Selection and Siting of Control Areas for Offshore Wind Fisheries Monitoring

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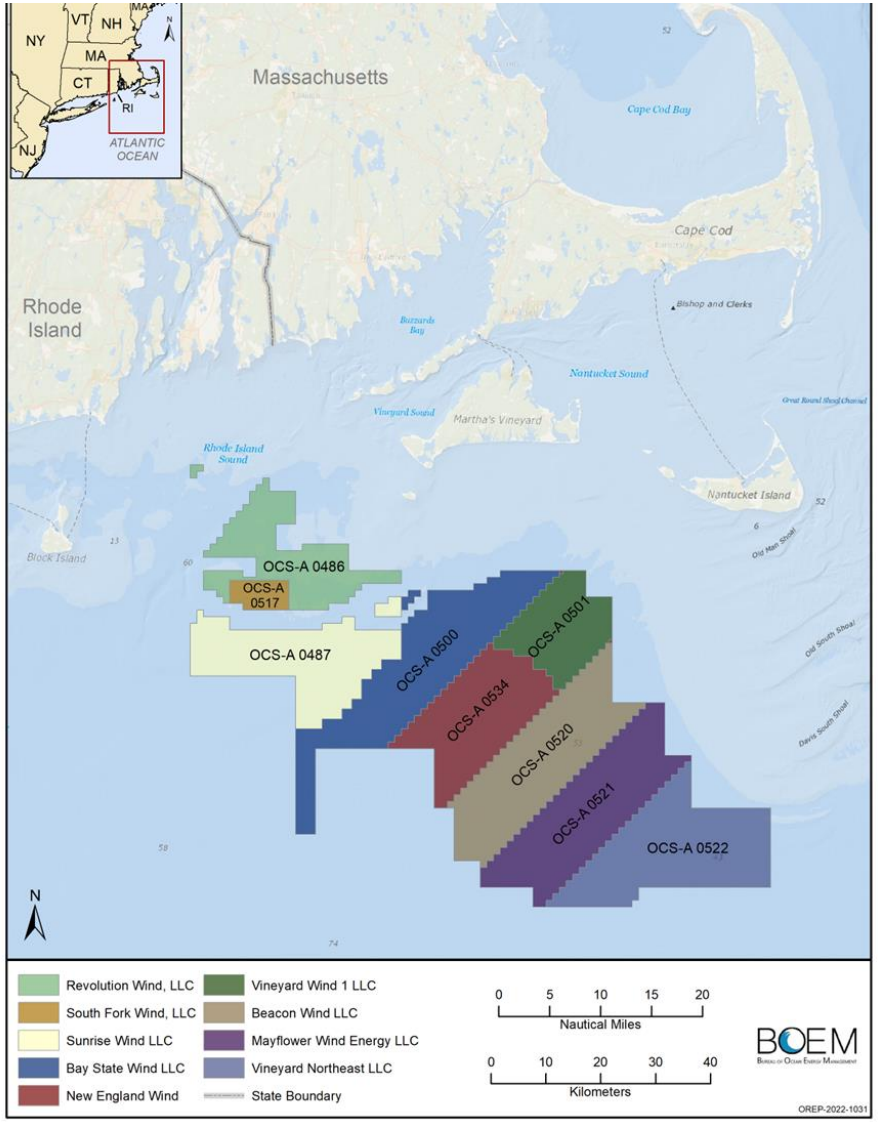
(SMAST)

