



Fisheries, Wildlife, & Ecosystem Surveys in a New Era of Offshore Wind Energy Development

Andy Lipsky, Debi Palka, Jon Hare, Angela Silva, Sean Hayes, Elizabeth Methratta, Chris Orphanides, Doug Christel, Sofie Van Parijs, and Jennifer-Lilah Ise

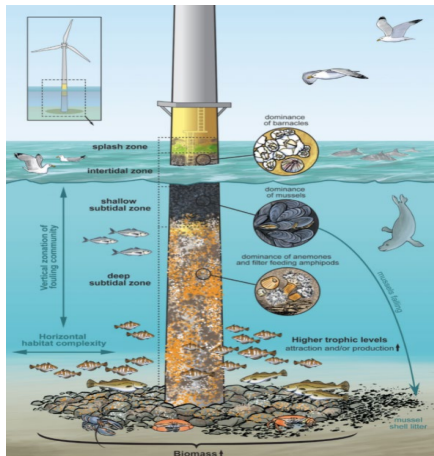
NOAA Fisheries

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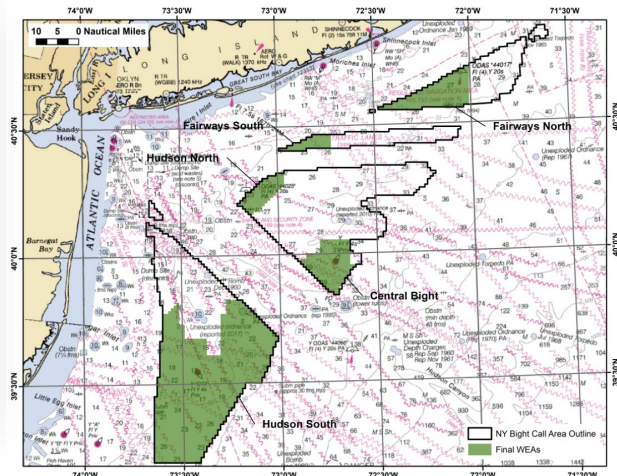
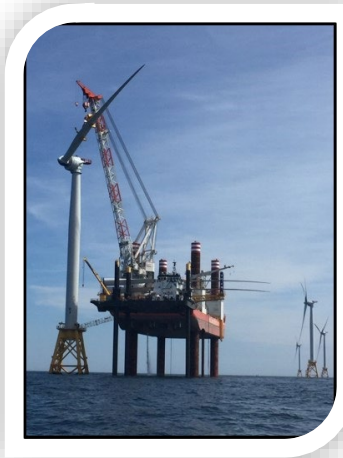
5/31/23 SEER Webinar

