Agenda

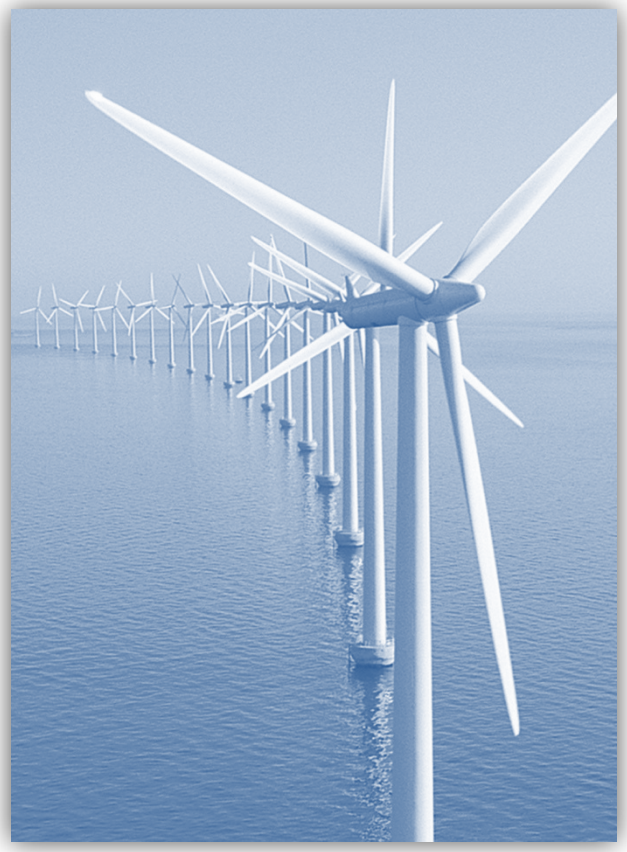
- Welcome
  - Bill White, Massachusetts Clean Energy Center (MassCEC)

- Updates from Interior's Bureau of Ocean Energy Management (BOEM)
  - Overview of commercial leasing process in Mass - Maureen Bornholdt, BOEM
  - Overview of Proposed Sale Notice - Jessica Stromberg / Jennifer Golladay, BOEM
  - Revised Massachusetts Environmental Assessment and Finding of No Significant Impacts - Brian Krevor, BOEM
- Questions, comments, input

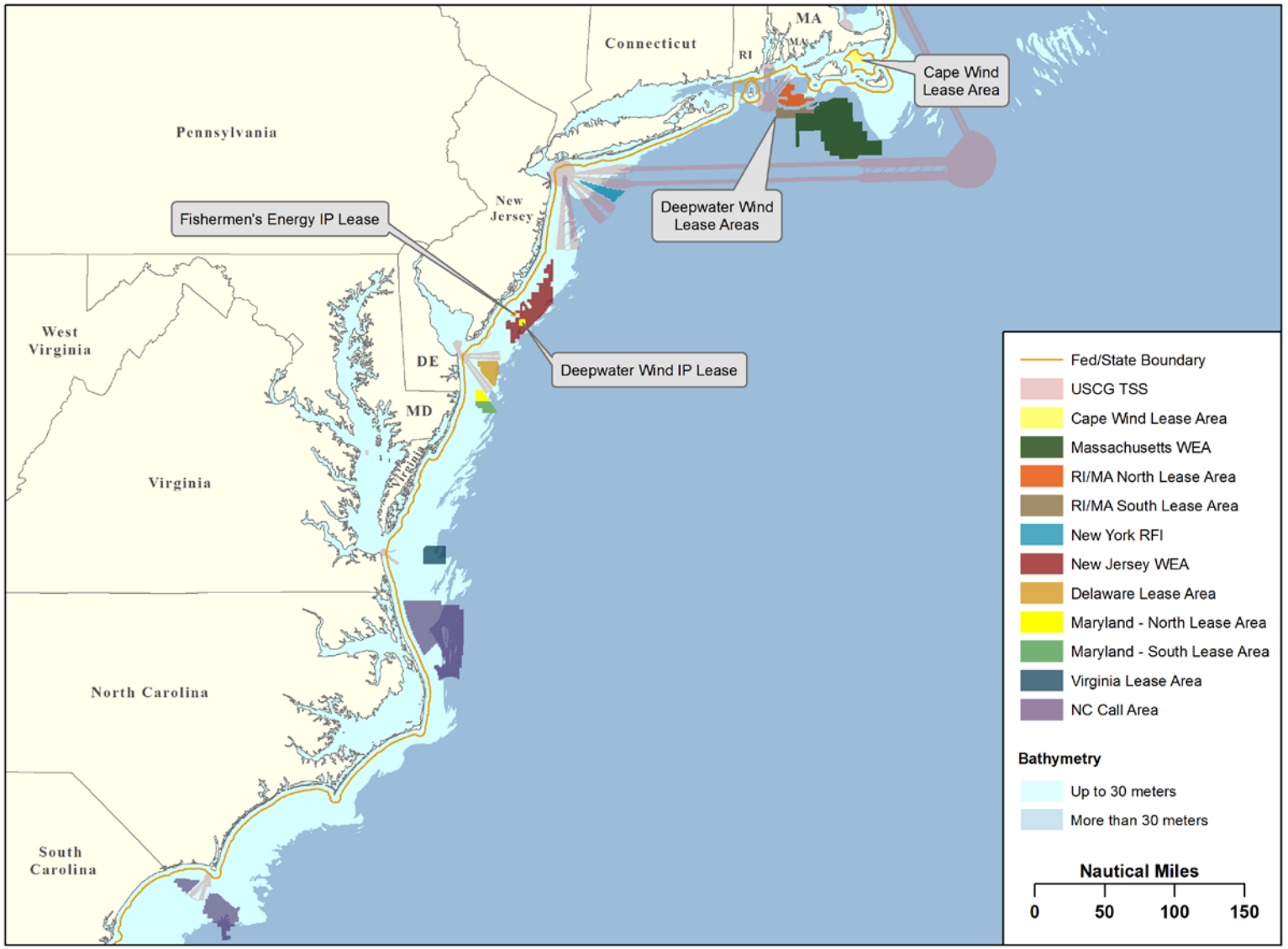
- Updates from Massachusetts
  - Overview of state efforts on offshore wind planning - Bill White, MassCEC
  - MassCEC studies: Transmission, Marine Mammals - Tyler Studds, MassCEC
  - Update of the Massachusetts Ocean Management Plan - Bruce Carlisle, Office of Coastal Zone Management - Executive Office of Energy and Environmental Affairs
- Questions, comments, input

