



Long-Term Restoration Plan for Lake Hopatcong, Morris / Sussex Counties, NJ

**The New York State Federation of Lake Associations
5th and 6th of May 2017**

Fred S. Lubnow, Ph.D., Director of Aquatic Programs

Princeton Hydro, LLC

203 Exton Commons

Exton, PA 19341

flubnow@princetonhydro.com

Lake Hopatcong, Morris / Sussex Counties, New Jersey



Lake Hopatcong, New Jersey

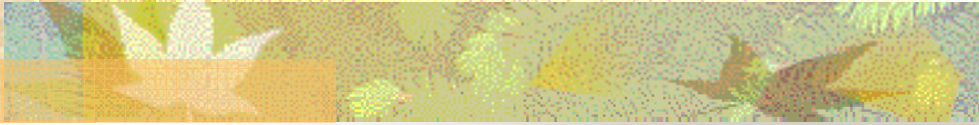
- Largest lake in NJ (2,686 acres; 1,087 ha).
- Five municipalities in watershed (13,548 acres; 5,482.7 ha).
- More than 500,000 people visit the lake or live in the watershed.





Lake Hopatcong's TMDL for total phosphorus


Described Scenario	Associated Value
Annual TP Load (refined TMDL)	8,097 kg (17,807 lbs)
Targeted TP Load	4,800 kg (10,560 lbs)
Required Percent Reduction to Attain Targeted TP Load	41 %
Required Reduction in the Existing TP Load	3,297 kg (7,253 lbs)






Municipal-based Phosphorus Loads for Lake Hopatcong

Municipality	kg per yr	Percent Contribution	Required Reductions (kg / yr)
Jefferson Township	4,201	57.6	1,899
Borough of Mt. Arlington	322	4.4	145
Roxbury Township	235	3.2	106
Borough of Hopatcong	2,538	35	1,147
Total	7,296	100	3,297



Implemented Stormwater or In-Lake Projects at Lake Hopatcong Morris / Sussex Counties, NJ	Total Phosphorus Removed (lbs)
Mechanical weed harvesting program (mean 2002-2012)	279
Partial sewerage of B. of Hopatcong (40% within SZI)*	1,353
Two Aqua-Swirl / Aqua-Filter MTDs in B. of Hopatcong and One Aqua-Filter MTD in T. of Jefferson (SFY 2005 319-grant) + One Filterra at T. of Jefferson	16
Three Nutrient Separating Baffle Boxes (two in Jefferson; one in Mt. Arlington; US EPA TWG)	50
One Nutrient Separating Baffle Box + Wetland Stormwater Basin (Roxbury; US EPA TWG)	32.5
Peat Biofilter retrofit to an existing community septic system (Jefferson; US EPA TWG)	10
Sub-TOTAL	1,740.5



Implemented Stormwater or In-Lake Projects at Lake Hopatcong Morris / Sussex Counties, NJ	Total Phosphorus Removed (kgs)
Sub-TOTAL	1,740.5
Watershed-wide use of non-P fertilizers (US EPA TWG; based on 2008-09 study; only for residential lawns)	439
Mandatory pump-outs of existing septic systems (Jefferson; Water Quality 604(b)-grant)*	114
One Nutrient Separating Baffle Box in Roxbury	1
Four Filterra Units (SFY2010 319-grant)	2
One Bioretention System at Lake Hopatcong State Park (SFY2010 319-grant)	1
Installation of two Floating Wetland Islands; scheduled for installation in 2014 (SFY2010 319-grant)	20
GRAND TOTAL	2,318 lbs



Lake Hopatcong

Described Scenario	Associated Value
Required Reduction to attain compliance with the TMDL for total phosphorus	7,253 lbs
Amount of total phosphorus removed at the end of 2016	2,318 lbs
Percent of the TP load targeted for reduction removed to date (end of 2016)	32 %
Amount of total phosphorus still in need of removal for TMDL compliance	4,936 lbs



