Mystic River Phosphorus Loading Study

Preliminary Results and Next Steps

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Mystic River Science Forum
US EPA offices, Boston, MA
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Mystic River
WATERSHED ASSOCIATION

Project Partners and Technical Steering Committee (TSC)

Mystic River Watershed Association (MyRWA) -Water quality monitoring, USGS flow gaging project management, TSC

MWRA -Water quality monitoring, financial support, TSC

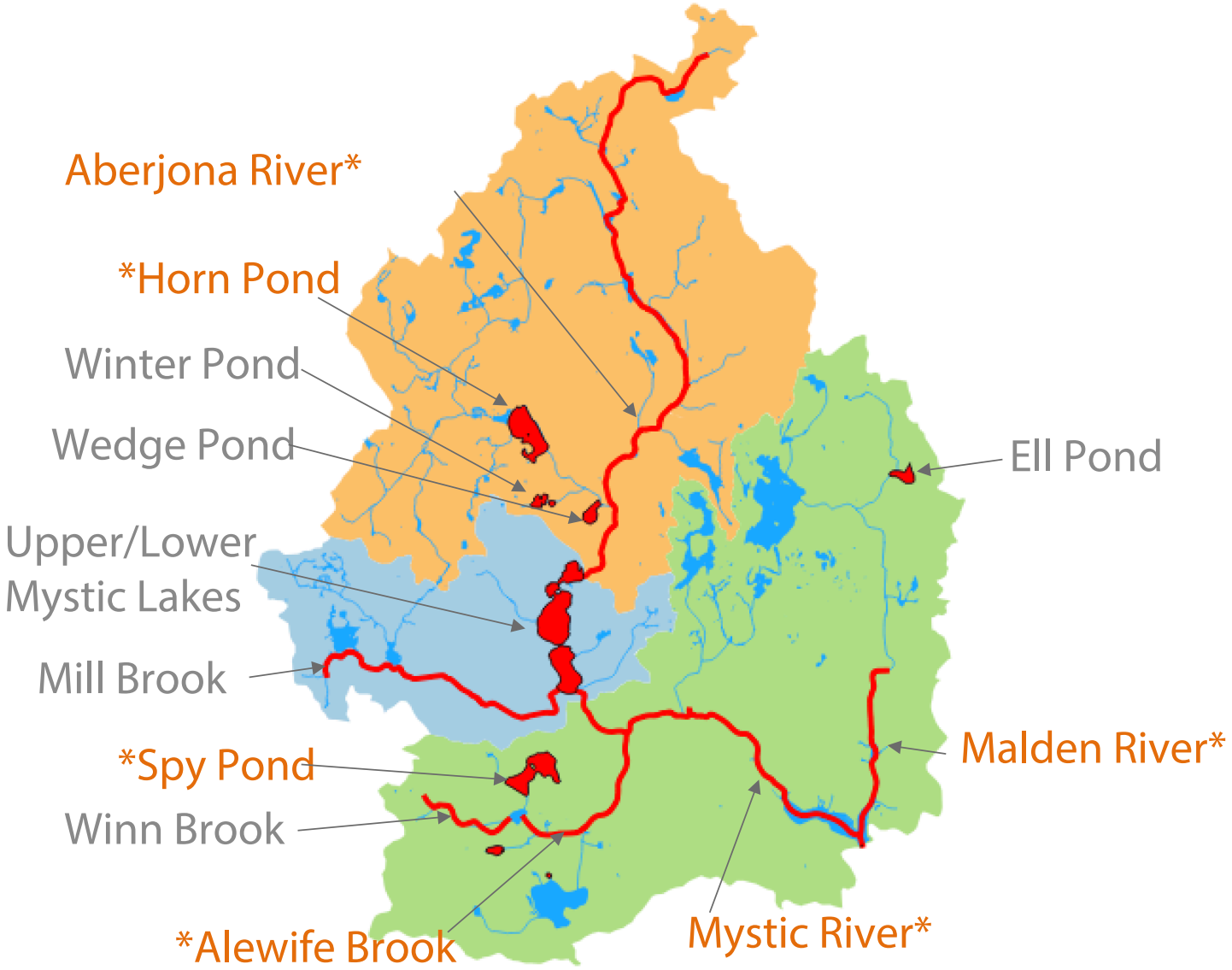
MassDEP -Technical and policy support, technical steering committee, pond/lake phosphorus load reduction analyses

