Northwest Association of Networked Ocean Observing Systems

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

IOOS

www.nanoos.org

Welcome!

1. Roll Call & Introductions,

2. Welcome and Call to Order

David Martin
NANOOS GC Board Chair

3. IOOS Recap and Introduction

Oriana Villar
U.S. IOOS Program Office

U.S. IOOS Program Updates

Oriana Villar
August 18, 2020

IOOS | EYES ON THE OCEAN™

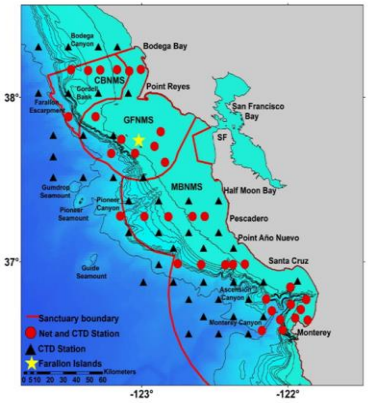
New Hires

- **Brian Zelenke** - Surface Currents Program Manager
- **Matt Biddle** - Data Management Analyst
- **Dr. Tracy Fanara -** Coastal Modeling Portfolio Manager

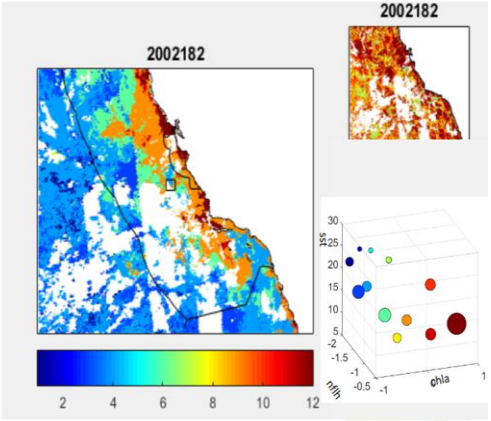
.

Marine Biodiversity Observation Network (MBON)

- Pacific Northwest (Northern California Current) MBON launched fall 2019
- Emphasis on plankton diversity, distribution, abundance and dynamics
- Tools include satellite observations, bio-optics, eDNA, Imaging FlowCytobot, plus traditional chemistry, zooplankton, fish abundance
- NANOOS to host data products
- PI Kavanaugh (OSU) also leading MBON US and global development of satellite-derived Seascapes, now produced on [CoastWatch]



•Net and CTD stations; 2-3 times during May and June
•Night midwater trawl, 15 min, headrope 30 m



•Dynamic seascapes classified from sst, nflh, and chl-a.
•1 km resolution; 8 day- monthly frequency

https://marinebon.org/

IOOS funding summary FY2020

FY20 $6.9M - 'National IOOS'

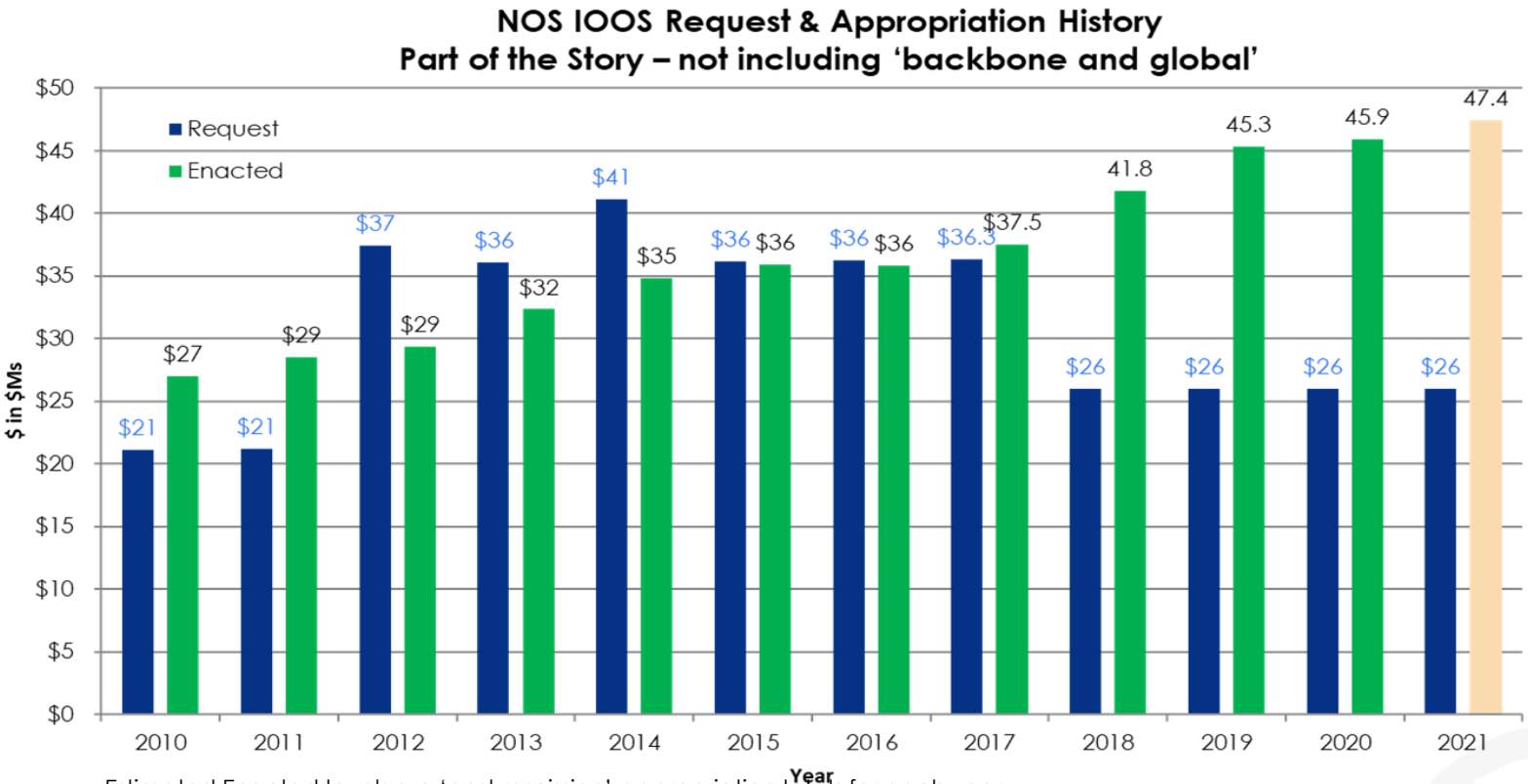
- Part of Navigation, Observations, and Positioning
  - Salaries and Benefits
  - Technical Service Contract
  - Office IT, operations, overhead
  - National Data Management Projects

FY20 $39M - IOOS Regional Observations

- Regional Association Cooperative Agreements (~$34M)
- Alliance for Coastal Technologies – Sensor Evaluation Program ($1M)
- Ocean Technology Transition Program ~$2.7M
- Coastal Ocean Modeling Testbed Program $~$1M (plus $1M leveraged)

FY20 ~$6M Other NOAA, BOEM, NASA, Navy/ONR, USGS etc.

U.S. IOOS Enacted and President's Budgets FY10-21



Estimated Enacted levels are 'post rescission' appropriation totals for each year
'Request' = the President's Budget Request
NOAA National Ocean Service - Navigation, Observations, and Positioning
'National IOOS' component FY21 House Mark $6.9M & 'Regional IOOS Observations' $40.5M
FY21 House Mark is first, next is Senate Mark, then Conference.

Thank you!

4. IOOS Association Recap

Josie Quintrell
IOOS Association

NANOOS General Council Meeting

Josie Quintrell
IOOS Association
08/18/2020

IOOS ASSOCIATION

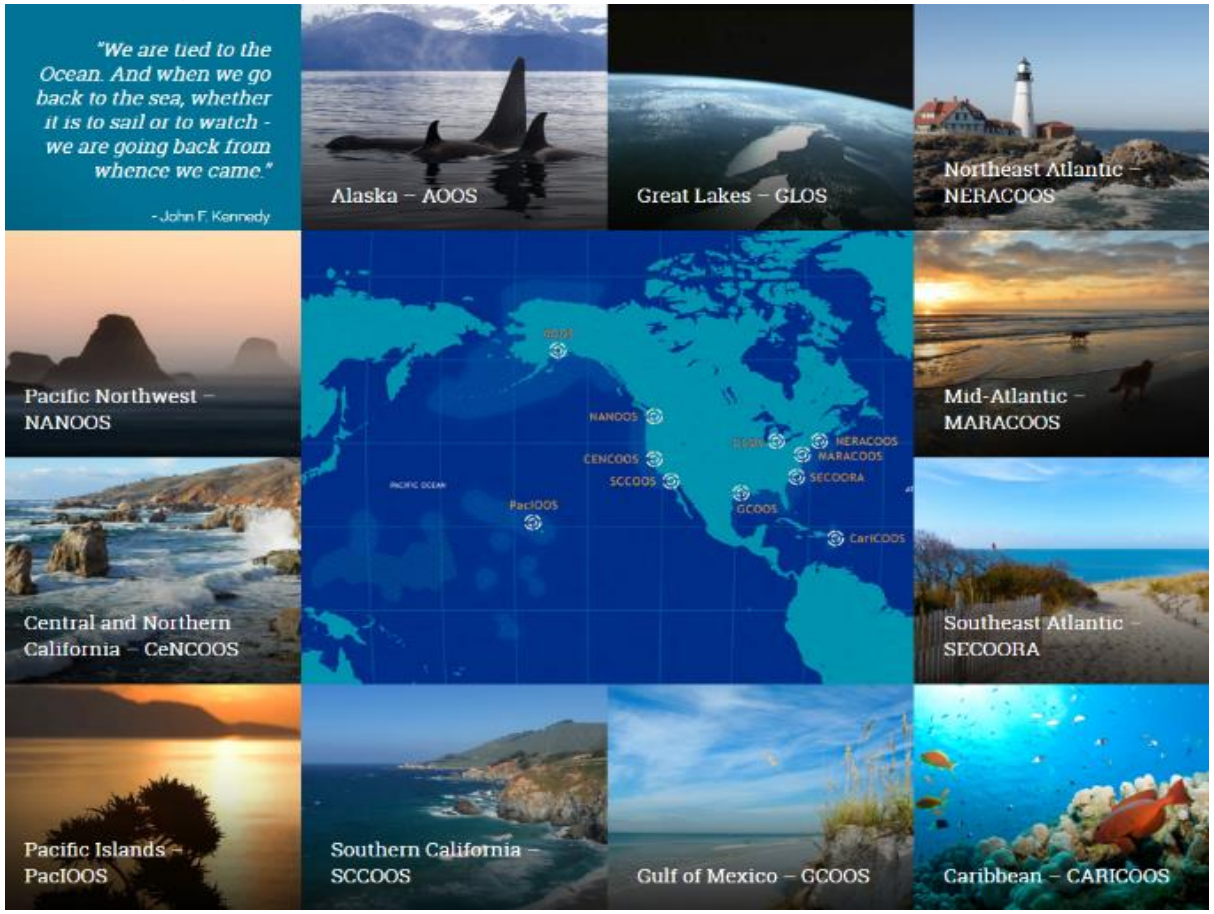
IOOS Association

- **Advocacy**
- **Common Issues**
- **IOOS federal/non-federal partnership**
  - ***Administration***
  - ***Congress***
  - ***National Partners***
- **Emerging Issues**
- **Special Projects**

