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Maritime Technical Working Group

Meeting

August 23, 2023 | Zoom Webinar

Meeting Agenda

- Member Updates
- Relevant State Updates
- Commercial and Recreational Uses Presentation
- Next Steps

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Member Updates

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New York State Offshore Wind Master Plan 2.0

Tess Arzu, Special Projects Manager
NYSERDA

August 23, 2023 - Maritime Technical Working Group Summer Meeting

Master Plan 2.0 Overview

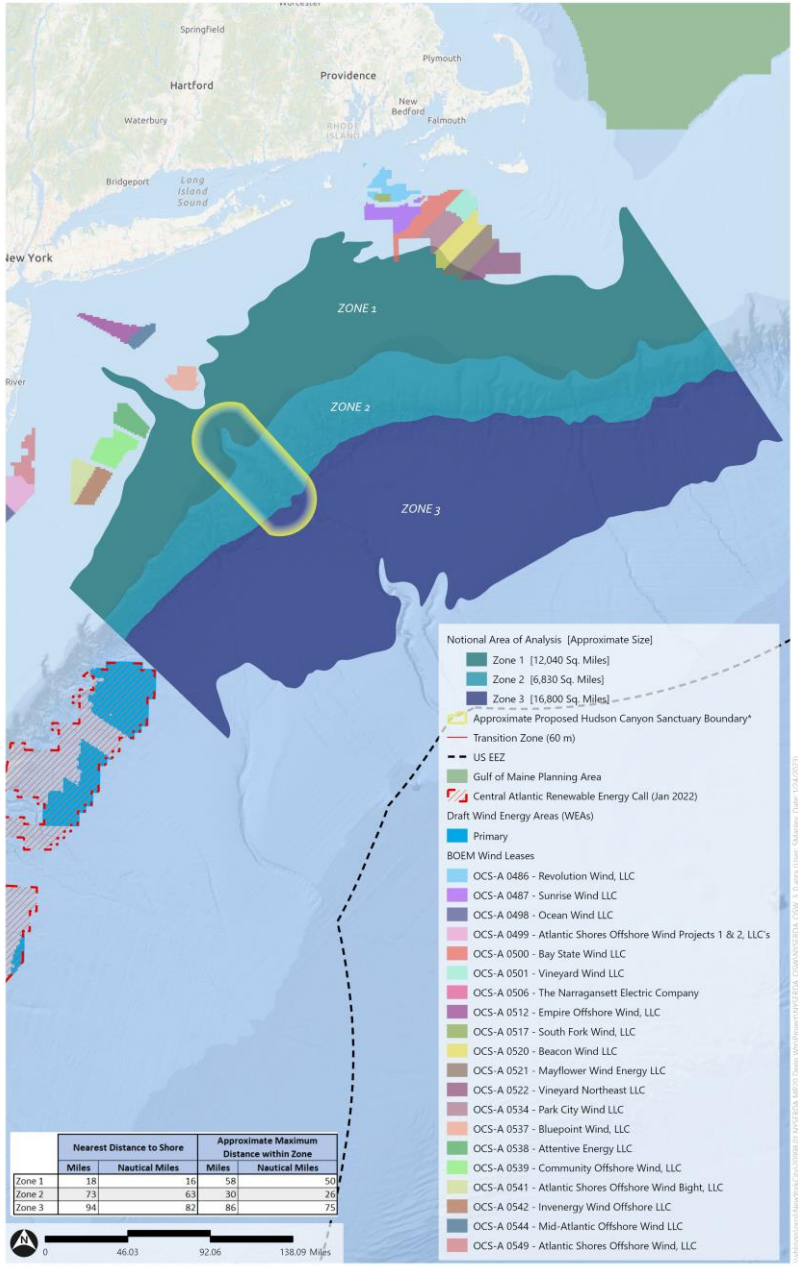
> *Serves as an* **organizing principle** *for all Offshore Wind work ensuring a robust and transparent strategy for achieving New York's 9GW goal*

> *Fosters ongoing and proactive* **stakeholder engagement**

> *Enables New York State to assess and* **characterize the risks and opportunities** *for offshore wind development in a comprehensive, sequential, and logical approach to achieve 9GW and beyond*

> *Builds on the success of New York's original Master Plan and* **unlocks the next frontier of offshore wind** *development*

Figure 2: Notional Area of Analysis Overview
NYSERDA OSW | East Coast US



	Nearest Distance to Shore		Approximate Maximum Distance within Zone	
	Miles	Nautical Miles	Miles	Nautical Miles
Zone 1	18	16	58	50
Zone 2	73	63	30	26
Zone 3	94	82	86	75

Master Plan 2.0 Track 1 Studies:
To inform "Areas for Consideration"

Credit: NOAA Fisheries

Maritime Activity

> **Maritime Assessment: Commercial and Recreational Uses**

The Environment

> *Birds and Bats*

> *Fish and Fisheries*

> *Marine Mammals and Sea Turtles*

> *Benthic Habitats*

> *Environmental Sensitivity Analysis*

Technology

> *Offshore Wind Resource Assessment*

> *Deep Water Wind Technologies: Technical Concepts*

Feasibility

> *Technology Assessment and Cost Considerations*

Master Plan 2.0 Timing

Track 1:

9 conducted Studies to inform future BOEM Offshore Wind Lease Areas

Areas for Consideration Report to BOEM

M-TWG Action Items:

August 2023 – M-TWG Meeting

September 2023 - Review Draft Report of the Commercial and Recreational Uses Study and provide feedback to NYSERDA within allocated 2-week review window

Track 2:

Studies to inform Master Plan 2.0

M-TWG Action Item:

Ideas for Studies welcomed by NYSERDA

2023 → **2024** → **2025**

2023 Key Technical Working Group Engagement

August 2023

- **TWGs and Third-Party Reviewers conduct Study reviews**
- *Birds and Bats: E-TWG feedback due August 21*
- **M-TWG Meeting: August 23**
- *Fish and Fisheries: E-TWG and F-TWG feedback due August 25*
- *Environmental Sensitivity: Under review*
- *Benthic Habitat; Marine Mammals and Sea Turtles Studies: E-TWG and F-TWG feedback received*

September 2023

- *Final product discussions commence*
- **Commercial and Recreational Uses : Draft Report for 2-week M-TWG review to be shared in September for feedback**
- *E-TWG Meeting : September 11*
- *F-TWG Meeting : September 22*
- *TWGs and Third-Party Reviewer feedback is incorporated in final product discussions*

October 2023

- **All studies and TWG feedback finalized by October 31**
- *Legal Review of all studies commence*
- *Final Areas for Consideration Report to NYSERDA by November 1*

November - December 2023

- *Areas for Considerations to BOEM*
- *Finalize Master Plan 2.0 supporting studies*

Timeline Goal:

Seek to make a formal request of BOEM early in 2024 based upon consideration of studies, support from regional states and stakeholders, and concurrence from State agencies.

Potential Master Plan 2.0 Track 2 Studies: **To inform Master Plan 2.0**

Transmission

> *Transmission planning and interconnection*

Supply Chain

> *Port Performance Permitting*

> *Wind Turbine Vessel and Technology Study*

> *Supply Chain Opportunities Analysis*

Workforce

> *Workforce Opportunities*

Disadvantaged Communities

> *Disadvantaged Communities: Cumulative Impacts*

> *Catalogue of Assets*

The Environment

> *Socioeconomic Analysis of Fishing*

> *Environmental Cumulative Impacts Study*

Credit: Vestas

Thank You

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NYSERDA Master Plan 2.0 Development
Commercial and Recreational Uses Study

MTWG Findings Presentation | August 23, 2023

Confidential

McQuilling Renewables

Project Objective

Contractor will provide an updated perspective on the maritime uses in the relevant offshore sector: one that addresses maritime commercial and recreational activity beyond the 60-meter depth contour based on both historical data as well as projected activity into the future

Objective of Findings Presentation

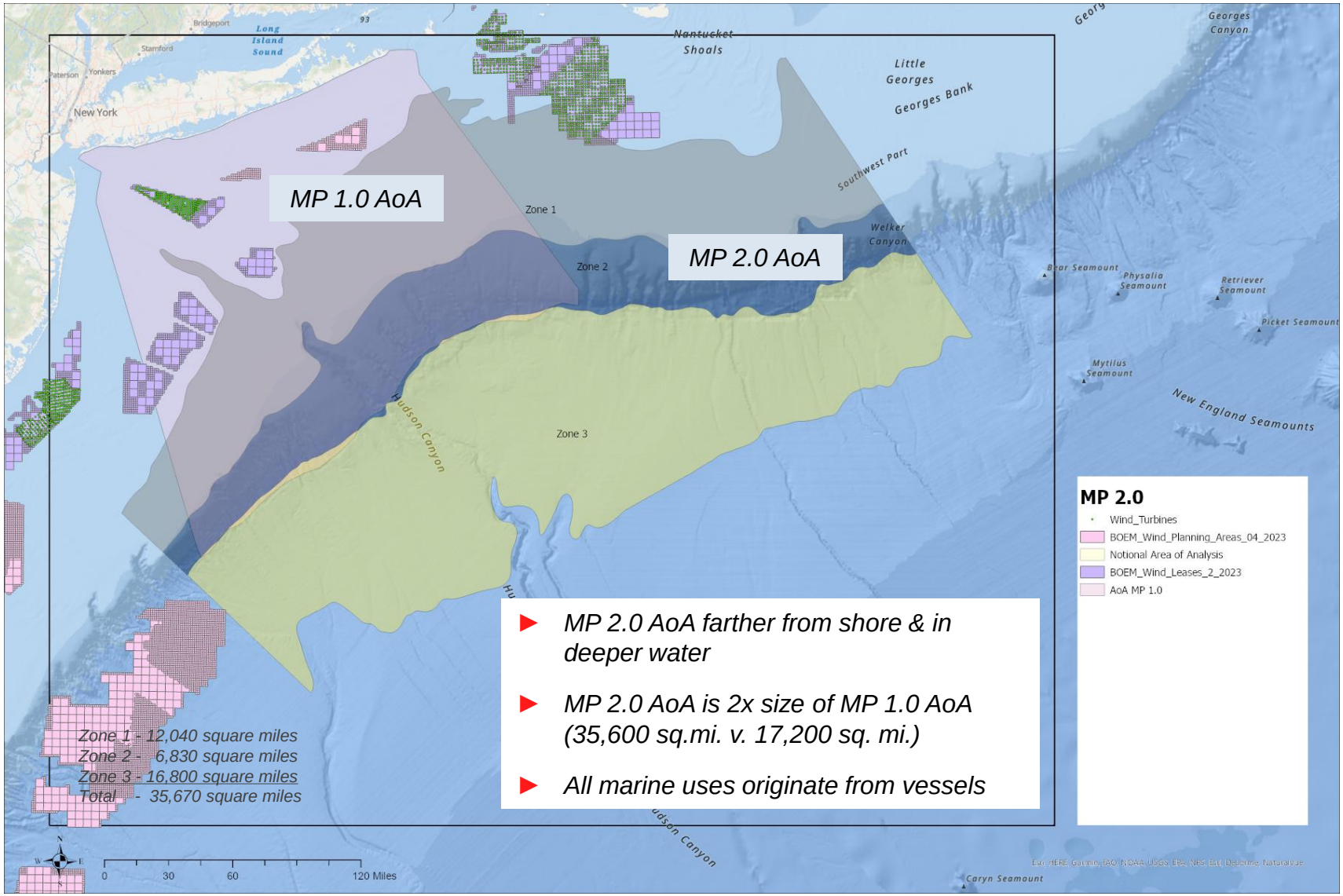
Present overview of findings of the various sub-tracks identifying & evaluating marine uses in and around the AoA – focus on commercial uses

Agenda

- *Introduction*
- *Guiding Principles*
- *Information & Data Sources*
- *Marine Uses / Vessel Traffic Data*
- *Marine Safety Considerations*
- *Industrial/Trade Growth Assessment – Coastwise US East Coast*
- *Presence & Persistence of Vessels in AoA & Adjacent Regions*
- *Task 2 Deliverables*
- *Next Steps*

