

# Water Quality in the Upper Oak Orchard Creek Watershed

Jim Gerek & George Thomas – CEI

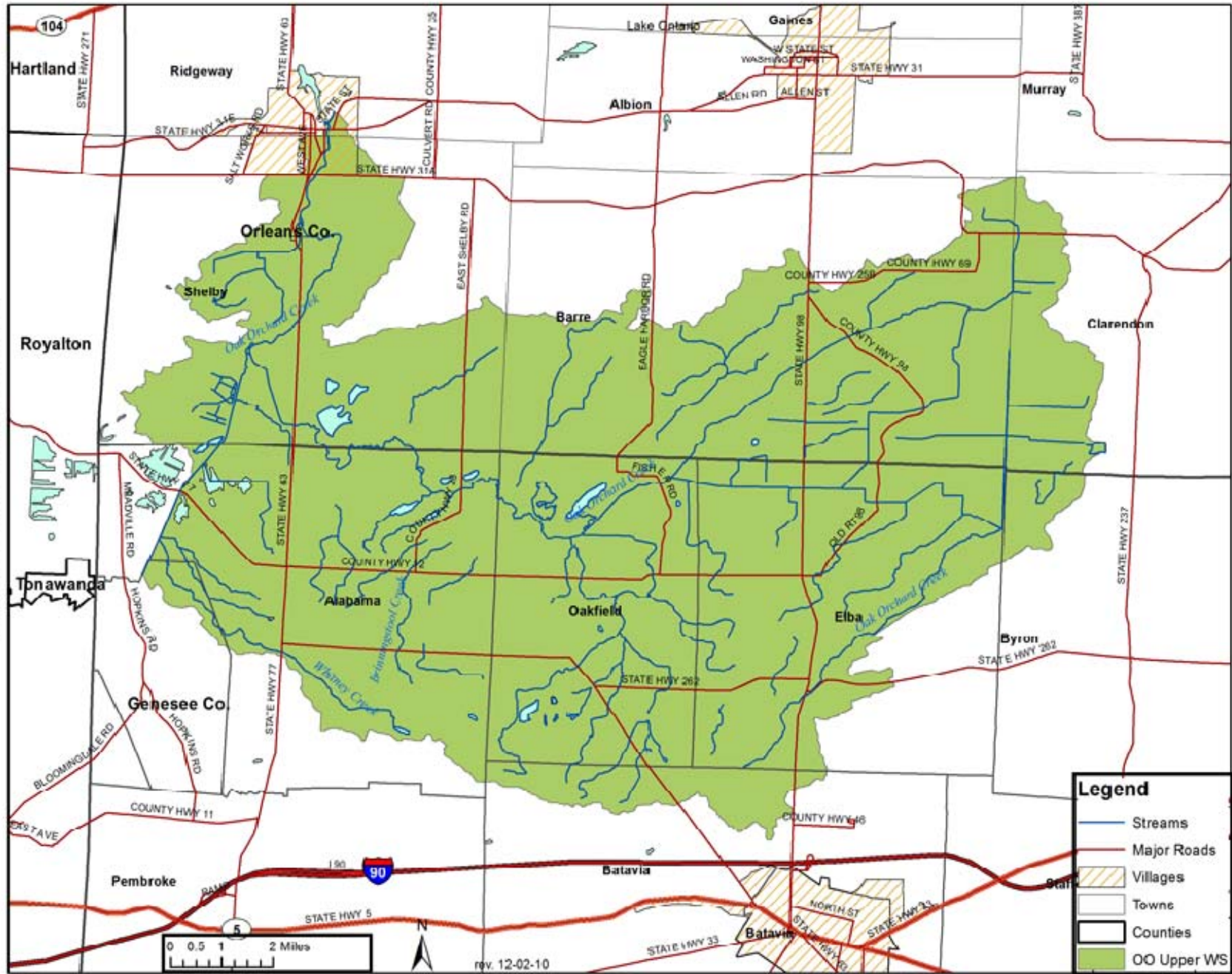
Ron Entringer - NYSDEC

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Orleans Cooperative Extension



Upper Oak Orchard Watershed



rev. 12-02-10

# Water Quality in the Upper Oak Orchard Creek Watershed

## Agenda

- Introduction to CEI
- Project Overview
- TMDL Basics
- Upper Oak Orchard Creek Water Quality Monitoring Data
- Major Upper Oak Orchard Creek Modeling Inputs
- Modeled Sources of Phosphorus in Upper Oak Orchard Creek
- Potential Water Quality Restoration Strategies
- Questions, Feedback and Discussion
- Next Steps

# Water Quality in the Upper Oak Orchard Creek Watershed

## Introduction to CEI

- Center for Environmental Information
  - Rochester-based not-for-profit, established 1974
  - Works to educate, collaborate, facilitate
  - Houses a variety of professional environmental expertise
- CEI is a partner in LOCI  
(the Lake Ontario Coastal Initiative)
- See: <http://www.ceinfo.org/> for more info