<u>NANOOS Board Members:</u>

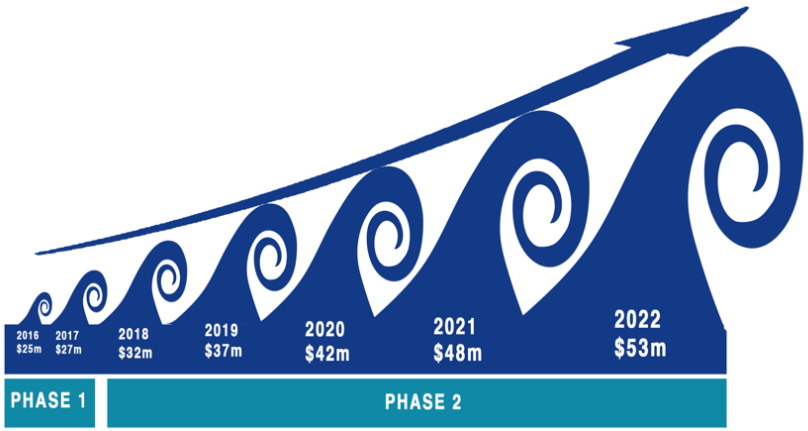
- **Jan Newton, Secretary**
- **David Martin**

Observing our oceans, coasts and Great Lakes
Providing information to those who need it, when they need it

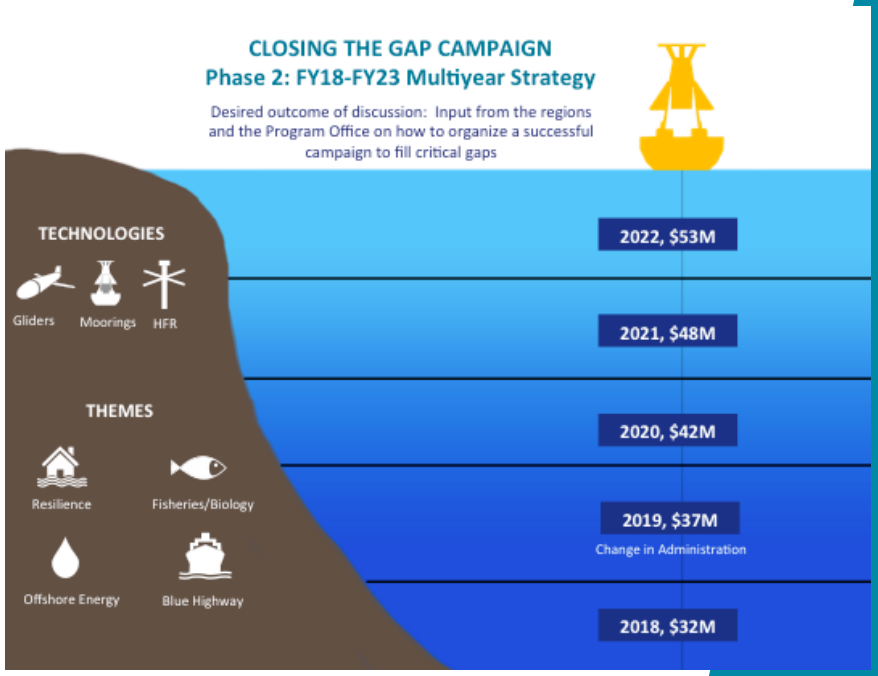


IOOS ASSOCIATION

IOOS Association: Fill the Gaps Congressional Campaign



- Scalable campaign
- Tangible outcomes
- Align with Administration Priorities
- Filling targeted gaps in:
  - HR Radars
  - Gliders
  - Streamlining observations



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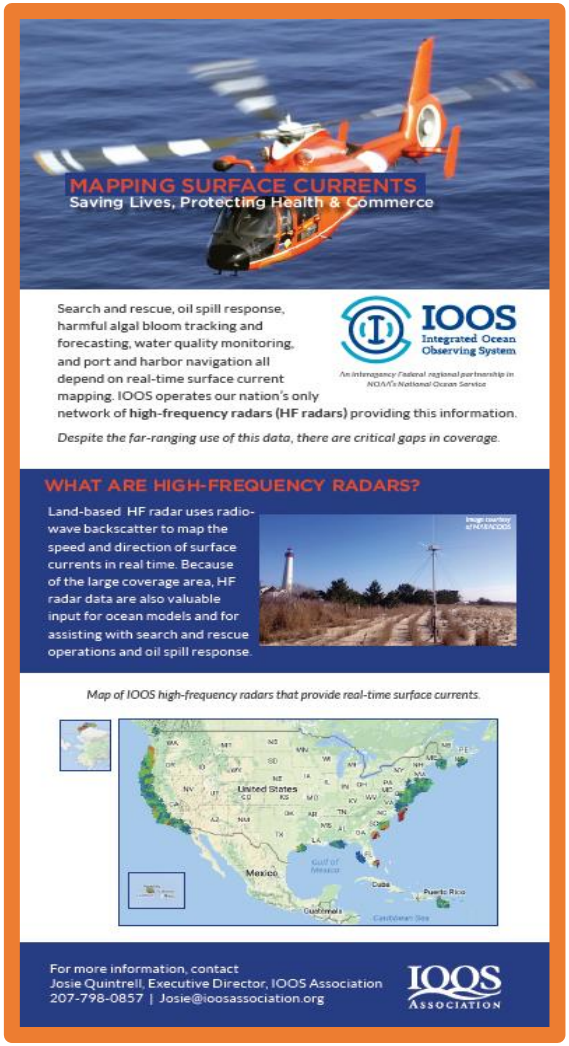
FY 17-21 Request:

Scalable requests each year for HFR, Gliders based on regional needs

From 2017-20:

Increase ~$8.5M



MAPPING SURFACE CURRENTS

Saving Lives, Protecting Health & Commerce

Search and rescue, oil spill response, harmful algal bloom tracking and forecasting, water quality monitoring, and port and harbor navigation all depend on real-time surface current mapping. IOOS operates our nation's only network of **high-frequency radars (HF radars)** providing this information.

Despite the far-ranging use of this data, there are critical gaps in coverage.

IOOS Integrated Ocean Observing System

An interagency Federal-regional partnership in NOAA's National Ocean Service

WHAT ARE HIGH-FREQUENCY RADARS?

Land-based HF radar uses radio-wave backscatter to map the speed and direction of surface currents in real time. Because of the large coverage area, HF radar data are also valuable input for ocean models and for assisting with search and rescue operations and oil spill response.

Map of IOOS high-frequency radars that provide real-time surface currents.

For more information, contact
Josie Quintrell, Executive Director, IOOS Association
207-798-0857 | Josie@ioosassociation.org

IOOS Association

Seeing Underwater with Coastal Gliders

Saving Lives, Protecting Health & Promoting Commerce

IOOS gliders provide data to support a range of operations including improving hurricane warnings, detecting harmful algal blooms, ensuring safe navigation, supporting offshore energy operations, fishermen and fisheries management and enhancing public health and safety.

IOOS Integrated Ocean Observing System

An interagency Federal-regional partnership in NOAA's National Ocean Service

Gliders are underwater robots that relay information about subsurface conditions. The U.S. Navy estimates gliders are 1/100th of the cost of ship-collected data. Gliders are revolutionizing ocean observing by being cost effective, safe and flexible.

IOOS FY 18 GLIDER REQUEST: $3.3m

Where our nation needs gliders to support safe navigation, public health and safety, and the economy:

Great Lakes: Protecting Drinking Water

Over 35 million people depend on the Great Lakes for their drinking water. Gliders provide the flexibility to focus on issues impacting local areas and to better predict the risk of harmful algal blooms (HABs).

Northeast: Enhancing Maritime Industry By Reducing Endangered Right Whale Collisions

Ship strikes and fishing gear entanglements threaten the endangered right whales. Gliders equipped with acoustic sensors can detect the whales and alert mariners and fishermen in real time about the location of the whales, thus minimizing impacts.

Mid-Atlantic: Protecting Lives and Property From Hurricanes

Gliders are a safe method for seeing below the surface of the coastal ocean, where strong winds stir cold water upwards, affecting the intensity of the storm. Such information improves warnings that can protect lives and property.

Southeast: Saving Lives, Supporting Fisheries and Detecting HABs

Information gathered from gliders along the Southeast coast is critical for predicting riptides, optimizing fisheries management models, improving hurricane intensity forecasts and detecting marine mammals and HABs.

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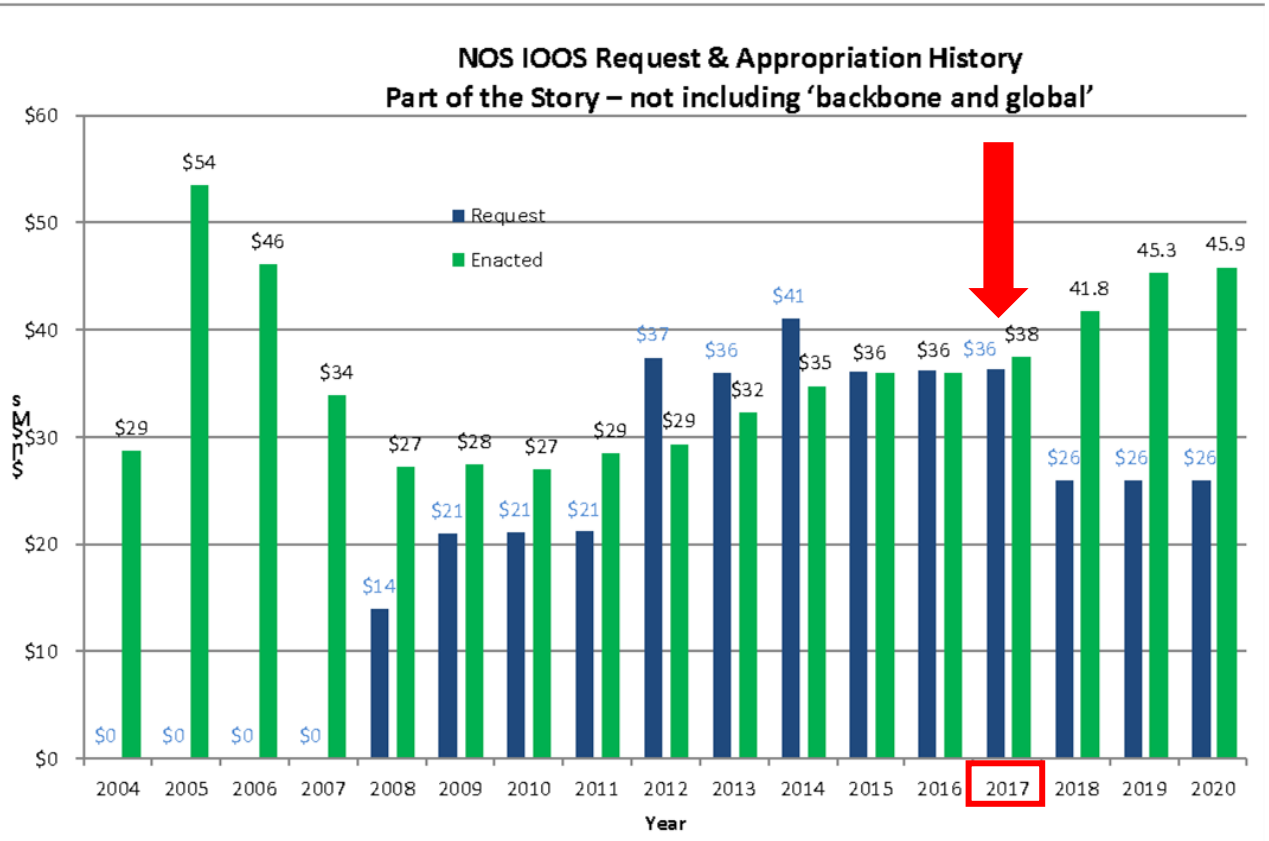
U.S. IOOS Enacted and President's Budgets FY04-20

