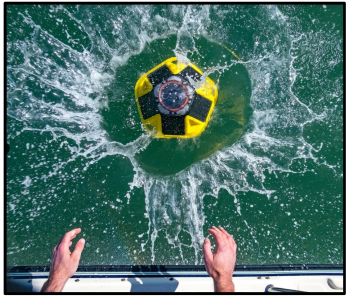




BACKYARD BUOYS

NOAA NWFSC Monster Jam Seminar
Roxanne J Carini, PhD
1 June 2023

OUR APPROACH



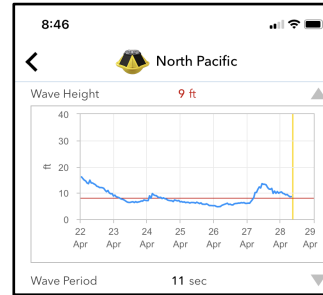
LOWER-COST TECH

Communities receive Sofar Spotter wave buoys



CO-DESIGN

Wave buoy programs bespoke to each community



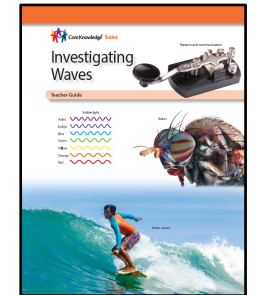
USEABILITY

New data tools developed with community input



TRUST

Expert scientific resources from long-term partners



EDUCATION

Curricula for the next generation of ocean stewards

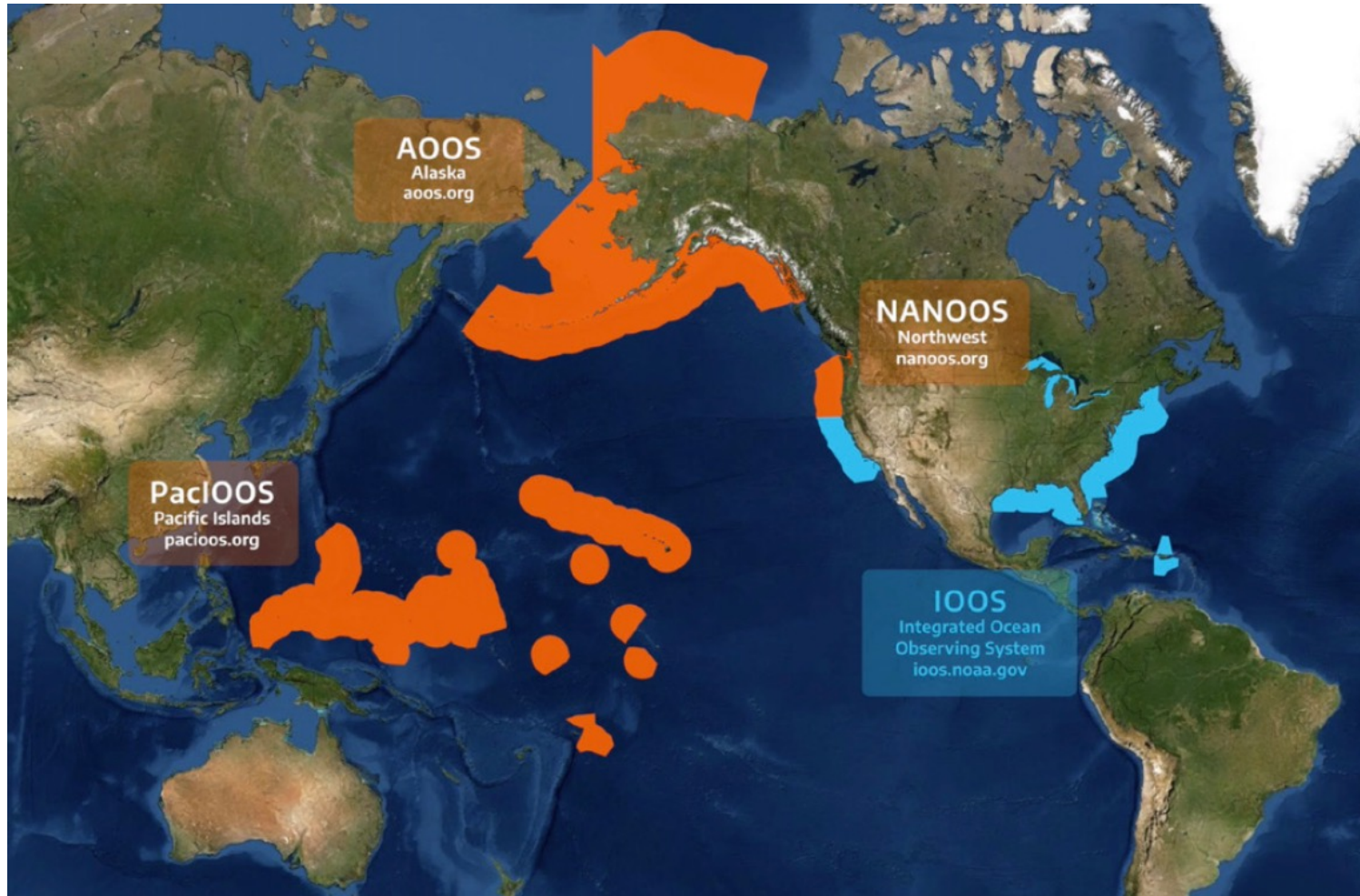
“If they don’t understand the data, then it’s not their data.”

- Dua Rudolph, Deputy Director for Marshall Islands Conservation Society

BACKYARD BUOYS TEAM

US Integrated Ocean Observing System (IOOS)

Ocean Observing Partners*



* US IOOS Regional Nodes

BACKYARD BUOYS TEAM

Indigenous/Community Partners



Marshall Islands Conservation Society



ALASKAESKIMO
WHALING COMMISSION

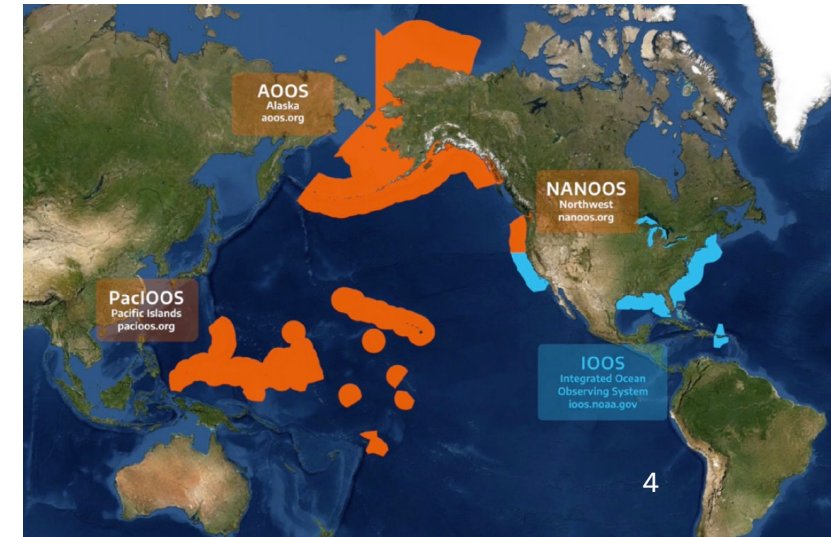
Ocean Observing Partners*



AOOS
Alaska Ocean Observing System

PacIOOS
PACIFIC ISLANDS OCEAN OBSERVING SYSTEM

* US IOOS Regional Nodes



BACKYARD BUOYS TEAM

Indigenous/Community Partners *Technical/Educational Partners* *Ocean Observing Partners**



