

Boat Pump-Out Expert Panel Report



A Presentation to the CBP Water Quality Goal Implementation Team
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Prepared by
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Contract Support Provided by Tetra Tech



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EPA, Coast Guard, State and Local Authority

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CWA, MARPOL Annex IV and etc.

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State and local programs related to MSDs, NDZ's, and regulations related to boat waste management.

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for estimating pollutant loads associated with boat discharges.

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The main charge for the Panel :

To develop a report that evaluates, defines and configures the proposed Boat Pump-Out Facility BMP for nutrient reduction credit within the Chesapeake Bay Program's Phase 6.0 Watershed Model.

The Panel would evaluate the policy and regulatory implications of providing credit for the pump-out practice, and provide a recommended methodology for reporting and modeling the reductions.

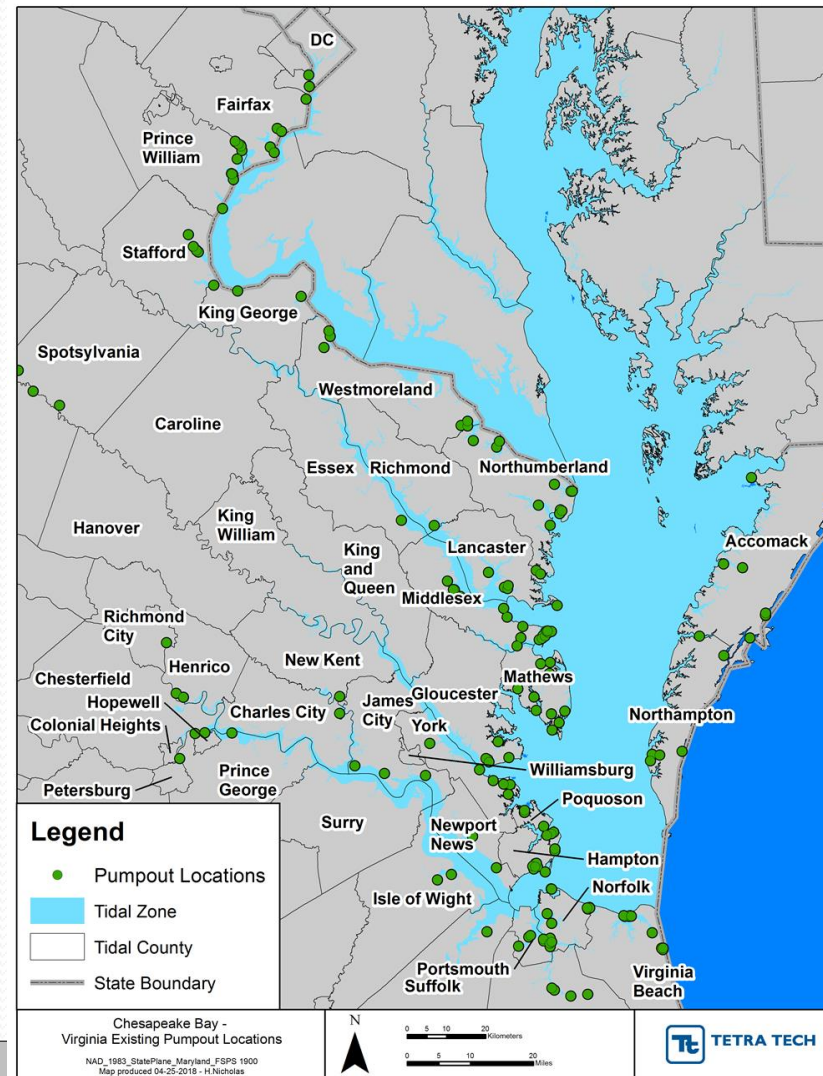
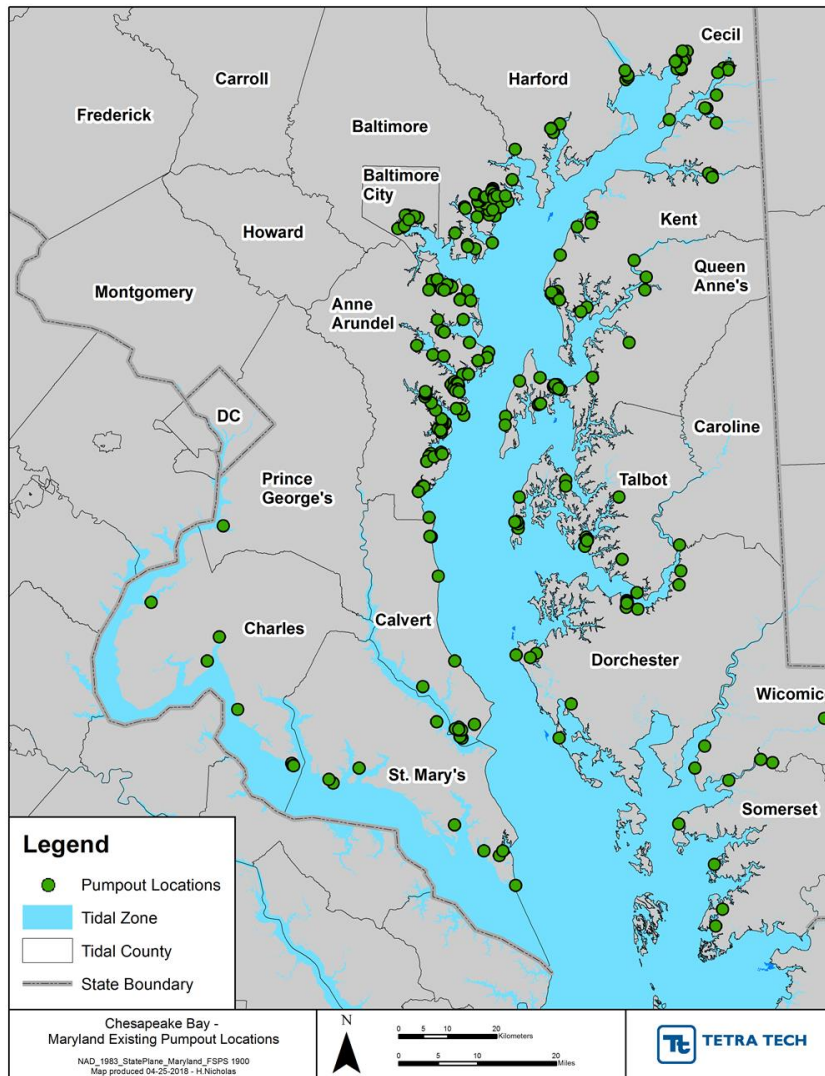


