NANOOS Governing Council & Principal Investigators Meeting

03-04 August 2021

Northwest Association of Networked Ocean Observing Systems
Integrated Ocean Observing System (IOOS)
Regional Association for the Pacific NW

www.nanoos.org

Agenda: 03 August 2021

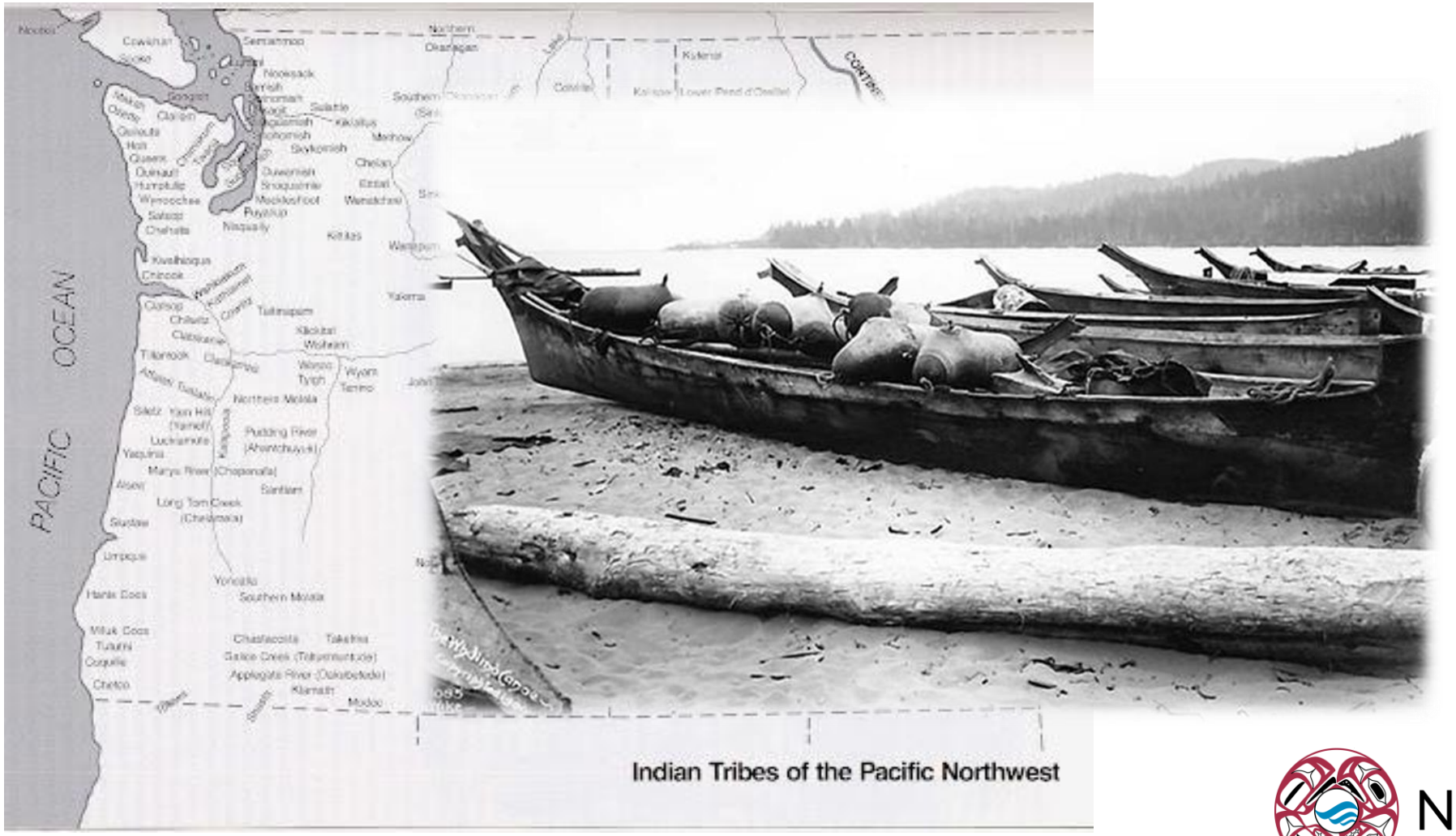
TIME	TOPIC	PERSON/S	DURATION
1:00	1. Welcome, Land Acknowledgement, & Introductions	All	15 mins
1:15	2. Call to Order	A. Barnard	5 mins
1:20	3. NANOOS Updates & Recognition: • NANOOS personnel and role changes	J. Newton	15 mins
1:35	4. IOOS Association Recap & Q/A	J. Quintrell	25 mins
2:00	5. IOOS Program Office Updates & Q/A	C. Gouldman	40 mins
2:40	6. NANOOS Accomplishments & Vision & Q/A	J. Newton	30 mins
3:10	**BREAK**		10 mins
3:20	7. NANOOS Tri-Comm Chairs Updates & Q/A	Admin	40 mins
4:00	8. Moderated Discussion • NANOOS Enabling Change efforts and plans • 2022 Community Workshop • Announcements from the floor	All	45 mins
4:45	9. Recap & Action Item review	J. Newton	15 mins
5:00	**ADJOURN**		

******* ZOOM SOCIAL HOUR following adjournment *******

1. Welcome, Land Acknowledgement, & Introductions

Jan Newton & All

Acknowledgment



NANOOS
Northwest Association of Networked Ocean Observing Systems

Introductions

- Please share your name and who you represent or role with NANOOS

2. Call to Order

Andrew Barnard, NANOOS GC Board Chair

3. NANOOS Updates & Recognition

Jan Newton, NANOOS Executive Director

NANOOS Personnel and Role Changes

- Craig Risien
- Roxanne Carini
- Beth Curry
- Dana Manalang

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NANOOS wishes to recognize

Craig Risien

for his steadfast support of NANOOS' DMAC for not only OSU investigators but also for the entirety of NANOOS within IOOS from its beginning. Craig supported the Tuna Fishers app, developed as NANOOS' first tailored app, from the start and had the vision for us to develop the Climatology app, which has recently grown in popularity with managers and scientists.

Craig's enthusiasm and leadership has been a prime driving force in the success NANOOS enjoys today.

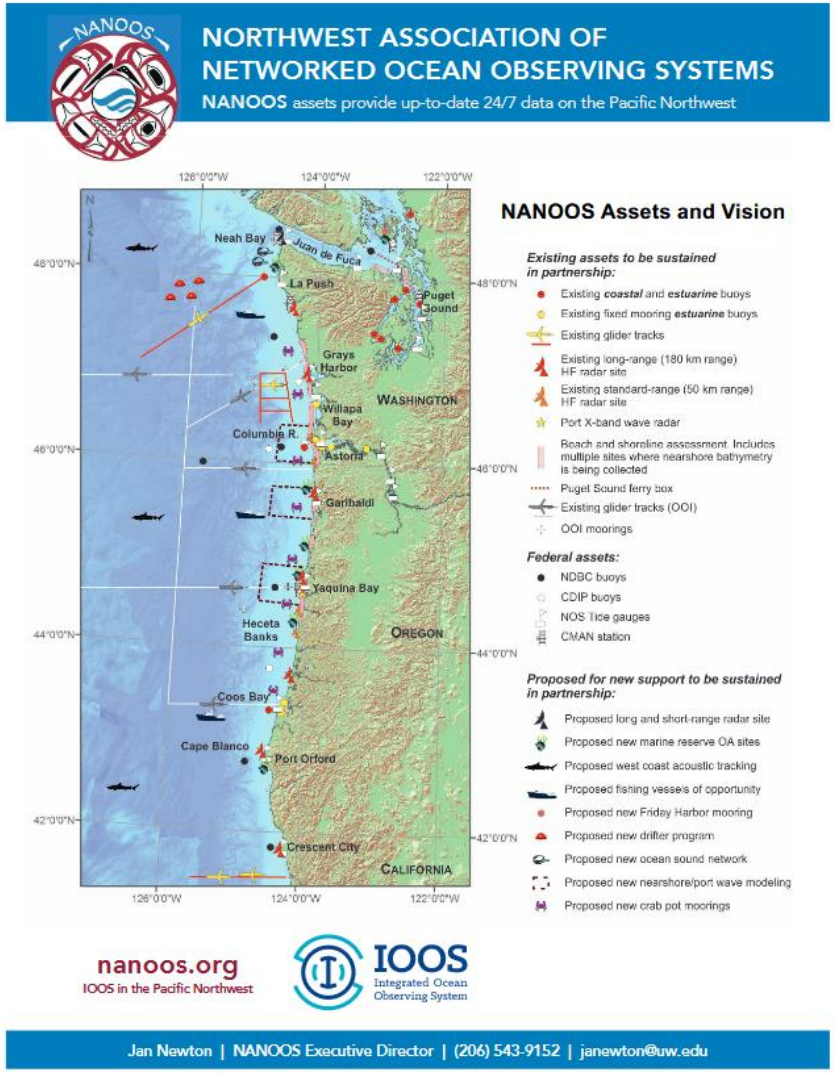
NANOOS wishes to recognize

David Martin

for exemplary leadership and vision that guided years of developing NANOOS since its inception and for his leadership at the national level even before IOOS existed, which has benefited NANOOS for years. David guided the development of NANOOS and elevated the visibility of ocean observing in the Pacific Northwest. David was our initial Governing Council Executive Committee Chair and will remain as a member-at-large through his term.

It is impossible to think of NANOOS without David Martin

NANOOS' 5-y proposal accepted!



- NANOOS reviewed very well
- 5-y plans in proposal will be shopped within NOAA etc. for other funding opportunities
- Strong Congressional support

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NANOOS' 5-y proposal review comments

The NANOOS proposal clearly demonstrates a track record, progress, and plans to sustain and further grow each of the five subsystems required for a regional component of the IOOS. This reviewer did not identify any notable deficiencies in this or other criteria.

This is a very strong proposal from a technical perspective.

Well-organized and written. Tied to both regional and national needs for ocean observing systems. Clear articulation of needs for sustaining existing infrastructure and expansions to fill gaps.

Strong governance system, with leadership clearly tied to stakeholder community, and more importantly, aware of and interested in addressing national policy priorities. Strong collaborations across the stakeholder community for contributions to the observing system as well as other subsystems. Especially strong tribal involvement.

Good use of stakeholder engagement and efforts to reach broader audiences.

NANOOS is turned to for coordination and assistance with key regional issues.
The letters of support indicate substantive engagement with stake holders and the usefulness of products.

A diverse group of stakeholders are already engaged, and products are built specifically to meet these needs. There are many products that are used by a wide variety of stake holders. Stakeholder engagement has led to the development of those products. There are detailed plans for future community engagement.

As an example of how they make good use of their governance structure NANOOS ran a competitive process before the development of this proposal, seeking proposals from the region for enhancements. The Governing Council selected which to include in this proposal, leading to the best and highest priority science.

The Governing Council is highly diverse, with 22% local, state, and federal government, 8% tribes and tribal organizations, 26% NGO/educational organizations, 22% industry, and 22% academic institutions.

They are doing a lot for the amount of funding they receive, which suggests that they are leveraging a lot of resources. Thus, NOAA receives a large bang for the buck. The budget is quite reasonable for the work that is proposed.

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NANOOS 5-y proposal review comments

NANOOS has a 16-year history of impactful accomplishments with an impressive capacity for regional collaboration to regionally maintain and build out additional components.

The data projects and information tools advanced and proposed by NANAOOS are excellent and it's great to see all the products they're managing to generate with a careful and sustained dialog with the end users. Many of these products rely on numerical modeling efforts and the push toward observing data assimilation should be sustained and further encouraged. It's important that any expansion of the observing footprint take into careful consideration of how those assets can best inform the numerical modeling efforts.

NANOOS has a 16-year demonstrated history of success and has forged an extensive network of critical partners which ensure that they have the best in the field towards meeting their proposed objectives. I have full confidence in the organization. The proposal (and past track record) well demonstrates that the NANOOS user community is fully engaged in product development and even in guiding the strategic direction of the organization itself. The extensive partnerships (particularly with respect to the tribal leadership) clearly demonstrates a strong intent to ensure that information generated by NANOOS will reach its intended target and provide for a valuable contribution to meeting the regional and national priorities of IOOS.

Education is also an outcome of specific observing activities, including both on students and citizen scientists. For example, they want to involve students in deploying and tracking drifters, which will provide useful information on surface currents and provide the students with an opportunity to be involved in a larger oceanographic research project.

NANOOS 5-y proposal review comments

Diversity outreach needs additional detail

Their plans to increase diversity were somewhat vague and could probably be implemented more quickly, especially with their connections with a number of tribes.

Not enough detail on emergencies: Regional data assembly is very organized and leverages the use of mobile phone applications, which seems like it would be a very effective way to communicate any emergencies, though some more detail on this topic would be valuable.

The methodologies employed all appear to be well proven (although data continuity from biogeochemical sensors remains spotty). I'd like to better understanding how DO, chlorophyll, and CDOM are faring relative to other measures in terms of quality assurance and deployment endurance.

One issue is trying to sustain observations, originally supported through research funding

Thanks to the:

- NANOOS GC for affirmation and prioritization
- PIs, existing and new, for their EOIs and submissions
- NANOOS GC Board for review and prioritization
- Patrick Allen, UW APL, for fiscal wizardry
- Nick Rome, NANOOS Program Manager, for unending help

NANOOS
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NANOOS GC Board 2020-2021

Academic:

- Parker MacCready, UW, Governing Council Board Member for UW
- Mike Kosro, OSU, Governing Council Board Member for OSU **(VICE CHAIR)**

State:

- Casey Dennehy, Ecology, Governing Council Board Member for Washington State Agencies
- Jon Allan, DOGAMI, Governing Council Board Member for Oregon State Agencies

Tribes:

- Julianna Sullivan, 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 Pilaro, PCSGA, Governing Council Board Member for Industry
- Andrew Barnard, WetLabs, Governing Council Board Member for Industry **(CHAIR)**

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:

- Russell Callender, WA Sea Grant, Governing Council Board Member At-Large
- David Martin, Retired, Governing Council Board Member At-Large

4. IOOS Association Recap

Josie Quintrell, IOOS Association Executive Director

NANOOS GC-PI Meeting

IOOS Association

Josie Quintrell

Aug 3, 2021

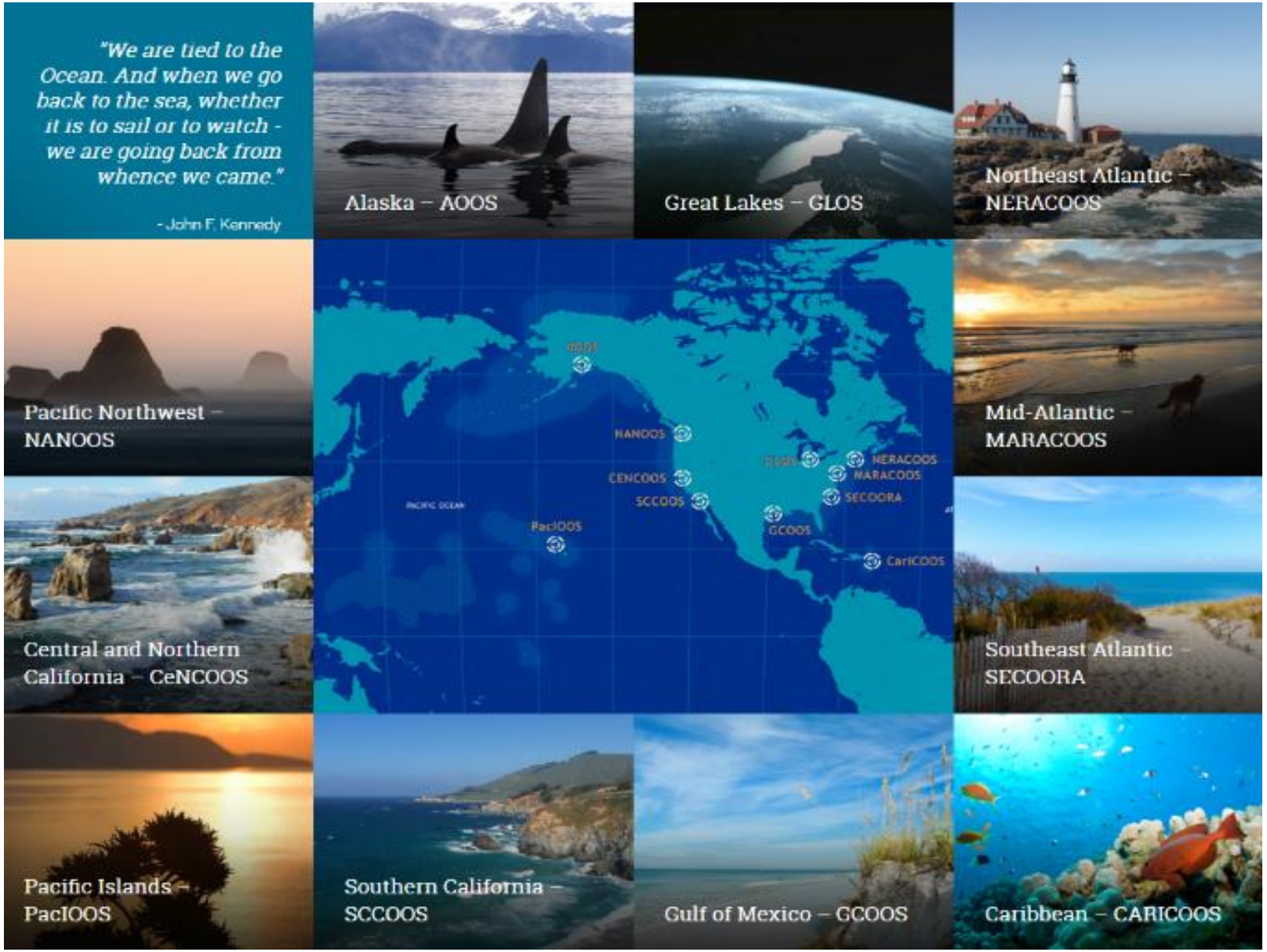
IOOS Association

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

Board Members from NANOOS:

- Jan Newton
- Andrew Barnard

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



Strategic Plan

IOOS ASSOCIATION

STRATEGIC PLAN
2021-2026

ADOPTED OCT 2020

MISSION

The IOOS Association promotes regional and national ocean, coastal, and Great Lakes observing systems

VISION

The IOOS enterprise has the resources to measure and predict the coast, ocean and Great Lakes to deliver sustained information, support decision making, and bring outstanding value to society.

1. Increase funding for IOOS by 100 percent
2. Increase ability of IOOS to be responsive and innovative
3. Increase coordination across all IOOS agencies & regions
4. Increase diversity and inclusivity of network and partnerships
5. Increase visibility and reach of IOOS
6. Ensure the health and sustainability of IOOS Association

IOOS ASSOCIATION

Appropriations

In Process….

