5TH ANNUAL CAPE COASTAL CONFERENCE

Overview of Marine Renewable Energy Activities in Massachusetts

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MA Office of Coastal Zone Management

Massachusetts Office of Coastal Zone Management

Overview

- Drivers: climate goals and policies
- Summary of marine renewable energy types
- Offshore wind
- Marine transmission of onshore renewable energy

Climate change

- Global climate change presents a serious threat to Commonwealth's environment, residents, communities, and economy
- Generation and consumption of energy continues to be a significant contributor to GHG emissions
- Great potential for reducing emissions through continued diversification of energy portfolio
- Some marine renewable technologies offer significant potential for sustainable energy
- Need for responsible development and to protect natural resources, ecosystems, and marine uses

Context: GHG reductions

- Global Warming Solutions Act requires Executive Office of Energy and Environmental Affairs to set economy-wide greenhouse gas (GHG) emission reduction goals for Massachusetts that will achieve reductions of:
  - Between 10 percent and 25 percent below statewide 1990 GHG emission levels by 2020
  - 80 percent below statewide 1990 GHG emission levels by 2050

Context: RGGI and RPS

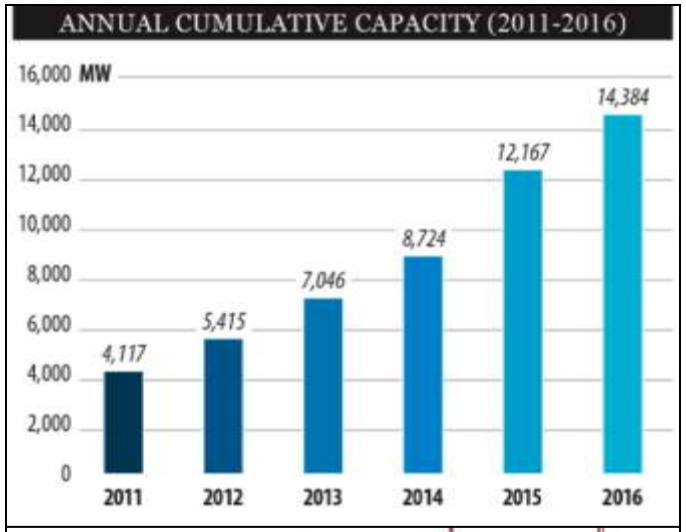
- Regional Greenhouse Gas Initiative (RGGI) – cap and trade agreement by 10 states
- RGGI CO2 cap declines 2.5% annually to 2020
- Renewable Energy Portfolio Standard (RPS) requires electricity suppliers to obtain percentage of electricity they serve customers from qualifying renewable energy facilities
- Green Communities Act requires annual increase of 1 percent to RPS
- 2017 – RPS is 12%; by 2050 RPS will be 45%

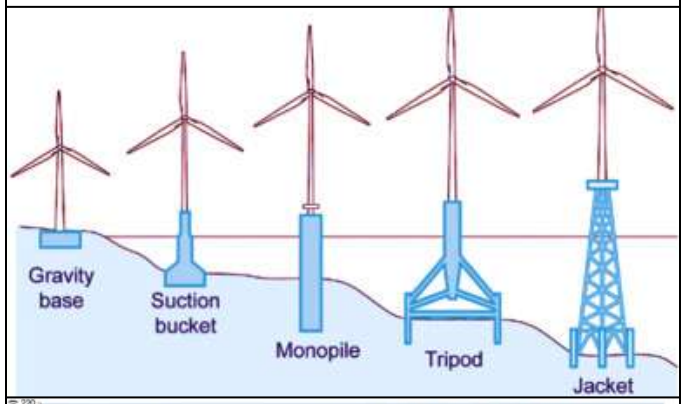
Context: Energy bill

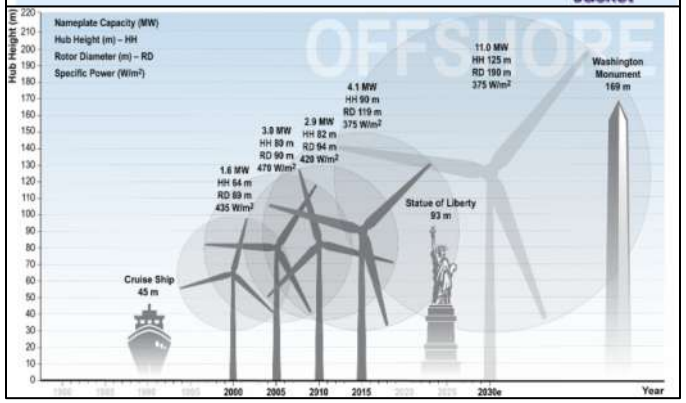
- August 2016, Governor Baker signed the *Act to Promote Energy Diversity*
- Calls for procurement of renewable energy
- Section 83D – 9 TW clean energy (hydro, wind, solar):
  - Proposals submitted in July
  - Selection by January 25
- Section 83C – 1.6 GW offshore wind energy:
  - Minimum bid of 400 MW, allows up to 800MW
  - Solicitation issued on June 29
  - Proposals due December 20
  - Selection by April 23

Marine renewable energy

- To meet state and regional goals, marine renewable energy needs to be part of renewable energy portfolio
- Offshore wind – maturing industry provides the greatest potential for significant power
- Marine hydrokinetic (includes tidal and wave energy) – generally in research and development stages

