Department of State
Watershed Planning Basics

Introduction to watersheds, planning, and their importance

An Office of New York Department of State

April 13, 2022
Presentation Overview

• What is a watershed and its importance?
• Water quality and its importance
• What is a Watershed Management Plan (WMP)? Types of plans (i.e. 9E)
• Review of Watershed Planning
• Requirements
• Projects, Implementation and Examples
• Succeeding in implementing the WMP
Watershed & its importance
What is a watershed?

- Area of land that contains common set of streams and rivers that all drain into single, larger body of water
- Can be broken down into different sizes depending on the scale you want examine
- Example: Each Finger Lake has watersheds (such as Canandaigua Lake Watershed), but Finger Lakes are also part of much larger Great Lakes Basin.
Hudson River Estuary Watershed

Agawamuck Creek is a subwatershed of the larger Hudson River Estuary Watershed.

Hudson River Watersheds
Water quality in the Watershed & its importance
The Hydrologic (Water) Cycle

• Continuous movement of water on, above, and below Earth’s surface
• NY’s water resources contribute to our quality of life
Surface Water Sources

Section 5-1.1 (cv) Surface water means all water open to the atmosphere and subject to surface runoff.

Source: http://seo.wyo.gov/surface-water
Ground Water Sources

- Unconfined aquifer
- Confined aquifer
Where does my community get its drinking water?

Groundwater:
  • Wells, usually drilled into aquifer

Surface Water:
  • Reservoirs, Lakes
  • Streams, Rivers
Water quality pollution

- Pollutants may flow directly into a pond or stream or be washed off the land.
- Some can also seep into the soil and contaminate groundwater.
- Depending on the type and level of pollution, waters may become unsuitable for fishing, swimming, or even for aquatic animals to survive.
Types of water quality (WQ) pollution

Point Source Pollution
"A single, identifiable source of pollution from which pollutants are discharged, such as a pipe, ditch, ship or factory smokestack.“ (U.S. EPA)

- Examples: factories, sewage treatment plants

Non-Point Source Pollution
Rainfall or snowmelt that picks up and carries away natural and human-made pollutants, depositing into lakes, rivers, wetlands, coastal waters, and ground waters

- Examples: excess fertilizer nutrients, pathogens and nutrients from faulty septic systems
Water Quality (WQ) Topics

- Impairments
  - Sediment, excess nutrients, pathogens

- Sources
  - Stream/road bank erosion, agriculture, road maintenance practices

- Trends
  - Changes over time
See watershed image on Hudson River Watershed Alliance website:
https://hudsonwatershed.org/what-is-a-watershed/
Source: Minnesota Pollution Control Agency (N/A). Access from: https://www.pca.state.mn.us/water/what-watershed
Benefits for water quality planning to my community

- Protect public health
- Avoid preventable drinking water treatment costs
- Increase community confidence
- Create long-lasting partnerships
- Utilize broad array of existing funding sources
- Save time in the long run
Local and Regional Solutions for WQ

Variety of options available to municipalities and regional groups for protecting and improving water quality:

- Drinking Water Source Protection Program (DWSP2)
- Watershed Planning (includes 9E)
- Local Land Use
What is a Watershed Management Plan (WMP)?
Watershed planning

- Watershed plan looks at entire watershed or subwatershed
- Collaborative planning and protection approach
  - Addresses water resources in the (sub)watershed and all land from which water drains
  - Encourages communities to integrate water and land resource protection and restoration with growth management at local and regional level
- Explores existing conditions (i.e. local land use practices) and makes recommendations on improvements that can be made locally and regionally
Watershed Management Plans

Guidebook

– Why?
– Where?
– What?
– Who?
– How?
Water Resources Management Guidance

Overview: Watershed Planning
Watershed planning, stakeholder involvement, water quality assessment & plan components.

Watershed Plans: Protecting and Restoring Water Quality Guidebook
Process for communities to create a watershed plan to protect & improve water quality.

Watershed Plans: Protecting and Restoring Water Quality Video.
Highlights of communities benefitting from watershed planning.

Introduction to Watershed Planning
Watershed planning, including EPA's Minimum Elements of Successful Watershed Plans.

Funding Opportunities
DOS grants and other opportunities to help create sustainable & vibrant communities.

