Research Coordination Webinar

Characterizing Patterns and Trends in Recreational Fishing/Boating in the Northeast U.S

October 22, 2026

10:00-12:00 PM ET

RWSC
Regional Wildlife Science Collaborative

ROSA
Responsible Offshore Science Alliance

Background - Offshore Research Funding Coordination Working Group

- ROSA & RWSC have been tracking partners' offshore research solicitations and procurements processes - and participating in proposal review/selection
- Many funders have participated in proposal review/selection for one another
- Huge opportunity for leveraging & coordination:
  - Research entities submitting similar proposals to multiple funders
  - Funders soliciting research on similar/related topics
  - Geographic area of focus Atlantic OCS
  - Offshore wind theme present in many



Meeting Purpose

Recreational Fishing/Boating Effort

This webinar is part of a broader coordination effort to help funders, researchers, the fishing industry, and other interested parties **understand the full picture of research underway**.

We have heard growing interest in recreational fishing effort recently, and a new project on this topic was just awarded.

By bringing this work together in one place, we hope to **build shared awareness**, **reduce duplication**, and **create opportunities for collaboration**.

Presentations

Lead	Presenter	Title	Funder
New England Aquarium & Pelagic Strategies	Jeff Kneebone	Characterizing recreational fishing effort for pelagic fishes in relation to wind development	NOAA Fisheries
		Understanding the effects of offshore wind development on recreational and for-hire fishing activity in Southern New England	MassCEC
		Recreational Biological Sampling Program - RecBio	NOAA Fisheries
University of Rhode Island	Robbie Hudson	Rhode Island Recreational Fishing Tool – Offshore Expansion	Rhode Island Coastal Resources Management Council
	Mateja Nenadovic	OffRec: Mapping offshore recreational fishing activity and perceptions of offshore development initiatives in the US Northeast region	Northeast Sea Grant Consortium
	Malachy McCaffrey	Spatio-Temporal Responses of Commercial and Recreational Fishing Vessels Across Phases of Offshore Wind Development in Southern New England	NSF Graduate Research Fellowship Program
Montclair University	Pankaj Lal	Monitoring the Socioeconomic Impacts of New Jersey's Offshore Wind Development on Recreational Fisheries Economy	New Jersey Research and Monitoring Initiative
University of Maryland Center for Environmental Studies	Dave Secor	Marwin Recreational Fishing Monitoring	US Wind
Northeast Regional Ocean Council	Emily Shumchenia & Amy Trice	Enhancing recreational boating and fishing datasets on the Northeast Ocean Data Portal	NROC
Discussion			

Discussion

Audience Q & A

Presenter Panel Question

- What new/additional data would be most helpful to your work & how can we best collect those data?

Menti

- What is your affiliation?
- What other relevant efforts should funders, researchers, and fishermen know about?
- What are potential solutions to challenges in understanding & documenting recreational fishing effort and catch patterns?



menti.com

2443 6337

If you are watching the recording, the menti is still open and we would like to hear from you!

Menti Results

What other relevant efforts should funders, researchers, and fishermen know about?

- The Nature Conservancy “Appscape” Publication - https://www.sciencedirect.com/science/article/pii/S0308597X2600206X
- NCOOS/ MD Sea Grant - Aquaculture siting effort for Aquaculture Opportunity Areas
- Using satellite data or aerial surveys to collect and spatialize presence/absence data on for-hire and recreational fishing activity
- ACCSP is piloting adding more specific fishing location data to the MRIP dockside survey.
- Continuing work from the NEFSC social science branch?

Menti Results

What are potential solutions to challenges in understanding & documenting recreational fishing effort and catch patterns?

- Need for increased data sharing and awareness of researchers on various data efforts so that fishermen do not get survey fatigue and feel that the same sort of data is being collected over and over
- This webinar showed some overlap in research effort that could benefit from better coordination among researchers. There are also many unknown aspects beyond just fishing effort and catch patterns.
- Involving and incentivizing fishers to collect and share data seems to be a promising approach
- Should probably clarify that this is *licensed* rec activity
- Model based approach using diverse aerial survey data (e.g. AMAPs camera data, satellites etc) in combination with covariates). Covariates include fishing rules, depth, weather, etc.

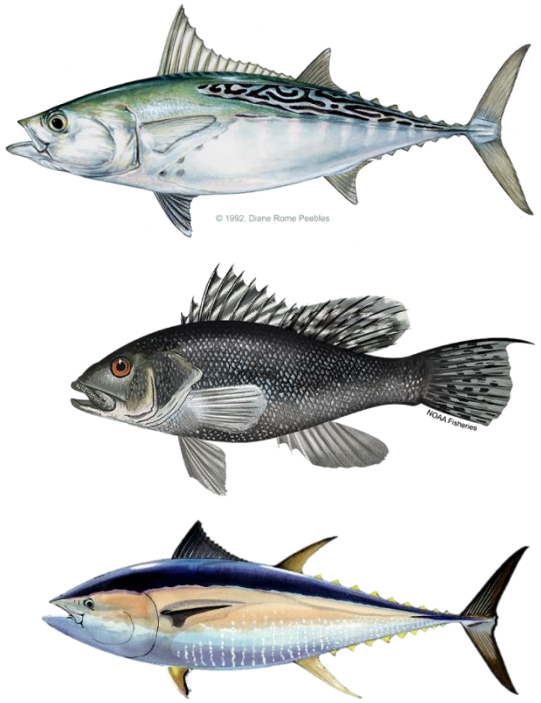
Steps towards monitoring and assessing the influences of offshore wind on recreational fishing and improving recreational catch data collection



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Principal investigators

Jeff Kneebone (New England Aquarium; jkneebone@neaq.org)

Anderson Cabot Center for Ocean Life at the New England Aquarium

Willy Goldsmith (Pelagic Strategies LLC; wgoldsmith@pelagicstrategies.com)

PELAGIC STRATEGIES

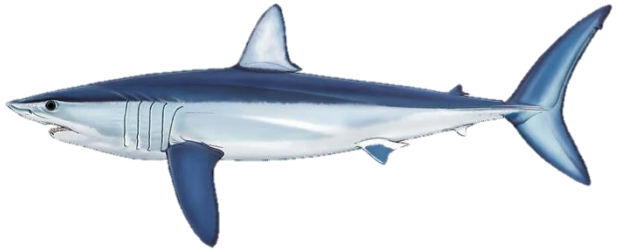
What I will tell you about….

A. Monitoring impacts of offshore wind (OSW) on the recreational fishery for highly migratory pelagic species (HMS) in southern New England

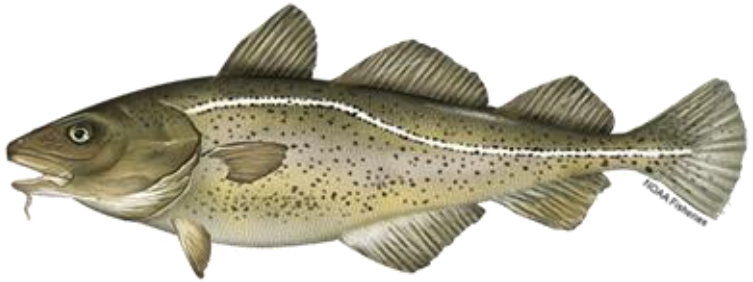
Phase 1 – How we characterized ‘baseline/pre-construction’ recreational fishing effort

Phase 2 – What we will do to assess how recreational fishing for HMS (and other species) has been impacted by OSW construction





B. Recreational Biological Sampling Program (RecBio) – leveraging the for-hire fishing industry to improve data collection in recreational fisheries in New England




Part A: Why do we need to monitor recreational effort for HMS?

- Primary recreational fishery that operates in waters of interest for OSW development

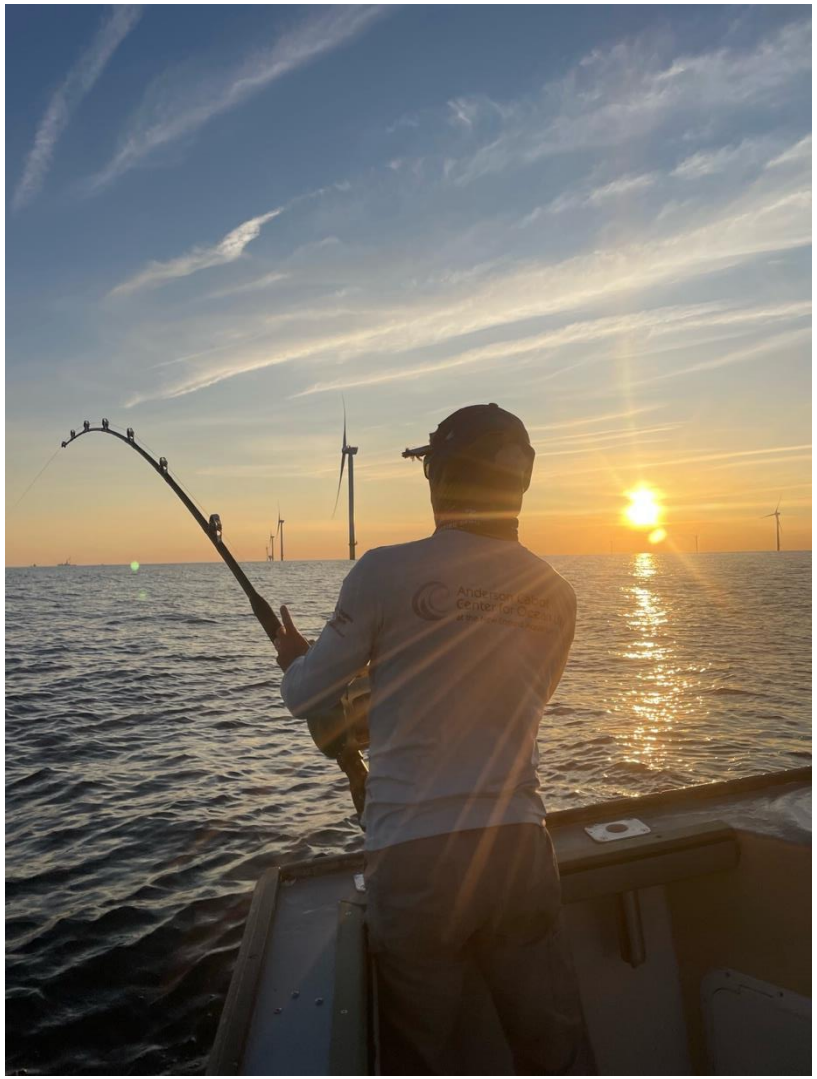
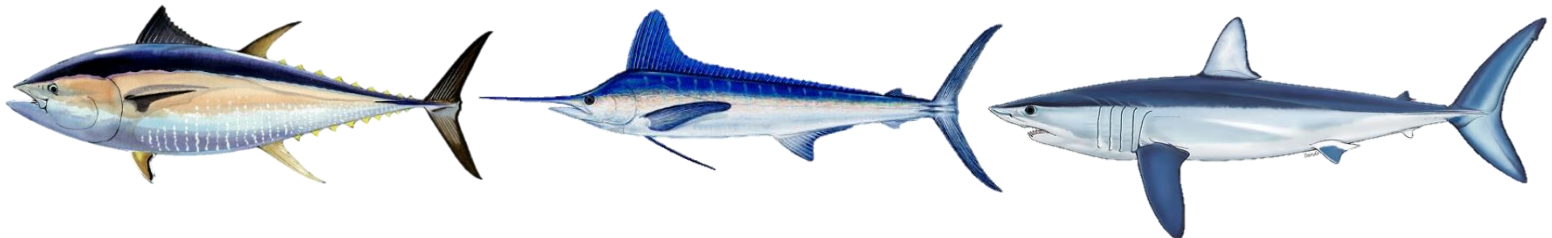


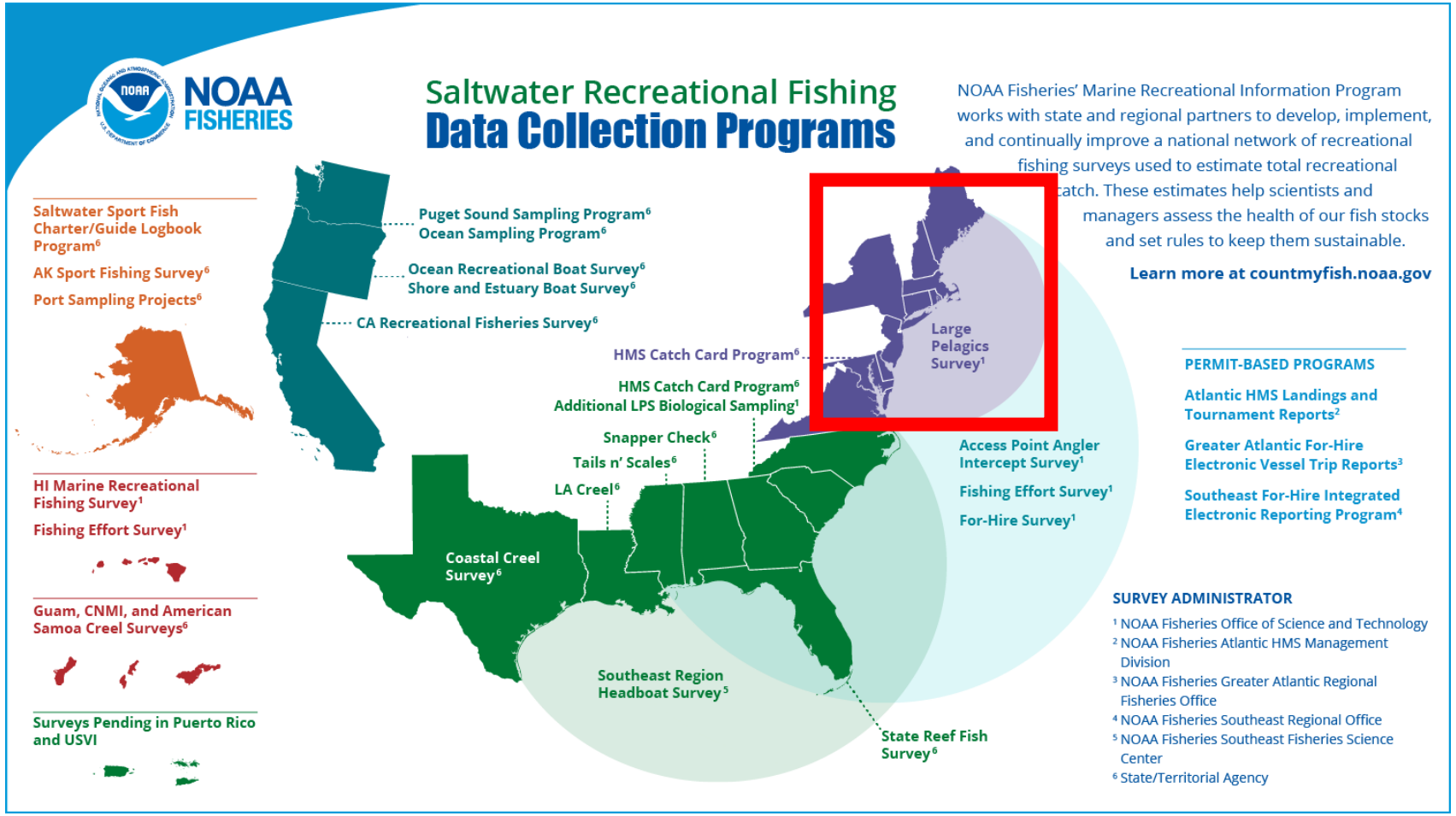
Photo credit: Ryan Lowndes

Year: 2022		
State	**Number of permits**	
	Angling (private)	**Charter/headboat**
ME	507	134
NH	325	99
MA	2,880	835
RI	846	179
CT	897	85
NY	2,672	349
NJ	4,255	503
All states ME to TX, USVI, Puerto Rico	23,605	4,175

Source: 2022 NOAA Fisheries HMS SAFE Report



What data are available on HMS recreational fishing effort?



For more information on the Large Pelagics Intercept Survey (LPIS), click here

- LPIS has data back to 2002 and covers Virginia to Maine from June through October
- No other formal federal effort surveys with *publicly available* data document specific fishing location
- The LPIS was NOT designed to monitor for changes in fishing effort due to offshore wind

What other types of data can tell us about recreational effort?

- Cooperative conventional tag, release, and recapture (CTR) data
  - Tagging and recapture events represent instances of fishing effort
  - Location of release/recapture is a proxy for the location of effort



- Fishermen's own experience or testimonials
  - Conduct surveys to inquire about recent and historical fishing effort

Approach – Phase A1: Establish the reference point before construction

The goals

- Document the baseline spatial distribution of recreational fishing effort for HMS
- Document the most popular target species, fishing tactics, and fishing locations

The data

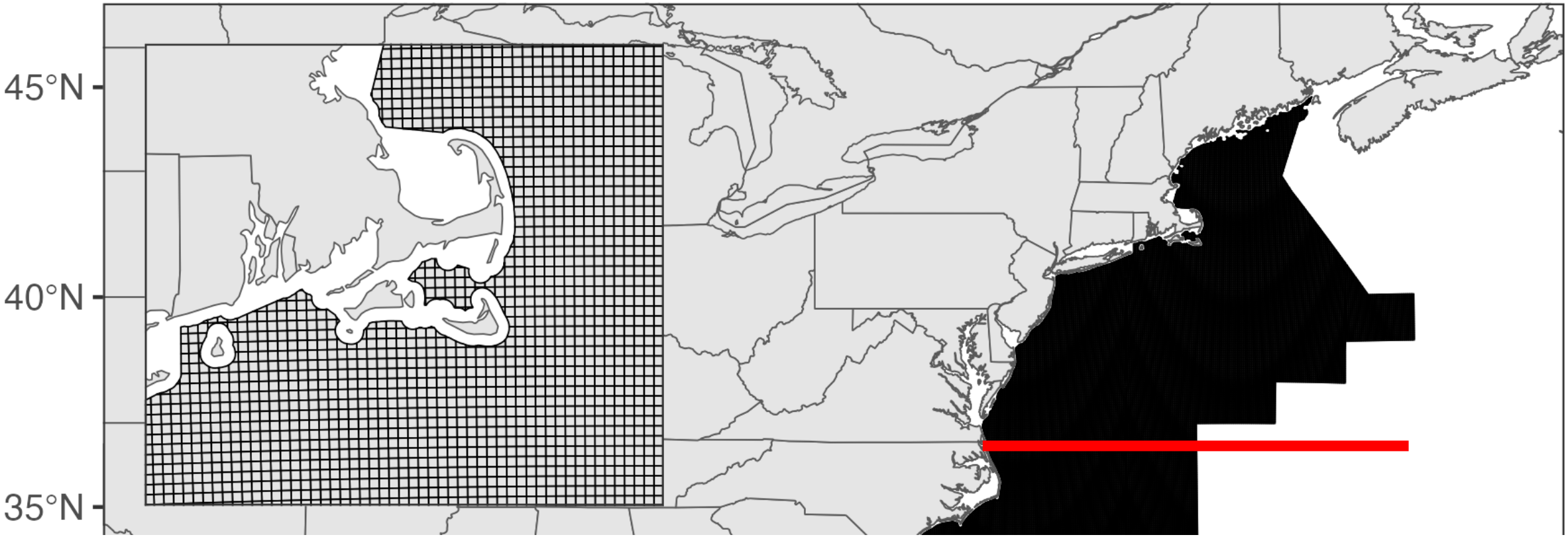
1) Large Pelagics Intercept Survey (LPIS): (2002 – 2022)
2) Conventional tag, recapture, or release (CTR): (1954 – 2022)
3) Survey of recreational and charter fishermen: Done regionally and periodically

Tag data providers:

Funders:

Collaborators:
Matthew Davis (Maine Department of Marine Resources)
Eric Orbesen, Read Hendon (SEFSC)
Cami McCandless (NEFSC, Cooperative Shark Tagging Program)
Peter Chaibongsai, Addie Spain (The Billfish Foundation)
Wessley Merten (Dolphinfish Research Program)

Phase A1: How effort and catch are quantified using LPIS and CTR data

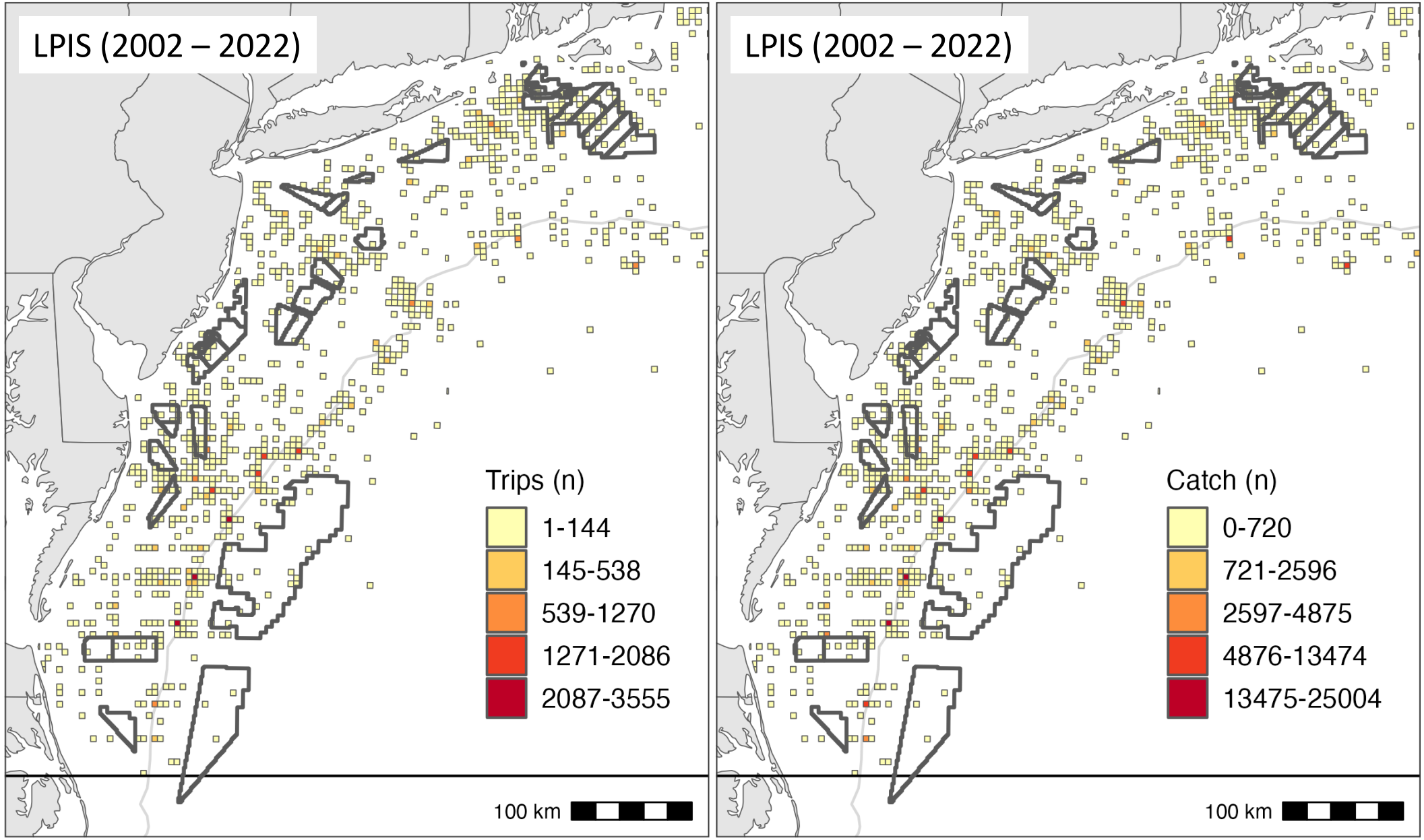


Workflow

1) Plot the location of trips/catch on the grid
2) Add up all trips and catch that occurs in each grid cell
3) Examine trends over time and between species

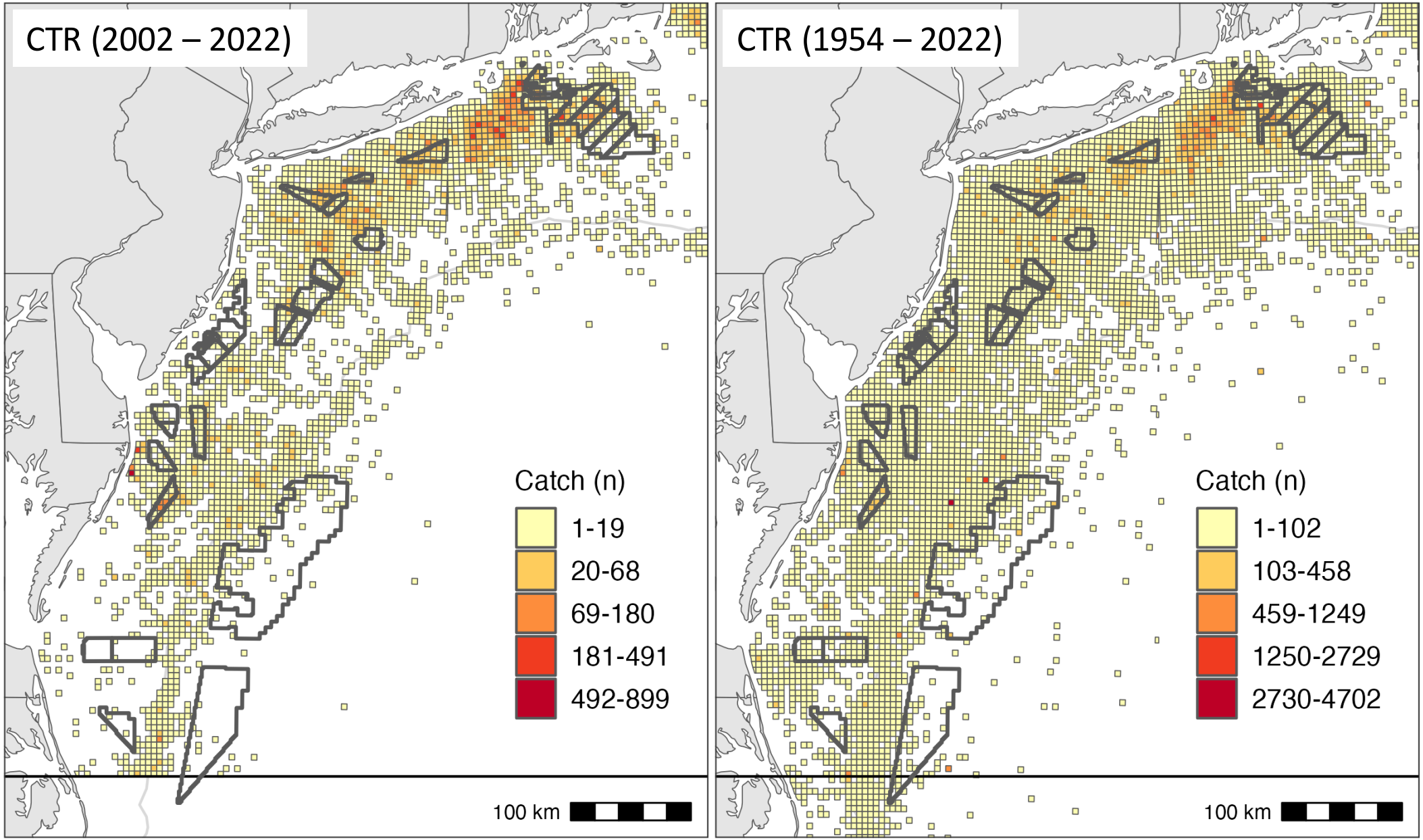
Options! LPIS: Vessel trips vs Catch (2002 – 2022)

Kneebone et al. (2026)



