RIMFI Meeting

April 8, 2025

Dr. Kris Lewis
Graduate School of Oceanography, URI

THE
UNIVERSITY
OF RHODE ISLAND
GRADUATE SCHOOL
OF OCEANOGRAPHY

LEWIS
LAB
Transdisciplinary Oceanography and Ecosystem Modeling

Fisheries Background

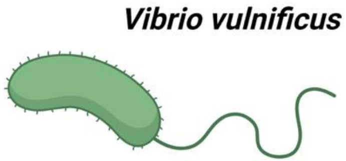
- **North Pacific Groundfish Observer**
  - Bering Sea and Gulf of Alaska
- **Marine Biologist**
  - National Marine Fisheries Service
    Alaska Fisheries Science Center
- **Fisheries Stock Assessment Scientist**
  - Louisiana Department of Wildlife and Fisheries

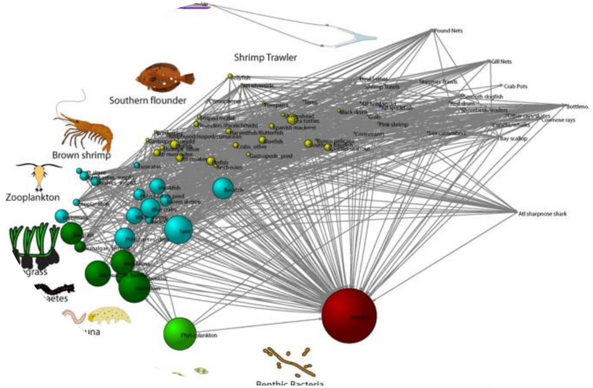
Academic Background

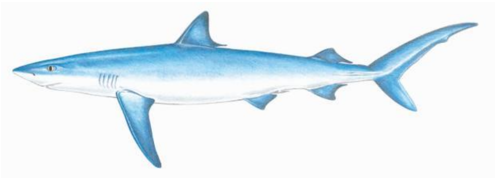
- **PhD - LSU** School of Oceanography and Coastal Sciences
- **Postdoctoral Research Fellow** George Mason University

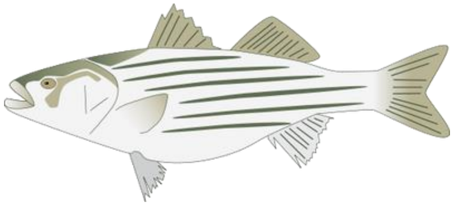
Overarching Research Question

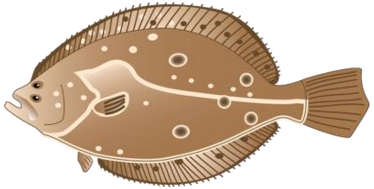
How will marine food webs, from **microbes** to **apex predators** to **humans**, change, and/or adapt as a result multiple synergistic disturbances and how will these changes affect the resilience of our ocean ecosystems?