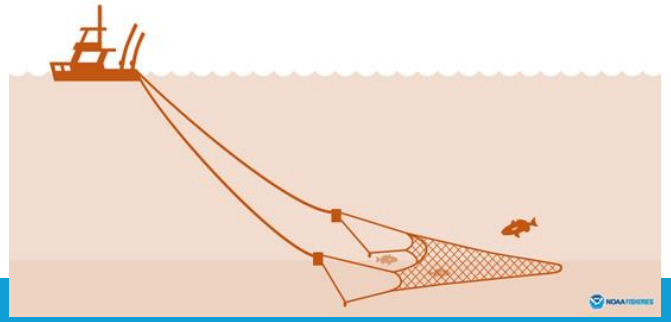


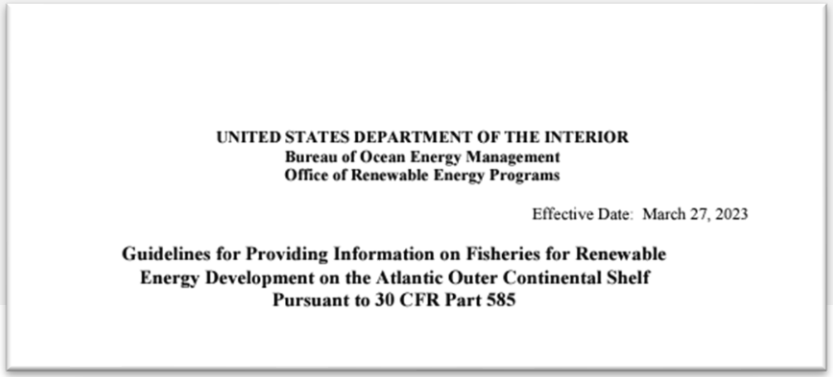
Background

- Offshore wind is rapidly developing
- Southern New England seeing the first development
  - Need to understand impacts
- Individual fisheries monitoring plans for each project

Background

- Fisheries Monitoring Plans
  - Many surveys follow a Before-After-Control-Impact (BACI) approach
    - Trawl & Ventless Trap/Fish Pot
  - Recommended by BOEM & ROSA
  - Key component of BACI design – control area is representative of impact area

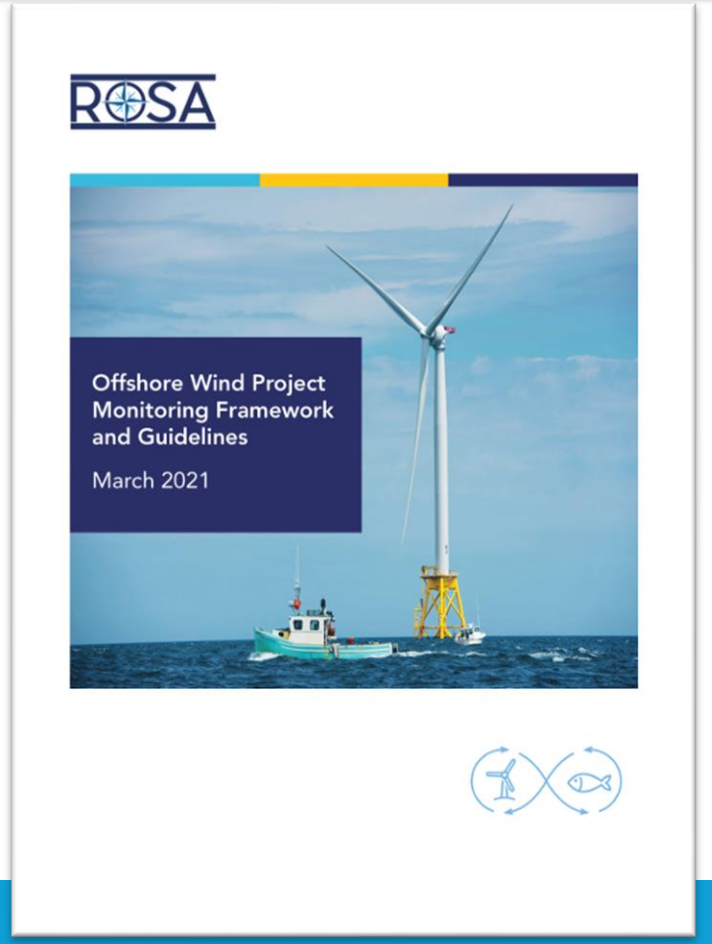




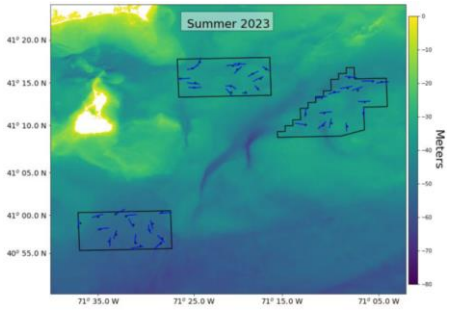
UNITED STATES DEPARTMENT OF THE INTERIOR
Bureau of Ocean Energy Management
Office of Renewable Energy Programs

