

Management of Microscopic Algae in the Western Basin of Monponsett Pond

Phosphorus Inactivation Program



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Pond Characteristics

Western Basin		Eastern Basin	
528 acres			
282 acres		246 acres	
Avg. Depth: 7 ft. Max. Depth: 13 ft.			
Approximately 6mi ² watershed, heavily developed with residential homes			
2010 303(d) list category 5 water body for nutrients, noxious aquatic plants, turbidity, and exotic species (Fanwort)		2010 303(d) list category 4c water body for presence of exotic species (Variable Milfoil and Fanwort), 2007 TMDL for Hg	
Extensive algae blooms resulting in closure of the lake (swimming and boating) for much of the summer seasons of 2010 and 2011		Periodic algae blooms	
Confirmed presence of three state-listed species of special concern: Tidewater Mucket (<i>Leptodea ochracea</i>), Eastern Pondmussel (<i>Ligumia nasuta</i>), and Umber Shadowdragon (<i>Neurocordulia obsoleta</i>)			



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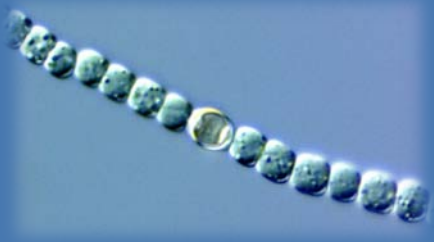
The Problem

- Harmful Algae Blooms (HABs)
 - Decrease in water clarity
 - Unpleasant odors
 - Drinking water quality decreases
 - Extensive beach closures
 - skin and eye irritation
 - gastrointestinal symptoms
 - asthma-like symptoms
 - toxins may be produced (hepatotoxins, neurotoxins)

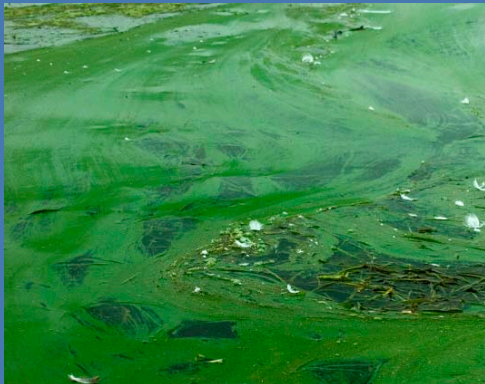


Algae

- Natural components of healthy ecosystems



- Ideal conditions produce blooms
 - nutrients (**Phosphorus**)
 - light availability
 - warm weather
 - low turbulence



Solutions

1. Watershed Management

- Identify nutrient sources
 - Fertilizers (residential & agricultural)
 - Sewage (old septics)
 - Stormwater
- Conduct remediation efforts

Long-term, ongoing solution

ESSENTIAL!!