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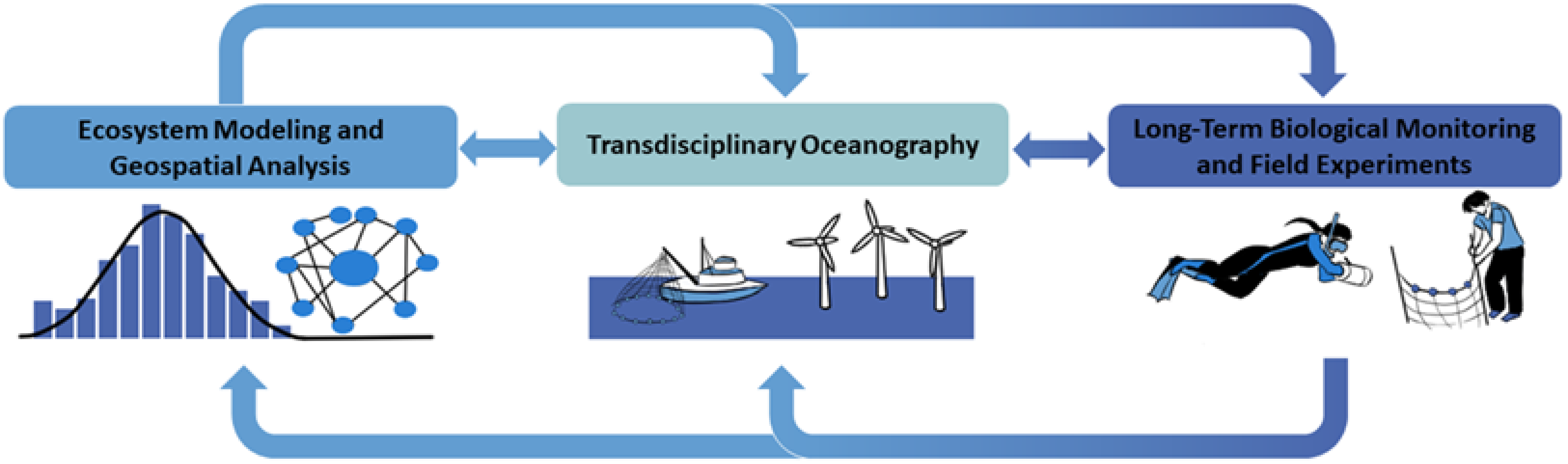
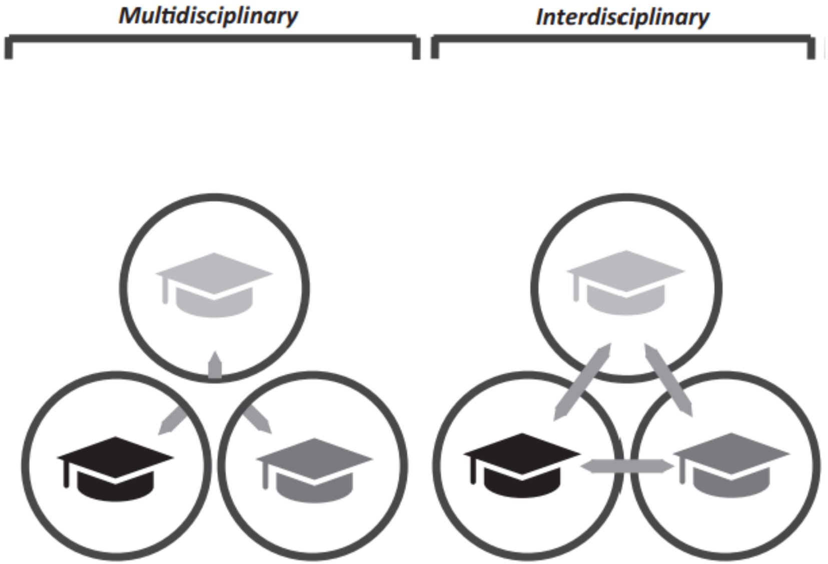
Lewis Laboratory
Research Arc



Why Transdisciplinary Oceanography?