Visit: https://dos.ny.gov/water-resources-management
Why develop a watershed management plan?

- Watershed based management approach
- Clear direction for future development
- Develop long-term partnerships
- More funding opportunities
Types of Plans: 9 Elements (9E) Plans
The Nine Elements

- Quantify Pollutant Inputs and Sources
- Set Pollutant Reduction Goals
- Identify Best Management Practices
- Schedule
- Funding Sources
- Measure Progress
- Monitoring
- Evaluation
Nine Element watershed planning

- Type of watershed management plan detailing community’s water quality concerns and strategy to address concerns requiring additional quantification of pollutant loading and estimates of pollutant reductions to achieve water quality goals than standard watershed plans.

- NYD DEC adopted EPA’s framework has nine key elements to ensure:
  - contributing causes and sources of nonpoint source pollution are identified;
  - key stakeholders are involved in planning process; and
  - Identify restoration and protection strategies to address water quality concerns.

- DOS and DEC work closely throughout process to provide assistance and coordinate approval for plans developed through Local Waterfront Revitalization Program (LWRP) grant
Nine Element Plan Continued

- Actively **engage** the public to capture local knowledge and priorities
- Use best available **science**
- Develop **quantitative tools** to predict how land use affects water quality
- **Set priorities to guide investment** in protection & remediation
- Commit to **adaptive management**—build and measure
From planning to implementation

- Watershed Planning is a great program for holistic look at water quality at within your watershed. Having a completed plan will make your municipality eligible for future LWRP funding for implementation projects (e.g. implementing your projects and strategies you identified)
Types of Plans: Watershed Management Plans
Watershed Management Plans

- Coastal Waterways
- Designated Inland Waterways
  - NYS Executive Law, Article 42
- CNPCP Boundary

- 50+ Watershed Management Plans
  - 590 communities
Importance of Collaborative Approach: Intermunicipal Organizations

- Create capacity for multi-municipalities and opportunities
- Share services, implementation, education and training
- Structure: MOA/MOU, Organization
Greater Restoration and Protection

- Local land and water controls
  - Regulatory
  - Programmatic
- Municipal practices
- Stormwater BMPs
- Green Infrastructure
- Stream stabilization
- Wetland restoration
DOS Watershed Plan Framework - Chapters

- Executive Summary
- Introduction
- Characterization (Tasks 8, 9 and 11)
- Watershed Management Recommendations (Tasks 16 and 18)
- Implementation Strategy (Task 19)
- Monitoring and Tracking (Task 20)
Your vision and goals (Task (T) 8): Examples

- Protect and enhance habitats of native plants and animals
- Adapt to a changing climate
- Ensure that communities retain their essential character while providing economic opportunity
- Resolve issues of legacy contamination and atmospheric deposition
- Increase awareness of how human actions affect the ecosystem
- Prepare for emerging issues and threats
Laying the Foundation:

• Planning for Community Involvement
  – Identify key stakeholders
  – Foster an appreciation of the watershed
  – Generate community consensus on strategies for addressing critical watershed issues
Laying the Foundation cont.:

* Establishing Partnerships
  - Funding
  - Data
  - Technical Assistance

* Organizing a Watershed Advisory Committee (T2)
  – Provide input on watershed issues
  – Review reports, designs, and other documents
  – Inform the public and local officials about the planning process
Characterization: Understanding your watershed

- Gathering existing data
  - Delineation
  - Land Use
  - Land Cover
  - Water Quality Data
  - Local controls, programs and practices
Characterization Chapter:

- Description and Assessment of Waterbody(ies) and Watershed Resources (T9)
- Description and Assessment of the Ability of Local Laws and Programs to Implement BMP to Protect Water Quality (T11)
Exploring Watershed Characterization

- Topography
- Subwatershed Delineation
- Soils
- Bedrock Geology
- Surficial Geology
- Land Cover
- Steep Slopes
- Sewer Districts
- Bathymetry
Here’s an example of the subwatershed of the subwatershed of the Agawamuck Creek Watershed:

Summit Lake Watershed

EXAMPLE:
This can be broken down into Units in the Summit Lake Watershed based on:
- Topography
- Delineation: Tributaries (Subunits – Subwatershed)
EXAMPLE:
This can be broken down into Units for its Subwatershed based on:
- Topography
- Delineation: Tributaries (Subunits – Subwatershed)

Here the subwatersheds of tributaries are the subwatersheds
Explore the Existing Issues

- Invasive Species
- High Phosphorus and Nitrogen Levels
- Contamination
Prioritization

Priority subwatersheds will generally be those that are impaired, are the most vulnerable to future development, contain important resources, or present the best opportunity for improvement.

