

Progress Report

Project Title: Sustaining NANOOS, the Pacific Northwest component of the U.S. IOOS

Award Number: NA21NOS0120093

Period of Activity: 01/01/2026 - 06/30/2026

Principal Investigator(s): Jan Newton, NANOOS Executive Director

1) Project Summary

Our overall project goal is to sustain the Northwest Association of Networked Ocean Observing Systems, NANOOS, as the Regional Coastal Ocean Observing System for the U.S. Pacific Northwest that serves regional stakeholders in alignment with the vision of the U.S. Integrated Ocean Observing System (IOOS®). NANOOS, with its essential subcomponents (integrated in-water and land-based Observing Systems, Data Management and Communications, Modeling and Analysis, and Education and Outreach) that are closely integrated within the national IOOS® system, provides significant societal benefits across a wide spectrum of users including federal, tribal, state, and local governments, marine industries, scientific researchers, Non-Governmental Organizations (NGOs), educators and the general public.

For FY2025 (= Y5 of the award = Y19 of NANOOS RCOOS) our objectives were to:

- 1) **Maintain NANOOS as the U.S. IOOS PNW Regional Association:** Sustain our proven role for regional coordination, administrative infrastructure, and stakeholder engagement, partnering with federal and non-federal (tribal, academic, state, local, industry, NGO, etc.) entities.
- 2) **Maintain surface current and wave observations:** Maintain existing HF-radar and wave mapping capabilities, providing critical national capacity along coasts and at critical ports.
- 3) **Sustain and enhance buoys and gliders in the PNW coastal ocean in coordination with national and regional programs:** Maintain, harden, enhance existing buoys and gliders, with focus on hypoxia, HABs, OA, and climate.
- 4) **Maintain multidisciplinary observational capabilities in PNW estuaries and the nearshore, in coordination with local and regional programs:** Sustain observing ability to aid sustainable resource management, water quality assessment, and sub-regional climate change evaluation.
- 5) **Maintain core elements of beach and shoreline observing:** Measure nearshore bathymetry, topographic beach profiles, and shoreline morphodynamics along OR and WA, contributing to hazard mitigation by providing essential observations and better decision support tools for coastal managers, planners, and engineers.
- 6) **Provide sustained support to a community of complementary regional numerical models:** Contribute to the operation of regional models, and the tools and products they support, covering the head of tide of estuaries to the outer edges of the Exclusive Economic Zone (EEZ) in both OR and WA.
- 7) **Maintain, harden, and enhance NANOOS' Data Management and Cyberinfrastructure (DMAC) system for routine operational distribution of data and information:** Sustain and enhance the DMAC system, including the NANOOS Visualization System (NVS), for dynamic and distributed data access.
- 8) **Continue to deliver existing and, to the extent possible, create innovative and transformative user-defined products and services for PNW stakeholders:** Continue our NVS innovation to succeed in this vital translation for meaningful and informative data products that address user needs and serve society.

- 9) **Sustain and expand NANOOS engagement to the extent possible:** Continue ongoing engagement with stakeholders and the public, increasing ocean awareness and literacy; to expand the ocean and coastal workforce; to improve our ability to provide relevant ocean and coastal data and information to communities; and to facilitate use of NANOOS products for societal objectives, the core task for which NANOOS exists.

During FY25, NANOOS has the following additional tasks funded via IOOS (4, 7-10, 13), NWFSC (5), NMFS (6), and the NOAA Ocean Acidification Program (10-12), as well as three pass-thru funded modeling projects (1-3):

1. For Salish Sea & Columbia River Operational Forecast System (SSCOFS) (Khangaonkar, UW Tacoma & Yun, PNNL)
2. For advancement of Coupled Ice-Ocean Forecast Capabilities in STOF3D-Alaska (Durski, OSU)
3. To initiate the design of NOS operation model infrastructure to support the development and operations of AI coastal models or hybrid AI-numerical models (Zaron, OSU)
4. For IOOS sponsorship for OceanHackWeek (Lee, Wu-Jung, UW)
5. To support OceanHackWeek-style events in 2025 and 2026 (Lee, Wu-Jung, UW)
6. For NMFS/NANOOS Glider collaboration in the Pacific, including off the U.S. west coast and in Hawaii (Barth, OSU)
7. To conduct HABs monitoring for NANOOS (several PIs)
8. To support Radiowave Operators Working Group (ROWG) (Kosro, OSU)
9. For NANOOS HFR Retune/Recap (Barnard/Kosro, OSU)
10. To support the NOAA-ON time series at CB06 (Hales, OSU)
11. To sustain OA measurements on the Washington coast at NOAA-ON NANOOS Mooring Cha'ba (Mickett, APL-UW)
12. To support GOA-ON, J-Scope, and C-CAN outreach/education project (Newton, APL-UW)
13. For a one-time FY25 adjustment to base (ATB) to be used on identified user needs and the RA priorities (Newton, APL-UW)

2) Progress and Accomplishments

During the project period, NANOOS accomplished its objectives outlined above. NANOOS maintained the RCOOS subsystems it has developed, implemented, and integrated with NOAA IOOS funding and substantial external leverage. NANOOS remained focused on delivering data-based products and services that are easy to use to stakeholders to address high-priority issues and aid decision making. NANOOS continued its proactive interactions and regional coordination with a wide range of PNW stakeholders, to prioritize and refine our observations, products, and outreach efforts as funding allowed.

NANOOS milestones for this award are reported on in detail throughout this document. Our assessment is that NANOOS has met these milestones for the reporting period. We report here on progress for: a) Observing Subsystem (surface currents and waves, shelf buoys/moorings/gliders, estuary buoys/moorings, and beaches and shorelines); b) Modeling and Analysis Subsystem (estuaries and shelves); c) Data Management and Cyberinfrastructure Subsystem; d) Engagement Subsystem; and e) Governance and Management Subsystem.

A. Observing Subsystem:

Data from all assets reported here are served via [NVS](#).

CURRENTS AND WAVES

Maintain surface current and wave observations: Maintain existing HF-radar and wave mapping capabilities, providing critical national capacity along coasts and at critical ports.

PNW Coastal HF Surface Current Mapping:

- *Maintain and operate 10 SeaSonde HF sites designated as Priority 1 sites by the national HF program; these are four long-range sites in OR, three in WA, one in CA, and two standard-range sites in OR [Barnard/Kosro]*
- *As resources allow, 3 Priority 2 standard-range sites covering Heceta Bank, which is a source for HABs and of strong bathymetric flow perturbation, as well as the shelf portion of the OOI Endurance Array*
- *Deliver data via NVS [Barnard/Kosro]*
- *Bring all data QA/QC to meet Certification standards [Barnard/Kosro]*

Status: On track

Summary: The site computer was replaced at KAL1 due to not restarting after power losses in early 2026. The dome antenna and receiver from LOO1 completed re-tuning and the equipment will be reinstalled in July/August 2026. All equipment at SEA1 has been removed due to issues in obtaining site permissions with the current property owner. As such, the search to relocate SEA1 is in process, and the SEA1 site equipment is being used at the YHS2 site until a new site permission for SEA 1 is formalized. The MAN1 site has been reinstalled and is operating after system maintenance was completed. The replacement of antennas at YHS2 with a new combined antenna and the installment of new cables has been completed. The YHS2 site is operational with the equipment removed from the SEA1 site. The WSH1 receive antenna was sent in for re-tuning and was replaced with a temporary spare. New cables at the WSH1 site (replacing aging and damaged cables) were completed, however a portion of the new transmit cable was stolen, thus impacting the operational status of the site. Efforts are in progress to further harden the site, including upgrading the site to a combined antenna. The WIN1 site was also further hardened, replacing the aging shed door to provide better security and interior climate control. We ordered and received new transmit antennas for LOO1 and WIN1 to replace aging equipment that can't be re-tuned to match new operating frequencies. We also ordered a new dome antenna to replace the failing box antenna at CBL1, along with a new transmitter. This new equipment is scheduled to be installed later this summer.

Accomplishments/Successes: MAN1 site completely reinstalled and operational after lightning strike in 2019. Communications with CA parks re-initiated by NANOOS/CeNCOOS for reinstalling PSG1, discussions are ongoing. The SEA1 site to relocate are being investigated. In the short term, the SEA1 site equipment has been recovered and has been allocated to other sites to maintain continuity in operations.

Problems/Delays: Communications from property owner delay reinstalling SEA1, search for alternative site underway.

FY23 Non-core Task 3: Expenses associated with SeaSondes for HFR [Barnard/Kosro]

Status: On track

Summary: The MAN1 site has been reinstalled and is operating after system maintenance was completed. The site will undergo an APM in the next performance period to ensure location returns are accurate.

Accomplishments/Successes: Re-installation and return to operational state at the MAN1 site. YHS2 is operational with a combined antenna and new cables. Additional hardening against lightning strikes will be completed in the next 6 months.

Problems/Delays: PSG1, negotiating permissions.

FY24 Non-core Task 4: One-time system add-on for HFR system-wide support and replacement for HFR manufactured last century [Barnard/Kosro]

Status: On track

Summary: Recapitalization needs in HFR Core section above revised to reflect this funding.

Accomplishments/Successes: We ordered and received new transmit antennas for LOO1 and WIN1 to replace aging equipment that can't be re-tuned to match new operating frequencies. We also ordered a new dome antenna to replace the failing box antenna at CBL1 along with a new transmitter. New equipment is scheduled to be installed later this summer. Equipment ordered and received, and scheduled to be installed later this summer.

Problems/Delays: Continuing to build further replacement for aging HFR hardware. In progress now, and we anticipate bringing this hardware to sites as they are received.

FY24 Non-core Task 5: For supplies, materials, and associated expenses needed to resume telemetering data to the IOOS HFR National Network from SeaSondes offline, including stations PSG1, MAN1, and SEA1 [Barnard/Kosro]

Status: On track

Summary: MAN1 (see above) is now operational. SEA1 site assets have been moved to support other sites (e.g. YHS2) to make sure that these sites are operational while we work on finding a relocated site for operations. PSG1 site locations and re-initiation of operations are still in progress with staff from NANOOS and CeNCOOS.

Accomplishments/Successes: MAN1 completely reinstalled and operational. PSG1 talks with CA Parks re-initiated by CeNCOOS personnel.

Problems/Delays: Still no communication from SEA1 property owner, all equipment removed and search for alternative site begun.

FY25 Non-core Task 8: To support Radiowave Operators Working Group (ROWG) [Kosro]

Status: Completed

Summary: ROWG-14 was held at the Hatfield Marine Science Center in Newport, OR May 5th - 7th. We thank the NOAA HFR staff and the workshop steering committee (including Brian Zelenke and others) and to Matthew Stroufe at OSU for leading this workshop which was well attended.

Accomplishments/Successes: See Summary

Problems/Delays: None

FY25 Non-core Task 9: For NANOOS HFR Retune/Recap [Barnard/Kosro]

Status: On track

Summary: With change of HFR to ITU operating frequencies, existing systems required re-tuning to the new frequencies, and modifications to allow for automated transmission of call signs.

Remaining sites (e.g. WLD2 and YHL1) still need re-tuning and work is planned to accomplish this in the next 6 months.

Accomplishments/Successes: Codar updated several of our existing systems to work under the new ITU rules.

Problems/Delays: None

Wave Imaging at Critical PNW Ports:

- *Sustain the existing marine radar observing station at USCG Station Yaquina Bay [Haller]*

- *Provide both real-time and historical wave information via NVS; mean and snapshot radar images are real-time viewable for use in environmental characterization [Haller]*
- *Bring all data QA/QC to meet Certification standards [Haller]*

Status: Offline

Summary: USCG watchtower is damaged and not presently accessible. Most recent communication with Chief Warrant Officer Jason McCommons (USCG Station Yaquina Bay) was July 20, 2026 stating that he would be reaching out to USCG Oakland Facilities for a repair order request.

Problems/Delays: The USCG Yaquina Bay watchtower at Newport, OR, remains out of commission. Awaiting response to our last communication July 20-2026.

Accomplishments/Successes: None during this period.

SHELF

Sustain and enhance buoys and gliders in the PNW coastal ocean in coordination with national and regional programs: Maintain, harden, enhance existing buoys and gliders, with focus on hypoxia, HABs, OA, and climate.

Washington Shelf Buoys/Moorings:

- *Maintain the WA shelf (off La Push) Cha'ba buoy and the NEMO subsurface profiler at existing levels [Mickett]*
- *Deliver NRT data streams via NVS [Mickett]*
- *Bring all data QA/QC to meet Certification standards [Mickett]*

Status: On track

Summary: The Washington Coast buoy observation program continued the work of maintaining and operating two real-time moorings 13 miles NNW of La Push, Washington. During this reporting period most effort was focused on scheduling and carrying out the spring mooring servicing cruise. The primary objectives of this cruise, which took place over three days from May 4-7, 2026, included the deployments of the summer Cha'Ba mooring and NEMO-subsurface profiling mooring and collecting CTD casts with water samples at the Cha'ba and other sites. Other activities included deploying the adjacent ESP HAB mooring, and servicing several small wave moorings as part of the Backyard Buoys project. An engineer from Seabird Scientific (A. Newhouse) joined this cruise to better understand customer needs and also learn how their instrument systems are deployed. He also was testing a new version of the SeaFET pH sensor that was deployed on the Cha'ba mooring. As of the end of the period, both Cha'ba and the NEMO-Subsurface moorings were in operation and reporting observations in near-real time. This includes the pCO₂ system that has been problematic over the past several years.

For the Cha'ba deployment we implemented a new design that decreases the anchor weight and removes the acoustic release with the intent to make the mooring more robust in the face of extreme winter storms while also making anchor recovery safer and more straightforward.