IA request:

- Increase in RA Base
- Gaps funding for HFR, gliders and resilience
- HAB ON
- Coastal modeling testbed and OTT

	FY 21	FY22 IA Req	FY 22 Pres Bud	FY 22 House	FY 22 Senate	FY 22 Final
Regional IOOS	$40.5	$56.5	$69.5	$50	TBD	TBD
National IOOS	6.8	7.3	13.8	TBD	TBD	TBD
Total	**47.3**	**63.8**	**83.3**			

Pres Bud:
Regional line= $40.5 for RA "base";
$10M for Coastal Modeling Testbed;
$4M for ecosystem mooring;
$ 15 M for Marine Life
National line =
$2M for data management
$2M for marine life
$5 M for coastal modeling (with other offices)

IOOS Association

Infrastructure Bill

IOOS: the "lighthouse of the 21st century"

- Maritime commerce and operations
- Resilient communities
- Blue economy

Fill gaps and modernize infrastructure *such as*:

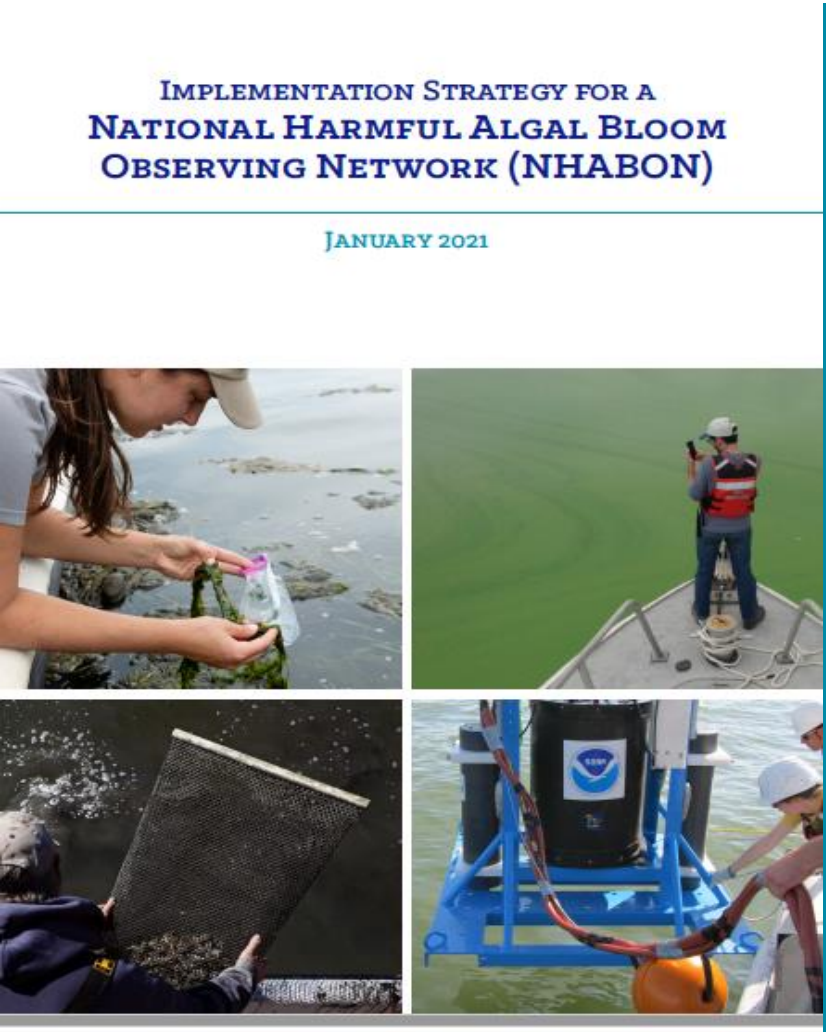
- Profiling gliders
- Surface current mapping
- Moorings – ecosystem, met, and waves

Bipartisan Infrastructure Bill

Investing in Ocean, Coasts and Great Lakes Infrastructure

- Bipartisan Infrastructure bill:
  - $150M for: "*supporting improved and enhanced coastal, ocean, and Great lakes observing Systems*"

Harmful Algal Blooms



- National HAB Observing Network
  - Identifies need for sustained observations to support HAB forecasts
  - Builds on IOOS Regions
  - HAB On Implementation Plan $30m for 5 year build out.
- FY 20 included $1M for HAB observing network pilots - CA, NW, Alaska, GL, and Gulf of Mexico
- FY 21 includes $2.5M for HAB observing network pilot projects - expanding to NE
- FY 22 House mark - $3M for HAB observing network pilot projects, Senate mark TBD

IOOS Association

Congressional Activities

Bills :

- Aquaculture bill
- BLUE GLOBE
- Ocean Exploration
- COAST Research Act

Briefings:

- NOS Resiliency
- Maritime Transportation

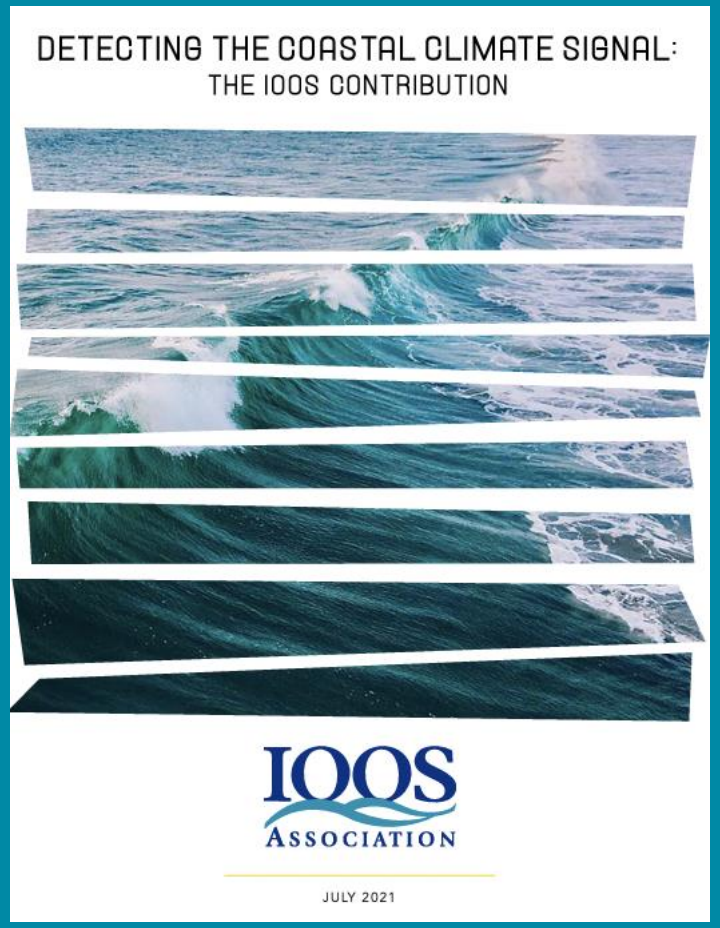
Coordinated Research and Monitoring Act of 2020:

S 914 Signed into law 12/31/20

- Reauthorizes program for another 5 years
- Staggers terms for FAC members
- Allows Feds to serve on RA Boards
- Clarifies agency funding mechanism
- RAs - Regional Coastal Observing Systems
- Added glider, HFR studies and amends FOARAM
- Authorization levels: $48M -$56 M

IOOS Association

Detecting the Coastal Climate Signal



- Climate signals:
  - Long-term trends and projections that carry the fingerprint of climate change.
    - Sea level rise
    - HABs, hypoxia, OA
    - Fisheries habitat shifts
    - Marine heat waves
- White Paper (July)
- Climate Dialog series (Sept-Nov)
- Workshop (Dec) to develop recommendation for improving coastal climate observations products

IOOS ASSOCIATION

Diversity, Equity Inclusion and Accessibility

Major priority for the administration - service equity

Presidential Ex Order #13985

Joint RA and IOOS Office project

Complement and enhance work being done at the regional level

- DEIA Fellow for 1 year:
  - to work with Ras to amplify existing efforts to improve DEIA and service equity,
  - Research techniques for reaching underserved communities,
  - training opportunities for staff,
  - workforce development opportunities and support, and
  - make recommendations for improving service equity, and DEIA

IOOS Association

Communication Initiative

Improve understanding and awareness of observations for society

Build support with policy makers, partners and others

Complement regional efforts at the national level

Goal: Double IOOS Funding

- Priority identified in strategic plan
- NAS Sustaining Obs Workshop recommendation
- Initial 5-month contract :
  - Develop communication plan
  - Develop key messages
  - Improve outreach materials – newsletters, social media, etc
  - Work with RAs on press events around 5- year awards, OpEds,
  - Website upgrade

IOOS Association

Other Events

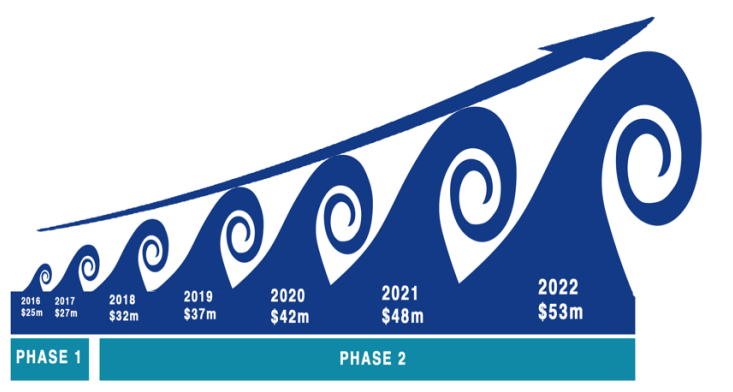
IOOS Fall Meeting – Oct 6-8

Nominations sought for 2022 Cariad Award – *celebrating collaboration in coastal observing*

Dr. Libby Jewett
recipient of the
2021 Cariad Award

IOOS Association

FY 22 Appropriations Request



- Largest request to date - $15M over enacted
- $5.5 M for RA operations
- President's budget out- waiting for details
  - Climate
  - Service delivery

FY 22 REGIONAL SYSTEM REQUEST: $56.5 MILLION

$40.2 million

for the national network of 11 regional coastal observing systems - providing a critical increase per region to provide timely and reliable information to regional and national stakeholders

$8.5 million

$2.5m to install high-frequency radar systems to close key gaps in the U.S. surface current mapping system

$3.5m to support underwater gliders to improve hurricane warnings, detect harmful algal blooms, and ensure safe navigation

$2.5m for streamlining observations, coastal resiliency, and coastal climate observations

$7.8 million

$3.5m to expand pilot projects for a National Harmful Algal Bloom Observing Network

$4.3m for innovation in ocean technology and modeling

FY 22 NATIONAL SYSTEM REQUEST: $7.3 MILLION

Increase of $0.5m to facilitate integration of non-federal efforts with NOAA's uncrewed system initiative and to continue the glider data center.

ASSOCIATION

5. IOOS Program Office Updates

Carl Gouldman, U.S. IOOS Director

U.S. IOOS Office Updates

Carl Gouldman
August 3, 2021

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New Administration Priorities - Executive Orders

All E.O.s here:
https://www.federalregister.gov/presidential-documents/executive-orders/joe-biden/2021

- **Executive Orders on Climate Change**
  - January 20, 2021
  - January 27, 2021
- **Executive Order on Racial Equity** - January 20, 2021
- **Executive Order Advancing Diversity, Equity, Inclusion, and Accessibility in the Federal Government** - June 25, 2021
- **Memorandum on Scientific Integrity** - January 2021
- **Executive Order on Protecting the Federal Workforce** - January 2021

2021 U.S. IOOS Drivers

Implementing IOOS - Observe, Predict, Inform, Learn

- ICOOS Act reauthorization—Coordinated Ocean Observing Research Act of 2020 - THANK YOU!
- New Administration priorities - Economy and Data driven solutions Climate observations, predictions and services, Ocean, coastal and G Lakes predictions for decisions
- Weather Research and Forecasting Innovation Act 2017 & 2019 - & NOAA Water Initiative - Title III of COORA
- Supporting the Blue Economy - Ocean Enterprise Study & Benefits of Ocean Observing Catalog
- CENOTE Act 2018 (Commercial Engagement Through Ocean Technology Act)

Research and Development

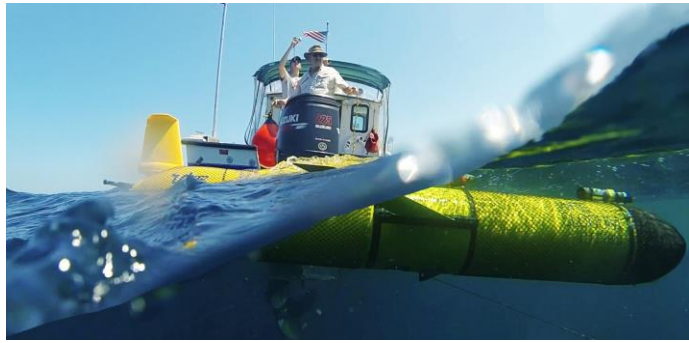
- Coastal and Ocean Modeling Testbed (COMT) - Water Modeling, Forecasting, and Prediction
- Ocean Technology Transition (OTT) - New Projects just started from FY 2020 Awards

FY 2021 IOOS Office Priorities

Coastal Observing, Predicting, and informing in support of Climate Services, Economic Development and Coastal Resilience

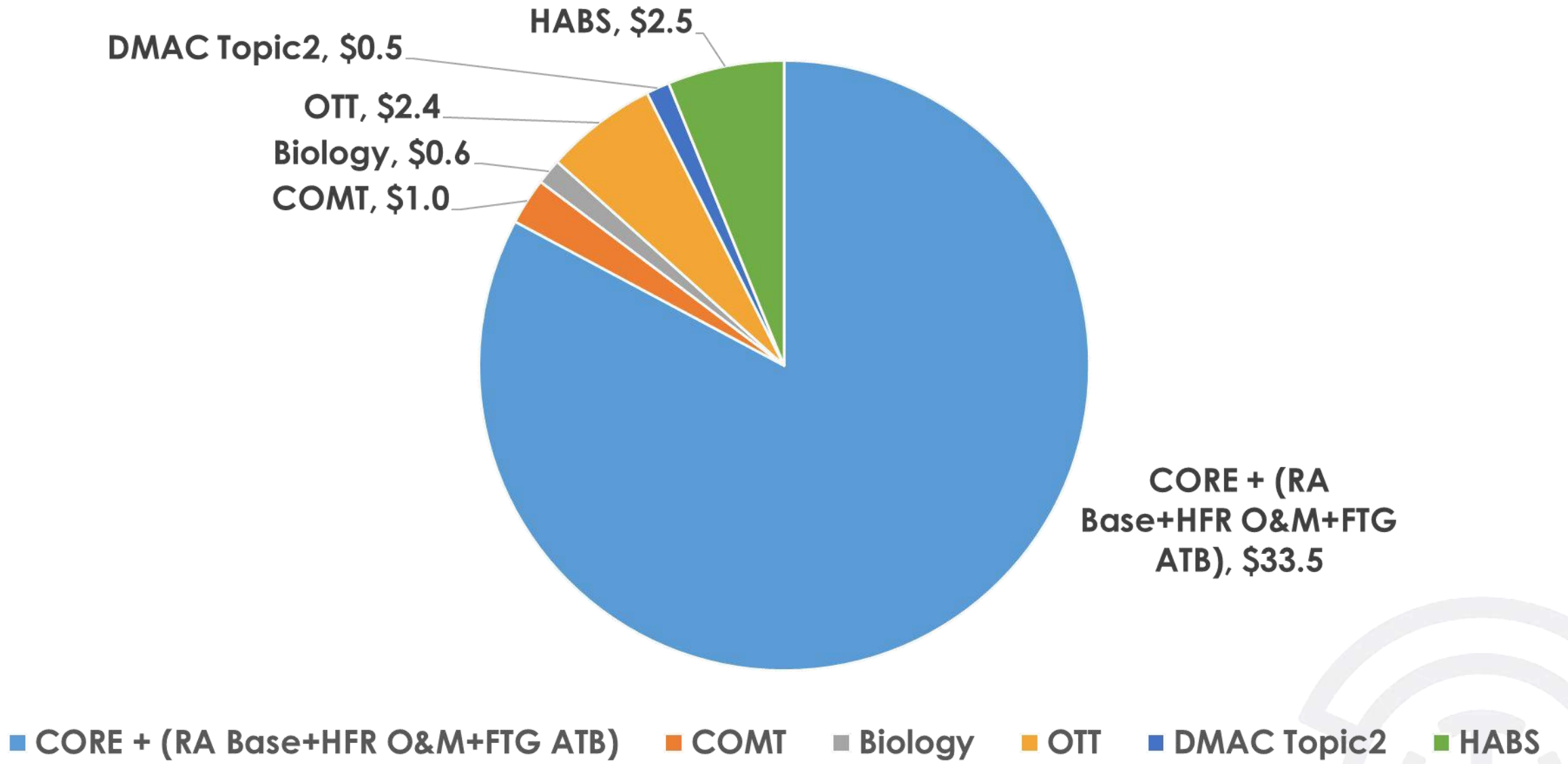
Continue expanding, diversifying and enhancing IOOS products and services for all Americans to meet customer needs

- **Climate Data & Services** - Detecting the climate signal at the coast and understanding its manifestations
- **Improved coastal modeling / predictions** - Enhance ecological forecasting supported by regional observing, science, and service delivery
- **Economic Opportunities** - healthy blue economy and services in the face of coastal hazards

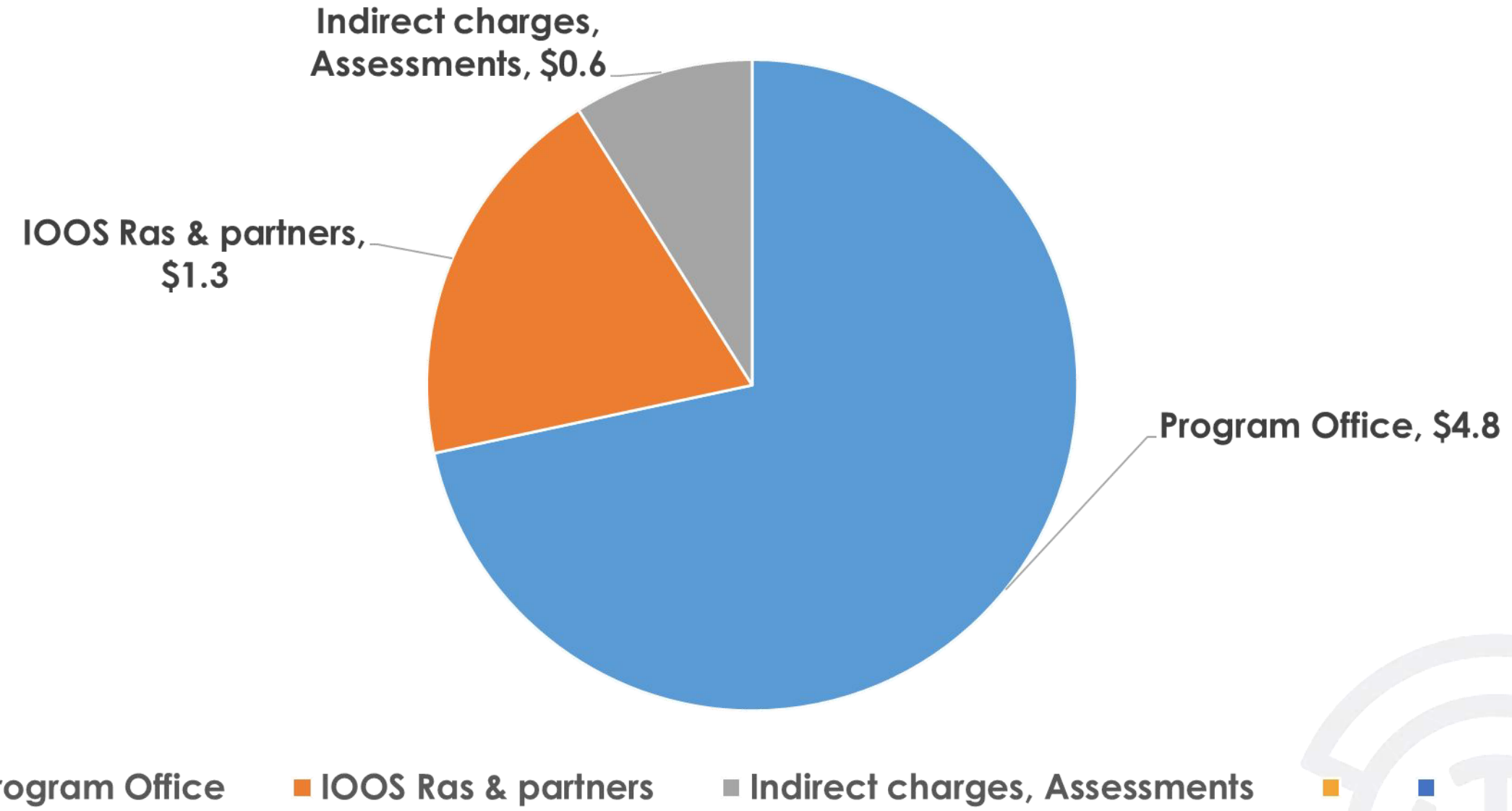


Richard Spinrad Testimony to Congress:
https://www.commerce.senate.gov/services/files/5BBBF383-0FC2-42DB-BF76-39F1B3AC2673