Traditional academic silos

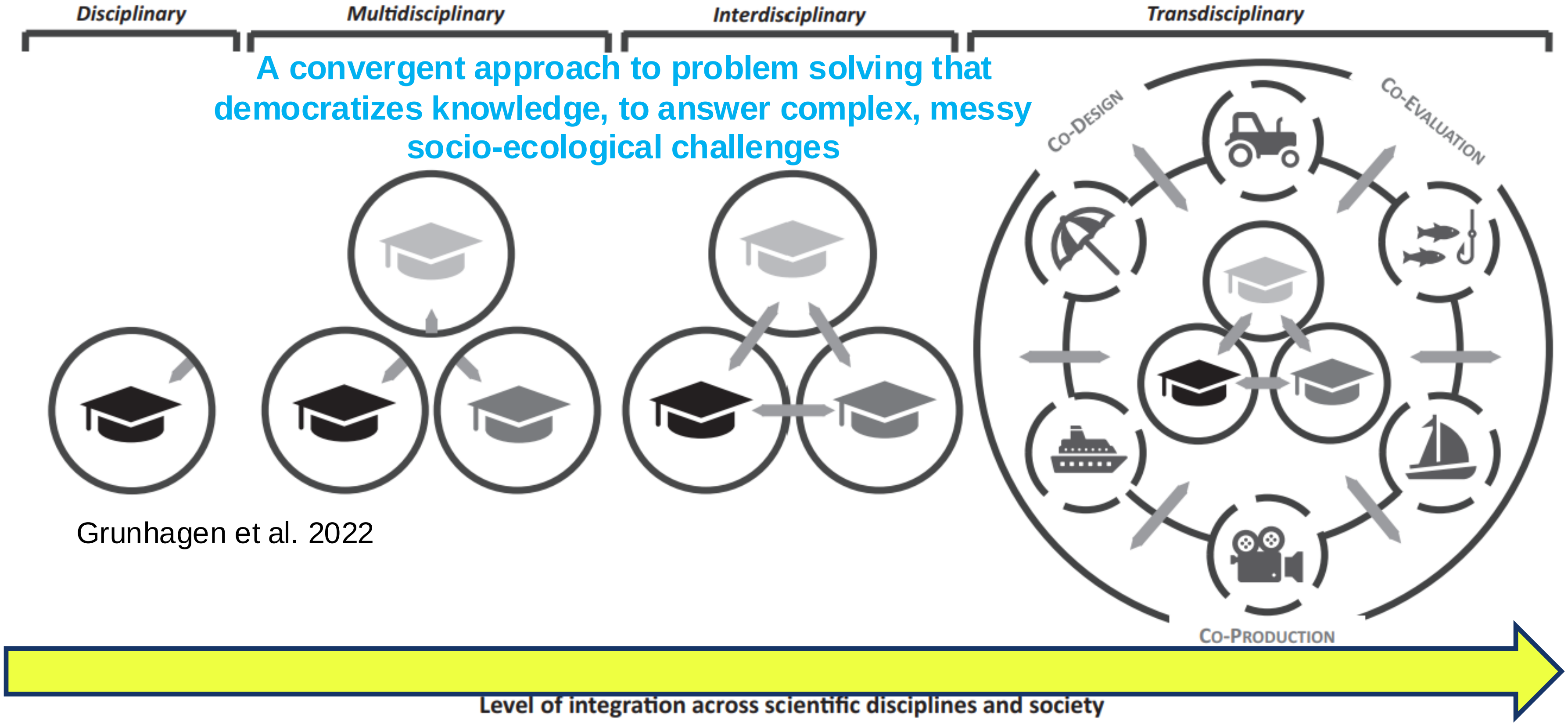


If **multidisciplinary** and **interdisciplinary** work addressed natural resource management effectively, then the challenges we are current facing would be solved or we would have solutions already planned or in place.

AS YOU KNOW - this is not the case

Multi-, Inter-, Transdisciplinary?

A convergent approach to problem solving that democratizes knowledge, to answer complex, messy socio-ecological challenges



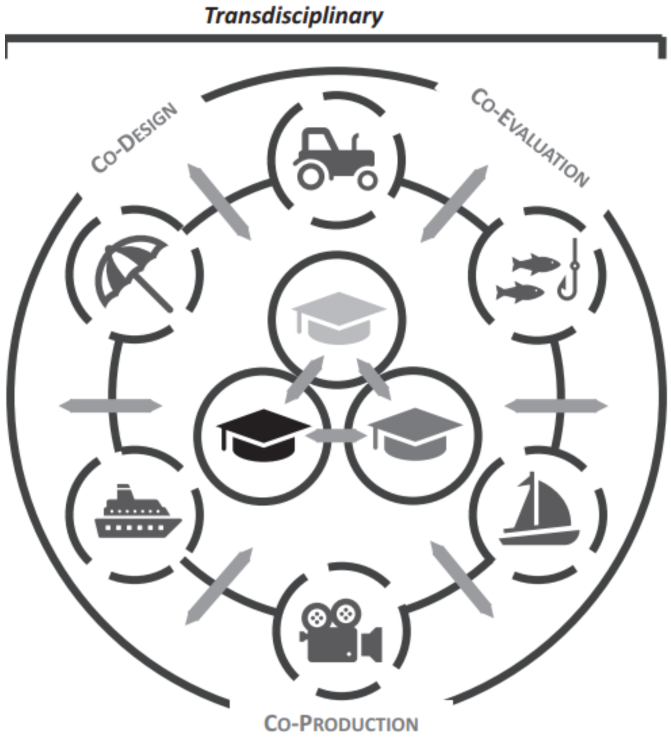
Grunhagen et al. 2022

Why Transdisciplinary Oceanography?

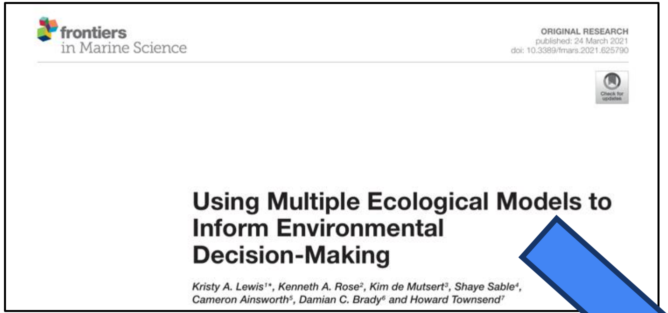
Rather than doing the science, and meeting with **communities/stakeholders/fishers/agencies** once or twice over 4 years to report out the data/results—

We must include **stakeholders as primary members of the team**, whose lived experiences is considered expertise, who know the problems more deeply than any researcher. Their participation drives problem identification, research, and solutioning.