# Water Quality in the Upper Oak Orchard Creek Watershed

## Project Overview

- Lake Ontario Basin TMDL Planning (Phase 1)
- Complex administrative structure:
  - Funded by American Recovery and Reinvestment Act (ARRA)
  - Driven by the federal Clean Water Act (CWA) Section 604(b)
  - Sponsored by the NYS DEC
  - CEI is subcontracted to the Great Lakes Commission (GLC)
- Two-year project 2010-2011

# Water Quality in the Upper Oak Orchard Creek Watershed

## Project Overview

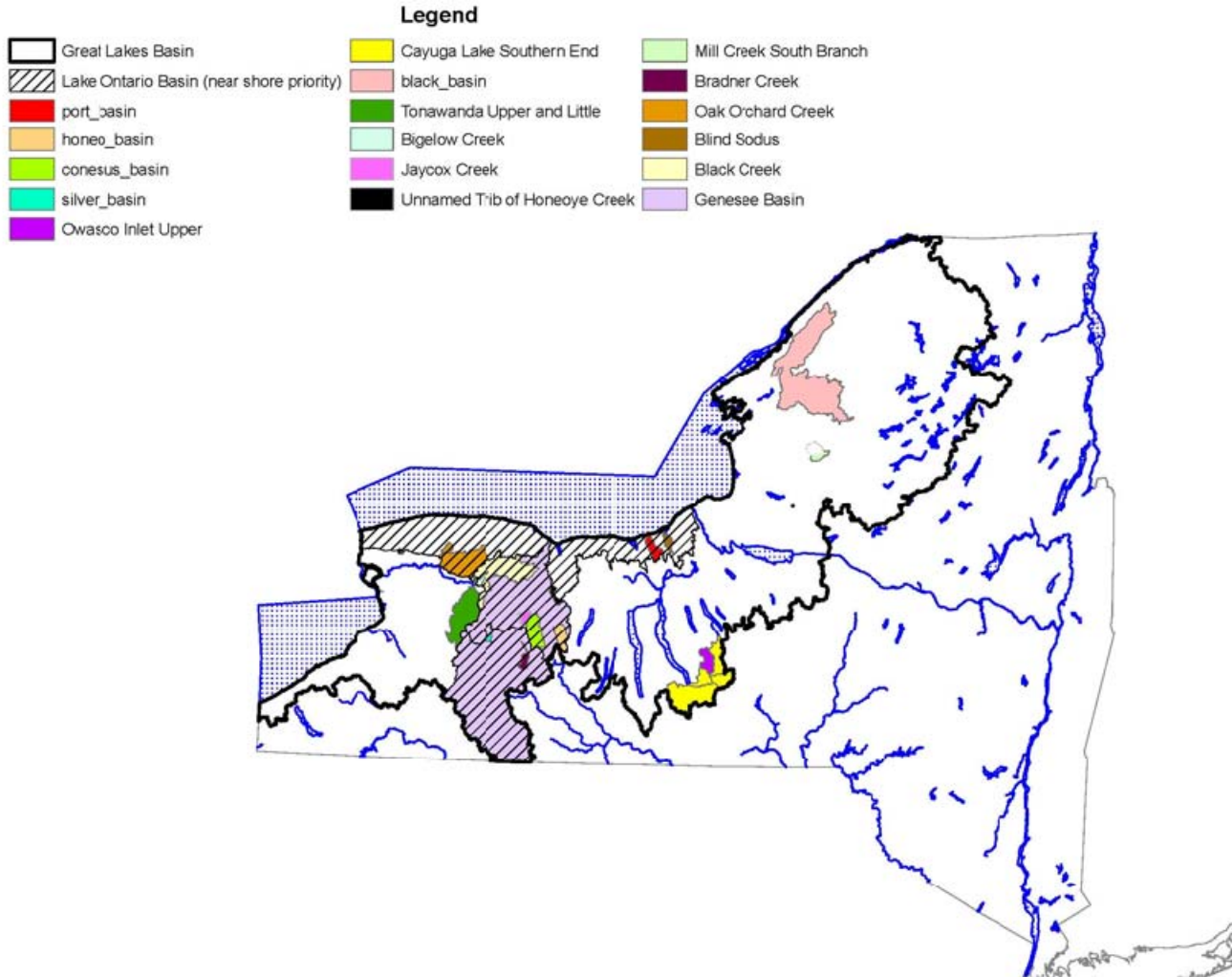
- Focusing on 7 separate watersheds in Western New York, including:
  - Upper Oak Orchard Creek
  - Not Directly on Lower Oak Orchard Creek
- Watersheds chosen by NYSDEC because their water quality is considered impaired
- Goal is to improve stream water quality to its “highest and best use”

# Water Quality in the Upper Oak Orchard Creek Watershed

## TMDL Basics

- Total Maximum Daily Load
  - Scientifically-derived amount of a pollutant that a waterbody can assimilate without impairment
  - Requires a numeric water quality endpoint/criteria
    - Narrative standard– “none in amounts that will impair use”
- What drives a TMDL requirement?
  1. Inclusion on NY Priority Waterbodies List (PWL)
  2. Previous evaluation of stream health
  3. Inclusion on state 303(d) list of Impaired Waters