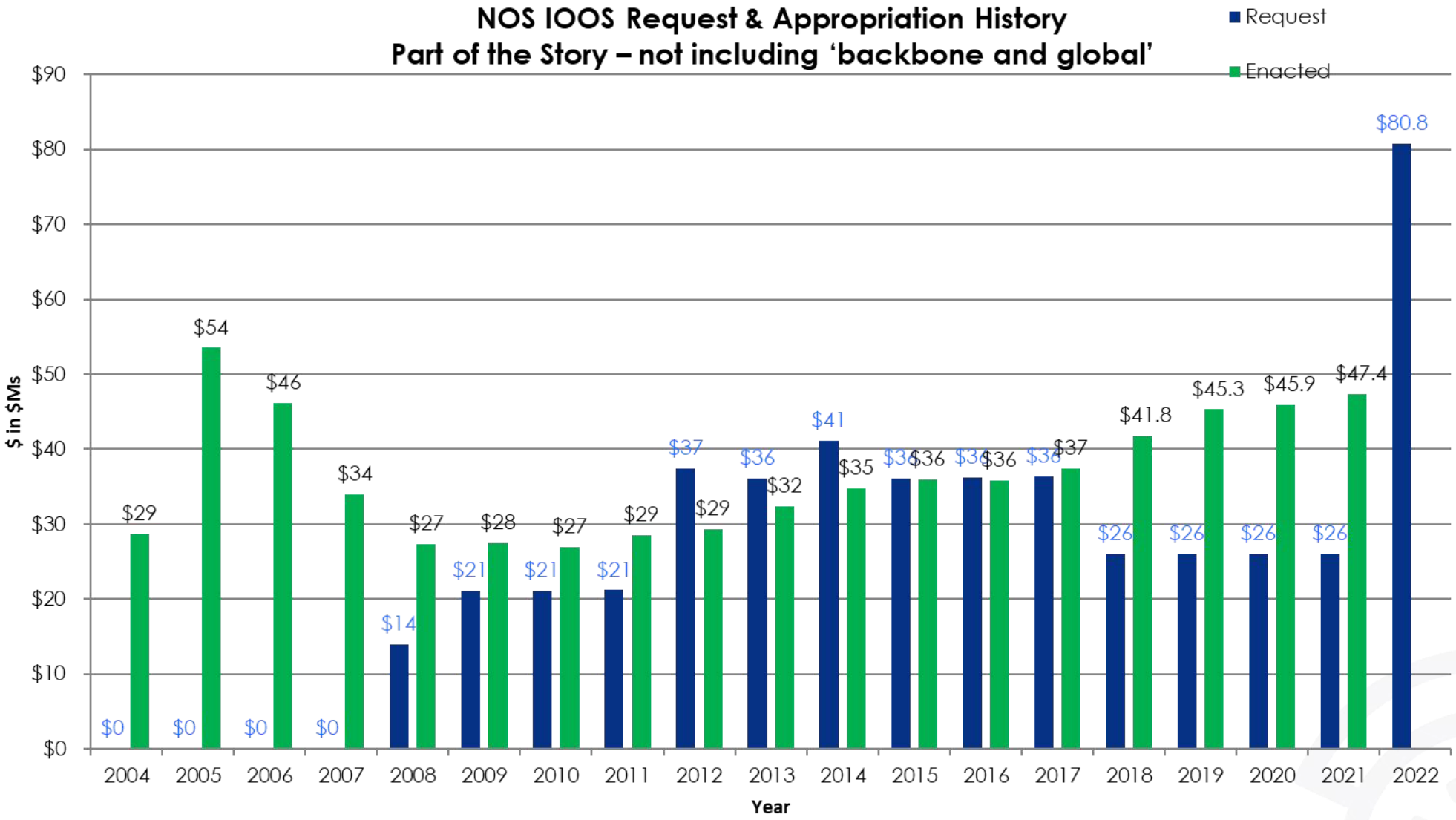
FY 21 IOOS Regional $40.5M – by categories



FY 21 IOOS “National” $6.8M



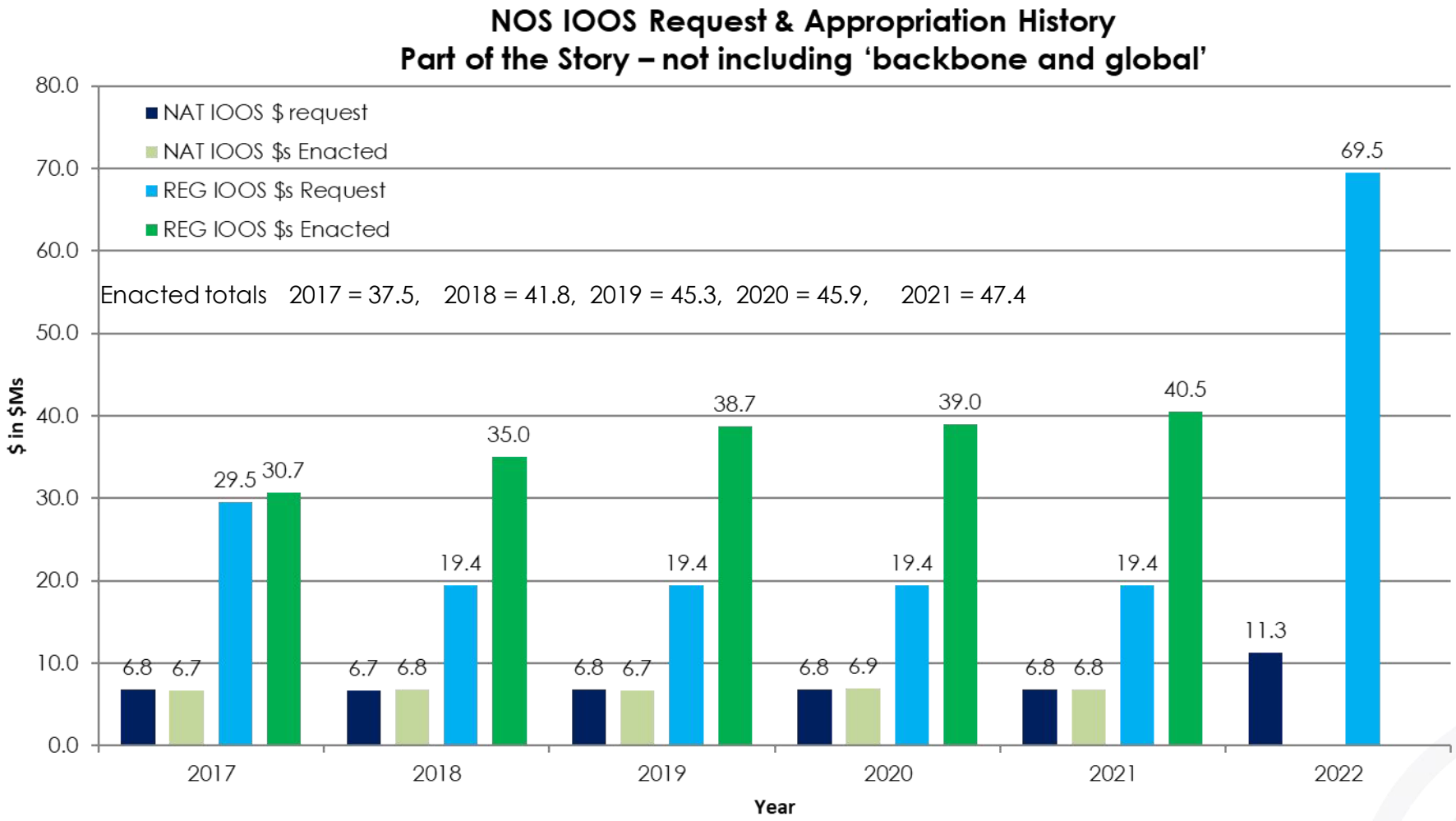
U.S. IOOS Enacted and President's Budgets FY04-22



NOAA National Ocean Service: Navigation, Observations, and Positioning: 'National' and 'Regional IOOS Observations' line items combined.

- 'Request' = the President's Budget Request
- FY22 House Mark is first, next is Senate Mark, then Conference…

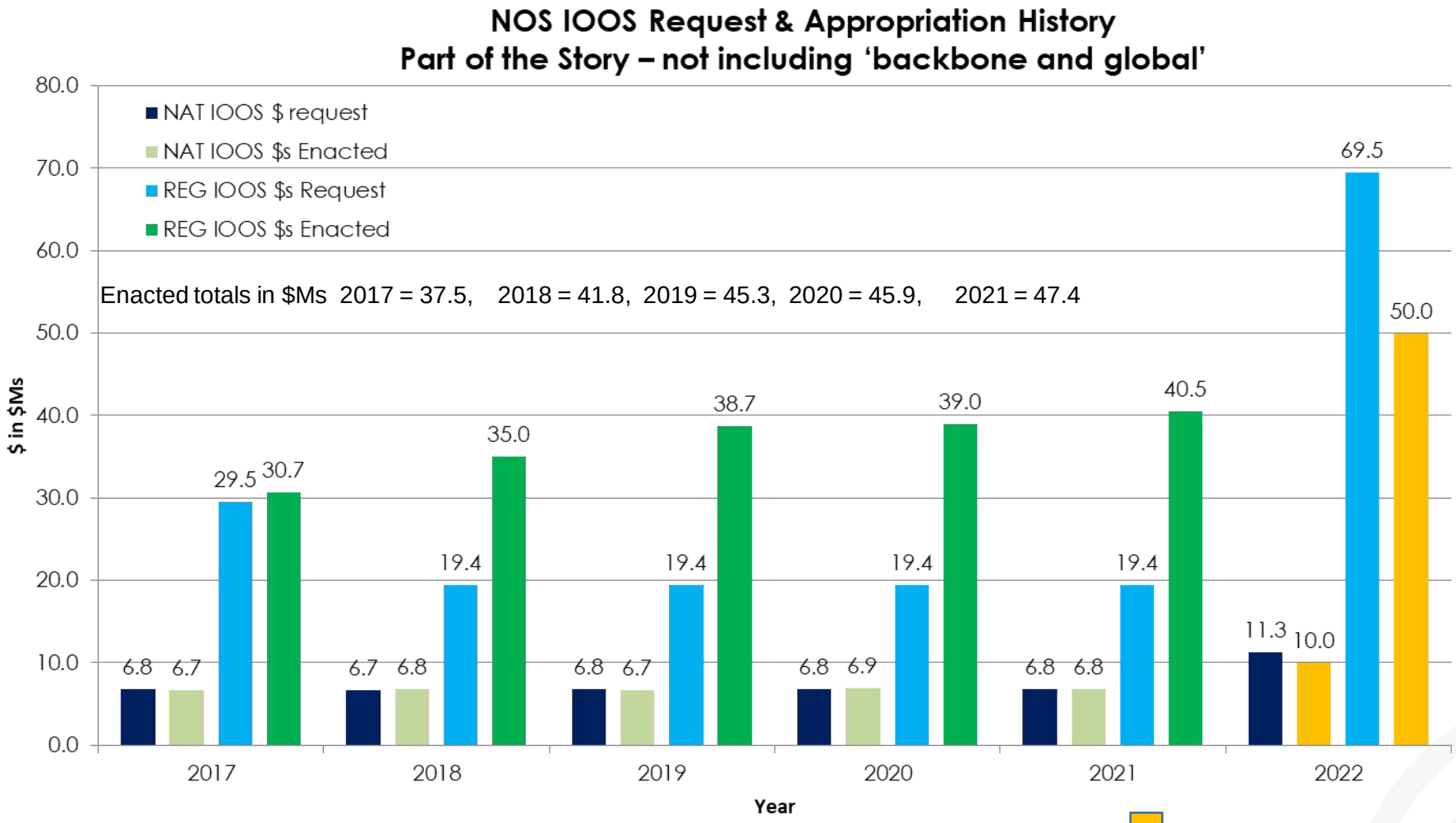
U.S. IOOS Enacted and President's Budgets FY17-22



NOAA National Ocean Service – Navigation, Observations, and Positioning:
'National IOOS' & 'Regional IOOS Observations'

- Estimated Enacted levels are 'post rescission' totals for each year
- 'Request' = the President's Budget Request

U.S. IOOS Enacted and President's Budgets FY17-22



"Org/Yellow = 'House Mark'
~$10M & $50M

NOAA National Ocean Service - Navigation, Observations, and Positioning:
'National IOOS' & 'Regional IOOS Observations'

- Estimated Enacted levels are 'post rescission' totals for each year
- 'Request' = the President's Budget Request

Observing - High Frequency Radar update

- Conducting updates to the radio broadcast frequencies used by the HFR stations.
  - IOOS Office assisting NANOOS with implementation of new FCC "operational" broadcast licensing requirements.
- NANOOS HFR operators at Oregon State University working with IOOS Office to implement these updates.
  - This will allow operation of new HFRs to *fill the gaps* off Washington state.

FY21 - Diversity, Equity, and Inclusion (and Accessibility)

- NOAA Strategy in place and NOS very engaged.
- This is a priority for IOOS, NOS, NOAA, and this Administration
- What actions are we committing to now?
  - For FY21, matching funds from the IOOS Office to build a joint approach for promoting DEIA
  - Seek opportunities to coordinate with other programs

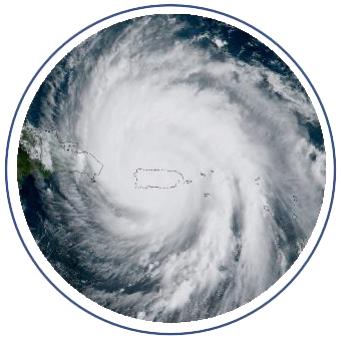
Looking forward – UN Decade of Ocean Science for Sustainable Development

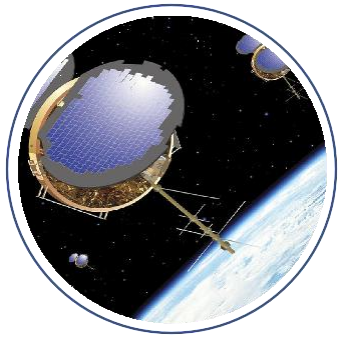
- **Programs: Ocean Observing Co-design / CoastPredict / Observing Together / Marine Life 2030**
  - 1 June kick off event to the Decade - https://oceandecade.org/events/88/High-Level-Launch-of-the-Ocean-Decade---First-international-Ocean-Decade-Conference
  - Series of "Ocean Decade Laboratories" - interactive sessions (2021 - mid-2022) to catalyze partnerships and co-design Decade Actions.
    - Predicted Ocean Laboratory - Sept 15-16
  - The 7 Laboratory themes: inclusivity, solutions-based ocean science, regional action, and resource mobilization, among others.

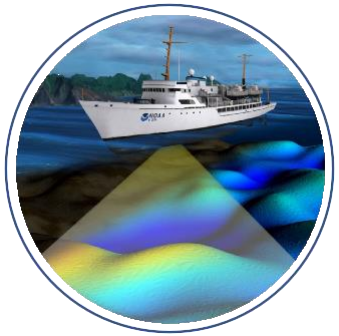
- **GOOS Regional Alliance Activities**
- **Continuing to support and implement OceanObs'19 recommendations**
- **IOOS continues to connect Global and Coastal observations**

Next Steps - FY21/22

- RA awards finalized - Thank you!
  - administrative tasks associated with this
- Senate Draft Mark



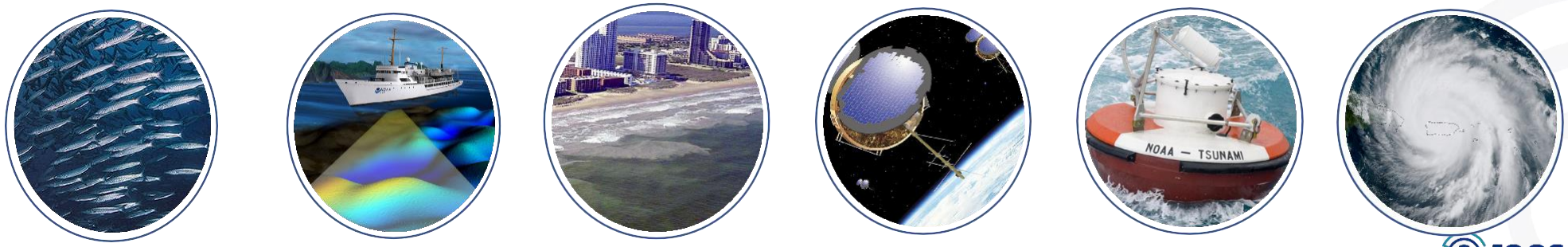



Next Steps - Infrastructure Bill

H.R.3684 — 117th Congress (2021-2022)

- **ORF -** (Operations, Research, and Facilities) $100,000,000 shall be for supporting improved and enhanced coastal, ocean, and Great Lakes observing systems. (spread over 5 years)

- **PAC** - (Procurement Acquisition and Construction) $50,000,000 shall be for coastal, ocean, and Great Lakes observing systems. (funds expire Sept. 30 2024)



Thank You

Carl Gouldman

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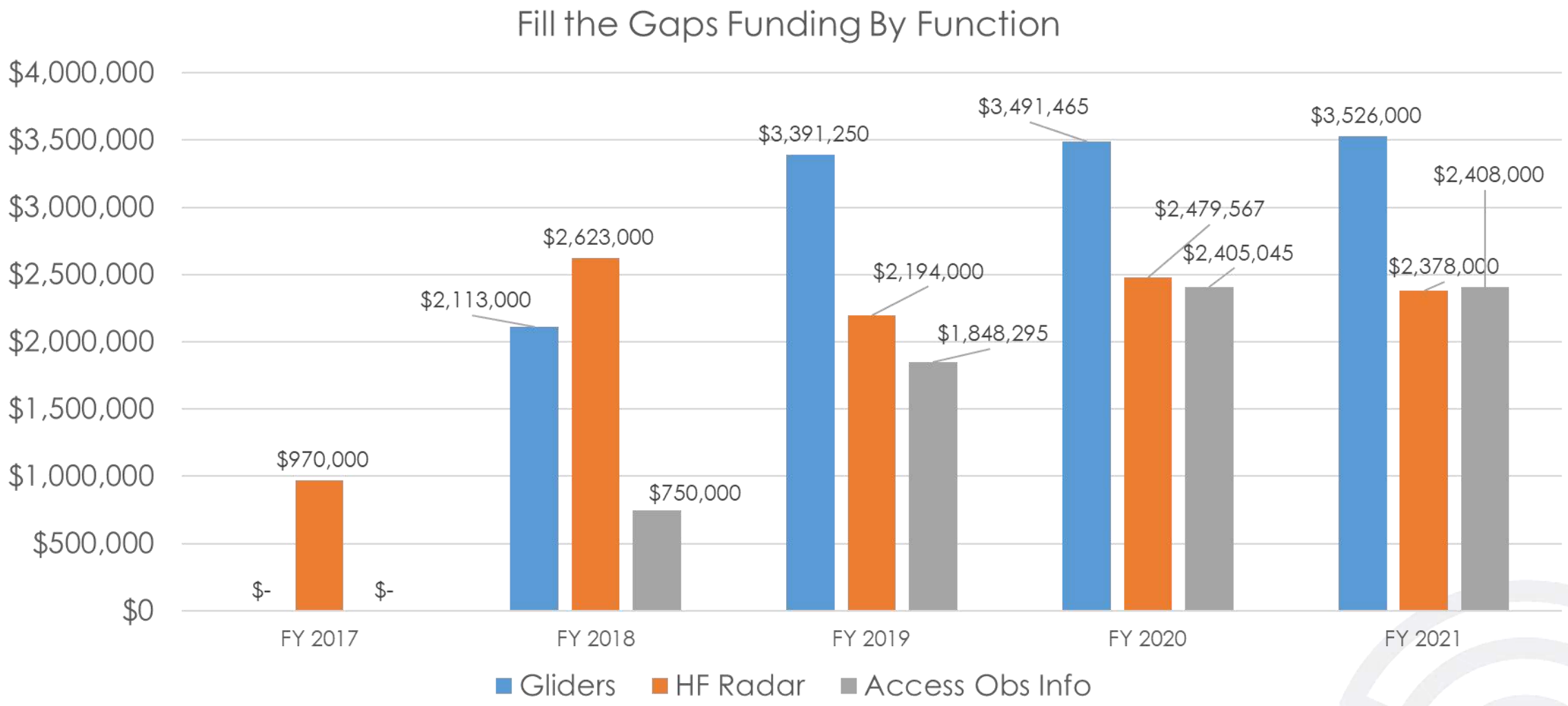
IOOS Fill The Gaps Funding 2017- 2021



