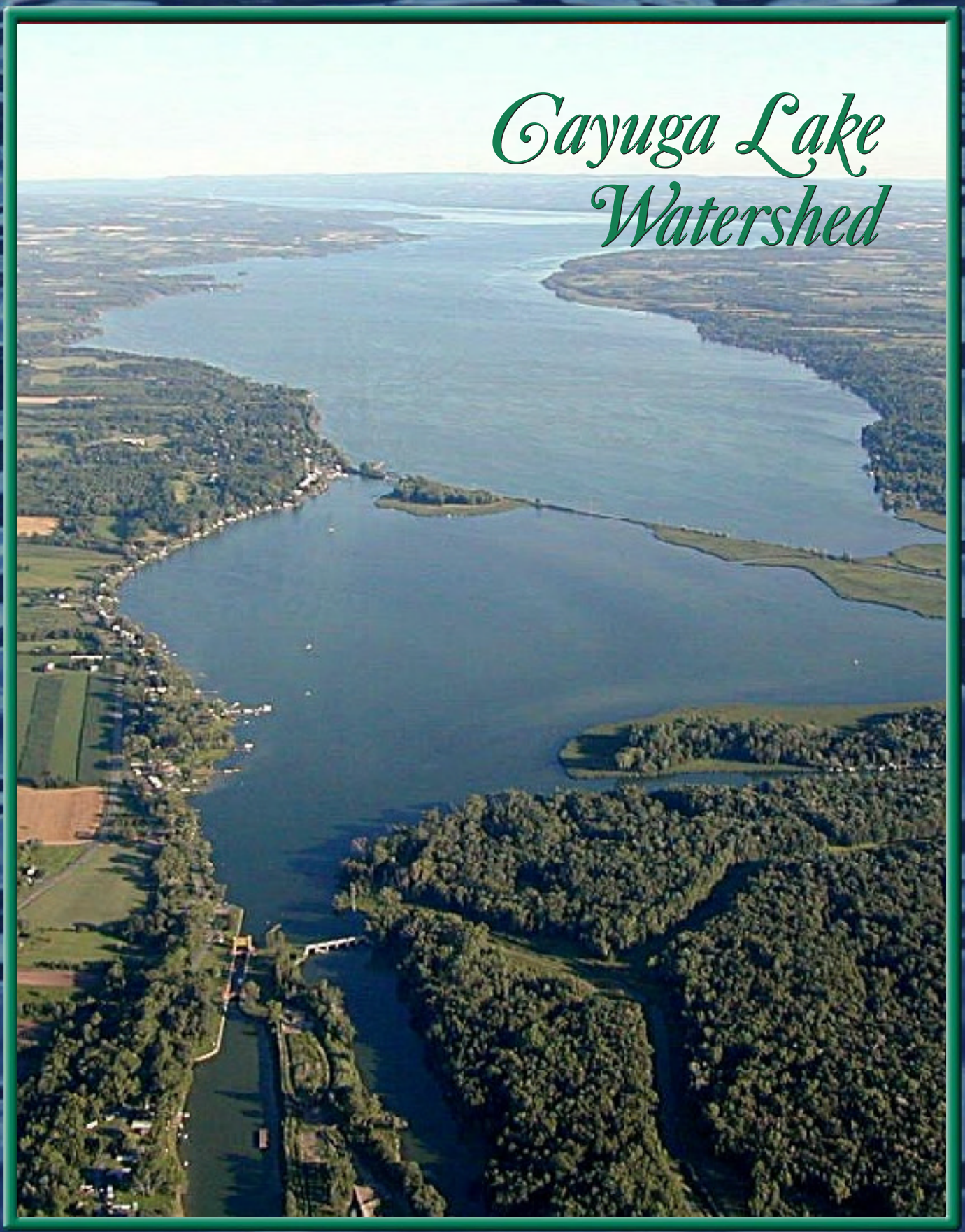


Cayuga Lake Watershed

Restoration and Protection Plan

Cayuga Lake Watershed Restoration and Protection Plan

July 2001

This report was prepared for the Cayuga Lake Watershed Intermunicipal Organization with funding provided by the New York State Department of State through Title 11 of the Environmental Protection Fund Act. Additional funding was provided through the Empire State Development Corporation, New York State Department of Environmental Conservation, United States Environmental Protection Agency, Tompkins County Department of Health, Cayuga Lake National Bank, and the municipal members of the Cayuga Lake Intermunicipal Organization.

Additional resources are available by using the full and/or on-line version of the Cayuga Lake Watershed Restoration & Protection Plan which are available on the Cayuga Lake Watershed Intermunicipal Organization internet web site at http://www.cayugawatershed.org.

This report was prepared by:
Genesee/Finger Lakes Regional Planning Council
City Place, 50 West Main Street, Suite 8107
Rochester, New York 14618
716-454-0190
http://www.gflrpc.org
gflrpc@gflrpc.org

EcoLogic

Limnological Consultants
EcoLogic, LLC
5891 Ridge Road
Cazenovia, New York
http://www.ecologicllc.com

Table of Contents

FIGURES

TABLES

MAPS

Acknowledgments

The Cayuga Lake Watershed Restoration & Protection Plan Project is greatly indebted to the many individuals and organizations who contributed their time, expertise, and resources during the development of this Watershed Restoration & Protection Plan. Their tireless efforts will greatly benefit future protection of the Cayuga Lake Watershed for years to come. The Cayuga Lake Watershed Restoration and Protection Plan process was initially funded by a grant to the Town of Ledyard from the New York State Environmental Protection Fund through the New York State Department of State (NYSDOS) Local Waterfront Revitalization Program. Subsequent funding for the project has been provided by the Empire State Development Corporation (ESD), New York State Department of Environmental Conservation (NYSDEC), United States Environmental Protection Agency (USEPA) and the municipal members of the Cayuga Lake Watershed Intermunicipal Organization (IO). Local and in-kind match has been provided by the Town of Ledyard, Central New York Regional Planning & Development Board (CNYRPDB), Genesee/Finger Lakes Regional Planning Council (G/FLRPC), and the members of the IO and the IO Committees including Technical, Education/ Public Participation & Outreach, and Agriculture.

The Cayuga Lake Watershed Restoration & Protection Plan Project would like to thank all of the members of the Cayuga Lake Watershed Intermunicipal Organization (IO), IO Technical Committee, IO Agriculture Committee, and the IO Education, Public Participation & Outreach Committee (see Appendix A) for sharing their wide array of experience and technical skills. There is great appreciation for the time and efforts of all of the private citizens as well.

The following organizations shared their personnel, data, meeting locations, and many other resources:

Atlantic States Legal Foundation

Cayuga County Cornell Cooperative Extension

Cayuga County Department of Health

Cayuga County Planning Department

Cayuga County Soil & Water Conservation District

Cayuga County Water Quality Management Agency

Cayuga Lake Watershed Network

Cayuga Lake Watershed Intermunicipal Organization

Central New York Regional Planning & Development Board

Cornell University Center for the Environment

Cortland County Planning Department

Cortland County Soil & Water Conservation District

Cortland County Water Quality Coordinating Committee

EcoLogic, LLC

Genesee/Finger Lakes Regional Planning Council

Schuyler County Cornell Cooperative Extension, Planning and Community Development Division

Schuyler County Soil & Water Conservation District

Schuyler County Watershed Protection Agency

Seneca County Planning Department

Seneca County Soil & Water Conservation District

Seneca County Water Quality Committee

Tompkins County Cornell Cooperative Extension

Tompkins County Planning Department

Tompkins County Soil & Water Conservation District

Tompkins County Water Resources Council

Town of Ledyard

New York State Department of Environmental Conservation, Division of Water

New York State Department of Environmental Conservation Region 7

New York State Department of Environmental Conservation Region 8

New York State Department of State, Division of Coastal Resources

United States Geological Survey

United States Department of Agriculture – Natural Resource Conservation Service

Wells College

Significant contributions to this report include the following:

Eric Ameigh, Genesee/Finger Lakes Regional Planning Council

Sharon Anderson, Cayuga Lake Watershed Steward

Rick Ayers, Yates County Soil & Water Conservation Committee

Chad Bennett, Field Intern

Kathy Bertuch, Central New York Regional Planning & Development Board

Kevin Borden, Genesee/Finger Lakes Regional Planning Council

Clifford Callinan, NYSDEC, Division of Water

Jerry Codner, Town of Lansing

Justin Damann, Field Intern

Michelle Debyah, Genesee/Finger Lakes Regional Planning Council

Steven Eidt, NYSDEC Region 7

Sherry Forgash, Tompkins County Soil & Water Conservation District

Jordan Gass, Field Intern

Deb Grantham, Town of Dryden

Phillip Griswold, Seneca County Soil & Water Conservation Committee

Kate Hackett, Tompkins County Planning Department

Karin Harjes, CCETC volunteer

Jason Howard, Genesee/Finger Lakes Regional Planning Council

Sylvia Hurlbut, Town of Ledyard

William Kappel, USGS

George Kennedy, Town of Ulysses

Lynn Leopold, IO member for Village of Lansing

Jose Lozano, City of Ithaca

Jim Malyj, Seneca County S&WCD

Charles McCafrey, NYSDOS

Kelly McCutcheon, Field Intern

Kevin Millington, NYSDOS

Elizabeth Moran, EcoLogic, LLC

Tom Pearson, NYSDEC Region 8

Will Poppe, Genesee/Finger Lakes Regional Planning Council

John Roebig, EcoLogic, LLC

Craig Schutt, Tompkins County S&WCD

Courtnie Simmons, Genesee/Finger Lakes Regional Planning Council

Jim Skaley, Education, Public Participation & Outreach Committee

Erin Smith, Seneca County Soil and Water Conservation Committee

A. Thomas Vawter, Wells College

Sean Vormwald, Field Intern

Linda Wagenet, Cornell Center for the Environment

David Zorn, Genesee/Finger Lakes Regional Planning Council

Others who have contributed include the following:

Amanda Barber, District Manager, Cortland County SWCD

Daniel S. Dineen, Cortland County Department of Planning

John Fessenden, Cayuga Lake Watershed Network

Janet Hawkes, Cayuga Nature Center

Gene Holcutt, Cayuga Lake Watershed Network

Tee-Ann Hunter, Education, Public Participation & Outreach Committee

Pamela O'Malley, Central New York Regional Planning & Development Board

Dan Winch, Tompkins County WRC

Preface

Roaring waterfalls, beautiful and extensive tracks of open space and rural landscapes, deep gorges with unique rock formations, inspiring views of Cayuga Lake with water so clean it can be used as a drinking source and for recreational activities such as swimming, fishing and sailing. These are only a few of the striking images that people envision when asked what they want our watershed to be like in 20 years. The high quality of life in the region, in part due to its rural landscapes, open space, streams, gorges and Cayuga Lake, is precisely why many people call the Cayuga Lake watershed home. Isn't this something worth protecting for our enjoyment and the sake of future generations?

Change in our watershed can come very quickly. An excellent example is the swift establishment of the Village of Lansing. Only 30 years ago the Village of Lansing didn't exist! Fed by an increasing population and a growing economy, land use changes in the watershed happen both incrementally and quickly. Thirty years ago the grape industry didn't exist around Cayuga Lake. Today wineries are a major tourist attraction providing economic growth and stability to the Finger Lakes region. Like other agricultural practices in the region, cultivation of grapes requires careful management of the land to minimize leaching of fertilizers and pesticides into groundwater, streams, and the lake. Another recent and quite obvious ecological change that has occurred in Cayuga Lake is the introduction of zebra mussels, which were completely foreign to the lake 30 years ago! These are only a few examples of how the Cayuga Lake watershed has changed in a short time. Change is a fact of life and the watershed is prone to ecological, economic and social change, which we can chose to either shape and direct or just leave to chance. Accommodating economic and population growth while mitigating its negative environmental impacts on the watershed is critical to the economic vitality and environmental health of the Cayuga Lake watershed. We can enhance the economic vitality of the region while protecting the environment by working together for that common goal.

