Northwest Association of Networked Ocean Observing Systems

The Integrated Ocean Observing System (IOOS)
Regional Association for the Pacific NW

www.nanoos.org
1. Call to Order
Welcome, Introductions, Charge for the Day

David Martin
NANOOS GC Board Chair
2. NANOOS update

Jan Newton
NANOOS Executive Director
Northwest Association of Networked Ocean Observing Systems

The Integrated Ocean Observing System (IOOS)
Regional Association for the Pacific NW

www.nanoos.org
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<table>
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</thead>
<tbody>
<tr>
<td><strong>1.</strong></td>
<td>Ocean Inquiry Project</td>
<td><strong>31.</strong></td>
<td>OR Dept of State Lands</td>
<td><strong>61.</strong></td>
<td>NOAA PMEL</td>
</tr>
<tr>
<td><strong>2.</strong></td>
<td>OR Dept of Land Conservation &amp; Development</td>
<td><strong>32.</strong></td>
<td>Columbia River Crab Fisherman’s Association</td>
<td><strong>62.</strong></td>
<td>Hakai Institute</td>
</tr>
<tr>
<td><strong>3.</strong></td>
<td>Surfrider Foundation</td>
<td><strong>33.</strong></td>
<td>Port of Neah Bay</td>
<td><strong>63.</strong></td>
<td>Salish Sea Expeditions</td>
</tr>
<tr>
<td><strong>4.</strong></td>
<td>The Boeing Company</td>
<td><strong>34.</strong></td>
<td>Northwest Research Associates</td>
<td><strong>64.</strong></td>
<td>Aquatic Innovations Research</td>
</tr>
<tr>
<td><strong>5.</strong></td>
<td>Oregon State University</td>
<td><strong>35.</strong></td>
<td>Pacific Ocean Shelf Tracking Project</td>
<td><strong>65.</strong></td>
<td>Long Live the Kings</td>
</tr>
<tr>
<td><strong>6.</strong></td>
<td>Oregon Sea Grant</td>
<td><strong>36.</strong></td>
<td>WA Dept of Fish and Wildlife</td>
<td><strong>66.</strong></td>
<td>Rockland Scientific</td>
</tr>
<tr>
<td><strong>7.</strong></td>
<td>Puget Sound Partnership</td>
<td><strong>37.</strong></td>
<td>Northwest Aquatic and Marine Educators</td>
<td><strong>67.</strong></td>
<td>Northwest Indian College</td>
</tr>
<tr>
<td><strong>8.</strong></td>
<td>University of Washington</td>
<td><strong>38.</strong></td>
<td>Seattle Aquarium</td>
<td><strong>68.</strong></td>
<td>Pacific Shellfish Institute</td>
</tr>
<tr>
<td><strong>9.</strong></td>
<td>Washington Sea Grant</td>
<td><strong>39.</strong></td>
<td>NOAA Northwest Fisheries Science Center</td>
<td><strong>69.</strong></td>
<td>Weatherflow</td>
</tr>
<tr>
<td><strong>10.</strong></td>
<td>WET Labs, Inc.</td>
<td><strong>40.</strong></td>
<td>Port Gamble S’ Klallam Tribe</td>
<td></td>
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</tr>
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<td><strong>11.</strong></td>
<td>Oregon Health and Science University</td>
<td><strong>41.</strong></td>
<td>The Nature Conservancy</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>12.</strong></td>
<td>Quileute Indian Tribe</td>
<td><strong>42.</strong></td>
<td>Portland State University</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>13.</strong></td>
<td>OR Dept of Geology and Mineral Industries</td>
<td><strong>43.</strong></td>
<td>NOAA Olympic Coast National Marine Sanctuary</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>14.</strong></td>
<td>Humboldt State University</td>
<td><strong>44.</strong></td>
<td>University of Victoria</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>15.</strong></td>
<td>Marine Exchange of Puget Sound</td>
<td><strong>45.</strong></td>
<td>University of Oregon</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>16.</strong></td>
<td>WA Dept of Ecology</td>
<td><strong>46.</strong></td>
<td>Port Townsend Marine Science Center</td>
<td></td>
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</tr>
<tr>
<td><strong>17.</strong></td>
<td>Pacific Northwest National Laboratory</td>
<td><strong>47.</strong></td>
<td>Intellicheck-Mobilisa</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>18.</strong></td>
<td>Port of Newport</td>
<td><strong>48.</strong></td>
<td>NortekUSA</td>
<td></td>
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</tr>
<tr>
<td><strong>19.</strong></td>
<td>Puget Sound Harbor Safety Committee</td>
<td><strong>49.</strong></td>
<td>Grays Harbor Historical Seaport</td>
<td></td>
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</tr>
<tr>
<td><strong>20.</strong></td>
<td>Sound Ocean Systems, Inc.</td>
<td><strong>50.</strong></td>
<td>Pacific Coast Shellfish Growers Association</td>
<td></td>
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</tr>
<tr>
<td><strong>21.</strong></td>
<td>Council of American Master Mariners</td>
<td><strong>51.</strong></td>
<td>US Army Corps Engineers</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>22.</strong></td>
<td>Pacific Northwest Salmon Center</td>
<td><strong>52.</strong></td>
<td>Olympic National Park</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>23.</strong></td>
<td>Northwest Indian Fisheries Commission</td>
<td><strong>53.</strong></td>
<td>Oak Harbor Middle School</td>
<td></td>
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<tr>
<td><strong>24.</strong></td>
<td>Sea-Bird Scientific</td>
<td><strong>54.</strong></td>
<td>Vancouver Island University</td>
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<tr>
<td><strong>25.</strong></td>
<td>Western Association of Marine Laboratories</td>
<td><strong>55.</strong></td>
<td>Ocean Networks Canada</td>
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<td><strong>26.</strong></td>
<td>Leidos</td>
<td><strong>56.</strong></td>
<td>Lower Columbia Estuary Partnership</td>
<td></td>
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<td><strong>27.</strong></td>
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<td><strong>57.</strong></td>
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<td></td>
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<tr>
<td><strong>28.</strong></td>
<td>King County Dept Natural Resources &amp; Parks</td>
<td><strong>58.</strong></td>
<td>Raincoast GeoResearch</td>
<td></td>
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</tr>
<tr>
<td><strong>29.</strong></td>
<td>Quinault Indian Nation</td>
<td><strong>59.</strong></td>
<td>WA Dept of Health</td>
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</tr>
<tr>
<td><strong>30.</strong></td>
<td>Western Resources and Applications</td>
<td><strong>60.</strong></td>
<td>Say Yes to Life Swims</td>
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</tbody>
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New NANOOS members