-NYSDOS Guidebook


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EXCERPT FROM A CHAPTER OF THE
UPPER HUDSON RIVER WATERSHED MANAGEMENT PLAN (MARCH 2020)

PRIORITY STORMWATER PROJECTS:

S-01 – Saratoga County: Purchase of trailer mounted vacuum unit. This unit to be utilized by municipalities throughout Saratoga County, is intended to benefit smaller municipalities that are anticipated to be designated an MS4 community following the 2020 Census. Many of these smaller municipalities do not have funding to purchase this equipment on their own. Through this recommended project, the Saratoga County SWCD will purchase and maintain the equipment and will contract with municipalities to perform the MS4 tasks. $275,000.

S-04 – Hamilton County: Purchase oil water separators for all municipal and county DPW garages. This equipment will be used at the DPW garages to treat water that has been contaminated with oil so that the oil can be disposed of properly. $25,000 each.

S-03 – Town of Schroon, Essex County: Dock Street engineering assessment and feasibility study. Dock Street is an area of heavy stormwater runoff into Schroon Lake. Engineering and feasibility studies should be conducted to evaluate the best methods for stormwater mitigation at this site.

S-04 – City of Glens Falls, Warren County: Design and implementation of separated storm sewer upgrades. The City of Glens Falls currently operates a combined system for stormwater and sewer which often leads to an overflow during heavy rain events and snow melts. A move toward a separated system would reduce CSO occurrences and lead to direct water quality improvements. $10,000,000.

S-05 – Village of Hudson Falls, Washington County: Boulevard separated sewer design and construction. The WCSD #2 operates a system for stormwater and sewer which often leads to an overflow during heavy rain events and snow melts. A move toward a separated system would reduce CSO occurrences and lead to direct water quality improvements. $700,000.

S-06 – Town of Greenwich, Washington County: Stormwater Improvements at the Washington County Fairgrounds. The Washington County Fairgrounds lack adequate stormwater infiltration provisions which results in extreme flooding at the site during heavy rain events. $200,000.
Watershed Management Recommendations Report
Chapter (T 16 and T 18)

- Watershed Management Recommendations to Achieve Goals and Objectives
  - Identify and Describe Management Strategies and Recommendations
  - Regulatory and Programmatic Actions
  - Restoration and Protection Projects Identified
  - Prioritize Recommended Projects and Actions and Key to Maps

Excerpt from a chapter of the Upper Hudson River Watershed Management Plan (March 2020)
Description and Assessment of Local Laws and Programs Chapter (Watershed Management Recommendation Report)

- Ability and effectiveness of local laws and programs to implement best management practices to protect surface and groundwater quality and habitat
- This analysis should identify laws and programs in place as well as any gaps that exist
- Include analysis of:
  - Local land use plans
  - Regulations (zoning, site plan review, subdivision regulations, etc.)
  - Programs and practices (road de-icing practices, ditch maintenance, etc.)
- Analysis of the strengths and weaknesses as they relate to water quality
General Watershed Recommendations

Restoration & Protection Projects

Collaboration, Partnership & Education

Municipal Actions
Examples of Regulatory and Programmatic

• Land use controls
• Municipal practices

Examples of Restoration and Protection Projects

• Programs
• Activities

For example….
Identify and Describe Management Strategies and Recommendations

Regulatory and programmatic actions
- Land use management (comp plans, zoning, site plan review, erosion and sediment control)
- Training, education, stewardship
- Improved stormwater management practices
- Wetland and watercourse protection (including buffer establishment)
- Groundwater and aquifer protection

Restoration and Protection Projects
- Watershed-wide and site-specific actions
- Stormwater remediation measures
- Identifying potential sites for fish and wildlife habitat restoration
- Structural activities (stream restoration or stormwater treatment retrofits)
- Educational programs to build awareness and stewardship
Prioritize Recommended Projects and Actions and Key to Map(s)