# Water Quality in the Upper Oak Orchard Creek Watershed TMDL Basics





# Water Quality in the Upper Oak Orchard Creek Watershed

## TMDL Basics

- The 2010 303(d) List includes:
  - Upper Oak Orchard Creek
    - Due to Nutrients (phosphorus) from agriculture
- Once listed, a stream requires:
  - A TMDL determination,
  - Further study, or
  - Delisting – no longer considered impaired

# Water Quality in the Upper Oak Orchard Creek Watershed

## TMDL Basics

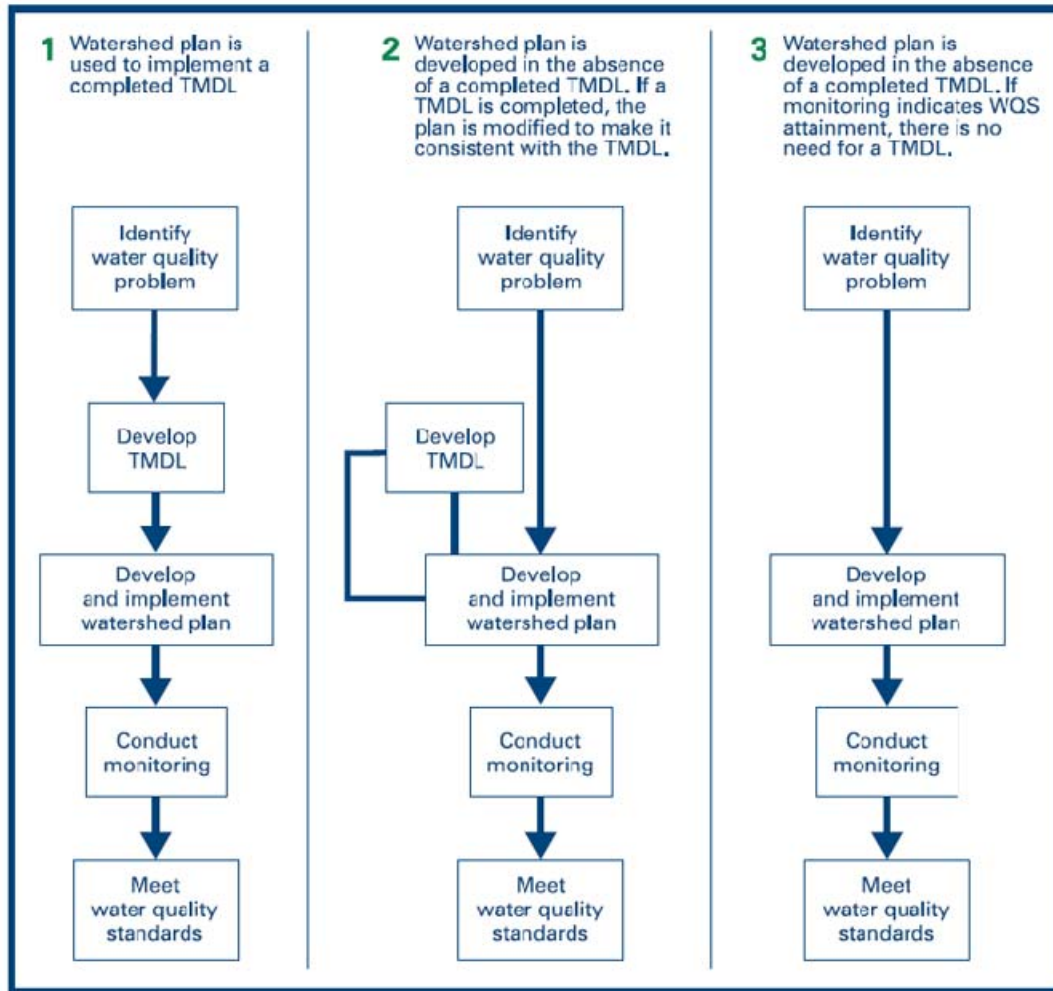


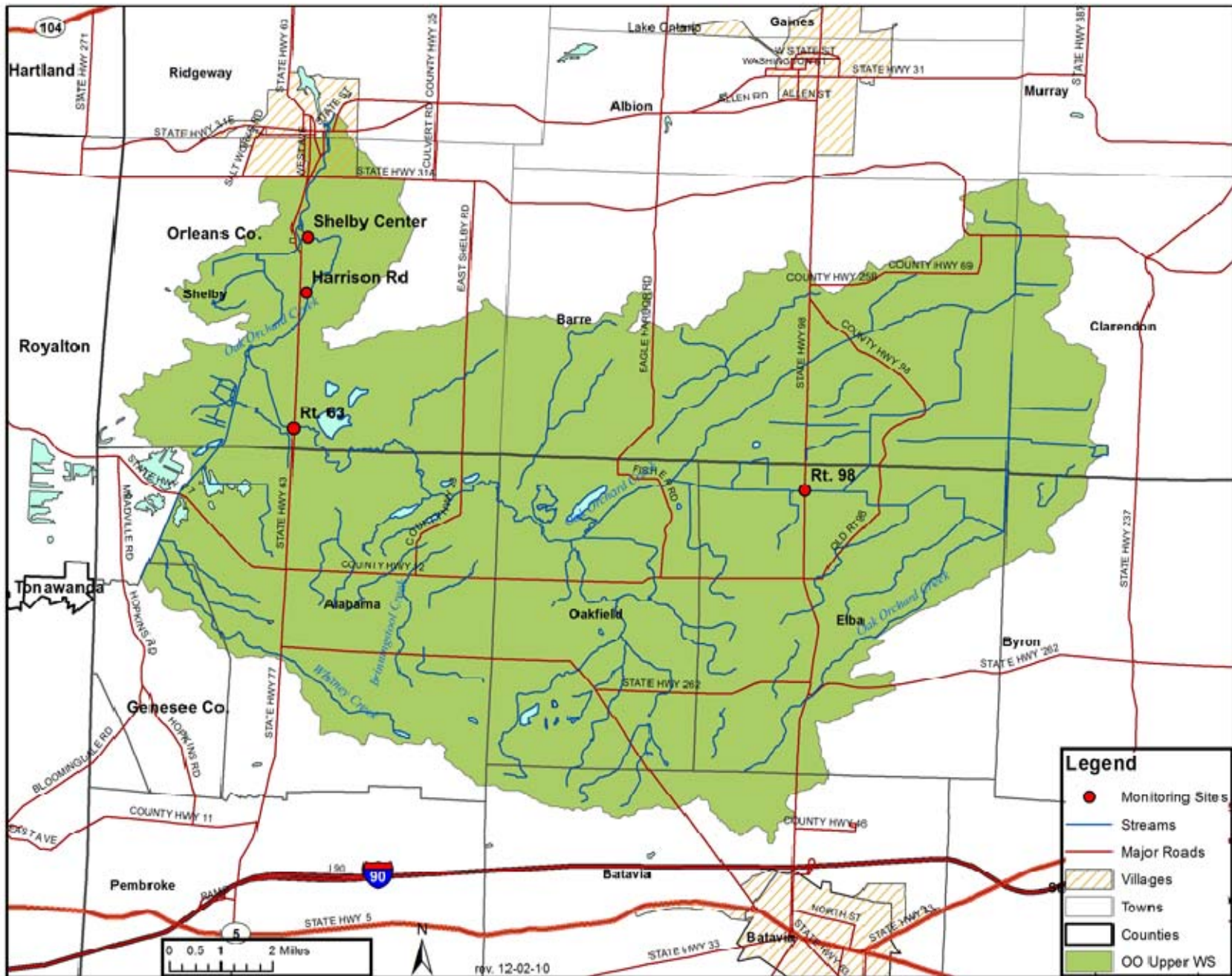
Figure 2-2. Potential Relationships Between TMDLs and Watershed Plans

Water Quality in the Upper Oak Orchard Creek Watershed

# Water Quality Monitoring Data

- Observation/survey of biological condition is used to understand the “health” of a stream
- Water chemistry used as common surrogate
- Setting TMDL requires highest quality data
  - 2010 NYSDEC RIBS Monitoring
  - 2008-2010 NWIS Monitoring
  - 2006-2008 Monitoring done by SUNY Brockport
    - Joseph C. Makarewicz and Theodore W. Lewis
- Other corroborating monitoring data exists