NOAA FISHERIES

Northeast Fisheries Science Center

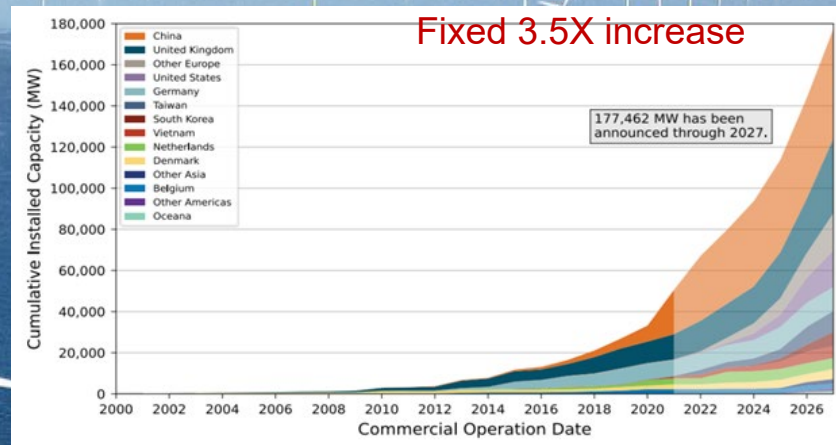


Degraer et al., 2020

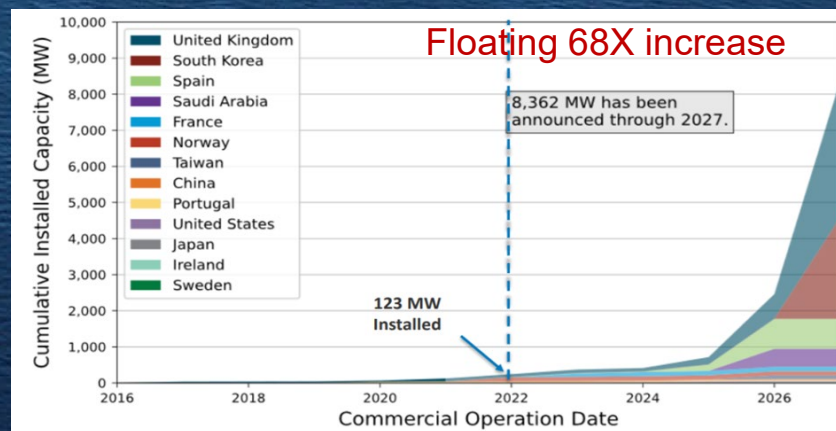


Significant Global Offshore Wind Growth

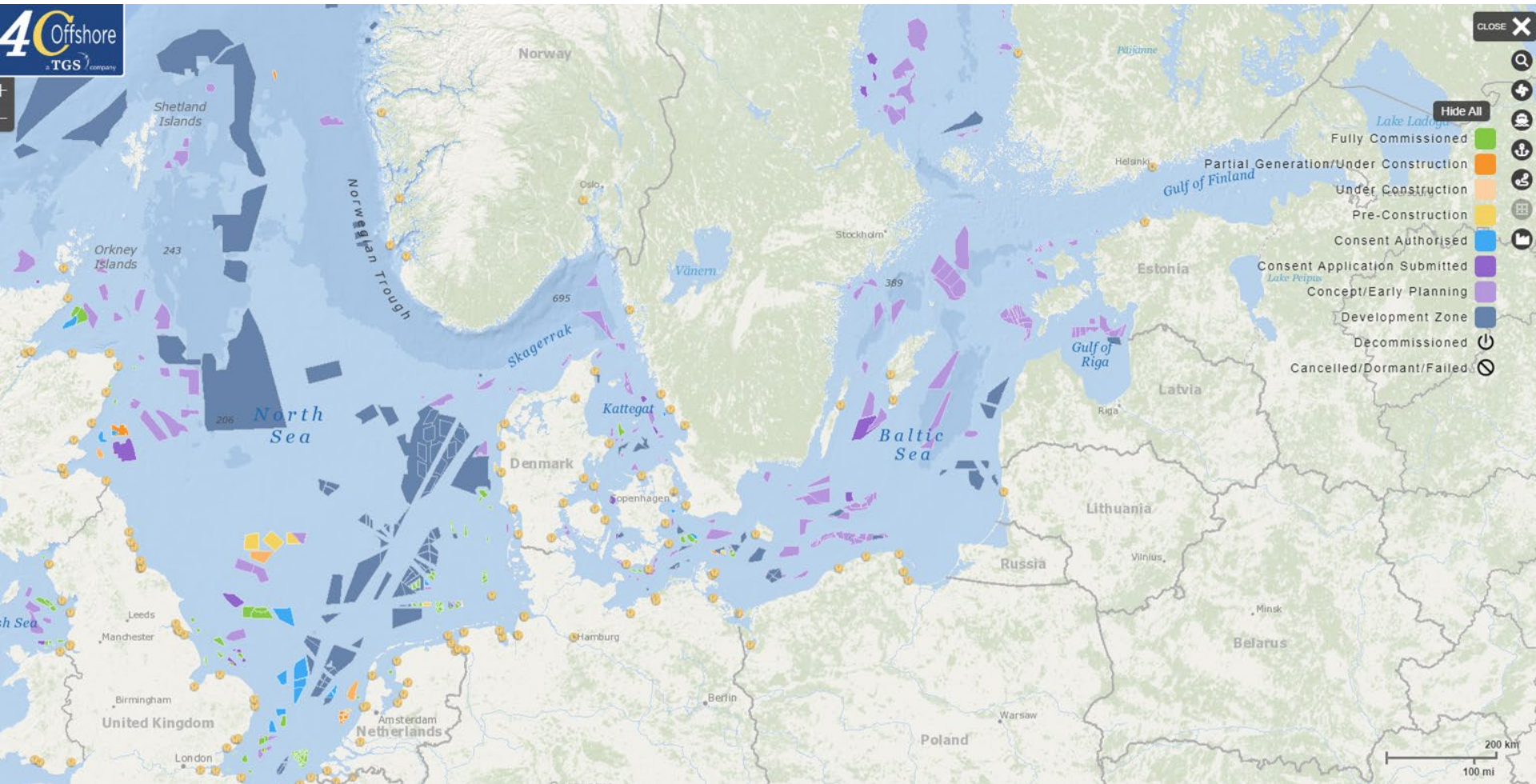
- Cumulative global offshore wind deployment by 2027 = 177GW
- Cumulative global floating offshore wind deployment by 2027 = 8GW



- Musial et al. 2022
<https://www.energy.gov/eere/wind/articles/offshore-wind-market-report-2022-edition>