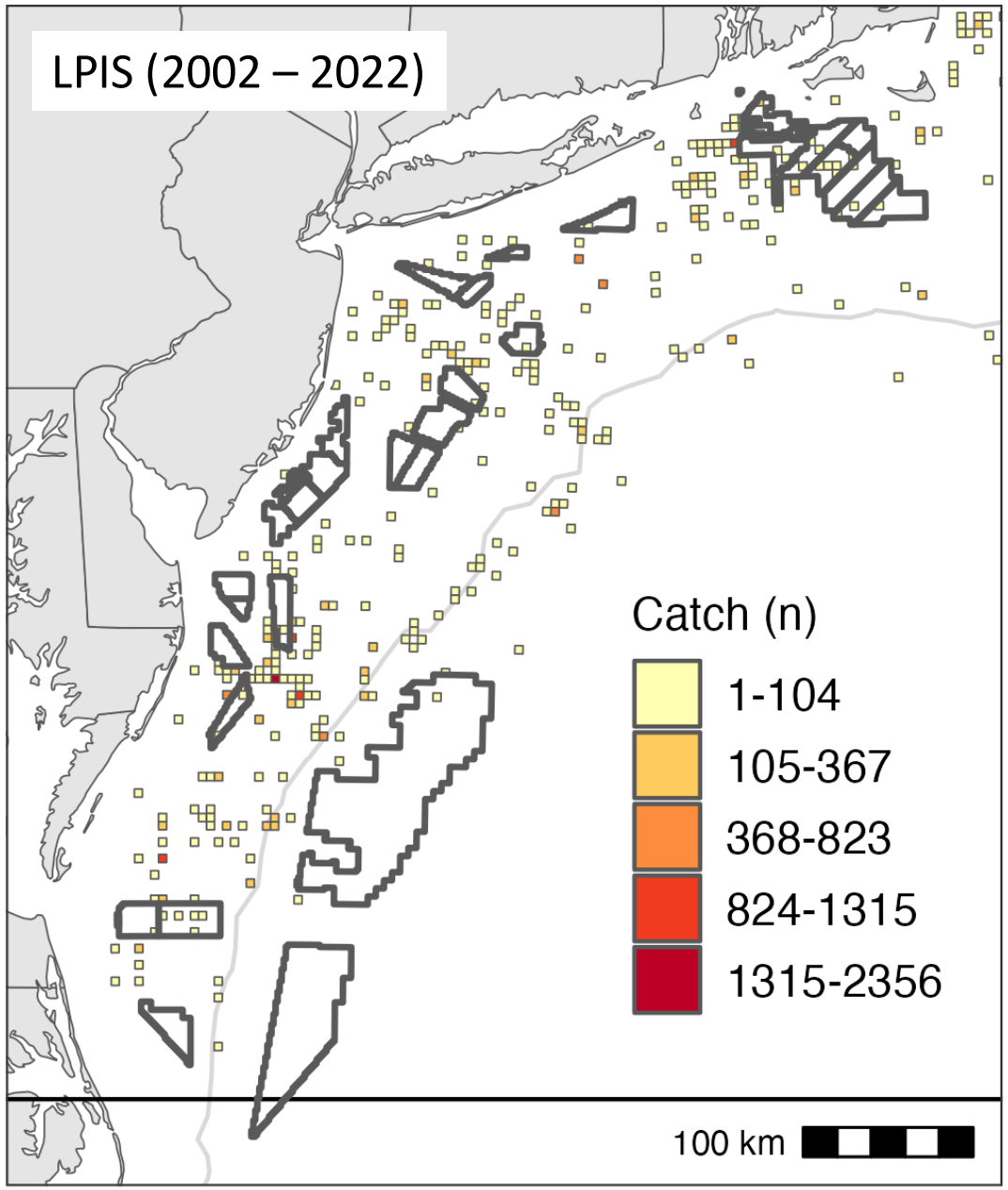
Options! CTR: Different time periods

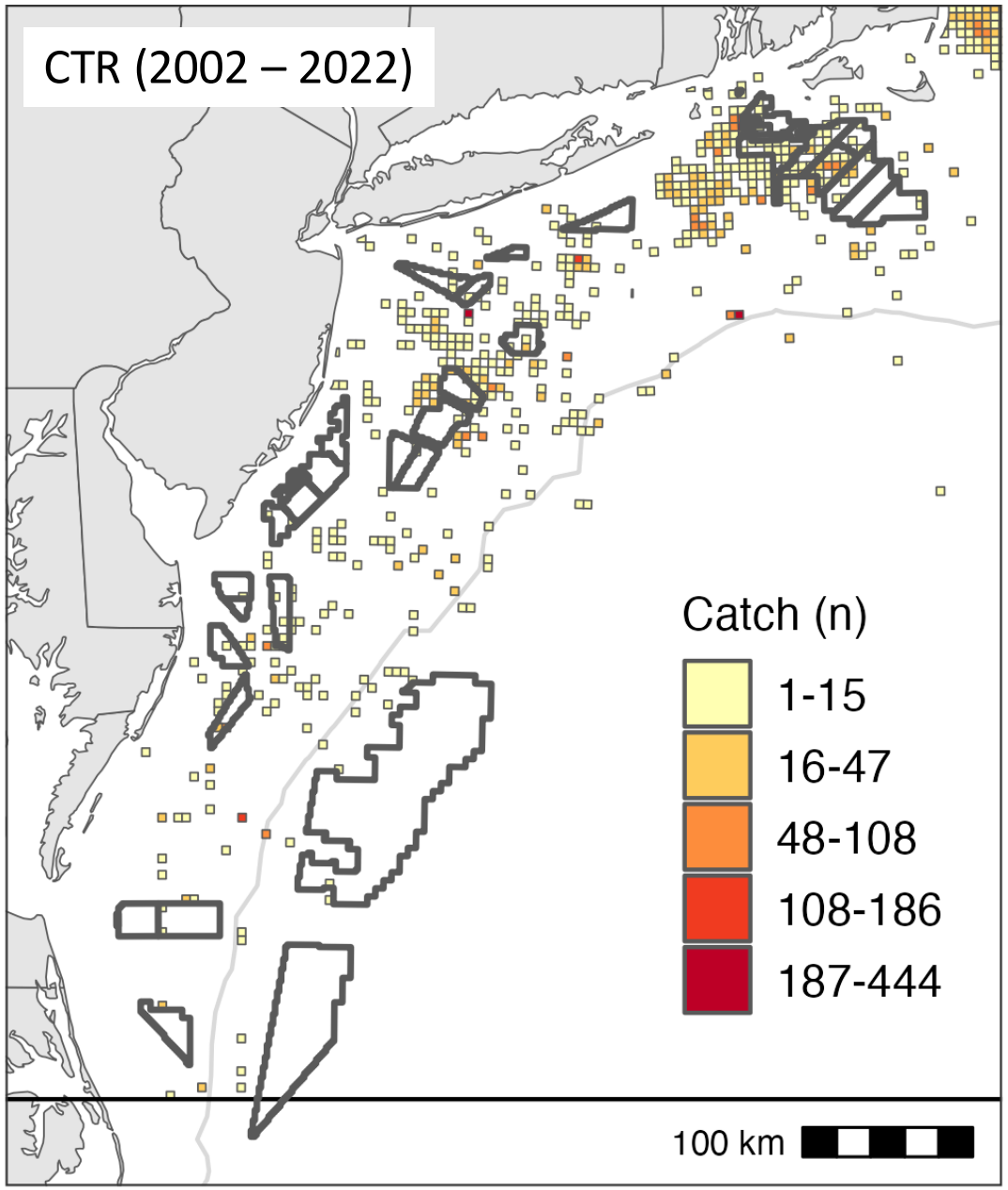
Click here to access published paper



Options: By species and source







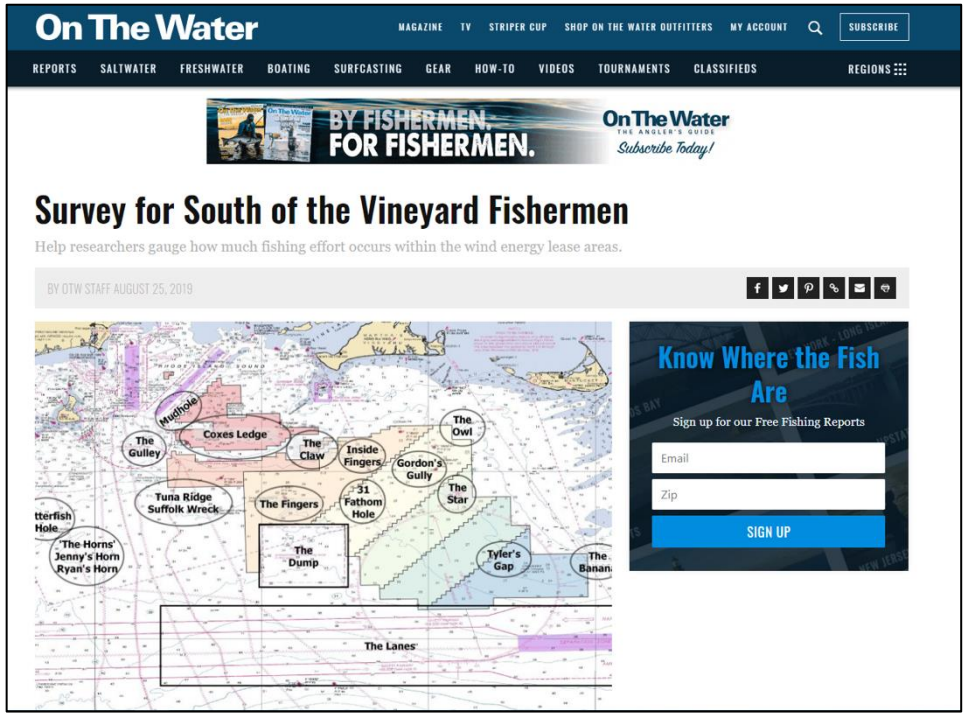
Phase A1: Survey of recreational fishermen

- Online surveys conducted following 2019, 2020, and 2021 fishing seasons in southern New England
- Online survey conducted in 2022–2023 in Gulf of Maine

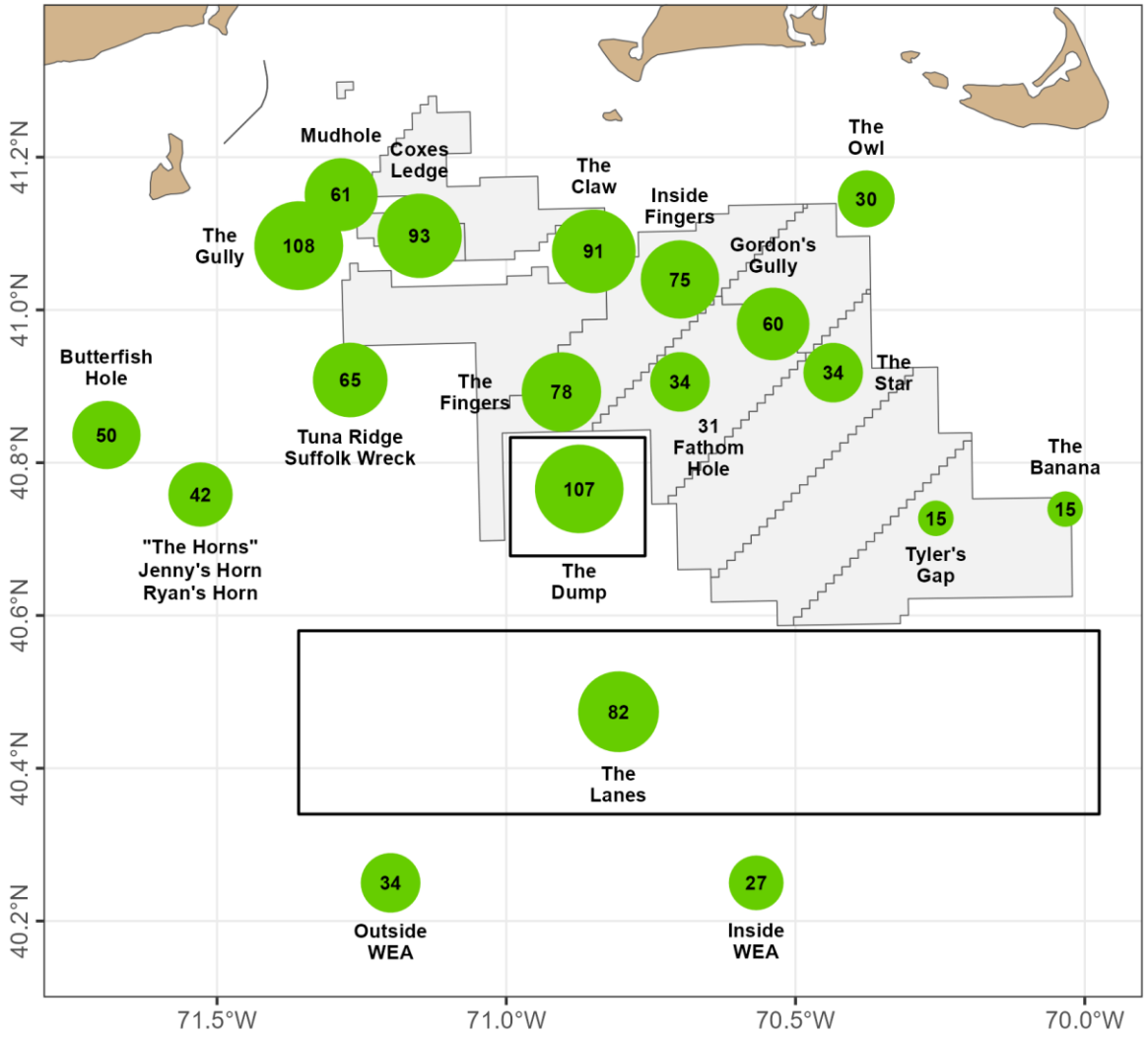
Basic questions:

1) Where do you fish and how many days do you fish there in a typical year?
2) What species do you typically target?
3) What fishing methods do you use to target those species?
4) Are you a private angler or charter boat captain?

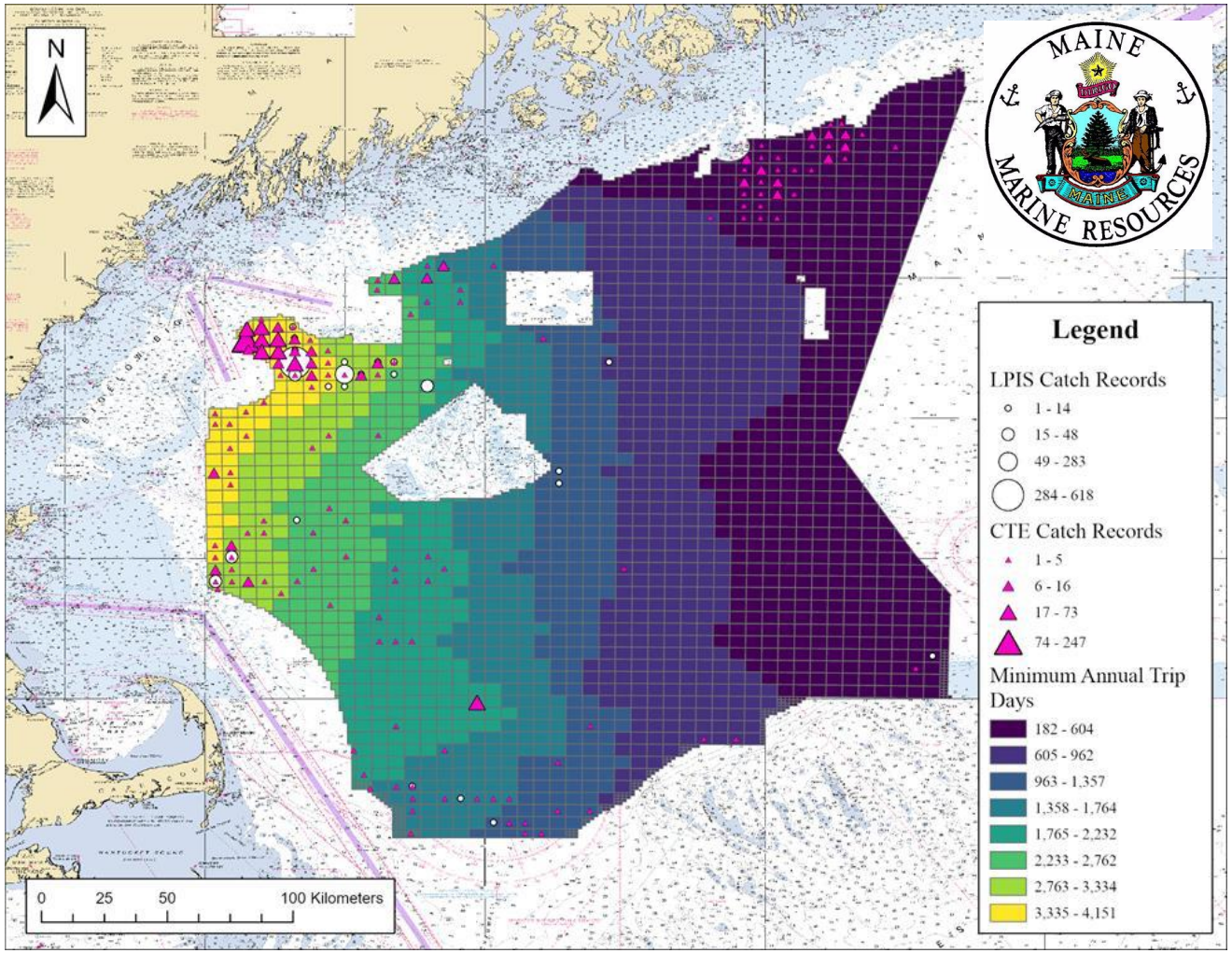
- Advertised through
  - Social Media
  - Online discussion forums
  - On the Water Media
  - Fishermen's social media
  - Vineyard Wind website
  - Email correspondence



Location of HMS effort in southern New England and the Gulf of Maine

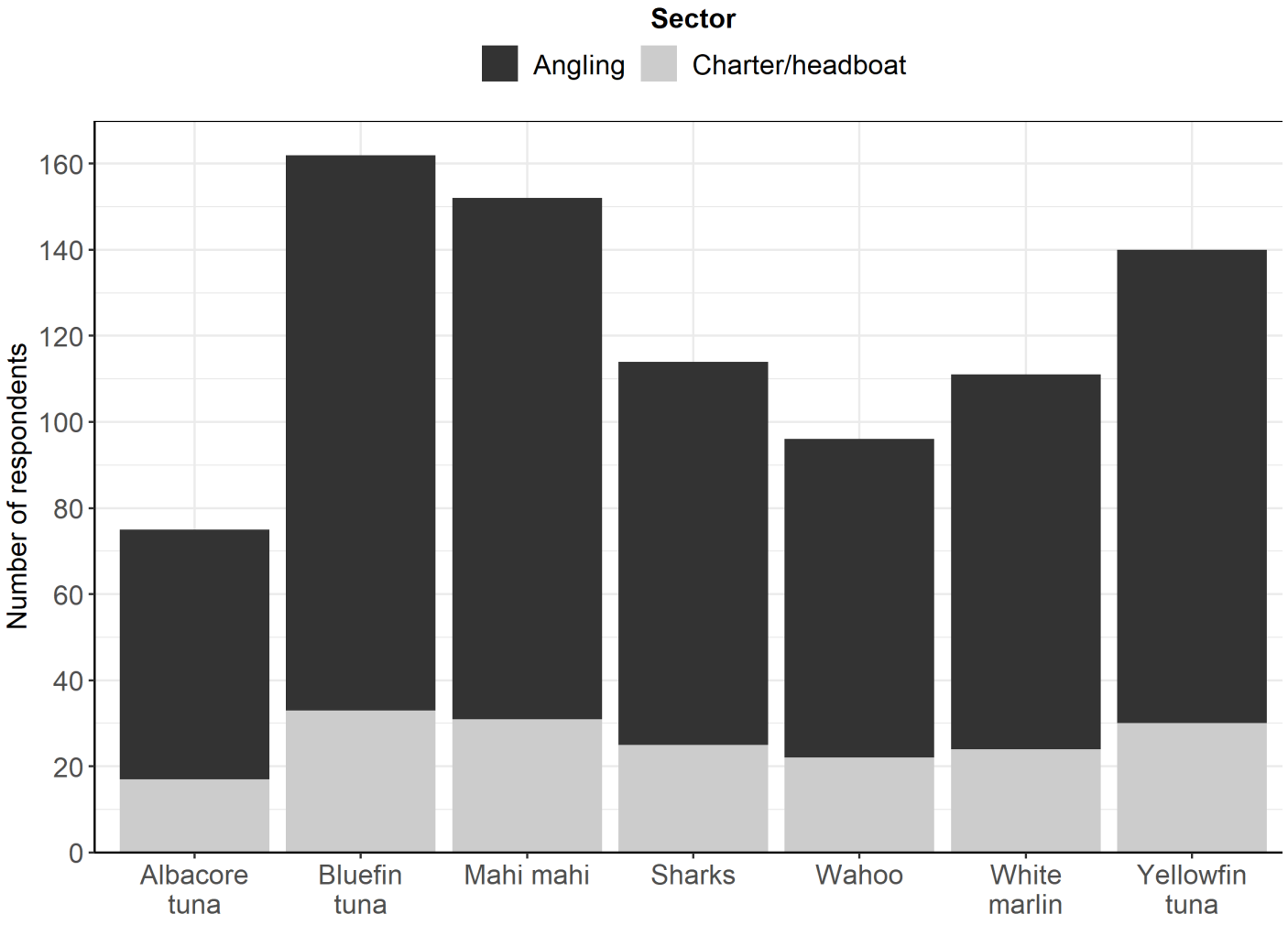


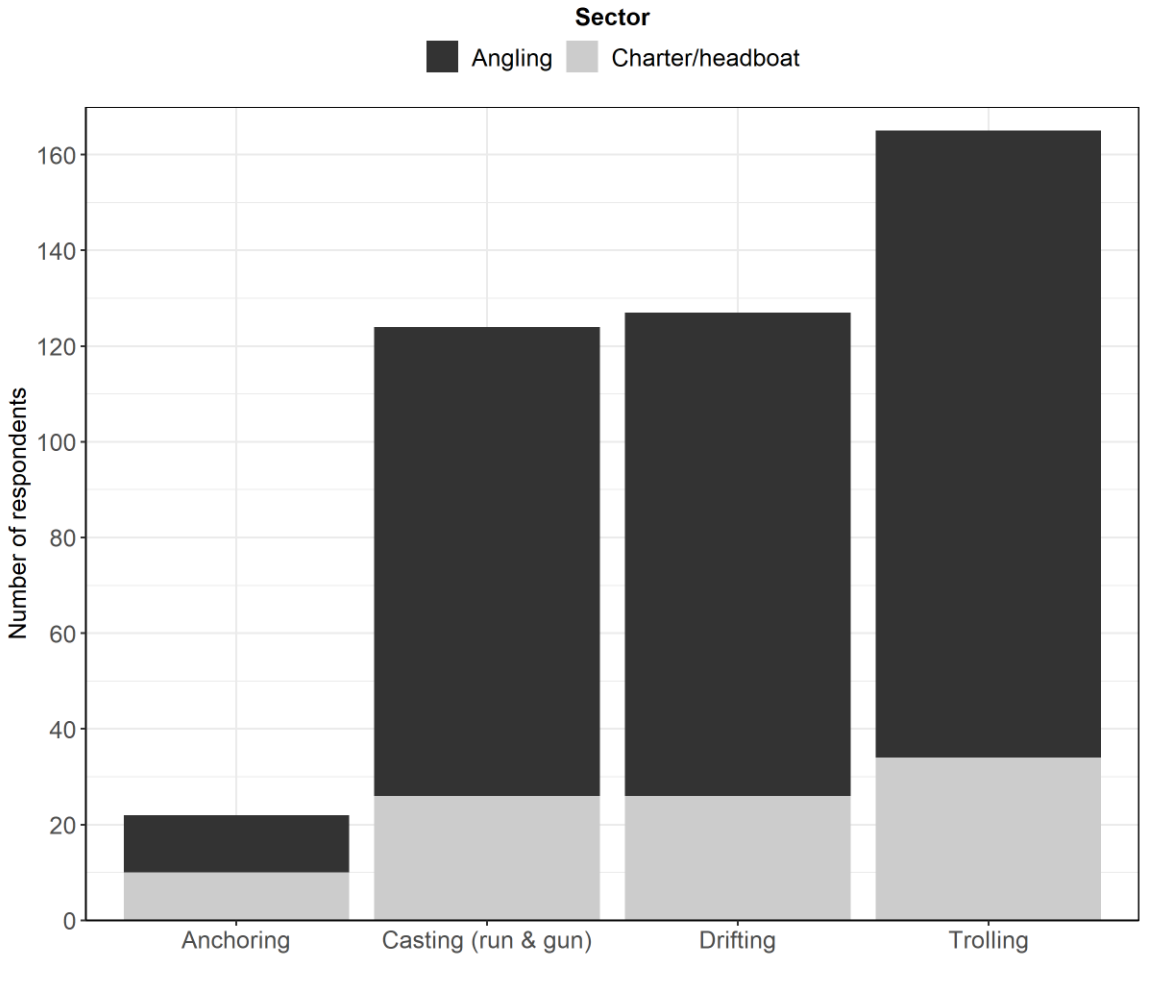
Circles represent how many of the 183 responding private anglers (angling category) fished in that area during 2021



Spatial overlay of LPIS catch and CTR tagging events from 1980 – 2021 onto the area reported to be fished based on the online survey

2021 survey responses: Target species and fishing method





More information and results can be found here.

Phase A2: Expand analysis to post-construction periods (2023 – 2027)

The overall goal

Evaluate and document actual and perceived impacts of OSW on recreational fishing performance and activity in southern New England

Specific objectives

1) Build upon framework of LPIS/CTR analysis: compile and analyze data from 2023 to 2027 and compare trends before and after construction with statistical analyses and spatial modelling
2) Investigate whether other data sources (e.g., Vessel Trip Reports) have information that can be used in the framework used in Objective 1, and if so, execute the analysis on those fisheries/species (e.g., cod)
3) Develop and administer surveys for private and for-hire recreational anglers to:
   a) Collect information on the nature and extent of effort for HMS in SNE from 2023 to 2027
   b) Collect information on the perceived impacts of OSW on all recreational fishing activities
4) Conduct structured interviews with private and for-hire anglers to collect individual testimonials about if/how their effort has been influenced
5) Perform broad outreach to share the project results with stakeholders

Funding from MASSACHUSETTS CLEAN ENERGY CENTER

RecBio: A biological sampling program for the for-hire fleet

Dr. Anna Mercer

Funders:

Goals and main objectives

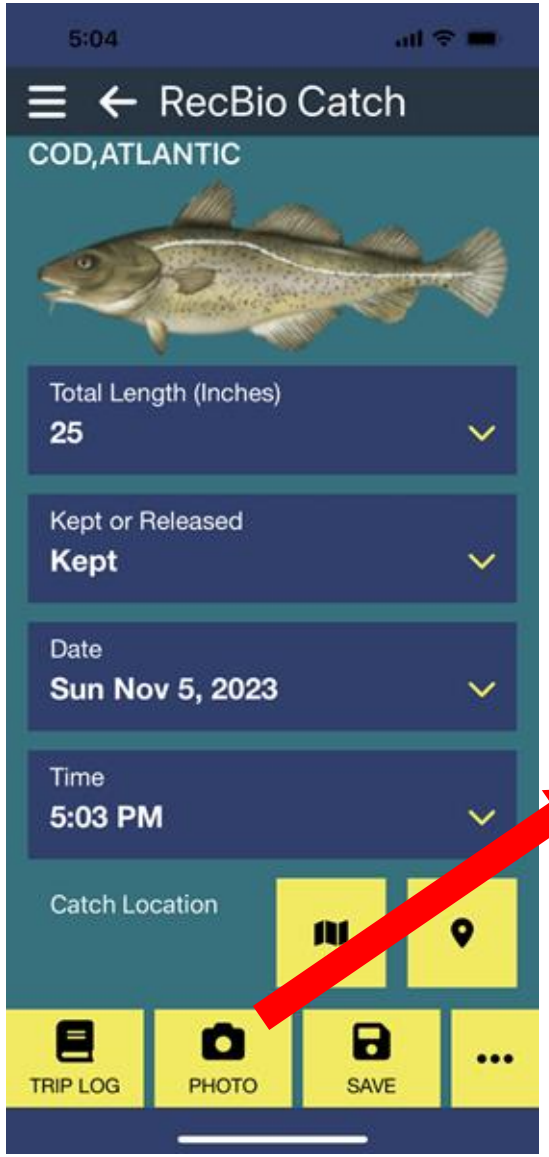
- To generate data on the length/age of fish caught in the recreational (for-hire/charter) fishery that are NOT collected by other means
- To collect better length information on recreational discards
- To collect catch data that are linked to a specific location (i.e., latitude and longitude) needed for stock-specific catch accounting

Why is this needed?

- Dockside intercepts are inadequate for collecting information about the size and condition of fish released at sea, which are critical data needs for stock assessments
- APAIS protocols do not allow for at-sea sampling of charter and private boats
- MRIP sampling does not record specific catch location; stock area is assumed based on port of trip origin

RecBio: How it works

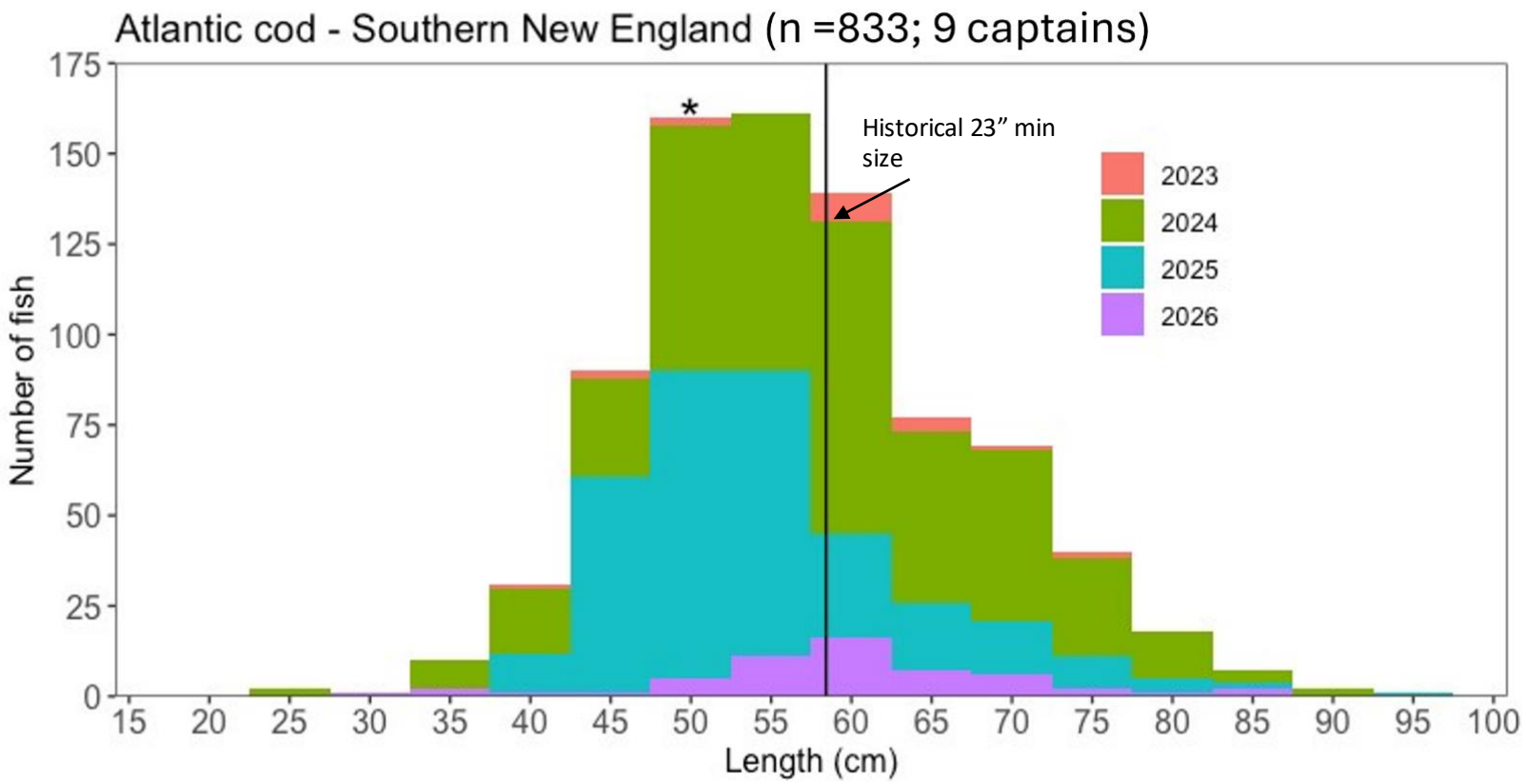
- 15 participating captains in MA and RI
- Portal in Harbor Light Software's AnglerCatch mobile app
- Participants collect time- and location-specific length information on kept and discarded fish
- Otolith and fin clip collection of retained fish
- Data regularly shared with NEFSC assessment scientists





Data collection totals: Southern New England cod*

- **833 fish measured** (352 kept, with otoliths/fin clips sampled from 299)







*Due to the moratorium on recreational harvest for this stock beginning in May 2025, lethal samples are now collected during sampling trips conducted under a NOAA Fisheries Letter of Acknowledgement.