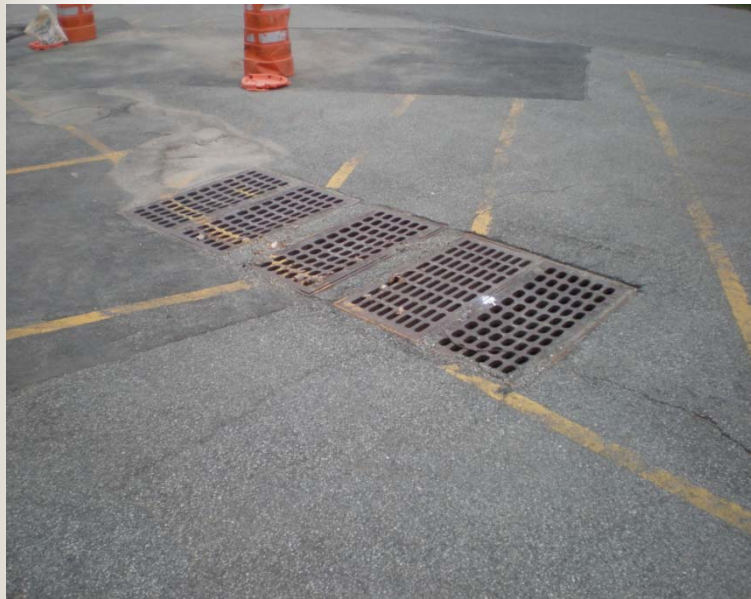




1st Aqua-Filter installed (B. of Hopatcong; December 2008)



2nd Aqua-Filter installed (B. of Hopatcong; June 2011)



Aqua-Filter installed (T. of Jefferson; August 2009)



Inside the Aqua-Swirl and Aqua-Filter Chambers



Filterra installed in Jefferson (August 2012)



Nutrient Separating Baffle Boxes (2 in Jefferson; 1 in Mt. Arlington)



East Shore (J) June 2009



Yacht Club (J) July 2009

Nutrient Separating Baffle Box (Singac Avenue; Roxbury; May 2009)



Retrofit existing basin to function as wetland BMP (Roxbury)



June 2007

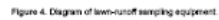


September 2011

Peat Biofilter retrofit for existing septic system (Jefferson; Aug – Oct 2012)



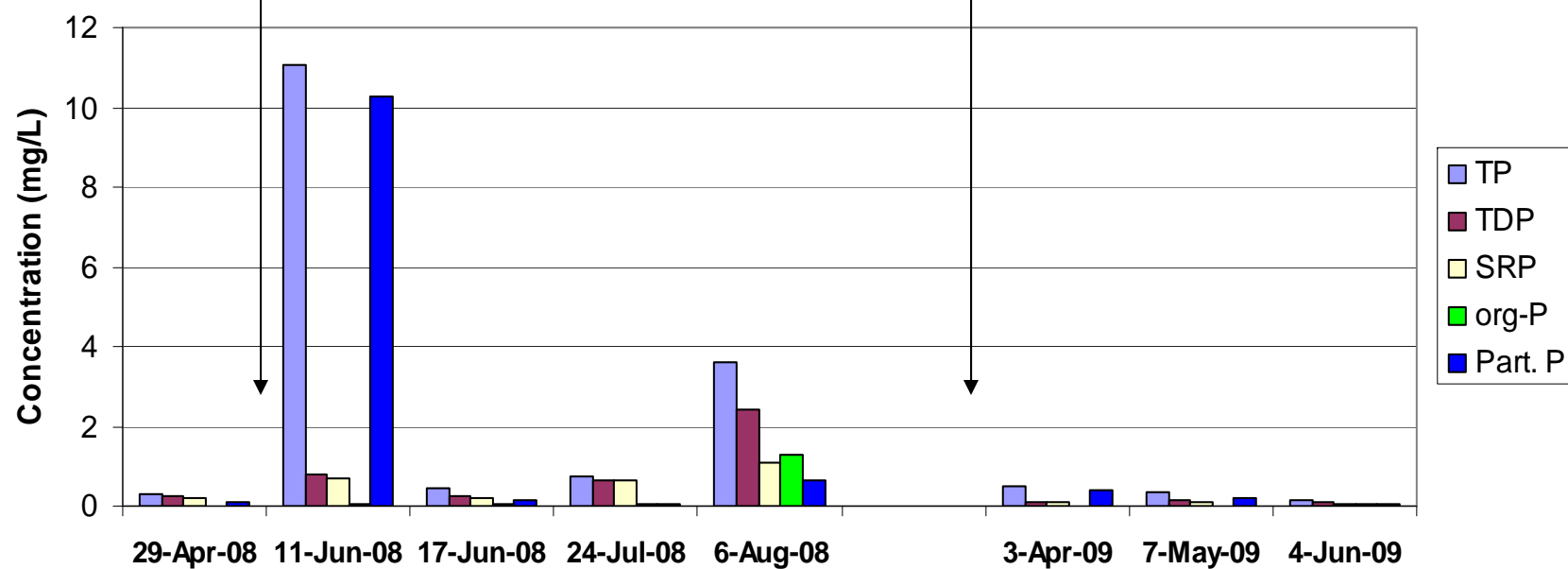
© 2015 Wiley Periodicals, Inc. • 14(1) • 100–105 • DOI: 10.1002/eqe.2201