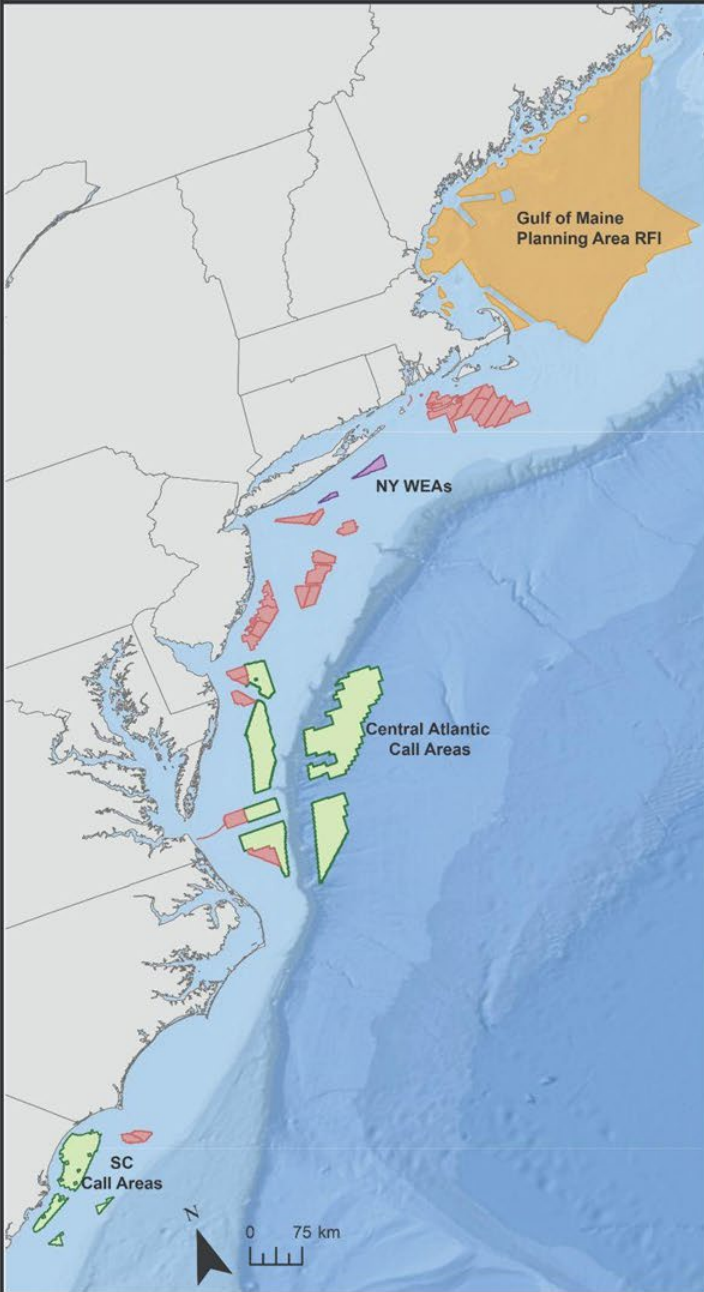


Decades of Development & Future Development



<https://map.4coffshore.com/offshorewind/>

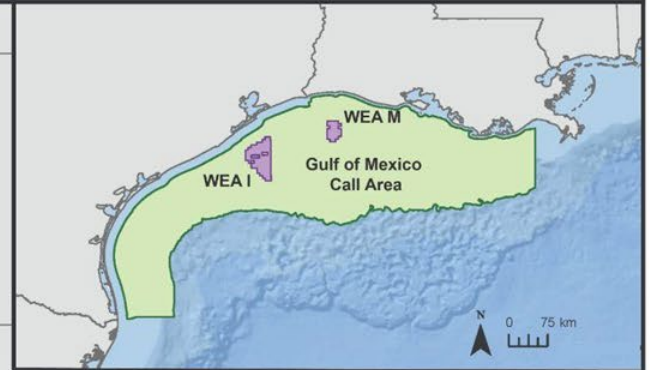
Atlantic OCS



Pacific OCS



Gulf of Mexico OCS



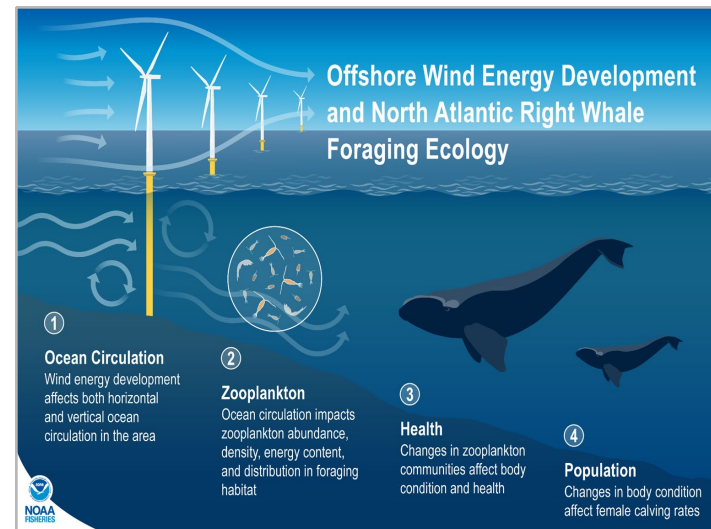
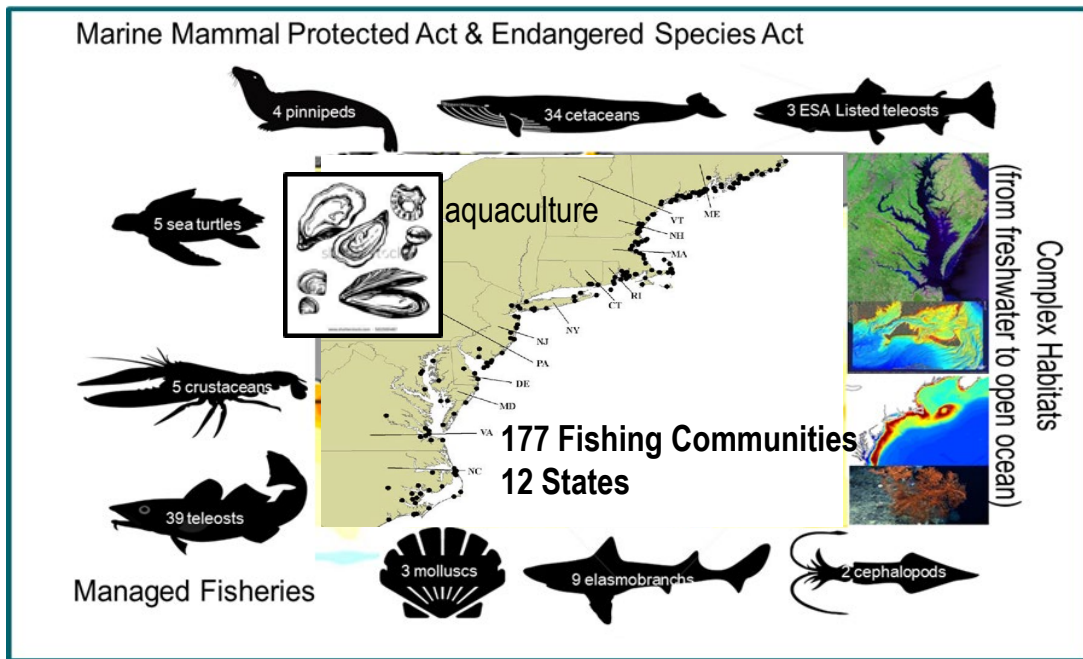
Map Legend