Also, we have been making significant progress on building a new Cha'ba controller which will be deployed on the winter 2016 Cha'ba buoy to allow additional real-time data streams, including near-bottom dissolved oxygen. We are still working with the PMEL Carbon Group to find a solution for the aging Battelle mapCO₂ system or reduce the rate of system failures. Working with S. Travis, we have updated the real-time display of surface data for Cha'ba, to improve readability and flexibility with data streams from different sensors: https://nwem.apl.uw.edu/prod_CS_ChaBa.shtml. Also, the process of transferring all historical Cha'Ba and NEMO-Subsurface data—going back to 2010—onto the group's ERDDAP server continues. In addition to the Cha'Ba wind data, WQM CTD data, and NEMO-subsurface CTD data, much of the historical ADCP data is now accessible. Most of the near-real time data streams are also now passing through an ERDAPP server prior to being available on NANOOS Explorer, an improvement in QA/QC and streamlining data flow and

archiving. All data currently available on the ERDDAP server can be found here:
<https://nwem.apl.washington.edu/erddap>.

The team continued collaboration with Jennifer Hagen, Marine Policy Advisor for Quileute Natural Resources, who participated in our spring operations. As mentioned the team also continued collaboration with Sea-Bird Electronics, who refurbished and renewed the loan of a Sea-Bird SeapHOX instrument that was deployed on the summer Cha'Ba mooring to collect deep (84 m) measurements of conductivity, temperature, depth, dissolved oxygen, salinity, and pH as well as leveraging Cha'ba to test a new version of the SeaFET. As usual, fieldwork was coordinated with the NOAA/APL ESP team, who deployed the ESP mooring nearby Cha'Ba and NEMO-subsurface.

Accomplishments/Successes: Cha'ba/NEMO-subsurface mooring deployments, Puget Sound Marine Waters presentation.

Problems/Delays: Winter Cha'ba broke free late in the deployment (April 10th, 2026), but was thankfully recovered in good condition by the crew of the fishing vessel F/V Sea Clipper and APL-UW field engineer extraordinaire R. Daniels.

FY25 Non-core Task 11: *Support efforts for OA observing on NANOOS NOA-ON Cha'ba on the WA shelf [Mickett]*

Status: On track

Summary: Carbon measurements are conducted in partnership with the PMEL Carbon Program. The Cha'Ba MapCO2 carbon system is operated on both the summer and winter Cha'Ba buoys, with instruments swapped every 6-8 months in the spring and fall.

Accomplishments/Successes: Deployed Summer Cha'ba mooring May 5th with pCO2 system peripheral instruments working as of the end of the reporting period. The system on winter Cha'ba operated successfully from deployment on Nov. 11th until the mooring broke free and was recovered on April 10th.

Problems/Delays: Winter Cha'ba breaking free, shortening the deployment by 3 weeks. Amazingly the pCO2 system worked as intended for both the winter and summer deployments.

Oregon Shelf Buoy:

- *Maintain the CB-06 buoy off Coos Bay at existing levels [Hales/Kosro]*
- *Deliver NRT data streams via NVS [Hales/Kosro]*
- *Bring all data QA/QC to meet Certification standards [Hales/Kosro]*

Status: On track

Summary: Mooring was deployed on 4 June 2026, using the OSU medium vessel *Pacific Storm*. Pacific Storm is a highly capable vessel for this work but the 24-hour requirement to steam from Newport to Coos Bay and back makes the deployment/recovery operations over twice as expensive as using a Coos Bay-based vessel. There may be some partial offset of that cost increase as the team does not need to truck the systems to/from Coos Bay, and does not need to stay in Coos Bay the night prior to deployment. Future budgets will have to anticipate a continued higher cost of CB06 maintenance going forward if a Coos Bay-based vessel can not be determined.

Accomplishments/Successes: Deployed CB06. Feeding data to NVS. New buoy is ready for the next deployment opportunity.

Problems/Delays: The long delay in deployment timeline allowed the ADCP battery to discharge undetected, so ADCP data is not being collected. Hales's team is designing a dedicated LiFePO4 battery pack that will have greater endurance, and rechargeability, compared to the off-the-shelf alkaline and non-rechargeable Li battery options currently available.

FY25 Non-core Task 10: *Support efforts for OA observing on NANOOS NOA-ON CB-06 off the OR shelf [Hales]*

Status: On Track

Summary: The buoy has been deployed and is delivering M_{AP}CO₂ data to NVS. The team continues to provide sample analyses for validation of in-water OA monitoring.

Accomplishments/Successes: Persistent deployment and monitoring. Demonstrated the feasibility of CB06 maintenance using Newport-based *Pacific Storm*.

Problems/Delays: None

Columbia River Shelf Mooring:

- *Maintain the CMOP shelf mooring at existing levels [Seaton/Gradoville]*
- *Deliver NRT data streams via NVS [Seaton/Gradoville]*
- *Bring all data QA/QC to meet Certification standards [Seaton/Gradoville]*

Status: On track

Summary: The CRITFC Columbia River Shelf Mooring (SATURN-02) is a multi-depth, inter-disciplinary buoy with real-time telemetry. Deployed seasonally off the mouth of the Columbia River at ~35m depth, it measures wind, air temperature, barometric pressure, PAR, and water velocity, as well as temperature, salinity, dissolved oxygen, chlorophyll, turbidity, and quantum yield at 1, 6, 11, 16, 21, and 35m. The SATURN-02 buoy was recovered on October 30, 2025. Data from the 2025 deployment were quality controlled and delivered to ERDDAP, NCEI, and NANOOS NVS. The buoy is currently being refurbished and tested, including new improvements to the solar power system to avoid data interruptions observed during the 2025 deployment. Buoy refurbishment is progressing; however, ongoing construction at the new CRITFC/CMOP Field Office have delayed the refurbishment process. The buoy is expected to be re-deployed in early August 2026.

Additionally, CRITFC staff are seeking a new site for a radio repeater near the river mouth to replace the repeater that was lost when CRITFC was asked to vacate the SATURN-03 station located at the Point Adams Fish Packing Plant in November 2025. This repeater will be needed to relay real-time SATURN-02 data to shore during the 2026 deployment.

Accomplishments/Successes: 2025 data were quality-controlled, improvements to the buoy power system were planned, and the 2026 buoy refurbishment was nearly completed. Additionally, CMOP staff facilitated the delivery of historical SATURN-02 data to multiple external research groups.

Problems/Delays: None.

La Push Glider:

- *Maintain the La Push line glider at existing levels [Rainville]*
- *Deliver NRT data streams via NVS [Rainville]*
- *Bring all data QA/QC to meet Certification standards [Rainville]*

Status: On track

Glider IDs serving this line: SG249, SG263, SG272

Summary: We continue to maintain repeated, persistent, and year-round occupations of the La Push line (47°52'N, 125°10'W to 47°00'N, 127°00'W) using long-endurance SGX Seagliders. The glider will profile from the sea surface to 1000-m depth, collecting profiles of temperature, salinity, oxygen, chlorophyll fluorescence, and optical backscatter to characterize physical and biological variability over the shelf-slope system offshore of Washington at timescales ranging from weeks to inter-annual. SG272 was deployed on 26 Feb 2026 and is still sampling. At the time of this report, it has completed over 700 dives. As some of its sensors have developed issues early in the deployment, a replacement glider, SG263, is being prepared and will be deployed as soon as ready. Rainville is now leading the LaPush glider program, but C. Lee continues to be involved. Data are displayed on NVS.

Accomplishments/Successes: Data processing and QC have been updated to our current standards, and data is flowing to the Glider DAC.

Problems/Delays: None

Washington Shelf Glider:

- *Maintain the Washington shelf glider at existing levels [Barth in collaboration with Seaton/Gradoville and Schumacker]*
- *Deliver NRT data streams via NVS [Barth]*
- *Bring all data QA/QC to meet Certification standards [Barth]*

Status: On track

Glider IDs serving this line: osu1138

Summary: Through a collaboration with the Columbia River Inter-Tribal Fish Commission (CRITFC), the OSU Glider Research group is conducting the NANOOS-funded glider sampling on the central Washington shelf. The program is designed to fly gliders off the central Washington coast, centered off Grays Harbor, WA, and south toward the Columbia River. The glider flies a mapping grid, from roughly the 30-m isobath, offshore to approximately the shelfbreak (~200 m). The mapping is done in consultation with the Quinault Indian Nation via Joe Schumacker, NANOOS Governing Council Representative and Executive Committee Representative for Tribes.

During the January to June 2026 reporting period, one glider map was made in late-May/early-June off central Washington. The glider was deployed for a total of 15 days, and produced 5 cross-shelf sections over 347 km with about 1408 vertical profiles of water properties. Glider data show that upwelled waters were present in late-May/early June, 2026, and that an approximately 20-m thick layer of low-oxygen water existed near the bottom in to about the 70-m isobath. Dissolved oxygen levels in this near-bottom layer were not hypoxic, but close around 1.5 ml/l. These data are displayed on NVS.

Accomplishments/Successes: Started the sixth, summer-season glider work off central Washington; continued operations with a reliable charter boat operator out of Westport, WA.

Problems/Delays: While waiting for delivery of a new Slocum G3 glider supported by NANOOS expected for fall 2026, we are facing more hardware challenges with our older Slocum gliders. There is also a systematic leak in the oil buoyancy pump of our newest Slocum G3 glider (sl1138); Teledyne Webb Research is working on a fix and we'll need to get sl1138 repaired.

Trinidad Head Glider:

- *Maintain the Trinidad Head glider, shared with CeNCOOS, at existing levels [Barth]*
- *Deliver NRT data streams via NVS [Barth]*
- *Bring all data QA/QC to meet Certification standards [Barth]*

Status: On track

Glider IDs serving this line: osu686, sg266

Summary: Starting in early December 2014, the Oregon State University glider research group has been obtaining vertical sections of ocean properties off Trinidad Head, CA (41° 3.5'N) using an underwater glider. We use a 1000-m capable Seaglider equipped with the following sensors: CTD, dissolved oxygen (Aanderaa 4831 optode), light backscatter (700 nm), chlorophyll fluorescence and Colored Dissolved Organic Matter (CDOM) fluorescence (WET Labs Ecopuck). The gliders also measure depth-averaged velocity, which can be combined with geostrophic estimates of relative velocity to get absolute velocity and hence transport. The glider samples from approximately the 100-m isobath (~10km offshore) to 130W (~500 km offshore), repeating the line every 30 days. We charter the *R/V North Wind* from CalPoly Humboldt to facilitate fieldwork off Trinidad Head. We used two of our Seagliders in order to "hot swap" them on the line when their batteries ran low. During this reporting period, this effort was jointly funded by NANOOS and CeNCOOS.

For the reporting period, January to June 2026, a glider was on the TH line for 163 days during two deployments, sampled along 3500 km of track line covering the transect 10 times, and

collected about 2200 vertical profiles of ocean properties. Glider uptime during this period was about 91%. Data are being sent in near real-time to the IOOS Glider Data Acquisition Center and, simultaneously, to the CeNCOOS and NANOOS data centers.

Accomplishments/Successes: We successfully implemented a pumped pH sensor in collaboration with Yui Takeshita (MBARI) and the University of Washington/Applied Physics Laboratory's (UW/APL) Integrative Observational Platforms (IOP) team. This worked on sg686 until the pH sensor cable failed. We recovered sg686 and sent it to UW/APL IOP for repairs and expect it back on the TH line in August 2026. Data from the Trinidad Head glider line are being used to monitor the arrival of the 2026-2027 El Niño (see Figure JB.1 below). There is an indication in the latest glider data that a deep El Niño signal via a coastal-trapped wave (Kelvin wave) may have arrived off Trinidad Head.

Problems/Delays: None

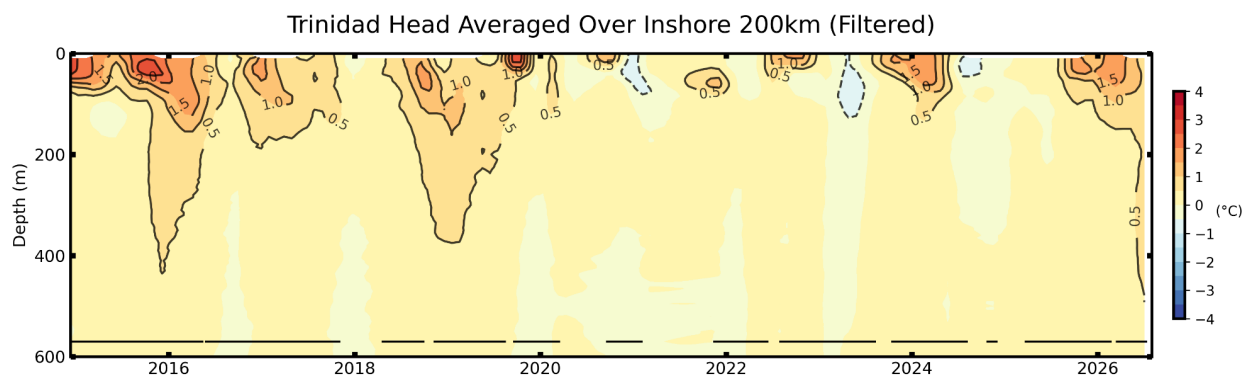


Figure JB.1: Temperature anomaly from the Trinidad Head, CA ($41^{\circ} 3.5'N$) glider line. Horizontal lines above the time axis indicate when the TH-Line glider was in the water.

FY25 Non-core Task 6: For NMFS/NANOOS Glider collaboration in the Pacific, including off the U.S. west coast and in Hawaii [Barth]

Status: On track

Summary: Collaborate with NOAA Fisheries in using passive and active acoustics from gliders.

Accomplishments/Successes: Begun acquisition and installation of acoustic sensors on both Seaglider and Slocum underwater gliders. Acquired passive acoustic sensor data from a Slocum glider trial off San Diego during 2025. Analyzed the broadband acoustic data to understand and deal with times that the Slocum glider itself makes noise (pitch motor, fin, ballast adjustment) that may interfere with acoustic detections. Working on tools to automate the removal of glider noise from passive acoustic records.

