NEW YORK
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Department of
Environmental
Conservation

Update to the Stakeholders

Conesus Lake TMDL and Watershed Plan

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NYSDEC Division of Water

August 25, 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 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:

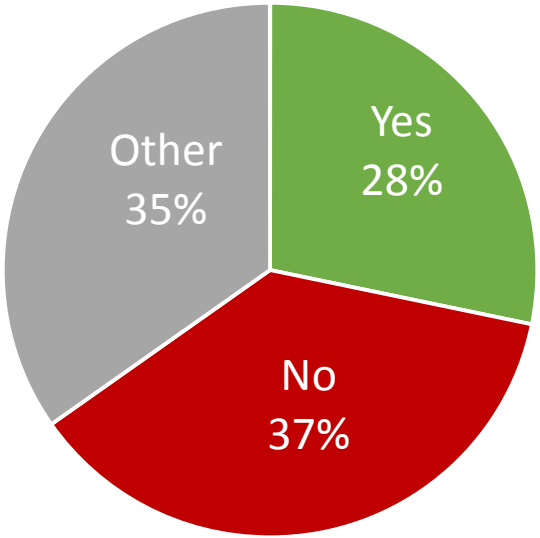
- Swimming
- Boating
- Fishing
- Aesthetics

Other uses noted:

- Water supply
- Duck & goose hunting
- Youth camp

Survey Results

Are you able to use the lake as desired?



Other: yes except when weeds/algae blooms

Survey Results

Are some areas worse than others?

1. **North end**
2. Coves/harbors
3. Long & McPherson Points
4. Shoreline (aquatic plants)
5. South

Survey Results

What prevents you from using the lake as desired?

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

Survey Results

What do you think is the source of the problem?

1. Runoff from roads, construction sites, lawns, crops
2. Pollution from pipes, ditches, containers or wells
3. Other
   - Invasive species, historic sediment, over use, over development, sewage overflows, farms, temperature
4. Septic systems
5. Fertilizer
6. Lake processes
7. Animals
8. Not sure

Survey Results

46 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)
  - 72% of people not able to use as desired
- Major impairments are known
  - Uses impacted by other causes as well

People know what the important sources of pollution are

How did we get here?