Marshall Islands Conservation Society



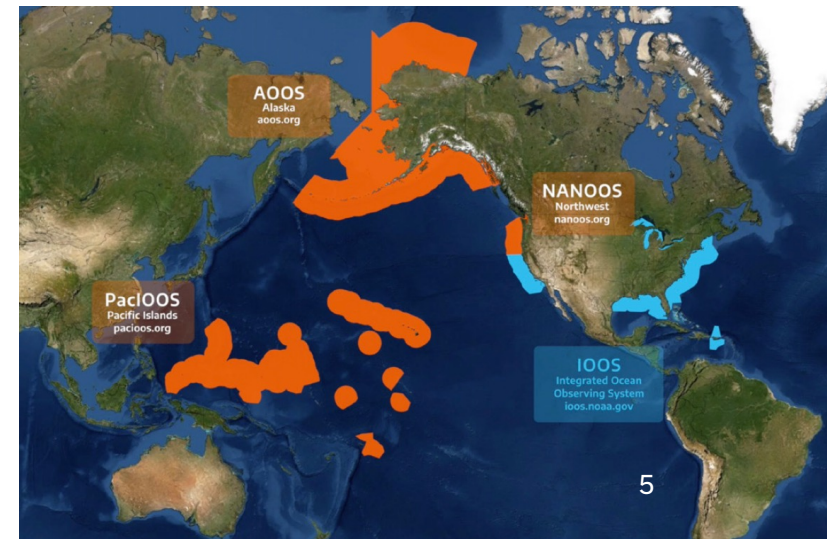
ALASKA ESKIMO
WHALING COMMISSION

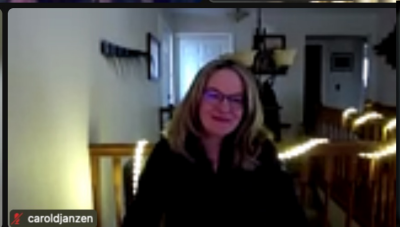
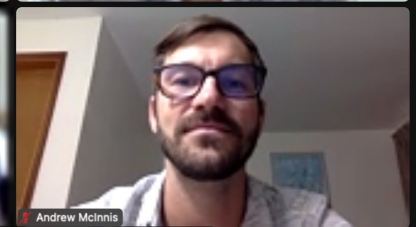
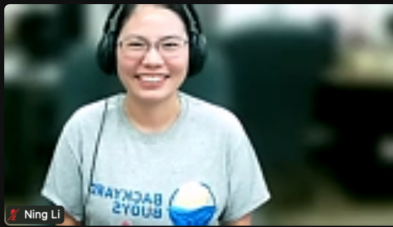


CONSERVATION INTERNATIONAL | HAWAII



* US IOOS Regional Nodes





An aerial photograph of ocean waves, showing white foam and dark blue water. The image is overlaid with a semi-transparent dark blue filter. The text is centered in the middle of the image.

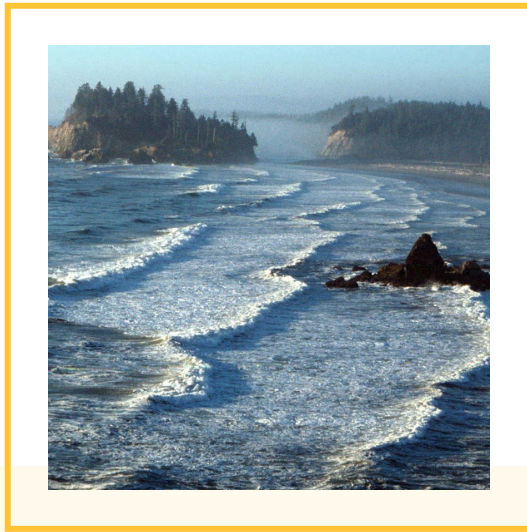
WHY

LACK OF WAVE DATA TO SUPPORT
INDIGENOUS COASTAL COMMUNITIES'
SAFETY IN A CHANGING CLIMATE

OUR THREE REGIONS
LOOK NOTHING ALIKE...