- Northwest Indian College
- Pacific Shellfish Institute
- Weatherflow

Welcome!
**Coastal ocean:**
Northern extent of California Current
Winds, topography, freshwater input, ENSO & other climate cycles

**Major inland basins:**
Puget Sound-Georgia Basin, Columbia River
Urban centers, nearshore development, climate variation

**Coastal estuaries:**
Willapa Bay, Grays Harbor, Yaquina Bay, Coos Bay, +20
Resource extraction, development, climate

**Shorelines:**
Rocky to sandy, dynamic: storms, erosion
Winds, development, climate

**Major rivers:**
Columbia River (~75% FW input to Pacific from US WC)
many rivers (e.g., Fraser, Skagit) via Strait Juan de Fuca
Dredging, water regulation, climate change

**NANOOS Region User Groups:**
Maritime: shipping, oil transport/spill remediation
Fisheries: salmon, shellfish, crab, groundfish, aquaculture
Environmental management: HABs, hypoxia
Shoreline: erosion, inundation
Hazards: Search and rescue, national security
Educators: formal, informal, research
Marine recreation: boating, surfing, diving
# NANOOS "Effort versus Application" Map for Observing and Modeling

<table>
<thead>
<tr>
<th>EFFORTS</th>
<th>APPLICATIONS: Coastal Ocean</th>
<th>Estuaries</th>
<th>Shorelines</th>
</tr>
</thead>
<tbody>
<tr>
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<td>Forecast models:</td>
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<td>mar ops</td>
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**KEY:**
- Italicized efforts indicate new investment
- Currently directly supports
- Currently indirectly supports
- Proposed to directly support
- Proposed to indirectly support
- Not applicable
- Text explains the current gap the proposed activities fill
NANOOS Objectives for FY2019

1) Maintain NANOOS as the U.S. IOOS PNW Regional Association
2) Maintain and enhance surface current and wave mapping capability.
3) Sustain existing buoys and gliders in the PNW coastal ocean, in coordination with other national programs.
4) Maintain observation capabilities in PNW estuaries, in coordination with local and regional programs.
5) Maintain core elements of beach and shoreline observing programs, in coordination with state programs.
6) Provide sustained support to a community of complementary regional numerical models.
7) Maintain NANOOS’ Data Management and Communications (DMAC) system for routine operational distribution of data and information.
8) Continue to deliver existing and, to the extent possible, create innovative and transformative user-defined products and services for PNW stakeholders.
9) Sustain NANOOS outreach, engagement and education efforts.
NANOOS budget:

FY07-09: $1.4M + 0.4M = $1,800,000
Year 1, 2, 3

FY10: $1.7M + 0.4M = $2,100,000
Year 4

FY11: $2,087,500 (w/ new start date)
Year 5 or 1 of new 5-y award

FY12: $2,428,291 ($2,288,000 base; ~$140K for DMAC, OA workshops)
Year 6 or 2

FY13: $3,089,477 ($2,392,136 base; ~$700K for OTT on OA plus OAP)
Year 7 or 3

FY14: $2,818,441 ($2,442,136 base; $109K HF; $217K OAP; $50K glider)
Year 8 or 4

FY15: $2,771,890 ($2,462,136 base; $309K OAP)
Year 9 or 5

FY16: $2,848,900 ($2,452,552 base; $317K OAP; $79K adds)
Year 10 or 1 of new 5-y award

FY17: $3,216,463 ($2,457,136 base; $360K HFR; $282K OAP; $117K adds)
Year 11 or 2

FY18: $3,264,472 ($2,462,136 base; $180K HFR; $330K OAP; $291K adds)
Year 12 or 3

FY19: $3,485,217 ($2,462,136 base; $375K obs; $379K OA; $269K adds)
Year 13 or 4
NANOOS budget:

FY19: $3,485,217 ($2,462,136 base; $375K obs; $379K OA; $269K adds)
Year 13 or 4

Fill the Gaps in Obs
- $150,000* for O&M for a glider: Columbia
- $150,000* for procurement of a glider: La Push
- $75,000* for observations: gear replacement
- $75,000 one time add: address observing data certification requirements

OA
- $189,790 for NANOOS ocean acidification observations in Oregon coastal waters (OSU)
- $66,291 for NANOOS ocean acidification observations in Washington coastal waters (UW)
- $70,000 to enhance the GOA-ON data portal as an OA dashboard to the world (UW)
- $40,000^ to continue funds for OA experts to aid OA observations for growers (OSU/UW)
- $13,000 to support NOA-ON mooring test-beds (UW)

Other
- $50,000 for workshop on extension and lessons learned from OA Regional Vulnerability Assessment
- $20,000 for deployment of LiveOcean in the IOOS cloud sandbox (MacCready)
- $15,000 for biology pilot projects in honor of Matt Howard on biological data stewardship
- $9,000 for OceanHackWeek 2019 (Mayorga)
- $100,000 for OSU ROMS-ICE model in Alaska (Kurapov)
The year of the glider

• Restore O&M for Columbia glider
• Obtain La Push glider
• New glider products on NVS, including OOI
• Glider group established
Why are glider data important to PNW?

1. Hypoxia is an existing and increasing issue in the Pacific Northwest. NANOOS has used its gliders to monitor this information. This need will only grow with time. Work to date has included a successful partnership on the Columbia line with the Quinault Indian Nation who provided operational ship tending that allowed operation of this glider. QIN wanted the data so that they could better visualize the hypoxic zone off their lands and inform fishing/crabbing practices. NANOOS glider information on hypoxia has been relayed to NOAA and others who are involved with stock management affecting fishers and crabbers.

