

# Sunrise Wind Fisheries Project Share 2024

# Agenda

**Intro:** Orsted – 5 min

**HabCam Survey:** Coonamessett Farm Foundation – 20 min

**Highly Migratory Species Monitoring:** New England Aquarium/ INSPIRE Environmental – 20 min

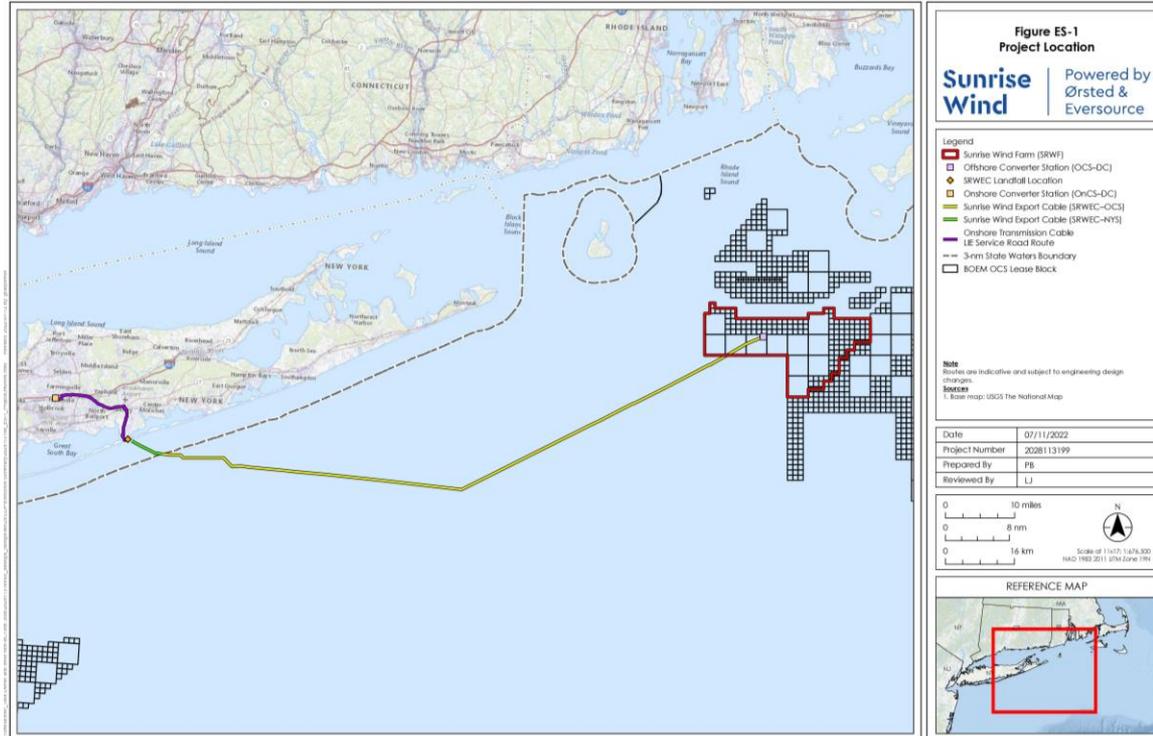
**Bottom Trawl and Ichthyoplankton Surveys:** School for Marine Science and Technology  
/Commercial Fisheries Research Foundation – 25 min

**Export Cable Acoustic Telemetry Studies:** Stony Brook/Cornell Cooperative Extension – 25 min

**Q&A** – 25 min

# Intro: Orsted

- Lease Area OCS-A 0487
- Approximately 30 miles from Montauk, NY
- 924 MW
- 84 WTGs
  - 11 MWs
  - 1 x 1 nm layout
- One Offshore Converter Station (OCS-DC)
- Landfall HDD at Smith Point County Park on Long Island



# HabCam Survey

**Coonamesett Farm Foundation**

**Presenter: Tasha O'Hara – Coonamesett Farm Foundation**

# 2023 CFF RSA HabCam v3 Survey

Sunrise Windfarm Lease Area

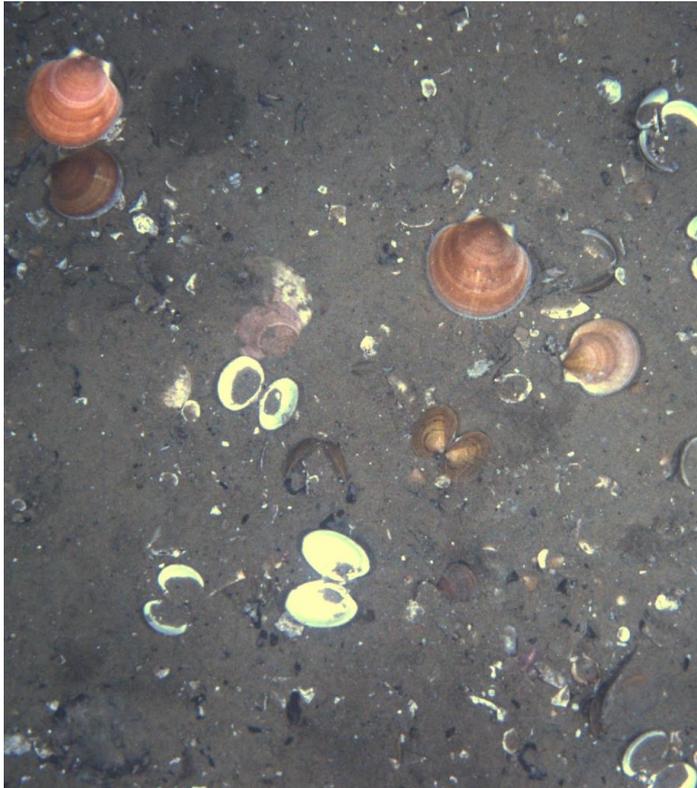
Tasha O'Hara, Luisa Garcia,  
Liese Siemann, Farrell Davis

Coonamessett Farm  
Foundation, Inc.

April 23, 2024



# Acknowledgements



## **Crew and Owners of *F/V* Kathy Marie**

Arnie DeMello, Jose Correia

## **Orsted staff**

Christopher Sarro, Greg DeCelles,  
Katelyn Schwebach, Jessica Cullinan,  
Maggie Curtis-Hardy

## **Engineering**

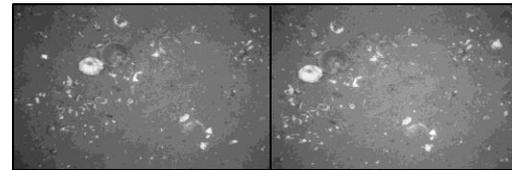
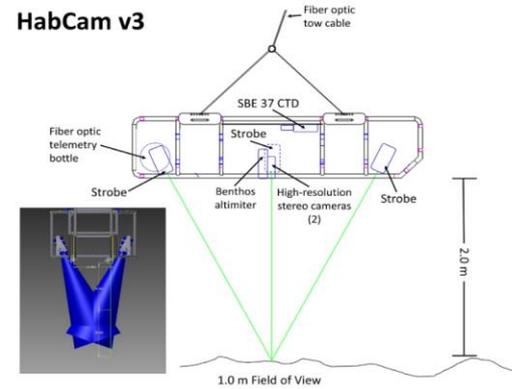
Jon Howland, Al Duester, Jim  
Newman

## **CFF staff and HabCam team**

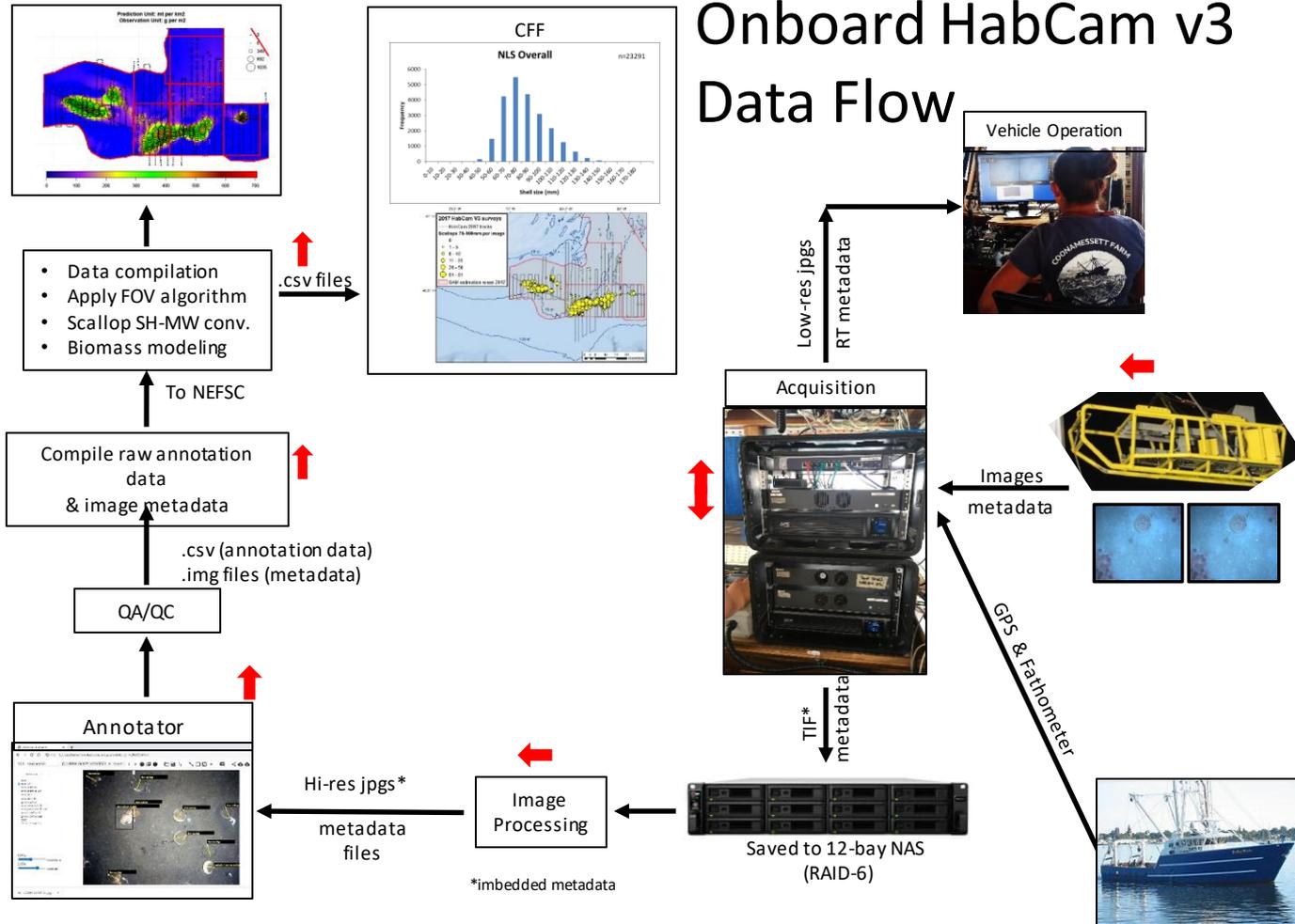
# HabCam v3 Vehicle Overview

## System Highlights

- Stereo cameras
- Strobes
- CTD, altimeter
- Telemetry / Control Bottle
  - Attitude sensor
  - Media converters
  - Network hardware
- Average tow speed:  
4.5-5.2 knots
- 6 images/second



# Onboard HabCam v3 Data Flow



# Data Analysis

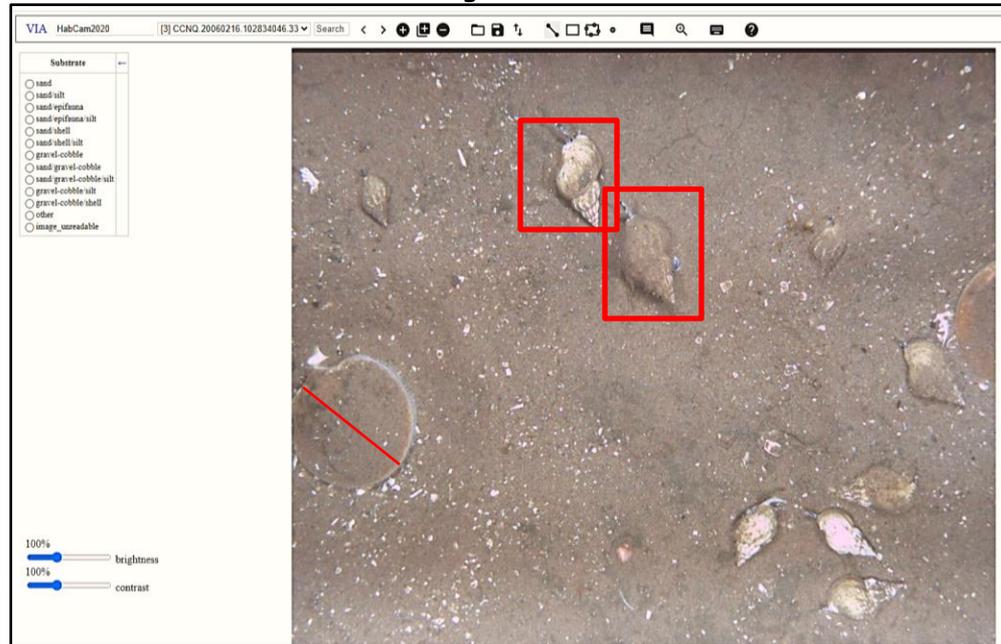
Annotators trained and assessed on control set

QAQC performed on a target 50% of image annotations

Similar annotation protocol to NOAA assessment survey

Biomass estimates calculated using stratified mean estimation by depth, area and Ordinary Kriging

Images aggregated over ~1000m segments



VIA annotator GUI. Annotations are made for pre-determined species and substrate lists. Brightness and contrast bars and zoom function added to improve annotations.

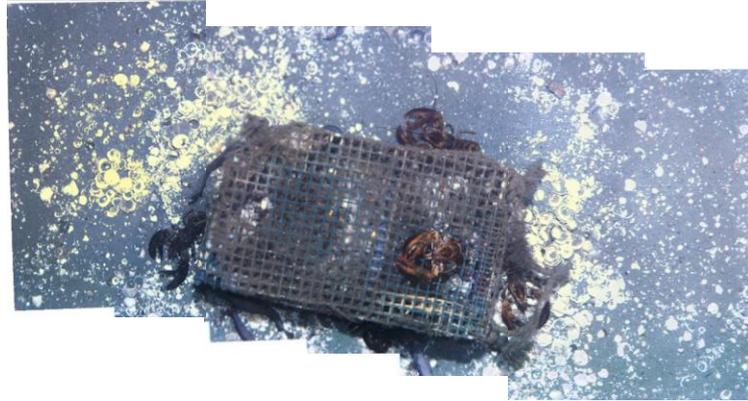
# Sunrise Wind Farm HabCam Survey

## Long-term Project Goals

Monitor and evaluate ecosystem changes before, during, after construction

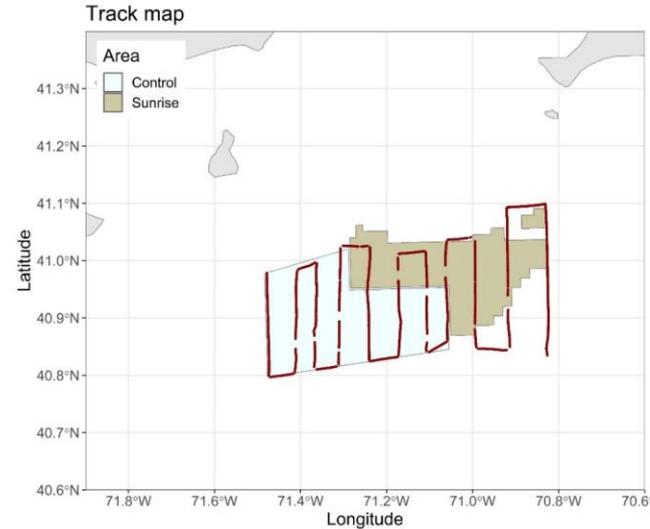
1. Changes in species abundance, density, distribution, and size
2. Benthic habitats and sediment shifts
3. Environmental factors such as salinity, temperature changes or anomalies

Collaborate with stakeholders to foster cooperation and build opportunities



# Survey Design

- July 6<sup>th</sup> -8<sup>th</sup> 2023
- Collected over 725,000 paired images
- Annotation rate 1:100
  - “Station” distance ~40m
- Proposed track 165 nm
  - R: track lines within lease and control areas
  - Modified for obstacle avoidance
  - Spacing ~3nm
- Control Area
  - Adjacent, non-WEA
  - Similar size, depth, vessel traffic, fishing effort, sediment



Map of completed survey track in 2023.

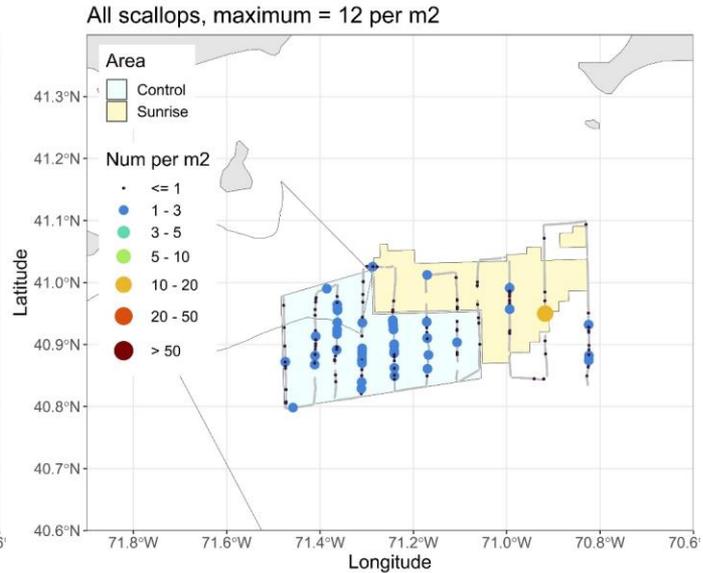
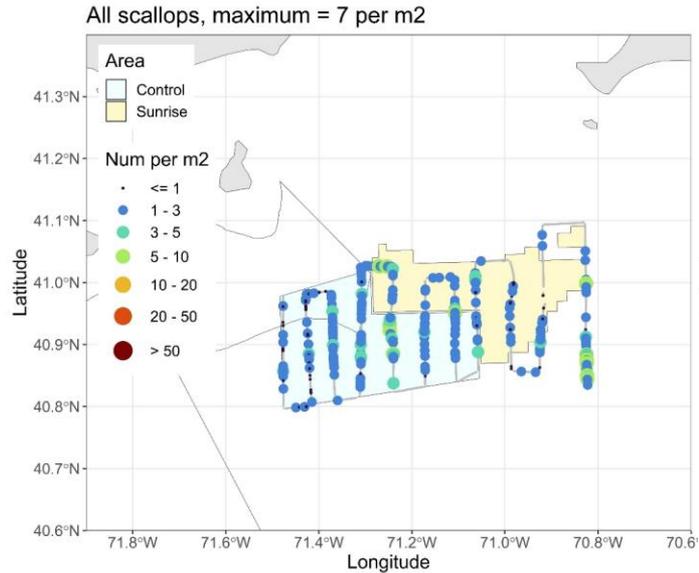
# Findings 2022 - 2023

- Change in species abundance and density between 2022 to 2023
- Decline in scallops and most species noted in both Control & SRWF in 2023
  - Aligns with scallop declines across the Mid-Atlantic
  - Change in survey timing 2022-2023
  - Fishing pressure
- Scallops ~3x more abundant in control area than SRWF

# Scallop Distribution

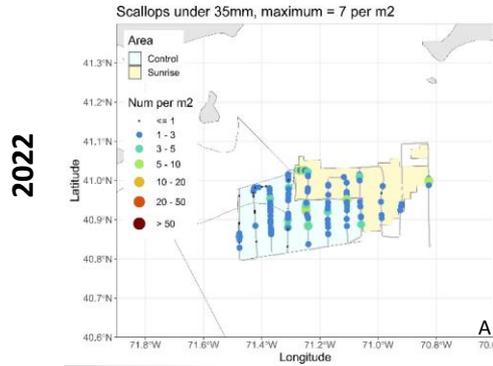
2022

2023

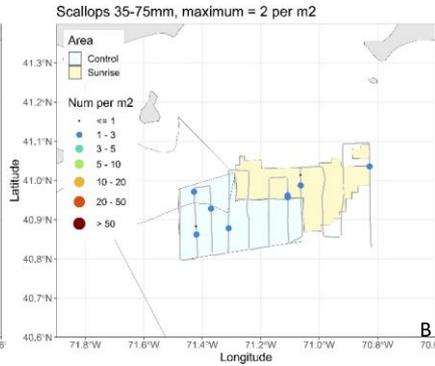


# Scallop Size and Distribution

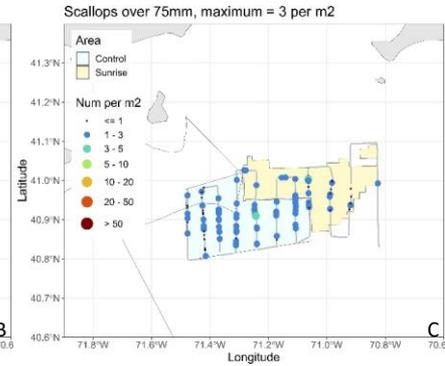
## Scallops < 35mm



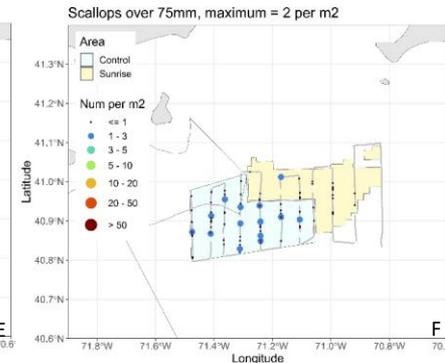
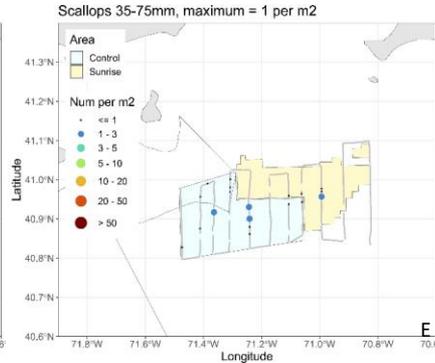
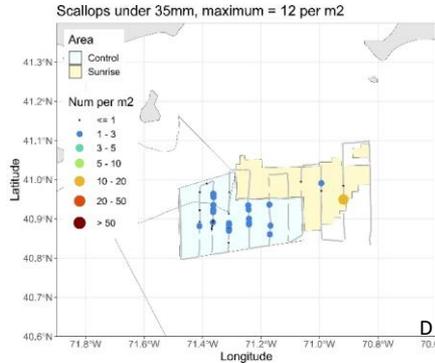
## Scallops 35 – 75 mm



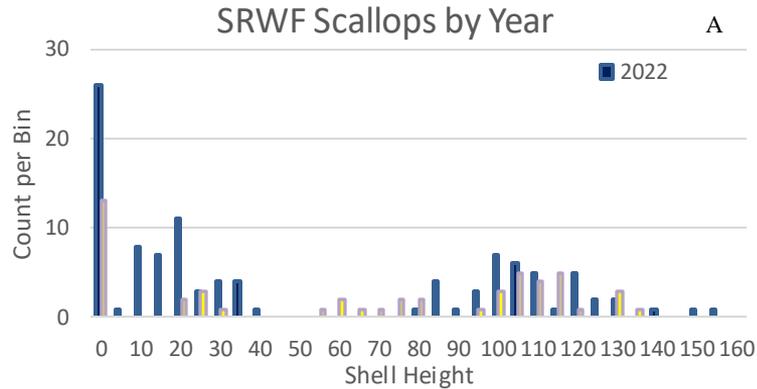
## Scallops > 75 mm



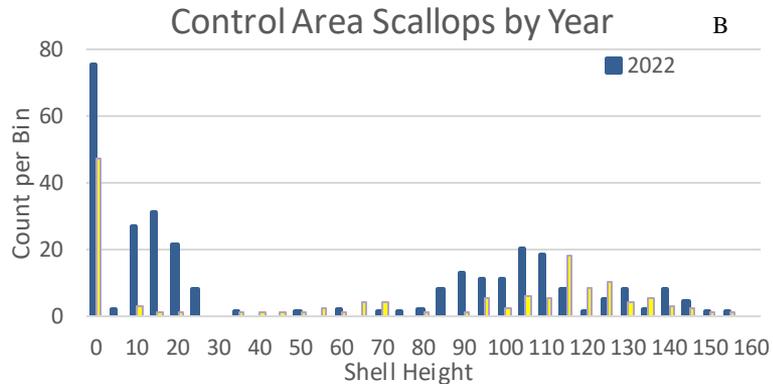
2023



# Scallop Shell Height

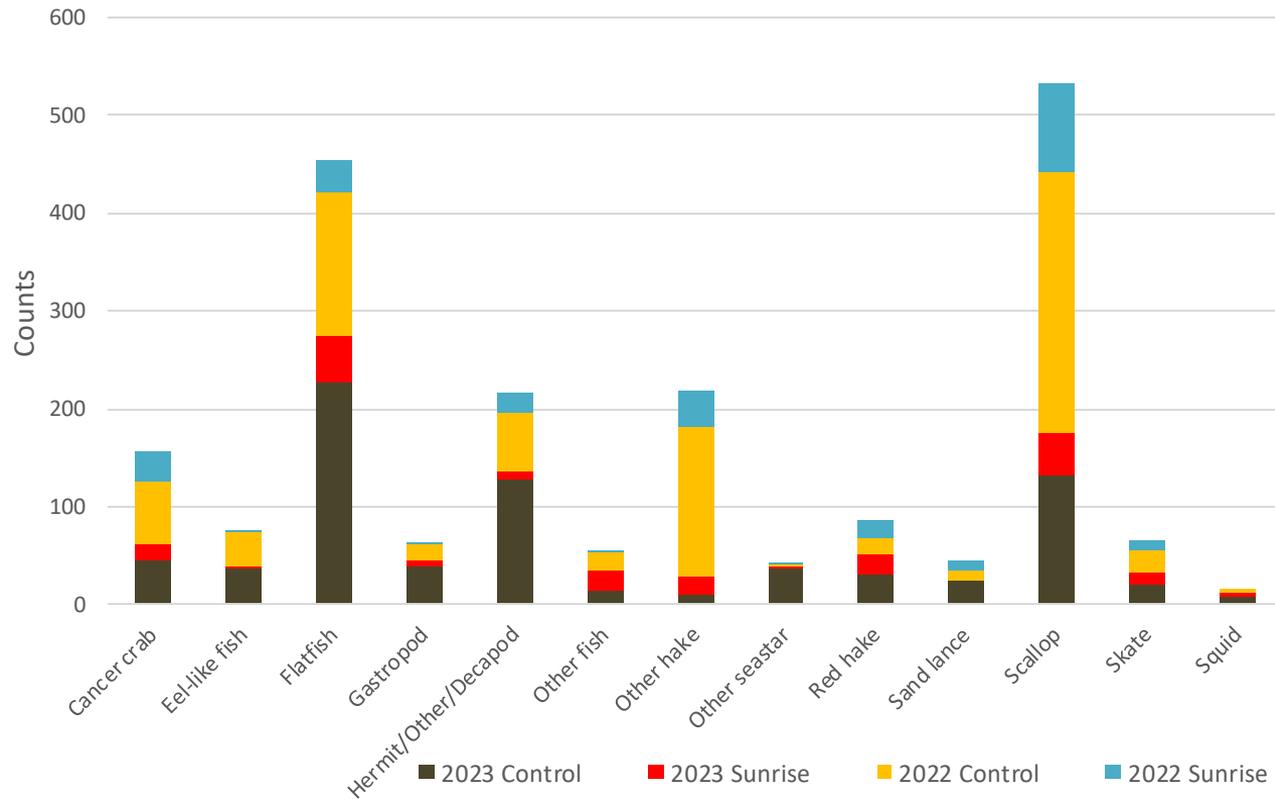


SRWF	2022	2023
N	41	32
Mean	109.4	102.4



Control	2022	2023
N	126	86
Mean	110.9	111.3

# Common Organisms by Area



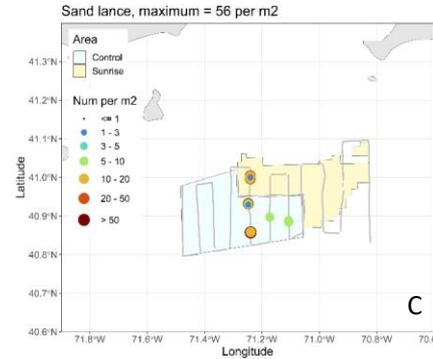
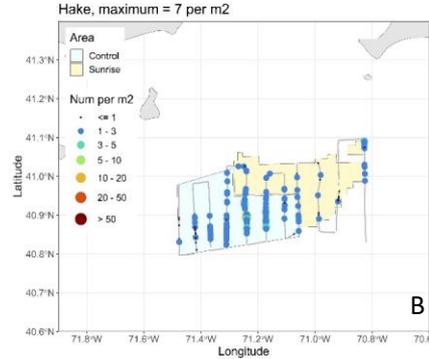
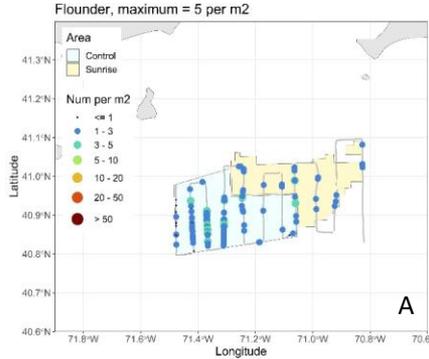
# Organisms by Area

