

Ocean Data to Advance Equity and Coexistence of Fisheries and Offshore Wind

9th World Fisheries Congress

Pathways for a Sustainable Co-existence of Offshore Energy, Fisheries and Marine conservation: From Local Empirical Evidence to Global Perspectives

Seattle, WA • March 5, 2024

Jake Kritzer (NERACOOS)*, Katy Bland (NERACOOS), Mary Ford (MARACOOS), Debra Hernandez (SECOORA), Gerhard Kuska (MARACOOS), Jackie Motyka (NERACOOS), Tom Shyka (NERACOOS)

Uncertainty Breeds Conflict & Inequity



Massive study examines offshore wind's impact on fishing, fisheries

"All of this is moving a lot quicker than the science should typically allow for the industrialization of our oceans."

April 3, 2023 • By Anastasia E. Lennon



Witness Drives Home Marine Vessel Safety Concerns as Offshore Wind Growth Questioned

Atlantic Storm Activity and National Defense Also Top Concerns

April 01, 2023 • By Gina G. Scala

Bloomberg

Pentagon Sounds Alarm Over Biden Plan for Offshore Wind Sites

April 17, 2023 • By Jennifer A Dlouhy

WORKBOAT

National Academies' offshore wind advisors meet, and critics fume

April 14, 2023 • By Kirk Moore

WINDPOWER MONTHLY

Republicans demand whale death hearings as fishing group calls BOEM rudderless

March 20, 2023 • By Ros Davidson



Report by feds, anglers cites offshore wind impacts on fish

March 31, 2023 • By Wayne Perry

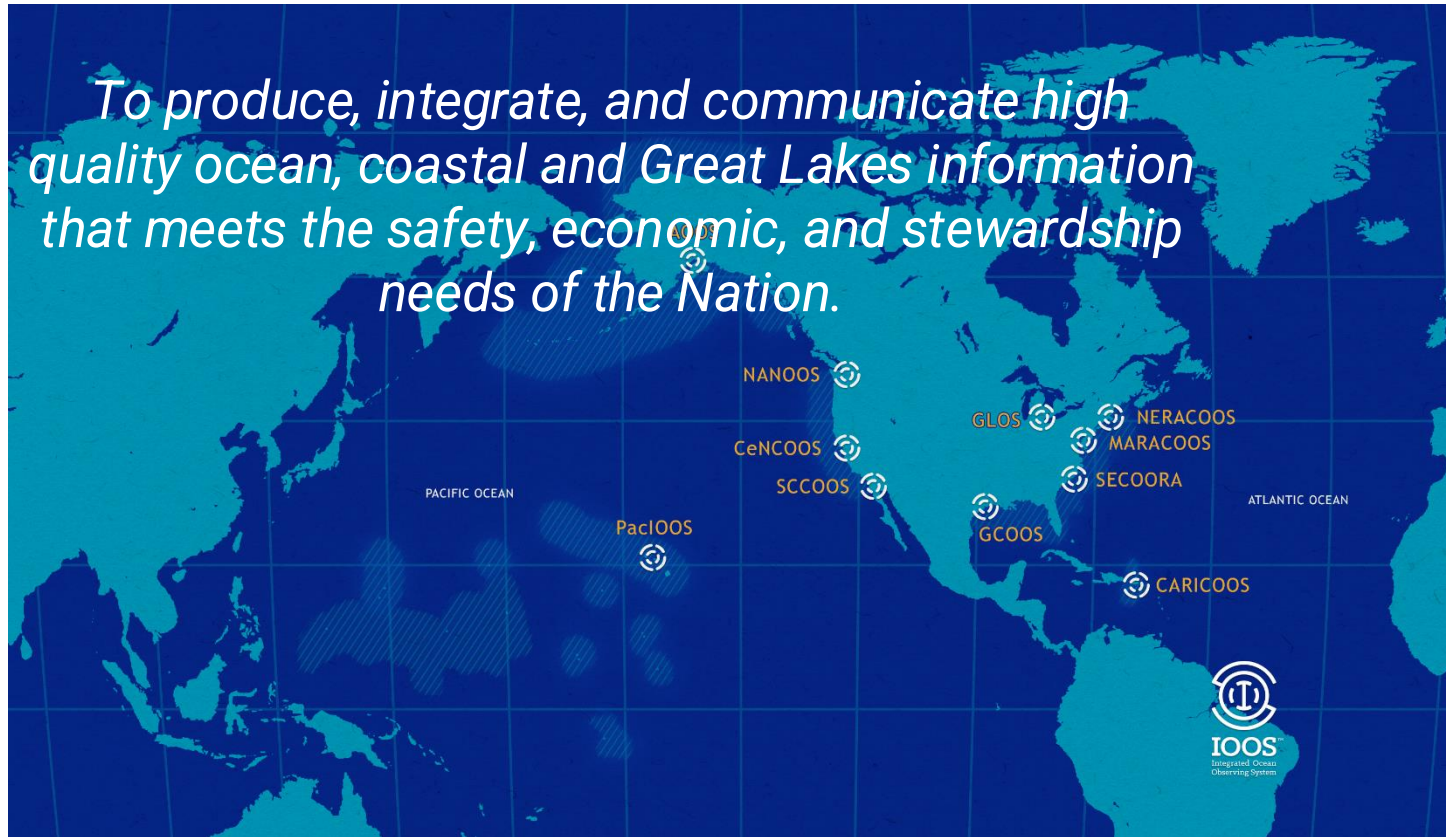
National Fisherman

NMFS, BOEM issue offshore wind 'mitigation strategy' for fisheries studies

March 24, 2022 • By Kirk Moore

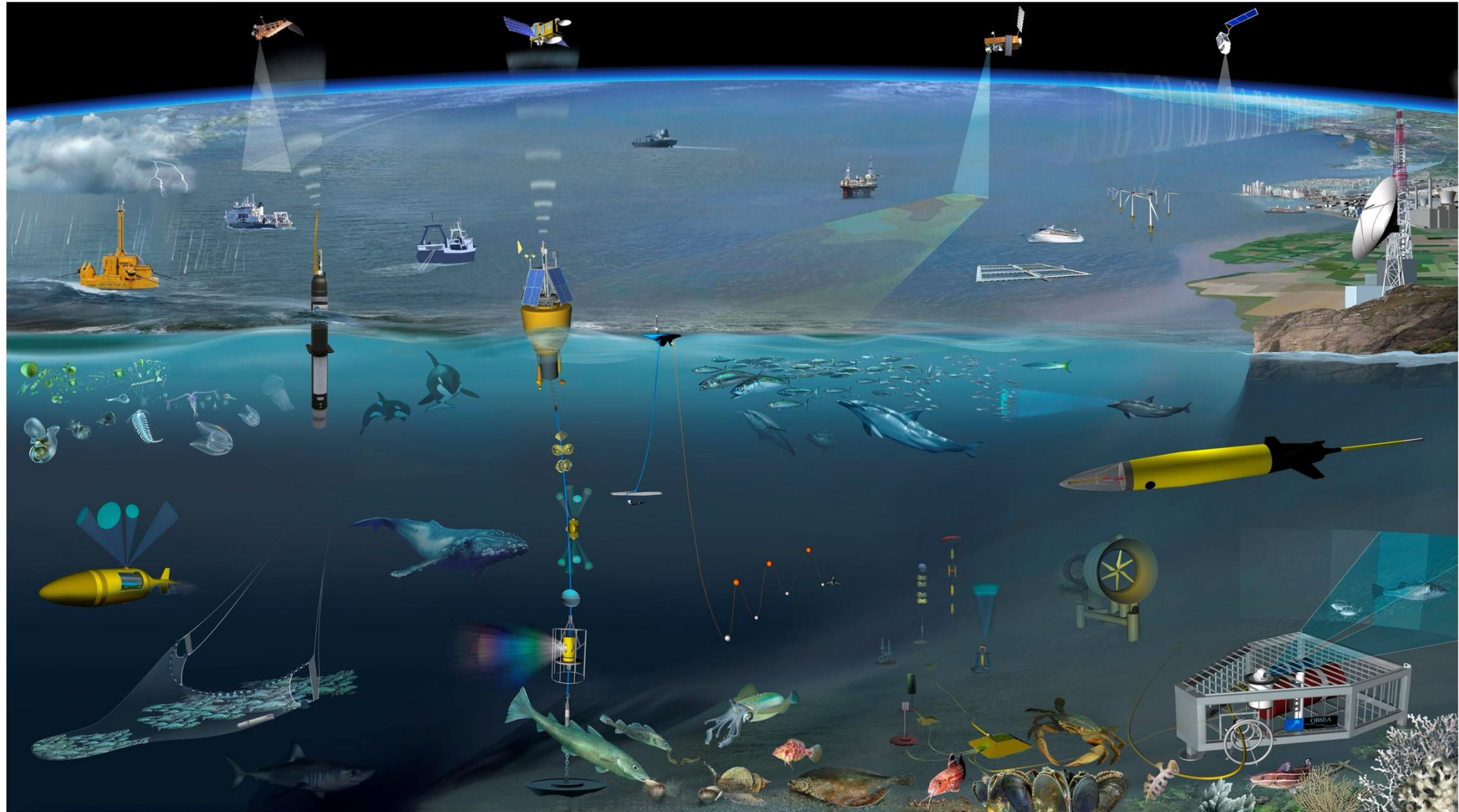
Confronting Uncertainty: U.S. Integrated Ocean Observing System

To produce, integrate, and communicate high quality ocean, coastal and Great Lakes information that meets the safety, economic, and stewardship needs of the Nation.



