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STATE OF
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Department of
Environmental
Conservation

Update to the Stakeholders

Honeoye Lake TMDL and Watershed Plan

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NYSDEC Division of Water

August 26, 2015

Purpose of tonight's meeting

- Initial public meeting last December
- Committed to a late summer meeting
  - Continue engagement with stakeholders
  - Opportunity to interact with seasonal residents
  - Provide everyone with an update on our progress

Agenda

1. Survey Results
2. Overview of TMDL/Watershed Plan Process
3. Model Results
   A. Endpoint
   B. Watershed Model
   C. Lake Model
   D. Needed Reductions
4. Load Reduction Implementation
5. Next Steps
6. Questions and Discussion

Survey Results

How do you use the lake?

Evenly split between:

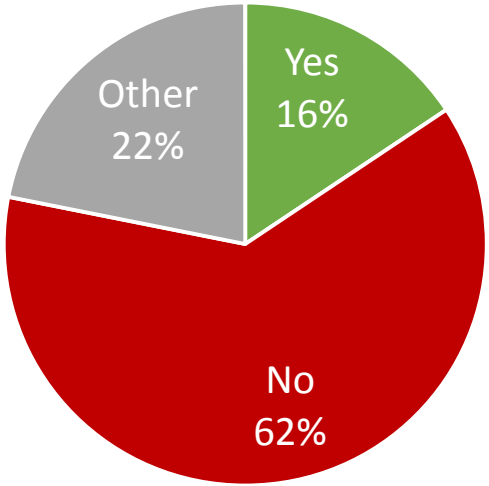
- Swimming
- Boating
- Fishing
- Aesthetics

Other uses notes:

- Water supply
- Water sports

Survey Results

Are you able to use the lake as desired?



Other: Yes, except before weeds/algae blooms

Survey Results

Are some areas worse than others?

1. **North end (algae)**
2. East side
3. South (aquatic plants)
4. Coves
5. Marinas
6. Everywhere

Survey Results

What prevents you from using the lake as desired?

1. Algae
2. Weeds
3. Mucky bottom
4. Nuisance species
5. Other
   - Odor, water advisories, poor fishing
6. People/competing uses
7. Nothing

Survey Results

What do you think is the source of the problem?

1. Runoff from roads, construction sites, lawns and crops
2. Pollution from pipes, ditches, containers or wells
3. Fertilizer
4. Lake processes
5. Other
   - Heavy rains, poor lake flushing, internal load, tree leaves, timber harvesting
6. Septic systems
7. Not sure
8. Animals

Survey Results

(40 responses)

Confirmed our understanding:

- How the lake is used (all identified best uses)
- That the uses of the lake are not being supported (i.e. lake is impaired)
  - 84% of people not able to use as desired
- Major impairments are know
  - Uses impacted by other causes as well

People know what the important sources of pollution are

How did we get here?

- Honeoye Lake listed on 303(d) list for oxygen demand (2002) and phosphorus (2006)
- NY TMDL program is refocussing resources on sources of drinking water and nutrients
- Funding became available through USEPA in the form of contractor support (Cadmus Group)
- Currently working with the contractor to complete the watershed and lake modeling