- Conesus 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

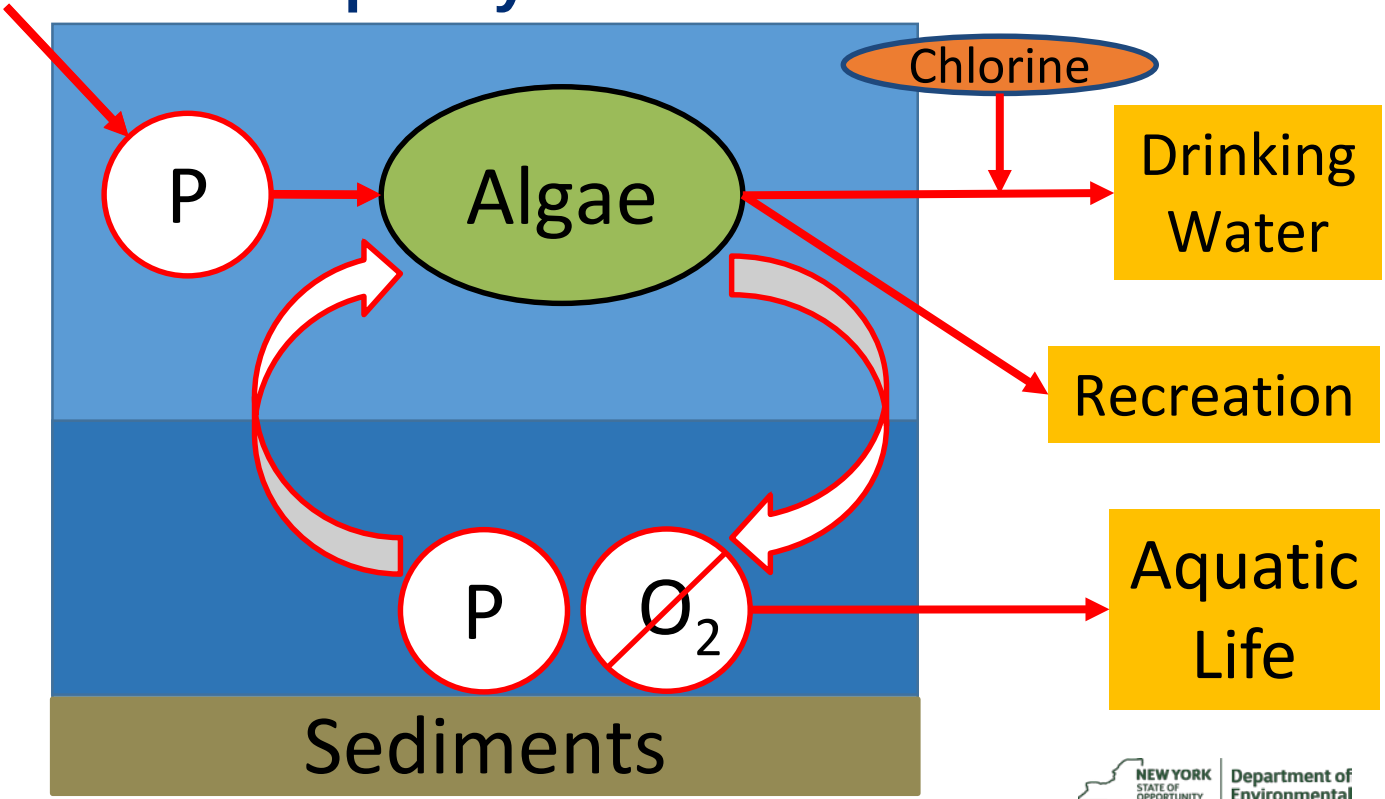
Understanding Total Maximum Daily Loads (TMDLs)

- Required when Water Quality Standards (WQS) not met
- Results in a plan to reduce pollutant loads and restore water quality

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 Conesus 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