## Flatfish

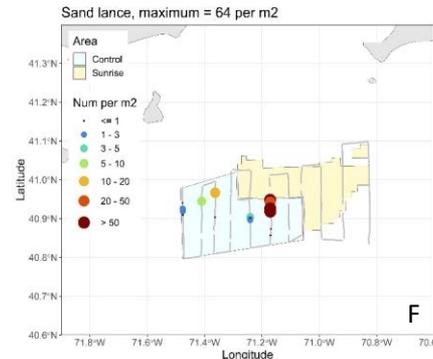
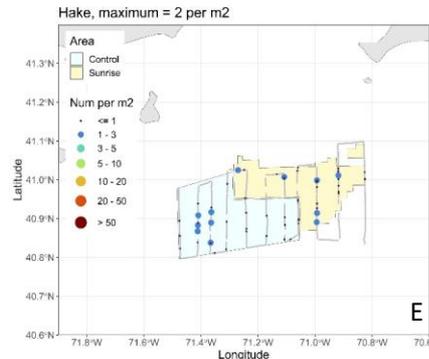
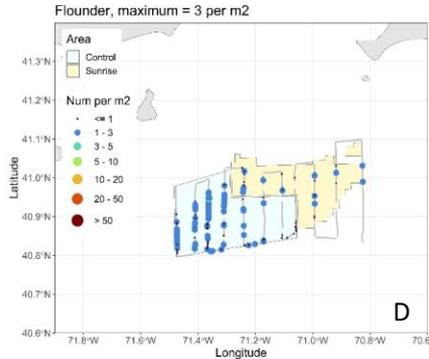
## Hakes

## Sand Lance

2022



2023

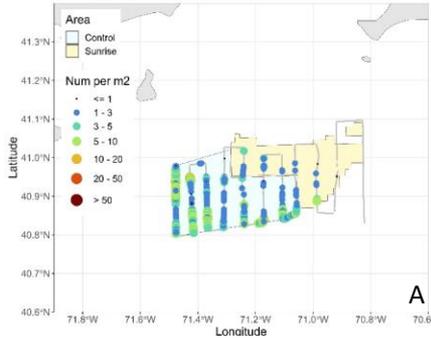


# Predator Organisms by Area

2022

## Astropecten

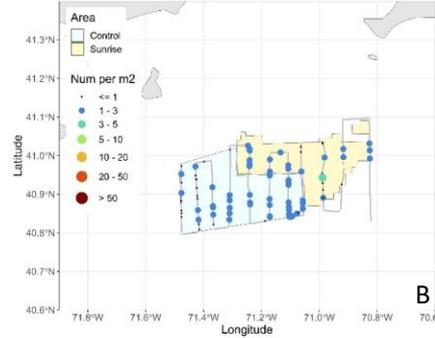
Astropecten, maximum = 13 per m2



A

## Cancer Crab

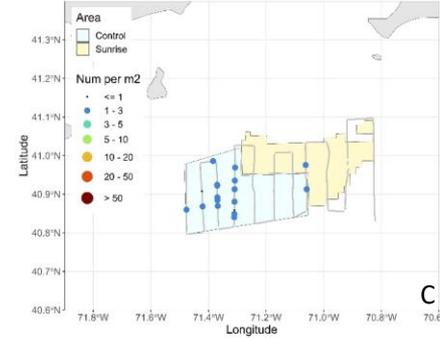
Crabs, maximum = 4 per m2



B

## Snails

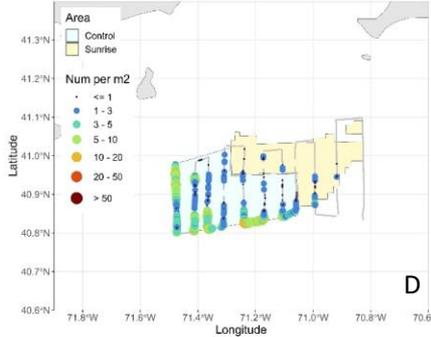
Snails, maximum = 2 per m2



C

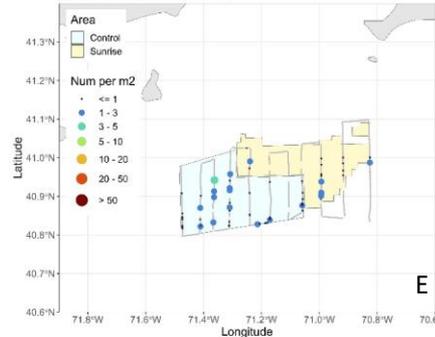
2023

Astropecten, maximum = 17 per m2



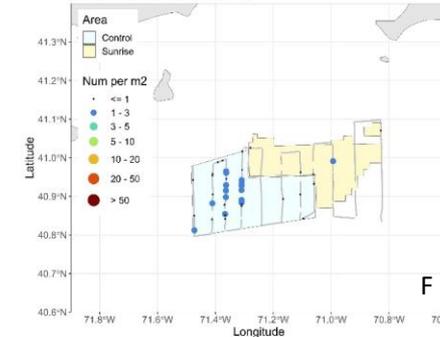
D

Crabs, maximum = 3 per m2



E

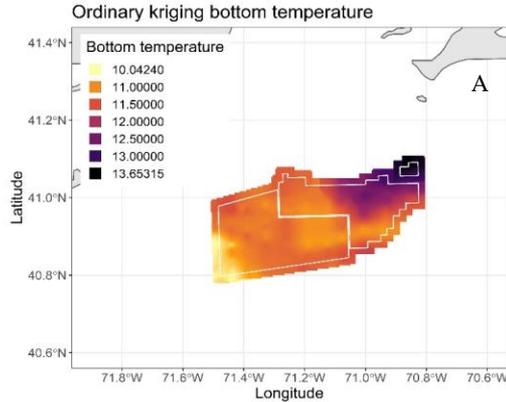
Snails, maximum = 2 per m2



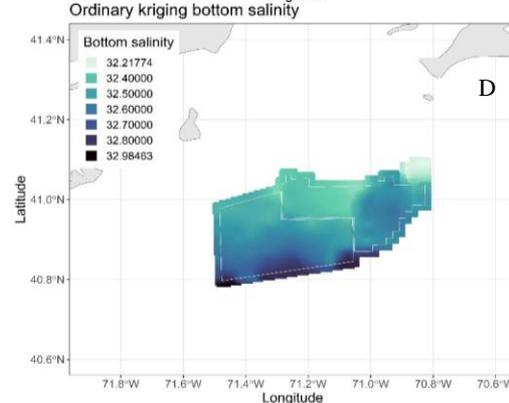
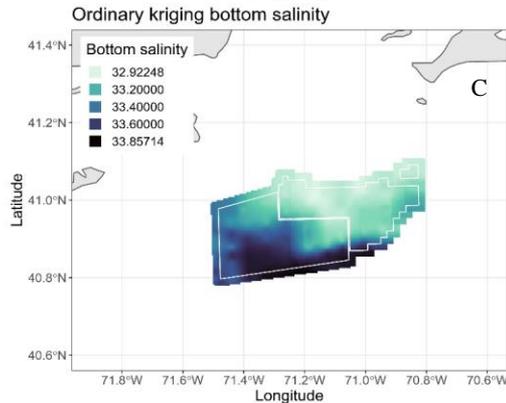
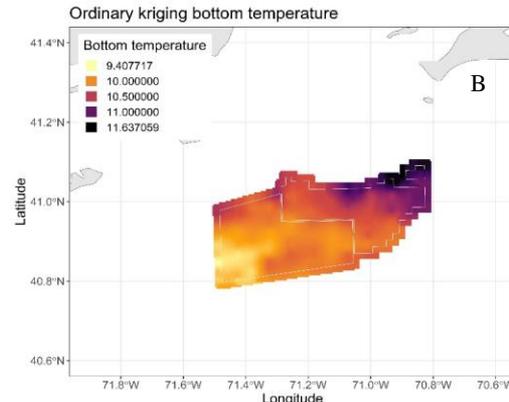
F

# Benthic Temperature and Salinity

2022

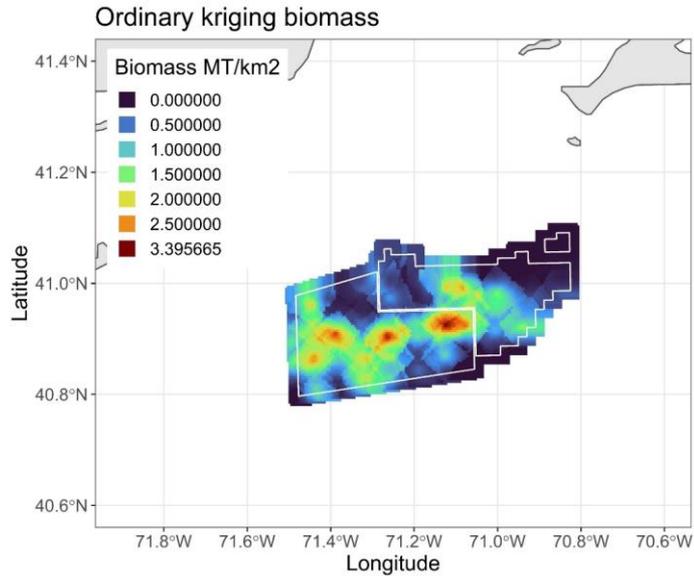


2023

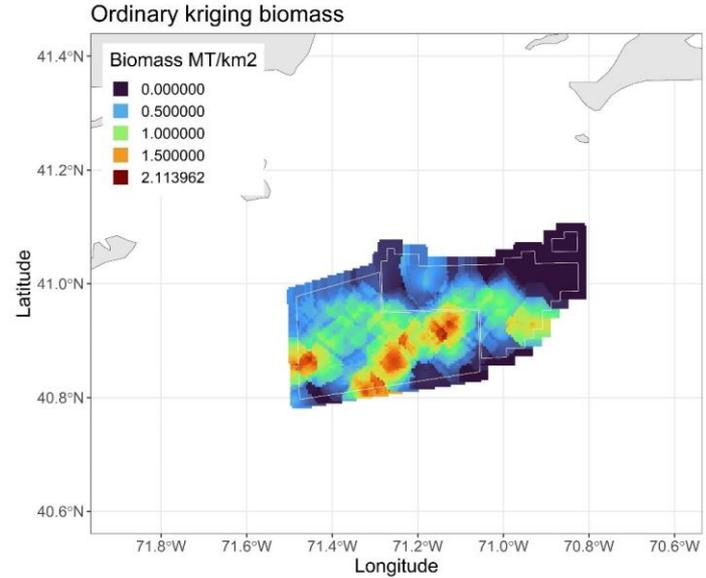


# Biomass Estimates-OK

2022

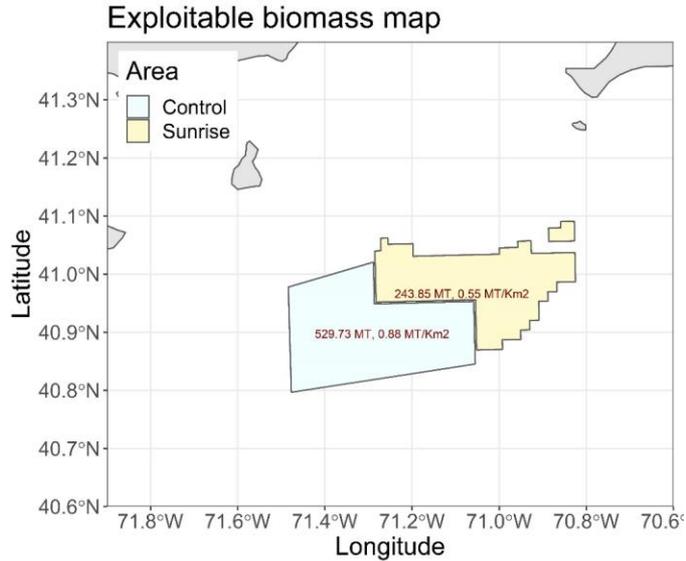


2023

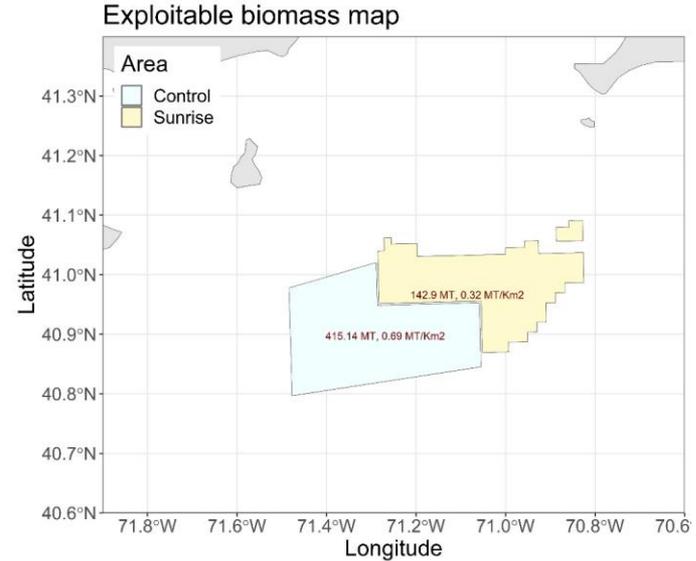


# Biomass Estimates-OK

2022

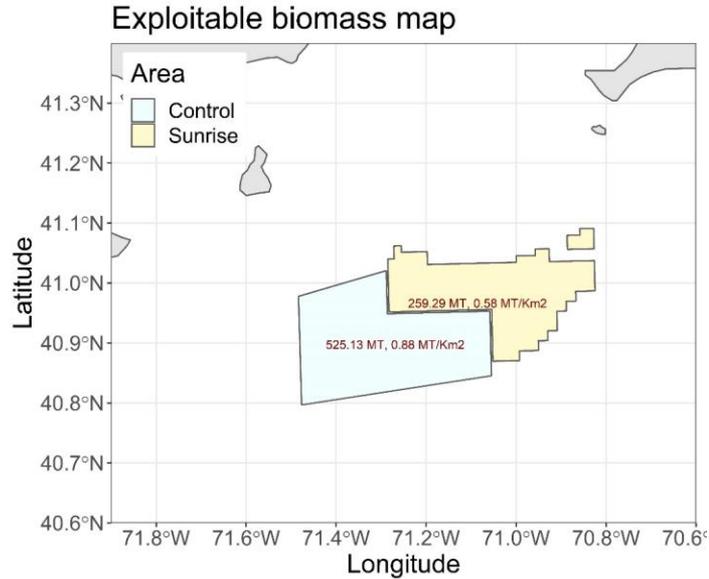


2023

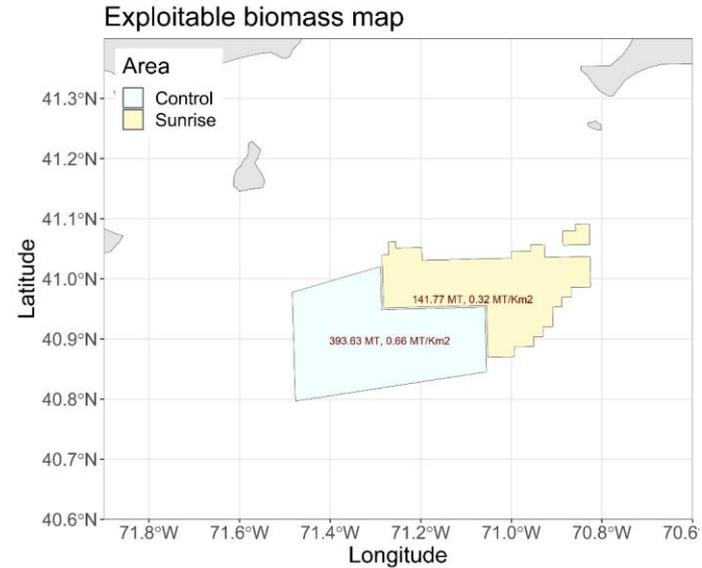


# Biomass Estimates- SM

2022



2023



# Biomass Estimates 2022-2023

		2023				2022			
		Total Biomass (MT)	Num millions	Exp Biomass (MT)	Exp Num millions	Total Biomass (MT)	Num millions	Exp Biomass (MT)	Exp Num millions
Ordinary Kriging	Control	487.01	20.27	415.14	12.44	679.62	26.61	549.72	18.92
	Sunrise	193.19	9.48	142.90	5.22	330.60	12.54	271.19	8.92
Stratified Mean	Control	467.00	19.12	393.63	11.81	649.56	25.22	526.18	18.06
	Sunrise	181.66	7.98	141.77	5.00	310.84	12.02	254.79	8.35

# Questions?



# Highly Migratory Species Monitoring

New England Aquarium/ INSPIRE Environmental

Presenter: Brian Gervelis – INSPIRE Environmental

# ***Monitoring the Baseline Presence and Persistence of Highly Migratory Species (HMS) within Southern New England Wind Energy Areas (WEA)***



Dr. Jeff Kneebone  
Edward Kim



Brian Gervelis



**Sunrise  
Wind**

Powered by  
Ørsted &  
Eversource

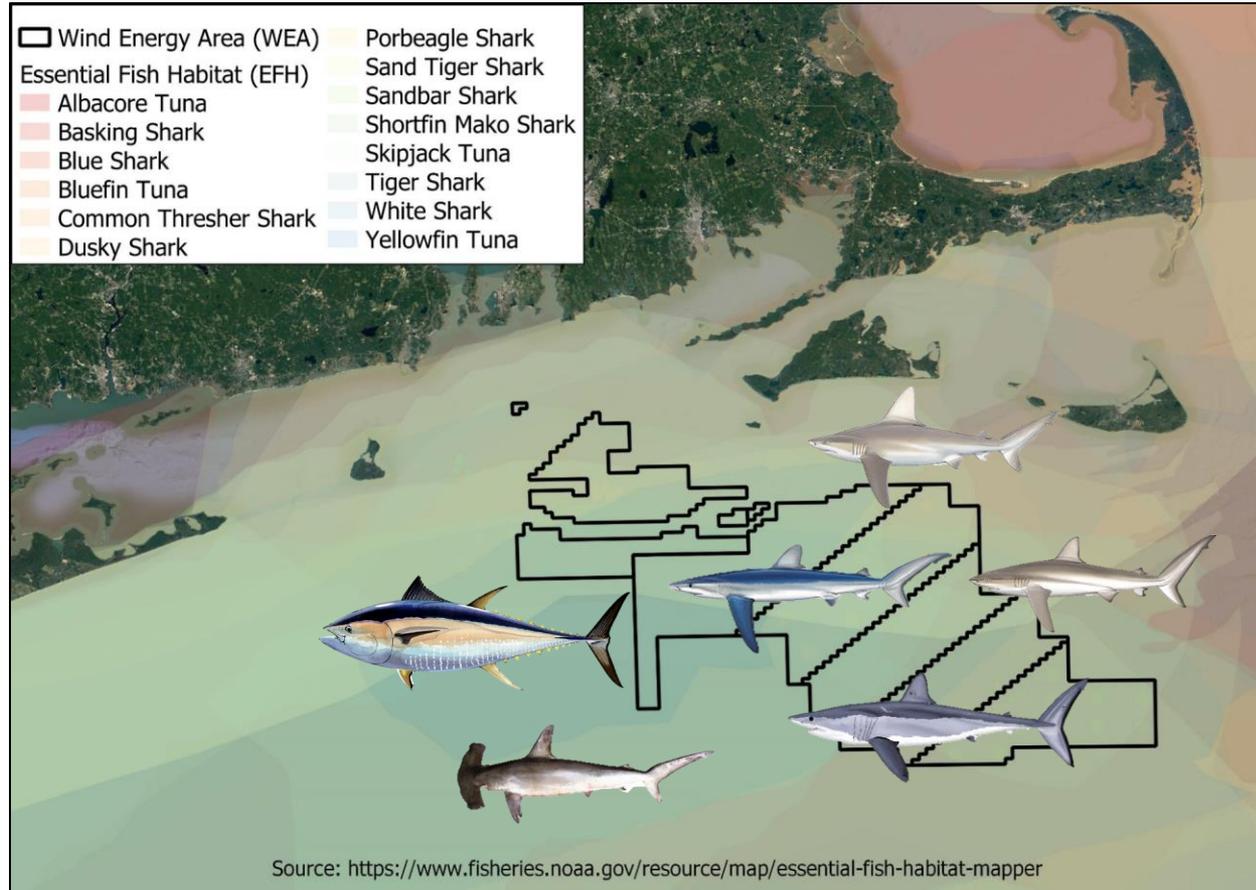
# HMS in southern New England (SNE) and the WEA

## SNE contains...

- Essential Fish Habitat (EFH) for 14 species
  - Migratory corridors
  - Foraging areas
  - Mating/pupping areas?

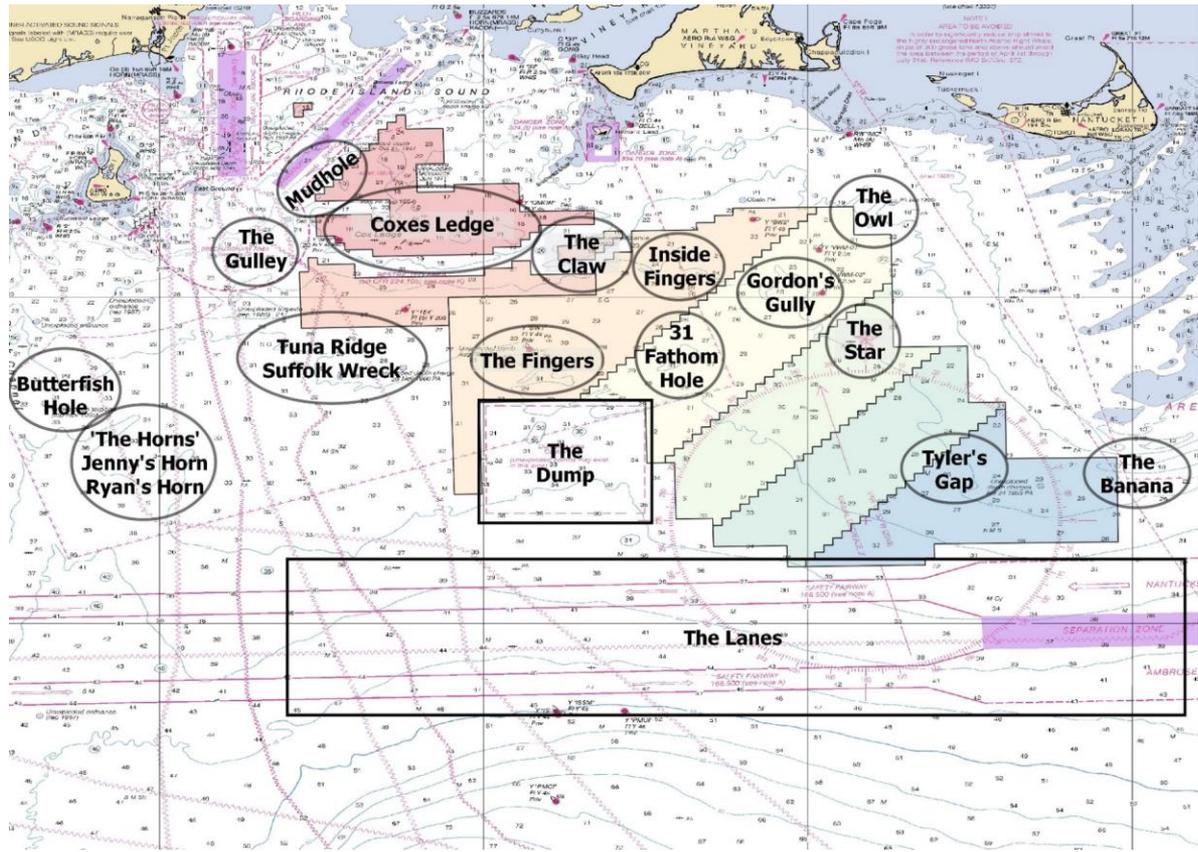
## SNE supports...