2. Glider data are critical to monitoring change in seawater properties like temperature and salinity for climate variability and change including phenomena, like El Niño, with strong societal impacts. Glider data provided information about the shoreward intrusion of the warm water anomaly (“the Blob”) and its development over time. Gliders provide subsurface temperature and salinity which added important information to the spatial view of surface T provided by satellites. While some said the Blob was dead, subsurface data showed that it was NOT! And this was important because it is the deeper waters that upwell.
CMOP Columbia glider from 2012
Figure 1: Temperature anomaly from the Trinidad Head, CA (41° 3.5’N) glider line.
50-m temperature anomaly averaged within 200 km of the coast (ala Rudnick)

Barth, Shearman, Erofeev, Pierce, Bjorkstedt
From 2016 planning document:

- **Top Priority: ~ $300,000**
  - 1-2 sentence description of the top priority for funding gliders in your region for $300K.
  - MAKE COLUMBIA OPERATIONAL: Provide operational shallow water O&M funds to Columbia glider with the existing two gliders. Continue work with QIN.

- **RESTORE LA PUSH:** Replace La Push glider. Continue coastal dynamics northwards.

- **Next Priority: ~ $300,000 (in addition to #1 priority)**
  - 1-2 sentence description of the second priority for funding gliders in your region for $300K.
  - MAKE LA PUSH OPERATIONAL: Provide operational shallow water O&M funds to La Push glider with the existing glider from first priority purchase.

- INSURE FUTURE OF HUMBOLDT OPERATIONS: Purchase second glider for Humboldt line for field swapping/replacing aging equipment.
Goals for WA HF re national “Fill the Gaps:”

- Complete the US west coast map
- Meet and join with Canadian system in Strait Juan de Fuca
- Expose full path of coastal currents
- Illuminate processes in the JdF Eddy, a HAB incubator

**Success!**
- Have funds for 2 HFRs

**Difficulties:**
- Remote coast
- Lack of power
- Obstructing headlands
- Wide beaches
- Cars on beaches

**Update:**
- Going forward on permit for site near Westport
- Evaluating site near Kalaloch
- Will seek funds for 3rd radar

Ideal plan: add sites
- N. Wash: Cape Flattery
- C. Wash: La Push
- S. Wash: Copalis
Operational ecological forecasting of PNW harmful algal blooms using an Environmental Sample Processor

MERHAB award: Operational funds for 4 years starting year after next
OA Science-Grower Partnerships

Wiley Evans, Hakai Institute

Tessa Hill, UC Davis

Todd Martz, SIO

Simone Alin, NOAA PMEL

Taylor Shellfish Hatchery
Quilcene, WA

Whiskey Creek Shellfish Hatchery
Tillamook, OR

Hog Island Oyster Company
Tomales Bay, CA

Carlsbad Aquafarm
Carlsbad, CA
The Olympic Coast as a Sentinel: An Integrated Social-Ecological Regional Vulnerability Assessment to Ocean Acidification
Goal:

Our overarching goal is to provide:

• an assessment of coupled social-ecological vulnerability to effects from OA that is

• based on new social science and a synthesis of existing data and model projections

• relevant to the Olympic Coast, its biological resources, and its inhabitants (including participating coastal tribes),

• developed in an actionable interdisciplinary approach that is
  • 1) transferrable to other locations and
  • 2) strengthens capacities for vulnerable place-based communities to adapt.
Define the scope of a place-based risk environment by identifying the local management and policy priorities and community needs.

Determine the social importance of key OA-sensitive marine species and the role these species play in community well-being.

Synthesize existing chemical and biological data sets, analyzing variability in space and time.

Model future projections, identify regions and timing of where OA conditions will cross thresholds for key species of interest to community partners.

Estimate the risk of direct and indirect OA impacts to key biological resources that are important to community partners.

Synthesize existing socioeconomic data, analyzing spatially-scaled socioeconomic factors that affect vulnerability.

Identify community-driven strategies for responding to threats and increasing adaptive capacity.

Engage with and provide critical information to decision-makers to increase coastal communities’ ability to prepare for and respond to OA vulnerabilities.

Assess the social vulnerability to OA through workshop-based sensitivity analyses.

Monitor, evaluate, adapt/act, reiterate.

Integrated Regional Vulnerability Assessment Approach
Project Team

• **Lead PIs:**
  Jan Newton (Lead PI), UW Applied Physics Lab/Washington Ocean Acidification Center (WOAC)
  Melissa Poe (Co-PI), UW Washington Sea Grant (WSG)/NOAA Northwest Fisheries Science Center (NWFSC)

• **Co-PIs:**
  Simone Alin, NOAA Pacific Marine Environmental Lab (PMEL)
  Meg Chadsey, WSG/PMEL
  Richard Feely, NOAA PMEL
  Steven Fradkin, Olympic National Park (ONP)
  Jennifer Hagen, Quileute Tribe
  Khalid Marcus, Hoh Tribe
  Joe Schumacker, Quinault Indian Nation (QIN)
  Samantha Siedlecki, U Connecticut
  Adrienne Sutton/Brendan Carter (JISAO/ NOAA PMEL)
  Russell Svec, Makah Tribe
  Jenny Waddell, Olympic Coast National Marine Sanctuary (OCNMS)
  Melissa Watkinson, WSG
GOA-ON is a collaborative international approach to document the status and progress of ocean acidification in open-ocean, coastal, and estuarine environments, to understand the drivers and impacts of ocean acidification on marine ecosystems, and to provide spatially and temporally resolved biogeochemical data necessary to optimize modeling for ocean acidification.
Supporting UN SDG 14.3
The North American Ocean Acidification Hub is being established to serve the countries of Canada, United States, and Mexico. The Global Ocean Acidification Observing Network (GOA-ON) has encouraged grass-roots formation of regional hubs to foster communities of practice for the efficient collection of comparable and geographically distributed data to...
Please join us for the next NOAA West Watch on Tuesday, September 10 2019 from 1-2 pm Pacific Time. I will send out a reminder email the week before the webinar. You are encouraged to add this meeting to your calendar. If you wish to be removed from this distribution list, please contact me at daniel.mcevoy@dri.edu.

Background: NOAA West Watch is a periodic webinar undertaken by the NOAA Western Regional Collaboration Team in partnership with the Western Regional Climate Center and with contributions from the three West Coast Integrated Ocean Observing System Regional Associations. These webinars are designed to bring together NOAA staff and partners from across the agency and region to share information about regional scale environmental observations and impacts on human systems. The webinars are not formal public releases of data but are a mechanism to facilitate interdisciplinary connections and the exchange of information among agency staff and partners on regional climatic and oceanic conditions, particularly departures from normal.