Totals over the years: 2017= $970,000 2018= $5,486,000 2019= $7,443,545
FY2020 = $8,376,077 FY21 = $8,312,000

6. NANOOS Accomplishments & Vision

Jan Newton, NANOOS Executive Director

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
Northwest Association of Networked Ocean Observing Systems

IOOS

Governing Council 8/2021

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. Columbia River Inter-Tribal Fish Commission
72. World Ocean Council
73. Ocean Aero

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

NANOOS Objectives for FY2021

1. Maintain **NANOOS as the U.S. IOOS PNW Regional Association**
2. Maintain and enhance **surface current and wave** observations
3. Sustain and enhance **existing buoys and gliders in the PNW coastal ocean**, in coordination with other national and regional programs (and deploy new observing assets to expand spatial scope and increase our focus on biology)
4. Maintain (and expand) **observation capabilities in PNW estuaries (and the nearshore)**, in coordination with local and regional programs
5. Maintain (and enhance) **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, harden (and enhance) NANOOS' Data Management and Cyberinfrastructure (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, diversify, (and strengthen) **NANOOS engagement**

FY21 (Year 1 of New Award) Details

- **$3,932,271** total
- $2,929,171 = Core: **base, HFR ops, Fill the Gaps, + $33k increase**
  - HFR = $405k;
  - FTG = $546k for ½ glider purchase; La Push, Columbia and ½ N CA O&M; ESP support
- National **HAB-ON** ($298k)
- **NOAA OAP** support ($409k)
- Pass throughs (CRITFC, $112k; OSU MBON, $64k)
- OceanHackWeek ($7.5k)

NANOOS
Northwest Association of Networked Ocean Observing Systems

NANOOS Budget Over Time

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 21: **$3,932,271** ($2,462,136 base; $546K add to base; $33k increase; $409K OA; $298K HABs; $184K adds)
Year 15 or 1 of new award

NANOOS
Northwest Association of Networked Ocean Observing Systems

FY21 Award Details

- Does not address any new NANOOS proposed ops
- Does not provide increase to base beyond $33k

- Hope is that these will be part of next 4 years
  - Power of a prepared action-ready proposal that can be shopped

IOOS
Integrated Ocean Observing System
Our Eyes on the Ocean, Coasts, and Great Lakes

FY 2021 Northwest Association of Networked Ocean Observing Systems Award Information
May 12, 2021

Dear Dr. Newton,

The U.S. Integrated Ocean Observing System (IOOS) Office has recommended funding in the amount of $3,820,306 in FY2021 for your NOAA award # NA21NOS0120093, entitled, *"Sustaining NANOOS, the Pacific Northwest component of the US IOOS."* NOAA's Grants Management Division will notify you of the availability of these funds.

At your request, we have held back $111,965 for transfer to the Consortium for Ocean Leadership (COL). These funds are not included in the recommended funding level mentioned above.

The Consolidated Appropriations Act, 2021 provided $40.5M in funding for IOOS Regional Observations with associated guidance in the Omnibus Report directing "NOS to expand the regional underwater profiling gliders program consistent with House direction as well as for disaster response and the forecasting of freshwater and marine water quality." The House direction "supports IOOS' efforts to expand its use of underwater gliders." In addition, the Omnibus Report states, "The agreement also adopts House direction and provides $2,500,000 to continue and expand the IOOS-sponsored pilot programs launched in fiscal year 2020 to enhance the monitoring and detection of HABs. In addition, the agreement provides up to $1,000,000, from within funds allocated to the IOOS-sponsored pilot programs, for IOOS to establish an initial HABs monitoring and detection test bed in the Gulf of Mexico. The agreement expects that the test bed will deploy, operate, and test a range of technologies and also determine the data management and dissemination needs for operating and maintaining a complete end-to-end HABs detection and monitoring system. The agreement encourages the testbed to be established in an area that has experienced HABs in recent years and which has existing expertise, infrastructure, and collaboration between IOOS, an IOOS regional association, and academic and State partners that can be readily leveraged."

A transfer of $409,302 FY21 NOAA Ocean Acidification Program (OAP) resources has been executed to NOAA IOOS in support of the OAP projects designated as such in the table below. Provided under the Task entry in the table are the project titles as documented in the NOAA OAP project database and the lead project investigators and/or key points of contact specific to

1315 East-West Hwy | Second Floor | Silver Spring, Maryland 20910 | ph: 240-676-5309 | fax: 301-713-3281 | ioos.noaa.gov

NANOOS | Northwest Association of Networked Ocean Observing Systems

2020-2021 highlights:

- Getting assets back in the water
- Partner observations on NVS
- HABs in the PNW
- Climatology and assessing extreme events
- COMT proposal success for LiveOcean
- Enabling Change Working Group

Getting back in the water


Cha'ba Redeployed

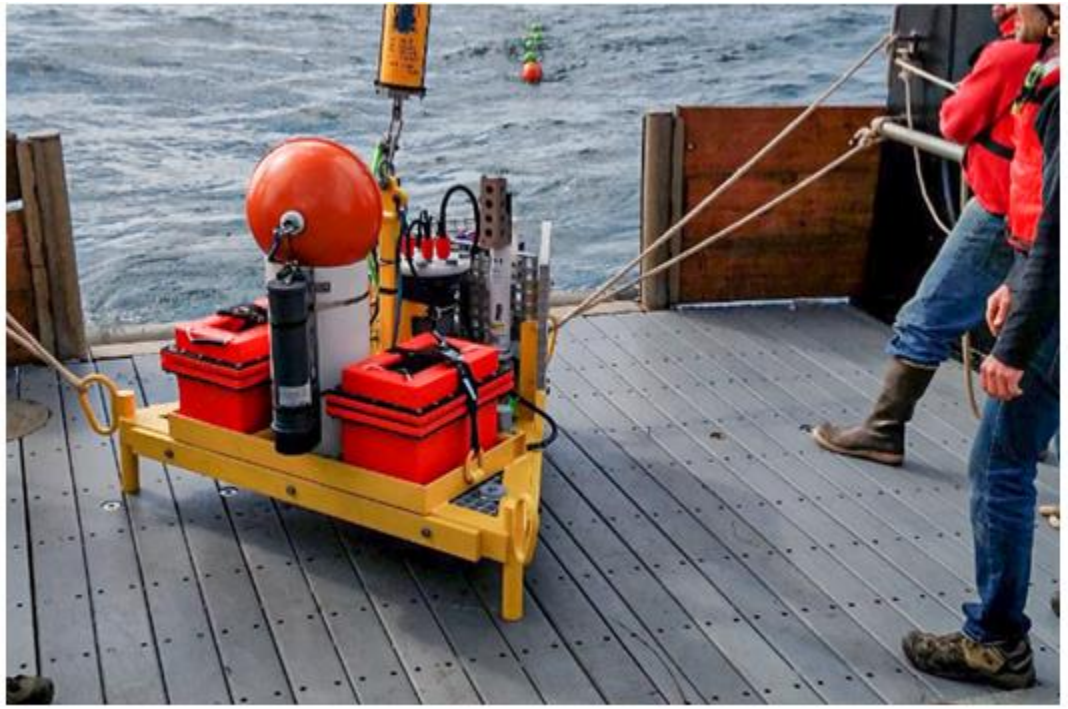

Oregon Shelf Buoy Redeployed


Washington Shelf Glider Back in the Water!

Columbia River Estuary Buoy Redeployed

Partner Observing Assets Now on NVS

Operated by UW Friday Harbor Labs: FHLOO
Funded by NSF & UW
Provides Biogeochemical measurements



Operated by the Quileute Tribe & UW-APL
Funded by Fishery Disaster Relief Program for Tribal Fisheries under the Bi-partisan Budget Act of 2018
Provides Oxygen and current meter measurements

HABs in the PNW

PNW HAB Bulletin Supports Tribal Access to Razor Clams

Members of the Quinault Indian Nation were able to harvest clams on the Washington coast for the first time since fall 2020. Joe Schumacker, Quinault Department of Fisheries, states that "access to weekly HAB monitoring data and guidance from the PNW HAB Bulletin gave us the confidence to go forward with a tribal dig at Mocrocks this week." These PNW HAB Bulletins are produced through the ORHAB Partnership, of which NANOOS is a partner, and allow coastal managers to better protect marine mammal health and shellfish safety by assessing HAB risk in the Pacific Northwest. The PNW HAB Bulletins and near real-time data can be found on the NANOOS Real-Time HABs app. *Photo Credit: David J. Ruck, NOAA*

Read the Press Release | Visit the Real-Time HABs Site

Are conditions average?

NANOOS Presentation for NOAA West Watch Highlights Hypoxia and Marine Heat Wave

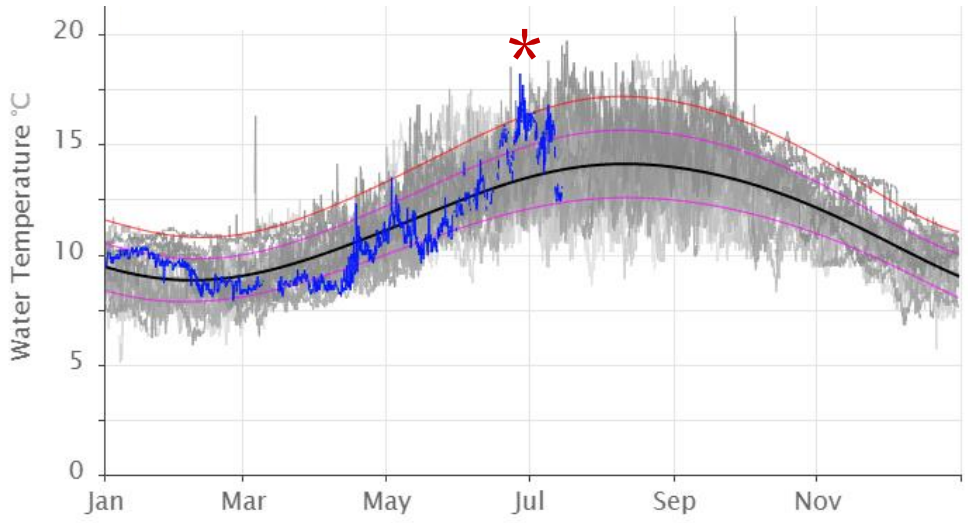
NOAA's most recent West Watch was held on 20 July 2021. The webinar summarized coastal environmental conditions and impacts in the Western Region, including the recent hypoxia off the coast and higher than normal temperatures. It included contributed slides from the NANOOS, CeNCOOS, and SCCOOS regions, who regularly report on their local coastal ocean conditions. The next webinar date is 26 October 2021. Contact us at NANOOS if you want to participate and please let us know if you have any comments.

View the Webinar Slide Set (PDF)

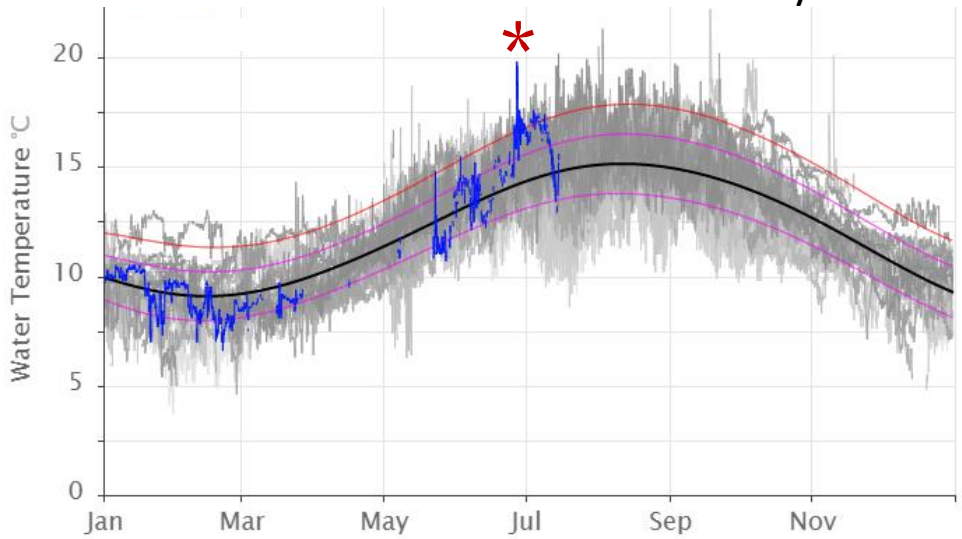
NANOOS: www.nanoos.org Climatology app

Sea Surface Temperature

NDBC Cape Elizabeth ● 34 yrs

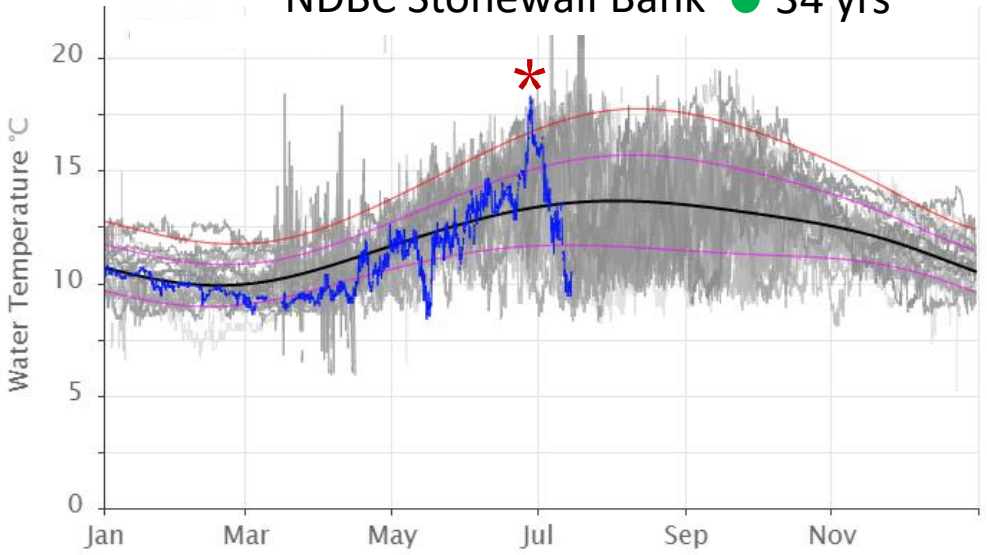


NDBC Columbia River Bar ● 37 yrs

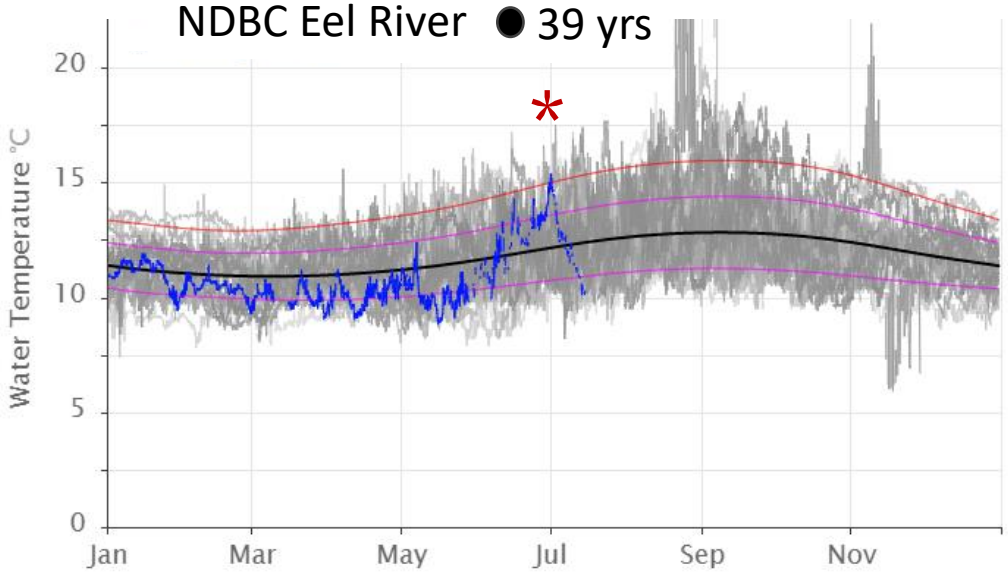


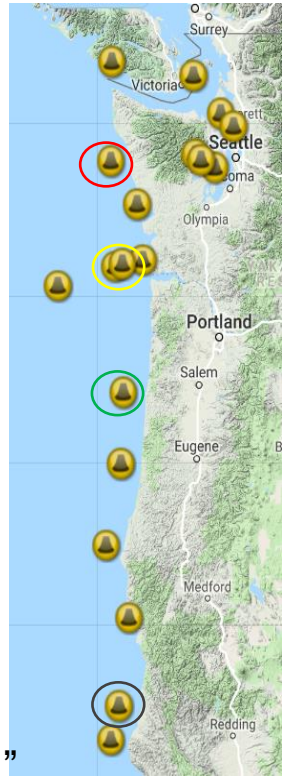
Seasonal Cycle n=34 Yrs
-1 STD
+1 STD
+2 STD
2021