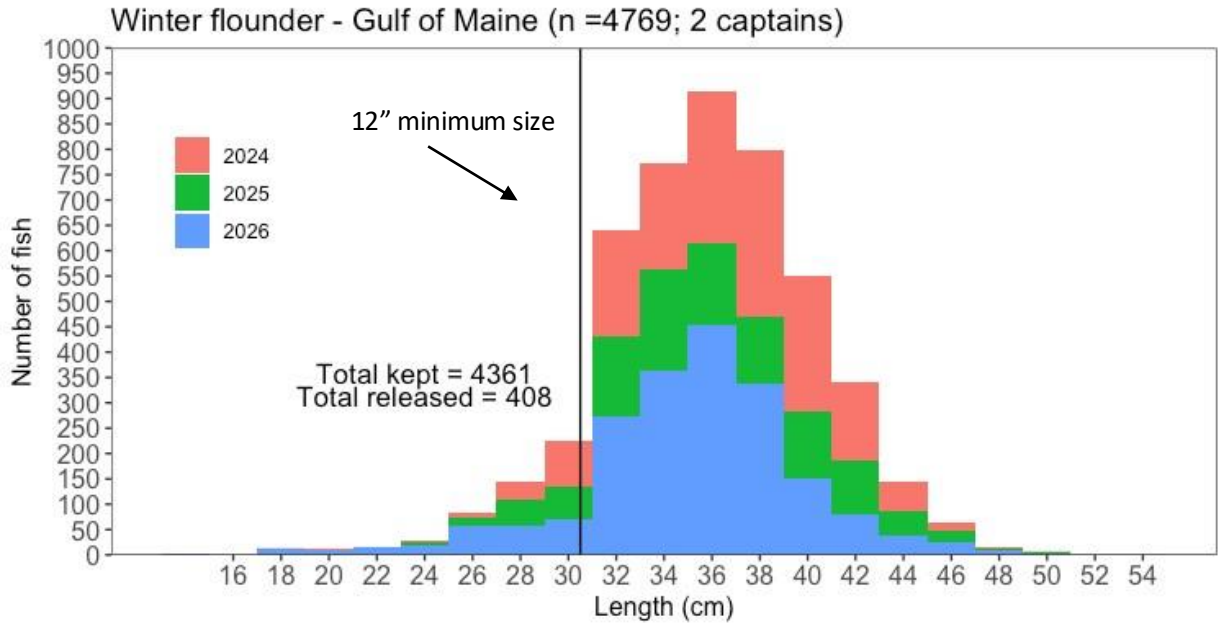
RecBio output data use

How the data will be used:

- Length (cod and flounder) and age (cod only) data will be used in future Management Track Stock Assessments for recreational catch expansions (currently using commercial data for catch expansions)
- To better understand discards: typically no length data associated with recreational discards
- To better track size/age distribution of the catch

How the data will NOT be used:

- As a new index of relative abundance
- For in season quota monitoring
- As a replacement for MRIP sampling



Many thanks to many!

- Crista Bank (Vineyard Wind)
- Capt. Mike Pierdinock
- Capt. Rick Bellavance
- Cliff Hutt, Anthony Kaufman (NOAA Fisheries)
- On the Water Media

Final report to Vineyard Wind LLC
May 4, 2020

A comprehensive assessment of baseline recreational fishing effort for highly migratory species in southern New England and the associated Wind Energy Area

Authors: Jeff Kneebone[1] and Connor Capizzano[1,2]

[1]Anderson Cabot Center for Ocean Life, New England Aquarium, Central Wharf, Boston, MA 02110; jkneebone@neaq.org; 617-226-2424 (office); corresponding author

[2]School for the Environment, University of Massachusetts Boston, 100 William T. Morrissey Blvd, Boston, MA 02125

Characterization of fishing efforts for highly migratory species in the Gulf of Maine and how this relates to areas considered for offshore wind development

Davis, M.M.[1] and Kneebone, J.[2]

[1] Matthew M. Davis: Department of Marine Resources, State of Maine, 194 Mckown Point Rd, West Boothbay Harbor, ME 04575; 207-592-2339 (office); matthew.m.davis@maine.gov; corresponding author

[2] Jeff Kneebone: Anderson Cabot Center for Ocean Life, New England Aquarium, Central Wharf, Boston, MA 02110

Fisheries Oceanography

WILEY

FISHERIES OCEANOGRAPHY

SPECIAL ISSUE ARTICLE OPEN ACCESS

Integration of Multiple Data Types to Document Spatial Effort in a Recreational Fishery for Highly Migratory Species in Relation to Offshore Wind Development

Jeff Kneebone[1] | Matthew Davis[2] | Ryan Knotek[1] | Connor Capizzano[1,3] | Edward Kim[1] | Camilla T. McCandless[4] | Peter Chaibongsai[5] | Wessley Merten[6] | Eric S. Orbesen[7]

Click box to download report

Rhode Island Recreational Fishing Tool - Offshore Expansion

Prepared for:
Research Coordination Webinar: Characterizing patterns and trends in recreational fishing/boating in the Northeast U.S.
October 22nd, 2026

Sea Grant
RHODE ISLAND

THE
UNIVERSITY
OF RHODE ISLAND
GRADUATE SCHOOL
OF OCEANOGRAPHY

RIRFT: Original and Expansion

Obj. (Original): - Completed 2023

- Bring together interested parties
- Map out recreational fishing activity in **RI Coastal Waters**
  - State waters only
- Develop mapping tool to show recreational fishing areas of importance.
  - **Purpose:** Assist CRMC in the development of policies to minimize user conflict between recreational fishing and other Bay uses.

Obj. (Expansion): - Ongoing (May '26 – Oct '27)

- Reconvene group, invite others when appropriate
- Map out recreational fishing activity in **RI Offshore Waters**
  - State offshore and Federal waters
- Develop mapping tool to show recreational fishing areas of importance.
  - **Purpose:**
  - Federal/State siting,
  - Mitigation (including compensation, community benefits),
  - Contribute to the monitoring of long-term recreational fishing behavior change.

All Results

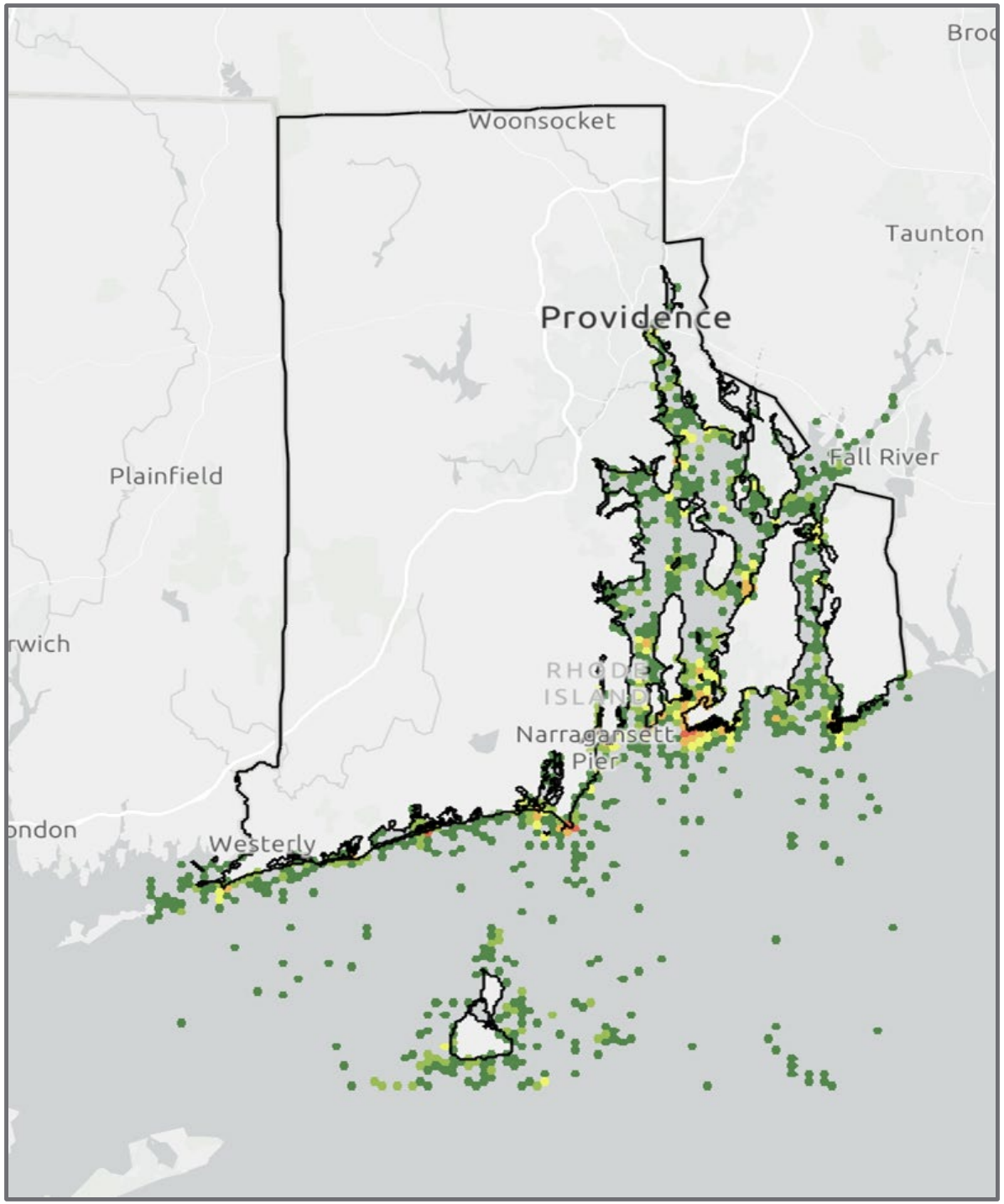
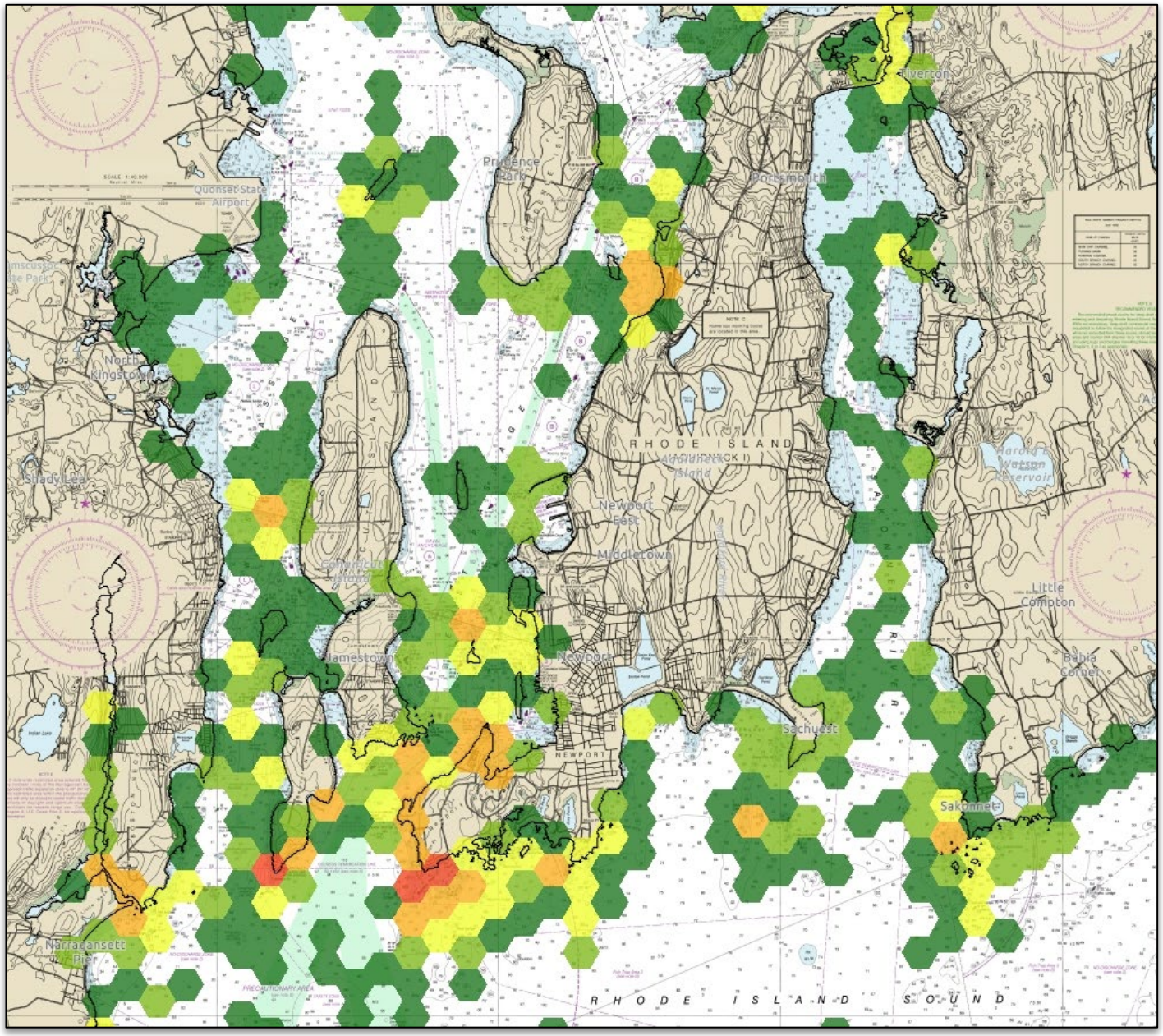


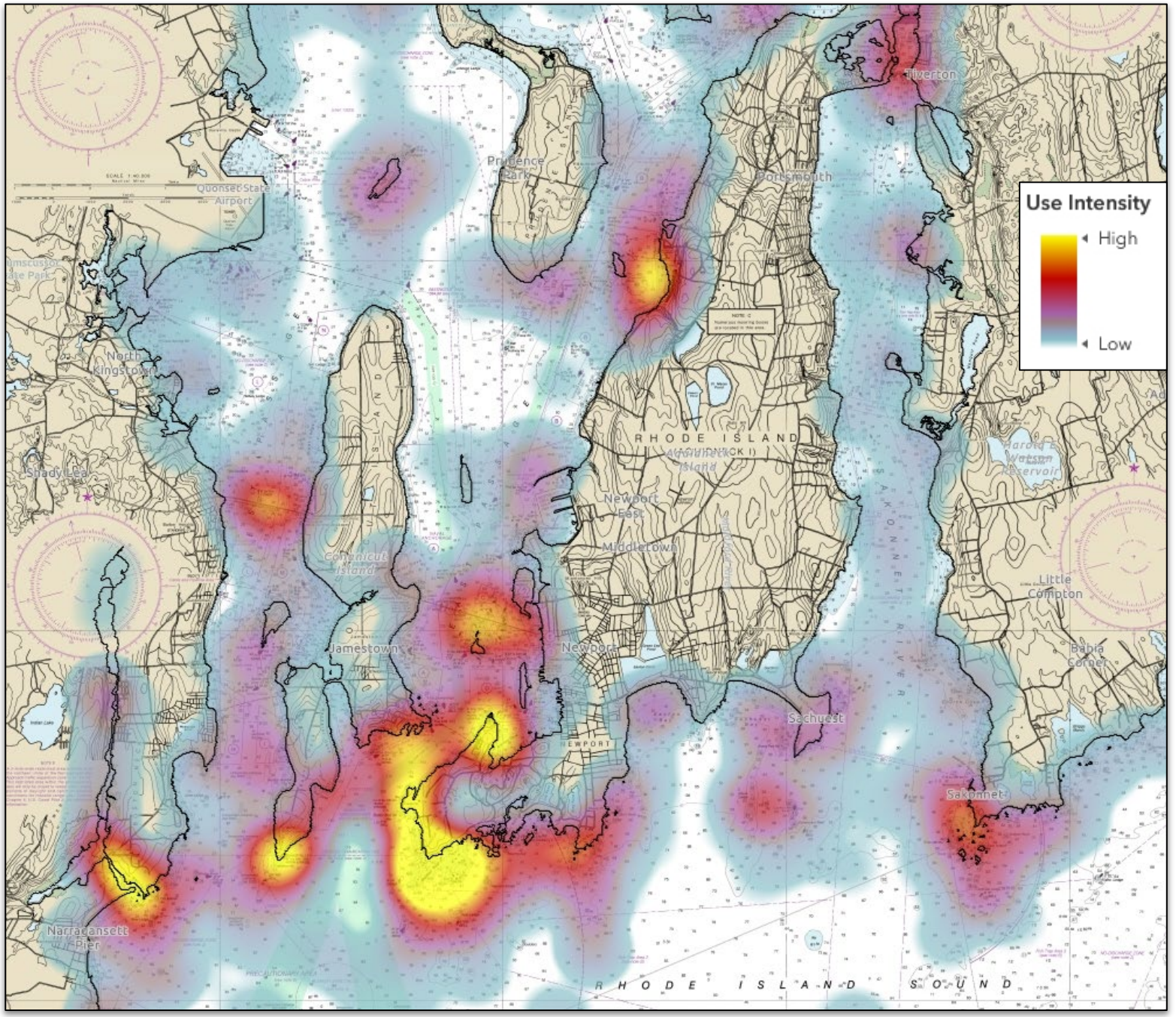
Image: A screenshot of the aggregate survey results that map priority fishing sites across Rhode Island state waters.

Binned Results from Survey

Binned Results



Recreational Fishing Intensity (Heat Map)



RIRFT – Orig.



Scan the QR Code to the left to view the storymap and tool, or visit https://arcg.is/1rOW0S

Key Findings from the (Original) Survey :

- **Major Hot Spots**
- **98% of fishers use a rod and reel to fish**
- **Targeted Species:** 1) Striped Bass, 2) Black Sea Bass, and 3) Bluefish.
- **97% fish in the summer,** 78% fish in the spring, 77% fish in the fall, and 22% fish in the winter.
- Of those surveyed, **69% fish from shore,** and **64% fish from a motorized boat**.

Products and Outcomes:

- **Standardized process (at a regional scale)**
- **Storymap of the work**
- **RIRFT**
  - **Layer added to ShellfAST -RI**
- **Baseline data set for the rec. fishing community & CRMC**

Lessons Learned

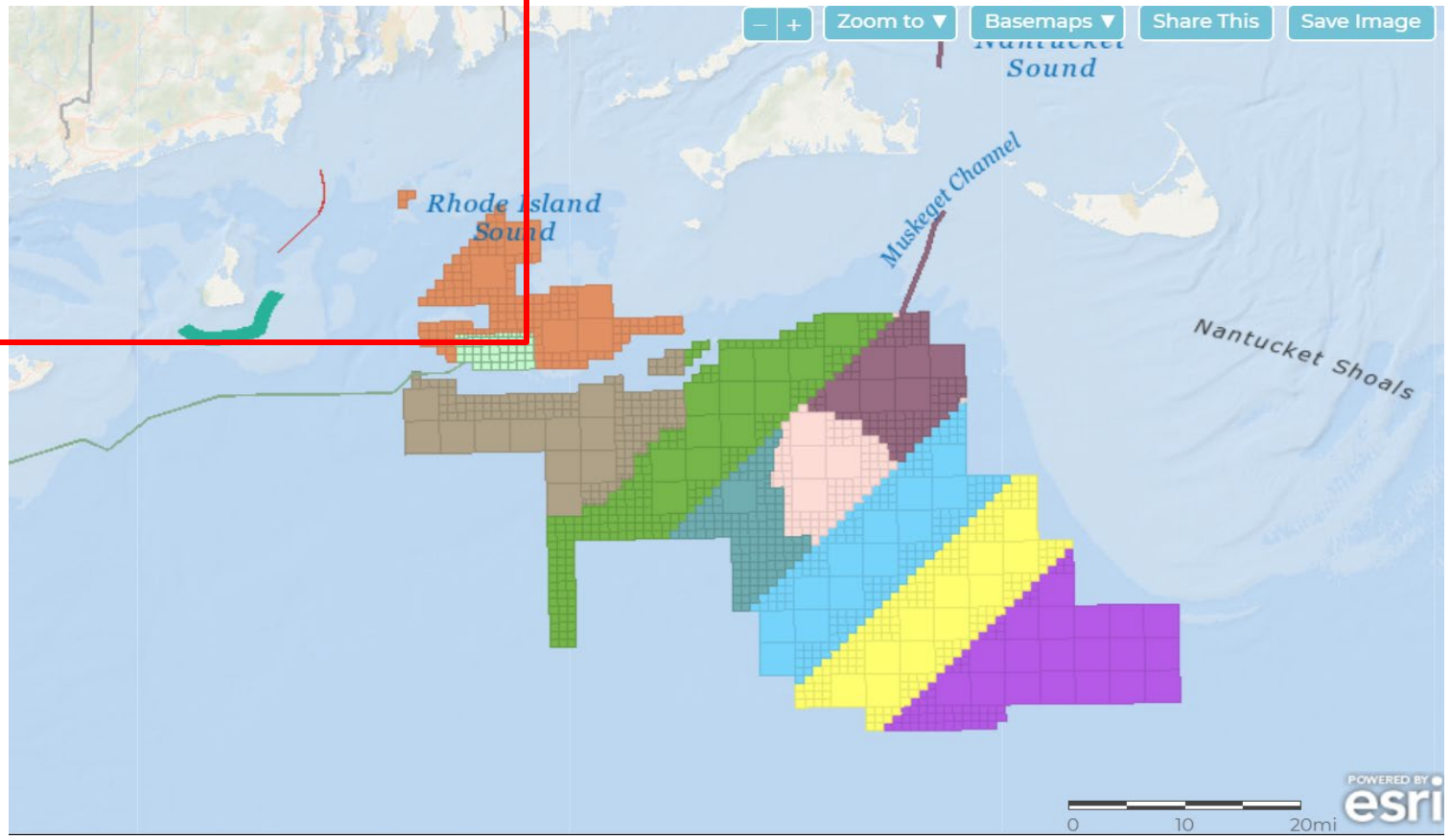
End Users: Regulatory agency staff, Potential leases applicants, Municipal officials, Fishing community

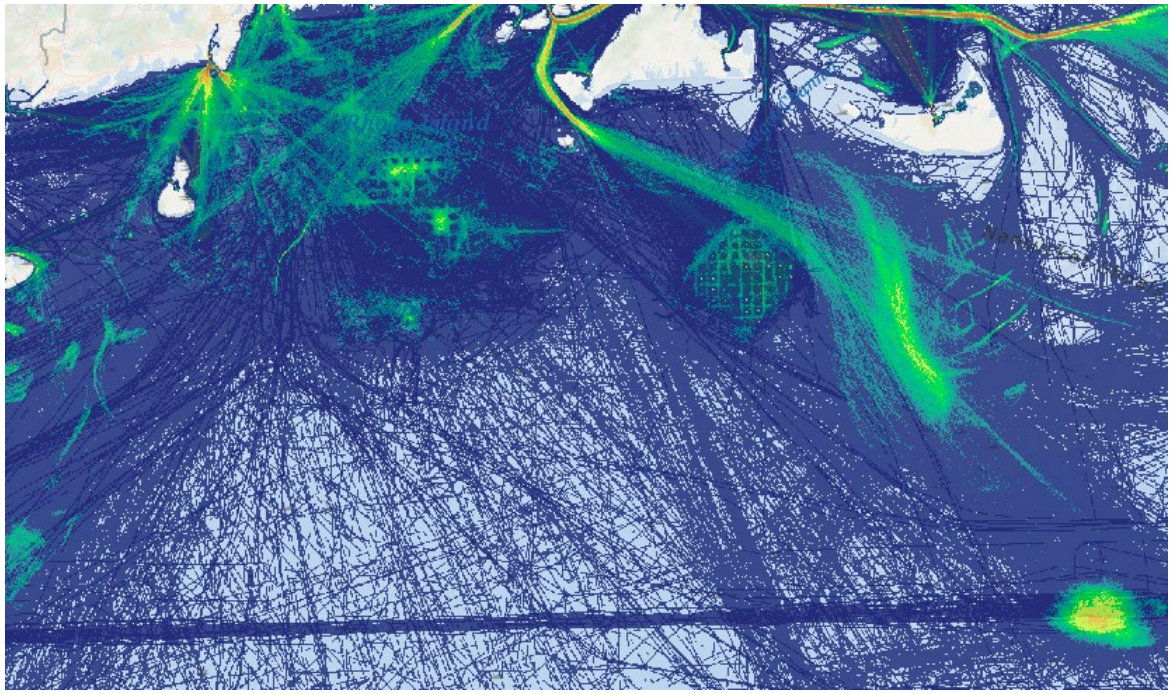
Lessons Learned from the RIRFT:

- **Bin Size**:
  - Polygon size matter to prevent spot burning
  - Great for stationary Rod & Reel
  - Larger - needed offshore (Fishing methods and species)
- **Visual Aids**
  - Some survey respondents had trouble picking the cells for their exact locations from a physical or digital map unless a nearby landmark was clearly identifiable
- **Update dataset:**
  - Learn which facets of the sites that fishers selected make them a “priority” for people in our survey questions. What features of these sites contribute to the popularity of their use? For example, do they have parking? Are there more desirable fish species there?
  - 5-10years – for coastal decision makers – Sooner if major changes in offshore development, environment, regulations

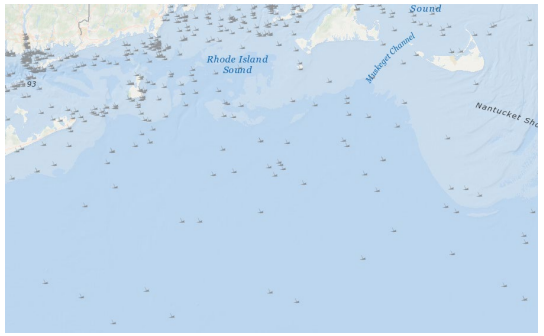
Next Phase: RIRFT

- **Goal:** Enhance understanding of impacts and changing behavior of recreational anglers due to offshore renewable energy development.
- **Geographic Scope:** Offshore waters of RI
- **Priority focus:** Recreational angler community









Phase I: Examine Existing Data

<u>Expansion:</u>

Have:

- Original RIRFT

Need:

- Satellite Data
- Cell Phone Data
- GPS – cards from fishing boats
- VMS/AIS – Charter/Party Boats
- MRIP
- Fishing Apps
- Place Names (Natural or Shipwrecks)
- Proprietary Maps
- Etc.