Marine Sanitation Devices (MSDs)

Type I	Treatment devices that commonly use maceration and disinfection for the treatment of sewage	May be installed only on vessels less than or equal to 65 feet in length	Must produce an effluent with: <ul style="list-style-type: none">• No visible floating solids• A fecal coliform bacterial count not greater than 1000 per 100 milliliters	No nutrient removal
Type II	Treatment devices that employ biological treatment and disinfection (some Type II MSDs may use maceration and disinfection)	May be installed on vessels of any length (more often on commercial vessels)	Must produce an effluent with: <ul style="list-style-type: none">• A fecal coliform bacterial count not greater than 200 per 100 milliliters• No more than 150 milligrams of total suspended solids per liter	Some nutrient removal
Type III	Typically a holding tank where sewage is stored until it can be disposed of shore-side or at sea (beyond three miles from shore)	May be installed on vessels of any length	No performance standard; must "be designed to prevent the overboard discharge of treated or untreated sewage or any waste derived from sewage." 33 CFR 159.53(c)).	100% nutrient removal if pumped out



Boat Pump-Out Locations



Baseline Load Estimation

- Estimate is a function of 6 key factors:
 1. Number of boats operating in the Chesapeake Bay with the ability to use pump-out facilities
 2. Annual use days per vessel
 3. Duration of trip per use day
 4. Number of persons aboard per trip
 5. Nutrient output per person per day
 6. Pump-out utilization by recreational boaters
- Model record spans 1985-2015
 - Influenced by changes in regulations and practices
- Seasonal influence

Buchart-Horn, Inc. & Versar, Inc. (1992). *A Survey of the Quantity, Characteristics, and Potential Impacts of Boat Pumpout Waste Generated within the Chesapeake Bay Region of Maryland*. A Marina Sewage Treatment Survey Project Conducted for the State of Maryland Department of the Environment.



Number of Boats - Maryland

Boat Category	Range (years)	Count (years)
Type	1975 – 2015	41
Length	2003 – 2015	13
County of Registration	2011 – 2015	5

- Maryland boat registration data provided by Maryland Department of Natural Resources.
- The data were separated by county of registration as well as by length and type of boat registered.
- Missing data extrapolated to cover 1985-2015 time period.

County/City	Percentage of Total Registered Vessels
Anne Arundel	21.02%
Baltimore County	12.11%
Baltimore City	2.13%
Calvert	4.43%
Caroline	1.33%
Carroll	2.88%
Cecil	3.56%
Charles	3.32%
Dorchester	1.85%
Harford	5.42%
Howard	2.73%
Kent	1.74%
Montgomery	6.04%
Prince George's	3.57%
Queen Anne's	3.88%
Somerset	1.12%
St. Mary's	5.32%
Talbot	3.25%
Wicomico	2.17%
Worcester	3.01%
<u>Total</u>	<u>90.9%</u>