Upper Oak Orchard Watershed Monitoring Sites



# Water Quality in the Upper Oak Orchard Creek Watershed

## Water Quality Monitoring Data

### NYSDEC 2010 RIBS Monitoring

Site Name	Date Collected	Event/ Non- Event	TP ( $\mu\text{g P/L}$ )	SRP ( $\mu\text{g P/L}$ )
OOC - HARRISON ROAD BR.	4/28/2010	NR	177	111
OOC - HARRISON ROAD BR.	5/17/2010	NR	193	138
OOC - HARRISON ROAD BR.	6/16/2010	NR	281	216
OOC - HARRISON ROAD BR.	6/30/2010	NR	360	220
OOC - HARRISON ROAD BR.	7/28/2010	NR	355	285
OOC - HARRISON ROAD BR.	8/17/2010	NR	439	257
OOC - HARRISON ROAD BR.	9/15/2010	NR	319	167
OOC - HARRISON ROAD BR.	10/6/2010	NR	278	198
OOC - HARRISON ROAD BR.	10/26/2010	NR	241	162
<b>Averages</b>			<b>294</b>	<b>195</b>

NR = Not Recorded

# Water Quality in the Upper Oak Orchard Creek Watershed

## Water Quality Monitoring Data

### NWIS 2008-2010 Monitoring

Site Name	Date Collected	Event/ Non-Event	TP ( $\mu\text{g P/L}$ )	SRP ( $\mu\text{g P/L}$ )
Harrison Rd.	11/6/2008	NR	246	176
Harrison Rd.	9/17/2010	NR	348	147
<b>Averages</b>			<b>297</b>	<b>162</b>