Offshore Wind Overview

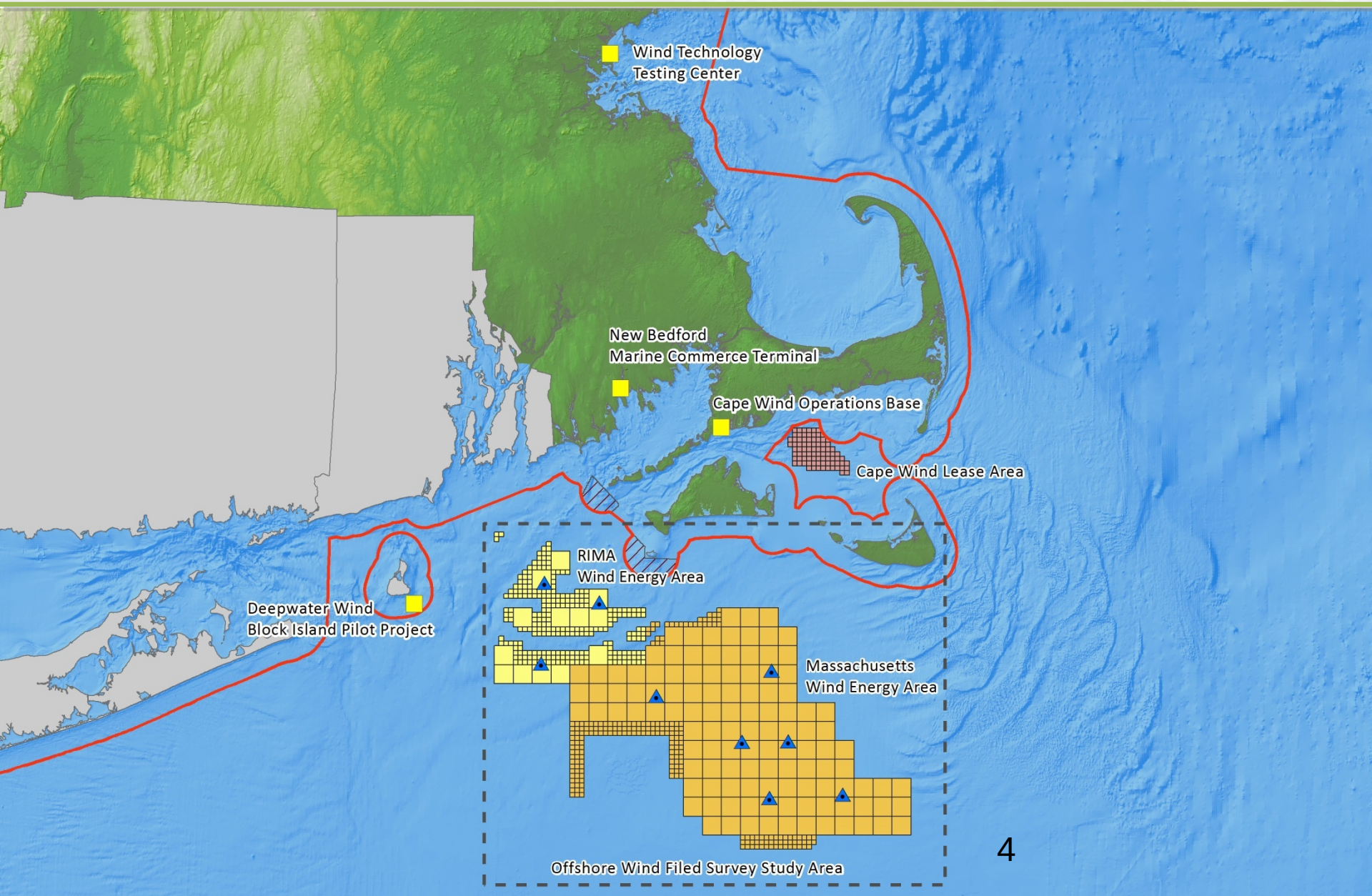
- Huge Resource, Close to Load
- New Technology, Higher Cost
- Massachusetts-Made Energy
- New Industry and Thousands of Jobs
- Climate Change
- ISO-NE Generation Retirements



Atlantic Offshore Wind Planning



MASSACHUSETTS: *Offshore Wind Hub*



Offshore Wind Stakeholder Engagement

- In 2009, convened MA BOEM Task Force on Offshore Renewable Energy (Feds, State, Tribe, State & Local)
- Members include Wampanoag Tribes of Gay Head/Aquinnah, Wampanoag Tribe of Mashpee, Mayor of New Bedford and selectmen from Gosnold, Aquinnah, Chilmark, Edgartown, Oaks Bluff, Tisbury, West Tisbury, Nantucket, Westport, and Dartmouth.
- Additional members include state legislators and reps from Martha's Vineyard Commission, Nantucket Commission, Nantucket Planning and Economic Development Council, Cape Cod Commission, and Dukes County Commission.

Offshore Wind Stakeholder Engagement

- To date, 11 Task Force meetings and consultation to receive input on the federal offshore wind process
- In conjunction with BOEM & U.S. Coast Guard, EEA convened over 90 public & stakeholder meetings (Martha's Vineyard, Nantucket, New Bedford, Boston)
- Formed Fisheries & Habitat Working Groups

Offshore Wind Stakeholder Engagement

FISHERIES WORKING GROUP

- Formed in 2011 to receive input from Reps. from different ports, commercial fisheries (scallopers, ground-fishermen, lobstermen, etc), recreational.

- 8 meetings to date: focused on industry compatibilities and concerns, questions/issues for further analysis

- Convened commercial fishing – offshore wind workshop aimed at minimizing conflict (arrays, cabling, navigation)

Offshore Wind Stakeholder Engagement

HABITAT WORKING GROUP

- Conservation Law Foundation, The Nature Conservancy, Mass Audubon, NE Aquarium, Nat. Wildlife Federation, Provincetown Center for Coastal Studies
- Served as experts on data quality & gaps
- 8 meetings focus on available data and information, questions/issues for further analysis/discussion

About MassCEC

- MassCEC created in 2009 as the first agency in the U.S. to combine clean energy investments, job training, incentives, and infrastructure investments.

- **Mission**
  - **Create** jobs, long-term economic growth
  - **Cultivate** a robust marketplace for innovation
  - **Accelerate** technology development
  - **Support** affordable and responsibly-sited municipal, residential and commercial projects

MassCEC Offshore Wind: Research Efforts

- Transmission
  - Finalize and release study
  - Follow up study to explore transmission ownership scenarios

- Large Whales and Turtles - *New England Aquarium*
  - 3 year effort in partnership with BOEM and EEA
  - Aerial Surveys and passive acoustic devices

- Avian - *College of Staten Island*
  - 3 year effort in partnership with BOEM and EEA
  - Aerial Surveys

- Benthic Survey – *UMass Dartmouth, SMAST*

- Supply Chain – *GLWN*
  - New Bedford and South Coast
  - Springfield/Worcester