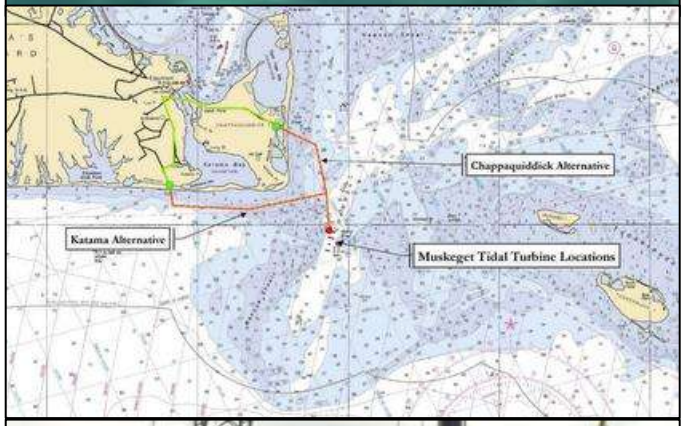






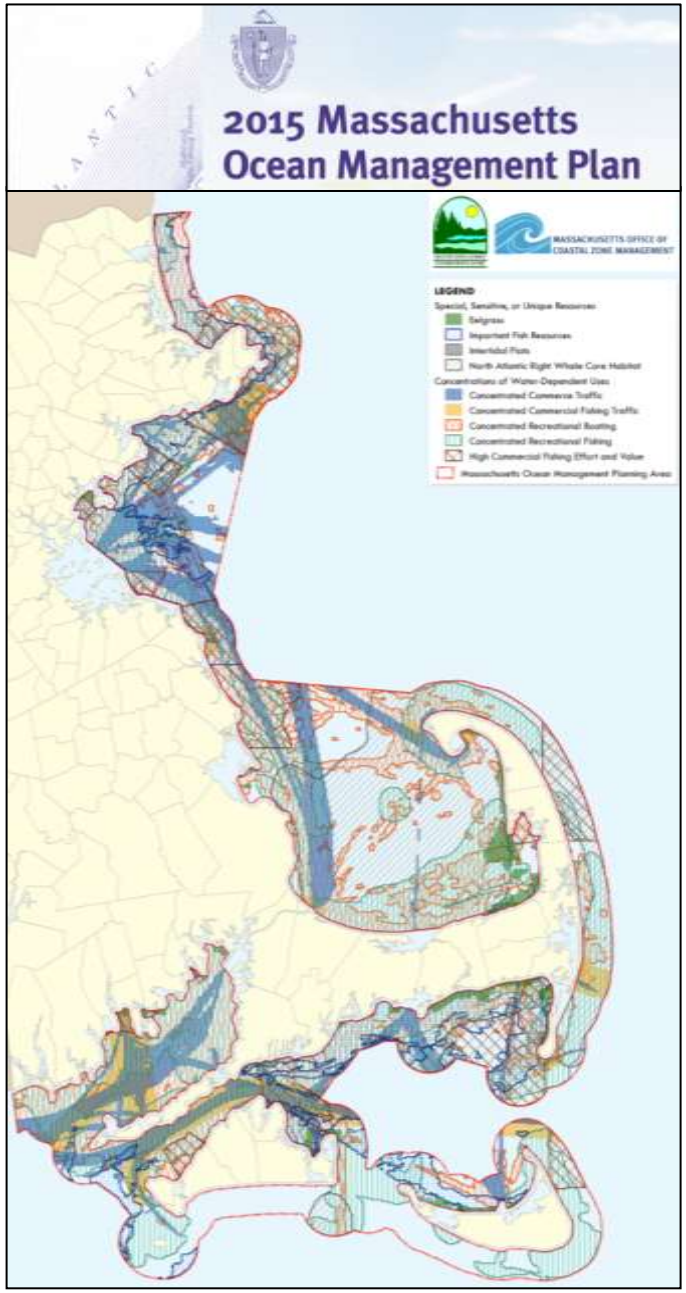
Offshore wind energy

- Winds are stronger and more consistent off coasts
- Close to energy loads
- Wind turbines installed on fixed or floating foundations
- Maturing industry in Europe and China, and expanding
- Primary foundation types: monopile, jacket, gravity, suction
- Technological advances for larger turbines: 9-11 MW



Hydrokinetic energy

- Several areas in state waters with very high tidal current velocities
- Wave resources exist but not as high compared to other geographies
- 3 FERC preliminary permits – all expired or not renewed
- Only a few full-scale devices have been installed
- Progress but industry still at early stages, more R&D



Planning, siting and management

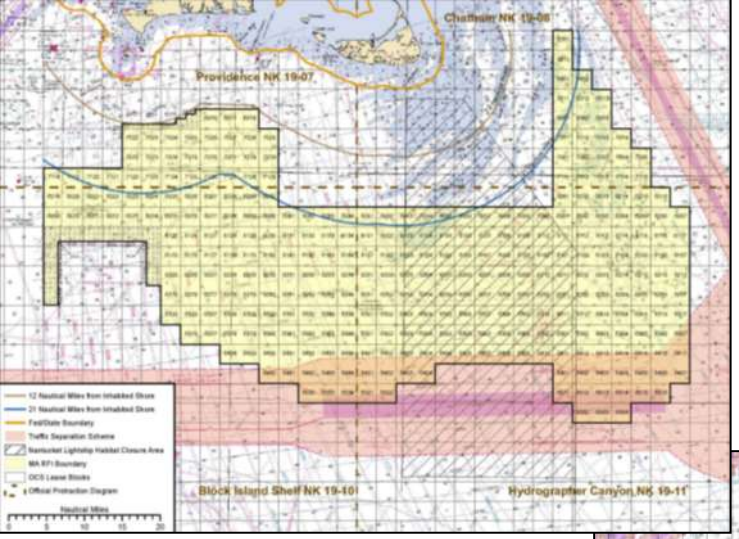
- Given potential for impacts to natural resources and conflicts with existing water-dependent uses, planning and siting is critical
- State waters: MA Ocean Plan; CCC and MVPC regional plans
- Federal waters (OCS) – BOEM
- Tidal energy – FERC
- Northeast Ocean Plan