- *Leverage previous work – conduct new research*
- *Focus on data*
- *Use marine safety & regulatory considerations to inform on marine uses*
- *Alignment with new Area of Analysis (AoA)*
- *Logical re-classification of uses for Master Plan 2.0*

Alignment with New Area of Analysis (AoA)



- *MP 2.0 AoA farther from shore & in deeper water*
- *MP 2.0 AoA is 2x size of MP 1.0 AoA (35,600 sq.mi. v. 17,200 sq. mi.)*
- *All marine uses originate from vessels*

Logical re-classification of uses for Master Plan 2.0:

- *Cruise ship tourism, wildlife viewing (whales), wreck/reef diving are classified as commercial activities conducted from vessels in this study*
- *We are considering charter/for-hire fishing vessels as non-recreational for the purposes of this study*
- *Recreational uses consist of:*
  - ✓ *Recreational fishing*
  - ✓ *Regional transits to / through AoA*
  - ✓ *Long distance sailing races*

Marine Uses Can be Broadly Grouped by Their Attributes

Commercial Uses

- *Persistent*
- *Dense*
- *Direct economic impact*
- *Business interest*
- *Regulated*
- *Established deployments*
- *Constrained maneuverability*

Recreational Uses

- *Transitory*
- *Sparse*
- *Lightly regulated*
- *Flexible deployments*
- *Maneuverable vessels*
- *Individual benefits*
- *Indirect economic contributions*

Previous Work

Maritime Studies (to 9GW)

- *Offshore Wind Ports: Cumulative Impacts Study (22-10)*
- *Offshore Wind Ports: Cumulative Vessel Traffic (22-11)*
- *Offshore Wind Ports: Vessel Traffic Risk Assessment Supplement (22-31)*
- *Consolidated Port Approaches and International Entry and Departure Transit*
- *Areas Port Access Route Studies (PARS)*

MasterPlan1.0 (2.4 GW Studies)

- *NYSERDA Offshore Wind Master Plan 1.0*
- *Shipping and Navigation Study (17-25q)*
- *Marine Recreational Uses Study (17-25m)*
- *Assessment of Ports and Infrastructure (17-25b)*
- *US Jones Act Compliant WTIV Study (17-13)*

Data Portals

- *Mid-Atlantic Regional Council on the Ocean Data Portal*
- *Northeast Ocean Data Portal*
- *Marine Cadastre*
- *New York Geographic Information Gateway*

New Research

Topics

- Historical oil & gas lease development experience in US Gulf
- European experience with wind fields
- Offshore Wind Technology
- Industrial / Trade Growth Assessment
- Marine Safety considerations
- Commercial Uses
- Recreational Uses

Selected Sources

- American Bureau of Shipping
- Bureau of Meteorology, Australian Government
- European Offshore Wind Deployment Center
- Institute for Energy Resources
- International Energy Agency
- International Monetary Fund
- Maritime & Coast Guard Agency (MCA-UK)
- Marine Cadastre
- National Oceanic & Atmospheric Administration
- National Renewable Energy Laboratory
- Organization of Economic Cooperation & Development
- US Bureau of Economic Analysis
- US Coast Guard
- US Code of Federal Regulations
- US Department of Interior

Data Sources – Vessel Positions

AIS	*Automatic Identification System*	***Positions for all vessels above certain sizes*** *- International maritime navigation safety system that transmits detailed vessel information to land-based receivers and satellites and is the preferred method of tracking marine activity on a global basis, particularly in areas outside port limits and further from shore*
VTS	*Vessel Traffic Services*	***Positions for commercial marine traffic in a specific near-shore port region*** *- VTS stations are operated by or in partnership with the USCG to provide real time monitoring and guidance to vessels in congested ports and waterways: New York harbor is a participating VTS port*
VTR	*Vessel Trip Report*	***Position information for vessels specific to the fishing industry*** *- Aggregated by the NOAA Fisheries group, this data tracks landed catches of various species by the commercial fishing industry*
VMS	*Vessel Monitoring System*	***Position information for vessels specific to the fishing industry*** *- Controlled by the NOAA Fisheries group, this system is installed on commercial fishing vessels and its data is used to monitor the locations of vessel activity via GPS*

Findings

- *Ingestion and distillation of AIS data is a big data challenge but is rich in detail and provides a trove of meaningful information from which to discern region use*
- *Marine Cadastre AIS data, while voluminous, may be incomplete in regions farther offshore (Zone 3) — we are investigating the necessity of supplementing with commercial satellite AIS vessel positions*
- *Fishing industry tracking systems (VTR, VMS) are typically industry focused and subject to availability from the collecting agencies*

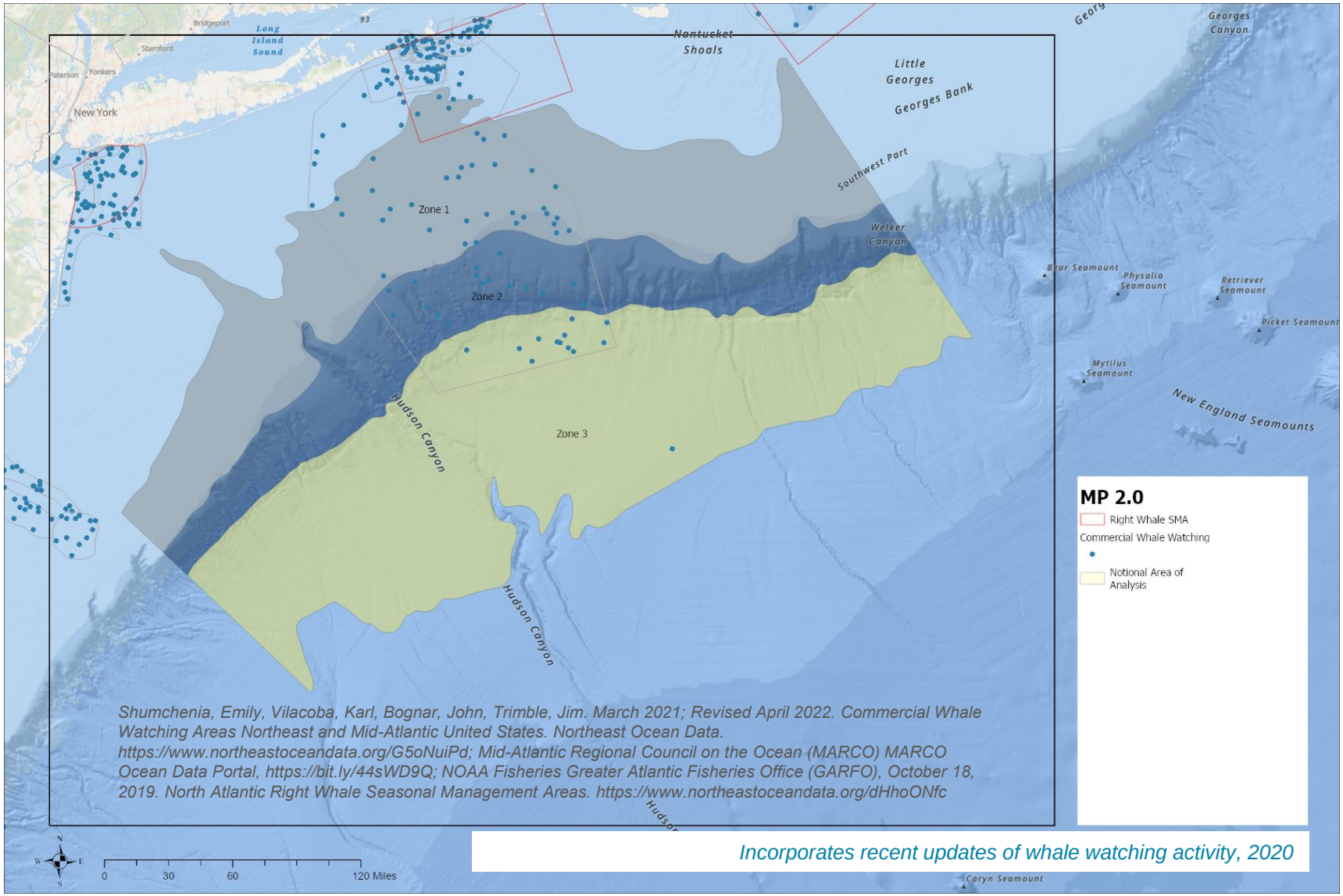
Methodology

Obtain AIS temporal and spatial data, clean and distill	*All vessel types, 2016 through 2022; Source: Marine Cadastre – a joint initiative between BOEM and NOAA to provide data needs to the offshore energy and marine industries, aggregate by BOEM vessel type into 10 codes*
Classify AIS data into traffic flows for vessel types; Analyze and evaluate marine traffic data for the region –	*- Quantitatively analyze marine traffic data* *- Qualitatively review ArcGIS layers & compare traffic patterns in and around the AoA* *- Consider vessel approaches and departures from the greater navigable region* *- Consider annual trends, seasonality, spatial distribution of traffic*
Compute traffic densities	*Using ArcGIS tools to characterize intensity of marine use of region*
Marine uses are classified as commercial or recreational	*Commercial vessels are required to carry AIS transponders when overall length exceeds 65 feet. Many recreation vessels also carry AIS transponders which provide a sampling of recreational uses in the region*
Commercial use	*Is characterized by for-hire activities having the following typical features: persistent, dense, direct economic impact, professional, regulated, established deployments, constrained maneuverability*
Recreational use	*Is characterized by leisure activities having the following typical features: transitory, sparse, unregulated, flexible deployments, maneuverable vessels, individual utility, indirect economic contribution*
Qualitative data has been used to supplement AIS information	*To further inform on what may be happening in and around the AoA – from vessels*

Aggregated BOEM AIS Vessel Codes

Aggregated Code	Detail Codes	Vessel Type	Description
1	AIS 70-79; AVIS 1003-1005, 1016	Cargo	Public Freight, Industrial Vessel, Cargo Vessel
2	AIS 80-89; AVIS 1017, 1024	Tanker	Carriage of crude oil, fuel oils, gasoline, jet fuel
3	AIS 31, 32, 52; AVIS 1023, 1025	Tug & Towing	Tug, tank barge, towed cargo barge
4	AIS 60-69; AVIS 1012-1015	Passenger	Cruise ships, ferries, excursion vessels
5	AIS 36, 37; AVIS 1019	Recreational	Pleasure craft, recreational fishing, sailboat
6	AIS 30; AVIS 1001, 1002	Fishing	Commercial fishing vessel, fish processing vessel
7	AIS 35, 55, 58, 59	Military / USCG / Law Enforcement	Military operations, law enforcement, medical transport
8	AIS 20-29, 33,34, 40-51, 53, 54, 90-99; AVIS 1006-1009, 1011, 1018, 1020-1022	Other	Wing in ground (WIG), high speed craft (HSC), dredging, diving, pilot, search & rescue (SAR), port tender, oil recovery, research vessel, school ship
9	AIS 0, 1-19, 38, 39, 56, 57	Empty, not assigned	N/A
10	AVIS 1010	Offshore Supply Boat	

Commercial | Wildlife Viewing (Whale Watching)



Shumchenia, Emily, Vilacoba, Karl, Bognar, John, Trimble, Jim. March 2021; Revised April 2022. Commercial Whale Watching Areas Northeast and Mid-Atlantic United States. Northeast Ocean Data. https://www.northeastoceandata.org/G5oNuiPd; Mid-Atlantic Regional Council on the Ocean (MARCO) MARCO Ocean Data Portal, https://bit.ly/44sWD9Q; NOAA Fisheries Greater Atlantic Fisheries Office (GARFO), October 18, 2019. North Atlantic Right Whale Seasonal Management Areas. https://www.northeastoceandata.org/dHhoONfc