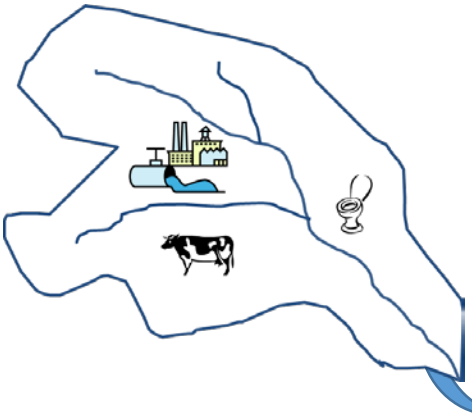
Selecting an Endpoint

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

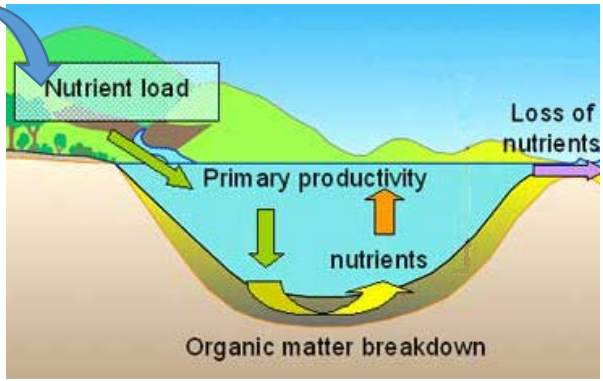
Watershed loading model



- Modeled 2006 to 2014
- Output daily flow, sediment and phosphorus

Lake water quality model

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



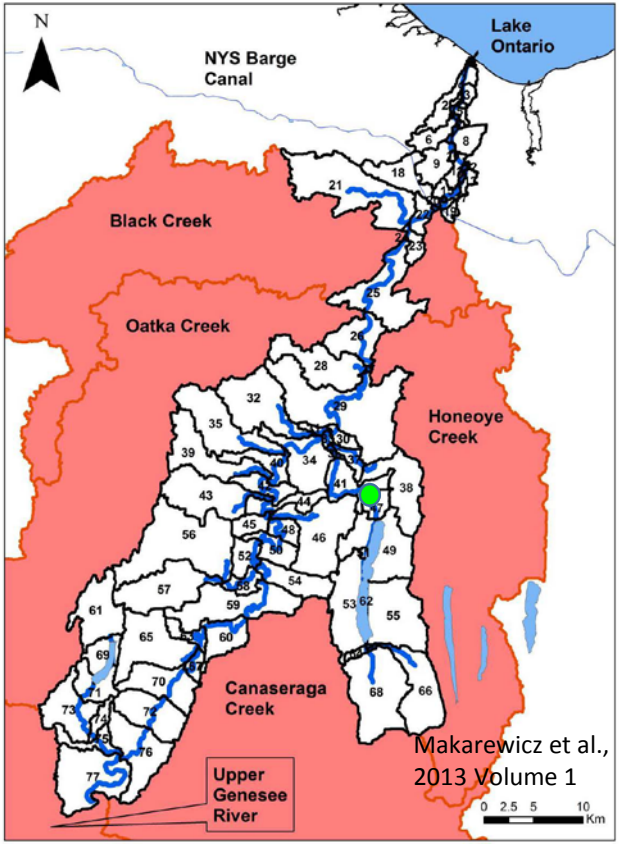
Acknowledgements

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

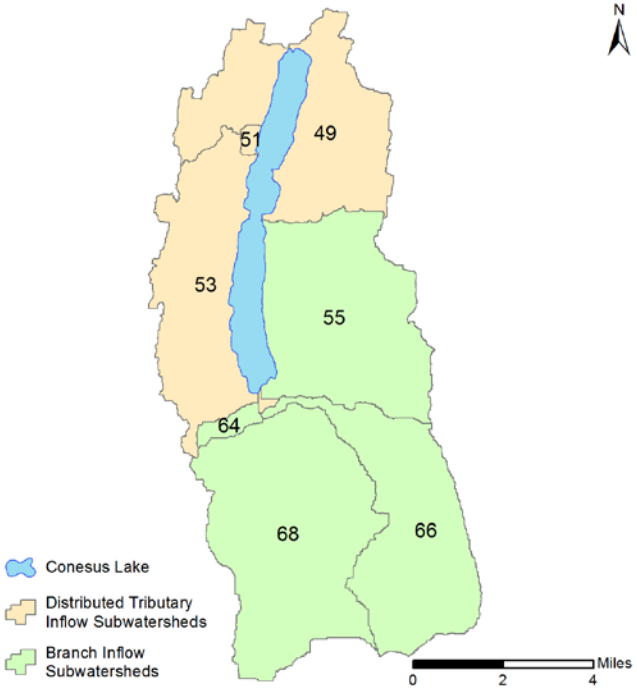
Watershed model development

- Developed by Dr. Makarewicz and students from SUNY Brockport
- Part of a model of the entire Genesee River basin
- Sampled Conesus Creek (Rt. 256 at Rt. 15) from August 2010 – August 2011
- Of the tributaries monitored Conesus Creek had highest annual average phosphorus concentrations (SRP & TP)
- Extended model period to 2014