With this purpose in mind and inspired by community groups, interested citizens, regional planning boards and the creation of the Intermunicipal Organization (IO), development of a collaborative management plan and planning process for the Cayuga Lake watershed began almost four years ago. Today, the IO is a voluntary partnership of 31 villages, towns, cities and counties in the watershed working together to develop a Cayuga Lake Watershed Restoration and Protection Plan (RPP).

The main purpose of the RPP is to serve as a working guide for the public, elected officials, farmers, the business community, environmentalists and others to manage Cayuga Lake's valuable water resources. It is important to realize that the RPP only provides a framework and that the work achieved in these past four years marks only the beginning of the process. Many challenges remain. Stakeholder interests must sustain their involvement and invite additional stakeholder interests to participate in the dialogue. Neighborhoods and municipal representation must be secured as the process shifts from collectively developing a vision for the watershed to implementing a watershed plan. Strategies that address public concerns, expressed by the public in various forums, need to be put to action. These will not and cannot happen overnight nor will every municipality see the benefits of implementation at the same time. Implementation of the plan will occur on a project-by-project basis, focused on the prioritized water quality threats and issues identified in the RPP. What is the bottom line for this plan to work? Cooperation between municipalities and active citizen participation maintained throughout the planning and implementation processes are the critical components for the success of the RPP.

Introduction

Chapter 1

Approach

Project Components

The Cayuga Lake Watershed Restoration and Protection Plan (*RPP*) process began in 1998 with the creation of the Cayuga Lake Intermunicipal Organization. The central focus from the beginning of the process was to identify priority issues and solutions on a watershed-wide basis and have all of the local governments and organizations in the watershed agree on the priorities and work together to access funding in order to implement the recommendations of the RPP.

The first step in the process was an assessment of current socio-economic and ecological conditions of the Cayuga Lake Watershed. The data collected in this assessment was published in September of 2000 in the *Cayuga Lake Preliminary Watershed Characterization*. In this report both the current understanding of the state of the watershed and the history and status of the watershed management planning process were explained.

Once the current state of the lake was analyzed, step two was to determine the desired future of the watershed. Based on input gathered from several IO and public meetings, it became clear that interested citizens wanted the watershed to remain a source of drinking water, a recreational and aesthetic resource, with public access to the lake and plenty of open space, while supporting a diverse and sustainable economy.

The third step was to identify and prioritize threats to the water quality of the watershed. In order of importance, as determined through meetings with the general public as well as the IO, the top seven threats identified (in ranked order) were agricultural practices, sediment loading, drinking water, water quality standards, development practices, stormwater runoff, and on-site wastewater systems. The primary sources of pollution identified in the watershed (in order of importance) included sediment, phosphorous, pesticides and fertilizers, organic compounds, heavy metals, pathogens and exotic organisms.

Next an inventory of current pollution controls highlighted methods being used, who is responsible for implementation and cost, how institutional measures are applied, and how feasible these controls are specifically for the Cayuga Lake Watershed. To finalize the groundwork for the *RPP* it was important to acknowledge that there are gaps in water quality and quantity monitoring data and limitations in funding both restoration and protection of our water resources. In addition, there is a clear need for watershed-wide public education, economic sustainability, pollution regulation and enforcement, and increased incentives for voluntary action.

Based on current water quality threats and pollution control methods, eleven strategies or action categories were identified in the *RPP*. They include the following:

1. public participation
2. watershed coordination, collaboration and partnerships
3. education
4. agricultural practices
5. stormwater management and erosion control
6. wastewater systems management
7. hazardous waste management
8. monitoring and assessment
9. wetland and riparian corridor management
10. forestry and silviculture management; and
11. regulatory management.

Tables for each of the eleven action categories in the *RPP* provide specific recommendations for what actions could be taken, the organizations that could be involved, possible measures and targets to follow, and approximate cost for each activity. The main purpose of these tables is to serve as a watershed management manual for municipalities, community groups and citizens interested in taking an active role in the restoration and protection of the Cayuga Lake Watershed. To prevent the watershed management plan from becoming mainly regulatory, communities and citizens are encouraged to take responsibility for their part of the watershed through "actions and deeds" and get involved in the watershed-wide process. As time progresses, more and more of the water quality threats and issues identified in the *RPP* will be addressed and new or previously unidentified issues will require an evaluation and revision of the *RPP* itself to reflect new information collected in the ongoing monitoring and assessment program. The revised *RPP* may cause a shift in management priorities as we further restore and protect our water resources and strive toward meeting our watershed goals.

While implementation has been going on prior to, and during the development of the *RPP*, it is suggested that coordinated implementation will be driven from, and by, the collective energy of the *RPP*. The institutional structure for implementing the *RPP* will be the IO. A strategy for that structure is being developed concurrently with this plan and will be functional by October 2001.

An Evolving Plan

The planning process preceding the actual production of this plan is important to understand. It includes an organizational structure that is founded in coordination, collaboration and partnerships, and understanding of nonpoint source pollution and the use of a watershed approach.

Non-Point Source Pollution

Cayuga Lake is significantly affected by non-point source pollution. Point source pollution is pollution that enters a waterbody from a pipe or other well known source. Non-point source pollution is carried to waterbodies like Cayuga Lake through runoff from the land. Thus a vast array of land use activities can potentially be a nonpoint source of pollution. Many of these activities have been identified in Chapter II of this report. Being general and indefinite, nonpoint source pollution is difficult, if not impossible, to regulate out of existence. Each individual non-point source is usually insignificant, but the cumulative effects of multiple non-point sources create the significance.

Chapter I of this report describes in large part the approach that has been used to develop and structure a plan addressing nonpoint source pollution in the Cayuga Lake Watershed. Chapter II covers the issues, water quality status and major areas of water quality concern in the Cayuga Lake Watershed. Chapter III considers the strategies, recommendations & management options for the major areas of non-point source pollution in the Cayuga Lake Watershed.

Watershed Approach

A watershed can be defined as a catch basin in which all water that lands in the basin eventually ends up in one specific delivery point (in this case Cayuga Lake). The Cayuga Lake Watershed can be broken down into 19 major subwatersheds (18 tributary based subwatersheds and the remainder in direct drainage) and then further broken down into 46 minor subwatersheds based on the network of larger tributaries (streams) flowing to Cayuga Lake.

A plan based on watershed boundaries rather than political boundaries can better target polluted or threatened areas for protection or restoration. This *RPP* calls for a watershed-based approach to planning and management that considers the Lake and its drainage area as a whole, interconnected, complex system. At the same time it is necessary to break down this complex watershed into subwatersheds to increase the ability to identify specific pollution sources and focus efforts.

The Watershed

The Cayuga Lake Watershed is part of the Oswego River Basin (see Figure 1-1). The Oswego River Basin in Central New York State is a diverse system made up of many hydrologic components that flow together. Water flows from (1) upland streams down to, (2) the Finger Lakes, then to (3) low-gradient rivers and the New York Barge Canal, and (4) ultimately to Lake Ontario. Within the Oswego River Basin, Cayuga Lake is downstream of Keuka and Seneca Lake. Keuka Lake waters flow into Seneca Lake via the Keuka Lake Outlet. Seneca Lake waters flow into the extreme northern end of Cayuga Lake via the Seneca-Cayuga Canal.

The Cayuga Lake Watershed (see Map 1-1) is the largest of the Finger Lakes, covering 785 square miles (approximately 500,000 acres) of agricultural, residential, industrial, and forest land. Although the dominant surface water feature of the basin is the lake itself, a network of more than 140 streams flow into the lake. The northern outlet of the lake receives about 48 percent of the total runoff from the Oswego River Basin's 5,100 square miles, before it flows into the Seneca River, towards the Oswego River and Lake Ontario. The land area of the Cayuga Lake Watershed includes six counties and 44 municipalities (cities, towns, and villages) (see Figure 1-2), and is home to over 120,000 people.

Cayuga Lake is the second-largest Finger Lake. It is the longest, widest and one of the deepest of the eleven

Finger Lakes, being 38.2 miles long, 1.75 miles wide (average width), up to 435 feet deep with a shoreline of over 95 miles. This lake's spectacular topography was formed through periods of glacial advance and recession, which deepened and widened the Cayuga Lake Valley and smoothed the surrounding hills. Due to Cayuga Lake's relatively large size and significant depth, water that drains into the lake takes over 10 years to cycle through the lake.

The economic and natural resources found in the Cayuga Lake Watershed are invaluable to residents and visitors alike. Economic resources include agriculture, tourism and recreation, real estate, industry, and commerce. Natural resources include wildlife, parks, fisheries, wetlands, forestry, and water.

The soils of the Cayuga Lake Watershed are among the richest and most fertile in the nation (*Cayuga Lake Preliminary Watershed Characterization, 2000*). According to the 1992 Census of Agriculture, the hundreds of cash crop, beef and dairy farms in the watershed generate annual receipts of approximately $176,423,000. The watershed's beaches, rivers, and lakes are an attractive vacation destination. In the Cayuga Lake Watershed, tourism and recreational activities include boating, bicycling tours, hiking, sport and recreational fishing, hunting, bird watching, swimming, and camping. On average, proximity to water raises the value of a home by about 28%. Furthermore, houses in better water quality areas are generally worth about 20% more than those

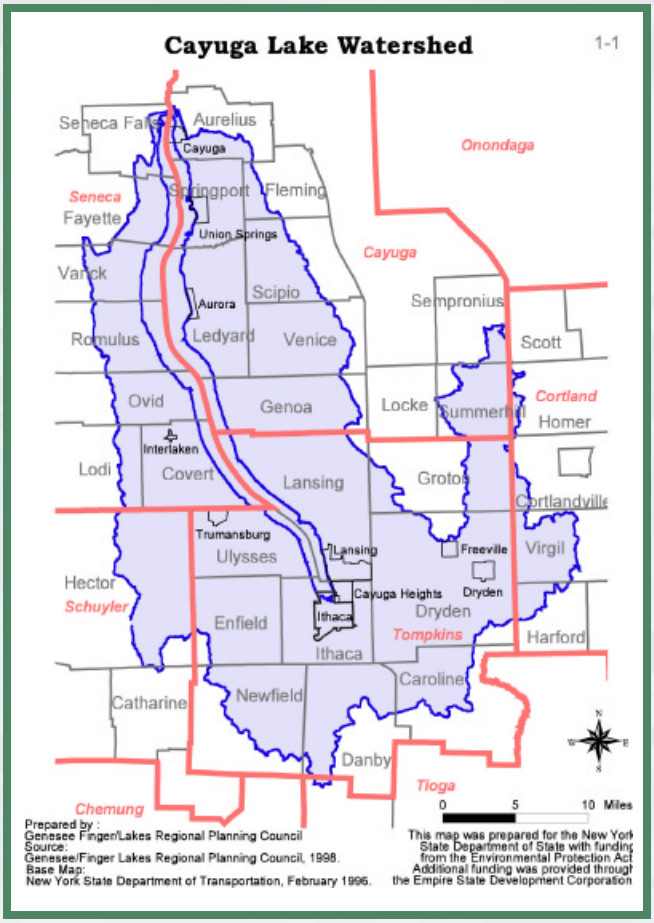


Figure 1-2
Municipalities in the Cayuga Lake Watershed

Tompkins County
- Town of Carline
- Town of Danby
- Town of Newfield
- Town of Dryden
- Town of Ithaca
- Town of Enfield
- Town of Lansing
- Town of Ulysses
- Town of Groton
- City of Ithaca
- Village of Dryden
- Village of Trumansburg
- Village of Lansing
- Village of Cayuga Heights
- Village of Freeville

Cayuga County
- Town of Summerhill
- Town of Genoa
- Town of Sempronius
- Town of Locke*
- Town of Venice
- Town of Ledyard
- Town of Scipio
- Town of Fleming
- Town of Aurelius
- Town of Springport
- Village of Aurora
- Village of Union Springs
- Village of Cayuga

Schuyler County
- Town of Hector
- Town of Catharine*

Tioga County
- Town of Spencer

Cortland County
- Town of Harford
- Town of Virgil
- Town of Cortlandville
- Town of Scott*
- Town of Homer

Seneca County
- Town of Covert
- Town of Lodi
- Town of Ovid
- Town of Romulus
- Town of Fayette
- Town of Varick
- Town of Seneca Falls
- Village of Interlaken

***Municipalities with small portion in watershed**

adjacent to poorer water quality. The beauty and bounty of the Finger Lakes Region attracts businesses and educational institutions that seek a high quality of life for their employees and families. Studies have shown that clean water and air are the two most important factors in choosing a place to live.