NDBC Stonewall Bank ● 34 yrs



NDBC Eel River ● 39 yrs

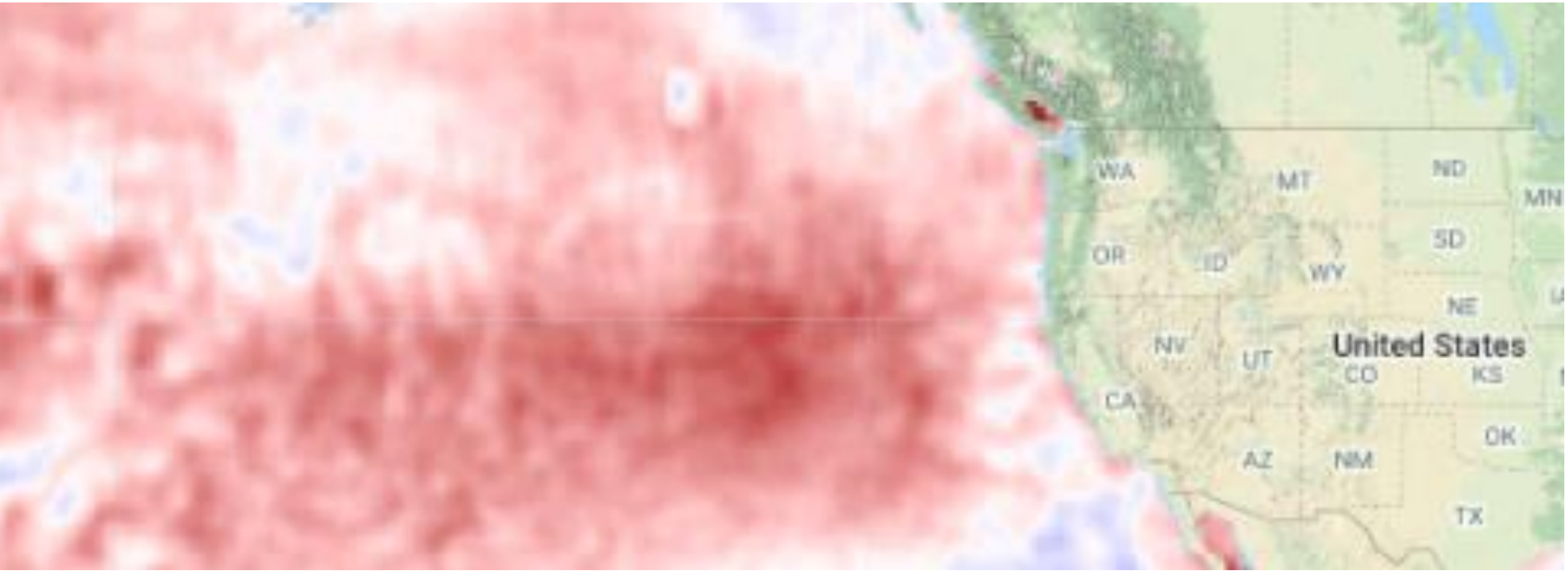




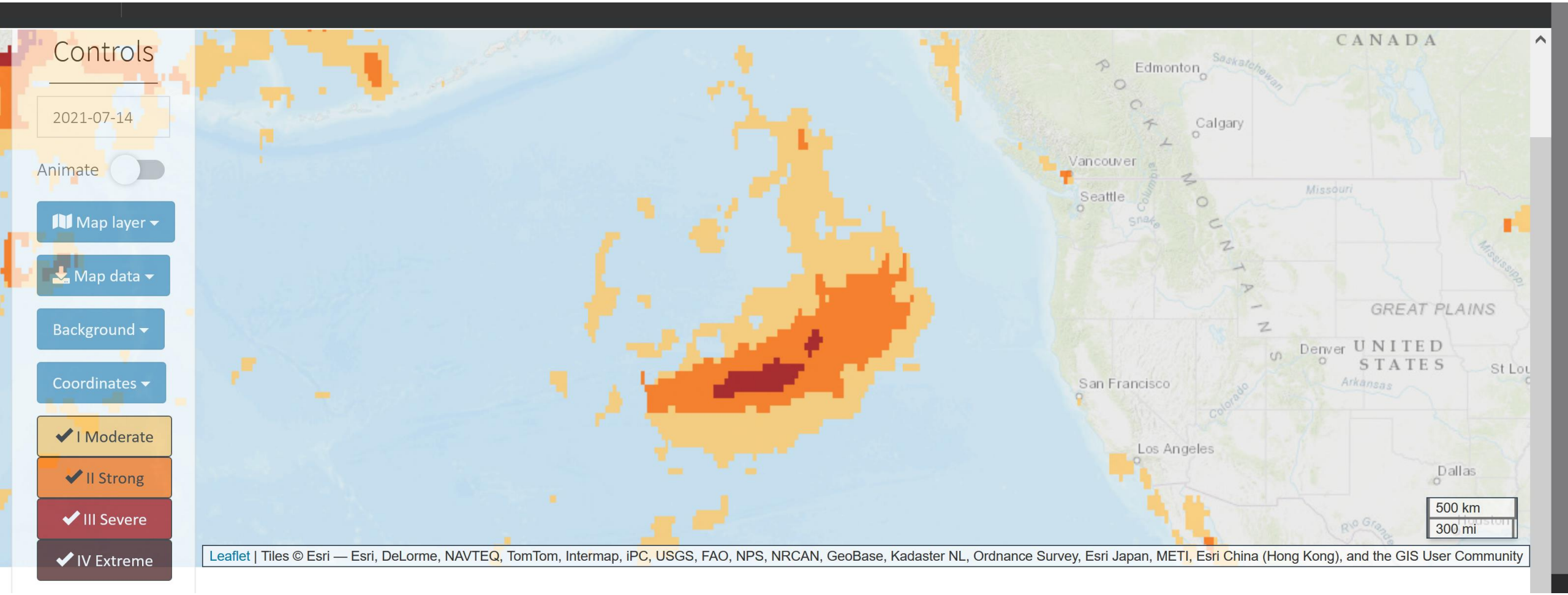
IOOS

*PNW heat dome: "... the strength of the ridge … was unprecedented in the record."

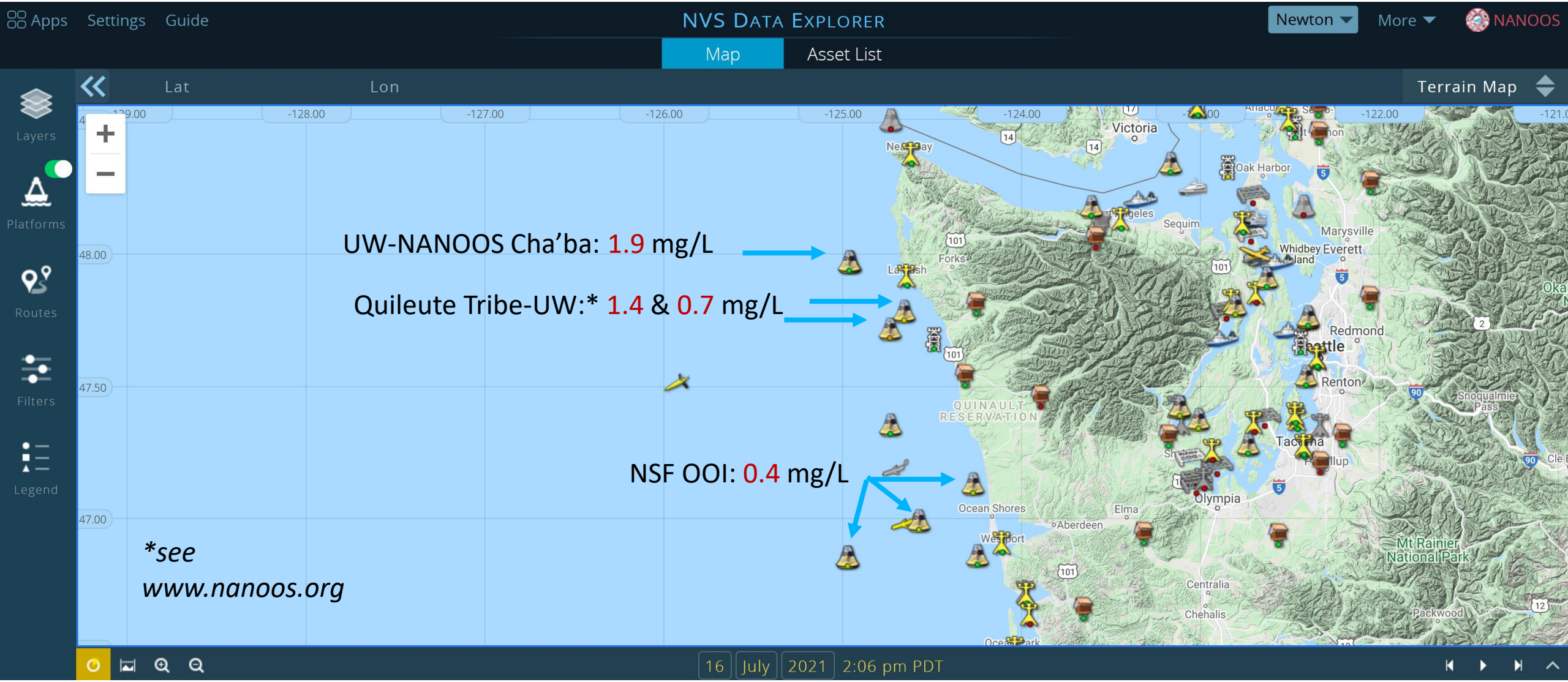
Marine heatwave tracker



Marine heatwave tracker

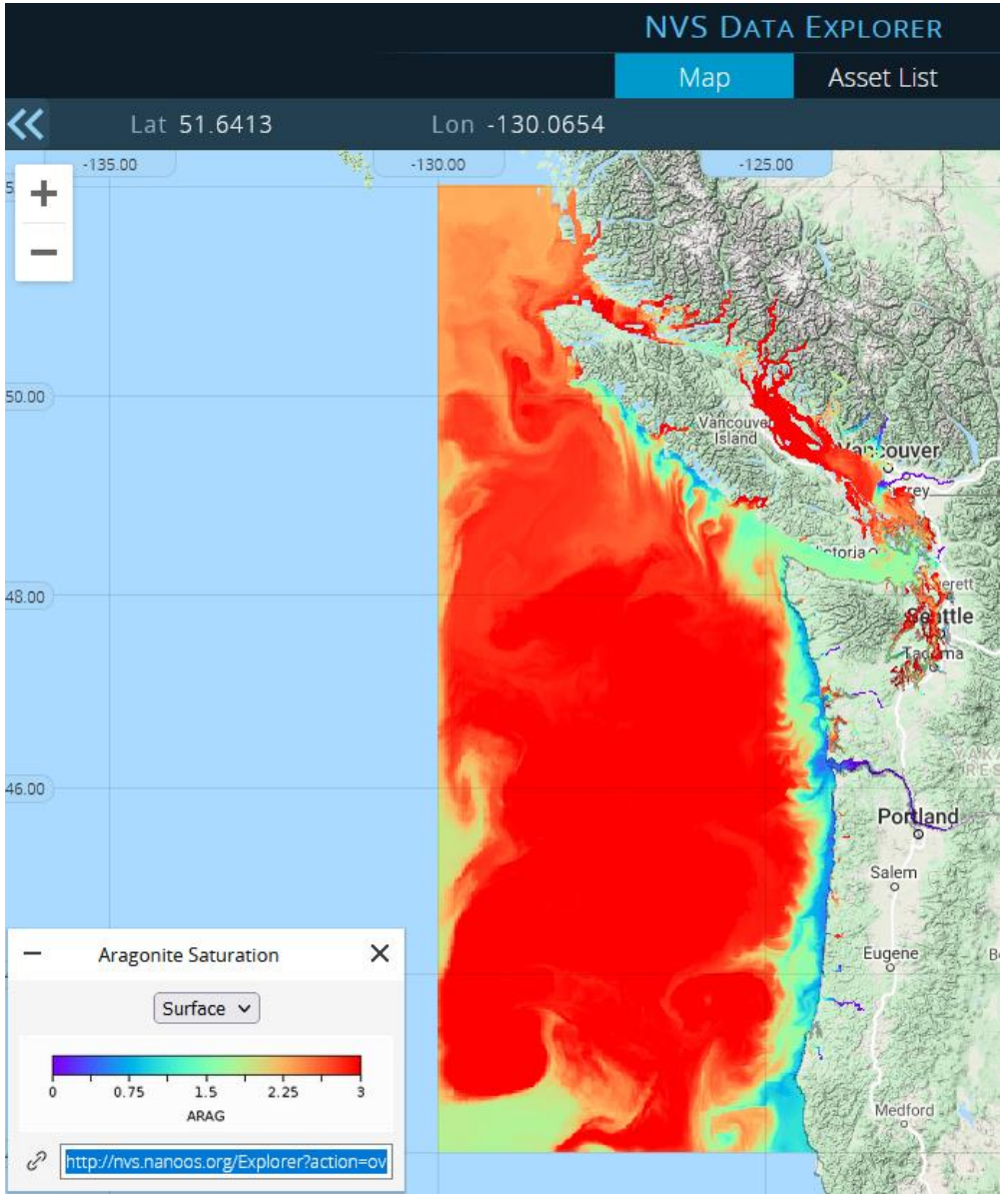


PNW Coastal Moorings with Real-Time Oxygen



IOOS Coastal and Ocean Modeling Testbed (COMT) to fund LiveOcean transition

- COMT proposal success for LiveOcean
- 21 letters for support from NANOOS community



Enabling Change Working Group

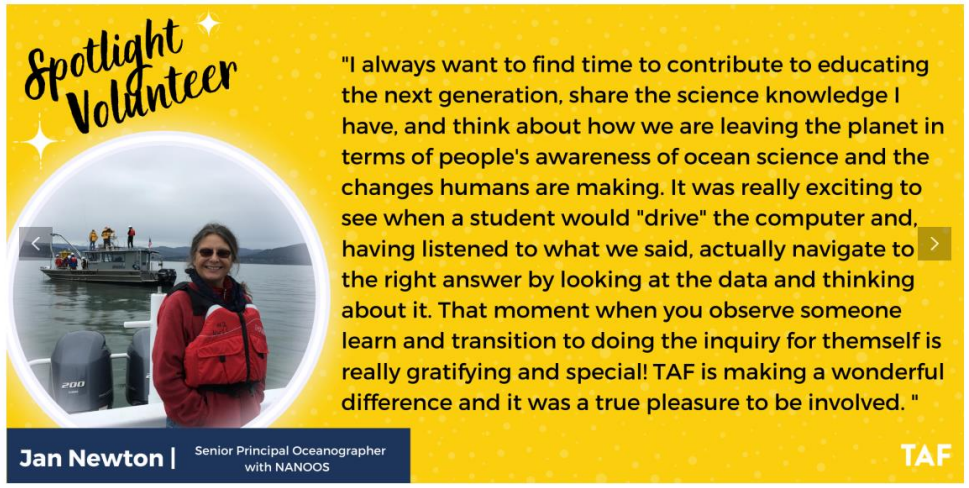
TAF Volunteers, We Appreciate You!

By Felicitas Fischer Posted June 24, 2021 In #TAFEvents, #TAFStory

They say that our most valuable asset is our time – how we spend it matters greatly since it is the one nonrenewable resource we cannot get back, control, or own. Yet so many of us feel short of time, where the days run together and there is little opportunity to pursue things outside of our daily tasks. If that weren't the case, what would you do with extra time on your hands?

In this past school year, 265 of you decided to dedicate that time to TAF, volunteering through a plethora of one-time or ongoing opportunities that make educational equity possible for our students and teachers across Washington state. Whether it was facilitating a workshop, mentoring

- **What to do ??**
- **Start !!**
  - **Leverage opportunity, see how it works or could be improved**
- **Seek ways to multiply**



Congressional Outreach

NANOOS

NORTHWEST ASSOCIATION OF NETWORKED OCEAN OBSERVING SYSTEMS

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

Coastal Hazard 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

"The beach and shoreline monitoring data supported by NANOOS has been instrumental in helping to support [Oregon state] requirements, such as completing new FEMA regulatory maps, updating the science for foredune management planning purposes, developing coastal hazard zone maps to guide development, and monitoring dynamic revetments used for mitigating the effects of coastal erosion."

– Patty Snow, Coastal Program Manager, Oregon Department of Land Conservation and Development

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*

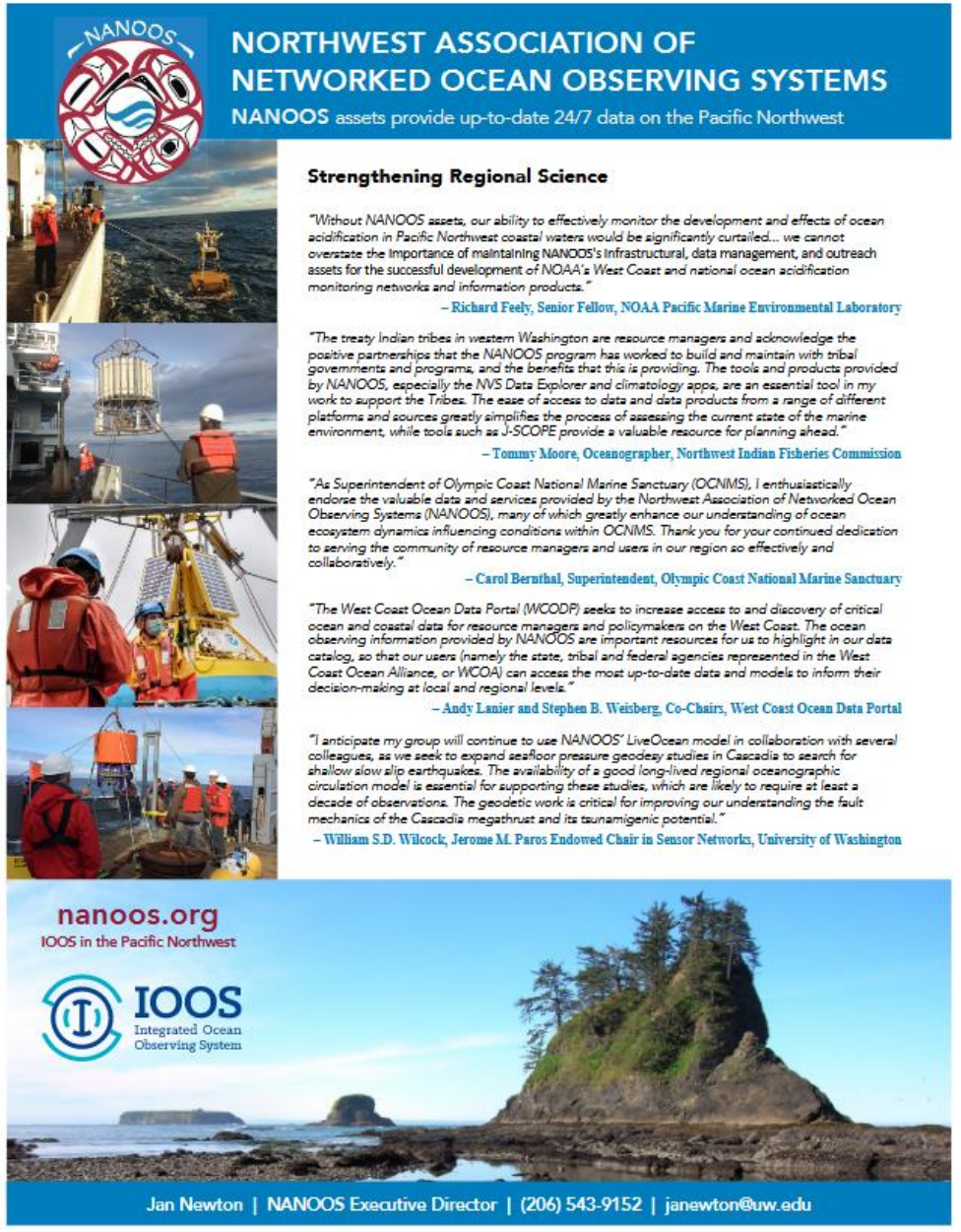
"The NANOOS surfer application provides the most comprehensive assemblage of ocean and coastal data on water quality, swell direction/height, winds, tides, and beach cameras that is currently available for the Pacific Northwest. Having access to these current conditions and forecasting models is crucial 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

nanoos.org
IOOS in the Pacific Northwest

IOOS
Integrated Ocean Observing System

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



NANOOS

NORTHWEST ASSOCIATION OF NETWORKED OCEAN OBSERVING SYSTEMS

NANOOS assets provide up-to-date 24/7 data on the Pacific Northwest

Strengthening Regional Science

"Without NANOOS assets, our ability to effectively monitor the development and effects of ocean acidification in Pacific Northwest coastal waters would be significantly curtailed... we cannot overstate the importance of maintaining NANOOS's infrastructural, data management, and outreach assets for the successful development of NOAA's West Coast and national ocean acidification monitoring networks and information products."

– Richard Feely, Senior Fellow, NOAA Pacific Marine Environmental Laboratory

"The treaty Indian tribes in western Washington are resource managers and acknowledge the positive partnerships that the NANOOS program has worked to build and maintain with tribal governments and programs, and the benefits that this is providing. The tools and products provided by NANOOS, especially the NVS Data Explorer and climatology apps, are an essential tool in my work to support the Tribes. The ease of access to data and data products from a range of different platforms and sources greatly simplifies the process of assessing the current state of the marine environment, while tools such as J-SCOPE provide a valuable resource for planning ahead."

– Tommy Moore, Oceanographer, Northwest Indian Fisheries Commission

"As Superintendent of Olympic Coast National Marine Sanctuary (OCNMS), I enthusiastically endorse the valuable data and services provided by the Northwest Association of Networked Ocean Observing Systems (NANOOS), many of which greatly enhance our understanding of ocean ecosystem dynamics influencing conditions within OCNMS. Thank you for your continued dedication to serving the community of resource managers and users in our region so effectively and collaboratively."

– Carol Bernthal, Superintendent, Olympic Coast National Marine Sanctuary

"The West Coast Ocean Data Portal (WCODP) seeks to increase access to and discovery of critical ocean and coastal data for resource managers and policymakers on the West Coast. The ocean observing information provided by NANOOS are important resources for us to highlight in our data catalog, so that our users (namely the state, tribal and federal agencies represented in the West Coast Ocean Alliance, or WCOA) can access the most up-to-date data and models to inform their decision-making at local and regional levels."

