

# **Implementation of the Watershed Implementation Plan to Comply with the Total Phosphorus TMDL for Harveys Lake, Luzerne County, PA**

**Beyond Nutrients: Case Studies and Tools for Addressing TMDL:  
Hosted by the CWEA Stormwater Committee  
8<sup>th</sup> June 2016**

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**Princeton Hydro, LLC**

203 Exton Commons

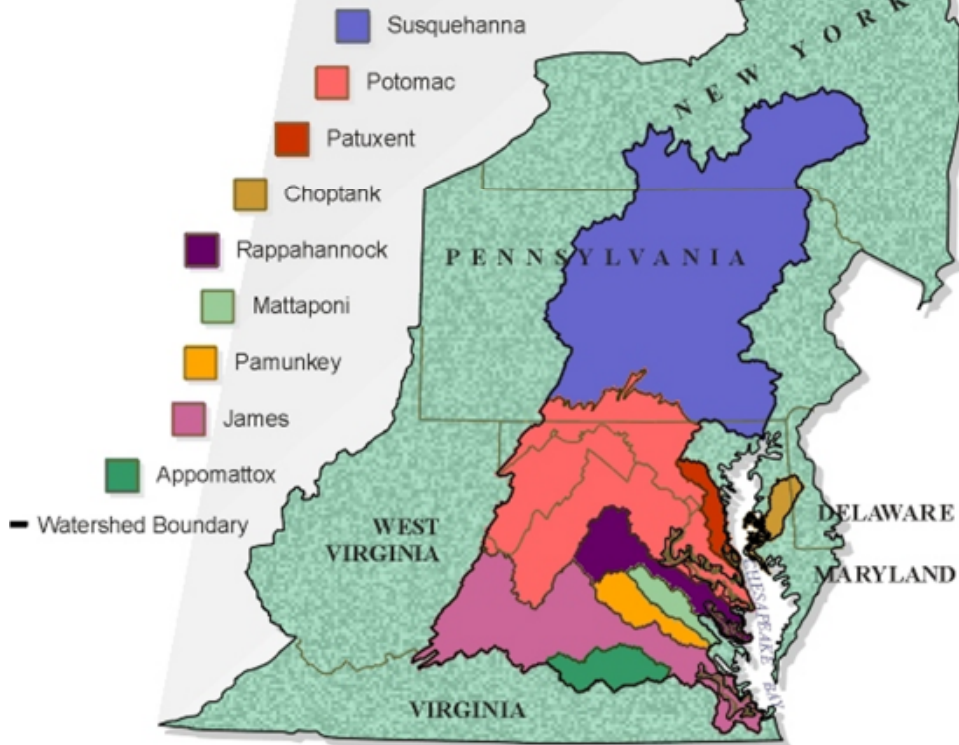
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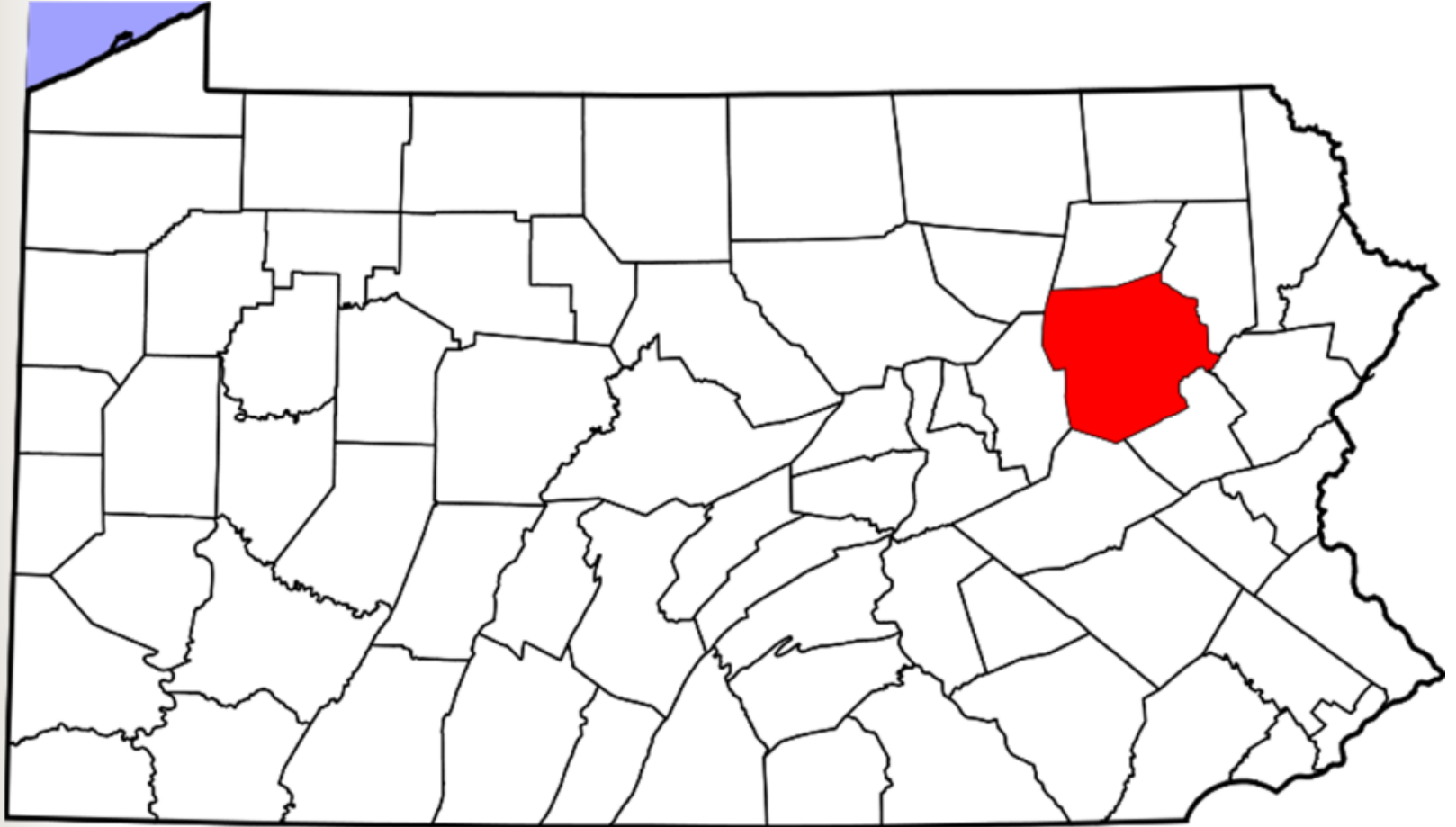
[flubnow@princetonhydro.com](mailto:flubnow@princetonhydro.com)