The Cayuga Lake Watershed is an important link in the waterfowl flyway of the Atlantic Coast. There is seasonal use by approximately 314 bird species, including many shorebirds and waders. There are seven state parks and numerous county/town parks that provide public access to the lake as well as preserve the integrity of various natural resources. The watershed supports both warm and cold water fishes, including lake trout and four species of salmonids. There are more than 6,000 acres of high quality wetlands in the watershed along with thousands of acres of valuable forests important for timber, wildlife, recreation, and water quality. Numerous communities and hundreds of households depend on Cayuga Lake and its watershed as a drinking water source from both surface and ground waters.

Statement of Watershed Restoration & Protection Plan Vision, Goals & Purpose

Vision

The Intermunicipal Organization envisions Cayuga Lake recognized and valued by all watershed residents as the watershed's foremost natural feature and resource, deserving of and receiving protection via watershed-wide adoption of land-use plans that minimize pollution and sprawl, preserve viewsheds and soils, and result in a sustainable and diverse economy that provides satisfying employment for all residents able to work and that contributes to regional self-sufficiency, all in a non-discriminatory, equitable, and cooperative manner.

A single vision for the Cayuga Lake Watershed is impossible to define without being overly simplistic. Who doesn't want high water quality? We all agree that clean water is essential.

Other than clean water, the more difficult question is, what do we want the watershed to look like in the future and how do we get there?

Goals

The Intermunicipal Organization (IO) will work through the development and implementation of the RPP *to promote the understanding that is vital to maintain and improve the ecological health and beauty of the watershed and the protection and preservation of Cayuga Lake, along with building and maintaining a productive economy in order to sustain a healthy social environment for the people of the Cayuga Lake Watershed. The cooperating municipalities share a number of common goals, including:*

- *minimize nonpoint source pollution of both surface and groundwater in the watershed;*
- *the remediation of existing pollution and degradation;*
- *the preservation of open space and natural resources;*
- *the expansion of economic activities consistent with the watershed environment;*
- *developing programs for educating the public and public officials;*
- *developing compatible components of their comprehensive plans and zoning and natural-resource ordinances;*
- *exploring mutually beneficial ways of securing and sharing federal, state, and county-agency funding for the programs that accomplish their objectives in the above areas;*
- *sharing the costs of monitoring compliance and enforcement of regulation;*
- *the resolution of disputes regarding development projects with intermunicipal impacts;*
- *the resolution of disputes regarding development projects that impact environmentally sensitive areas;*
- *working with federal, state, and county agencies and authorities to assure that their activities in the watershed are compatible with the plans and programs of the cooperating municipalities; and*
- *understand ecosystem dynamics within the watershed in an effort to prevent and/or respond to threats to its integrity.*

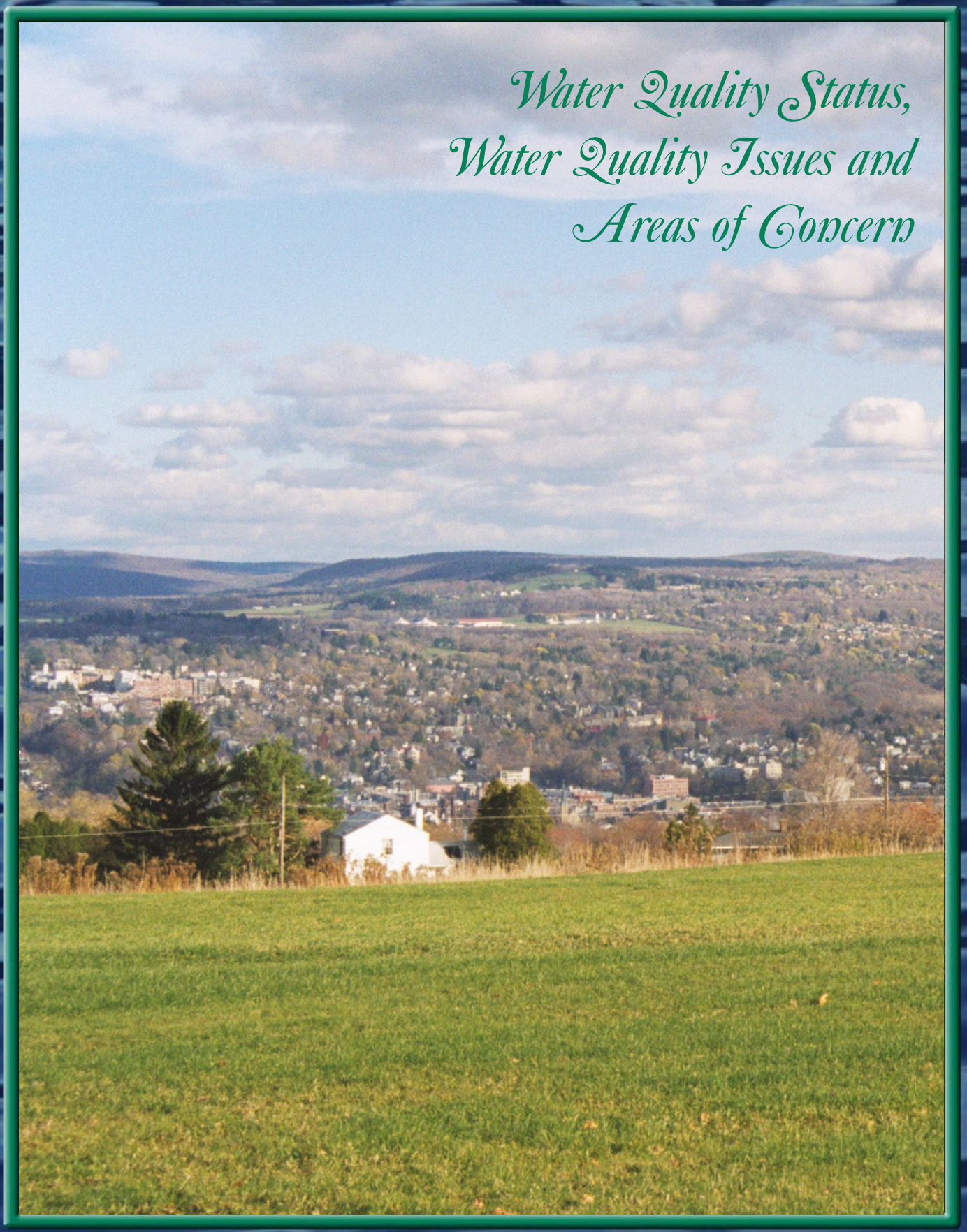
Purpose

*The purpose of the IO according to the Memorandum of Understanding establishing it is "to develop a Cayuga Lake Watershed Management Plan (*RPP*) and oversee and administer it." To this end, the IO operates under the following expanded statement of purpose:*

The purpose of the IO is to recognize the interrelatedness of all activities within our watershed and to collaboratively and collectively work to address issues and problems. The goal is to promote understanding that is vital to maintain and improve the ecological health and beauty of the watershed along with building and maintaining a productive economy and also sustain a healthy social environment for the people of the Cayuga Lake Watershed.

The charge of developing a RPP *includes the need to:*

- *establish watershed priorities;*
- *approve an annual work plan and budget;*
- *approve requests for funding and for endorsement of projects consistent with the priorities;*
- *provide a forum for all municipalities within the watershed to interact and exchange information; and*
- *review technical and fiscal summary reports.*



Water Quality Status, Water Quality Issues and Areas of Concern

CHAPTER 2

Water Quality Status

Cayuga Lake has a rich history of research activities. Physical, chemical, and biological conditions of the lake and its tributary streams have been investigated for decades. The lake and its watershed remain the focus of several long-term monitoring initiatives. However, important data gaps remain.

Cayuga Lake's water quality is generally very good. The lake is a valued and visible resource, serving as a public water supply and focal point for recreation. The fish community is diverse and productive. Overall, the tributary streams exhibit moderate to high water quality and habitat conditions that support a balanced biological community. However, there is evidence of habitat degradation along segments of the watershed's many streams. Much less is known about the quality of the groundwater. Limited testing indicates that groundwater quality is generally acceptable, although contamination has occurred in specific areas.

Despite the conclusion that water quality is generally very good, several types of pollution migrate from the watershed to the surface and groundwater resources of the basin. Through the watershed planning process much has been learned regarding specific types and sources of pollution that threaten the lake for its desired uses. This information has provided a technical basis for defining water quality issues (defined as pollution types and sources), geographical areas of concern (defined as sites in the lake or watershed that are sources of pollution), and has allowed for issues prioritization and strategies prioritization. The RPP *is built on the foundation provided by this analysis. Priority areas reflect the significant sources and types of pollution that threaten the human uses and ecological integrity of the aquatic resources.*

These issues prioritization, water quality issues, and areas of concern are summarized below, along with a discussion of additional data needed to set priorities and define effective remedial strategies. Links are provided to a monitoring plan designed to fill data gaps, support priority determinations, and track progress towards improvement. Chapter III discusses strategies, recommendations and management options designed for these issues and areas of concern.