Offshore wind process

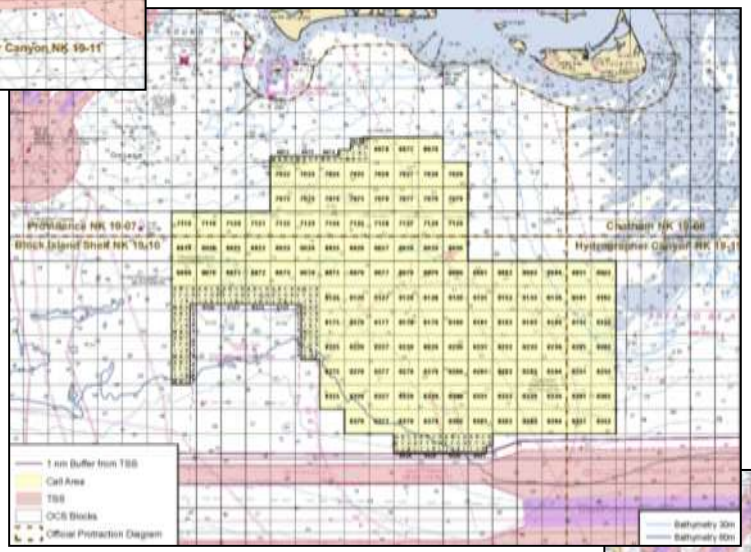
- Bureau of Ocean Energy Management (BOEM) responsible for renewable energy development on Outer Continental Shelf (OCS)
  - 2009: Formation of Intergovernmental Task Force to advise BOEM in the planning, siting, and analysis of offshore wind
  - 2010-2011: Request for Interest; Call for Interest and Nominations
  - 2011-2012: Identification of Wind Energy Areas
  - 2013 and 2015: Competitive auctions / lease sales

Offshore wind process

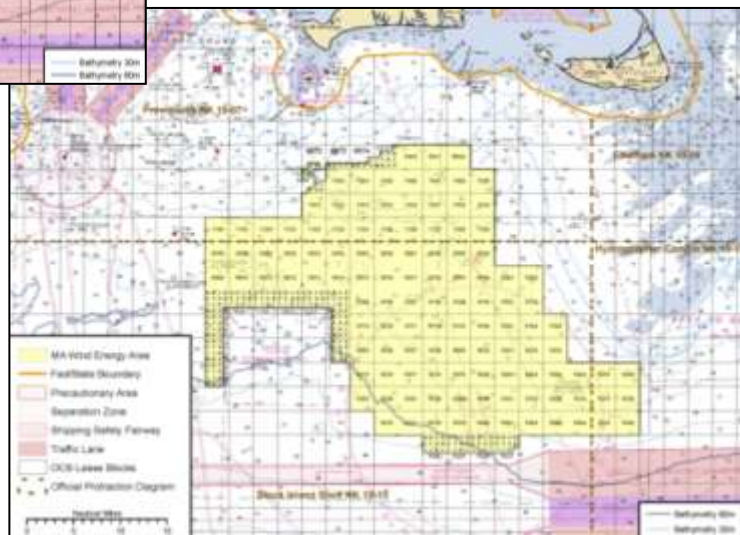
- To augment federal process, MA convened two groups to engage stakeholders on fisheries and marine habitat issues:
  - **Fisheries Working Group on Offshore Wind Energy**: commercial fishermen and reps from different ports and sectors, recreational fishermen, scientists, and state and federal agencies
  - **Habitat Working Group on Offshore Wind Energy**: scientists and technical experts from environmental organizations, academia, and state and federal agencies