EPA Region 1 -EPA Contractor support, water quality monitoring, laboratory analyses, technical and policy support, TSC, pond/lake load reduction analyses

EPA's Contractor: Environmental Research Group (ERG)
-Team includes PG Environmental, Horsley Witten Group, & Paradigm Environmental
-Overall technical support including data analyses, water quality endpoints, watershed and receiving water modeling

303(d)-listed Water Bodies in Watershed

All category 5 impairments (TMDL required) 2014



Phosphorus high in urban stormwater

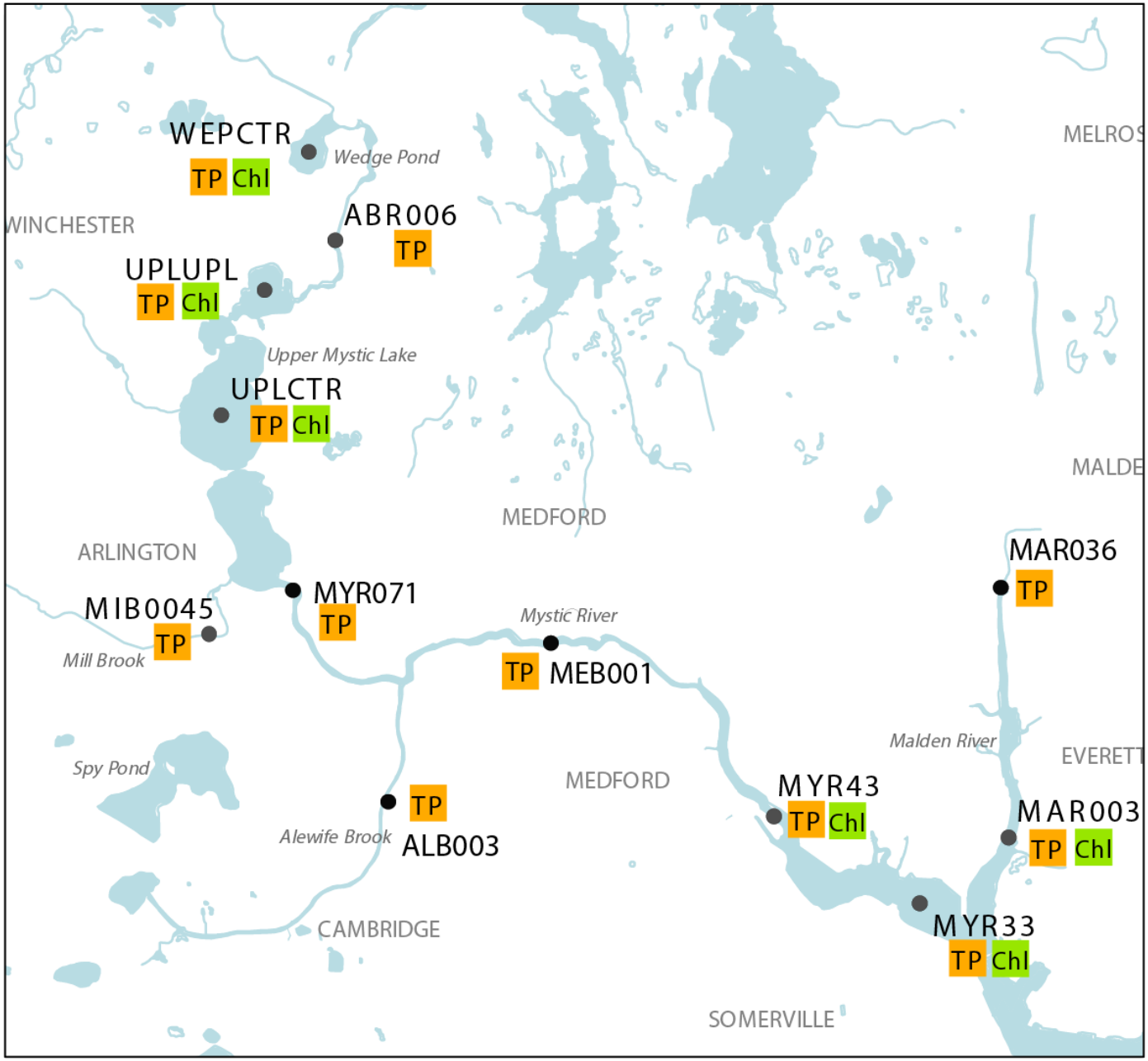
- Soil particles
- Leaf litter
- Fertilizer
- Pet waste