Boat Usage - Maryland

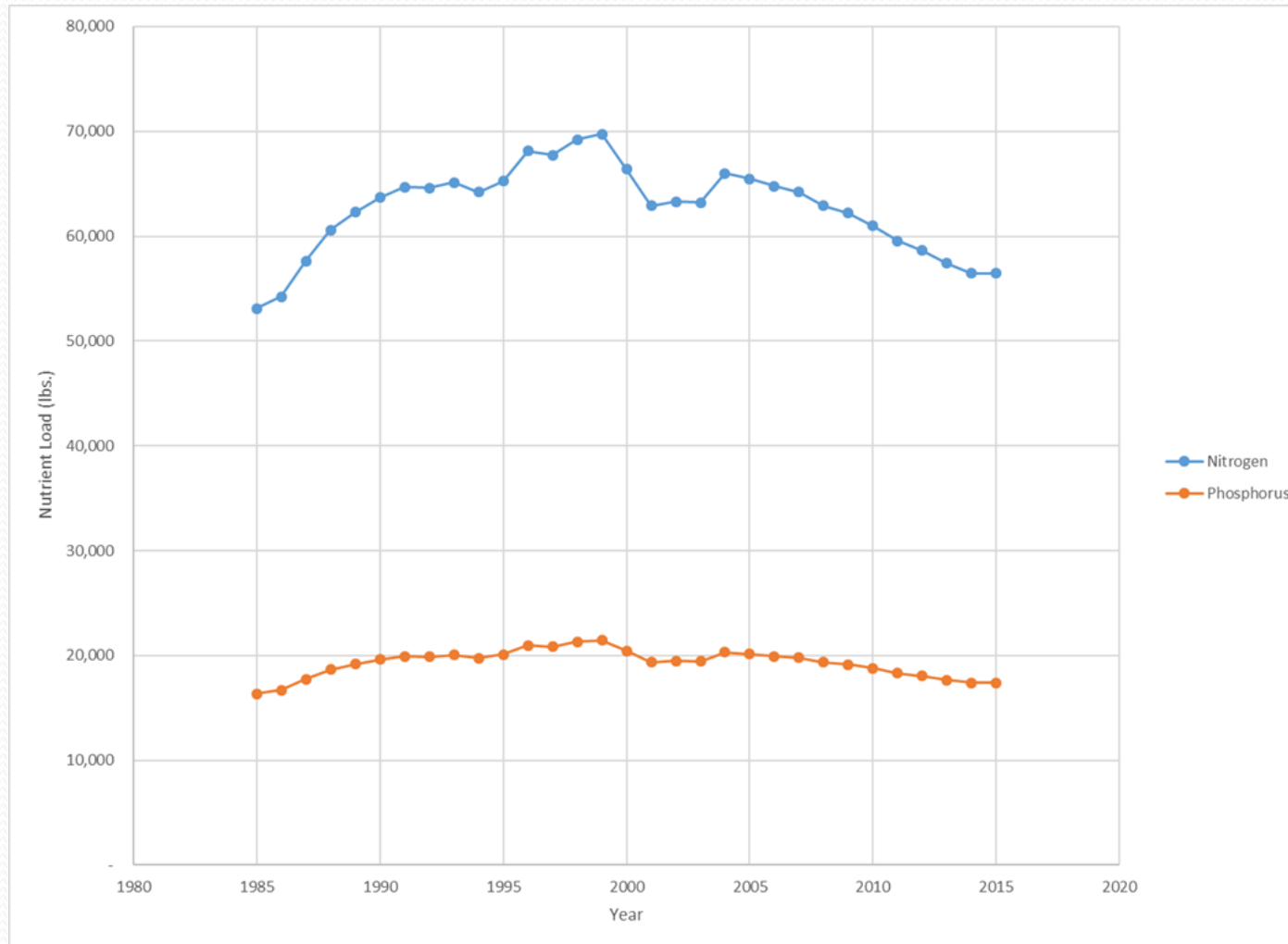
- United States Coast Guard (USCG). (2012). National Recreational Boating Survey.

Boat Type	Boating Days/Year	Hours/Day	Persons Onboard
Powerboat	14.1	6.1	2.6
Sailboat	12.8	8.0	2.4

Source	Type of Waste	Total Nitrogen		Total Phosphorus	
		Min. N (g/p/d)	Max. N(g/p/d)	Min. P (g/p/d)	Max P (g/p/d)
Kirschmann et al. (1995)	Liquid	6.85	11.78	1.92	2.74
	Solid	1.37	1.92	0.82	1.37
	Total	8.22	13.7	2.74	4.11
Hänninen, S., & Sassi, J. (2009)	Total	12	15	3	5
Assumed for Baseline Estimate	Total	13		4	