### Location in the United States

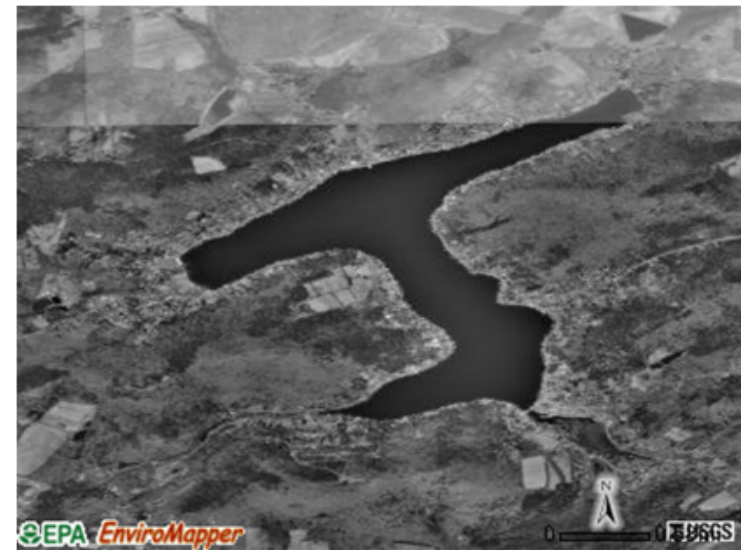


### River Basins





# Harveys Lake, Luzerne County, PA







# Harveys Lake

- Largest natural lake, by volume, entirely within the Commonwealth of PA
- Outflow of Harveys Lake forms Harveys Creek, which eventually discharges into the Susquehanna River at West Naticoke, PA
- Lake and Creek classified as cold water fishery (CWF)
- Lake and upper part of Creek is classified as CWF and high quality.