- 17 federal partners
- 11 regional associations
- 34 core variables
- Federally-certified data management

The Ocean Observing Toolkit



Who Uses Ocean Observing Systems?

| | Government | Private company | NGO | Academic | Other |
|-----------------|--------------|-----------------|-------------|--------------|--------------|
| AOOS | 32.4% | 18.9% | 29.7% | 13.5% | 5.4% |
| CARICOOS | 29.7% | 35.1% | 13.5% | 13.5% | 8.1% |
| CenCOOS | 30.2% | 14.0% | 11.6% | 38.4% | 5.8% |
| GCOOS | 12.0% | 16.0% | 28.0% | 44.0% | 0.0% |
| GLOS | 15.4% | 53.0% | 6.0% | 8.6% | 17.1% |
| NERACOOS | 30.1% | 26.0% | 9.3% | 15.0% | 19.7% |
| PacIOOS | 33.7% | 28.6% | 6.1% | 21.4% | 10.2% |
| SCCOOS | 47.9% | 8.3% | 14.6% | 25.0% | 4.2% |
| SECOORA | 25.2% | 13.1% | 6.5% | 48.6% | 6.5% |



Middlebury Institute of
International Studies at Monterey

Who Uses Ocean Observing Systems?

| | Fishing | Shipping | Aquaculture | Recreational Guiding | Consulting | Oil and Gas | Renewable Energy | Insurance | Value Added Data | Other |
|-----------------|--------------|-------------|-------------|----------------------|-------------|-------------|------------------|-------------|------------------|--------------|
| AOOS | 50.0% | 7.1% | 0.0% | 7.1% | 21.4% | 14.3% | 0.0% | 0.0% | 0.0% | 0.0% |
| CARICOOS | 3.9% | 7.7% | 0.0% | 38.5% | 15.4% | 0.0% | 7.7% | 7.7% | 0.0% | 19.2% |
| CenCOOS | 8.3% | 0.0% | 8.3% | 8.3% | 16.7% | 8.3% | 8.3% | 0.0% | 8.3% | 33.3% |
| GCOOS | 0.0% | 0.0% | 0.0% | 25.0% | 25.0% | 0.0% | 0.0% | 0.0% | 0.0% | 50.0% |
| GLOS | 5.0% | 6.7% | 5.0% | 36.7% | 10.0% | 3.3% | 3.3% | 1.7% | 0.0% | 28.3% |
| NERACOOS | 35.6% | 6.7% | 6.7% | 15.6% | 8.9% | 2.2% | 0.0% | 0.0% | 8.9% | 15.6% |
| PacIOOS | 7.1% | 7.1% | 0.0% | 25.0% | 21.4% | 3.6% | 7.1% | 0.0% | 0.0% | 28.6% |
| SCCOOS | 25.0% | 0.0% | 0.0% | 0.0% | 50.0% | 25.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| SECOORA | 0.0% | 7.1% | 7.1% | 0.0% | 42.9% | 0.0% | 7.1% | 0.0% | 7.1% | 28.6% |

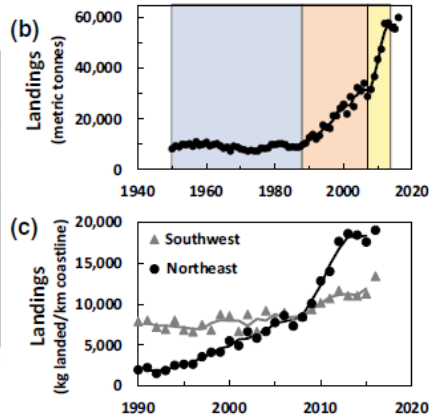
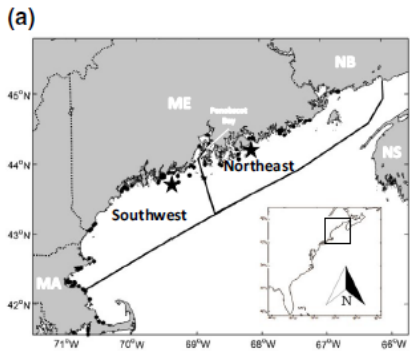


