

An underwater photograph showing a yellow autonomous underwater vehicle (AUV) or glider in the deep blue water. The surface of the water is visible at the top, with light reflecting off the ripples. The AUV is positioned in the lower right quadrant of the frame, angled upwards and to the left. The text is overlaid on the left side of the image.

Fisheries monitoring of an offshore windfarm off New Jersey: Utilizing Autonomous Platforms

Josh Kohut, Grace Saba and MANY MANY MANY others
Rutgers University

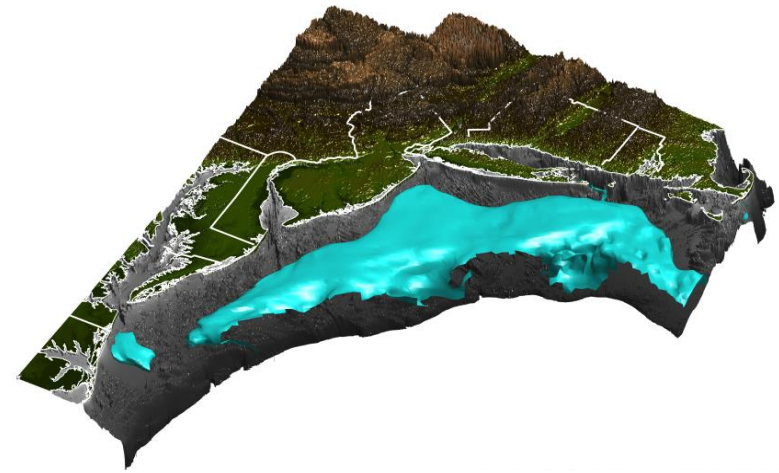
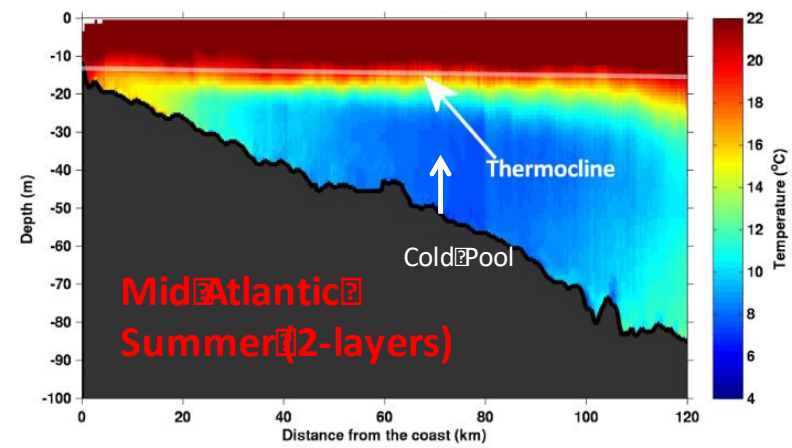
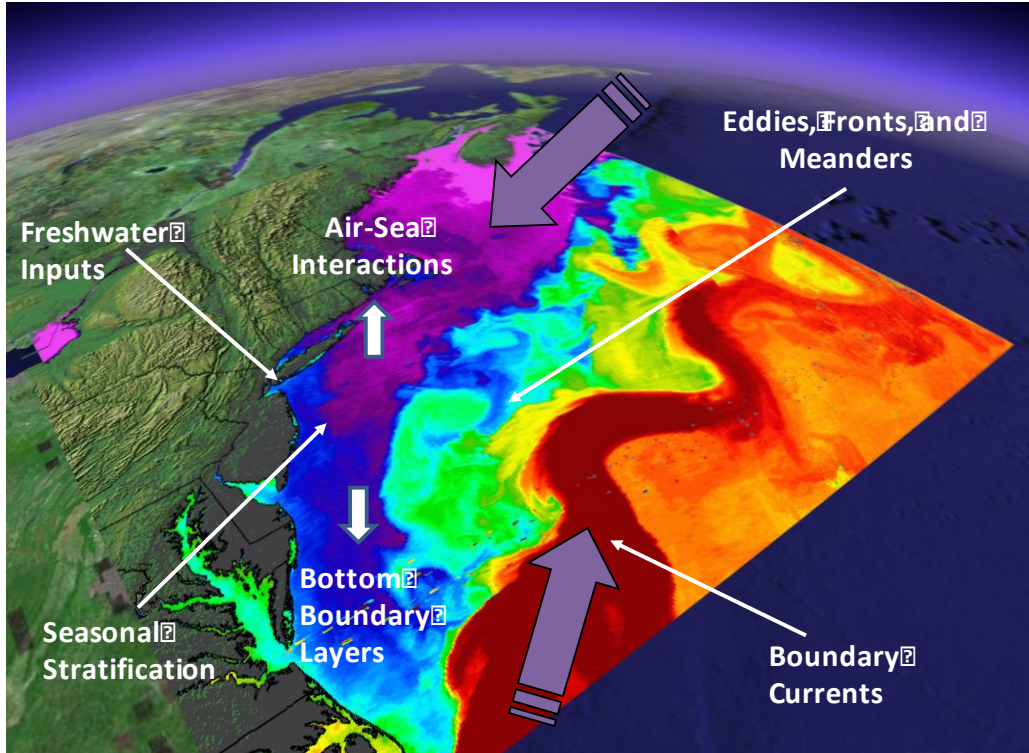
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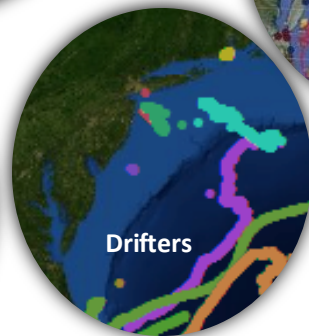
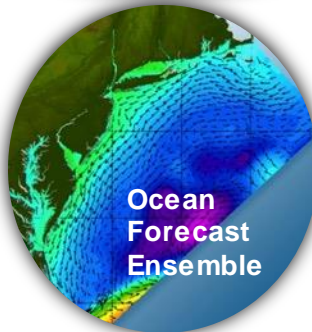
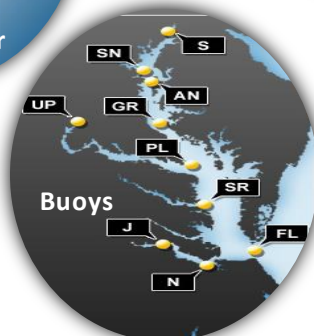
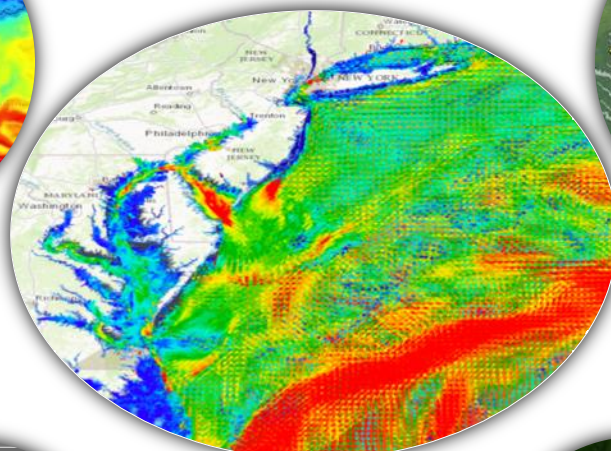
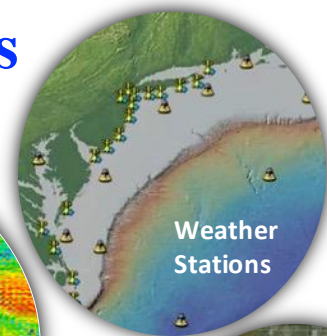
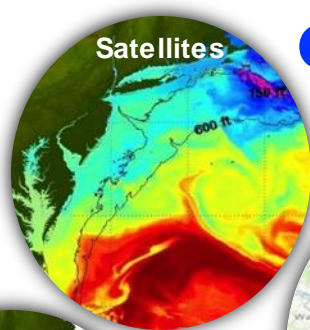
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*Center for Ocean Observing
Leadership*

