NYSERDA Offshore Wind Ports: Cumulative Vessel Traffic Assessment and Risk Assessment Supplement

May 22, 2023
Maritime Technical Working Group - Working Meeting

Task Goals & Purpose

Task Goal

- Quantify anticipated OSW-related vessel traffic

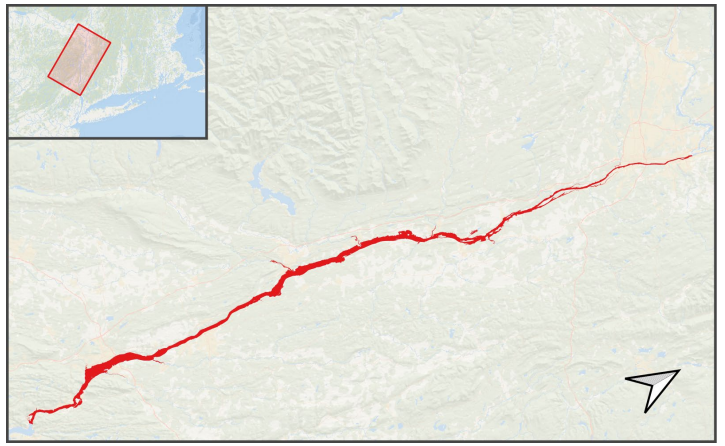
Purpose

- Compare OSW vessel traffic to baseline traffic levels in order to estimate impacts to existing vessel traffic

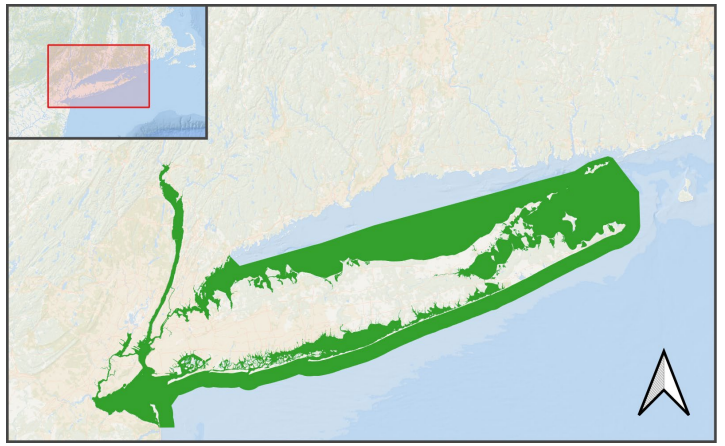
Underlying Assumptions and Analysis Boundaries

- OSW Activities:
  - Transportation of Tier 1 components from Manufacturing/Fabrication to Marshalling Yard
  - Transportation from Marshalling Yard to Offshore Site
  - Operations & Maintenance Vessels

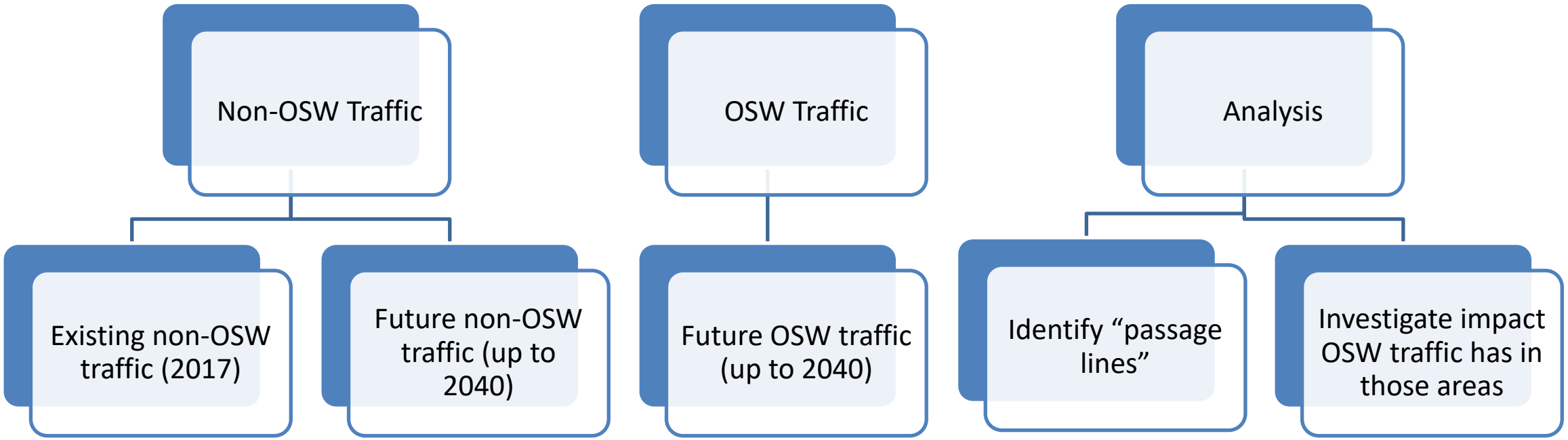
  *Pre-construction surveys and transport of raw materials to manufacturing sites not included
- Full U.S. East Coast OSW Market demand
- Vessel traffic in New York State
- Port / Vessel activity proportional to NYS percentage of East Coast offtake