Incorporates recent updates of whale watching activity, 2020

Commercial | Underwater Activity: Reef / Wreck Diving

Shipwreck and Reef Sites

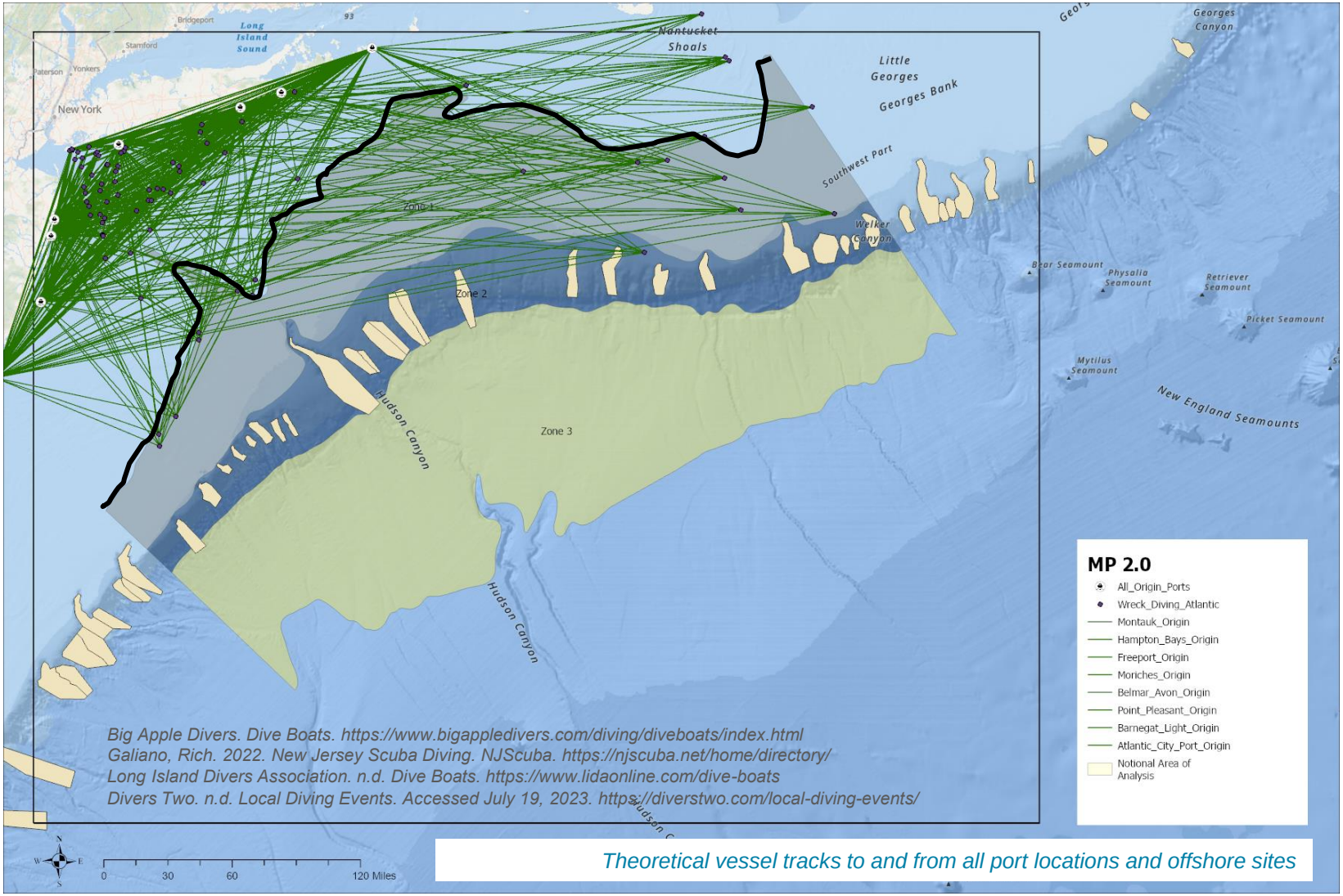
Technical diving, beyond 130 feet (~ 40 meters), requires mixed-gas breathing equipment and further training limiting the diving population beyond this depth contour. At least 16 commercial dive vessels operating with boats departing from at least eight locations in New York and New Jersey. Frequency may be up to a few times per week to specific dive sites

Vessels	Ports
Miss Atlantic City	Atlantic City, NJ
Dina Dee II Sea Hag	Barnegat Light, NJ
Gypsy Blood, Tuna Seazure Independence II, Sea Lion	Point Pleasant / Brielle, NJ
Ol' Salty II Venture III Sea Eagle	Belmar / AVON-BY-THE-SEA, NJ
Sea Hawk Tempest	Freeport, NY
Fish-On Sidekick	Moriches / East Moriches, NY
Halftime	Hampton Bays, NY
Sea Turtle	Montauk, NY

Shipwreck	Latitude	Longitude
San Diego	40.6376	-73.0218
Stolt Dagali	39.9889	-73.6656
Stone Barge	40.5407	-73.5407
Tarantula	40.3270	-73.2240
Texas Tower #4	39.7968	-72.6707
Texel Shipwreck	39.0684	-73.3019
USS Turner	40.4975	-73.8725
Valerie E	40.5160	-73.7119
Algol	40.1099	-73.6850
Alan Martin	40.1061	-73.6799

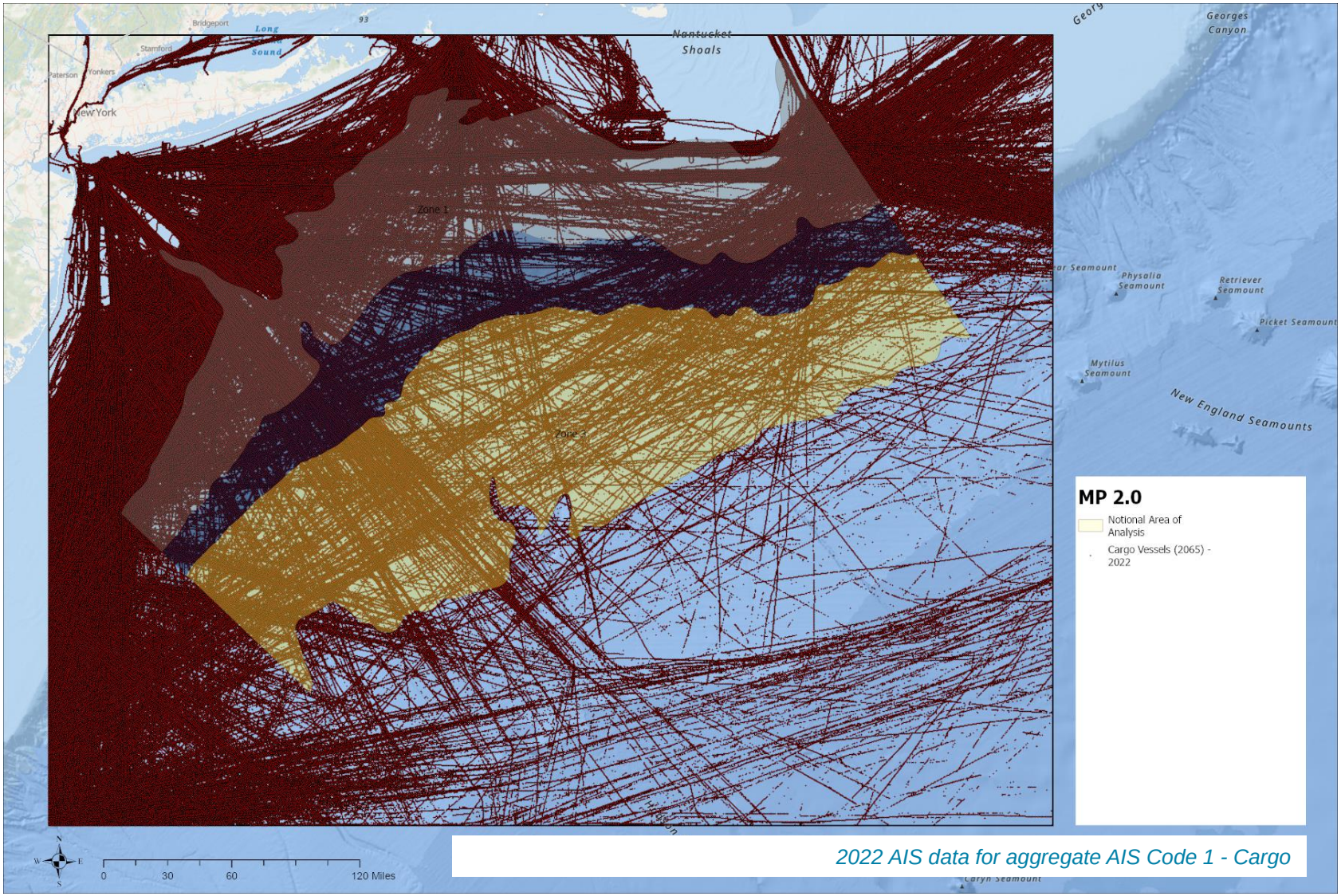
New York State Department of State Geographic Information Gateway. June 22, 2022. Wreck Diving – NY, Atlantic Ocean. ArcGIS.com. https://www.arcgis.com/home/item.html?id=b613aebe21054e19a93bfb3e354fc2aa
SeaPlan, Surfrider, and Point 97. Recreational SCUBA Diving Areas. September, 2015. Northeast Ocean Data. https://www.northeastoceandata.org/KCmMHi4Y