- Create a prioritized list of recommendations
  - Include justification, maps, any photographs
- Prioritization process should include:
  - Evaluating subwatersheds according to impairments or threats
  - Identifying priorities within subwatersheds
  - Ranking projects and actions within each subwatershed according to anticipated impact
    - Goals, priorities, and vulnerabilities
    - Pollutant reduction/protection afforded, water resources and/or habitat value
    - Cost, permitting, and maintenance
    - Landowner cooperation, public access, and visibility
    - Partner involvement and innovation
Priority – Stormwater ranked number 1, and here is the associated map with the legend to the left and below chart details for this priority.
Implementation Strategy and Schedule Chapter (T19)

Prepare a strategy and schedule to implement the identified watershed management practices and approaches

- Clearly articulate priorities, measurable objectives, and steps to implement strategies
- Include cost estimates, potential funding sources, and a phasing schedule
- Include a schedule to periodically update the plan
- Articulate the ongoing role of the watershed advisory committee

<table>
<thead>
<tr>
<th>Table 5.1 Sample Watershed Implementation Strategy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Management Recommendation</td>
</tr>
<tr>
<td>----------------------------</td>
</tr>
<tr>
<td>Build capacity of watershed organization and coordinator</td>
</tr>
<tr>
<td>Adopt local laws for environmental protection</td>
</tr>
<tr>
<td>Implement priority stream restoration</td>
</tr>
<tr>
<td>Install priority stormwater retrofit</td>
</tr>
<tr>
<td>Illicit discharge detection and elimination</td>
</tr>
<tr>
<td>Monitoring and project tracking</td>
</tr>
</tbody>
</table>

* Potential costs are for illustrative purposes only
* Denotes project leader
Implementation Strategy

- Prioritizing recommendations
- Project leaders and involved organizations
- Timing
- Costs and funding sources

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### Table 4-1. IMPLEMENTATION STRATEGY AND SCHEDULE FOR OWASCO LAKE WATERSHED RECOMMENDATIONS

**KEY:**
- **LEADERS/PARTNERS/FUNDING SOURCES LIST, ABBREVIATIONS**
  - CCHD: Cayuga County Health Department
  - CCPT: Cayuga County Parks and Trails
  - CCPED: Cayuga County Department of Planning and Economic Development
  - Cayuga Water/Sewer: Cayuga County Water and Sewer Authority
  - CCE: Cornell University Cooperative Extension
  - CLR: Cornell Local Roads Program
  - CNYEAB: Central New York Emerald Ash Borer Task Force
  - CNYPDB: CNY Regional Planning and Development Board
  - CSWL: Cornell University Soil and Water Lab
  - EPF: Environmental Protection Fund (administered by several NYS agencies)
  - FL: Finger Lakes Institute
  - FLOWPA: Finger Lakes - Lake Ontario Watershed Protection Alliance
  - FLT: Finger Lakes Land Trust
  - FL-PRISM: Finger Lakes Partnership for Regional Invasive Species Management
  - FPC: Farm Practices Council
  - GIGP: Green Innovation Grants Program (NYSEFC)
  - GLRI: Great Lakes Research Initiative
  - Hwy Depts.: Highway Departments
  - NRCS: Natural Resources Conservation Service

**CATEGORIES OF COST**
- $ = $1–$1,000
- $ = $1001–$10,000
- $ = $10,001–$100,000
- $ = $100,001–$500,000
- $ = > $500,000

**GOALS FOR THE WATERSHED**
1. Identify and reduce the adverse water quality impacts from agricultural operations.
2. Identify and reduce nonpoint sources of nutrients, sediment, microorganisms, salts, and other chemicals to Owasco Lake and its tributary streams.
   a. Identify model practices that will reduce adverse water quality impacts from roadway maintenance practices such as ditching and application of salt and sand, and support municipal efforts to adopt and implement such practices.
   b. Research ways that new technologies such as innovative septic systems or stormwater treatment systems would improve water quality, and promote their adoption.
   c. Minimize the impact of contamination from fuel and other chemicals associated with transportation and storage accidents.
3. Reduce the risk of water-related illnesses associated with using Owasco Lake as a source of drinking water and recreation.