THIS is a truly transdisciplinary approach to science.



One example of stakeholder involvement


frontiers in Marine Science

ORIGINAL RESEARCH
published: 24 March 2021
doi: 10.3389/fmars.2021.625790

Using Multiple Ecological Models to Inform Environmental Decision-Making

Kristy A. Lewis[1]*, Kenneth A. Rose[2], Kim de Mutsert[3], Shaye Sable[4], Cameron Ainsworth[5], Damian C. Brady[6] and Howard Townsend[7]

NOAA FISHERIES

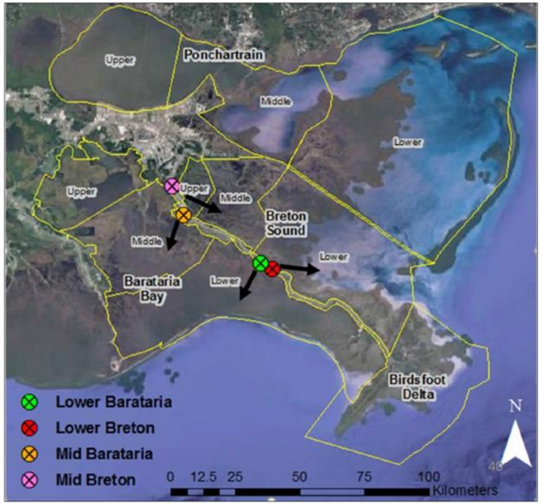
US Army Corps of Engineers

LOUISIANA DEPARTMENT OF WILDLIFE & FISHERIES

COASTAL PROTECTION AND RESTORATION AUTHORITY CPRA

THE WATER INSTITUTE

How do **a select combination of river diversions** affect **fish and shellfish** in the receiving basins?

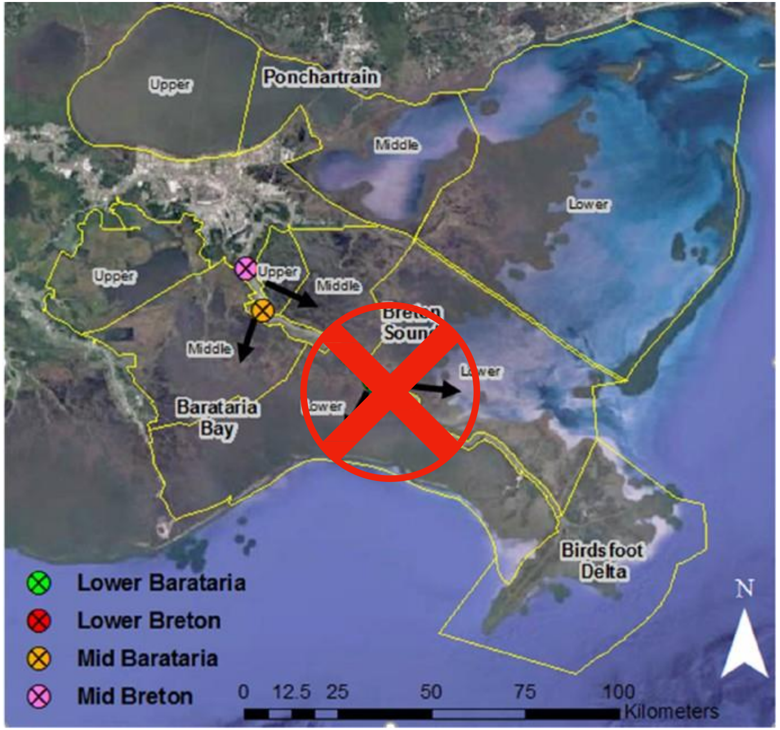


Ecosystem Model Contributes to Management Decision

Decreases in species that prefer higher salinities on a sub-basin level, increases in (few) species that prefer lower salinities

Magnitude of change dampened on a larger spatial scale; redistribution of species

*Spatial pattern suggests two lower diversions mostly responsible for the changes, **so the state omitted 2 lower diversions from restoration plan***