Request for Interest area



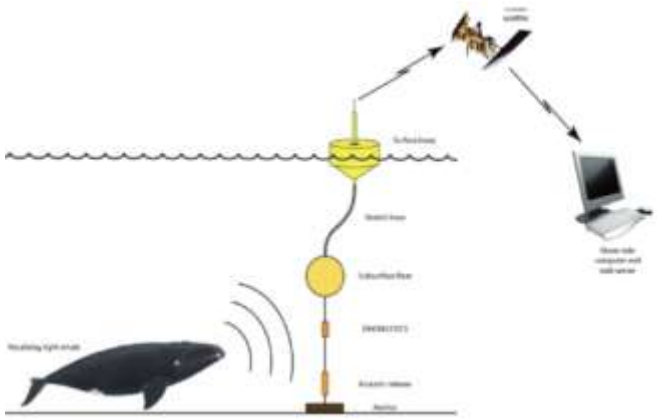
Call for Interest and Nominations area



Wind Energy Area

Environmental studies

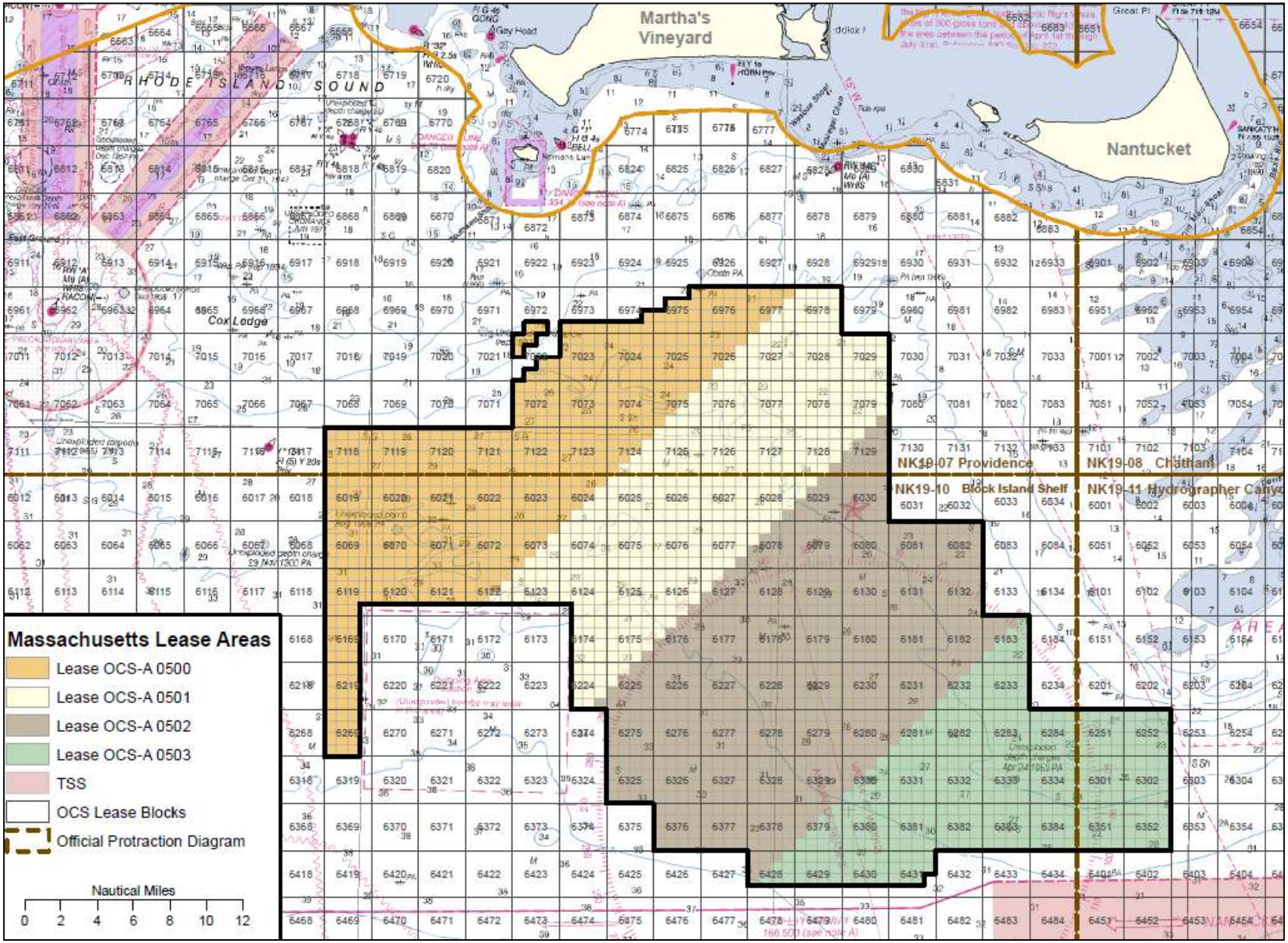
- State and federal investment in marine wildlife surveys and characterization work
- 2010 – gap survey to identify available data and needs
- Marine mammals and turtles – 4 years aerial survey + 3 years passive acoustic
- Marine avifauna – 3 years aerial survey
- Benthic characterization – 2 years



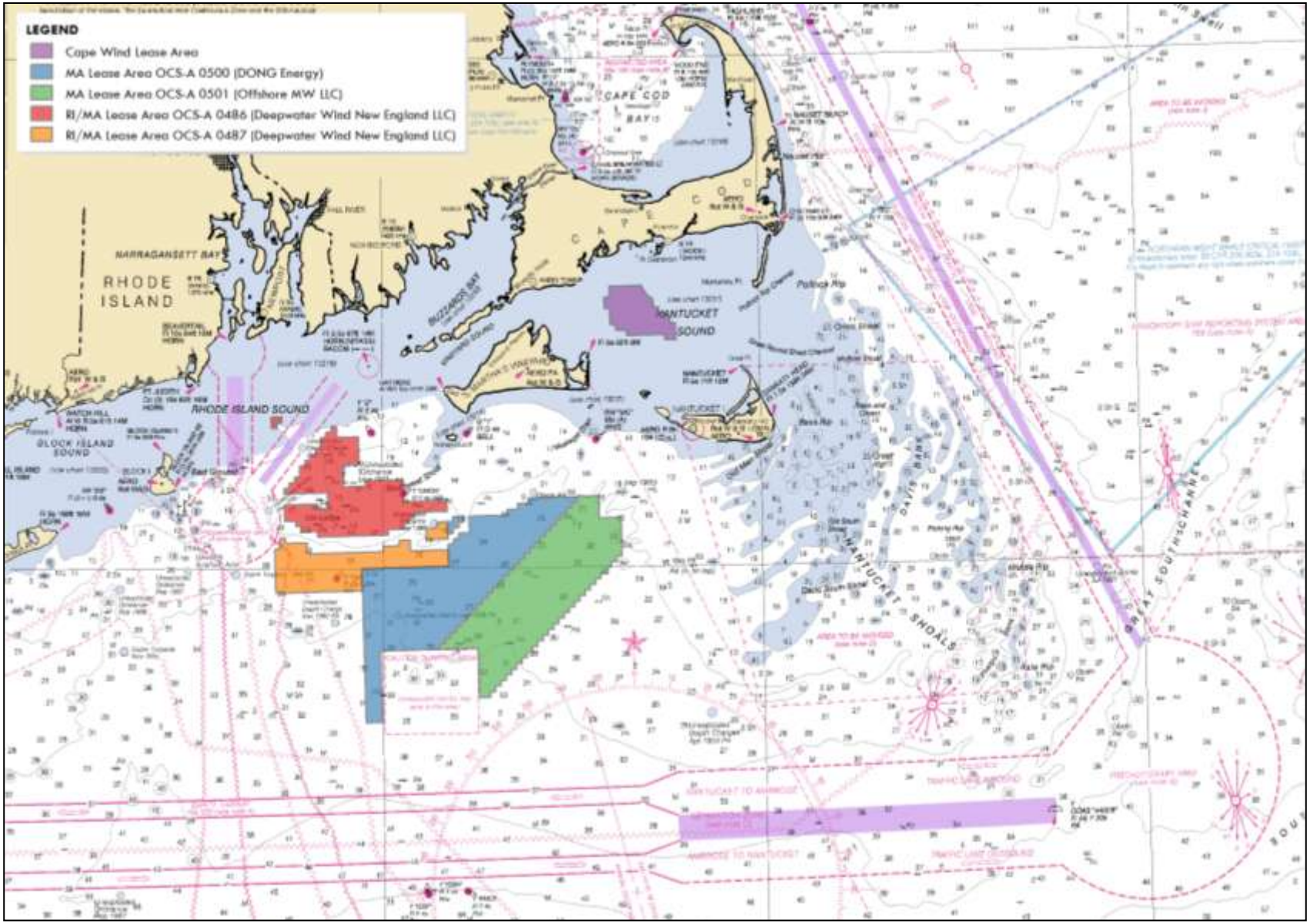
Real-time Acoustic Detection Technology of Marine Mammals