- Large recreational fishery for HMS
- >5,700 permitted vessels in 2022\*



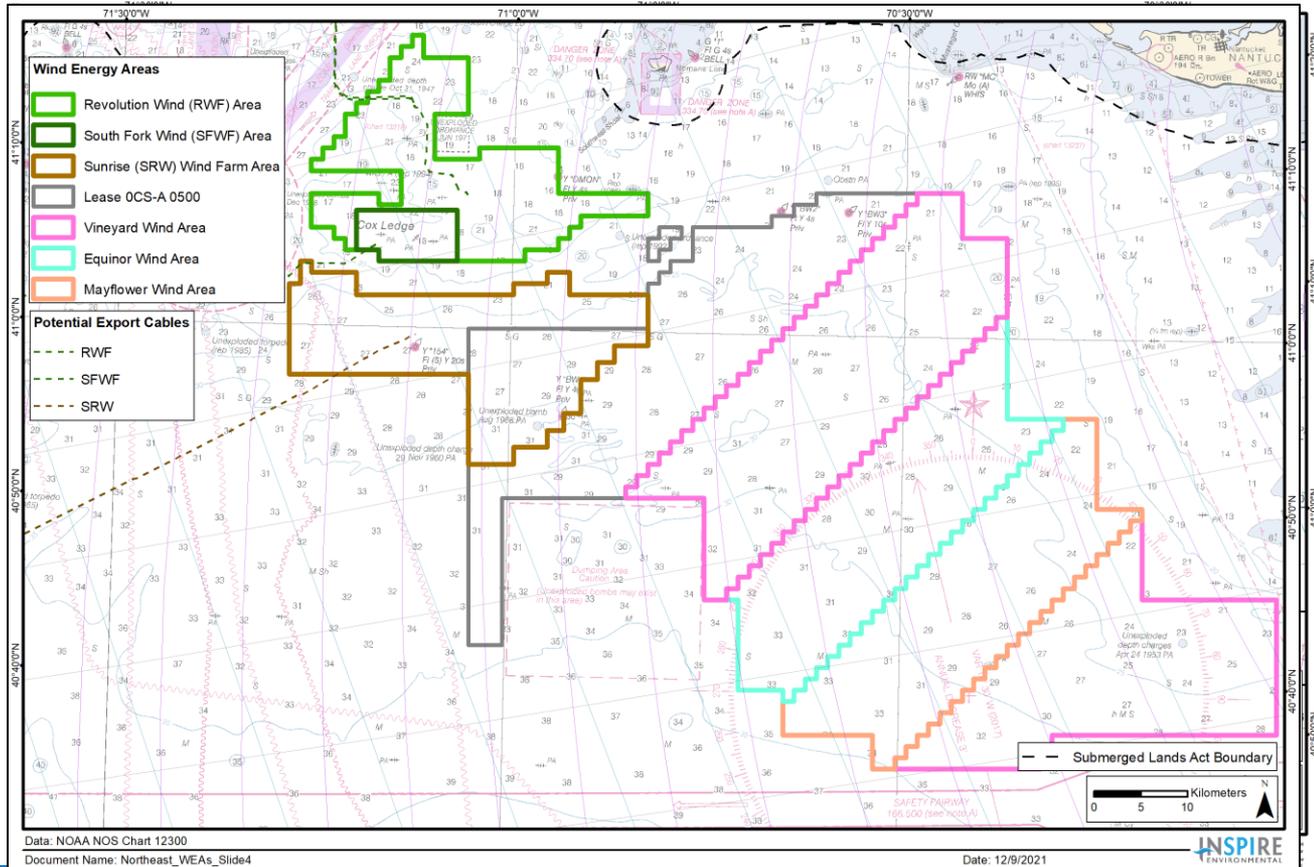
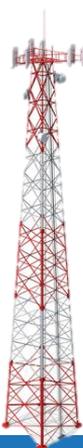
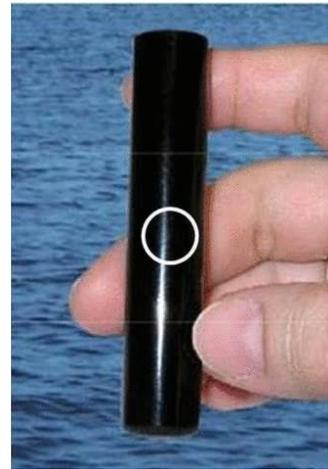
\*Source: NOAA Fisheries 2022 HMS SAFE report (ONLY MA, RI, CT vessels)

# How it started...



Kneebone & Capizzano 2020

# Acoustic Telemetry Monitoring in the SNE WEA



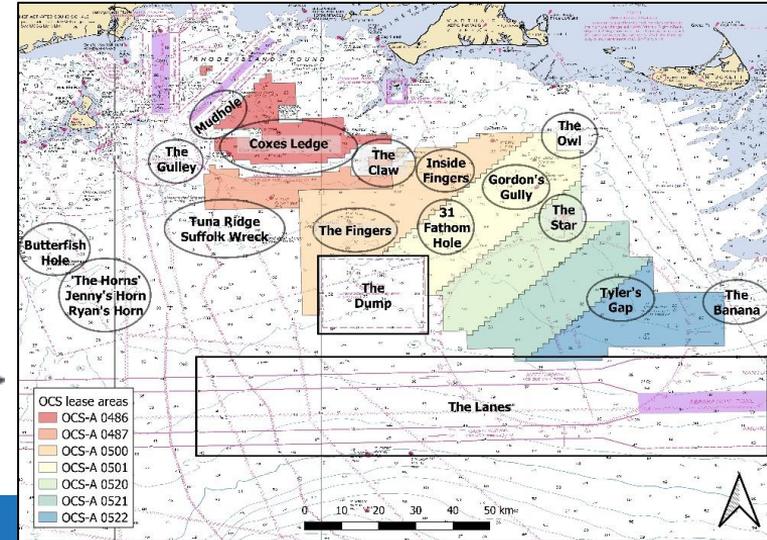
# Highly Migratory Species Monitoring: Acoustic Telemetry

## Long-term goals

- Monitor the presence, persistence, and movements of highly migratory pelagic species (HMS) through various stages of offshore wind development (baseline, construction, operations)
- Assess impacts of offshore wind activities on HMS by directly comparing metrics/data across various stages of development

## Short-term goal

- Collect baseline (pre-construction) information about HMS use of the lease areas and broader southern New England
- Illustrate utility of acoustic telemetry for monitoring HMS responses to offshore wind over various spatial and temporal scales
- Illustrate utility of acoustic telemetry as a multi-species monitoring technology



# MassCEC Pilot Study: 2020 and 2021



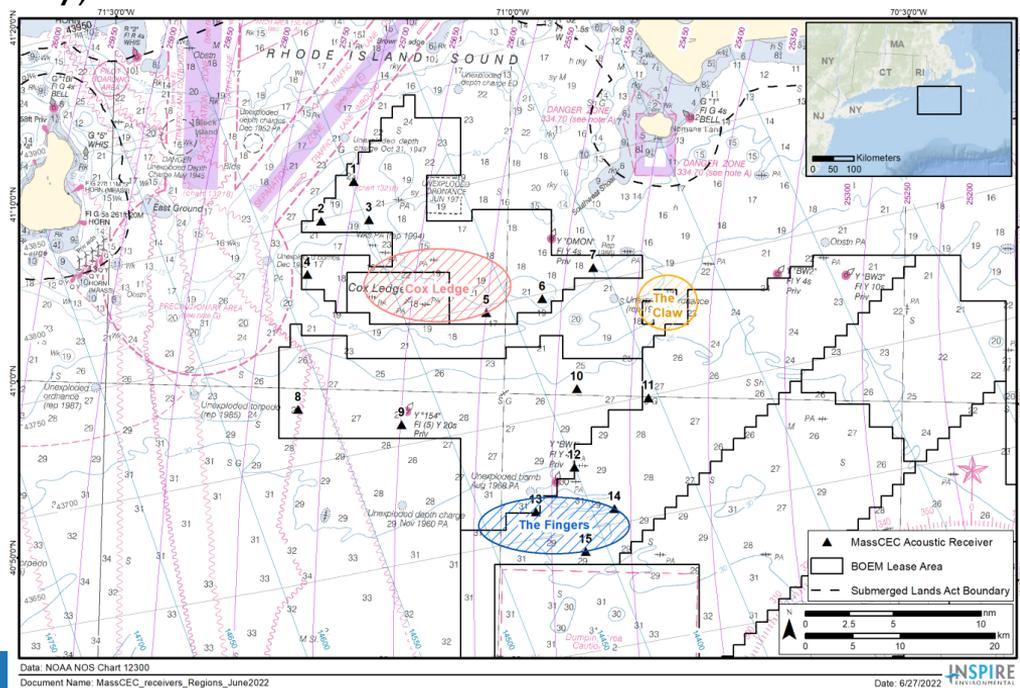
- Monitor at the most popular recreational fishing spots for HMS in southern New England WEA
- Monitor species of greatest importance to the recreational HMS fishery: bluefin tuna, blue shark, shortfin mako
- Deploy tags both within and outside the WEA
- Monitor for animal presence and persistence (residency)
- Monitor inter-annual use of WEA
- Establish baseline metrics



X15 July to December (2020)  
June to December (2021)



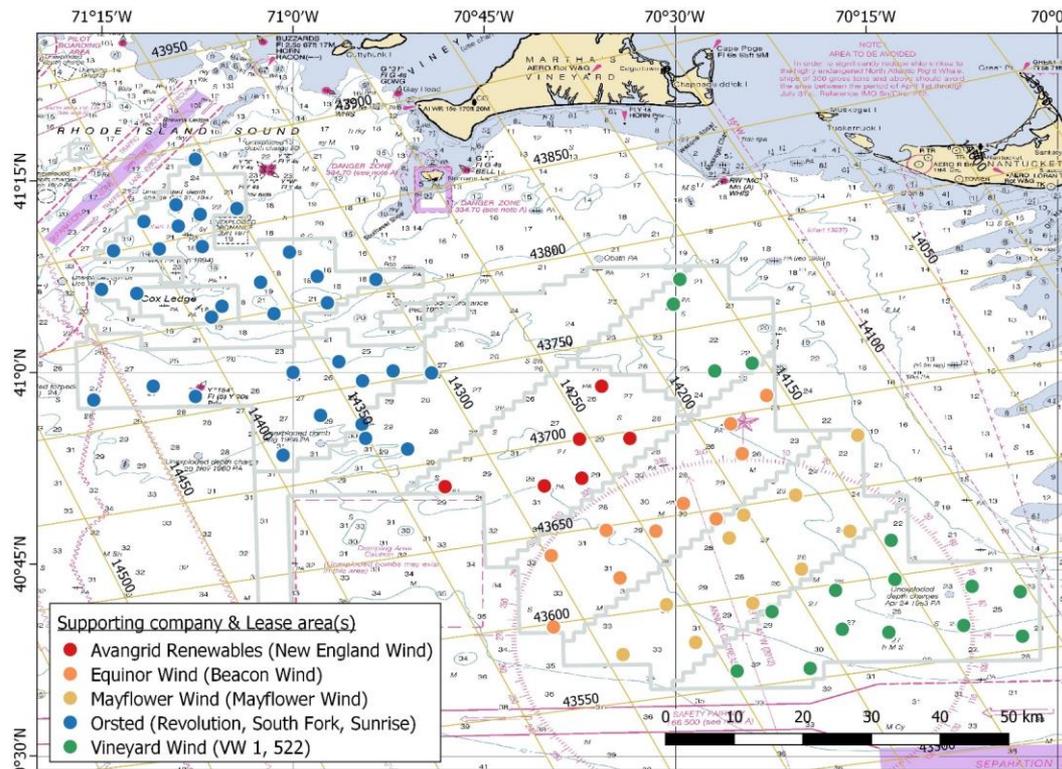
X 60



# Project expansion 2022 & 2023

## Monitoring HMS presence with telemetry

- Expansion of acoustic receiver array
  - 32 receivers in Ørsted lease areas in 2022
  - 10 receivers each added to Beacon Wind and Mayflower (now SouthCoast) in 2021
  - 6 receivers in New England Wind in 2022
  - 16 receivers in Vineyard Wind lease areas in 2022
- Continued tagging through Ørsted in 2023 (n=49 tags) but not in 2022
- Data sharing agreement signed in September 2023 permitting aggregation of data collected across all developer projects (sharing of transmitter IDs)
- From 2020 - 2023, 259 total transmitters deployed across MACEC pilot and all developer projects



# Tag deployments and detections: No Sharing vs. Sharing



VINEYARD  
WIND



AVANGRID  
RENEWABLES



SOUTHCOAST  
WIND



MASSACHUSETTS  
CLEAN ENERGY  
CENTER®

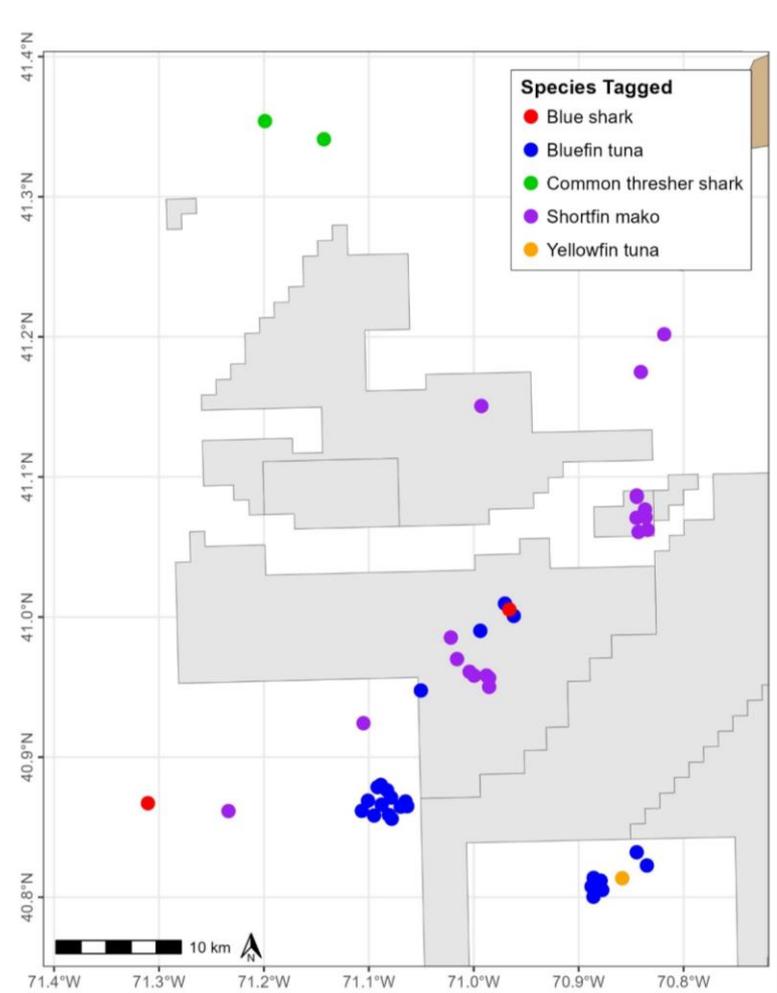
## MACEC and Orsted project only: NO DATA SHARING

Species	Number tagged				Total
	2020	2021	2022	2023	
Bluefin tuna	8	17	0	25	50
Yellowfin tuna	0	0	0	1	1
Little tunny	0	0	0	0	0
Blue shark	13	8	0	2	23
Shortfin mako	8	4	0	19	31
Common thresher	0	0	0	2	2
Dusky shark	0	0	0	0	0
Sandbar shark	0	1	0	0	1
Spinner shark	0	0	0	0	0
Smooth hammerhead	0	1	0	0	1
<b>Total</b>	<b>29</b>	<b>31</b>	<b>0</b>	<b>49</b>	<b>109</b>

## MACEC and Orsted project + DATA SHARING with all other developers

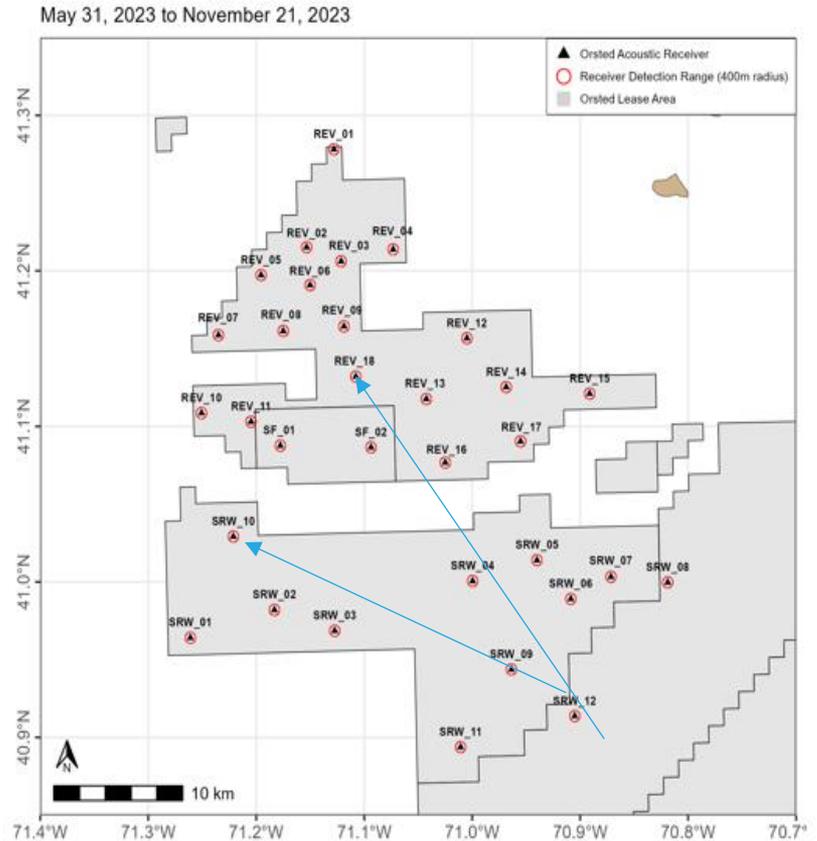
Species	Number tagged				Total
	2020	2021	2022	2023	
Bluefin tuna	8	22	5	35	70
Yellowfin tuna	0	0	12	19	31
Little tunny	0	0	0	1	1
Blue shark	13	36	33	4	86
Shortfin mako	8	6	8	28	50
Common thresher	0	0	1	2	3
Dusky shark	0	2	8	2	12
Sandbar shark	0	2	1	0	3
Spinner shark	0	0	2	0	2
Smooth hammerhead	0	1	0	0	1
<b>Total</b>	<b>29</b>	<b>69</b>	<b>70</b>	<b>91</b>	<b>259</b>

# Tag deployment locations 2023



# Current Sunrise Wind acoustic receiver array

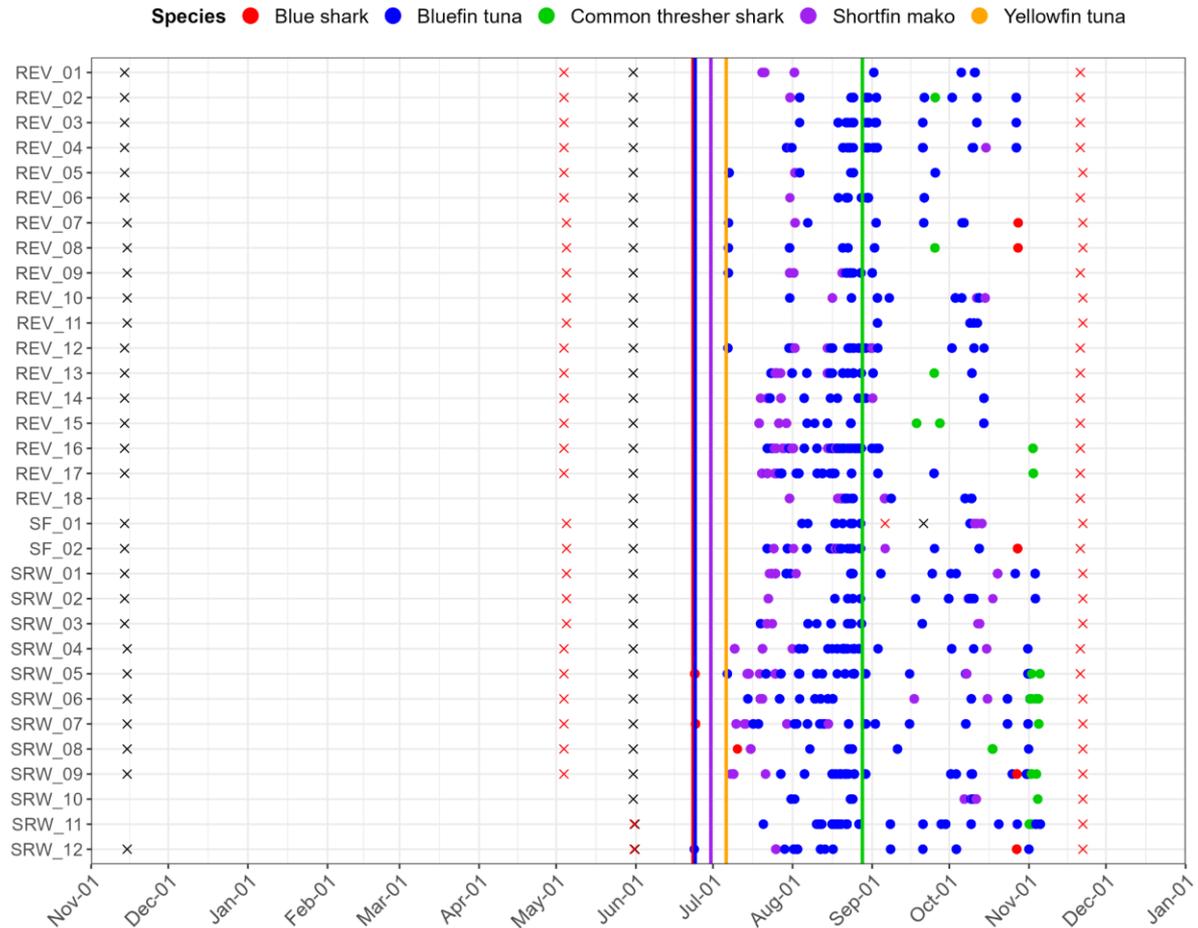
- 32 receivers in Ørsted lease areas; 10 in Sunrise
- Two Sunrise receivers moved in May 2023
- Receivers deployed year round



# Detections - 2023

Species	# Tagged	# Detected
Blue shark	2	2 (1)
Bluefin tuna	25	16 (5)
Common thresher	2	2
Shortfin mako	19	14 (1)
Yellowfin tuna	1	1

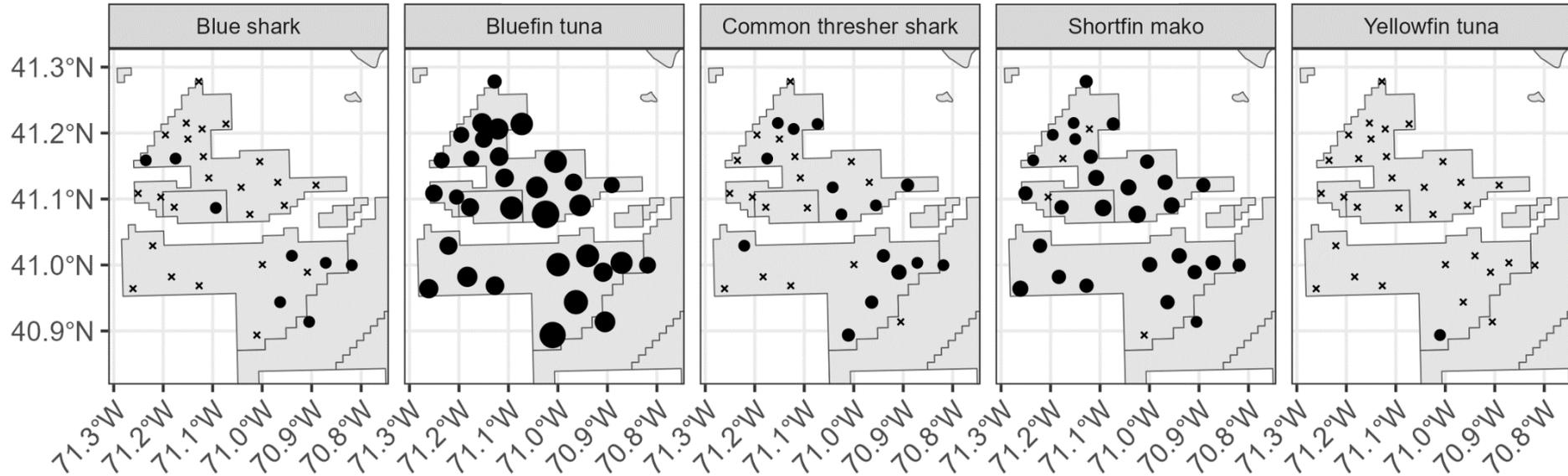
35 of 49 tagged fish detected  
 42 fish detected overall  
 7 fish returned from previous years (#)



Black 'X's represent the time when the receiver was deployed, and red 'X's' represent the time it was downloaded.