NR = Not recorded

# Water Quality in the Upper Oak Orchard Creek Watershed

## Water Quality Monitoring Data

### Makarewicz 2006 -2008 Monitoring

Site Name	Date Collected	Event/ Non-Event	TP ( $\mu\text{g P/L}$ )	SRP ( $\mu\text{g P/L}$ )
Shelby Center	11/17/2006	NR	172.1	100.2
Shelby Center	1/9/2008	NR	124.5	90.6
Shelby Center	4/1/2008	NR	102.4	41.8
<b>Averages</b>			<b>133.0</b>	<b>77.5</b>

NR = Not  
Reported

# Water Quality in the Upper Oak Orchard Creek Watershed

## Water Quality Monitoring Data

### Mucklands

### Makarewicz 2006-2010 Monitoring

Site Name	Date Collected	Event/ Non-Event	TP ( $\mu\text{g P/L}$ )	SRP ( $\mu\text{g P/L}$ )
Rt. 98	11/17/2006	NR	717.5	562.8
Rt. 98	12/1/2006	NR	723.5	466.9
Rt. 98	1/7/2008	NR	412.6	402.3
Rt. 98	1/9/2008	NR	607.7	519.7
Rt. 98	3/20/2008	NR	584.4	577.5
Rt. 98	4/1/2008	NR	689.9	504.1
<b>Averages</b>			<b>622.6</b>	<b>505.6</b>

NR = Not  
Reported



## Water Quality in the Upper Oak Orchard Creek Watershed

# Major Modeling Inputs

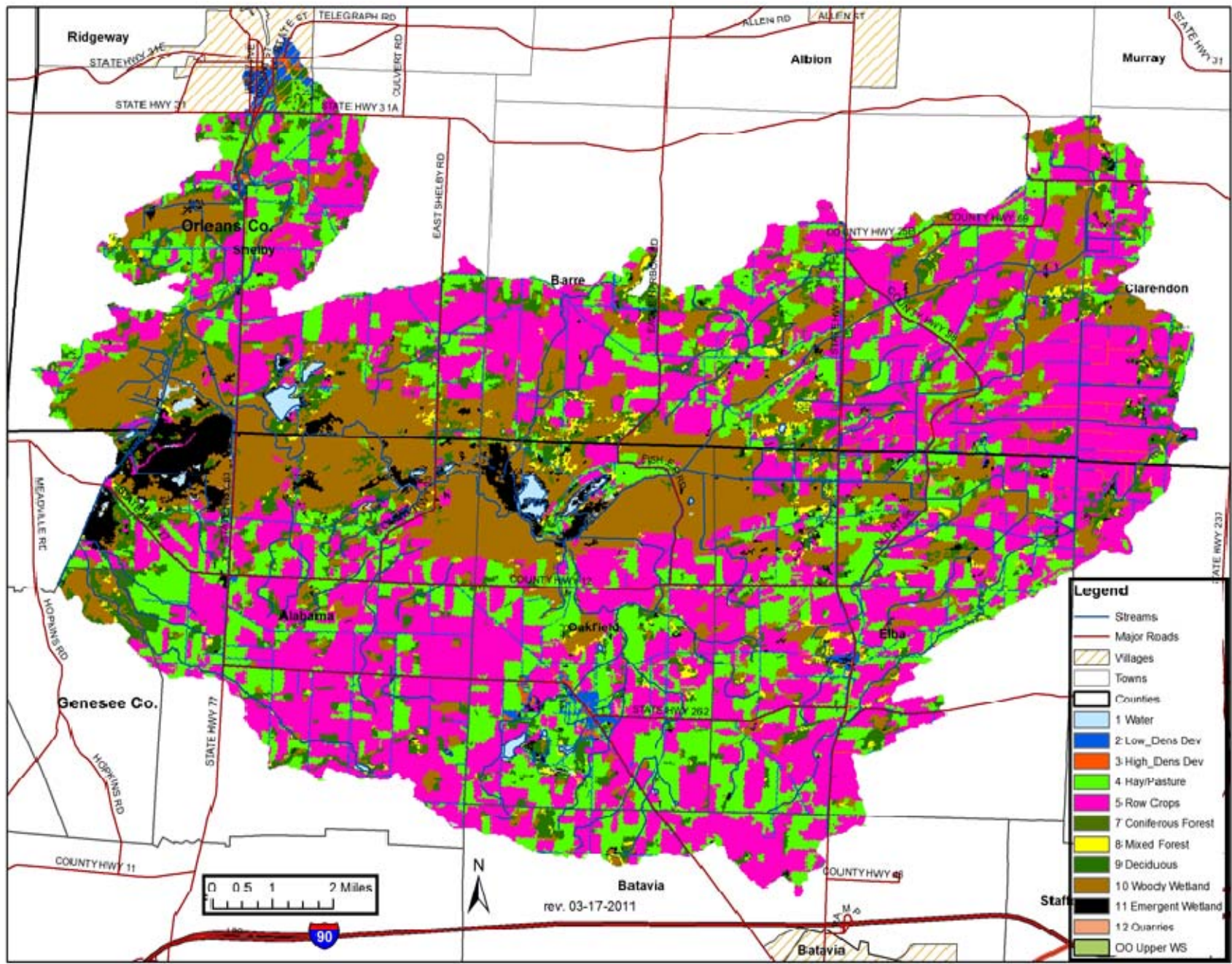
- CEI has chosen to use the AVGWLF model
  - ArcView Generalized Watershed Loading Function
  - Developed by PSIEE – Dr. Barry Evans
- Model requires specific information on:
  - Physical parameters of watershed
  - Weather
  - Potential point and non-point sources of pollution
- Real flow and water quality data at Churchville used for model calibration