- Develop tool to detect, classify and localize large whales during OSW construction
- Mitigate or avoid impacts of OSW construction noise
- Building off existing technology developed by WHOI
- State/Federal/Industry Collaboration

MA Lease Areas for Auction



Active Leases



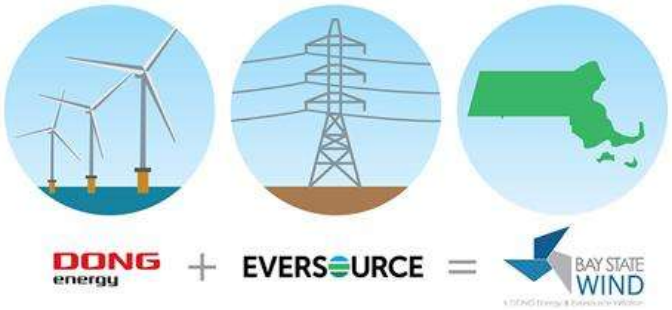
Deepwater Wind

- Block Island Wind Farm began commercial operations in December 2016
- Site assessment surveys completed in 2015
- BOEM approved SAP in October 2017
- Power Purchase Agreement for 90 MW South Fork Wind Farm approved by Long Island Power Authority
- Proposal submitted for 83D clean energy procurement
- Transmission connection proposed to Brayton Point

DEEPWATERWIND

Orsted Energy – Bay State Wind

- SAP approved by BOEM in June 2017
- Survey work recently completed:
  - Benthic geophysical and geotechnical surveys
  - Avifauna
  - Cable reconnaissance
  - FLIDAR and met buoys operational
- Construction and Operations Plan in development
- Transmission connection proposed to Brayton Point