# Residency in Ørsted leases during 2023

# of residences    ×   0   ●   10   ●   20   ●   30



# Work plan: 2024-2026

- Deploy 50 transmitters in 2024 and 2025
- Target species: blue shark, bluefin tuna, yellowfin tuna, shortfin mako, common thresher, white marlin, dusky shark
- Continued deployment of 32 receivers during construction and operation phases
- Conduct regional analysis of HMS presence, movements across entire SNE WEA
- Investigate impacts from South Fork and Vineyard Wind I construction
- Share Ørsted receiver detection and transmitter metadata through the Mid-Atlantic Acoustic Telemetry Observation System (MATOS) starting in June

# Acknowledgements

**Sunrise  
Wind**

Powered by  
Ørsted &  
Eversource

**South Fork  
Wind**

Powered by  
Ørsted &  
Eversource

**Revolution  
Wind**

Powered by  
Ørsted &  
Eversource

- Captain Greg Mataronas, *F/V Cailyn & Maren*
- Captain Rob Taylor, Newport Sportfishing Charters, *F/V Reel EZ*
- Captain Mike Littlefield, Arch Angel Fishing Charters, *F/V Arch Angel*
- Dr. Diego Bernal, UMASS-Dartmouth, *F/V Toro*

# Bottom Trawl and Ichthyoplankton Survey

School for Marine Science and Technology/Commercial Fisheries Research  
Foundation

Presenter: Chris Rillahan – School for Marine Science and Technology

# Demersal Trawl Survey

## Sunrise Wind Project Share



Keith Hankowsky, Christopher Rillahan, Pinguo He, David Bethoney, Elizabeth Soranno, Susan Inglis

Conducted by:

University of Massachusetts Dartmouth – SMAST  
Commercial Fisheries Research Foundation



# Adoption of NEAMAP Trawl and Survey Protocol

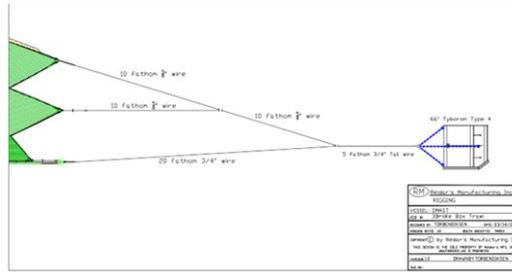
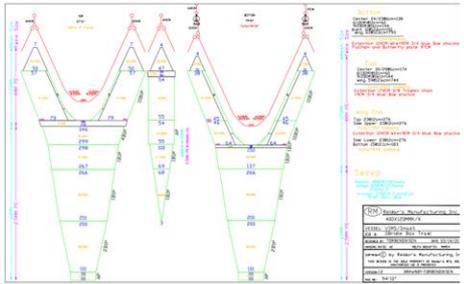
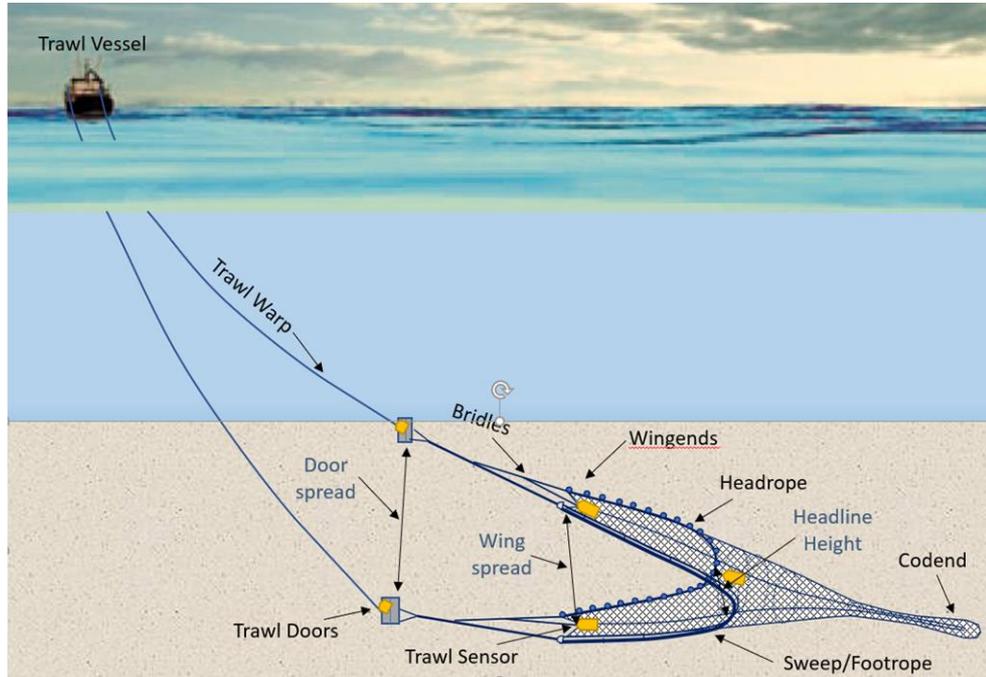
- NorthEast Area Monitoring and Assessment Program
- Regional biannual nearshore survey (2006 – Present)
  - Cape Hatteras, NC to Block Island Sound, RI
  - Data currently used in stock assessment and management.
  - Adapting this methodology provides consistency between regional surveys, and possible incorporation of high-resolution data for regional ecosystem assessments.
    - Used by the Vineyard Wind 1 project since 2019

## NEAMAP trawl

- Three-bridle, four-seam bottom trawl developed by Northeast Trawl Advisory Panel (NTAP)
- Thyboron IV 66" door
- Uses a "flat-sweep" to reduce escape of fish under the net
- The use of 1" knotless liner in the codend to retain juvenile fish

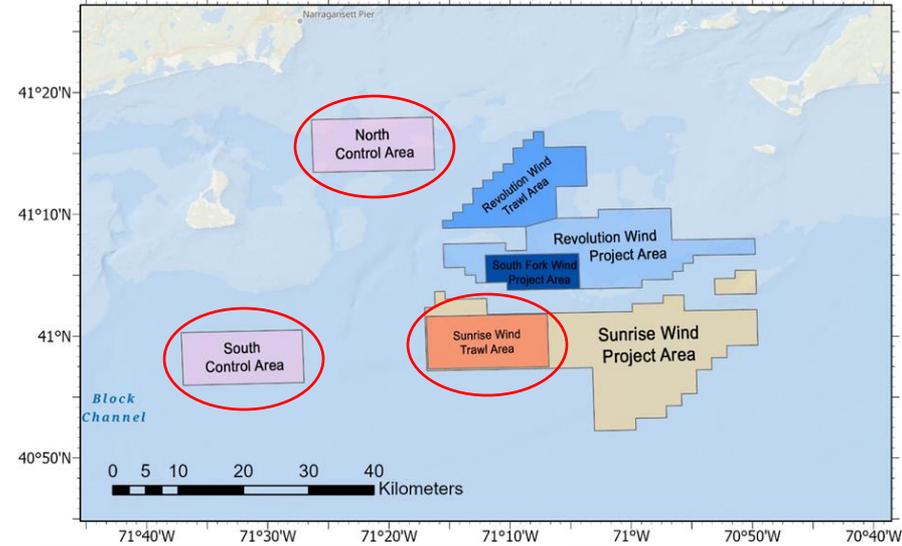
## NEAMAP survey protocol (Bonzek et al., 2008 )

- Commercial fishing vessel
- Tow duration: 20 min
- Tow speed: 3.0 knots
- Daytime only: 30 min after sunrise – 30 min before sunset



# “Beyond-BACI” Design

- Before-After-Control-Impact (BACI) as recommended by BOEM and ROSA.
- Accounts for spatial and temporal variations in fish populations (Underwood, 1991).
  - Multiple tows across the development and control areas
  - Quarterly surveys for temporal variations in fish assemblages
    - Winter (January – March), Spring (April – June), Summer (July – September) and Fall (October – December)
- Control Areas were selected by Orsted based on adjacency, depth, availability, commercial fishing pressure and consultation with industry and regulatory agencies.
- Tow locations were selected using spatially balanced sampling design to ensure spatial distribution of tow locations.
  - 15 tows in Sunrise Wind and 2 Control Areas
- A statistical analysis will compare catch rates, population structure, diet, and community composition before and after construction.
- The data from the Development Areas and the Control Areas assess possible effects of the wind farm on fish communities and commercial fish population.



# Data Collected

## Trawl Performance

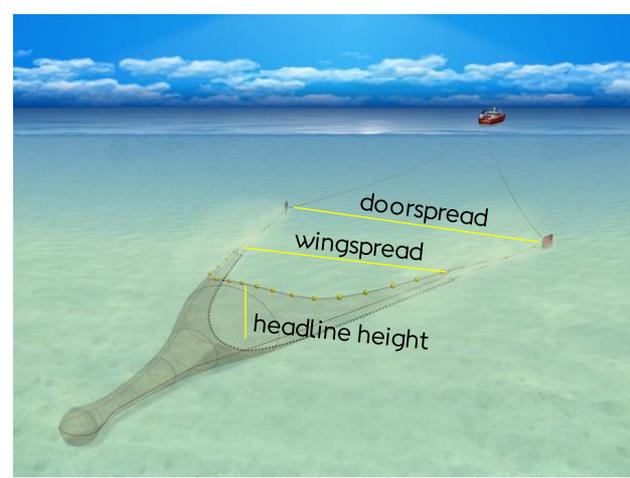
- SIMRAD PX Trawl Monitoring System
- Wingspread – Horizontal opening of the net mouth
- Door Spread – Horizontal distance between the trawl doors
- Headline Height – Vertical opening of the net
- Pitch sensor in the net belly – Used to ensure the net on the bottom

## Biological

- Aggregated catch weight for each species
- Individual length and weights
  - Population Structure and Fish Condition
- Reproductive Status
  - Sex & Maturity
  - Atlantic cod, American lobster, black sea bass, summer flounder, winter flounder, Atlantic herring, monkfish, yellowtail flounder
- Stomach content
  - Black sea bass and summer flounder
  - Diet Analysis

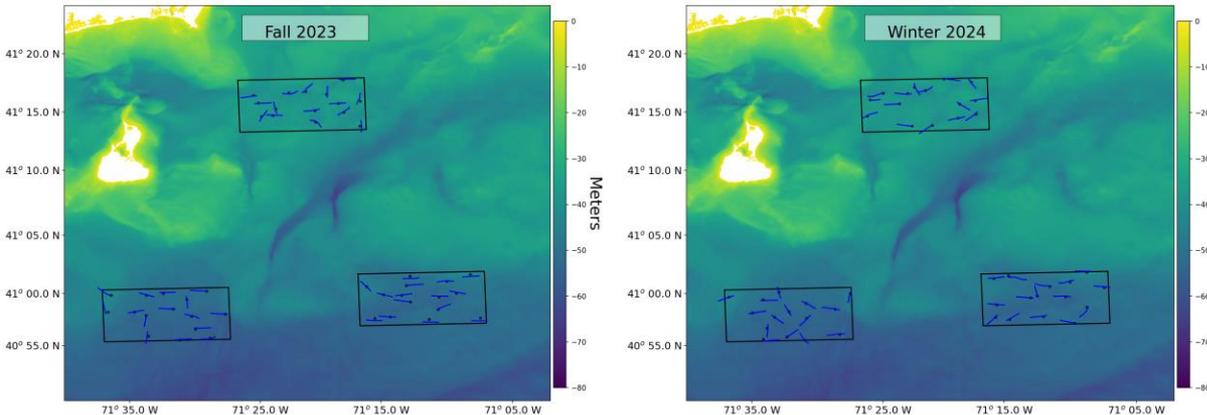
## Environmental

- Sea state, wind speed & direction
- Bottom water temperature
- CTD cast at every station
  - Vertical profile of Conductivity, Temperature and Depth



## Completed to date:

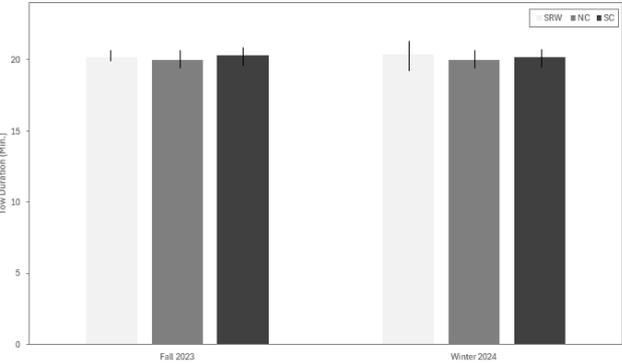
- Surveys were delayed due to permitting.
  - Two surveys completed
  - Fall 2023 & Winter 2024
  - F/V Heather Lynn – Point Judith, RI
- Number of species: 45 observed
  - SRW (34 species), South Control (39 species), North Control (38 species)
- Individual lengths: 19,763 individuals
- Individual weights: 12,712 individuals
- Sex & Maturity: 639 individuals
- Stomachs: 248 individuals



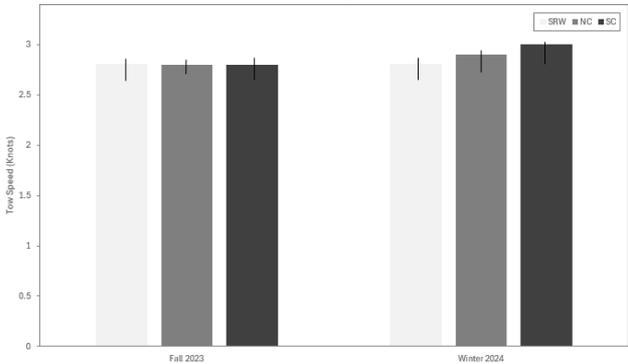
Sunrise Wind	South Control Area	North Control Area
Alewife	Alewife	Alewife
Atlantic Cod	Atlantic Cod	Atlantic Cod
Black Sea bass	Black Sea bass	Black Sea bass
Bluefish	Bluefish	Bluefish
	Bonito, Atlantic	
Butterfish	Butterfish	Butterfish
	Crab, Rock	Crab, Rock
Crab, Horseshoe		Cunner
Dogfish, Smooth	Dogfish, Smooth	Dogfish, Smooth
Dogfish, Spiny	Dogfish, Spiny	Dogfish, Spiny
Flounder, Fourspot	Flounder, Fourspot	Flounder, Fourspot
Flounder, Gulfstream	Flounder, Gulfstream	Flounder, Gulfstream
Flounder, Summer (Fluke)	Flounder, Summer (Fluke)	Flounder, Summer (Fluke)
Flounder, Windowpane	Flounder, Windowpane	Flounder, Windowpane
Flounder, Winter	Flounder, Winter	Flounder, Winter
	Flounder, Yellowtail	
Hake, Red	Hake, Red	Hake, Red
Hake, Silver (Whiting)	Hake, Silver (Whiting)	Hake, Silver (Whiting)
Hake, Spotted	Hake, Spotted	Hake, Spotted
Herring, Atlantic	Herring, Atlantic	Herring, Atlantic
Herring, Blueback	Herring, Blueback	Herring, Blueback
Kingfish, Northern	Kingfish, Northern	Kingfish, Northern
	Lizardfish	
Lobster, American	Lobster, American	Lobster, American
Mackerel, Atlantic	Mackerel, Atlantic	Mackerel, Atlantic
Menhaden, Atlantic	Menhaden, Atlantic	Menhaden, Atlantic
Monkfish	Monkfish	Monkfish
Ocean Pout		Ray, Cownose
		Ray, Torpedo
Scup	Scup	Scup
Sculpin, Longhorn	Sculpin, Longhorn	Sculpin, Longhorn
Sea Robin, Northern	Sea Robin, Northern	Sea Robin, Northern
Sea Robin, Striped	Sea Robin, Striped	Sea Robin, Striped
Sea Scallop	Sea Scallop	Sea Scallop
Shad, American	Shad, American	
	Skate, Clearnose	Skate, Clearnose
Skate, Little	Skate, Little	Skate, Little
Skate, Winter	Skate, Winter	Skate, Winter
	Spot	Spot
Squid, Atlantic Longfin	Squid, Atlantic Longfin	Squid, Atlantic Longfin
		Tautog
	Triggerfish, Grey	
Weakfish	Weakfish	Weakfish

# Operational Data

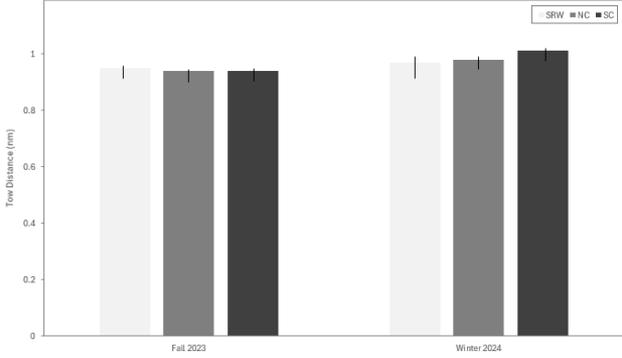
Tow Duration



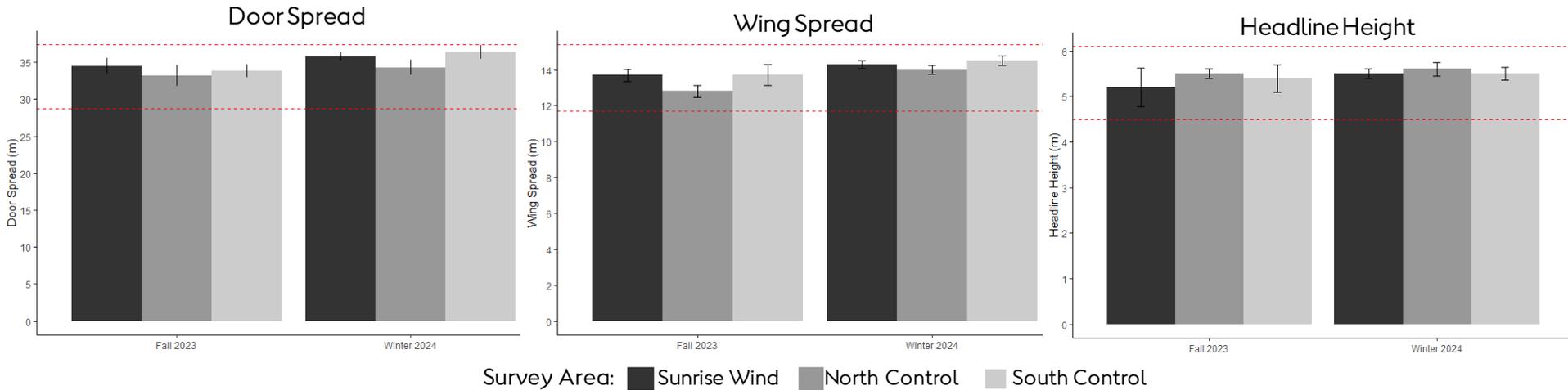
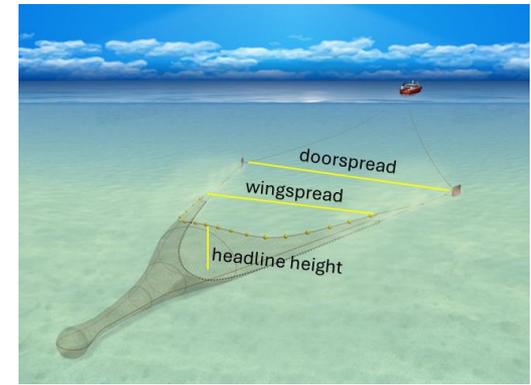
Tow Speed



Tow Distance



# Net Performance



Acceptable Limits:

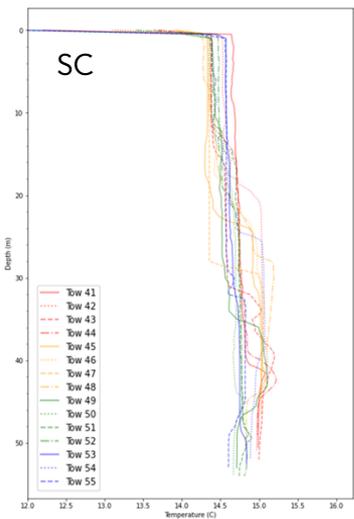
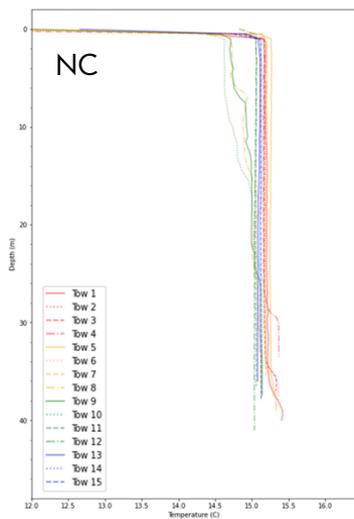
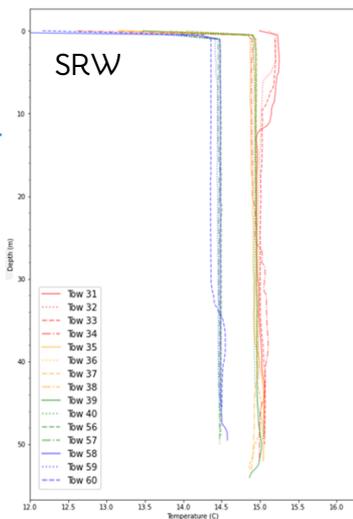
Door Spread: 28.8 – 37.4 m

Wing Spread: 11.7 – 15.4 m

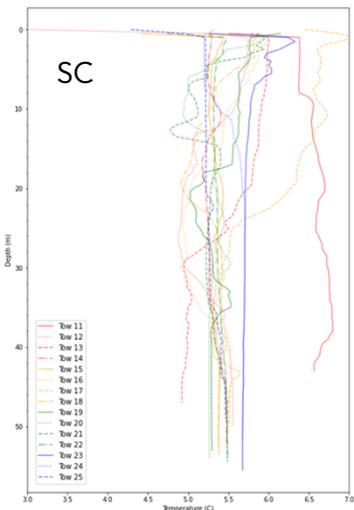
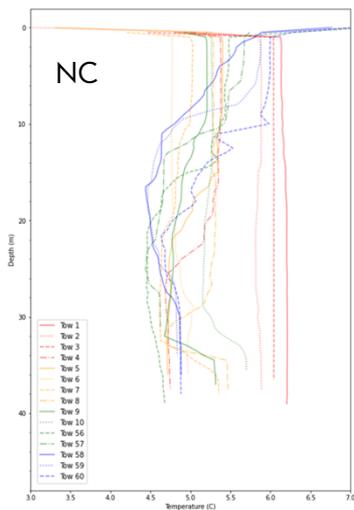
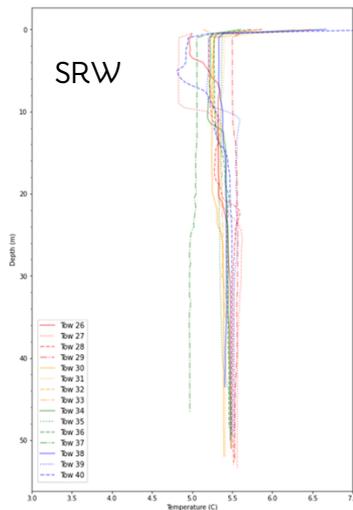
Headline Height: 4.5 – 6.1 m

# CTD Data

Fall 2023



Winter 2024



# Fall 2023 Survey

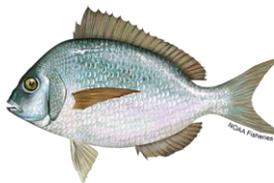
## SRW Dev Area

- The three most abundant species accounted 93.3% of the total catch weight
  - Butterfish (37.7% of total catch weight)
  - Scup (31.5%)
  - Spiny Dogfish (24.1%)



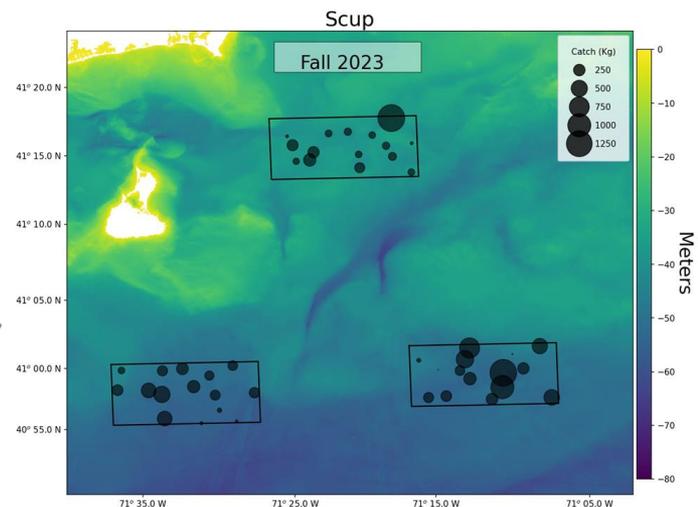
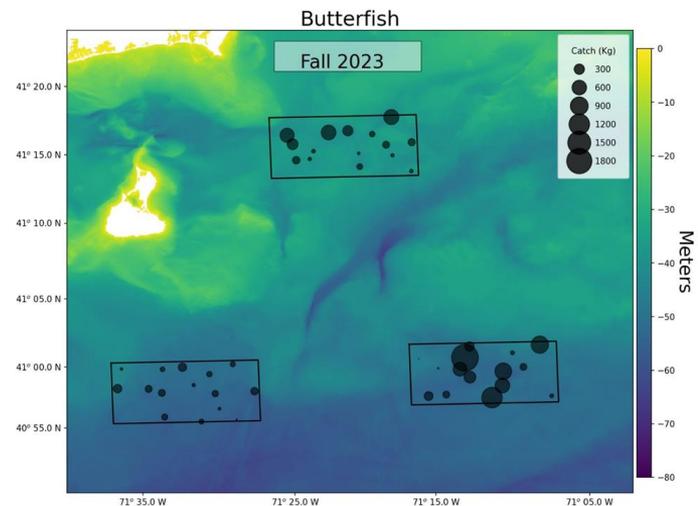
## North Control Area

- The three most abundant species accounted 92.4% of the total catch weight
  - Butterfish (45.6%)
  - Scup (43.5%)
  - Little skate (3.3%)



## South Control Area

- The three most abundant species accounted 86.8% of the total catch weight
  - Spiny dogfish (48.9%)
  - Scup (26.1%)
  - Butterfish (11.8%)



# Fall 2023 Survey

## Sunrise Wind Area

Species Name	Total Weight (Kg)	Catch/Tow (Kg)		% of Total Catch	Tows with Species Present
		Mean	SEM		
BUTTERFISH	7241.0	499.9	149.9	37.7	15
SCUP	6040.9	418.1	102.7	31.5	15
DOG FISH, SPINY	4627.6	320.0	42.7	24.1	15
BLACK SEA BASS	307.5	21.5	6.1	1.6	15
SQUID, ATLANTIC LONGFIN	286.2	19.8	2.3	1.5	15
HAKE, SILVER (WHITING)	218.5	15.3	4.3	1.1	12
SKATE, WINTER	156.1	10.8	2.8	0.8	13
SKATE, LITTLE	121.6	8.4	1.6	0.6	15
HAKE, SPOTTED	43.7	3.0	0.8	0.2	12
SEA ROBIN, NORTHERN	43.4	3.0	1.0	0.2	15
FLOUNDER, SUMMER (FLUKE)	31.1	2.2	0.7	0.2	9
WEAKFISH	27.0	1.9	0.8	0.1	10