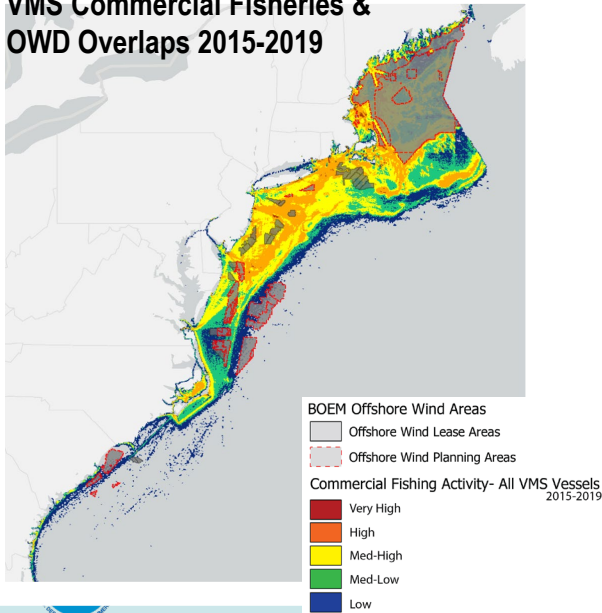
U.S. Wind Development Footprint

Stage	Wind area	Acres
Atlantic OCS		
Lease Areas	28 Lease Areas	2,344,225
Wind Energy Areas (WEAs)	New York WEA (Fairways)	112,032
Call Areas	Central Atlantic Call Area	4,185,688
	South Carolina Call Areas	853,765
Request for Interest	Gulf of Maine	13,724,530
Total Atlantic OCS Acres		21,405,254
Pacific OCS		
Lease Areas	5 Lease Areas	373,267
Call Areas	CA Call Area- Diablo Canyon	356,284
	CA Call Area- Morro Bay	48,414
	OR Call Area- Coos Bay	873,084
	OR Call Area- Brookings	286,513
	HI Call Area- Oahu North	153,475
	HI Call Area- Oahu South	331,427
Total Pacific OCS Acres		2,422,464
Gulf of Mexico OCS		
WEAs	Option I and Option M	734,668
Call Areas	Gulf of Mexico Call Area	29,700,000
U.S. Totals		
TOTAL Lease Acres to date		2,717,492
TOTAL Planning Acres to date		50,625,212

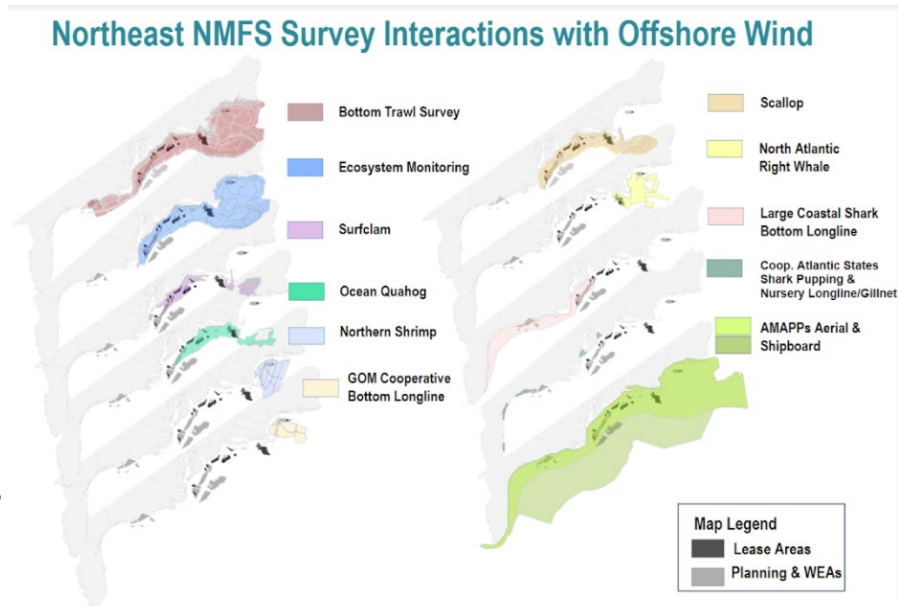
Interactions of Wind on Northeast U.S. Fisheries Scientific Enterprise



VMS Commercial Fisheries & OWD Overlaps 2015-2019



Northeast NMFS Survey Interactions with Offshore Wind



NOAA Fisheries & Offshore Wind

1. **Support Offshore wind planning & regulatory process**
1. **Scientific and technical support** to regulatory process
1. **Mitigate impacts** of wind energy development on **Scientific Enterprise- Surveys, Assessment, Data to Scientific advice**
1. **Research to understand impacts** of wind energy development on marine ecosystems and NOAA trust resources
1. **Mitigate unavoided impacts-Fishing Communities, Environmental Mitigation/Compensation**



NOAA Fisheries Regional Surveys

Responsible for stewardship of the nation's living marine resources

Surveys to support Assessment of:

- 500 Fish Stocks and Stock Complexes
- 120 Marine Mammal Species
- 163 Threatened and Endangered Species

Regional Surveys:

- > 50 long-term, standardized surveys
- Many time series >30 years

Regional Survey Qualities:

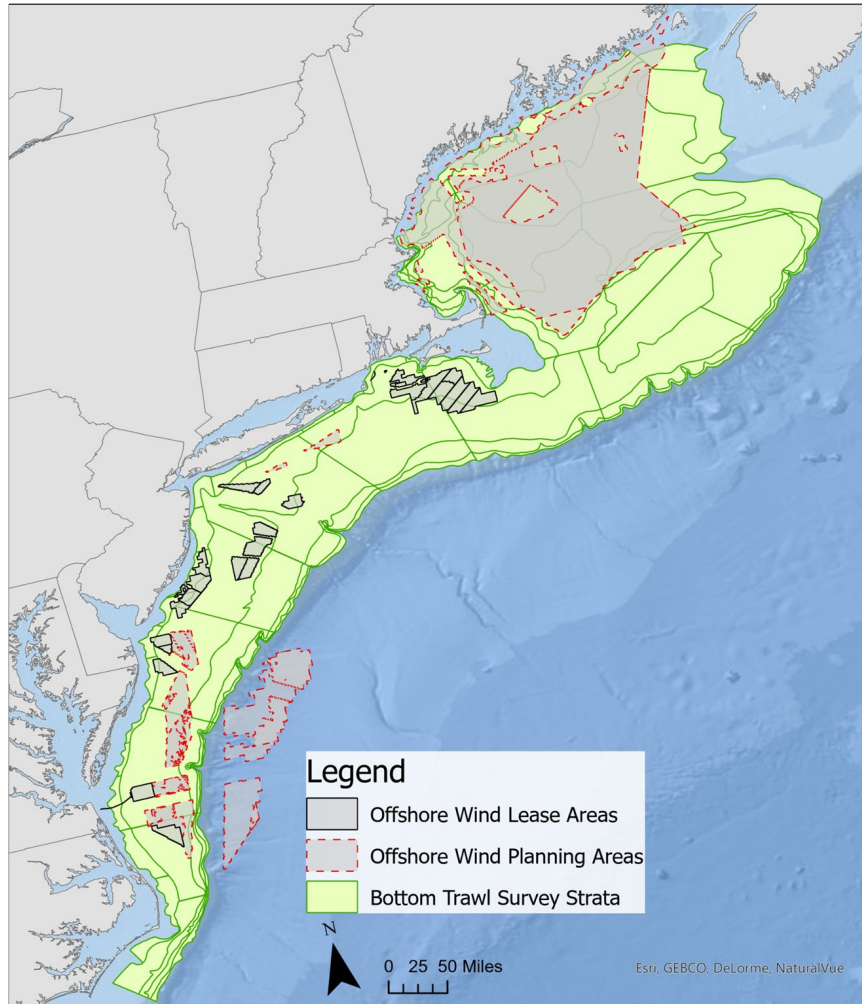
- Seek to reduce uncertainty
- Increase accuracy and precision by maintaining consistency over time
- Consistent sampling designs and methods are essential feature of their value
- Allows NOAA to examine status and trends of trust resources, habitats, and ecosystems consistently through time