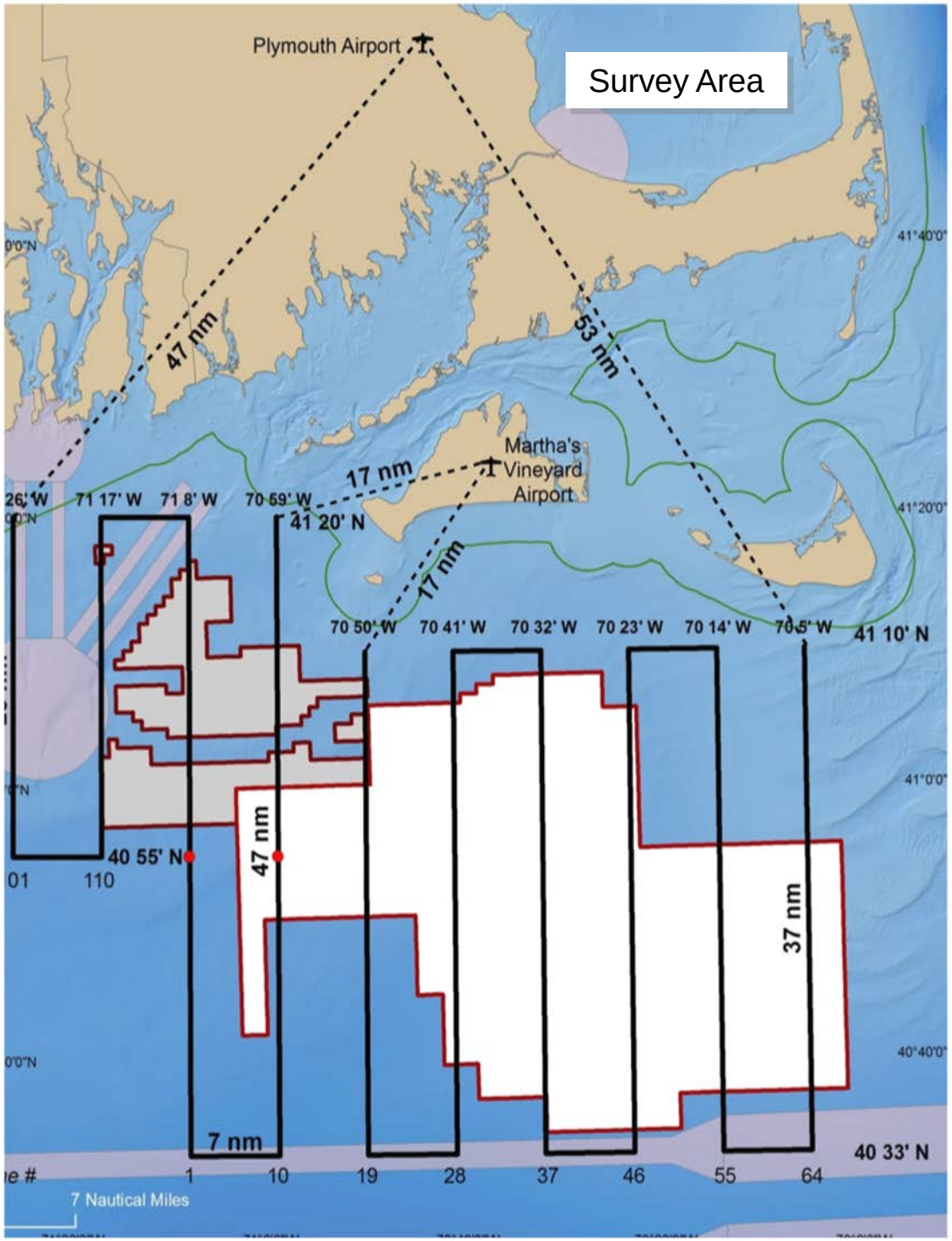
Offshore Wind Field Surveys

SURVEY OVERVIEW

- **Goal**: Characterize the distributions and abundances of birds, whales and sea turtles in the Massachusetts Wind Energy Area and the Rhode Island – Massachusetts Wind Energy Area.
- **Benefits**
  - Responsible siting
  - Minimize impact
  - Accelerate permitting
- **Researchers and Survey Targets**
  - New England Aquarium - Large whales and Sea Turtles
  - College of Staten Island - Avifauna

SURVEY PERIODS

- **Year 1 (Completed)**
  - Funded by MassCEC
  - October 2011 to October 2012
- **Year 2 (Completed)**
  - Jointly funded by BOEM and MassCEC
  - January 2013 to January 2014
- **Year 3 (Under way)**
  - Jointly funded by BOEM and MassCEC
  - March 2014 to March 2015
- **Final 3-Year Report September 2015**


Survey Area
Plymouth Airport
Martha's Vineyard Airport
47 nm
53 nm
17 nm
17 nm
47 nm
37 nm
7 nm
71 17' W
71 8' W
70 59' W
70 50' W
70 41' W
70 32' W
70 23' W
70 14' W
70 5' W
41 20' N
41 10' N
40 55' N
40 33' N
41°40'0"
41°20'0"
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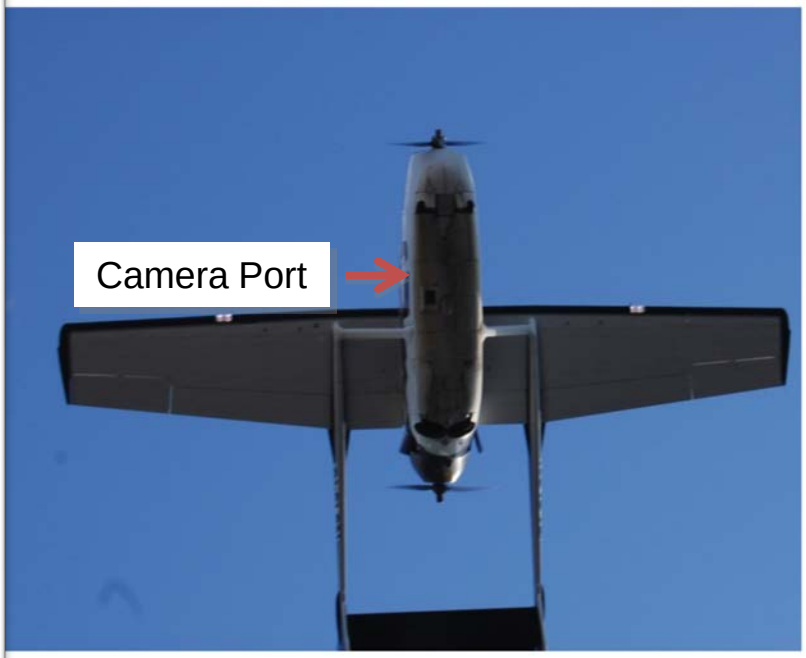
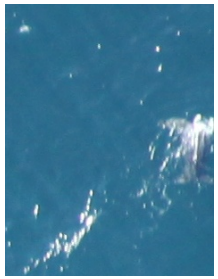
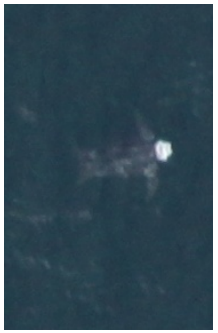
1
10
19
28
37
46
55
64
7 Nautical Miles