- **NOAA National Ocean Service - Navigation, Observations, and Positioning: 'National IOOS' component FY20 Omnibus $6.9M & 'Regional IOOS Observations' $39M**
- **Gaps Campaign started in FY17**



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FY 21 Appropriations

House Mark:

- $40.5 M
- Up $1.5M from FY20
- $2M for HAB observing network

Senate: TBD

House Report Language

- The Committee supports IOOS's efforts to expand its use of underwater gliders and encourages NOAA to fill critical gaps in the current surface mapping system and to ensure streamlined access to data for weather forecasting, detection of ecological phenomena, and safe maritime operations.
- The Committee provides $2,000,000, from within the funds allocated for IOOS, to continue and expand the pilot program launched in fiscal year 2020 for IOOS to enhance the nation's capacity for monitoring and detection of Harmful Algal Blooms (HABs) by leveraging the expertise of the IOOS regional associations—including through expanding the deployment of in-situ observing assets— in order to improve HABs warning and forecast accuracy. IOOS is directed to coordinate with the National Centers for Coastal Ocean Science on the implementation of these funds. "

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COVID Impacts

- **Highlighted vulnerability of system to interruptions**
- **Request to build resiliency to system: Aging infrastructure**

Economic Stimulus - $25M

- **'In the pipeline projects' for maritime transportation, weather, sea level rise, ecological health (HABs), fisheries and coastal hazards.**

Immediate Needs for Resiliency: $25 million for restoring, sustaining, and building resiliency for critical observations in support of weather forecasting, safe and efficient marine operations, and search and rescue missions.

IOOS works as an integrated system of a variety of observing platforms, but to restore mission critical operations impacted by COVID-19 and continue protecting lives and livelihoods, we request support specifically for our radars, buoys, and gliders.
This includes:

- $12 million for high frequency radars
  - Supporting maritime commerce and at-sea safety
- $7 million for gliders
  - Supporting accurate weather forecasting including hurricanes
- $6 million for coastal moorings
  - Supporting accurate weather forecasting and real-time data for weather forecast offices

Figure 1. IOOS operates the nation's only network of land-based high-frequency radars (pictured above) that provide continuous, real-time mapping of the speed and direction of surface currents in coastal waters.

Longer Term Resiliency

COVID-19 further exposes gaps and weaknesses in our infrastructure and their negative impacts on life and the economy. For the IOOS system to achieve full resiliency, estimated costs are $75.65 million over the next 1-3 years.

The estimated cost for full resilience of the integrated system, by subsystem is:

- $32 million for high frequency radars
- $11.57 million for gliders
- $25 million for coastal moorings
- $5 million for shore stations, including water levels and met stations
- $2.15 million for modeling/computing capacity

In support of the U.S. Integrated Ocean Observing System

Alaska (AOOS) • Caribbean (CariCOOS) • Central and Northern California (CeNCOOS) • Great Lakes (GLOS)
Gulf of Mexico (GCOOS) • Pacific Islands (PacIOOS) • Mid-Atlantic (MARACOOS) • Northeast-Atlantic (NERACOOS)
Pacific Northwest (NANOOS) • Southern California (SCCOOS) • Southeast-Atlantic (SECOORA)

Learn More: Josie Quintrell | josie@ioosassociation.org | www.ioosassociation.org

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ICOOS Reauthorization

Other Bills :

- NOPP
- Aquaculture bill
- BLUE GLOBE
- Ocean Exploration
- HABRCA

House: *HR 729 – passed House 12/2019*

- Straight reauthorization with 3 amendments:
  - Allows Feds to serve on RA Board
  - Clarifies language regarding interagency financing
  - Authorization: $47.5 M for FY21-FY25

Senate: *S 914 PASSED!*

- Updated language and purpose
- Add glider, HFR studies and OA
- Authorization levels:
  - FY21 $48M
  - FY22 $50M
  - FY23 $52M
  - FY24 $54M
  - FY25 $56M

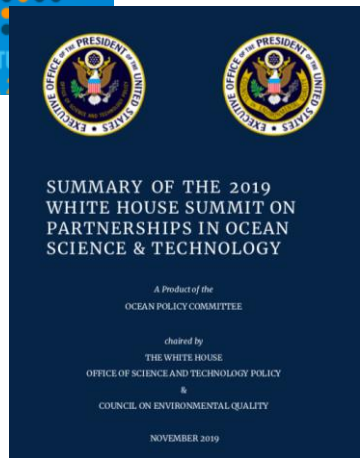
IOOS Association

National and International

- **UN Decade**
- **OceanObs'19**
- **National Outreach**
- **EO on Mapping**
- **EO on Aquaculture**
- **NOAA's Strategies**

UN Decade

OceanObs'19



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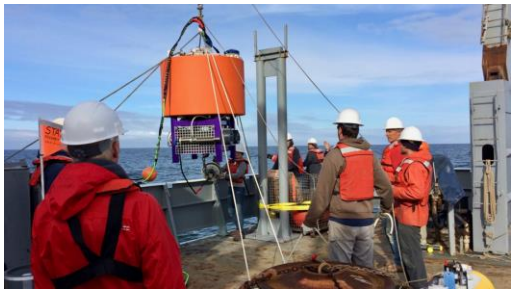
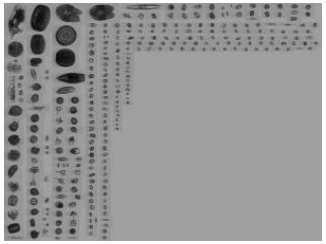
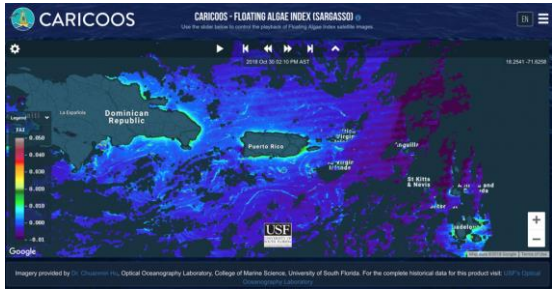
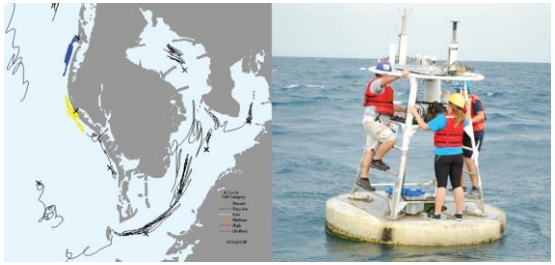
Harmful Algal Blooms (HAB)

- IOOS and NCCOS are partnering to advance HAB research into operations
  - IOOS Regional Association HAB initiatives - http://www.ioosassociation.org/habs-initiatives
- Collaboration with NCCOS/MERHAB on transition planning for Pacific Northwest HAB Bulletin
- Funding for new HAB detection technologies through the OTT Program - https://ioos.noaa.gov/project/ott-habs-hypoxia/
- FY20 included $1M to pilot five HAB observing network projects - AOOS, NANOOS, SCCOOS/CeNCOOS, GLOS, GCOOS



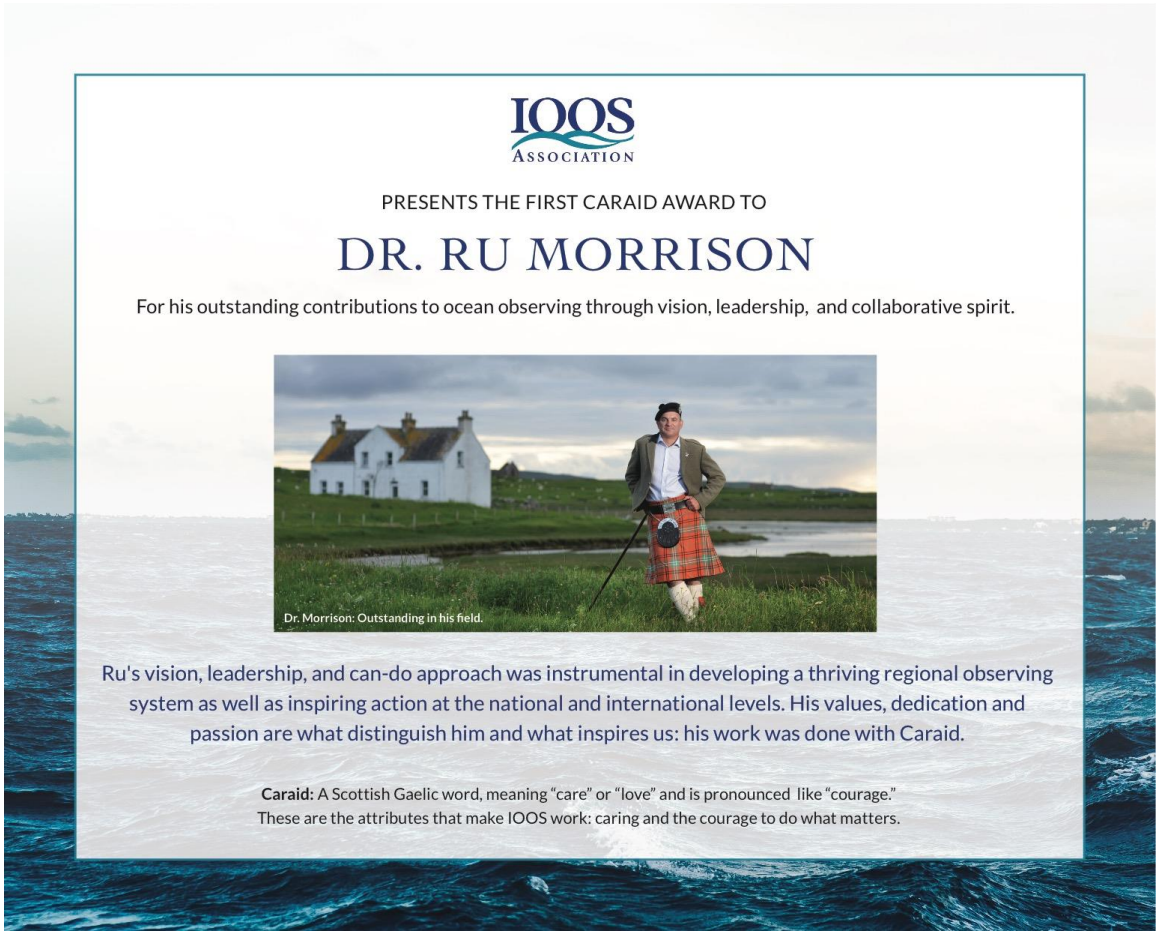






CARAID Award

Annual award to recognize outstanding contributions to coastal and Great Lakes observing through collaboration