Evidence of impairment:
Invasive plants


Mystic River
Cyanobacteria Bloom
Summer 2017

Phosphorus and chlorophyll grab sample locations

2015-2017



Chl Chlorophyll-a sampling location

TP TP grab sampling location

- **Sampling and Analysis Plans each year**
- **SOPs**
- **Approved by EPA and DEP**

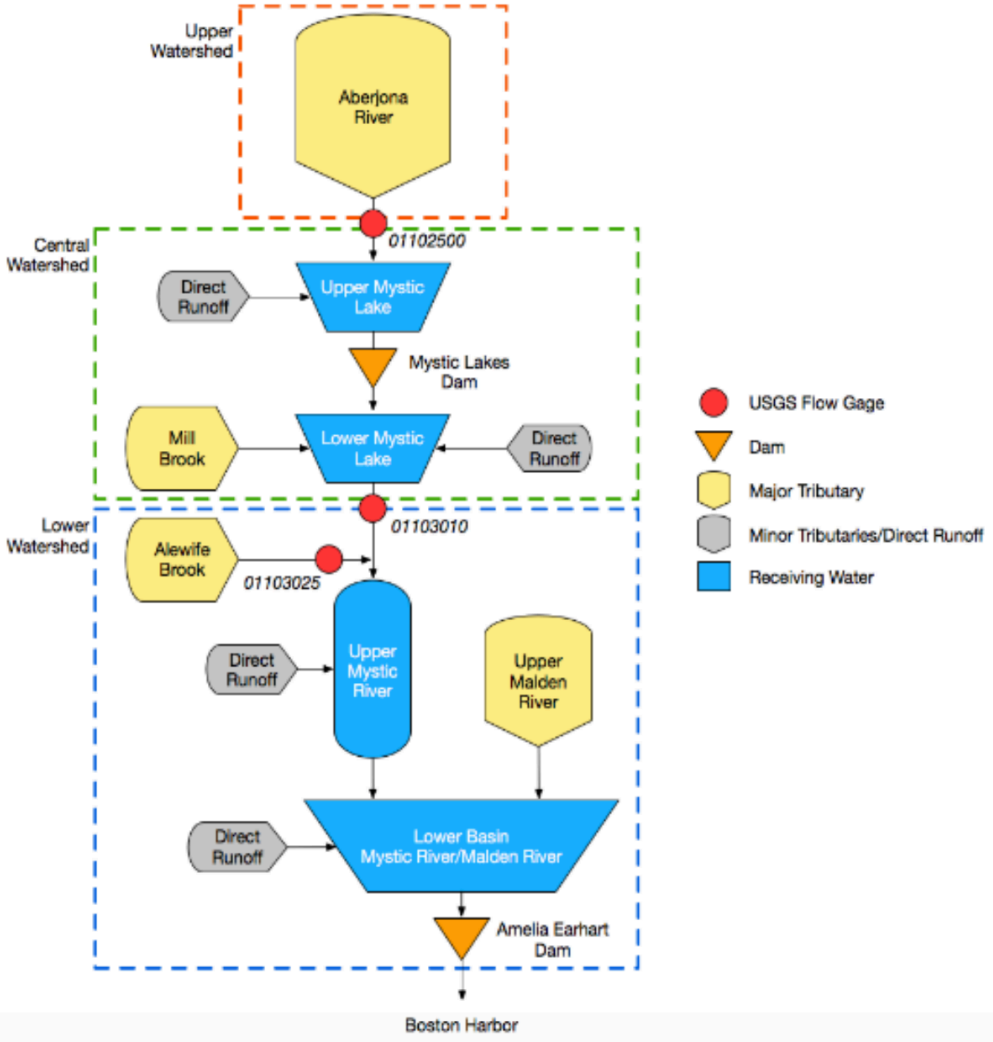

3 years
700+ visits
2500+ samples
TP, CHL, etc.
Photo: David Mussina

Autosamplers

Phase 1 – Draft Report

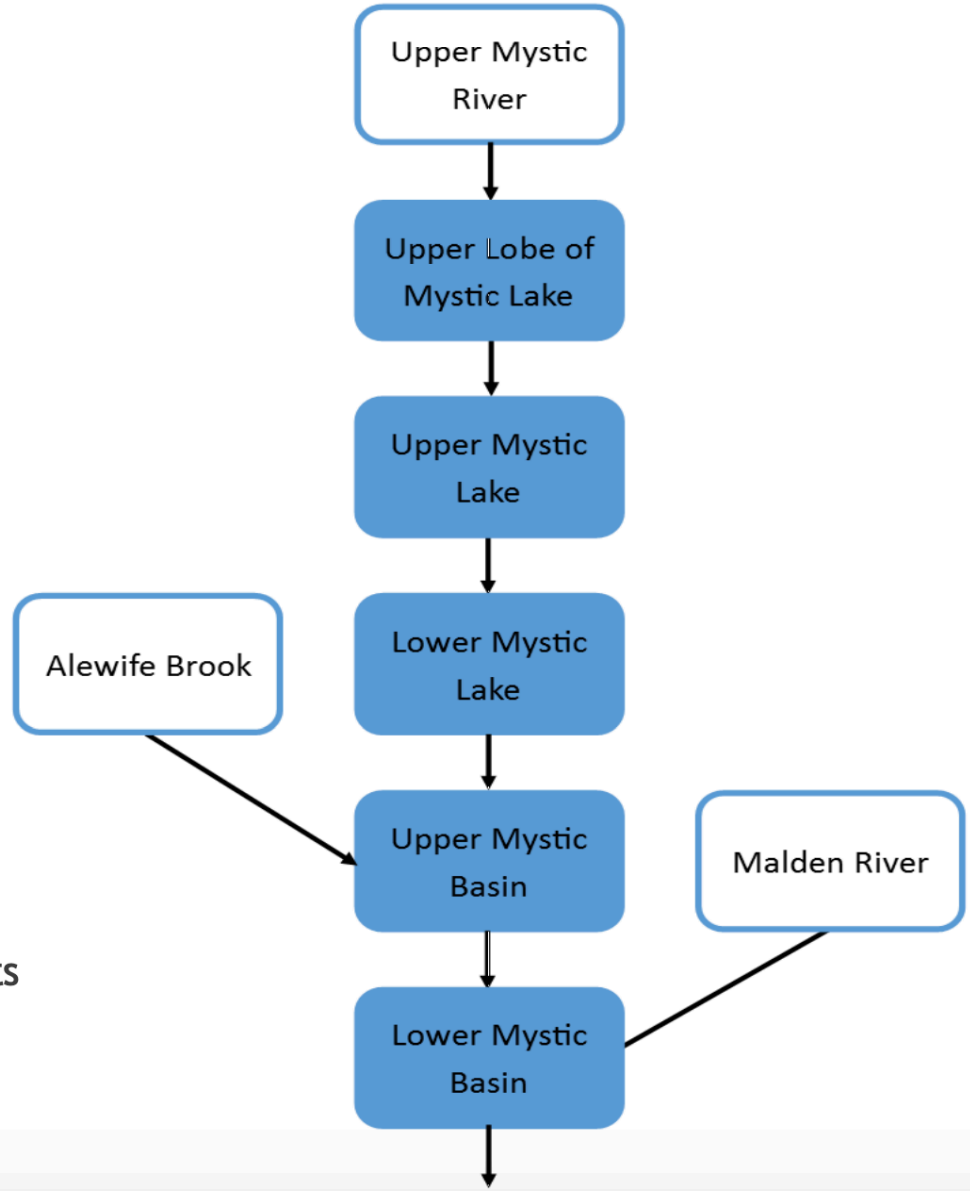
Completed June 2017

- Phase 1 Draft Report compiles project tech memos:
  - Conceptual Model memo
  - Data Review memo
  - Water Quality Targets memo
  - Model Approach Alternatives memo



Calibration of the BATHTUB Model

- Selection of critical period (2007-2016)