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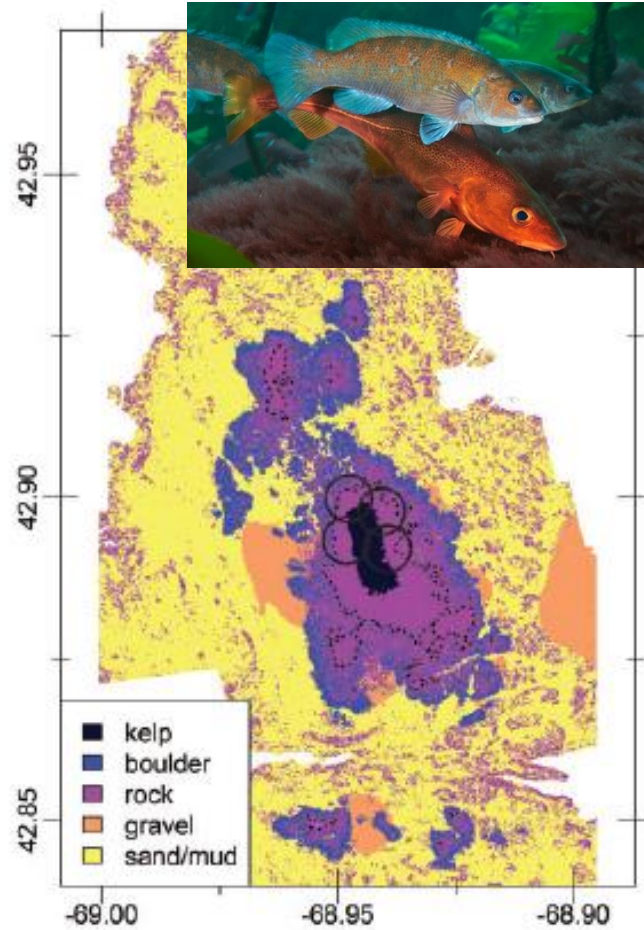
Why Are Users Coming to Ocean Observing Systems?

| | Current Conditions | Forecast Conditions | Historical Data | Administrative Information | Resource Use |
|-----------------|--------------------|---------------------|-----------------|----------------------------|--------------|
| AOOS | 37.6% | 15.1% | 28.2% | 3.4% | 8.7% |
| CARICOOS | 51.5% | 32.2% | 7.4% | 2.9% | 3.1% |
| CenCOOS | 49.5% | 15.9% | 19.5% | 3.6% | 2.0% |
| GCOOS | 47.2% | 12.5% | 18.0% | 6.7% | 4.8% |
| GLOS | 75.3% | 15.6% | 4.0% | 0.7% | 1.8% |
| NERACOOS | 59.1% | 16.1% | 20.2% | 0.8% | 1.9% |
| PacIOOS | 56.6% | 33.2% | 6.8% | 0.9% | 1.0% |
| SCCOOS | 41.2% | 15.4% | 30.0% | 2.3% | 4.8% |
| SECOORA | 44.7% | 15.1% | 20.7% | 3.5% | 4.9% |

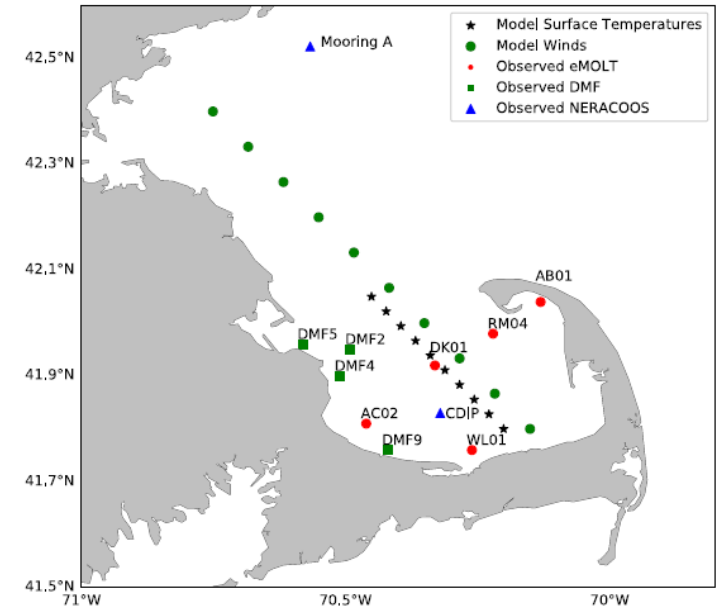
Fisheries & Wildlife Science Supported by Buoys