Mid Atlantic Bight is Physically Complex



Observing Platforms



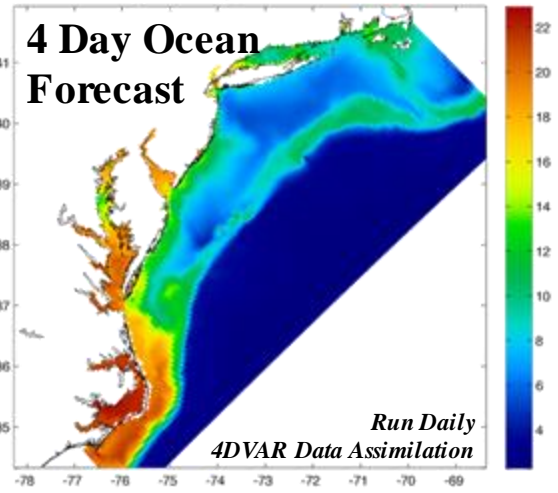
MARACOOS: Mid-Atlantic Regional Association Coastal Ocean Observation System



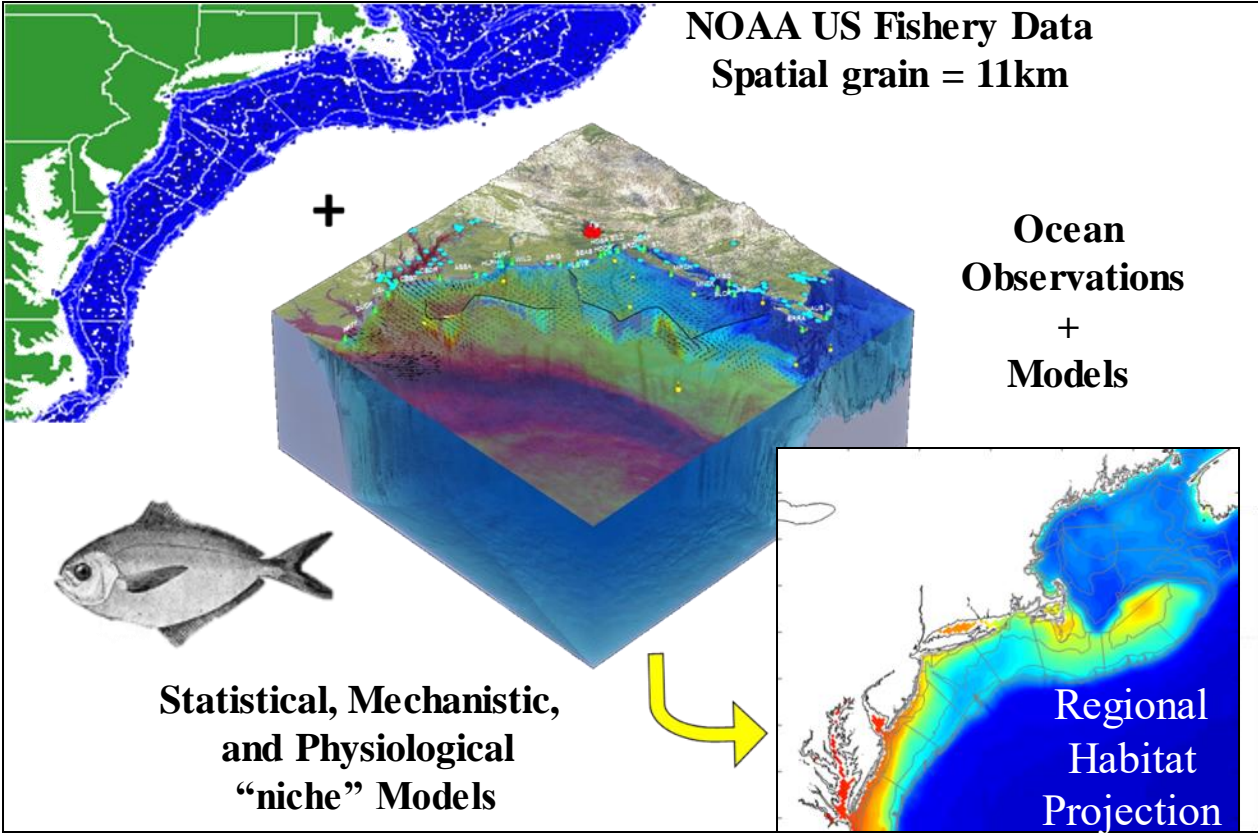
Data QA/QC



www.maracoos.org



Ocean Connections: Fisheries



Products enabled through partnership



NOAA FISHERIES
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION



Delaware State University



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Coastal Ocean
Observation Lab