## North Control Area

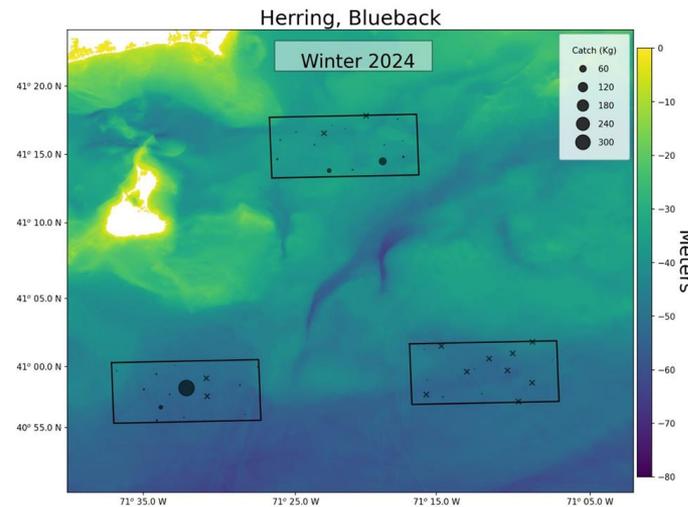
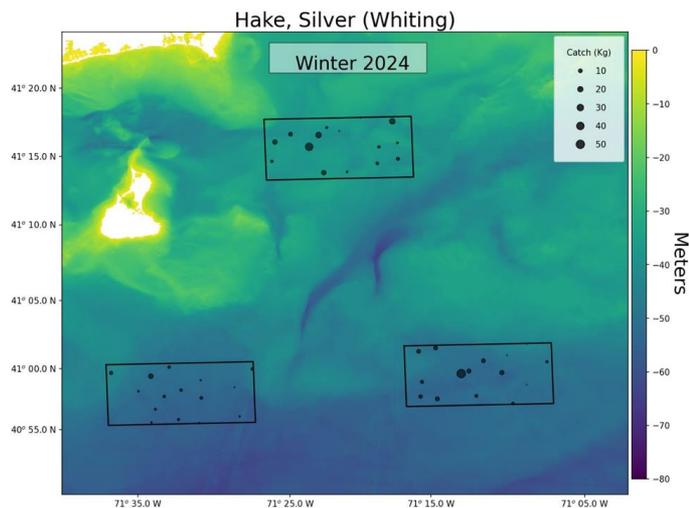
Species Name	Total Weight (Kg)	Catch/Tow (Kg)		% of Total Catch	Tows with Species Present
		Mean	SEM		
BUTTERFISH	3251.4	241.8	63.4	45.6	15
SCUP	3100.9	231.84	95.3	43.5	15
SKATE, LITTLE	235.7	17.9	3.2	3.3	14
SQUID, ATLANTIC LONGFIN	166.5	12.5	1.3	2.3	15
BLACK SEA BASS	83.9	6.4	2.1	1.2	15
HAKE, SILVER (WHITING)	45.1	3.4	1.1	0.6	14
SEA ROBIN, NORTHERN	38.7	2.9	0.7	0.5	13
HAKE, SPOTTED	37.8	2.8	0.9	0.5	12
DOG FISH, SPINY	31.8	2.4	0.9	0.5	9
FLOUNDER, WINTER	31.2	2.3	0.4	0.4	15
SKATE, CLEARNOSE	21.8	1.6	0.8	0.3	5
SKATE, WINTER	13.5	1.0	0.4	0.2	6

## South Control Area

Species Name	Total Weight (Kg)	Catch/Tow (Kg)		% of Total Catch	Tows with Species Present
		Mean	SEM		
DOG FISH, SPINY	5944.5	421.3	127.3	48.9	15
SCUP	3180.1	225.2	40.4	26.1	15
BUTTERFISH	1429.9	101.4	17.8	11.8	15
BLACK SEA BASS	356.1	25.1	4.0	2.9	15
SKATE, WINTER	336.8	23.7	4.3	2.8	15
SEA ROBIN, NORTHERN	293.8	20.7	3.0	2.4	15
SKATE, LITTLE	218.9	15.5	1.7	1.8	15
SQUID, ATLANTIC LONGFIN	141.6	10.0	1.4	1.2	14
HAKE, SILVER (WHITING)	116.3	8.2	1.6	1.0	15
HAKE, SPOTTED	62.1	4.4	0.8	0.5	15
FLOUNDER, SUMMER (FLUKE)	31.0	2.2	0.6	0.3	14
MACKEREL, ATLANTIC	12.1	0.8	0.7	0.1	6

# Winter 2024 Survey

- Small catches
- Dominated by juvenile silver hake and little/winter skates
- Several large catches of Blueback and Atlantic herring



# Winter 2024 Survey

## Sunrise Wind Area

Species Name	Total Weight (Kg)	Catch/Tow (Kg)		% of Total Catch	Tows with Species Present
		Mean	SEM		
HAKE, SILVER (WHITING)	157.0	10.1	3.1	43.3	15
SKATE, LITTLE	84.0	5.5	1.4	23.2	14
SKATE, WINTER	75.9	5.0	1.3	20.9	13
HERRING, ATLANTIC	15.3	1.0	0.4	4.2	9
FLOUNDER, WINDOWPANE	4.2	0.3	0.1	1.2	12
SEA SCALLOP	4.0	0.3	0.1	1.1	8
FLOUNDER, SUMMER (FLUKE)	3.6	0.2	0.1	1.0	7
SCULPIN, LONGHORN	3.5	0.2	0.1	1.0	5
HAKE, SPOTTED	3.1	0.2	0.1	0.9	6
ATLANTIC COD	2.8	0.2	0.1	0.8	3
SHAD, AMERICAN	1.8	0.1	0.0	0.5	9
HERRING, BLUEBACK	1.7	0.1	0.1	0.5	6

## North Control Area

Species Name	Total Weight (Kg)	Catch/Tow (Kg)		% of Total Catch	Tows with Species Present
		Mean	SEM		
HAKE, SILVER (WHITING)	158.0	10.4	2.8	46.7	15
HERRING, BLUEBACK	96.7	6.3	4.5	28.6	13
HERRING, ATLANTIC	19.5	1.3	0.5	5.8	12
LOBSTER, AMERICAN	18.5	1.2	0.3	5.5	11
ALEWIFE	15.9	1.1	0.4	4.7	14
MACKERAL, ATLANTIC	5.8	0.4	0.2	1.7	8
ATLANTIC COD	4.4	0.3	0.2	1.3	2
SKATE, LITTLE	4.3	0.3	0.1	1.3	8
BUTTERFISH	2.7	0.2	0.1	0.8	12
SCULPIN, LONGHORN	2.3	0.2	0.0	0.7	8
MENHADEN, ATLANTIC	2.1	0.1	0.1	0.6	7
FLOUNDER, WINTER	1.9	0.1	0.0	0.6	7

## South Control Area

Species Name	Total Weight (Kg)	Catch/Tow (Kg)		% of Total Catch	Tows with Species Present
		Mean	SEM		
HERRING, BLUEBACK	364.4	23.3	21.6	60.4	13
MACKERAL, ATLANTIC	90.9	5.7	4.2	15.1	10
HAKE, SILVER (WHITING)	66.8	4.2	0.9	11.1	15
SKATE, LITTLE	20.0	1.2	0.2	3.3	13
SKATE, WINTER	16.6	1.0	0.4	2.8	6
FLOUNDER, SUMMER (FLUKE)	12.0	0.7	0.1	2.0	13
ATLANTIC COD	6.5	0.4	0.2	1.1	4
HAKE, SPOTTED	5.6	0.3	0.1	0.9	12
ALEWIFE	3.5	0.2	0.1	0.6	8
FLOUNDER, WINDOWPANE	3.2	0.2	0.0	0.5	10
HERRING, ATLANTIC	3.0	0.2	0.1	0.5	11
SCULPIN, LONGHORN	364.4	23.3	21.6	60.4	13

# Sex & Maturity Data

Area		Sex	Atlantic Cod	Black Sea Bass	Summer Flounder	Winter Flounder	American Lobster	Monkfish
Fall 2023	Sunrise	M	0	18	13	4	0	0
		F	0	46	12	2	1	1
	North Control	M	0	10	12	32	10	0
		F	2	54	10	28	14	0
	South Control	M	0	7	30	6	0	0
		F	0	55	11	4	1	0

Area		Sex	Atlantic Cod	Black Sea Bass	Summer Flounder	Winter Flounder	American Lobster	Yellowtail Flounder	Atlantic Herring
Winter 2024	Sunrise	M	1	0	6	0	0	0	18
		F	2	3	3	0	0	0	15
	North Control	M	1	0	0	3	21	0	22
		F	0	0	0	10	33	0	16
	South Control	M	1	0	30	1	0	1	10
		F	2	2	9	1	0	0	9

# Scallop Biological Sampling

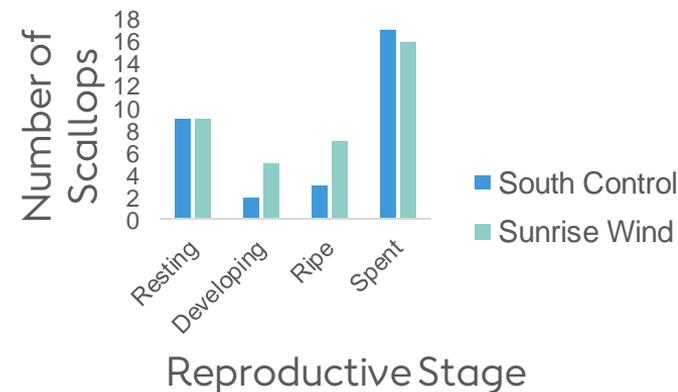
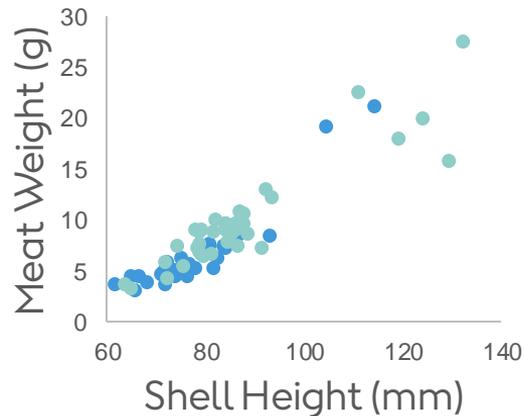
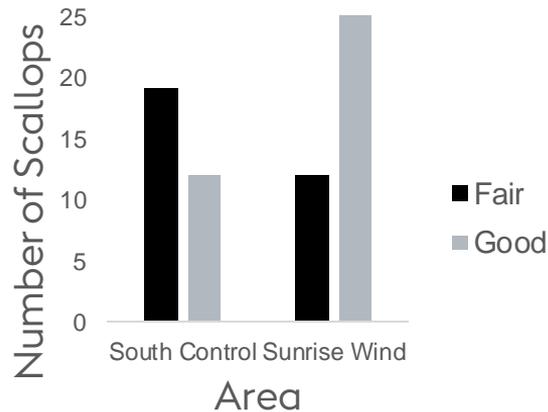
- Protocol
  - Modeled after scallop sampling protocol from CFRF's Beam Trawl Survey
  - Record the first 30 scallops caught per area, shell height >60mm
- Parameters
  - Shell height (mm), sex, reproductive stage, meat quality rating
  - Meat, gonad, and tissues weights are measured on land



Good: Normal, white scallop coloration, firm texture. Scallops with orange meats if firm should be in this category too.

Fair: Muscle starting to degrade, slight brown discoloration, slightly smaller than expected, noticeable change in texture, softer

Poor: Gray meat, muscle is soft, flaccid, and degraded. The meat is shrunken and often difficult to separate from other tissues.



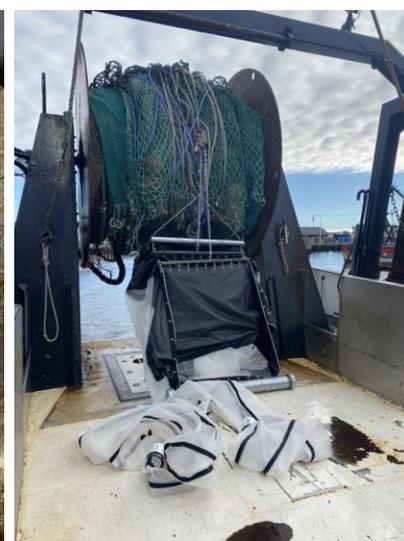
# Ichthyoplankton Survey

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Monitor relative ichthyoplankton abundance and distribution in relation to the cooling water intake system (CWIS)

- Bongo net - sample the full water column
  - Daylight tows at four distances (0m, 100m, 300m, 500m)
  - Three replicates at each distance
  - 12 samples total
- Tucker trawl – sample within the hydraulic zone of influence of the CWIS
  - Used a double release mechanism to intimate and terminate the sample collection at sampling depth 10m above the seafloor
  - Daylight & night sampling at four distances (0m, 100m, 300m, 500m)
  - Three replicates at each distance
  - 24 samples total

All sampling was consistent with NEFSC EcoMon protocols  
One survey conducted in Winter 2024



# Moving forward...

---

- Upcoming spring (May) and summer (August) surveys.
- Seasonal reports submitted.
- Annual report will be completed following one year of monitoring.
- Annual report will contain:
  - Analysis of gear performance
  - Analysis of the control areas.
    - Catch comparisons and community composition comparisons between SRW development area and control areas.
  - Power Analysis



# Export Cable Acoustic Telemetry Study

**Stony Brook and Cornell Cooperative Extension joint discussion (part 1)**

**Presenter: Bradley Peterson – Stony Brook University**

# Orsted Sunrise Wind Project Update Stony Brook University

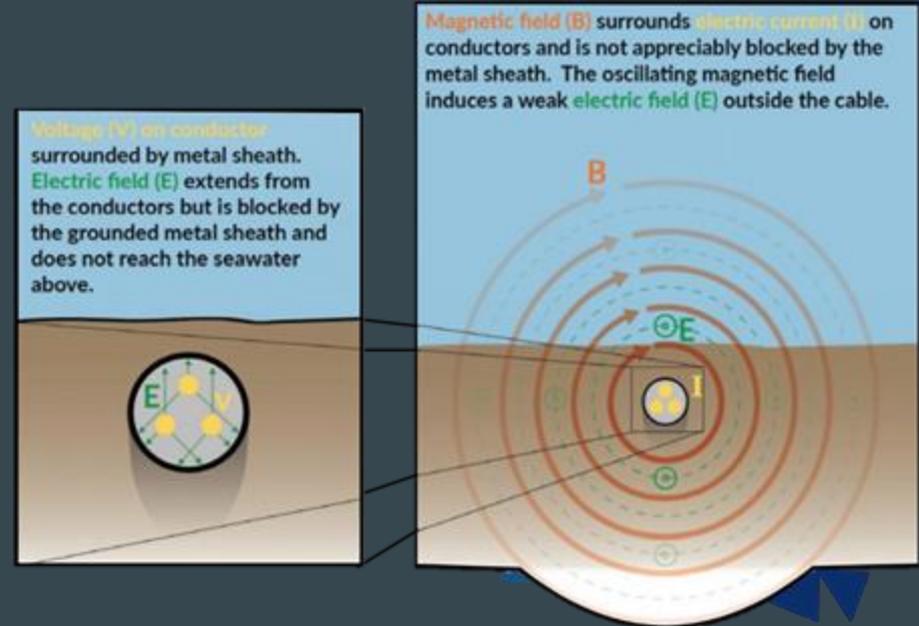
April 23rd, 2024

Brad Peterson, Brianna Cahill,  
Brittney Scannell, and Lucas Ludica



# Electromagnetic Field Production (EFP)

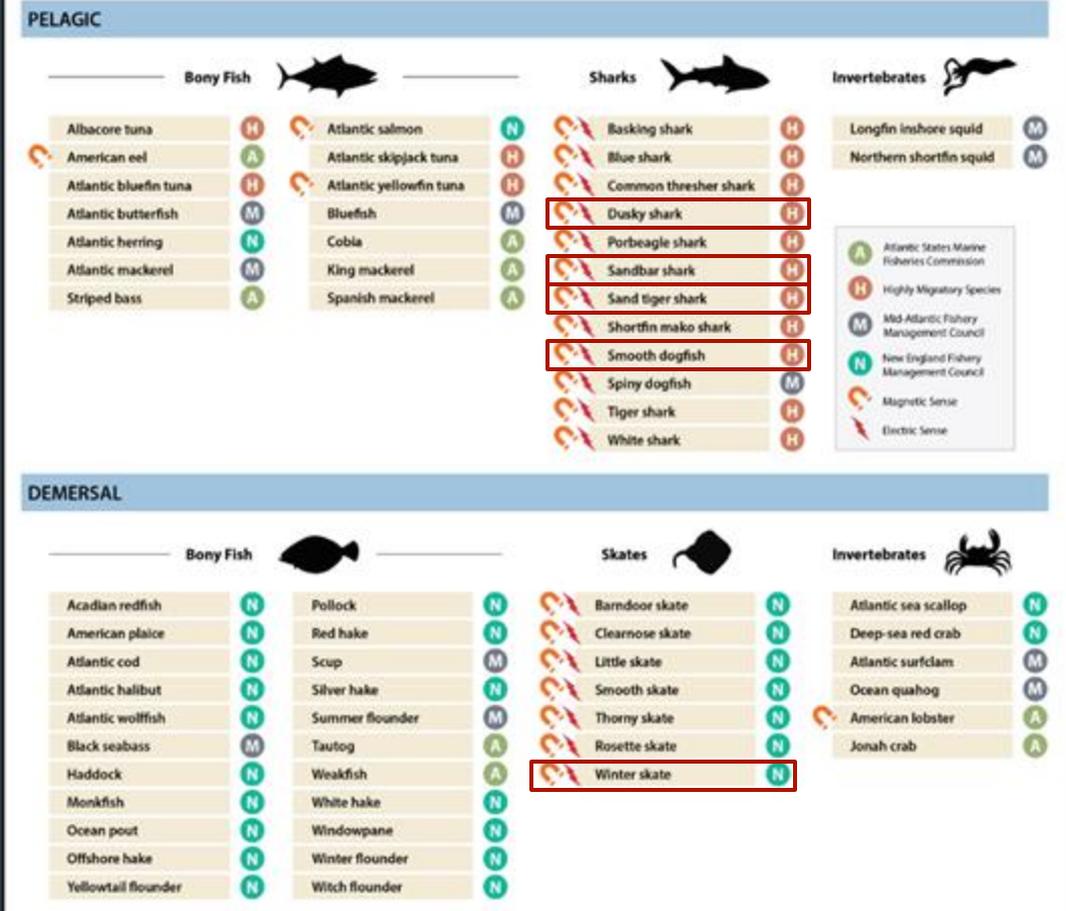
- Cable completely blocks the electric field produced by the transfer of energy BUT only partially blocks the electromagnetic field (EMF) produced
- EMF field is emitted into the marine environment AND an electric field is induced through the movement of water or animals through the EMF



# Fish Interactions

- Use magnetic fields for navigation
- Ampullae of Lorenzini
- Detectable difference in natural geomagnetic field

## Fish species in the southern New England area and their reported abilities to detect EMF



# Project Objectives



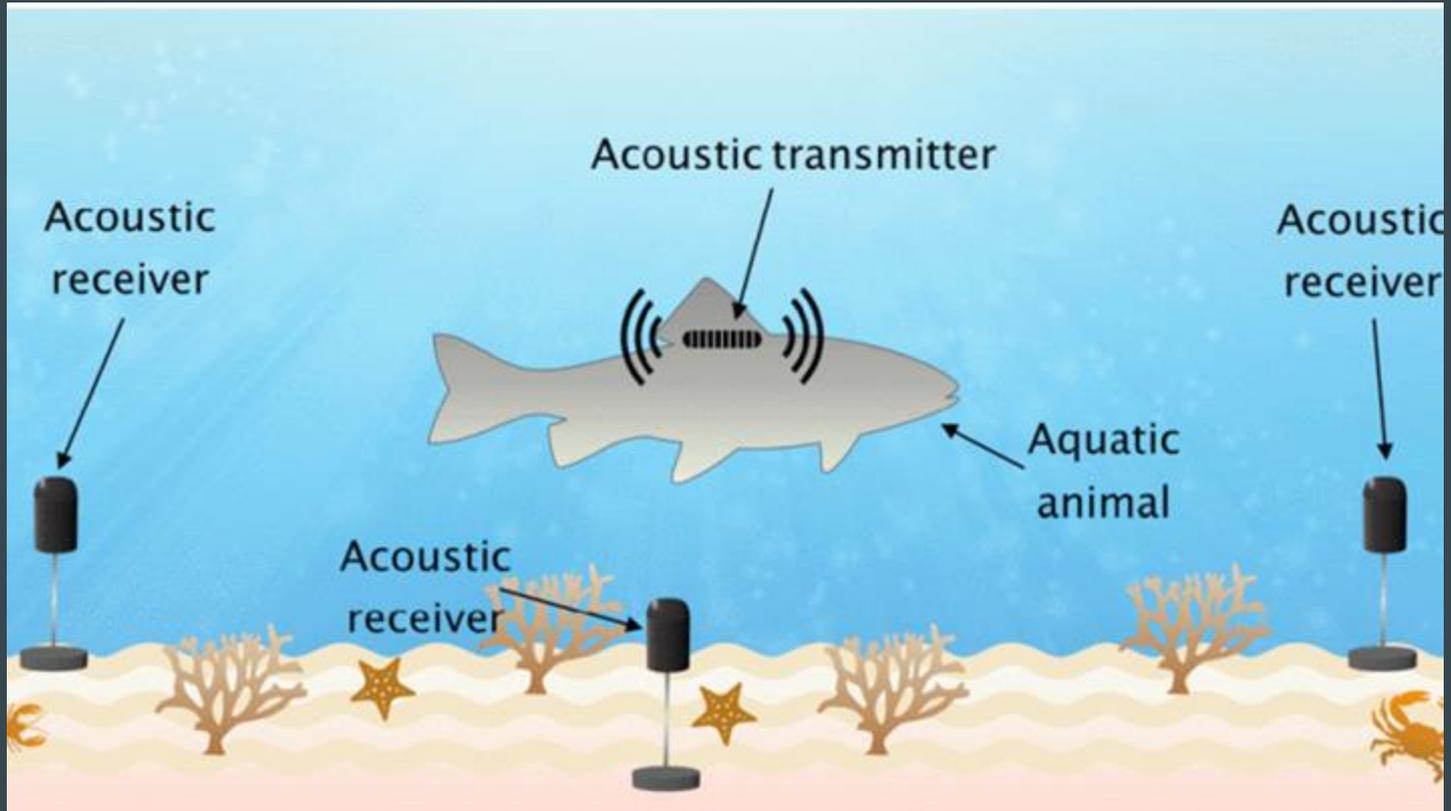
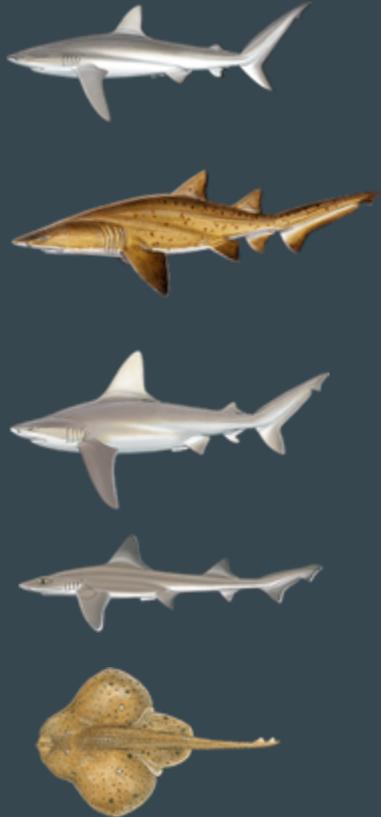
Evaluate effects of electromagnetic fields (EMF) on behavior and movement on targeted species pre- and post-construction



Evaluate effects of South Fork Export Cable (SFEC) on fine-scale changes in behavior and movement in the near field environment around the cable



# Acoustic Telemetry



# Receiver Servicing

## Spring 2023

- 22/32 receivers successfully downloaded
- Reduced array size

## Fall 2023

- 11/21 receivers successfully downloaded

## Spring 2024

- 15/21 receivers successfully downloaded
- Testing Innovasea ARC in first row
- These data not presented today



# Receiver Servicing

## Spring 2023

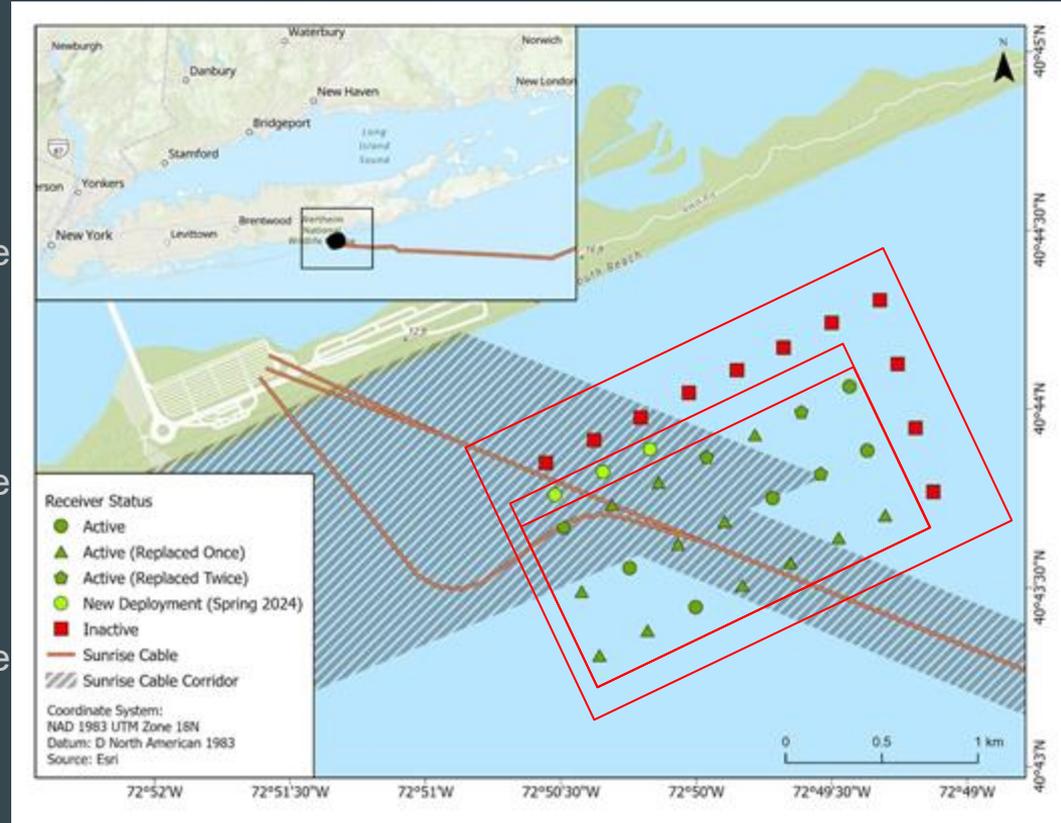
- 22/32 receivers successfully downloaded
- Reduced array size