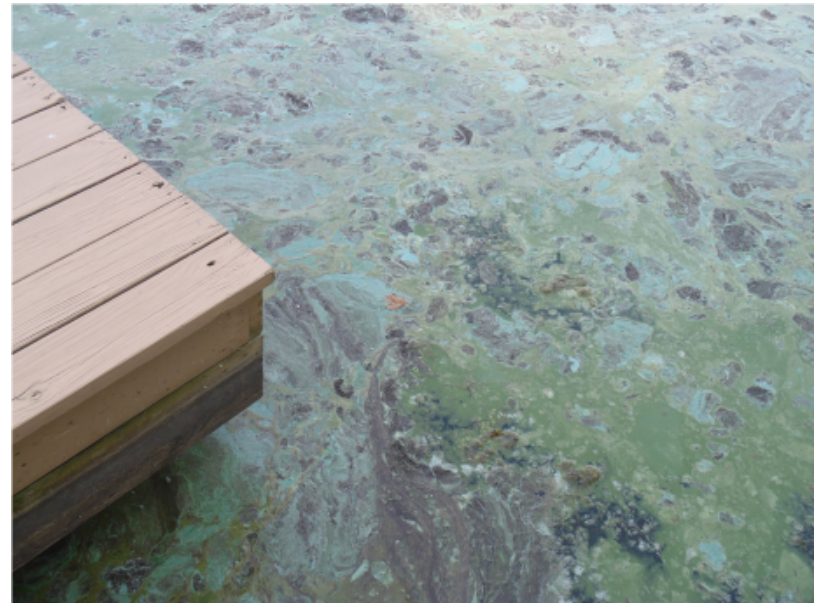
# Harveys Lake

- Surface area: 621.5 acres
- Watershed area: 3,627 acres
- Mean depth: 36 ft
- Maximum depth: 96 ft
- Recognized as being limited in total phosphorus relative to algal growth