- New York State Waters, inside of 3 nautical mile boundary from the shoreline



General Analysis Procedure



Generation of OSW operations and vessel traffic

Key Inputs Assessment

- Define key OSW port facility characteristics
- Identify key inputs for NYS currently active OSW ports

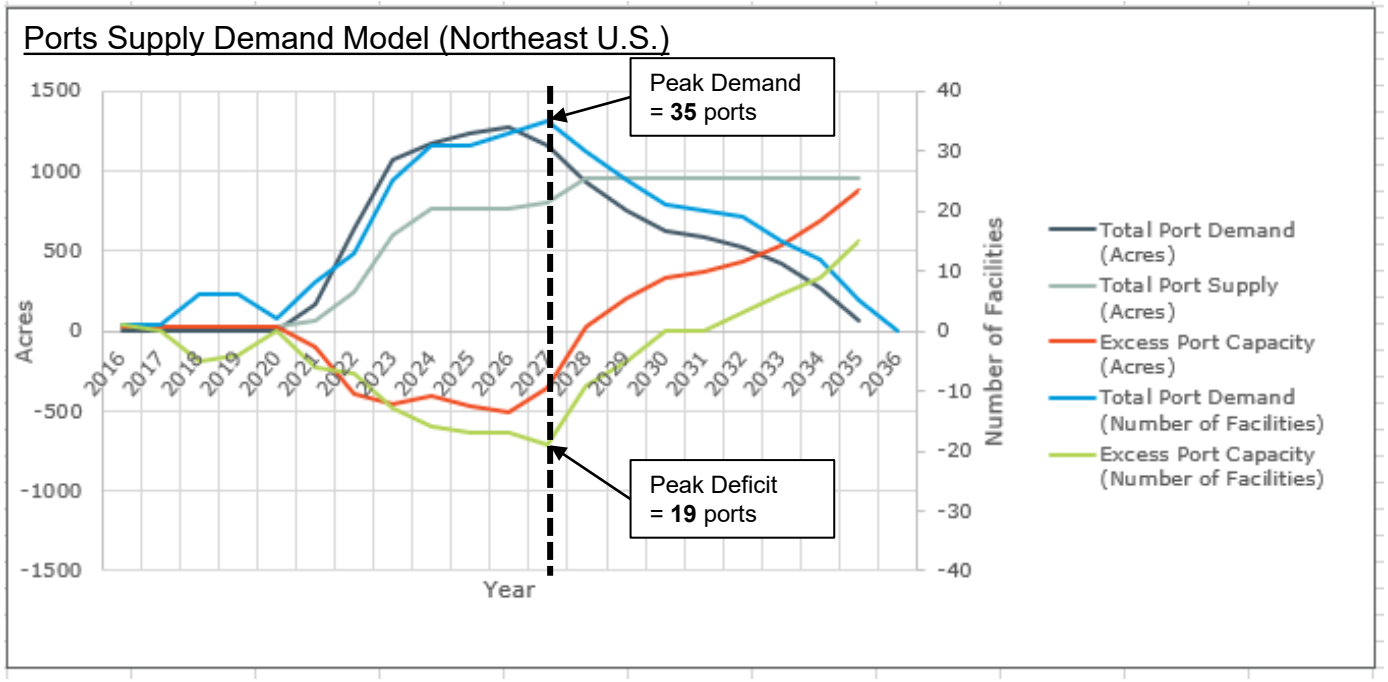
Ports Supply Demand Model

- Update existing model (previous version April 2020) to incorporate new data

Project Design Envelope

- Number of facilities
- Function and location of facilities
- Proposed envelope scenario for fully-developed supply chain in NYS

Ports Supply Demand Model – Updated Results



- Update to original Model (April 2020) to incorporate new public OSW industry data
- Estimates needs and deficit/surplus capacity of U.S. port facilities to support capital construction (CC)
- Results limited to end year 2035
- Demand peak based on state commitments through 2035

RESULTS INTERPRETATION FOR NEW YORK STATE

U.S. East Coast Procurement	NYS Procurement	NYS % Procurement	U.S. East Coast Peak Demand (each)	NYS # Facilities
41 GW	9 GW	22%	35	8

(8) TOTAL – **(3)** KNOWN = **(5)** ADDITIONAL PROPOSED

Proposed PDE

- Input (start & end points) to Vessel Traffic Model.
- Provides a scenario of a fully-developed OSW supply chain within NYS.
- Study does ***NOT*** endorse any specific port location for development.