Daniel McEvoy, PhD, Western Regional Climate Center
NVS Climatology App
2018-9 new developments:

**University of British Columbia Salish Sea Model Live on NVS**

The high-resolution "SalishSeaCast" University of British Columbia (UBC) model, funded by the Marine Environmental Observation Prediction and Response Network (MEOPAR), can be accessed on the NVS Data Explorer App. This model includes temperature and salinity now-casts from the surface to 415m depth, covering the Strait of Georgia and Salish Sea.

- View the SalishSeaCast Model in NVS
- More Information About the Project

**NANOOS modeling PNW scale**

4 regional models:
- CMOP Columbia
- UW LiveOcean
- OSU ROMS
- UBC SalishSeaCast
- PNNL Salish Sea

**LiveOcean comes to the Salish Sea!**

A new version of the UW Live Ocean model has been released! Alongside greater spatial resolution comes the coverage of the Salish Sea in the model’s 3-day forecasts of variables like aragonite saturation state, oxygen, nutrients, and phytoplankton. Forecasts are available for many depths, including a bottom contour. See the LiveOcean homepage link below for more information and some great animations.

- NVS LiveOcean
- LiveOcean Homepage
- Read UW News Article

**11:00–11:20 Towards an Operational Forecast System for the Salish Sea to Support Maritime Emergency and Spill Response**

Tarang Khangaonkar, Principal Program Manager, Coastal Ocean Modeling, Pacific Northwest National Laboratory
You are cordially invited to attend a stakeholder engagement workshop on the 5-6 September 2019 at Monterey Bay Aquarium Research Institute (MBARI) in beautiful Moss Landing, CA. The workshop is supported by a U.S. Integrated Ocean Observing System (IOOS) Coastal Ocean Modeling Testbed (COMT) project that is evaluating the utility of a pre-operational NOAA model, the West Coast Ocean Forecast System (WCOFS). The purpose of the workshop is to initiate a dialogue with important members of the natural resource management community who have a vested interest in guiding the development and implementation of ecological forecasting for marine species habitat, harmful algal blooms, and ocean acidification.

This 1 1/2 day workshop will focus on conversations between the technical team and the broader scientific and management communities from California, Oregon, and Washington states. Importantly, this workshop will lay the groundwork for years of ecological forecasting discussions on how best to meet management requirements given the broad scope of applications along the U.S. West Coast.
Challenges

• Sustaining infrastructure on ~level funding

• Avoiding NANOOS being the best kept secret
NANOOS pays annual $1000 non-federal dues to IOOS Association, split by:

– Seabird Scientific
– Pacific Coast Shellfish Growers Association

THANK YOU!!!
NORTHWEST ASSOCIATION OF NETWORKED OCEAN OBSERVING SYSTEMS (NANOOS)
The eye on the Pacific Northwest’s ocean and coast

"NANOOS provides critical life safety information to the public, aiding coastal communities to reduce risk." - Jonathan Allen, Coastal Geomorphologist, Oregon Department of Geology and Mineral Industries

NANOOS is the Regional Association of the national Integrated Ocean Observing System (IOOS) in the Pacific Northwest, primarily Washington and Oregon. Investments in NANOOS have resulted in high-technology jobs, better-informed decisions, and new innovation.

We help improve:

**HEALTH**
Decision-making to protect human health

**SAFETY**
Enabling preparedness and security

**ECONOMY**
Preserving economic benefits of the ocean

NANOOS Increases Efficiency
The NANOOS Visualization System (NVS) integrates data from a wide variety of sources, and makes that data available in one online data portal, saving substantial time and money. Real-time observations and forecasts from a range of assets including buoys, shore and tidal stations, high-frequency radar, wave and current forecasts, and satellites are available in user-friendly data displays. NVS provides sophisticated yet accessible capabilities such as comparisons of forecasts with real-time observations, and customized presentations based on community feedback.

nanoos.org

For More Information
Contact us if you have any questions, or to learn more about our program.

Jan Newton, NANOOS Executive Director
Tel: (206) 543-0152 | jannewton@uw.edu
TSUNAMI RISK REDUCTION

“As a coastal community deeply committed to emergency preparedness, we find the new tsunami application to be a critical tool. It is easy and flexible to use and allows access to and clear designation of evacuation zones, allowing you to understand your risk and how to get to safety quickly after an earthquake. Access to accurate information is so important to our citizens and, as a destination location, to our visitors as well. We are proud to market our region as the most prepared on the Oregon coast and the tsunami software has become an important and useful tool.”
– Linda Kaslowski, President, Emergency Volunteer Corp of Nehalem Bay

“This app is great for homeowners on the coast as well as visitors who are planning trips. Knowing where you are in the tsunami zone means you will be better prepared should a tsunami occur. You can bookmark places and save or print a unique evacuation map centered on your home, workplace, hotel or even campsite. Users can then determine their nearest point of high ground outside the evacuation zone and develop a plan for how to get there.”
– Jon Allan, Coastal Geomorphologist, Oregon Department of Geology and Mineral Industries

FISHERIES SCIENCE & COMMERCE

“I just wanted to let everyone know that the real time data from the various buoys are incredibly helpful for those of us in the Marine Fish Science Unit at WDFW. We use this information to assist us with planning our field sampling on a daily and weekly basis; wind speeds and directions, as well as temperatures, help us determine the feasibility of our sampling routine. We hope this network stays funded to provide long-term data that we can use to help understand the dynamics of forage fish and their trophic interactions in the southern Salish Sea and beyond!”
– Todd Sandell, Senior Forage Fish Specialist, Washington Department of Fish and Wildlife

“I wanted to let you know that we started using the tuna fisheries application again after a year away from fishing due to back surgery. I am so impressed with the improvements you have made since I used it last. Your team has made this a very solid and valuable tool for our tuna fishing business. Some of my favorite features are trip planning and creating routes; identifying sea surface temperatures—current and forecasted; combining chlorophyll locations with warm water currents; understanding current flow so I can estimate the direction and distance we will drift at night; and wave and wind forecasting. This application is helping us enjoy safer trips, find the fish easier and save on fuel usage. Thank you for the great job you’re doing, we appreciate it very much.”
– Gary and Julie Palmer, Fishing Oregon Podcast