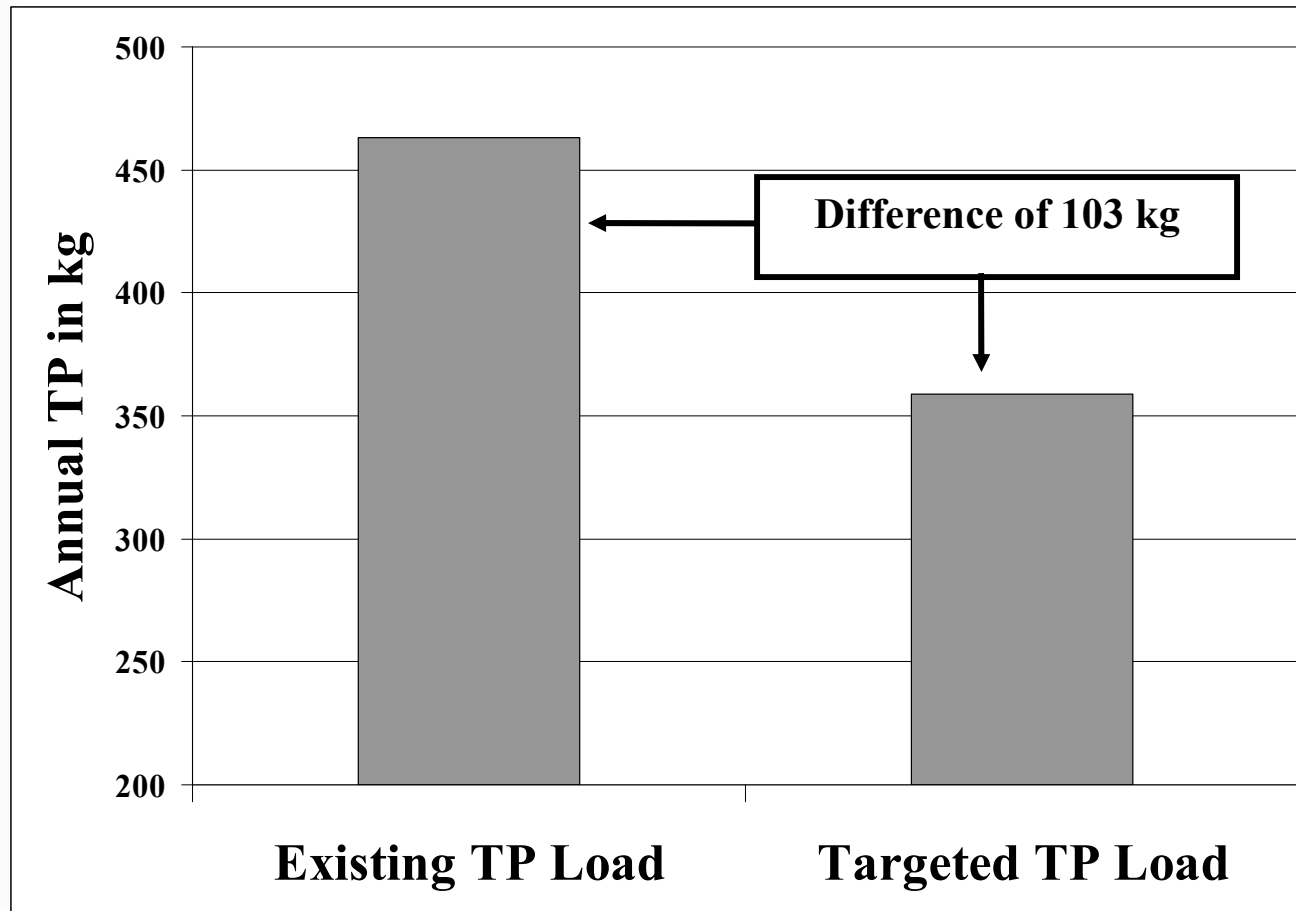


# Why Care About Phosphorus?

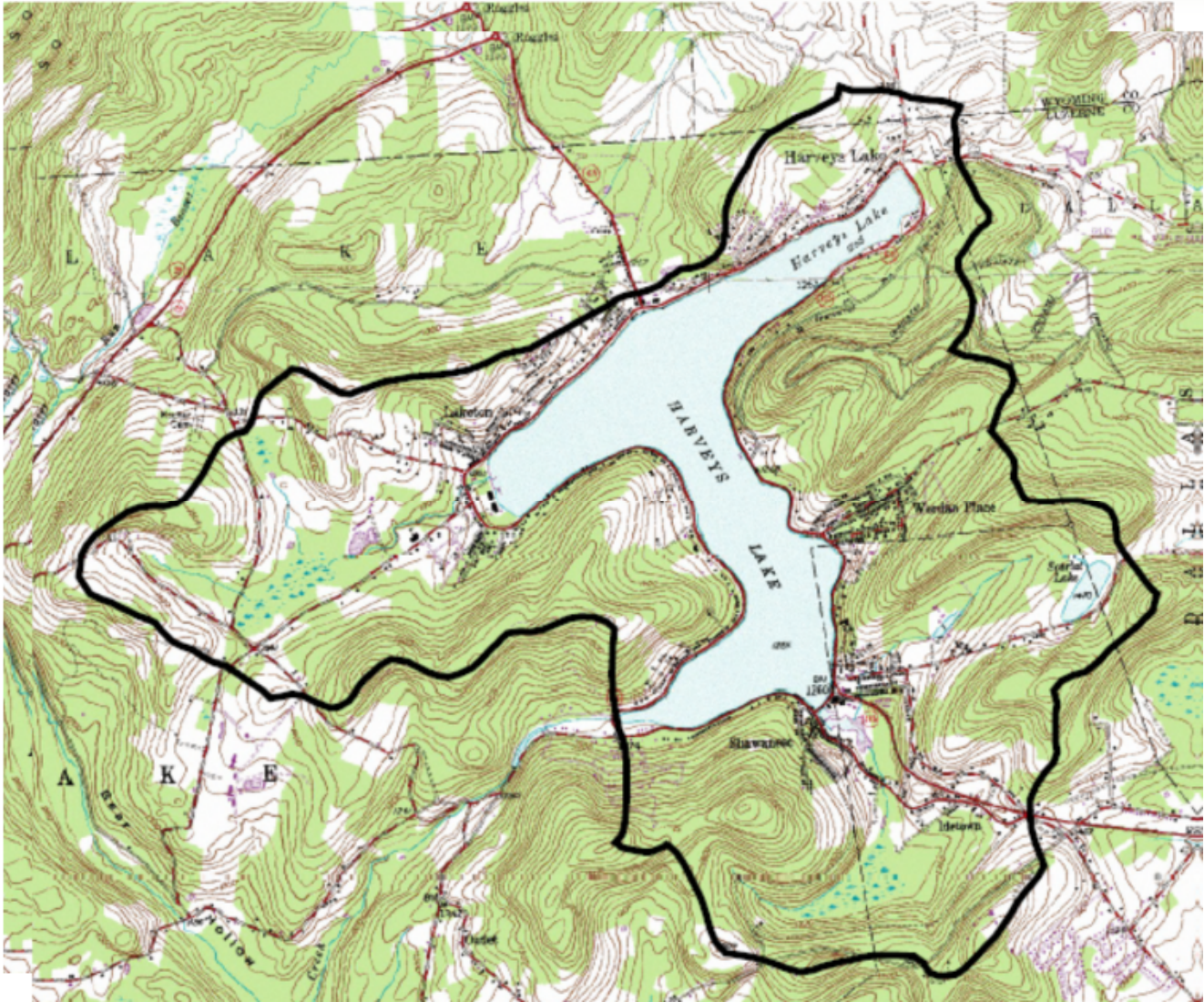
- Higher phosphorus means more blue-green algae
- Produce nuisance surface scums
- Taste & Odor problems
- Cyanotoxins



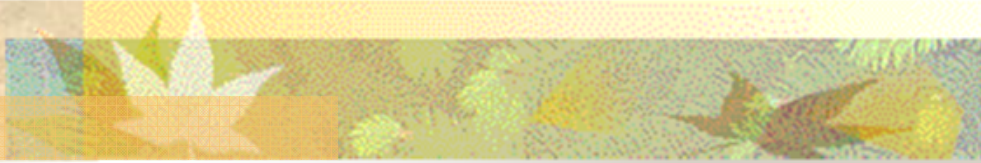
# The Total Maximum Daily Load (TMDL) Approach (Harveys Lake, PA)