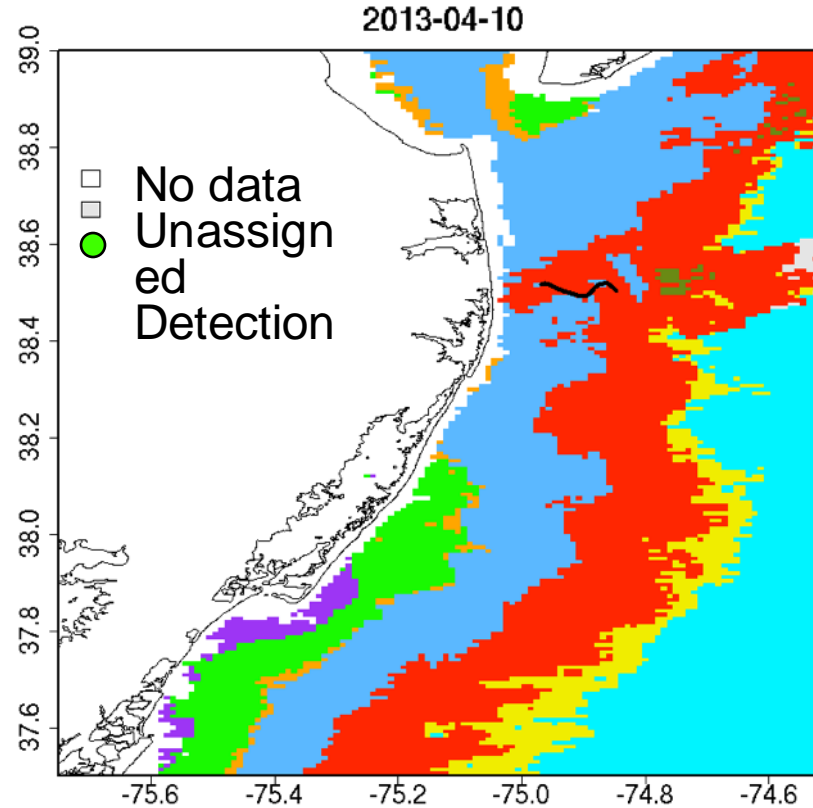


**The Atlantic Cooperative
Telemetry Network**



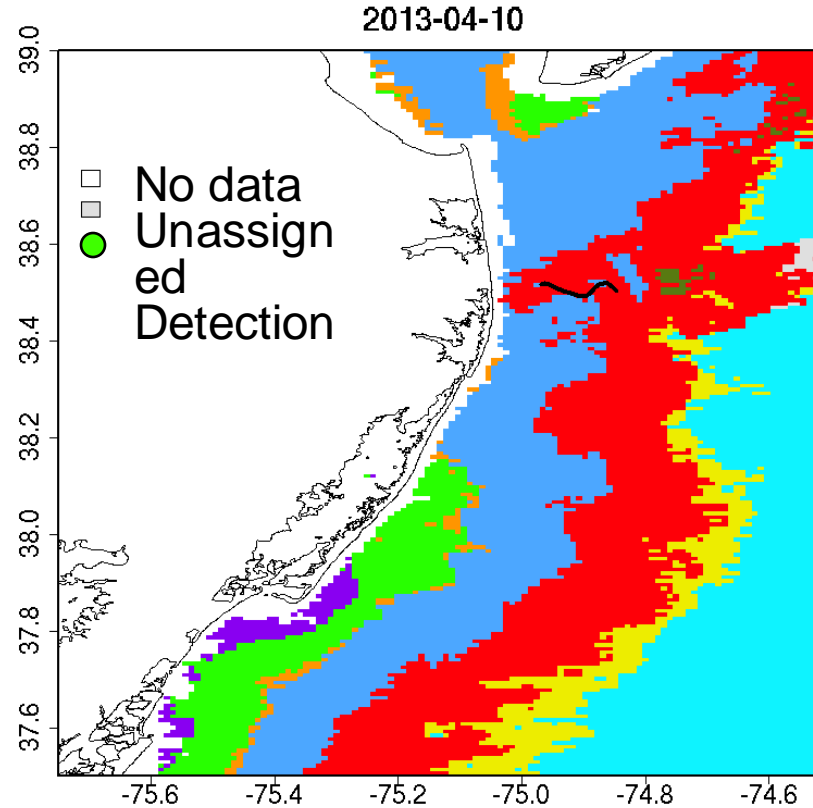
Sturgeon Mission (2013)

- **79 Days at sea**
 - 10 April – 28 June
- **1,420 km**
- **71,000 Profiles**
 - Salinity
 - CHL
 - CDOM
 - Temperature
 - Oxygen
- **62 Sturgeon**
- **187 Detection Hours**



Sturgeon Mission (2013)