  - Complete
- Calibration of reach loads (2007-2016)
  - Complete
- Calibration of BATHTUB model (2005)
  - Original 3 critical reaches expanded to 5 reaches
  - Upper and Lower Basin split into two parts



Preliminary results

Phosphorus Load Reductions

- Critical Period of Interest
  - 10-year period from 2007 to 2016
  - Includes 2 wet years (2008, 2011), 2 dry years (2015, 2016)
  - Watershed Phosphorus Loading Estimates for Critical Period
    - Average annual flows and loads from land loads, groundwater, sediment, CSO/SSOs
    - Attenuated loads from the tributaries, unattenuated loads from direct discharges to segments
- Very Preliminary Results indicates SW P load reductions of 40-60% may be needed to attain nutrient related WQS.

Stormwater Management Strategies Opti-Tool

- GOALS:
  - Develop a step-by-step, high-level approach
    - Generalize approach
    - Treating impervious areas
    - Structural BMPs only
  - Demonstrate cost-benefits of optimization at sub-watershed scale (pilot watershed demonstration)
    - Include all storm events using hourly rainfall to assess cumulative benefits (2007–2016)
    - Develop most cost-effective solutions for varying TP load reductions
  - Provide real-world SW control retrofit examples

Big themes for cities and towns

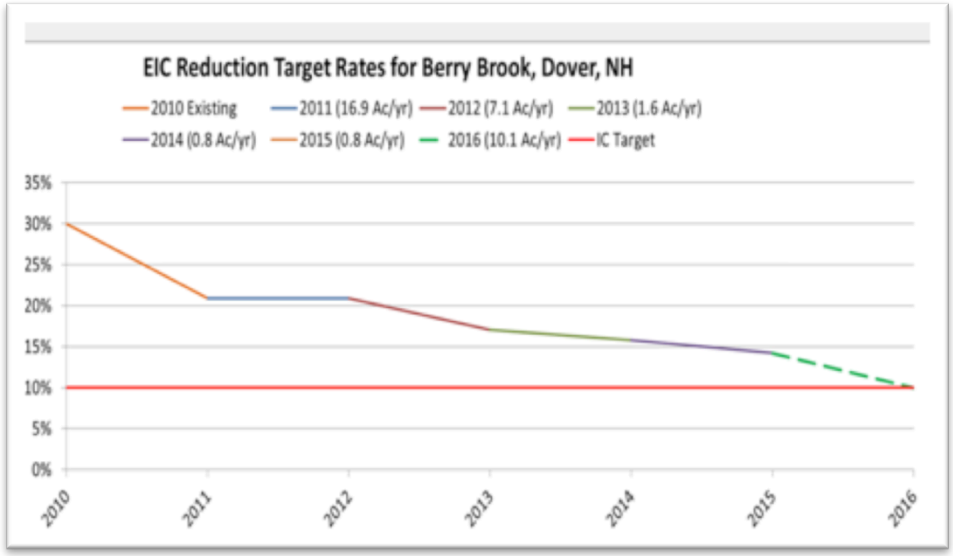
- **Act now.** Don't miss opportunities now for cost effective solutions. These targets may get turned into strict requirements later.