RECREATION SAFETY

“While traveling from Port Angeles to Seattle in July, we had the opportunity to travel through some of the more remote sections of the Salish Sea. The NANOOS NVS system provided valuable information on tidal heights and winds, which we used to optimize our passage to Seattle. A VHF weather broadcast, which is in hours old can be inadequate when compared to the immediacy of the data available through the NANOOS NVS system.”
– Captain Lincoln Ruston, S/V Saga

“The NANOOS surfer application provided the most comprehensive assembly of ocean and coastal data on water quality, swell direction/height, winds, tides, and beach cameras that is currently available for the Pacific Northwest. Having access to these current conditions and forecasting models is crucial for decision making on where and when to recreate, which aids in trip planning and safe ocean enjoyment.”
– Ken Gats, Washington Policy Manager, Surfrider Foundation

nanoos.org
IOOS in the Pacific Northwest

Jan Newton | NANOOS Executive Director | (206) 543-9152 | jannewton@uw.edu
Next 5-y FFO will post before our next meeting

• What are your priority needs?
• What do you value: sustaining obs or new investments?
• What kind of products do you need?
  – For decision support, for prediction?
• Are there geographical priorities?
THANK YOU !!!
3. NANOOS Standing Committees reports

User Products Committee

Data Management and Communication Committee

UPC

DMAC

E&O

Education and Outreach Committee

Tri-C
NANOOS Visualization System Update

Jonathan Allan
NANOOS User Products Chair

Team: Troy Tanner, Emilio Mayorga, Rachel Wold, Paul Rudell, Jan Newton (APL, UW); Craig Risien, Mike Kosro (CEOAS, OSU), Charles Seaton (CMOP, OHSU)
Lots of data: NANOOS provides access to 47 different types of variables, and in total ~234 ‘assets’ & 12 model/forecast overlays.
**NVS History and Status:**

Oct 2014 – v3.8 – Climatology web app released

Jun 2017 – v. 4.0 iPhone/Android NVS rebuild released

Dec 2017 – v5.5 – Added map graticules (selectable);

May 2018 – v6.0 – Developed new web app for fishing community *(SEACAST, unplanned)*. New UI released (simplified format).

Expanded *Xtide* to include Canadian tide stations *(Boaters)*;

Jun 2017 – v6.1 – Added two new web apps: **BEACHVIEW & SURFERS**

July 2018 – Released Tsunami print-your-own brochure.

January 2019 – v. 2.0 iPhone/Android **TsunamiEvac** released

**V6.2**
- Updated tsunami evacuation zones *(Washington)*
- Added ability to query overlay (model) data in Surfers App

**V6.3**
- Improvements to timeline (able to plot timeseries for model outputs for any location in map)
- Added ability to query overlay (model) data in Boaters App (new overlays)
An earthquake has occurred, but does not pose a tsunami threat.

- Time: 31 July 2019 8:02 am PDT
- Magnitude: 6.6
- Depth: 167 km
- Location: near the Vanuatu Islands
- Longitude: 167.9000

* There is no tsunami danger for the U.S. West Coast, British Columbia, or Alaska. * Based on the depth of the earthquake, a tsunami is not expected.
* This will be the only U.S. National Tsunami Warning Center message for this event unless additional information becomes available. Refer to the internet site tsunami.gov for more information.
Mobile Phone App
NVS-TsunamiEvac (Released Jan 2019)
How are we doing?
<table>
<thead>
<tr>
<th>Web App/Asset</th>
<th>Pageviews</th>
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<td></td>
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</table>
How are people getting to NVS?

Direct = bookmarks/direct URLs; Referrals = from other sites

How do we capture public interest?
Focus for next 12 months:

1) Particle Tracking (testing with CMOP data)
2) Dynamic Plotting (Climatology app)
3) Cross-section tool

4) Alerting capability (TsunamiEvac smartphone app,... coming very soon)
LiveOcean Particle Tracking
Questions?
NANOOS Data Management and Communications (DMAC) presentation to NANOOS Principal Investigators & Governing Council August 1, 2019

NANOOS DMAC chair:
Emilio Mayorga – UW-APL
NANOOS DMAC Focus Team:

Emilio Mayorga – UW/APL, Chair
Craig Risien – OSU
Charles Seaton – OHSU/CMOP

Part of broader DMAC-UPC-Web-Outreach team. But with focused interactions to give sustained attention to “low-level” DMAC issues and IOOS DMAC compliance.

Also: Alex Dioso, Troy Tanner (UW/APL); Jon Allan (DOGAMI)
NVS: New or Enhanced Assets
http://nvs.nanoos.org/AssetHistory

1. In-situ fixed
   a. New OSU Yaquina Bay sensors, serving crab
   b. New Hakai Institute Kwakshua OA mooring, Queen Charlotte Sound, BC
   c. WADOH seasonal monitoring network: renewed engagement, new Kilisut Harbor site
   d. CB-06 ADCP integration and visualization
   e. Overhauling OOI mooring data ingest, enabling data from more sensors

2. Models
   a. UBC SalishSeaCast nowcast model: nitrate, new model versions
   b. UW LiveOcean: New model versions; handling substantial upgrades (challenges from larger data); higher resolution, extended domain

3. Gliders
   a. NVS Glider Apps. La Push: Updated plots and added optical sensors. Trinidad Head: updates now being released monthly
   b. Working on OOI gliders, to create NVS Glider Apps
NANOOS Data Management Plan (NANOOS DMP)

Table of Contents

A. Background..............................................................................................................................1
B. Roles and Responsibilities.......................................................................................................3
C. Implementation of Data Management Protocols....................................................................4
D. Computing Infrastructure.........................................................................................................4
E. Data Streams............................................................................................................................5
   E.1 NANOOS (Internal) Data Streams....................................................................................7
      * Surface Currents and Waves.........................................................................................9
      * Fixed-location Sensor Platforms....................................................................................9
      * Gliders and Ferries...........................................................................................................11
      * Beach and Shoreline Observations...............................................................................13
   E.2 External Data Streams.......................................................................................................13
F. Web Portal and User Applications..........................................................................................16
G. References..............................................................................................................................19

http://www.nanoos.org/about_nanoos/certification.php

One year ago.

Certification does NOT cover models.