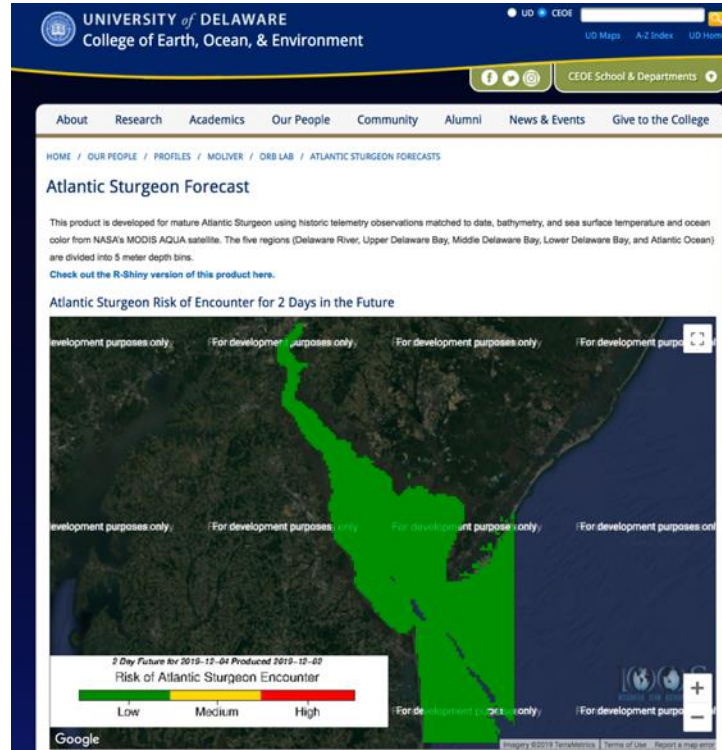
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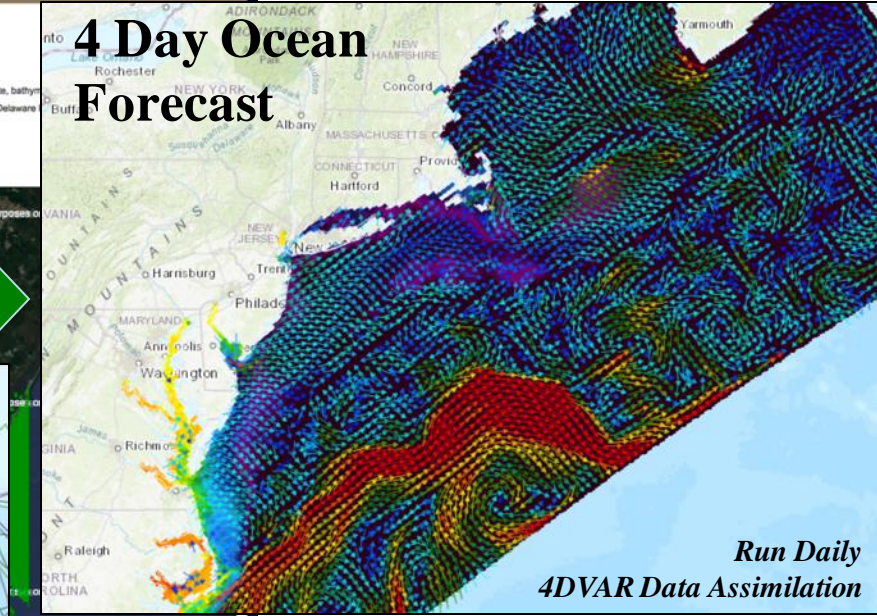
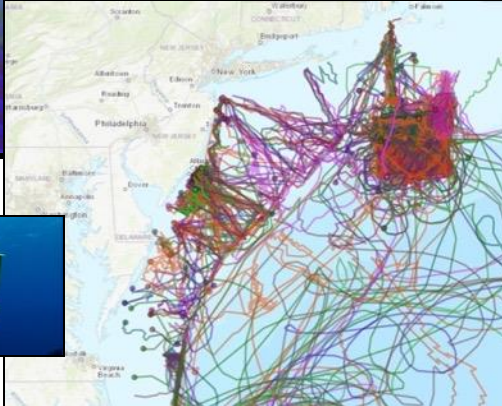
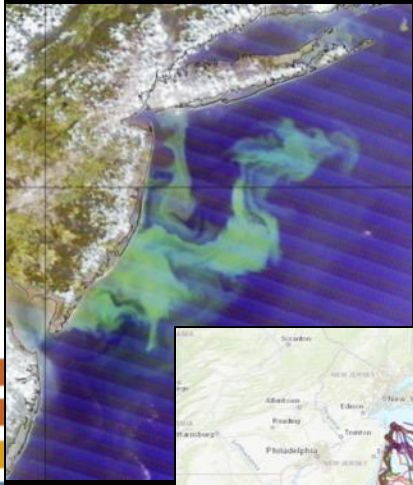
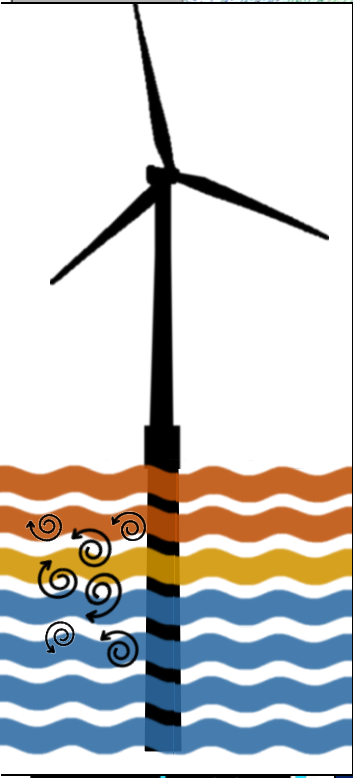
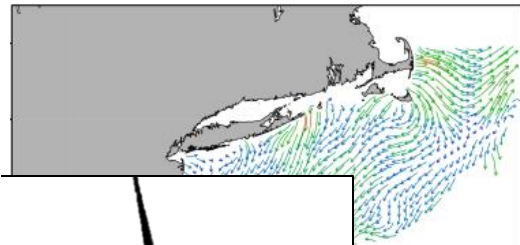
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Decades of ocean observation and simulation



Short term environmental research priorities (2020-2021)