Phase II: Survey

Over 300 surveys collected, 2500+ fishing locations





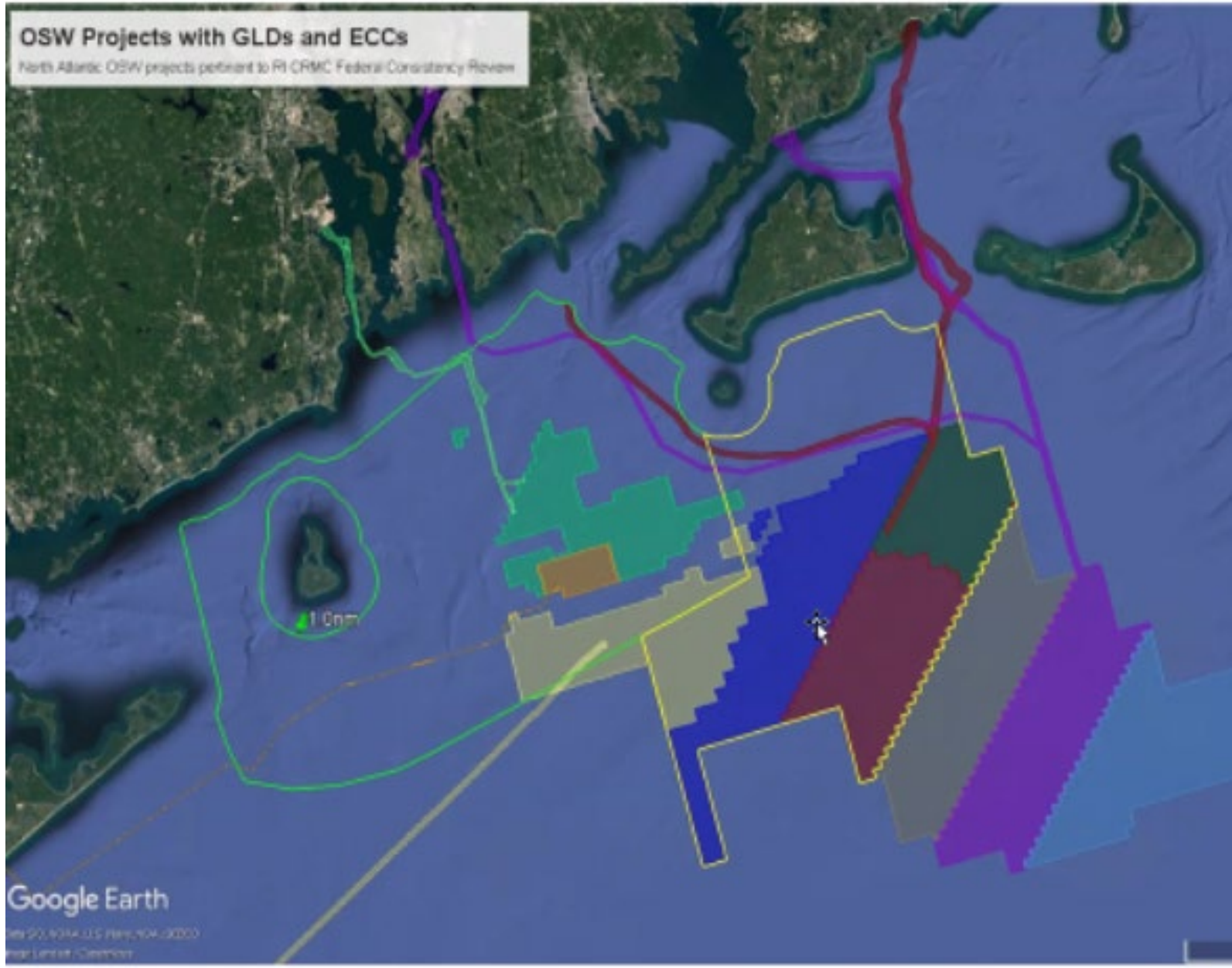


- Fishing shows and events - Surveys
- Build a sampling frame for individual fishers
- Work with charter/party boats

Mitigation Questions for Survey

<u>For CRMC- A dollar value needs to be assigned</u>

- Average vessel size
- Average trips/year
- Species targeted
- Number of catches
- Seasons (Spring, Winter, Summer, Fall)



2011 GLD – Green Outline

2018 GLD – Yellow Outline

Thank you

Contact:
Rob Hudson
Rhudson@uri.edu

OffRec

Opportunities and challenges of offshore wind development from the perspective of the recreational fishing sector in the US Northeast region



Mateja Nenadović

Core Team



David Bidwell



Christopher Damon



Amanda Gilmore



Rob Hudson



Kristy Lewis



Dave Monti



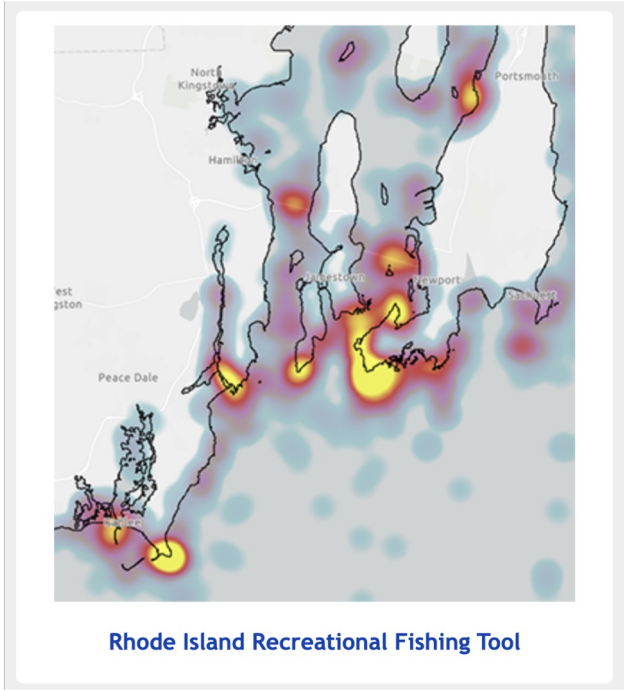
Mateja Nenadovic



Tiffany Smythe

Two project components, closely integrated

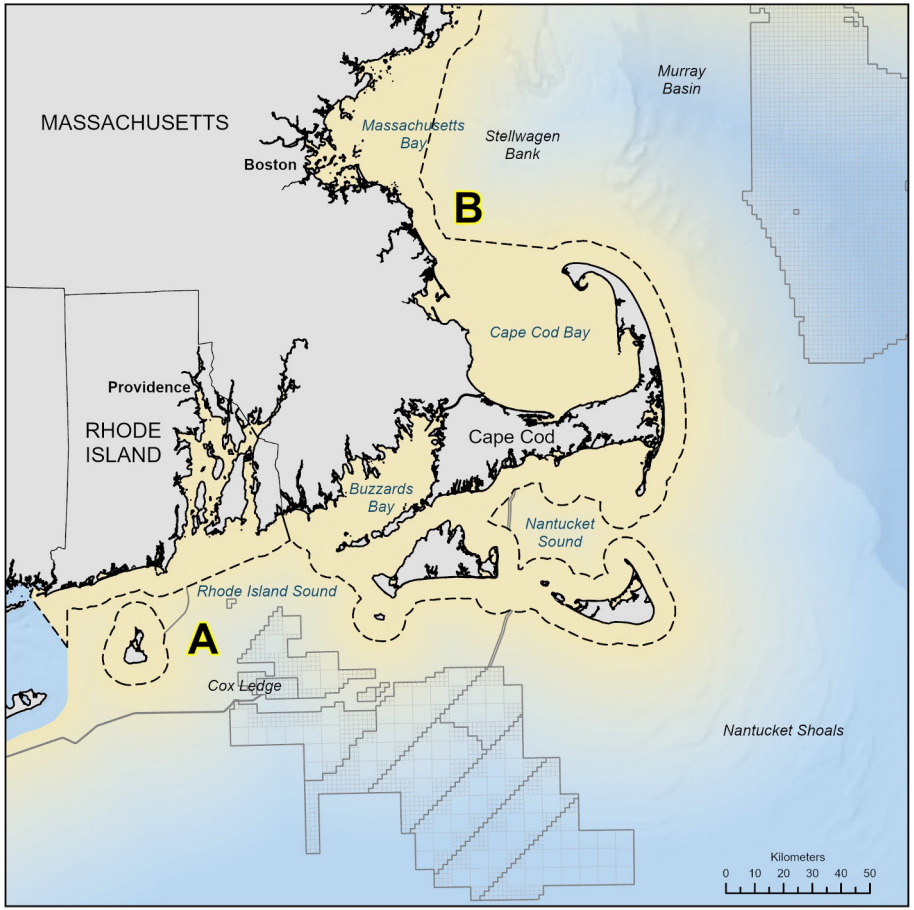
Geospatial characterization:
distribution of recreational fishing effort



Social characterization: attitudes and perceptions of recreational fishers toward offshore wind



CREDIT: left, CRMC; right, Michael Caruso photo



Research Questions

RQ1: What is the spatial distribution of recreational fishing efforts in the region, and how does this distribution overlap with OWD areas?

RQ2: What are the perceptions that this sector has towards OWD?

RQ3: To what degree and in which ways have perceptions changed/evolved over the last 10 years, since the development of the first wind farm (Block Island)?

Research Setup & Framing



Project phases

(1) Preparatory stage

Spring 2026

(2) Exploratory focus groups

Summer-Fall 2026

(3) Survey data collection and analysis

Winter-Spring 2026

(4) Explanatory focus groups

Spring 2027

(6) Integrative analysis

Summer 2027

(6) Dissemination of findings

Fall 2027

Exploratory focus groups (Summer-Fall 2026)

Three focal actor groups in MA and RI:

- State and Federal entities
- For-hire sector
- Private anglers

Exploratory focus groups (Summer-Fall 2026)

Three focal actor groups in MA and RI:

- State and Federal entities
  - *3 focus groups*
  - *16 participants*

INSTITUTION
CT Department of Energy & Environmental Protection
CT Sea Grant
MA Division of Marine Fisheries
MA Office of Coastal Zone Management
MassCEC
NOAA Fisheries
NY Sea Grant
NY SERDA
RI Division of Marine Fisheries
RI Sea Grant

Exploratory focus groups (Summer-Fall 2026)

Key Themes

1. Changing fishing patterns
   - OW siting, ocean warming, fishing regulations, economic conditions

2. Offshore wind creates new fishing opportunities
   - black sea bass, mahi-mahi

3. Mixed perceptions of offshore wind
   - productive fishing grounds vs. obstacles and hazards

4. Changing fishing practices
   - mobile applications -> rapid/open information sharing

5. Critical data gaps
   - MREP lacks spatial resolution

6. Trust and engagement
   - …

Challenges

Methodological:

- Developing a representative sampling frame for recreational fishers operating in offshore waters
  - ✅ For-hire sector: Relatively well defined
  - ❌ Private anglers: Major sampling challenge

Technical:

- Developing a user-friendly online approach for collecting spatial data on recreational fishing activity
  - Creating multiple maps
  - Developing meaningful basemaps
- Data triangulation: integrating existing spatial data (e.g., AIS, Global Fishing Watch)

Data triangulation

Historic fishing areas (Captain SeaGull fishing charts)
- Mapping known offshore fishing areas and wrecks from recreational fishing charts
- Using these maps to better understand where fishing has occurred historically

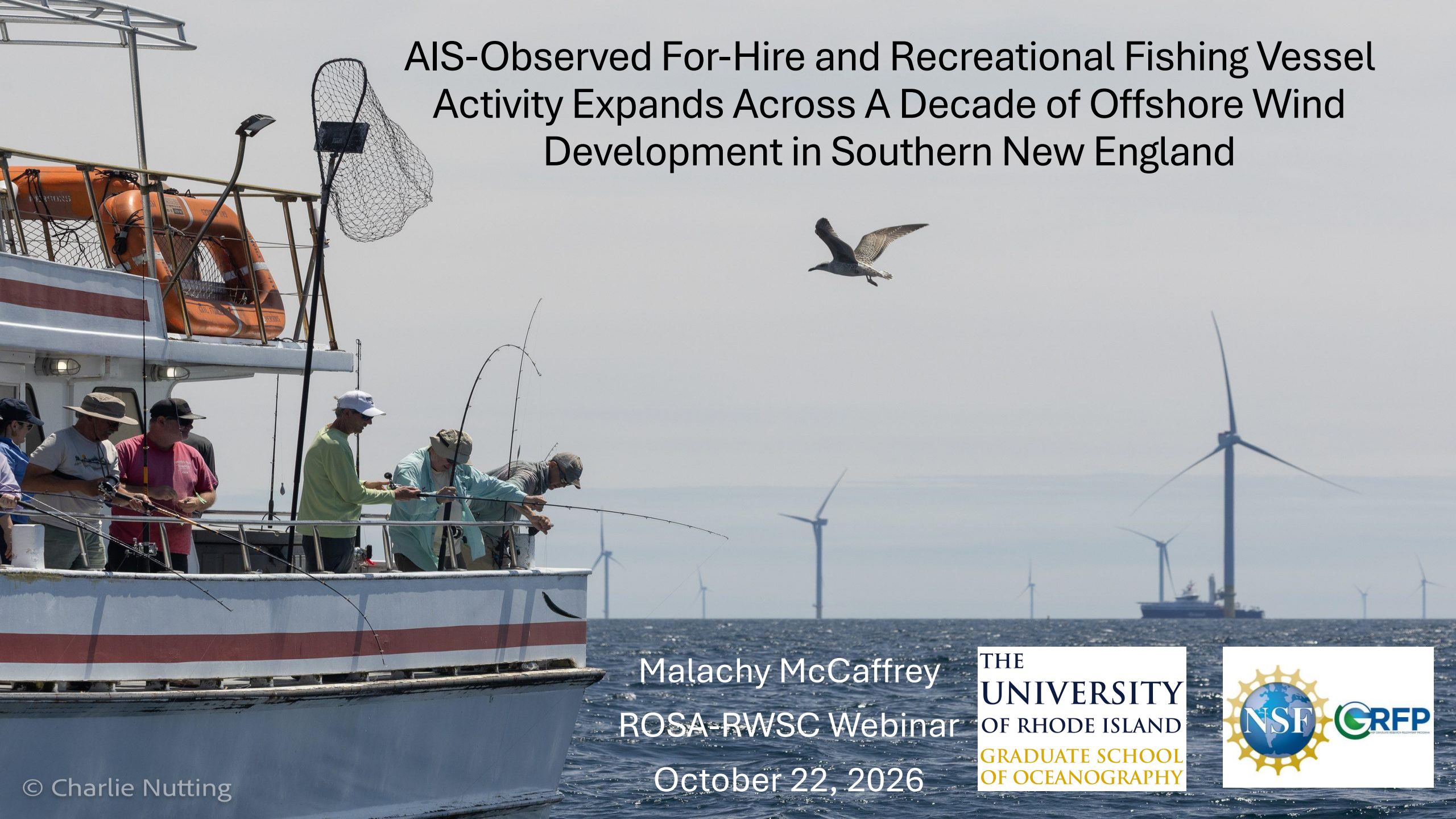
Party & charter boats
- Using vessel tracking data (AIS) to identify likely offshore fishing areas over several years
- Main limitation: this does not capture most private recreational boats

Online survey maps
- Creating simple yet familiar custom nautical basemaps that fishermen will find informative



Thank you!

AIS-Observed For-Hire and Recreational Fishing Vessel Activity Expands Across A Decade of Offshore Wind Development in Southern New England



Malachy McCaffrey

ROSA-RWSC Webinar

October 22, 2026

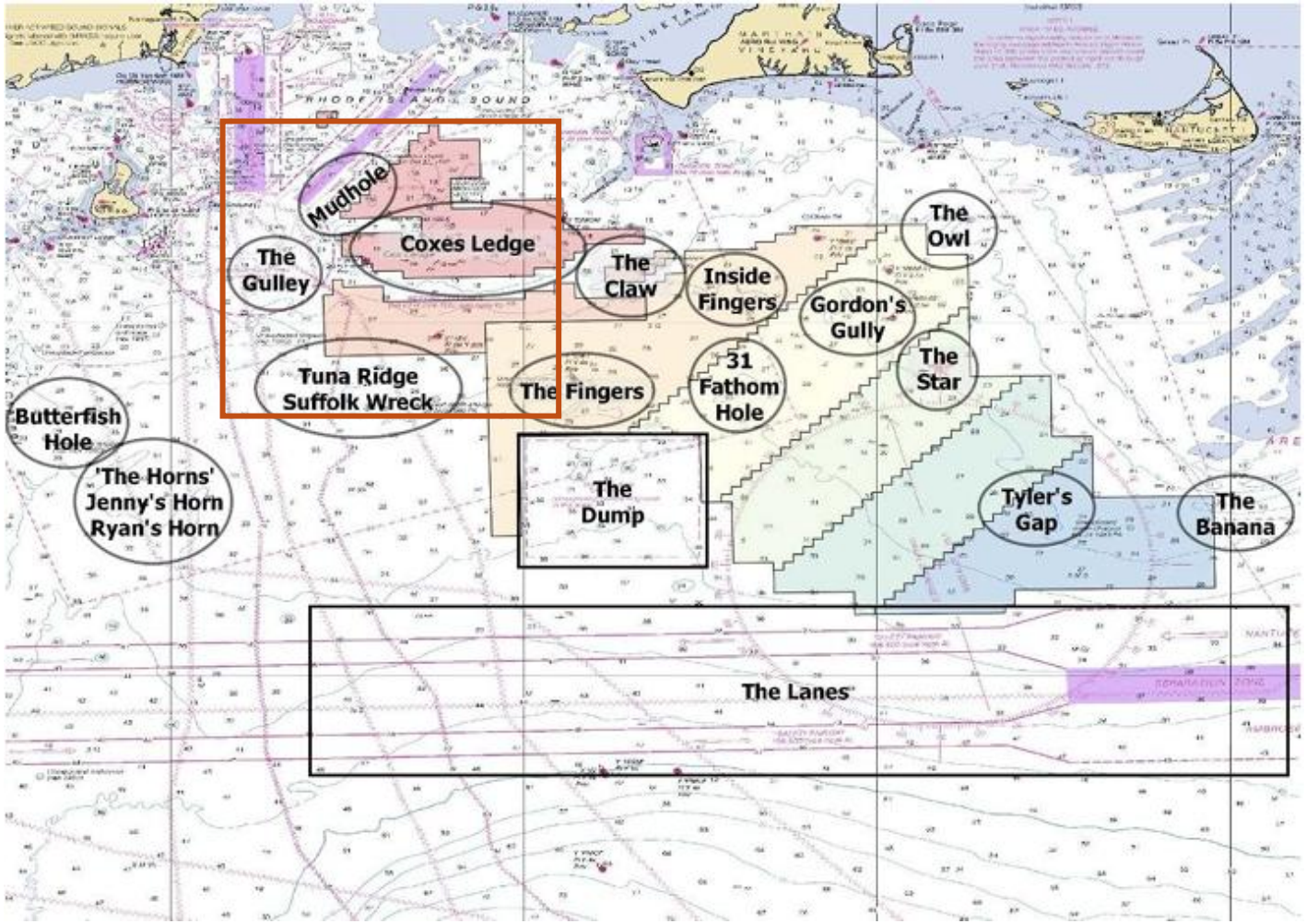
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© Charlie Nutting

How has recreational and for-hire fishing activity changed over time in relation to offshore wind development here in SNE?

- Ørsted projects South Fork Wind (SFW), Revolution Wind (REV), and Sunrise Wind (SRW) overlap with historical fishing grounds

- Turbines may attract fish and anglers, or construction may keep them away



Kneebone & Capizzano 2020
Final Report to Vineyard Wind

How do we measure this activity?

- Fishermen's Ecological Knowledge

Wind farm tuna bite good, be mindful of safety zones

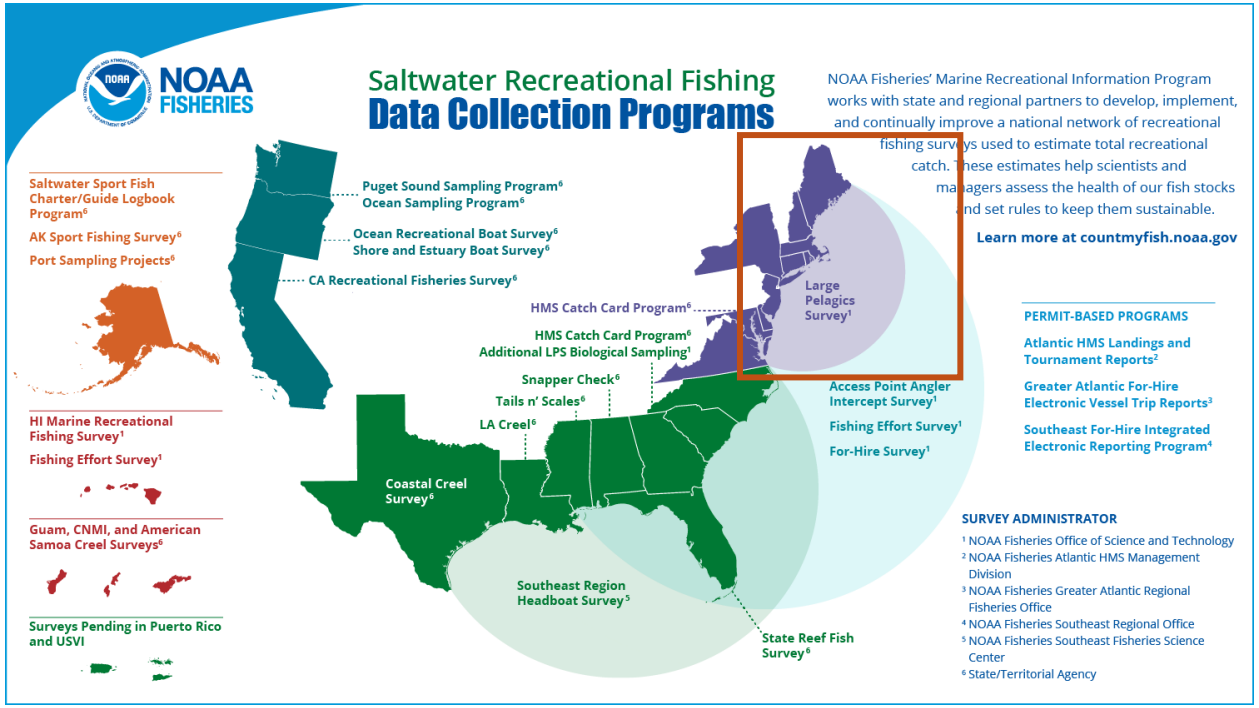
Posted Monday, July 21, 2025 9:28 am

By Capt. Dave Monti

EastBay MEDIA GROUP

- Spatial Data
  - Vessel Trip Reports (VTR)
    - Coarse spatial resolution
    - Many assumptions and biases (DePiper, 2014; Livermore & Guilfoos, 2024)
  - VMS does not cover rec fishing, AIS only slightly…

- Surveys and interviews
  - At the dock, over the phone, online and via email



Methods – Datasets

- Global Fishing Watch
  - Vessel Identity
    - Captures vessel names, flag states, unique vessel IDs (e.g. MMSI), gear types
    - Uses registry data from RFMOs (e.g. ICCAT) and int'l organizations (e.g. IMO)
  - AIS Vessel Presence
    - Daily count of hours an AIS-broadcasting vessel spends in a 1 km^2 grid cell
    - All vessels are assigned a vessel type and gear type (e.g. Fishing, Pole and Line)

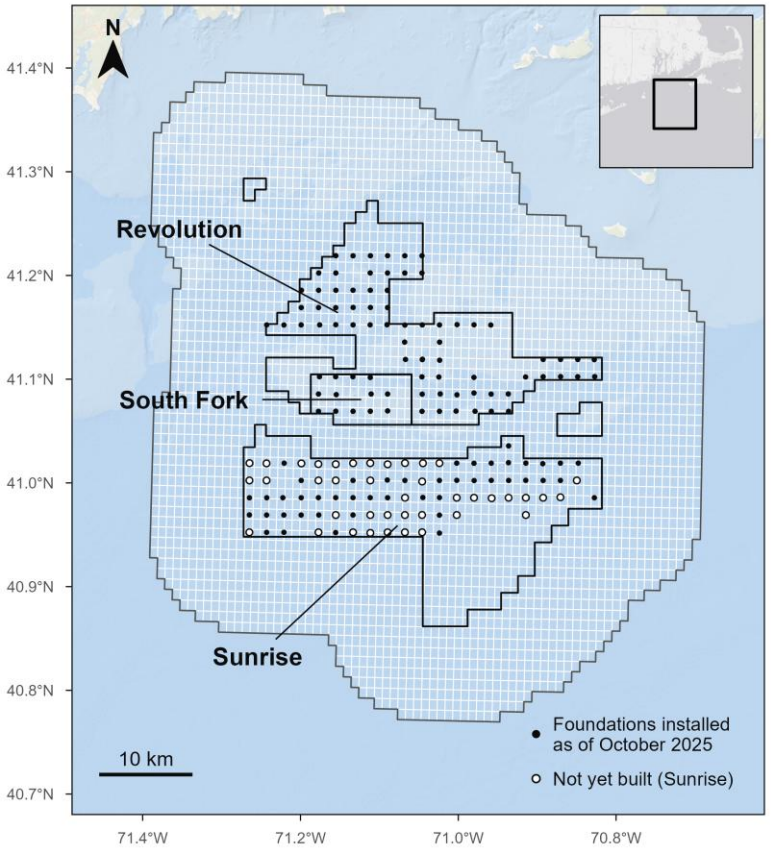
- Cross-referenced with GARFO permit data, the USCG Port State Information Exchange, and Marine Traffic

NOAA FISHERIES Greater Atlantic Region Fisheries Office

USCG Maritime Information Exchange Port State Information Exchange

MarineTraffic Global Ship Tracking Intelligence

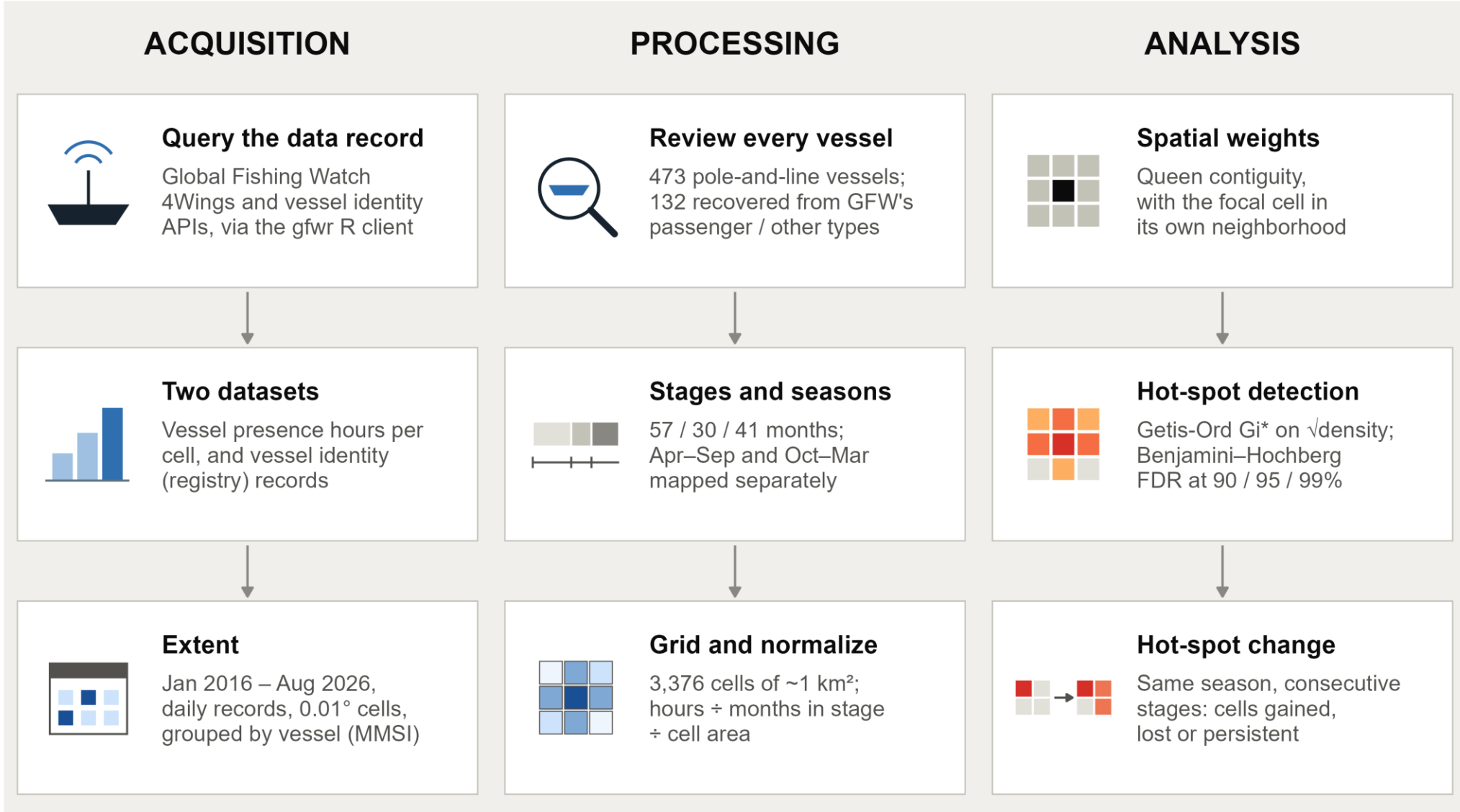
Methods – Study Area and Timeline





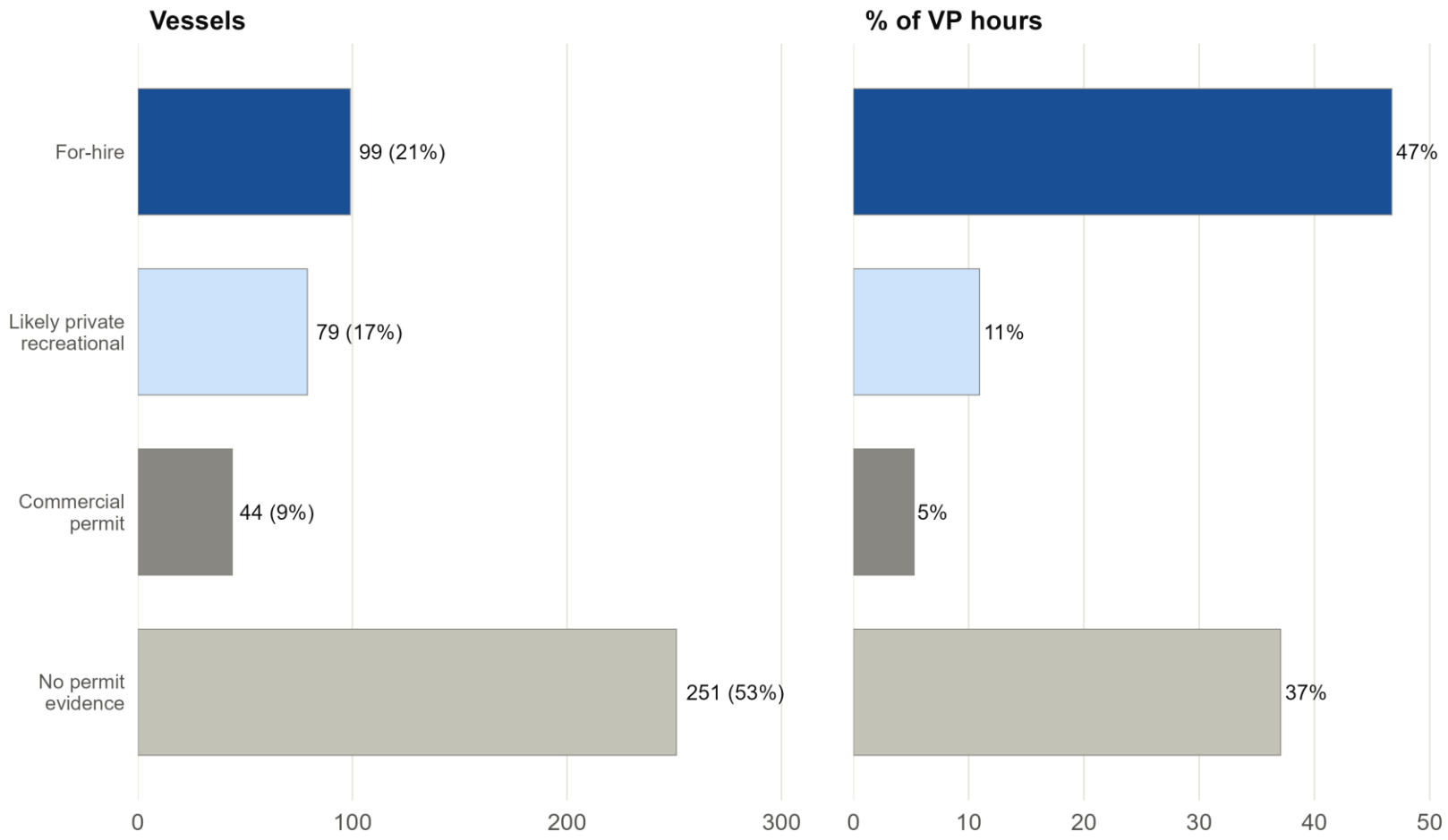
- Analyzed GFW data over a 10-year period
  - encompassed three stages of offshore wind development
- Created six-month chunks within stages to capture seasonality
  - Spring/Summer (April – September)
  - Fall/Winter (October – March)