Spatial Shifts in Lobster Catch
Goode et al. 2019

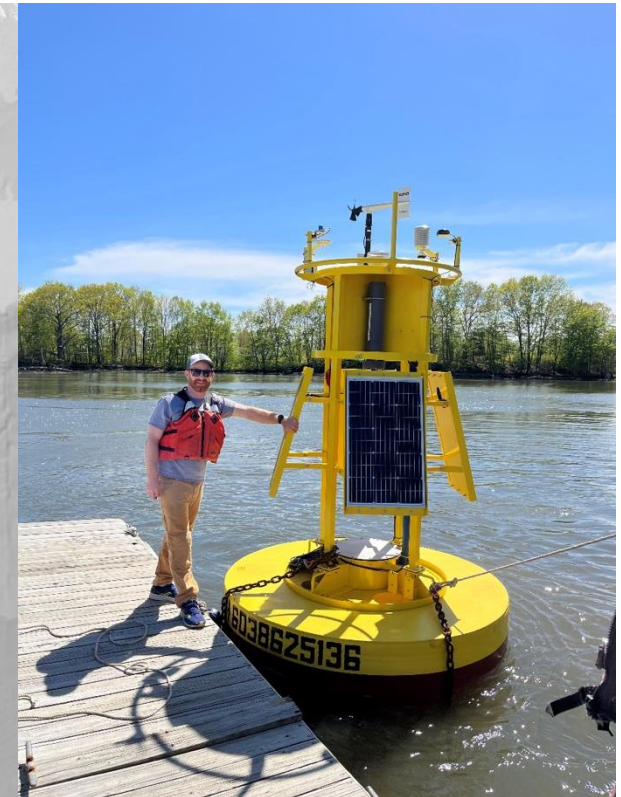
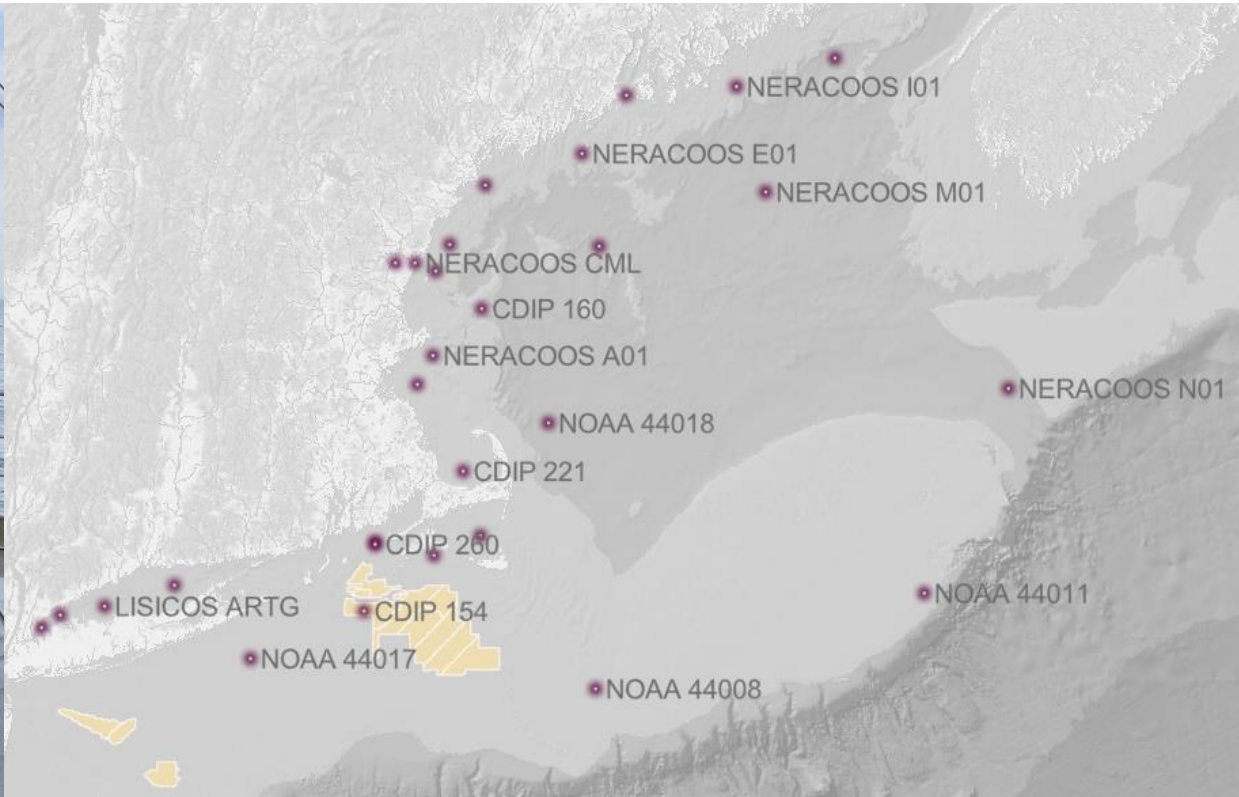