- **Develop** a **methods and metrics** document to define what monitoring should be done and how
- **Link** the **physical effects** of offshore wind energy development to **biological effects**
- **Coordinate** existing **efforts** to maximize utility of available resources and expand scale of inference
- **Conduct** feasibility studies to identify the **types and scale of potential effects** and focus research in the eastern U.S.
- **Examine** effects of offshore wind energy development on **ocean stratification**
- **Assess** changes in **light conditions**



Search: 'State of the Science Workshop'

https://www.nyetwg.com/_files/ugd/78f0c4_0942f9d60ff84b45b6bea7e33ad6044e.pdf

Short term environmental research priorities

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- **Link** the **physical effects** of offshore wind energy development to **biological effects**
- **Coordinate** existing **efforts** to maximize utility of available resources
- **Conduct** feasibility studies to identify the **types and scale of potential impacts** in the eastern U.S.
- **Examine** effects of offshore wind energy development on **ocean stratification**
- **Assess** changes in **light conditions**

Final Report

Partners in Science Workshop:
**Identifying Ecological Metrics and Sampling
Strategies for Baseline Monitoring During Offshore
Wind Development**

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Douglas Zemeckis, Ph.D. (NJAES)

Workshop Hosts:

Center for Ocean Observing Leadership School of Environmental and Biological Sciences Rutgers, The State University of New Jersey 71 Dudley Road New Brunswick, NJ 08901 https://rucool.marine.rutgers.edu/	Cooperative Extension of Ocean County New Jersey Agricultural Experiment Station Rutgers, The State University of New Jersey 1623 Whitesville Road Toms River, NJ 08755 http://ocean.njaes.rutgers.edu/
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 **RUTGERS**
Center for Ocean Observing Leadership

 **RUTGERS**
New Jersey Agricultural Experiment Station
COOPERATIVE EXTENSION
OCEAN COUNTY

Workshop Facilitator:
Consensus Building Institute
<https://www.cbi.org/>

Workshop Sponsored by the New Jersey Board of Public Utilities



Date: 28 January 2021

Report Date: 8 September 2021

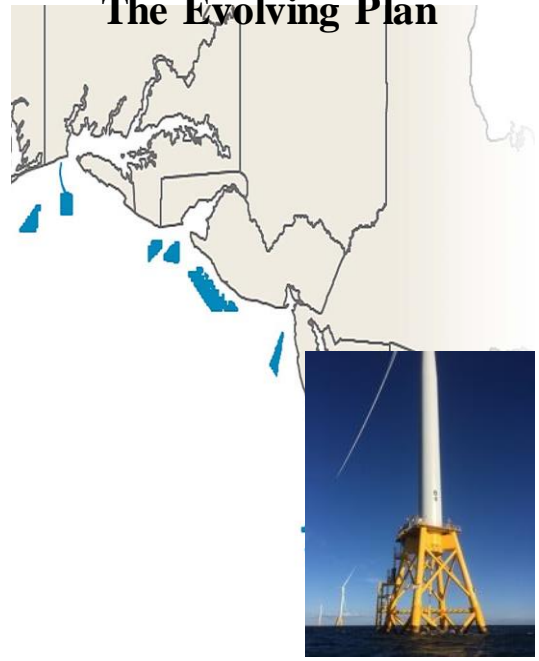


Search: 'Partners in Science Workshop Rutgers'

<https://rucool.marine.rutgers.edu/wp-content/uploads/2021/09/2021-Partners-Workshop-Report-FINAL.pdf>

Ocean robots: Tracking dynamic seascapes to inform offshore wind development

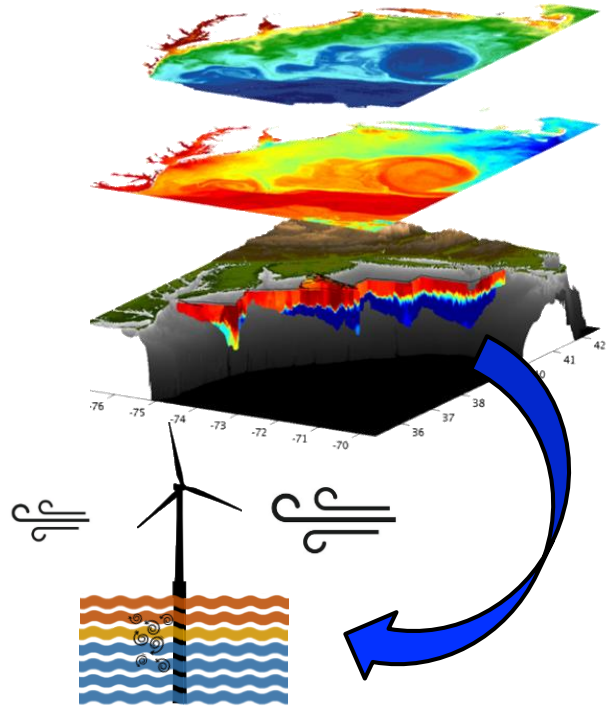
The Evolving Plan



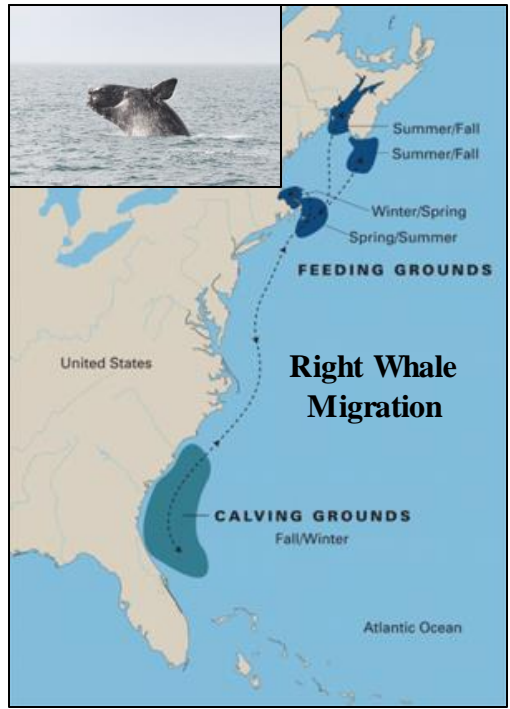
State Commitments: ~39 GW by 2040
Federal Goal: 30 GW by 2030