Priority Setting By The Intermunicipal Organization

Issues of concern in the Cayuga Lake Watershed were gathered over the last several years from multiple sources including public forums (see Appendix B), the findings of the Preliminary Watershed Characterization Report (see Appendix C) and IO committees (see Appendix A). These issues were then developed into a list of 49 items by the IO Technical Committee that was then submitted to the IO for approval and ranking. Once the list of items was approved, each municipality was asked to complete the Cayuga Lake Watershed Issues Prioritization form (see Appendix D) through their IO representative. These forms were then compiled to produce a list of top ranked items on which to focus the *RPP* Strategies, Recommendations, and Management Options. The top ranked items (in order of ranking) with their associated code are as follows:

A	Agricultural Practices
S	Sediment Loading
DW	Drinking Water
WQS	Water Quality Standards
D	Development
SR	Stormwater Runoff
O	On-site Wastewater Systems
T	Tourism and Other Economic Development
C	Comprehensive Planning
WQ	Water Quality (also see Water Quality Issues section below)
N	Nutrient Loading
WW	Wastewater and Wastewater Treatment Plants
I	Infrastructure
E	Education
ER	Economic Revitalization & Sustainability

Refer to the RPP *On-Line at http://www.cayugawatershed.org for Description and Resources for the above ranked list.*

Water Quality Issues

There are several water quality issues that threaten the continued use of the resource as a high quality water supply and focus for recreation and aesthetic enjoyment. The following water quality issues, in priority order, pose the greatest long-term challenge to the ecosystem of Cayuga Lake and its watershed:

Sediment (S)

Sediment is a significant water quality, habitat, and use impairment issue, particularly in the southern tributaries and southern Cayuga Lake. The southern basin of Cayuga Lake is included on the State's Priority Waterbodies List (PWL) (see Appendix L); silt and sediment is listed as the primary pollutant. Six tributaries are included on the PWL with silt and sediment listed as the primary pollutant; the six tributaries include four southern streams (Cascadilla Creek, Fall Creek, Six Mile Creek, Cayuga Inlet), Yawger Creek, and Bolter tributary. Southern Cayuga Lake is also included on the 303(d) list, a national compendium of impaired waters requiring a watershed approach to restoration.

Sediment is a significant pollutant in many New York watersheds. It creates or contributes to a number of water quality problems both in streams and ultimately in the impoundments they feed. Excessive sediment concentrations in the water column can be harmful to aquatic life and will exacerbate the toxic effects of other pollutants. Suspended sediment in the water column can increase temperature. Sediment deposits within streams degrade habitat for macroinvertebrates and fish. Finally, and perhaps most importantly, sediment carries other types of contaminants into the aquatic system: nutrients, organic compounds including pesticides, and heavy metals.

Phosphorus (N)

Phosphorus is the limiting nutrient for algal growth in Cayuga Lake as it is for most inland lakes in the Northeast. Enrichment of lakes with phosphorus increases the level of plant and algal growth (primary productivity) and is associated with loss of water clarity. Recent monitoring data confirm that Cayuga Lake is mesotrophic, with moderate levels of primary productivity. However, the shallow areas at the northern and southern ends of the lake exhibit higher levels of phosphorus and productivity. NYSDEC considers both the northern and southern segments of Cayuga Lake as priority areas, indicating water quality concerns. Phosphorus sources include the two wastewater treatment plants discharging to the southern lake basin and runoff from residential and agricultural areas. Septic systems are considered by NYSDEC to be significant sources of phosphorus to the northern segment.

Fertilizers and Pesticides (F)

Fertilizers and pesticides have been detected in both tributary streams and the lake. Recent data provide direct evidence of chemical loss from the landscape and transport to the lake. Almost half of the land in the Cayuga Lake watershed is in active agriculture, and this land use contributes nitrate-nitrogen and pesticides (most notably, herbicides used in corn cultivation) to the lake. Residential and commercial areas are also a potential source of pesticides and herbicides. Using analytical methods with low detection limits, scientists from USGS and NYSDEC have documented trace concentrations of pesticides in the streams and lake. Concentrations of fertilizers and pesticides in groundwater are not well documented.

The herbicides are present at levels far below ambient water quality standards or guidelines based on toxicology and risk assessment. No exceedances of standards or guidelines developed to protect human health and the environment have been detected. However, long-term effects of exposure to trace concentrations of many of these chemicals, singly or in combination, are unknown. The monitoring program has also detected breakdown products of several herbicides in the lake. Concentrations of the breakdown products can be higher than the concentrations of the original compounds. The long-term health effects of exposure to these breakdown products are not well documented. Even when inputs are reduced, contaminants tend to persist in Cayuga Lake, due to the 9-12 year cycle of water replacement.

Organic compounds (OC)

There is localized contamination of groundwater in the Cayuga Lake watershed. The public water supplies in the Towns of Union Springs and Aurelius have detectable concentrations of trichloroethylene (TCE), an organic compound widely used as an industrial solvent, and several TCE breakdown products. Investigations are underway to identify the source(s) of the contamination. Monitoring of private and public wells is also being conducted and water is supplied to affected residents. Groundwater in the Village of Jacksonville has been contaminated by petroleum.

Trace Elements (H)

Limited monitoring has documented elevated concentrations of trace elements (heavy metals) in sediments of Fall Creek and nearshore areas of southern Cayuga Lake. Potential sources of these trace elements are industrial discharges, stormwater runoff, and/or atmospheric deposition. Adverse impacts of metals include toxicity to sediment organisms (such as aquatic insects

and worms), and bioaccumulation within the food web. Extensive monitoring data from Cayuga Lake and the tributaries used for water supply document that concentrations of trace elements in water are low. Concentrations are consistently within limits developed to protect human health and the environment.

Pathogens (P)

Monitoring for the potential presence of pathogens (disease causing microorganisms) is very limited in the Cayuga Lake watershed. Pathogens originate from untreated or inadequately treated human sewage and wild and domestic animal waste. More data are needed to determine whether the issue poses a threat to the desired uses of the water resources.

Exotic species (ES)

Because of its connections to the Great Lakes through the Seneca River, Cayuga Lake is vulnerable to invasion by nonindigenous species of plants and animals. Two recent invaders are a focus of special concern due to their potential to alter the food web. These organisms are the zebra mussel (*Dreissena polymorpha*) and a predatory cladoceran zooplankton (*Cercopagis pengoi*). The macrophyte Eurasian water milfoil (*Myriophyllum spicatum*) is another introduced species that has, until recently, been a nuisance in Cayuga Lake.

Lake Level Management

The Canal Corporation of the New York State Thruway Authority manages water levels of eight Finger Lakes, including Cayuga Lake, and connecting canals. As discussed in the **Preliminary Watershed Characterization Report,** ***water levels are raised and lowered seasonally to protect recreational uses, increase storage capacity, and minimize the potential for flooding. Water flows from Cayuga Lake to the Barge Canal through a gated structure at Mudlock, where the change in elevation is only nine feet. During periods of high runoff the water surface elevation of the Canal can be higher than the lake, limiting management options for lowering lake levels.***

High water levels can contribute to nonpoint source pollution by eroding shorelines and streambanks, inundating septic disposal fields, and saturating soils used for agriculture. Visible sediment plumes are evident in the spring. Water level management is an issue that is closely linked to the significant water quality threats facing the Lake and Watershed.

Areas of Concern (Geographical)

The Cayuga Lake watershed can be divided into a number of subwatersheds (see Map 2-1), which are defined as the land area draining to each tributary stream. The subwatershed is a useful unit of investigation, for a stream's concentration and loading of chemicals, sediment, and bacteria reflect the land use, geology, and hydrology of its drainage area. Assessing the relative contribution of substances from individual subwatersheds can help investigators and watershed managers identify priority areas within the larger watershed. Investigations at the subwatershed level have been conducted in support of the RPP. *Findings are summarized in this section.*

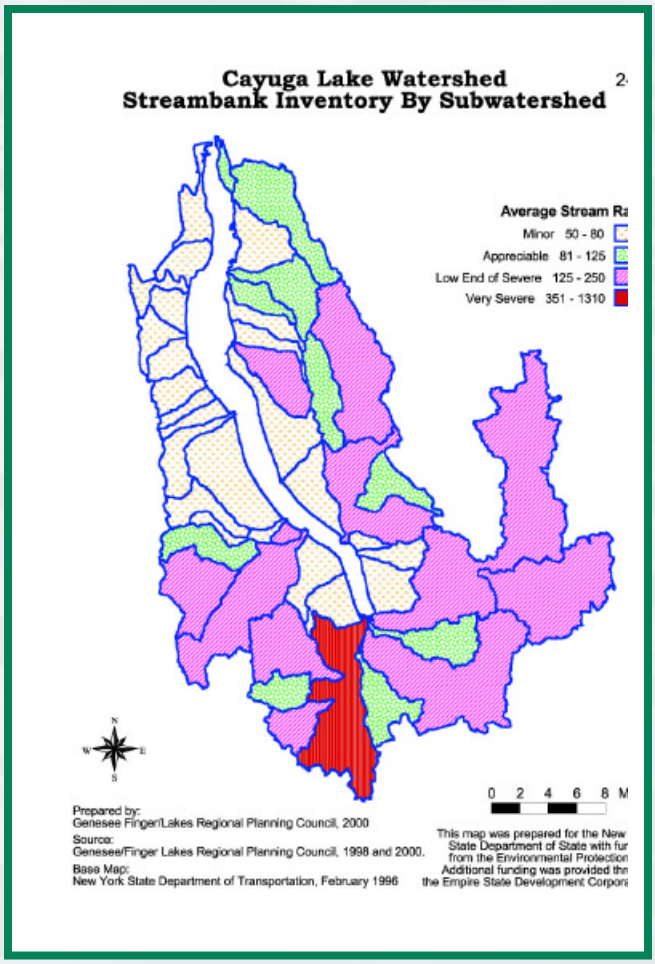
Sediment

Sediment eroded from the landscape enters the extensive surface drainage network in the Cayuga watershed and ultimately flows to Cayuga Lake. Important sources of sediment include streambank erosion, losses from cultivated fields, land development practices, and erosion along roadways. Materials applied to impervious surfaces wash into streams during storms and snowmelt. Stormwater runoff is the primary mechanism of transporting sediment from the watershed to the lake and streams. Both field observations and models were used to identify specific areas within the watershed contributing sediment from eroding streambanks, cultivated fields, development activity, and roadways. As described in the following sections, the major sources are different for each stream. This analysis has provided a basis for targeting restoration actions to specific sources and locations in order to reduce overall sediment loading.

Streambank Erosion and Encroachment on Riparian Corridors

In the southern tributaries, the primary source of sediment appears to be streambank erosion. A detailed streambank survey was completed in 2000 (see *Cayuga Lake Preliminary Watershed Characterization* Section 3.4.1.2) documenting the severity and linear extent of bank erosion along major and minor streams throughout the watershed. The Salmon Creek subwatershed has severe erosion problems, as do Fall Creek (including the nested subwatershed Virgil Creek), and Sixmile Creek (a nested subwatershed of the Cayuga Inlet). Cayuga Inlet exhibits the most severe streambank erosion problems in the entire basin. Detailed results of this analysis are presented in the *Cayuga Lake Preliminary Watershed Characterization* Section 3.4.1.2 and the map of Streambank Inventory by Subwatershed (see Map 2-2). Specific very severe sites and recommendations for remediation are addressed in the Wetland, Shoreline & Riparian Corridor section of Chapter III.

Geology, soil characteristics, and slopes in these subwatersheds contribute to the extent of erosion and sedimentation. Areas with erodible soils and steep slopes such as the Fall Creek and Six Mile Creek subwatersheds are naturally vulnerable to streambank erosion. Disturbance of natural vegetation along the shorelines of streams (the riparian corridor) can accelerate erosion. Finally, destruction and fill of the extensive wetland areas that were historically present in southern Cayuga Lake has exacerbated sediment transport by removing a natural filtration process that captured sediment from these southern streams before it entered the lake.