Hoagland Site

Spring application (P) - 17 May 08

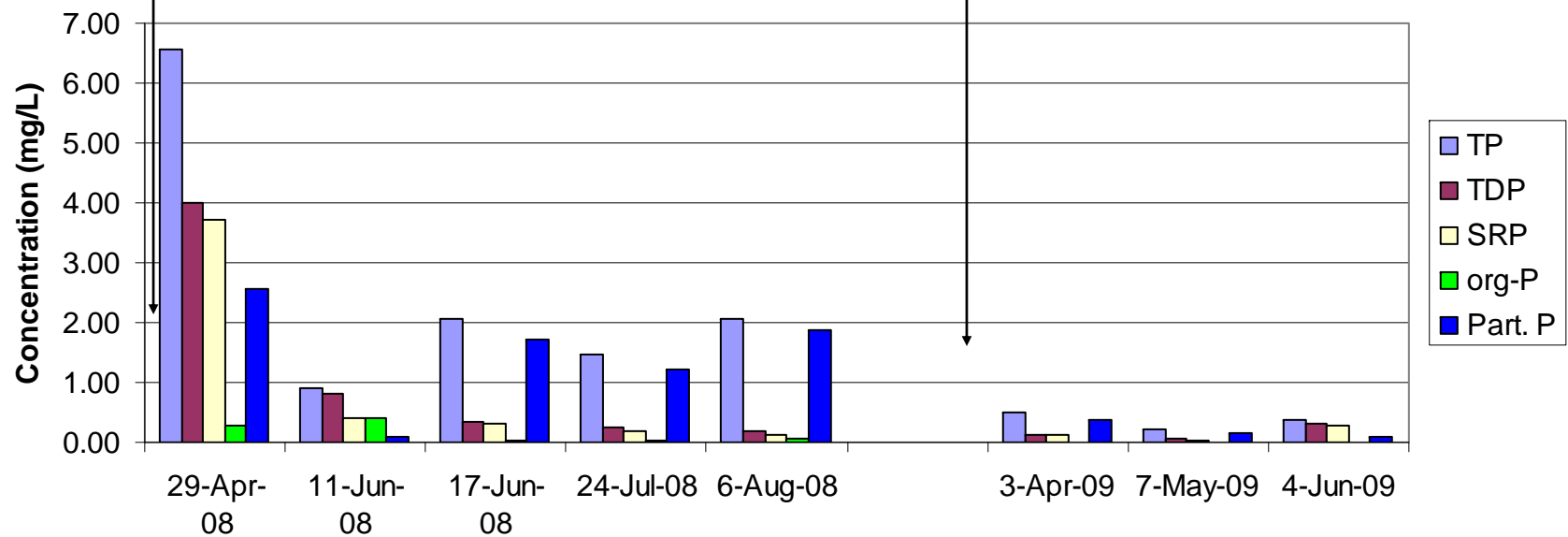
Spring application (non-P) - 27 March 09



K Mulch Site

Spring application (P) - 20 April 08

Spring application (non-P) - 30 March 09



Nutrient Separating Baffle Box (Roxbury; June 2013) and Bioretention Basin at the Hopatcong State Park



June 2012

Bioretention Basin (August 2013)



Bioretention Basin (August 2013)



Bioretention Basin (August 2014)



Bioretention Basin (August 2015)



Bioretention Basin (September 2016)



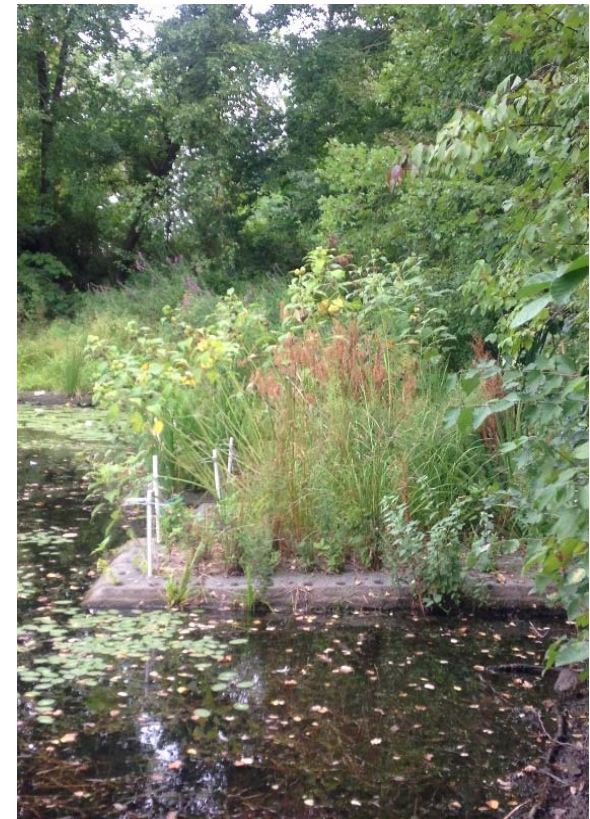
Install two, 250 sq. ft. Floating Wetland Islands in Ashley Cove (Jefferson)