Scope:
- NANOOS supported observation assets
- Local/regional “external” observation assets integrated by NANOOS
  (mainly in situ, fixed-location)
NANOOS Data Management Plan (NANOOS DMP)

Scope:
- NANOOS supported observation assets
- Local/regional "external" observation assets integrated by NANOOS (mainly in situ, fixed location)

Another NANOOS DMP Submitted July 1, in fulfillment of NOAA Data Management Planning Procedural Directive, NOAA's Environmental Data Management Committee (EDMC)
- [https://nosc.noaa.gov/EDMC/PD.DMP.php](https://nosc.noaa.gov/EDMC/PD.DMP.php)
- Drawn from Certification NANOOS DMP, but required substantial changes and new information, as questions asked were different

**Data Management Plan**

[http://www.nanoos.org/documents/certification/NANOOS_DMP.pdf](http://www.nanoos.org/documents/certification/NANOOS_DMP.pdf) (Hereon referred to as the Certification NANOOS DMP)
[http://www.nanoos.org/documents/certification/DMP/NANOOSAssetInventory.pdf](http://www.nanoos.org/documents/certification/DMP/NANOOSAssetInventory.pdf)

**1. General Description of Data to be Managed**

1.1. Name of the Data, data collection Project, or data-producing Program:
Northwest Association of Networked Ocean Observing Systems (NANOOS)

1.2. Summary description of the data:

The NANOOS Data Assembly Center (DAC) integrates and manages data from a variety of sources and types of assets including in-situ observations, remote sensing observations and products, processed data products (such as climatologies), and numerical model nowcasts and forecasts. These activities are carried out as a distributed collaboration involving primarily the University of Washington (UW), Oregon State University (OSU) and the Oregon Health and Science University (OHSU), led by UW. Integrated data includes "internal" data
Certification DMAC Commitments

1. 5-year period
   a. Phased implementation of requirements, where some are already fully met, others are in transition towards full implementation (demonstrated initial work and plans).

2. QARTOD Quality Control testing, flagging
   a. See next slide.

3. Archiving with NCEI
   a. See next slide.

4. Data Sharing
   a. Mostly met, except for some unconventional data sets (X-Band radar, Victoria Clipper, beach profiles, bathymetry)

5. “External” Datasets (partners not funded by NANOOS)
   a. Some requirements may not realistically apply, specially archiving. Next phase.
QARTOD Testing and Flagging

1. Implement published QC tests and flagging for selected variables, at fixed stations
   a. QC tests: **Gross range** (initially), local range, spike, flat line, etc
   b. Emilio participated in Workshop on Quality Control processes of key Biogeochemical Parameters at NOAA PMEL, Sept. 2018

2. Tasks ahead, collaboratively with Charles Seaton (CMOP)
   a. Tools and process to select thresholds for each test, variable. With input from PI’s
   b. Flags applied centrally while accommodating QARTOD flags from providers (CMOP, King County, Hakai, PMEL)
   c. Initial operationalization in datasets on ERDDAP, Summer 2019 and later on NVS

Archiving with NCEI

1. **In place:** Complete CMOP fixed time series and largely automated monthly updates; some glider data.
2. **Ongoing:** DOGAMI beach profiles (coordinating with NCEI since Nov. 2018); UW NW Environmental Moorings pH sensor data (initial discussions with Zoli & team), to be followed by ORCA depth profiles.
3. **To do:** Initiate discussions with each NANOOS PI, to assess archiving procedures and develop plan and time frame for each dataset.
All 3 NANOOS models are integrated
Glider DAC: NANOOS & OOI

NANOOS on Glider DAC:
- UW La Push, CMOP SW WA, OSU Trinidad Head.
- Well positioned to enable near-real-time submissions to Glider DAC once La Push and CMOP SW WA gliders are deployed.
- New NVS Glider App for CMOP glider is needed.

NVS Glider Apps for OOI gliders
- Beth Curry (UW APL) and others actively working on this!
- Targeting 2-3 glider transects.
NANOOS ERDDAP

- ERDDAP provides data browsing, visualization and download that’s highly flexible and reasonably user friendly, for technical users
- Enables automated data access
- IOOS has adopted ERDDAP as the new, recommended approach for distributing data interoperably, specially in-situ data. Previous recommended service (SOS) will be deprecated over next 12 months.
- NANOOS test ERDDAP in place. Expected public release this Summer.
- Another NANOOS ERDDAP is deployed at OSU (Craig Risien), used for development and internal data distribution.
- Planned datasets to be included:
  - Long time series from stations, from NANOOS and others: NDBC and CDIP time series and climatologies, from Jon and Craig; CMOP complete time series; other NANOOS station time series, as they become available.
  - Glider data, from NANOOS and OOI (via Glider DAC)
  - Biological datasets, as available
  - NANOOS model output
  - Remote sensing and other gridded data products
  - Beach profiles
  - Near-real-time data store from local and regional stations on NVS
  - Cruise data
Other Activities

**Biological Data**

1. IOOS support for enabling interoperable regional biological datasets
   
   a. Goal to distribute the datasets via ERDDAP and submit to MBON Portal (https://mbon.ioos.us) and OBIS (https://obis.org), using IOOS data standards and procedures for data sharing.

   b. UW Pelagic Ecosystem Functions (PEF) dataset, Salish Sea. Should be ready by early Fall.

   c. Other potential target: OR Newport line, NOAA NWFSC, Jennifer Fisher.

2. Support continued into FY19

**Ocean Acidification Data**

New NANOOS portal Data/DMAC page by early Fall
New or Enhanced Assets, next 12 months

1. OOI
   a. Substantially enhanced representation of all moorings (more sensors), and easier to maintain in the future.
   b. Depth profilers
   c. Gliders (as mentioned)

2. NEMO profiler
   a. Profiles expected on NVS by September.

3. Gliders
   a. Redeployed CMOP and UW La Push gliders. New NVS Glider App for CMOP glider

4. Reconnect with Stillaguamish Tribe, to find telemetry and data access solution for their Port Susan mooring?

5. Others, as they arise.
NANOOS Outreach, Engagement, & Education

NANOOS Joint PI and Governing Council Meeting
August 1, 2019

Paul Rudell, Operations Coordinator
Rachel Wold, Outreach Chair
Education:

NANOOS goal is to increase ocean literacy

- NW Aquatic & Marine Educators Conferences
- Whidbey Watershed Stewards
- NOAA Science Camp
Outreach: engaging with the public

- Soundwaters – a ‘one-day university for all’
- Discover Science Weekend
- Curiosity Days: Climate Change
Outreach: targeted user groups

- Shellfish Growers
- Pacific Coast Shellfish Growers Association Meeting
- Maritime Industry
- Blue Forum – Washington Maritime Blue
- Recreational users
- OR and WA boat shows
- Salem Saltwater Sportsmen
- Illwaco Tuna Club
- Club meetings and conferences
Engagement: recreational users

- Tuna Fishers
  - Further developed Tuna Fishers App and Seacast
- Boaters
  - Visibility forecast
  - Click-anywhere capability
- Surfers
  - Worked directly with Surfrider and other users to refine app
  - Added CoastView content
Online presence

NANOOS Observer

Latest news and updates from NANOOS!