Baseline Estimates - Maryland

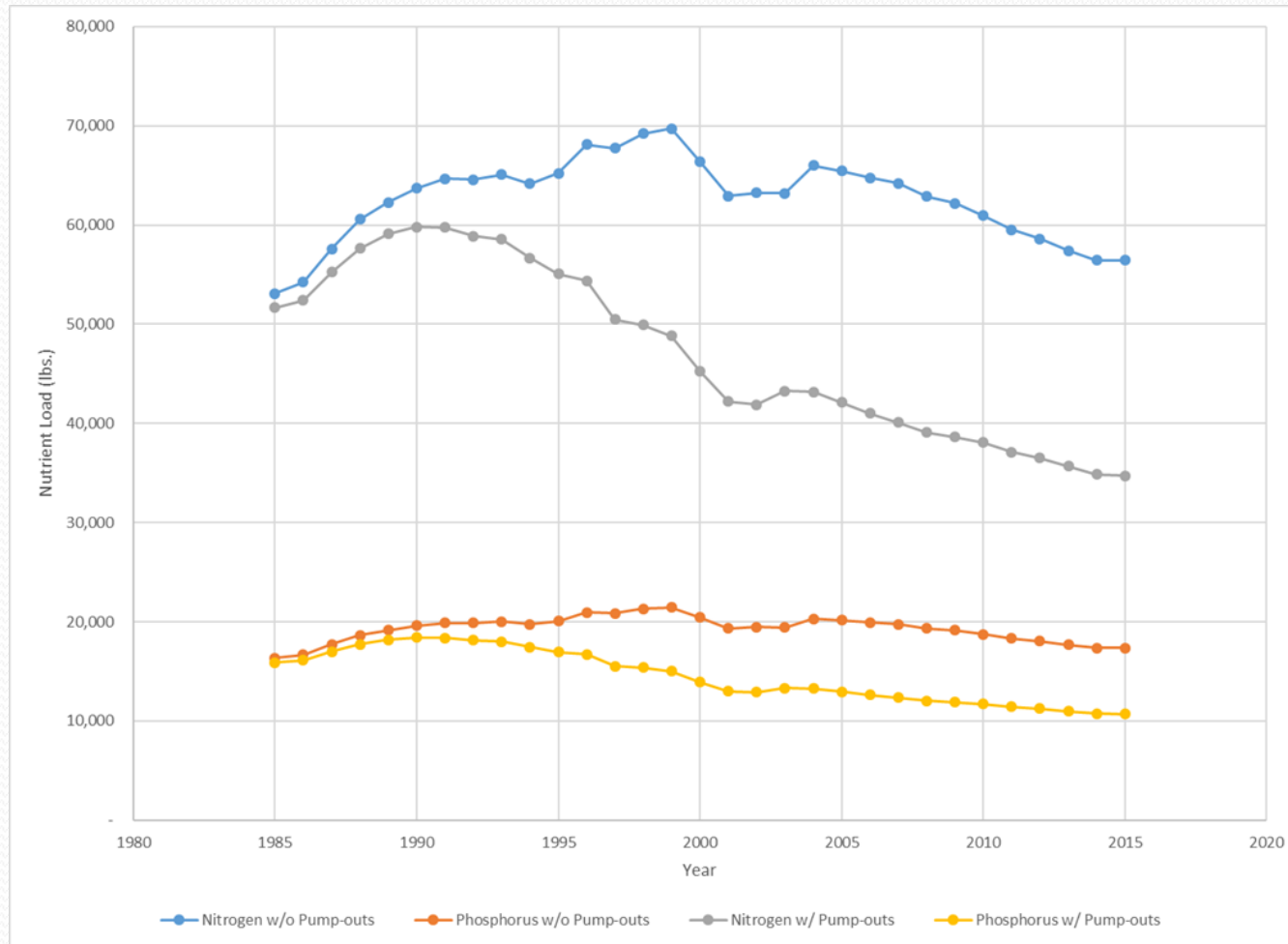


(Reid, S. et al., 2005)

Month	% of Total Annual Boat Usage
January	3.0%
February	3.0%
March	8.5%
April	8.5%
May	8.5%
June	14.5%
July	14.5%
August	14.5%
September	7.5%
October	7.5%
November	7.5%
December	2.5%



Effect of Pump-Outs - Maryland



30.8% of boats 16'-21' and 88% of boats >22' have ability to use pump-out facilities (Buchart-Horn, Inc. and Versar, Inc., 1992; and MD DNR, 2000a).

Pump-out utilization estimated by creating a timeline of the total number of pump-out facilities in the state and the date they were installed, assuming that each had an equal effect on increasing utilization up to 95% (MD DNR, 2000; and O'Neill, D. and Morrow, D., 2014).