PACIFIC ISLANDS



PACIFIC NORTHWEST



ALASKA

NATURAL WAVE BUFFERS



CORAL
CORAL BLEACHING

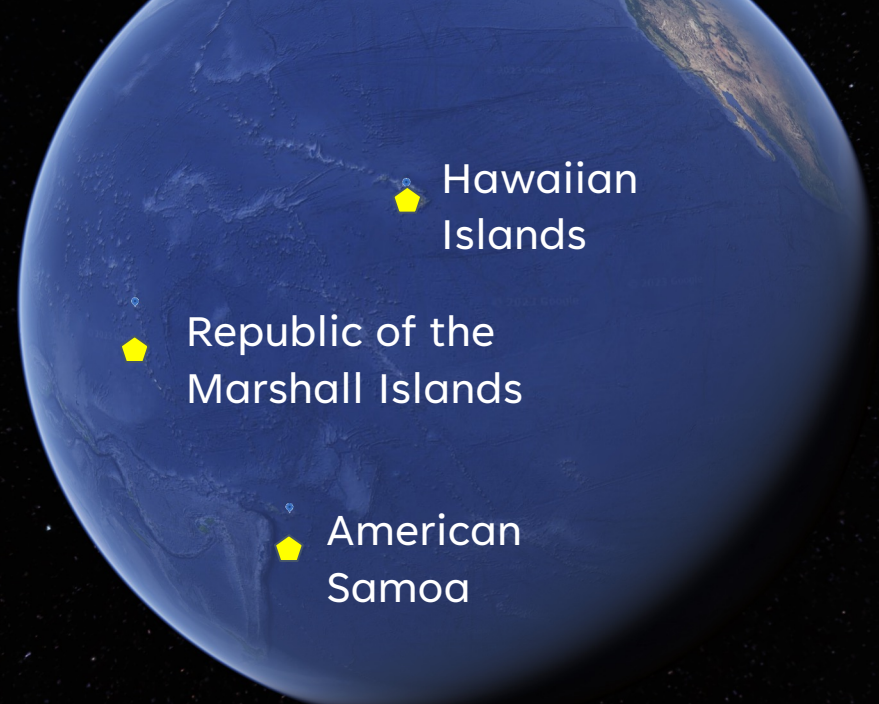


KELP
MARINE HEAT WAVES



ICE
GLOBAL WARMING

PACIFIC ISLANDS



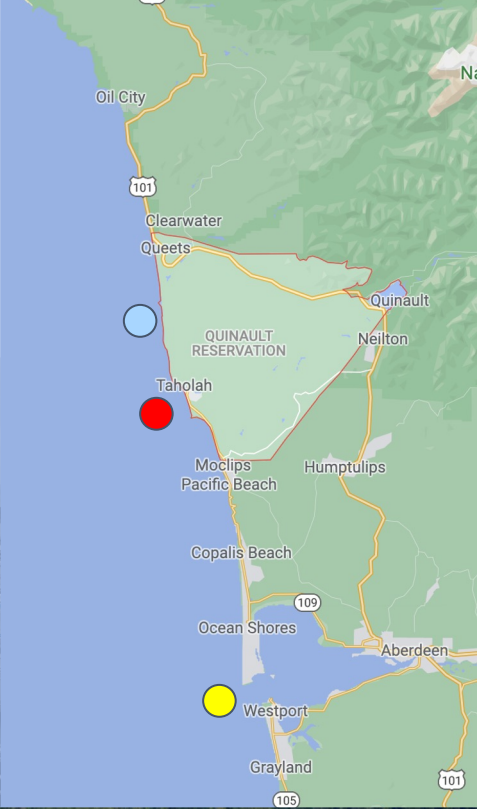



Fuiava Bert Fuiava

Samoan Village Chief, National Park of American Samoa, Project Partner

PACIFIC NORTHWEST

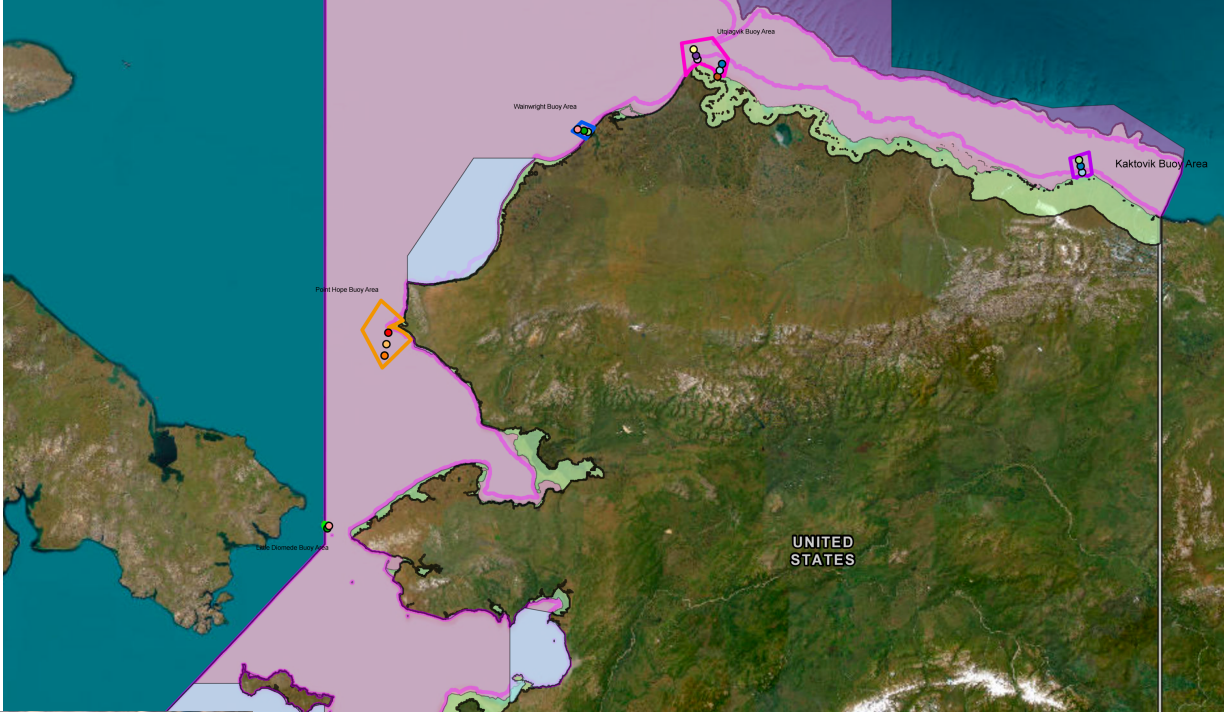
Quileute Tribe
Quinault Indian Nation





Voice of: Ervin (Joe) Schumacker
Marine Resources Scientist, Quinault Indian Nation, Project Partner

ALASKA





CHALLENGES

1

Insufficient wave data to support safety at sea

2

Indigenous communities not prioritized for ocean observing assets

3

Data access in challenging environments

4

Difficult to sustain long-term monitoring

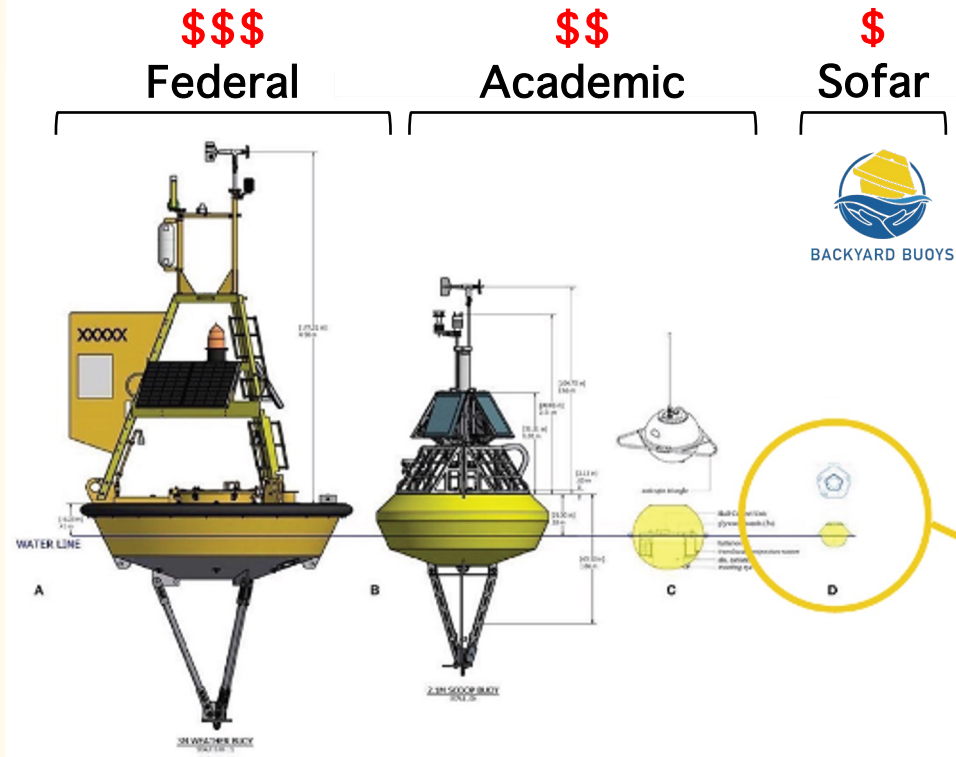
5

Need new ways to engage youth in ocean science and Indigenous practices

SOLUTIONS

1

Insufficient wave data to support safety at sea



[Scale comparison of buoys]

SOLUTIONS



2

Indigenous communities not prioritized for ocean observing assets

Working Groups:

- ✓ Everyone is a full partner
- ✓ Room for critical feedback



SOLUTIONS



2

Indigenous communities not prioritized for ocean observing assets

The “CRISP”



Information gathering for your Community Research Implementation and Stewardship Plan (CRISP)

3. Motivations, Needs, and Goals

1. What is your primary motivation for participating in Backyard Buoys? What need are you hoping to address?

2. To call this partnership a **success**, what must happen? (please check all that apply)

- A buoy gets in the water
- More than one buoy gets in the water
- Mutually accepted vision for continuing buoy deployments
- People in the community know about the buoy program and how it may help them
- Real-time wave information is accessible on the water
- The program bridges with Indigenous knowledge
- Educational materials are made available to our schools

SOLUTIONS

3

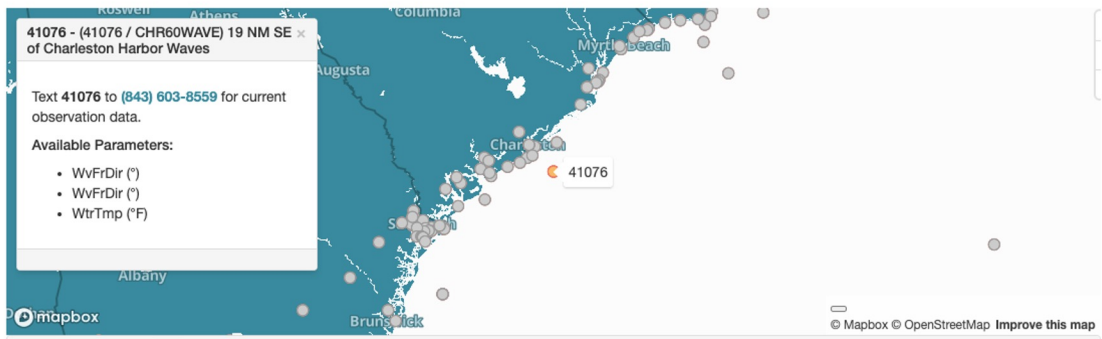
Data access in challenging environments

Text a Buoy

Access SECOORA observation data through a text message!