Floating Wetland Islands in Ashley Cove (installed 2014)



Floating Wetland Islands (2015)



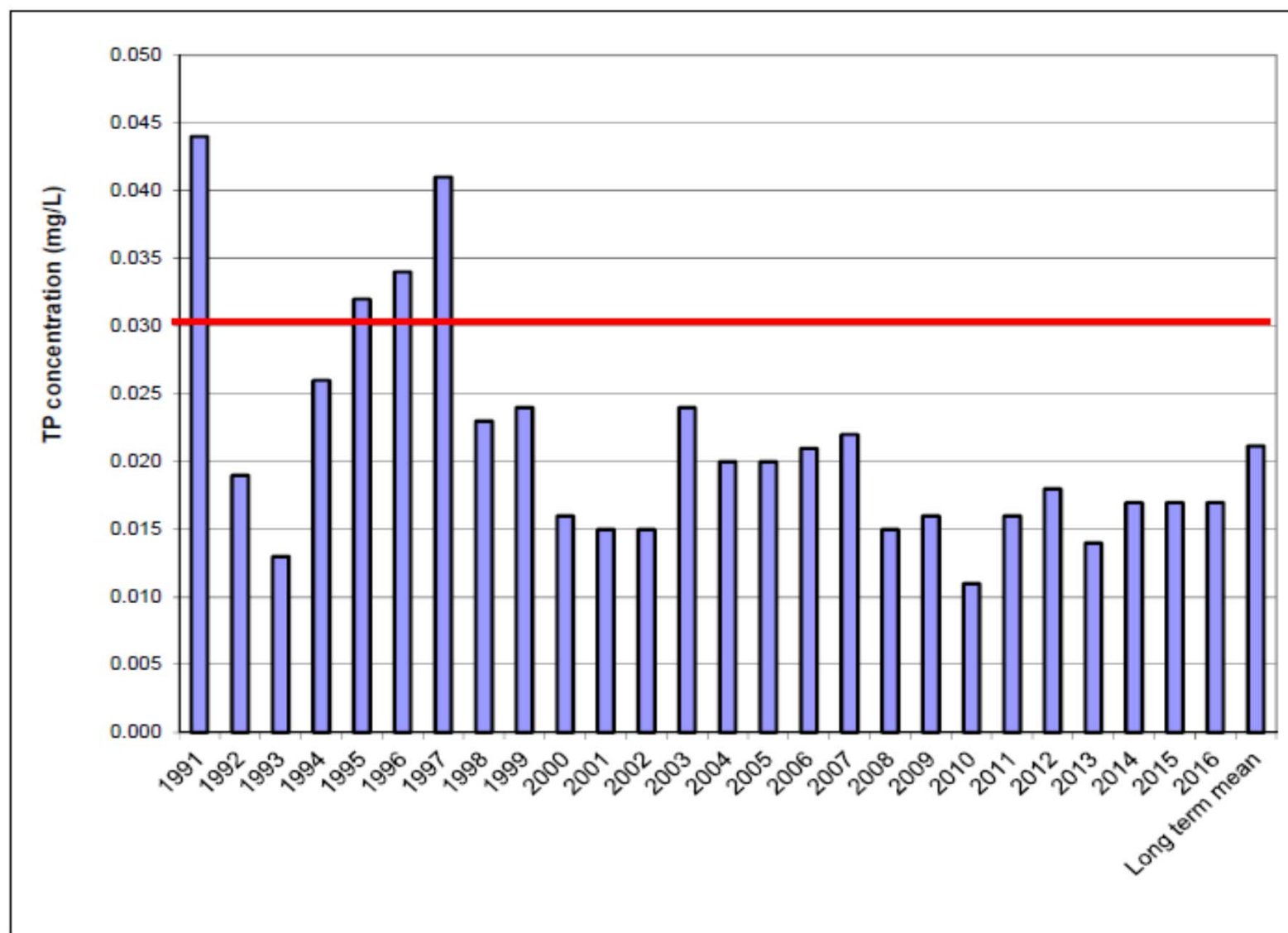
Deerfield Lake, Wayne County, PA (July 2014; installed 2010)