Problems/Delays: None

FY25 Non-core Task 7: Further HABs understanding and prediction to be distributed to tribes, UW, WA Sea Grant, OSU, and for data services relevant to HABs in service of the PNW HAB Bulletin for WA and OR and other PNW HAB observing [Mordy/McCabe (CICOES/NOAA), Trainer (UW ONRC), Hewett (UW APL), Little (UW Washington Sea Grant), Kavanaugh (OSU), Newton (UW APL)]

Mordy/McCabe

Status: On track

Summary: PI McCabe has continued to collaborate with Barbara Hickey (UW School of Oceanography) and Vera Trainer (UW ONRC) to produce the Pacific Northwest Harmful Algal

Blooms Bulletin (PNW HAB Bulletin) for coastal shellfish managers. Six to eight PNW HAB Bulletins are typically produced each calendar year, with nominally four Bulletins during spring razor clam digs and another four during fall razor clam digs.

Accomplishments/Successes: McCabe, Hickey, and Trainer produced four PNW HAB Bulletins to support coastal shellfish managers during the reporting period. These included the 8-Apr-2026, 22-Apr-2026, 12-May-2026, and 26-May-2026 Bulletins; all rated conditions at relatively 'low risk' for a domoic acid (DA) outbreak. Offshore data from a variety of sources including ships, two Lightfish autonomous surface vehicles, and the Environmental Sample Processor (ESP) mooring off La Push, WA, were incorporated into three of the four Bulletins. Although mid-shelf bottom temperature began to slowly decrease in March, it remained above 8 °C (an indication of weak upwelling) until mid-May, a result of the generally weak and variable along-shelf winds. *Pseudo-nitzschia* cell concentrations increased above established testing thresholds in mid-April, but subsequent analysis indicated only low concentrations of particulate DA were being produced at that time. Particulate DA remained at relatively low concentrations into June 2026, and shellfish DA concentrations throughout WA and OR also remained below closure limits at beaches open to harvest (some sites such as Gold Beach, OR, remained closed as a result of DA exposure in prior seasons). The PNW HAB Bulletins continue to be made publicly available on both the [ORHAB](#) and [NANOOS](#) websites.

Problems/Delays: None

Trainer

Status: On track

Summary: The funds from the current performance period were used to purchase supplies for HAB monitoring, including Lightfish deployments, led by the 4 coastal tribes and UW ONRC.

Accomplishments/Successes: UW ONRC in collaboration with ORHAB (Olympic Region Harmful Algae Bloom partnership), serves as a primary data source for state and tribal shellfish managers and the PNW HAB Bulletin on Washington's outer coast. The four Coastal Treaty Tribes (Hoh, Quileute, Makah, and the Quinault Indian Nation) are members along with state, federal and academic partners. Core funding for ORHAB's shore-based monitoring is provided by the Washington State Legislature from a percentage of recreational shellfish license fees but off-shore monitoring is not mandated or included.

The June 2026 fund balance for ONRC cost and tribal allocation is \$69,788, necessary for participating in offshore sampling over-and-above their weekly shore-side sampling. A highlight in spending during this period was the purchase and installation of distilled water systems at the ONRC, Makah lab and Quinault lab. All Tribes received ELISA kits, allowing them to perform domoic acid analyses onsite in their labs in response to elevated HAB cell counts observed by microscopy. The domoic acid ELISA is now working well in the hands of all Tribes and the WDFW. Dr. Avery Tatters is spending considerable time providing phytoplankton ID and toxin analysis training to Charlotte Foster, the new Makah analyst who will participate in ORHAB.

A key and lab access has been provided to the Hoh Tribe, allowing the Tribe continued access to the ONRC facility as a laboratory resource. All Tribes will play a pivotal role in processing samples and hosting the launching and retrieval for remote vehicle missions of the Lightfish. The funds provided here are proving important in helping each tribe meet that new challenge.

Trainer's discussions with PI, Kavanaugh, has allowed the Cooperative Fisheries Research project to expand this project into Washington to help manage Dungeness crab. Dr. Avery Tatters has been in communication with charter fishing boat captains who depart from La Push and Sekui, recruiting them to participate in this project. A total of \$30,000 was received in Spring 2026 to spearhead this project. Trainer is a committee member for Dr. Kavanaugh's student, Taylor Wood, who is assisting us in establishing this program to train Dungeness crab fishers in Washington to sample for HABs.

Trainer has helped write a proposal, to be led by Dr. Misty Peacock of the Northwest Indian College, to test a new dipstick method, produced by the company, Sensoreal, for paralytic shellfish toxin (PST). This test looks very promising for use by ORHAB, Washington shellfish growers, and our Oregon partners. Following the paralytic shellfish poisoning event in Oregon that sickened over 40 people (2 were intubated in the ICU), Trainer obtained contaminated shellfish samples from WDOH for PSTs and is in discussion with the WDOH about possible applications. The analysis of these samples using the Sensoreal kits showed great promise in use for rapid screening. The ultimate goal is to provide a cost-effective, easy-to-use test for all coastal monitoring personnel in WA and OR.

A Lightfish training took place in April 2026 in anticipation of the first PNW HAB Bulletins in Spring 2026 and a successful Lightfish mission was conducted in May 2026. These data were incorporated into the PNW HAB Bulletins.

Trainings/Meetings:

- ORHAB Annual Meeting, 15 January 2026
- Lightfish operational planning meeting, May 2026

MacCready/Hewett

Status: On track

Summary: During this reporting period NANOOS support for MacCready's salary allowed for improvements to the reliability of the LiveOcean model system.

Accomplishments/Successes: MacCready runs the LiveOcean daily forecast model that is used as part of the information for the PNW HAB Bulletin. The model continued to run with high reliability during this period, and post-processing particle tracking results used by managers were produced daily. In this period we made several improvements to the LiveOcean system. These are detailed later in the section: Modeling & Analysis Subsystem/WA & OR ESTUARIES & COAST MODELS. MacCready is training Hewett to assume responsibility for the daily forecasts when he retires in August 2026. Effective 1 Sept 2026, Hewett will assume the role of PI.

Problems/Delays: None

Litle

Status: On Track

Summary: The SoundToxins program continues to provide support for phytoplankton monitoring throughout Washington's marine waters.

Accomplishments/Successes: For this reporting period we received 66 emails alerting to the presence of harmful algal bloom species, of which 35 of the alerts were passed on to the Washington State Department of Health (WDOH) as part of the phytoplankton cell presence alert system. In particular, our network reported the presence of *Alexandrium* in early June in south Hood Canal, alerting us to the beginning of the unusual bloom event that led to the ongoing shellfish harvest closures throughout Hood Canal. This event was unusual as this area does not frequently have problems with paralytic shellfish poison aside from the unprecedented *Alexandrium* bloom in 2015. Our network responded to requests from WDOH to get additional samples along Hood Canal to help track the progress of the bloom.

We onboarded two new sites at the beginning of the year in Grays Harbor partnering with the Willapa-Grays Harbor Oyster Growers Association.

In February we held our annual training and meeting, which consisted of 2 short virtual refresher training sessions and 2 full in-person days. The in-person training event included live cultures of harmful algae for study, a field trip to visit the Public Health Lab, and a series of research presentations. We also celebrated the 20th year anniversary of the program.

SoundToxins was represented in formal science presentations at the ORHAB Annual Meeting, the Washington Sea Grant Shellfish Growers Conference, and the OASeS Symposium.

We also shared data at the PSEMP Marine Waters Work Group Marine Conditions Updates Meetings in January and March. We contributed to outreach and education through participation in Hama Hama Oyster Rama and the Tulalip Earth Day celebration.

Problems/Delays: None.

Kavanaugh

Status: On track

Summary: We have transitioned to Year 5 of the Cooperative Fisheries Plankton Research project to target Harmful Algal Bloom (HAB) forming plankton taxa, in particular the domoic-acid producing species *Pseudo-nitzschia* sp (P/N), and as of 2024, the saxitoxin producing species *Alexandrium* sp in response to a Paralytic Shellfish Poisoning (PSP) event on the Oregon Coast. Commercial fishermen, including charter boats, as well as recreational fishermen, have been trained to collect seawater samples which are preserved and/or frozen for analyses in the lab. In the lab, we utilize imaging flow cytometry to rapidly assess plankton community composition, *Alexandrium* sp and P/N abundance, dominant P/N morphology (thick, thin), and environmental correlates. Procedures to collect filter and whole seawater samples for ELISA Domoic Acid analysis were implemented during the 2025 sampling season, and continue to be utilized during the 2026 sampling season. A regular exchange of new sampling kits and collected samples was tested, and successfully implemented at a central location, Hatfield Marine Science Center in Newport, Oregon, and an additional station was established at Pacific Seafoods in Newport, Oregon. Another kit exchange station was established at the Oregon State University Port Orford Field Station in Port Orford, Oregon for the 2025 season, but may not be utilized for the 2026 sampling season. The project funds graduate student stipend (for project coordination), technician time (to assist with running and annotating samples), and hourly undergraduate assistants.

Accomplishments/Successes: For each sampling season so far since the pilot project in 2022, 150-200 samples on average have been collected and processed within the Cooperative Fisheries Plankton Research (CFR) project, yielding a total of over 800 new observations as of 2025. It is estimated that the project will have more than 1000 total observations by the end of the 2026 sampling season.

For the 2025 sampling season, Lab Manager Kelly George trained new Graduate Student Taylor Wood on all aspects of managing the CFR project, including fishermen/sample coordination, sampling kit station establishment and maintenance, and outreach related to the project. One of Wood's goals for 2025 was to encourage stronger fishermen participation, yielding a higher-than-average volume of sample collections and observations for the 2025 sampling season, and that goal was accomplished with great success. The project had 7 participating fishermen for the 2025 sampling season, including a combination of new and returning fishers. Wood and George successfully maintained three sample kit stations at Hatfield Marine Science Center (HMSC), Pacific Seafoods in Newport, Oregon, and at the OSU Port Orford Field Station in Port Orford, OR. The Pacific Seafoods station was established in direct response to feedback from participating fishers. This location provides greater convenience to some participating fishers, and successfully encouraged some fishers to return to the project after taking a couple of years off from sampling. Sampling during the 2025 season was relatively consistent and steady in the Newport area, partially due to the implementation of the secondary sampling kit station. An additional fishermen sampling kit station, located in Port Orford, OR, was maintained June- September of 2025. This location was selected with the assistance of Tom Calvanese and Caroline Rice with Oregon State University. Sampling started through ODFW and OSU partnerships, and Calvanese and Rice leveraged community connections to recruit new commercial fishing participants. The secondary station at Port Orford allowed for regular sample collection by the ODFW Marine Reserves team during their Redfish Rocks Marine Reserve surveys. Although connections were established with several other prospective participants, ultimately one commercial fisher contributed water samples. Broader

participation was hindered by ongoing Port construction and operational transition at the OSU Field Station.

For the 2026 sampling season, George and Wood successfully re-established the two Newport-based sample kit stations at HMSC and Pacific Seafoods. The Port Orford Field Station fisher sample kit site was not re-established for the 2026 sampling season due to access and Seascope Ecology Lab personnel limitations, in combination with the minimal fisher participation. Sampling from the Newport-based fishers started slow for the 2026 season, due primarily to the environmental conditions on the Oregon Coast. Participating fishers consist almost entirely of returning fishers from previous years. Historically, these fishers have started sampling consistently in early June of each sampling season, but most were delayed in beginning their operations until late June or early July due to unsafe and/or unfavorable weather conditions on the Oregon Coast. We have contacted participating fishers, and they are eager to increase sampling frequency now that ocean conditions are beginning to be more favorable. We anticipate consistent sampling during the remainder of the 2026 season, as long as the coastal conditions remain safe and favorable. In the 2026 sampling season, the project team goals are to focus on incorporating recent project feedback, retain previous project participants, improve upon existing workflows to increase sample processing efficiency, and expand participation to include 1-2 new Newport-based fishers.

The CFR more closely monitored saxitoxin-producing *Alexandrium* sp. during the 2025 sampling season in response to the Paralytic Shellfish Poisoning (PSP) outbreak during the Summer of 2024, and will continue with *Alexandrium* sp. monitoring during the current sampling season (2026) and likely all CFR project iterations going forward. In 2024, CFR personnel conducted beach sampling at six beach locations on the Oregon coast as a direct action to assist Oregon Department of Fish and Wildlife (ODFW) in monitoring the PSP outbreak on the Oregon Coast that summer. These locations were: Roads End State Recreation Site and Nelscott Beach in Lincoln City, Gleneden Beach and Moolack Beach in Lincoln County, Fogarty Creek State Recreation Area in Depoe Bay, and Agate Beach State Recreation Site in Newport, Oregon. At each site, environmental data including salinity and temperature were recorded, and seawater samples were collected. Seawater samples included whole seawater, as well as concentrated seawater samples that were collected using a plankton net. Samples were then analyzed for *Alexandrium* sp. and *Pseudo-nitzschia* sp. counts using imaging flow cytometry, which were then shared with ODFW to help inform management decisions regarding the PSP outbreak. *Alexandrium* sp. was detected in some fisher-collected CFR samples during the 2025 sampling season, prompting CFR personnel to work towards streamlining sampling workflows in order to share that data with the appropriate state departments as soon as possible. No new beach sampling responses were needed during the 2025 sampling season, but CFR personnel remain prepared to conduct increased beach sampling efforts to assist ODFW in detecting *Alexandrium* sp. abundance if needed in the event of another *Alexandrium* sp. bloom.

In 2024, George and former undergraduate assistant Amanda Kent increased outreach for this project by establishing a monthly newsletter that is sent out to all sample-collecting participants of the project, as well as any other interested parties. The newsletter included three to four different topics each month, such as: updates on how the samples they have collected are being processed, information about the taxa being detected in the samples, educational information related to Harmful Algal Bloom (HAB) forming taxa such as *Alexandrium* sp. that caused recent shellfish closures on the Oregon Coast, sampling calls-to-action during HAB events, and more. In 2025, Wood continued production of the project newsletter to keep participants and interested parties up to date. We plan to continue the production of these newsletters on a monthly basis during the 2026 sampling season.