Observer Sitings


Camera Port



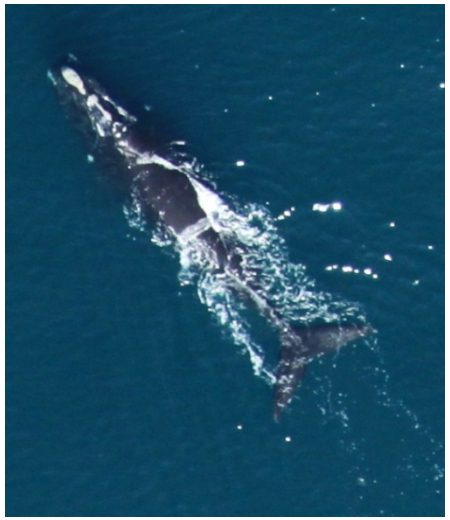



Leatherback Turtles

Vertical Image Examples

Common dolphins

Right Whales

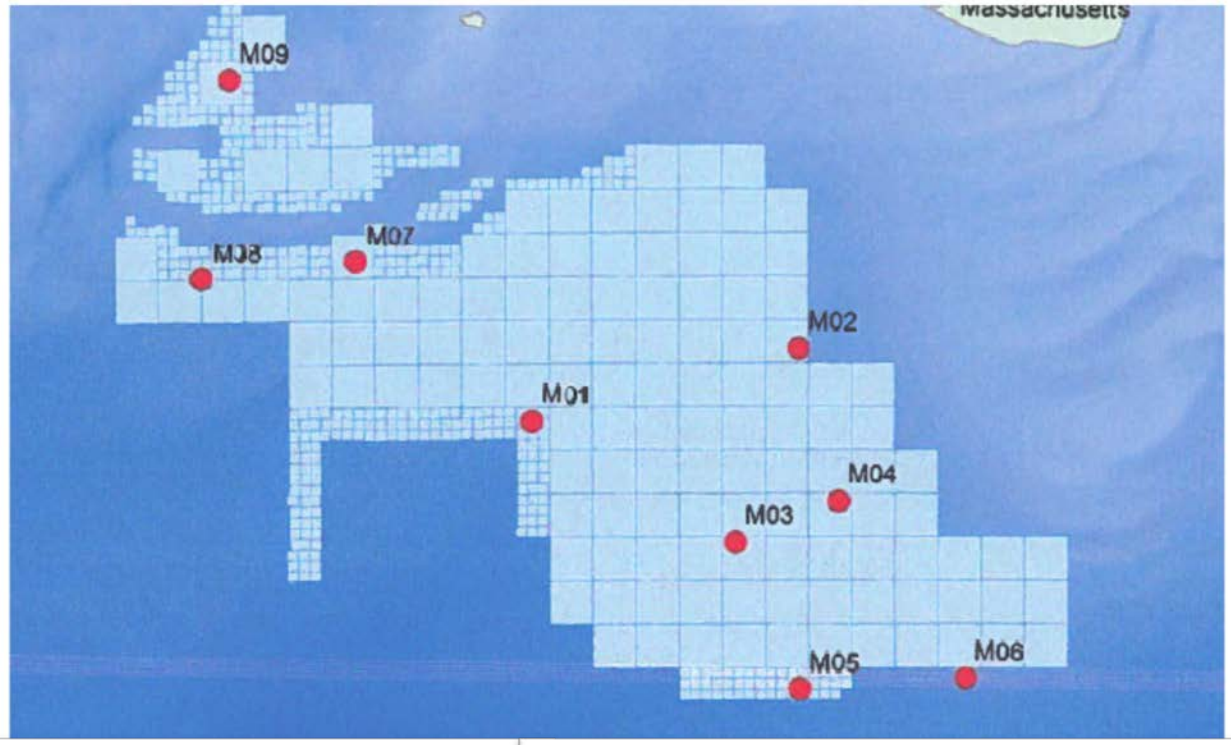


Blue shark

Basking Shark

New England Aquarium Large Whale and Turtle Surveys:

Passive Acoustic Data Collection



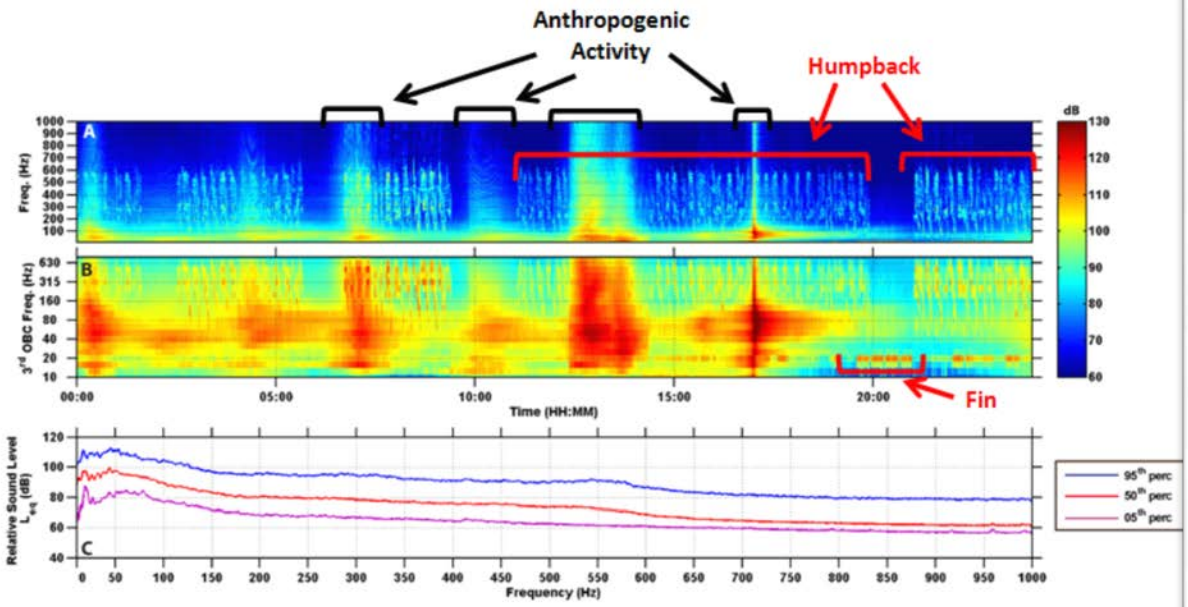
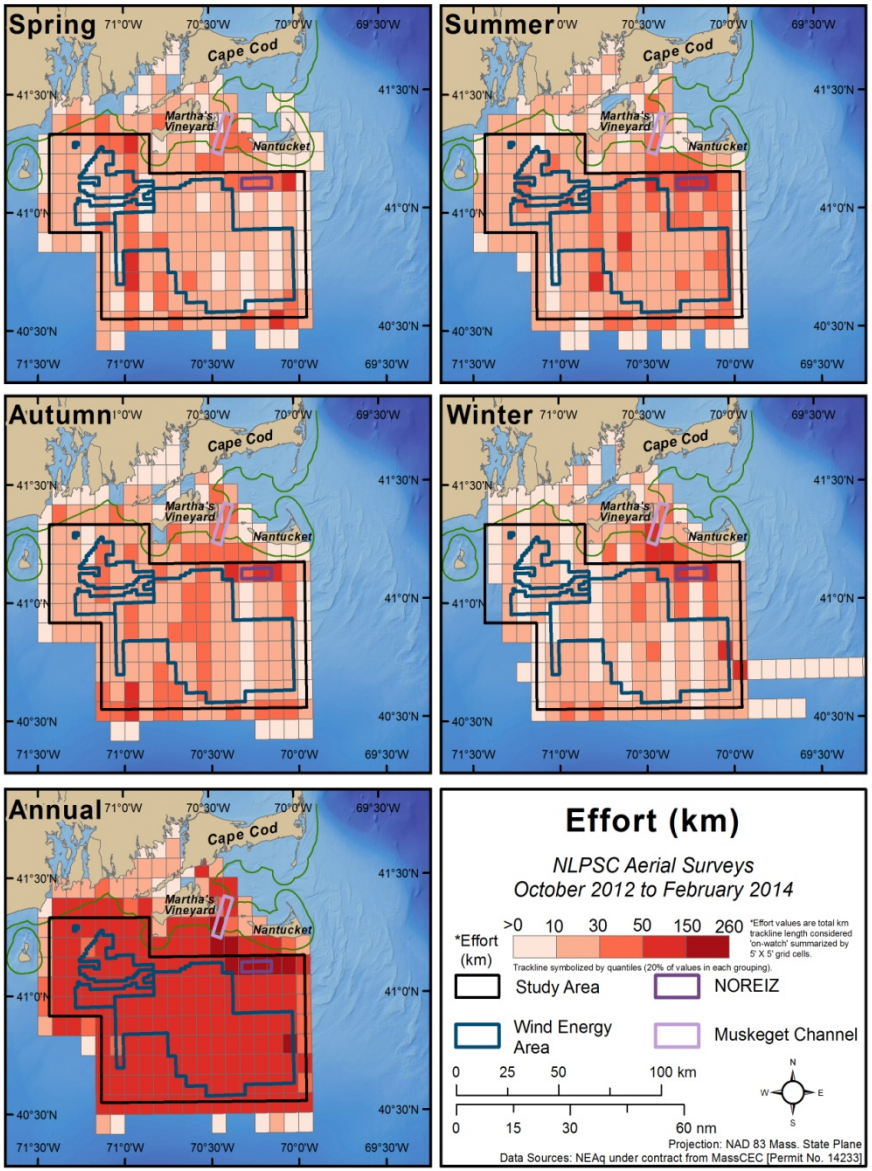