	Port Location	Supply Chain Activity	NYS Region
KNWON [a]	South Brooklyn Marine Terminal	Staging › WTG & Foundation O&M	NYC Harbor
	Port of Albany	Manufacturing › Towers	Capital Region
	Port of Coeymans	Fabrication › Foundations	Capital Region
	Port Jefferson	O&M	North Shore LI
	Port of Montauk	O&M	North Shore LI
REPRESENTATIVE PROPOSED FOR PDE	Arthur Kill Terminal	Staging › WTG	NYC Harbor (Staten Island)
	Port Ivory	Fabrication › OSS	NYC Harbor (Staten Island)
	Homeport Pier[b]	O&M	NYC Harbor (Staten Island)
	Brooklyn Navy Yard	O&M	NYC Harbor (Brooklyn)
	Brooklyn Port Authority Marine Terminal (PAMT) [c]	O&M	NYC Harbor (Brooklyn)
	NYS Wind Port (East Greenbush)	Manufacturing › Blades	Capital Region
	Cortland	Manufacturing › Nacelles	Upper Hudson Valley
	Tomkins Cove	Manufacturing › Cables	Upper Hudson Valley

[a]Considered to be New York State's currently active OSW related ports.

[b]Identified by NYCEDC's RFEI issued for Offshore Wind companies, service providers, manufacturers, and developers.

[c]Identified by PANYNJ's Port Master Plan 2050 as a suitable port facility to support offshore wind needs.

Vessel Trip Quantity- Capital Construction

RESULTS : # Round Trips per Year per Vessel per Route

Sum of # Trips	Yea																
Projects then Routes	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	Grand Total
South Fork	10	22	16	4													52
Sunrise Wind		47	106	76	17												246
Empire Wind		29	66	48	11												154
Empire Wind 2					44	100	72	16									232
Beacon Wind						35	81	59	13								188
Project 2029							35	84	63	14							196
Project 2031									35	84	63	14					196
Project 2033											35	84	63	14			196
Project 2035													33	78	58	13	182
Grand Total	10	98	188	128	72	135	188	159	111	98	98	98	96	92	58	13	1642

Model Basis:

Variables

- Port Locations
- Port Activities
- Projects
- Components
- Construction Schedule
- WTG Capacity (MW)

Relationships

- WTG Capacity to Time
- Component to Activity
- Activity to Time
- Component to Vessel
- Component to Route

Notes:

- Vessel trip = transit of a vessel between (2) ports, or between a port and OWF.
- Peaks in trip grand total coincide with simultaneous construction of multiple projects.

Vessel Trip Quantity – O&M

RESULTS : # O&M Round Trips per Year

Sum of Round Trips			Year															
Project	**Route (Assumed)**	**Vessel**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**	**2034**	**2035**	**Grand Total**
South Fork	Port Montauk - South Fork	CTV	0	0	0	50	50	50	50	50	50	50	50	50	50	50	50	50	**650**
Empire Wind	SBMT - Empire Wind	SOV	0	0	0	0	20	20	20	20	20	20	20	20	20	20	20	20	**240**
Sunrise Wind	Port Jefferson - Sunrise Wind	SOV	0	0	0	0	33	33	33	33	33	33	33	33	33	33	33	33	**396**
Empire Wind 2	SBMT - Empire Wind 2	SOV	0	0	0	0	0	0	0	31	31	31	31	31	31	31	31	31	**279**
Beacon Wind	SBMT - Beacon Wind	SOV	0	0	0	0	0	0	0	0	24	24	24	24	24	24	24	24	**192**
Project 2029	Brooklyn PAMT - Project 2029	SOV	0	0	0	0	0	0	0	0	0	25	25	25	25	25	25	25	**175**
Project 2031	Brooklyn PAMT - Project 2031	SOV	0	0	0	0	0	0	0	0	0	0	0	25	25	25	25	25	**125**
Project 2033	Homeport Pier - Project 2033	SOV	0	0	0	0	0	0	0	0	0	0	0	0	0	25	25	25	**75**
Project 2035	Brooklyn Navy Yard - Project 2035	SOV	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	25	**25**
	Grand Total		**0**	**0**	**0**	**50**	**103**	**103**	**103**	**134**	**158**	**183**	**183**	**208**	**208**	**233**	**233**	**258**	**2157**

Steady increase predicted as projects come online and remain online through 2035.