## Fall 2023

- 11/21 receivers successfully downloaded

## Spring 2024

- 15/21 receivers successfully downloaded
- Testing Innovasea ARC in first row
- These data not presented today



# Species of Interest

Dusky shark (*Carcharhinus obscurus*)

N = 61

Sand tiger shark (*Carcharias taurus*)

N = 44

Sandbar shark (*Carcharhinus plumbeus*)

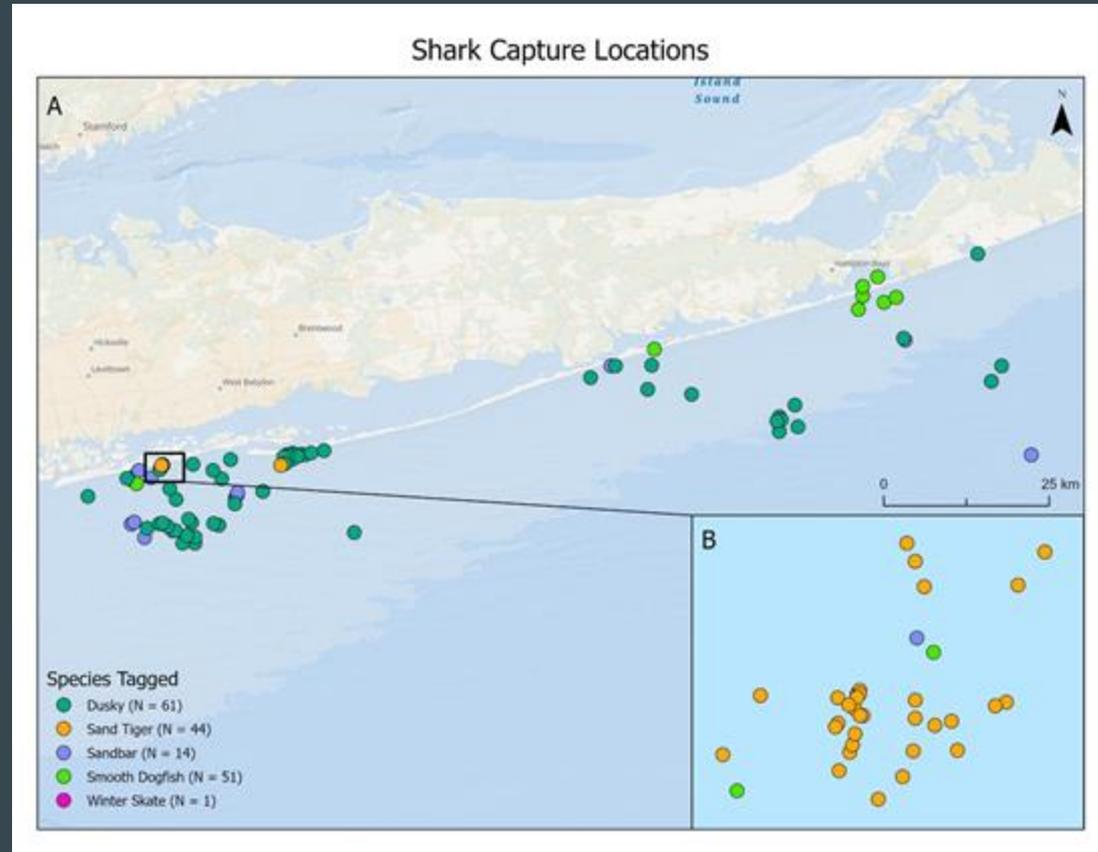
N = 14

Smooth dogfish (*Mustelus canis*)

N = 51

Winter skate (*Leucoraga ocellata*)

N = 1



# Shark Tagging



Sampling for all 25 acoustically tagged: Measurements, Fin, Blood, Muscle, Fecal Samples



# Detection Data



108,000  
detections



140 tags



32 Duskys



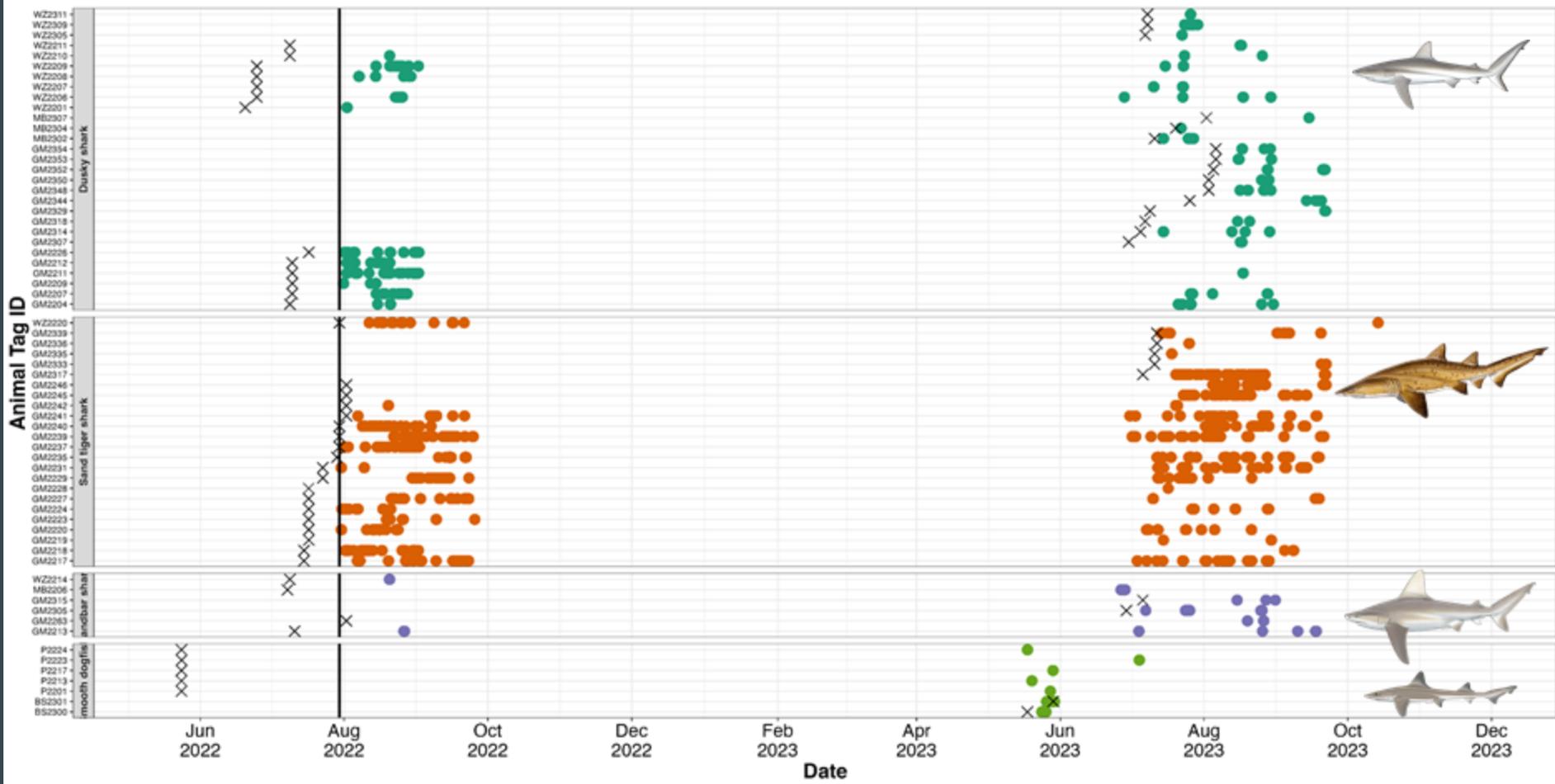
24 Sand Tigers



7 Sandbars



10 Smooth  
Dogfish



# Animal Positioning

Dusky shark

2,622 positions

Sand tiger shark

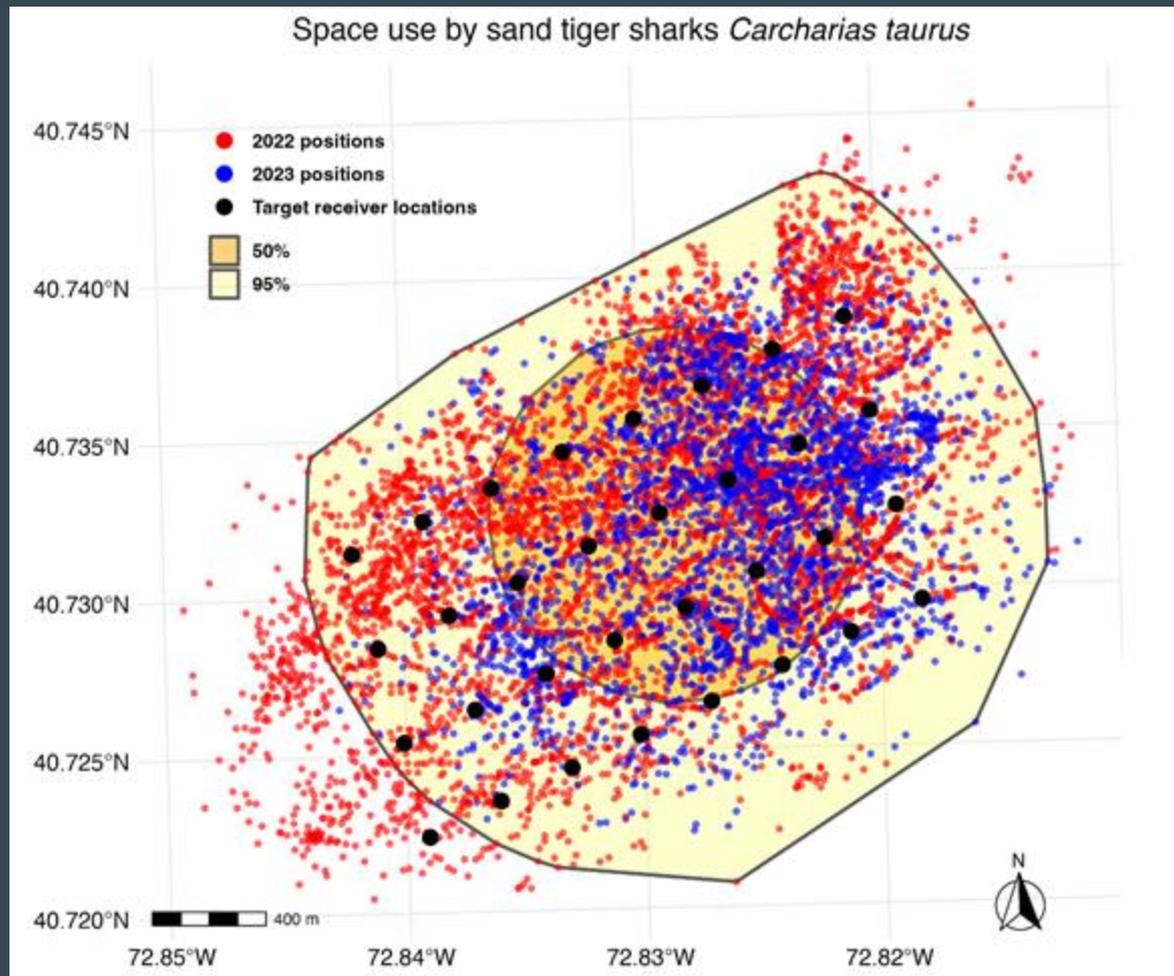
8,467 positions

Sandbar shark

180 positions

Smooth dogfish

19 positions



# Animal Positioning

## Dusky shark

2,622 positions

## Sand tiger shark

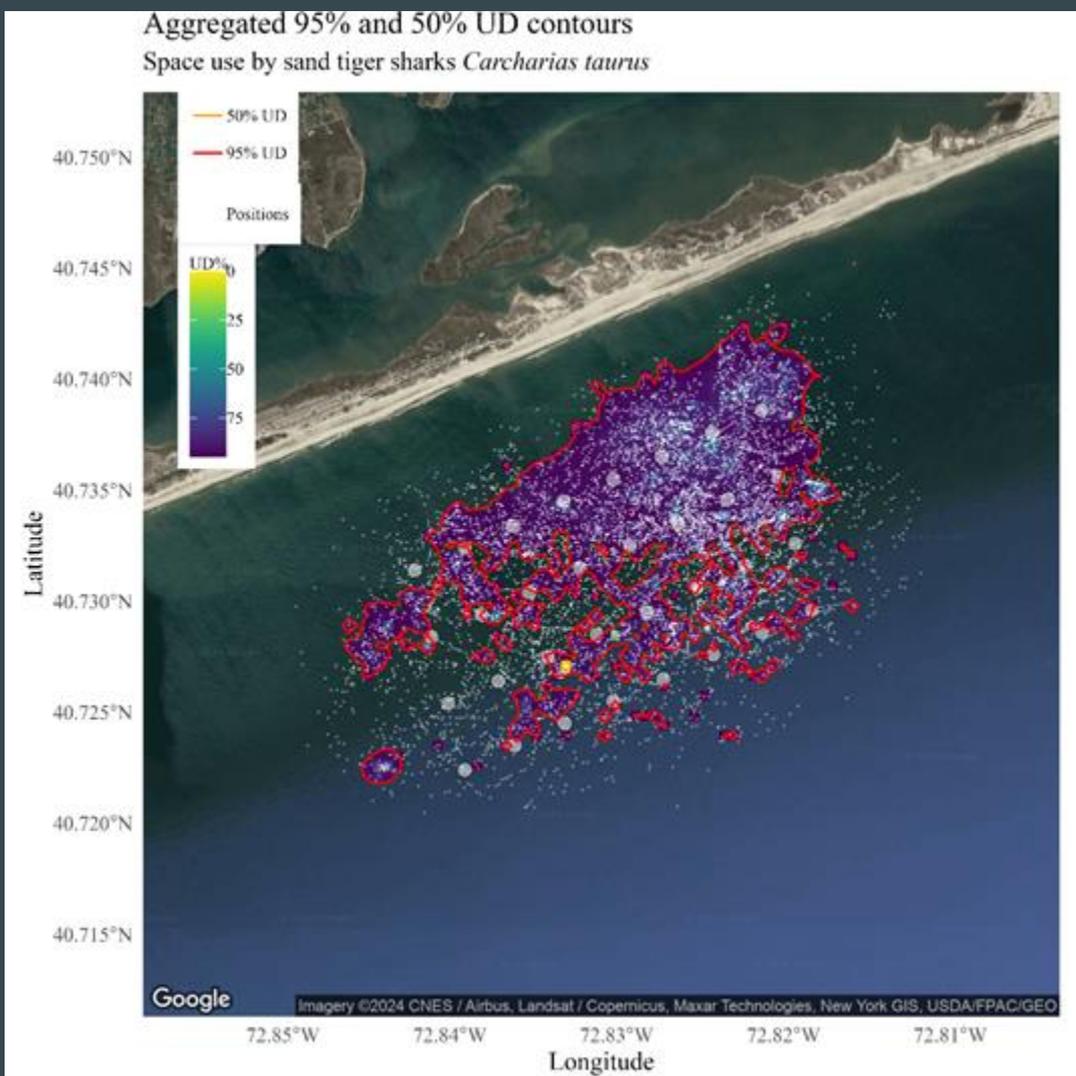
8,467 positions

## Sandbar shark

180 positions

## Smooth dogfish

19 positions



# Future Objectives

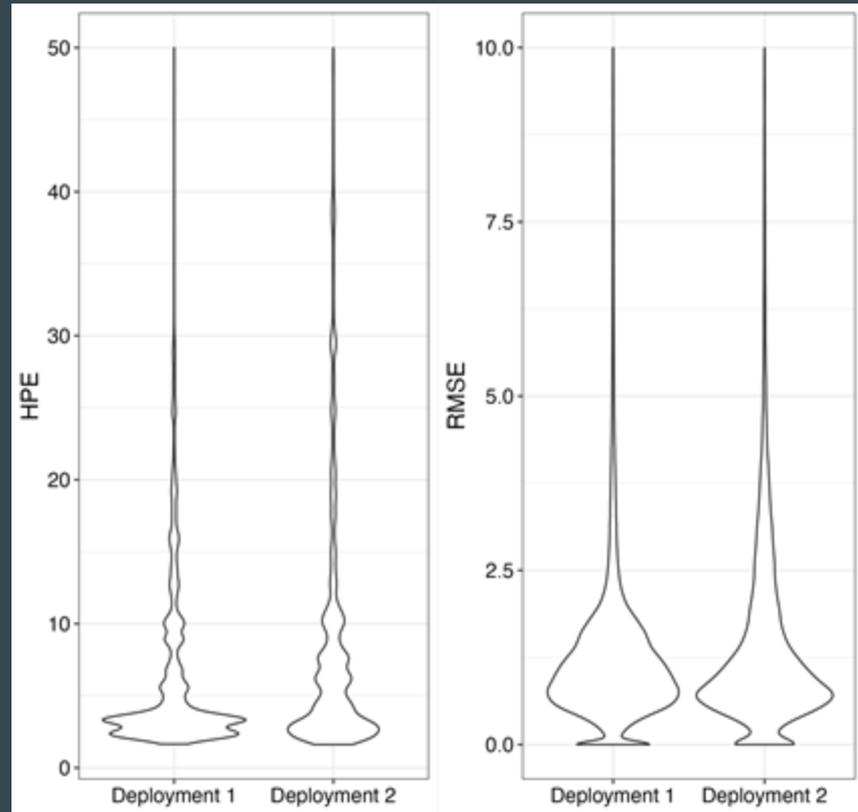
Increase tagging efforts for winter skate and sandbar sharks

- NOAA longline research cruise
- Commercial trawls

Continue analyzing animal positions

Calculate habitat use from spatial models

Quantify error metrics for each deployment





# Export Cable Acoustic Telemetry Study

**Stony Brook and Cornell Cooperative Extension joint discussion (part 2)**

**Presenter: Matt Sclafani – Cornell Cooperative Extension**



# Sunrise Wind Export Cable: Acoustic Telemetry and Tagging of Horseshoe Crab and Lobster 2023

Co-PI's: Matthew Sclafani (Cornell Cooperative Extension)  
Bradley Peterson (Stony Brook University)

Project Partners: R. Cerrato (Stony Brook University), J. Bopp (Mass. DMF)

Contributing CCE Technicians: Joe Costanzo, Stephen Havens, Jordan Russo, Kaitlin Morris

## Project Goals

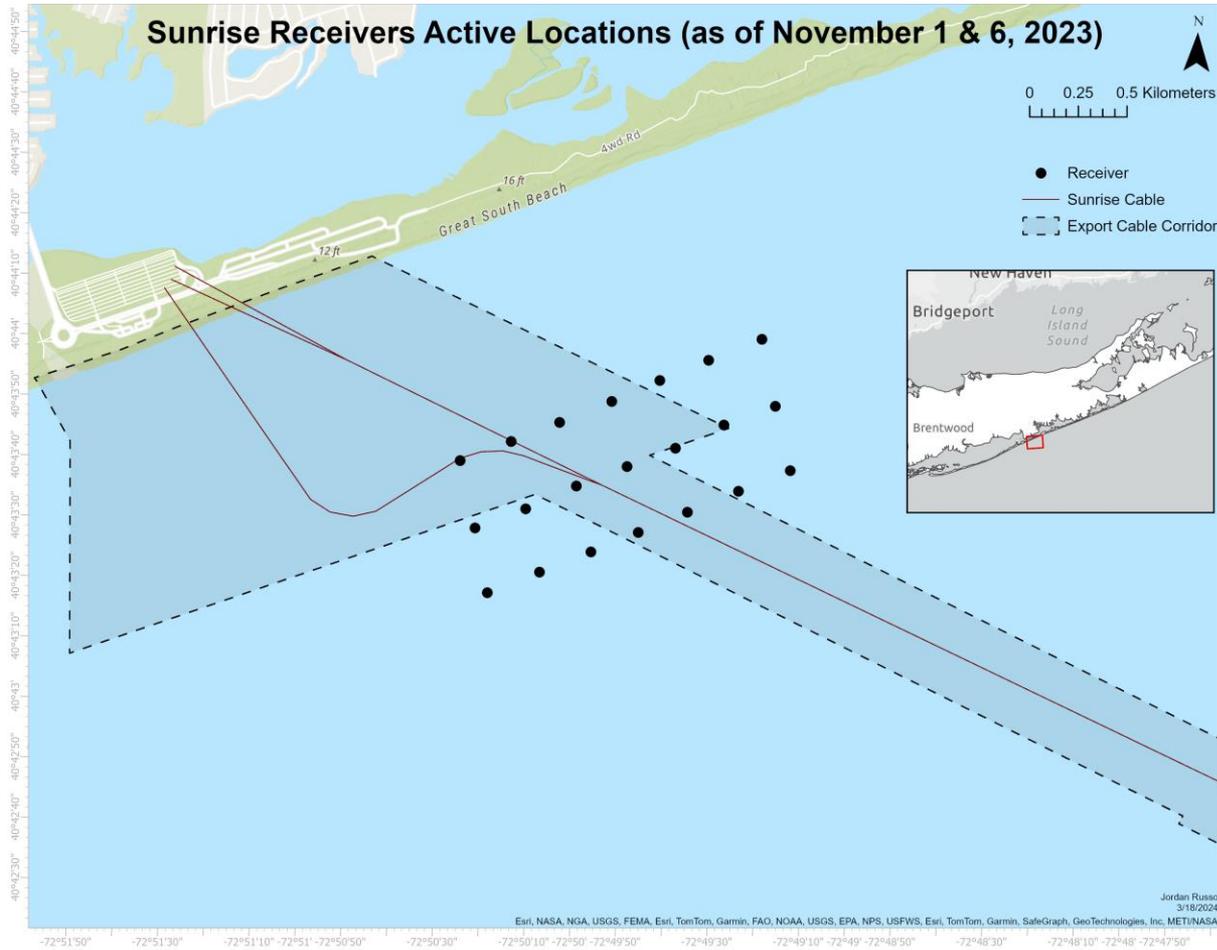
Use acoustic telemetry methods to monitor the movements of horseshoe crab (*Limulus polyphemus*) and American lobster (*Homarus americanus*) during pre-construction, construction, and post-construction of the Sunrise Wind Farm export cable (SWFEC).

Determine behavioral metrics from the positional acoustic receiver array to evaluate if there are changes in behaviors and movements in relation to EMF from the export cable.

# Why Horseshoe Crab and Lobster?

- Important fisheries in NYS
- Species that have close associations with benthic habitats will have the greatest exposure to EMF from the export cable (Exponent 2021)
- Horseshoe crab and lobster can exhibit migratory movements, traverse export cables, and may also be detected in both the Sunrise and South Fork Wind acoustic arrays
- Lobster have been shown to exhibit behavioral changes when exposed to EMF from high voltage DC power cables (Hutchison et al. 2018, 2020)
- Horseshoe crabs have been listed as a priority species for assessment of effects of EMFs from undersea power cables by the Bureau of Ocean Energy Management (Normandeau et al. 2011).