Table 4-1. IMPLEMENTATION STRATEGY AND SCHEDULE FOR OWASCO LAKE WATERSHED RECOMMENDATIONS

A. PLANNING

<table>
<thead>
<tr>
<th>Specific Recommendations</th>
<th>Goal</th>
<th>Target Sub-Watershed or Critical Area</th>
<th>Project Leader* &amp; Potential Partners</th>
<th>Potential &amp; Existing Funding Sources</th>
<th>Potential Cost +</th>
<th>Priority</th>
<th>Implementation Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td>A-1. Expand to nine element plan.</td>
<td>ALL</td>
<td>Entire watershed</td>
<td>*CCPED, SWCD, CCHD</td>
<td>NYSDOS (grant received to expand plan, staff time), NYSDEC, FLOWPA</td>
<td>$SS</td>
<td>HIGH</td>
<td>X</td>
</tr>
</tbody>
</table>

B. MEASURES TO REDUCE NONPOINT SOURCE POLLUTION

<table>
<thead>
<tr>
<th>Specific Recommendations</th>
<th>Goal</th>
<th>Target Sub-Watershed or Critical Area</th>
<th>Project Leader* &amp; Potential Partners</th>
<th>Potential &amp; Existing Funding Sources</th>
<th>Potential Cost +</th>
<th>Priority</th>
<th>Implementation Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td>B-1-a. Identify and remove barriers to implementing improved practices.</td>
<td>1</td>
<td>Priority subwatersheds</td>
<td>*WQMA, SWCD, CCEPDE, CCE</td>
<td>Department and agency budgets</td>
<td>$S</td>
<td>HIGH</td>
<td>X</td>
</tr>
<tr>
<td>B-1-b. Seek additional sources of support for programs/services aimed at reducing nutrient and sediment loss.</td>
<td>1, 9</td>
<td>N/A</td>
<td>*SWCD, CCE, OLWMC, WQMA</td>
<td>Department and agency budgets</td>
<td>$</td>
<td>MED</td>
<td>X</td>
</tr>
<tr>
<td>B-1-c. Enforce existing regulations and laws that prohibit livestock access to streams and manure runoff.</td>
<td>1</td>
<td>All watershed areas</td>
<td>*WIP, CCHD, SWCD, NYSDEC</td>
<td>Department and agency budgets</td>
<td>$</td>
<td>HIGH</td>
<td>X</td>
</tr>
<tr>
<td>B-1-d. Coordinate/improve communication between agricultural community and other stakeholders.</td>
<td>1</td>
<td>N/A</td>
<td>*WQMA, CCEPDE, SWCD, CCE, OWLA, FPC</td>
<td>Department and agency budgets</td>
<td>$</td>
<td>HIGH</td>
<td>X</td>
</tr>
</tbody>
</table>

### Restoration and Protection Actions

| B-1-4. Implement agricultural BMPs in a strategic manner to reduce the loss of soil, nutrients, fertilizers, animal wastes, crop residues, and pesticides from the landscape. | 1 | Areas that are prone to saturation; are proximate to watercourses and natural conveyances; have steep slopes; have highly erodible soils | *SWCD, CCE, NRCS, farmers | NYSDEC, NYSDOS, NYSEF, FLLOWPA, department and agency budgets | $$$ | HIGH (a top priority in Plan) | X |

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**Owasco Lake Watershed Management and Waterfront Revitalization Plan, March 2016**

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**Recommendation B-1, continued**

| B-1-f. Assist in implementing recommendations of the Cayuga Co. Manure Mgmt. Working Group Advisory Committee. | 1 | All watershed areas | *OLWMC, WQMA, CCPED, SWCD, WIP, CCHD, CCE. See list MMWG 14-Pt Plan. | NYSDEC, NYSDOS, NYSEF, FLLOWPA, department and agency budgets | $$$ | HIGH (a top priority in Plan) | X |

| B-1-g. Support development/use of technologies such as mobile apps, nutrient boom. | 1 | As/where needed | *SWCD, CCE | New Farmers Grant Fund, CIG, SARE, Small Business Innovation Research Program | $$$ | MED | X |

| B-1-h. Provide technical assistance on emergency response procedures/resources for farms of all sizes. | 1 | All watershed areas | *SWCD, NYSDEC | Department and agency budgets | $ | MED | X |

| B-1-i. Identify and promote measures to reduce the use of pesticides and loss of nutrients and sediment. | 1 | All watershed areas | *WQMA, SWCD, OLWMC, CCE | Department and agency budgets, NYS Integrated Pest Management Program | $ | HIGH | X |