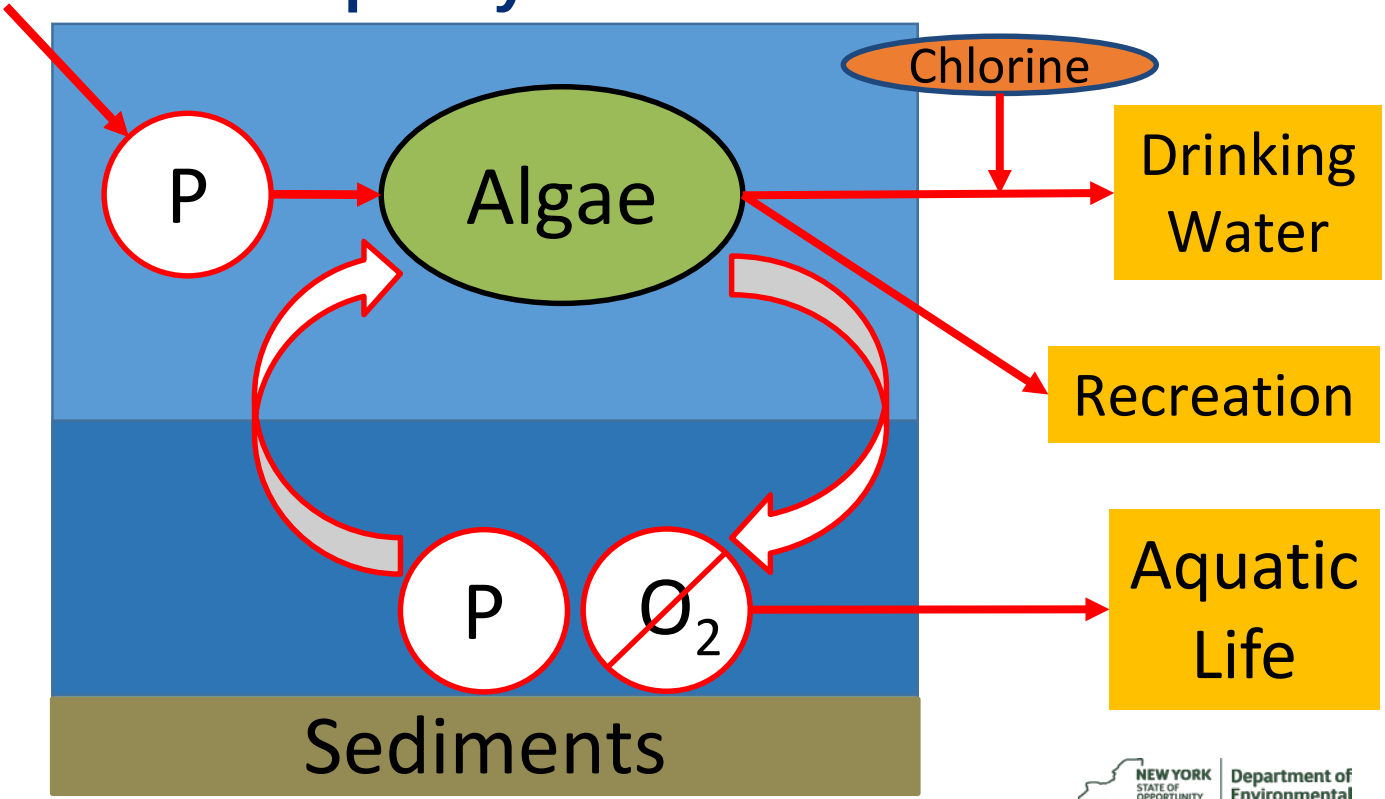
Understanding Total Maximum Daily Loads (TMDLs)

- Required when Water Quality Standards (WQS) not met
- Defines the ability of the waterbody to absorb a pollutant and still meet WQS

TMDL = Clean Water Blueprint

- Identifies the sources of pollutant(s)
- Defines ability of waterbody to absorb a pollutant and still meet WQS
- Assigns reductions to each source
- Meet EPA's 9 Element Watershed Plan

Phosphorus, dissolved oxygen and water quality



Potential Endpoints

At the end of this, what do we want Honeoye Lake to look like?

Phosphorus impairment

- Narrative Water Quality Standard (WQS) to protect uses:
  - Fishing/wildlife: supported at current conditions, except dissolved oxygen
  - Recreation: phosphorus guidance value of 20 µg/L
  - Water supply: chlorophyll-a value of 4 µg/L

Dissolved oxygen impairment

- WQS: not less than 4 mg/L
  daily average not less than 5 mg/L

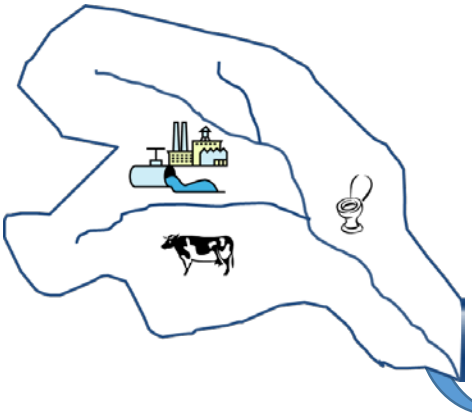
Selecting an Endpoint

Protecting the water supply use is limiting factor for phosphorus

- Goal of achieving an average chlorophyll-a concentration of 4 µg/L
- May need to be lower to address low dissolved oxygen
  - Model will help determine impact of phosphorus on dissolved oxygen

Model Framework

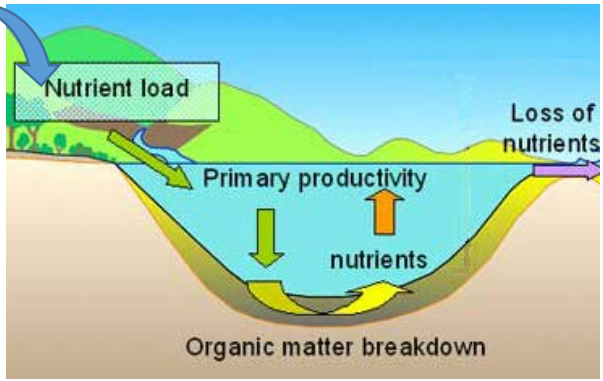
Watershed loading model



- Model Runs from 2006-2014
- Output daily flow, sediment and phosphorus

Lake water quality model

- 2009, 2012 modeled so far
- Output phosphorus, chlorophyll-a, dissolved oxygen, clarity