Send a text message to (843) 603-8559 with the station "key" from the below table. This is a free service from SECOORA. Standard message rates from your carrier will apply.

Please use the teal Feedback button on the left hand side of the page if you have any issues or comments when using the service.



41076 - (41076 / CHR60WAVE) 19 NM SE of Charleston Harbor Waves

Text 41076 to (843) 603-8559 for current observation data.

Available Parameters:

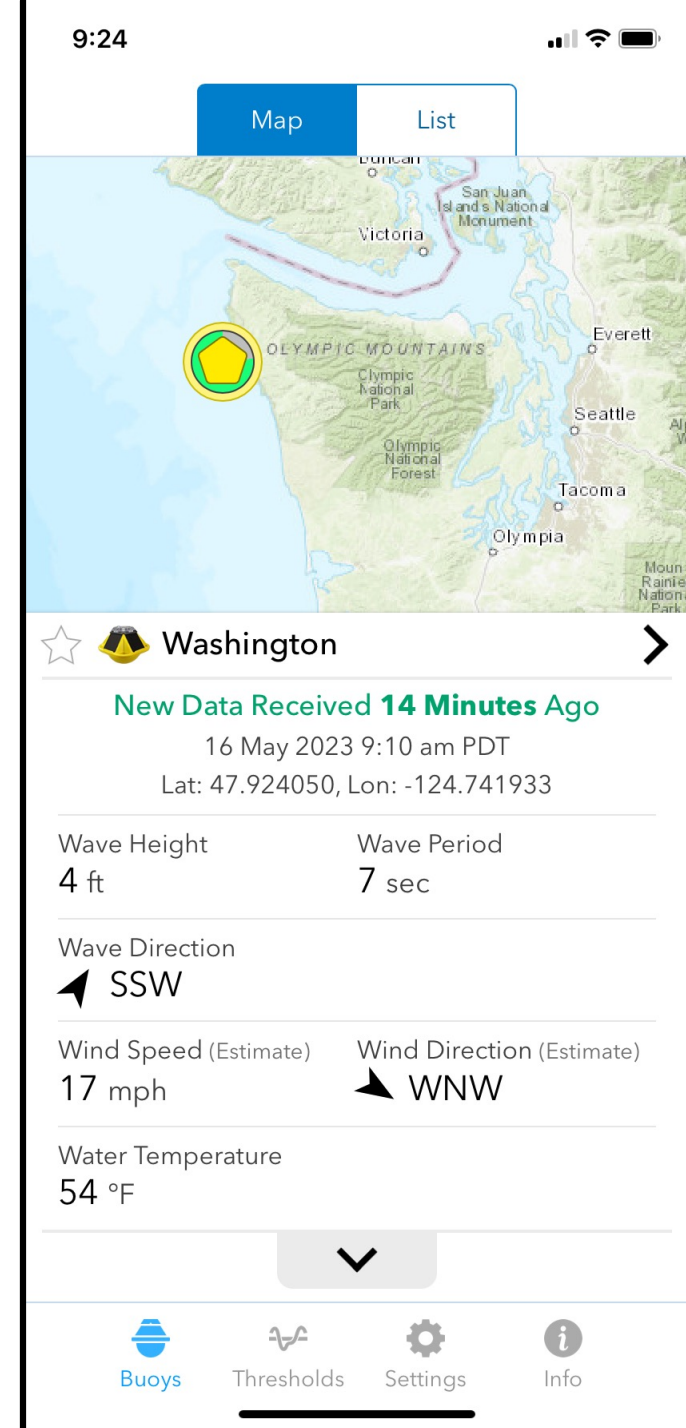
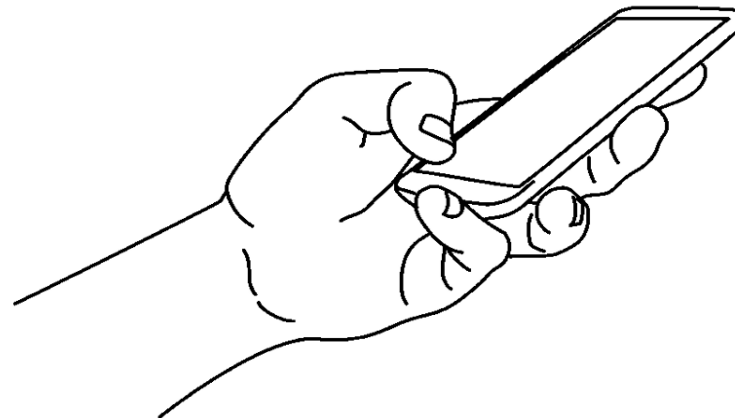
- WvFrDir (°)
- WvFrDir (°)
- WvTmp (°F)

Text-a-Buoy Catalog 400

SOLUTIONS

3

Data access in challenging environments



SOLUTIONS

“IOOS is about working with stakeholders and meeting needs at all levels, including local community, regional, national, and global. We are excited to see how NSF investment in **Backyard Buoys is creating momentum and demonstrating how our network can co-develop ocean knowledge with coastal communities to support decisions affecting lives everyday. IOOS Regional Associations are perfectly situated to scale up this work and to take it to another level.**”

- *Carl Gouldman, Director, U.S. IOOS*

4

Difficult to sustain long-term monitoring

MARKET OPPORTUNITY

"**Vulnerable communities across the Mid-Atlantic** have expressed a **great need** for and interest in wave information in **data gap areas**. **MARACOOS** has started the **groundwork for joining Backyard Buoys** by **planning for acquisition of a Sofar buoy and scoping pilot project communities**, such as those facing extreme flooding events **along the Delaware Bay and Chesapeake Bay**. We are very excited about the possibilities of Backyard Buoys to help us reach more vulnerable towns and municipalities, including underserved communities."

- Gerhard Kuska, Director, MARACOOS



CHALLENGES



“For this project to be sustained, we need fewer gray hairs to be a part of this.”
- *Arctic Whaling Captain*