## Water Quality in the Upper Oak Orchard Creek Watershed

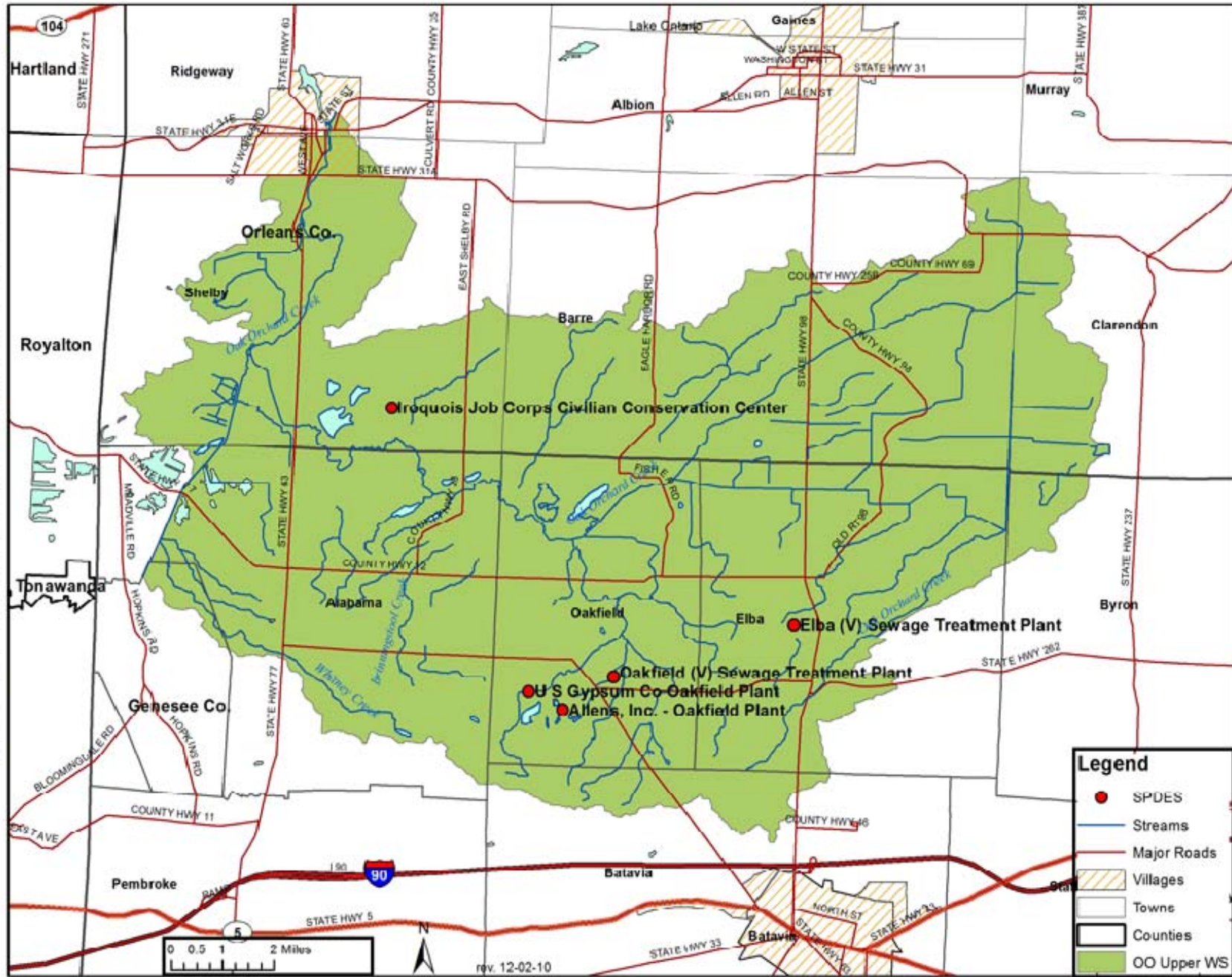
# Major Modeling Inputs

- CEI has collected best Upper Oak Orchard Creek Data on:
  - Watershed boundaries
  - Land area draining through wetlands/lakes
  - Land cover/use
  - Tile drain density (prevalence of use)
  - CAFOs – Dairy and Beef
  - Agricultural Best Management Practices (BMPs)
  - SPDES permits – Municipal and Private
  - Septic Systems