# Sunrise Receivers Active Locations (as of November 1 & 6, 2023)



Esri, NASA, NGA, USGS, FEMA, Esri, TomTom, Garmin, FAO, NOAA, USGS, EPA, NPS, USFWS, Esri, TomTom, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA

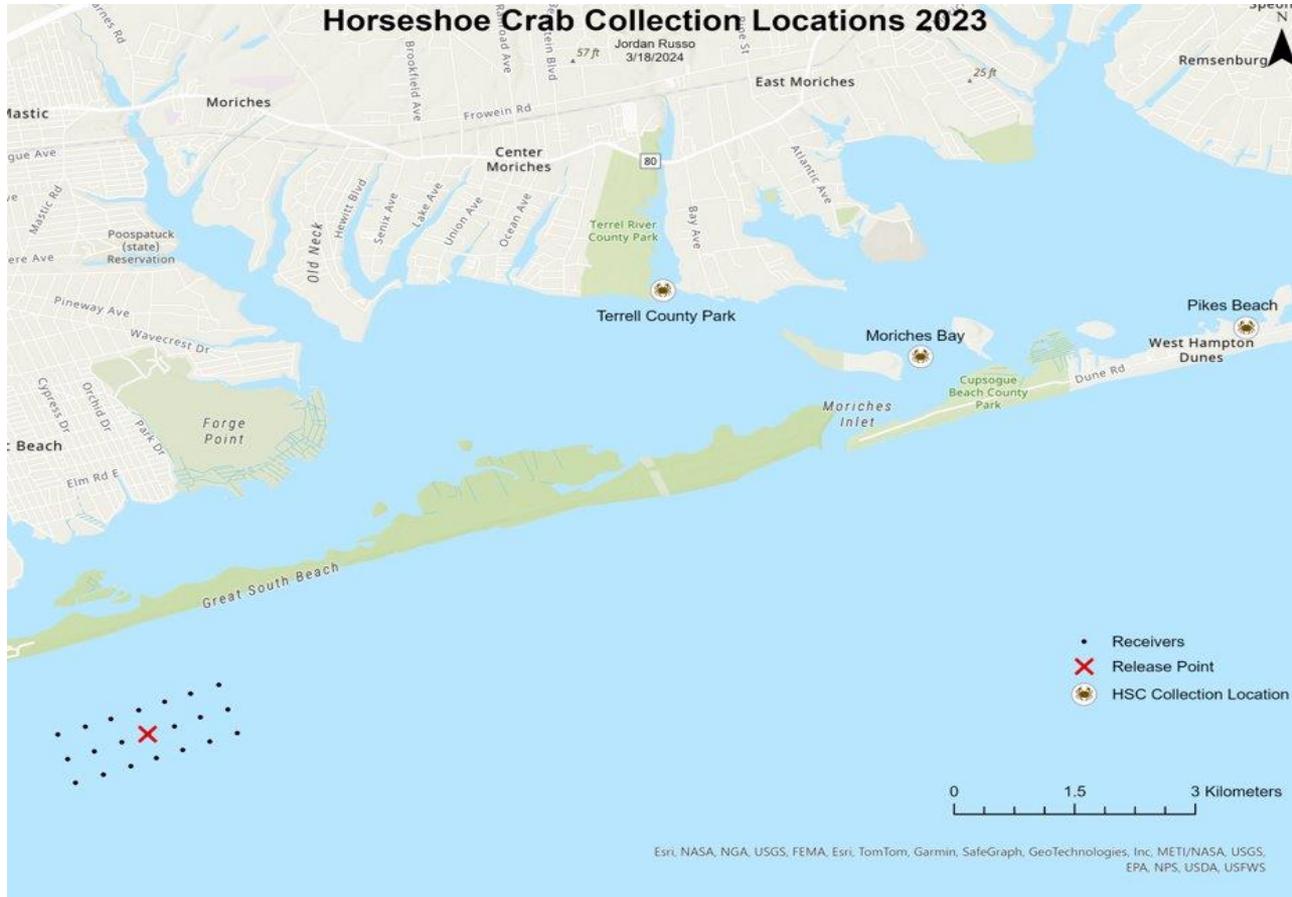
Jordan Russo  
3/18/2024

## Atlantic Horseshoe Crab Tagging

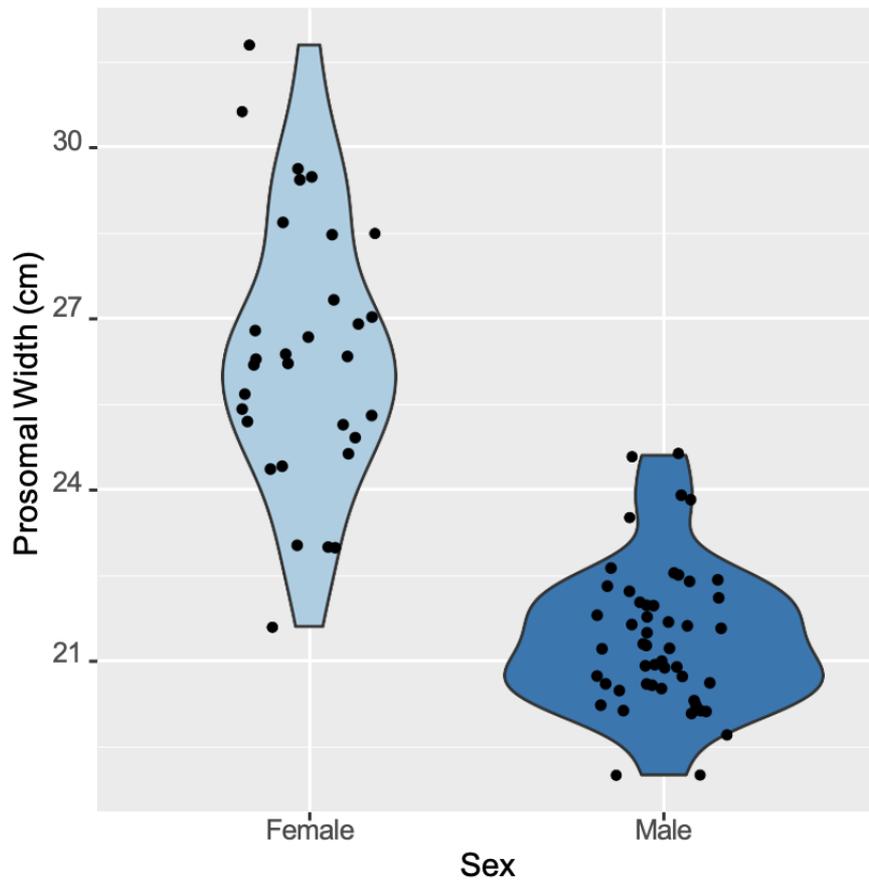
- **Goal:** Annually tag 75 horseshoe crabs and release them in the positional array.
- Innovasea V-16 tags and a USFWS button tag, using tagging methods described in Brousseau et al. 2004.
- Tagged 125 horseshoe crabs from Terrell County Park, Pikes Beach and Moriches Bay from June to August 2023.



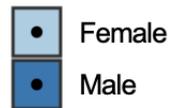
# Horseshoe Crab Collection Locations 2023



## Horseshoe Crab Size Distributions



Sex



Females:

Mean prosomal width= 26.2 cm ( $\pm$  2.16)

Males:

Mean prosomal width= 21.4 cm ( $\pm$  1.20)

# Horseshoe Crab: Detection Summary Through November 2023

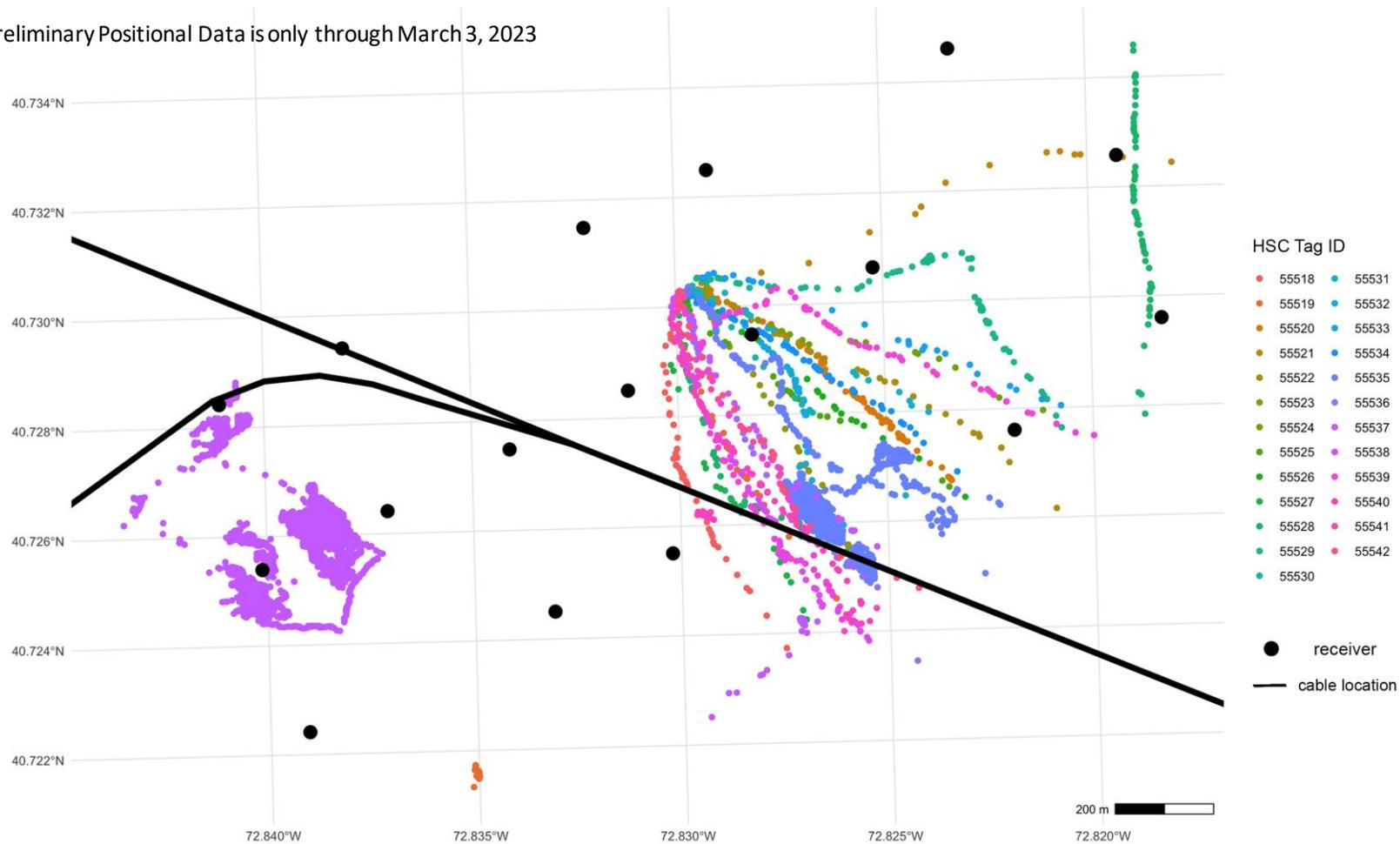
Species	Horseshoe Crab (n=137)
Total Detections	606,675
Mean	4,428
Min	10
Max	120,110

Mean # of days in the array= 10 d



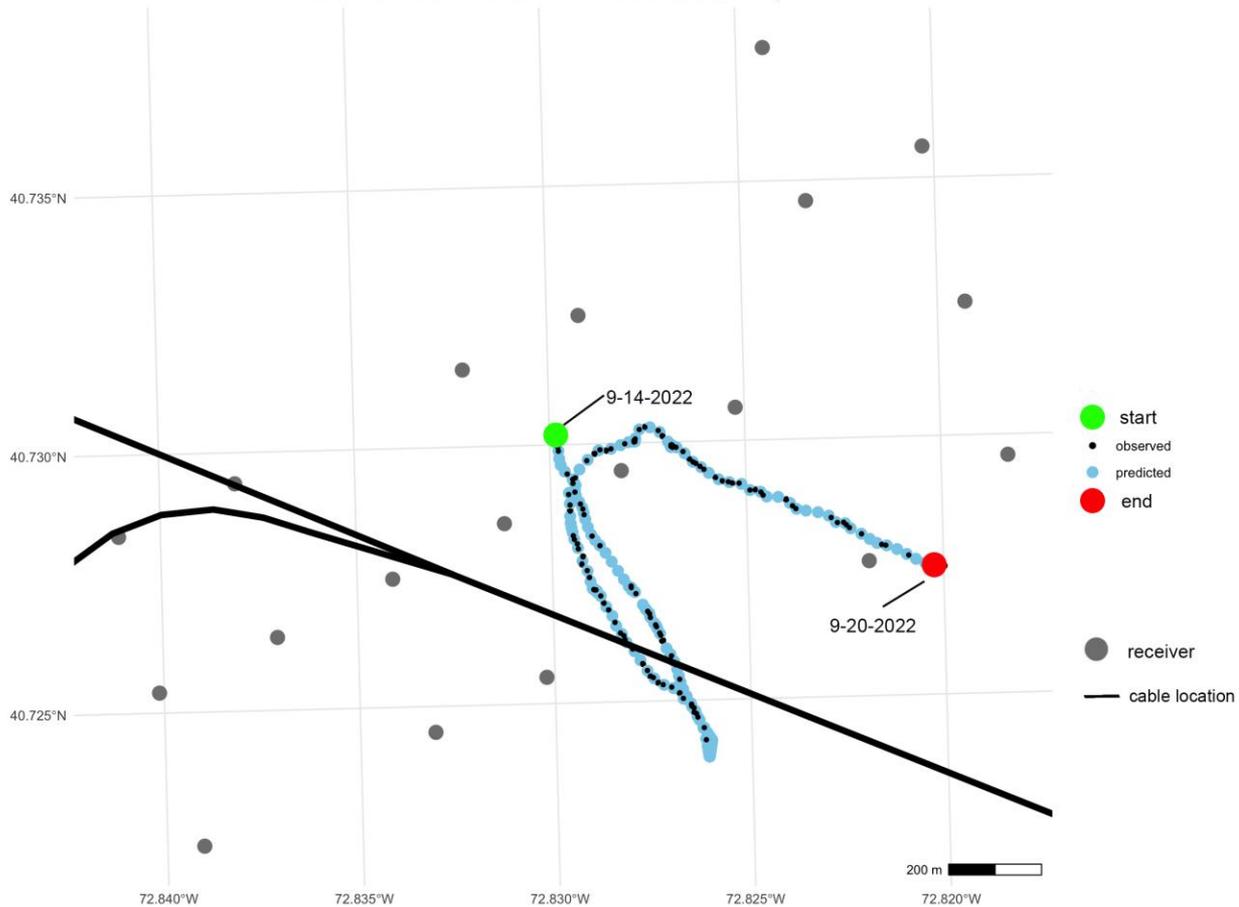
# Preliminary Positional Data from Sept 2022 - March 3, 2023 (n=25)

Note: Preliminary Positional Data is only through March 3, 2023

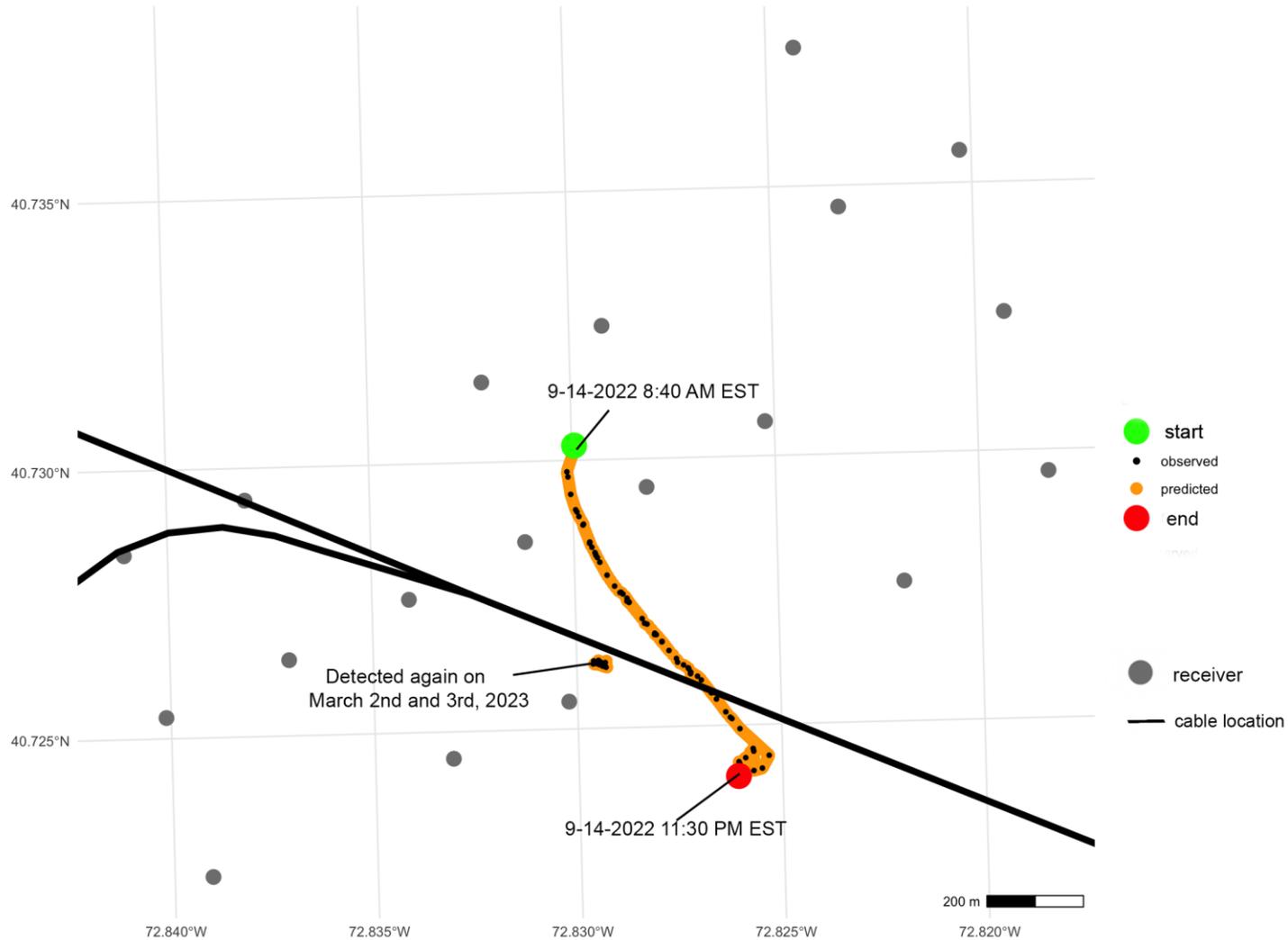


# Individual Horseshoe Crab Movements

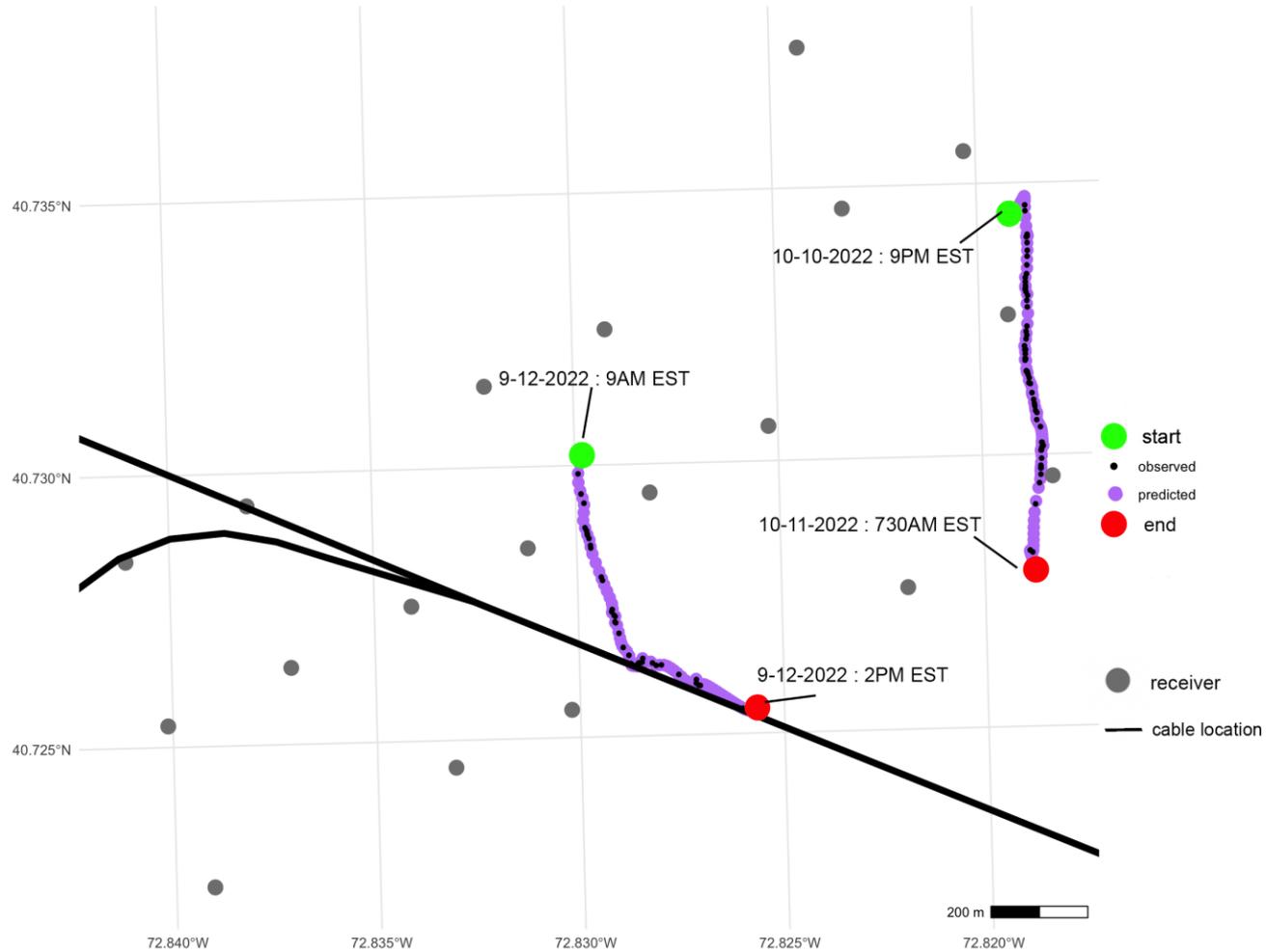
Horseshoe Crab ID 55539: Female released Sep 14th, 2022



# Horseshoe Crab ID 55540: Male released Sep 14th, 2022



Horseshoe Crab ID 55528: Female released Sep 12th, 2022

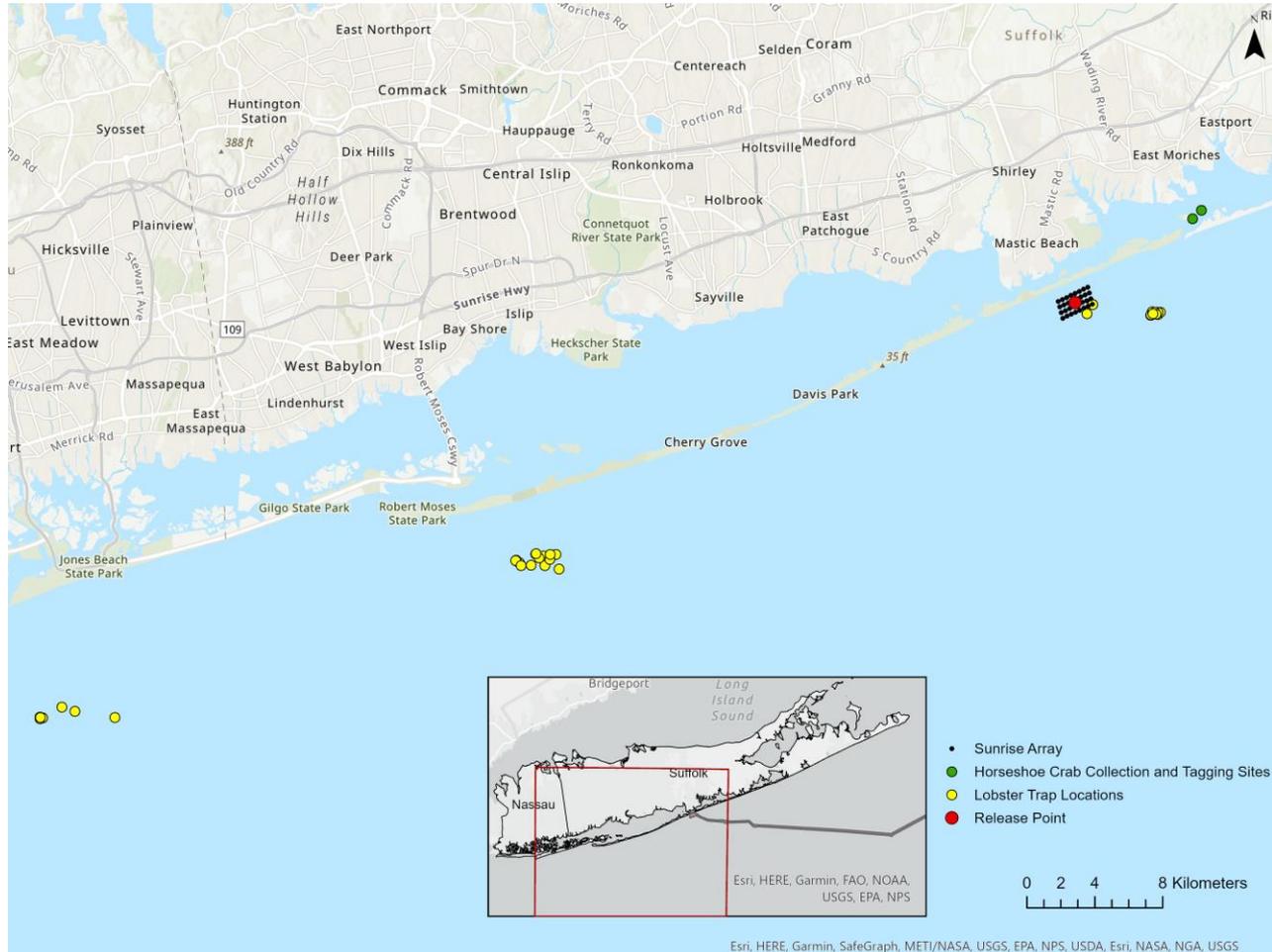


# American Lobster Tagging

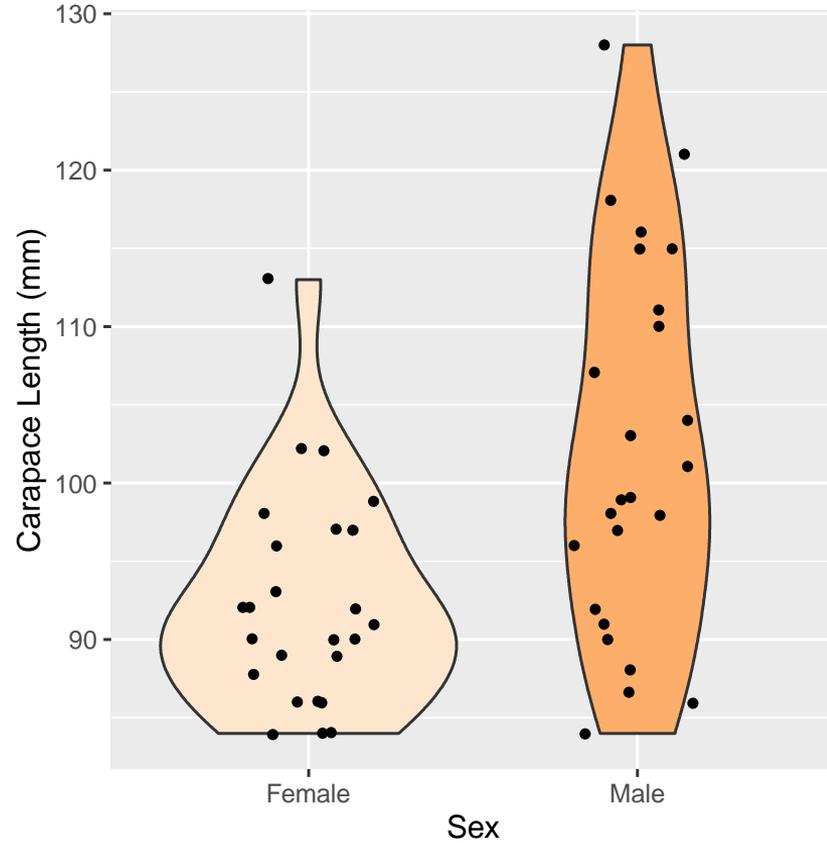
- **Goal:** Tag 50 lobster annually and release them in the positional array.
- Innovasea V-13 tags and FTL-69 Floy tags.
- Tagged 50 lobsters caught at Fire Island Reef and Moriches Reef from January to March 2023.