Model Basis:

Variables

- Vessel Type (SOV vs. CTV)
- SOV Serviceability
- CTV Serviceability
- (#) Turbines Installed

Relationships

- Project to Vessel Type
- Project to # SOV Trips
- Project to # CTV Trips
- Port to Project (Route)

Notes

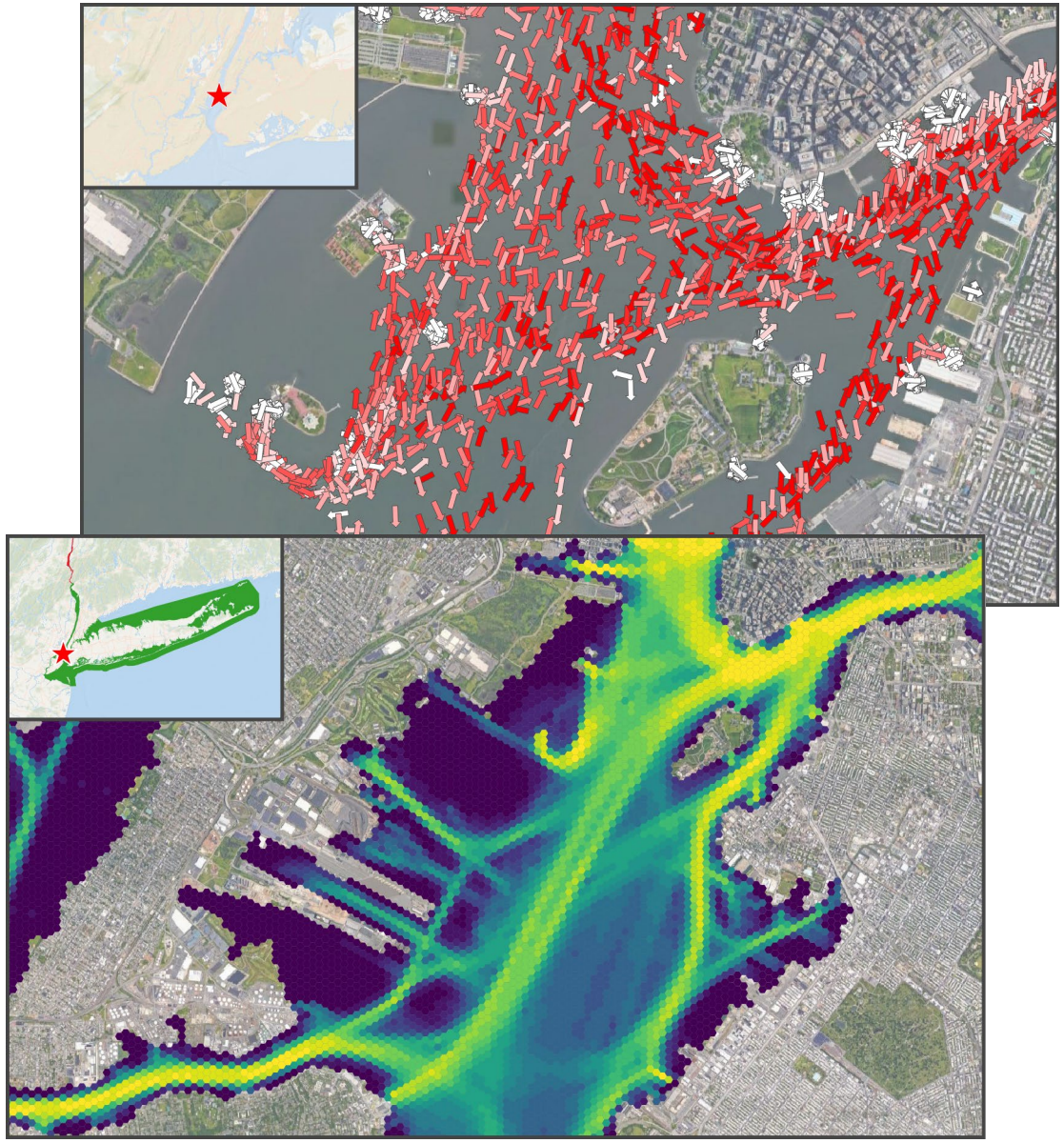
- Results capture likely scenario. O&M strategy is project-specific and O&M requirements vary unpredictably across turbine/foundation design and manufacturer.
- SOV-based strategy was assumed for PDE Ports except Port Montauk, which assumes a CTV strategy based on sailing distance and port site plans available at the time of the study.

Vessel Traffic Model and Platform

Risk Assessment

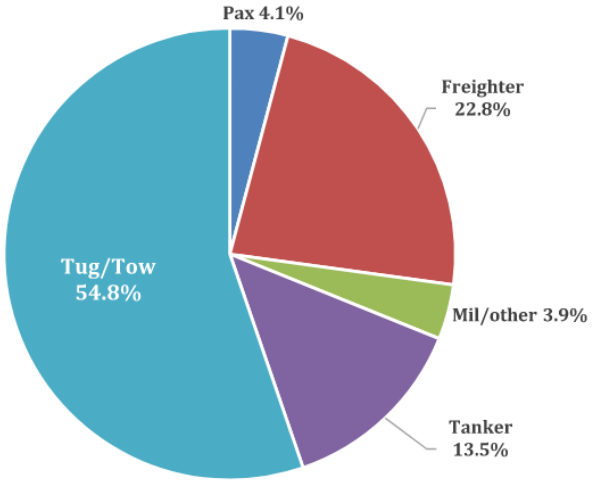
Existing Vessel Traffic

1. Download and process AIS data for 2017 from MarineCadastre.gov
2. Filter data and store in database
3. Identify individual vessel tracks
4. Build model grid and create traffic density map