IOOS ASSOCIATION

Other Projects

IOOS Association Annual Meeting

Friday, Oct 9

10 am – 1 pm PT

- Association Strategic Planning Process-
  - Looking Forward to the Next Decade
- IOOS Economic Valuation
- IOOS/OAR Collaboration Workshop -
  - Pacific Basin - Aug 25-26
  - Atlantic - June 30 – July 1
  - Great Lakes – Oct 6-7
- HAB Observing Network: Framework for implementation
- Diversity and Inclusion Discussion
  - Supporting regional efforts,
- FY 22 Appropriations Request
- Infrastructure/stimulus request

IOOS ASSOCIATION

Thank you!

IQOS
ASSOCIATION

5. NANOOS Recap

Jan Newton
NANOOS Executive Director

Northwest Association of Networked Ocean Observing Systems

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

IOOS

www.nanoos.org

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 Governing Council Members 8/2020

NORTHWEST ASSOCIATION OF NETWORKED OCEAN OBSERVING SYSTEMS

WASHINGTON - OREGON - NORTHERN CALIFORNIA

IOOS

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

KEY: Tribal | Industry | NGO | Academia/Research | Federal/State/Local Government

NANOOS Objectives for FY2020

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**
FY10: $1.7M + 0.4M = **$2,100,000**
FY11: **$2,087,500** *(w/ new start date)*
FY12: **$2,428,291** ($2,288,000 base; ~$140K for DMAC, OA workshops)
FY13: **$3,089,477** ($2,392,136 base; ~$700K for OTT on OA plus OAP)
FY14: **$2,818,441** ($2,442,136 base; $109K HF; $217K OAP; $50K glider)
FY15**:** **$2,771,890** ($2,462,136 base; $309K OAP)

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
FY 20: **$3,923,322** ($2,462,136 base; $546K add to base; $373K OA; $250K HABs; $292K adds)
Year 14 or 5

FY 20: **$3,923,322** ($2,462,136 base; $546K add to base; $373K OA; $250K HABs; $292K adds)

Adds to base

- $150,000 for Columbia glider O&M
- $150,000 for La Push glider O&M
- $80,000 for WA HFR O&M
- $75,000 for offshore buoys
- $91,000 for HAB ESP Spring deployment

OA

- $123,895 for NANOOS ocean acidification observations in Oregon coastal waters (OSU)
- $66,291 for NANOOS ocean acidification observations in Washington coastal waters (UW)
- $90,000 to enhance the GOA-ON data portal as an OA dashboard to the world (UW)
- $80,000 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

- $250,000 HAB understanding and prediction as part of HAB-ON
- $16,500 for biology pilot projects in honor of Matt Howard on biological data stewardship
- $7,500 for OceanHackWeek 2019 (Mayorga)
- $160,000 for Columbia River extension of Salish Sea model (Khangaokar)
- $108,000 for CRITFC for observation, modeling, DMAC activities

COVID-19

- NANOOS, our PIs, and partners are adapting to the challenges presented by COVID-19 as presented in our latest six-month NANOOS Progress Reports. Primary impacts are from delayed research cruises and supply chain disruptions;
  - Delayed La Push and Columbia glider deployments; Trinidad glider suffered casualty; all anticipated later this year
  - Delayed first WA HF installation; initiated on week of 10 August
- Observation asset deployment and maintenance has resumed with strict COVID-19 screening prior and concluding any at-sea activities, and with field teams wearing additional Personal Protective Equipment (PPE) to ensure crew safety.
- NANOOS continues providing sustained ocean observations and is working with its members' virtually further the scientific and operational design and maintenance of the Pacific Northwest regional ocean observing system.

HFR installation at Westport Beach State Park!!

Installation has started !!!
Congrats Mike Kosro and team

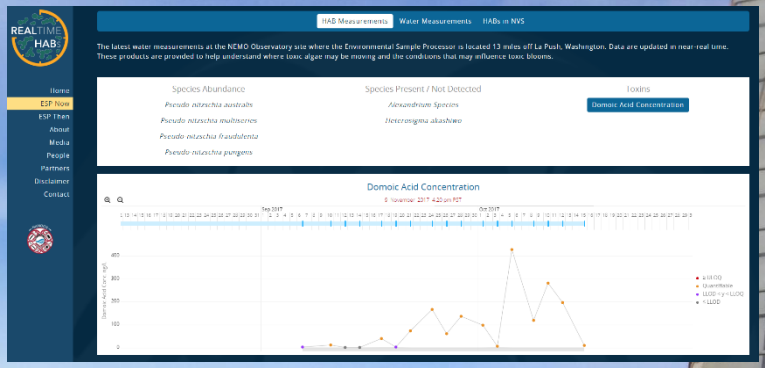
New NVS-TsunamiEvac phone app

- A major update receives push notifications from the National Tsunami Warning Center that may include information statements on distant earthquakes, tsunami advisories, watches, or warnings.
- The NVS Tsunami Evacuation Zone App was highlighted in a newsletter produced on behalf of the National Tsunami Hazard Mitigation Program. NANOOS PI Jon Allan provided a retrospective on the 10-year development of the NVS Tsunami web app and smartphone application, highlighting the strong collaborative approach taken by NANOOS, DOGAMI and WA DNR to ensure easy access to critical life safety information (tsunami evacuation zones and warning information) for the PNW region.
- The process and app product were successful because strong stakeholder input guided its development and because of the strong partnerships.

HABs highlighted in FY20

- Funds for HAB-ON and preserving PNW HAB Bulletin, now on NANOOS
- Operational funds for additional ESP deployment in spring 2021
- OTT award for additional HAB sampling

Operational ecological forecasting of PNW harmful algal blooms using an Environmental Sample Processor



MERHAB award:
Operational funds for 4 years

Pacific Northwest Harmful Algal Blooms Bulletin

May 19, 2020 HAB risk = ✔

HAB risk key:

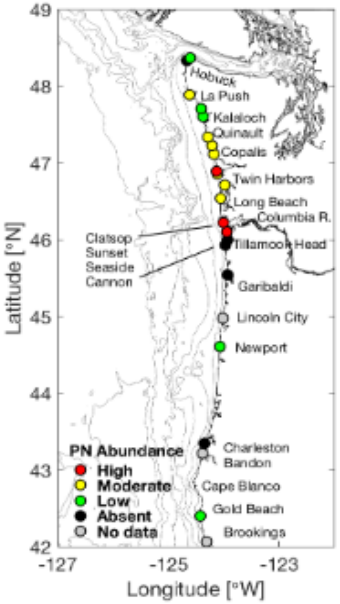
- ✔ = low
- ⚠ = medium
- ✖ = high

JISAO | School of Oceanography, University of Washington

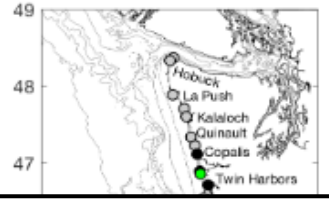
ORHAB Partnership

Beach Sampling

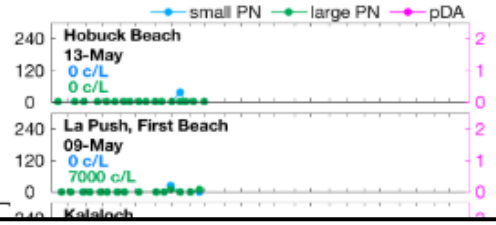
(*Pseudo-nitzschia*)



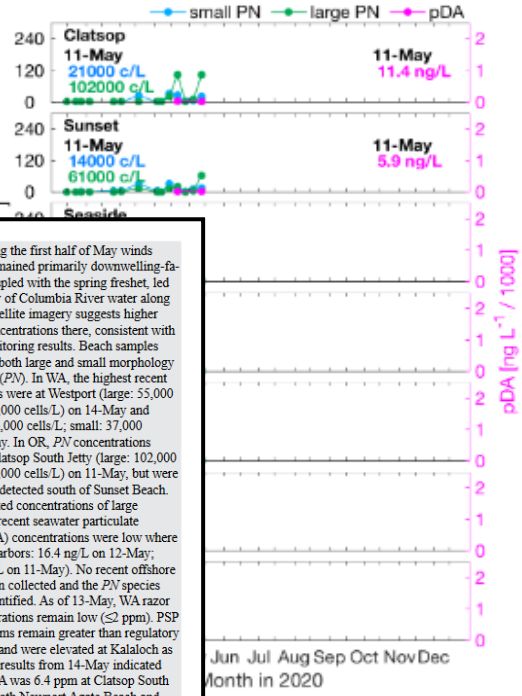
(particulate domoic acid)



WA *Pseudo-nitzschia* & Domoic Acid

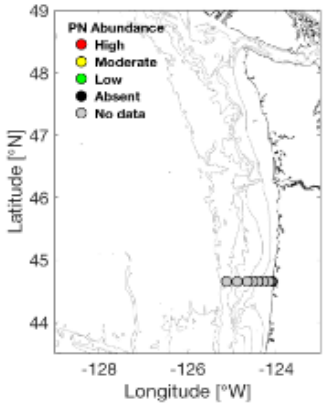


OR *Pseudo-nitzschia* & Domoic Acid

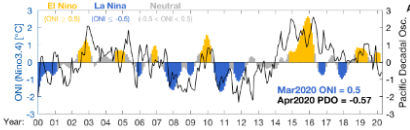


Offshore Sampling

(*Pseudo-nitzschia*)

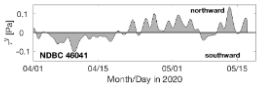


Pacific Ocean Indices

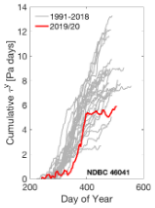


Research has shown that toxic HAB events off WA and OR tend to occur during or following periods of El Niño and/or positive phases of the PDO, when ocean temperatures are relatively warm.