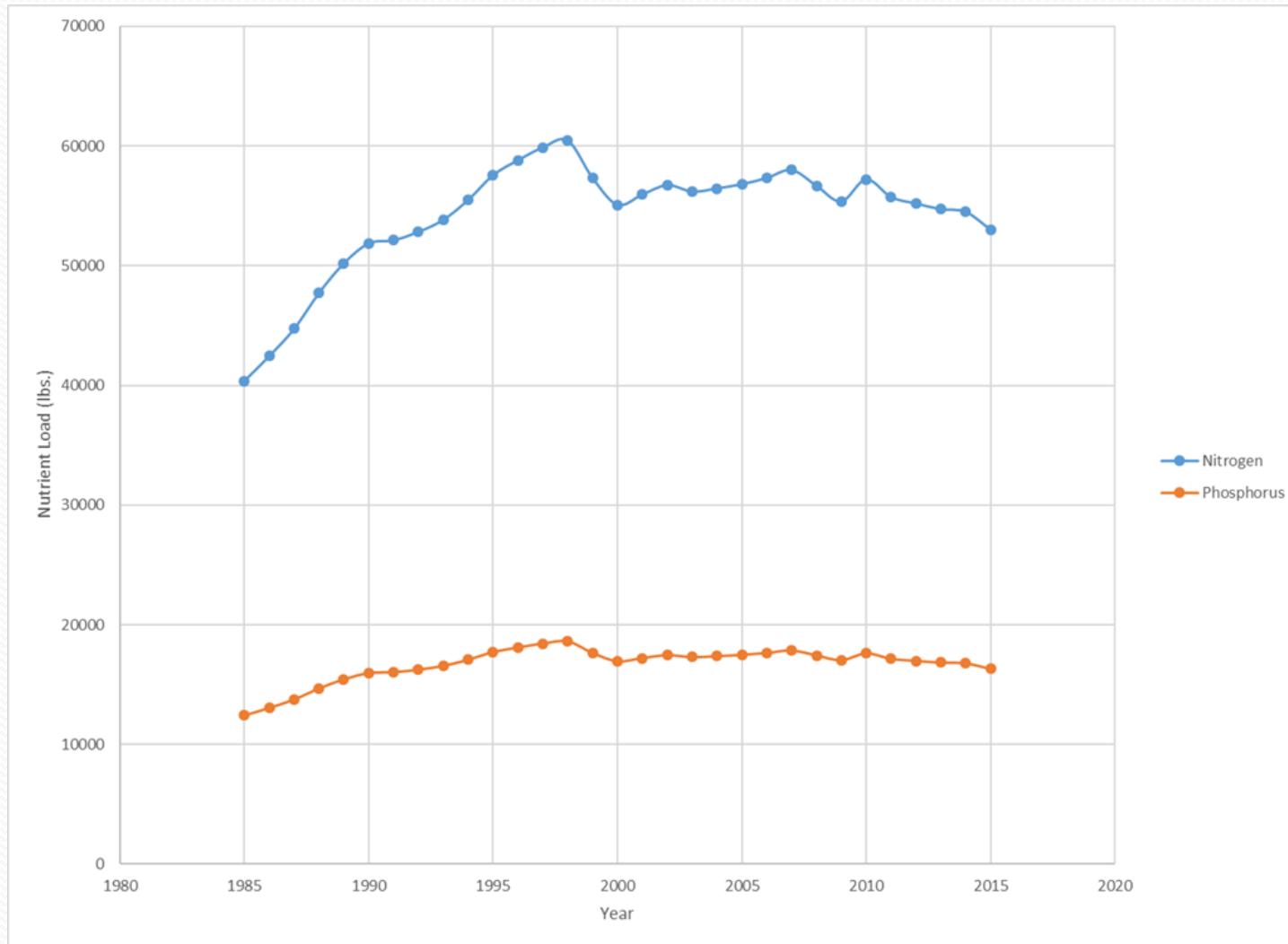
Number of Boats - Virginia

- Virginia boat registration data provided by Virginia Department of Game and Inland Fisheries (DGIF).
- The data were separated by county of registration as well as by length and type of boat registered.
- Missing data extrapolated to cover 1985-2015 time period.
