Science Center, and the Puget Sound Partnership on 10-11 April in Port Townsend, WA. Sprenger gave a talk on NANOOS capabilities and future plans for allowing data input by citizen scientists with observations. Newton gave a talk on different scales of relevance for coastal observations.

- **WA Seafloor Mapping Group** – Newton was invited to participate in a meeting of the Washington Seafloor Mapping Group on 22 April at NOAA, Seattle, regarding strategic planning. The discussion focused on their strategic plan, communication, outreach and partnerships, including synergies with NANOOS. NANOOS currently links to the NOAA NWFSC sea-floor and habitat maps on our website.

- **NANOOS and National Security –** Martin briefed the Regional Counter Intelligence Group of the FBI in Seattle regarding the role that ocean observing and NANOOS can play in national security 30 April.

- **SeaKeepers and NANOOS** – On 30 April, Newton met with Jim Gilbert of the International SeaKeepers Society and Paul McCollum of the Port Gamble S'klallam Tribe in Silverdale, WA regarding potentially outfitting a Washington State Ferry with a donated SeaKeepers Society flow-through instrument. Data flow would be through NANOOS. A strategic meeting with WSF-WSDOT will be scheduled in June.

- **NANOOS to be represented at "PaCOOS Zooplankton workshop"** - A workshop is planned for 9-10 June in La Jolla, CA to discuss vision and data needs for consistent California Current zooplankton monitoring from Canada to Mexico in response to climate change detection. Newton and Emilio Mayorga (NANOOS DMAC) will attend on behalf of NANOOS.

- **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. In addition, they met face-to-face on 13 February in Seattle at APL-UW and participated in the "Tri-Committee" meeting 15-16 April, also in Seattle at APL-UW.

Data Integration: One focus of the February meeting was to identify new data sources from buoys, models, and stakeholder data sets. Efforts since then have been to integrate these new data sources into NANOOS DMAC. These include: the Newport, Oregon glider, Saturn 05 and 06 fixed stations in the Columbia River, CMOP Jetta station, the ORCA buoys in Puget Sound, WA, and several cruises in Puget Sound (PRISM) and Hood Canal (HCDOP).

Data Services: Currently there is an Oregon Sensor Observation Service hosted at OHSU-CMOP since October 2008, and a Washington Sensor Observation Service to be hosted at APL-UW in fall 2009. There will also be ERDDAP to be hosted at both APL-UW and OSU. We currently have catalog/registration services for registration and lookup. Portal integration of services currently includes SOS, KML plots/data in Google Maps, an asset list and other data assets.

NANOOS DMAC team members are active members of various IOOS working groups and have routinely participated in regular telecons and workshops.

NANOOS User Products Committee (UPC) meeting - Chaired by Jonathan Allan (OR State Dept of Geology and Mineral Industries), the NANOOS UPC instigated the highly successful "Tri-Committee" meeting held 15-16 April in Seattle at APL-UW. NANOOS plans to adopt an annual Tri-Committee meeting in spring. The focus of the meeting was to share progress and then to prioritize activities, given the mid-way point in the NANOOS RCOOS 3-year grant. Topics and outcomes from the meeting were: the NANOOS Visualization System (NVS) Portal is recognized as the high priority focus for the NANOOS region; work on an interactive education/outreach display developed by Sarah Mikulak (OSU) for the Hatfield Marine Science Center will be integrated into NANOOS web format for the capability to interact at one's leisure; work on new remote sensing products will be emphasized; the successful "Ocean Acidification Theme Page" will be expanded to other topics, with priority to HABs, hypoxia, and coastal erosion; newer NANOOS-supported data streams will be integrated into the NANOOS web, including X-band radar, glider, and shoreline change; NANOOS wants to place effort on developing means for integrating citizen science observations.

NANOOS Education and Outreach Committee – Chaired by Mike Kosro (OSU) and staffed by Amy Sprenger (APL-UW), this vital NANOOS committee met regularly over the period via bi-monthly teleconference calls. They also attended the "Tri-Committee" meeting held 15-16 April in Seattle at APL-UW. 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

outreach, education, and training activities to be held during 2009. In addition, specific activities of Sprenger or NANOOS committee members included:

- NFRA Education Committee - Sprenger participated in monthly NFRA Education committee teleconferences where representatives from each RA share resources and information on educational projects, work with the NOAA IOOS office on outreach and IOOS messaging, and collaborate on projects which reach across RAs. The first major collaboration will be for representatives from each RA to jointly present a session "What Can the Integrated Ocean Observing System Offer Educators?" at the National Marine Educators Association Annual Conference.
- Ocean Observing Story-Tellers - Craig Risien (NANOOS DMAC, E&O and UPC Committees, OSU) and Sprenger attended a workshop for ocean observing education at Maryland Science Center in Baltimore, Maryland, January 8-9, 2009, on behalf of NANOOS. The workshop was organized by COSEE Networked Ocean World and attended by educator and scientist pairs from each RA, NOAA IOOS representatives, and OOI representatives.
- Tuna and Halibut Fishers - Jon Allan (NANOOS UPC Chair, DOGAMI) and Sprenger attended the Tuna and Halibut Fishermen Convention, "Salty Dog", held in Newport, OR on February 28, 2009 and presented a display on NANOOS products of interest to fishers. Approximately 80 tuna and halibut fishers attended the convention.
- Oregon Ocean Salmon Researchers and Fishers - Risien attended the Collaborative Research on Oregon Ocean Salmon (CROOS) fishermen's workshop on February 25, 2009. He presented a poster detailing the NANOOS mission as well as data products that are currently available through the NANOOS web portal. During the session Craig talked with 10-12 recreational and commercial fishermen. During these discussions he was able to both promote IOOS and NANOOS goals and show, by way of a laptop computer, data tools and information that NANOOS and its partners are currently providing. These discussions also provided an excellent opportunity for NANOOS to learn more about what the needs, with regard to data and information, and challenges, with regard to data access, of the fishing community.
  In addition, Allan represented NANOOS at a CROOS meeting held April 14, 2009 for persons directly involved in the CROOS project (i.e. the members from Oregon's Salmon Commission, PI's, selected key fisherman, outreach folks, and scientists from Oceanography and HMSC). Allan provided an overview about NANOOS activities and was able to touch base with these key individuals involved in fishery science and marketing.
- Scientists and Fishers - Kosro presented physical oceanography of the spring transition at panel discussion, for meeting of the Scientists and Fishermen's Exchange (SAFE) in Newport, Oregon, on Feb 20, 2009. Exchange of information was had among physical and biological oceanographers and fishers related to recognizing the annual onset of sustained upwelling from available data, its year-to-year variability, and the effects on catches of various species.
- Shellfish Growers - Washington Sea Grant Shellfish Growers Conference March 2-3, 2009– Sprenger presented a poster on the NANOOS-NERRS real-time water

quality data shellfish growers website. The conference reached approximately 70 shellfish growers

- Undergraduate Educators - Newton gave a seminar at APL-UW in Seattle on Research Apprenticeships offered at the UW Friday Harbor Laboratories on 19 March. These are aimed at undergraduate and students and post-baccalaureates from anywhere. She has led one that incorporates time-series data from the Strait of Juan de Fuca.
- Environmental Educators – Sprenger represented NANOOS at two regional conferences for formal and informal environmental educators. "Storming the Sound North" took place January 30, 2009 in La Conner, WA and was attended by 80 educators. Sprenger presented a display on NANOOS education. "Storming the Sound – Central Sound" took place on April 3, 2009 in Seattle, WA and was attended by 125 educators. Sprenger was part of the three-person planning committee for this event. Sprenger co-presented a session on boat-based marine education programs in Puget Sound and presented a display on NANOOS education. These two events highlighted educators' enthusiasm for NANOOS to develop the capability for citizens (including students) to contribute observations to NANOOS observing efforts.
- Citizen Scientists - Sprenger and Newton participated in panels on why we collect baseline data at the April 11-12, 2009 Citizen Science Workshop at Fort Worden, Port Townsend, WA sponsored by COSEE OLC, Washington Sea Grant and the Port Townsend Marine Science Center. The event was attended by over 125 citizen scientists; both Sprenger and Newton's panels were attended by more than 30 participants.
- NANOOS web - Several resources and lesson plans for using ocean observing data in the classroom continue to be added to the NANOOS web.

- **Ongoing IOOS related activity:**

  - **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.

  - **NANOOS participation in NFRA and IOOS**
    - Newton and Martin participated in the monthly NFRA Board phone conferences
    - Martin participated in the NFRA Executive Committee teleconference calls and meetings.
    - Sprenger participated in the NFRA-IOOS led Education and Outreach teleconferences.
    - Martin and Shulenberger attended the NOAA IOOS Regional Coordination and NFRA meetings in December 2008 (described above).

- **NANOOS programmatic updates**
  - RA organizational structure

- Changes: Two new member organizations were added to NANOOS this period, listed here with their Governing Council representatives: Seattle Aquarium (Mark Plunkett); Northwest Association of Marine Educators (Linda Maxson).

- Planning and implementation
  - Progress made towards the development of the business plan: NANOOS has a draft Business Plan. We will be voting to adopt this at the NANOOS Governing Council meeting scheduled for June 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 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.

  - 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, 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 have fully met the objectives of this work.

4) Leadership personnel – no changes.

5) Budget analysis

At the conclusion of this no-cost extension with 100% of the time spent, NANOOS has expended 100% of the funds allotted.