Commercial | Underwater Activity: Reef / Wreck Diving

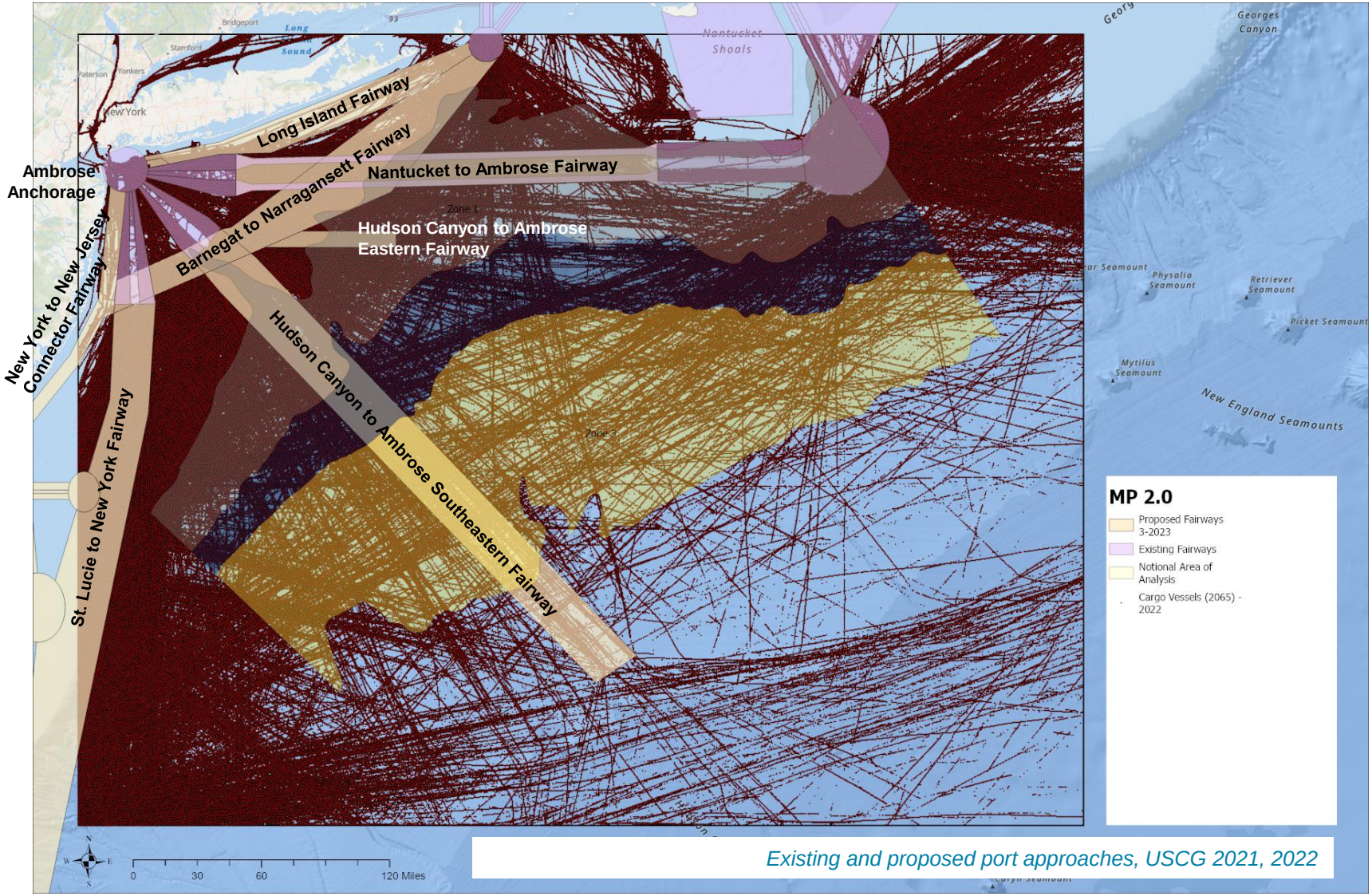


Theoretical vessel tracks to and from all port locations and offshore sites

Historical Trading / Transit Patterns – 2022



Marine Traffic Separation Schemes & Safety Fairways



Existing and proposed port approaches, USCG 2021, 2022

Marine Traffic – US Gulf, European, Other Experiences and Best Practices

Best practices and risk mitigation measures for locating wind energy areas can be derived from legacy industries such as oil and gas development in the US Gulf and established wind field planning practices in Europe.

While there are no international standards that specify minimum distances between routes and structures, Port Access Routing Studies (PARS) are carried out by the USCG in the US prior to establishing the location for structures such as wind turbines to analyze safe access routes for marine traffic. Safety Fairways and Traffic Separation Schemes are then designated and implemented to guide and inform the marine community.

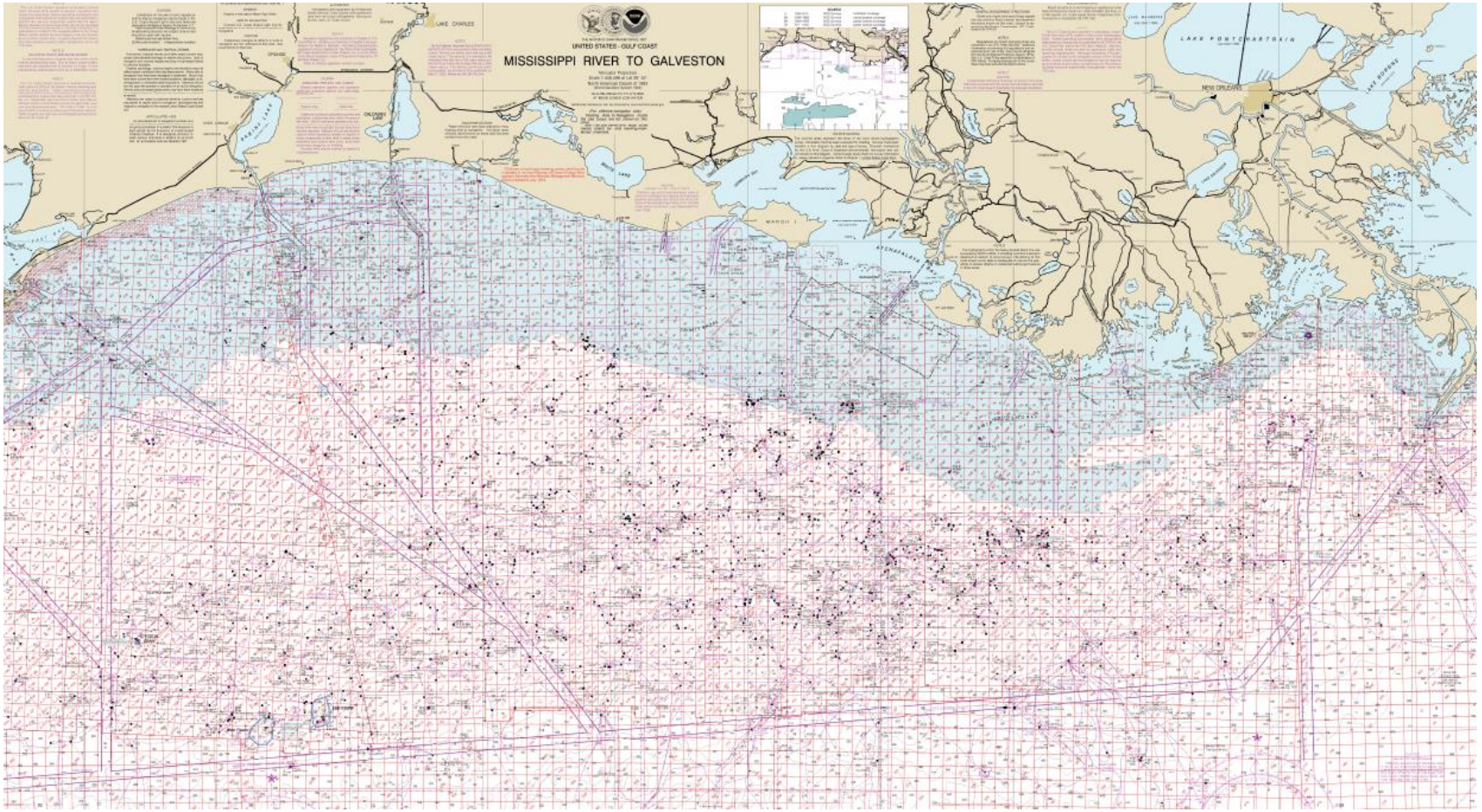
- *A **Shipping Safety Fairway** or fairway means a lane or corridor in which no artificial island or fixed structure, whether temporary or permanent, will be permitted. Aids to navigation approved by the U.S. Coast Guard may be established in a fairway.*

- ***Traffic Separation Schemes (TSS)** - Planning Guideline for the location of structures: 2 NM from the parallel outer or seaward boundary of a traffic lane (Assumes 300-400 vessels); 5 NM from the entry/exit (terminations) of a TSS*

In the UK, the Maritime and Coast Guard Agency (MCA) carries out similar studies focusing on risk mitigation to provide guidance to Offshore Renewable Energy stakeholders highlighting issues that need to be taken into consideration when assessing the impact of a project on navigational safety and emergency response.

Maritime Rules of the Road as applicable – 72' COLREGS International Rules outside of Demarcation Lines & Inland Navigation Rules inside of Demarcation Lines (33 CFR 80)
U.S. Code of Federal Regulations 33 CFR Part 166.105. June 30, 1983. Definitions "Shipping Safety Fairway."
United States Coast Guard. December 27, 2021. "Port Access Route Study: Northern New York Bight - Final Report."
USCG Notice to Mariners

Marine Traffic – US Gulf, European, Other Experiences and Best Practices



Lease Block Chart for Mississippi River to Galveston (116A), 80th Ed., July 1st 2017. NOAA RNC.

Marine Traffic – US Gulf, European, Other Experiences and Best Practices

Wind Farm Shipping Route Template

The wind farm "Shipping route" template below is one example and can be used as guidance but agreement of distances between wind farm boundaries and shipping routes will be on a case-by-case basis among relevant navigation stakeholders. It is important to recognize that the template is not a prescriptive tool but needs intelligent application and advice will be provided on a case-by-case basis.

Distance of turbine boundary from shipping route (90% of traffic, as per Distance C)[7]	Factors for consideration	Risk	Tolerability
<0.5nm (<926m)	X-Band radar interference Vessels may generate multiple echoes on shore-based radars	VERY HIGH	INTOLERABLE
0.5nm to <1nm (926m to <1852m)	Mariners' Ship Domain (vessel size and maneuverability)	HIGH	TOLERABLE IF ALARP
1nm to <2nm 1 (852m to <3704m)	Minimum distance to parallel an IMO routing measure, as per Distance B.; S-Band radar interference ARPA affected (or other automatic target tracking means)	MEDIUM	Additional risk assessment and proposed mitigation measures required * Descriptions of ALARP can be found in: a) Health and Safety Executive (2001) 'Reducing Risks, Protecting People'; b) IMO (2018) MSCMEPC.2/Circ.12/Rev.2 dated 9 April 2018, 'Revised Guidelines for Formal Safety Assessment (FSA) in the IMO Rule-Making Process'
2nm to 3.5nm (3704m – 6482m)	Preferred distance to parallel boundary of an IMO routeing measure, as per Distance B8 Compliance with COLREG becomes less challenging	LOW	
>3.5nm (>6482m)	Minimum separation distance between turbines on opposite sides of a route	LOW	BROADLY ACCEPTABLE
>5nm (>9260m)	Adjacent wind farm introduces cumulative effect Minimum distance from TSS entry/exit	VERY LOW	BROADLY ACCEPTABLE

Source: Maritime & Coast Guard Agency

[7] Distance from an IMO Routing Measure is measured from the routing boundary i.e. Distance B.

[8] The Netherlands assessed sea room requirements using data supported by the PIANC assessment for channel design and the PIANC Interaction Between Offshore Wind Farms and Maritime Navigation (2018) report. In general, they strive for an obstacle free, or buffer, zone of 2nm between wind farms and shipping routes.

Offshore Wind Traffic Development – Assumptions & Methodology

Assumptions

1) All foundations for turbine installation for NYS MP 2.0 beyond 60-meter contour are floating

2) Four types are considered: Spar, Semi-sub, Barge, TLP

3) Offshore energy capacity additions:

	2023-2030	2031-2040	2035	2041-2050
United States	+ 30 GW	+ 40 GW		+ 40 GW
US East Coast	+ 30 GW	+ 30 GW		+ 30 GW
New York State	+ 4.3 GW		+ 9 GW	

4) Turbine size for planning purposes:

2023-2030	2031-2040	2035	2041-2050
15 MW	17.5 MW	17.5 MW	20 MW

5) Installation assumption for fixed foundations:

Foreign WTIV | US Flag Jones Act feeder barge - (2 monopiles per barge trip, 1 set turbine components / barge trip)

6) Installation assumption for floating foundations:

On-site install with feedering equipment - (Towed floating foundation, 1 set turbine components / barge trip)

7) Turbine foundation & component sources:

US east coast ports – staging areas (various)

8) Imports of turbine components:

Included in non-OSW marine traffic growth estimates.