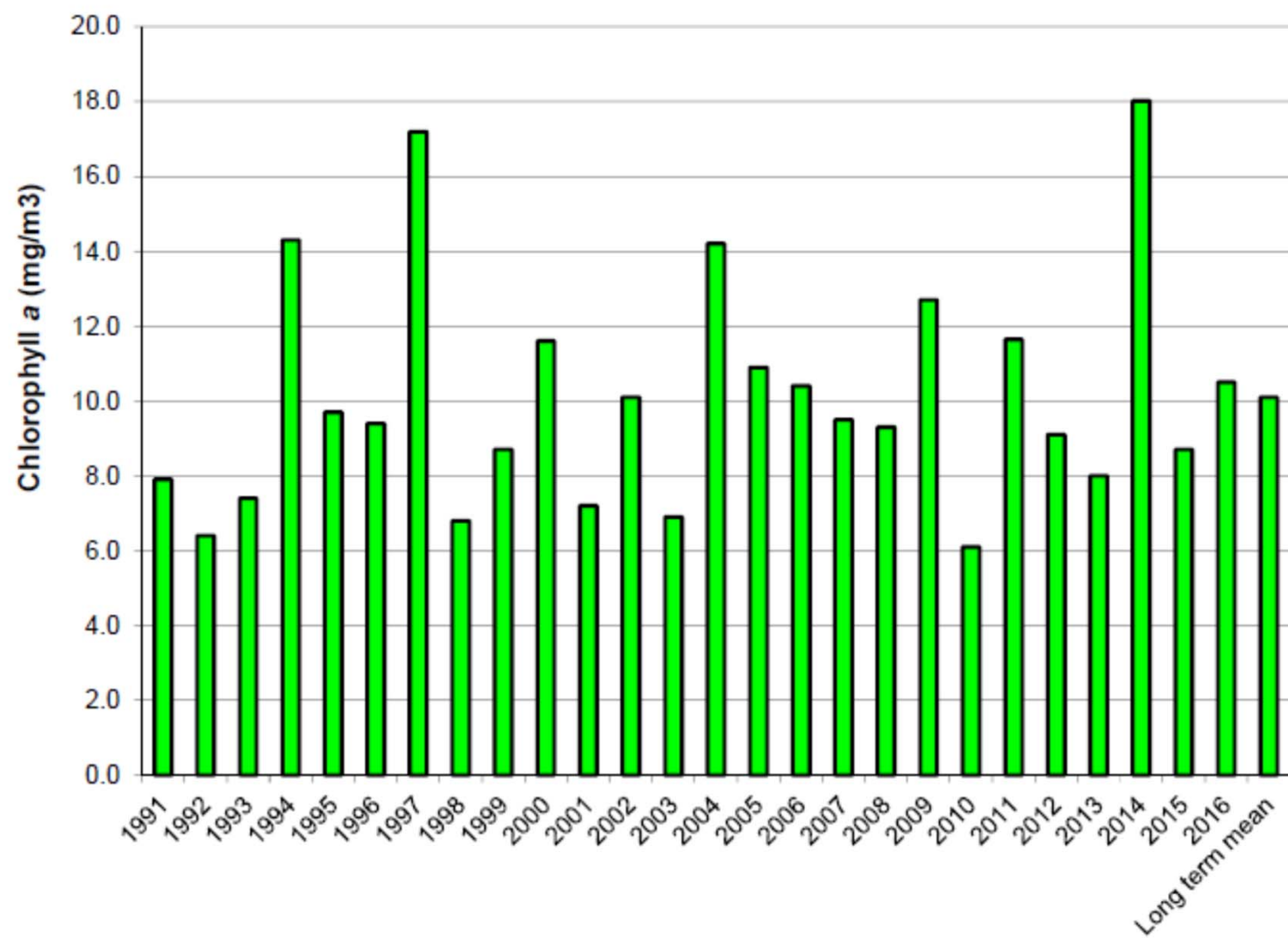


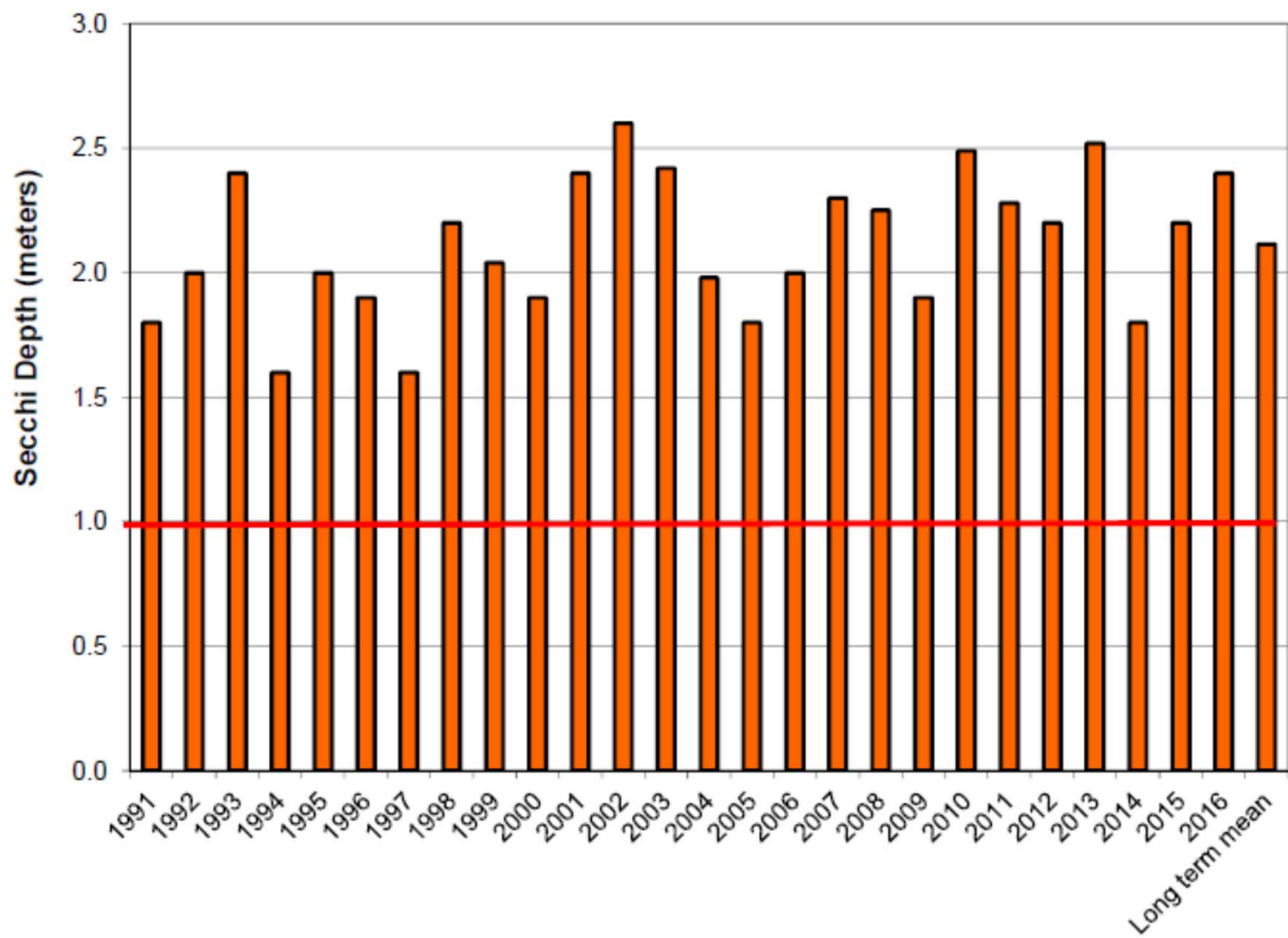


Native Vegetation Planted on Islands

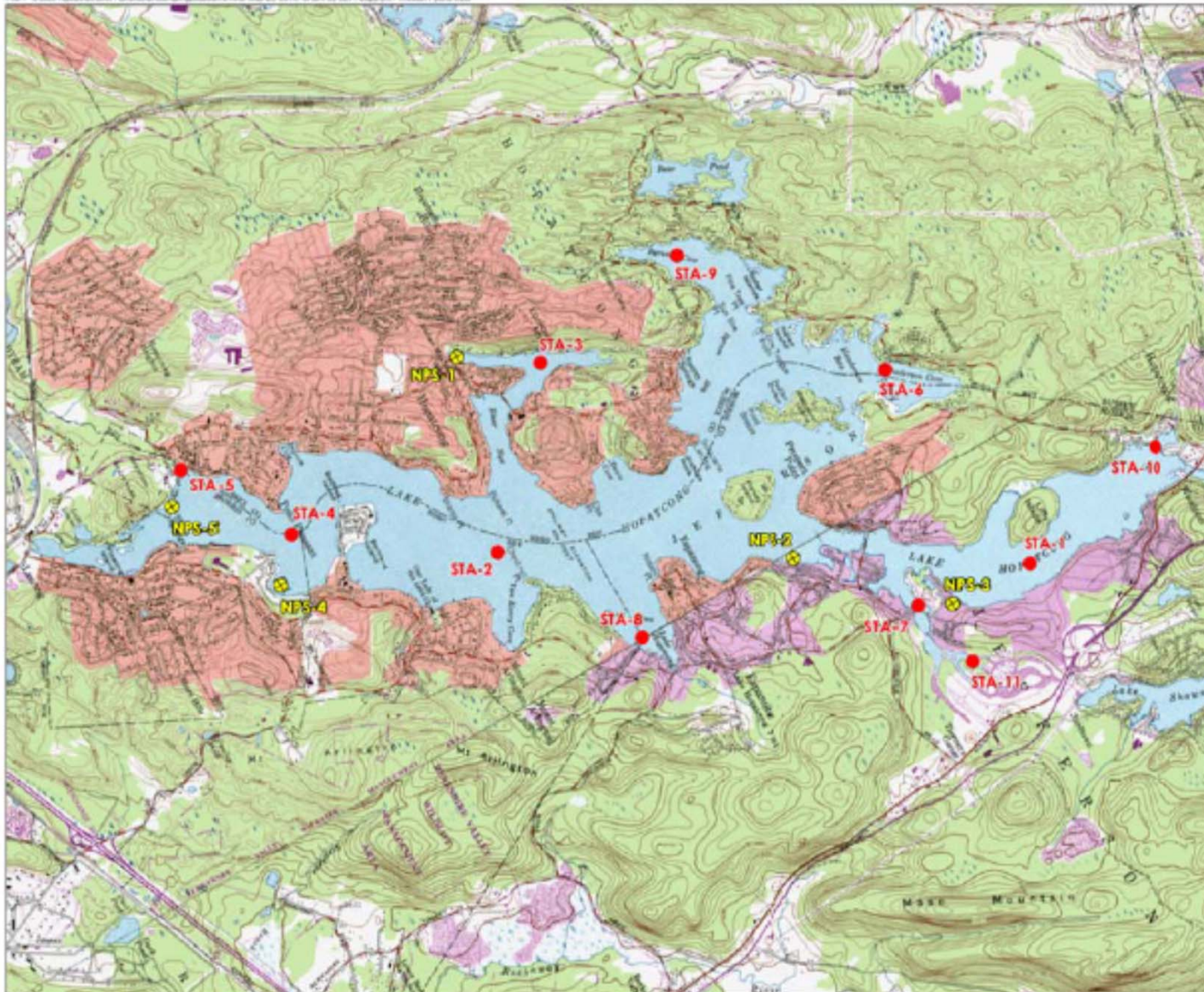
Botanical Name	Species Name
EUPATORIUM MACULATUM	JOE-PYE WEED
IRIS VERSICOLOR	BLUEFLAG IRIS
LOBELIA SIPHILITICA	BLUE LOBELIA
SCIRPUS CYPERINUS	WOOLGRASS
ASCLEPIAS INCARNATA	SWAMP MILKWEED
EUPATORIUM PERFOLIATUM	BONESET







File: P:\enviro\Projects\0010107\GIS\MapDocs\mapdoc1.mxd, May 25, 2015, Drawn by G.P. Copyright Princeton Hydro, LLC