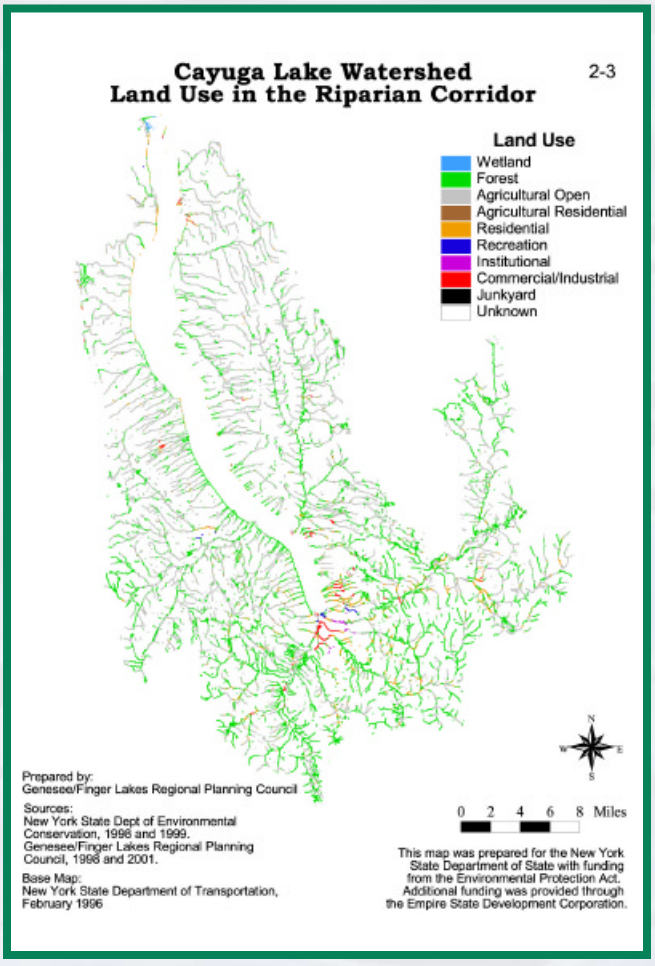
Land use along riparian corridors (see Map 2-3) throughout the watershed has been examined and results are summarized in Table 2-1. The majority of land within a corridor extending 150-ft along the tributary streams is categorized as "developed land"; agriculture is by far the dominant land use. Only a few subwatersheds (Renwick, Canoga, Gulf Creek and Glenwood) have more than nine percent of the riparian corridor in residential land uses. Consequently, impervious surfaces represent a very small fraction of the riparian corridor on a watershed-wide scale. Subwatersheds with a high percentage of the riparian corridor in developed land use are the most vulnerable to streambank erosion. These results (discussed further in the section entitled Wetlands, Shoreline, & Riparian Corridor Management Section) indicate that the smaller agricultural subwatersheds tend to have the greatest degree of encroachment of human activities within the riparian corridors.

Land Use & Development

Land use is also a factor in sediment loss. Agriculture, an important land use throughout the watershed, is most concentrated in the northern two-thirds of the watershed, on both the eastern and western shores. As displayed in Figure 2-1, active agriculture ranges from more than 70% of the land area in Great Gully and Yawger Creek to less than 30% in Cayuga Inlet.

Simple loading models have been developed to estimate sediment loss based on land use and hydrologic conditions. As part of the technical analysis completed for the RPP, annual average sediment loss from agricultural runoff was estimated for the major subwatersheds in the Cayuga Lake basin. These results, displayed in Figure 2-2, provide a basis for defining priority areas. The importance of Salmon Creek, a relatively large subwatershed with a high percentage of the land area in active agricultural use, is evident. However, monitoring is needed to confirm the findings (a recommendation to install a stream gauge on Salmon Creek is included in the Monitoring & Assessment section).

Areas of concern for agricultural runoff, which has the potential to transport sediment, nutrients, animal waste (a source of pathogens and oxygen-demanding material) and pesticides are noted in Table 2-2 and associated



Map 2-4 of Potential for NPS Based on Land Use and Hydrologic Characteristics.

The initial construction phase when land is cleared of vegetation and graded to create a proper surface for construction is one of the largest potential sources of erosion and sedimentation. When natural vegetation and topsoil are removed, the exposed area is particularly susceptible to erosion, causing transformation of existing drainage areas and disturbance of sensitive areas. Sediment loss from developed areas is potentially significant in the Cayuga watershed.

Roadways and Roadside Ditches

Stream networks are integrally linked to a more extensive network of roadside ditches. Although functioning only during storm events and spring runoff, there is evidence that, within the Cayuga Lake Watershed, this network of ditches significantly increases the total volume of discharge and degrades the quality of water flowing into creeks (Schneider 1999). Shoulder ditching practices can leave large areas of sediment exposed and vulnerable to erosion.

Table 2-1

Percent of 150-ft riparian zone with developed land use, tributaries to Cayuga Lake

Subwatershed	Percent Agriculture	Percent Residential	Total Percent Developed	ENCROACHMENT RANK
Great Gully	78	3	81	H
Yawger Cr.	74	3	77	H
Sheldrake	70	4	74	H
Hicks Gully	68	4	74	H
Paines Cr.	70	3	74	H
Ledyard	68	3	71	H
Tributary 68	64	5	70	H
Direct Drainage	61	7	70	H
Mack Cr.	63	1	64	M
Trumansburg	57	6	63	M
Salmon Cr.	58	4	62	M
Canoga Cr.	46	16	62	M
Renwick Cr.	23	27	61	M
Taughannock	50	4	54	M
Glenwood	41	10	52	M
Willow Cr.	48	1	49	L
Fall Cr.	39	7	47	L
Gulf Cr.	37	9	46	L
Cayuga Inlet	28	8	38	L

Figure 2-1.
Percent Agriculture of Major Cuyuga Lake Watersheds

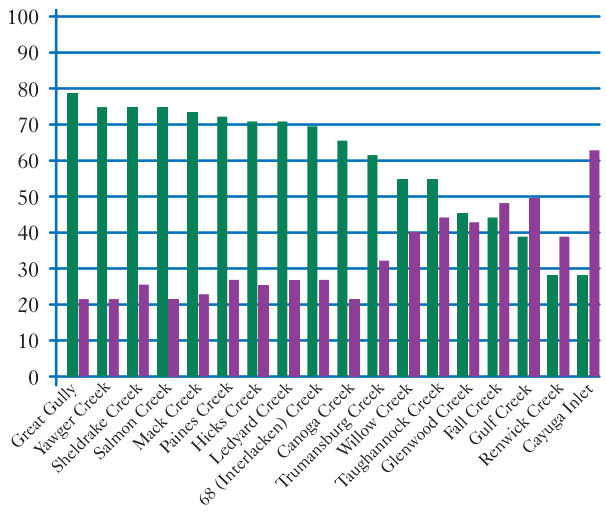
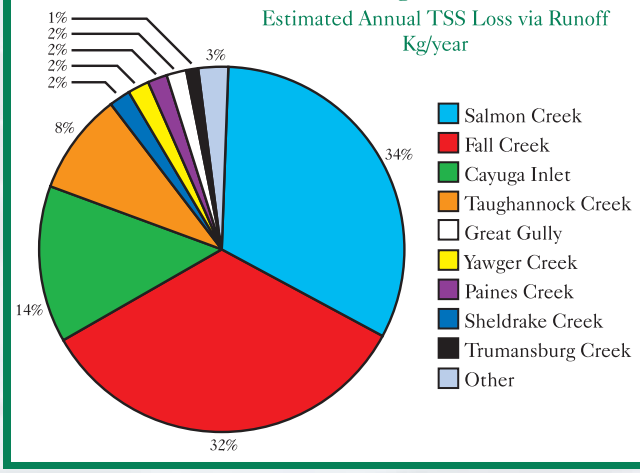


Figure 2-2.
Estimated Annual TSS Loss via Runoff
Kg/year



Runoff from rural roads can also contribute to water quality and habitat degradation of streams and lakes. Sand and sediment applied for winter deicing can wash into road ditches and streams. Throughout the watershed are many storm drains with no provision for sediment removal.

The roadbank survey (see *Cayuga Lake Watershed Preliminary Watershed Characterization* Section 3.4.1.1) conducted in 2000 for this project provided detailed site-specific data in the Cayuga Watershed. All of the roads in the Watershed were surveyed for physical characteristics (slope, channel morphometry) vegetative cover, and the degree of erosion. Results highlight many areas where roadbanks themselves show signs of significant erosion and are a major source of sediment. This, in combination with the road ditch network, indicates

TABLE 2-2

Subwatershed areas with highest potential for nonpoint source pollution, based on land use and hydrologic characteristics

Potential for Nonpoint Source Pollution (Based on Annual Loading per Unit Area)	Subwatershed Areas
High	Salmon Creek Fall Creek Sheldrake Creek Great Gully Yawger Creek (including Yawger Tributary)
Moderate	Taughannock Paines Brook Hicks Creek Subwatershed 68 (Interlaken) Mack Brook Canoga Creek Cayuga Inlet Trumansburg Creek Ledyard Creek Willow Creek
Low	Gulf Creek Renwick Brook Glenwood Creek

a significant problem that directly affects wetlands, riparian corridors and ultimately Cayuga Lake.

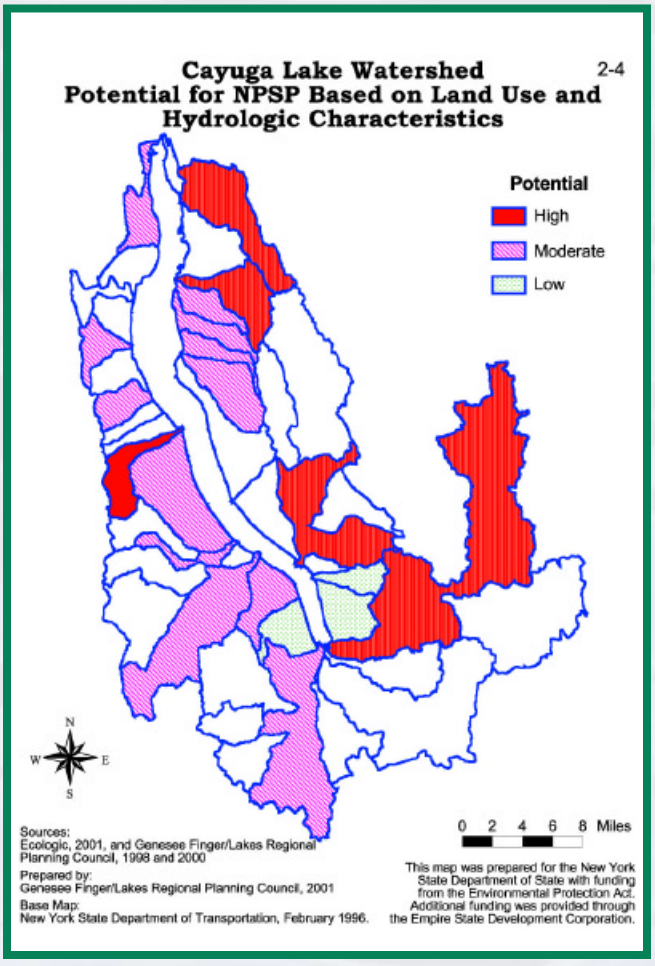
Results of the roadbank survey were used to calculate sediment loss per road mile on a subwatershed basis and provide a basis for identifying priority areas for restoration. These findings are displayed in Map 2-5 of Estimated Potential Roadbank Sediment by Subwatershed and Table 2-3. Specific very severe sites and recommendations for remediation are covered in the Stormwater Management & Erosion Control section of Chapter III.

Phosphorus

No recent synoptic survey of the tributaries to Cayuga Lake has been completed to identify subwatersheds where phosphorus concentrations are high and the loading is disproportionate to the hydrologic contribution. The modeling approach used to estimate sediment loading based on land use and hydrology also results in estimated phosphorus load from the subwatersheds. Recall that this simple modeling approach is best used to estimate the relative magnitude of annual loading. The effects of management practices on specific parcels are not accommodated. Because the majority of phosphorus entering streams from nonpoint source pollution is associated with soil particles, the subwatersheds identified with high, moderate, and low potential for sediment loading are also ranked in this manner for phosphorus loading.