Wood and George have developed protocols to overcome the challenges of coordinating Domoic Acid sampling that have been faced in previous years of the CFR project. Previously, subsamples of whole seawater were reserved in a frozen archive for later Domoic Acid processing.

There were challenges in finding accessible Domoic Acid testing kits that were compatible with whole seawater samples rather than filter samples for particulate Domoic Acid (pDA). In 2024, George and Kent successfully sourced Domoic Acid ELISA kits that were compatible with whole seawater samples, and efficiently processed a large subset of DA samples dating back to the 2022 sampling season. This eliminated the large backlog of DA samples, and set the project up for success in the 2025 sampling season. In addition to saving whole seawater subsamples for tDA analysis, for the duration of the 2025 season, Wood aimed to filter seawater to collect pDA within 24-48 hours of fishermen collection, and preserved the filter samples in a -80 freezer for later ELISA analysis. Due to the distance between the main lab in Corvallis and the station in Port Orford, the fast 24-48 hour turnaround time between sample collection and filtering for pDA was not always possible for CFR personnel to accomplish. In response to this challenge, personnel at the Port Orford station volunteered to assist with filtering incoming samples for pDA, and measuring the salinity of those samples. The method of using filter pDA samples for ELISA testing is more reliable than using whole seawater for ELISA testing, so it was projected that the 2025 sampling season will yield a robust dataset of Domoic Acid concentration to analyze alongside imaging flow cytometry and environmental data once the pDA samples have all been processed. ELISA sample processing for the 2025 samples is still underway, and we continue to collect whole seawater samples to analyze tDA as well as filter samples to analyze pDA for the 2026 sampling season.

Challenges/Delays: Fisher sample collection for the 2026 season experienced slight delays due to unsafe and unfavorable ocean conditions on the Oregon coast during much of June, preventing our fisher participants from conducting their usual operations. Fisher safety and ability to conduct their normal operations is our top priority, and their communication about these challenges has been integral for our understanding of any sampling delays. With coastal conditions improving, sampling has been increasing as of early July 2026. One challenge has been the coordination of filtering seawater samples for pDA within the ideal 24-48 hour window due to the distance between the sample kit stations and the main lab in Corvallis, OR. Filtering stations have been set up in the secondary lab in Newport to help alleviate this challenge, but personnel aren't always able to travel to the secondary lab within that 24-48 hour timeframe. pDA filter samples were still collected from all sample kits, regardless of whether or not the 24-48 hour window had passed during the 2025 season. We are currently using the pDA samples that were filtered more than 48 hours after fishermen collection to assess their viability for ELISA analysis, and determine how imperative the 24-48 hour timeframe is. Implementing an efficient workflow to process the pDA samples within a short timeframe after they have been collected has been a challenge, as there were delays in training for ELISA pDA analysis methods. We anticipated that the completion of ELISA analysis training would yield a more efficient DA workflow for the 2026 sampling season, but new challenges have come to light with this process. Due to the high salt content in the samples, determining the appropriate dilution ratio to show accurate presence and magnitude of DA in our samples has been a longer, more complicated process than anticipated. Through collaborative work with Dr. Vera Trainer's lab, the project team is actively working to help overcome ELISA tDA analysis challenges associated with high salt content in whole water samples. An additional challenge is keeping samples cool and well-preserved when participants are at sea for several days at a time on commercial fishing trips.

Bolm

Status: On Track

Summary: During this reporting period, Bolm successfully led the Oregon portion of the autonomous surface vehicle (ASV) Lightfish pilot training, completed two successful ASV deployments, and implemented several improvements to deployment efficiencies. The Lightfish deployments collect water samples to monitor for harmful algal blooms (HABs), targeting Heceta Bank, a known HAB retention zone located nearshore between Newport and Florence on the central Oregon coast. The

two-day pilot training was held at the Hatfield Marine Science Center (HMSC) in Newport, Or, with seven of eight Oregon-based participants attending in person. To prepare for the training and upcoming field season, improvements were made to the Lightfish trailer and deployment “go-bag” to streamline field operations and increase deployment efficiency. During the 2026 spring Bulletin season, Bolm coordinated and piloted two successful Lightfish deployments to collect phytoplankton and HAB samples across Heceta Bank. Grant funds supported personnel time and effort, the purchase of supplies to improve Lightfish deployment efficiency, acquisition of domoic acid test kits, and refreshments provided during the volunteer pilot training.

Although not supported by this award, Bolm co-taught a four-week continuing education class, *Introduction to Marine Phytoplankton*, at Oregon Coast Community College in April and May alongside newly trained Lightfish pilots and regional phytoplankton taxonomic experts. The course complemented the project’s objectives by providing regional training in phytoplankton identification, increasing public awareness, and strengthening local partnerships supporting Oregon’s HAB monitoring efforts.

Accomplishments/Successes: The April 2026 Lightfish pilot training was highly successful and substantially expanded local capacity to support future ASV operations. All seven newly trained Oregon pilots received hands-on operational experience during the training and subsequently participated in at least one of the two spring deployments, reinforcing their training through real-world field operations. The April and May ASV deployments successfully characterized the nearshore phytoplankton community within Heceta Bank during the spring HAB monitoring season. Together, the deployments sampled 16 unique stations spanning approximately 30 miles of the central Oregon coast between Newport and Florence, providing valuable observations from a region known to retain HAB populations. Operational improvements made to the Lightfish trailer, deployment equipment, and field procedures also increased deployment efficiency and better prepared for future sampling efforts. Improvements include, hands-free headsets for pilot communication, hooks and drawers in the trailer for organization, a cradle to safely store the top solar panel, and tools.

Problems/Delays: Following the first ASV deployment, a mechanical failure was identified that prevented the upper solar panel from charging the vehicle’s battery. SeaSats sent an engineer to replace the failed component, perform a comprehensive inspection of the vehicle, and install a second bilge pump as an additional reliability improvement. Although the repairs were successful, a planned deployment coincided with the maintenance period. By the time the vehicle was operational again, weather conditions had deteriorated beyond operable limits, resulting in the cancellation of one scheduled deployment.

Newton

Status: On Track

Summary: During this reporting period, Newton oversaw all aspects of the NANOOS HABON effort. This included attending ORHAB meetings and discussing progress with each of the HABON PIs in Washington and Oregon. She coordinated with Tanner (UW, NANOOS web) to assure that all PNW HAB Bulletin and other HAB content matched the needs of the community. We are designing new content for the web, based on new infographics and pulling in content from other HABON PIs.

Accomplishments/Successes: Additional PNW HAB observing needs are being addressed through NANOOS’ IRA work and are actively being coordinated with this core work.

Problems/Delays: None

ESTUARIES

Maintain multidisciplinary observational capabilities in PNW estuaries and the nearshore, in coordination with local and regional programs: Sustain observing ability to aid sustainable resource management, water quality assessment, and sub-regional climate change evaluation.

Puget Sound, WA, Profiling Buoys:

- *Maintain 6 Puget Sound estuarine profiling moorings at existing levels [Travis]*
- *Deliver data via NVS [Travis]*
- *Bring all data QA/QC to meet Certification standards [Travis]*

Status: On track

Summary: Work to maintain Puget Sound Profiling Buoys continued, including regular maintenance conducted at each of six buoy sites. Buoy maintenance includes instrument package swaps, winch repairs, and electrical and mechanical maintenance.

All Puget Sound Profiling buoy data products can be found on the team ERDDAP server (found here: <https://nwem.apl.washington.edu/erddap>) and are utilized for providing streamlined product creation into a uniform workflow. Puget Sound profiling buoy data is also delivered to NVS and has been made available to NDBC via the NANOOS ERDDAP server.

Accomplishments/Successes: Multiple successful maintenance operations and continued troubleshooting to identify root causes of rapid failure modes. The aging ORCA buoy at Hansville was recovered and replaced with a recently redesigned ORCA2.0 mooring. This is the second of the ORCA buoy upgrades to the redesigned ORCA2.0 design. The replacement has made the mooring safer, as old anchor lines were reaching the end of their useful life, and the new mooring design provides for a better platform for field teams to safely and efficiently perform operations. The ORCA mooring at Hoodspoint has been serviced and had an ADCP installed, transmitting profiles of water velocity in real-time. The new design uses a new buoyancy-driven float system for profiling, and also uses an updated controller system for more robust and consistent data transmission. The Se'lhaem buoy in Bellingham Bay has been redeployed, and is sampling and transmitting data in real time.

Problems/Delays: Continued profiling downtime was experienced due to aging systems and external factors, such as poor weather, preventing service visits to the buoys. ORCA2.0 buoyancy float software has required significant attention to bring to more regular operational status, but improvements continue. Reduced inventory of functional floats has required more in-field maintenance and cleanings, reducing overall data quality. Supply chain issues, including long lead times on ordering replacement parts, has slowed the regular maintenance schedule. This includes delayed delivery of buoyancy floats, affecting field swaps of floats.

Puget Sound, WA, US-Canada ferry-box:

- *Maintain the US-Canada ferry-box despite challenges as ferry companies work to regain profitability with Canadian tourism having sharply dropped. [Krembs]*
- *Deliver data via NVS as data interface becomes available [Krembs]*
- *Ensure all data meets QA/QC Certification standards after successful fine tuning of the system. [Krembs]*

Status: No progress has been made in moving the en route ferry box system from testing into full operational status.

Summary: See section Problems/Delays

Accomplishments/Successes: None

Problems/Delays: Although all initial installations were completed successfully—and the system operated in autonomous test mode between Seattle and Victoria—no additional improvements have been possible. This is due to limited access to the vessel, and difficulty scheduling time with engineers while the vessel is in port.

The Victoria Clipper has generally been supportive in allowing the use of their vessel for installations; however, increasing coordination challenges and commitments of their engineers have prevented us from gaining the access needed to move forward. Despite multiple attempts and repeated communication from our team to secure time to address outstanding issues on the vessel,

we have fallen short and were unable to proceed with critical work. This includes resolving GPS signal strength issues by relocating the antenna to the bridge and installing new cable runs. Reliable access to the Victoria Clipper—despite carefully crafted communications and reminders—has become increasingly difficult. The lack of ship access remains unresolved and is a major impediment to progress.

Ferry-based monitoring - Washington State ferries (WSF)

Sponsor: Washington State Dept of Ecology

Jim Thomson, Applied Physics Laboratory, University of Washington,

Status: No new updates

Summary: ADCP data collection has continued as planned onboard WSDOT ferries operating between Port Townsend and Coupeville, WA extending a record that now spans over 11 years. Observations are made available via HTTP server links on the Ferries for Science webpage with long-term average profiles archived within UW ResearchWorks digital repository in native RDI format (<https://hdl.handle.net/1773/53826>).

Accomplishments/Successes: The team is in process of updating the Ferries for Science webpage and met with a representative from WSDOT Ferries in June 2026 to discuss producing new outreach materials that WSDOT may use to amplify the project.

Problems/Delays: Intermittent issues with parsing ship navigation data and ADCP current profiles continues in telemetered data, but raw files stored within the onboard instruments contain the full suite of measurements. We are working to improve data accessibility and integration within NVS, but IT challenges continue to slow progress. We plan to address these issues in the coming year.

Columbia River Estuary, OR, Moorings:

- *Maintain CMOP estuarine moorings at existing levels [Gradoville]*
- *Deliver data via NVS [Gradoville]*
- *Bring all data QA/QC to meet Certification standards [Gradoville]*

Status: On track

Summary: CRITFC continued to maintain NANOOS-supported stations in the Columbia River estuary. The Tongue Point (SATURN-04) pier-based, pumped station collected real-time data at both levels, with short data gaps due to pump, flow meter, and/or mooring issues. The US Job Corps center, on whose pier the station is located, initiated new security procedures limiting CRITFC access to SATURN-04 for a short time, but this issue has been resolved. Data collection at the Point Adams (SATURN-03) pier-based station was paused in November 2025 after CRITFC staff were asked to remove instrumentation since the Point Adams Fish Packing plant, on whose pier the station was located, was being sold. CRITFC staff are tracking this situation and will attempt to contact new owners as soon as a sale is finalized. In the interim, staff planned and tested possible station replacement options, including designing and testing a simplified prototype station replacement buoy, analyzing available datasets to determine suitable replacement buoy locations, seeking funding for replacement buoy initialization costs, and discussing a possible new land-based station with local landowners. CRITFC staff also collaborated with NANOOS PI Maria Kavanaugh to test deploy an Imaging Flow Cytobot at the CMOP Field Office using water collected from SATURN-03 and SATURN-04 sites (funded externally). The Baker Bay (SATURN-07) buoy is currently on station and is scheduled for refurbishment; recovery is pending. The Youngs Bay (SATURN-09) buoy was recovered in January 2025 and is expected to be refurbished and re-deployed in spring 2027. Refurbishment of this buoy has been delayed in part due to limited working space during construction of the new CMOP Field Office, which is expected to be completed in summer 2026. The Cathlamet Bay (CBNC3) buoy was deployed on January 23, 2026 and remains on station. All stations except for CBNC3 (Cathlamet Bay) are real-time, and data are displayed on NVS. Data are subject to QA/QC, which is included in data submitted to NCEI via

NANOOS and to the recently deployed ERDDAP server. The transition of CMOP data management servers to new hardware and operating systems is still in progress. CRITFC staff worked toward finalizing all QC of historical datasets from core estuary moorings and facilitated the delivery of historical data to external research groups. Additionally, a CRITFC staff member was trained and certified as an instructor for the OSU Motorboat Operator Training Certification Course, to support training other CRITFC staff and community members in motorboat safety.