Solutions

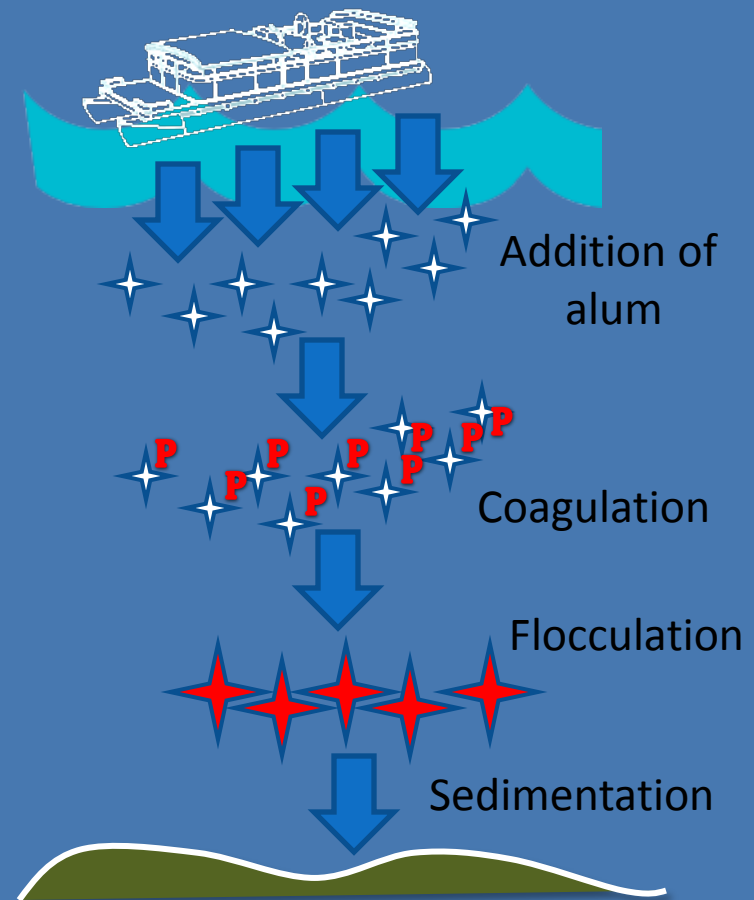
2. In-Lake Management: Copper Treatment

- Direct treatment of algae
- Only affects algae present during treatment
- Reactionary - treatment required at specific time (algae dependent)
- If algae counts are too high, treatment not possible (could result in fish/mussel kills)
- Multiple treatments per year likely

Solutions

3. In-Lake Management: Phosphorus Inactivation

- Aluminum sulfate, a.k.a. alum
- Binds to phosphorus, precipitating it to the bottom
- Byproducts can lower pH in poorly buffered water bodies
- Buffering agent (sodium aluminate) added with alum to maintain pH



Monponsett's Alum Treatment

- Goals of the 2013 Treatment
 - Reduce Phosphorus in the water column
 - Evaluate the effects of low-dose alum on:
 - In-water Phosphorus
 - Algae production
 - State-listed species

Monponsett's Alum Treatment

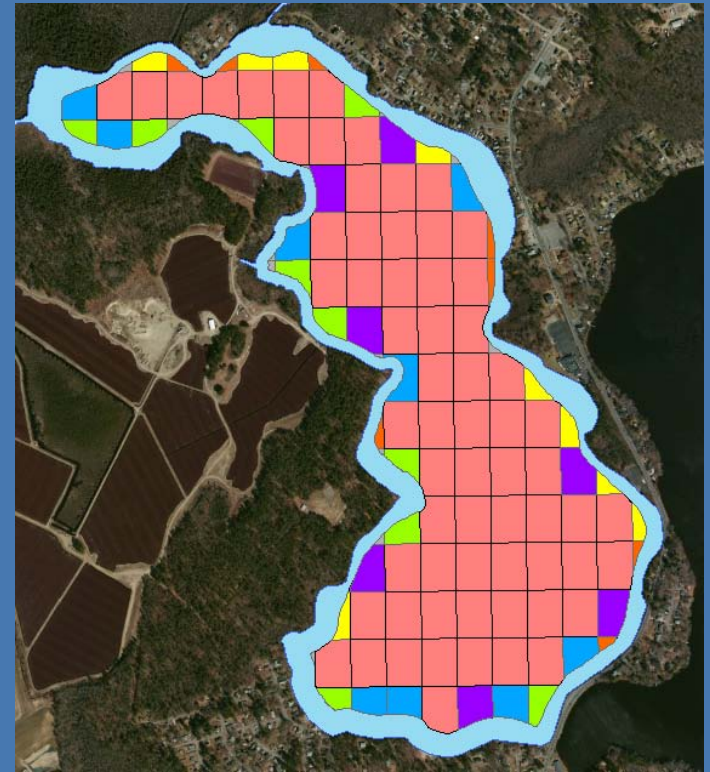
- Permits
 - DEP/Natural Heritage & Endangered Species Program (NHESP)
 - Management of State-listed species habitat
 - Town Orders of Conditions (Hanson & Halifax)
 - EPA NPDES Permit
 - MA DEP License to Apply



Monponsett's Alum Treatment

Treatment Design

- Areas >4ft. to reduce effects of wind/waves on floc
- 3 ppm
- Buffered treatment: Aluminum sulfate + Sodium aluminate
- Treatment area broken into 3 sections, 2.77-acre sectors
- Multi-day operation (~1 week)