Offshore Wind Traffic Development – Assumptions & Methodology

Methodology

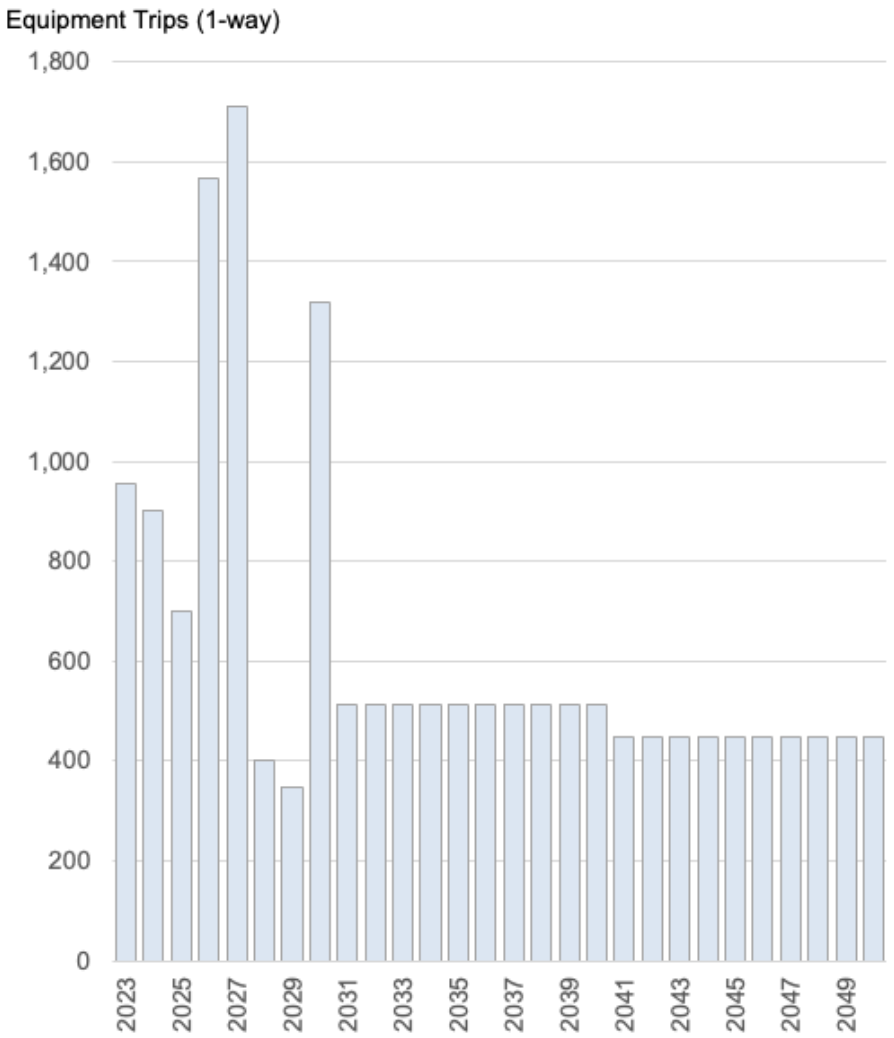
Identify existing projects for 2023-2030 including number of turbines to be installed and estimate of when

Using assumptions on previous page, develop number of turbines implied for each year from 2030 through 2050 located offshore US east coast

Highlight known manufacturing and staging areas shoreside and select representative targets offshore for field development based approximately on lease, call area and wind energy area locations

Allocate number of equipment trips across network of tracks uniformly

Evaluate marine traffic impact during the period

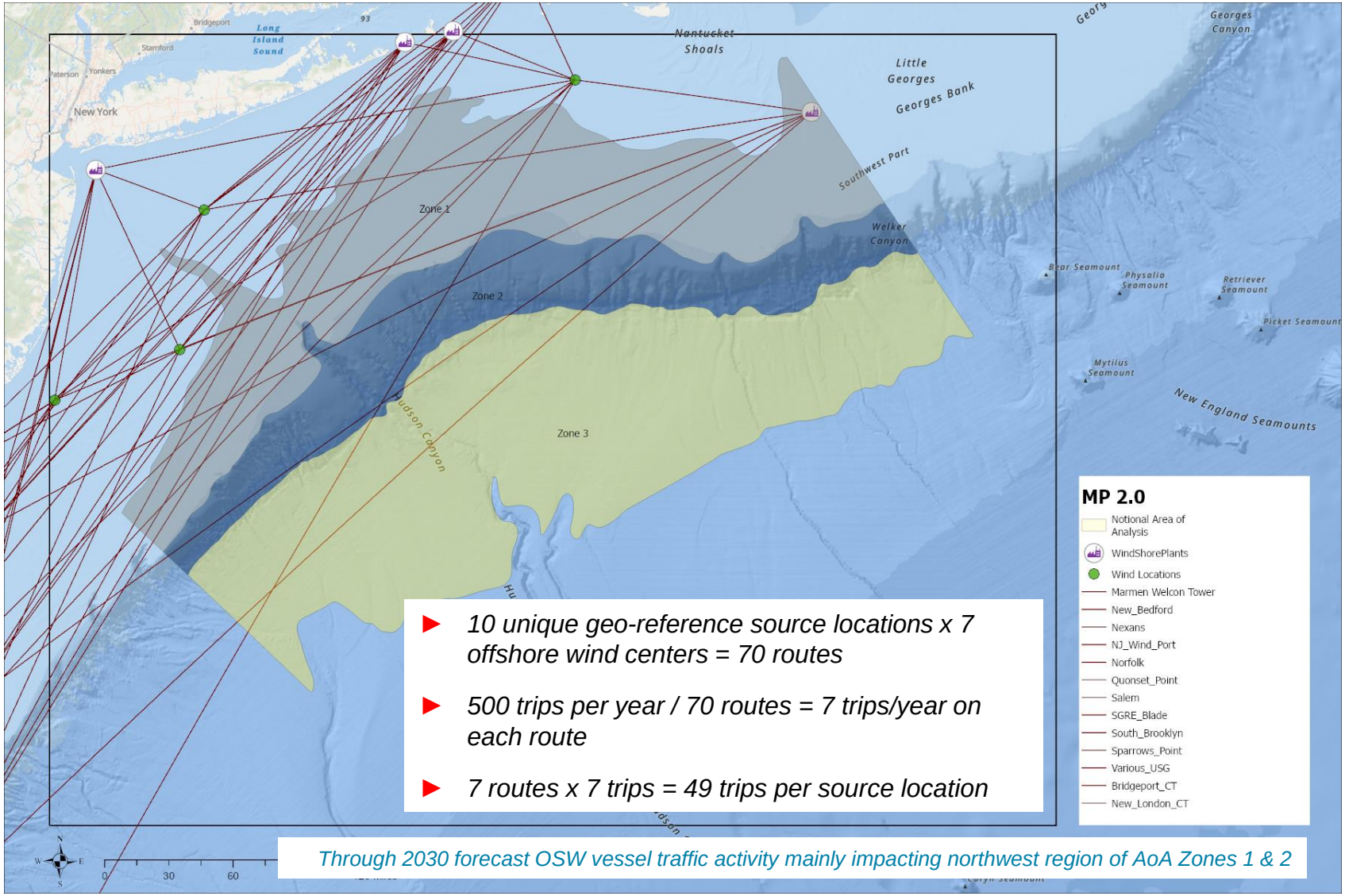


Port Facilities & Offshore Points

Port Facilities - Manufacturing & Staging	Geo-Reference	LAT	LONG
Marmen/Welcon Tower Facility Albany NY	The Narrows - Ambrose Channel	40.457700	-73.836667
South Brooklyn Marine Terminal, NY	The Narrows - Ambrose Channel	40.457700	-73.836667
NJ Wind Port - EEW AOS Plant Paulsboro, NJ	Delaware Bay	38.839499	-74.947674
Sparrows Point Steel, Baltimore, MD	Lower Chesapeake Bay	36.935500	-75.957367
Norfolk Harbor Staging Area (Ørsted Lease), VA	Lower Chesapeake Bay	36.935500	-75.957367
SGRE Blade Facility, Portsmouth Marine Terminal, VA	Portsmouth, VA	36.935500	-75.957367
Nexans High Voltage Subsea Cable Plant, Charleston, SC	Charleston, SC	32.730147	-79.846279
Various US Gulf Fabrication Facilities	Florida Straits N of Bahamas	27.508333	-79.480983
New Bedford, MA	Entrance to Buzzards Bay	41.484588	-70.950322
Bridgeport, CT	Montauk Pt. - East	41.108900	-71.748333
New London, CT	Montauk Pt. - East	41.108900	-71.748333
Salem, MA	Nantucket Shoals TSS	40.752433	-69.000000
Providence, Quonset Point Development Corp. RI	Narragansett Bay Traffic Lane (Out)	41.166667	-71.424450

Offshore Points - Wind Field Locations	Geo-Reference	LAT	LONG
Northeast Cluster		40.917000	-70.599000
New York Bight		40.250000	-73.104000
Offshore New Jersey (North)		39.525000	-73.269000
Offshore New Jersey (South)		39.262000	-74.115000
Delaware Bay		38.595000	-74.554000
Offshore DelMarVa Peninsula		37.644000	-74.719000
Offshore Virginia		36.462889	-75.038018

Offshore Wind Traffic Development

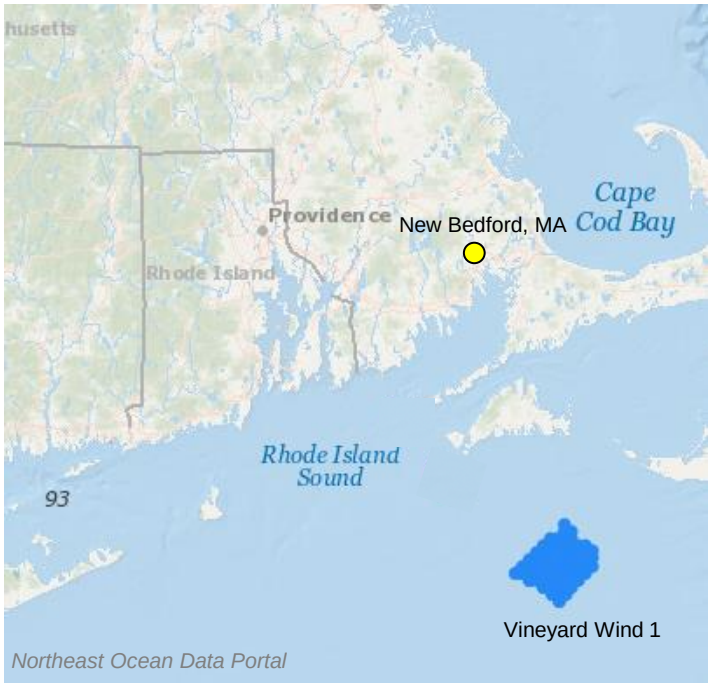


- *10 unique geo-reference source locations x 7 offshore wind centers = 70 routes*
- *500 trips per year / 70 routes = 7 trips/year on each route*
- *7 routes x 7 trips = 49 trips per source location*

Through 2030 forecast OSW vessel traffic activity mainly impacting northwest region of AoA Zones 1 & 2