- **Look for "low-hanging fruit"**, for example:
  - Install green infrastructure during routine road work
  - Maximize benefit of non-structural practices like street sweeping and leaf collection

- **Code and ordinance review**, coordination and streamlining

- Need for **adequate funding**, innovation in funding schemes, including stormwater utilities.

Green Infrastructure Can Reduce Effective Impervious Cover

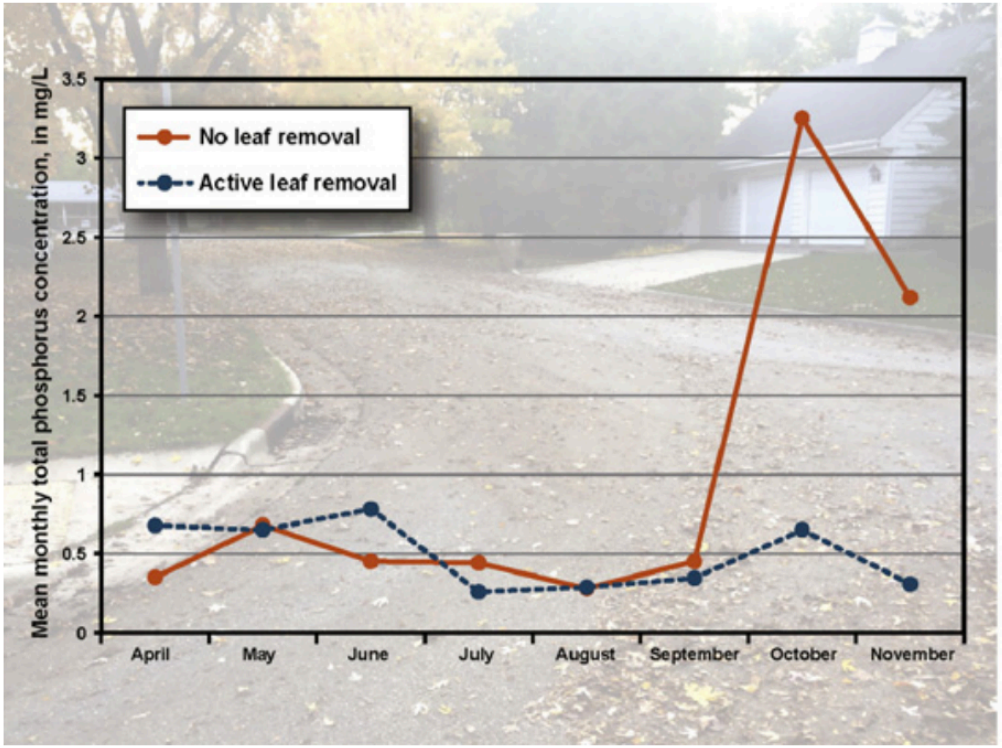


Data from UNH Stormwater Center

Berry Brook, NH

USGS study: Leaf removal and phosphorus in Madison WI

GRAPHICAL ABSTRACT



W. R. Selbig (2016). Evaluation of leaf removal as a means to reduce nutrient concentrations and loads in urban stormwater. *Science of The Total Environment*, 571.


Small: Bioretention basin / Raingarden
Hardy School, Arlington


Large: Stormwater constructed wetland
Alewife Reservation, Cambridge

Our next steps: MET grant

- Work with EPA and municipalities to share information, best practices
- Meet with mayors and other officials
- Assist with job of education, through presentations, social media, etc.
- Continue to advocate for the most beneficial solution for the river system

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