Phosphorus concentrations of Cayuga Lake are variable along the lake's 38-mile length. Concentrations are highest in the southern lake basin, where discharge from the Ithaca Area Wastewater Treatment Plant, the Cayuga Heights Wastewater Treatment Plant, and the two largest tributaries Fall Creek and Cayuga Inlet, all flow into the lake.

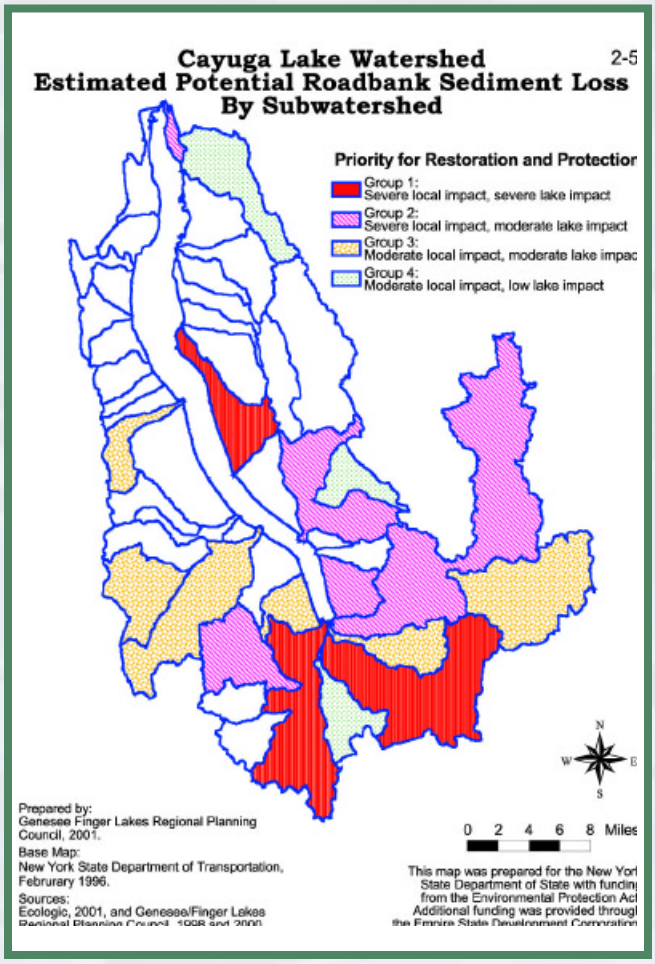
An estimated phosphorus budget for the southern lake basin would include the two streams and two wastewater treatment plants. In addition, phosphorus drawn from deep in Cayuga Lake is returned to the shallow southern basin by Cornell's Lake Source Cooling project (see Figure 2-3). This industrial cooling water return flow represents a new source of phosphorus to southern Cayuga Lake during May – October when the lake does not naturally mix.



Permit conditions are tabulated. However, performance of the wastewater treatment plants and the Lake Source Cooling facility are all consistently better than the permit limits (resulting in lower phosphorus loading). Engineering improvements to both wastewater treatment plants are planned to improve the phosphorus removal (see Appendix F - Wastewater and Wastewater Treatment Plants). Final effluent limits from the two wastewater treatment plants are still under review and discussion; a determination of the revised permit limits has not been made. Estimates of the current phosphorus loads to southern Cayuga Lake are summarized in Table 2-4. Note that the phosphorus from Lake Source Cooling and the wastewater treatment plants is more biologically available (that is, more of the total phosphorus is in the soluble reactive form) than is the phosphorus from the two tributary streams. Phosphorus loading from the tributaries is typically much higher during the December – April period when flows are at their annual peaks.

Table 2-3
Estimated Annual Sediment Loss from Roadways and Restoration Priorities

Priority for Restoration and Protection	Streams	Estimated annual sediment loss from roadways	Estimated annual sediment loss per roadway mile
Group 1: Severe local impact, severe lake impact	Sixmile Creek Cayuga Inlet King Ferry Station area	More than 900 tons/yr	3-7 tons/mile/yr
Group 2: Severe local impact, moderate lake impact	Fall Creek Enfield Creek Lansing area Salmon Creek Cayuga Village area	250 - 700 tons/yr	2-4 tons/mile/yr
Group 3: Moderate local impact, moderate lake impact	Glenwood Creek area Cascadilla Creek Sheldrake Creek Taughannock Creek Virgil Creek Spring Brook	100-250 tons/yr	More than 2 tons/mile/yr
Group 4: Moderate local impact, low lake impact	Yawger Creek Buttermilk Creek Locke Creek	More than 100 tons/yr	More than 1 ton/mile/yr



Fertilizers and Pesticides

The lack of a recent synoptic survey of the tributaries to Cayuga Lake limits our ability to highlight specific subwatersheds with elevated concentrations of fertilizers and pesticides. NYSDEC monitors nitrate-nitrogen concentrations of Fall Creek as part of their Rotating Intensive Basin Survey (RIBS) program.

Fall Creek is also included in the statewide pesticide monitoring network, a joint program of USGS and NYSDEC. Herbicides used in corn cultivation are consistently detected at trace concentrations in Fall Creek. USGS completed a storm sampling program to measure pesticide concentrations in three tributaries draining agricultural subwatersheds in June, 1998. Samples were collected in Salmon Creek, Yawger Creek, and Paines Creek during a storm that occurred shortly after the herbicides metolachlor and alachlor had been applied. Peak concentrations of herbicides in these streams were 100 to 1000 times higher than detected in Fall Creek or Cayuga Lake. From the limited data available, it is clear that agricultural areas have the potential

to export pesticides to the lake. Important data gaps remain regarding the relative significance of residential and commercial uses of pesticides on the quality of the lake and its tributary streams.

Table 2-4

Estimated Phosphorus Budget, Southern Cayuga Lake

Source	Annual average, pounds per day)	May – October average, pounds per day)	Actual Load (years of measurement, pounds per day)	Biological Availability of Phosphorus from this Source
Ithaca Area Wastewater Treatment Plant	83.4 (permit conditions)	83.4 (permit conditions)	33.7 (1998 – 2000 average performance)	High
Cayuga Heights Wastewater Treatment Plant	16.7 (permit conditions)	16.7 (permit conditions)	15 (1996 – 1999 average performance)	High
Fall Creek (average hydrologic year)	42	21	N/A	Low
Cayuga Inlet (average hydrologic year)	17	8	N/A	Low
Lake Source Cooling	2.3 (permit conditions)	4.6 (permit conditions)	1.9 (July – November 2000 average performance)	High

Organic Compounds

Groundwater quality data are limited. There are regions of the Cayuga Lake watershed with detectable concentrations of organic chemicals in the groundwater. These areas of concern are located in the Fleming-Union Springs-Aurelius area and in the Jacksonville area.

New York State Department of Health has released an initial Source Water Assessment Program (SWAP) Report for the Cayuga Lake Watershed (Refer to the RPP On-Line at http://www.cayugawatershed.org). These reports analyze the hydrogeologic sensitivity of public water supply sources and integrate this information with a contaminant inventory. The goal is to define the overall susceptibility of a water supply source to contamination. When complete, the SWAP report will include both surface water and groundwater supplies. From the preliminary analysis of hydrogeologic sensitivity, wells in the Genoa-King Ferry Water District were designated as having a high sensitivity because of their location in an area of high conductivity (water moves through the soil too fast for adequate filtration and contaminants can reach water supply wells). Many other groundwater sources are also at risk of being influenced by surface waters. These areas will require continued protection to maintain the quality of the supply.

Trace Elements

Monitoring data documenting the concentrations and distribution of trace elements in the Cayuga Lake watershed are very limited. Fall Creek is monitored as part of the Rotating Intensive Basin Studies (RIBS) program, and seven heavy metals have been detected in sediments of this stream.

Pathogens

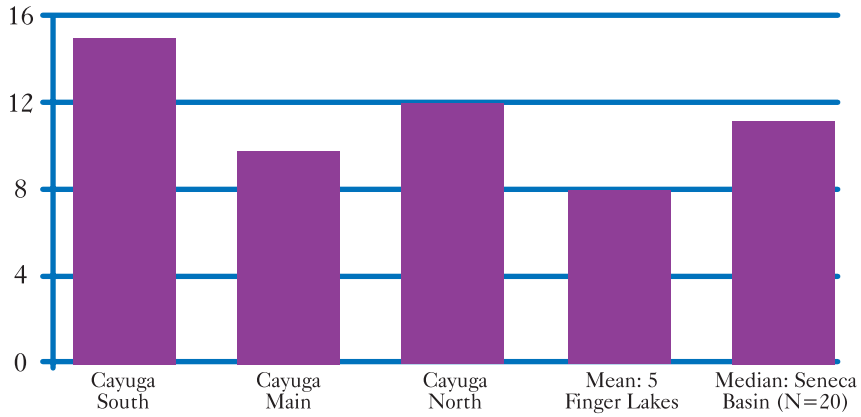
Microbiological testing is also very limited in the Cayuga Lake watershed. No specific geographical areas of concern are known.

Exotic Organisms

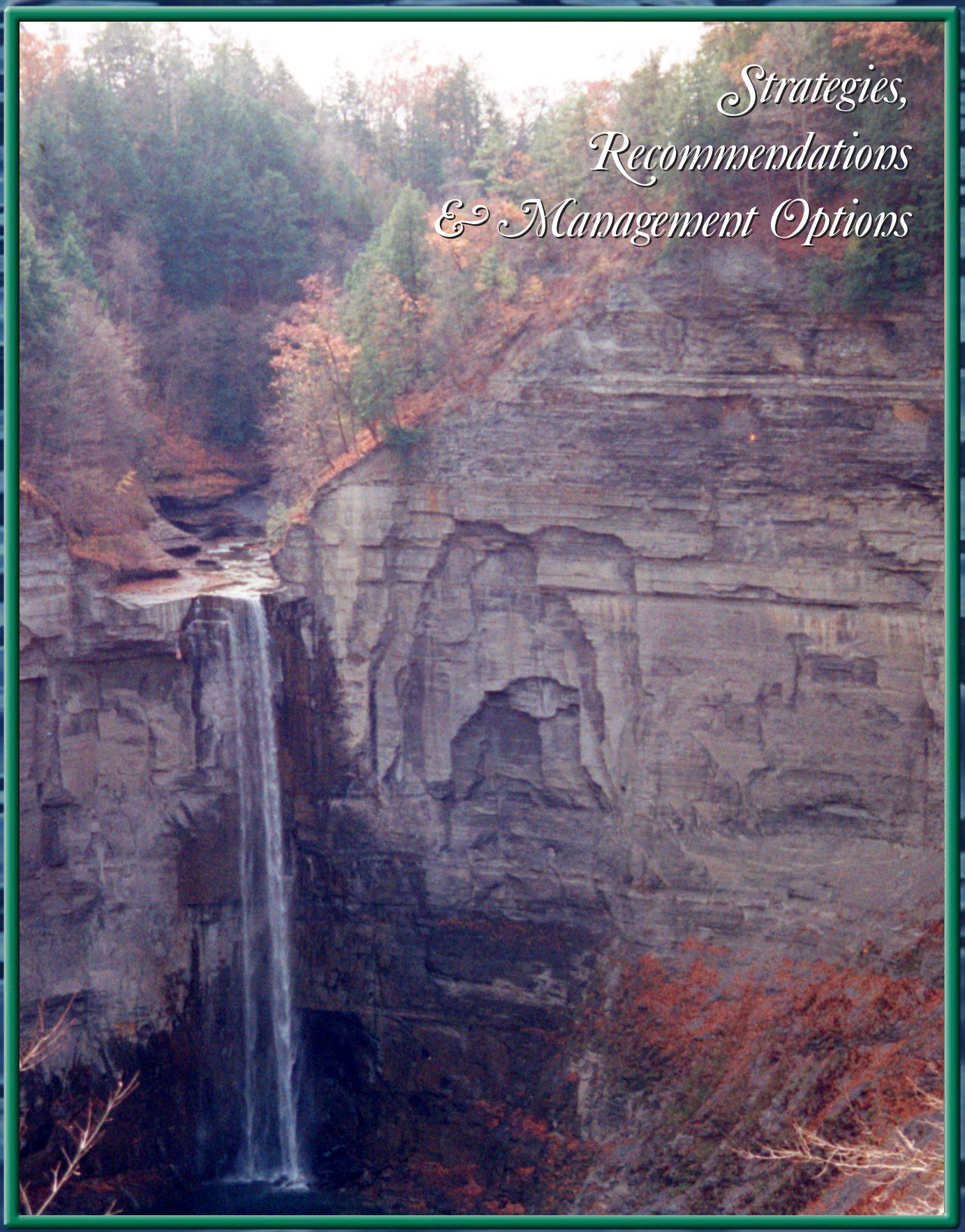
Exotic organisms including Eurasian water milfoil and zebra mussels are distributed throughout the lake.