5

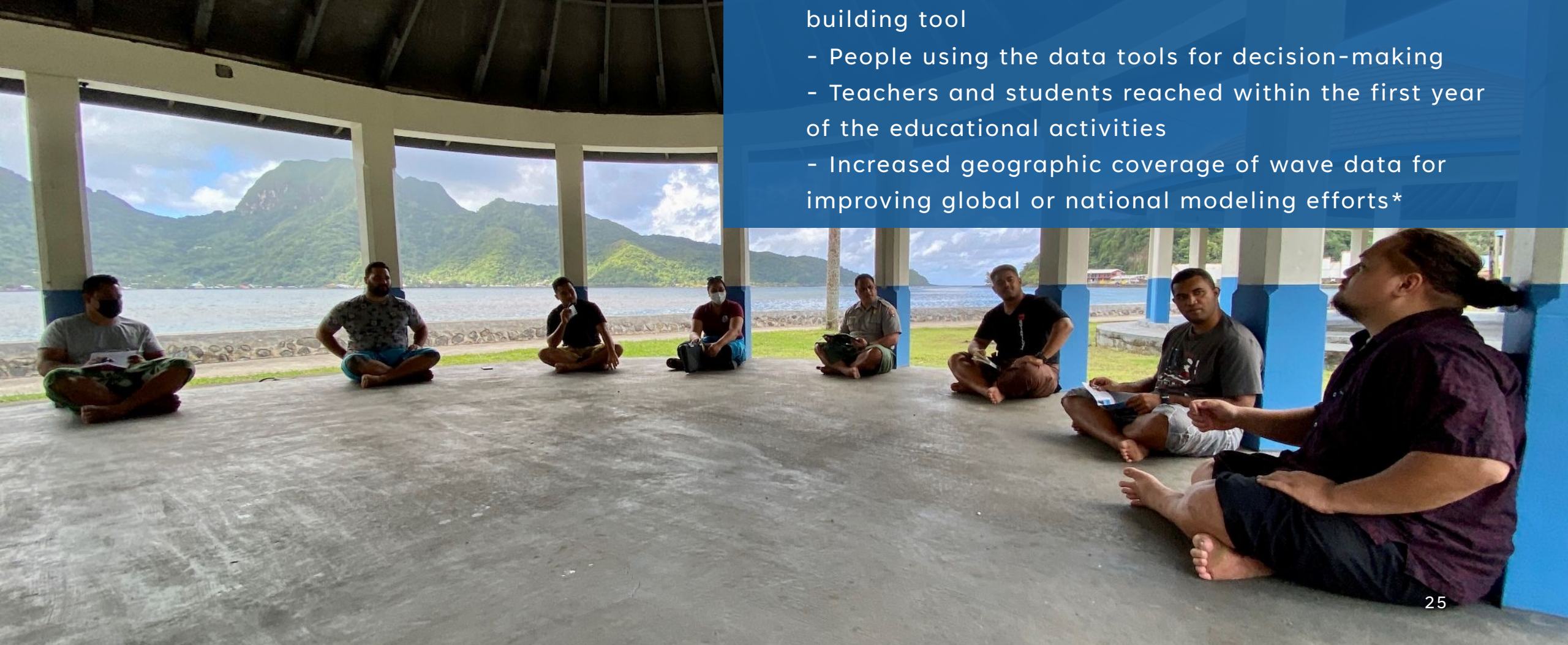
Need new ways to engage youth in ocean science and Indigenous practices



METRICS OF SUCCESS: QUANTITATIVE

The number (or percentage) of:

- Buoys deployed
- Training modules incorporated into CRISPs
- New communities and partners using the CRISP-building tool
- People using the data tools for decision-making
- Teachers and students reached within the first year of the educational activities
- Increased geographic coverage of wave data for improving global or national modeling efforts*

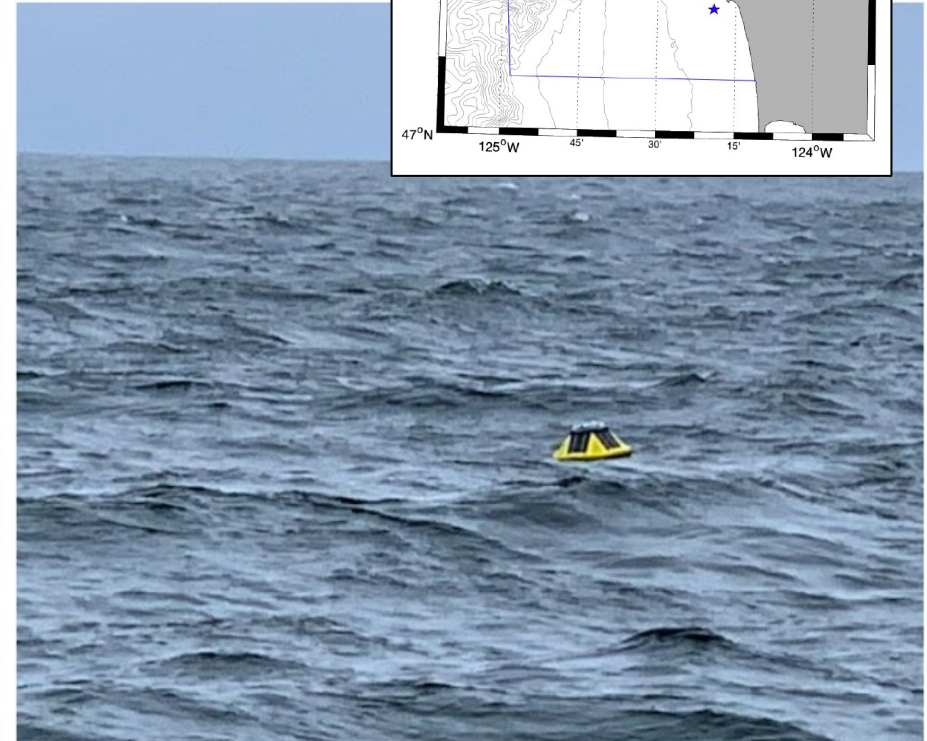
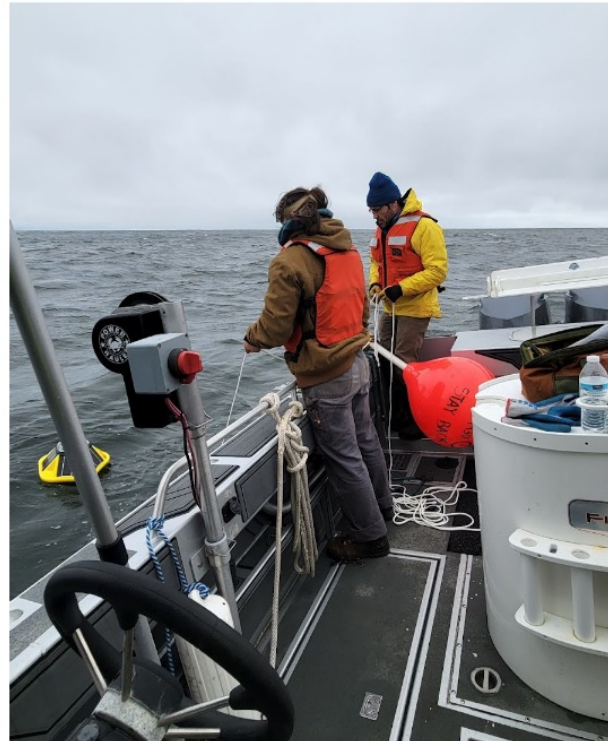
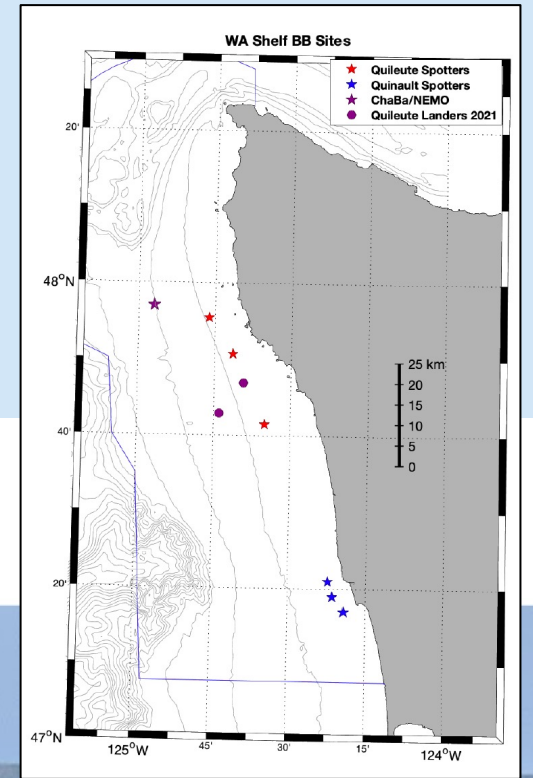


METRICS OF SUCCESS: QUALITATIVE

- Locally-defined community goals are met
- User stories of how the information gathered increases safety and enhances livelihoods
- Capacity building



QUILEUTE TRIBE TEST DEPLOYMENT!