NANOOS and the Oregon Department of Geology and Mineral Industries have released a new mobile app! The brand new Tsunami Evacuation App provides easy access to tsunami hazard areas on the Oregon and Washington coasts. Whether you are a coastal resident...
Plan for Upcoming Year

Stay the course!!

• Continue to assist with development of web and mobile apps assuring ease of use and relevance to users

• Continue outreach to public and user groups in OR and WA
  • Develop stronger bonds with commercial maritime (e.g., USCG, pilots)

• Continue to enhance visibility of NANOOS information to a wider audience
4. Program Coordination

→ Krisa Arzayas, U.S. IOOS Program Office
→ Josie Quintrell, IOOS Association
→ Denis D’Armours, Canadian IOOS Pacific
→ Dwight Owens, Ocean Networks Canada
U.S. IOOS: Program Overview

Partnership effort that leverages dispersed national investments to deliver ocean, coastal and Great Lakes data relevant to decision-makers.

Global Component
- US contribution to Global Ocean Observing System (GOOS)
- 1 of 15 Regional Alliances of GOOS

National Component
- 17 Federal agencies

Regional Component
- 11 Regional Associations
  - Stakeholder driven
  - Academia, state/local/tribal government, private industry
Looking forward - importance of the ocean

- OceanObs’19 - Regional - Coastal - Global
- Essential Ocean Variables and Communities of Practice
- White House (OSTP) Science and Tech for America’s Oceans: A Decadal Vision
- UN Decade of Ocean Science for Sustainable Development
- US IOOS 20th Anniversary Kick Off at Ocean Obs ‘19
NOAA National Ocean Service
Estimated Enacted levels are ‘post rescission’ totals for each year
‘Request’ = the President’s Budget Request
FY20 House Mark is first, next is Senate Mark, then Conference…
IOOS Fill the Gaps Funding FY17-19

Fill the Gaps Funding By Function

- FY 2017: $970,000
- FY 2018: $2,623,000
- FY 2019: $3,391,250

- Gliders
- HF Radar
- Access Obs Info
FY2019 IOOS Highlights

- FY20 NOAA Strategies: Artificial Intelligence, Unmanned Systems, and ‘Omics
- OSTP Ocean Summit - November 2019
- ICOOS Act reauthorization
- NOAA Weather Act & NOAA Water Initiative
- CENOTE Act 2018 (Commercial Engagement Through Ocean Technology Act of 2018)
- Ocean Enterprise Study Reprise
- IOOS Advisory Committee
  - IOOS FAC public call Wednesday, August 21, 2019, 11:00 a.m. - 3:00 p.m. EST, see [website](#) for details.
- Filling gaps +$7.5M: Surface Currents, Gliders, Streamlined Access to observation information

Research and Development

- Ocean Technology Transition – new FFO ~late Aug 2019 for award in FY2020
- Coastal and Ocean Modeling Testbed COMT - Coastal / Ocean /Water Modeling, Forecasting, and Prediction
- ACT workshops for IOOS RAs and OAR Labs and Cooperative Institutes
INTEGRATION OF OCEAN AND COASTAL DATA FROM THE INTEGRATED OCEAN OBSERVING SYSTEM.—In National Weather Service Regions where the Director of the National Weather Service determines that ocean and coastal data would improve forecasts, the Director,..., shall—

(A) integrate additional coastal and ocean observations, and other data and research, from the Integrated Ocean Observing System (IOOS) into regional weather forecasts to improve weather forecasts and forecasting decision support systems; and

(B) support the development of real-time data sharing products and forecast products in collaboration with the regional associations of such system, including contributions from the private sector, academia, and research institutions to ensure timely and accurate use of ocean and coastal data in regional forecasts.

(C) support increasing use of autonomous, mobile surface, sub-surface, and submarine vehicle ocean and fresh water sensor systems and the infrastructure necessary to share and analyze these data in real-time and feed them into predictive early warning systems. (C was added with NIDIS reauth. Act S2200 in 115th Cong.)
Purpose: The AGM provides planning guidance for the execution of the IOOS Office’s resources. It conveys IOOS Office strategic direction.

FY20 Highlights:

- **Obs** - fill gaps in the Surface Current Observing network and deploying gliders (includes hurricane forecasting, HABS, etc.)
- **Obs and data** - integrate biological observations into IOOS
- **Transition and integrate new technology** into operations (OTT, ACT)
- **Data** - Improve real time data flow into National Centers for Environmental Prediction “data tanks”
FY20 Annual Guidance Memorandum

- **Modeling** - Develop a new NOS coastal modeling strategy with NOS offices and IOOS RAs
- **Modeling** - Develop a **cloud computing framework** to enable effective operational ocean model development and improvements.
- **Products and tools** - assess user satisfaction and economic benefit with IOOS data and information products and services.
- **Governance** - Support the U.S. IOOS Federal Advisory Committee as they formulate their work plan to guide the implementation of U.S. IOOS.
Great work NANOOS!