North-south Wind Stress

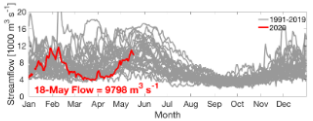


Cumulative Wind Stress



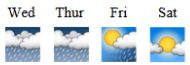
Southward wind stress drives coastal upwelling that can lead to plankton blooms. Northward wind stress tends to push any existing offshore plankton and toxins towards beaches. In addition, summer/fall toxic blooms often occur in years with a moderate cummulative upwelling index (i.e. during years with fluctuating winds) rather than in years with sustained upwelling or downwelling winds.

Columbia River Discharge



The Columbia River plume can help transport HABs and toxins from the south, northward along the WA coast. However, the plume can also serve as a protective barrier by preventing offshore toxins from reaching beaches.

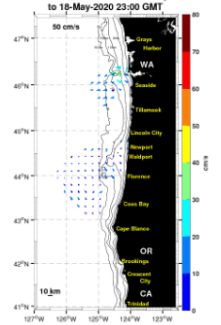
Marine Weather Forecast



Wed - W wind, 15 kt
Thur - NW wind, 15 kt
Fri - NW wind, 15 kt
Sat - SW wind, 10 kt

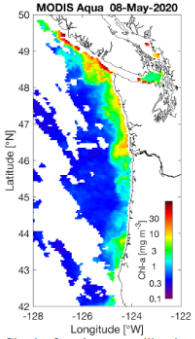
Fair weather can support plankton blooms whereas storms can concentrate any plankton and toxins on beaches.

Ocean Surface Currents



Primary currents flow north and south in winter and summer, respectively, except within ~10 km of shore, where fluctuations follow changes in wind direction.

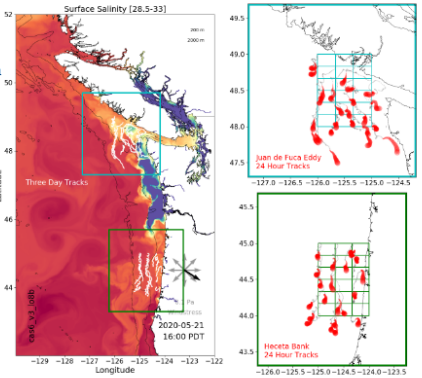
Satellite Chlorophyll-*a*



Clouds often obstruct satellite views, but the extent of phytoplankton blooms can at times be seen from space. Blooms do not necessarily reflect the presence of toxins.

LiveOcean Forecast Model

Model predicted sea surface salinity with particles released near the Juan de Fuca eddy and Heceta Bank and tracked three days into the future.



Summary - During the first half of May winds fluctuated, but remained primarily downwelling-favorable. This, coupled with the spring freshet, led to a large quantity of Columbia River water along the WA coast. Satellite imagery suggests higher chlorophyll-*a* concentrations there, consistent with recent beach monitoring results. Beach samples confirm a mix of both large and small morphology *Pseudo-nitzschia* (*PN*). In WA, the highest recent *PN* concentrations were at Westport (large: 55,000 cells/L; small: 20,000 cells/L) on 14-May and Copalis (large: 26,000 cells/L; small: 37,000 cells/L) on 18-May. In OR, *PN* concentrations were highest at Clatsop South Jetty (large: 102,000 cells/L; small: 21,000 cells/L) on 11-May, but were much lower or undetected south of Sunset Beach. Despite the elevated concentrations of large morphology *PN*, recent seawater particulate domoic acid (pDA) concentrations were low where sampled (Twin Harbors: 16.4 ng/L on 12-May; Clatsop: 11.4 ng/L on 11-May). No recent offshore samples have been collected and the *PN* species have not been identified. As of 13-May, WA razor clam DA concentrations remain low (≤2 ppm). PSP levels in razor clams remain greater than regulatory limits at La Push and were elevated at Kalaloch as of 8-May. In OR, results from 14-May indicated that razor clam DA was 6.4 ppm at Clatsop South Jetty, 12 ppm at both Newport Agate Beach and Coos Bay North Jetty sites, and 24 ppm at Gold Beach. Near Humboldt, CA, recent reports indicate that seawater DA has been increasing, consistent with an ongoing *PN* bloom; razor clams there continue to contain dangerous levels of DA.

Forecast - ENSO neutral conditions continue, and are expected to persist through summer and fall. The recent PDO value remains negative. High pressure offshore will lead to generally southeastward winds this week. The LiveOcean forecast suggests some upwelling, with nearshore currents turning southward. Northward winds are forecast for the weekend, but high pressure is expected to build next week which should drive additional upwelling. Given this, we do not anticipate rapid changes in the state of the coastal ocean. The current low pDA concentrations are encouraging. The short-term perceived risk of a large DA outbreak remains low, but managers should reassess with updated *PN* and pDA results as the weather changes, particularly during any extended duration harvests. Given the elevated seawater DA levels in northern CA, managers should continue diligent monitoring in southern OR.

sing light microscopy. Threshold
nal testing for seawater particulate
ish such as razor clams. Sampling
gy; *moderate:* > 1/3 threshold; *low:*
t there were no data within the
eaches are shown in the upper right
ervals during late summer/early
essor (ESP) that is moored off La

hington Department of Health, the
s in shellfish collected from each
ormation presented here aids
le of toxin outbreaks as well as

OTT Award !

The IOOS Ocean Technology Transition Program awarded $1M over 3 years to UW, OSU, Ocean Aero and NOAA NWSFC partners to enhance and deploy an Ocean Aero ASV to collect offshore HAB samples in Washington and Oregon. The enhanced Ocean Aero ASV will augment existing HAB sampling efforts by collecting water samples in rough weather conditions, common during peak HAB seasons of early spring and fall, that would prohibit sampling by small vessels. In addition to acting as an early warning system, this sampling will provide valuable measurements to the Pacific Northwest (PNW) HAB Bulletin, ground-truthing and increasing the accuracy of HAB forecasts and providing essential measurements of toxin concentration.

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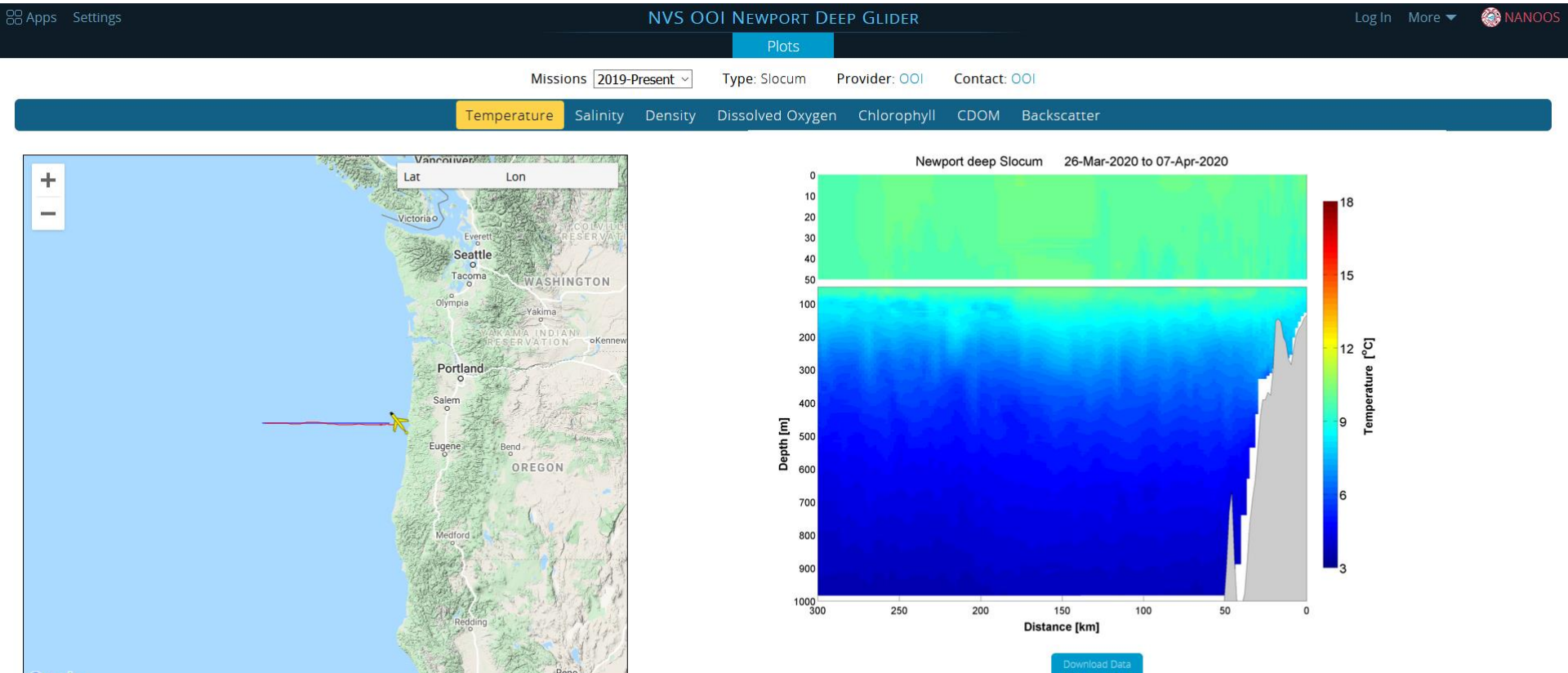
OOI glider data on NANOOS

Ocean Observatories Initiative (OOI) Newport Hydrographic Line glider data are available via NVS for temperature, salinity, and bio-chemical data and links to the IOOS Glider DAC where users can download these data. This collaboration between OOI and NANOOS builds upon previous work to include near real-time OOI mooring observations in the NVS Data Explorer.

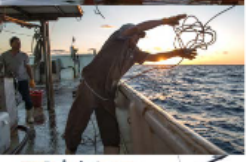


Enabling Change Working Group

- Seven people volunteered to help NANOOS develop actions to increase our diversity, equity, and inclusion.
- Our first call was July 24th and we plan to meet monthly.
- Solutions are not quick or easy, but some ideas are gelling; we know we need to work to achieve the results we want.

NORTHWEST ASSOCIATION OF NETWORKED OCEAN OBSERVING SYSTEMS

NANOOS enhances health, safety and economic prosperity in the Pacific Northwest



FISHERIES SCIENCE and COMMERCE

"I start my work day every day, by visiting the NVS data explorer for the latest real time data and modelling forecasts. NANOOS and the NVS data explorer have become a routine resource and are an incredible benefit to the management and mitigation of Harmful Algal Blooms along Washington's outer coast for ORHAB. One stop shopping to open-access mooring data, satellite imagery, and UW's LiveOcean model have been instrumental in advancing ORHAB's understanding of ocean processes and harmful algal bloom development along Washington's outer coast."