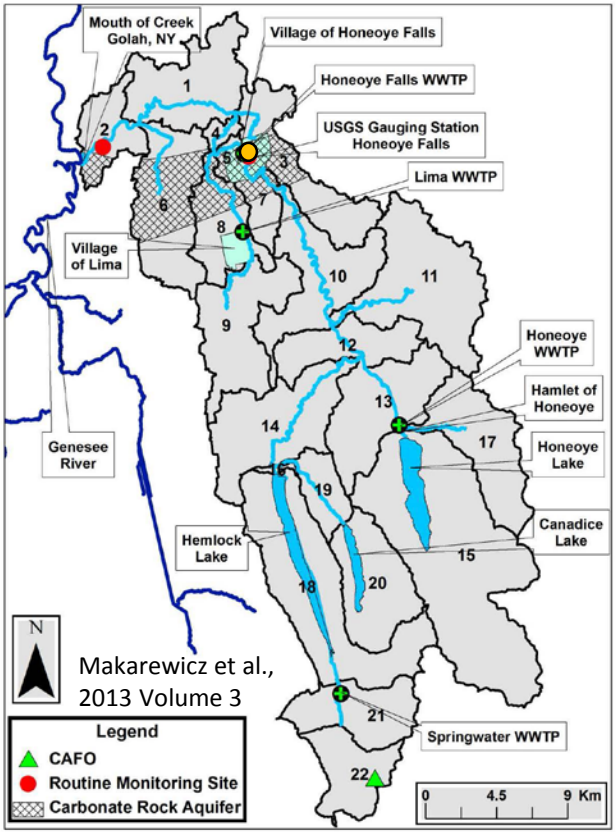
Acknowledgements

Watershed Model Development

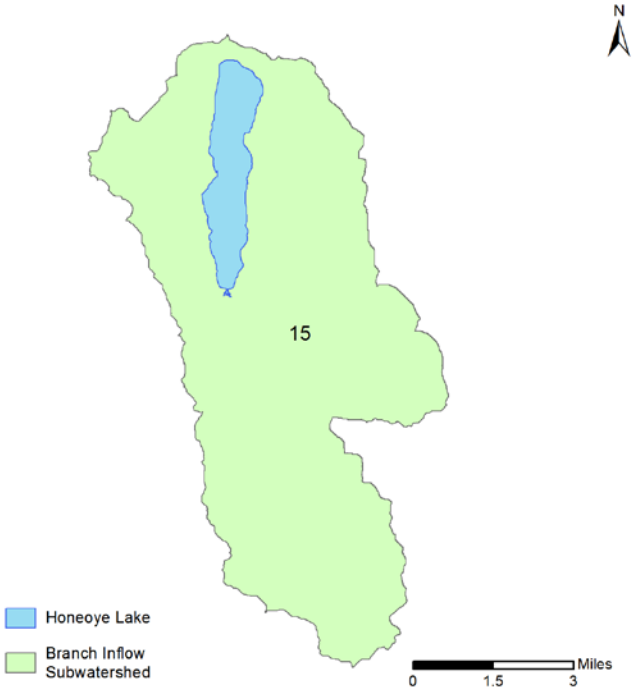
- Professor Joseph C. Makarewicz and students
  - Digital Commons @Brockport: Genesee River Watershed Project
- SUNY College at Brockport
- The Research Foundation for The State University of New York

Watershed model development

- Developed by Dr. Makarewicz and students from SUNY Brockport
- Part of a model of the entire Genesee River basin
- Sampled at Honeoye Falls August 2010 - August 2011
- Limited samples from the outlet had high phosphorus concentrations
- Extended model period to 2014

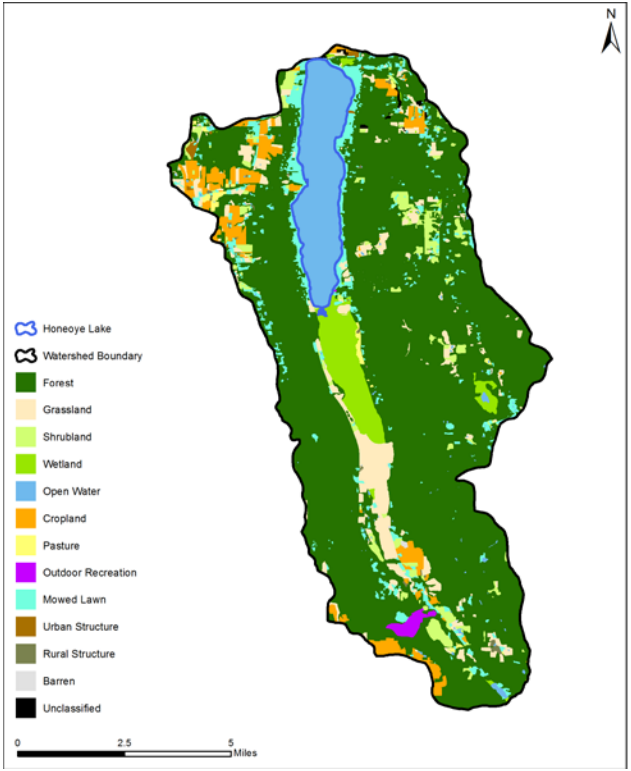


Honeoye Lake watershed model



- 1 sub-basin
- 8 smaller units with similar characteristics
  - Land use
  - Slope
  - Soil type