Surveys to Support Key Authorities:

- Marine Mammal Protection Act-1972
- Endangered Species Act-1973
- Magnuson-Stevens Act-1976
- Fish & Wildlife Coordination Act-1934
- *Other policies & regulations*



541 Years of Total Survey Effort in Northeast



1960s

- Autumn Bottom Trawl Survey (BTS)
- Spring Bottom Trawl Survey (BTS)
- Continuous Plankton Recorder Survey (CPR)

1970s

- Sea Scallop Dredge/Integrated Benthic Habitat Survey (Scallop)
- Ecosystem Monitoring Survey (EcoMon)

1980s

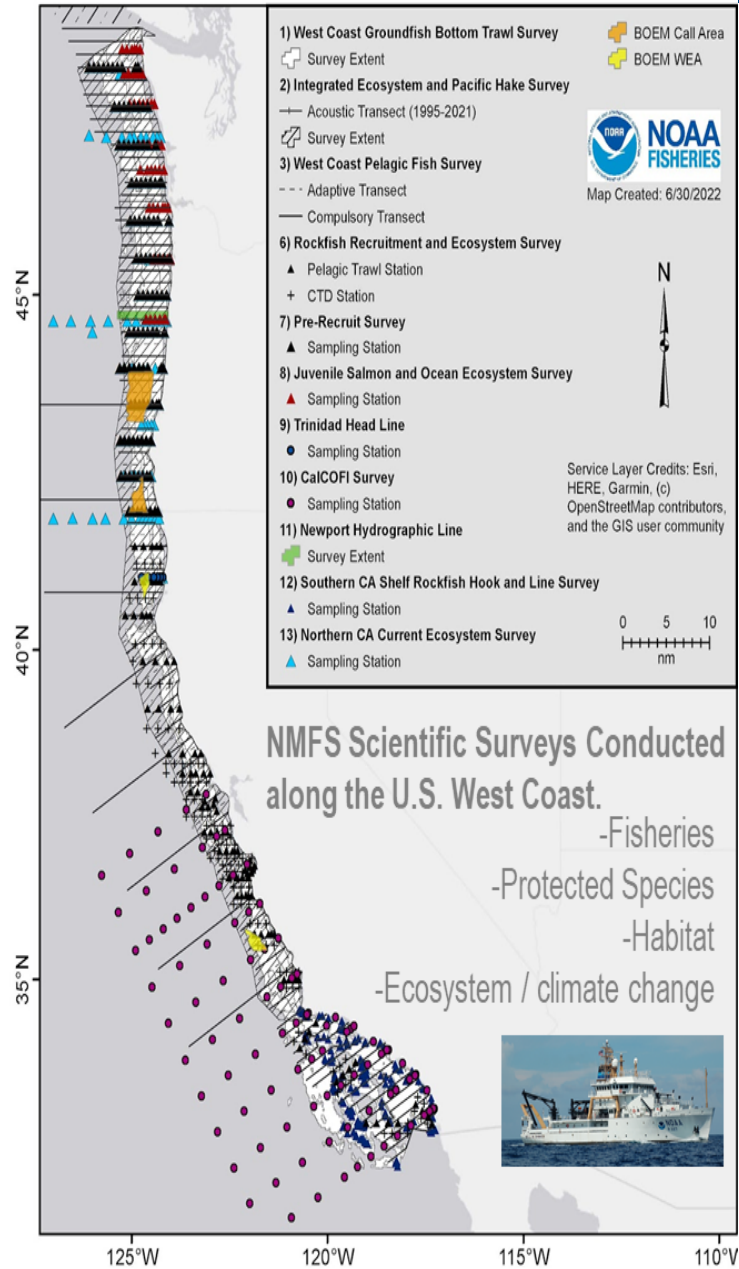
- Atlantic Surfclam and Ocean Quahog Surveys (Clam Surveys)
- Northern Shrimp Survey (Shrimp)
- Large Coastal Shark Bottom Long-line Survey (Shark BLL)

1990s

- Marine mammal and sea turtle (AMAPPS) Ship-based surveys
- Marine mammal and sea turtle (AMAPPS) Aerial surveys
- North Atlantic Right Whale (NARW) Aerial Surveys
- Cooperative Atlantic States Shark Pupping and Nursery Longline/Gillnet Survey (COASTSPAN)
- Seal Aerial Abundance Surveys