Oak Orchard Upper Watershed Land Use - NLCD 2006



Upper Oak Orchard Watershed Significant SPDES Sites



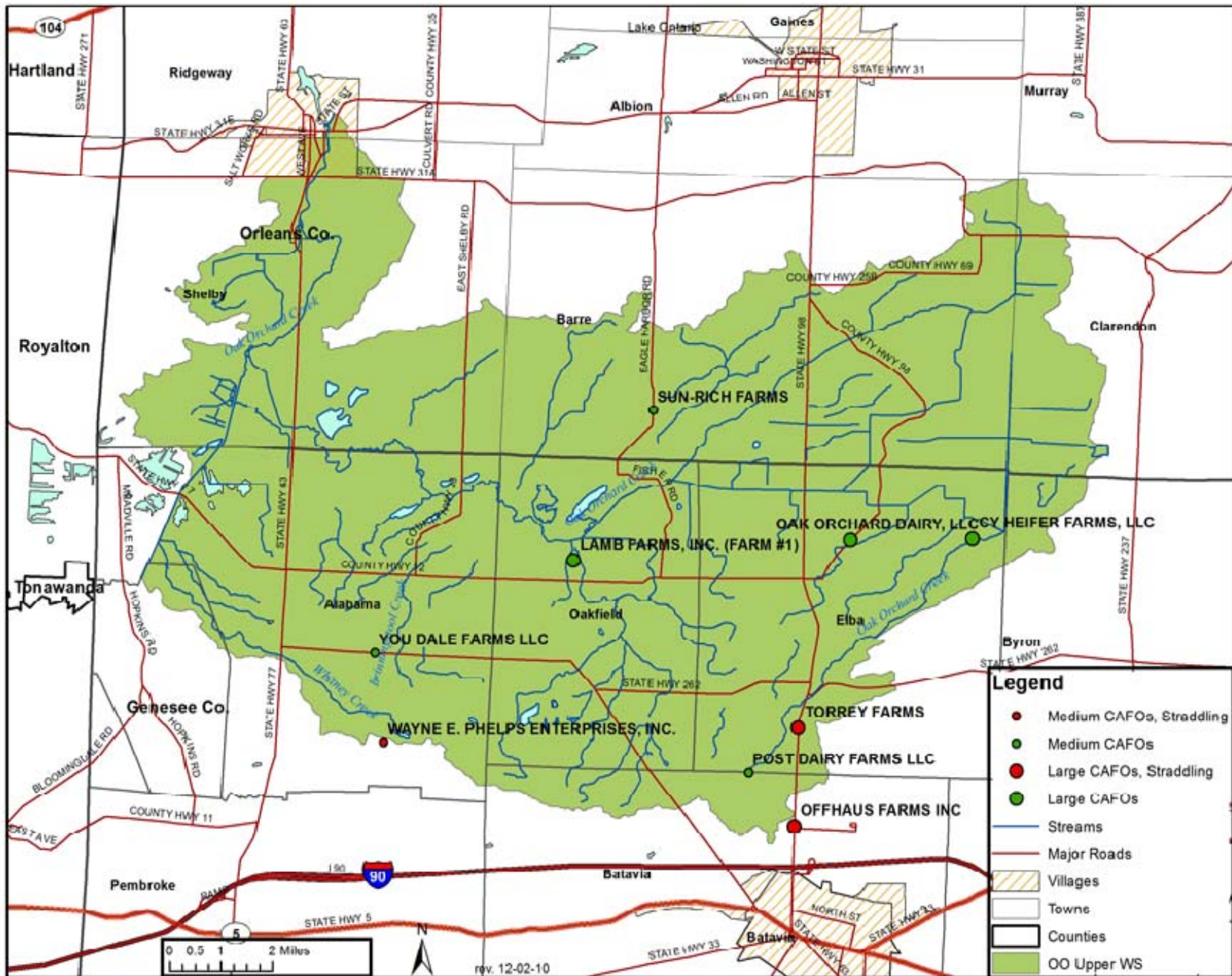
**Legend**

- SPDES
- Streams
- Major Roads
- ▨ Villages
- Towns
- Counties
- OO Upper WS



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Upper Oak Orchard Watershed CAFOS