- Maryland trends used where data were limited.
- 66.5 percent of vessels registered in counties within 50 miles of Bay.

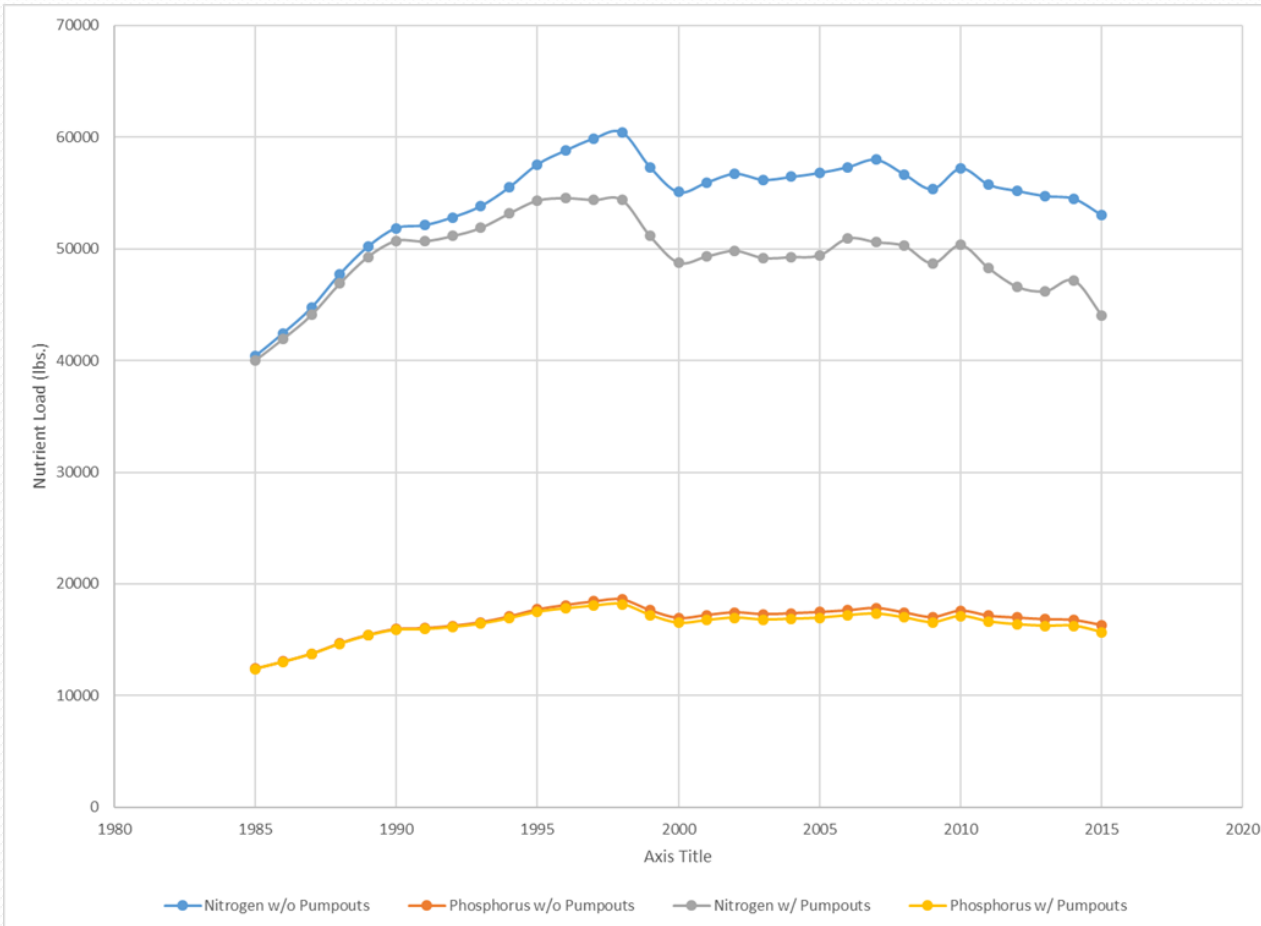
Boat Category	Range (years)	Count (years)
Type	2015	1
Length	2015	1
County of Registration	1997 – 2015	19
Total Registrations	1960 – 2015	56