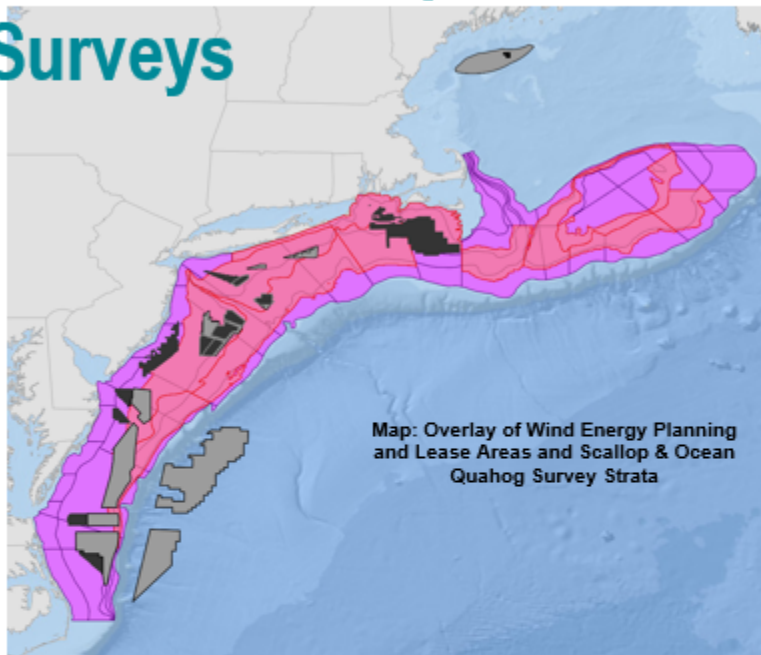
2010s

- Gulf of Maine Cooperative Bottom Longline Survey (GOM BLL)



	NMFS Survey	Year Started	Frequency	Informs Mandated Activities under	Overlap with NMFS Surveys?			
					OR Coos Bay Call Area	OR Brookings Call Area	CA Morro Bay WEA	CA Humboldt WEA
1	West Coast Groundfish Bottom Trawl Survey (website)	1998	Annual	MSA ESA	Y	Y	Y	Y
2	Integrated Ecosystem and Pacific Hake Survey	1977	Biennial	MSA	Y	Y	Y	Y
3	West Coast Pelagic Fish Survey	2006	Annual	MSA	Y	Y	Y	Y
4	West Coast Marine Mammal Survey	1991	Triennial	MMPA ESA	Y	Y	Y	Y
5	Pacific Orcinus Distribution Surveys	2015	Irregular	MMPA ESA	N	N	N	Y
6	Rockfish Recruitment and Ecosystem Survey	1983	Annual	MSA	N	N	Y	Y
7	Pre-Recruit Survey	2011	Annual	MSA	Y	Y	N	N
8	Juvenile Salmon and Ocean Ecosystem Survey	1998	Biannual	MSA ESA	N	N	N	N
9	Trinidad Head Line	2007	Monthly	MSA ESA	N	N	N	Y
10	CalCOFI Survey	1949	Quarterly	MSA ESA	N	N	Y	N
11	Newport Hydrographic Line	1996	Biweekly	MSA ESA	N	N	N	N
12	S. California Shelf Rockfish Hook and Line Survey	2003	Annual	MSA	N	N	N	N
13	Northern California Current Ecosystem Survey	1996	Seasonal	MSA	Y	Y	N	Y

Offshore Wind & Fisheries Independent Surveys



Survey	Year Started	Survey Design	Major Applications
Autumn Bottom Trawl Survey	1963	Random Stratified Design - North Carolina to Nova Scotia (bottom trawl)	abundance; length, age, sex, weight, diet, maturity samples, distribution, EcoMon
Spring Bottom Trawl Survey	1968	Random Stratified Design - North Carolina to Nova Scotia (bottom trawl)	abundance; length, age, sex, weight, diet, maturity samples, distribution, components of Ecosystem Monitoring survey
Scallop Survey	1979	Random Stratified Design (dredge); line transect (HabCam)	biomass, abundance, distribution, size and sex of sea scallops and other benthic fauna
Atlantic Surfclam and Ocean Quahog Surveys	1980	Random Stratified Design (hydraulic dredge)	biomass, abundance, distribution, size and sex of Atlantic surfclam and ocean quahog
Northern Shrimp Survey	1983	Random Stratified Design (commercial shrimp trawl)	biomass, abundance, length
Gulf of Maine Cooperative Bottom Longline Survey	2014	Randomly Stratified Design (bottom longline)	abundance, biomass, length, age, sex, weight, maturity samples, distribution, habitat data
Ecosystem Monitoring Survey	1977	Random Stratified Design (linked to Trawl Survey Design); fixed stations embedded in design (plankton and oceanographic sampling)	Phyto/nkton, zooplankton, ichthyoplankton, carbonate chemistry, nutrients, marine mammals, sea birds
North Atlantic Right Whale Aerial Surveys	1998	Aerial line transects	Right Whale population estimates; dynamic area management
Marine mammal and sea turtle ship-based and aerial surveys	1991	Line transects for ship and aerial surveys. biological and physical oceanography sampling	Abundance and spatial distribution of marine mammals, sea turtles, and sea birds
Large Coastal Shark Bottom Long-line Survey	1986	Fixed station design in US continental shelf waters from FL to DE with stations ~ 30 nm apart	Abund., distribution, migrations (tagging), and bio-sampling for assessment, EFH designations, and life history studies
Coop. Atlantic States Shark Pupping and Nursery Longline/Gillnet Survey	1998	Random stratified and fixed station (longline and gillnet) surveys in estuarine and nearshore waters from Florida to Delaware	Abundance, distribution, migrations (tagging), and bio-sampling for assessment, EFH, and life history studies



AMAPPS: Atlantic Marine Assessment Program for Protected Species



Collaborative efforts with NMFS (Northeast & Southeast), US Fish and Wildlife Service, BOEM, US Navy and other organizations



To assess the abundance, distribution, ecology, and behavior of marine mammals, sea turtles, and seabirds throughout the US Atlantic and to place them in an ecosystem context



[AMAPPS I: 2010 – 2014](#); [AMAPPS II: 2015 – 2019](#); [AMAPPS III: 2019 – 2023](#)



Objectives:

- Collect abundance and distribution data
- Collect tag telemetry data
- Collect additional data on life-history and ecology
- Collect and process opportunistic plankton samples
- Estimate broad scale abundance estimates
- Develop fine scale seasonal, spatially-explicit density estimates within the ecosystem context to be used for management purposes