Future Non-OSW Vessel Traffic

- Future non-OSW vessel traffic developed by SUNY Maritime using USCG Vessel Traffic Service (VTS) data
- Compound average growth rate (CAGR) determined to be 0.8% across all vessel types based on limited hindcast data
- Model is ready to accommodate category-specific growth rates



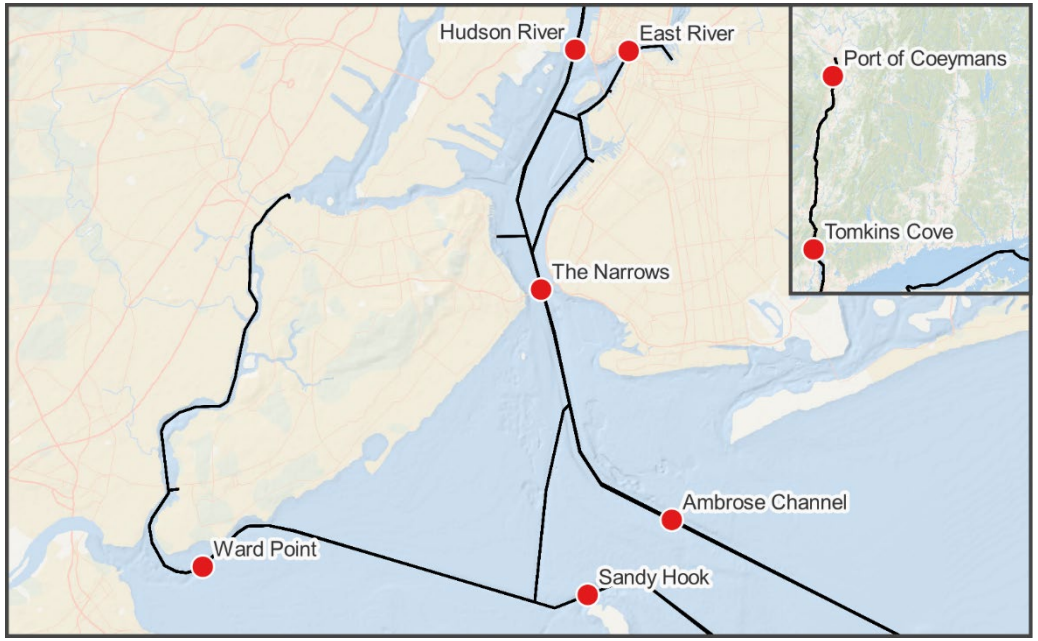
New York Harbor Vessel Traffic Service (VTS) data distribution for 2019