Accomplishments/Successes: Tongue Point maintained, CBNC3 deployed, Point Adams replacement options investigated, IFCB test deployed, historical dataset QC finalization progressed, CRITFC staff became MOTC instructor.

Problems/Delays: Temporary buoy refurbishment delays due to Field Office construction and loss of the Point Adams site; both are being actively managed.

South Slough/Coos Bay, OR, Moorings:

- *Maintain South Slough/Coos Bay estuarine moorings for the NERRS at existing levels [Helms/DeMarzo]*
- *Deliver data via NVS [Helms/DeMarzo]*
- *Bring all data QA/QC to meet Certification standards [Helms/DeMarzo]*

Status: On track

Summary: South Slough Reserve continued data collection for a network of moored estuarine water quality observing stations as part of the NERRS System-Wide Monitoring Program with additional NANOOS support. Four real-time water quality stations in the South Slough estuary measured continuous water temperature, salinity, dissolved oxygen, pH, turbidity, and water level every 15 minutes over the period 1/01/26 – 6/30/26. Tom's Creek weather station provided real-time measurements of air temperature, relative humidity, barometric pressure, and wind speed/direction. The weather sensors were swapped out for calibrated sensors for annual maintenance June 2026. In May, the satellite transmitters were disconnected from Tom's Creek, Winchester Creek, and North Spit-BLM stations due to NOAA ending support for older Certification Standard 1 transmitters and they were replaced with compliant ones (CS2). Telemetry functions operated continuously for the Elliot Creek water quality stations and Tom's Creek weather platform once transmitters were replaced in May/June. Water quality data collection was completed at the Charleston Bridge and Valino Island stations, but telemetry transmissions were unavailable in preparation for piling installations due to aged wood infrastructure and biofouling issues. During November 24-26, 2025, two steel pilings were installed at the Charleston Bridge and Valino Island water quality stations by Oregon Marine Construction. Water quality instruments will be deployed simultaneously at the old and new piling locations to satisfy NERRS requirements for moving long-term stations. Progress was made on acquiring Storm 3 telemetry systems and assembling components for installation at the new pilings later in the summer at Charleston Bridge and Valino Island stations. In collaboration with the Confederated Tribes of the Coos, Lower Umpqua and Siuslaw Indians (CTCLUSI), SSNERR maintains telemetry for the North Spit BLM water quality station, located in the lower Coos estuary. The North Spit station resumed data collection and transmission February - May 2026 but is offline as of 5/29/26 due to an out of date transmitter, but SSNERR will assist CTCLUSI with installation when a new transmitter is acquired to resume data collection. Monthly sonde instrument exchanges, maintenance, and data management for all South Slough sites were completed following NOAA NERRS Centralized Data Management Office protocols.

Accomplishments/Successes: Water quality and meteorological time-series data were integrated into collaborative research and education programs at the Reserve. A NERRS wide data synthesis project to understand trends and drivers of change in hypoxia and eutrophication across Reserve sites was completed with manuscript accepted to Nature, Communications Earth & Environment July 2026. The Reserve's 2024-2026 Margaret Davidson fellow is utilizing water quality data near green crab monitoring sites to understand trophic relationships and diets of wild crabs. A University

of Oregon graduate student is researching sediment dynamics in kelp forests and has accessed meteorological and water quality data, including turbidity and TSS. The Reserve education and science program accessed water quality datasets for hosting Teacher on the Estuary Workshops in June 2026.

Problems/Delays: The Charleston Bridge and Valino Island water quality pilings were replaced at the end of November 2025 and staff are planning for instrument deployment overlaps at the two stations once two sonde instrument packages are acquired. Data collection is continuing in the meantime at the original piling locations.

BEACHES AND SHORELINES

Maintain core elements of beach and shoreline observing: Measure nearshore bathymetry, topographic beach profiles, and shoreline morphodynamics along OR and WA, contributing to hazard mitigation by providing essential observations and better decision support tools for coastal managers, planners, and engineers.

Washington Beach and Shoreline:

- *Maintain shoreline observations in WA at existing levels [Kaminsky]*
- *Deliver data via NVS [Kaminsky]*
- *Bring all data QA/QC to meet Certification standards [Kaminsky]*

Status: Complete for the season

Summary: NANOOS funds contribute to the Washington State Department of Ecology Coastal Monitoring & Analysis Program (CMAP) under technical direction by G. Kaminsky. This progress report summarizes the work completed during the reporting period under the interagency agreement to monitor Pacific Coast shorelines within the Columbia River littoral cell and South Beach near Kalaloch. Additionally, it highlights supplementary work made possible by leveraging other state and federal funding sources to enhance and expand CMAP's baseline monitoring efforts. These supplementary efforts build on shoreline monitoring data by delivering technical support to vulnerable coastal communities, monitoring additional sites, and advancing research on nature-based shoreline protection, further amplifying the impacts of NANOOS-funded work.

During this reporting period, the CMAP team completed winter and spring seasonal beach monitoring surveys in southwest Washington and northwest Oregon, including the beaches of Long Beach, Grayland Plains, North Beach, and Clatsop Plains, which make up the Columbia River littoral cell (CRLC). In February-March, CMAP collected 83 winter beach profiles, 5 surface maps, and 63 sediment samples, and in June, CMAP collected 65 spring beach profiles and 3 surface maps along 135 km (84 mi) of the CRLC ocean beach shoreline. Seasonal beach profile data and contour change plots for the CRLC are made available through the NANOOS Visualization System: [Beach and Shoreline Changes portal](#). The portal is updated with data through this winter 2026.

The CMAP team continues to monitor active and planned dynamic revetments along Washington's Pacific Ocean coast at Westport, North Cove, Graveyard Spit, Benson Beach, and Ocean Shores as well as a natural analog at South Beach on the Olympic Peninsula. Our team provides data and monitoring results to these local communities to help inform their maintenance and adaptive management efforts. Results from data collected at beaches on either side of the Columbia River Mouth were presented to the Lower Columbia Solutions Group and the U.S. Army Corps of Engineers in January to inform their practices on the Beneficial Use of Dredged Material. In January, PI Kaminsky provided recommendations to WSDOT for modified design approaches for constructing a more resilient transition between static and dynamic structures at the root of Graveyard Spit. PI Kaminsky presented Graveyard Spit morphology monitoring results at the first annual meeting on June 24th.

PI Kaminsky coordinated with Webcam Coastal Observation System (WebCOOS) partners on the installation of webcams for monitoring the effect of wave runup on the dynamic revetment

and adjacent unprotected dune at the Westport by the Sea condominiums in Westport, WA. The first camera (facing south) was installed on November 15th, and the second camera (facing north) was installed on April 17th. Two cameras were installed at Oyhut Bay in Ocean Shores on January 14th: One camera faces east along a cobble berm, and one camera faces west along a predominantly unprotected shoreline experiencing retreat. The CMAP team collected Ground Control Points (GCPs) for the Oyhut cameras on March 23rd and on June 2nd for the Westport cameras.

PI Kaminsky participated in the IOOS Water Level Workshop (April 14-16, 2026) as the NANOOS representative. The workshop was designed to increase familiarity across water level coordinators and projects between IOOS Regional Associations, increase familiarity with vision for water level sensing in each region, and identify specific challenges for regional water level sensing networks.

The CMAP team has been working on a data release with NANOOS and DOGAMI to provide beach profile data on the NOAA National Centers for Environmental Information (NCEI) website. We are in the process of preparing standard data formats and metadata.

Accomplishments/Successes: Data collected by the CMAP team continues to be used by the U.S. Army Corps of Engineers and various engineering consultants (e.g., Mott MacDonald at Oyhut Bay, Moffatt and Nichol at North Cove, and Blue Coast LLC at Westport) to assess local and regional coastal changes on Washington beaches, particularly at locations with dynamic revetments. Our expanded team of coastal engineers provides ongoing technical assistance to local communities like Westport by the Sea, North Cove, and Ocean Shores, as well as shoreline planners at Ecology in the review and evaluation of shoreline development projects along Washington's shorelines.

Profile and contour change data from a new site, South Beach near Kalaloch, WA, was added to the NVS. We are on track to be able to add data from additional sites in the coming year. Increased capacity from hiring and training new staff has enabled us to better keep up with data processing from seasonal collection efforts. We are still working to finalize past datasets to get them ready for the data release, but the backlog is not growing.

Problems/Delays: We continue to have a backlog of sediment samples to process, but significant progress has been made.

Oregon Beach and Shoreline:

- *Maintain shoreline observations in OR at existing levels [Allan]*
- *Deliver data via NVS [Allan]*
- *Bring all data QA/QC to meet Certification standards [Allan]*

Status: Complete for the season

Summary: The Oregon Beach and Shoreline Mapping Analysis Program (OBSMAP) efforts are led by J. Allan and his team at the Oregon Department of Geology and Mineral Industries (DOGAMI). Beach profile data – late winter surveys – were successfully collected in the Rockaway littoral cell (25 sites), along the Clatsop Plains (6 sites), and along the Neskowin cell (15 sites). Winter surveys were undertaken between March and April, 2026. In addition to measurements of the transects, datum-based shorelines were also collected along each of the study areas. Beach profile and shoreline data have been processed, QA/QC'd, and archived both locally and remotely. The reduced profile plots, change plots, and trends have been posted to the NANOOS beach and shoreline portal.

DOGAMI staff continue to use a terrestrial laser scanner (TLS) to collect additional change information at the Columbia River dynamic revetment and foredune adjacent to the south jetty. These data were recently presented to the Lower Columbia River Solutions group, which is focused on regional sediment management.

DOGAMI staff continue to work with NOAA National Centers for Environmental Information (NCEI) to archive Oregon's long-term OBSMAP seasonal monitoring datasets on the web. The sites

presently under consideration are those in the Neskowin and Rockaway littoral cells and on the Clatsop Plains. DOGAMI is also assisting WA CMAP with their data archiving to ensure there is consistency between both sets of monitoring data. DOGAMI has already completed development of the OBSMAP metadata and recently updated the time series data.

DOGAMI PI Allan also provides assistance to NANOOS UPC. This includes maintaining and updating the long-term WaveWatch III wave and wind anomalies that are updated approximately every 2 months, as well as performing daily updates to the Regional PNW Wave and Wind Forecasts. During this reporting period, PI Allan completely redeveloped the approaches used to download, process and generate the plots used by NANOOS. These changes were instigated due to how these data are now being disseminated by NOAA.

Accomplishments/Successes: Data collected as part of OBSMAP continue to be used by regional coastal managers (e.g., Oregon State Parks, Oregon Department of Land Conservation and Development agency), research students (e.g., work to evaluate dune grading options at various sites on the Oregon Coast) and the public to assess local and regional coastal changes taking place on Oregon beaches. Results from our monitoring are currently being used by an OSU PhD student to explore dune grading activities at several key sites.

Problems/Delays: Equipment failures (ARGO ATV) have delayed our goal of updating our beach change data for Gold Beach (southern Oregon Coast) and Cannon Beach (north coast). These delays are due to challenges in sourcing needed parts from Canada.

Washington and Oregon Bathymetry:

- *Maintain nearshore bathymetric observations of beach and shoreline morphodynamics in WA and OR at existing levels [Ruggiero]*
- *Deliver data via NVS [Ruggiero]*
- *Bring all data QA/QC to meet Certification standards [Ruggiero]*

Status: Complete

Summary: NANOOS funds contribute to P. Ruggiero's lab group at Oregon State University. This progress report summarizes the work completed during the reporting period under the interagency agreement to monitor Pacific Coast shorelines within the Columbia River littoral cell and Newport, OR. Additionally, it highlights supplementary work made possible by leveraging other funding sources to enhance coastal resilience in Cascadia coastal communities. P. Ruggiero's group at Oregon State University completed, via collaborations with the USGS and the Washington Department of Ecology, the processing of nearshore bathymetry data collected in summer 2025 along the four sub-cells of the Columbia River littoral cell (CRLC). Over 220 individual cross-shore profiles were collected during summer 2025 extending from the lower inter-tidal to ~12 m of water depth (~2000 m from the shoreline). Approximately 400 kilometers of nearshore mapping took place within ~6 days of field data collection. These data have been processed from their raw format into deliverable text files and have passed a rigorous quality assurance process bringing the data to certification standards. In all cases these nearshore bathymetry measurements have been combined with topographic measurements collected by Ecology developing complete maps of the nearshore planform. Data through 2025 are now available via Stevens, A.W., Weiner, H.M., Wood, J.M., Ruggiero, P., Kaminsky, G.M., and Gelfenbaum G.R., 2019, Beach topography and nearshore bathymetry of the Columbia River littoral cell, Washington and Oregon (ver. 5.0, June 2025): U.S. Geological Survey data release, <https://doi.org/10.5066/P9W15JX8>.

Accomplishments/successes: These data continue to provide a critical source of information for improving coastal hazard mitigation along the coastlines of the CRLC and for understanding the morphodynamics of high-energy beaches. For example, P. Ruggiero and G. Kaminsky co-authored a paper summarizing and modeling coastal dune evolution along the SW Washington coast that used NANOOS data (Heminway, S., N. Cohn, IJzendoorn, C., **Ruggiero, P.**, Wengrove, M., **Kaminsky, G.**, Weiner, H., 2026. Assessing drivers of alongshore variation in historical coastal dune

evolution: A field and model-based approach, JGR-ES, <https://doi.org/10.1029/2025JF008717>, Figure 1). The new PWC implemented into the Coastal Profiling System in 2025 have been recently improved with hull flush transducers. These system improvements will be implemented during our 2026 field campaign.