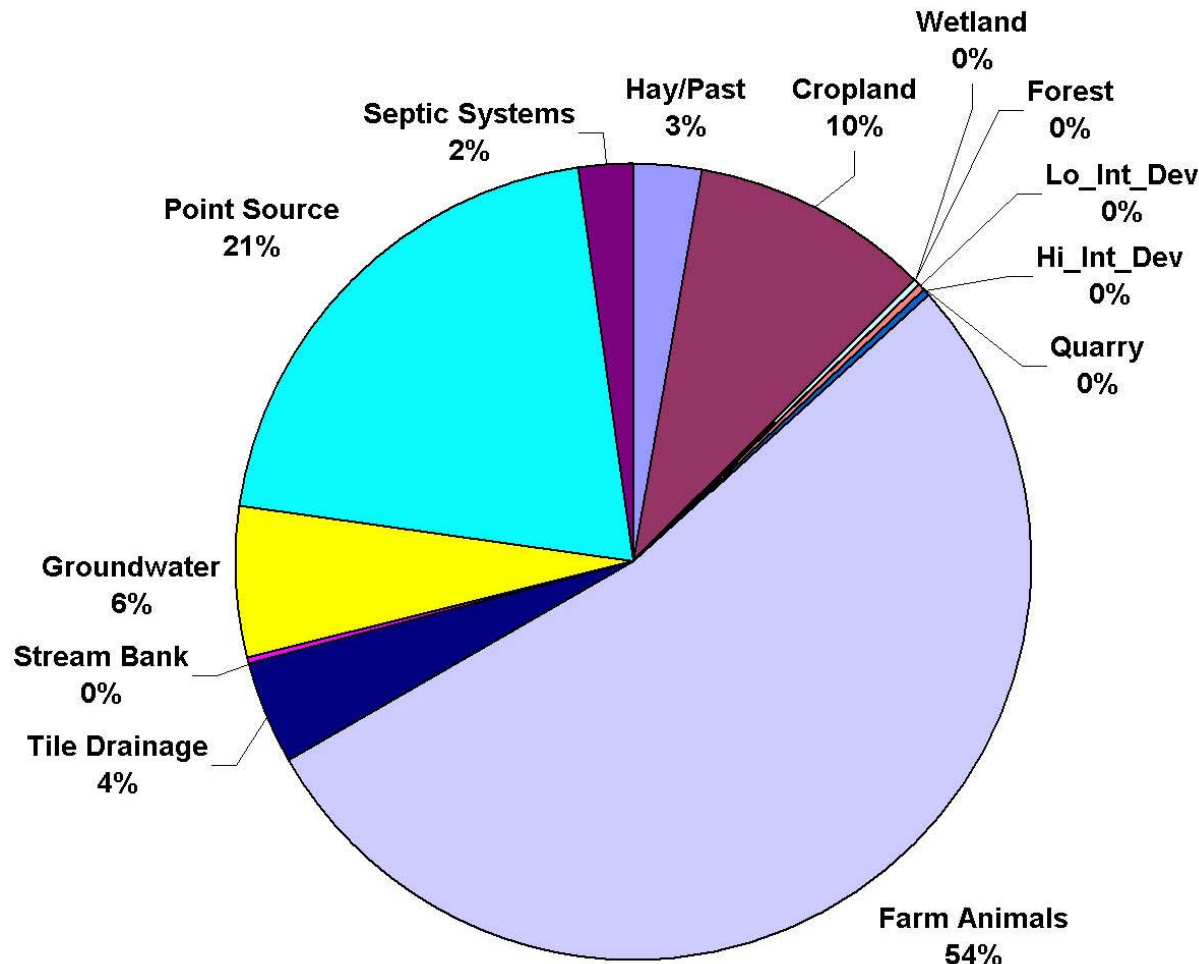


# Water Quality in the Upper Oak Orchard Creek Watershed

## Modeled Sources of Phosphorus

Upper Oak Orchard Creek

~85,200 lbsP/yr



# Water Quality in the Upper Oak Orchard Creek Watershed

## Potential Restoration Strategies

- Water Quality Restoration Strategy (WQRS)
- Factors for identifying potential strategies:
  - Focused on largest source categories
  - Utilizing known technologies/methods
  - Consider most efficient methods
  - Emphasis on cost effectiveness
- Strategy will recommend actions in watershed
- Funding can come from existing programs

# Water Quality in the Upper Oak Orchard Creek Watershed

## Potential Restoration Strategies

- Farm Animals
  - Manure Management in confined areas
  - Runoff Control in confined areas
  - Anaerobic Digestion of manure – two test sites
- Cropland/Tile Drainage
  - Streambank Fencing, Stabilization and Vegetative Buffer Strips
  - Muckland BMP from CCE Study
  - Nutrient Management
- Septic Systems
  - Inspection and maintenance program to get 80% of failing systems operating properly
- Wastewater
  - US Gypsum – reduce P discharge by 50%



# Water Quality in the Upper Oak Orchard Creek Watershed

## Potential Restoration Strategies

- Upper Oak Orchard Creek Watershed
- Estimated water quality impact of implementing the suite of practices:
  - 40-45% reduction of total phosphorus
  - 294  $\mu\text{gP/L}$  down to approximately 150  $\mu\text{gP/L}$

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# Questions/Feedback/Discussion



- Primarily looking for:
  1. Any additional factual information
  2. Comments on approach
  3. Suggested BMP implementation priorities

## Water Quality in the Upper Oak Orchard Creek Watershed

# WQRS Next Steps

1. Evaluate Public Meeting Comments
2. Preliminary Draft WQRS Completed
3. NYSDEC Review and Comment
4. Draft WQRS Completed
5. Public Notice/Another Public Meeting
6. Evaluate Comments Received
7. Final WQRS Completed
8. Approval from NYSDEC and USEPA

# Water Quality in the Upper Oak Orchard Creek Watershed

## More Information

- CEI – LOCI Website
  - <http://www.ceinfo.org/loci/index.php>
  - Fact Sheet
  - Public Meeting Presentation
- Project Manager – Jim Gerek
  - [jgerek@ceinfo.org](mailto:jgerek@ceinfo.org)
  - (585) 262-2870

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