Methods – Workflow



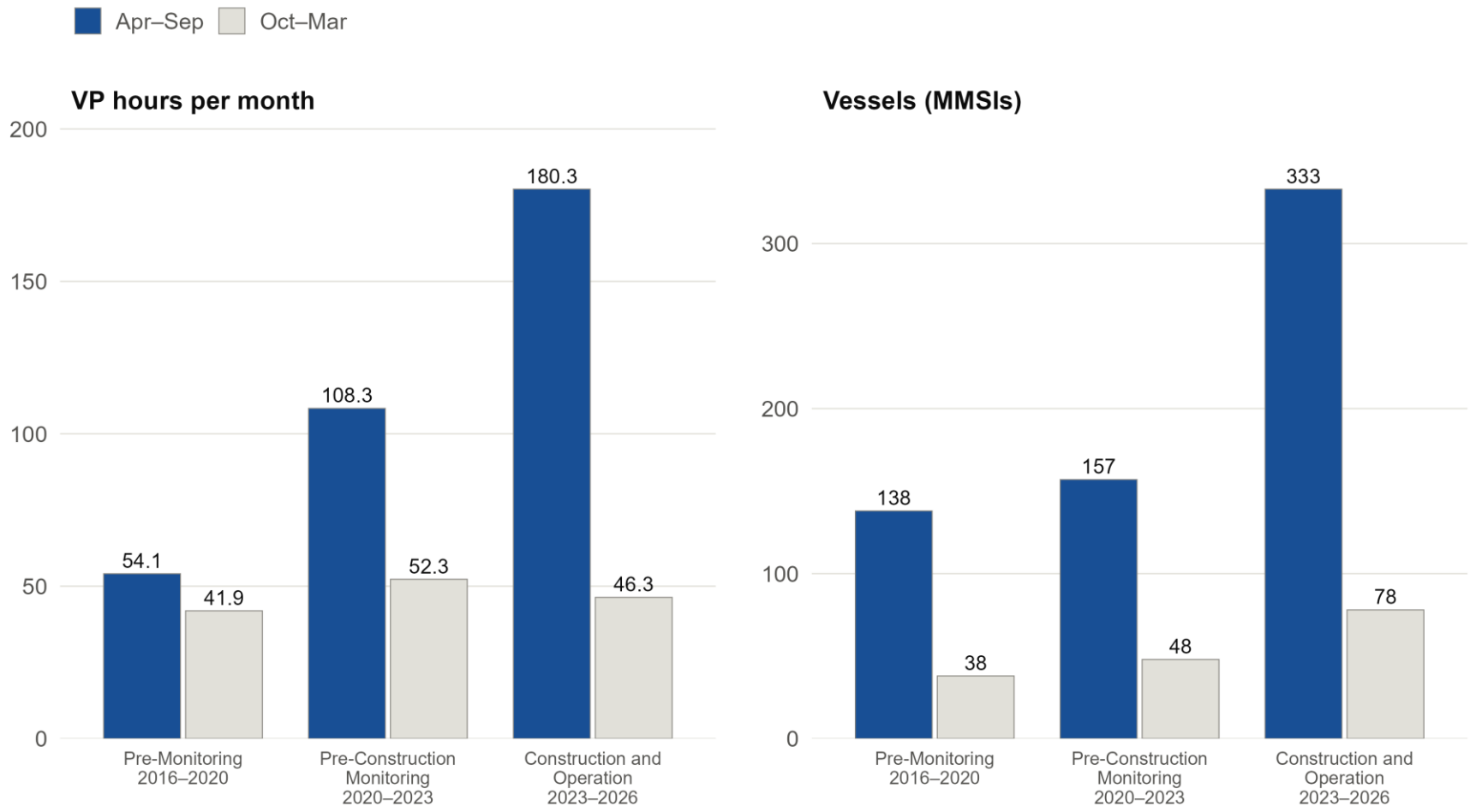
Estimated pole-and-line permit breakdown

- For-hire vessels represented a fifth of the vessels but nearly half the hours
- Many vessels had both for-hire and commercial permits
  - Each vessel counted toward one class
  - Lower bounded estimates



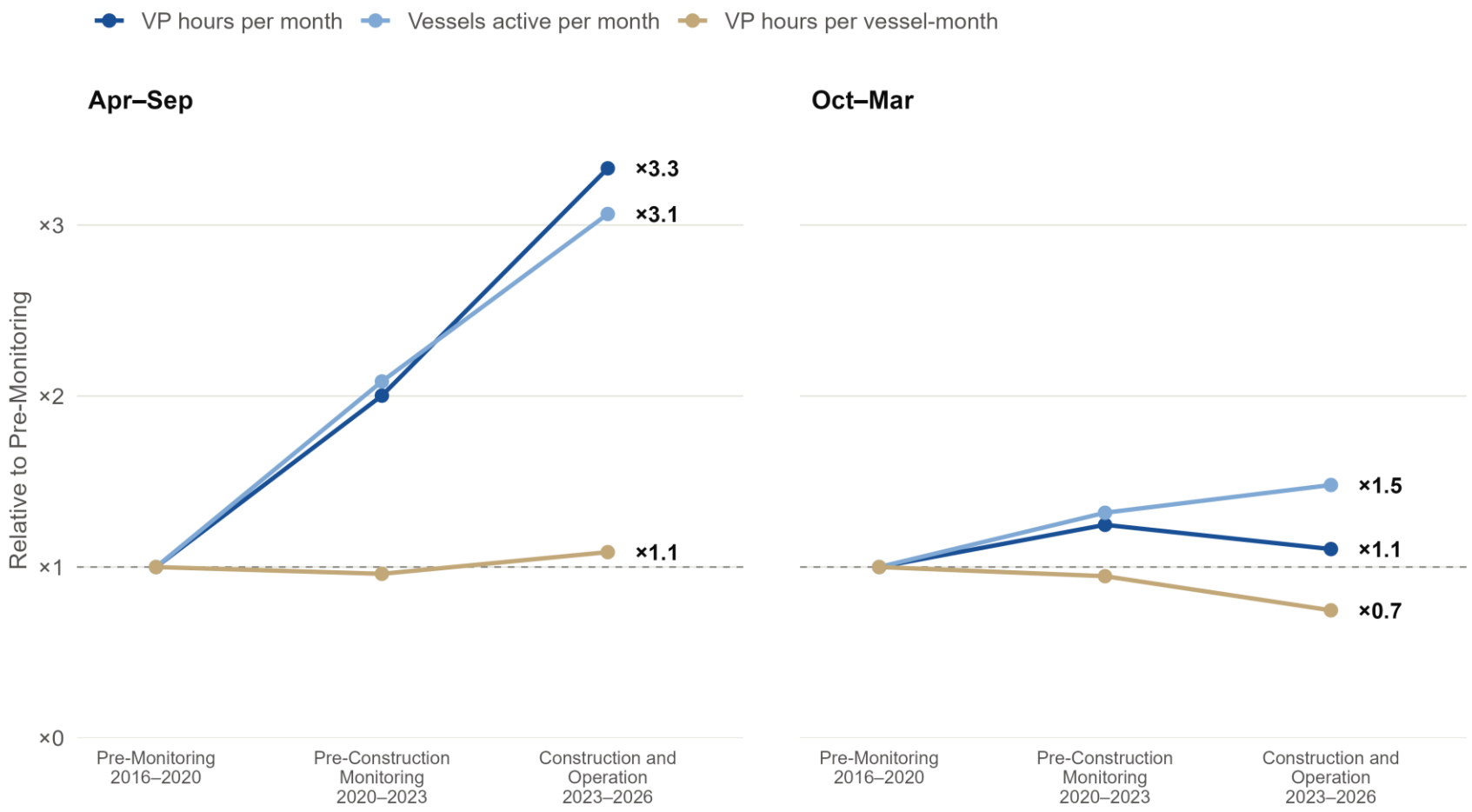
VP hour rates and vessel count at first glance

- Strong seasonality in both metrics
- How much of the growth is more vessels, and how much is more time per vessel?

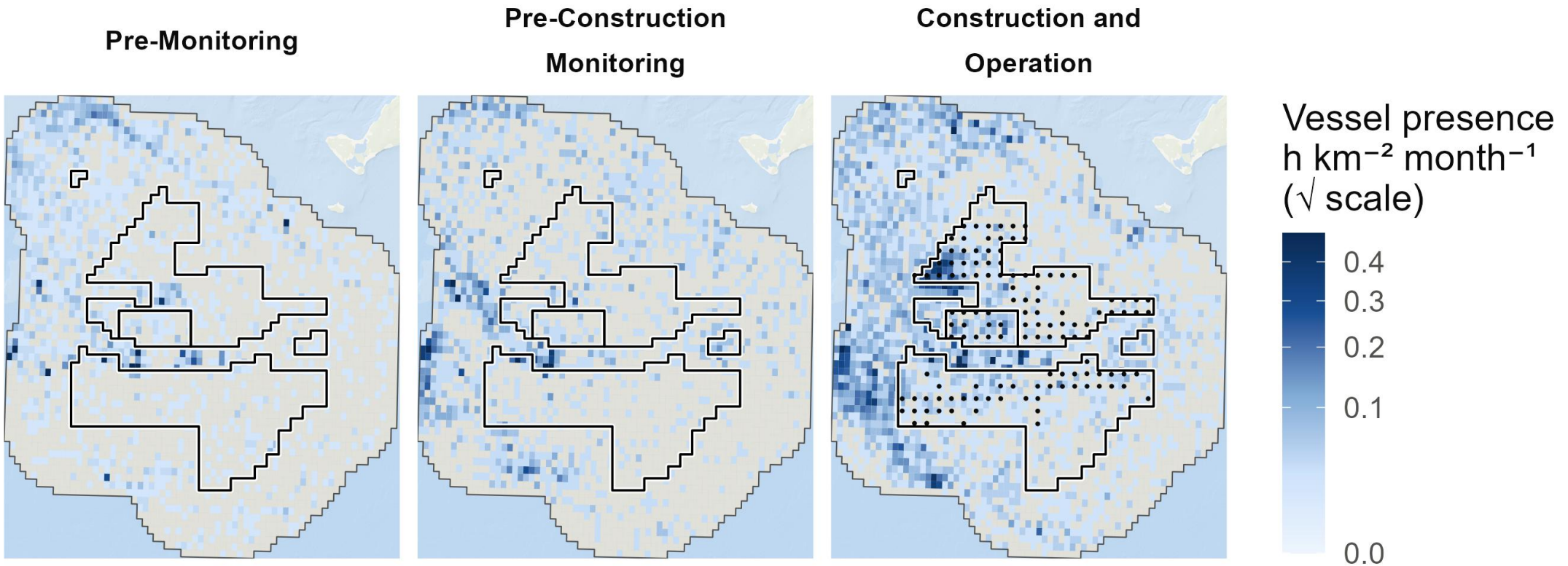


Rise in VP hours comes from more tracked vessels over time

- Fleet-normalized rate
- Growth is driven by AIS uptake



VP density by stage – All Months



149 vessels
2,755 hours
One vessel 21%

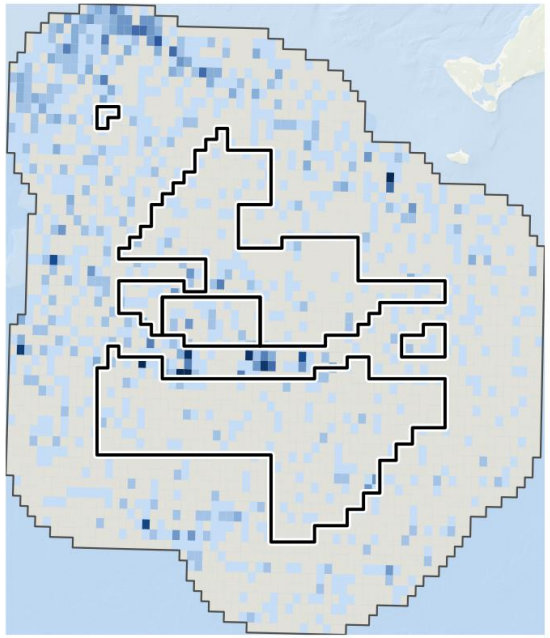
171 vessels
2,241 hours
One vessel 25%

349 vessels
4,980 hours
One vessel 10%

From S2 to S3, vessels and hours more than doubled!

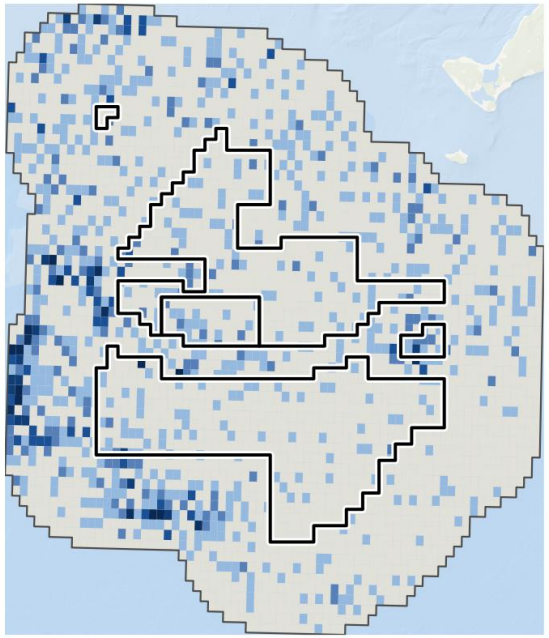
VP density by stage – Spring and Summer

Pre-Monitoring



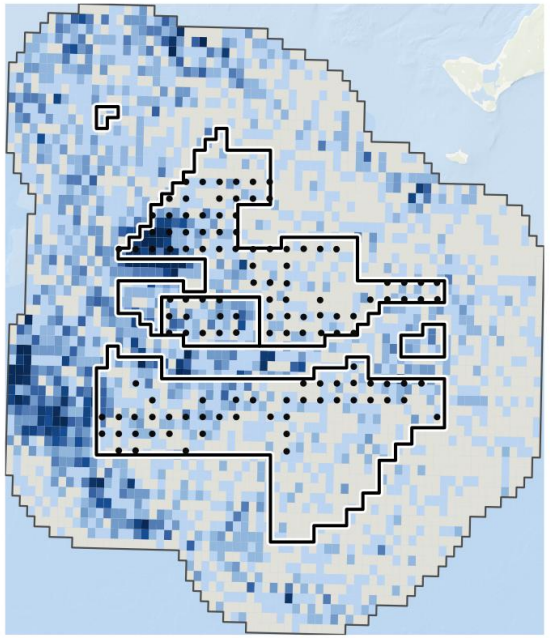
138 vessels
1,623 hours
One vessel 12%

Pre-Construction Monitoring

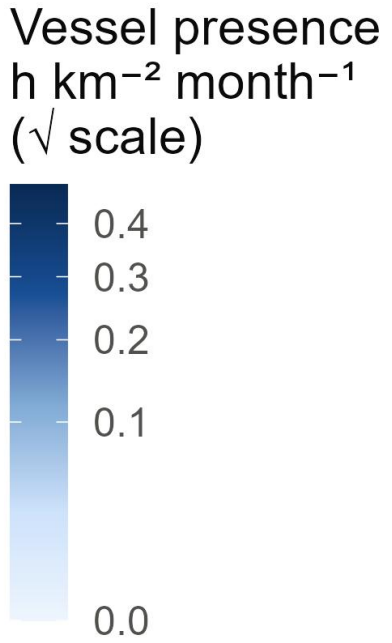


157 vessels
1,300 hours
One vessel 9%

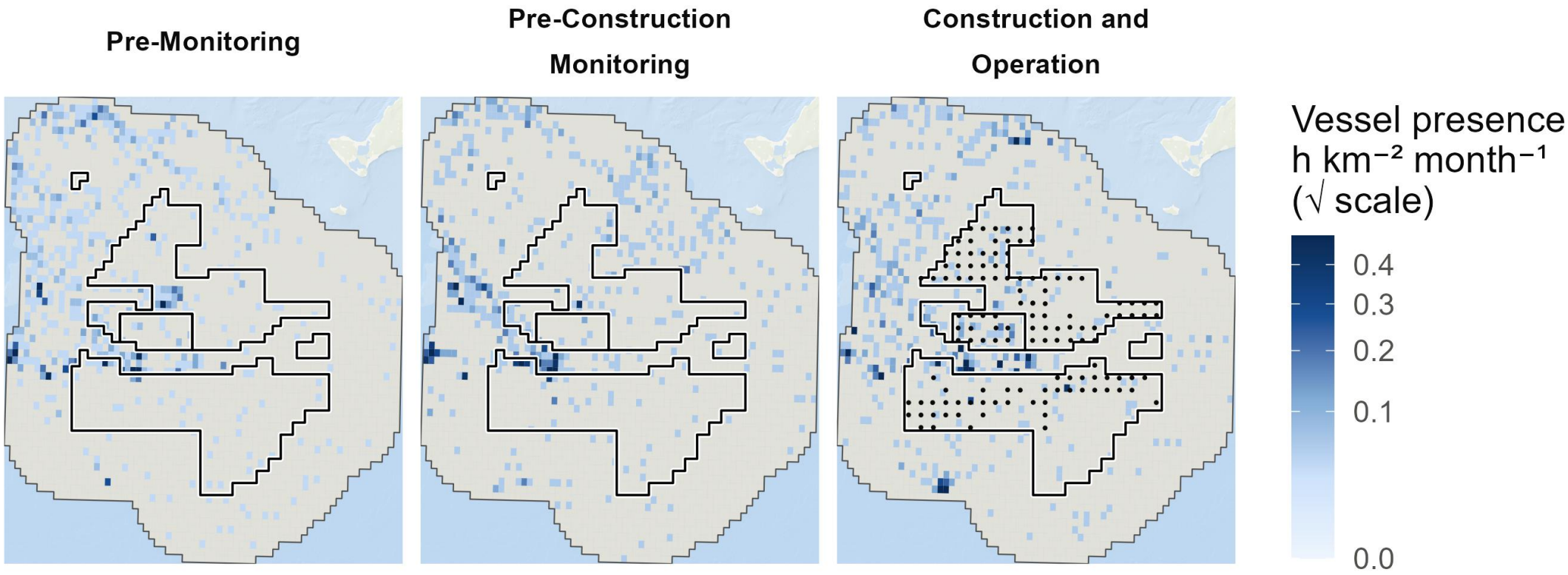
Construction and Operation



333 vessels
4,146 hours
One vessel 7%



VP density by stage – Fall and Winter

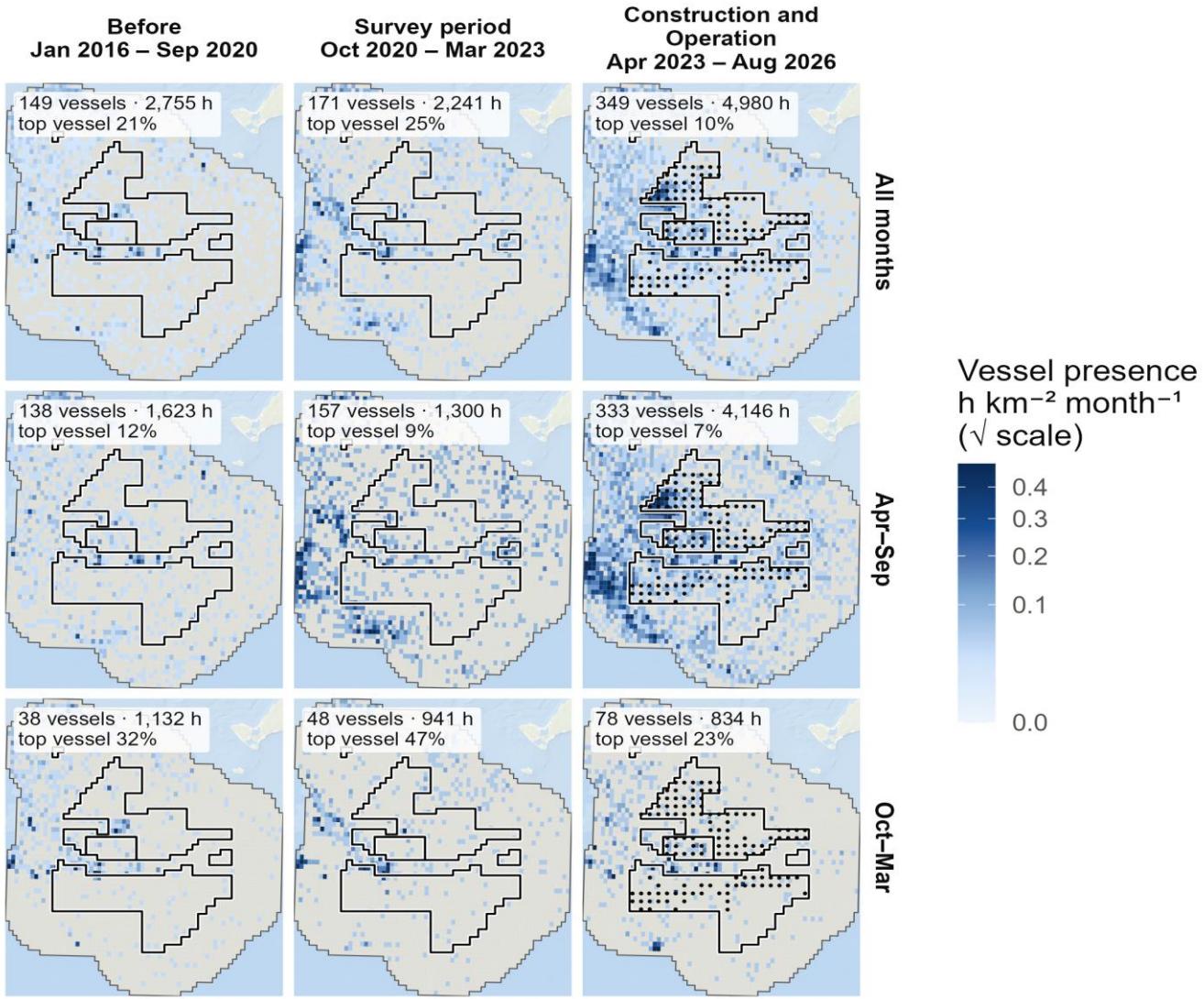


38 vessels
1,132 hours
One vessel 32%

48 vessels
941 hours
One vessel 47%

78 vessels
834 hours
One vessel 23%

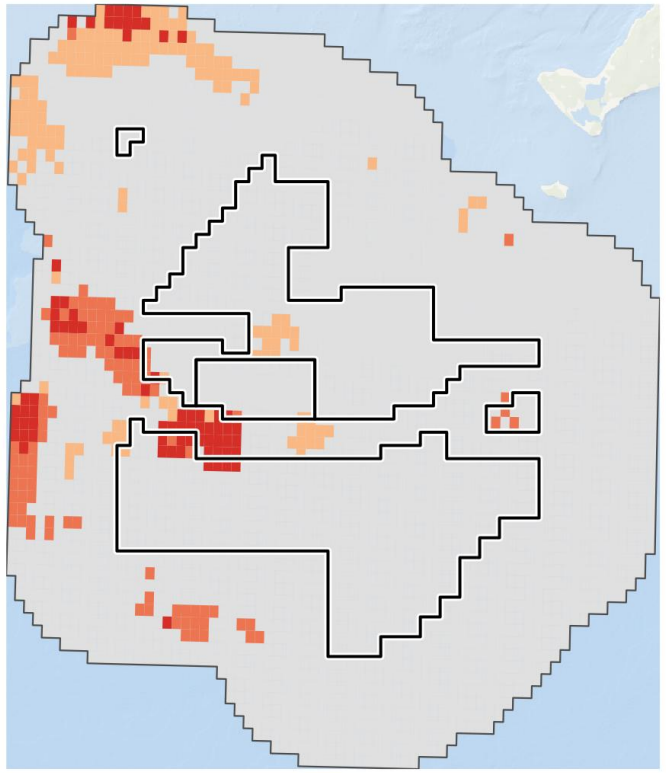
VP density by stage and season



- Summer activity spread and intensified across the stages, especially W and SW of the leases and in northern REV
- Winter activity was sparse and stayed near the coast and the western edge

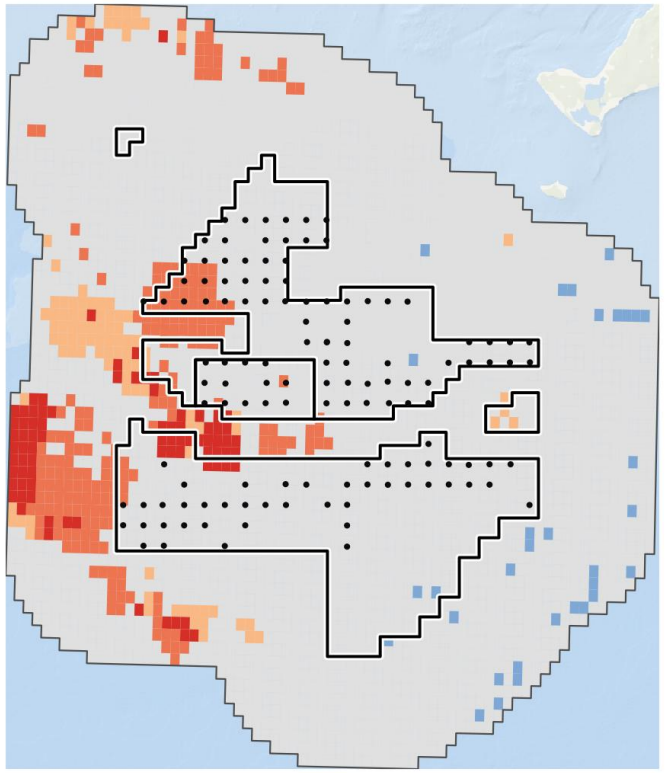
Gi* hot spot change – All Months

Pre-Monitoring → Pre-Construction Monitoring

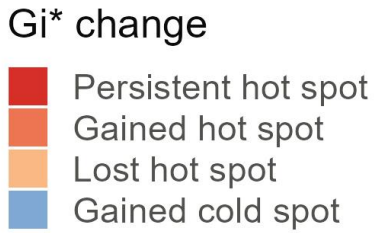


103 cells gained
150 cells lost
76 persistent

Pre-Construction Monitoring → Construction and Operation



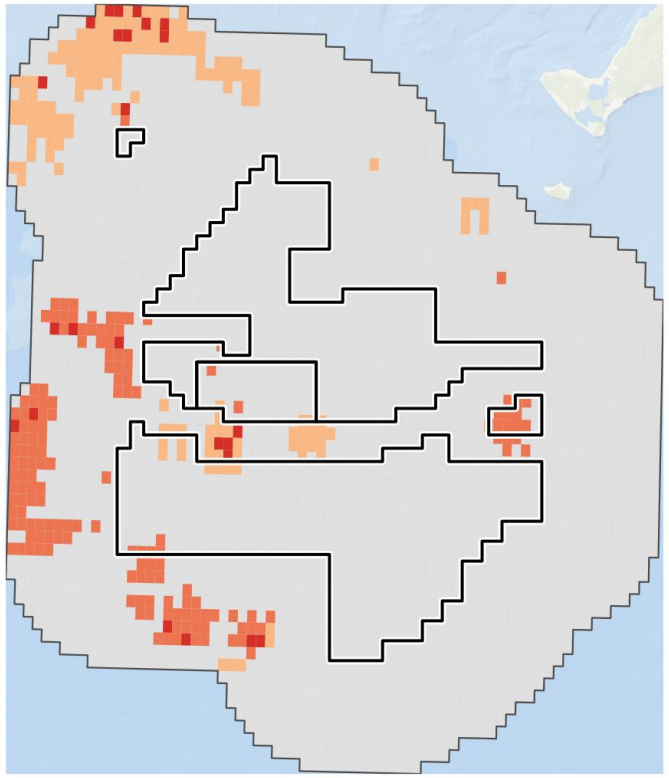
218 cells gained
99 cells lost
80 persistent