Baseline Estimates - Virginia



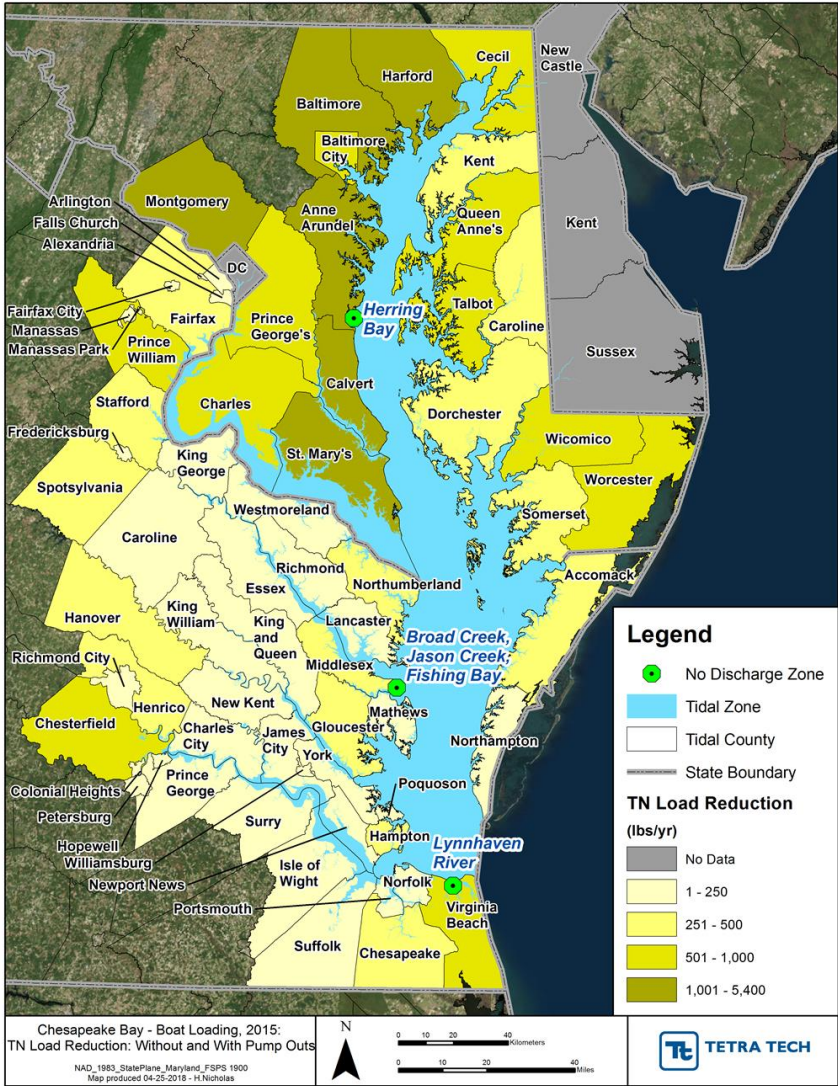
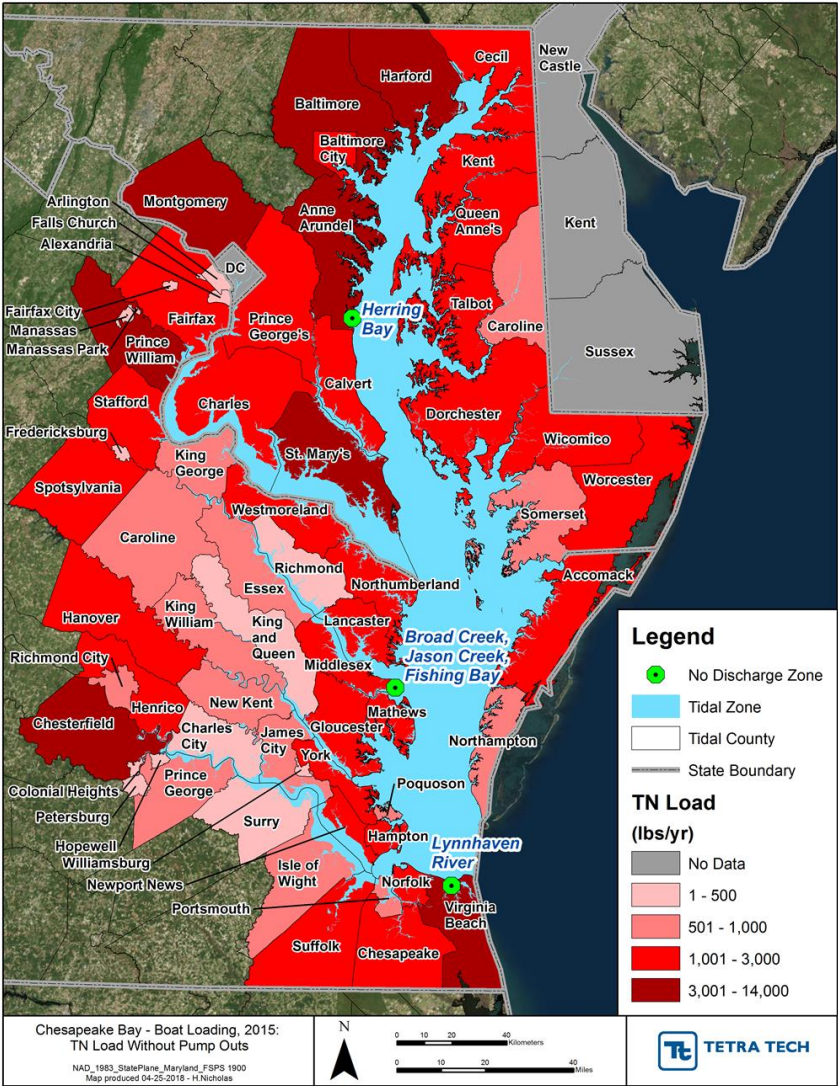
Effect of Pump-Outs – Virginia