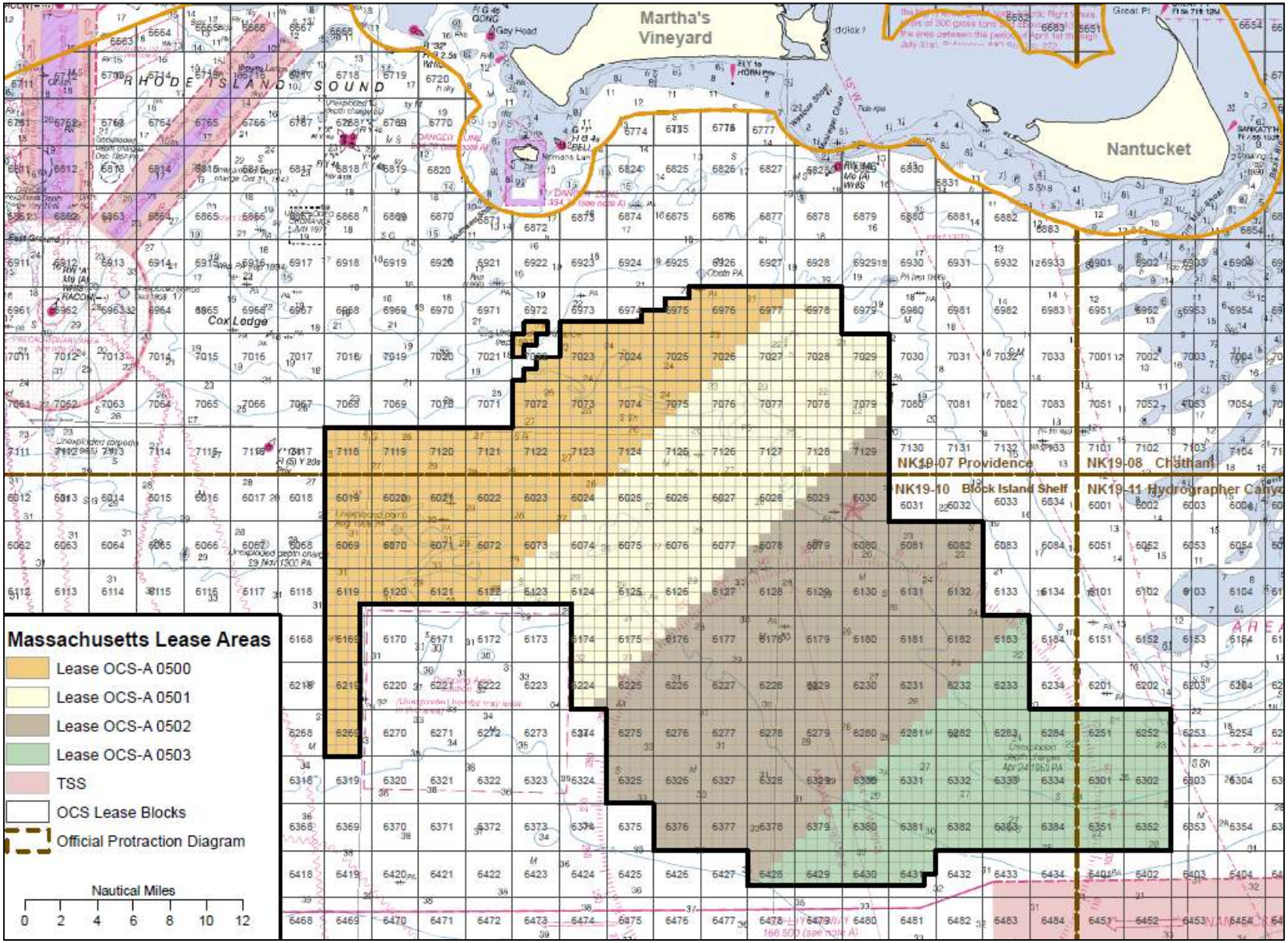
Offshore MW / CIP – Vineyard Wind

- Vineyard Power Cooperative, non-profit energy cooperative is local community partner
- SAP under review by BOEM
- Survey work underway and/or recently complete:
  - Benthic geophysical and geotechnical surveys
  - Cable reconnaissance
- Construction and Operations Plan in development

Proposed sale notice for unleased areas

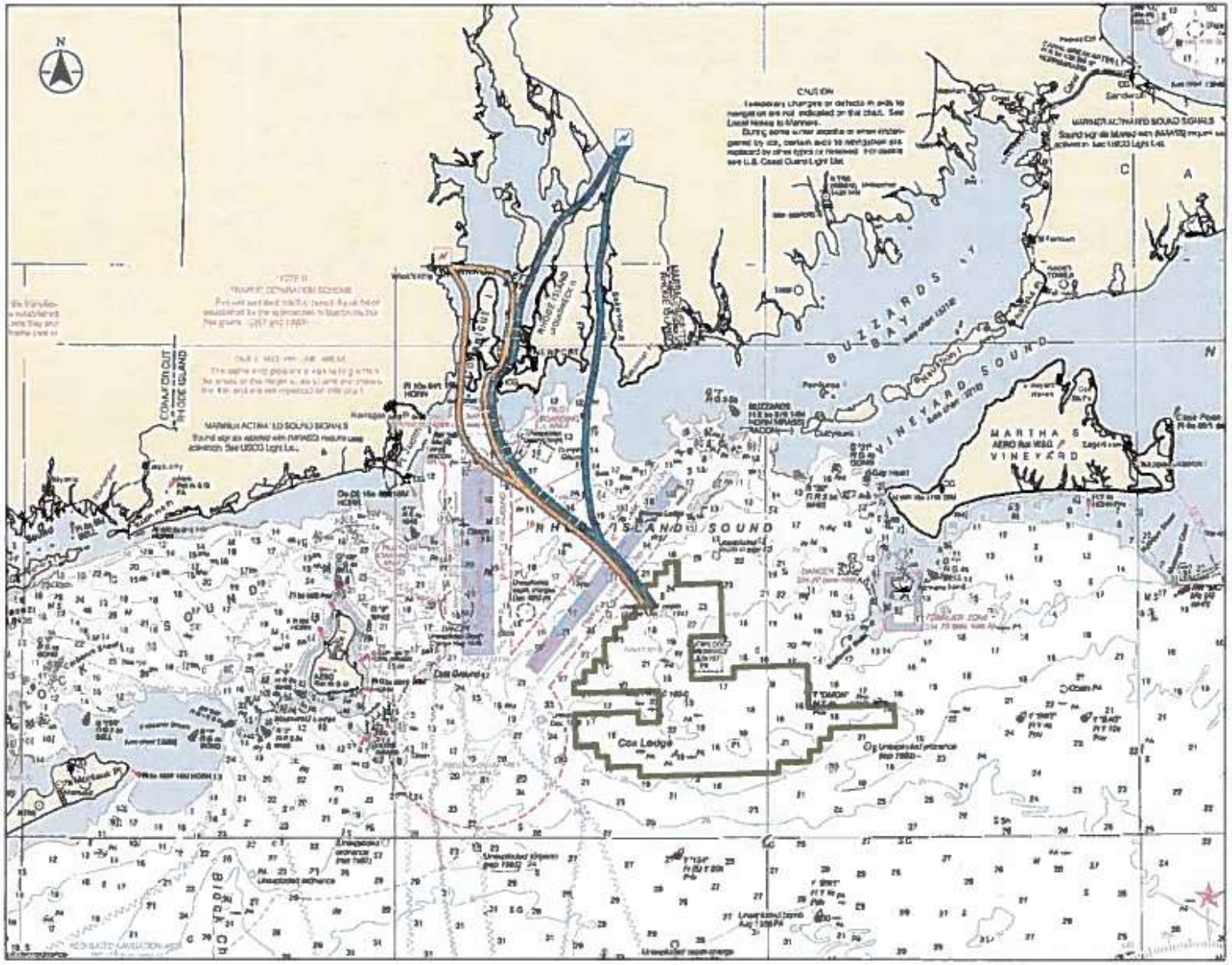
- Lease Areas OCS-A 502 and 503 went unsold during the 2015 Lease Sale
- On December 16, 2016 and January 4, 2017, Statoil Wind and PNE Wind individually submitted unsolicited lease requests for both lease areas
- At Task Force meeting in May, recommendation to move forward with leasing
- Draft Proposed Sale Notice recently reviewed by Task Force
- Proposed sale notice to be issued in January 2018
- Auction planned for Summer 2018