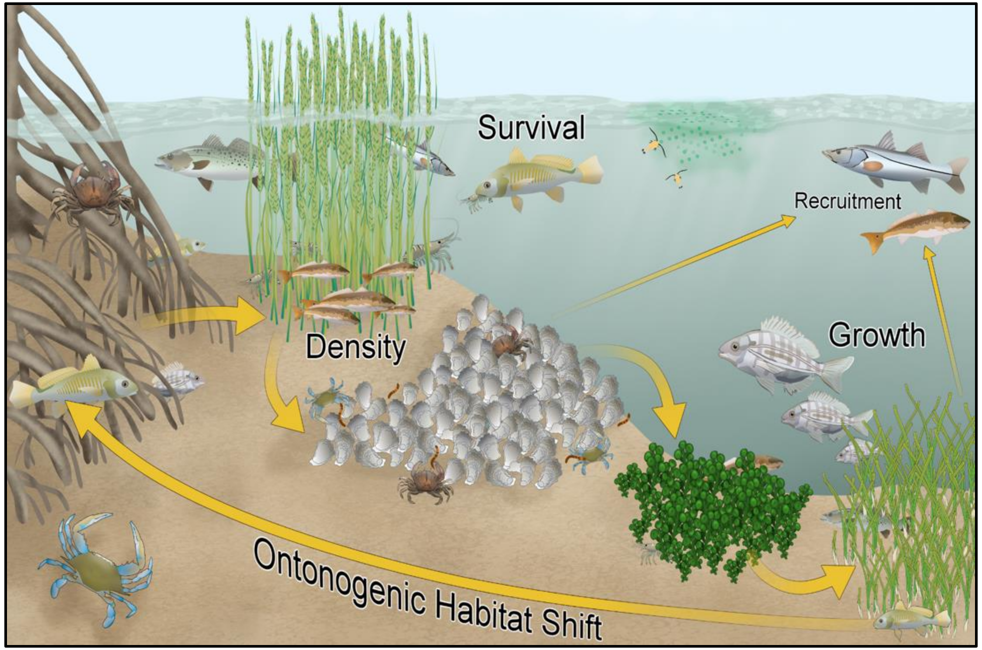


Some thoughts on future research, some already underway, some coming soon!

Would love to hear research needs/ideas from those of you who have been working in this system for years

Future Grant

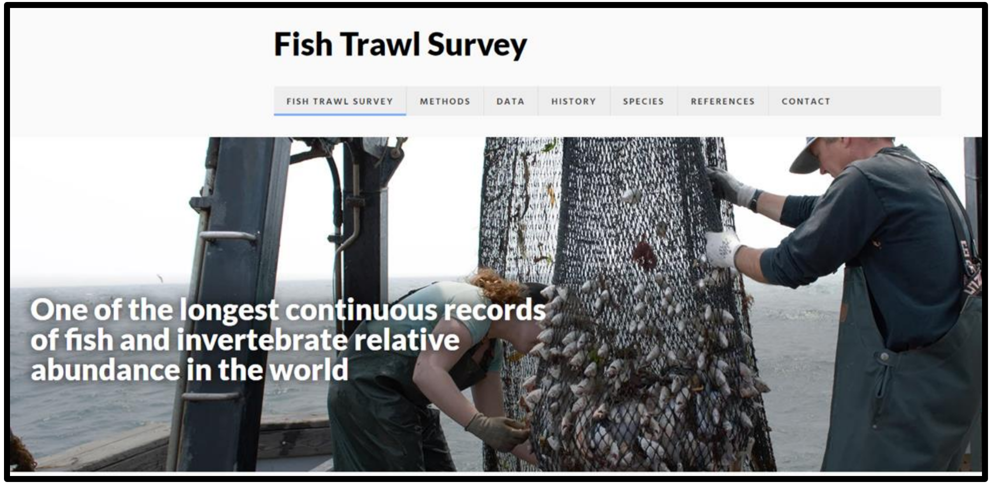
Development of the first Spatial-Temporal Ecosystem Model of Narragansett Bay



This study will investigate the synergistic stressors acting on marine food webs and, how those disturbances impact the dynamics of **nursery function** through **field experiments, geospatial and ecosystem modeling**.