# Streambank Stabilization

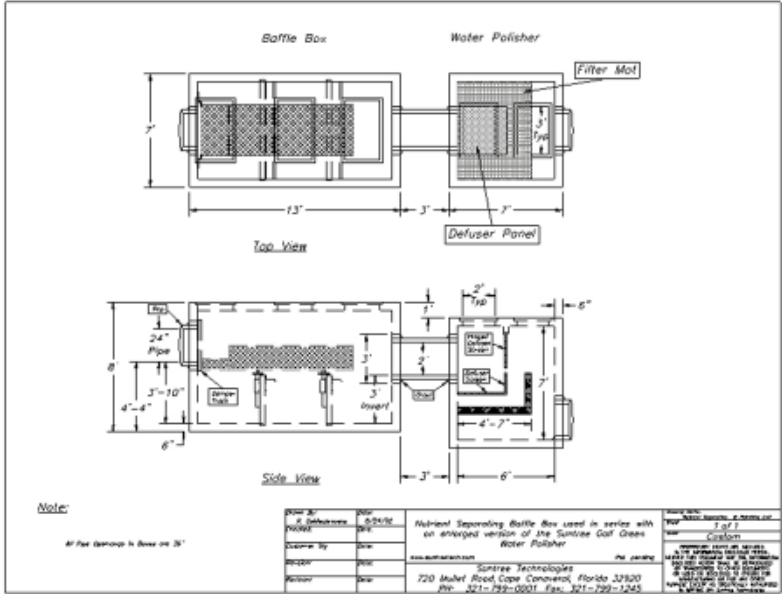


# Hemlock Gardens section of watershed





# Nutrient Separating Baffle Box with Water Polishing Unit MTD





















SUNTREE® 8000  
6'x12'x36" TOP 3" MIN  
12/14/02  
7.64 TMS

APR 9 2003





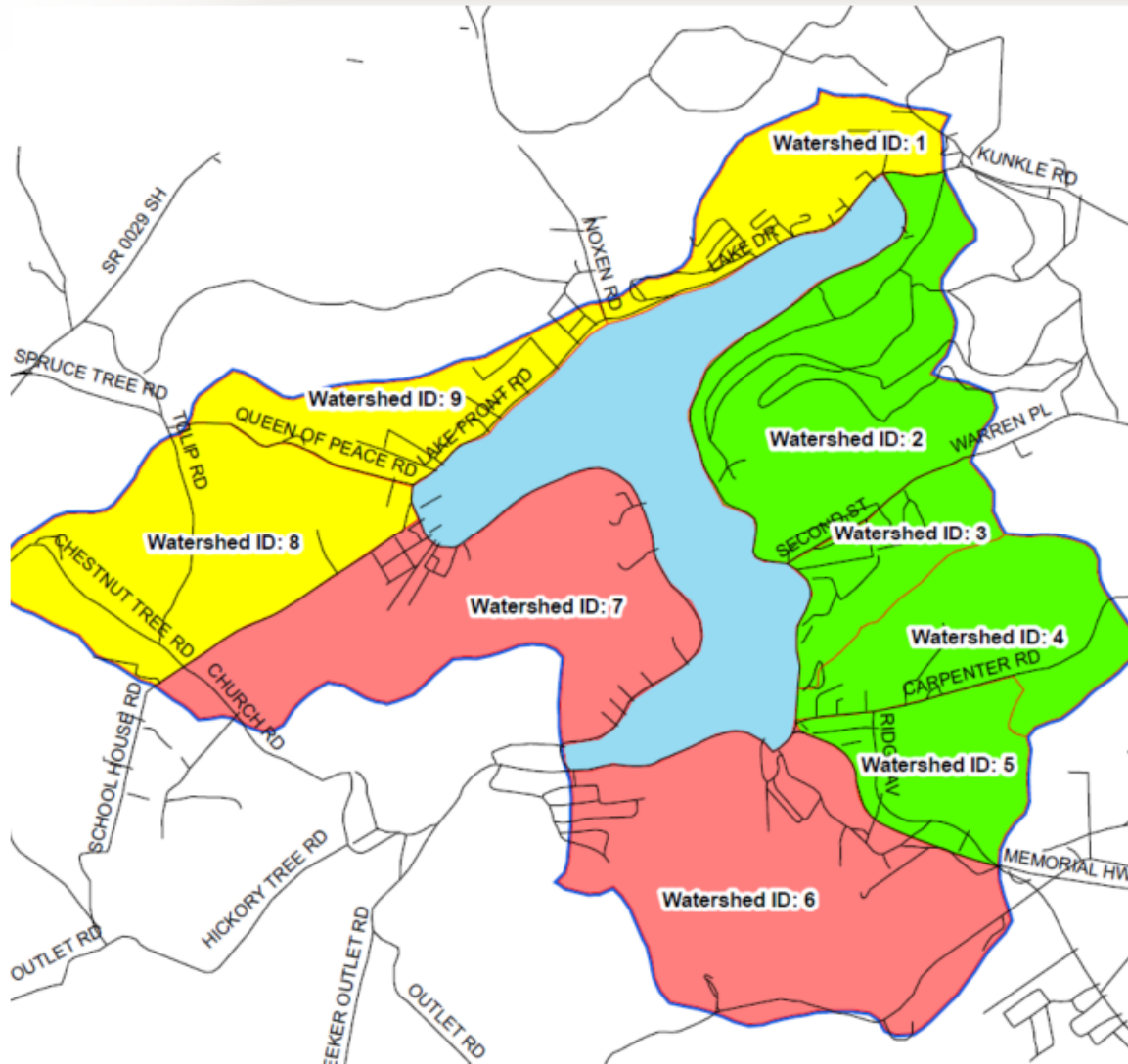






# Nutrient Separating Baffle Box

- Treated stormwater from an approximately 12.9 ha (28.4 acre) drainage area.
- In 2003 removed approximately 20 kg of TP.
- In 2004 removed approximately 13 kg of TP.
- In 2005 removed approximately 11 kg of TP.
- Eventually, decided to designate the annual removal rate of TP for this stormwater BMP to be 13.6 kg per year



**Table 4: Proposed Projects to Reduce Phosphorus in Stormwater Runoff**

<b>Site Name</b>	<b>Site Number</b>	<b>Priority*</b>	<b>Proposed Project</b>
Baird Street	1	Medium	Installation of series of Aqua-Guardians
Queen of Peace Road	2	Medium	Stabilization of road-side swales; bioretention swales
West Point Avenue/ Knoll Street Intersection	3	High	Installation of a three-chambered baffle box
Rood Avenue	4	High	Installation of a three-chambered baffle box
Wood Street	5	High	Pave road, stabilize road-side swales, and installation of Aqua-Guardians
Fish and Boat Commission Launch	6	High	Three-chambered baffle box and possibly some additional roadside stormwater infrastructure work



# Installation of StormBasin Retrofits in December 2009 / January 2010 (23 units installed along Baird and Maple Streets and Lakeside Drive)





# Installation of 3-Chambered Baffle Box at Wood Street in December 2011



# Installation of 3-Chambered Baffle Box at Old Lake Road completed in September 2013





# Installation of five Floating Wetland Islands (FWIs) in 2014



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# Installation of five Floating Wetland Islands (FWIs) in 2014





# Floating Wetland Islands (FWIs) in Spring 2015





# Floating Wetland Islands (FWIs) in Spring 2015



# Floating Wetland Islands (FWIs) in Summer 2015





# Species Planted in FWIs (Mid-Atlantic States)

- Swamp milkweed
- New England aster
- Rice cutgrass
- Swamp-rose mallow
- Fringed sedge
- Soft rush
- Pickerelweed
- Blue-flag iris
- New York ironweed
- Soft stem bulrush