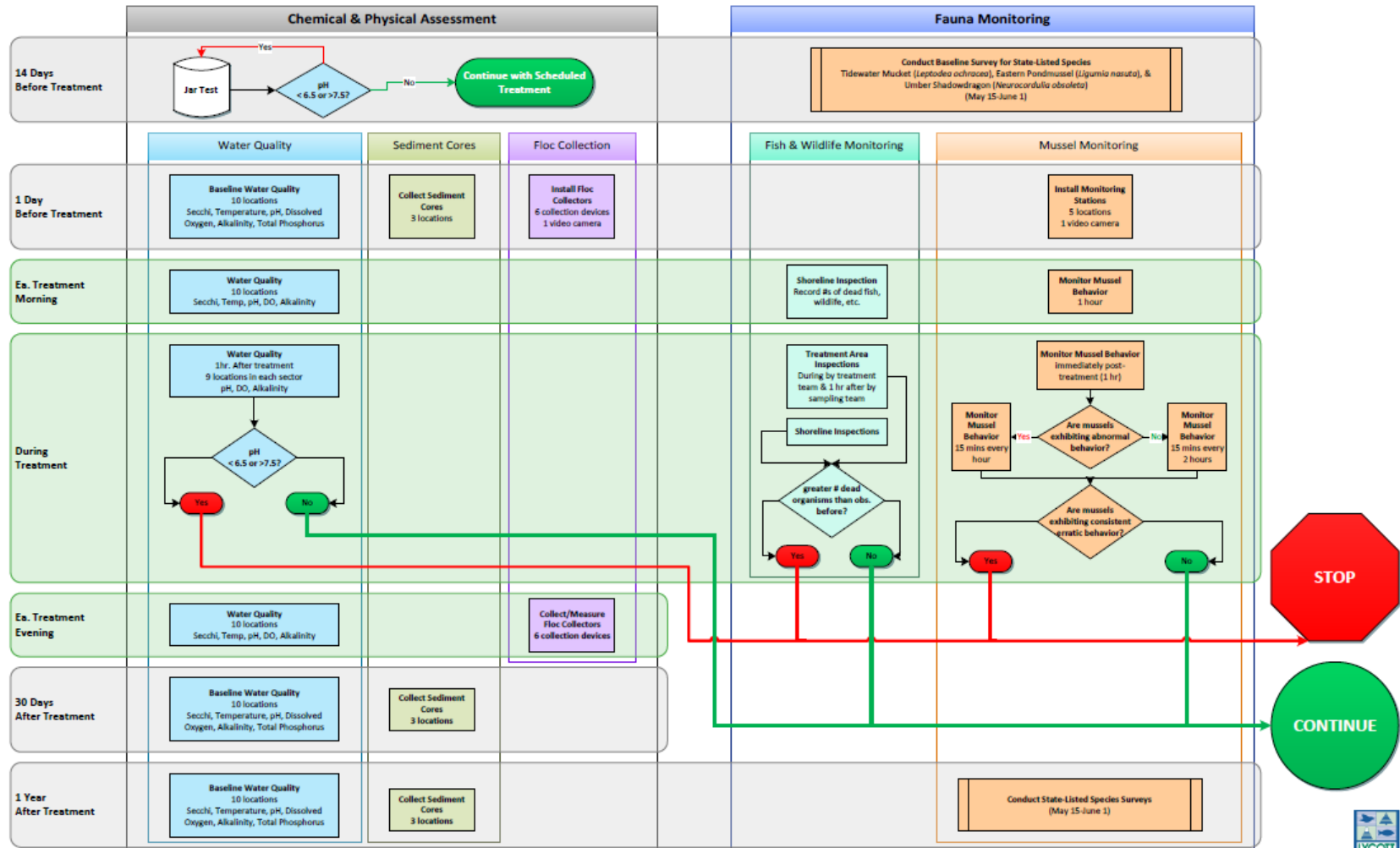
Monponsett's Alum Treatment

Monitoring Program Design

Monitoring Component	Timing in relation to treatment	Location(s)	Goal
Large-scale jar test	2 weeks prior	Treatment staging area	Verify that pH in the treatment area will remain within the target range of 6.5 and 7.5
Water quality	Before, during, and after months and years following	10 established locations; multiple locations during treatment	Evaluate short and long-term effects on water quality
Measurement of flocculation	During	1 visual recording; 6 measurement locations	Assess the amount of floc accumulated on the sediments
Monitoring of state-listed species	Before, during, and after One and five years following	5 paired plots	Evaluate short and long-term effects on these species identified by NHESP as potentially susceptible to the treatment
Sediment cores	Before and after One month, one and five years following	3 established locations	Assess changes in AL and sediment P