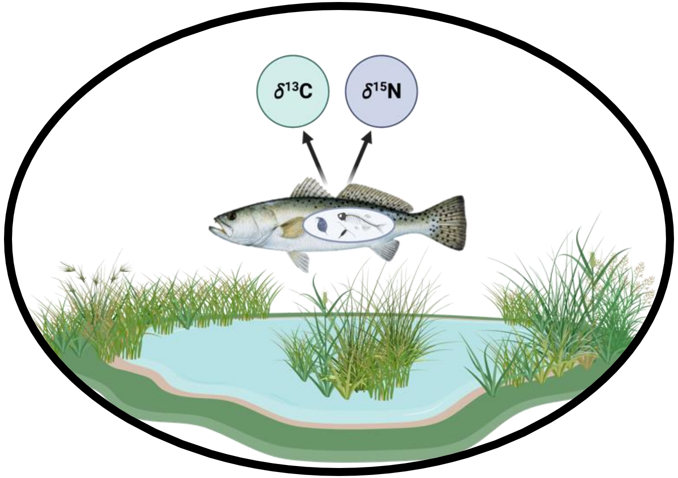
Crosscutting Educational Research Program:
-Culminating in an REU-style research experience at GSO called Semester at the Bay.

Two huge gaps in food web modeling data



1. Zooplankton distribution and biomass

- Partner with ongoing long-term surveys to create zooplankton collection database

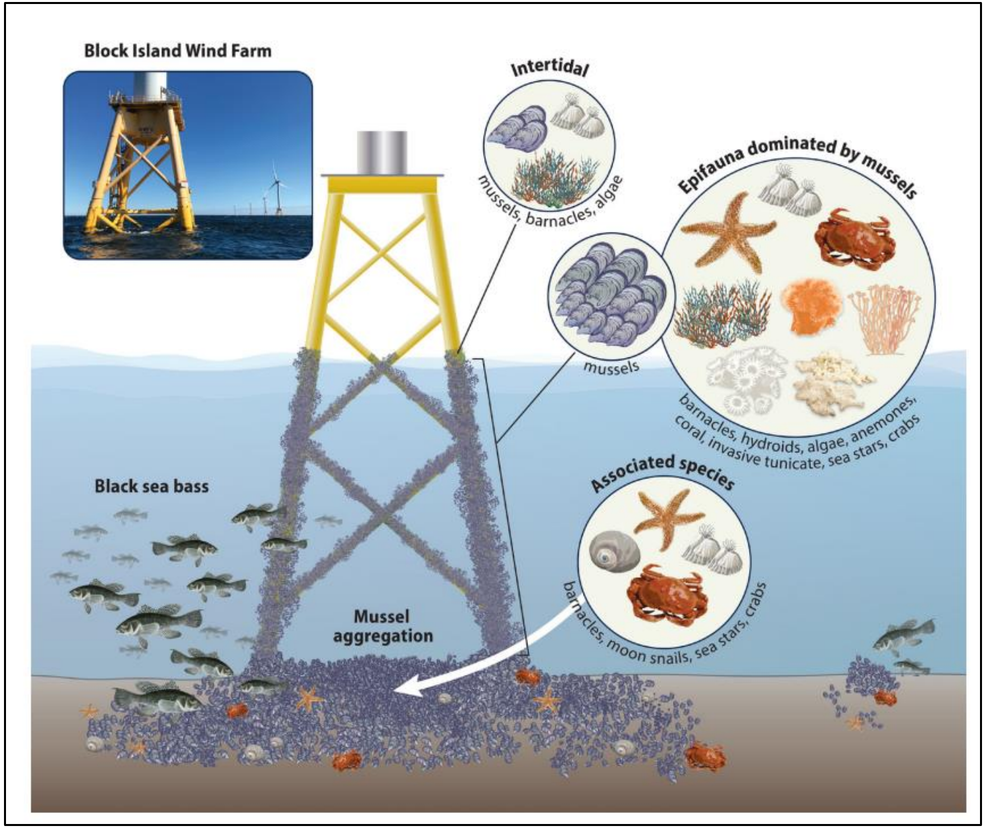


2. Model Validation for Management Use

Gut content studies (diet data)

Build a gut content lab with GSO, NOAA, and RI-DEMparnters to create a globally recognized framework for model validation

Grants submitted or funded



Offshore Wind Opportunities

Leverage expertise working with state and federal agencies to permit large infrastructure projects.

- **Northeast Sea Grant Consortium:** funded project on updated the recreational fishing tool
- **BOEM:** EBFM project ongoing
- **NOAA:** two submitted grants

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THANK YOU!

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