– Andy Lanier and Stephen B. Weisberg, Co-Chairs, West Coast Ocean Data Portal

"I anticipate my group will continue to use NANOOS' LiveOcean model in collaboration with several colleagues, as we seek to expand seafloor pressure geodesy studies in Cascadia to search for shallow slow slip earthquakes. The availability of a good long-lived regional oceanographic circulation model is essential for supporting these studies, which are likely to require at least a decade of observations. The geodetic work is critical for improving our understanding the fault mechanics of the Cascadia megathrust and its tsunamigenic potential."

– William S.D. Wilcock, Jerome M. Paros Endowed Chair in Sensor Networks, University of Washington

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IOOS
Integrated Ocean Observing System

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

IOOS Association Dues

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

- Seabird Scientific
- Pacific Coast Shellfish Growers Association

THANK YOU!!!

THANK YOU !!!

BREAK

7. NANOOS Standing Committees

- DMAC
- User Products
- Engagement, Outreach, Education

DMAC Update

Craig Risien (OSU)
Troy Tanner, Alex Dioso, Roxanne Carini (UW)
Charles Seaton (CRITFC)
Jonathan Allan (DOGAMI)

2020 – 2021 Accomplishments

- Transitioned DMAC roles and responsibilities from Emilio Mayorga to other committee members.
- Significant progress on updating NVS data harvesters and parsers (Python 2.7 to Python 3).
- Developed a framework for implementing QARTOD tests.
- Worked with NDBC and IOOS to test data ingestions via NANOOS ERDDAP and that data sets met Metadata Profile 1.2 requirements.
- Worked with NDBC to operationalize CB-06 (46128) data ingestions via the NANOOS ERDDAP.
- Completed and submitted an Advanced Tracking and Resource tool for Archive Collections (ATRAC) document to NCEI for the archiving of DOGAMI shoreline data.
- Continued monthly NCEI archiving of CRITFC fixed-location time series data.
- Progress on creation of a centralized THREDDS server for serving NANOOS model fields.
- Updated and restructured OSU servers to meet new OSU cyber security requirements.

NVS Data Harvesters and Parsers

- Significant progress on updating NVS data harvesters and parsers (Python 2.7 to Python 3)
  - 43/126 harvesters complete
  - Project is on track to be completed by the end of 2021

- New data streams added
  - UW Friday Harbor Laboratories
  - Quileute Bottom Lander
  - CDIP buoy (Angeles Point / Salish Sea)
  - NWS Shore Stations (Cape Disappointment, Clatsop Spit)

- Upgraded/enhanced data streams
  - CRITFC Saturn-07 mooring
  - Woody Island fixed station

Quileute bottom lander

NDBC Data Ingestion via ERDDAP

- Developed and tested an ERDDAP data set that adhered to IOOS Metadata Profile 1.2 requirements
  - Created a framework for implementing QARTOD tests
  - Ongoing efforts to implement “required” and “strongly recommended” QARTOD tests
- Transitioned to having NDBC pull CB-06 data via ERDDAP
- Ongoing work to have NDBC pull ORCA and Chá Bă data via ERDDAP
- Future work to have NDBC pull CRITFC data via ERDDAP

CB-06 mooring

NCEI Data Archiving

- DOGAMI
  - Completed and submitted an Advanced Tracking and Resource tool for Archive Collections (ATRAC) document for the archiving of Oregon shoreline survey data.
  - Archive request was approved by the NCEI Archive Appraisal Committee (AAC).
- CRITFC
  - Continued archiving of fixed-location time series data from OHSU CMOP stations (https://www.ncei.noaa.gov/thredds-ocean/catalog/ioos/nanoos/catalog.html).
- CB-06
  - Subset of chemical, meteorological, and physical time series data archived and available at https://doi.org/10.25921/rr8z-se53.
- Efforts to archive pH sensor data from UW Washington Shelf and Puget Sound moorings are ongoing.

Cyber Security

- Oregon State University
  - All Apache webservers updated.
  - Java Developer Kit updated.
  - Tomcat (including THREDDS and ERDDAP) updated.
  - Moved all servers (except for nanoos.ceoas.*) to a private IP space behind OSU firewall.
  - Regular OS updates.

- UW/APL
  - Regular OS and software updates.
  - Monitor for unauthorized activity.
  - Access limited to necessary personnel only.

2021/2022 Planned Activities

- Continue adding datasets to NANOOS ERDDAP for ingestion by NDBC
- Extend QARTOD to include additional tests
- Finish converting NVS data harvesters and parsers from Python 2.7 to 3
- Build out of NANOOS THREDDS server as a centralized data repository for model archiving and distribution
- Continue to support archiving NANOOS glider data in the IOOS Glider DAC
- Work with NANOOS PIs and NCEI on data archiving
- Recertification & PI Data Management Plan revisions
- Personnel transitions, hiring of new personnel

Questions?

Craig Risien
Oregon State University
craig.risien@oregonstate.edu

User Products Chair Update

Jonathan Allan (DOGAMI)

Craig Risien, Mike Kosro (OSU)

Troy Tanner, Alex Dioso, Roxanne Carini,

Jan Newton, Nick Rome, Anna Boyer (UW)

Charles Seaton (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)

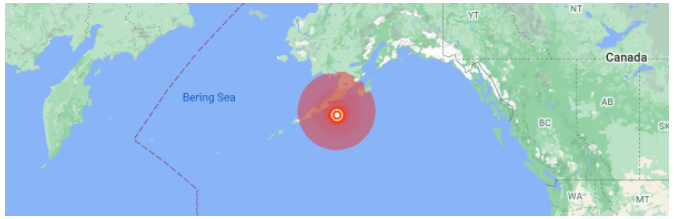
Current version remains at V6.3

- **Refined our overview app… needed to understand the status of any platform, sensor, overlay, or server.**

- **Added tsunami evacuation routing capability for select Oregon communities (helps guide residents out of the inundation zone to nearest safety location). Collaboration between DOGAMI, UofO, and NANOOS.**

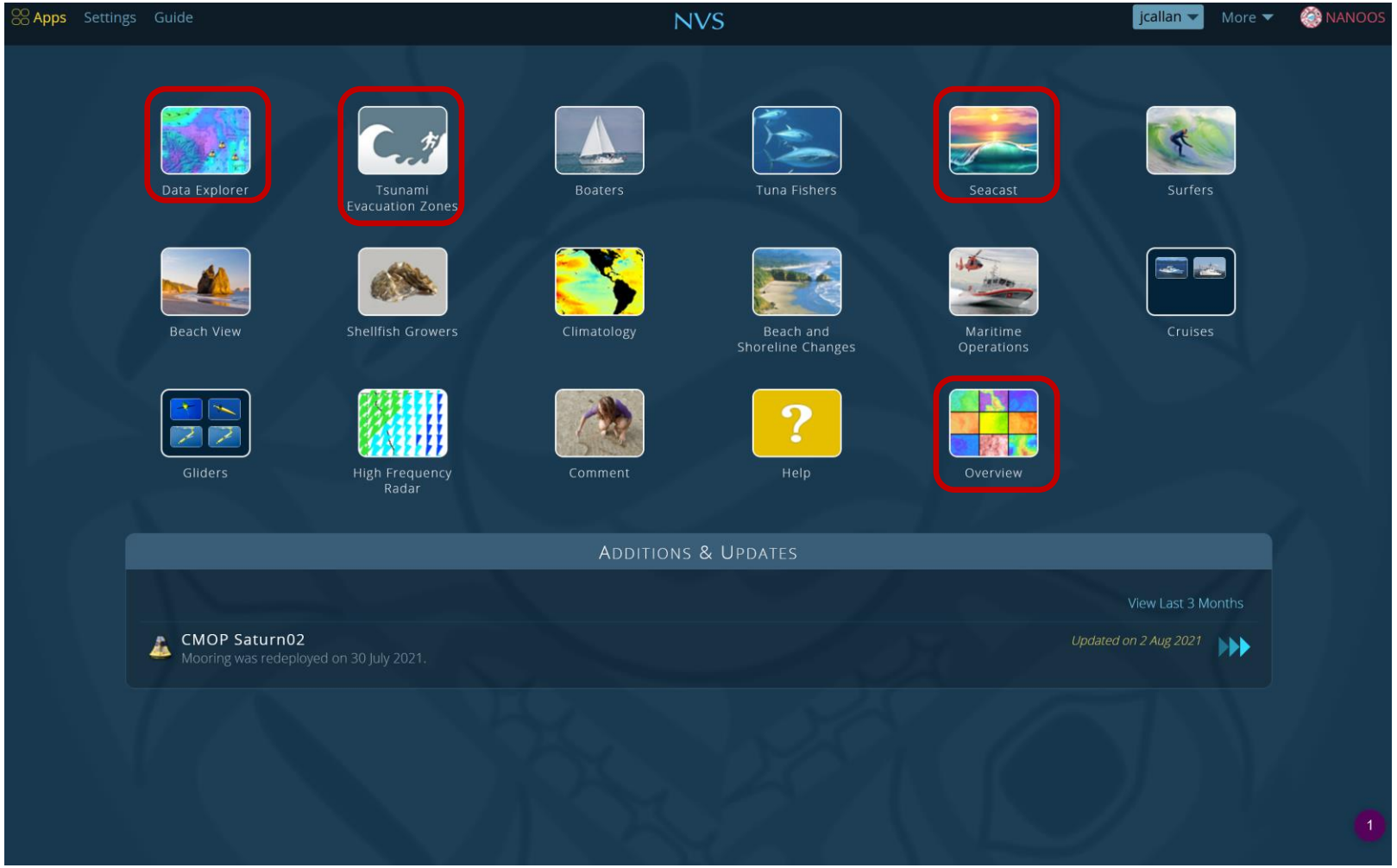
- **Working with WA DGS to incorporate latest tsunami modeling results into the tsunami evacuation portal**

- **Updated NDBC climatology time series datasets… addressed sampling issues.**



NANOOS
Northwest Association of Networked Ocean Observing Systems

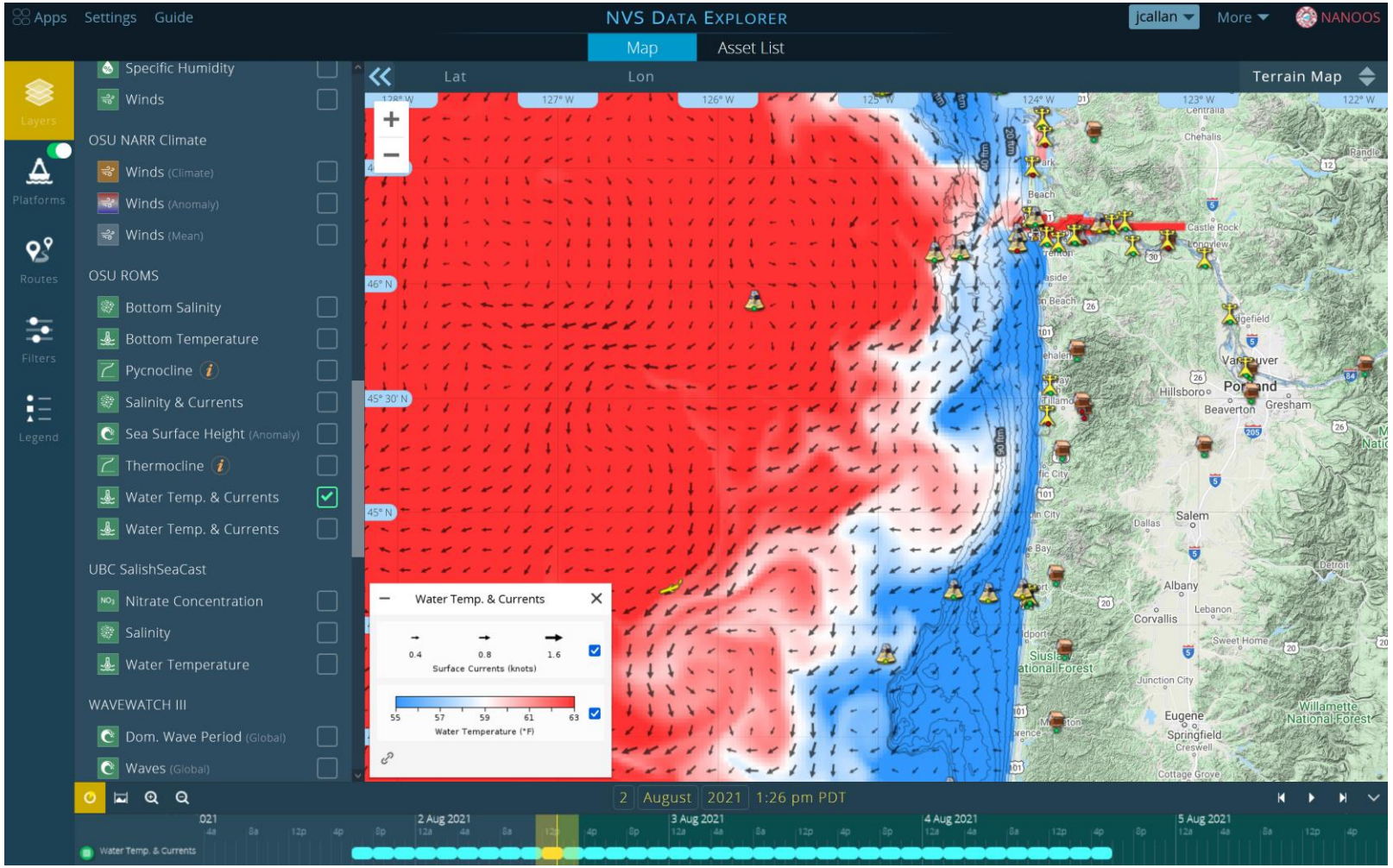
NVS Apps



- User focused apps.

NANOOS
Northwest Association of Networked Ocean Observing Systems

NVS Data Explorer (in situ assets and overlays)



- Access to all in situ assets and overlays.
- Limited to last 60 days for federal and NANOOS supported assets (varies for others)
- Model forecasts (3 & 7 days)
- Multiple filters for finding data (platform, region or parameter (e.g. nitrates vs surface waves))

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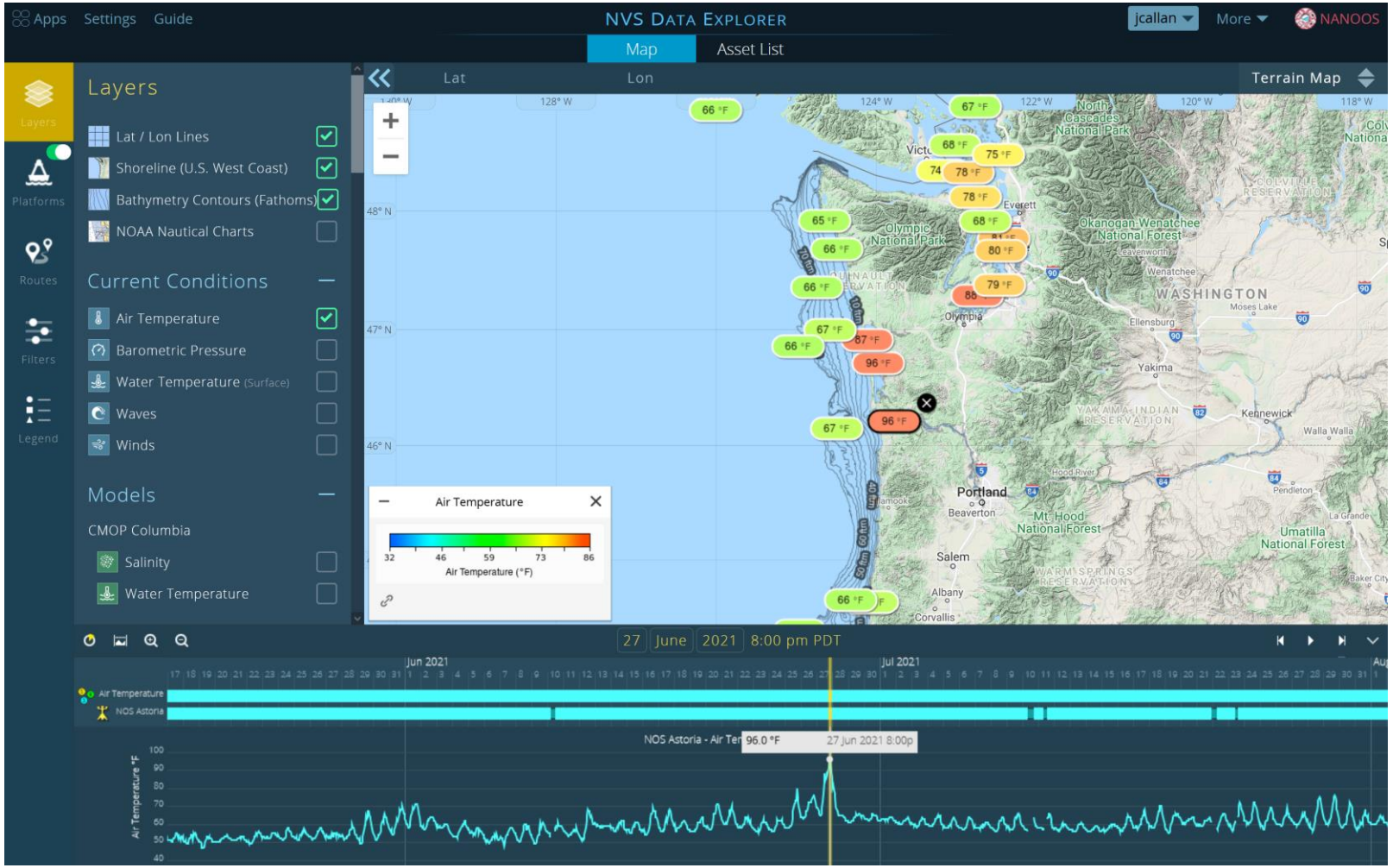
NVS Data Explorer (evaluate synoptic conditions)



- Access to current conditions and review associated time series from the various platforms and sensors.

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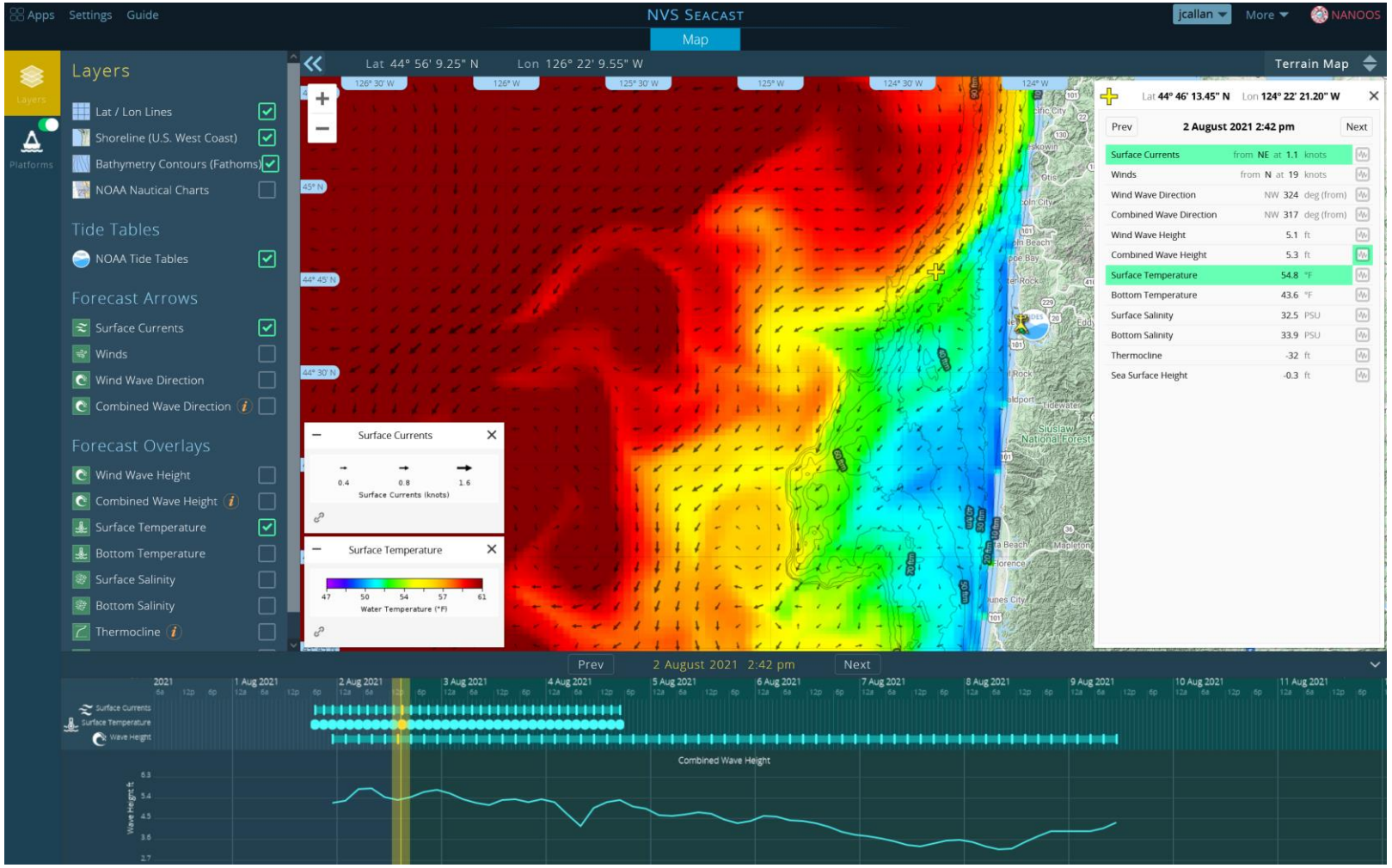
NVS Seacast App



- Click anywhere enables access to multiple parameters and their accompanying data.
- Able to advanced hourly to view forecasted conditions
- Overlay two variables and evaluate time series of third parameter of interest.