Figure 34. Ambient noise analysis figures for a 24-hour recording period on 14 March 2012 at

New England Aquarium Large Whale and Turtle Surveys:

Survey Effort

Total Flight Hours	125
Nautical Miles of Trackline Flown	6,560
Images Collected to Date	171,126
Average No. Images Collected per Full Survey	10,240
Total Images Analyzed to Date, including duplicates	127,205



Offshore Wind Transmission Project

BACKGROUND

CONTEXT

- Industry growth will be driven by markets and policies
- Benefits to understanding technical characteristics of offshore wind transmission infrastructure independent of markets and policies

RATIONALE

- Likelihood of multiple developers, projects, timeframes
- Economic and environmental benefits of advanced planning
- Reduce developer risk

Offshore Wind Transmission Project

QUESTIONS

What is the relationship between sequential development of the MAWEA/RIMA WEAs and associated transmission infrastructure?

- What is the scale, location and timing of development that could occur in MAWEA/RIMA WEAs?
- Where can OSW projects interconnect to the grid? Which interconnection points are preferred and why?
- What types of transmission configuration alternatives result from a consideration of WEA build-out scenarios and feasible interconnection points?

Offshore Wind Transmission Project

GOALS

- Describe transmission infrastructure components and system requirements for WEA development scenarios
- Identify and characterize interconnection points
- Identify routes that minimize transmission cable distance with least environmental impact and fewest conflicts
- Support EEA and CZM in current update of the 2009 Massachusetts Ocean Management Plan, which will examine potential transmission cable routes within the context of critical marine habitat areas, other natural resources, and marine water-dependent uses.

Offshore Wind Transmission Project

ASSUMPTIONS

BUILDOUT SCENARIOS

- Path to achieving Industry development outcome based on incremental addition of capacity and associated transmission infrastructure

- Near Term (focus of study)
  - <10 years,
  - Water < 50M
  - Exiting technology
  - 3000 MW

- Long Term
  - >10 years
  - Water >50M
  - Floating technology
  - 2000 MW

SCENARIO	CAPACITY
Highly Conservative	500 MW
Conservative	1000 MW
Moderate	2000 MW
Ambitious	3000 MW

Offshore Wind Transmission Project

ASSUMPTIONS

INTERCONNECTION LOCATIONS

- Must be at an existing ISO-NE 345kV Substation.
- Lower voltage ISO-NE substations (i.e., 115kV) not be suitable for interconnection of such a large resource.
- existing ISO-NE 345kV Substation must be relatively close to the shore in order to minimize the length and associated complexity of the HVDC underground cable system.

Offshore Wind Transmission Project
ASSUMPTIONS

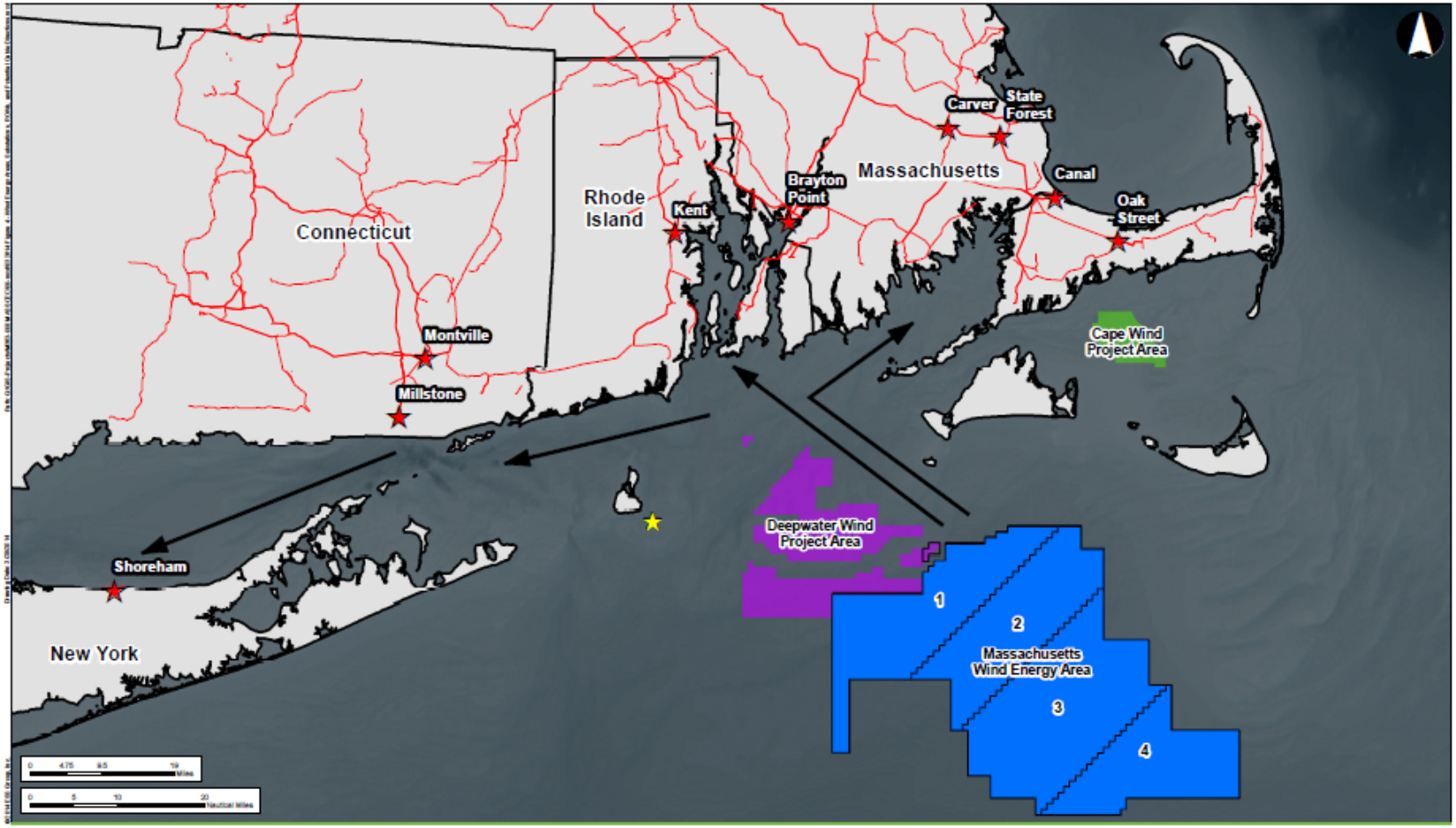
LAND CONSTRAINTS

- Land cable routes should follow existing rights-of-way to the maximum extent practicable.

- Potential landfall areas will be identified, (based on recommended cable corridor widths) rather than specific landfall locations, since property ownership issues are beyond the scope of this assessment.