Offshore Wind Traffic Development

Vineyard Wind Case Study - OCS-A-0501 – 62-Wind Turbines / 1-OSS

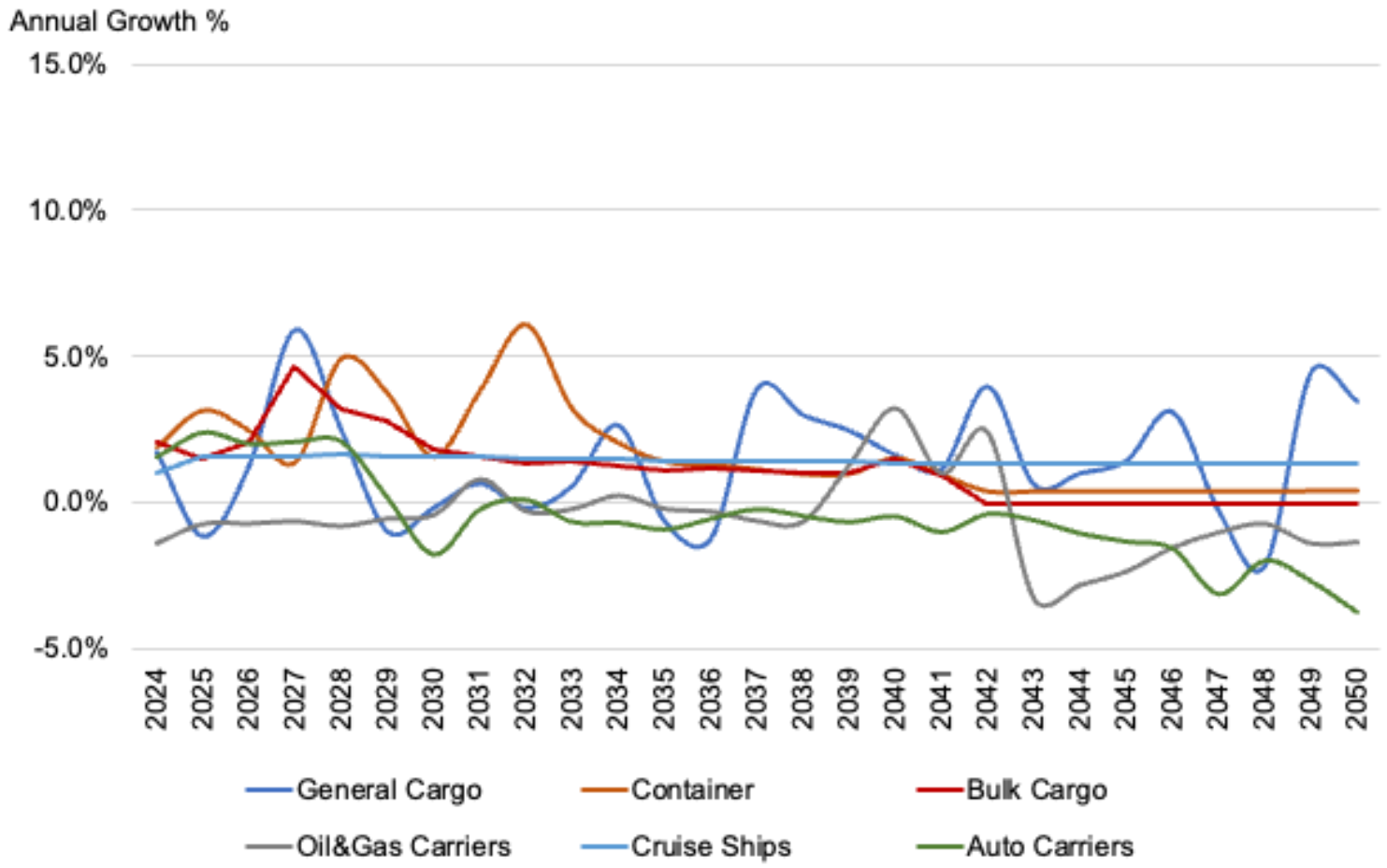


- ✓ *The Vineyard Wind 1 field development is underway: As such, it provides actual data on vessel traffic related to installation activities*
- ✓ *Offshore Wind mariner updates are provided by wind field project developers and serve as notice to the marine community for safe navigation and voyage planning, typically advising on marine assets to be deployed for various phases of the project with vessel particulars, location and scope of work defined*
- ✓ *Eighty-seven (87) offshore wind Mariner's Updates reviewed, sampled and recorded according to marine asset and deployment particulars, commencing September 2016 and ending July 2023*
- ✓ *To date, there were approximately 169 vessel missions completed or in progress*
- ✓ *Marine asset deployments categorized by impact on marine traffic in and around the lease area and its approaches by length overall (LOA) and project phase*
- ✓ *Approximately 110 vessel deployments in total for vessels of 65 ft LOA and above*
- ✓ *Two project phases of: 1) Site Assessment & Survey; 2) Construction and Installation.*
- ✓ *This case study will continue to be updated as the project progresses and serve as a tool for validating US east coast offshore wind marine traffic growth forecasts*

Methodology – Non-Offshore Wind Traffic Growth

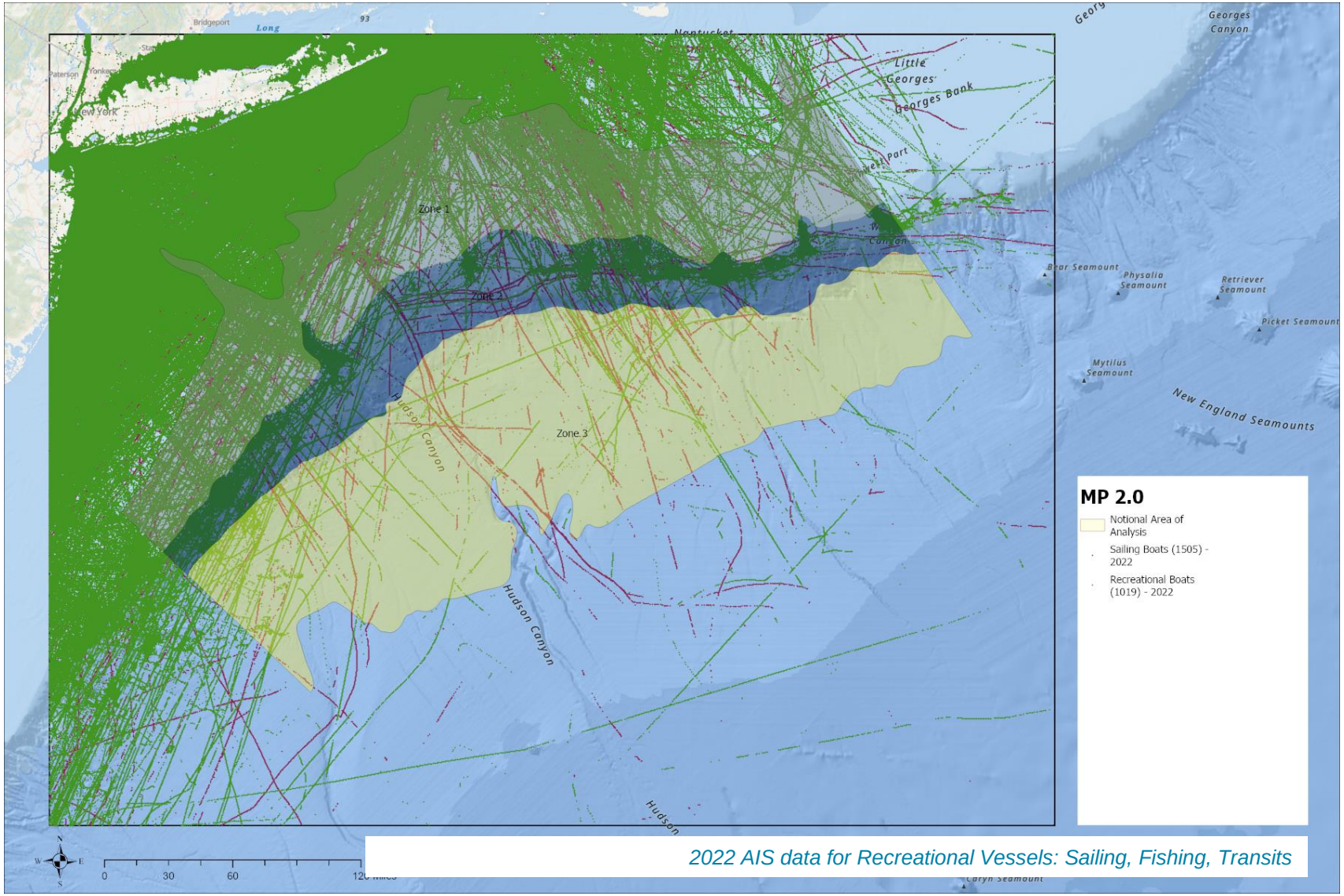
Establish link between global economic activity and global maritime transport	*Thesis: Economic activity drives cargo movement* *Test: Model transported cargo volumes (UNCTAD) with World GDP figures (World Economic Outlook / IMF).*
Utilize global and US GDP figures to derive regional economic activity for NY/NJ region	*Analyze GDP output from NY and NJ combined in relation to total US GDP Output (Bureau of Economic Analysis) - We note that for the years 1997 through 2022, NY/NJ total GDP averages 11% of total US GDP output.*
Establish relationship between NY/NJ economic activity with regional maritime activity	*We applied historical NY/NJ GDP figures to historical cargo flows to evaluate its utility in explaining marine trade. There was strong influence for NY/NJ combined GDP figures explaining New York and New Jersey Port Authority General Cargo Tonnage data during the period 2005-2016.*
Generate future economic growth for NY/NJ region utilizing OECD and IMF growth forecasts to 2050	*Apply economic models developed in previous steps to produce estimates of future marine trade growth.*
Determine cargo activity breakdown between general cargo, bulk cargo, oil & gas carrier, cruise ships, automotive segments	*Analyze the historical relationship between activity for various vessel segments in the NY/NJ region and our derived regional economic activity measurements.*
Derive future growth matrix for each vessel segment	*Utilizing the historical relationship observed in the previous step, we derived a forecasted future growth matrix for future growth per vessel segment, shown in an annualized growth format out to 2060.*

Non-Offshore Wind Marine Trade Growth Assumptions - 2023-2050



Source: McQuilling Renewables

Recreational Uses – Transits / Fishing / Sailing



2022 AIS data for Recreational Vessels: Sailing, Fishing, Transits

Drivers to Presence & Persistence

Ocean Metadata Sea States & Weather

- *Distill & evaluate weather and sea state conditions in/around MP 2.0 AoA*

Marine Safety Considerations

- *Interpret US Coast Guard and National Weather Service small craft advisory guidance regarding vessel deployment according to weather and sea state conditions (small craft < 65-feet)*

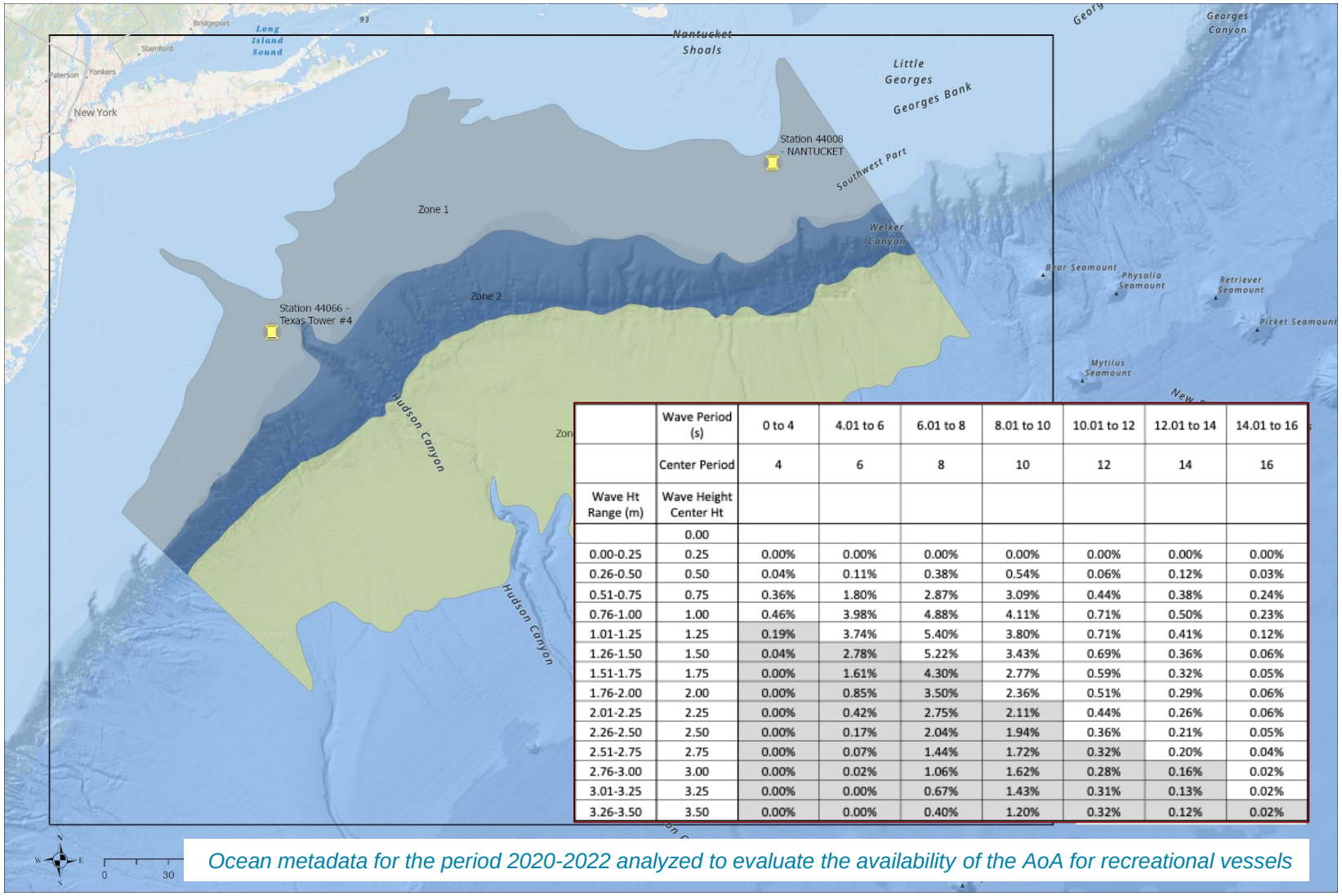
Discretionary Use

- *Evaluate state registration statistics for vessels to characterize recreational marine use in northeast region*