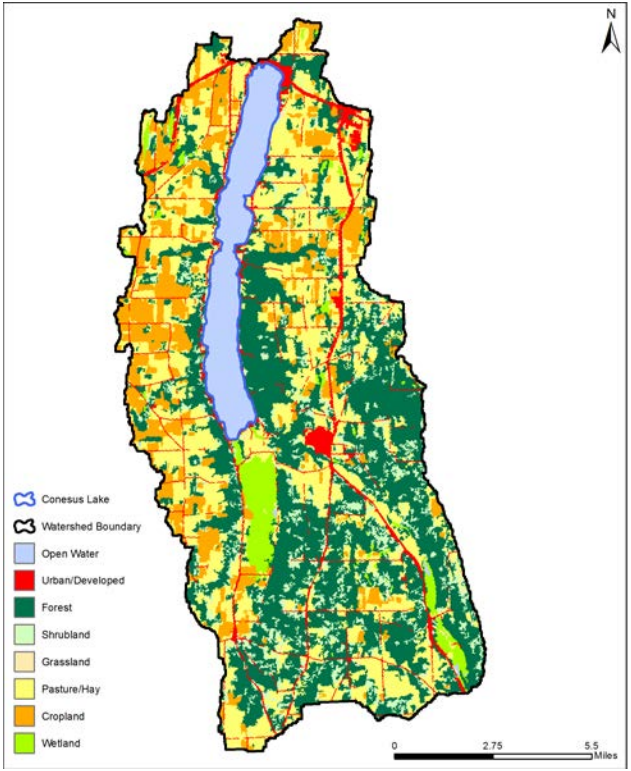
Makarewicz et al., 2013 Volume 1

Conesus Lake watershed model



- 8 sub-basins
- 628 smaller units with similar characteristics
  - Land use
  - Slope
  - Soil type

Land Use in the Watershed



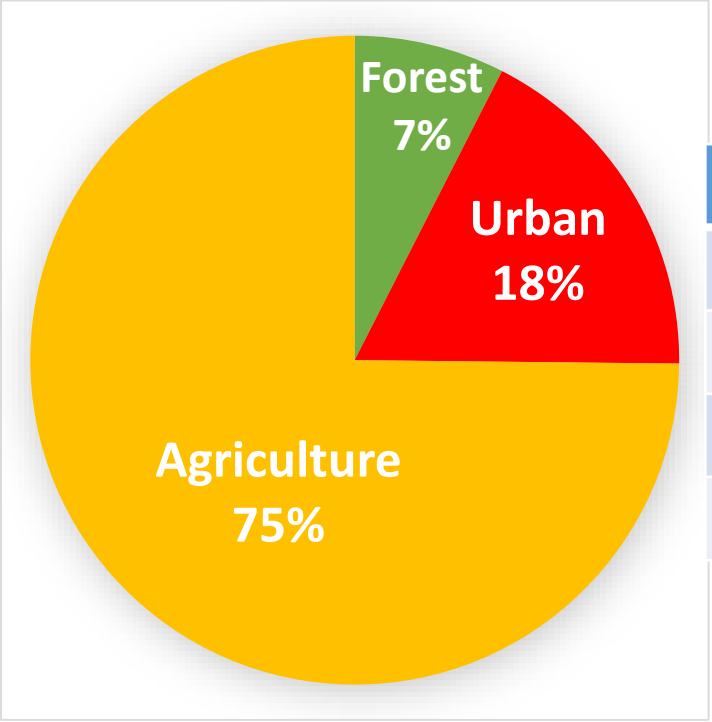
Land Use	% of Watershed
Forest	34%
Pasture/Hay	28%
Cropland	13%
Shrubland	8%
Open Water	7%
Urban	6%
Wetland	4%
Grassland	0.5%

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	708
Urban	1,667
Agriculture	7,059
Total	9,433

Estimated Septic System Contribution

Most properties along lake shore on municipal sewer

From sewer service area maps and tax parcel data:

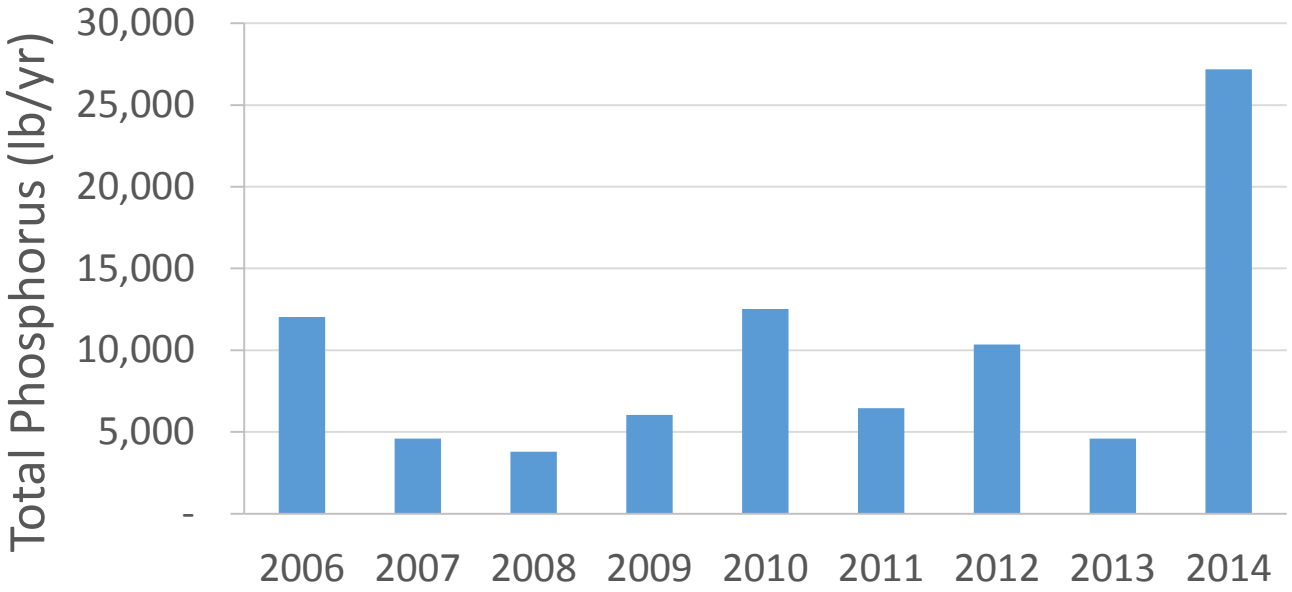
- Approximately 1,716 residential properties with septic systems in the watershed
- About 329 (19%) are within 250 feet of a stream

Estimated contribution:

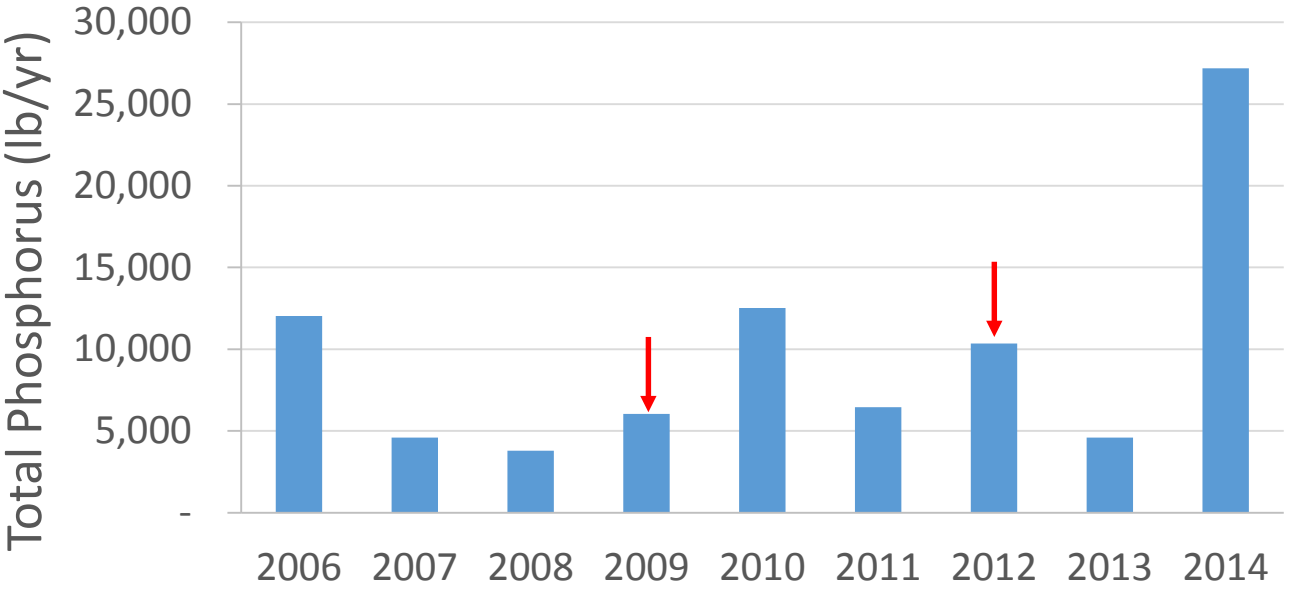
- 323 lb/yr
- ~3% of watershed load

Livingston County maintains a permit system and responds to complaints

Draft 2006 to 2014 Watershed Phosphorus Loads



Draft 2006 to 2014 Watershed Phosphorus Loads



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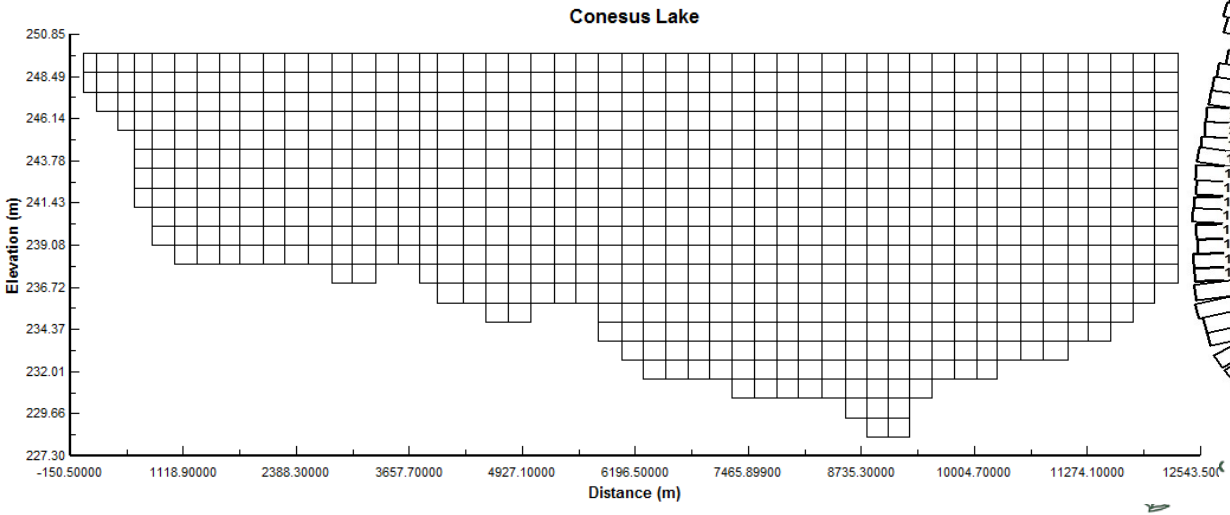
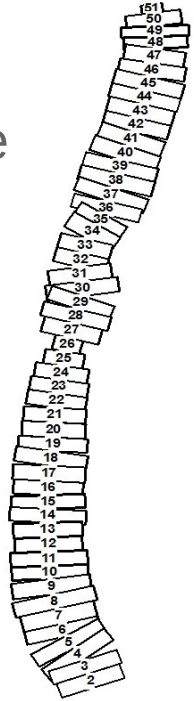
Conesus Lake Model

2009 Bathymetric survey

- 50 Longitudinal segments 500 – 900 ft wide
- 20 vertical layers 3.5 ft thick
- Laterally averaged