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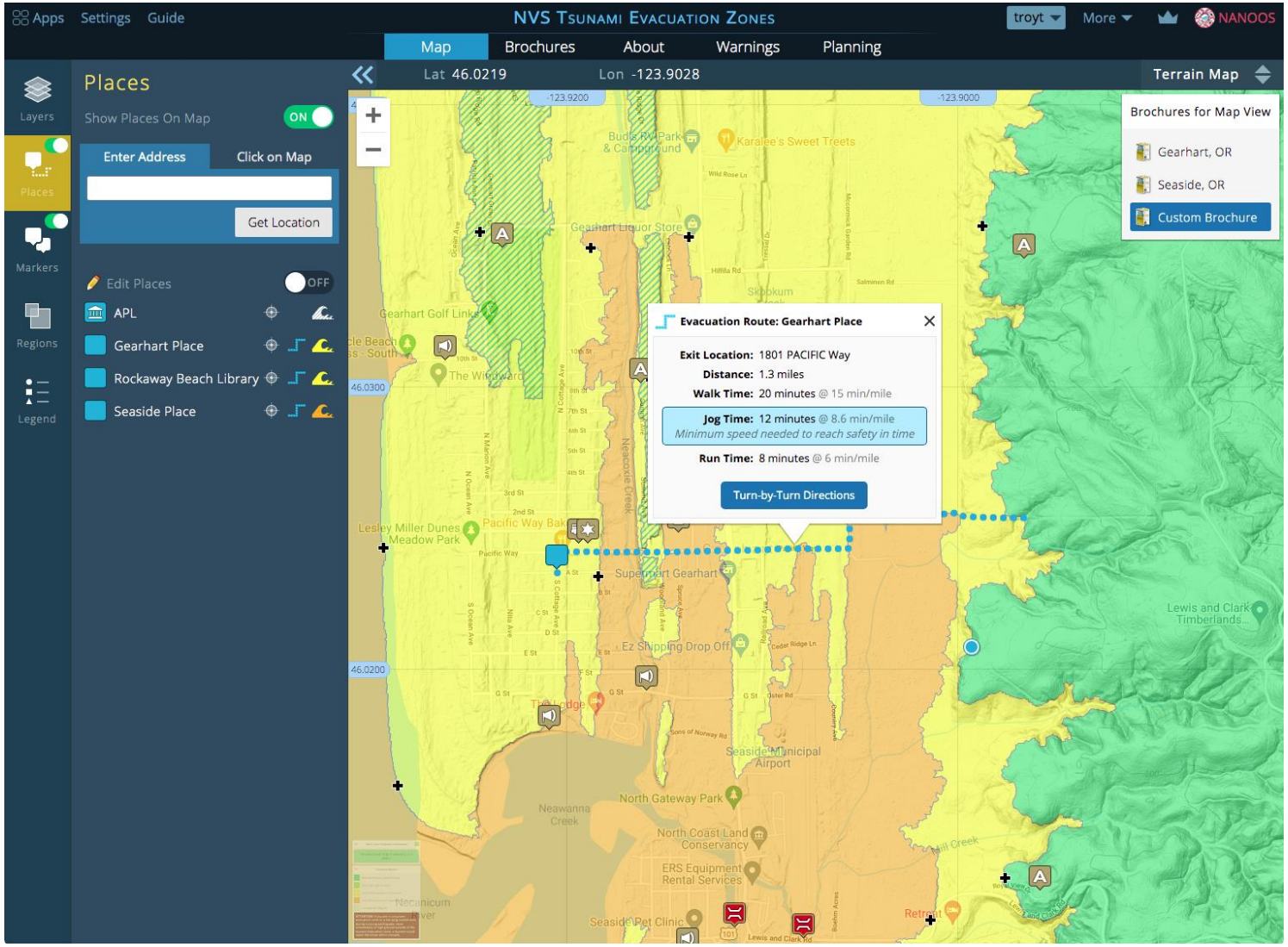
NVS Tsunami Evacuation Routes



User-created places in select Oregon communities provide evacuation route information and recommended travel speed needed to reach safety.

Partnership between DOGAMI (data provider), UofO (routing tool developer) and NANOOS (visualization).

UNIVERSITY OF OREGON

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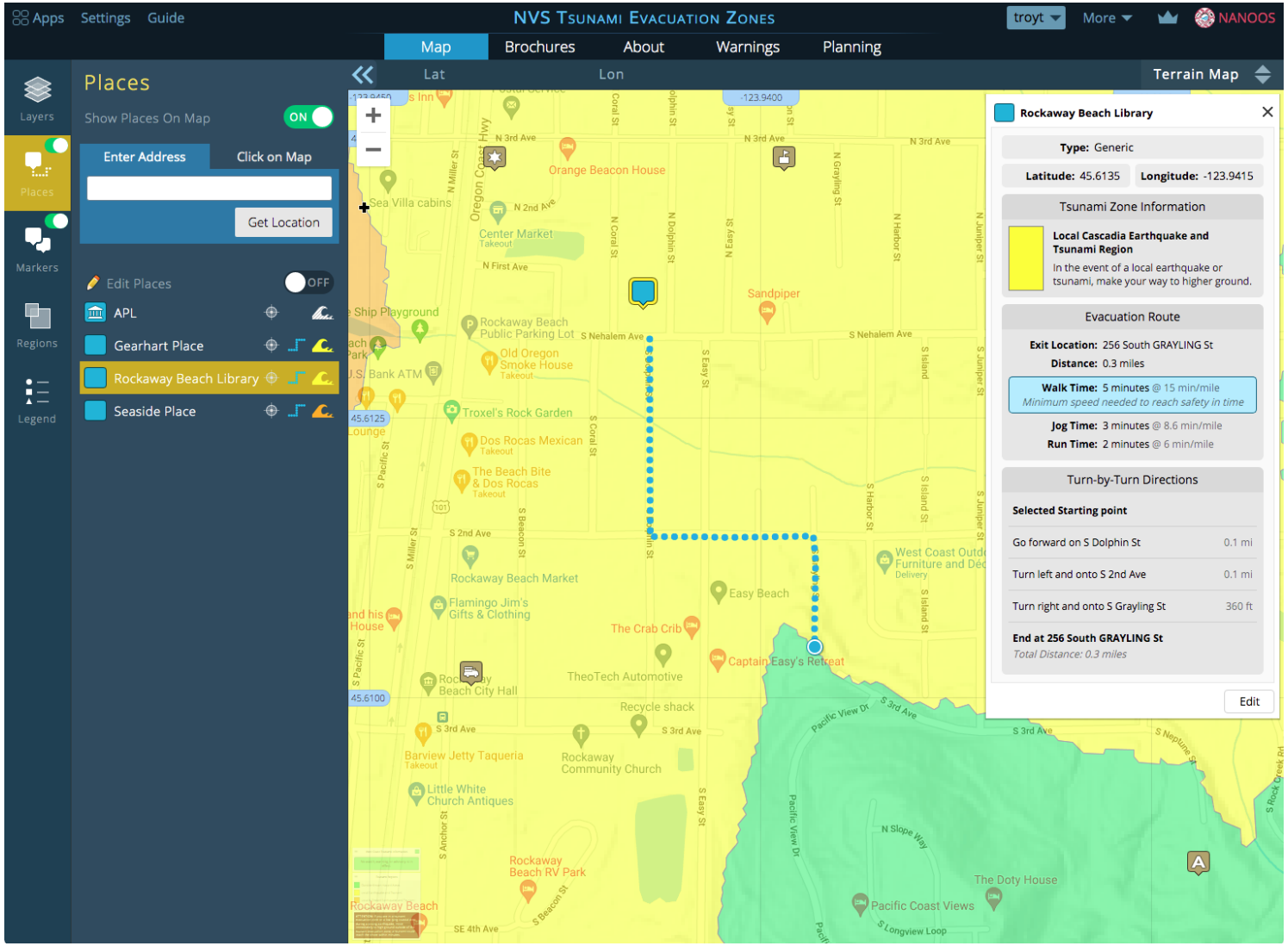
NVS Tsunami Evacuation Route Instructions (soon)



Tsunami evacuation routes is being enhanced to include turn-by-turn instructions.

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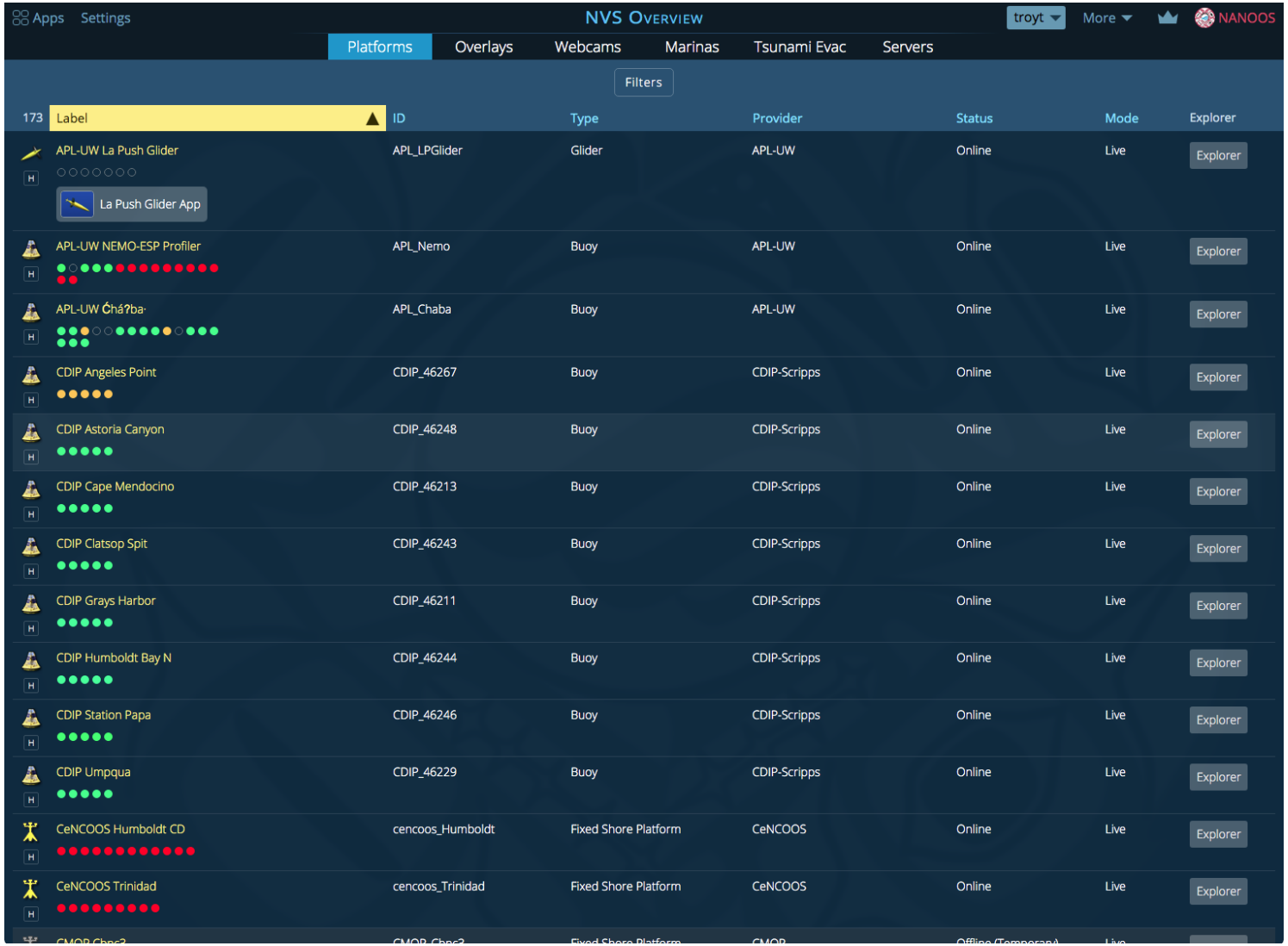
NVS Overview App - Platforms



The platforms section provides an overview of platforms, metadata, and data age in a single view.

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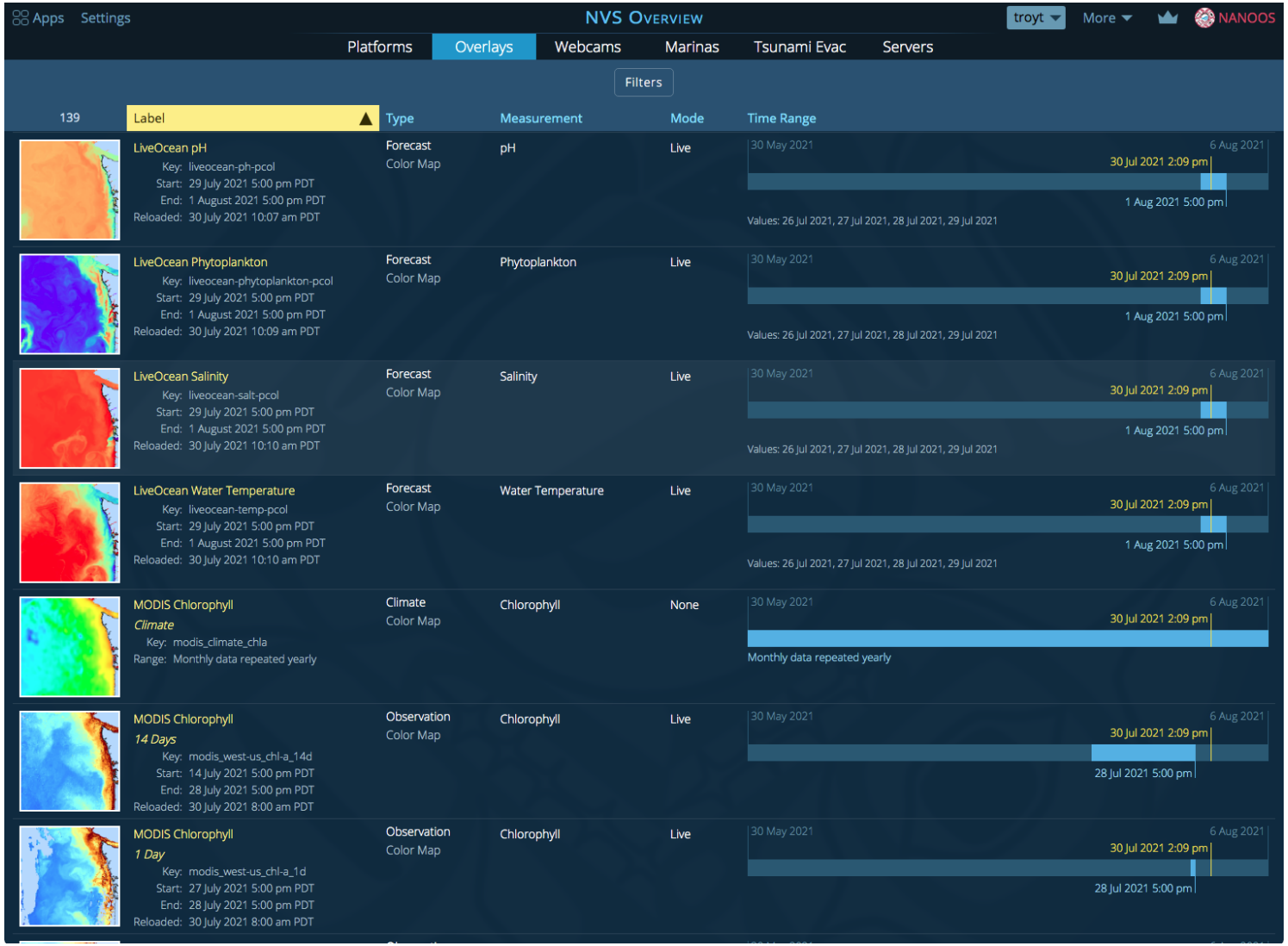
NVS Overview App - Overlays



The overlays section lists all available overlays and provides information about update time and the temporal range of each overlay.

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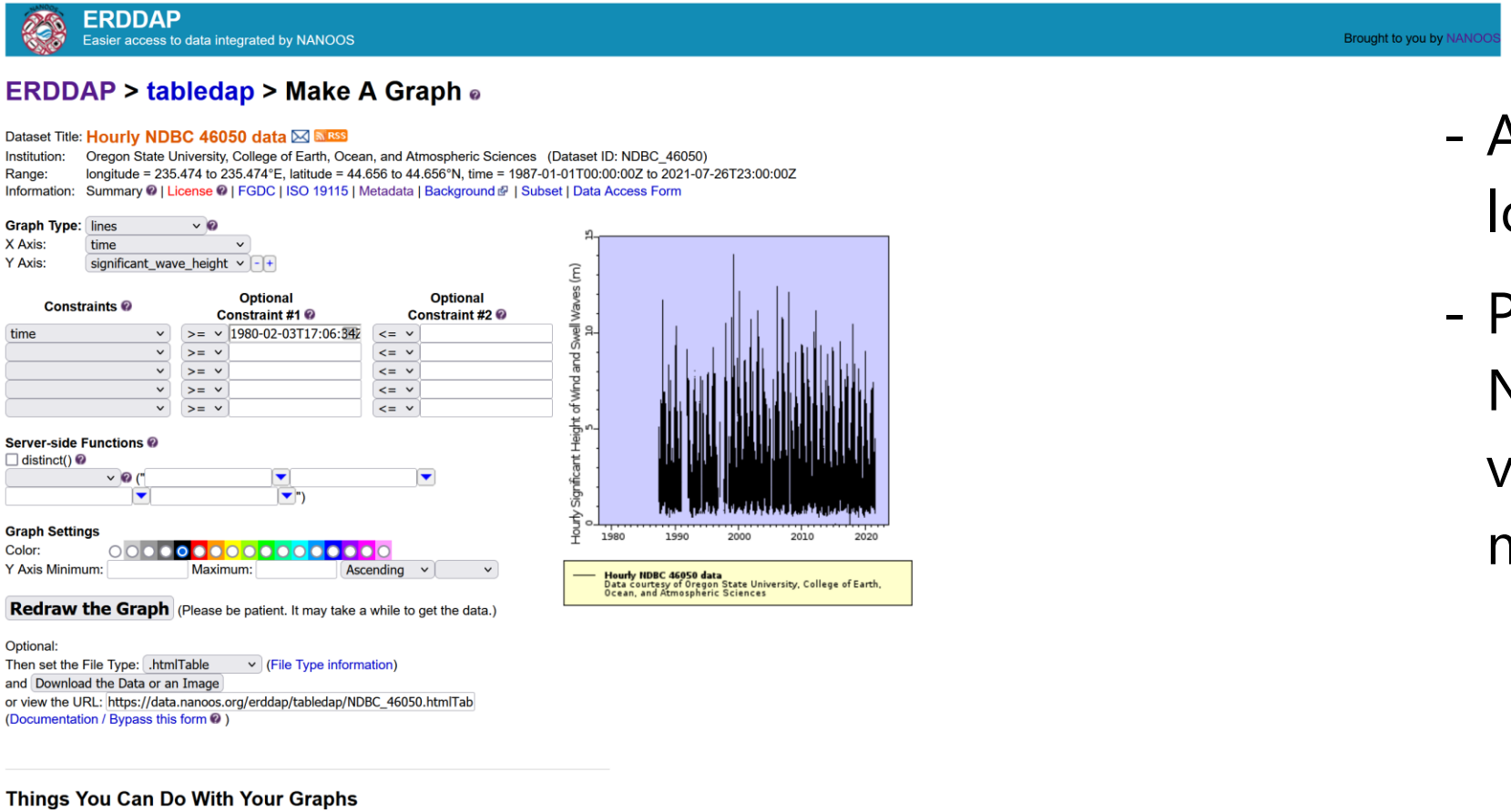
NVS ERDDAP



- Ability to access longer time series.
- Platforms include NDBC, NOS and various glider missions.