Land use in the watershed



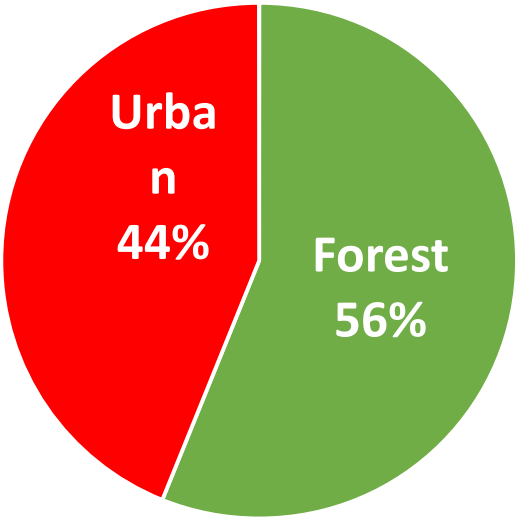
Land Use	% of Watershed
Forest	70%
Open Water	7%
Grassland	6%
Mowed Lawn	5%
Cropland	4%
Wetland	4%
Shrubland	3%
Other	1%

Results are preliminary

Received initial modeling results from contractor last week

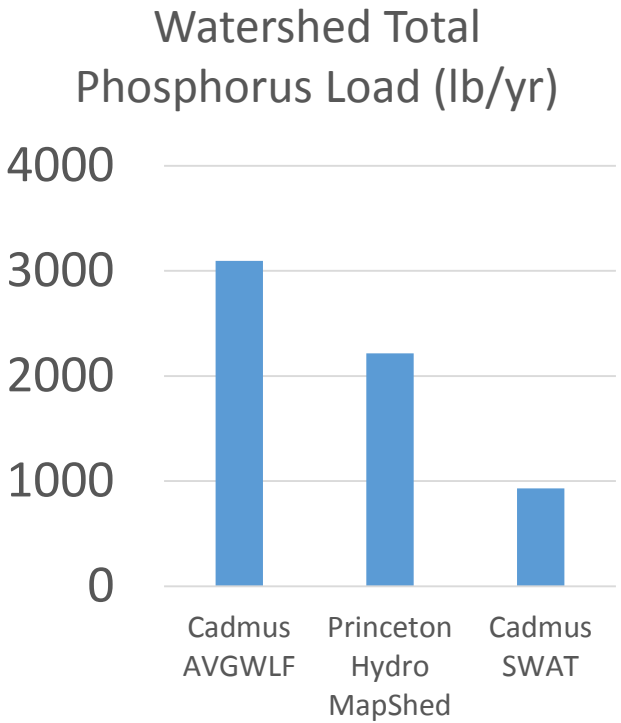
- Still reviewing model inputs and outputs
- Some modifications to the models may be needed
- Likely to model additional years and additional load reduction scenarios

Draft 2006 – 2014 Average Watershed Phosphorus Load



Land Use	Load (lb/yr)
Forest	522
Urban	408
Total	930

Comparing Different Model Results



Three separate models of the Honeoye Lake watershed have been developed

- Expect some differences between models
- Greater than expected, setup of SWAT model needs further investigation

Estimated Septic System Contribution

Most properties along lake shore on municipal sewer

From sewer service area maps and tax parcel data:

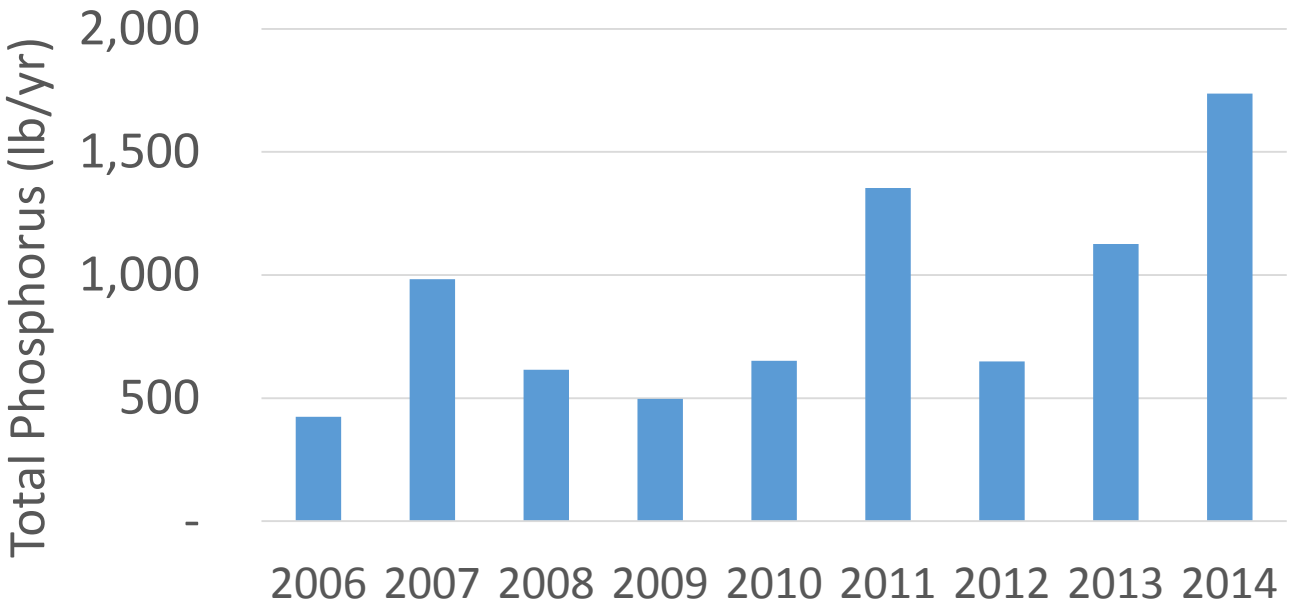
- Approximately 591 residential properties with septic systems in watershed
- About 126 (19%) are within 250 feet of a stream