Problems/delays: N/A

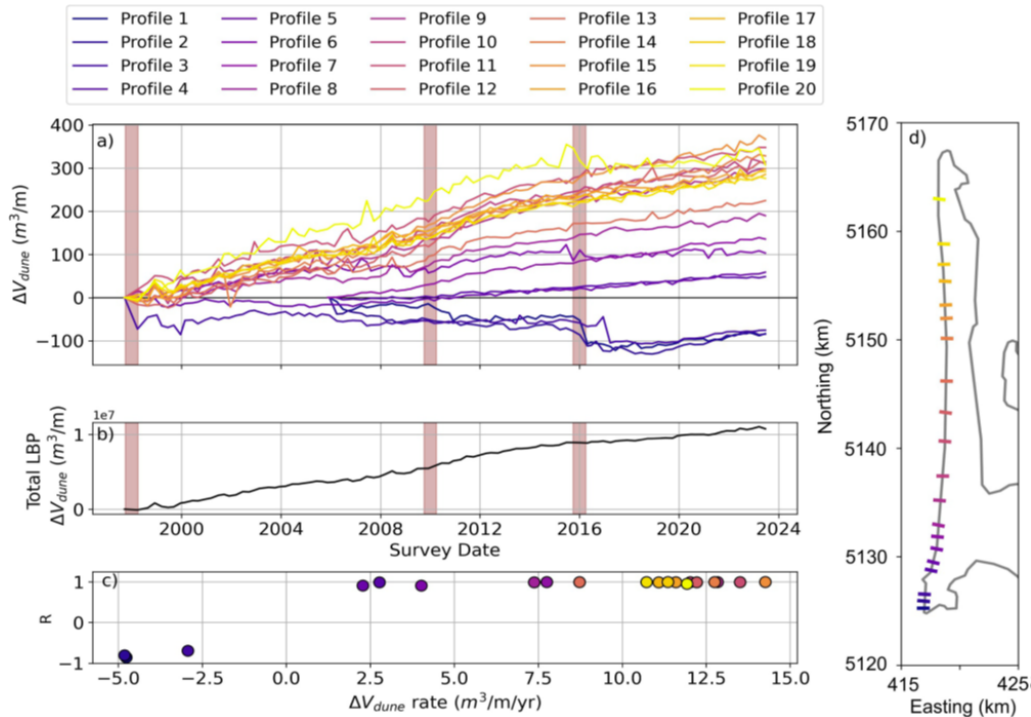


Figure PR. 1. Alongshore variation in dune volume change (ΔV_{dune}) for each profile (a) and total LBP ΔV_{dune} across the whole study area (b). The red shaded areas represent El Niño winters. The correlation coefficient (R) between time and ΔV_{dune} rate is shown in panel c. In this study, we interpret R values of 1 and -1 to represent perfect models of linear dune growth and erosion. The location of each profile is shown in panel d.

B. Modeling & Analysis Subsystem:

WA & OR ESTUARIES & COAST MODELS

Provide sustained support to a community of complementary regional numerical models:

Contribute to the operation of regional models, and the tools and products they support, covering the head of tide of estuaries to the outer edges of the Exclusive Economic Zone (EEZ) in both OR and WA.

NE Pacific and Salish Sea:

- Support, at existing levels, the daily forecast model, LiveOcean, which simulates ocean circulation and biogeochemistry in the Salish Sea and in coastal waters of the NE Pacific, including Oregon, Washington, and British Columbia [MacCready/Hewett]
- Deliver model output via NVS [MacCready/Hewett]
- Model verification and validation [MacCready/Hewett]

Status: On track

Summary: During this reporting period NANOOS support allowed for continued upgrades of the LiveOcean model system. Daily forecasts from the large NE Pacific domain and the nested Willapa Bay-Grays Harbor and South Puget Sound domains were reliably produced during this period and distributed to the public and stakeholders through the NANOOS NVS, the LiveOcean website, and a NANOOS server. Parker MacCready is training Kate Hewett to assume responsibility for the daily forecasts when he retires in August 2026. Effective 1 Sept 2026, Hewett will assume the role of PI.

Accomplishments/Successes: In this period we continued testing and improving the latest version of the model. By adding 50% burial of organic carbon particles that sink to the sediment of the Salish we substantially improved the modeled pCO_2 in the deep water, which is important for our work on ocean acidification and marine carbon dioxide removal. By switching our open ocean boundary conditions from HYCOM to GLORYS we improved the modeled salinity and velocity data on the shelf. We finished a new long hindcast (October 2012 to present, cas7_t1_x11ab) with the improved model. We submitted a new study, Leeson et al. to JGR (in review), quantifying the drivers of low oxygen in terminal inlets in the Salish Sea. This paper also documents many previous model improvements and validation. We transitioned storage assets to Kopah, a secure S3-compatible object storage service for the University of Washington research community. This involves transitioning off the two Linux servers in Parker MacCready's lab, which improves data access for LiveOcean users.

Problems/Delays: None

Columbia River Estuary and Plume:

- *Support, at existing levels, the CRITFC circulation modeling and forecasting system, which covers the Columbia River estuary and plume [Seaton]*
- *Deliver model output via NVS [Seaton]*
- *Model verification and validation [Seaton]*

Status: On track

Summary: CRITFC has maintained an extensive modeling system for the Columbia River coastal margin, denoted Virtual Columbia River (VCR). The VCR has evolved from multi-institutional collaborations involving modelers and non-modelers, in academia and across regional, federal, and tribal agencies. The modeling capabilities of the VCR has assisted the region in the study of salmon life cycle, habitat, estuarine pathways, and status under the Endangered Species Act and in relation to hydropower management and climate change.

Anchoring the system are simulations of circulation, conducted in four distinct forms: (1) daily forecasts, (2) multi-year simulation databases, currently 1999-2018, (3) scenario simulations, and (4) process simulations. Of these, daily forecasts are displayed on NVS. To meet the challenges that the highly energetic and strongly stratified Columbia River estuary and plume pose to numerical models, we have experimented with—and contrasted among—multiple codes (Thetis, SLIM, SELFE and SCHISM) representing different classes of unstructured-grid finite element methods.

Accomplishments/Successes: Maintained forecasts, with forecast overlays provided through CMOP website and NVS. During this reporting period we have continued calibration and evaluation of a new SCHISM model to be used for a new multi-year simulation database and eventual updated forecast. CMOP model data management and visualization servers were upgraded to modern hardware (hardware purchased with non-NANOOS funding) and operating systems. Previous years' pass-through funding supported development of NOAA operational forecast STOPS-3D-Pacific at CMOP. STOPS-3D-Pacific is scheduled to become operational on Aug 7, 2026.

Problems/Delays: CMOP server transition has interrupted display of forecast on NVS. Forecast transfer method will be modernized during this transition to upgrade display on NVS. Restoration of modernized display of forecasts on NVS is waiting on completion of new NVS tile server, expected in Fall 2026.

PNW Coastal Waters:

- Support, at existing levels, the OSU real-time coastal ocean forecast model, which covers the coastal waters off OR and WA [Zaron]
- Deliver model output via NVS [Zaron]
- Model verification and validation [Zaron]

Status: On track

Summary: We continued real-time operation and support of our RTDAOW (Real Time Data Assimilation for Oregon and Washington) system on a daily basis. The data delivery is near-real-time and stable. At this moment we do not anticipate any substantive changes to the project Scope of Work.

Accomplishments/successes: The data assimilation and modeling system continue to provide real-time forecasts to fishers and the public via the NANOOS Visualization System. By pooling funds with other projects, we were able to purchase a new server for conducting data analysis and model diagnostics, and we will be able to transition operations to this server when the current system (which is aging, stuck with out-of-date-software, and shared among other PIs) fails.

Problems/delays: None

FY25 Non-core Task 1: Salish Sea & Columbia River Operational Forecast System v2 (SSCOFS) [Khangaonkar/Yun]

- Add temperature and salinity variables from SCCOFS v1 to NVS
- Build SSCOFSv2 using SCHISM
- Expand the model domain into coastal estuaries and refine lateral resolution
- Conduct skill assessment
- Add biogeochemical forecast capability for Salish Sea region

Status: On track (based on delayed FY 26 start)

Summary: Funds were distributed to UW Principal Investigator (PI) Dr. Tarang Khangaonkar (SSMC), and the subaward to Pacific Northwest National Laboratory (PNNL) for co-PI Su Kyong Yun was successfully executed. However, due to unforeseen delays in getting the approvals and contracts in place, the project kickoff did not occur until January of 2026. In consultation with the project sponsors from IOOS and collaborating partners from NOAA COOPS the priorities for various tasks were reset and the tasks were reordered over the 3-year project duration. To support the timely development of SSCOFSv2 (SSM2.0), SSMC reprioritized Year 1 activities to focus on foundational hydrodynamic model improvements, including transition from the FVCOM framework to the SCHISM modeling system, domain expansion, and vertical and horizontal grid refinement. By consolidating these efforts into a single integrated development phase, the team improved development efficiency and streamlined the eventual transition of SSCOFSv2 to NOAA NOS operations.

As part of this strategic adjustment, the biogeochemical (BGC) model development activities originally scheduled first, were deferred. This re-sequencing enabled project resources to be focused on critical hydrodynamic upgrades necessary to establish a robust platform for future BGC.

We have completed several tasks, including transitioning the Salish Sea Model from the FVCOM modeling framework to SCHISM, expanding the model domain to include key coastal estuaries, and implementing a 25-layer Localized Sigma Coordinate with Shaved Cell (LSC2) vertical grid. Model refinement and calibration were completed for several Pacific Coast estuaries, including the Quillayute River, Grays Harbor, Willapa Bay, Tillamook Bay, and Yaquina Bay. Refinements followed SCHISM grid development standards, allowing accurate representation of steep bathymetric gradients, tidal channels, and flood-prone intertidal areas while maintaining a minimum grid resolution of approximately 25 m. Model calibration and validation were conducted using NOAA National Water Level Observation Network (NWLON) water surface elevation observations from 2017 and evaluated using NOAA standard model skill assessment procedures.

These coastal estuary enhancements provided the foundation for subsequent Columbia River Estuary refinement and floodplain representation efforts, which were completed using hydrologic and observational datasets from 2022 and 2023.

Model skill assessment Task 16 is in progress, presently focused on the Columbia River segment. In addition to water surface elevation data from NOAA and USGS gages along the 146 mile long Lower Columbia River, the acoustic doppler current profiler (ADCP) measurements collected during NOAA surveys in 2022 and 2023 from 23 stations have been incorporated for currents calibration and validation. This ongoing effort is improving the model's ability to represent tidal propagation, riverine circulation, and estuarine exchange processes throughout the Columbia River system. Completion of these hydrodynamic setup and refinement activities will culminate in Task 16, which focuses on comprehensive testing and evaluation of the final integrated SSCOFsv2 (SSM2.0) model configuration. The task is on track based on delayed schedule with a target completion date of December 2026 for Year 1 tasks.

Accomplishments/Successes: SSMC successfully completed the transition of the Salish Sea Model from the FVCOM framework to the SCHISM modeling system. The new SCHISM-based SSM2.0 configuration provides improved computational efficiency, reduced model latency, and enhanced scalability while maintaining NOAA operational skill standards for water level predictions. The upgraded framework enables larger domains, increased vertical resolution, and more efficient operational forecasting.

A major achievement of this effort was the implementation of a 25-layer LSC2 vertical coordinate system that preserves the raw bathymetry and substantially reduces the pressure gradient errors. This advancement allows accurate simulation of highly stratified estuarine and fjord environments while improving representation of intertidal and nearshore processes. Model testing demonstrated that SSM2.0 reproduces water surface levels with skill comparable to the previous operational model, while providing notable improvements in current predictions in regions characterized by steep bathymetry and narrow channels.

The project team also successfully incorporated and calibrated multiple outer coastal estuaries within the expanded domain while maintaining NOAA model Skill Assessment standards at both coastal and Puget Sound water level stations. Flood-prone tidal areas and intertidal wetlands were incorporated into the computational mesh, improving the model's ability to simulate inundation and drainage processes.

In addition, refinement of the Columbia River Estuary and inclusion of tidal floodplain representation have been completed. These capabilities were not fully represented in SSCOFsv1 and are expected to enhance hydrodynamic forecasting spatial coverage in the estuary and lower Columbia River region. Calibration and validation activities for the Columbia River system are continuing, including incorporation of NOAA's National Water Model (NWM) flows and additional observational datasets.

Problems/Delays: Although Year 1 activities were originally planned to begin earlier (July 2025), the signed contracts between UW APL, UW Tacoma, and PNNL were not in place until December 2025. As a result, the Year 1 performance period was revised and extended to December 2026. To mitigate schedule impacts, SSMC reprioritized project activities by focusing first on high-priority hydrodynamic model development tasks required for SSCOFsv2 development. This approach enabled successful completion of the planned foundational model transition, domain expansion, and vertical grid refinement activities despite the delayed project start.

FY25 Non-core Task 2: Advancement of Coupled Ice-Ocean Forecast Capabilities in STOFS-3D-Alaska [Durski]

Status: On Track

Summary: We continue work with OCS-CSDL to develop a three-dimensional coupled ice-ocean forecast system for the coastal waters of Alaska (STOFS-3D-Alaska). This year as part of the task

of continuing to improve the fully two-way coupled CICE(sea ice)/ 3-D SCHISM(ocean) Bering Sea model. This coupling is achieved within the Unified Forecast System framework using the NUOPC interoperability layer. In our analysis of the system performance we discovered issues with the data-atmosphere-ocean model coupling of precipitation in the UFS-coastal app that caused sea at first no snow to form on the sea ice, and later too much snow which led to delayed melting of sea ice. We have led efforts to update the SCHISM coupling module to alleviate these issues and have added coupling of mixed layer depth between the ocean and sea ice module. We have also integrated river and freshwater runoff to the regional Bering Sea model. We are in the process of evaluating both the summer ice-free model performance within UFS and the winter time response with the improvements to the UFS SCHISM coupling interface and exploring parametric sensitivities in hopes of improving model-observation comparisons. We have worked with the UFS NOAA team to ensure that the CICE-standalone (with data-atmosphere through CMEPS) passes all regression tests as well. We are working with NOAA and VIMS also to develop a full Alaska regional model domain that includes the Alaskan Arctic and Gulf of Alaska. Continued collaboration with the UFS-coastal team is ensuring that the model development meshes seamlessly with other components of the coupled modeling framework as we work towards a 3-way coupled version of the model that will include WaveWatchIII.