– Anthony Odell, Research Analyst Lead, Olympic Region Harmful Algal Bloom (ORHAB) Monitoring Partnership-University of Washington/Olympic Natural Resources Center

"The NANOOS Visualization System is an essential tool for the shellfish industry and provides critical real time data to aid in decisions surrounding harvests, food safety and hatchery operations. Having immediate access to this information throughout the summer allows us to ensure the highest degree of confidence that our forecasting and harvest schedules are in accordance with the best practices and State vibrio control plans. As an industry, we'd greatly benefit from an expansion of the program and increase in monitoring sites to help us utilize this technology for safe and profitable resource use ."

– Justin Stang, Wholesale Manager, Hama Hama Company

"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 fishers 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

"As an ocean sport fisherman, I want to give a huge shout out to the team at NANOOS. The NVS Tuna Fisher application has given myself and other sport boats the ability to narrow our search area for the fish we seek. As a sport halibut fisherman, wave height, wind and current direction are very important in how far we travel off shore as well as setup for fishing. Your tools provide us the ability to glimpse hours out into the day before I leave the dock to ensure I have the best knowledge possible on where to go, but more importantly, whether or not to go. As a new albacore fisherman, I read the information provided on your site discussing chlorophyll and what it meant for tuna. I was then able to use your chlorophyll and sea surface temperature maps to target an area I thought may be productive. Using the GPS coordinates from your mapping product, I reached out to an acquaintance who operates a tuna charter boat. I asked the captain if he could help direct me to an area that he felt would be productive on that particular day. Much to my surprise, he gave me coordinates about 1 NM from where I had planned to start. The education I have received from your tools has paid off greatly, saving us time and money. Lower fuel consumption is good for all of us. We love your toolset. Keep up the great work."

– Wallace Coon, F/V *Kimberlie Marie*, Oregon Resident

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IOOS in the Pacific Northwest

IOOS Integrated Ocean Observing System

Jan Newton | NANOOS Executive Director | (206) 543-9152 | janewton@uw.edu

NORTHWEST ASSOCIATION OF NETWORKED OCEAN OBSERVING SYSTEMS

NANOOS enhances health, safety and economic prosperity in the Pacific Northwest

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 Kozlowski, 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

RECREATION SAFETY

"For Pacific Northwest boaters crossing the Strait of Juan de Fuca or the Strait of Georgia, real time data on wave heights, wind speeds, and other meteorological information can be invaluable. To time such passages optimally and safely requires a knowledge of the sea conditions actually present at the time of the decision to set sail. A VHF weather broadcast, which is hours old can be inadequate when compared to the immediacy of the data available through the NANOOS NVS system."

– Captain Lincoln Rutter, S/V *Sajal*

"The NANOOS surfer application provides the most comprehensive assemblage 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."

– Gus Gates, Washington Policy Manager, Surfrider Foundation

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Jan Newton | NANOOS Executive Director | (206) 543-9152 | janewton@uw.edu

NANOOS pays annual $1000 non-federal dues to IOOS Association, split by:

- Seabird Scientific
- Pacific Coast Shellfish Growers Association

THANK YOU!!!

NANOOS Standing Committees

- User Products
- DMAC
- Engagement, Outreach, Education

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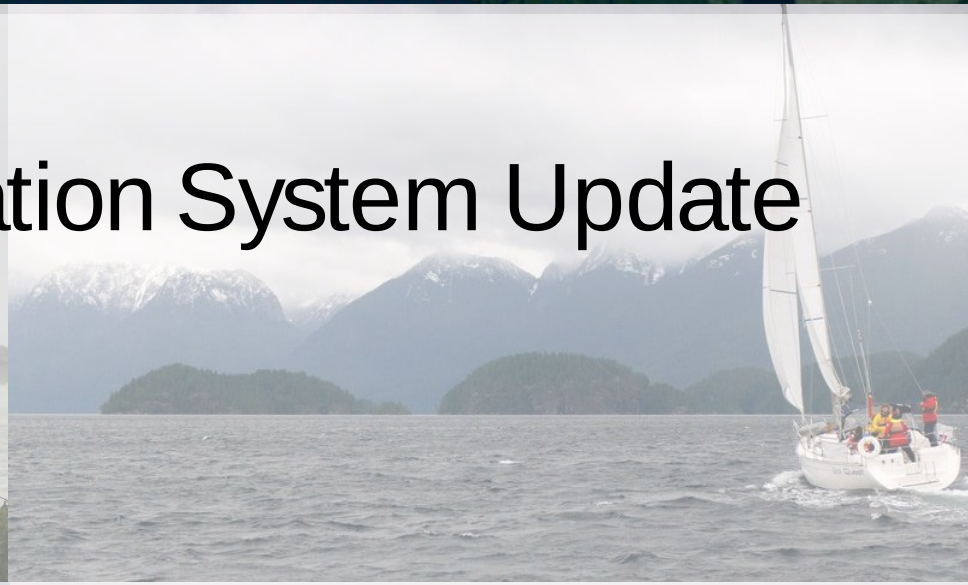
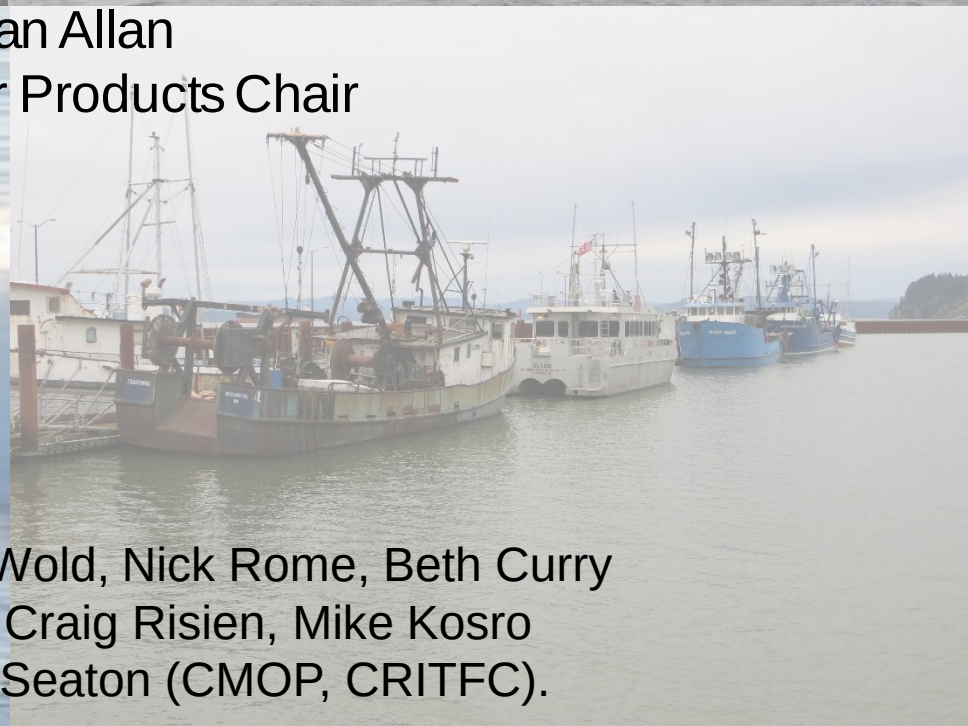
IOOS

NANOOS Visualization System Update



Jonathan Allan
NANOOS User Products Chair



Team: Troy Tanner, Rachel Wold, Nick Rome, Beth Curry
Jan Newton (APL, UW); Craig Risien, Mike Kosro
(CEOAS, OSU), Charles Seaton (CMOP, CRITFC).

NVS History and Status:

Oct 2014 – v3.8 – Climatology web app released

….

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

….

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)**;

….

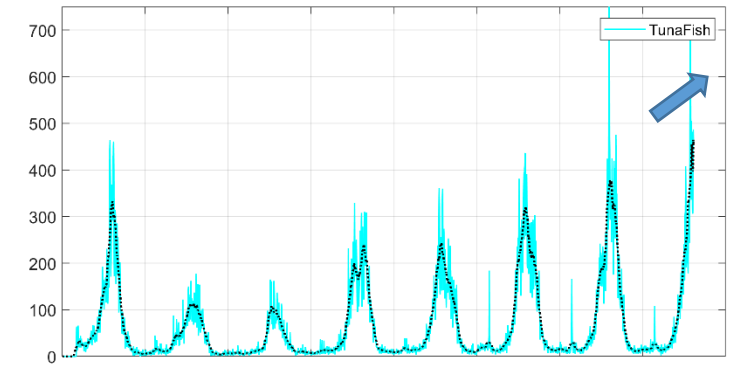
January 2019 – v. 2.0 iPhone/Android TsunamiEvac released

2019 – v6.3 – Updated tsunami evacuation zones (Washington); Improvements to timeline (able to plot timeseries for model outputs for any location in map); ability to query overlay (model) data in Boaters App (new overlays)

2020 – v. 2.3 iPhone/Android TsunamiEvac updated – added push notifications

Huge benefit!

NVS v6.3 – Main improvement relates to a new 'Overview' tool on the back end (not publicly viewed) that allows the NANOOS development team to evaluate status of any sensor or model overlay.