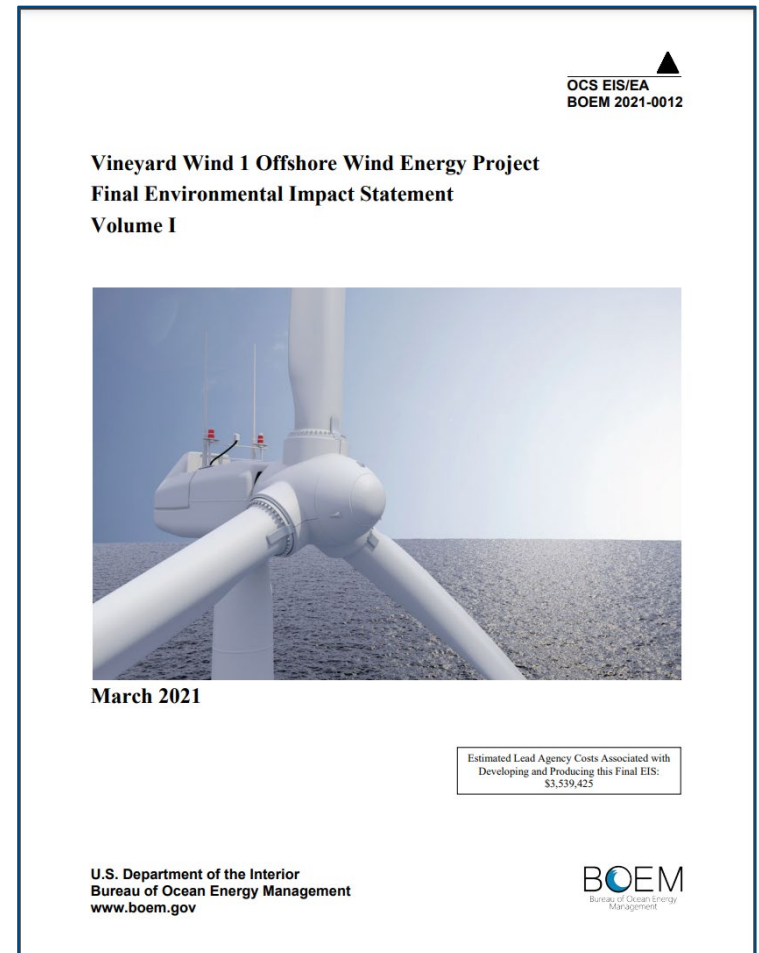


Analogous Programs in Gulf of Mexico- GOMAPPS & Pacific Ocean- PacMAPPS

Wind and Survey Interactions

Wind energy development will have major impacts on the NOAA Fisheries mission

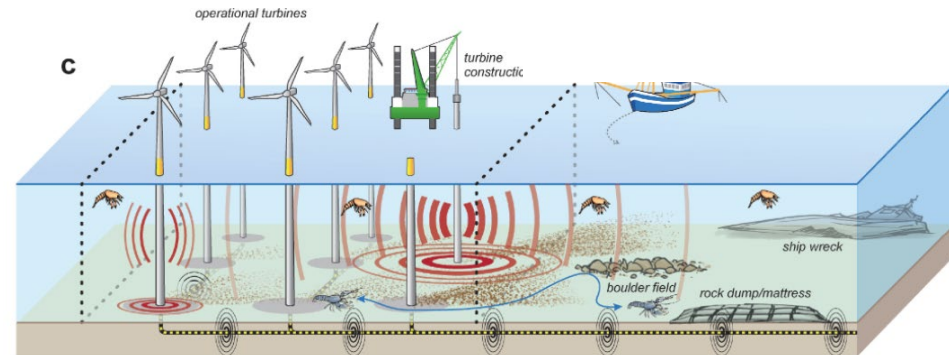
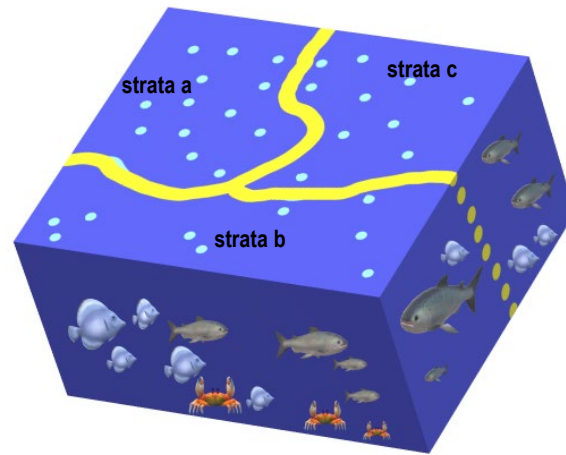
“the Proposed Action is anticipated to have major impacts on scientific surveys, potentially leading to impacts on fishery participants and communities and potential major impacts on monitoring and assessment activities associated with recovery and conservation programs for protected species.” [[Vineyard Wind 1 Offshore Wind Energy Project Final EIS](#)]



<http://vineyardpower.com/news/2021/3/26/boem-releases-final-environmental-impact-statement-feis-for-vineyard-wind-1-project>

Wind Energy Actuates Impacts to Scientific Surveys in Four Ways:

1. **Preclusion**- displacement by infrastructure
2. **Impacts to Statistical Survey Design**
3. **Habitat Change** that affect species distribution, abundance, and vital rates within and outside wind energy areas
4. **Impacts to sampling** outside of developments by wind energy-induced transit effects that can result in lost sampling time



Gill Methratta et al., 2020

Implications of NOAA Fisheries Survey Disruptions

American Public

- Adverse impacts on fishermen and fishing communities and American public who consume seafood and expect recovery and conservation of endangered species and marine mammals

Commercial/Recreational Fishermen & Fishing Communities

- Increase uncertainty in estimates of abundance—through application of the precautionary approach—impacting setting of quotas,
- Increase in more precautionary protected species management measures