- Live Ocean Expands to Salish Sea
- Promoting Safe Boating Conditions with NVS Boaters App
- Submaran Deployment for HABs Forecasting
- Participation on NOAA Westwatch Webinars
- US West Coast Biological Observations Workshop
NANOOS Governance Council
Observing our oceans, coasts and Great Lakes
Providing information to those who need it,
when they need it

• Advocacy
• Common Issues
• IOOS federal/non-federal partnership
  • Administration
  • Congress
  • National Partners
• Emerging Issues
• Special Projects
Closing the Gaps: 5 yr Campaign

- Scalable campaign
- Tangible outcomes
- Align with Administration Priorities
- Filling targeted gaps in:
  - HR Radars
  - Gliders
  - And Moorings?
US IOOS FY 17 High Frequency Radar Request

$3.1 million to install 12 high frequency radar systems

SUCCESS!!
IOOS +$1.2M

- Safeguarding the Arctic Marine Highway
  2 remote radars needed

- Protecting Lives and Public Health in the Pacific Northwest
  3 radars needed

- Cleaning up the Great Lakes
  3 radars needed

- Saving Lives off Florida’s Coast
  2 radars needed

- Saving Millions in the Gulf of Mexico
  3 radars needed
## FY 20 Appropriations

### Appropriations Chart for NOAA’s National Ocean Service Regional IOOS

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* Funding included in the Navigation, Observations and Positioning funding line

** Includes $1.5m for Regional Ocean Partnerships
Reauthorization of the ICOOS Act of 2019

Senate - S 914  Marked up in Senate
House - HR 1314  Hearing held in House
S 933 – BLUE GLOBE Act
Sen Whitehouse (D-RI) and Murkowski (R-AK), S 933 would enhance ocean monitoring by enhancing interagency coordination, expanding ocean exploration, creating innovation prizes and ARPA O for Oceans

Ocean Acidification – House Passes 4 bills
HR 1237 - Coastal and Ocean Acidification Stressors and Threats (COAST) Research Act (Bonamici).
HR 1716 - Coastal Communities Ocean Acidification Act (Pingree) S 778 Senate Version (Murkowski)
HR 1921 - Ocean Acidification Act of 2019 (Kilmer)
HR 988 - National Estuaries and Acidification Research (NEAR) Act of 2019 (Kilmer)

National Ocean Partnership Program (NOPP)
Rep Panette (D-CA) introduced H.R. 3161 introduced in House to reauthorized the NOPP,

Senator Wicker (R-MS) S 1439 MARAD to strengthen public and private partnership for oceanographic research and education

Regional Ocean Partnership S 2166 Wicker, Cantwell
Establishes voluntary ROPs (including the West Coast Alliance) to coordinate science and data collection for large marine ecosystems.
Building Support in DC

GULF OF MEXICO CONGRESSIONAL BRIEFING
Are we better informed today than before Hurricane Katrina and the Deepwater Horizon Disaster? A discussion on the state of coastal observing in the Gulf of Mexico.

SENATE OCEANS CAUCUS BRIEFING
Coastal Innovations: Enhancing security, economy and the environment

SENATE OCEANS CAUCUS BRIEFING
Buoying our Nation’s Economy: The Role of Ocean Data in Supporting the Blue Economy
Integrated Ocean Observing System (IOOS) Supports a National Network of Certified Regional Observing Systems

IOOS is essentially the weather service for the coastal ocean and Great Lakes, providing the ability to "see" what is happening above and below the water surface and making these insights readily available.

IOOS consists of 17 federal agencies with 11 regional observing systems.

All 11 regional observing systems meet rigorous federal standards for governance and data management.

Why Certification Matters

- IOOS provides national consistency while addressing unique and diverse regional needs.
- IOOS provides ready access and preserves data with transparency and documentation.
- Certification enhances efficient interagency coordination at the regional and national level.
IOOS Coordination Meetings – March & Sept

Special Focus - Biology

HABs – HAB operational observing network
Fisheries – integration of NMFS data
Marine biodiversity - adoption of data standards (Darwin core)
Sound – acoustics
Ecosystem monitoring - ecosystem moorings, etc
New technologies - eDNA, IFCB, ESPs, etc
Stakeholder needs
Looking Forward

- Policy Meetings
  - IOOS Ex Comm and Program Office Leadership Discussion
    - Gaps Campaign and beyond
    - Funding decisions, building the network

- Economic Valuation

- Outreach Committee

- Ocean Obs 19 -- Hawaii 2019 – IOOS turns 20!

- HAB operational network

- 2020 All Hands Community of Practice
Thank you
5. Round Table for contributions from GC members

→ announcements
→ priorities
6. Discussion
7. PI reports

→ Payoff to date

→ Needs going forward
8. GC Business

→ Election
→ FFO process
→ Priorities
2017-8 NANOOS GC Board

Academic:
• Parker MacCready, UW, Governing Council Board Member for UW
• Mike Kosro, OSU, Governing Council Board Member for OSU (VICE CHAIR)
• Antonio Baptista, OHSU, Governing Council Board Member for OHSU

State:
• Carol Maloy, Ecology, Governing Council Board Member for Washington State Agencies
• Jon Allan, DOGAMI, Governing Council Board Member for Oregon State Agencies

Tribes:
• Paul McCollum, Port Gamble S'Klallam Tribe, Governing Council Board Member for Tribes
• Joe Schumacker, Quinault Indian Nation, Governing Council Board Member for Tribes

Federal:
• Kevin Werner, NOAA NWFSC, Governing Council Board Member for Washington Federal Offices
• Andy Lanier, Governing Council Board Member for Oregon Federal Offices

Industry:
• Margaret Barrette, PCSGA, Governing Council Board Member for Industry
• Andrew Barnard, WetLabs, Governing Council Board Member for Industry

NGO:
• Fritz Stahr, OIP, Governing Council Board Member for Non-Governmental Organizations
• Gus Gates, Surfrider, Governing Council Board Member for Non-Governmental Organizations

At Large:
• Paul Dye, WA Sea Grant, Governing Council Board Member At-Large
• David Martin, Retired, Governing Council Board Member At-Large (CHAIR)
2019 NANOOS GC Board Election

Academic:
• Parker MacCready, UW, Governing Council Board Member for UW
• Mike Kosro, OSU, Governing Council Board Member for OSU (VICE CHAIR)
• Antonio Baptista, OHSU, Governing Council Board Member for OHSU

State:
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• David Martin, Retired, Governing Council Board Member At-Large (CHAIR)
FFO process

• Discuss NANOOS GC priorities
• Solicit input from current PIs for sustaining current observations, modeling, DMAC, products, EEO, and operations
• Solicit input from all PIs for new ideas
• Use Executive Committee (Board plus functional Chairs, and ED) to rank and decide on final budget priorities
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![Bar chart showing data distribution across different categories.](image-url)
9. Wrap-up, Action Item review, and Adjourn