Findings to inform on presence & persistence of recreational vessels in the region

Source: Marine Cadastre

Ocean Metadata



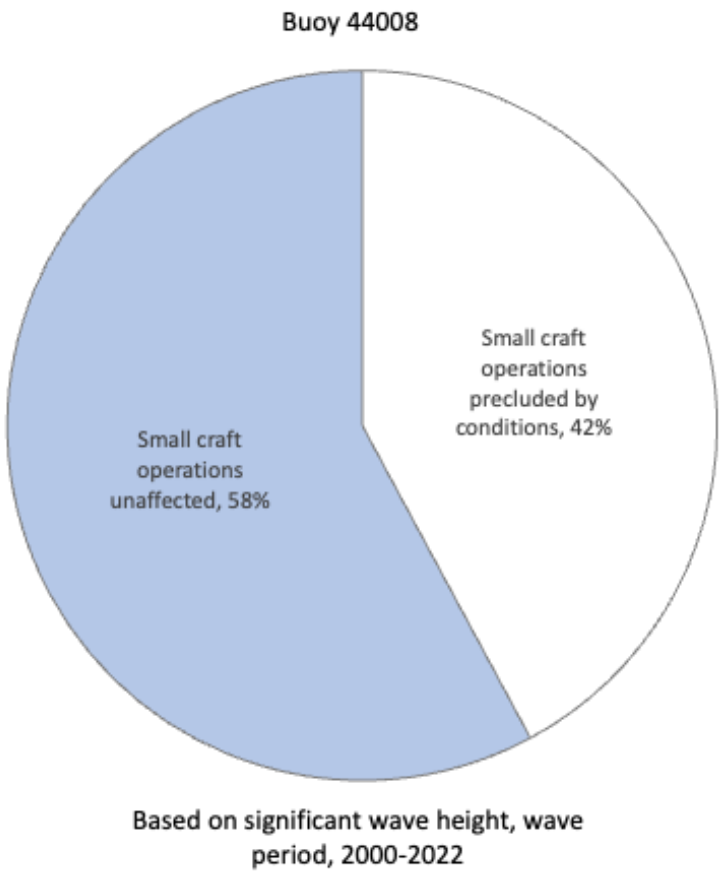
	Wave Period (s)	0 to 4	4.01 to 6	6.01 to 8	8.01 to 10	10.01 to 12	12.01 to 14	14.01 to 16
	Center Period	4	6	8	10	12	14	16
Wave Ht Range (m)	Wave Height Center Ht							
	0.00							
0.00-0.25	0.25	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
0.26-0.50	0.50	0.04%	0.11%	0.38%	0.54%	0.06%	0.12%	0.03%
0.51-0.75	0.75	0.36%	1.80%	2.87%	3.09%	0.44%	0.38%	0.24%
0.76-1.00	1.00	0.46%	3.98%	4.88%	4.11%	0.71%	0.50%	0.23%
1.01-1.25	1.25	0.19%	3.74%	5.40%	3.80%	0.71%	0.41%	0.12%
1.26-1.50	1.50	0.04%	2.78%	5.22%	3.43%	0.69%	0.36%	0.06%
1.51-1.75	1.75	0.00%	1.61%	4.30%	2.77%	0.59%	0.32%	0.05%
1.76-2.00	2.00	0.00%	0.85%	3.50%	2.36%	0.51%	0.29%	0.06%
2.01-2.25	2.25	0.00%	0.42%	2.75%	2.11%	0.44%	0.26%	0.06%
2.26-2.50	2.50	0.00%	0.17%	2.04%	1.94%	0.36%	0.21%	0.05%
2.51-2.75	2.75	0.00%	0.07%	1.44%	1.72%	0.32%	0.20%	0.04%
2.76-3.00	3.00	0.00%	0.02%	1.06%	1.62%	0.28%	0.16%	0.02%
3.01-3.25	3.25	0.00%	0.00%	0.67%	1.43%	0.31%	0.13%	0.02%
3.26-3.50	3.50	0.00%	0.00%	0.40%	1.20%	0.32%	0.12%	0.02%

Ocean metadata for the period 2020-2022 analyzed to evaluate the availability of the AoA for recreational vessels

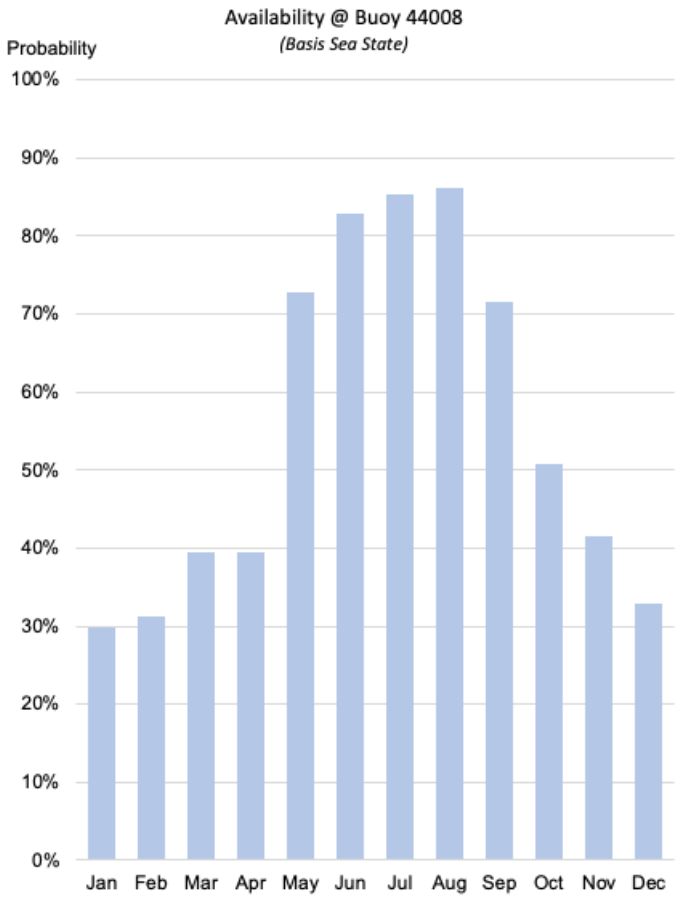
NOAA Buoy 44008 Coordinates 40.496 N, 69.250 W | NOAA Buoy 44066 Coordinates 39.618 N, 72.644 W

Availability Results

Average: 58%



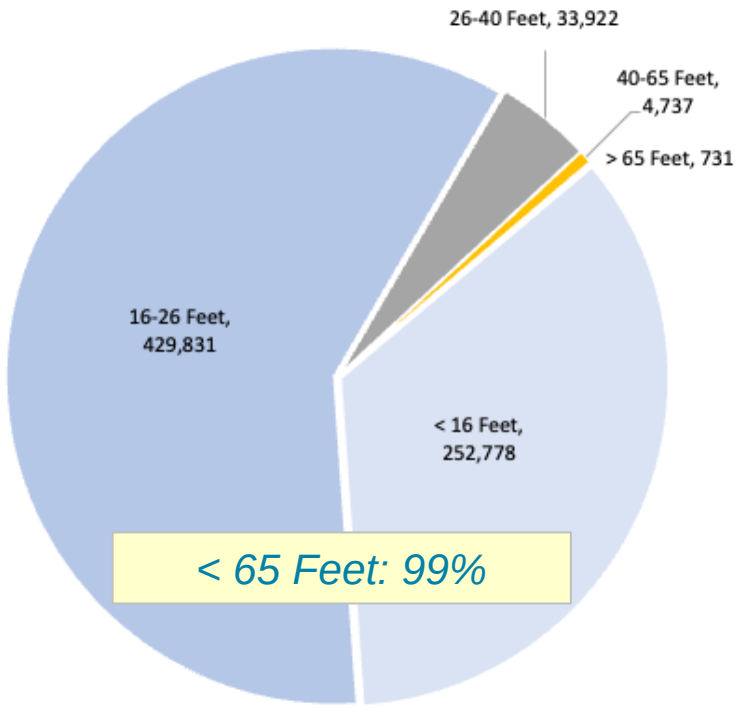
Seasonal: 30-85%



Source: Marine Applied Physics Corporation
NOAA Buoy 44008 Coordinates 40.496 N, 69.250 W | 2000 – 2022 Observations

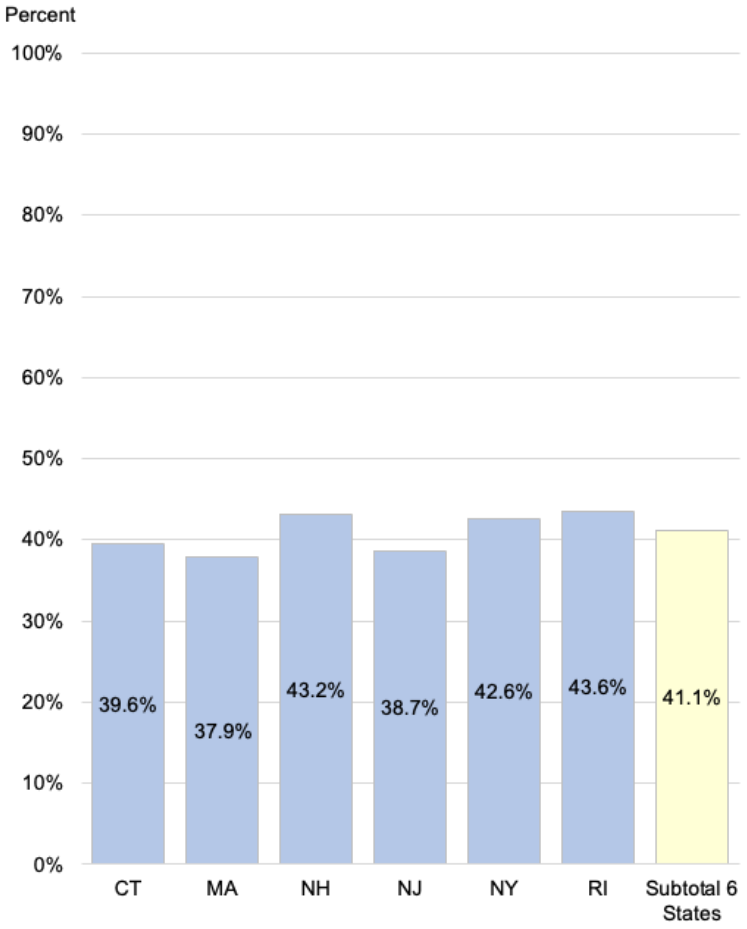
Recreational Vessel Registration by Length and Means of Propulsion - 2022

Six States: CT-MA-NH-NJ-RI*



**** Estimated 722,000 Mechanically propelled***

Percentage of Boats that Were Taken Out on the Water at Least Once by Boat Type and by State of Registration or Storage, 2018



Source: US Department of Homeland Security, US Coast Guard, Office of Auxiliary and Boating Safety, 2022. Duffy, et al. 2018. "National Recreational Boating Safety Survey Exposure Survey Final Report."