Cod Spawning Patterns
Conroy et al. 2018

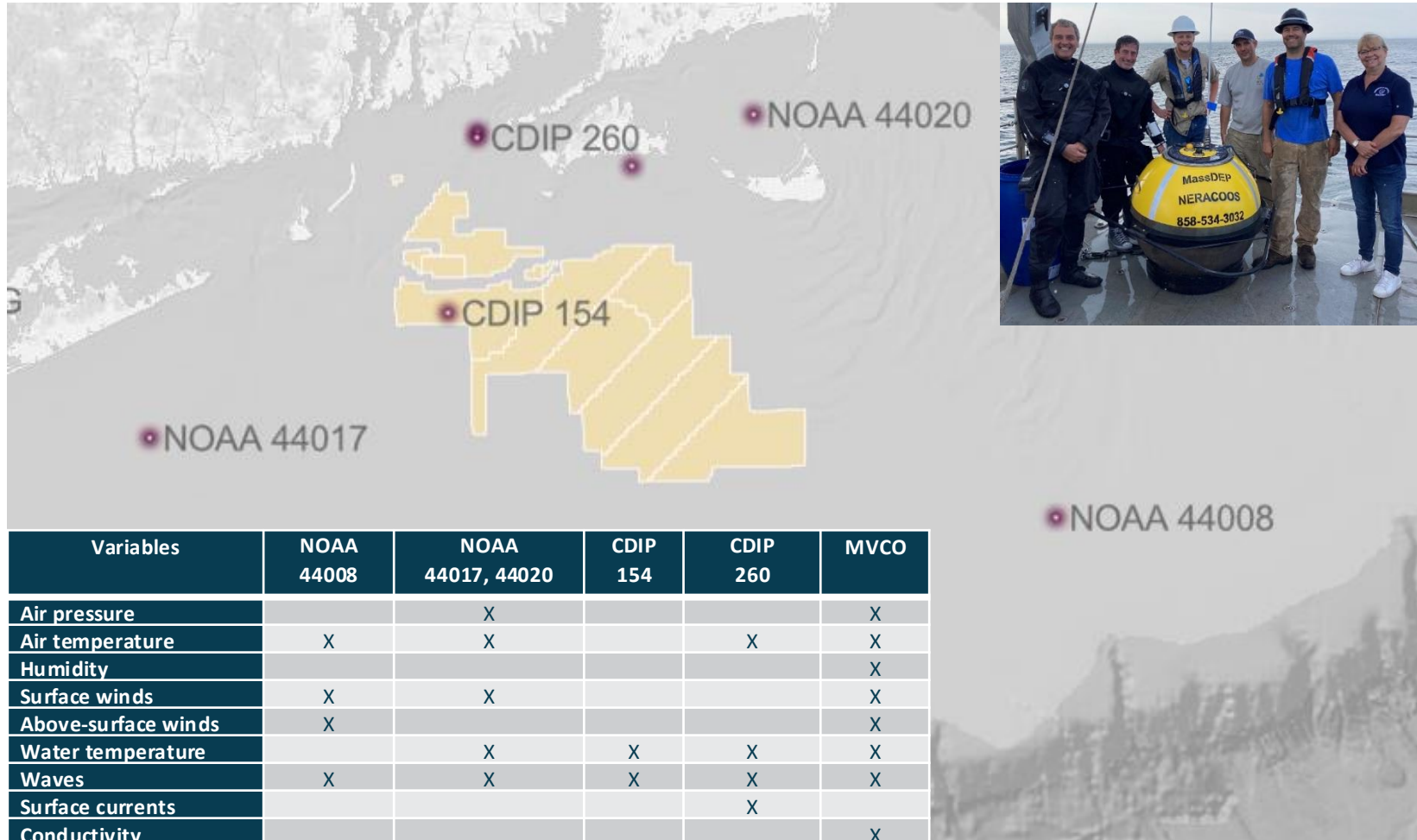


Predicting Sea Turtle Strandings
Liu et al. 2019

Northeast MetOcean & Ecosystem Buoy Network



Mass./Rhode Island Wind Energy Area

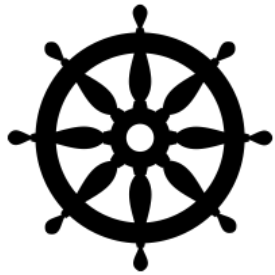


- Site of first utility-scale development nationwide.
- Critical to Biden-Harris goal of 30 GW by 2030.

Existing observing assets:

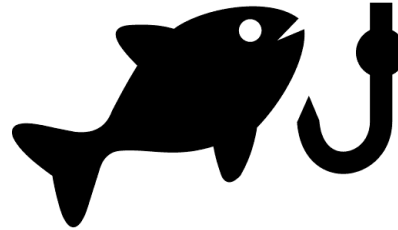
- Valuable for navigation and forecasting.
- Narrow set of variables.
- Lower station density.
- Limited offshore coverage.
- Few subsurface measurements.

Do These Assets Address Key Issues?