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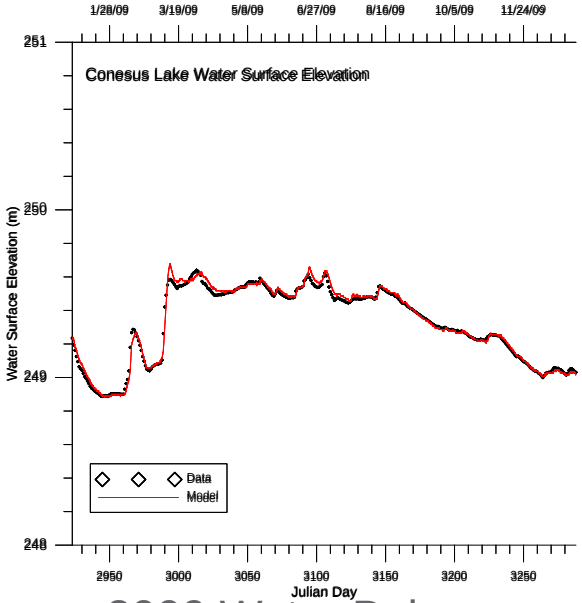
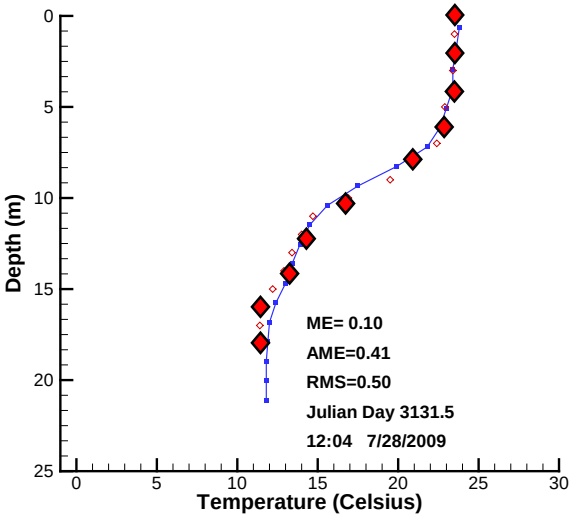
Draft Lake Model Predictions



2009 Water Balance



Temperature
July 28, 2009

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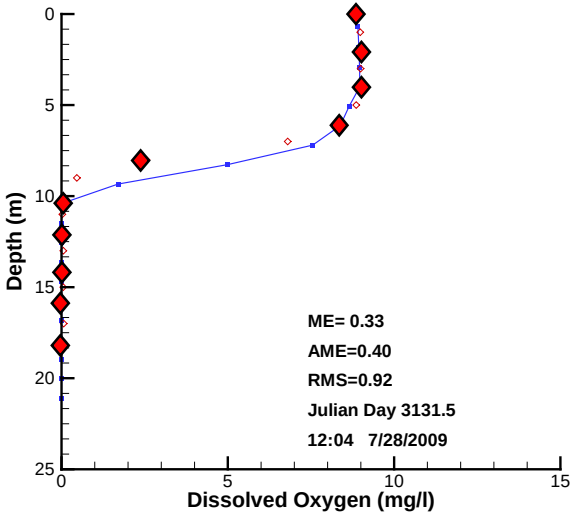
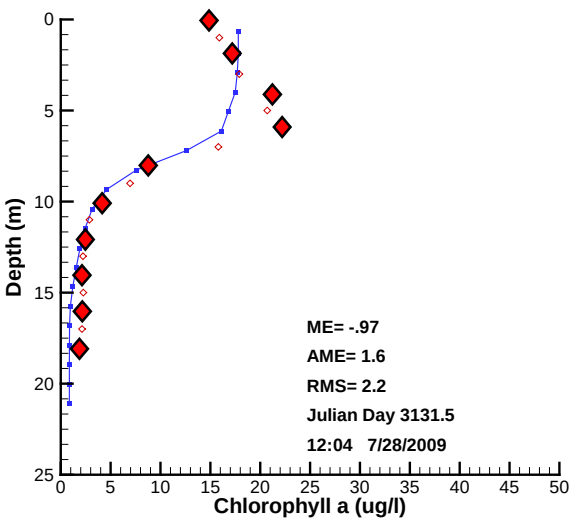
Draft Lake Model Predictions