Offshore Wind Transmission Project

INTERCONNECTION LOCATIONS

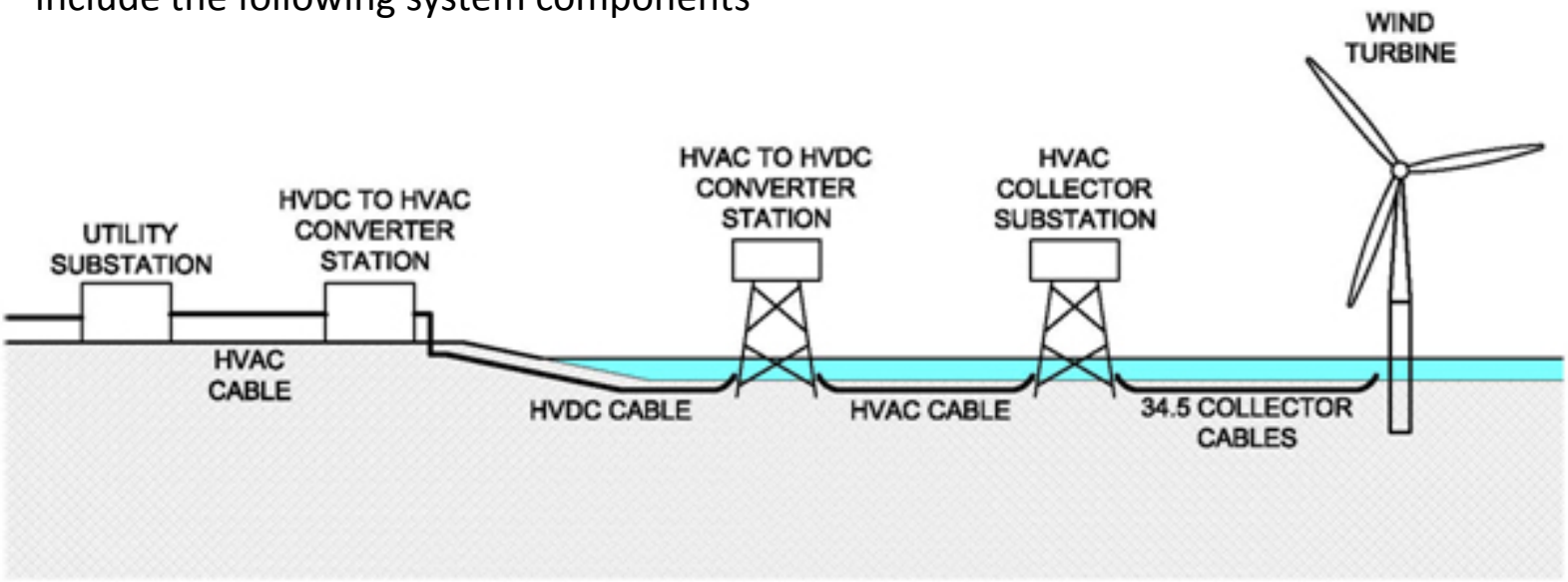


Offshore Wind Transmission Project

ASSUMPTIONS

SYSTEM COMPONENTS

Representative Offshore Wind Energy Facility with HVDC Transmission System would include the following system components



HVDC Offshore Transmission Components

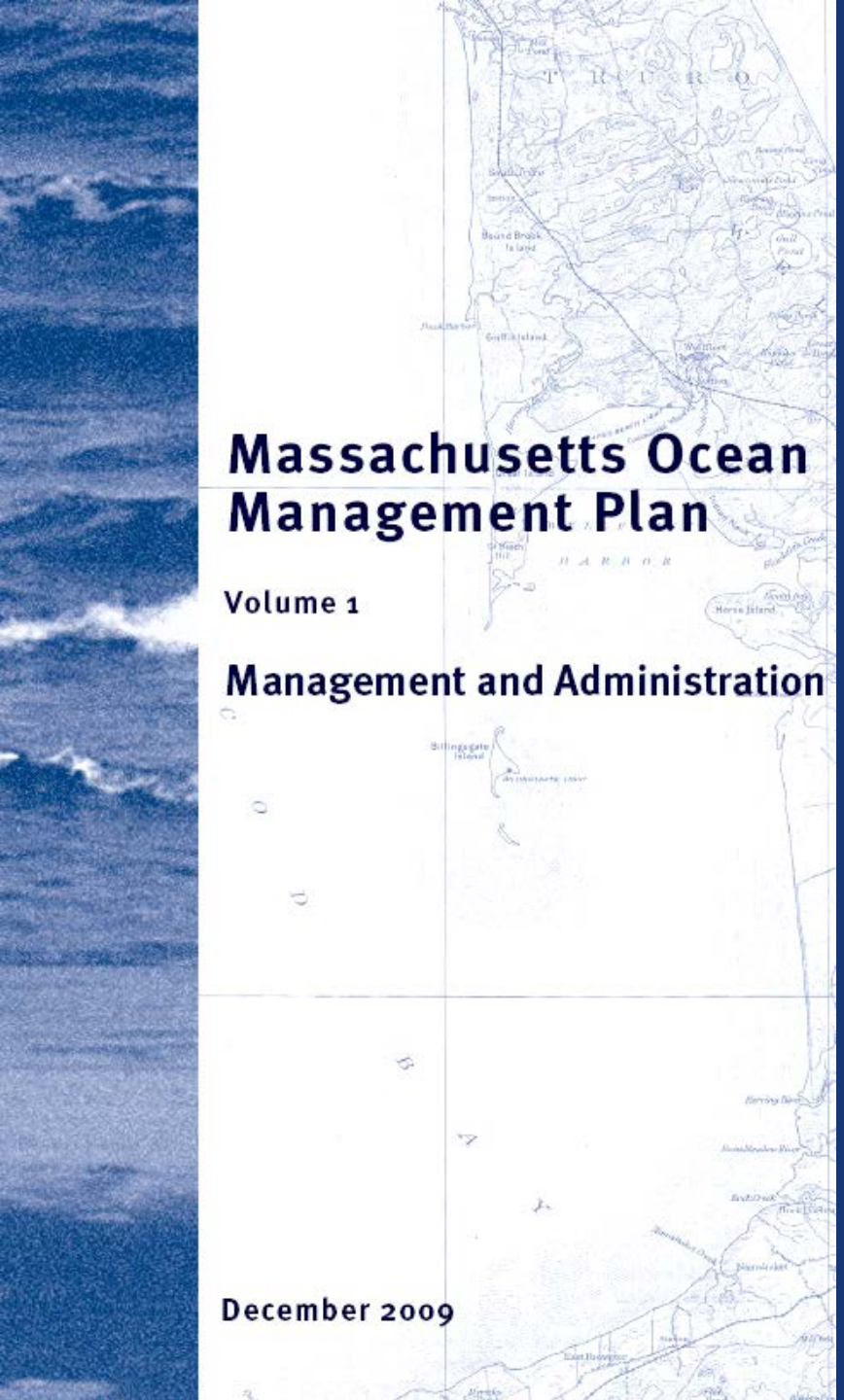
HVDC Converter Station – Land	HVDC Cable	HVDC Converter Station - Land	HVAC Cable	Collector Station	Collector Cable	Wind Turbines
< 1000 MW	30 – 130 Miles	< 1000 MW	Distance varies	< 250 MW	12-15 miles	200-1000 MW
Converts HVDC back to HVAC for interconnection at substation		Converts HVAC to HVDC for long distance transmission		Collects AC power from multiple wind turbines		Generate AC power