Navigation Safety

Operations; search-and-rescue;
weather forecasting



Fisheries Management

Stock assessment inputs; survey mitigation



Wildlife Conservation

Detection & avoidance; prediction



Marine Pollution

Tracking plumes; impact assessment



Climate Tracking

Long-term signals; disentangling
climate & OSW impacts

Understanding End-User Needs

- **Surveying public statements in the press, in comment letters, and at public hearings, workshops, trade shows, etc., to understand concerns and needs.**
- **Conducting informal interviews with energy company representatives, commercial fishermen, other private sector actors, researchers, and federal, state, and Tribal agencies.**
- **Reviewing pertinent literature, including peer-review publications, technical reports, and agency strategy documents.**
- **Connecting with existing and forthcoming buoy deployments by agencies and industry.**

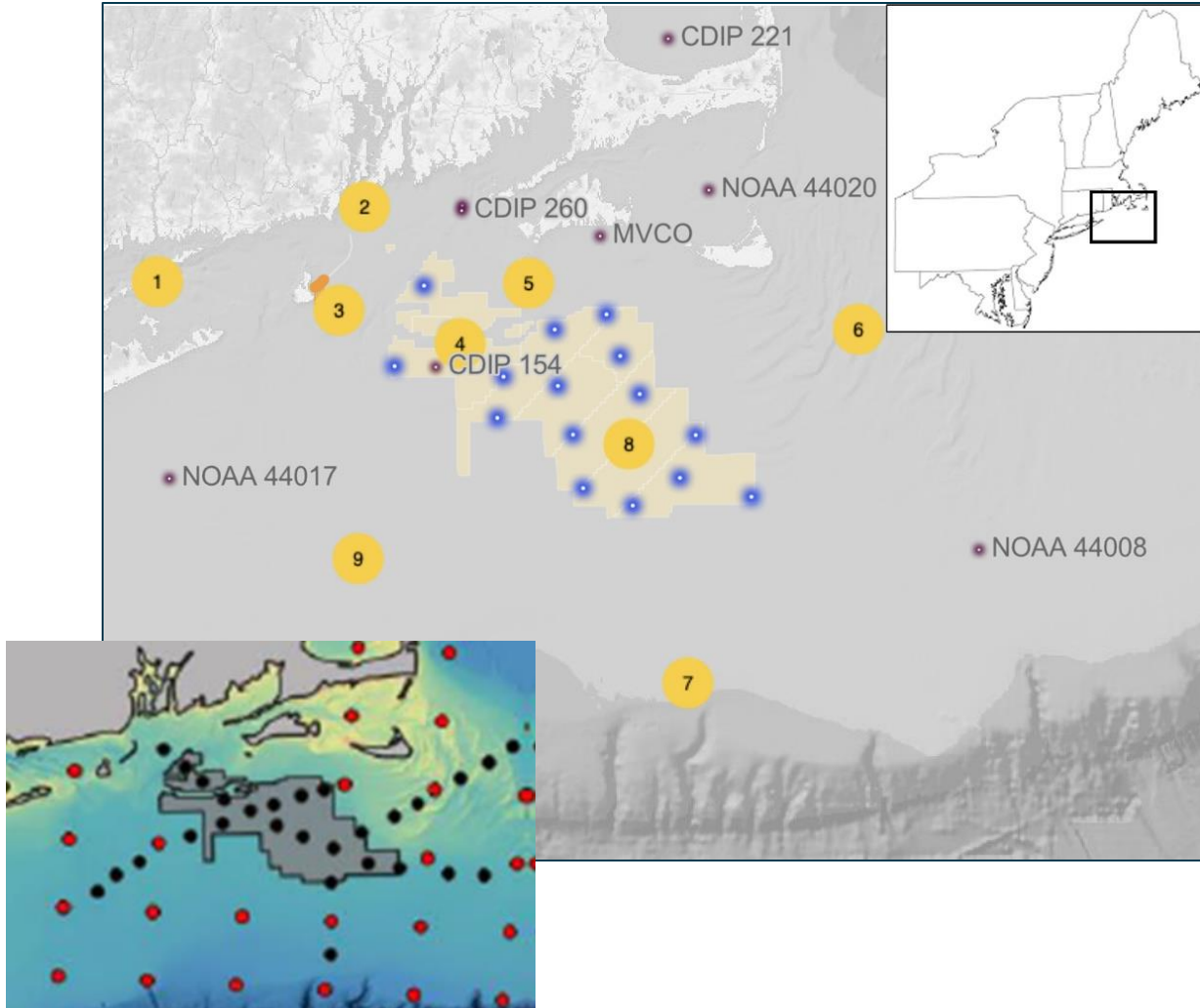


Preliminary User Needs Assessment

| Variables | Navigation Safety | Marine Pollution | Fisheries Management | Wildlife Conservation | Climate Tracking |
|---------------------|-------------------|------------------|----------------------|-----------------------|------------------|
| Air pressure | W | | | | |
| Air temperature | W | | | | X |
| Humidity | W | | | | |
| Surface winds | O, S | T | | | |
| Above-surface winds | S | | | | |
| Visibility | O, S | | | | |
| Water temperature | S | A | X | X | X |
| Waves | O, S | T | | | |
| Currents | S | T | X | X | X |
| Conductivity | | A | | | |
| Dissolved oxygen | | A | X | X | X |
| Turbidity | | A | | | |
| Chlorophyll | | | X | X | X |
| pH/PCO ₂ | | A | X | | X |
| CDOM | | | | | X |
| Nitrate | | | | | X |
| Hydrocarbons | | A | | | |
| Methane | | A | | | X |
| Heavy metals | | A | | | |
| Telemetry receivers | | | X | X | |
| Passive acoustics | | | X | X | |
| Active acoustics | | | X | X | |
| Fluorescence/PAR | | A | | | |
| Genomics | | | X | X | |
| Imaging (plankton) | | | X | X | X |
| HABs/toxins | | A | X | X | X |