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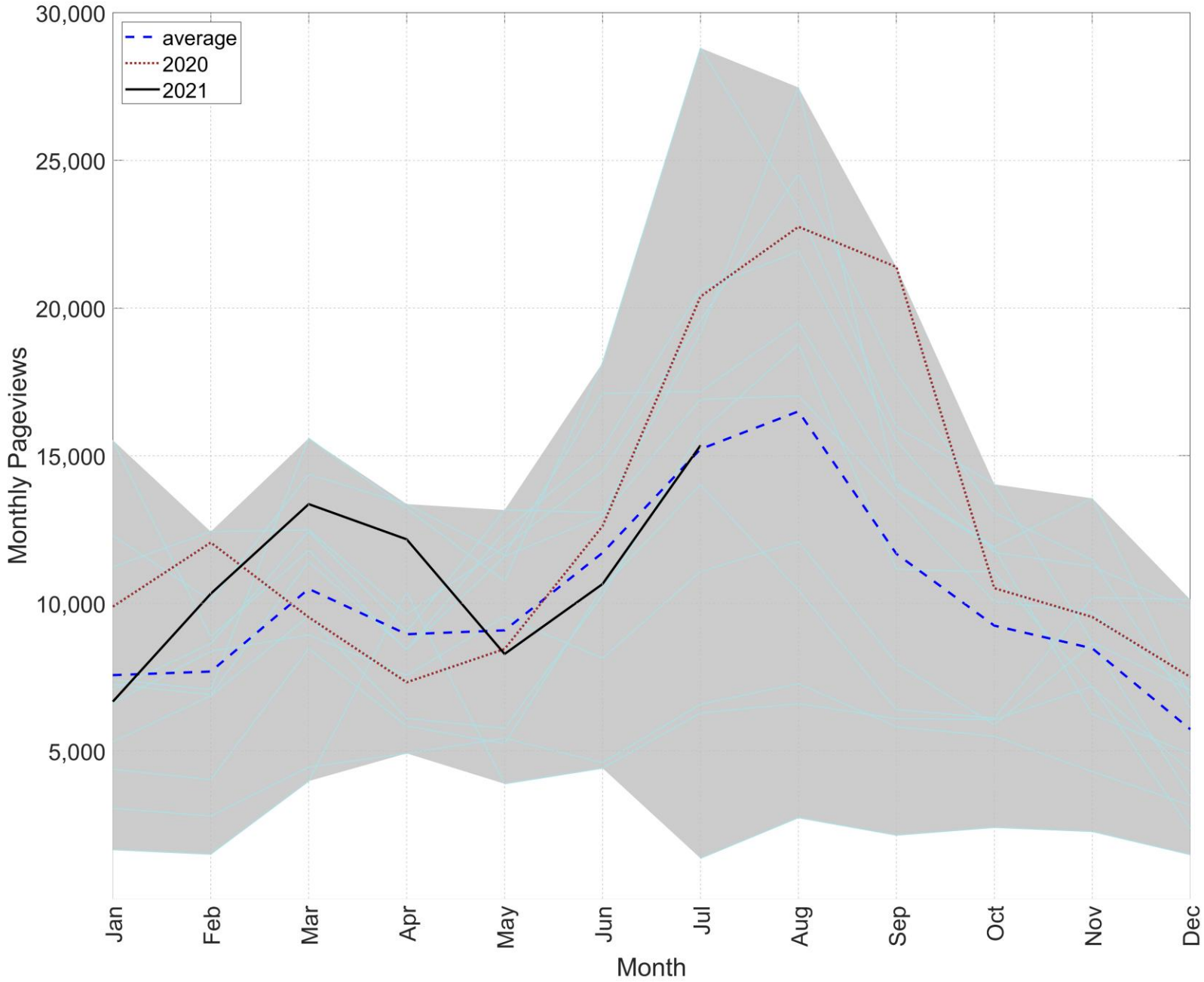
average
2020
2021
30,000
25,000
20,000
15,000
10,000
5,000
Monthly Pageviews
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Month

Priority for the next 12 months: *Modernize aging DMAC infrastructure, operations (data harvesters) and security issues.*

1) Develop a unified glider app
2) Particle Tracking
3) Update NVS smartphone app
    - Map view
    - Favorite assets
4) Incorporate geospatial web mapping services (evaluating biological data from the OR coast)
5) Cross-section tool

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Outreach, Education, & Engagement Chair Update

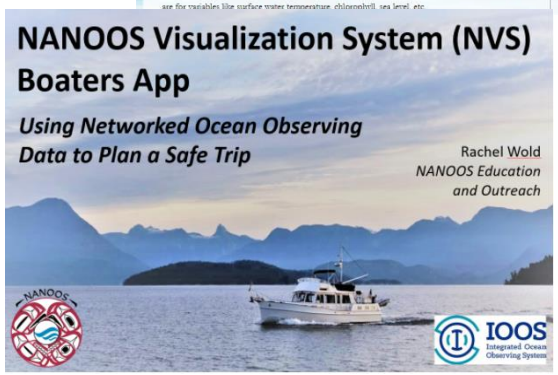
Rachel Wold

Outreach and Engagement:
Increasing awareness and connecting with users

- Virtual engagement with the general public and targeted user groups:
  - Sound Waters: A One Day University for All
  - Recreational boaters, fishers, surfers in PNW
  - Collect and utilize user feedback

- Continue communication with members of various recreational, educational and stewardship organizations while their regular meetings and events were on hold due to COVID

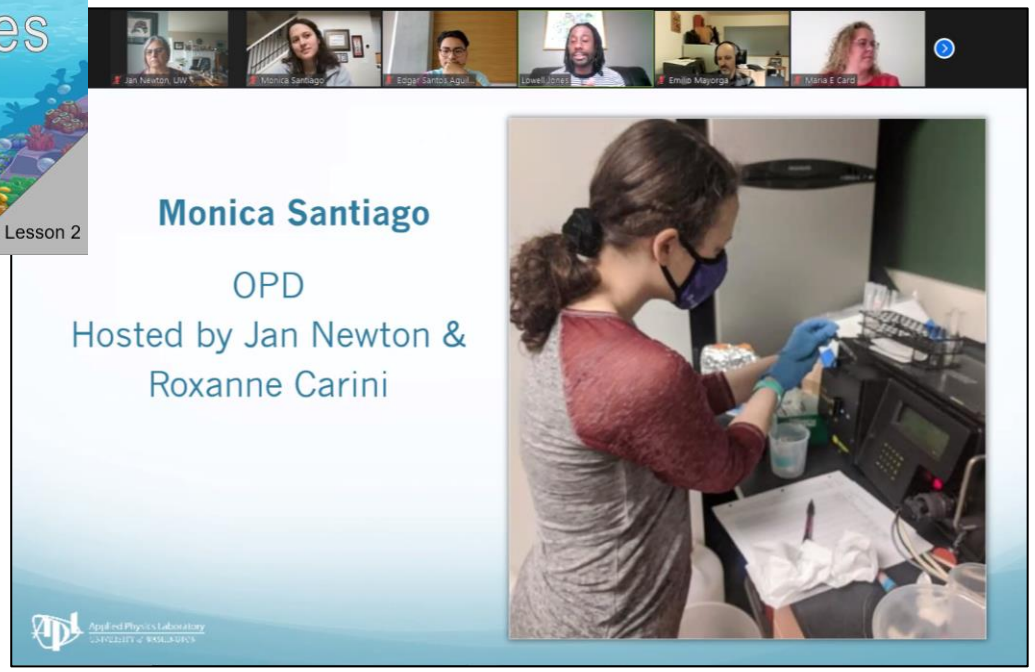
- Increasingly active with external engagement groups
  - IOOS Outreach Committee
  - Applied Physics Lab DEI Workgroup



Enabling Change Working Group:
Diversity, Equity, and Inclusion

- Members: NANOOS, NOAA PMEL, NOAA West Coast Regional Office, Olympic Coast National Marine Sanctuary, IOOS Office

- Activities:
  - Middle School – TAF Marine Heatwaves Curriculum
  - High School – Seattle Maritime High School, sponsored by Port of Seattle
  - Undergraduate – LSAMP spring intern

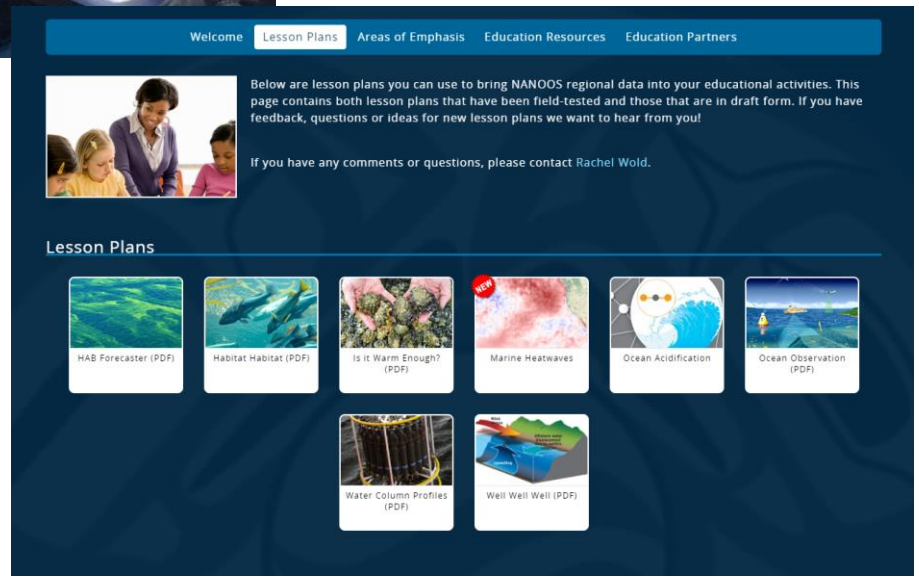


Education: Increasing ocean literacy

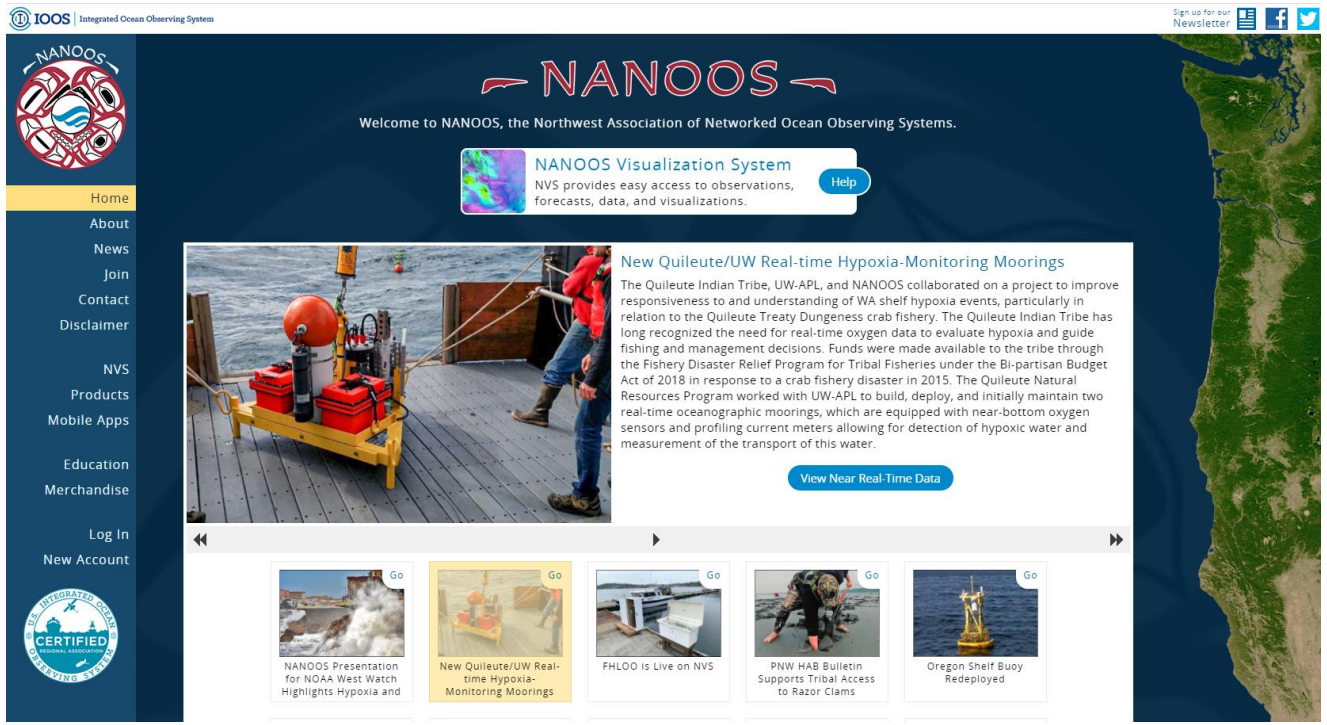
- Whidbey Watershed Stewards
  - South Whidbey Middle School
    - Student buoy program
    - Teacher workshop – Using data in the Classroom

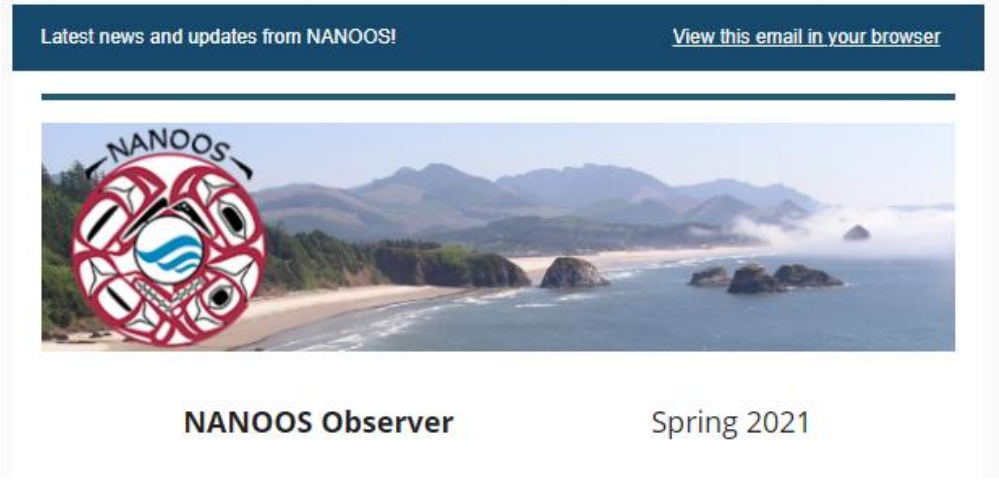
- NANOOS Enabling Change Activities
  - Middle school, High school and Undergraduate

- Lesson plans online



Online Presence





Plans for the upcoming year

- Return of in-person opportunities
  - Tradeshows, conferences, meeting
  - Also continue exploring virtual capabilities
- Expand on Enabling Change endeavors
  - Utilize the NANOOS GC/PI network
- Develop stronger bonds with commercial maritime (e.g., USCG, pilots) and resource managers
- Increase awareness and use within member organizations

8. Moderated Discussion

- *NANOOS Enabling Change efforts and plans*

- *2022 Community Workshop*

- *Announcements from the floor*

All

NANOOS Enabling Change

- There will be an IOOS wide effort to identify opportunities across RAs
- Is there a way you could invite additional perspectives into your project? Who is using your data?
- Two focus areas:
  - Training the next workforce
  - Making sure useable information is getting into the hands of impacted communities and users

NANOOS Enabling Change

- How can we leverage the work to date?
- How can we extend the reach of NANOOS' efforts?
- Who else is willing to or could be involved?

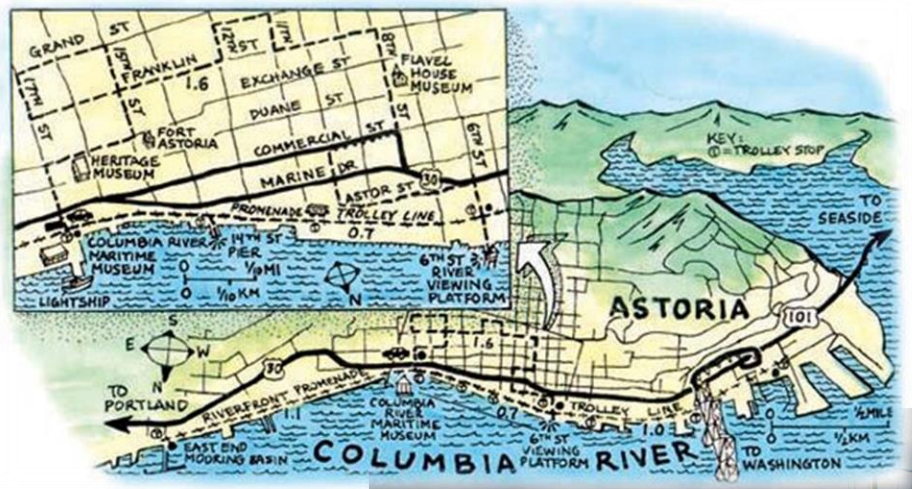
Community Workshop 2022

Spring ‘22 | Columbia River Maritime Museum | Astoria, OR

Challenges:
- Reaching a broader audience
- Connecting with relevant programs
- Strengthening DMAC
- Communicating the benefits

Goals:
- Galvanize PNW users and stakeholders
- Connect with old and new partners
- Forge new strategies
- Direct user feedback
- Refine NANOOS vision

Outcomes:
- Coming together where we want to be in 5 years
- Expanding membership and users
- Better meeting the community’s needs



Community Workshop 2022

Spring ‘22 | Columbia River Maritime Museum | Astoria, OR

Target Audience
- Scientific community
- Policy community
- Federal and state agencies
- Tribal governments and orgs
- Coastal advisory councils
- State beach erosion
- Transportation (shipping, ferry, etc.)
- Offshore renewable
- Underwater cable (private, OOI)
- Recreation (boating, fishing, surfing, etc.)
- Fisheries and aquaculture
- Current and potential users

Workshop Topics
- HABs and hypoxia
- Climate and ocean acidification
- HF Radar
- Real-time data provision, coverage
- Low-cost tech (NSF CA, OTT, XPRIZE)
- Modeling and predictions
- Renewable energy (utility and powering obs)

Format:
- Keynote Speaker/s (Bonamici, Wyden, CRITFC, Biz/NGO, Philanthropy)
- Panel talks
- Open discussion
- Evening reception

GC/PI INVOLVEMENT

Content & Organization

Getting the word out:
- Catchy theme
- Advertising
- Invitations

Potential Sponsors (Goal $10K-$30K)
- Sensor and Platform Manufacturers
  E.g. England Marine, CODAR
- Cyberinfrastructure
  E.g AWS, Axiom
- Others?

Announcements from the floor

9. Recap & Action Item review

Jan Newton

ADJOURN