THANK YOU

Roxanne J Carini

rjcarini@uw.edu

www.backyardbuoys.org



BACKYARD BUOYS





BACKYARD BUOYS

Roxanne J Carini, PhD
rjcarini@uw.edu
www.backyardbuoys.org

Extra Slides

WHAT IS BACKYARD BUOYS?

MISSION

Support collection, stewardship, and use of wave data that complements existing knowledge and protects lives and livelihoods

COMMUNITY LEVEL

Build community-stewarded wave data programs supported by an existing federally-funded system

NATIONAL LEVEL

Serve the nation's underserved communities and expand baseline wave data to study climate change impacts and coastal hazards in previously unmeasured areas

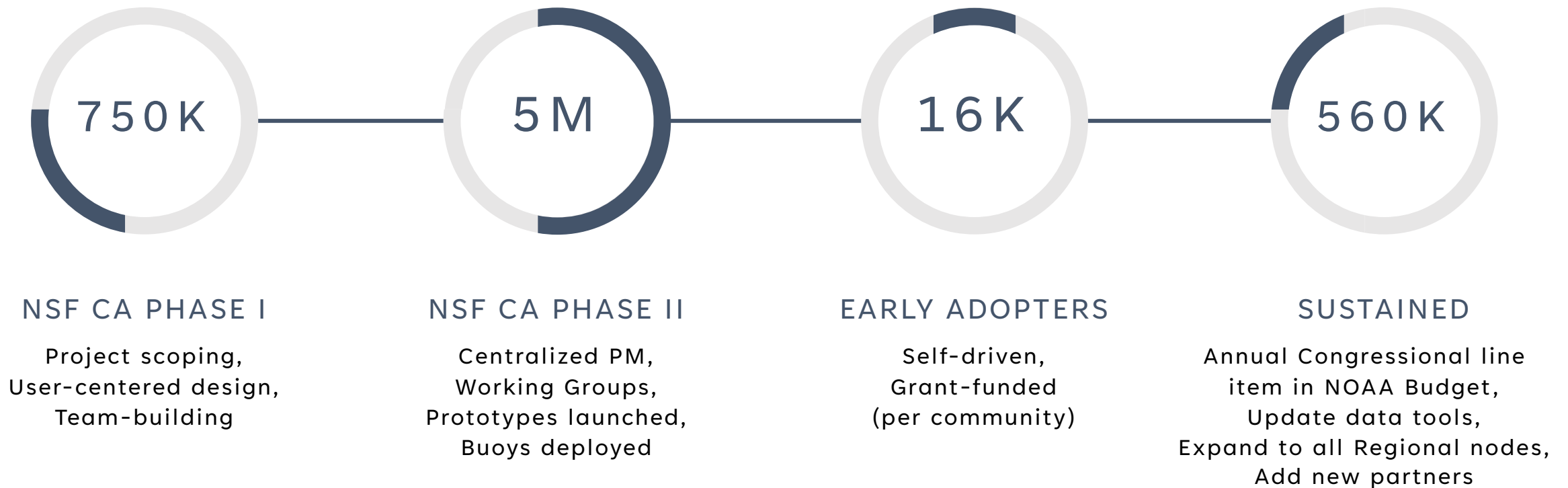


2-YEAR ACTION PLAN



	Sep 2022	Mar 2023	Sep 2023	Mar 2024	Sep 2024
Co-designed Community Plans	Info collection tool prototyped	Plan building & implementation		Refine tool	
Buoy Operations		50% deployed		100% deployed	
Data Access Tools	Data app prototyped, user testing, complete features list	Build apps	Real-time data flowing	Refine tools	
Trust and Engagement	Working Groups			Best Practices document	
Education		Development	Testing	Refined & packaged to share	

FUNDING MILESTONES



DELIVERING VALUE TO FUNDERS

Mission Alignment

NOAA's Mission:

1. TO UNDERSTAND AND PREDICT CHANGES IN CLIMATE, WEATHER, OCEAN AND COASTS;
2. TO SHARE THAT KNOWLEDGE AND INFORMATION WITH OTHERS; AND
3. TO CONSERVE AND MANAGE COASTAL AND MARINE ECOSYSTEMS AND RESOURCES.

“INTEGRATING EQUITY INTO OUR CORE OPERATIONS”

– NOAA 2022-2026 STRATEGIC PLAN

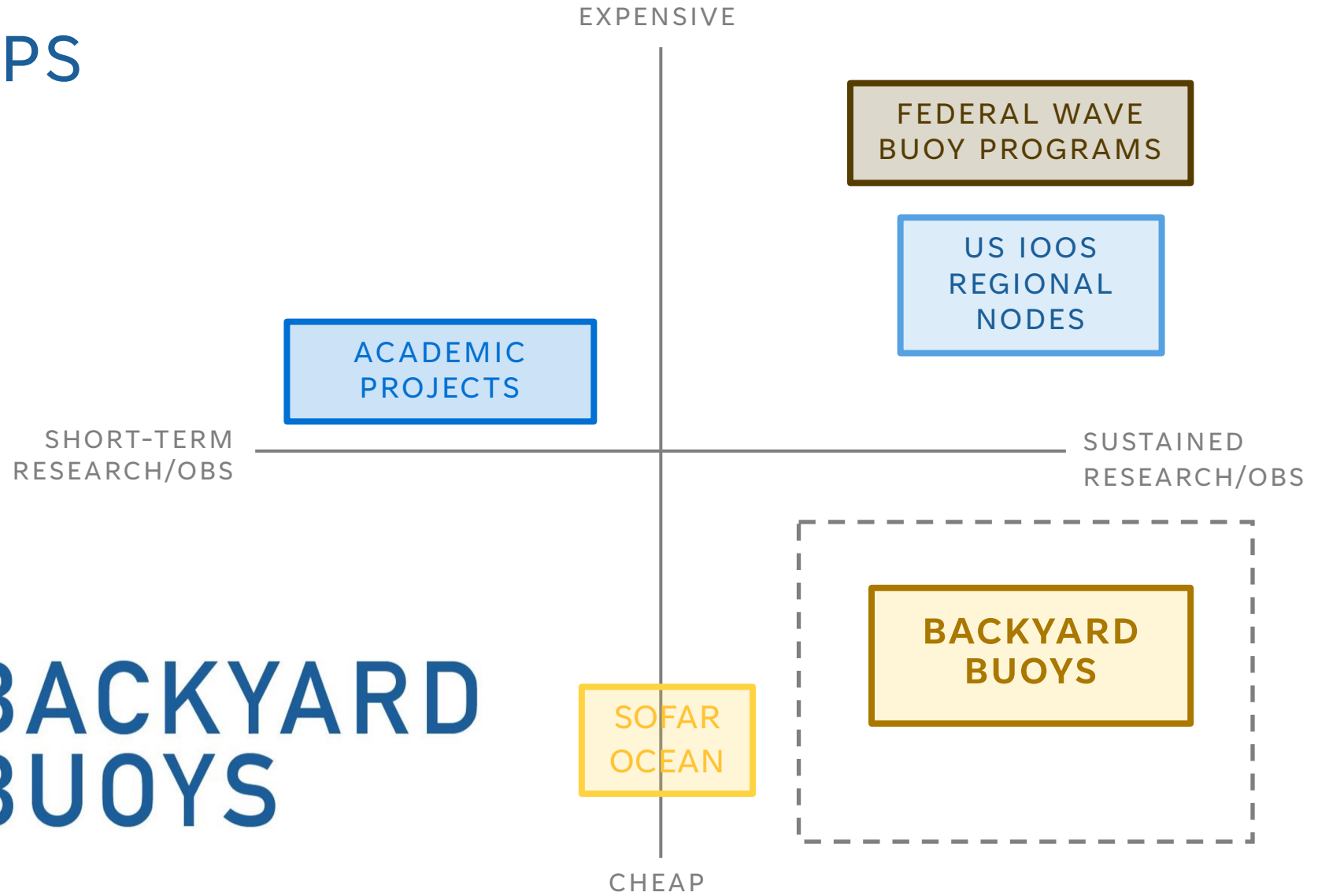


Backyard Buoys delivers:

- INCREASED WAVE DATA COLLECTION, GEOGRAPHIC COVERAGE, AND AVAILABILITY FOR SCIENCE AND DECISION-MAKING SUPPORT
- EXPANDED SUPPORT FOR PARTICULARLY VULNERABLE AND OFTEN UNDERSERVED COMMUNITIES



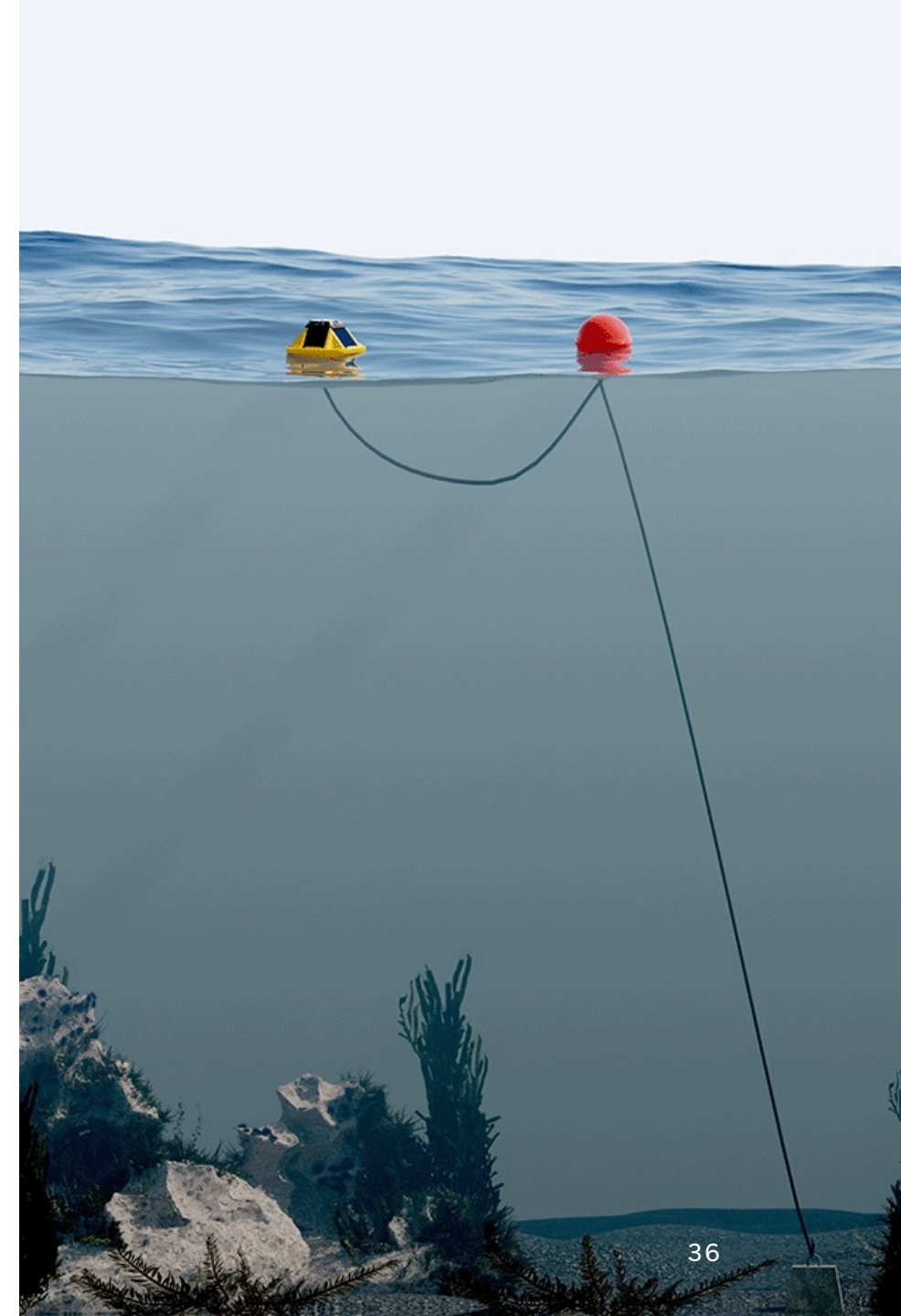
MARKET GAPS



**BACKYARD
BUOYS**

PER COMMUNITY COSTS

CATEGORY	COST	ASSUMPTIONS
Sofar Spotter buoys	\$5950 * 2	Includes 1 replacement or spare buoy
Data transmission fees/year	\$1008	Iridium transmission in "Standard" mode with updates every 30'
Mooring materials	\$1300	1 mooring build/year
Deployment/recovery	\$1338	
Personnel	\$1186	Total = \$30 hourly rate of crew member * 2 crew members * 8 hours + \$50 personal car use * 2 + \$0.65 * 20 miles roundtrip * 2
Insurance	\$80	\$10 hourly rate of insurance * 8 hours
Fuel for boat	\$72	Assumes boat owned by community member (not chartered); Total = 30 miles roundtrip at 2.5mpg * \$6/gallon
Servicing (i.e., checking on biofouling)	\$0	Opportunistic
TOTAL COSTS	\$15,546	



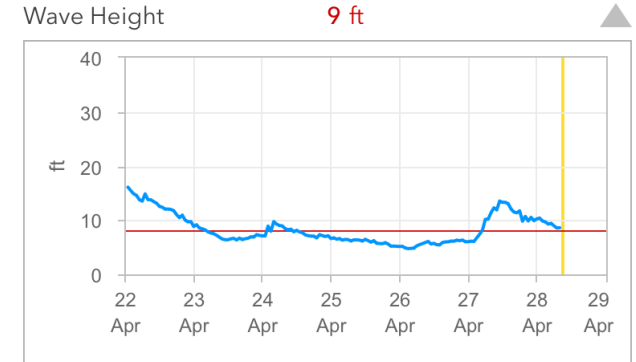
MAINTENANCE COSTS

CATEGORY	COST	ASSUMPTIONS
Software developer time for app maintenance	\$9750	2 weeks time/year (salary, fringe, indirect)
Software developer time for text-a-buoy maintenance	\$9750	2 weeks time/year (salary, fringe, indirect)
Software developer time for website maintenance	\$9750	2 weeks time/year (salary, fringe, indirect)
Staff time for data integration into Regional node data portals	\$3195 * 11	1 week time/year/Regional node (salary, fringe, indirect)
Expert technical consultations for buoy mooring design	\$6390 * 11	2 weeks time/year/Regional node (salary, fringe, indirect)
Staff time for community coordination	\$38,340 * 11	3 months time/year/Regional node (salary, fringe, indirect)
TOTAL COSTS	\$556,425	Amount to be requested via IOOS National Congressional outreach or other avenues