TunaFish
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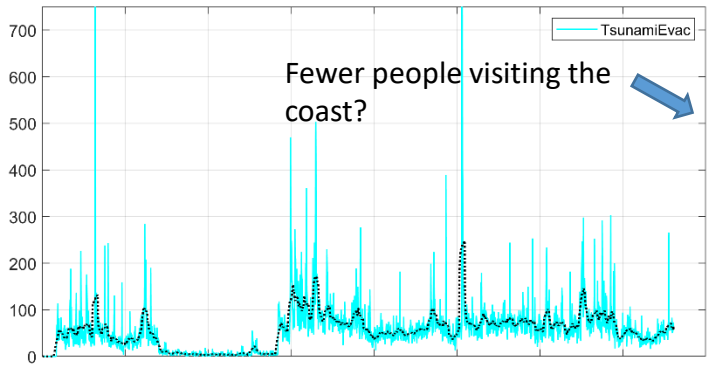
TsunamiEvac
Fewer people visiting the coast?
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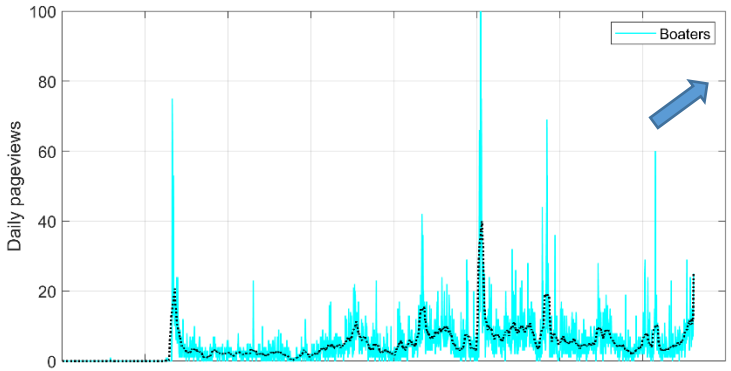
Boaters
Daily pageviews
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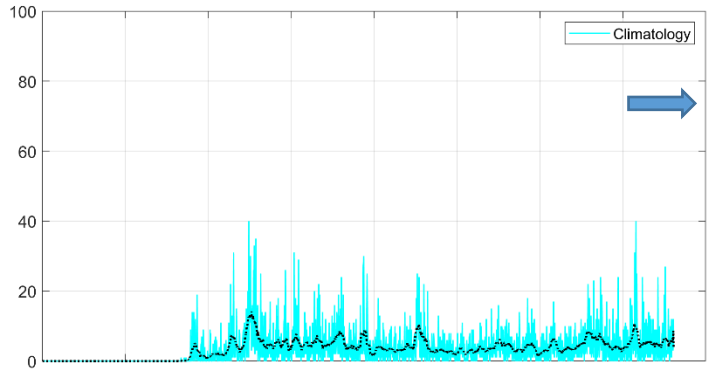
Climatology
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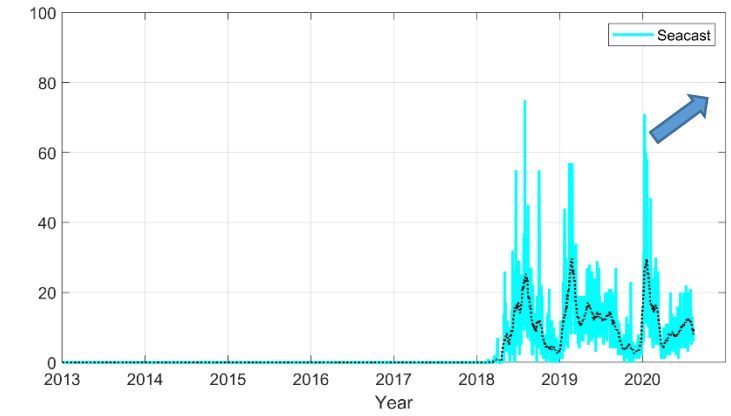
Seacast
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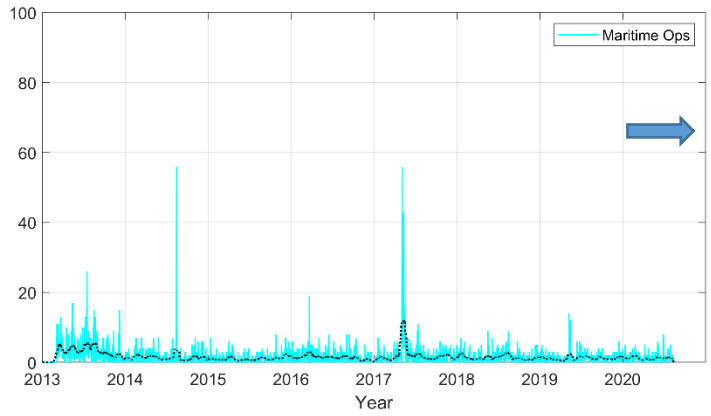
Maritime Ops
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2013
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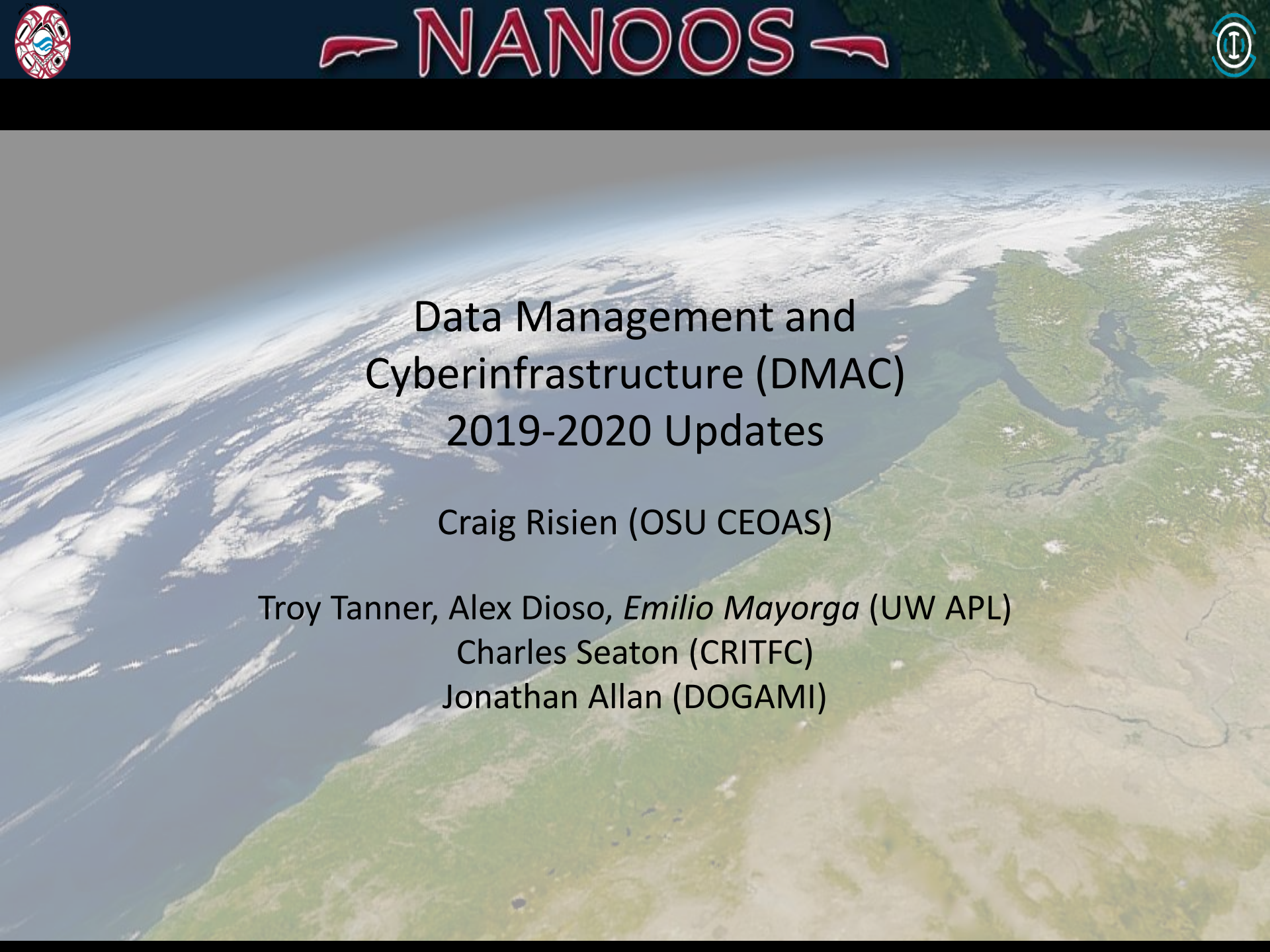
2016
2017
2018
2019
2020
Year

Focus for next 12 months:

- Particle tracking (product by spring 2021)
- Develop an integrated glider app for viewing multiple gliders at once
- Update NVS Data Explorer smartphone app
  - Map view
  - Favorite assets
- Updated bathymetry contours (entire region) / habitat GIS layers
- Model cross-section tool



Data Management and Cyberinfrastructure (DMAC) 2019-2020 Updates

Craig Risien (OSU CEOAS)

Troy Tanner, Alex Dioso, *Emilio Mayorga* (UW APL)
Charles Seaton (CRITFC)
Jonathan Allan (DOGAMI)

DMAC 2019-2020 Updates

- **New Data Streams**
  - ONC Baynes Sound mooring
  - OOI Endurance Array moorings
  - CDIP Angeles Point wave buoy
  - NWS wind stations north and south of the Columbia River mouth
  - USGS river gage in Vancouver, WA,
  - Friday Harbor Laboratory weather station

- **Upgraded Data Streams**
  - New pH sensors on Dabob Bay, Hansville and Point Wells ORCA buoys
  - Ingesting latest version of UBC SalishSeaCast model

- **New Glider Data**
  - OOI glider transects off Newport, OR and Grays Harbor, WA

DMAC 2019-2020 Updates

- **NCEI Data Archiving**
  - Continued **archiving** of **CMOP** time series data
  - Ongoing efforts to archive 20 yrs of **DOGAMI shoreline surveys**
  - Ongoing efforts to archive **pH data** from Washington Shelf and Puget Sound moorings maintained by the UW **NWEM group**

- **ERDDAP* Implementation**: Easier Access to Data Integrated by NANOOS
  - Released an **ERDDAP server** that provides data access to **113 datasets** that include NANOOS **gliders**, NANOOS processed time series and **climatologies** from NDBC, NOS and CDIP, and NANOOS-originated **remote sensing products**.

    http://data.nanoos.org/erddap

**ERDDAP (the Environmental Research Division's Data Access Program) is a data server that gives you a simple, consistent way to download subsets of scientific datasets in common file formats and make graphs and maps.*

NANOOS Outreach, Engagement, & Education

NANOOS Joint Governing Council and PI Meeting

August 18, 2020

Rachel Wold (UW APL)
NANOOS Outreach Chair

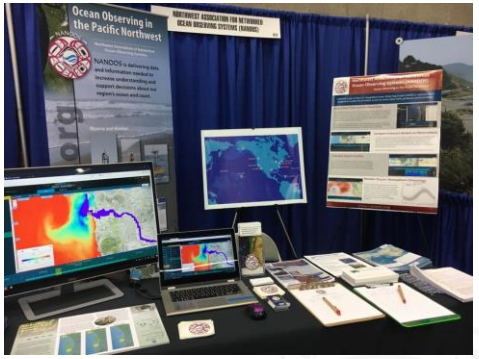
Outreach, Engagement, Education:

2019-2020 Updates

- Engaged with the general public and targeted user groups
  - Various public events, tradeshows, conferences, meetings
  - Offered virtual NVS demonstrations
- Made NVS enhancements based on user input

Signs of success:

- Asked back
- Saltwater Sportsmen Show: >70 at 8 am Sunday talk
- More quotes from Tuna fishers
- More traffic on NVS with Qs



Plans for Upcoming Year

- Continue engaging existing and new user groups
  - Explore more virtual opportunities
- Develop stronger bonds with commercial maritime (e.g., USCG, pilots) and resource managers

THANK YOU !!!

5. Recognition

Thanking Antonio Baptista and Welcoming CRITFC Executive Director Jaime Pinkham

NANOOS

Northwest Association of Networked Ocean Observing Systems

Washington - Oregon - Northern California

IOOS

NANOOS wishes to recognize

Antonio Baptista

for exemplary leadership and vision that guided years of developing coastal ocean margin observing and predicting tools that have been part of NANOOS since its inception; for transitioning these capabilities such that these can continue to benefit Columbia River tribes, NANOOS, and the public for years to come.