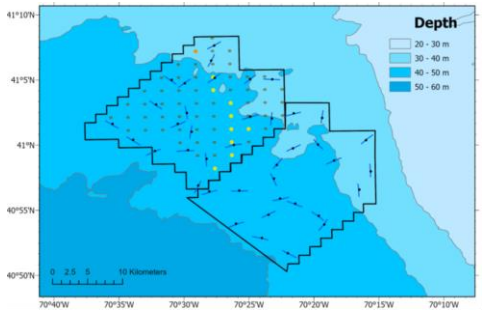
Effective Date: March 27, 2023

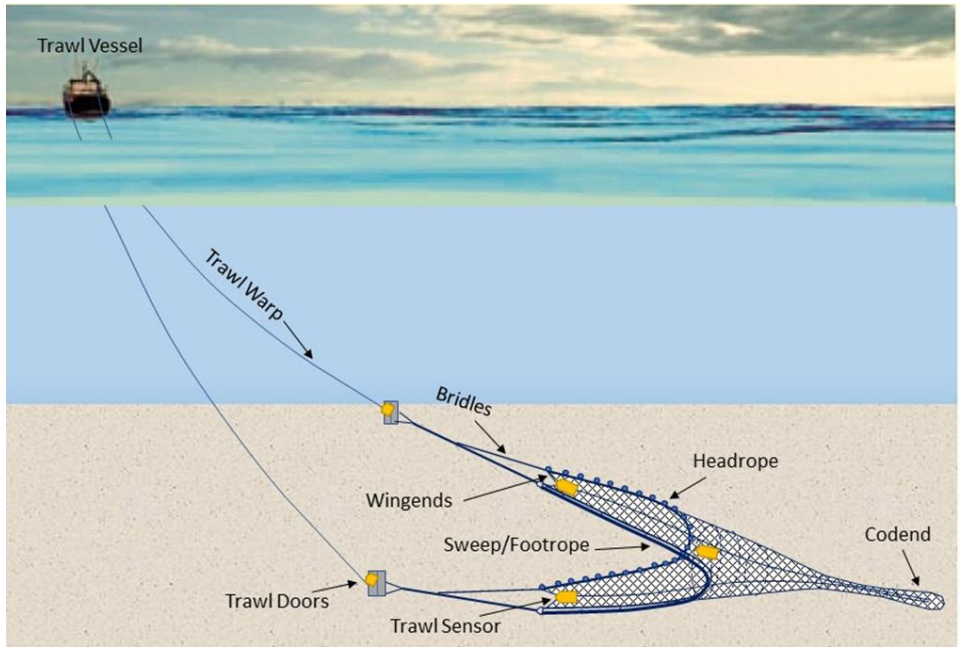
Guidelines for Providing Information on Fisheries for Renewable Energy Development on the Atlantic Outer Continental Shelf Pursuant to 30 CFR Part 585



NEAMAP Trawl & 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

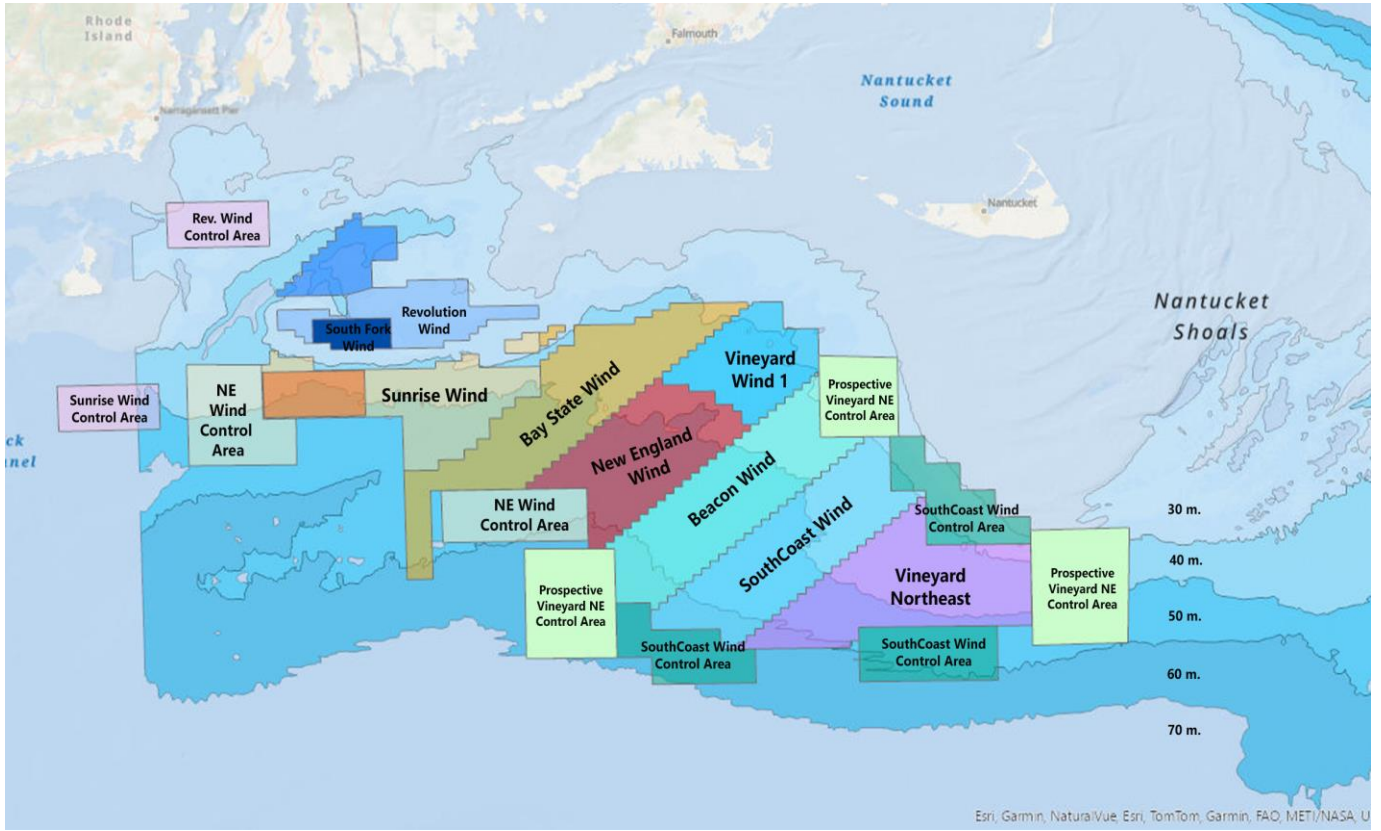
NEAMAP survey protocol (Bonzek et al., 2008)