Sources: DOE 2021 Off shore Wind Market Report and NCSL
As of August 2021

The Dynamic Environment



The Dynamic Ecology

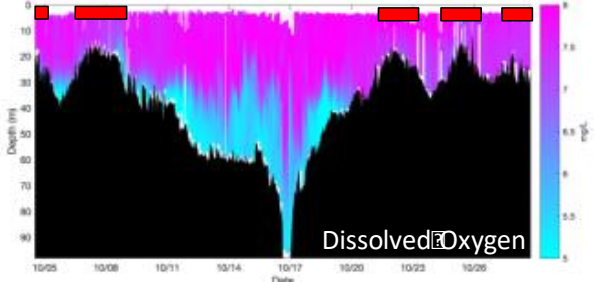
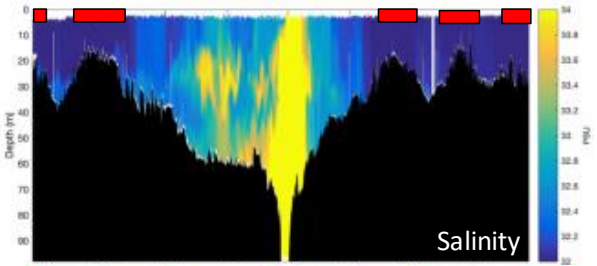
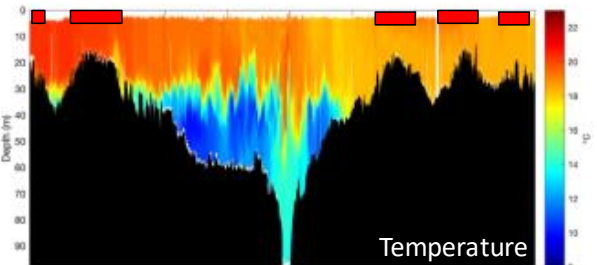
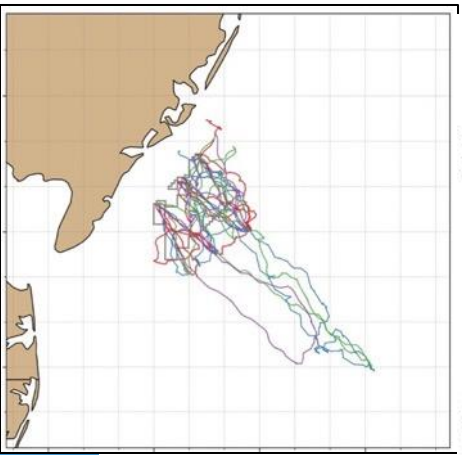


Ocean robots: Tracking dynamic seascapes to inform offshore wind development

Ørsted forms new research partnerships
Advancing technology for protection and conservation of North Atlantic right whales



*Devices are not to scale



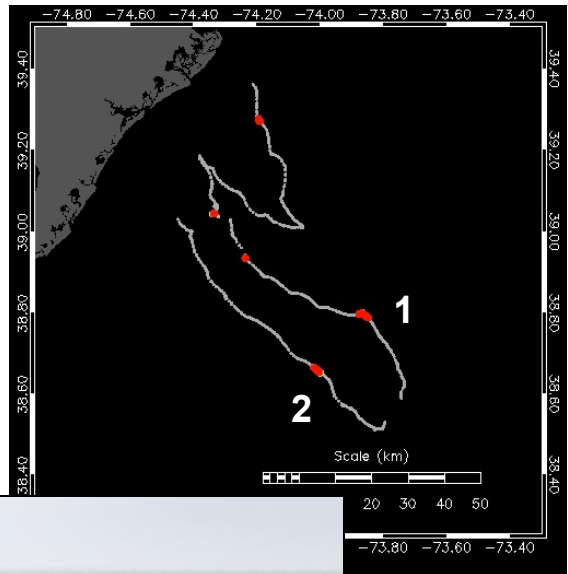
Ørsted | Ocean Wind | ECO-PAM Project



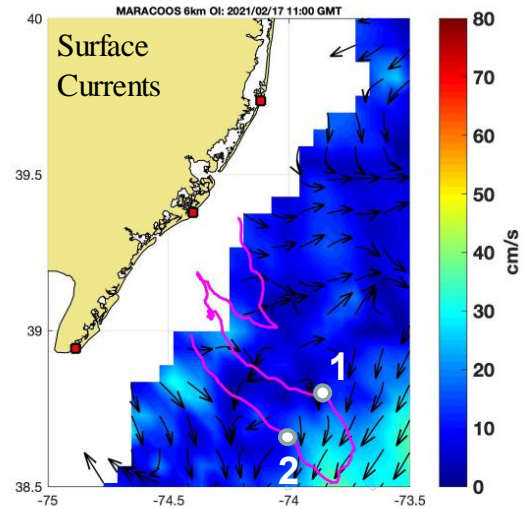
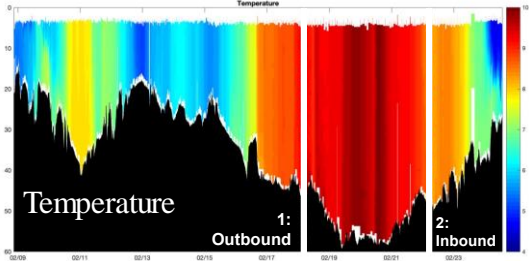
Our ecological scout