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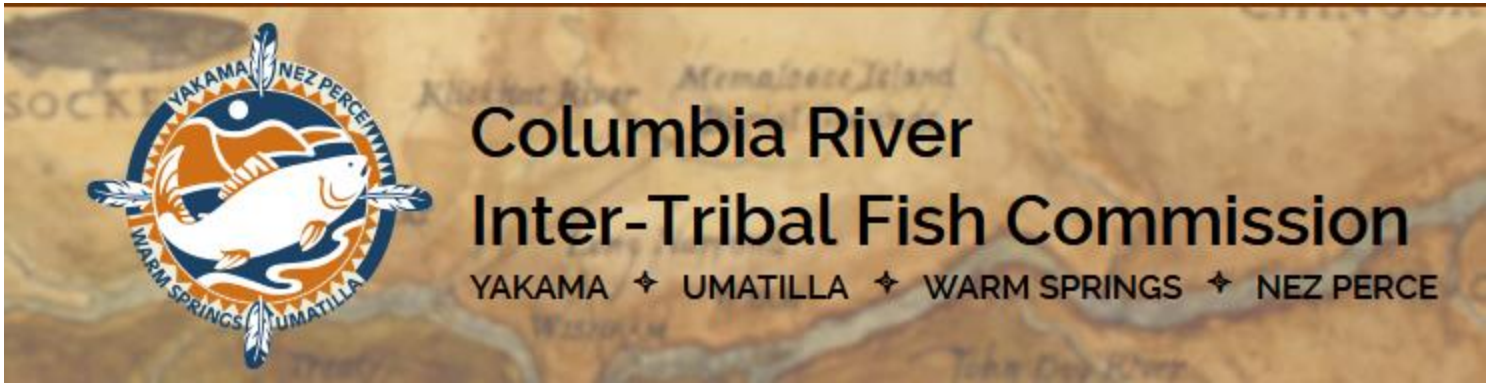
Washington - Oregon - Northern California

NANOOS warmly welcomes



Jaime Pinkham, CRITFC Executive Director & NANOOS GC Member
Charles Seaton, CRITFC, CMOP Coordinator & NANOOS PI

5. Recognition

Thanking Emilio Mayorga and Introducing the NANOOS DMAC Lead Craig Risien and the distributed DMAC team

NANOOS

Northwest Association of Networked Ocean Observing Systems

Washington - Oregon - Northern California

IOOS

NANOOS wishes to recognize

Emilio Mayorga

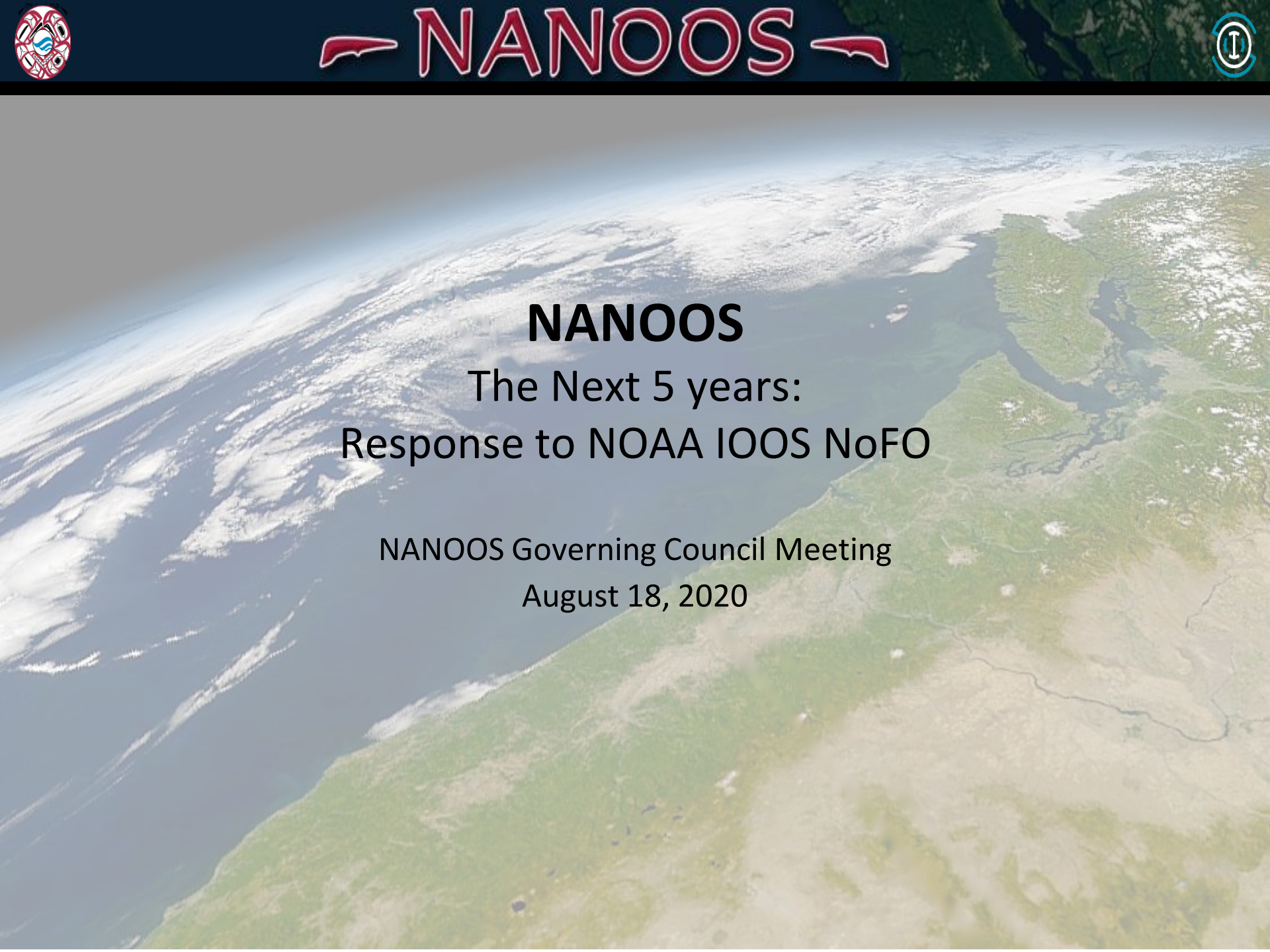
for outstanding leadership and vision that guided the development of data management systems for NANOOS, connecting with and building a distributed DMAC team, interacting with myriad stakeholders to connect their data streams into the NANOOS Visualization System data portal; for applying his expertise and knowledge to U.S. IOOS; and for adapting NVS to serve the Global Ocean Acidification Observing Network.

NANOOS introduces our DMAC Team

Craig Risien, NANOOS DMAC Lead

Charles Seaton, CRITFC
Troy Tanner and team, UW
Jon Allan, DOGAMI

BREAK


NANOOS
NANOOS
The Next 5 years:
Response to NOAA IOOS NoFO
NANOOS Governing Council Meeting
August 18, 2020

NANOOS Proposal for IOOS NoFO

- 5-year period
- Due 31 December 2020
- $6M budget for each of five years

- Proposal text will describe two efforts: $3M and $6M
- Award funding for NANOOS now is ~$3M

- Need to scope the full budget

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Northwest Association of Networked Ocean Observing Systems
IOOS
Washington - Oregon - Northern California

2019 GC slide

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

NANOOS Functional Systems

- Observations
- Modeling
- DMAC
- Engagement, Education, & Outreach
- Management

NANOOS Geographic Priority Areas

- **Coastal Ocean**
  - La Push buoy & glider; Columbia buoy & glider; Coos Bay buoy; Trinidad Head glider
  - HF Radar in OR & WA
  - LiveOcean & OSU ROMS
- **Estuaries**
  - South Slough; Columbia estuary; Puget Sound & Bellingham Bay
  - X-band radar in Yaquina
  - Columbia modeling & LiveOcean
- **Shorelines**
  - Washington and Oregon shorelines and bathymetry

NANOOS Theme Areas

- **Climate**
  - Buoy, glider, shoreline time-series measurements
- **Coastal Hazards**
  - Shoreline accretion/erosion; project on oil spill trajectories
- **Ecosystem Assessment**
  - Hypoxia, OA, HABs, nutrients, temperature, salinity, LiveOcean
- **Fisheries and Biodiversity**
  - Plankton data; Columbia habitat modeling; projects with IFCBs, eDNA, HABs, WCOFS
- **Maritime Operations**
  - Currents, model real-time conditions, forecasts by OSU ROMS, Columbia, & LiveOcean

2014-2020 proposal

NANOOS "Effort versus Application" Map for Observing and Modeling

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2019 GC slide

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?

2019 GC consensus:

- Sustain existing assets and capabilities
- Assure that transition plans are developed
- Seek to bring in new work, but not at cost of eliminating existing work; and cognizant that level funding is actually de-funding over time
- Continue to work with Congress and feds on growing budget

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NANOOS Proposal for IOOS NoFO

NANOOS Invites Expressions of Interest on Next 5-Year Effort

NANOOS invites input for our response to the U.S. Integrated Ocean Observing System (IOOS) Notice of Federal Funding to guide the next 5 years of NANOOS operations. If you would like to be considered for projects under the new 5-Year award, follow the links below to submit your (1) Expression of Interest and (2) Budget Estimate. Submissions are due 25 July; see Timeline for more information.

Federal Notice | Expression of Interest (DOCX) | Budget Estimate (XSLX) | Response Timeline (DOCX)

Timeline

	DATE	ACTION	POINT
√	25 June	Expressions of Interest (EOI) process announced	PIs
√	25 July	All EOIs due to janewton@uw.edu and nrome@uw.edu	PIs
√	Early August	EOIs prioritized by NANOOS Governing Council Executive Committee	GC Exec Comm
	Late August	Further Management deliberation with NANOOS Governing Council Executive Committee to finalize budget and proposal scope	GC Exec Comm
	31 Aug	All included PIs notified	PIs
	Sept	Proposal writing begins	NANOOS
	30 Sep	All sub-budgets due to their respective institutional fiscal offices	PIs
	30 Oct	All sub-budgets, SOW, budget justification due to APL-UW	PIs
	30 Nov	Proposal submission target date	NANOOS

NANOOS Submission

- Will articulate a $3M effort (~level with now) and, also, what enhanced and new activity would occur under a $6M effort.
- Does not need to prioritize beyond $3M vs. $6M in the 5-y plan
- Each year NANOOS “de-scopes” a budget: sustaining efforts plus filling the gaps targeted funds and support from other NOAA offices. If new “base” funding awarded, then EC/GC would be utilized for priorities to match increase.

NANOOS Budget Categories

- Sustained existing operations and functions
- Enhancements to existing operations and functions
- New operations

Plan for discussion today

- Affirming we are on track with this process and 2019 priorities
- GC reaction and input on “New” projects as advisory input to EC
- GC input on gaps

Recap and Action Item Review

ADJOURN