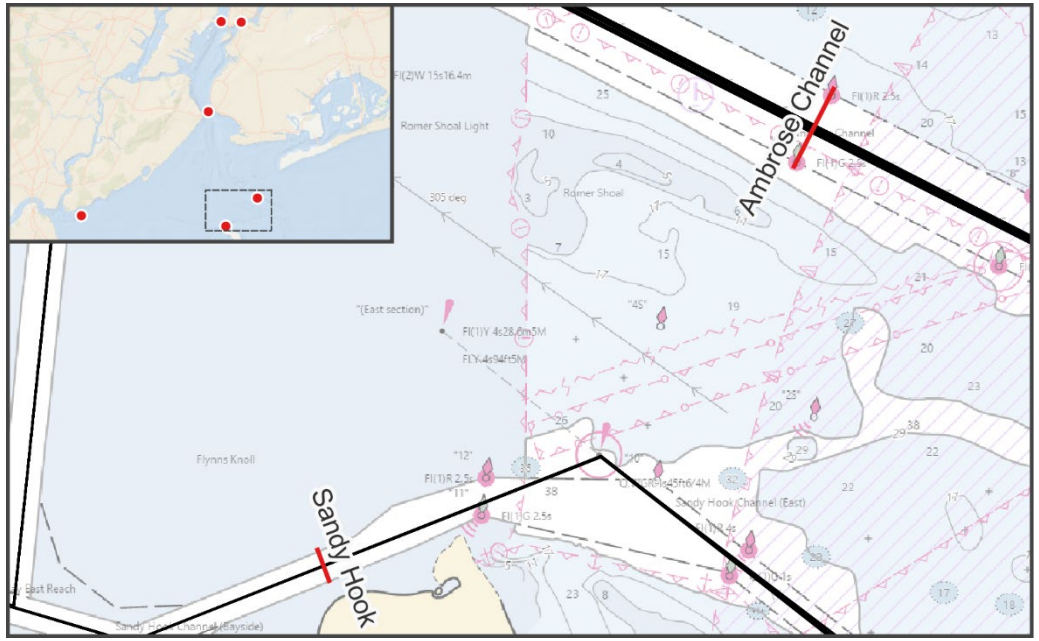
Table 8. Monthly VTS net activity

	2017	2018	2019	2020	2021	Avg. (2017 to 2019)
January	5218	5533	5138	5166	4488	5,296
February	4775	5249	4970	4762	3802	4,998
March	5011	4945	4896	4975	5030	4,951
April	5215	5210	5282	3857	4620	5,236
May	5306	5642	5310	4088	4720	5,419
June	5218	5311	5243	4401	4619	5,257
July	5314	5617	5528	4508	4830	5,486
August	5338	5911	5701	4902	5382	5,650
September	5374	5824	5599	4465		5,599
October	5464	6085	5594	4874		5,714
November	5803	5374	5420	4596		5,532
December	5227	5493	5458	4719		5,393
Avg.	**5,271.9**	**5,516.2**	**5,344.9**	4,609.4	4,686	**5,377.7**
STDV	235	310	243	359	426	**231**
STDV/Avg.	4.5%	5.6%	4.5%	7.8%	9.1%	4.3%
% Change		**4.6%**	**-3.1%**			**0.80%**

Passage Line Analysis

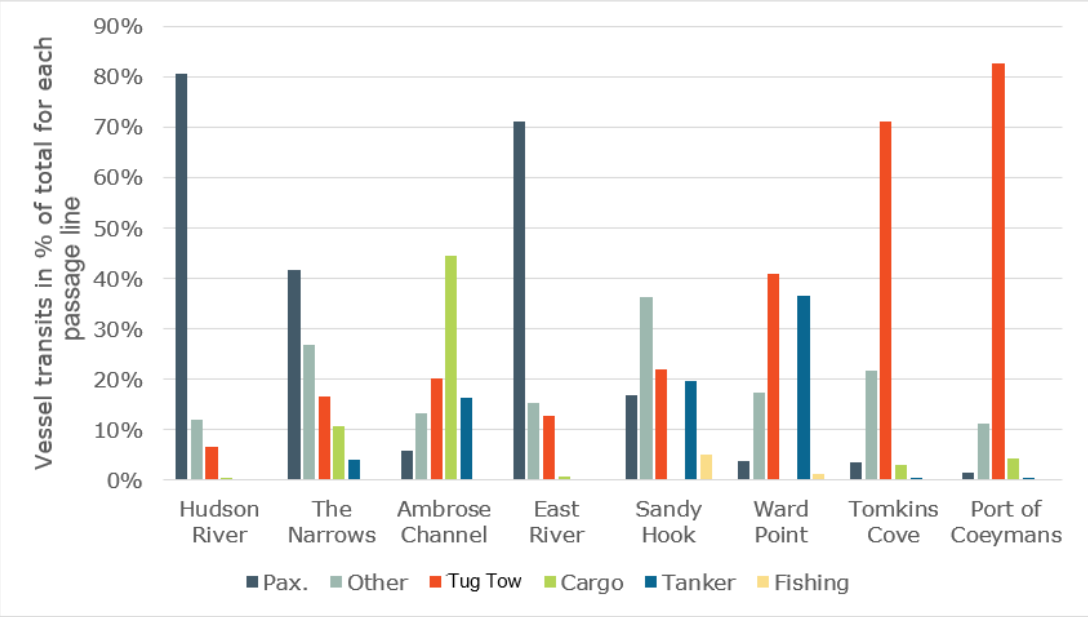
- Determination of passage line location based on a qualitative approach
  - Traffic patterns and density (2017)
  - Topography
  - Interests for the purpose of the study