Offshore Wind Transmission Project

KEY FINDINGS

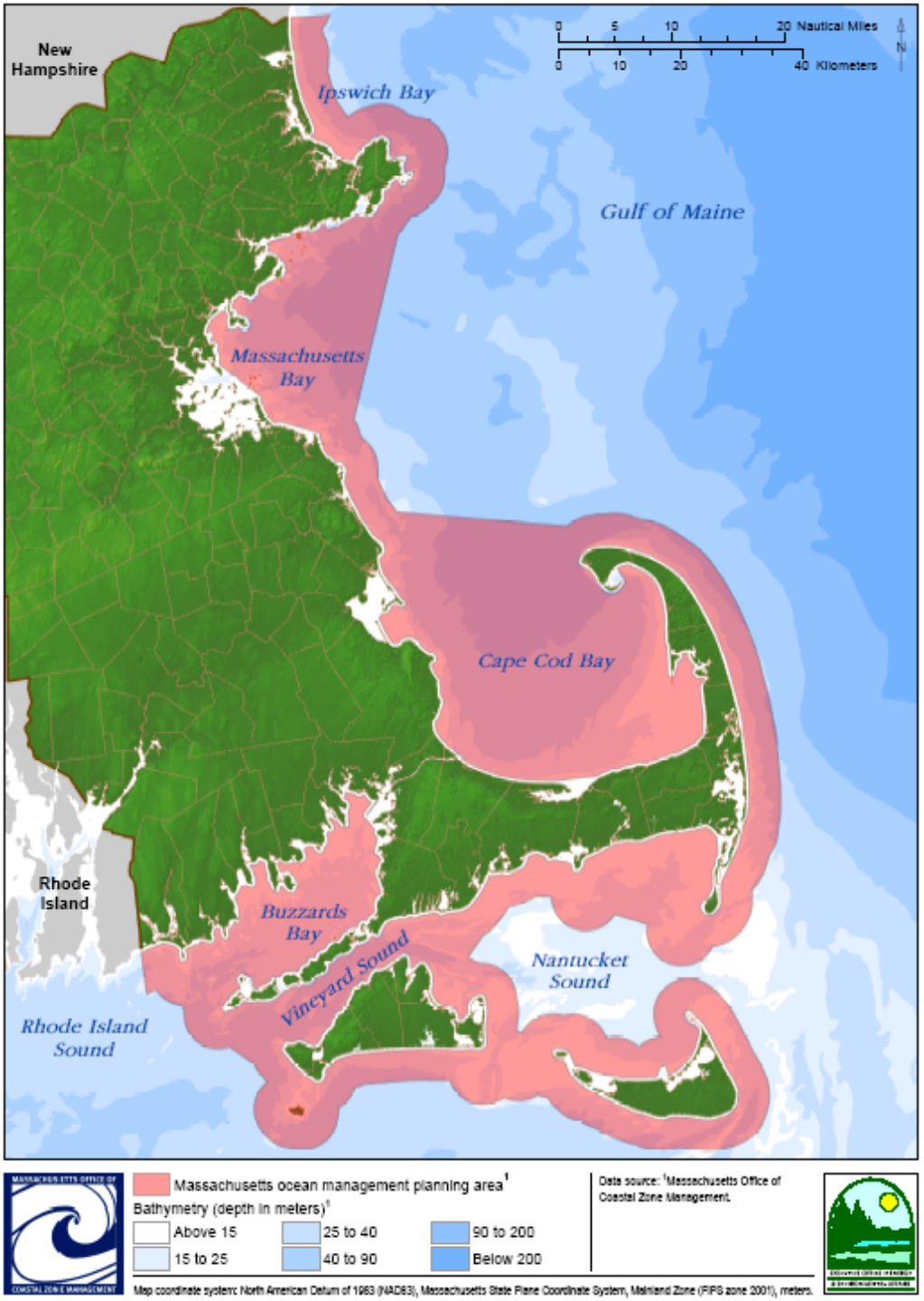
- Transmission cable distance 40 - 130 miles; requires High-voltage Direct Current (HVDC) technology.
- HVDC transmission systems, which include offshore collector station(s), offshore converter station undersea transmission cable bundle, and onshore converter station, currently limited to 1000 MW
- Multiple potential interconnection points available at 345 kV substations
- Technically feasible to interconnect 500 - 1000 MW, and in certain cases up to 2,000 MW, of offshore wind capacity at each potential interconnection point.
- Transmission-related economies of scale possible with Incremental development in 500 - 1000 MW phases
- Markets/Policy factors could drive project development in 200-400 MW increments

Update of the Massachusetts Ocean Management Plan

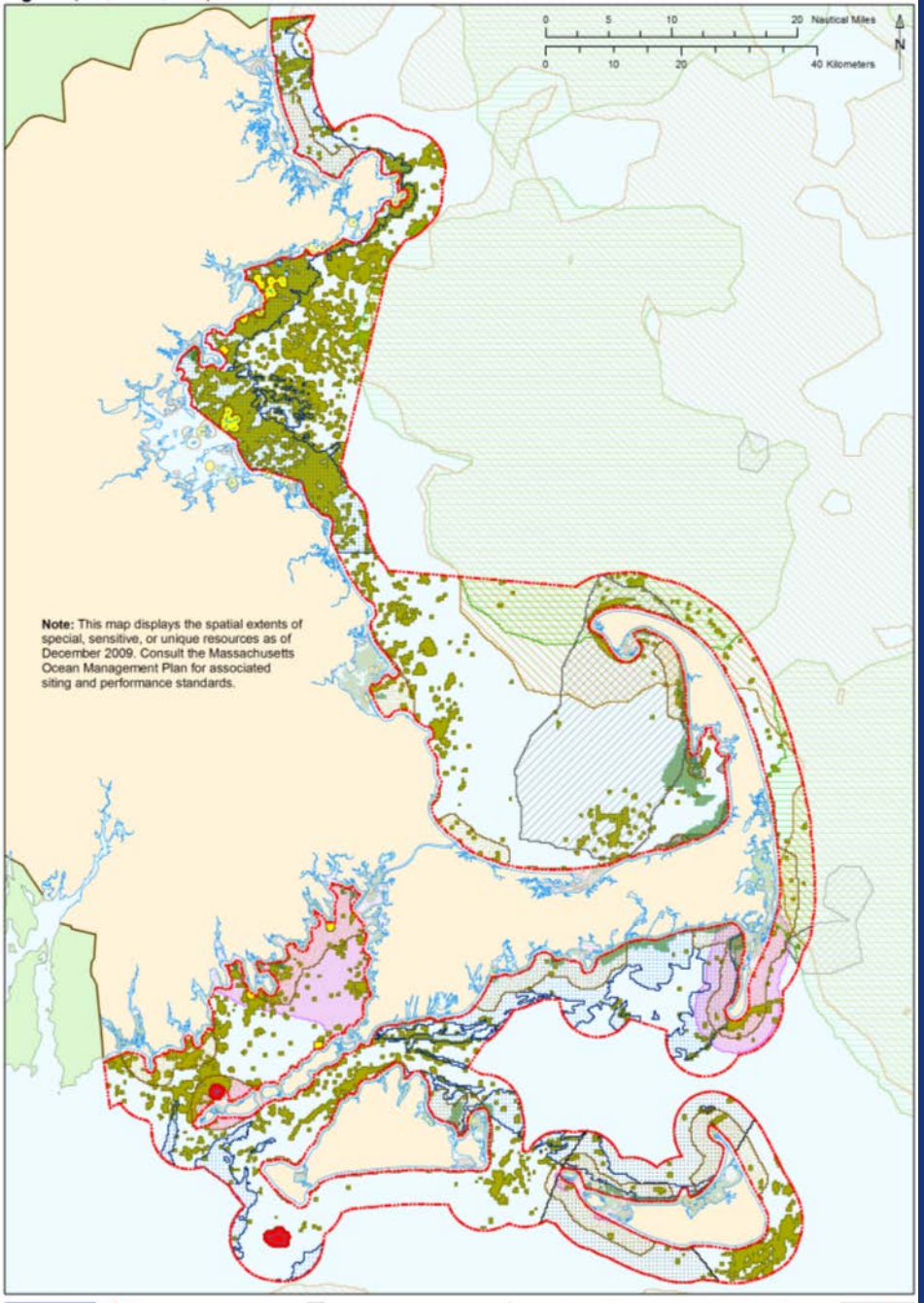


Ocean Plan

- Promulgated pursuant to Ocean Act
- 2009 Plan identifies and maps:
  - Important marine and estuarine life and habitats (aka Special, Sensitive, and Unique resource areas)
  - Existing water-dependent uses
- Contains siting and performance standards to protect these areas and interests