Proposed sale notice for unleased areas



Marine transmission of onshore renewables

- 83D clean energy procurement, 3 projects with marine transmission components were submitted:
  - Deepwater Wind: Revolution Wind
    - Utility-scale offshore wind farm (96-288 MW) paired with an energy storage system
    - Preferred transmission route to Brayton Point
  - Atlantic Link
    - Energy from wind facilities and hydro from facilities in Atlantic Canada
    - 1000 MW HVDC transmission line Colson Cove, NB to Plymouth, MA
  - County Line Wind
    - Energy from wind facilities in central Maine
    - Partnered with the Maine Power Express 1000 MW HVDC transmission line Searsport, ME to Boston, MA



Legend

- Lease Area (OCS-A-0486)

Export Cable Route

- Option 1A
- Option 1B
- Option 2A
- Option 2B

Interconnect Points

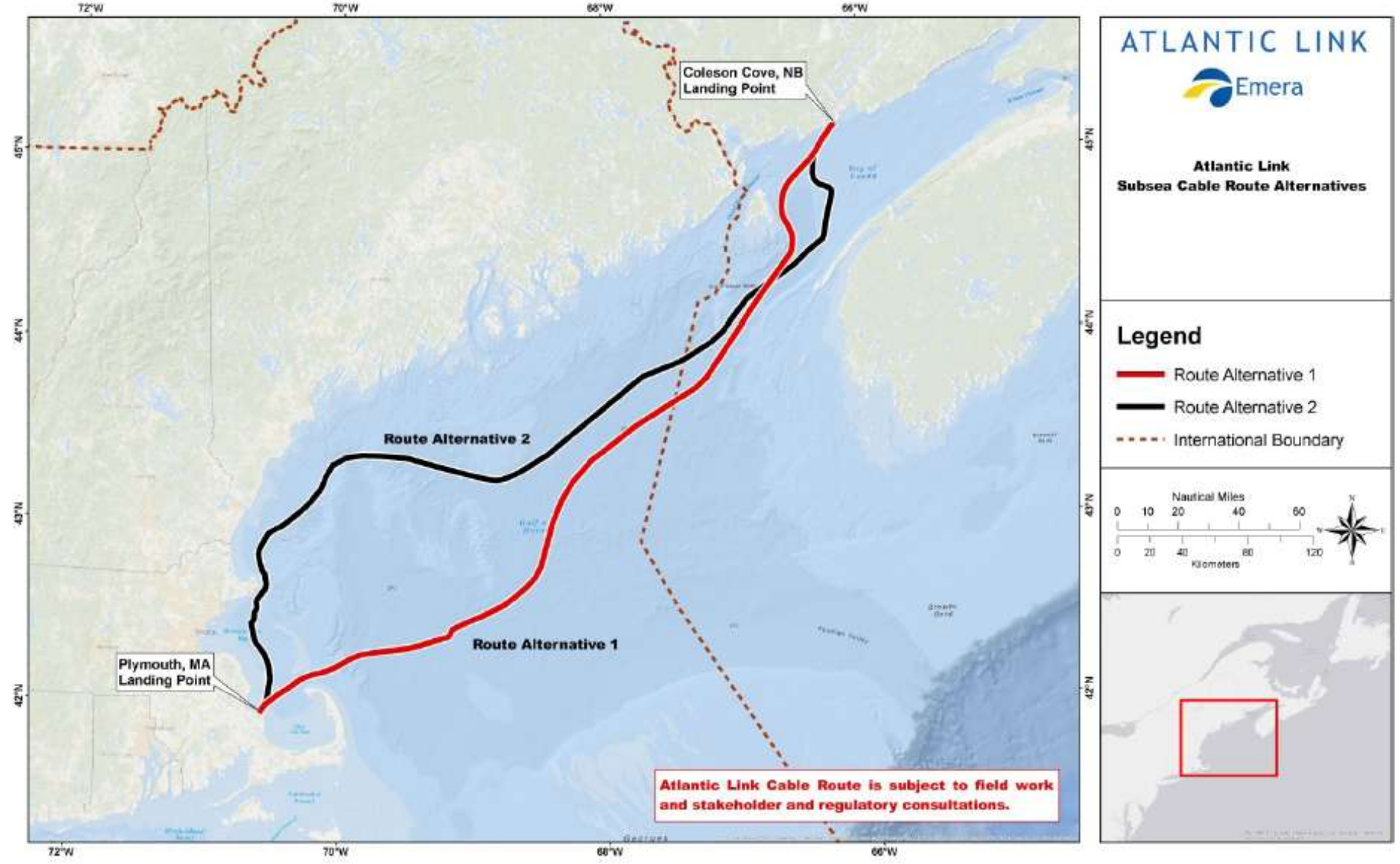
- Option 1: Brayton Point Substation
- Option 2: Davisville Substation