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

Background

- SMAST – otter trawl survey
  - Vineyard Wind – started in 2019
  - Revolution & Sunrise Wind – started in 2023
- More monitoring surveys coming online
- Control area selection
  1. Depth
  2. Adjacency
  3. Bottom Habitat

- **Does our current approach for siting control areas work?**

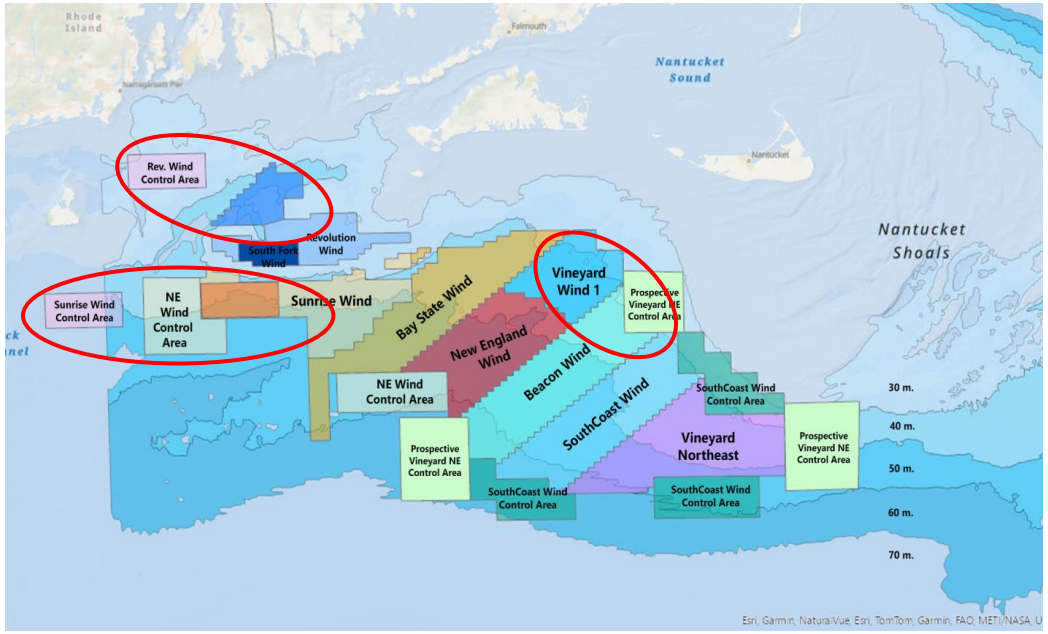


Project Objectives

1. Are the current control areas representative of their development areas?
2. Could multiple control areas work for one development area?
    - Beyond BACI
    - Integrated/Regionalized Approach to Fisheries Monitoring