- Navigation Safety requires a more focused set of ocean surface and lower atmosphere measurements.
- Other issues require more measurements throughout the water column, but with considerable overlap.
- New observations address some of these needs, but are not:
 - Coordinated
 - Scaled
 - Sustained
 - Accessible


An Expanded Network Design



| | Location | Navigation Safety | Marine Pollution | Fisheries Management | Wildlife Conservation | Climate Tracking |
|---|--------------------|--|--|--|--|--|
| 1 | The Race | High traffic area, incl. OSW service vessels from Connecticut ports | Eastern end of designated no-discharge zone | Migratory pathway for species to and from Long Island Sound | Endangered sturgeon migrate along the coast to spawning rivers | Sea-level rise and storm surge exacerbate coastal impacts |
| 2 | Brenton Reef | Underwater obstacle near the entryway to Narragansett Bay | Sensitive coastal habitats are vulnerable to spill events | Migratory pathway for species to and from Narragansett Bay | Endangered sturgeon migrate along the coast to spawning rivers | Sea-level rise and storm surge exacerbate coastal impacts |
| 3 | Block Island | Popular tourism destination with ferry traffic near the NW corner of the WEA | Sensitive coastal habitats are vulnerable to spill events | Existing turbines attract sport fishing activity | Endangered sturgeon migrate along the coast to spawning rivers | Sea-level rise and storm surge exacerbate coastal impacts |
| 4 | Cox Ledge | Interior WEA site that can serve maritime operations and WTRIM | Biodiversity hotspot could be vulnerable to spill events | Southernmost known spawning population of Atlantic cod | Tracking protected species within the WEA | Species composition at biodiversity hotspot could change |
| 5 | Nomans Land Island | Existing vessel traffic bottleneck that could become more congested | Sensitive coastal habitats are vulnerable to spill events | Near the boundary of a proposed new Atlantic cod stock | National Wildlife Refuge supports diverse birdlife | Sensitive geology is vulnerable to sea level rise |
| 6 | Nantucket Shoals | Important fishing ground with little data to support at-sea operations | Filter feeding scallops create human health risks following spill events | Rotational closure site for valuable scallop fishery | Feeding and migratory area for endangered right whales | Acidification impacts are of particular concern to the scallop fishery |
| 7 | Shelf Break | Point at which oceangoing vessels enter the high seas | Fewer concerns due to lower vessel density and absence of structures? | Offshore tuna and crab fisheries would benefit from data for at-sea operations | Offshore migratory route for endangered whales | Point where Gulf Stream warm core rings enter the shelf ecosystem |
| 8 | Mid-Shelf | Interior WEA site that can serve maritime operations and WTRIM | Collision risks presented by OSW facilities | Environmental measurements could support survey mitigation | Tracking protected species within the WEA | Continued tracking of Gulf Stream influences into the WEA |
| 9 | Downstream Shelf | Route for vessels from Mid- Atlantic ports serving the WEA | Fewer concerns due to lower vessel density and absence of structures? | Northern end of the Cold Pool that affects multiple target species | Offshore migratory route for endangered whales | Disentangling climate effects and influences of the WEA |

Summary & Next Steps

- **Uncertainty creates conflicts and distrust, and risks inequitable development of ocean industries, whereas information enables informed debate and decision-making.**
- **Ocean observing systems have the important benefit of providing coordinated, sustained, continuous, and accessible data.**
- **Existing observing buoys near the MA/RI WEA provide valuable data for operations and forecasts but lack many measurements and the spatial coverage needed for sustainable and equitable offshore wind development.**
- **Preliminary research on end-user needs related to Navigation Safety, Marine Pollution, Fisheries Management, Wildlife Conservation, and Climate Tracking identified the most important measurements for each and key spatial gaps.**
- **Continuing to work with industries and agencies to improve understanding of end-users needs and refine this plan.**
- **Implementing this plan through participatory, cross-agency, and public-private partnership presents an opportunity to promote co-existence through collaboration and a stronger information base.**



Thank You! Questions?*

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*Come to Regency at 9:45 AM tomorrow for thoughts on fisheries survey mitigation