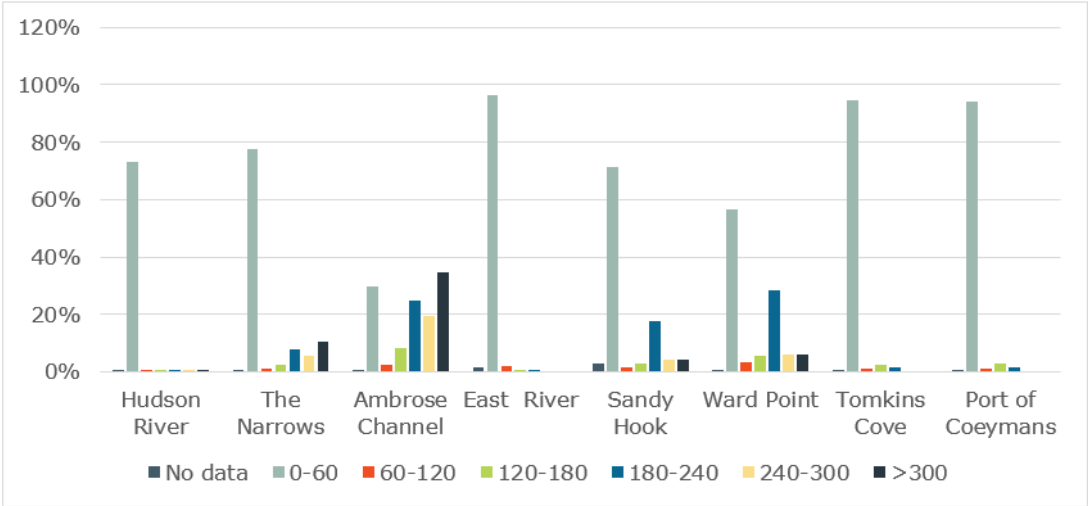


Vessel Types and Sizes

Relative distribution of vessel type across passage lines (based on AIS data)



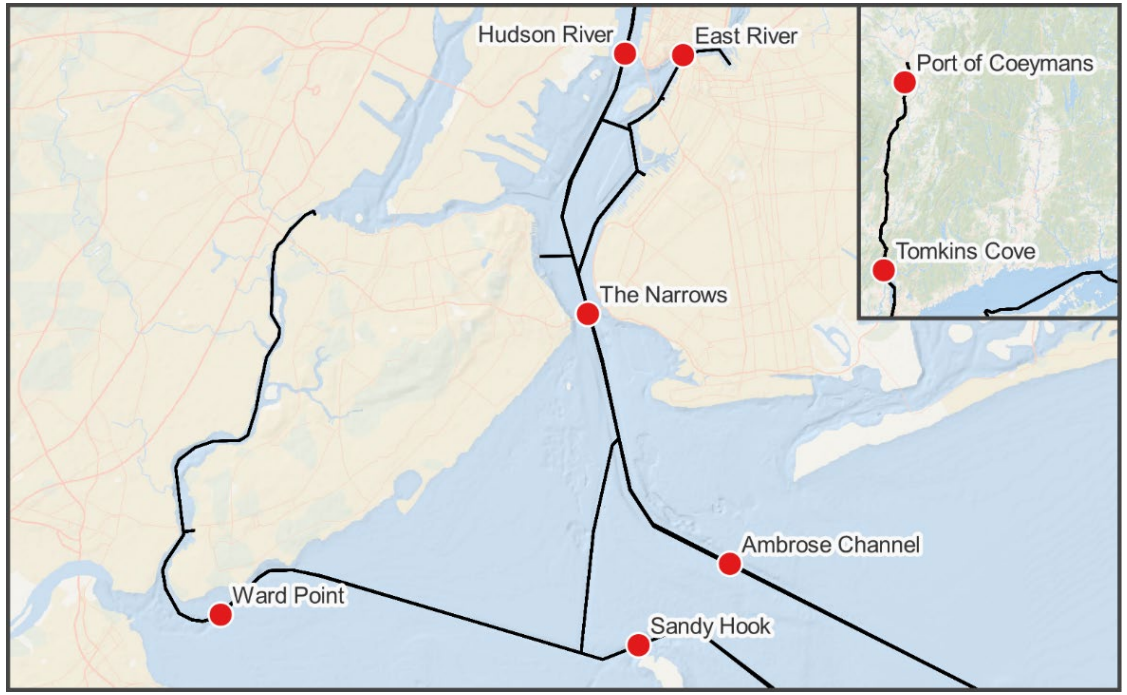
Relative distribution of vessel size across passage lines (based on AIS data)



(m, LOA)