Methods

- REV/SRW Trawl Survey Data
  - 4 seasonal surveys included in this analysis
  - 3 overlapping seasonal surveys with VW
    - Summer 2023, Fall 2023, Winter 22024



- Community Structure Analysis
  - Primer-E
  - Species presence and relative proportion of each species in the catch
  - Analysis of Similarities (ANOSIM)
    - Results in R-Statistic
- Power Analysis
  - Ability to detect changes in fish populations

$$n = \frac{2(z_{1-\frac{\alpha}{2}} + z_{1-\beta})^2 (CV)^2}{[\ln(1 - PC)]^2}$$

- $\alpha = 0.05$, $\beta = 0.8$, PC is percent change in population means, CV is coefficient of variation

Results – Community Composition

Summer 2023

	Rev	North Control	SRW	South Control	VW1	VW Control
Rev		0.102		0.61	0.465	0.587
North Control				0.844	0.711	0.742
SRW						
South Control					0.236	0.619
VW1						0.205
VW Control						

*Did not survey SRW due to permitting issues

Fall 2023

	Rev	North Control	SRW	South Control	VW1	VW Control
Rev		0.151	0.619	0.685	0.232	0.589
North Control			0.589	0.654	0.245	0.497
SRW				0.202	0.392	0.556
South Control					0.378	0.551
VW1						0.133
VW Control						

Winter 2024

	Rev	North Control	SRW	South Control	VW1	VW Control
Rev		0.538	0.228	0.546	0.376	0.454
North Control			0.555	0.411	0.44	0.465
SRW				0.29	0.531	0.581
South Control					0.624	0.595
VW1						0.034
VW Control						

Spring 2024

	Rev	North Control	SRW	South Control	VW1	VW Control
Rev		0.354	0.434	0.495		
North Control			0.837	0.707		
SRW				0.39		
South Control						
VW1						
VW Control						

*Did not survey VW areas

R = 0, no difference in community composition | R = 1, large separation in community composition between groups

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Results – Power Analysis (REV)

- Values are the minimum percent change in the population with an 80% probability of detection

- Default condition would be REV + North Control (120 tows per year) – we are able to detect a 47% change in BSB abundance
  - If we add the SC effort (180 tows per year) – we detect a 42% change in BSB abundance

	North Control (120)	South Control (120)	VW Control (140)	NC + SC (180)	NC + VWC (200)	SC + VWC (200)	NC + SC + VWC (260)
Black Sea Bass	**46.9**	52.1	61.2	42.0	44.2	49.2	40.3
Summer Flounder	**47.7**	42.9	47.0	39.8	42.6	39.2	36.8
Silver Hake	**42.8**	46.3	33.9	38.7	31.3	32.9	29.9
Scup	**49.1**	48.8	46.7	43.1	39.9	41.4	36.8
Little Skate	**29.9**	28.8	39.8	24.9	34.0	31.2	27.9
Longfin Squid	**38.7**	38.8	50.3	32.8	47.1	45.7	42.7

Results – Power Analysis (SRW)