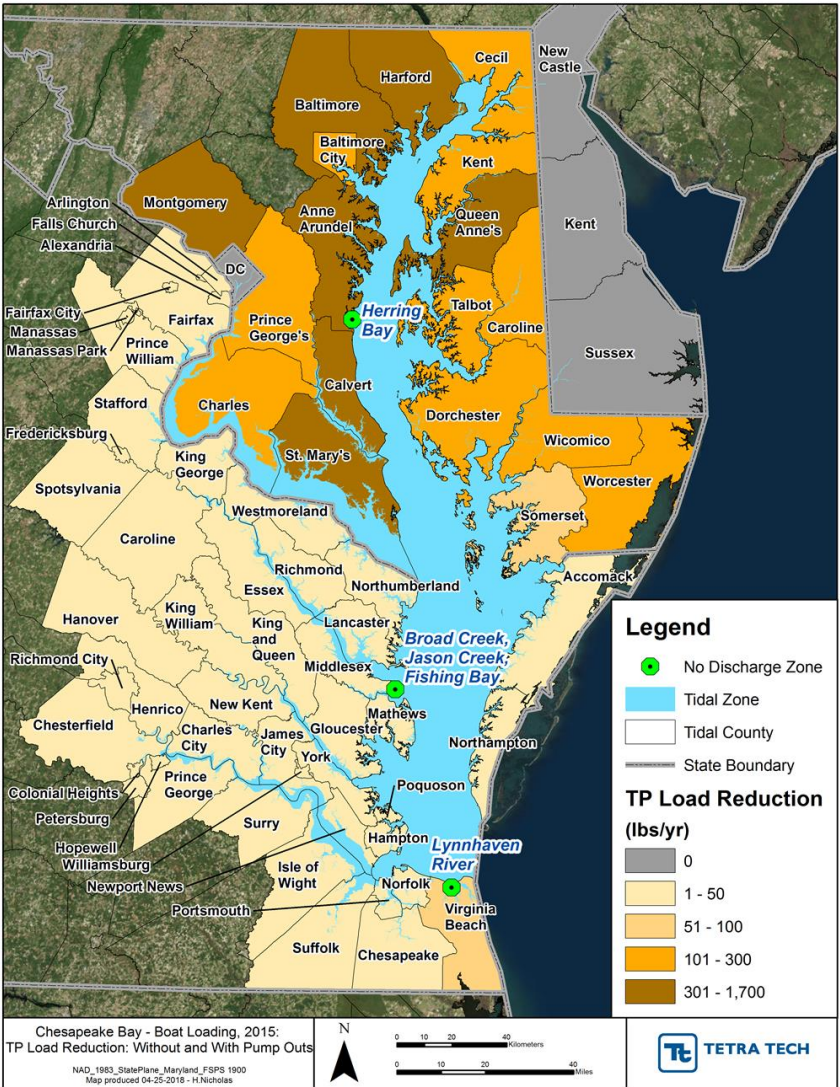
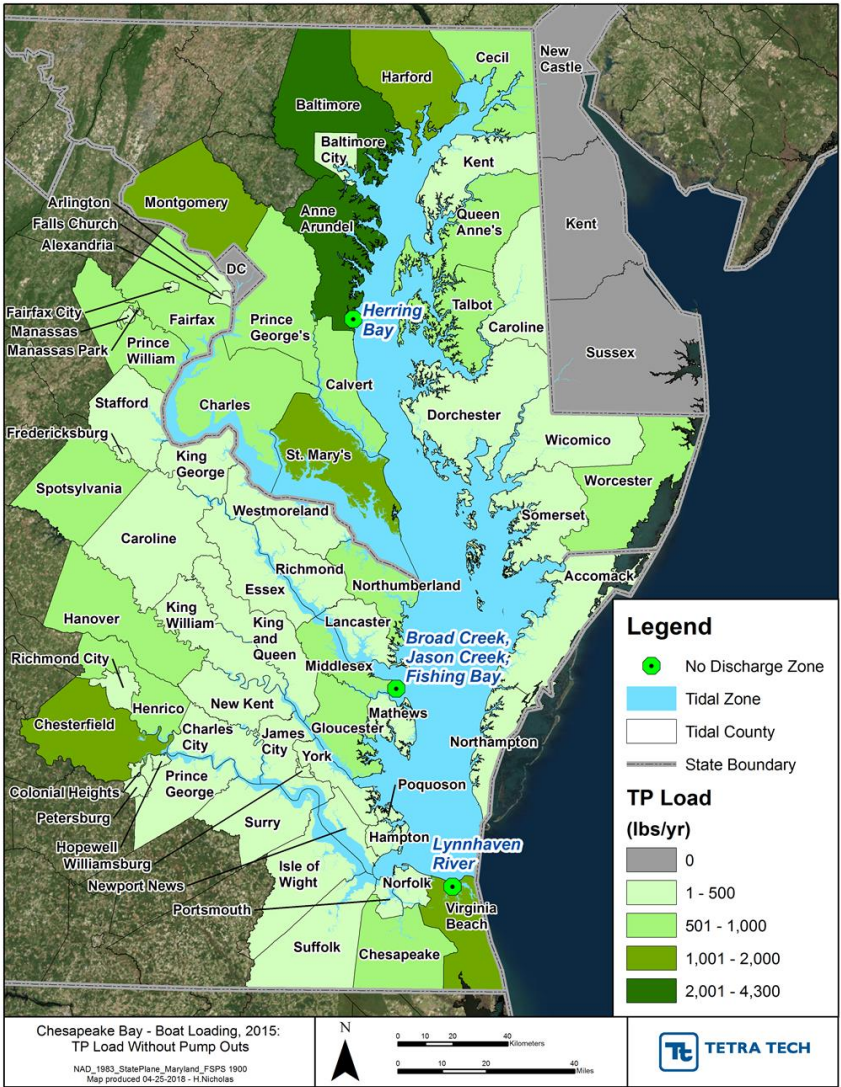
- Sewage and associated nutrient removal by boat pump-outs was estimated using methods similar to those used by the City of Virginia Beach in a memorandum delivered to the Virginia Department of Conservation & Recreation.
- 58 percent of boats 26'-40' and all boats greater than 40' have the ability to use pump-out facilities.
- Pump-out utilization was estimated using Maryland data.
- Annual pump-out volumes were assessed on the basis of 21 peak weekends per year from early May to late September and a peak occupancy rate of 40% for weekends during the peak boating season.
- The volume of wastewater removed per pump-out is based on data and records kept by the Hampton Roads Sanitation District (HRSD).
- The nutrient content of boat wastewater was based on the Lynnhaven River Boat Wastewater Sampling Program report prepared for the City of Virginia Beach (KCI Lewis White & Associates, 2008).



TN Loads – Spatial Differentiation



TP Loads – Spatial Differentiation



Recommendations

- Include VA and MD estimated marine discharge loads in the Phase 7 Main Bay Model (MBM) and Multiple Tributary Models (MTMs) and boat pump-outs as a credited CBP BMP:
 - Direct TN & TP discharger into Bay tidal waters by county and month.
 - Provides credit for no discharge zones and boat pump-out stations.
 - Uses well documented and referenced methods.
 - Provides “completeness” in nutrient load estimates to the Bay.
 - Puts estimated nutrient loads at the correct place and time.