OSW Vessel Traffic

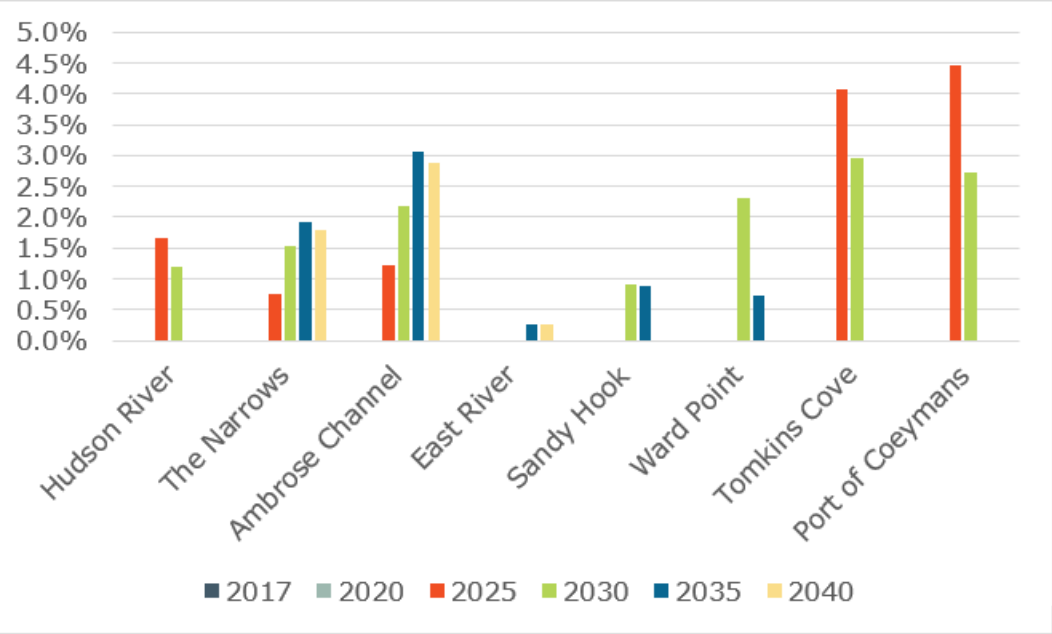
- OSW traffic based on analytical model
- Synthetic vessel tracks developed using known channel depths, OSW vessel characteristics (draft), and common navigation routes
- All voyages that comprise OSW vessel traffic were informed by the component flow model discussed earlier



Relative Increase due to OSW Traffic

Year	Hudson River	The Narrows	Ambrose Channel	East River	Sandy Hook	Ward Point	Tomkins Cove	Port of Coeymans
2017	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
2020	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
2025	0.1%	0.2%	1.0%	0.0%	0.0%	0.0%	3.1%	3.9%
2030	0.1%	0.5%	1.9%	0.0%	0.4%	1.8%	2.2%	2.4%
2035	0.0%	0.6%	2.6%	0.0%	0.4%	0.6%	0.0%	0.0%
2040	0.0%	0.6%	2.5%	0.0%	0.0%	0.0%	0.0%	0.0%

Comparative assessment – large vessels



- Increase large vessels (>60m+ tugs)

Year	Hudson River	The Narrows	Ambrose Channel	East River	Sandy Hook	Ward Point	Tomkins Cove	Port of Coeymans
2017	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
2020	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
2025	1.7%	0.8%	1.2%	0.0%	0.0%	0.0%	4.1%	4.5%
2030	1.2%	1.5%	2.2%	0.0%	0.9%	2.3%	3.0%	2.7%
2035	0.0%	1.9%	3.1%	0.3%	0.9%	0.7%	0.0%	0.0%
2040	0.0%	1.8%	2.9%	0.3%	0.0%	0.0%	0.0%	0.0%

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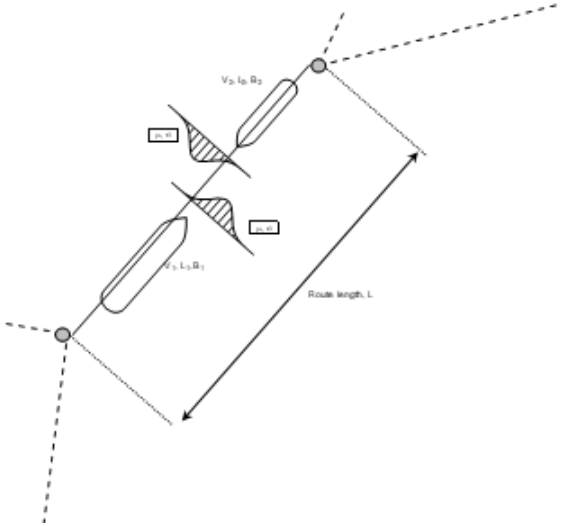
Risk identification and evaluation

- Impact on navigation safety resuting from changed traffic density in existing waterways
  - Allision with fixed object
  - Ship-ship collision
- Note: site and project specific NSRA neccesary.

- Evalution
  - Allision with fixed object: Increase of 1-5%
  - Ship-ship collision: Increase of 1-10%



Mitigation Measures

- Aids to navigation (ATON)
- Pilotage in high congestion areas
- VTS and AIS-based services
- Precautionary areas and areas to be avoided
- Anchorage restrictions
- Limited access areas
- Advanced notification systems
- Other routing measures

Summary of Findings

- COWI analyzed traffic at eight locations - comparative assessment from 2020 to 2040

- The increase in vessel traffic incurred by OSW projects at each location is small compared to the increase in non-OSW traffic anticipated over time
  - Increase of up to 3.9% compared to all traffic
  - Increase of up to 4.5% compared to large vessels (>60m LOA including tugs)

- OSW traffic is estimated to increase baseline navigational risks associated with traffic density, within study area by up to 1-10% for the two evaluated risks. Several mitigation measures to reduce risk are identified.

Questions?

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