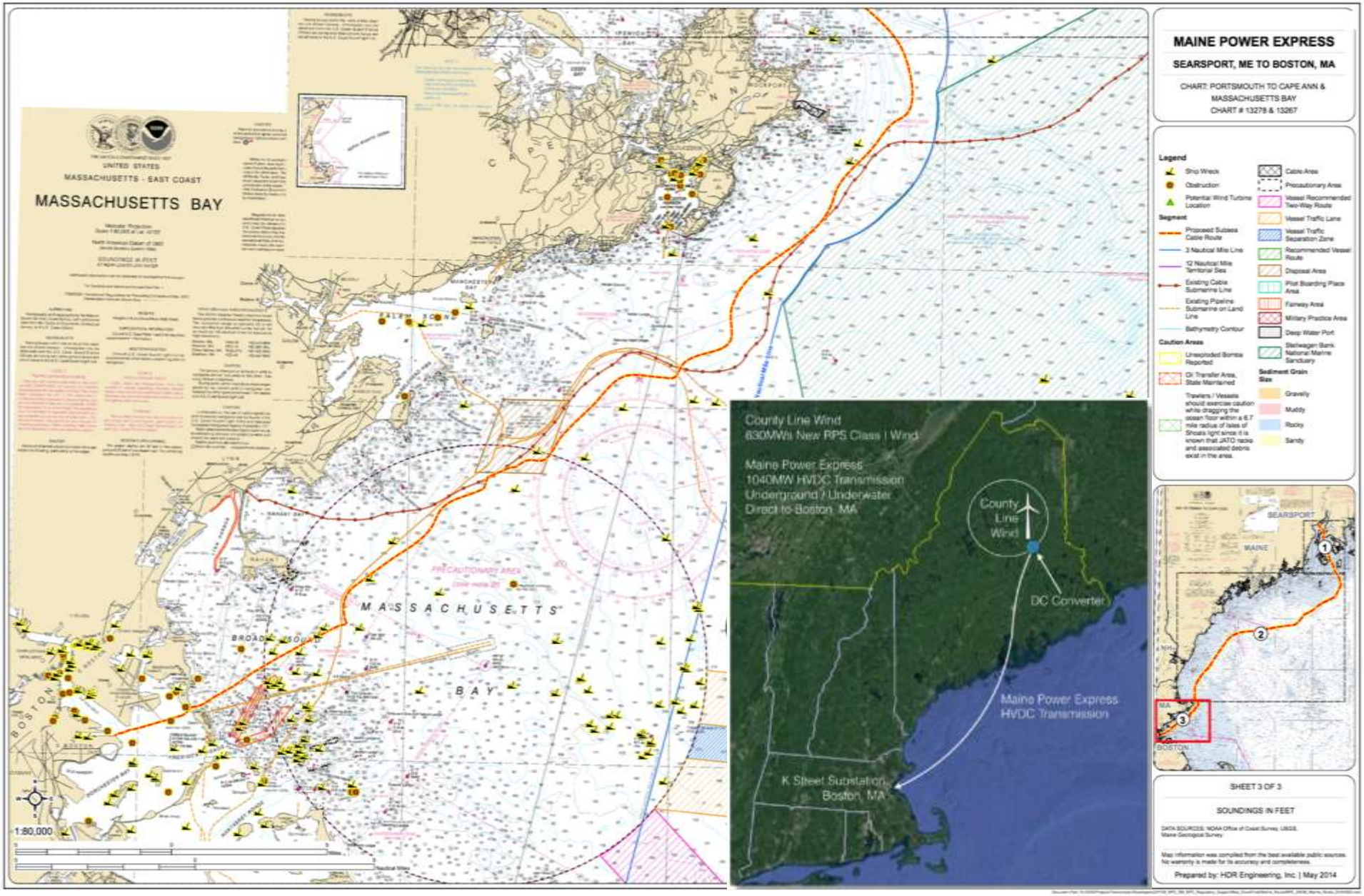
Notes
1. Coordinate System: NAD 1983 StatePlane Rhode Island FIPS 3800 Feet
2. Base map: NOAA RNC charts 12300 and 13205.

0 7 14 Miles

DEEPWATERWIND

Title
Revolution Wind Site Plan


72°W
70°W
68°W
66°W
45°N
44°N
43°N
42°N
Coleson Cove, NB
Landing Point
Route Alternative 2
Route Alternative 1
Plymouth, MA
Landing Point
Atlantic Link Cable Route is subject to field work and stakeholder and regulatory consultations.
ATLANTIC LINK
Emera
Atlantic Link
Subsea Cable Route Alternatives
Legend
Route Alternative 1
Route Alternative 2
International Boundary
Nautical Miles
0 10 20 40 60
0 20 40 80 120
Kilometers
N


MAINE POWER EXPRESS
SEARSPORT, ME TO BOSTON, MA
CHART: PORTSMOUTH TO CAPE ANN & MASSACHUSETTS BAY
CHART # 13278 & 13267
Legend
Ship Wreck
Obstruction
Potential Wind Turbine Location
Segment
Proposed Subsea Cable Route
3 Nautical Mile Line
12 Nautical Mile Territorial Sea
Existing Cable Submarine Line
Existing Pipeline Submarine or Land Line
Bathymetry Contour
Caution Areas
Unexploded Bombs Reported
Oil Transfer Area, State Maintained
Trawlers / Vessels should exercise caution while dragging the ocean floor within a 6.7 mile radius of Isles of Shoals light since it is known that JATO racks and associated debris exist in the area.
Cable Area
Precautionary Area
Vessel Recommended Two-Way Route
Vessel Traffic Lane
Vessel Traffic Separation Zone
Recommended Vessel Route
Disposal Area
Pilot Boarding Place Area
Fairway Area
Military Practice Area
Deep Water Port
Stellwagen Bank National Marine Sanctuary
Sediment Grain Size
Gravelly
Muddy
Rocky
Sandy
UNITED STATES
MASSACHUSETTS - EAST COAST
MASSACHUSETTS BAY
PRECAUTIONARY AREA
MASSACHUSETTS
BAY
BOSTON
1:80,000
County Line Wind
630MWs New RPS Class I Wind
Maine Power Express
1040MW HVDC Transmission
Underground / Underwater
Direct to Boston, MA
County Line Wind
DC Converter
Maine Power Express HVDC Transmission
K Street Substation, Boston, MA
SEARSPORT
MAINE
MA
BOSTON
1
2
3
SHEET 3 OF 3
SOUNDINGS IN FEET
DATA SOURCES: NOAA Office of Coast Survey, USGS, Maine Geological Survey
Map information was compiled from the best available public sources. No warranty is made for its accuracy and completeness.
Prepared by: HDR Engineering, Inc. | May 2014

Thank you

www.mass.gov/czm/

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