Figure 2-3.

Total Phosphorus Concentrations, Summer Average Upper Waters



Data: Cayuga South Cornell Lake Source Cooling, 1999-2000
Other data: NYSDEC, 1996-1999
5 other lakes include: Seneca, Skaneateles, Owasco, Canandaigua, Keuka



Strategies, Recommendations & Management Options

CHAPTER 3

Introduction

Eleven management action categories were developed to reflect the priority setting by the Intermunicipal Organization (IO) and the major water quality issues in the Cayuga Lake Watershed. The process used to determine these priorities is described in Chapter II. Sediment loading is the highest priority issue in the Cayuga Lake Watershed, with phosphorus loading an important second. The action categories address Agricultural Practices, Stormwater Management & Erosion Control, Monitoring & Assessment, Wetland, Shoreline & Riparian Corridor Management, Forestry & Silviculture, and Regulatory Management. There are specific recommendations in each section designed to effectively reduce the potential for nonpoint source pollution from sediment, phosphorus, and other contaminants. Recommendations are both technical and institutional: the what, who, how, where and when of watershed restoration and protection.

As noted in Chapter II, the three main sources of sediment loss from the watershed are streambank erosion, roadbank and road ditch erosion and maintenance, and human alteration of the landscape. Agriculture and development practices are the land uses with the greatest potential for increased sediment loss. Overall, the most effective means to reduce sediment loss from the Cayuga Lake Watershed is to protect and restore the riparian corridors along the many tributaries. The highest priority areas for these actions are specific segments of Big Salmon Creek, Cayuga Inlet, and Fall Creek (see Appendix S - Very Severe Segments/ Riparian Corridors) that were identified through a quantitative streambank assessment as described in the *Cayuga Lake Preliminary Watershed Characterization* (2000) and summarized in the Wetland, Shoreline & Riparian Corridor Management section of this chapter. Controlling streambank erosion can be difficult and costly and will require a firm commitment from many levels of government.

Controlling roadbank erosion and reducing the adverse environmental impacts of roadway maintenance will require changes in practices by highway construction and maintenance personnel. Some roadway segments require immediate stabilization, especially in the Towns of Caroline, Danby, Enfield, Genoa, Hector, Lansing, Ledyard, Newfield, and Summerhill (see Appendix I - Very Severe Roadbank/Road Ditch Erosion). These are identified through a quantitative roadbank assessment and described in the *Cayuga Lake Preliminary Watershed Characterization*. The highest priority actions for mitigation include practical measures (vegetating ditches using hydroseeders) and enhanced training for construction and maintenance personnel. These actions are summarized in the Stormwater Management & Erosion Control Section of this chapter.

Specific actions for agriculture and development are described that will reduce the loss of sediment and associated pollutants from the landscape. There are two central recommendations for controlling agricultural nonpoint source pollution. First, continue to develop and implement whole farm plans using the Agricultural Environmental Management (AEM) framework (see Appendix H - Agricultural Programs). Second, protect and/or restore riparian corridors adjacent to agricultural lands throughout the watershed. Adverse impacts of development can be mitigated through the adoption and enforcement of local Stormwater & Erosion Control ordinances (see Appendix I). The priority subwatersheds where controls on land use will effect the greatest overall reduction of loading to the lake were highlighted in Chapter II and include the Towns of Venice, Genoa, Lansing, Summerhill, Groton, Dryden, Virgil, Ithaca, Lodi, Ovid, Ledyard, Aurelius, Springport, Fleming and Scipio, the City of Ithaca, and the Villages of Dryden and Freeville.

Two other issues of high concern are the potential pollution to both surface water and groundwater associated with on-site wastewater (septic) systems and hazardous material storage. The findings of the *Cayuga Lake Preliminary Watershed Characterization* (2000), as well as other documents, strongly suggest that most on-site systems in the Cayuga Lake Watershed are installed in areas considered marginal for optimal operation of septic systems. These environmental constraints include high groundwater table, poor soils, or inadequate depth to bedrock. Compounding this problem are inadequate maintenance and inspection. The primary recommendation for on-site wastewater systems is the use of regular assessments and inspections through the institution of local on-site waste water regulation, county public health law (similar to the process already in use in Cayuga County), or Watershed Rules and Regulations coupled with hiring a watershed inspector. These recommendations are discussed in the Wastewater Systems Management and Regulatory Management sections of this chapter.

Hazardous material storage has already had a devastating effect on many groundwater supplies in the watershed. The primary recommendation in this category is information gathering: determine the location and type of sites and design effective methods for their remediation. Another significant recommendation is to implement regular hazardous waste collection days. Only Tompkins County has a permanent hazardous waste collection facility. The hazardous materials recommendations are covered in the Hazardous Waste Management section of this chapter.

It is important to point out that all the recommendations, regardless of priority or perceived importance, will be difficult or impossible to implement without continued public discourse. Targeted education, along with coordination, collaboration, and partnerships and public participation are critical. Efforts to engage watershed residents have been a major focus of the RPP process. As these activities transcend the individual issues, sources, and management strategies they are included as action categories.

The success of the *RPP* will be measured using three interrelated processes: (1) achievement of measures and targets for the action category recommendations, (2) assessment of the health of the watershed and lake through continued monitoring, and (3) evaluation techniques recommended by the IO Organizational Consultant (see Appendix A) and adopted by the IO in the Fall of 2001. Through regular and systematic monitoring, priority sources and issues can be identified and mitigated or protected, and the success of targeting resources through strategies such as the *RPP* itself can be evaluated. Recommendations for sampling and monitoring are covered in the Monitoring & Assessment section of this chapter.

Each section of this chapter has an introductory matrix (with the exception of Public Participation) associating the issues outlined in Chapter II with the management option (associated if white), followed by an introduction stating the situation, a set of goals, a listing of existing measures, and a matrix of recommendations.

The recommendation matrix for each action category (with the exception of Public Participation and Forestry and Silviculture Management) has six columns. The first column lists the prioritized recommendation number. The second column lists the prioritized recommendation. The third column lists the abbreviation of the issues as discussed in Chapter II, addressed by each recommendation. Use the issues matrix at the beginning of each section as a key to the abbreviation. The fourth column lists the abbreviation for the potential organizations responsible for the recommendation (see recommendation key). The fifth column lists the measure and/or target that will be used to implement and evaluate the recommendation. The sixth column lists the approximate cost of the recommendation.

Recommendation Key
Potential Responsible Organization(s)

AI	Academic Institutions
C	County Agencies
CCE	Cornell Cooperative Extension
CLWN	Cayuga Lake Watershed Network
CWQCC	County Water Quality Coordinating Committees
IO	Intermunicipal Organization
IOAC	Intermunicipal Organization Agriculture Committee
KLA	Keuka Lake Association
LO	Land Owner
LC	Land Trust
M	Municipalities
NRCS	Natural Resource Conservation Service
NYSDEC	New York State Department of Environmental Conservation
NYSDOT	New York State Department of Transportation
NYSDOH	New York State Department of Health
NYPF	New York Planning Foundation
ORPS	Office of Real Property Services
PC	Private Consultant
RPB	Regional Planning Boards
SLAP5	Seneca Lake Area Partners in the Five County of the Seneca Lake Watershed
SWCD	Soil & Water Conservation District
USDA	United States Department of Agriculture
USEPA	United States Environmental Protection Agency
USGS	United States Geologic Survey
WWTF	Wastewater Treatment Facility
WSS	Watershed Steward

The following are the action categories with their associated strategies, recommendations, and management options:

Public Participation
Coordination, Collaboration, and Partnerships
Watershed Education
Agricultural Practices
Stormwater Management & Erosion Control
Wastewater Systems Management
Hazardous Waste Management
Monitoring & Assessment
Wetland, Shoreline & Riparian Corridor Management
Forestry and Silviculture Management
Regulatory Management

1. Public Participation

The RPP *is a process that culminates with a document of shared goals, objectives, strategies, and recommendations that will serve as a guide in the restoration and protection of the watershed. Over the past four years there have been several planned opportunities for individuals and groups to voice their interests and concerns on issues effecting the Cayuga Lake Watershed (see Appendix B - Public Participation). Additionally, individuals and groups are encouraged to take a more active role by working with the IO member in your municipality, attending or becoming an active member of an IO committee (see Appendix A - IO Structure), commenting on draft documents as they become available, and/or becoming an active member of other organizations concerned with the future of the Cayuga Lake Watershed.*

2. Coordination, Collaboration & Partnerships

Agricultural Practices (A)	Development (D)	On-site Wastewater Systems (O)	Stormwater Runoff (SR)	Wastewater Treatment (WW)			
Drinking Water (DW)	Tourism and Other Economic Development (T)	Water Quality Standards (WQS)					
Water Quality (WQ)	Exotic species (ES)	Fertilizers and Pesticides (F)	Heavy metals (H)	Phosphorus and Nutrient Loading (N)	Organic compounds (OC)	Pathogens (P)	Sediment (S)
Comprehensive Planning (C)	Education (E)	Economic Revitilization & Sustainability (ER)	Infrastructure (I)				

Introduction

Any effort to protect and improve the watershed requires concerted effort by all stakeholders. The Intermunicipal Organization (IO) (see Appendix A - IO Structure) and the *RPP* process is in a unique position to provide the organizational structure and improve collaboration watershed-wide. Each of the other elements of the process support and are supported by this element. Actions might include collaborative grant writing, joint meetings and conferences, and offers of technical and financial assistance to collaborators, when funding is available. The participation of watershed partners in IO efforts, including watershed municipalities (see Figure 1-2), IO Committees (see Appendix A - IO Structure), the Cayuga Lake Watershed Network (see http://www.cayugalake.org), the Cayuga Lake Watershed Steward (see Appendix J), Cornell Cooperative Extension, the County Water Quality Coordinating Committees, and the Soil & Water Conservation Districts, academic institutions, as well as State and Federal agencies, is vital and should be encouraged.

Goals

Coordination, collaboration and partnerships are the key to efficient and effective watershed management. All groups and organizations that do work within the Cayuga Lake Watershed should coordinate their activities and consider partnerships and collaboration as an efficient and effective means of improving the Cayuga Lake Watershed.