8:46



North Pacific



- Wave Period **11 sec**
- Wave Direction **WNW**
- Wind Speed (Estimate) **19 mph**
- Wind Direction (Estimate) **N**
- Water Temperature **50 °F**

Wind Waves

Wind wave information is not available

Swell Waves

Swell information is not available

Messages

+ New

28 Apr 2023 8:46 am PDT 1 Minute Ago
 Heading home, waves above my threshold for safety



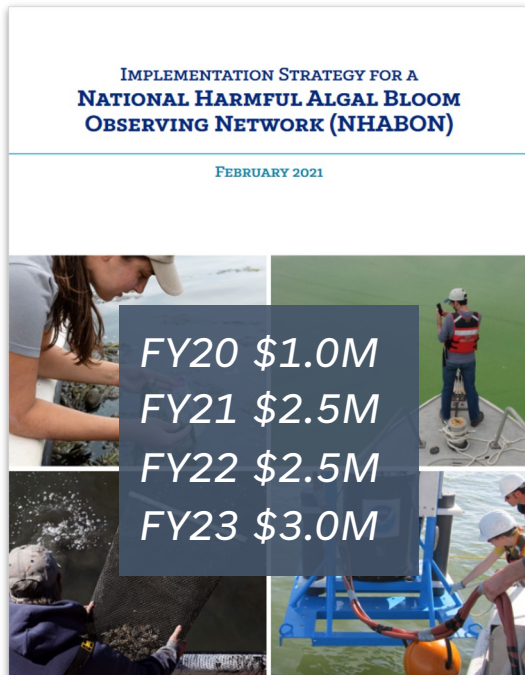
GO TO MARKET STRATEGY

US IOOS has experience building out national programs that started in a few regions

National HAB Observing Network
US IOOS produced cost-estimated Implementation Strategy for NHABON

IMPLEMENTATION STRATEGY FOR A
**NATIONAL HARMFUL ALGAL BLOOM
OBSERVING NETWORK (NHABON)**

FEBRUARY 2021



FY20 \$1.0M
FY21 \$2.5M
FY22 \$2.5M
FY23 \$3.0M

High Frequency Radar for coastal currents
“Fill the Gaps” Campaign

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



WHY WE CAN SUCCEED

PRECEDENCE

Armed with testimonials from constituents, request \$560K increase per year to IOOS Regional Line (\$45M), small ask for big payoff

ALL FOR ONE & ONE FOR ALL

Regional nodes responsive to local needs while coordinating national effort through NOAA, attractive to Congress

SUPPORT AT THE HIGHEST LEVEL

“IOOS is about working with stakeholders and meeting needs at all levels, including local community, regional, national, and global. We are excited to see how NSF investment in **Backyard Buoys is creating momentum and demonstrating how our network can co-develop ocean knowledge with coastal communities to support decisions affecting lives everyday.**

IOOS Regional Associations are perfectly situated to scale up this work and to take it to another level.”

- Carl Gouldman, Director, U.S. IOOS

GROWTH PROJECTIONS

Buoys in the water & data in hands!

IOOS
BACKYARD
BUOYS

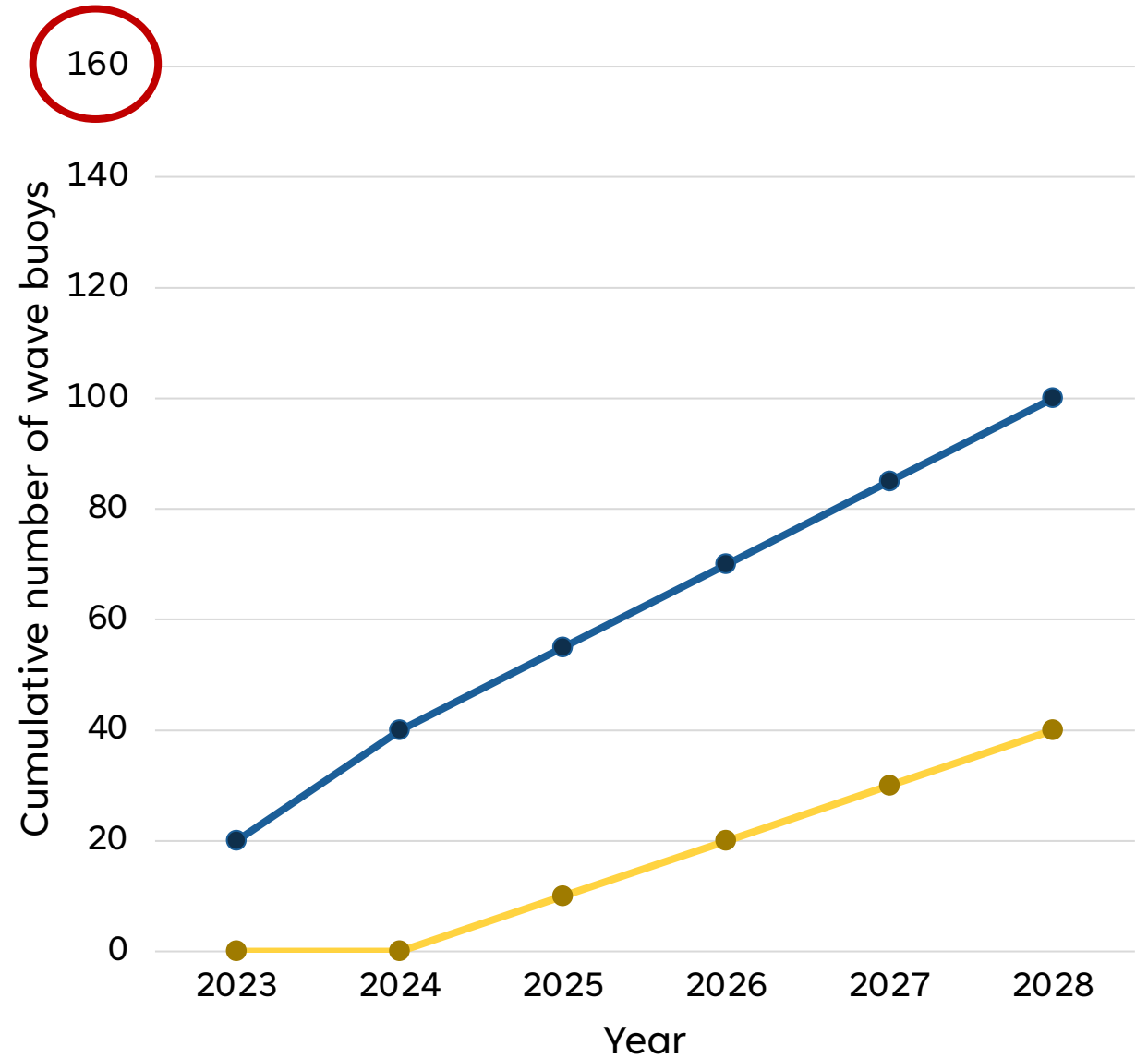
Growth of national federally-funded Backyard Buoys through NOAA-IOOS Regional nodes

160
FEDERAL
WAVE BUOYS

Existing federally-funded operational coastal wave buoys

GLOBAL
BACKYARD
BUOYS

Growth of independent worldwide Backyard Buoys adopters





BACKYARD BUOYS



ALASKA



PACIFIC NW



PACIFIC ISLANDS