# Lobster Trap Deployments 2023



## Lobster Size Distributions



Females:

Mean Carapace length= 92.4 mm (± 6.89)

Males:

Mean Carapace Length= 102 mm (± 12.1)

# Lobster: Detection Summary Through November 2023

Species	American Lobster (n=50)
Total Detections	1,562,848
Mean	31,257
Min	283
Max	152,143

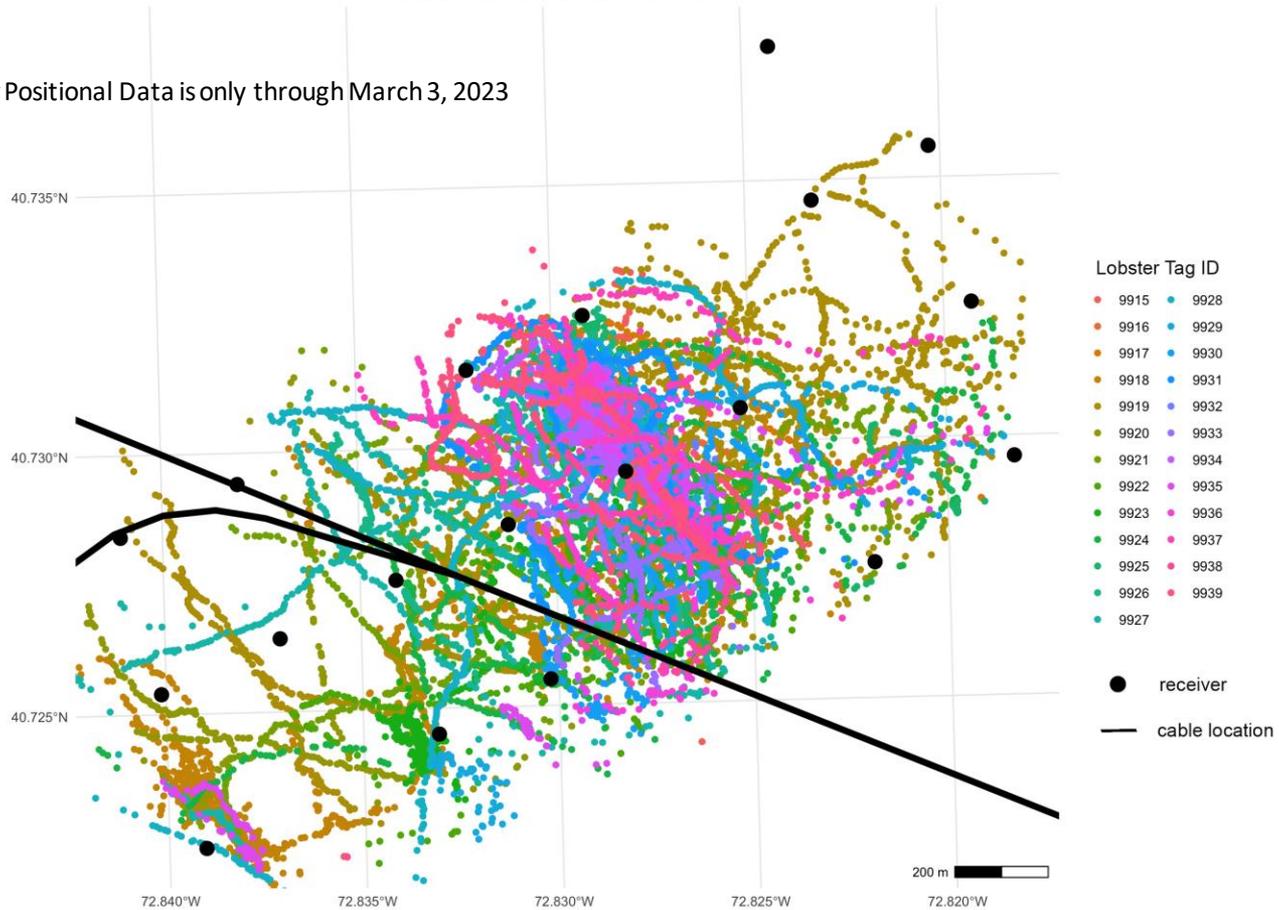
Mean # of days in the array= 63 d



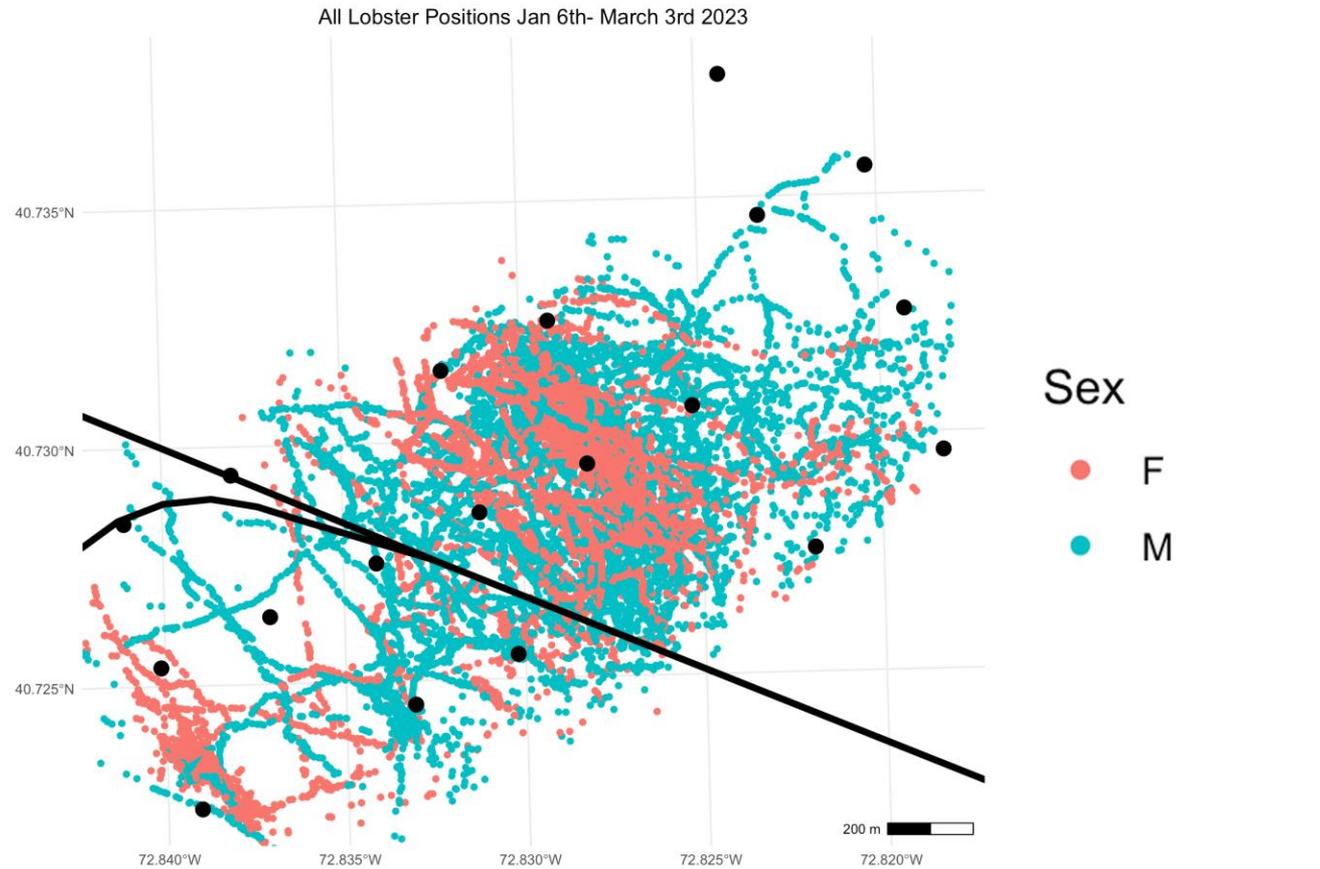
# Positional Data from January- March 3, 2023 (n=25)

All Lobster Positions Jan 6th- March 3rd 2023

Note: Preliminary Positional Data is only through March 3, 2023



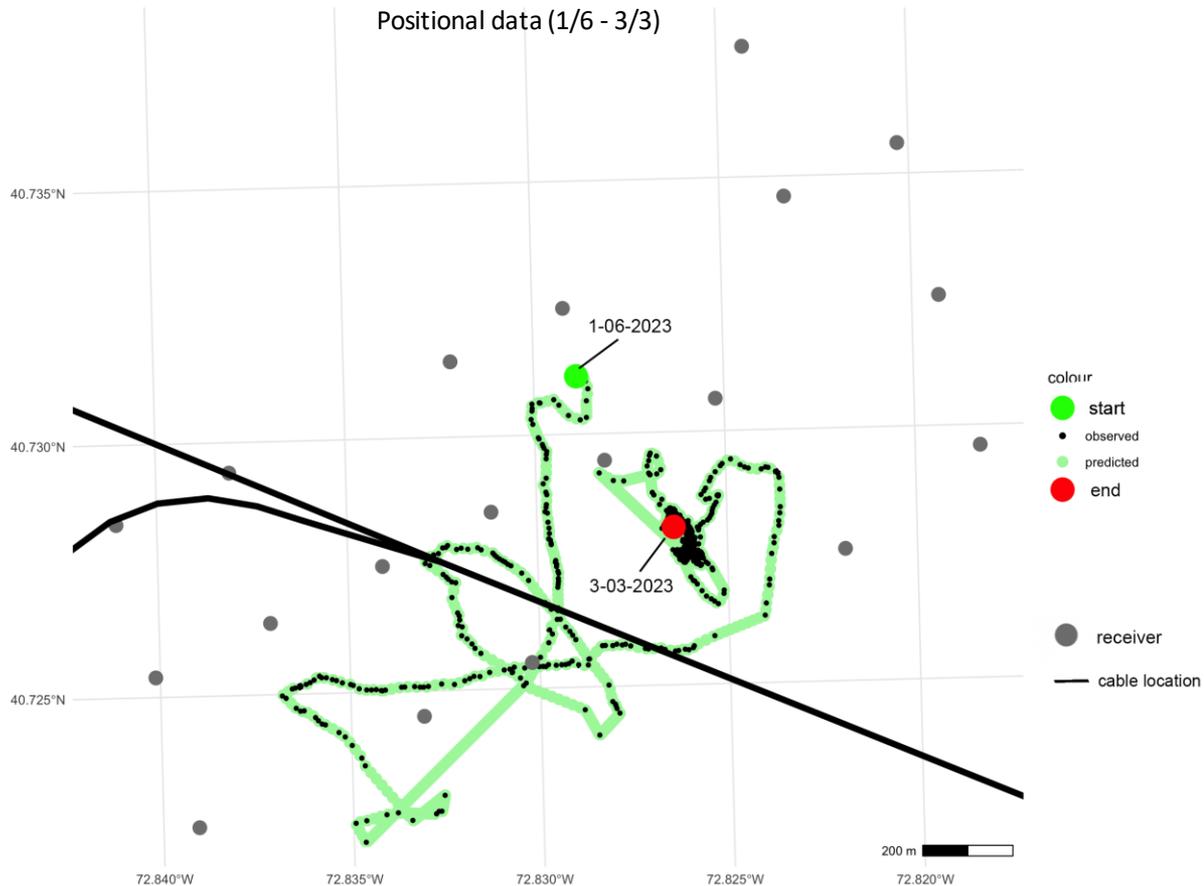
# Lobster- Male and Female Positions



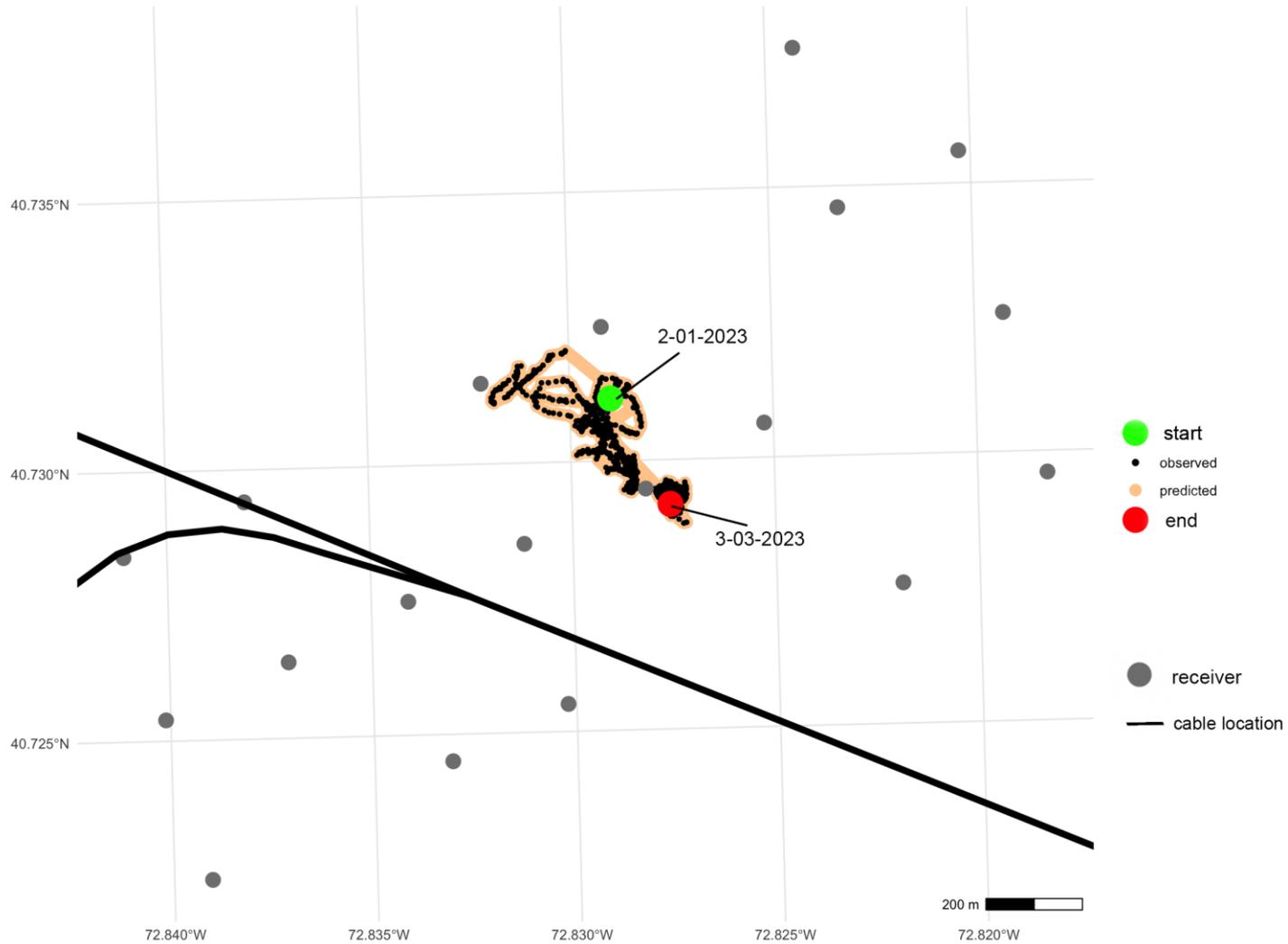
# Individual Lobster Movements

Lobster ID 9922: Female released Jan 6th, 2023

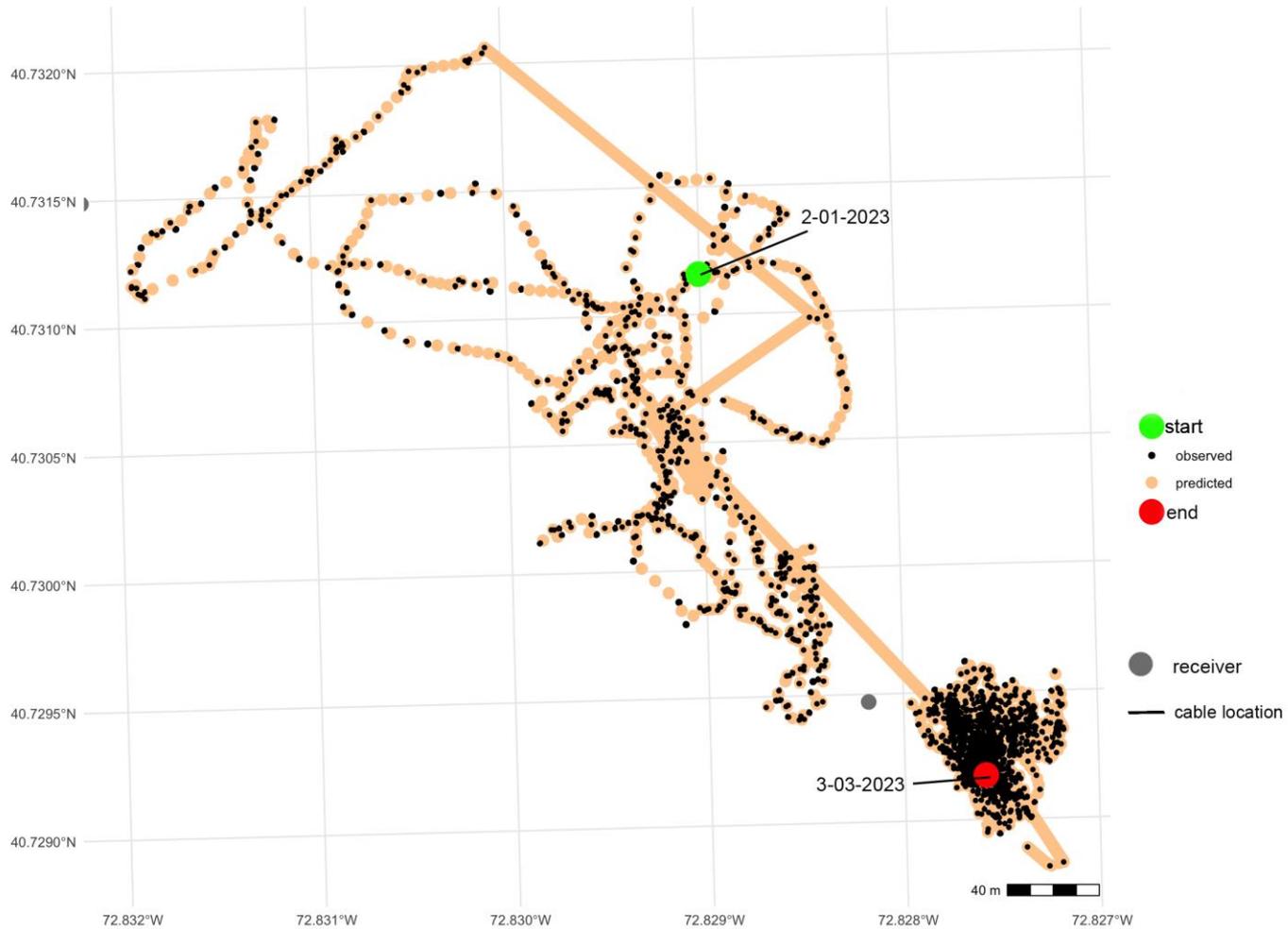
Positional data (1/6 - 3/3)



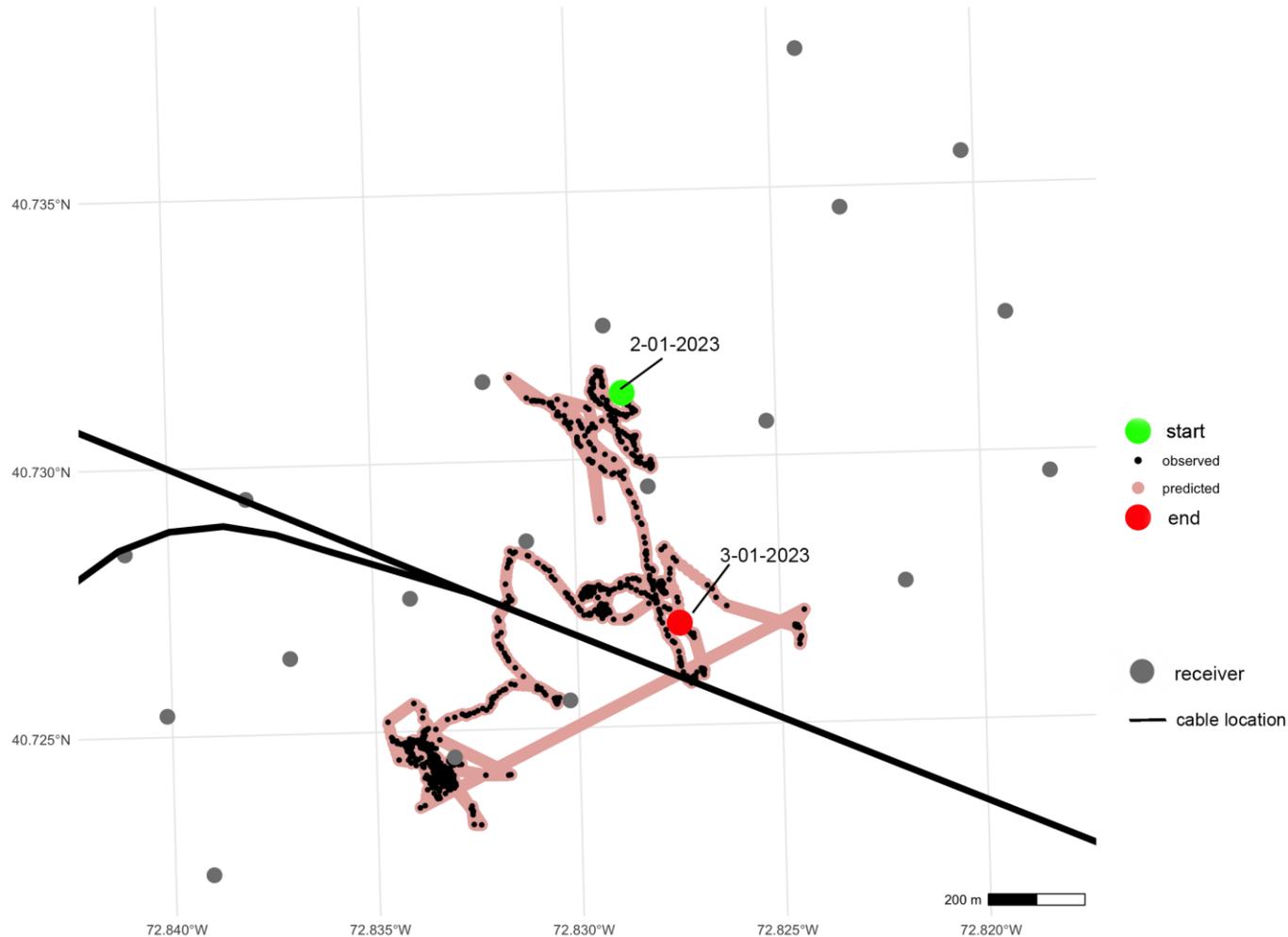
Lobster ID 9934: Female released February 1st, 2023



Lobster ID 9934: Female released February 1st, 2023, Zoomed In

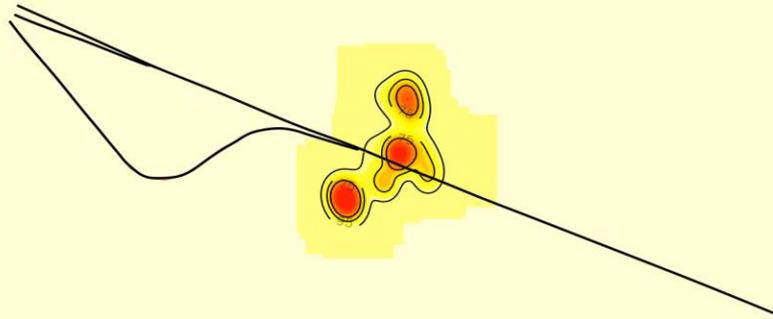


Lobster ID 9923: Male released February 1st, 2023



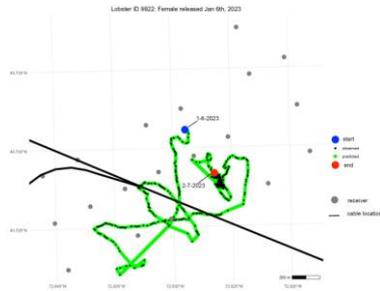
# Lobster Home Range Estimate- Example

Lobster ID 9923: Male Released February 1, 2023



KUD  
95%= Home Range  
50%= Core Area

# Future Telemetry Analyses



- u Estimates of Range Use and Habitat use
  - u Kernel density estimators
  - u Brownian Bridge Model
- u Movement and behaviors
  - u State-space models
  - u Hidden Markov Models
    - u Covariates: time of day, tide, sex, etc.
  - u Model movement in relation to the Export Cable and determine if there are differences Before and After the export cable is installed and energized.

# Summary

- Preliminary positional data through March 3, 2023:
  - Positional array is yielding high resolution spatial positions of horseshoe crab and lobster.
  - Telemetry data for horseshoe crab movements are more limited temporally than lobster (i.e. shorter residency), but will be useful for determining any potential effects of export cable EMF on behavior.
  - The horseshoe crab tags may also last up to 5 years and annual migrations may enable multiple detections in the area of interest in subsequent years.
  - Horseshoe crabs (~40%) were detected again by additional receivers in Moriches Bay in 2023

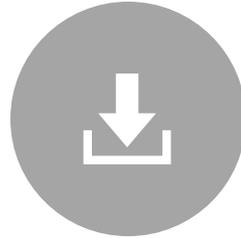
# Summary

- Lobster had increased temporal and spatial use within the array.
  - Spatial use between Jan-March 3, 2023 varied between individuals
  - Some lobster appear to have fully utilized the space within the array and traversed the cable multiple times.
  - One lobster was also recovered off Moriches artificial reef (~3.5 miles)
  - Data appears to be suitable for detailed behavioral analysis using Hidden Markov Models

## Future Work



Continue to tag and release 75 horseshoe crabs (Spring/Summer) and 50 lobsters (Winter) annually.



Download data from the receivers 2 times a year.



Analyze horseshoe crab and lobster movements within the positional array.



Explore movement models for determining behavioral changes pre-post cable installation

# Questions?