Estimated contribution:

- 125 lb/yr
- ~13% of watershed load

May be a source sector to investigating further

Draft 2006 to 2014 Watershed Phosphorus Loads



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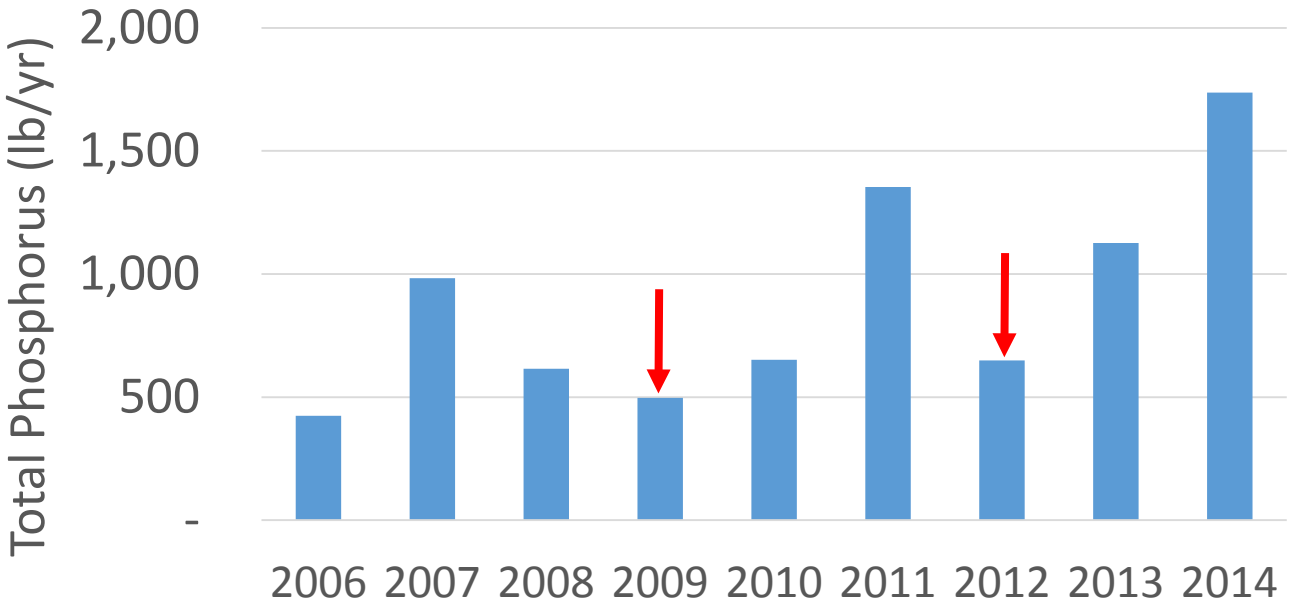
Draft 2006 to 2014 Watershed Phosphorus Loads