Hours per Boat on Last Outing in the Target Month for Operated Boats — Median and Mean by Aggregated Boat Type by State of Operation, 2018

Hours	All Boats	All Boats	Motorized	Motorized	Other	Other
	Mean	Median	Mean	Median	Mean	Median
Six States: CT-MA-NH-NJ-NY-RI	2.0-3.0	2.7-3.8	3.0-5.0	3.9	2.0-3.0	2.3-3.1

	Zone 1: 50nm Span			Zone 2: 26nm Span			Zone 3: 75 nm Span		
	Near		Far	Near		Far	Near		Far
Distance 1-Way (nm)	16		66	63		89	82		157
Distance RT (nm)	32		132	126		178	164		314
Transit Hours @ 20 kts (1-Way)	0.8	✓	3.2	3.2	✗	4.5	4.1	✗	7.8
Transit Hours @ 20 kts (RT)	1.6	✓	6.6	6.3	✗	8.9	8.2	✗	15.7

Presence & Persistence of Recreational Vessels in AoA

↓ *Reduced by sea state & weather*

↓ *Reduced by discretionary use*

↓ *Reduced by logistics constraints*

Transitory

Sparse

Flexible

Duffy, et al.2018. "National Recreational Boating Safety Survey Exposure Survey Final Report."

Summary of Findings

Big Data Challenges

- *Ingestion and distillation of AIS data is a big data challenge but is rich in detail and provides a trove of meaningful information from which to discern region use*
- *Marine Cadastre AIS data, while voluminous, may be incomplete in regions farther offshore (Zone 3) — we are investigating the necessity of supplementing with commercial satellite AIS vessel positions*
- *Fishing industry tracking systems (VTR, VMS) are typically industry focused and subject to availability from the collecting agencies*

New AoA Requires Re-Classification of Marine Uses

- *AoA is twice the size of MP1.0 AoA (35,600 sq.mi. v. 17,200 sq. mi.)*
- *AoA is farther offshore (from 16 to 157 nautical miles offshore)*
- *AoA is in much deeper water (> 60-meters / ~200 feet)*
- *All marine uses take place from vessels in and around this AoA*

Summary of Findings

Commercial Uses

- *Persistent*
- *Dense*
- *Direct economic impact*
- *Business interest*
- *Regulated*
- *Established deployments*
- *Constrained maneuverability*

- *Substantial persistent commercial marine use exists in Zone 1, less in Zone 2 and still less in Zone 3 but data issues in Zone 3 raise questions*
- *Cruise ship tourism, wildlife viewing and underwater activities should be reclassified as commercial uses as they share the same attributes of other commercial uses and represent commercial endeavors and jobs*
- *Whale watching commercial activity is present in few areas around the AoA and only one part in the AoA, but spans all three zones – activity is comparatively sparse*
- *Most underwater commercial activity (wreck/reef diving) exists north of the AoA – the few wrecks in the AoA are almost entirely in Zone 1 and are technical dives requiring mixed gas breathing equipment due to deeper (>130 feet) water depth, reducing the diver population visiting these areas*
- *Mixed non-OSW growth across commercial vessel sectors is expected through 2050, driven by economic forecasts for the region*
- *Growth of OSW marine traffic during the forecast period, while significant as a segment, is characterized as sparse, and tracks are project-oriented and variable*
- *Commercial traffic growth, except for OSW traffic, will trend towards denser existing tracks rather than expand spatially in the region*
- *USCG PARS recommendations target increased commercial marine traffic track density with time, and should be viewed as increasingly highly active marine traffic areas for lease siting purposes*

Summary of Findings

Recreational

- *Transitory*
- *Sparse*
- *Unregulated*
- *Flexible deployments*
- *Maneuverable vessels*
- *Individual benefits*
- *Indirect economic contributions*

- *All recreational uses (recreational fishing, sailing races, regional transits), and some commercial uses, are comparatively sparse, and not location dependent or constrained by turbine location – some commercial uses are location dependent*
- *Recreational boating impacts some of Zone 1, little of Zone 2 and still less of Zone 3 but data issues in Zone 3 raise questions*
- *Long distance sailing races' use of the region is both spatially and temporally sparse and not constrained by turbine location*
- *Sea state and weather conditions in the AoA reduce the presence and persistence of recreational vessels*
- *Recreational boater state registration data indicate availability of recreational boats at sea is limited by discretionary use*
- *The distance from shore of Zone 2 and Zone 3 make recreational boating in these regions sparse, except for recreational fishing along the rim of the continental shelf break, the boundary between Zone 1 and Zone 2*

Summary of Findings

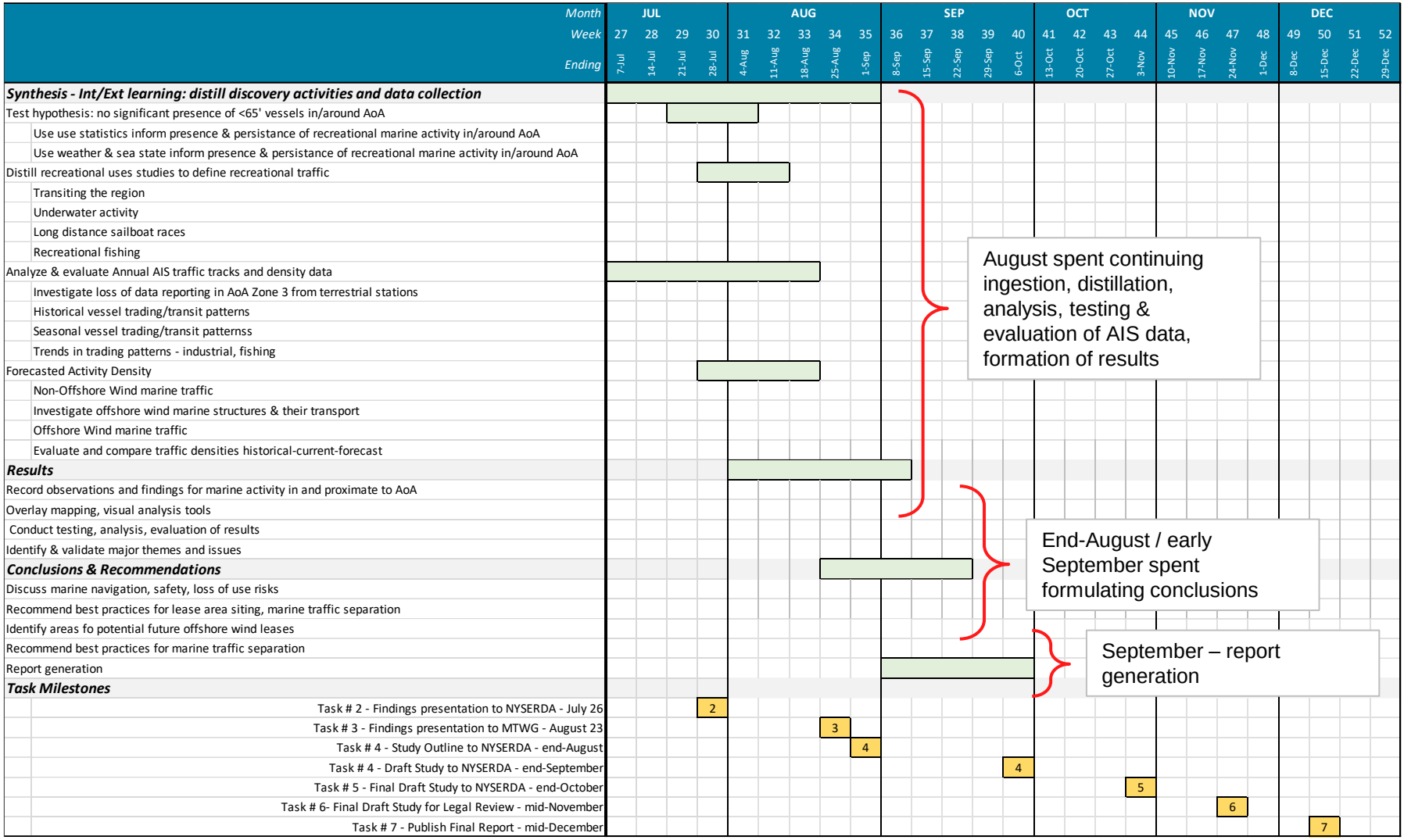
Marine Safety & Other

- *There is ample marine navigation safety planning experience from the US Gulf offshore oil and gas industry and from European offshore wind farm planning to inform safe navigation practices in/around AoA*
- *Substantial regulatory and advisory systems, processes and reporting inform on expected presence and persistence of recreational vessels in/around the AoA*
- *Military use is designated over a large area and impinges mainly on Zone 1 of the AoA while submarine transit lanes are present in all Zones*
- *Disposal sites are present in the AoA and should be considered in the lease siting process*

Major Datasets

- *Regional marine traffic AIS dataset 2016-2022*
- *Ocean metadata buoy observations (NOAA Buoy 44008, 44066) – 2000-2022*
- *Global, regional historical and forecast economic activity dataset – through 2050*
- *Vineyard Wind 1 case study offshore wind mariner's update dataset*

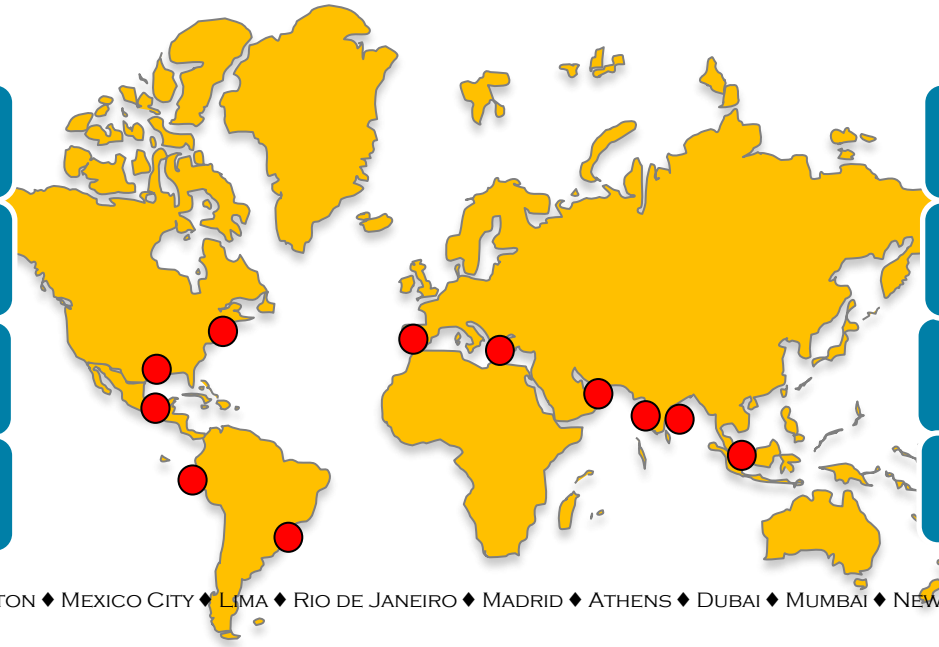
Task 2 – 7 Roadmap Remaining



ADVISORY | PLANNING | PROJECT MANAGEMENT | TRANSACTIONS

McQuilling Partners ('72) | McQuilling Services ('97) | 11 Offices – 130+ people

- Management Consulting
- Business Development
- Market Research
- Marine Logistics Analysis



- Ship Finance Advisory
- Ship Construction & Repair Advisory
- Information Technology
- Personnel Training

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McQuilling Services dba McQuilling Renewables

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McQuilling Study - Discussion Questions

- What are your initial reactions to the findings?
- What data limitations or assumptions would you like NYS to be aware of?
- What future trends should be identified?

Master Plan 2.0 - Discussion Questions

- What are maritime priorities in deepwater?
- What areas present the highest conflict to siting wind?
- What other maritime industry groups should be consulted on MP2.0 studies?

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Next Steps

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