Protected Species

- Greater uncertainty in protected species assessments/recovery programs

Non-fishing Sectors-Shipping & Energy

- Uncertainty in protected species information and stock assessments

Federal Agencies

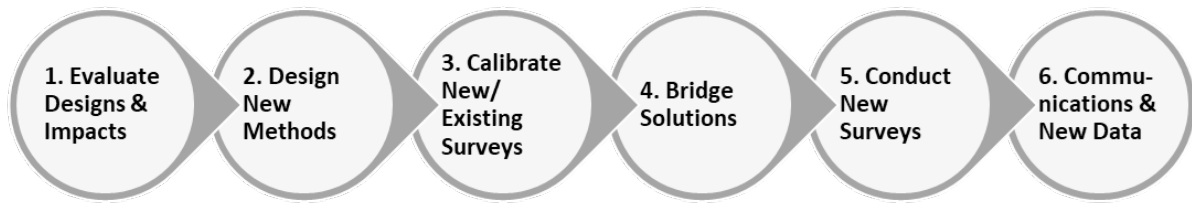

- Harm caused by the need to include more precautionary mitigation measures, e.g., Incidental Take Statements (ITA) through ESA Biological Opinions and MMPA ITAs

Climate Science

- Disruptions of 60+ year time series decreases ability to understand and mitigate the effects of climate change, impacting American Public



Implementing a Survey Mitigation Program in the Northeast U.S.- Status of Steps

NOAA Technical Memorandum NMFS-NE-292

NOAA Fisheries and BOEM
Federal Survey Mitigation Strategy –
Northeast U.S. Region

US DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
Northeast Fisheries Science Center
Woods Hole, Massachusetts
December 2022

<https://www.fisheries.noaa.gov/feature-story/efforts-mitigate-impacts-offshore-wind-energy-development-noaa-fisheries-surveys>

Coming Soon!
Gulf of Mexico
West Coast

- Regional Mitigation Strategies
- Regional Mitigation Programs
- Survey Specific Mitigation Plans

Fall BTS	Started	Initial Steps	No	No	No	Initial Steps
Spring BTS	Started	Initial Steps	No	No	No	No
EcoMon	No	No	No	No	No	No
Scallop	Started	Started	No	No	No	Started
Clam Surveys	No	Initial-NJ	No	No	No	No
Right whale-aerial	Initial Steps	No	No	No	No	No
AMAPPS	Started	Initial Steps	Initial Steps	No	No	No
Shark BLL	No	No	No	No	No	No
GOM BLL	No	No	No	No	No	No
GOM Shrimp	No	No	No	No	No	No
COASTSPAN	No	No	No	No	No	No
CPR-plankton	No	No	No	No	No	No
Seal Surveys	No	No	No	No	No	No

NE Survey-Specific Mitigation Plans



NEFSC Fisheries Surveys

1. Spring Multi-Species Bottom Trawl Survey
2. Fall Multi-Species Bottom Trawl Survey
3. Integrated Benthic/Atlantic Sea Scallop Survey
4. Surf Clam/Ocean Quahog Survey
5. Gulf of Maine Northern Shrimp Survey
6. Cooperative Atlantic States Shark Pupping and Nursery
7. Coastal Shark Bottom Longline Survey
8. Cooperative Shark Tagging Program
9. Ecosystem Monitoring Program
10. Continuous Plankton Recorder Survey
11. Cooperative Gulf of Maine Bottom Long-line Survey

Proposed New or Expanded Fisheries/Habitat Surveys

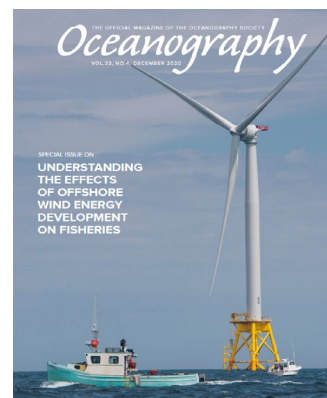
12. Recreational Hook & Line Survey
13. Fish Trap/Video Survey- SEAMAP expand
14. Pelagic Acoustic Survey-
15. Passive Acoustic Monitoring Surveys
16. eDNA Survey

Protected Species Surveys

17. North Atlantic right whale Aerial Survey
18. Marine Mammal & Sea Turtle Vessel Survey
19. Marine Mammal & Sea Turtle Aerial Surveys
 - Marine Mammal Abundance Survey
 - Sea Turtle Ecology Survey
 - North Atlantic Right Whale Ecology Survey

Closing : National, Regional & International Collaboration, Co-Production of Knowledge, Partnerships

Challenge = Steep learning curve concurrent with rapid advancement of OWD, new stakeholders, and new resource needs



col·lab·o·ra·tion

noun

Two or more people working together towards shared goals

Future Northeast Regional Survey Outlook

NMFS & BOEM Survey Mitigation Strategy Implementation:

- Established NMFS/BOEM Survey Implementation Team
- Project level standardized monitoring requirements and data sharing
- Interagency Resource Plan to support survey mitigation
- In review- *OWD project-level monitoring in Northeast Shelf: Evaluating potential to mitigate impacts to long-term scientific surveys*
- CINAR [Survey Simulation Experimentation and Evaluation Project](#)



NOAA Technical Memorandum NMFS-NE-291

Fisheries and Offshore Wind Interactions:
Synthesis of Science

US DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
Northeast Fisheries Science Center
Woods Hole, Massachusetts
March 2023

RODA, NOAA, BOEM
Synthesis of the
Science II:
Floating Offshore
Wind

In Progress



RODA, NOAA, BOEM
Synthesis of the Science II:
Floating Offshore Wind
In Progress

RODA logo

ROSA Responsible Offshore Science Alliance logo

ICES CIEM logo

RWSC logo

Science Priorities for Offshore Wind and Fisheries Research in the Northeast U.S. Continental Shelf Ecosystem: Perspectives From Scientists From the National Marine Fisheries Service

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Abstract
Offshore wind development (OWD) is set to expand rapidly in the United States as a component of the nation's effort to reduce climate change. Offshore wind development in the United States is slated to begin in the Greater Atlantic region, which is expected to interact with ocean ecology, human demographics, fisheries data, infrastructure, and fisheries management. Understanding these interactions is key to ensuring the coexistence of offshore wind energy with sustainable fisheries and a healthy marine ecosystem. These anticipated interactions compelled the authors, all fisheries scientists or managers at National Oceanic and Atmospheric Administration (NOAA) Fisheries who are actively engaged in offshore wind science, to identify scientific research priorities for OWD in the Greater Atlantic

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