S2 to S3 is mostly hot spots gained near and inside the leases

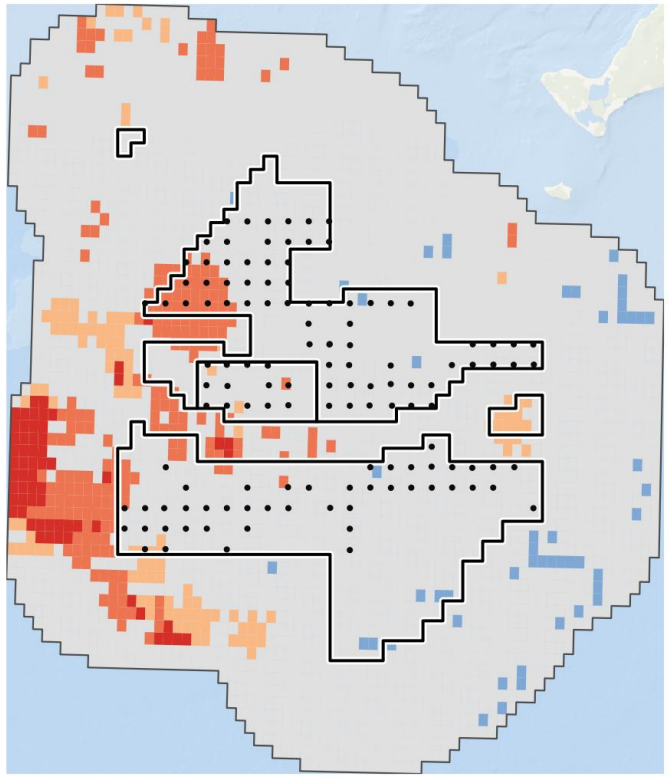
Gi* hot spot change – Spring and Summer

Pre-Monitoring → Pre-Construction Monitoring

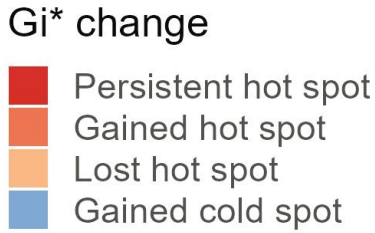


157 cells gained
158 cells lost
24 persistent

Pre-Construction Monitoring → Construction and Operation



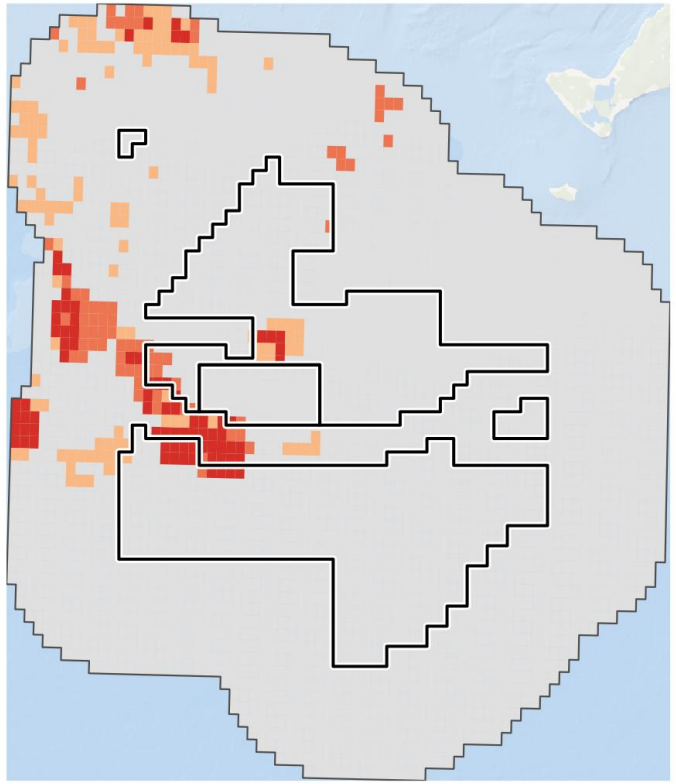
215 cells gained
119 cells lost
62 persistent



75 cells became hotspots at 0-2 km from leases and 52 inside the leases (38 in REV)

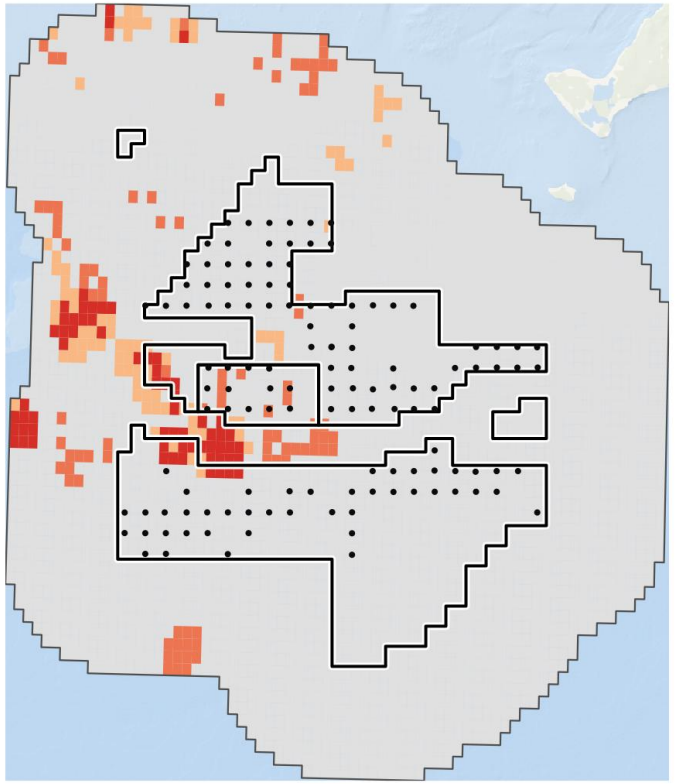
Gi* hot spot change – Fall and Winter

Pre-Monitoring → Pre-Construction Monitoring

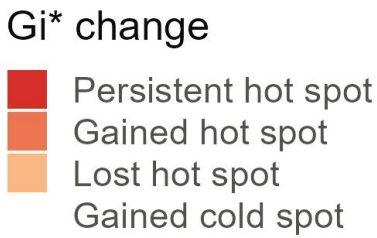


70 cells gained
120 cells lost
79 persistent

Pre-Construction Monitoring → Construction and Operation

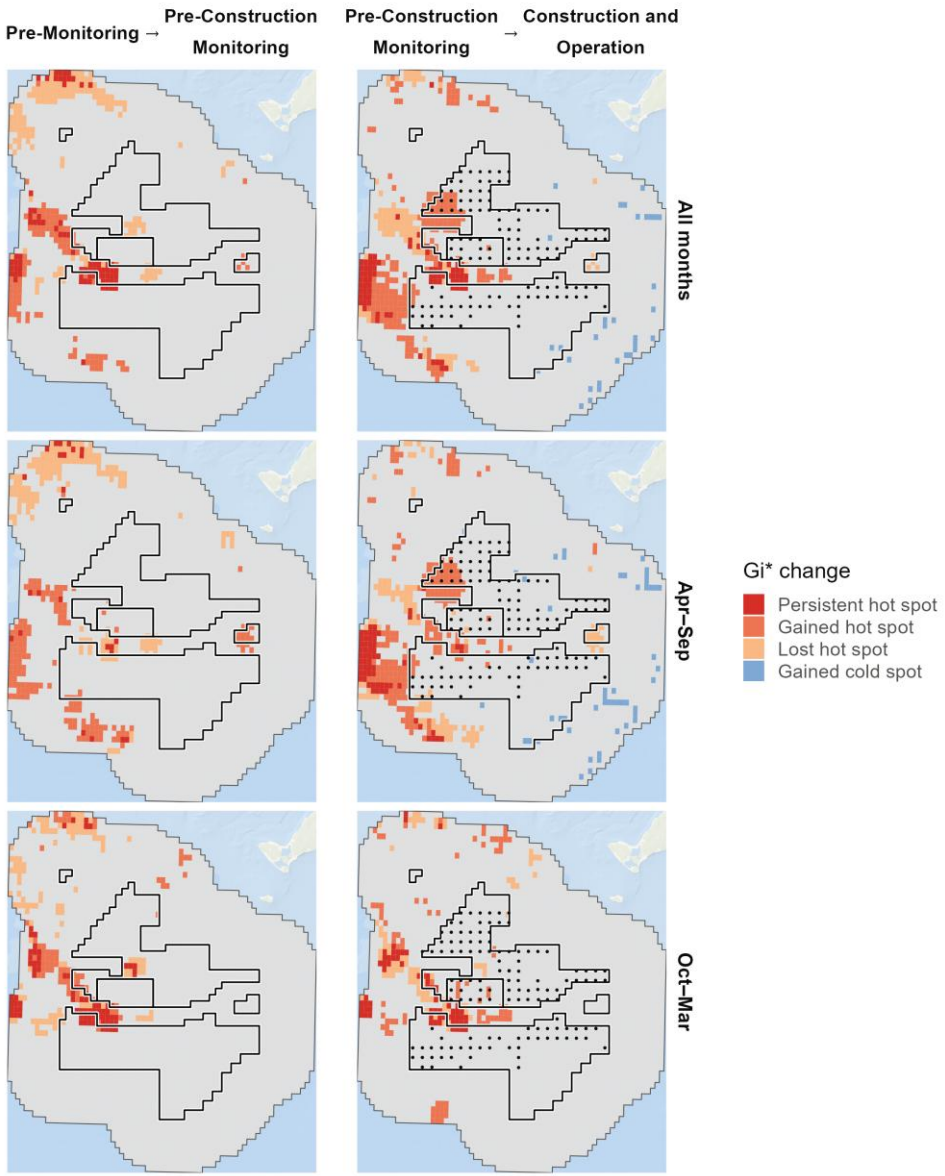


90 cells gained
85 cells lost
64 persistent



Gi* hot spot change between stages within seasons

Hot spots shifted from outer edges toward the leases!



Takeaways and What's Next

- What we can say
  - AIS captures a portion of for-hire and recreational fishing vessel activity
  - Vessel activity grew and shifted between stages mostly during the summer and due to more vessels using AIS
  - Hot spots formed inside and beside the lease areas during Construction and Operation
  - GFW data can't be used out of the box but can be a valuable complementary data source

- What we can't say
  - How much OWFs caused changes in activity
    - Many factors influence fishing activity (e.g. species distributions and regional trends)

- What next
  - Before-After-Gradient models to test relative impact of OWD
  - Open dialogue with fishing community – why are we observing these patterns?
    - If anyone has any ideas, please reach out!
  - How do we collect more highly resolved spatial data for private rec boats???

Thank you!



Email:
mmccaffrey17@uri.edu

LinkedIn:
https://www.linkedin.com/in/malachymcc/

LEWIS LAB
Transdisciplinary Oceanography and Ecosystem Modeling

COMMERCIAL FISHERIES RESEARCH FOUNDATION
CFRF

COASTAL INSTITUTE

Global Fishing Watch

GRFP
NSF GRADUATE RESEARCH FELLOWSHIP PROGRAM

THE UNIVERSITY OF RHODE ISLAND
GRADUATE SCHOOL OF OCEANOGRAPHY



Clean Energy and Sustainability Analytics Center

MONTCLAIR STATE UNIVERSITY

Monitoring the Socioeconomic Impacts of New Jersey's Offshore Wind Development on Recreational Fisheries Economy

Research Team- Dr. Pankaj Lal , Dr. Aditi Ranjan, Dr. Meghann Smith, Dr. Trang Luong, Kripa Shrestha, Dr. Ram Sewak Dubey, Karthik Reddy Duddukunta

NJDEP Support Team- Caitlin McGarigal, Collen Brust, Jeffrey Brust

•

Research Coordination Webinar: characterizing patterns and trends in recreational fishing/boating in the Northeast U.S.

October 22, 2026



Recreational Saltwater Fishing in New Jersey

New Jersey is a hotspot for saltwater fishing with rich biodiversity and easy coastal access.

- $673 million spent by anglers
- 3,546 jobs supported in the fishing sector
- $220 million income generated

Source: NOAA's Fisheries Economics of the United States report (2022)

Strong infrastructure supports anglers:

- Piers and marinas
- Charter boats
- Tackle shops

This sector is vital to New Jersey's economy and culture.

Complements NOAA's Marine Recreational Information Program: existing efforts are not specific to the waters of interest or to offshore wind, so a recreational fisheries baseline is needed.

Clean Energy and Sustainability Analytics Center

MONTCLAIR STATE UNIVERSITY

Research Objectives

This study aims to understand the impact of offshore wind development on recreational saltwater anglers' attitudes, opinions, behaviors, and expenditures in New Jersey.

1	**Effects on fishing activities**	Estimate the potential effects of offshore wind farms (OWF) on recreational saltwater fishing activities, including access to fishing grounds, changes in fishing locations, and potential disruptions during construction and operation.
2	**Perceptions and attitudes**	Understand recreational saltwater angler perceptions and attitudes toward OWF development initiatives.
3	**Willingness to pay (WTP)**	Estimate recreational saltwater anglers, tourists, and residents' WTP for offshore wind-related recreational activities, services, and experiences.
4	**Economic baseline and impacts**	Estimate the economic impacts of OWF development on the recreational fishing economy to establish a baseline of expenditures.
5	**Differences, 2023 vs. 2025**	Evaluate changes in recreational saltwater anglers' behavior, expenditure, and attitudes between 2023 and 2025 to identify emerging trends over this period.

Data Sources and Analysis

Data sources

2023 Recreational Saltwater Angler Survey

Oct - Nov 2023; 95,200 registered anglers (NJDEP registry); 8,181 completed.

2025 Recreational Saltwater Angler Survey

Apr - May 2025; 114,580 registered anglers (2024 registry); 8,444 completed.

NJ Coastal Tourism and Offshore Wind Survey

July 2025; Qualtrics panel within 200 miles of the OWF; 1,021 residents and tourists.

Survey design sources

2014 NJ Recreational Fishing Expenditure Survey (NOAA Fisheries, 2019); Block Island WTP survey (Trandafir et al., 2020).

Economic model inputs

BEA national and input-output accounts; American Sportfishing Association (2023); World Bank (2023) U.S. GDP.

Analysis

- **Descriptive comparisons:** 2023 vs. 2025 angler samples; residents vs. tourists.
- **Expenditure analysis:** annual and per-trip means with and without outliers, adjusted for double counting.
- **Zip-code spending:** half-normal modeled means × registered anglers, mapped with GIS.
- **Sentiment analysis:** BART classification of open-ended responses, word frequencies, and word clouds.
- **WTP:** anglers' mean hourly WTP with 95% confidence limits; OLS regression for residents and tourists, with robust standard errors clustered by state.
- **Economic contribution:** constrained SAM multiplier model estimating output, GDP, and household income effects under best- and worst-case scenarios.

2023 and 2025 Recreational Saltwater Angler Surveys

	2023 (Round 1)	2025 (Round 2)
Survey period	Oct 16 – Nov 16, 2023	Apr 29 – May 29, 2025
Registry (NJDEP)	2022 NJ Saltwater Recreational Registry	2024 NJ Saltwater Recreational Registry
Distributed to	95,200 registered anglers	114,580 registered anglers
Completed responses	8,181	8,444
Completed response rate	8.6%	7.7%

- **Design:** expands the 2014 NJ Recreational Fishing Expenditure Survey (NOAA Fisheries, 2019); the same questionnaire was used in both rounds.
- **Target areas:** Long Beach Island, Atlantic City, and Ocean City, near planned offshore wind projects.
- **Pre-test:** 100 randomly selected registrants; the baseline version had higher participation (24% vs. 16%) and was refined for launch.
- **Distribution:** Qualtrics email invitations with reminders; the 2025 round had 5,393 bounced and 4,838 duplicate emails.
- **Sample size:** both rounds exceed the 2,401 needed for 95% confidence and a 2% margin of error.

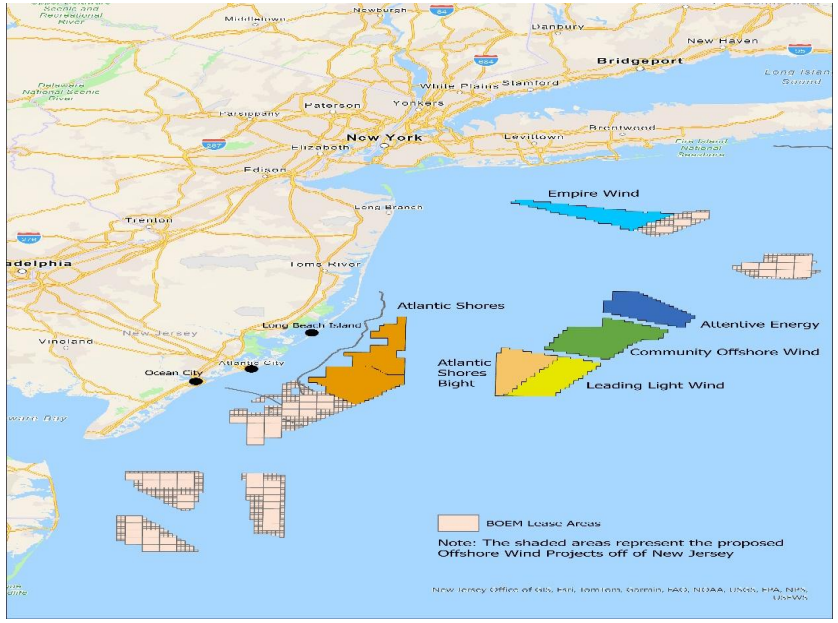
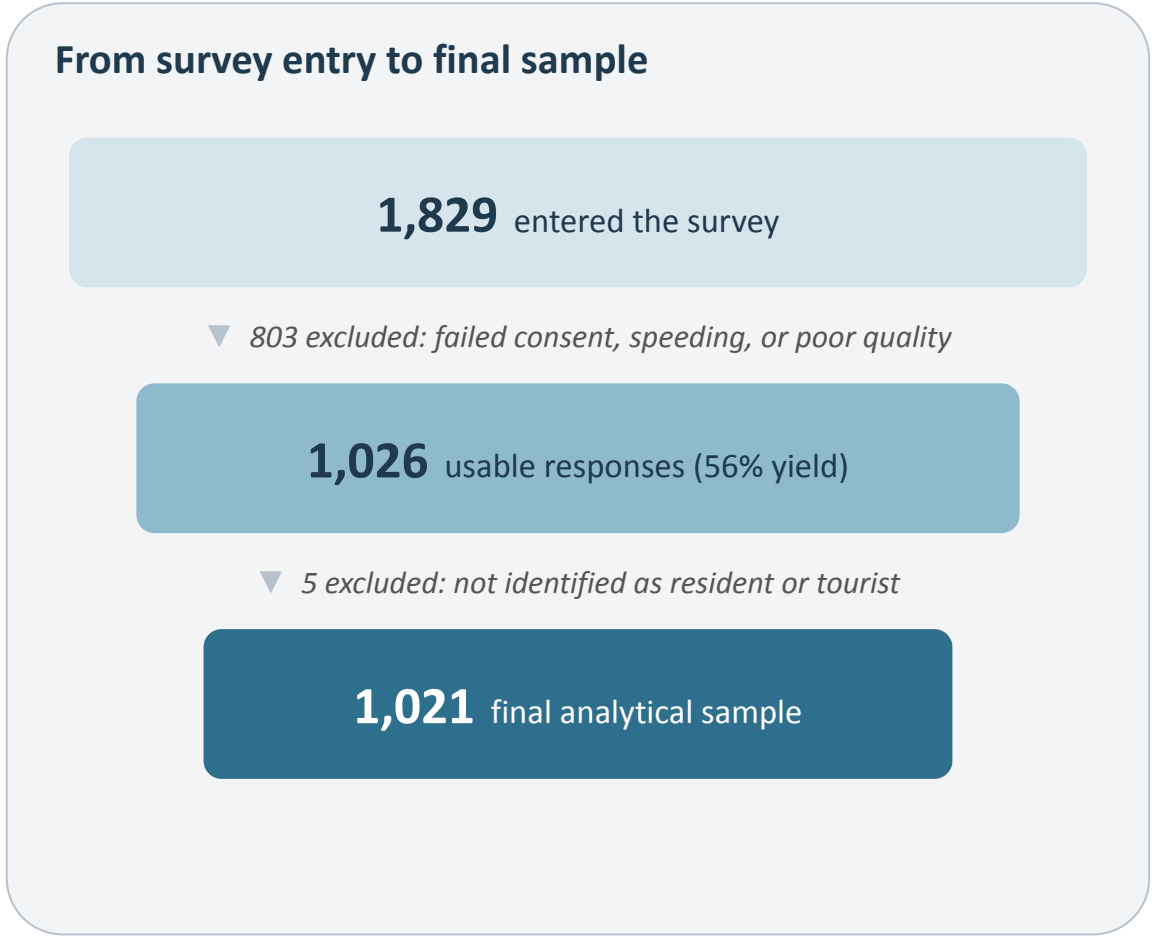


Figure 1. BOEM offshore wind lease areas off New Jersey relative to Atlantic City, Ocean City, and Long Beach Island

Clean Energy and Sustainability Analytics Center
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New Jersey Coastal Tourism and Offshore Wind Survey

- **Design:** built from the angler's survey, adding tourist/resident questions and WTP for recreation adapted from Block Island (Trandafir et al., 2020).
- **Soft-launch pre-test:** checked programming, skip logic, and response quality, and set data-screening procedures; approved responses were retained.
- **Distribution:** Qualtrics opt-in panel, July 2025, to U.S. residents within 200 miles of the proposed OWF, weighted toward the 75-mile radius. Prior angler-survey respondents were screened out.
- **Residents vs. tourists:** identified by a screening question (NJ resident or tourist visiting at least once per year).
- **Sample size:** target of 1,067 (95% confidence, 3% margin of error); 1,026 usable responses (3.8% below target) was considered adequate.



Angler Visit Frequency and Motivations

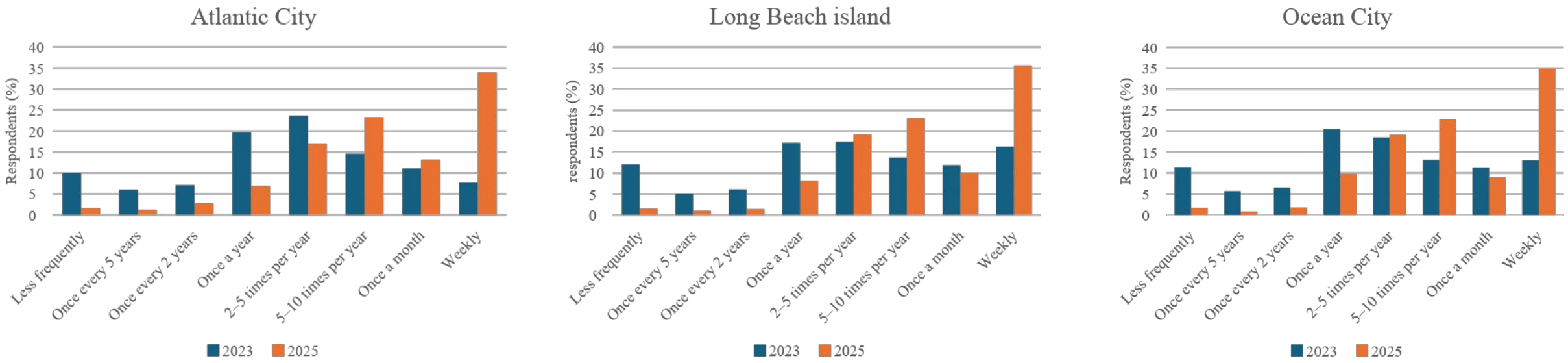


Figure 2. Comparison of respondents' visitation frequency to Atlantic City, Long Beach Island, and Ocean City during the previous five years in the 2023 and 2025 New Jersey Recreational Saltwater Angler Survey

- **Visit frequency:** the 2025 sample reported more frequent visits; weekly trips were the most common response for all three destinations, while most of the 2023 sample visited 2 - 5 times per year or once a year.
- **Rare visits** (once every 2 years or less) were reported much less often in the 2025 sample.
- **Motivations:** fishing and beach recreation were the top reasons for visiting in both samples; casinos and concerts mattered mainly for Atlantic City.
- **Ratings:** average importance ratings were generally lower in the 2025 sample.

Angler Attitudes Toward Offshore Wind Development

Awareness and Knowledge

Awareness was high in both samples (92% in 2023 vs. 89% in 2025), as was feeling moderately to highly informed (68% vs. 62%). Environmental groups (41% vs. 43%) and universities (32% vs. 35%) were the most trusted sources; social media was the least trusted (6% vs. 9%).

Pre-Construction Fishing Activity

About half of the 2023 sample (52%) had fished in or near the wind lease areas in the past 10 years, compared with 39% of the 2025 sample. More of the 2025 sample had never fished there (30% vs. 21%), and about a quarter were unsure in both.

Fishing Behavior Impact

Most in both samples would keep fishing preferred areas (66% vs. 64%). About 62% would avoid construction, but only 40% would avoid built turbines; 16 - 17% would seek them out.

Perceived Effects on Enjoyment and Catch

Close to half in both samples expect decreased enjoyment (48% vs. 45%) and catch (50% vs. 43%); few expect improvement (6% enjoyment; 10 - 12% catch), and many remain uncertain.

Overall Perceptions

Negative views prevail on aesthetics, boating, navigation, and tourism, though less so in the 2025 sample. Clean energy, energy security, and job creation are viewed positively, and most prefer turbines not be visible.



Sentiment Analysis: Anglers, Residents, and Tourists









Figure 4. Most frequent words in open-ended responses about offshore wind

Anglers

- **Overall sentiment:** Mixed/Uncertain led the 2023 sample (49%); Opposition led 2025 (50%). Support was smallest in both (11 - 12%).
- **Framing:** environmental risk dominated, with cost concerns more pronounced in 2025.

Residents and tourists

- **Response length:** very short responses were mostly opposed (78.4% of residents, 75.9% of tourists); long ones mostly supportive (about 65%).
- **Framing:** positive, energy-focused words (“energy,” “clean,” “good”), with some concern about visual impacts.

Angler Expenditure: Estimation Methods

Per-trip spending

Annual median or mean ÷ average days fishing per year (53 days).

Share spent in NJ applied by category (about 79 - 99%).

Scenario 1: Median

Treats all reported values as true; zeros recorded for no spending.

Total annual median: $1,767.50 (2023) vs. $560.00 (2025).

Scenario 2: Mean with outliers

Keeps every response for a comprehensive view, but extreme values inflate the mean.

Scenario 3: Outliers removed

Adjusted IQR (2.2 multiplier) for right-skewed data (Hubert & Vandervieren, 2008; Hoaglin & Iglewicz, 1987).

Half-normal mean

After outlier removal, means were estimated with a half-normal distribution, $\mu = \sigma\sqrt{(2/\pi)}$, suited to non-negative, skewed data (R fdrtool).

Expected spending by zip code

Half-normal mean per zip code × respondent weight, scaled by registered anglers per zip code and summed.

Comparative Analysis: Expenditure Means Across Scenarios

	Scenario 2 (with outliers)						Scenario 3 (excluding outliers)					
	2023 ($)		2025 ($)		% change		2023 ($)		2025 ($)		% change	
Expenditure	Annual mean	Per-trip mean	Annual mean	Per-trip mean	Annual mean	Per-trip mean	Annual mean	Per-trip mean	Annual mean	Per-trip mean	Annual mean	Per-trip mean
Accommodation	582.22	10.99	1,843.17	34.78	217	217	0.00	0.00	0.00	0.00	n/a	n/a
Restaurants, cafes, bars, other dining	1,024.73	19.33	2,807.05	52.96	174	174	402.70	7.60	568.68	10.73	41	41
Entertainment or entrance fees	74.11	1.40	375.20	7.08	406	406	0.00	0.00	0.00	0.00	n/a	n/a
Shopping or other souvenirs	296.28	5.59	1,154.98	21.79	290	290	6.70	0.13	0.00	0.00	-100	-100
Transportation	67.40	1.27	504.03	9.51	648	648	0.00	0.00	0.00	0.00	n/a	n/a
Personal vehicle costs	2,084.73	39.33	1,674.82	31.60	-20	-20	306.94	5.79	291.70	5.50	-5	-5
Renting water sports equipment	79.28	1.50	157.75	2.98	99	99	0.00	0.00	0.00	0.00	n/a	n/a
Boat launch or marina fees	853.65	16.11	2,137.34	40.33	150	150	35.41	0.67	46.38	0.88	31	31
Fuel for fishing vessel	1,150.20	21.70	3,926.14	74.08	241	241	366.85	6.92	313.47	5.91	-15	-15
Rods, poles, reels	1,271.40	23.99	1,290.84	24.36	1.5	1.5	235.60	4.45	160.73	3.03	-32	-32
Tackle and gear	916.17	17.29	8,717.90	164.49	852	852	235.95	4.45	188.99	3.57	-20	-20
Saltwater fishing licenses, stamps, or fees	40.06	0.76	244.95	4.62	511	511	1.52	0.03	0.00	0.00	-100	-100
Special saltwater fishing clothing	315.84	5.96	187.87	3.54	-41	-41	92.47	1.74	66.55	1.26	-28	-28
Books, magazines, newspapers, e-subscriptions	47.59	0.90	79.05	1.49	66	66	2.49	0.05	0.00	0.00	-100	-100
Dues/contributions to recreational fishing clubs	54.81	1.03	212.21	4.00	287	287	0.00	0.00	0.00	0.00	n/a	n/a
Processing or taxidermy fees	9.58	0.18	91.35	1.72	854	854	0.00	0.00	0.00	0.00	n/a	n/a
Purchase of motorized boat and accessories	11,934.20	225.17	133,163.10	2,512.51	1016	1016	0.00	0.00	0.00	0.00	n/a	n/a
Purchase of non-motorized boat and accessories	129.59	2.45	200.59	3.78	55	55	0.00	0.00	0.00	0.00	n/a	n/a
Boat electronics and accessories	1,319.10	24.89	8,893.35	167.80	574	574	0.00	0.00	0.00	0.00	n/a	n/a
Boat and trailer maintenance and repairs	1,720.96	32.47	2,482.56	46.84	44	44	108.91	2.05	6.06	0.11	-94	-94
Boat mooring, storage, and haul-out/launch fees	3,313.67	62.52	1,415.45	26.71	-57	-57	31.13	0.59	0.00	0.00	-100	-100
Boat insurance	445.54	8.41	1,212.70	22.88	172	172	128.63	2.43	157.54	2.97	22	22
Boat and trailer license and registration	53.74	1.01	229.31	4.33	327	327	26.55	0.50	29.95	0.57	13	13
Purchase of a second home for fishing	11,774.70	222.16	56,054.50	1,057.63	376	376	0.00	0.00	0.00	0.00	n/a	n/a
Repair and maintenance of second home	3,314.64	62.54	6,846.90	129.19	107	107	0.00	0.00	0.00	0.00	n/a	n/a
Insurance for second home	509.46	9.61	1,201.30	22.67	136	136	0.00	0.00	0.00	0.00	n/a	n/a
TOTAL	**43,383.70**	**818.56**	**237,104.40**	**4,473.67**	**447**	**447**	**1,981.86**	**37.39**	**1,830.05**	**34.53**	**-8**	**-8**

Table 1. Comparative analysis: expenditure means across scenarios.

Total annual average expenditure: Scenario 2: $43,383.70 (2023) vs. $237,104.40 (2025); Scenario 3: $1,981.86 (2023) vs. $1,830.05 (2025). **Per-trip:** Scenario 2: $818.56 vs. $4,473.67; Scenario 3: $37.39 vs. $34.53.

Annual Expenditure per Angler After Adjusting for Double Counting

Why adjust for double counting

- Anglers often combine fishing, water sports, and other beach activities on one trip; assigning all spending to each activity would count it multiple times.
- Spending was allocated once, by each trip's stated purpose, to keep estimates defensible.