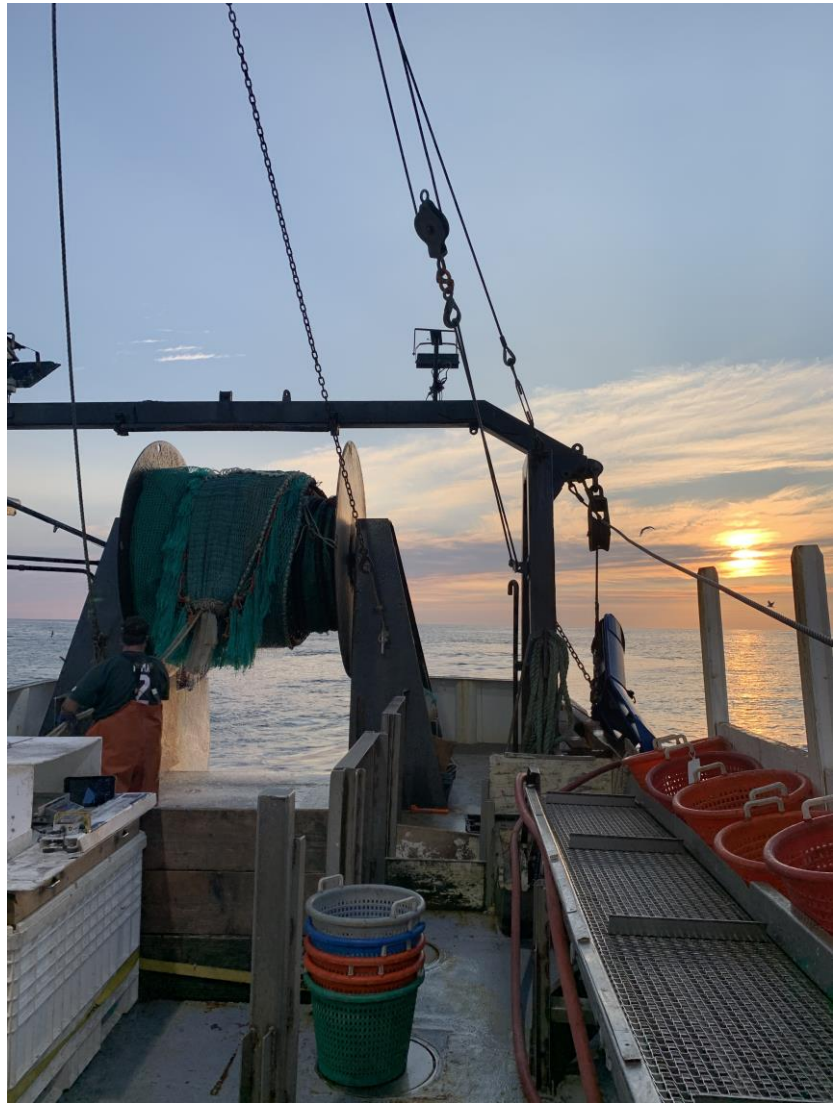
- Values are the minimum percent change in the population with an 80% probability of detection
- Default condition would be SRW + South Control (120 tows per year) – we are able to detect a 52% change in BSB abundance
  - If we add the NC effort (180 tows per year) – we detect a 43% change in BSB abundance

	South Control (120)	North Control (120)	VW Control (140)	SC + NC (180)	SC + VWC (200)	NC + VWC (200)	SC + NC + VWC (260)
Black Sea Bass	**52.3**	51.0	65.9	43.3	50.6	49.1	42.1
Summer Flounder	**45.8**	51.5	51.5	41.9	41.6	45.6	38.6
Silver Hake	**43.5**	40.1	31.4	36.5	31.2	29.6	28.6
Scup	**55.4**	49.3	47.5	44.5	43.2	40.2	37.6
Little Skate	**30.0**	28.8	42.0	25.0	32.2	35.5	28.7
Longfin Squid	**40.3**	41.1	48.8	33.9	45.0	46.4	42.4

Conclusions & Future Work

- Control area siting matters
  - The current control areas are working well
- Including more control areas might increase our ability to detect smaller changes

- Simulation Testing
- Spatio-temporal modelling



Acknowledgements

Revolution Wind | Powered by Ørsted & Eversource

Sunrise Wind | Powered by Ørsted & Eversource

VINEYARD WIND

REV

	North Control (260)	South Control (260)	VW Control (260)	NC + SC (260)	NC + VWC (260)	SC + VWC (260)	NC + SC + VWC (260)
Black Sea Bass	**35.0**	39.3	50.1	36.5	40.1	44.8	40.4
Summer Flounder	**35.6**	31.7	37.2	34.4	38.6	35.4	36.8
Silver Hake	**31.6**	34.5	26.2	33.5	28.0	29.5	30.0
Scup	**36.8**	36.6	37.0	37.4	36.1	37.5	36.9
Little Skate	**21.5**	20.6	31.1	21.3	30.6	28.0	28.0
Longfin Squid	**28.3**	28.4	40.2	28.2	42.8	41.5	42.8

SRW

	South Control (260)	North Control (260)	VW Control (260)	SC + NC (260)	SC + VWC (260)	NC + VWC (260)	SC + NC + VWC (260)
Black Sea Bass	**39.5**	38.4	54.6	37.6	46.1	44.7	42.1
Summer Flounder	**34.0**	38.9	41.2	36.4	37.6	41.3	38.6
Silver Hake	**32.1**	29.4	24.2	31.4	28.0	26.5	28.7
Scup	**42.2**	37.0	37.7	38.7	39.1	36.3	37.6
Little Skate	**20.7**	20.6	32.9	21.3	28.9	31.9	28.7
Longfin Squid	**29.5**	30.2	38.8	29.2	40.8	42.2	42.4