Ocean robots: Tracking dynamic seascapes to inform offshore wind development

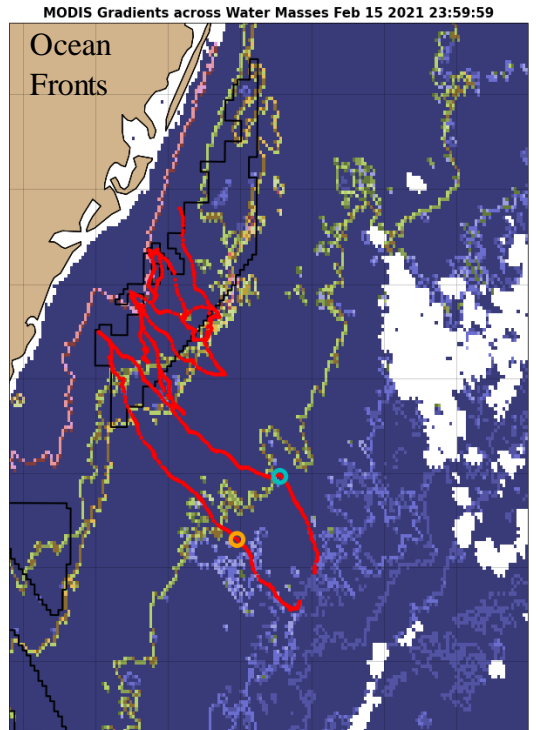
The Dynamic Ecology



The Dynamic Environment

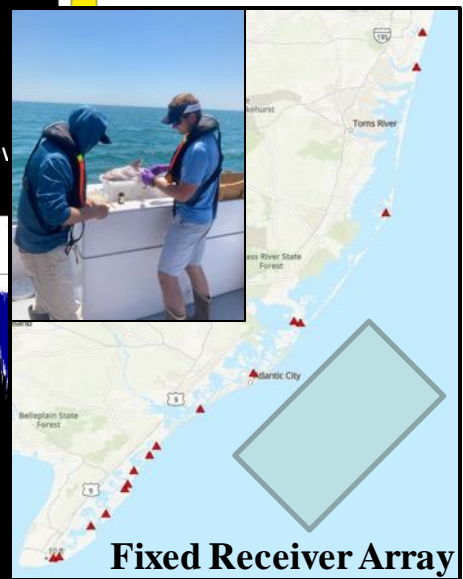
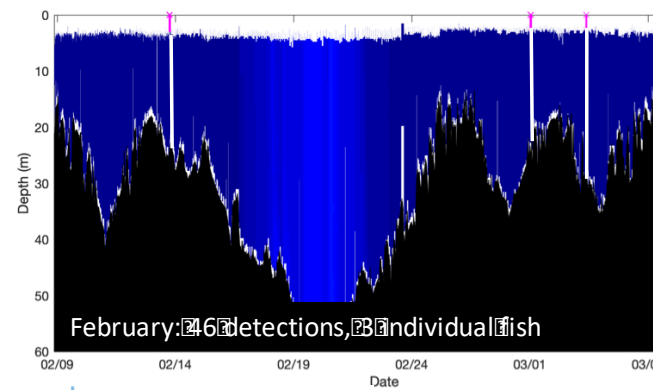
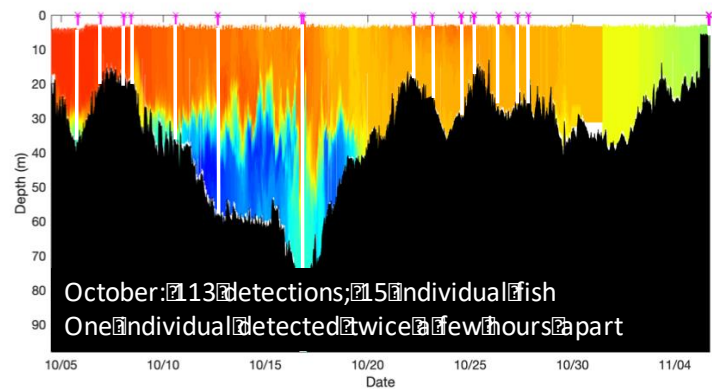
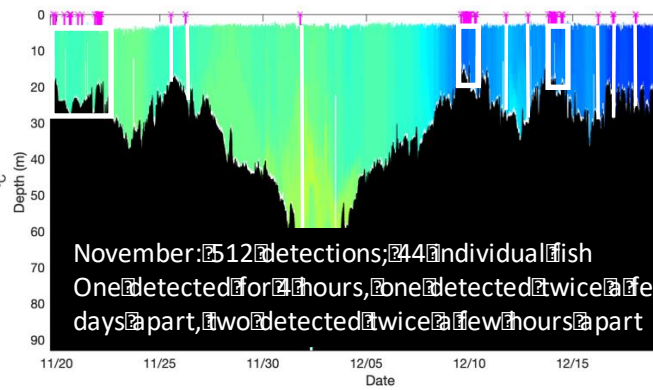
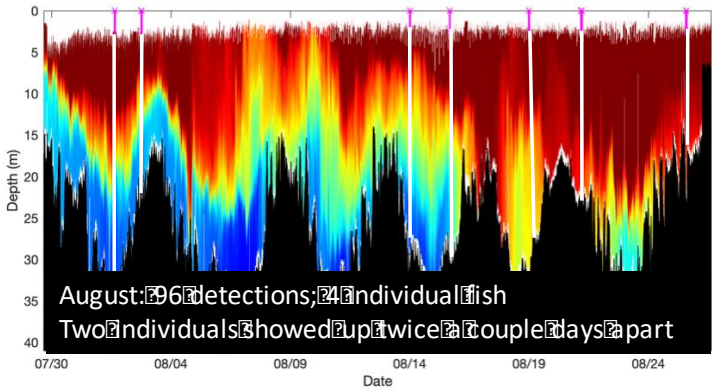