What the adjusted data show

- Fishing and water sports generated far more spending than all other activities combined in both samples.
- **Fishing:** boat fuel, personal vehicle costs, rods, reels, and tackle.
- **Water sports:** marina fees, boat insurance, and maintenance.
- **Other activities:** mostly dining and personal vehicle expenses.
- Spending was lower in the 2025 sample, but its structure was similar in both samples.

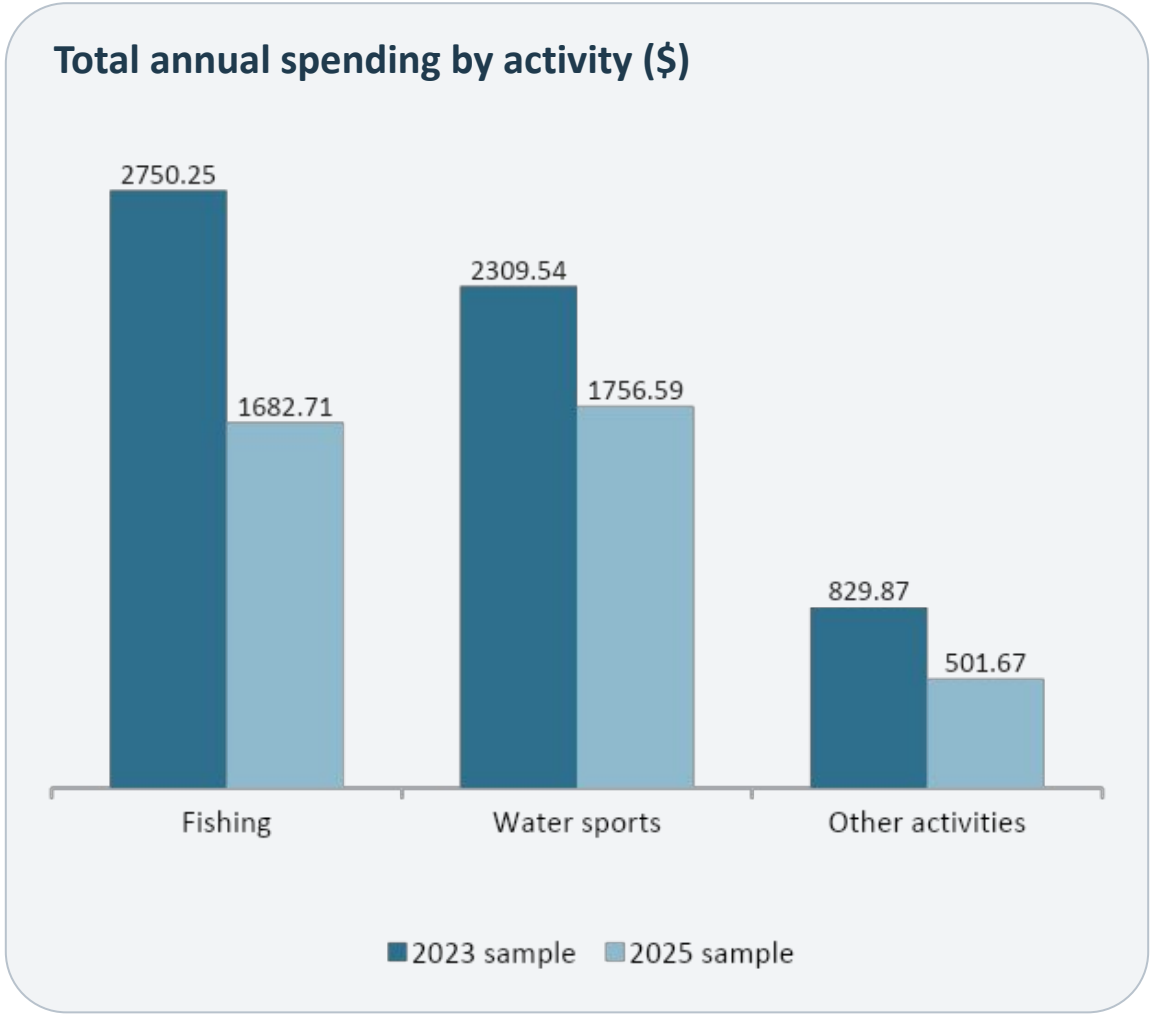
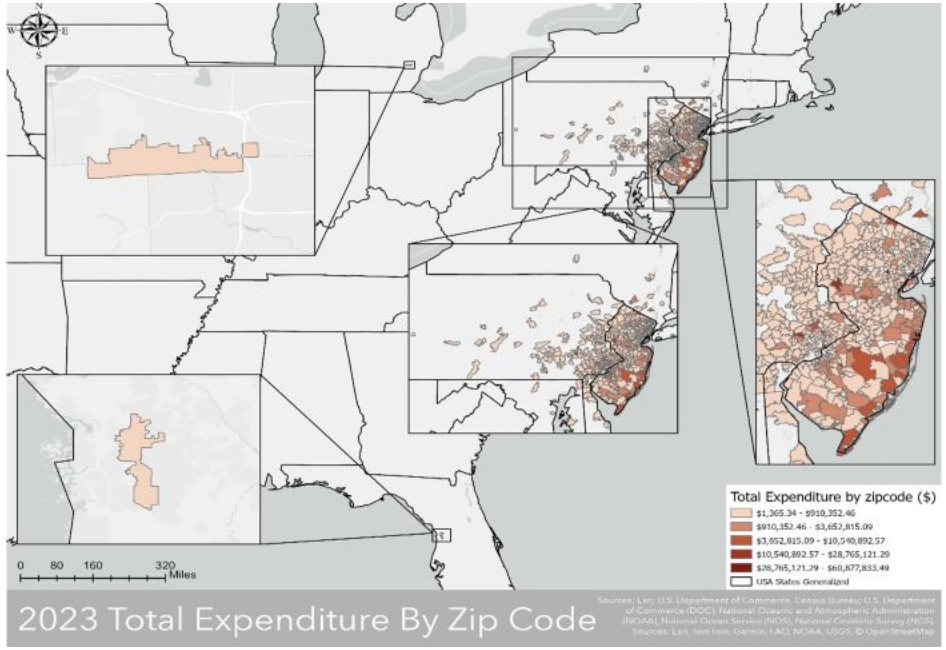
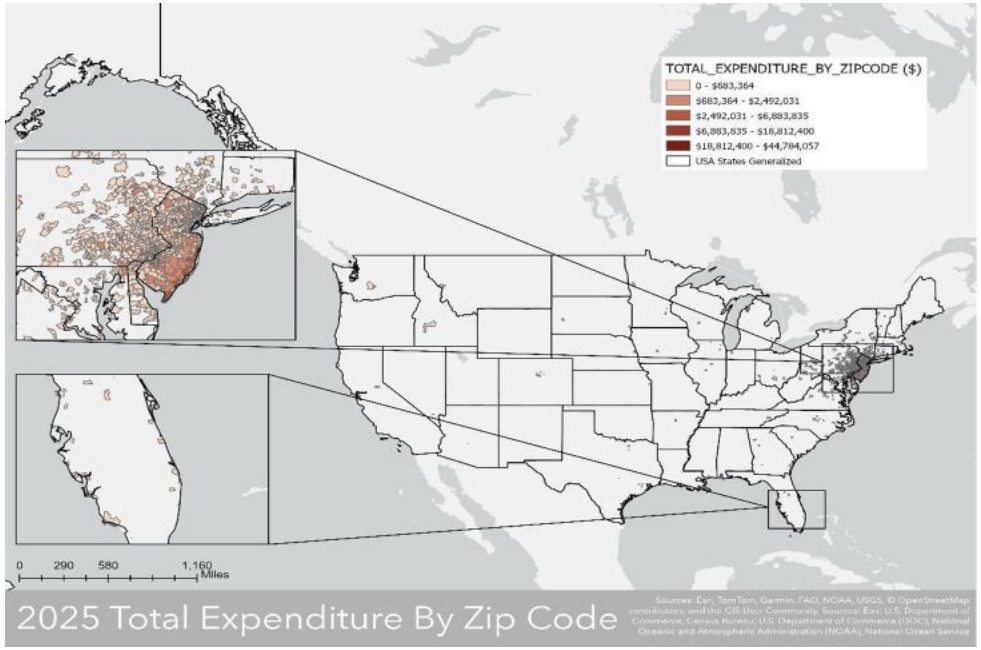


Figure 5. *Annual spending per angler by activity, adjusted for double counting (2023 vs. 2025 samples)*

Expected Expenditure by Zip Code





By total expenditure

Rank	2023 sample		2025 sample	
	Zip code	$	Zip code	$
1	**08861** Perth Amboy	$60.9M	**08836** Martinsville	$44.8M
2	**08091** West Berlin	$56.6M	**07093** West New York	$31.9M
3	**07974** New Providence	$39.2M	**19010** Bryn Mawr, PA	$6.9M
4	**19406** King of Prussia, PA	$28.8M	**08731** Forked River	$5.0M
5	**08867** Pittstown	$19.2M	**08008** Long Beach Island	$4.2M

By per-person expenditure

Rank	2023 sample		2025 sample	
	Zip code	$	Zip code	$
1	**08091** West Berlin	$725,943	**08836** Martinsville	$878,119
2	**07974** New Providence	$612,928	**19010** Bryn Mawr, PA	$245,851
3	**19406** King of Prussia, PA	$410,930	**07093** West New York	$229,260
4	**19003** Ardmore, PA	$394,626	**07931** Far Hills	$189,125
5	**07452** Glen Rock	$392,990	**07946** Millington	$60,861

Coastal concentration: shore zip codes ranked in the top 5% for total expenditure in both samples; Forked River and Long Beach Island ranked 4th and 5th in the 2025 sample (14th and 16th in the 2023 sample).

Economic Contribution Analysis

- **Method:** constrained Social Accounting Matrix (SAM) multiplier model for New Jersey, capturing direct and indirect effects on output, GDP, and household income, with supply constraints.

Spending shocks applied to the model

Scenario	Survey basis	2023	2025
S1: Best case	Would try fishing near OWF (13.0% / 17.2%)	**+$270M**	**+$360M**
S2: Worst case	Would avoid fishing near OWF (32.7% / 40.4%)	**–$690M**	**–$850M**

- **Asymmetric risk:** modeled losses under S2 are about 2.5 times larger than gains under S1.
- **Households:** effects rise with income; households earning over $150,000 gain or lose the most.
- **2025 sample:** larger effects in both scenarios, reflecting larger survey shares; samples are unmatched and fielded in different seasons.

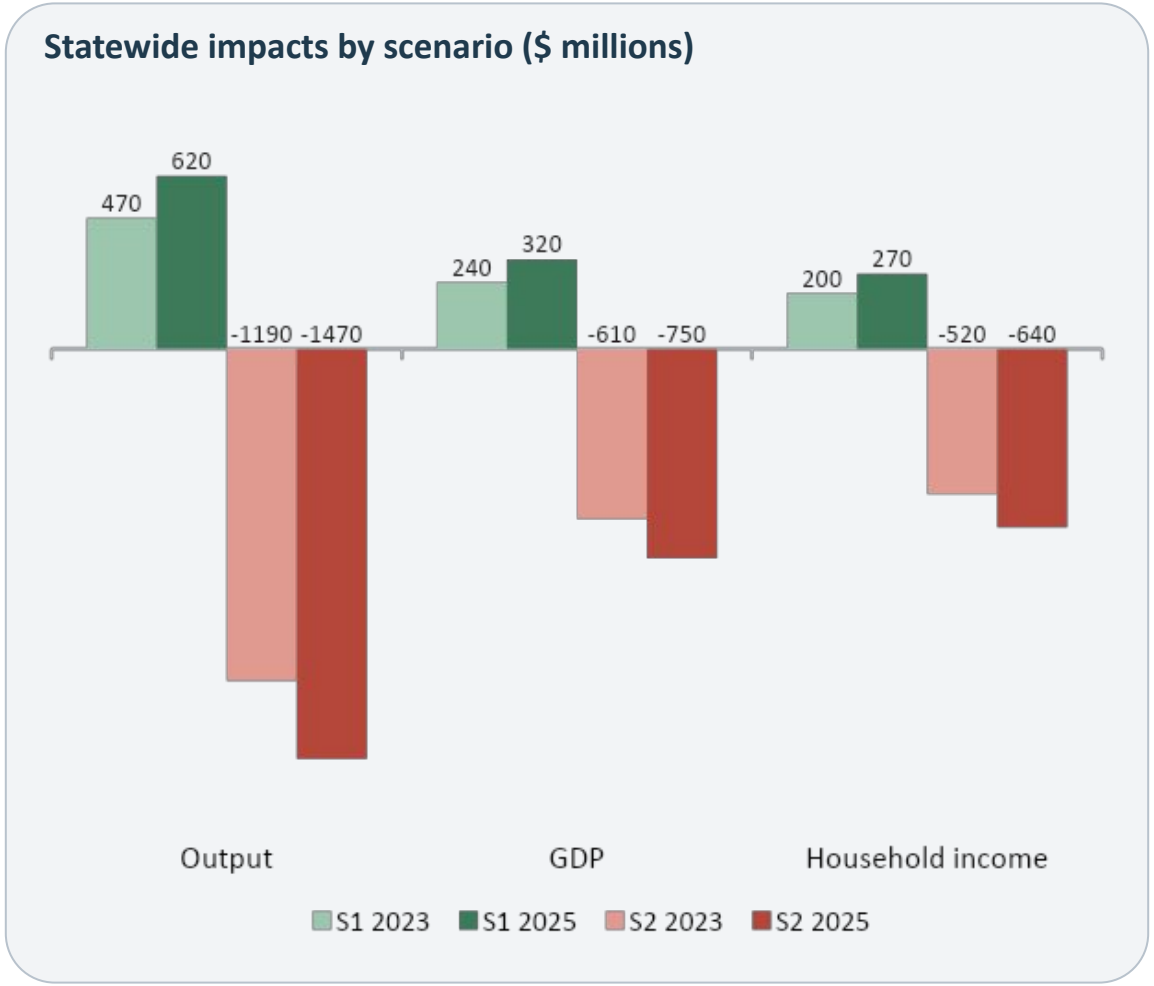


Figure 6. Modeled statewide impacts of offshore wind on New Jersey's recreational fishing economy, by scenario ($ millions)

Clean Energy and Sustainability Analytics Center
MONTCLAIR STATE UNIVERSITY

Tourism Expenditure: Residents and Tourists

Residents	With outliers		Without outliers		Outliers removed
Activity	Annual ($)	Per trip ($)	Annual ($)	Per trip ($)	
Beach and/or boardwalk	2,060.14	38.87	**102.92**	**1.94**	32
Amusement parks	643.18	12.14	60.93	1.15	37
Non-motorized water sports	162.13	3.06	0.00	0.00	63
Motorized water sports	1,572.87	29.68	0.00	0.00	96
Beach/waterfront exercise	465.68	8.79	0.00	0.00	91
Casino	369.17	6.97	64.31	1.21	63
Wildlife spectating	102.23	1.93	0.00	0.00	70
Restaurants	528.48	9.97	118.20	2.23	35
Shopping	7,202.32	135.89	119.98	2.26	34
Concerts and festivals	193.87	3.66	0.00	0.00	113
Business events	192.02	3.62	0.00	0.00	36
Other attractions/sightseeing	38.40	0.72	0.00	0.00	33
TOTAL	**13,530.49**	**255.29**	**466.34**	**8.80**	**703**

Tourists	With outliers		Without outliers		Outliers removed
Activity	Annual ($)	Per trip ($)	Annual ($)	Per trip ($)	
Beach and/or boardwalk	693.90	13.09	**118.81**	**2.24**	34
Amusement parks	722.39	13.63	53.55	1.01	43
Non-motorized water sports	1,068.89	20.17	0.00	0.00	28
Motorized water sports	212.55	4.01	0.00	0.00	45
Beach/waterfront exercise	256.06	4.83	0.00	0.00	80
Casino	674.37	12.72	78.88	1.49	62
Wildlife spectating	60.51	1.14	0.00	0.00	61
Restaurants	940.00	17.74	145.35	2.74	16
Shopping	959.18	18.10	144.28	2.72	39
Concerts and festivals	181.56	3.43	0.00	0.00	100
Business events	120.88	2.28	0.00	0.00	30
Other attractions/sightseeing	69.95	1.32	0.00	0.00	63
TOTAL	**5,960.23**	**112.46**	**540.87**	**10.21**	**601**

- **Outliers matter:** a few extreme values greatly inflate averages; means without outliers are lower, more stable, and better reflect typical spending.
- **Typical annual spending (without outliers):** $540.87 for tourists ($10.21 per trip) and $466.34 for residents ($8.80 per trip).
- **Top categories:** restaurants, shopping, and beach/boardwalk made up about three-quarters of average spending for both groups, with residents spending less than tourists in each.
- Both groups spend modestly on similar activities, with residents showing a more conservative, routine pattern.

Anglers' WTP for Offshore Wind Recreation

- **Program interest:** more of the 2025 sample had no interest in any offshore wind tourism program (55.5% vs. 39.1%), and fewer wanted offshore recreation access (19.8% vs. 30.8%).
- **Consistent niche:** about 20% in both samples were interested in educational tours and an onshore educational center.
- **Most valued:** fishing near turbines (about $33 - $34 per hour), followed by scuba diving and guided boat tours.
- **Higher in 2025 sample:** snorkeling ($13.85 vs. $10.63) and guided reef tours ($15.87 vs. $13.34).
- **Least valued:** onshore centers, unguided tours, and surface activities such as wake surfing and paragliding ($3 - $8 per hour).
- Overall demand is limited, but a committed subset values marine-based experiences combining adventure, education, and proximity to turbines.

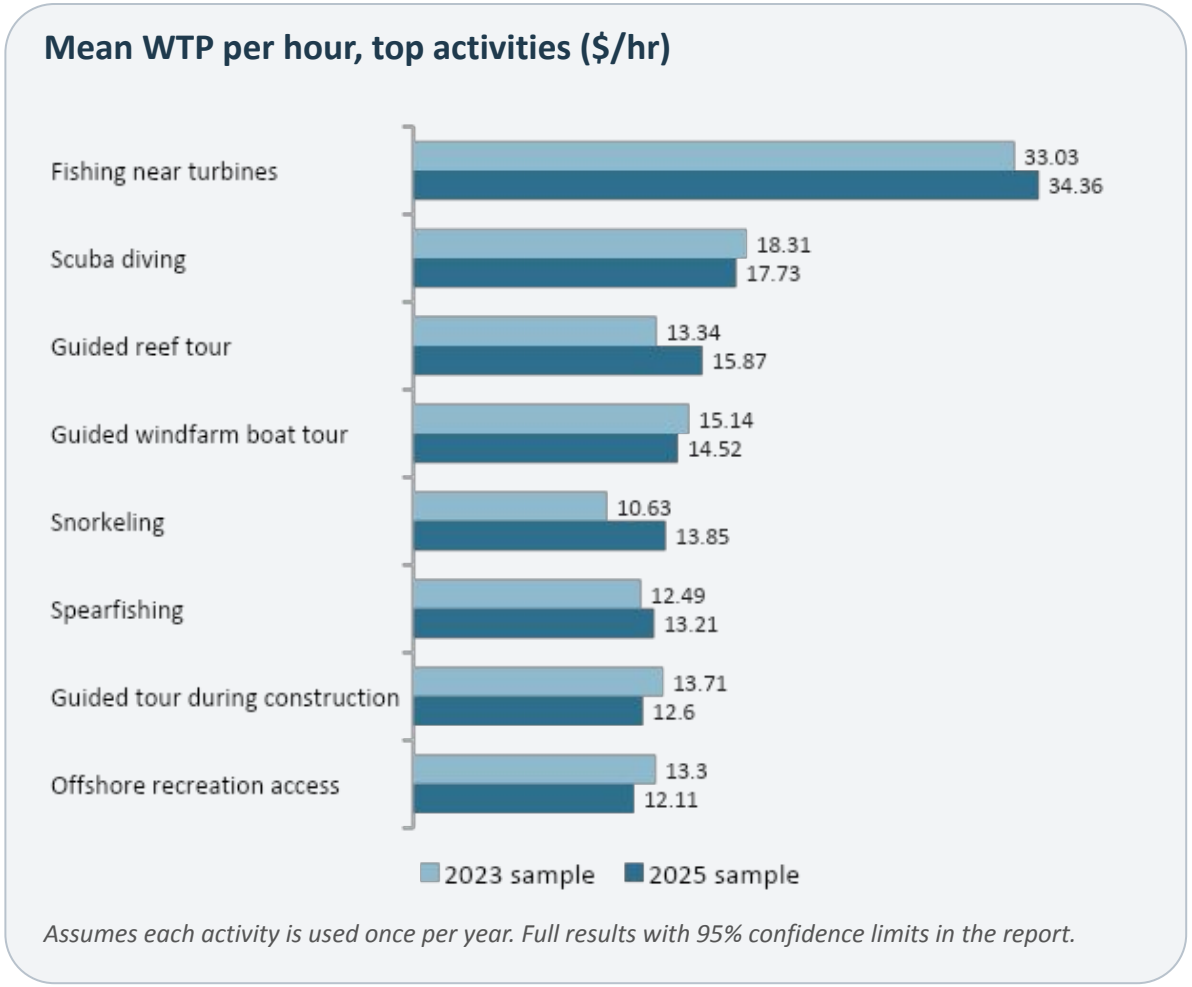


Figure 7. Anglers' mean WTP per hour for top offshore wind activities (2023 vs. 2025 samples)

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Willingness to Pay (WTP): Econometric Model for Residents and Tourists

- **Purpose:** estimate how prior knowledge of offshore wind and other factors relate to residents' and tourists' WTP for recreation where turbines are visible.
- **Activities:** sightseeing, fishing, boating, beach visitation, and bird/whale watching, each modeled separately.
- **Method:** Ordinary Least Squares (OLS) with Huber-White robust standard errors clustered at the state level to correct for heteroskedasticity.
- **Reference levels:** the largest group for each variable (Hardy, 1993), applied to both models so residents and tourists can be compared.

Model specification

$$WTP_i = \beta_0 + \beta_1 Season_i + \beta_2 Visit_Frequency_i + \beta_3 Repeat_Visitor_i + \beta_4 Knowledge_OWF_i + \beta_5 Awareness_OWF_i + \beta_6 Race_i + \beta_7 Education_i + \beta_8 Age_i + \beta_9 Income_i + \varepsilon_i$$

Trip behavior
Season, visit frequency, repeat visitor

Familiarity with offshore wind
Prior knowledge, prior awareness

Demographics
Race/ethnicity, education, age, income

WTP_i: WTP of resident or tourist i for each activity; ε_i: error term.

WTP Regression Results

- **Prior knowledge** of offshore wind raised WTP for several activities in both groups.
- **Visit frequency:** tourists visiting once a year had higher WTP for sightseeing (+$271) and beach (+$284); frequent residents for boating (+$236), beach (+$172), and birding (+$182).
- **Age:** younger groups had higher WTP than those aged 55+, mainly for sightseeing, beach, and boating.
- **Ethnicity:** some differences by activity (e.g., higher birding WTP among Hispanic/Latino and Black/African American participants).
- **No clear effects:** season, education, and income.
- No significant negative effect of turbine visibility on WTP for any activity.

Key Outcomes by Research Objectives

Objective	Outcome
1. Effects on fishing activities	Most anglers would keep fishing preferred areas (66% in 2023; 64% in 2025). About 62% would avoid construction, but only 40% would avoid built turbines; 16 -17% would seek them out.
2. Perceptions and attitudes	Close to half expect lower enjoyment and catch. Concerns center on aesthetics, navigation, and tourism, while clean energy and jobs are viewed positively.
3. Willingness to pay	Anglers valued fishing near turbines most (about $33 - $34/hr) but showed limited interest in offshore wind tourism programs. For residents and tourists, prior knowledge raised WTP, and turbine visibility had no significant negative effect.
4. Economic baseline	Expenditure baselines were established for both samples. After adjusting for double counting, fishing and water sports far exceeded other activities, and shore zip codes ranked in the top 5% for spending. SAM modeling estimated statewide output gains of $470M - $620M (best case) and losses of $1.19B - $1.47B (worst case).
5. Differences, 2023 vs. 2025	Demographics were similar, the 2025 sample reported more frequent coastal visits, and cost concerns were more prominent in its open-ended responses.

Research Outputs and Data Products

Data products

Survey instruments
Angler questionnaire (both rounds) and the coastal tourism questionnaire.

Cleaned survey datasets
2023 and 2025 angler surveys and 2025 tourism survey, screened for quality.

Zip-code estimates and maps
Expected angler spending for 677 zip codes, with GIS maps for 2023 and 2025.

Research outputs

Expenditure estimates
Annual and per-trip spending by category for anglers, tourists, and residents.

Economic impact estimates
SAM multiplier results for output, GDP, and household income under best- and worst-case scenarios.

Sentiment analysis
Sentiment by response length, word frequencies, and word clouds for each group.

WTP results
Anglers' hourly WTP for 15 offshore wind activities; regression of residents' and tourists' WTP.

Thank You!

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Dave Secor

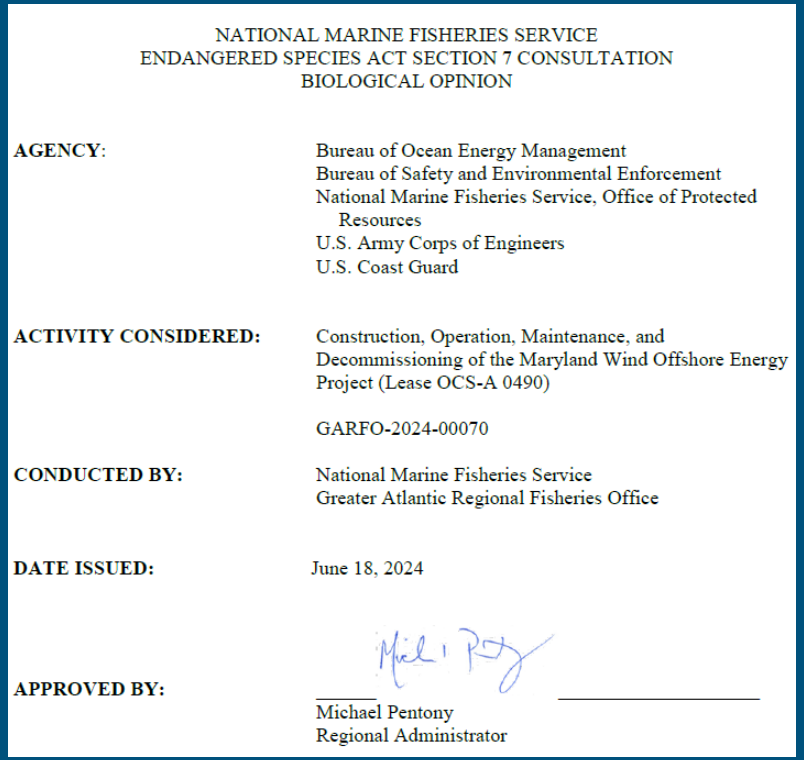
TailWinds

tailwinds.umces.edu

US Wind
Fueling our future, naturally.

Fisheries Resource Monitoring Project

Pot (commercial) and recreational (charter) BACI experiments



NATIONAL MARINE FISHERIES SERVICE
ENDANGERED SPECIES ACT SECTION 7 CONSULTATION
BIOLOGICAL OPINION

AGENCY: Bureau of Ocean Energy Management
Bureau of Safety and Environmental Enforcement
National Marine Fisheries Service, Office of Protected Resources
U.S. Army Corps of Engineers
U.S. Coast Guard

ACTIVITY CONSIDERED: Construction, Operation, Maintenance, and Decommissioning of the Maryland Wind Offshore Energy Project (Lease OCS-A 0490)

GARFO-2024-00070

CONDUCTED BY: National Marine Fisheries Service
Greater Atlantic Regional Fisheries Office

DATE ISSUED: June 18, 2024

APPROVED BY:
Michael Pentony
Regional Administrator

The Maryland Offshore Wind Project also includes a number of survey components including high-resolution geophysical surveys (HRG), fisheries resource surveys and monitoring, and a Marine Mammal Monitoring Program that includes passive acoustic monitoring studies conducted in partnership with the University of Maryland Center for Environmental Science (UMCES) "Tailwinds"…These data collection activities will occur at different times during the pre-construction, construction, and operation and maintenance phases of the project

Recreational (Charter) Survey

Dave Secor, Mike O’Brien, Ryan Woodland

2022=trial year

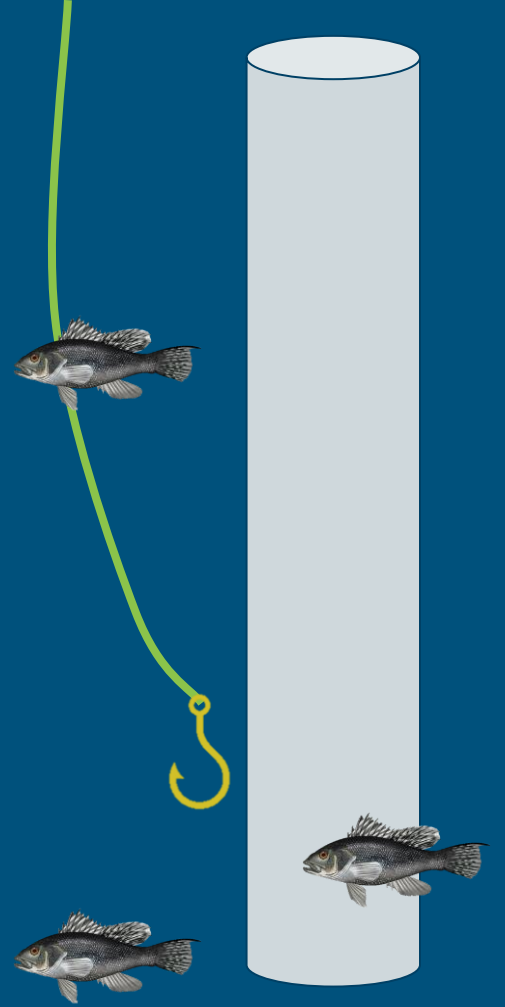
2023=first Before After Control Impact (BACI) year (2023-2028)

2024=cessation of BACI

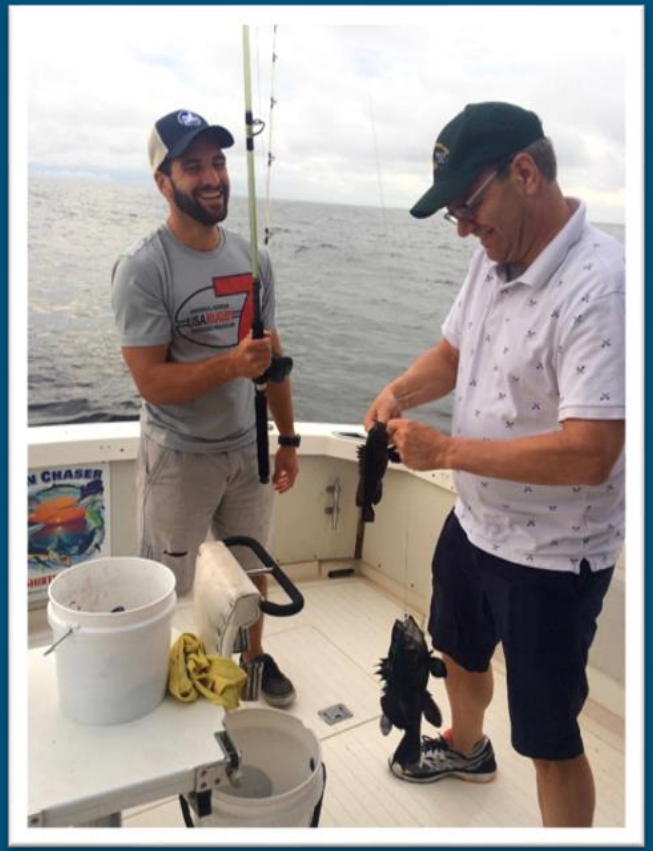








The Reef Effect: Recreational fishing



Well suited for classic BACI Designs
Key challenge: What's the control?