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Watershed Implementation Examples and Review

- Green infrastructure, Stormwater management
- Amend or adopt local land and water use controls
- Education and outreach programs and use of citizen scientist activities
Tracking and Monitoring (T20)

- Prepare a plan that includes strategies for tracking implementation of projects and actions and monitoring water and related resources to measure success at achieving project goals and objectives
- Identify methods to track implementation of projects
- Periodic monitoring of water and related resources which may include:
  - Identification of potential parties to conduct monitoring
  - Potential funding sources
  - Methods of data management
### Table 5-1. Summary of Recommended Lake Monitoring Program

<table>
<thead>
<tr>
<th>Desired Use</th>
<th>Goal</th>
<th>Key Measurements or Indicators *</th>
<th>Compliance</th>
<th>Trends</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public water supply</td>
<td>Finished water is safe for consumers of all ages and health conditions</td>
<td>Sub-part 5 of NYS Sanitary Code list for public water supply</td>
<td>Meets requirements of Sub-part 5 of NYS Sanitary Code</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Total organic carbon</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Na and Cl</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>Disinfection by-products</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>HAB toxin levels</td>
<td></td>
</tr>
<tr>
<td>Lake waters meet the NYSDEC</td>
<td></td>
<td>• Chlorophyll-a</td>
<td>Meets NYSDEC ambient water quality standards and guidance values</td>
<td></td>
</tr>
<tr>
<td>ambient water quality</td>
<td></td>
<td>• Total phosphorus (P)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>standards and criteria in</td>
<td></td>
<td>• Total dissolved phosphorus (TDP)</td>
<td></td>
<td></td>
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<tr>
<td>place for Class AA waters</td>
<td></td>
<td>• Soluble reactive phosphorus (SRP)</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>• Total nitrogen (N)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Recreation</td>
<td>Water quality conditions are safe for full contact recreation</td>
<td>• Indicator bacteria at bathing beaches</td>
<td>Meets requirements of Sub-part 6-2 of the NYS Sanitary Code and NYSDEC</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Visual evidence of cyanobacterial blooms</td>
<td>Absence of harmful algal bloom</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• HAB toxin levels</td>
<td>Number of harmful algal blooms</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Days of beach closures</td>
<td>Extent of harmful algal blooms</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>• Secchi disk transparency</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>• Macrophyte harvest</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aquatic Life protection</td>
<td>Water quality and habitat conditions support a diverse assemblage of</td>
<td>Dissolved oxygen (DO) profiles during late summer at deepest station</td>
<td>Water column depth at which dissolved oxygen is less than 6 mg/L</td>
<td></td>
</tr>
<tr>
<td></td>
<td>native species, including sensitive life stages</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ecosystem functioning</td>
<td>Phytoplankton community is composed of a mix of species typical of an</td>
<td>Plankton counts, identified to major taxa (monthly May–Sept.); every 3 years</td>
<td>Community composition (percent of major taxa)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>oligomesotrophic lake</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Zooplankton community is composed of a mix of species typical of an</td>
<td>Plankton counts, length measurements, and identify to major taxa (monthly May–Sept.); every 3</td>
<td>Average size of zooplankton</td>
<td></td>
</tr>
<tr>
<td></td>
<td>oligomesotrophic lake</td>
<td>years</td>
<td>Community composition (percent of major taxa)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Lake supports a diverse assemblage of native species typical of an</td>
<td>Benthic surveys; macrophyte surveys: density and area colonized (one survey, late summer); every</td>
<td>Presence/composition of dreissenid mussels, Asian clams, and other invasive</td>
<td></td>
</tr>
<tr>
<td></td>
<td>oligomesotrophic lake</td>
<td>3 years</td>
<td>species</td>
<td></td>
</tr>
</tbody>
</table>