Informing the Plan

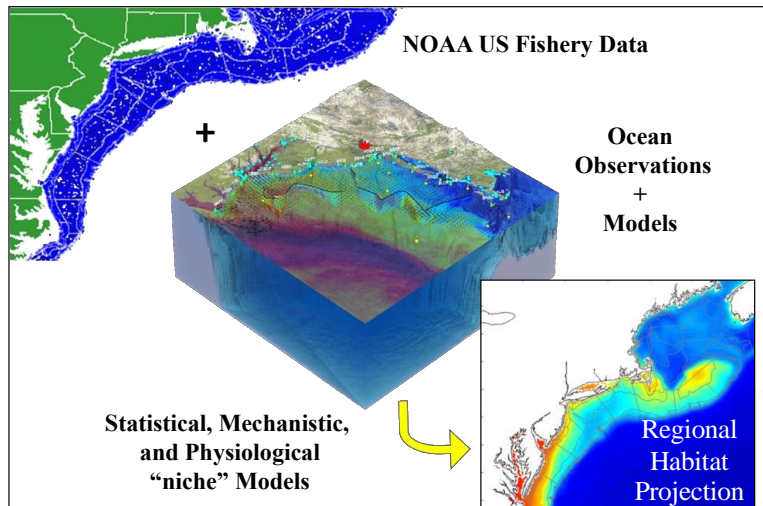


Dynamic mapping of ecological features

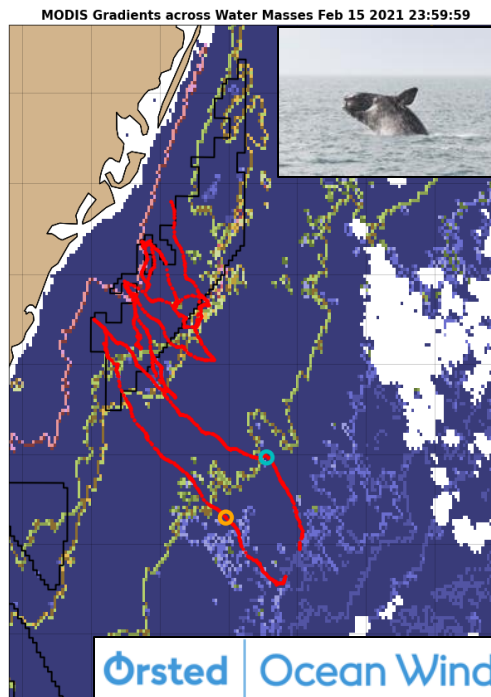
High Resolution Mapping focused on the Ocean Wind Site: Fish Telemetry



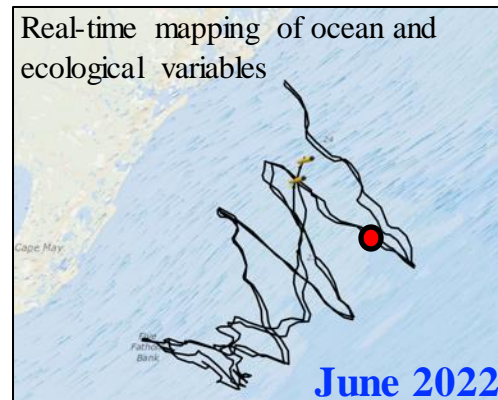
Dynamic seascape mapping can inform offshore wind development



Dynamic mapping of ecological features



Real-time mapping of ocean and ecological variables

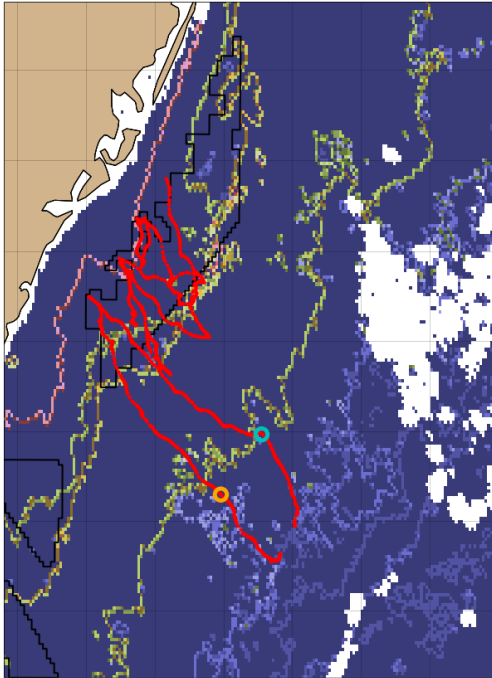


Temperature	Active acoustics
Salinity	(38 KHz)
Density	Active Acoustics
Ocean currents	(120 KHz)
Dissolved oxygen	Active Acoustics
Chl Fluorescence	(200 KHz)
CDOM Fluorescence	Passive Acoustics
Optical backscatter	Fish telemetry

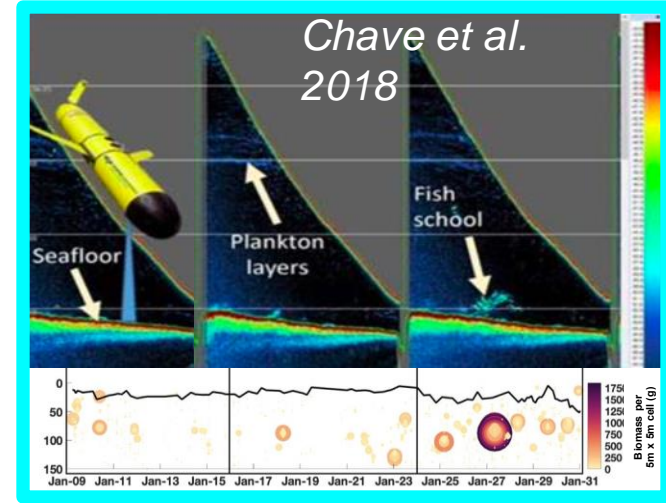
Industry-focused efforts in the Mid-Atlantic



MODIS Gradients across Water Masses Feb 15 2021 23:59:59



Method
Benthic Trawl Survey
Structured Bottom Survey
Clam Survey
Pelagic Fish Survey
Telemetry Measures
eDNA
Oceanography



**Glider with oceanographic, telemetry, and active acoustic sensors will test the potential for autonomous platforms to augment/replace traditional vessel-based efforts*