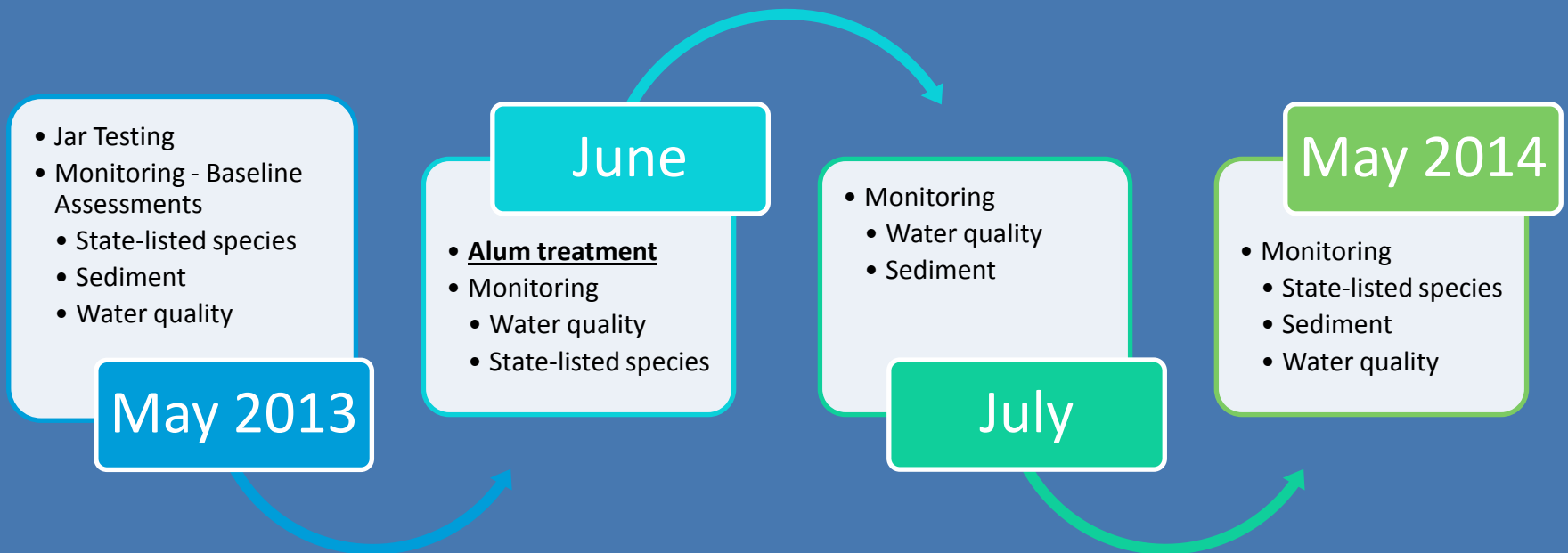
Monponsett's Alum Treatment 2013 Schedule

Schedule of Habitat Management Plan for Phosphorus Inactivation in the Western Basin of Monponsett Pond



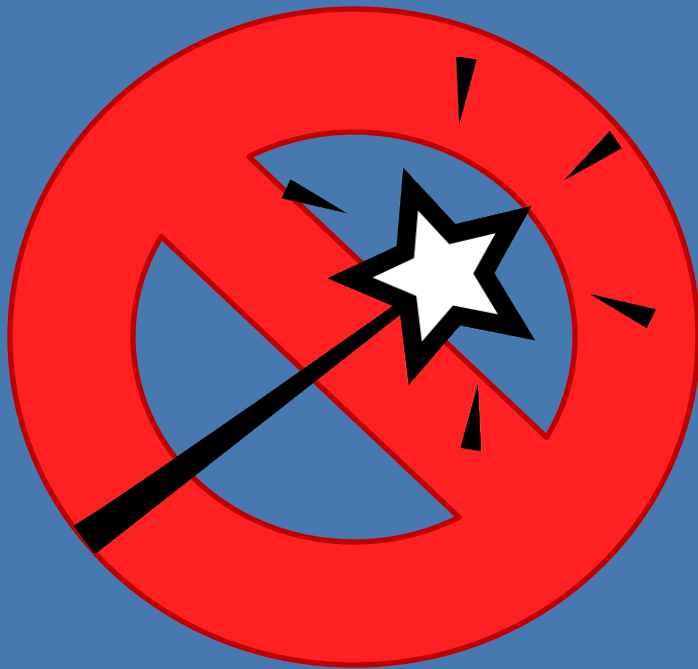
Monponsett's Alum Treatment

2013 Schedule



Following final monitoring and report, NHESP/DEP will determine if additional treatment(s) are possible

Things to Remember



- Treatments are not a magic wand
- Further review will be required
- **Control of nutrient source(s) is the best option for long-term lake management!!**

Questions?