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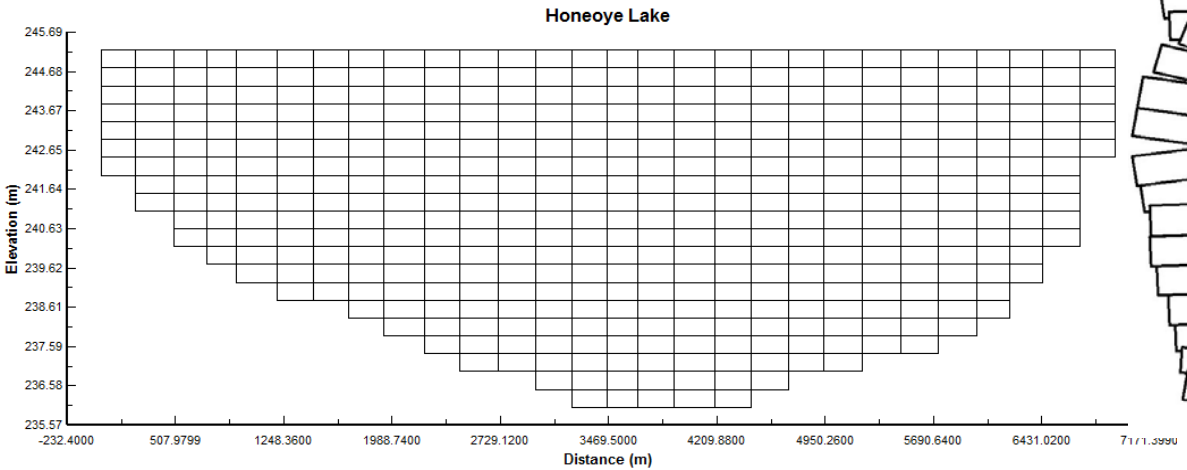
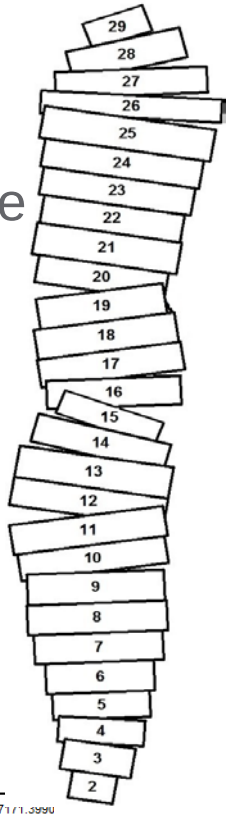
Honeoye Lake Model

2014 Bathymetric survey

- 28 Longitudinal segments 650 – 900 ft wide
- 20 vertical layers 1.5 ft thick
- Laterally averaged





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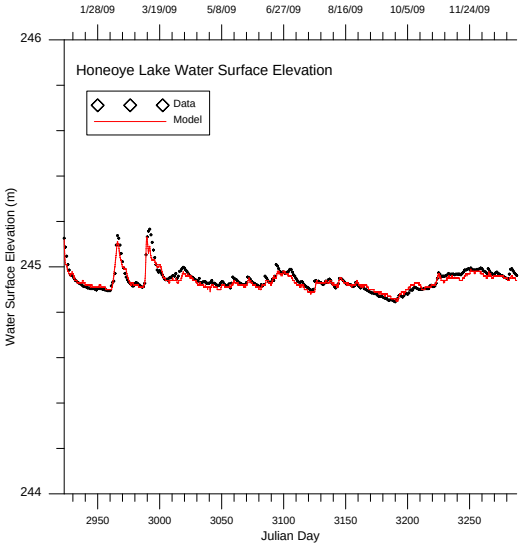
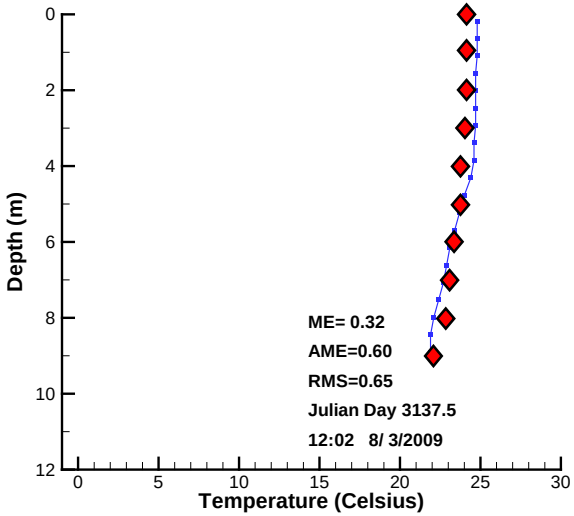
Draft Lake Model Predictions