1. Use existing wreck sites as controls
2. Evaluate
    - Colonization by black sea bass
    - Greater relative catch rates
    - Greater jigging catch rates



Photo by D. Monti

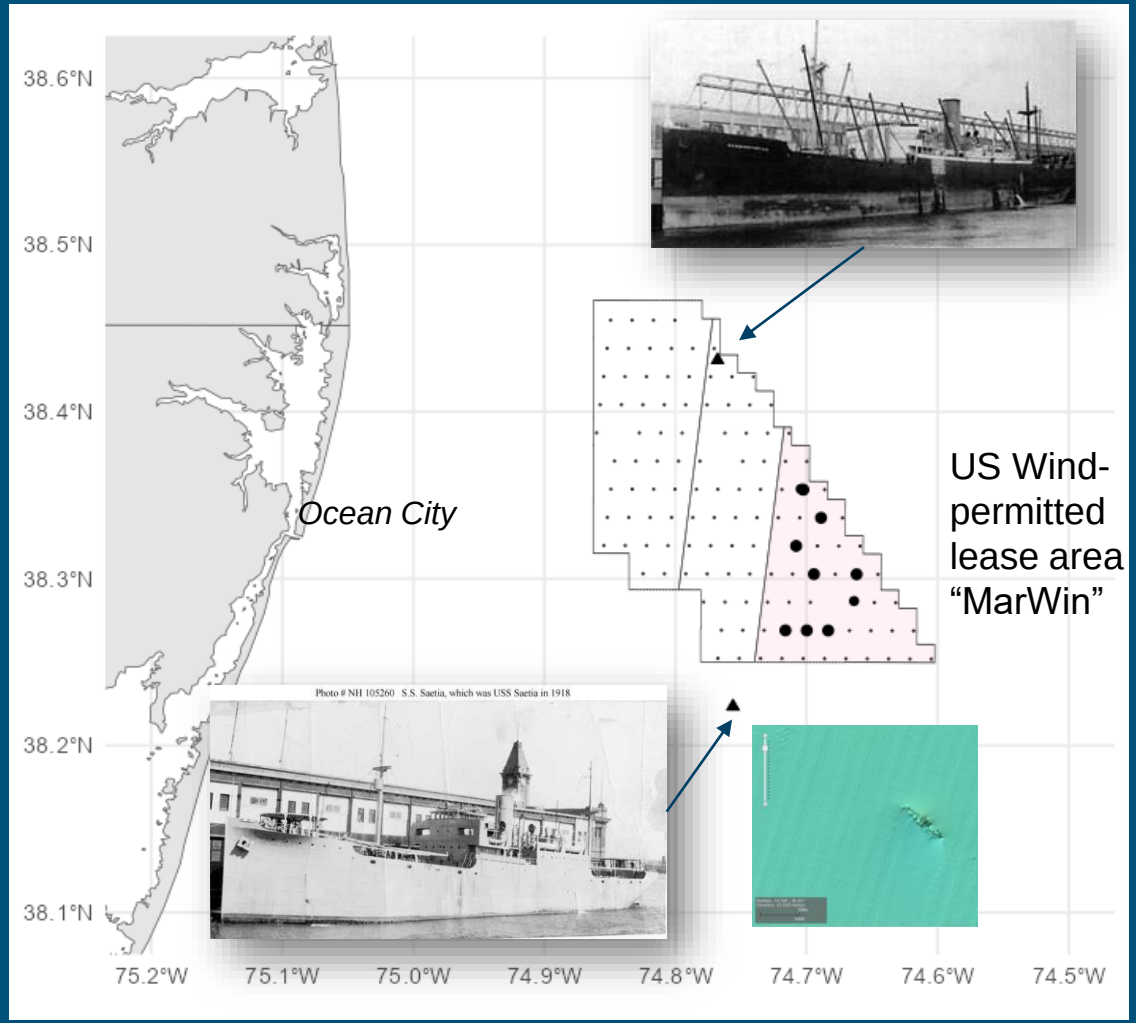
Recreational survey: BACI

Control wrecks:

- SS Washingtonian
- USS Saetia

Experimental sites:

- Future turbines
- Only those surrounded by other turbines
- Randomized selection each cruise



Recreational survey: BACI

Monthly 2-day surveys:

Two Control wrecks:

- SS Washingtionian
- USS Saetia

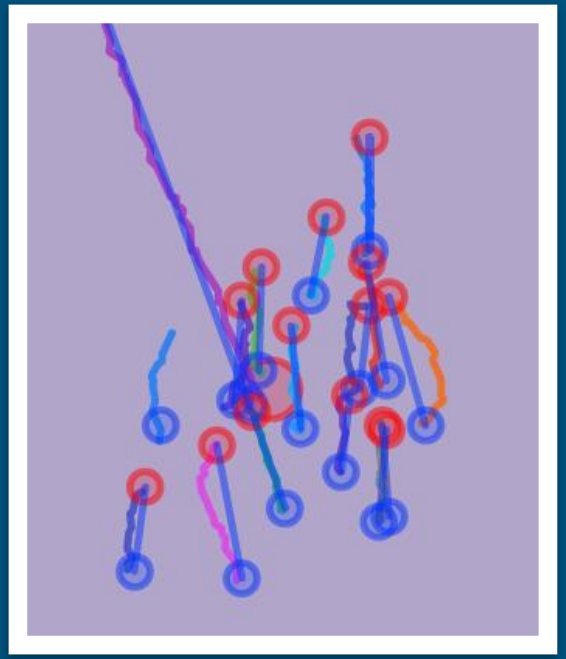
Two Experimental sites:

- Random future turbine locations

Methods

1. 15 min jigging (mate)

2. 15 x 3 min “drops” (3 anglers)





Charter Vessel
FV Fin Chaser



- Standard double J hook rigs
- 3 anglers & their proficiency
- Catch times for each 3 minute drop
- Bait type
- Fish species, wt, TL, barotrauma



Date: 9-7-23 Station: L08 Retain 10 fish each from jig and drop bring caraway to Sarette. BUCKET TARE

Drop ID/ Anchor?	GPS start wpt	GPS end wpt	Start	Drop times Fish on	Drop times Surface	Completed Species	Angler	Bait	Hook	Baro	TL	Weight	Retained	Notes	Sex
J-4	68	69	9:11	142	2:03	SR	M	S	M	S	282	150	N		
				11:50	12:10	CNR	M	S	M				N	460 dsk w/ clear nose ray	F
D1	70	71	9:29	44	1:00	SR	DS	S	M	A	267	215	N		F
D2	72	73	9:33	2:50	3:17	SR	M	S	M	A	21	90	N		
D3	74	75	9:37												
D4	76	77	9:41	3:00	3:15	SR	M		M	A	226	105	N	* at 3 min mark	
D5	78	79	9:46												
D6	80	81	9:49	101	119	SR	M		M	N	180	65	N		
				2:48	3:10	SR	DW		M	A	239	145	N		F
D7	82	83	9:55												
D8	84	85	9:58	300	3:15	SR	M		M	A	228	115	N		F
D9	86	87	10:03	219	2:40	SR	DW		M		235	100	N	Fish ~ 997 off	
				2:30	~~2:45~~	SR	M		M						
D10	88	89	10:07	1:30	1:50	SR	DW		M	A	223	100	N		F
D11	90	91	10:12	24	45	SR	DW		M	N	210	175	N		
				100	1:22	SR	DS		M	A	265	220	N		F
D12	92	93	10:16	34	51	SR	M		M		186	55	N		
				1:45	2:07	SR	DS		M	S	262	225	N		
D13	94	95	10:21	35	53	SR	M		M	N	232	130	N		
D14	96	97	10:26	47	1:07	SR							N		F
				2:28	2:50	SR						150	N		F
D15	98	99	10:30	126	146	SR									
				2:08	2:25	SR	M		M	A	205	110	N		F



Start = time of day Fish on / Surface time = running

Recr. Survey, 6+ years, 6 surveys/yr; 2 d/survey

BACI Period	Years	Monthly Surveys	N	Sites
TRIAL (BEFORE)	2022	May-Aug	2	2
BEFORE	2023-2024	May-Oct	6	4
CONSTRUCTION	2025-2026	May-Oct	6	4
AFTER	2027-2028	May-Oct	6	4



On hold

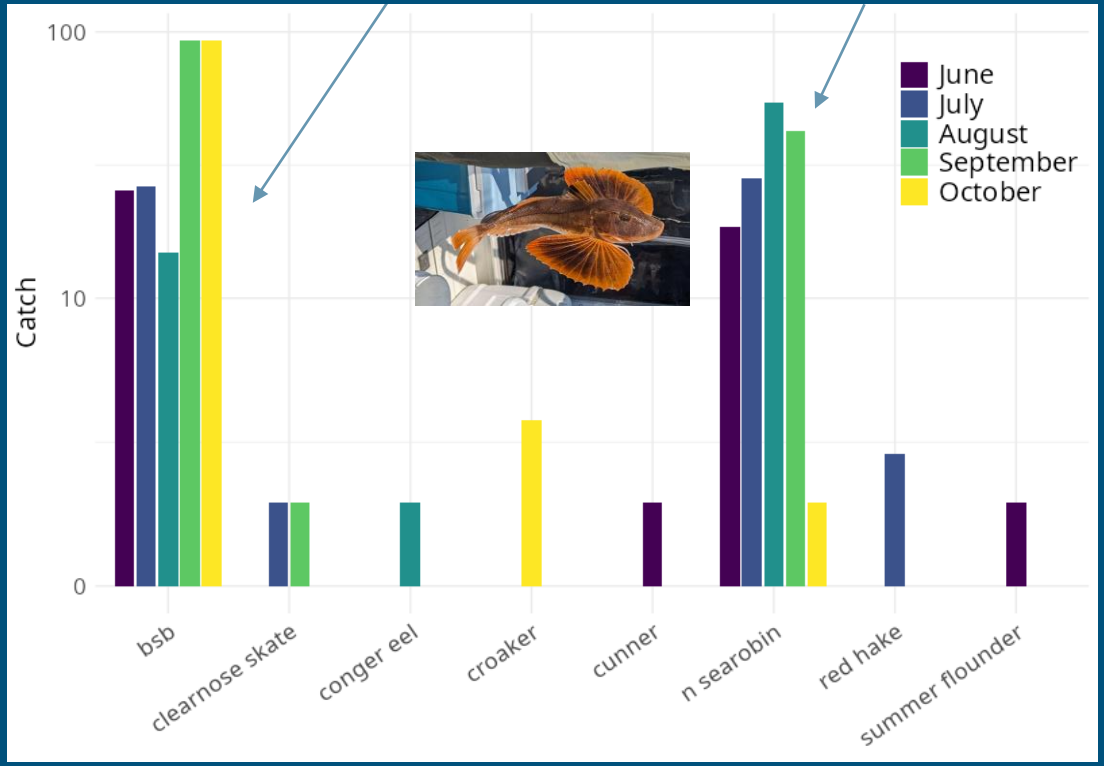
Black sea bass dominant at control wreck sites
Only northern sea robin caught at project sites (structureless)
Will not be able to evaluate power until turbines are in place



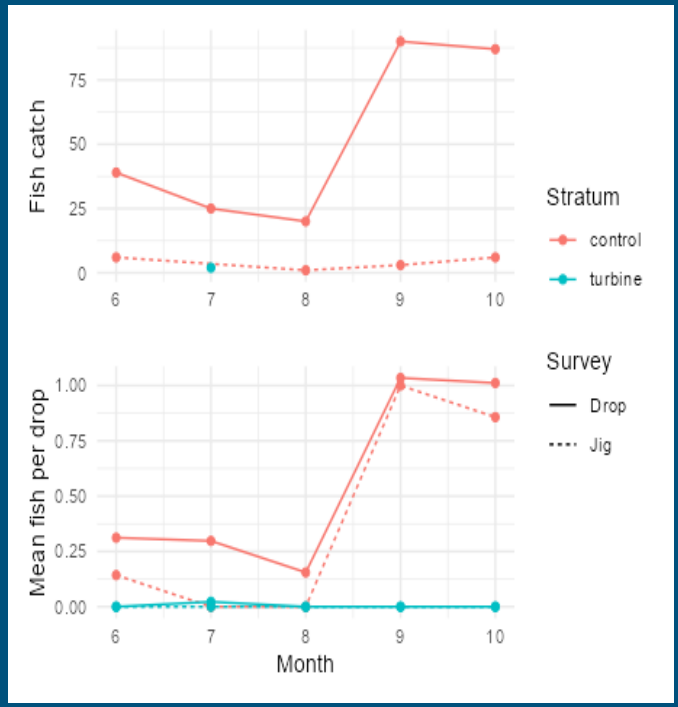
2023: Yr 1 of six-year BACI

Wreck sites

Turbine sites



Black sea bass catch rates



Biological Sampling





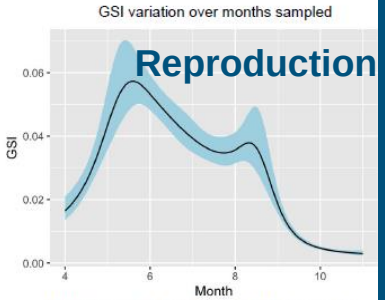


Figure 1. Generalized additive model of gonadosomatic Index GSI by month with 95% confidence interval, n=345.

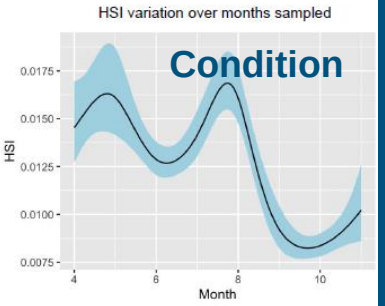


Figure 2. Generalized additive model of hepatosomatic Index HSI by month with 95% confidence interval, n=345.

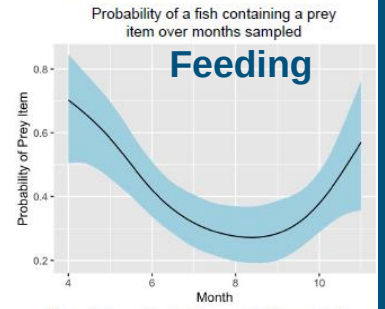


Figure 3. Generalized additive model of the probability of a subsampled fish containing a prey item by month with 95% confidence interval, n=345.

Colonization Hypotheses

1. Smaller fish initially colonize sub-foundations
2. Condition indices higher for sub-foundations than for wrecks (density-dependence)
3. Diet less diverse on sub-foundations than on wrecks
4. Pelagic prey will be more important for sub-foundations than for wrecks

Dave Secor

P. Perez (ROSA): What new/additional data would be most helpful to your work & how can we best collect those data?

Response:

- In the Mid Atl Bight, we will see >100-fold expansion of "reef" habitat. Turbine monopiles, foundations, and scour protection will become a new resource with technical interactions between recreational, charter and commercial fleets.
- "Unlimited" access to this new habitat resource is an emergent problem, which will be aided by information on the evolution of fishing effort on turbine structures.

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Fisheries Resource Monitoring Project

US Wind
Fueling our future, naturally.

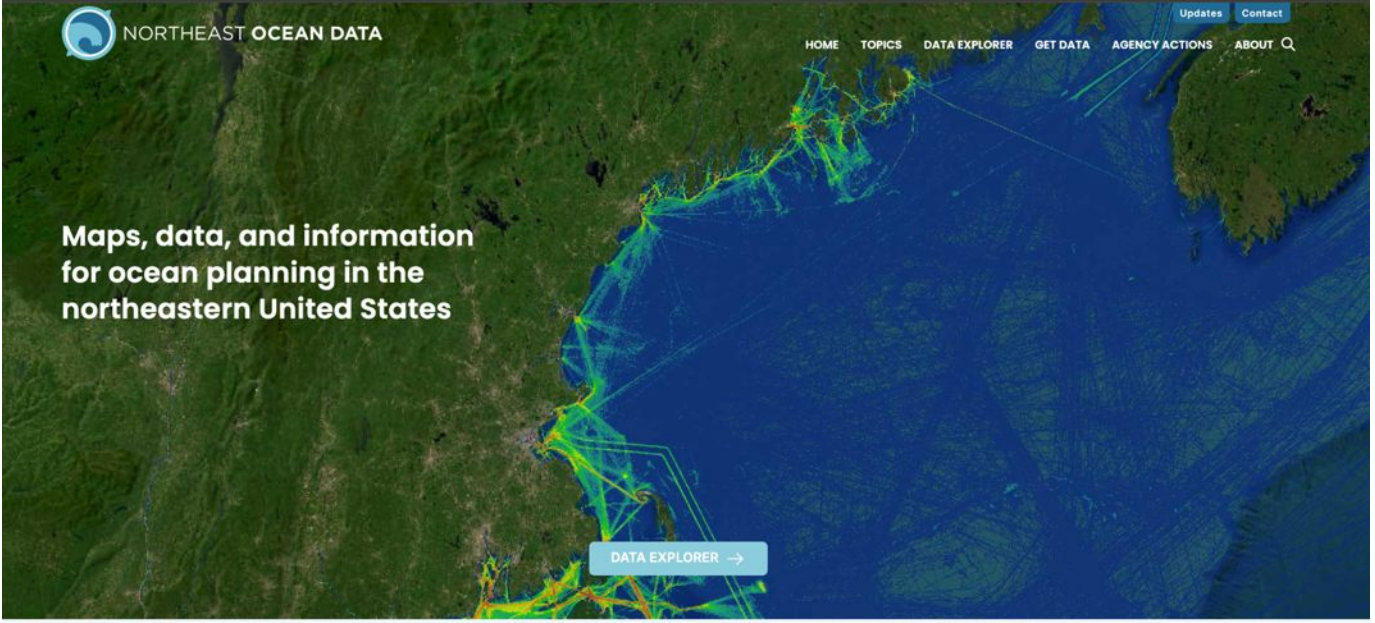
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Enhancing recreational boating and fishing datasets on the Northeast Ocean Data Portal

Amy Trice, NROC Senior Program Director

Emily Shumchenia, NROC Science and Portal Director



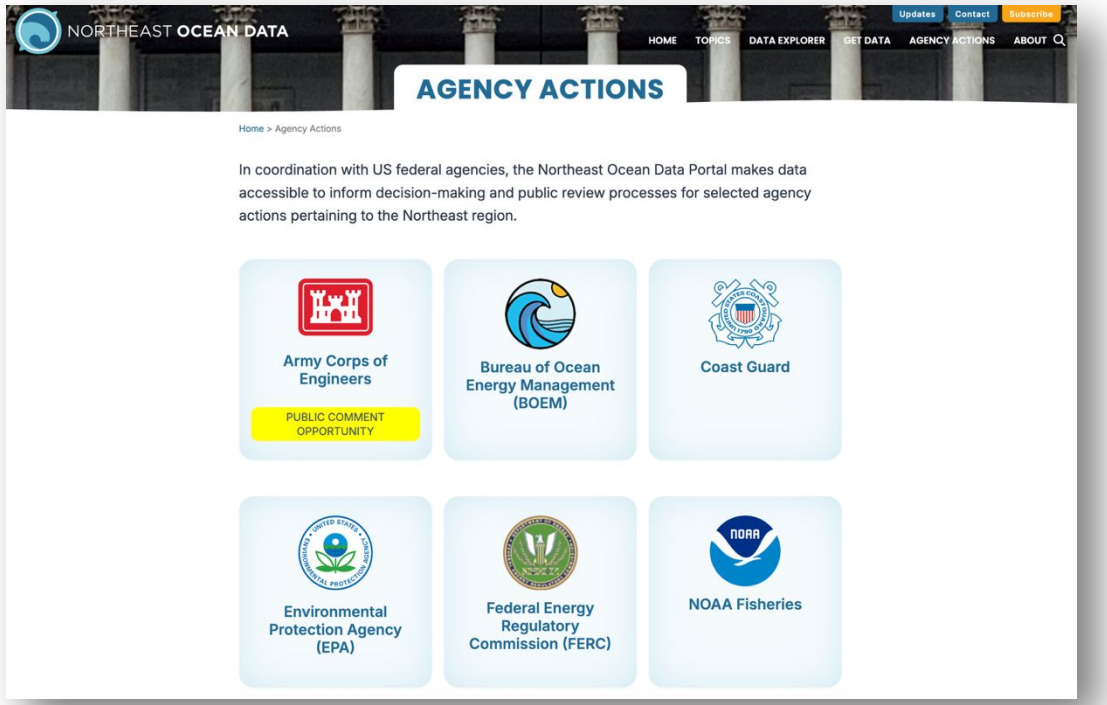


Northeast Ocean Data Portal

- Over 8,000 spatial data layers from federal, state, industry, researcher, and other sources
- Map products showing the footprint and changes over time for economic activities and ecological resources
- Maps showing jurisdictional areas, agency actions, and proposed projects
- Informed and vetted by regional experts, agencies, and stakeholders

NortheastOceanData.org

Why the Portal? Who uses it?



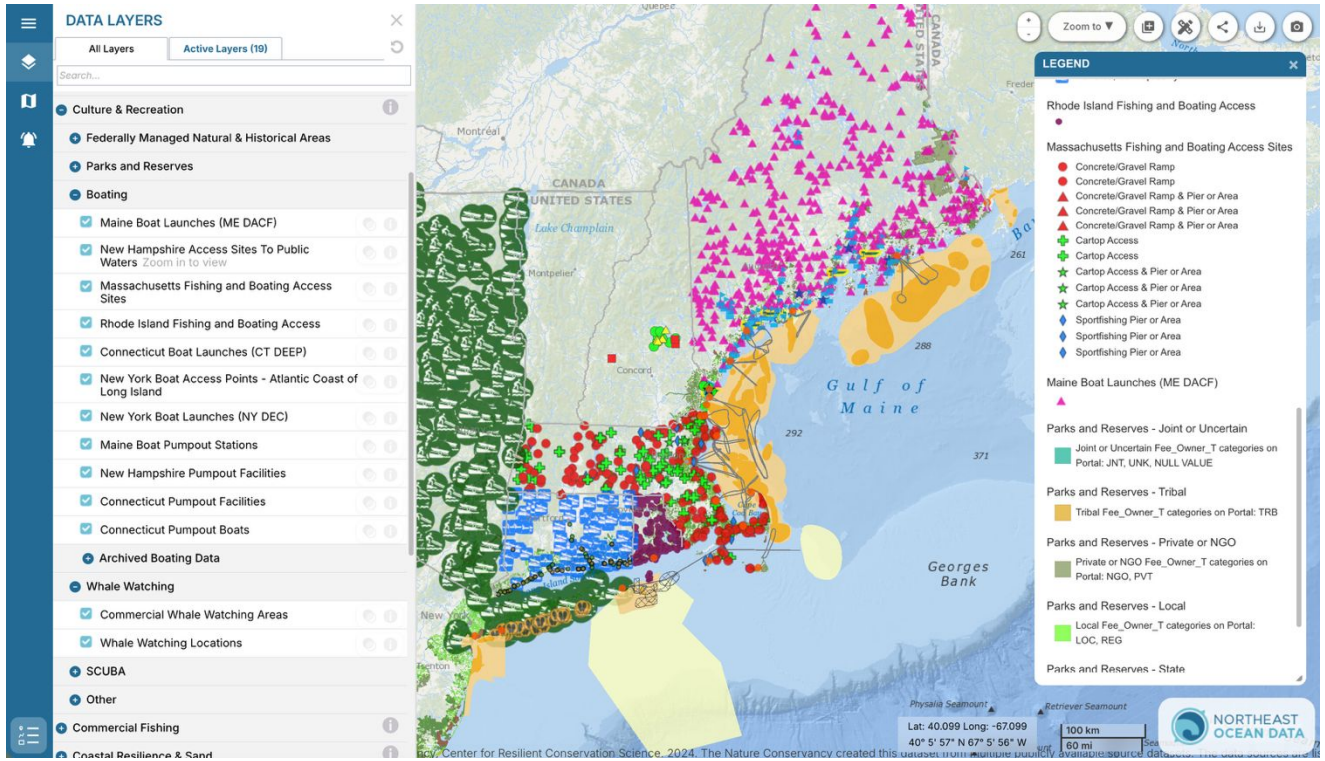
States, federal agencies, and industry partners have requested data and information related to recreational boating and fishing activities in the region.

NROC and Portal staff engage directly with USCG, marine trades, port operators' groups, and other national organizations to hear about what data are needed and how data are used.

Relevant Agency Actions: agencies reviewing permits for aquaculture, marine events, dredging, sand/minerals, energy projects

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Existing recreational fishing and boating datasets on the Portal



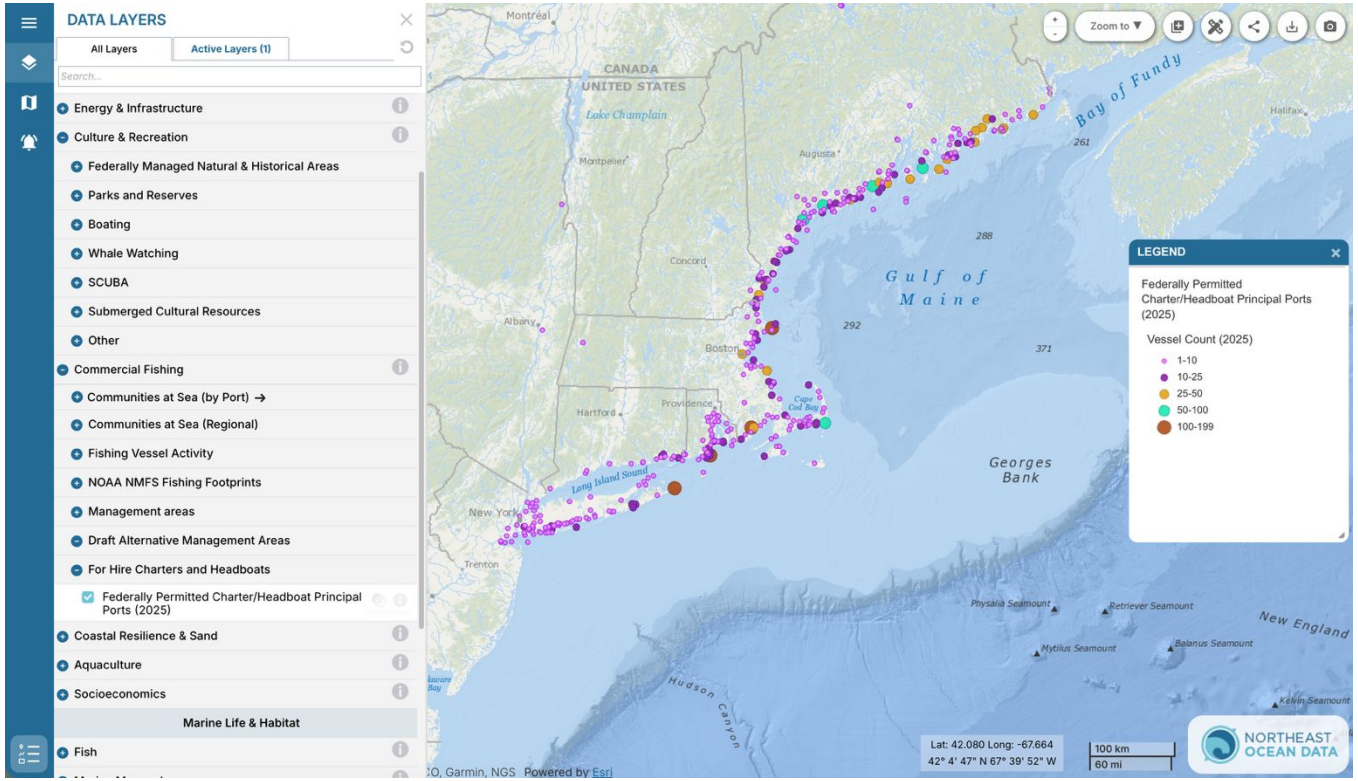
- Recently updated datasets: coastal public access points, boat ramps, boating pumpout facilities, Parks & Reserves which includes historic sites, and other properties that support coastal recreation, conservation, and tourism
- Whale watching areas, SCUBA sites
- “Archived boating data”: recreational use survey (boater routes, density, activities), distance sailing races, board and paddle events

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Enhancing recreational fishing and boating datasets on the Portal

Datasets coming soon / in progress:

- Federally permitted charter/headboats by principal port (w/ NOAA GARFO)
- Marine events (w/ USCG)
- Activity data? (w/ NOAA GARFO)
- Data products discussed today?



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NROC contacts

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