Accomplishments/Successes: Finished regression testing of coupled CICE-CMEPS, SCHISM-CICEC-CMEPS in UFS. Improved the SCHISM and CICE UFS interfaces ('cap') to more accurately represent surface flux exchange between models correcting precipitation, adding snow and mixed layer depth.

Problems/Delays: None

FY25 Non-core Task 3: Initiate the design of NOS operation model infrastructure to support the development and operations of AI coastal models or hybrid AI-numerical models [Zaron]

Status: On Track.

Summary: We have tested a modern shallow water solver called ForestClaw, which is based on the ClawPack library, on GPU- and CPU-based computers to assess performance and capabilities.

Accomplishments/Successes: We implemented tidal forcing and performed global simulations to verify the solver performance with strongly varying topography (verifying well-balanced numerics), found a bug in the treatment of the Coriolis term, and verified details in the treatment of spherical-polar grids, poles, etc. by the model. We are proceeding with examination of the model's multi-resolution capabilities and wetting/drying representations in a high-resolution simulation.

Problems/Delays: None

C. Data Management and Cyberinfrastructure Subsystem:

DATA MANAGEMENT & CYBERINFRASTRUCTURE (DMAC)

Maintain, harden, and enhance NANOOS' Data Management and Cyberinfrastructure (DMAC) system for routine operational distribution of data and information: Sustain and enhance the DMAC system, including the NANOOS Visualization System (NVS), for dynamic and distributed data access.

Mature Regional DAC Operations:

- *Sustain, refresh, and enhance a highly available, robust, distributed hardware and software environment; maintain appropriate staffing and team coordination; maintain up-to-date operations and system documentation to ensure transparent and clear descriptions of DAC architecture [Tanner]*
- *Sustain & enhance existing data streams, IOOS web services, GTS submission; implement NCEI data archiving, NDBC data archiving, Glider DAC submission, QARTOD; maintain and expand*

ERDDAP to leverage web services, serve NANOOS applications and users; evaluate where new tech (e.g., cloud, AI, etc.) may afford NANOOS better efficiencies and robustness [Travis]

Status: On track

Summary: Continued maintenance and development of BlueHarvest, as needed. BlueHarvest is the internal NANOOS DMAC application for harvesting data from a wide range of data providers. The system is robust and maintains flexibility to accommodate a wide range of data providers/sources. It populates the NANOOS internal database in a standardized way so the data can be easily integrated into the various data products served on NVS. BlueHarvest also provides immediate feedback about data transmission frequency/latency, which enables NANOOS to identify and fix data flow issues more efficiently. All NANOOS gliders transmit their data to the Glider DAC. All NANOOS HFR transmit their data to the HFR DAC. All NANOOS-funded buoys/moorings and dock/land-based stations are visible in the NANOOS ERDDAP. Relevant data is harvested by NDBC to ensure availability for GTS ingestion.

Accomplishments/Success: Consistent, reliable data harvesting. Created new harvester for Ocean Networks Canada (ONC) platforms. Updated OSU Yaquina harvester, added harvester for OCNMS Landers. Maintained existing data streams.

Problems/Delays: None

NVS Support and Development:

- *Maintain NVS support leveraging regional user needs, feedback, and data reviews to continually improve the relevance and quality of metadata for observing and modeling data assets integrated and served by NANOOS [Tanner, Wold]*
- *Engage new local providers (not NANOOS funded), integrate their data into NVS and IOOS DMAC services; strengthen DAC capabilities and resources through regional and thematic partnerships [Tanner, Travis]*

Status: On track

Summary: Added MOCI Index for Oregon to NVS Averages and Anomalies App. Updated Oregon communities and brochure links in TsunamiEvac NVS app. Created Autonomous Vehicles App - V2. Created Transect Tool. Added WMO Code and WMO Code URL to NVS platforms. Updated Washington shape files for Tsunami Evacuation app. Restored previous HFR overlays to NVS line.

Accomplishments/Success: Updates to apps, new transect tool.

Problems/Delays: None

Engagement in National and Cross-regional DMAC Efforts:

- *Sustain participation in IOOS DMAC community activities, including QARTOD development, semantic mapping, OGC WMS/WFS support, climatology data development, UGRID support, and shared code development and testing [Tanner, Travis, Carini]*
- *Extend to other areas via pan regional products with sister IOOS RAs; engage and leverage NSF-funded OOI, international GOA-ON activities, and Canadian collaborations; engage with other West Coast and Pacific efforts, including WCGA and IPACOA [Tanner, Carini]*

Status: On track

Summary: Travis attended IOOS DMAC webinars. The DMAC team regularly participates in national DMAC efforts. Travis attended the IOOS DMAC annual meeting in person, with remote attendance by Carini, and Tanner. Continued working with Ocean Networks Canada (ONC) to understand their data workflow and services. Developed new BlueHarvest harvesters to download and process data from ONC time-series and profile data streams.

Accomplishments/Successes: Continued development of capabilities to harvest time-series and profile data from ONC services.

Problems/Delays: None

FY25 Non-core Task 4: For IOOS sponsorship for OceanHackWeek [Lee, Wu-Jung]

Status: Complete

Summary: OceanHackWeek 2025 (OHW25) was held on 18-22 August 2025 at the UW School of Fisheries and Aquatic Sciences. The event was attended by 6 organizers, 4 “fellows,” and 29 participants.

Accomplishments/Successes: OHW25 engaged participants ranging from undergraduate, graduate, postdocs, to early career scientists, who jointly developed a total of 7 group “hack” projects hosted on the OHW GitHub organization (<https://github.com/oceanhackweek>). The fellows were engaged in the event organization process from early on and functioned as project mentors and helpers throughout the event.

Problems/Delays: None

FY25 Non-core Task 5: For support of OceanHackWeek-style events in 2025 and 2026 [Lee, Wu-Jung]

Status: On track

Summary: A portion of Task 5 funds were used to support participant and organizer travel to OHW25. See Task 4 for details. The remaining funds will be used to support registration fees for US participants to join OceanHackWeek 2026, which will take place on August 24-28, 2026 at the Bamfield Marine Sciences Centre in British Columbia, Canada.

Accomplishments/Successes: See Task 4

Problems/Delays: None

D. Engagement Subsystem:

EDUCATION & OUTREACH (E&O)

Sustain and expand NANOOS engagement to the extent possible: Continue ongoing engagement with stakeholders and the public, increasing ocean awareness and literacy; to expand the ocean and coastal workforce; to improve our ability to provide relevant ocean and coastal data and information to communities; and to facilitate use of NANOOS products for societal objectives, the core task for which NANOOS exists.

USER PRODUCTS COMMITTEE (UPC)

Continue to deliver existing and, to the extent possible, create innovative and transformative user-defined products and services for PNW stakeholders: Continue our NVS innovation to succeed in this vital translation for meaningful and informative data products that address user needs and serve society.

Communication:

- *Maintain up-to-date success stories, employing effective use of social media and newsletters [Wold, Newton]*
- *Support national communication through IOOS Program Office and IOOS Association collaborations [Wold, Newton]*
- *Be responsive to regional and local events (e.g., harmful algal blooms, fish kills, marine heat waves, hypoxia, floods, etc.) to enhance relevance to public and highlight regional stories with NANOOS members and partners [Wold, Newton]*
- *Maintain existing and build new relationships to stakeholder user groups and the education community enabling NANOOS to achieve effective education and outreach [Wold, Newton]*

Status: On track

Summary: During this reporting period, NANOOS staff engaged with end users and educational partners (fishers and boaters in Washington and Oregon, Sound Waters Stewards, National Harbor

Safety committees, OASes, Technology Access Foundation), mentored 10th graders at the Maritime High School, mentored an undergraduate UW Earthlab intern working with lesson plans that bring NVS data into the classroom, maintained content on social media, newsletters, website slideshow, etc., and regularly participated in IOOS Outreach and IOOS Strategic Communications committee meetings.

Accomplishments/Successes: Include Oregon Sea Grant's Tsunami Sense curriculum to the NANOOS Education pages,

Problems/Delays: None

Tailored Products Co-Development:

- *Engage users in product co-development through focus groups; use targeted interviews or surveys to garner feedback and input on products as they are developed; gain feedback and conduct self-assessment after product release [Wold, Tanner]*
- *Conduct trainings to broader user groups and evaluate trainings to optimize NANOOS functionality [Wold]*
- *Annually evaluate priorities for products at the Tri-Com meeting (DMAC, UPS, and E&O), based on outreach feedback, regional issues, and GC input, and will implement new tailored products to the extent possible [Tanner]*

Status: On track

Summary: This committee is composed of members from OHSU, UW, OSU, NANOOS E&O, and NOAA. NANOOS UPC chair Tanner participates in weekly "tag-up" calls with members from DMAC, UPC, E&O, and Web development to facilitate consistent work efforts, synergy across the committees, and improvements to product development and enhancements. Activities for this period centered around weekly NANOOS meetings. Incorporated informal user feedback, collected via engagement activities by Wold, into enhancing NVS.

Accomplishments/Success: Added MOCI Index for Oregon to NVS Averages and Anomalies App. Updated Oregon communities and brochure links in TsunamiEvac NVS app. Created Autonomous Vehicles App - V2. Created Transect Tool that visualizes model output conditions throughout the water column along a path in NVS. Added WMO Code and WMO Code URL to NVS platforms. Updated Washington shape files for Tsunami Evacuation app. Restored previous HFR overlays to NVS.

Problems/delays: None

Website:

- *Continue to evaluate and update web content relevant to stakeholder issues, especially those related to Maritime Operations, Ecosystem Assessment, Fisheries & Biodiversity, Coastal Hazards, and Climate; improve ease of usability and user tracking capabilities [Tanner]*

Status: On track

Summary: Added infographics to HABs product page. Created ROWG-14 Workshop page. Add plots to multi-stressors project site. Created IFCB Product Page.

Accomplishments/Successes: New and updated content.

Problems/Delays: None

Ocean Workforce Pipeline Development:

- *Engage with regional formal education communities to use ocean observing and NANOOS products to support STEM education, and with regional non-formal education communities to facilitate the use of NANOOS products to foster community ocean literacy [Wold, Tanner]*
- *Work with the other IOOS regions and the Program Office on workforce development initiatives to expand the ocean, coastal, and Great Lake workforce and to improve our ability to provide relevant ocean and coastal data and information to communities who need it. [Newton, Wold]*

- *On a more immediate and local scale, NANOOS actions that match NANOOS' commitment ability to foster opportunities for new entries to the ocean observing workforce [Newton, Wold]*

Status: On track

Summary: During this reporting period: NANOOS and partners supported interns at OSU, funded by CRITFC through external funding, leveraging NANOOS funded capabilities at OSU and CRITFC. Worked with TAF@Saghalie educators to develop OA lesson plans in spring 2026.

Accomplishments/Successes: NANOOS staff began hosting EarthLab summer interns in June 2026, continued to support tribal summer research interns through a partnership between CRITFC and OSU, mentored students at the Maritime High School throughout the year.

Problems/Delays: None

FY25 Non-core Task 12: To support GOA-ON, J-Scope, and C-CAN outreach/education project [Newton]

GOA-ON [Tanner/Newton]

Status: On track

Summary: Newton continued to serve as co-Chair of *Global Ocean Acidification Observing Network* (GOA-ON), along with Steve Widecombe, University of Khorfakkan. She represented IOOS on GOA-ON Executive Council calls and activities. Newton oversaw the efforts of NANOOS to power the GOA-ON web and data portal, updating content, and working on OCADS. Tanner maintained the GOA-ON website, with updates to slideshow, webinars, and the addition of new regional hub pages. He worked to incorporate datasets from OCADS.

Accomplishments/Successes: Over the period, Newton aided the following activities: Newton chaired the in-person/on-line GOA-ON Executive Council meeting 21-22 February, prior to the Ocean Sciences Meeting (OSM) in Glasgow, Scotland; she presented two GOA-ON related posters at OSM, and continued planning for the Oceans in a High CO₂ World. Tanner worked on developing an automated platform metadata harvesting tool for the GOA-ON data portal.

Problems/Delays: None

J-SCOPE [Tanner]

Status: On track.

Summary: Tanner works with content provided by Samantha Siedlecki to create web pages for J-SCOPE forecasts.

Accomplishments/Successes: Created J-SCOPE forecast pages for Jan 2026 and Apr 2026.

Problems/Delays: None.

C-CAN outreach/education project [Chadsey, Washington Sea Grant via Newton]

Status: On track

Summary: Progress was made during the period on Goal 1 (Education & Outreach subcommittee meetings). Washington Sea Grant student assistant Isaac Olson worked with CeNCOOS Engagement Specialist Alexandra Boutros to convene the C-CAN Outreach & Education working group. They met to further discuss outreach content aimed at tribal and non-tribal fisher audiences in each of the three west coast states (WA, OR and CA).

Accomplishments/Successes: None yet

Problems/Delays: None

E. Governance & Management Subsystem:

Governance:

- Assure that NANOOS has transparent, effective, and representational governance via its Governing Council and the NANOOS Executive Committee composed of its elected Board and its functional committee chairs [Newton, Carini, UW]
- Assure these bodies are engaged in NANOOS prioritization of regional needs, work effort, and product development [Newton, Carini, UW]
- Assure balance of stakeholders represented in NANOOS reflects that found in PNW [Newton, Carini, Rome, UW]
- Conduct annual GC meeting [Newton, Carini, UW]

Status: On track

Summary: Newton (NANOOS Executive Director), Carini (NANOOS Deputy Director), and Barnard (NANOOS Board Chair) continued to provide leadership to NANOOS operations and connection to the US IOOS enterprise. Newton and Carini assured progress on the above milestones. Rome assisted with strategic partnerships.