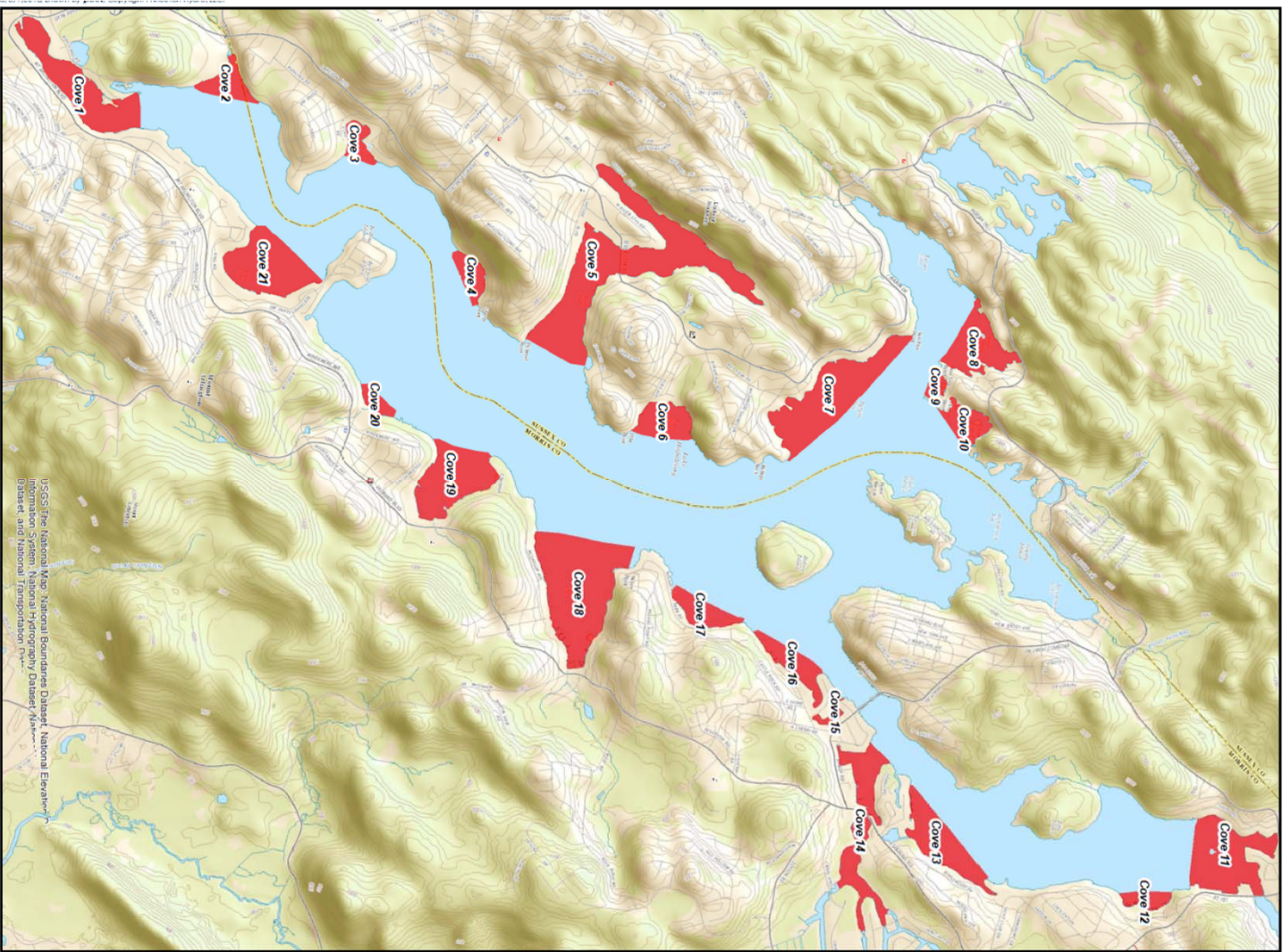
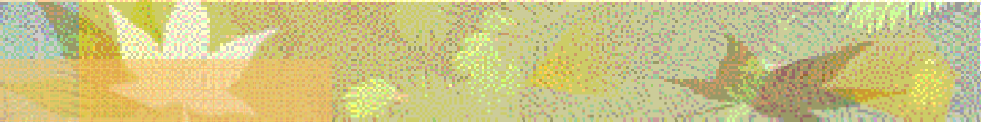
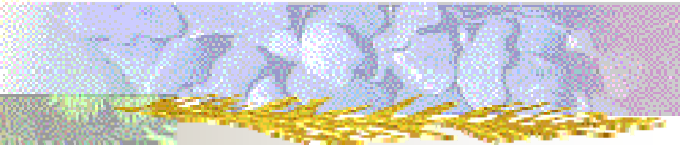


Conclusions


- By the end of 2016, approximately 32% of the Lake Hopatcong TMDL for total phosphorus will be in compliance.
- A combination of in-lake and watershed-based restoration projects have been implemented with funding from two 319-grants and a US EPA Targeted Watershed Grant
- Long-term water quality improvements have been measured, however additional measures are necessary to continue to comply with the TMDL and protection the water quality of Lake Hopatcong.

THANK YOU





USGS, the National Map, National Boundaries Dataset, National Elevation Information System, National Hydrography Dataset, National Wetlands Dataset, and National Transportation Network



BATHYMETRIC PARAMETER	VERY HIGH PRIORITY	HIGH PRIORITY	MEDIUM PRIORITY	LOW PRIORITY	VERY LOW PRIORITY
Water depth (ft)	<3	<3	3 to >5	<3 to >5	>5
Sediment Thickness (ft)	>3	1 to 3	>3	<1 to 3	<1