2009 Water Balance



Temperature

August 3, 2009

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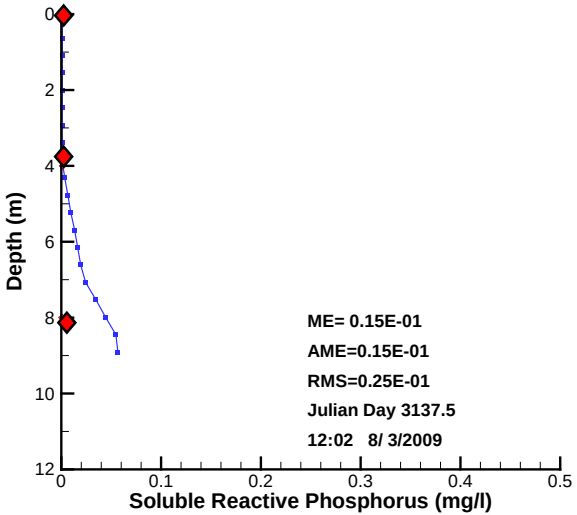
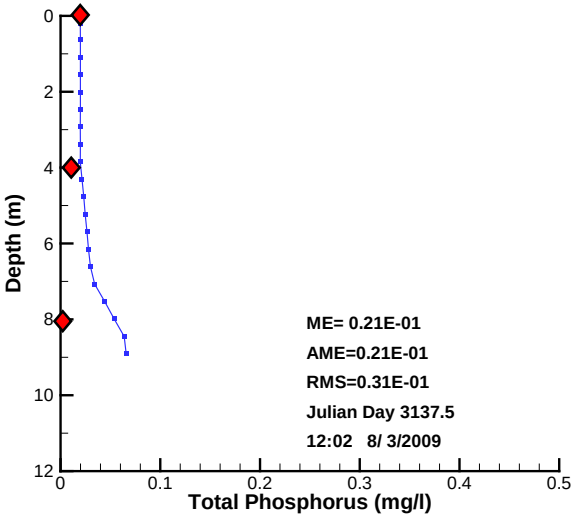
Draft Lake Model Predictions



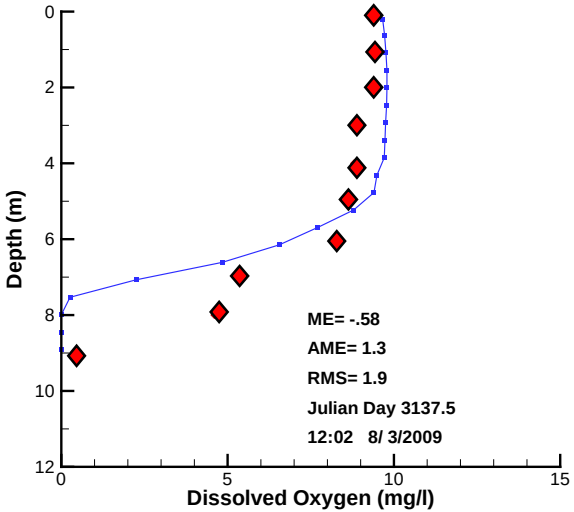
Soluble Reactive Phosphorus

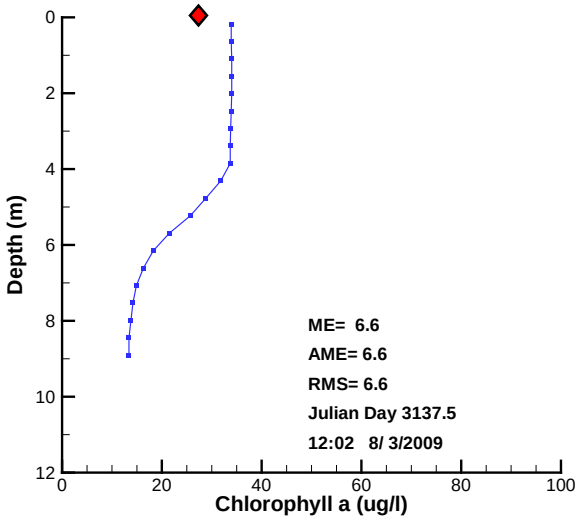


Total Phosphorus

August 3, 2009

Draft Lake Model Predictions





Dissolved Oxygen

Chlorophyll-a

August 3, 2009

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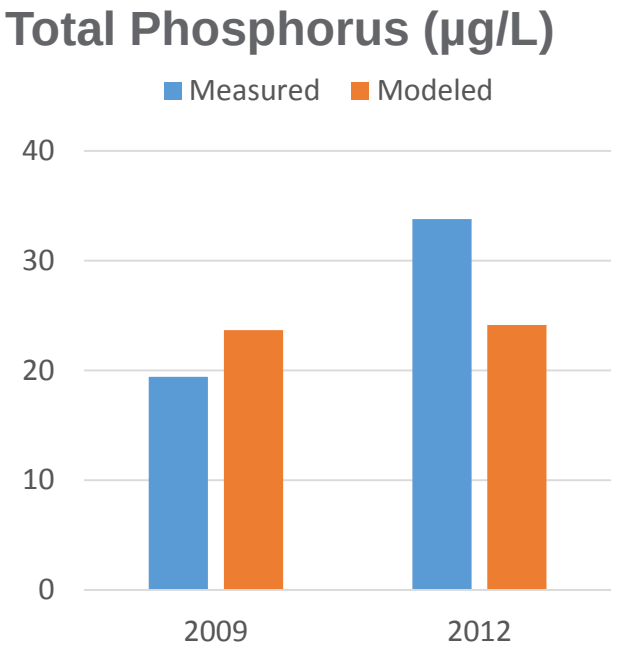
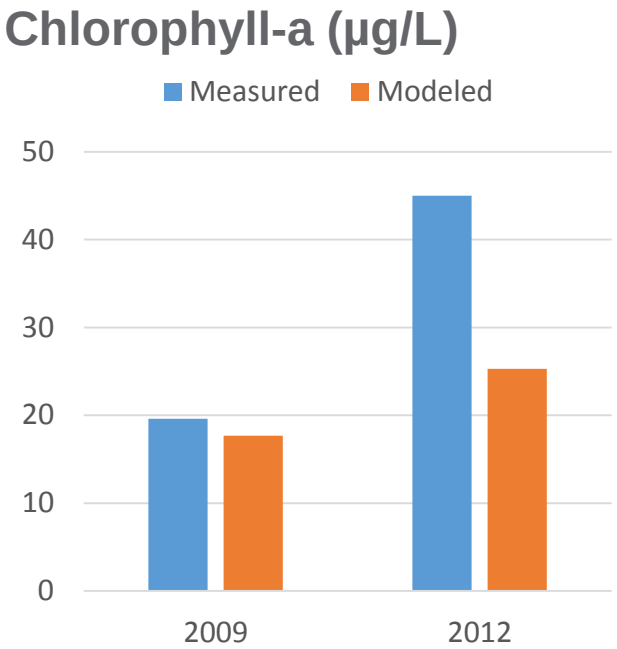
Draft 2009 and 2012 Average Lake Model Output