Accomplishments/Successes:

- Executive Committee meetings were held virtually bi-monthly in January, March, and May to advise NANOOS on its strategy and priorities.
- NANOOS is planning for its Annual NANOOS Governing Council (GC) and Principal Investigator (PI) meetings on 5-6 August 2026 in Vancouver, WA.

Problems/Delays: None

Representation:

- Represent NANOOS at IOOS Program Office and IOOS Association meetings, and at national meetings of significance [Newton, Carini, Rome, UW]
- Engage at a regional level at meetings and workshops affecting PNW stakeholders and NANOOS [Newton, Carini, Rome, UW]

Status: On track

Summary: Newton participated in IOOS Program Office and IOOS Association calls. Newton is a member of the IOOS Association Executive Committee and participated in their teleconferences during the period.

Accomplishments/Successes: Newton and Carini attended the IOOS Spring Meeting in Washington DC on 17-19 March.

Throughout the period, Newton continued representing NANOOS and IOOS at various meetings, including:

- Newton was invited to present at the Washington Sea Grant 2026 Shellfish Growers Conference, 9-10 February in Union, WA, with a talk *"Tools for assessing water conditions from NANOOS: what we have and what's in the works"*. Many shellfish growers interacted with interest about the new tools, including the transect tool.
- Newton attended the IOOS Plankton Workshop in San Diego, 21-22 April and presented on NANOOS plankton efforts. This IRA-funded workshop is part of the IOOS "EcoObs" project to coordinate and synergize plankton efforts. Newton assured participation from NANOOS, including NANOOS PIs Chase, Kavanaugh, and Trainer.
- NANOOS was honored to participate in the recent Technologies for Innovation, Design, & Environmental Stewardship (TIDES) Conference, 23 April, hosted by UW. Newton was invited to join a panel discussing ocean science in the Pacific Northwest. This conference, recognized by the UN Ocean Decade as an Endorsed Activity, was an opportunity for science and industry experts to "explore innovations shaping marine technology, ocean sustainability, and coastal economies." Newton highlighted NANOOS as a nexus between these all, encouraging the student attendees to consider careers that blend science with society and technology.

- The 14th annual IOOS Radiowave Operators Working Group (ROWG) met in Newport, OR. NANOOS PI Mike Kosro and Matthew Srouffe (OSU) were well recognized for their contributions to the workshop and to years of success with NANOOS HFR measurements. Newton gave welcoming remarks and NANOOS Board Chair Andrew Barnard offered closing reflections.
- NANOOS participated in the IOOS Association “Ocean Data Day” on 24 June in Washington DC. Newton introduced Rep Bonamici of Oregon who was presented with a Bipartisan Leadership in Ocean Observing Award. NANOOS ExCom member Margaret Pilaro, Pacific Coast Shellfish Growers Association, participated on a panel on America’s seafood economy – *from shellfish farms to lobster boats*, speaking on the practical value of ocean and coastal data for an industry that relies on water quality, environmental conditions, and the ability to plan around change.

Problems/Delays: None

Project Oversight:

- *Conduct annual all-PI meetings and Tri-Committee meetings, providing clear feedback and direction [Newton, Carini, UW]*
- *Share project evaluation at the annual PI meeting [Newton, UW]*

Status: On track

Summary: Newton and Carini participated in weekly Tri-Comm calls and coordinated with PIs throughout the period. The Tri-Comm meeting was held 27-28 May at UW, both in person and virtual. During the period, they met with each NANOOS PI to assess funding needs, succession plans, and any concerns. The annual NANOOS all-PI meeting will be held prior to the Governing Council-PI meeting in Vancouver, WA, 5-6 August.

Accomplishments/Successes: The annual Tri-Comm meeting was well attended. We reviewed past accomplishments, discussed issues, and prioritized activity for the next year.

Problems/Delays: None

Coordination:

- *Coordinate with West Coast RAs and other RAs to optimize and leverage capabilities and assure consistencies [Newton, Carini, Rome, UW]*
- *Engage in sub-regional and user-group specific workshops to aid coordination and optimization of effort [Newton, Carini, Rome, UW]*
- *Coordinate with Canada [Newton, Carini, Rome, UW]*

Status: On track

Summary: Newton, Carini, and Rome engaged activities over the period with regional and local entities in a variety of venues and opportunities. Newton was invited to attend the BC-OAH Action Forum on 3 March. NANOOS continued to re-establish ONC data streams on NVS. Newton attended West Coast Ocean Science Action Agenda Advisory Committee meetings during the period. See below for additional activities.

Accomplishments/Successes: NANOOS was involved in 13 IOOS Ocean Technology Transfer proposals. NANOOS coordinated with SCCOOS and CeNCOOS, as well as other RAs on some of them.

Problems/Delays: None

Accountability:

- *Submit required IOOS progress reports and respond to other requests [Newton & Carini, UW]*
- *Attain recertification in 2023 as the Regional Information Coordination Entity of US IOOS for the PNW [Carini, UW]*

Status: On track

Summary: Progress report and other requests have been fulfilled during the period. NANOOS was successfully recertified in 2023.

Accomplishments/Successes: While Progress Reports in the IOOS requested format have been filed on time, a more readable format is produced and these reports are publicly available at https://www.nanoos.org/about_nanoos/documents.php.

Problems/Delays: None

Additional NANOOS coordination and representation included:

- Carini serves as a NANOOS representative on the NSF-funded Cascadia Coastlines and Peoples Hub (CoPes Hub) Community Advisory Council (CAC). As such, she served on the planning committee for the Coastal Hazards Workshop #3 and attended the workshop on 9-10 February 2026. She attended quarterly CAC meetings.
- In coordination with Washington state agencies, tribes, industry, and others, Newton represented NANOOS at the Marine Resources Advisory Council virtual meetings.
- NANOOS provided updates on oceanographic conditions in the Pacific Northwest for the NOAA *WestWatch* webinar series on 20 January and 23 June along with the other two west coast RAs.
- NANOOS made contributions to *PSEMP Puget Sound Marine Condition Updates* bi-monthly throughout the period: 28 January and 25 March, and participated in the 16 April meeting to inform publication of the 2025 Marine Waters Overview, to which several NANOOS PIs contribute.
- QIN BB training, 3/30-4/1 Tahola, WA: Supported both by Core and IRA T2 funds, NANOOS staff visited the Quinault Indian Nation to conduct in-person training about the Sofar Spotter Mooring and deployment procedures.
- Ocean Acidification Sentinel Site (OASeS) Symposium was held on May 12-14 in Ocean Shores, WA. NANOOS presented content on using real-time data and forecasts for education and decision making.
- NANOOS continued work on the development of OA indicators for the West Coast Ocean Data Portal.
- Locally, Newton served on the Steering Committees of C-CAN, OASeS, ORHAB, Cascadia CoPes Hub, and the Puget Sound Environmental Monitoring Program. She informed regional and national groups about the west coast OAH indicator work.

Keeping the goals and capabilities of NANOOS and IOOS represented internationally, NANOOS Administration and PIs made several important contributions:

- Newton served as a member of the *Canadian IOOS (CIOOS) Pacific* Regional Oversight Committee. Also in Canada, Newton chaired the *Marine Environmental Observation, Prediction, and Response Network*, a Canadian Center of Excellence (MEOPAR) International Science Advisory Committee.
- Newton continued as a member of the Science Advisory Team for the *Joint European Research Infrastructure in the Coastal Ocean* (JERICO) along with Henry Ruhl (CeNCOOS) and Clarissa Anderson (SCCOOS). There were no reviews during the period.
- Coordination with the Global Ocean Acidification Observing Network (GOA-ON) is described in non-core task 5.
- MacCready continued service on the Olympic Coast National Marine Sanctuary's Advisory Council as the primary Research representative (2023-2026). He also serves on the SeaGrant Willapa Grays Harbor Estuary Collective Scientific Advisory Committee.
- Barth is the academic representative on the North Pacific Marine Science Organization's (PICES) Governing Council and took part in the virtual Intersessional Governing Council meeting on May 13, 2026.

- NANOOS is engaged with planning for the next OceanObs meeting, a decadal event that will be held in 2029 in Qingdao: OceanObs'29. Through his role at Center for Ocean Leadership, Rome is helping to lead the planning. Newton is on the International Advisory Committee. A recent three-day event in Hong Kong started scoping the event and ways the broader community can connect. Newton gave a talk at the hosting conference.

FY25 Non-core Task 13: *For a one-time FY25 adjustment to base (ATB) to be used on identified user needs and the RA priorities [Newton]*

- *Fill Engagement and Outreach funding gap to provide dedicated time for outreach to local branches of the US Coast Guard and regional harbor safety committees and for product co-development with these stakeholders*

Status: On track

Summary: Continued communication with US Coast Guard and Harbor Safety contacts.

Accomplishments/Successes: NANOOS was invited by the Marine Exchange of Puget Sound to participate in the biennial [National Harbor Safety Conference](#) in Seattle on March 24-25. This conference was an opportunity for maritime professionals from around the country to discuss resources and best practices for safe port operations. Wold and Rome connected with representatives from various Marine Exchanges, ports, waterway associations, NOAA CO-OPS, etc. to showcase existing products like the [NVS Maritime Operations](#) web app, and learn more about the data needs of this community.

Problems/Delays: None

F. Presentations & Publications Acknowledging NANOOS Support:

Presentations: underline indicates NANOOS PI

Durski, S., Smith, J., Kurapov, A., Zhang, J., Cassalho, F., Sun, Y., Myers, E., Moghimi, S. Coupling CICE to SCHISM in UFS coastal: Working towards a coupled ice-ocean forecast system for Alaska, Unifying Innovations in Forecasting Capabilities Workshop 26, July 2026

Durski, S., Smith, J., Kurapov, A., Zhang, J., Cassalho, Jung, J., F., Sun, Y., Myers, E., Moghimi, S. Coupling CICE to SCHISM in UFS coastal: Lessons learned while working towards a coupled ice-ocean forecast system for Alaska, Unifying Innovations in Forecasting Capabilities Workshop 25, Sept 2025

Gostic, M., Kaminsky, G., Drummond, H., 2026. Science-based coastal management: Examples from Washington's Applied Coastal Research and Engineering team. Cascadia CoPes Hub Virtual Seminar. 5 February 2026.

Gradoville, M.R. and Seaton, C.S. From sensors to salmon: the Columbia River Inter-Tribal Fish Commission's CMOP ocean and estuary research program. Past to Present Lecture Series, Columbia River Maritime Museum. 01/2026, Astoria, OR.

Gradoville, M.R. Biogeochemical variability and ecosystem response in the Columbia River estuary: sustained observations for tribal stewardship. Oceanography Seminar Series, University of Hawaii Manoa. 04/2026, Honolulu, HI.

Hemingway, S., Ruggiero, P., Wengrove, M., Cohn, N., Hacker, S., Weiner, H., Kaminsky, G., 2026. Reconciling reduced-complexity versus process-based modeling of long-term dune evolution. International Conference on Coastal Engineering, Galveston, Texas, 18 May 2026.

Newton, J. 2026. Tools for assessing water conditions from NANOOS: what we have and what's in the works. Washington Sea Grant Shellfish Growers Conference, Union, WA, 10 February 2026.

Newton, J., M. Poe, S. Alin, S. Siedlecki, J. Turner, K. Isensee, S. Widdicombe, A. Kenworthy. 2026. Ocean Acidification Research for Sustainability (OARS): A Social-Ecological Regional Vulnerability Assessment to Ocean Acidification Use Case. Ocean Sciences Meeting, Glasgow, Scotland, 23 February, 2026.

Newton, J., K. Isensee, S. Widdicombe, A. Kenworthy, J. Turner. 2026. Using Ocean Acidification Research for Sustainability (OARS) to Highlight Research on Ocean Acidification That Can Make a Difference. Ocean Sciences Meeting, Glasgow, Scotland, 23 February, 2026.

Newton, J., M. Poe, S. Alin, S. Siedlecki, J. Schumacker, R. Svec, J.A. Koehlinger, J. Hagen, T. Moore, J. Waddell, S. Fradkin, M. Chadsey, H. Berger, R. Carini. 2026. Projected effects on local species from ocean acidification and other stressors. OASes 3rd Biannual Conference, Ocean Shores, WA, 12 May 2026.

Newton, J. 2026. Ocean Observing from local to global scales: how can we improve? Global Ocean Summit, GOS2026, Ocean Observation and Prediction, Hong Kong, 19 May 2026.

Weiner, H., Kaminsky, G., DeVore, K., Dietrich, J., 2026. Mouth of Columbia River Beach Morphology Monitoring. Delivered to the Lower Columbia Solutions Group, Astoria, Oregon, 27 January 2026.

Publications: underline indicates NANOOS PI

Cassalho, F., Kurapov, A. L., Moghimi, S., Durski, S. M., Zhang, J. Y., Abdolali, A., et al. (2026). Tidal modulation of waves around the Aleutian Islands. *Journal of Geophysical Research: Oceans*, 131, e2025JC023780. <https://doi.org/10.1029/2025JC023780>

Findlay, H. S., Gaultier, L., Gregor, L., Gruber, N., Land, P., Ford, D., Sabia, R., Raise-Uili, A., Widdicombe, S., Newton, J., Lowder, K., Shutler, J. (2026). Entering the era of directly supporting society with observation-based ocean acidification data. *Perspectives of Earth and Space Scientists*, 7, e2025CN000290. <https://doi.org/10.1029/2025CN000290>

Heminway, S., N. Cohn, IJzendoorn, C., Ruggiero, P., Wengrove, M., Kaminsky, G., Weiner, H., 2026. Assessing drivers of alongshore variation in historical coastal dune evolution: A field and model-based approach, JGR-ES, <https://doi.org/10.1029/2025JF008717>