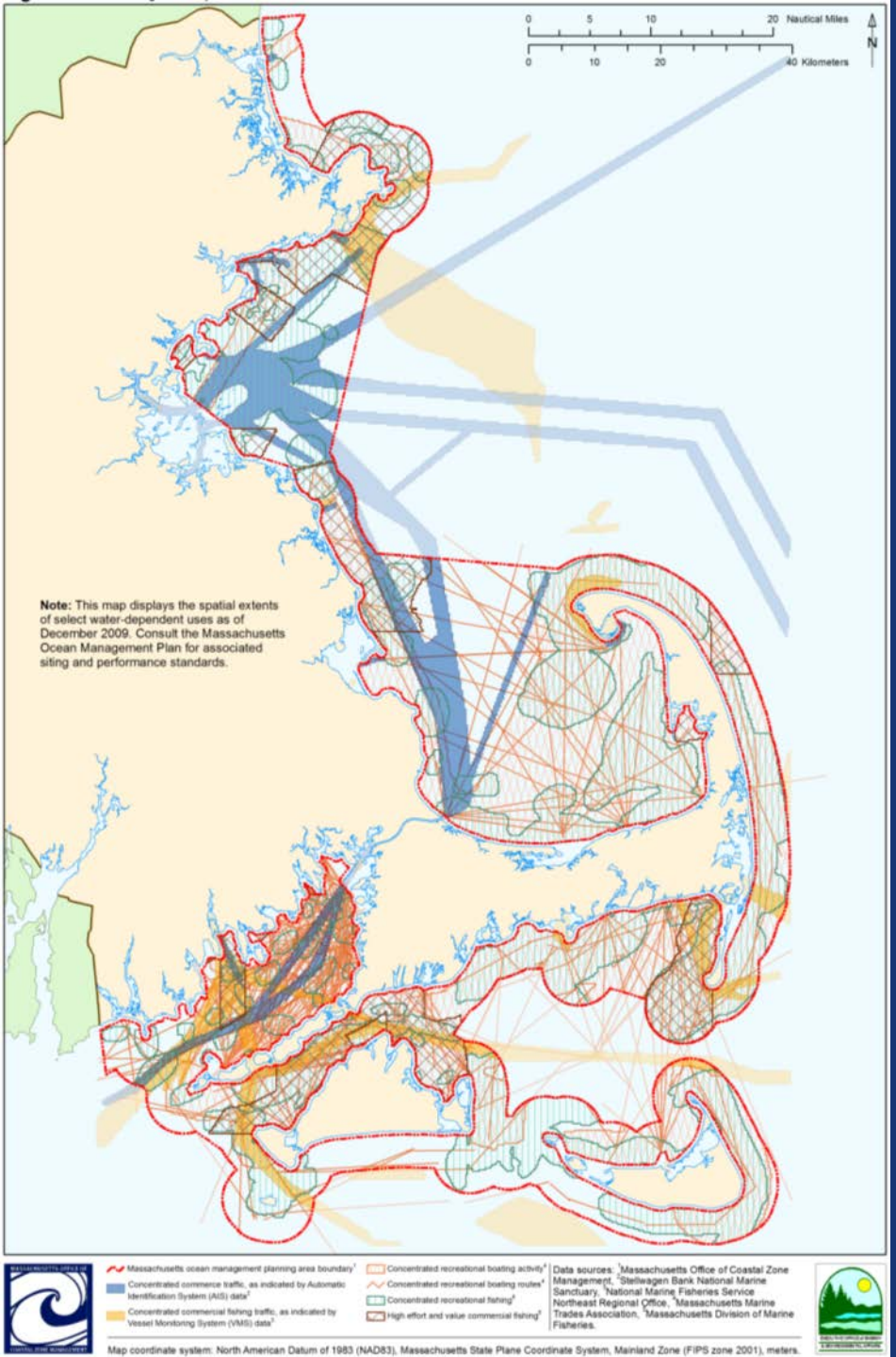


Ocean planning area



Special, sensitive, & unique resources

- Endangered whale core habitat
- Important fish resource areas
- Roseate Tern core habitat
- Special concern tern core habitat
- Hard/complex seafloor
- Eelgrass
- Intertidal flats
- Long-tailed duck, Leach's storm petrel and colonial important habitat



Existing water-dependent uses

- Areas of high commercial fishing by effort and value
- Concentrated commerce and commercial fishing traffic
- Concentrated recreational boating activity
- Concentrated recreational fishing

Updates to 2009 Plan

- Oceans Act requires the review and update of the Ocean Plan at least once every five years
- 2-year process began in January 2013
- Scope reflects ocean management priorities that have emerged / evolved since the release of 2009 plan
- Developed with input and feedback from the Commission, Council, and many different stakeholders as provided at meetings, presentations, and other forums over the past 5 years
- Four public meetings and a formal 60-day public comment period provided stakeholders with the opportunity to provide input and feedback

Scope for Plan update

1. Updating all of the data used in Plan to ensure best and most current information included
2. Baseline Assessment: indentify trends that have been measured and/or observed since 2009
3. Planning and steps to site transmission corridor(s) from BOEM-designated Wind Energy Areas to landside electric grid interconnection points
4. Planning and steps to site appropriate locations for potential offshore sand resource areas
5. Development of fee schedule and guidance for the Ocean Development Fee

Technical work groups

- In June 2013, 6 technical work groups re-convened:
  - Identify and review best available data and information; characterize important trends in ocean resources and uses; provide recommendations for priority science and data
- Subject matter scientists and technical experts from state and federal agencies, academia, non-profits, and private sectors
  - Habitat
  - Fisheries
  - Transportation and Navigation
  - Sediment Resources
  - Recreation and Cultural Services
  - Energy and Infrastructure
- Workshops in March 2014; reports released in April

Plan update: transmission

- Important information and context for planning / siting effort becoming available
- Mass Clean Energy Center transmission study:
  - Key elements of transmission configurations, scenarios, land-side/sub-station tie-ins, etc.
- BOEM: Proposed Sale Notice
- Maps, data, and information from technical work groups and other sources
  - Seafloor mapping and characterization
  - Resource and use characterization
- Interagency working group (CZM, CEC, DMF, DFG, DEP, MEPA) working on integrating and analyzing information

Jurisdictional areas (via ocean plan and other laws/regulations)	Hard and complex seafloor SSU resource areas
	Important fish resource areas
	Eelgrass resources areas
	Shellfish resources areas
	Salt marsh
Other important siting criteria	Areas to avoid (Anchorage Areas, Nomans Danger Zone, Nearshore Disposal Sites …)
	Shipping lanes / concentrated marine navigational areas
	Existing cable and pipelines

http://www.mass.gov/eea/waste-mgnt-recycling/coasts-and-oceans/mass-ocean-plan/