*Measures taken annually, unless otherwise noted.
### Table 5-2. Summary of Recommended Tributary Monitoring Program

<table>
<thead>
<tr>
<th>Objective</th>
<th>Locations</th>
<th>Parameters</th>
<th>Frequency</th>
<th>Metrics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assess annual external loads from major streams</td>
<td>Owasco Inlet, Dutch Hollow Brook</td>
<td>Total phosphorus, Soluble reactive phosphorus, Total dissolved phosphorus, Total nitrogen, Suspended sediment, Discharge</td>
<td>Annual: March-November, strive to sample during high flow conditions</td>
<td>Annual load (calculated using FLUX) Annual flow-weighted average concentration</td>
</tr>
<tr>
<td>Provide data to calibrate and verify loading model for completing Nine Elements Plan</td>
<td>Multiple locations representing data gaps and under-represented land use patterns</td>
<td>Total phosphorus, Soluble reactive phosphorus, Total dissolved phosphorus, Total nitrogen, Suspended sediment, Discharge</td>
<td>2016: April-November, strive to sample during high flow conditions</td>
<td>Per model requirements</td>
</tr>
<tr>
<td>Evaluate quality of stream habitat using benthic macroinvertebrates</td>
<td>Downstream sites in mapped streams that meet habitat requirements (sites can be monitored on a rotating basis)</td>
<td>Macroinvertebrate community (counts and species ID)</td>
<td>One event every 3 to 5 years for each stream, during low flow conditions, target late July through early Sept.</td>
<td>Family biotic index (FBI), Percent model affinity (PMA), Percent of dominant family, Taxa richness, and Ephemeroptera-Plecoptera-Trichoptera (EPT) index</td>
</tr>
<tr>
<td>Monitor response to agricultural impacts and BMP implementation</td>
<td>Upstream and downstream during spring runoff</td>
<td>Total phosphorus, Soluble reactive phosphorus, Total dissolved phosphorus, Total nitrogen, Suspended sediment, Discharge</td>
<td>Before and after improvements</td>
<td>Flow-weighted average concentration</td>
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<tr>
<td>Use a statistical analysis to determine whether stream conditions vary from</td>
<td>At an established sentinel station, establish a baseline relationship between</td>
<td>Pollutants of concern: for example: Total phosphorus, Soluble reactive phosphorus</td>
<td>Baseline, then in response to specific hypotheses</td>
<td>Load of pollutants of concern over critical period (March-June)</td>
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<tr>
<td>Objective</td>
<td>Measured By</td>
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<td>Improve the capacity of local government to reduce nonpoint sources of</td>
<td>Number of municipalities with sediment and erosion control local laws</td>
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<td>pollution</td>
<td>Number of highway personnel attending environmentally-related training</td>
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<td>Number of municipal Departments of Public Works or Highways using</td>
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<td>sediment and erosion control best practices</td>
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<td>Improve outreach and education on</td>
<td>Number of press releases regarding the Owasco Lake watershed</td>
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<td>Owasco Lake watershed issues</td>
<td>Number of contacts with educational institutions</td>
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<td>Attendance at annual Lake Day events</td>
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<td>Visits to related web pages</td>
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<td>Expand recreational access and use</td>
<td>Number of canoe and kayak rentals</td>
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<td>Attendance at local parks</td>
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<td>Number of beach closures</td>
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<td>Number of boat launches</td>
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Next Step: Implementation
Importance of WMP and How to Succeed in Implementation
Some elements of successful watershed planning:
– Broad participation
– Intermunicipal cooperation
– Realistic goals and strategies
– Data collection and analysis
– On-the-ground projects coupled with local controls
– Monitoring and tracking successes
– Maintaining momentum and consensus
– FUNDING
Benefits of Completing an WMP:

• Eligibility for future funding of projects and strategies through NYS DOS LWRP program

• Protect and restore waterways for the community and future generation

• Be a good “neighbor” and “steward”
Questions

NYS Department of State, Office of Planning Development & Community Infrastructure
99 Washington Ave, Suite 1010
Albany, NY 12231
Water Resources Management | Department of State (ny.gov)

Model Local Laws to Increase Resilience
Model Local Laws to Increase Resilience | Department of State (ny.gov)

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