Draft Internal Loading

Oxic – aerobic decomposition of organic matter that settles to sediment surface (e.g. oak leaves)

- 3,878 lb/yr

Anoxic – release of sediment bound phosphorus under low dissolved oxygen conditions

- 1,678 lb/yr

Suggests a system dominated by internal loading

- **Model input and assumptions need to be scrutinized further**

Draft Reference Watershed Conditions

Use model to simulate undisturbed watershed conditions by replacing urban and agricultural lands with forest

- Reduce watershed load to 527 lb/yr (43% reduction)
- Reduce sediment oxygen demand to zero
- Reduce initial TP to 10 µg/L

	Total Phosphorus (µg/L)	Chlorophyll-a (µg/L)
2009	7.95	6.22
2012	8.58	8.33

Dissolved Oxygen in Honeoye Lake Draft Results

Current water quality standards

- Minimum daily average not less than 5.0 mg/L
- At no time less than 4.0 mg/L

Surface waters

- Water Quality Standards met in all scenarios

Bottom waters

- Water Quality Standards not under current or reference conditions

Some degree of low dissolved oxygen is natural

- Need to investigate impact of phosphorus further

Draft Loading Capacity Analysis

Reduce watershed loads until water quality target is met

- Maximum watershed load = 714 lb/yr
- Substantial reduction of internal load

	2009	2012
Chlorophyll-a	4.0	Greater than 4.0

Target is 4 mg/L chlorophyll-a on average

- Need to consider other years
- This loading capacity may be too conservative

Draft Load Reduction Needed

TP Load (lb/yr)	Current	Proposed Allocation
Watershed Load	930	643
Internal – Oxic	3,878	
Internal – Anoxic	1,668	
Margin of Safety (10%)		71
Total	6,476	714

- Estimated 31% watershed load reduction
- Endpoint refinement may change these numbers

Load Reduction Implementation

- Develop a strategy to achieve the phosphorus reductions needed

- Conference call with partners key to implementation:
  - Honeoye Lake Watershed Task Force
  - Ontario County Planning Department
  - Ontario County Soil & Water Conservation District

- Review what has already been done
- Generate ideas for projects likely to be implemented

Potential Projects

- Rain garden & informational kiosk
- Homeowners guide
- Stream bank erosion
- Storm water detention ponds
- Roadside ditch erosion control
- Debris and sediment control basins (WQIP 11)
- Internal load controls (oxygenation)
- Residue management/ Plowing patterns
- Stream/shoreline buffers on agricultural & residential lands
- Vernal pool creation
- Retention basin on publicly owned land
- Curtis Road subdivision runoff control

Potential Projects – Honeoye Inlet Wildlife Management Area

Honeoye Inlet significant contributor of phosphorus and sediment

- Floodplain wetland adjacent to stream
- Return meander to stream
- Grade control due to stream bank incision
- Divert flow out of drainage ditches onto adjacent land, creating vernal pools
- Backwater wetland for pollutant removal and flow attenuation during high flows

Estimated to substantially reduce Honeoye Inlet phosphorus and sediment contributions to Honeoye Lake

Where are we in the process?

1. Information gathering
   - Gather and review existing data and reports
2. Model development
   - Calibrate and validate
   - Compare results to existing data
3. Model execution
   - Historic conditions
   - Current conditions
   - Restoration scenarios
4. Draft Report
   - 9 element watershed plan
   - Problem description
   - Current loading
   - Load allocations
   - Implementation plan
5. Public Review and Comment
   - Public meeting
   - Comment period
6. Revisions and Submit to USEPA

Next Steps

- Continue analyzing model results
- Conduct additional model runs if needed
- Draft an implementation plan

- Rough schedule
  - Draft document due from contractor in late 2015
  - 30 day public comment period
  - Final documents 2016
  - EPA approval

Discussion and Questions

Thank You

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