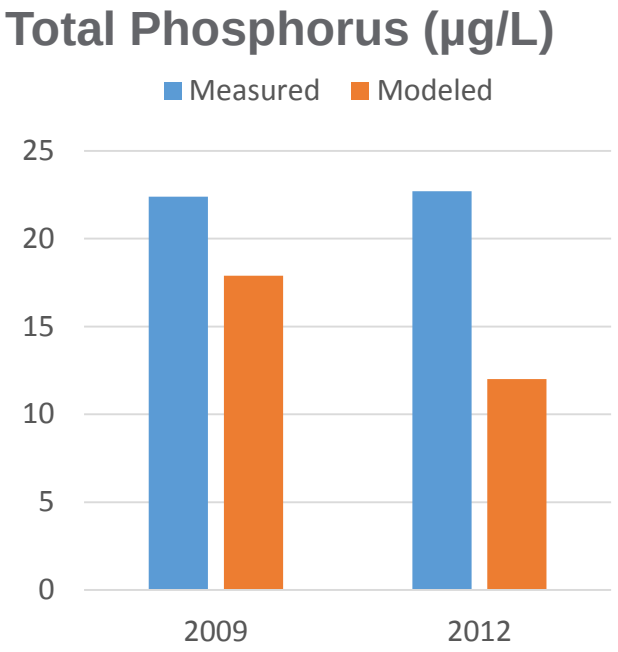


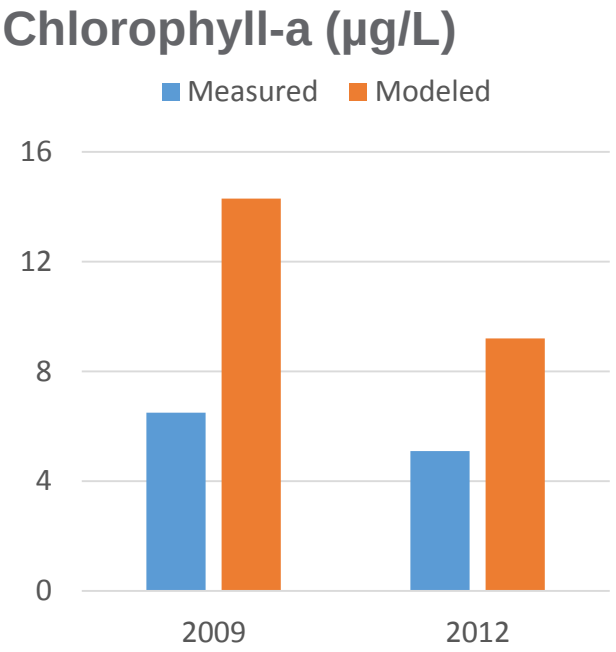


Dissolved Oxygen Chlorophyll-a

July 28, 2009

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)

- 8,907 lb/yr

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

- 26,914 lb/yr
- Need to compare against estimates used in alum EIS

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

- Reduced watershed load to 1975 lb/yr (79% reduction)
- Reduced sediment oxygen demand to zero

	Total Phosphorus (µg/L)	Chlorophyll-a (µg/L)
2009	11.53	3.95
2012	8.05	1.65

Dissolved Oxygen in Conesus 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 met 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 = 2,249 lb/yr
- Substantial reduction of internal load

	2009	2012
Chlorophyll-a	4.0	1.8

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	9,433	2,024
Internal – Oxic	8,907	
Internal – Anoxic	26,914	
Margin of Safety (10%)		225
Total	45,254	2,249

- Estimated 79% 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:
  - Livingston County Planning Department
  - Livingston County Water & Sewer Authority
  - Livingston County Soil & Water Conservation District

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

Potential Projects

- **Residue cover management**
- **Field borders/buffers**
- **Cover crops**
- Terracing
- Diversions
- Water retention basins

- Sewer extension
  - Lacks local support
  - Isolated areas with difficult access
- Overflows being studied

- Urban stormwater management
- Rain gardens
- Other green infrastructure
- Landowner education

- Stream bank restoration (ongoing)
- Road ditch hydroseeding

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 as 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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