# Plants of Concern at Harveys Lake



**Grassy (variable)  
pondweed**



**Vasey's pondweed**



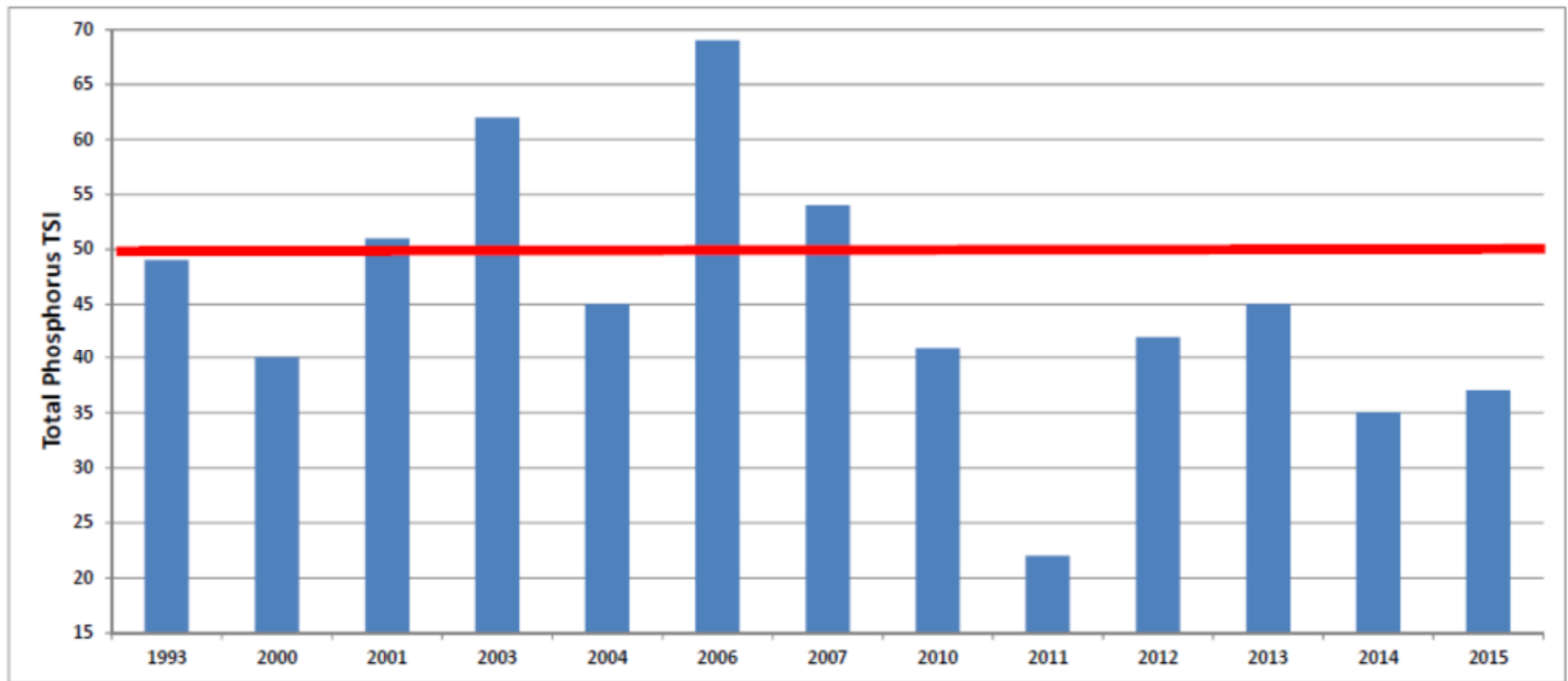


# Harveys Lake – Projects Implemented to Date

<b>Implemented Stormwater or In-Lake Project</b>	<b>Total Phosphorus Removed in kgs (lbs)</b>
Two streambank / shoreline stabilization projects	10.0 (22)
Hemlock Garden Nutrient Separating Baffle Box	13.6 (30)
Series of small, catch basin retrofits	6.1 (13.4)
Wood Street Nutrient Separating Baffle Box	3.0 (6.6)
Old Lake Road Nutrient Separating Baffle Box	3.0 (6.6)
Floating Wetland Islands (Five)	18.1 (40)
Two more Nutrient Separating Baffle Boxes; 2015	6.0 (13.2)
<b>TOTAL</b>	<b>59.8 (131.8)</b>

**By the end of 2015, the TMDL is approximately 58% in compliance for total phosphorus**

# Harveys Lake mean, growing season TSI for total phosphorus







# Progress on the Harveys Lake TMDL for total phosphorus

- At the end of 2015 the TMDL was approximately 58% in compliance for total phosphorus.
- Based on the Watershed (Stormwater) Implementation Plan, previously approved by PADEP and US EPA in 2009, the targeted reduction in TP should be at 55% by the end of 2014
- Some upcoming projects are scheduled beyond 2015; total compliance is tentatively scheduled to be attained by the end of 2019.
- Next chapter in Harveys Lake – the infestation of the invasive species hydrilla, first identified in 2014.

**THANK YOU**