Existing Measures

Intermunicipal Organization (see Appendix A)
Intermunicipal Organization/Cayuga Lake Watershed Network Joint Strategy Committee (see Appendix A)

No. 2 ~ Coordination, Collaboration & Partnership Recommendations

		Potential Related Issue(s)	Responsible Organization(s)	Measure/ Target	Approx Cost
A	**Specific IO Actions**				
A1	Short presentation to municipal boards on watershed and *RPP* (including preparation, one staff person and one person from IO)	WQ, E	IO, CLWN	100% within 1 year	$2,000
A2	Initiate a process to further engage the County WQCCs, including brief presentations to the IO about the county water quality strategies and current projects of the committees; b) identification of common goals and efforts; and c) application for joint funding to conduct work across the watershed.	WQ, E	IO, CWQCC	a. 100% by 7/01 b. by 8/01 c. 1 year	$3,000
A3	Provide opportunities for citizens to volunteer for specific projects and on IO committees (see Appendix A).	WQ	IO, CLWN	Increase number of volunteers by 10% within 1 year	$200
A4	Identify stakeholders with respect to specific priority issues, such as local roads management, and facilitate funding applications to support joint projects.	WQ	IO, CLWN	Identify 3 significant joint projects and seek funding within 1 year	$1,000
A5	Support other, complementary efforts in the watershed by, for example, letters of support and in-kind contributions.	WQ	IO, CLWN	Support 2 additional efforts within 1 year and continue existing efforts	$4,000
B	**Coordinated Actions**				
B1	Data and information clearinghouse (see Appendix K) including inventory and design of data and information clearinghouse	WQ	IO, CLWN, RPB	1 year	$5,000
B2	Volunteer monitoring programs through Citizens Statewide Lake Assessment Program (CSLAP) Professional monitoring programs (see Monitoring & Assessment)	A, D, O, SR, WW, DW, WQ, ES, F, H, N, OC, P, S, E	CLWN, WSS, CWQCCs, CCE	6 months	$2,500
B3	Education and public participation programs (see Education and Public Participation sections)	WQ, E	IO, CLWN, CCE		
B4	Development, distribution and analysis of a resident survey	WQ	IO, CLWN	2-3 years	$50,000
B5	Assist in updating a comprehensive resource guide/directory (see *RPP* On-Line at http://www.gflrpc.org) of existing monitoring and implementation programs and complimentary organizations.	WQ	IO, CLWN, C	6 months	$2,000
B6	Coordination with other programs and organizations doing work in the watershed using the management strategies of the *RPP* so as to maximize resources along with efficiency and effectiveness. This would include coordination of funding proposals and allocation of resources based on a comprehensive strategy.	WQ	IO, NYSDEC	ongoing	
C	**Future of the IO**				
C1	Institutionalize and restructure IO as an implementation organization (see Appendix A - IO Structure After to July 2001)	WQ	IO along with all identified interested parties		7/01
C2	Through a Request for Proposals process the IO has chosen an Organization Facilitator to assist the IO in research and development of a self-sustaining organizational structure capable of advancing and overseeing the implementation of the *RPP*. The responsibilities of the consultant are listed in the Scope of Services (see Appendix A)	WQ	IO along with all identified interested parties	5/01 - 9/01	$25,000
C3	Contribute to the development of Watershed Restoration & Protection Strategies (WRAPS) (see http://www.dec.state.ny.us/website/dow/uwa/index.htm)	WQ	NYSDEC along with all identified interested parties	2002-03	

		Potential Related Issue(s)	Responsible Organization(s)	Measure/ Target	Approx Cost
C4	Participate in the Source Water Assessment Program (SWAP) (see http://www.health.state.ny.us/nysdoh/water/swap.htm) for the Cayuga Lake Watershed. Use the Cayuga Lake Watershed SWAP (see *RPP* On-Line at http://www.cayugawatershed.org) as a source of data and targeting	WQ	NYSDOH	2001-02	
C5	Participate in the Priority Waterbodies List (PWL) (see *RPP* On-Line at http://www.cayugawatershed.org) update	WQ	NYSDEC	2001-03	
C6	Develop a framework for working with Seneca Lake Area Partners (SLAP)/Seneca Lake Watershed (see http://www.gflrpc.org/Seneca.htm) and Keuka Lake Association/ Watershed Management Plan (see http://www.keukalakeassoc.org/) - *The combined Keuka-Seneca watershed contributes about half the flow that leaves the Cayuga Lake watershed at Mudlock through the Seneca-Cayuga Canal. Yet, the Keuka and Seneca watersheds are managed under their respective plans and are not considered part of the Cayuga Lake Watershed Restoration and Protection planning process. Some of the point and nonpoint sources within the Seneca-Cayuga Canal probably influence the northern end of Cayuga Lake (north of the railroad causeway) even though it is diluted by the outflow from the Seneca Lake system.*	WQ	IO, SLAP5, KLA	Meet with and develop a framework within 6 months	$250
C7	Continued Coordination with Academic Institutions including Cornell University, Ithaca College, Wells College, and others	WQ	IO, AI	ongoing	
C8	Continued Coordination with Federal Agencies including United States Geologic Survey (USGS), Natural Resources Conservation Service (NRCS), United States Department of Agriculture (USDA), United States Environmental Protection Agency (USEPA), Army Corps' of Engineers, and United States Fish & Wildlife Service	WQ	IO along with agencies listed	ongoing	
C9	Continued Coordination with State Agencies including New York State Department of Environmental Conservation, New York State Department of State, and New York State Department of Health	WQ	IO along with agencies listed	ongoing	
C10	Continued Coordination with County Agencies including County WQCC (Cayuga County Water Quality Management Agency, Cortland County Water Quality Coordinating Committee, Seneca County Water Quality Committee, Schuyler County Water Quality Coordinating Committee, and Tompkins County Water Resources Council), County of Regional Department of Health, County Cornell Cooperative Extension (CCE), County Soil & Water Conservation District (SWCD), County Environmental Management Council (EMC), County Planning Department, County Economic Development Department, County Tourism Promotion Agency (TPA), County Highway Department, and County Emergency Management Agency	WQ	IO along with agencies listed	ongoing	
C11	Continued Coordination with Municipalities including mayors, supervisors, legislators, highway superintendent/ public works, clerks, water suppliers, wastewater treatment operators	WQ	IO along with agencies listed	Increase number of IO participants - attain coverage of 85% of land area in watershed	

3. Watershed Education

Agricultural Practices (A)	Development (D)	On-site Wastewater Systems (O)	Stormwater Runoff (SR)	Wastewater Treatment (WW)			
Drinking Water (DW)	Tourism and Other Economic Development (T)	Water Quality Standards (WQS)					
Water Quality (WQ)	Exotic species (ES)	Fertilizers and Pesticides (F)	Heavy metals (H)	Phosphorus and Nutrient Loading (N)	Organic compounds (OC)	Pathogens (P)	Sediment (S)
Comprehensive Planning (C)	Education (E)	Economic Revitilization & Sustainability (ER)	Infrastructure (I)				

Introduction

The watershed education recommendations have been prioritized given the priorities outlined in the *RPP*, as well as the input from coordinating groups, individuals and organizations.

Public education and involvement efforts are required for implementation of the *RPP*. Each individual watershed resident should be considered a watershed manager. Thus, a public that understands the watershed's water quality and resource management issues will make informed choices about the long-term protection and restoration of the Lake. An informed and actively involved watershed population will provide the support necessary for the elected leaders to continue this program.

Goal

Coordination, collaboration and partnerships are key to successful watershed education. This includes working with all associated organizations, municipalities, and groups and the Cayuga Lake Watershed Steward (see Appendix J) in implementing comprehensive watershed education that results in a more informed watershed community.

Existing Measures

Public Forums (see Appendix B)

Cayuga Lake Intermunicipal Organization web site <http://www.cayugawatershed.org>

Genesee/Finger Lakes Region Local Government Workshop <http://www.gflrpc.org>

Cayuga Lake Watershed Network newsletter, listserv, and web site <http://www.cayugalake.org>

No. 3 ~ Watershed Education Recommendations

A	**Agriculture - Develop educational materials for agricultural producers and the community at large.**	**Related Issue(s)**	**Potential Responsible Organizations(s)**	**Measures/ Targets**	**Approx Cost**
A1	Identify or develop and distribute public information materials that discuss agricultural issues of concern to the entire watershed community such as the factors affecting farm size, regulatory and voluntary measures to control agricultural pollution, and the relationships between agriculture and other amenities such as open space.	A, T, C, E, ER	IOAC	3 articles submitted to various media per year	$5,000
A2	Document and disseminate successful strategies for nutrient management, manure handling, and erosion control. Consider publishing reports in trade journals for the dairy industry.	A, SR, DW, WQ, N, P, S, E, ER	USDA, NRCS, SWCD, AI, CCE, LO	Distribute information to farms participating in AEM type programs within 2 years.	$1,000

		Related Issue(s)	Potential Responsible Organizations(s)	Measures/ Targets	Approx Cost
A3	Provide software and training for producers throughout the watershed to help manage the record keeping associated with recommendations related to management of nutrients, agricultural wastes (including manure), and pesticides.	A, DW, WQ, F, N, OC, P, E	USDA, NRCS, SWCD, AI, LO	Research existing software within 1 year. Offer 3 training's within 3 years	$10,000
A4	Provide training and materials for producers throughout the watershed to develop Emergency Action Plans.	A, DW, WQ, F, N, OC, P, E	USDA, NRCS, SWCD, LO	Publicize availability of materials and support - 18 months.	$5,000
B	**Stormwater Management & Erosion Control**				
B1	Provide education and training of local officials on erosion controls and stormwater management and the benefits and process of adopting and/or updating local stormwater and erosion control ordinances.	A, D, SR, DW, WQ, C, E	RPB, C, M, SWCD, NYSDEC, NYSDOS	4 education programs within 4 years.	$10,000
B2	Increase training for highway officials in erosion control and road deicing	E	RPB, C, M	Assess current level of education - 18 months. Increase by 10% within 30 months.	$5,000
B3	Coordinate training for all municipal elected officials, enforcement officers, highway superintendents, boards, and related professional staff on existing (Stormwater Phase I) and new (Stormwater Phase II) state and federal regulations.	A, D, SR, DW, WQ, S, E	C, M	Serve as clearinghouse for training announcements and assist with promotion - current to year 4.	$5,000
B4	Municipalities covered under the new Stormwater Phase II regulations for stormwater control (Cayuga Heights (V), Dryden (T), Ithaca (C), Ithaca (T), Lansing (T), and Lansing (V)) should undergo training toward implementation.	D, SR, DW, WQ, E	C, M	3 trainings offered within the next 2 years.	$5,000
B5	Increase public awareness of the need to control litter and pet waste in urban and developing areas.	A, D, SR, DW, WQ, N, P, S, E	IO, C, M	2 articles in local media and newsletters within 18 months.	$2,000
C	**On-Site Wastewater Systems**				
C1	Host technology transfer workshops for local code enforcement officers, design professionals, and representatives of State and County Health Departments responsible for evaluating alternative and innovative technologies.	O, DW, WQ, E	NYSDOH, C, M	Workshop offered watershed-wide - 3 years.	$2,500
C2	Hold regular educational/training forums for the following: contractors and others associated with septic system design and construction, municipal boards (e.g. elected, zoning, and planning), enforcement officers and home owners, using the Home*A*Syst Program (*see* http://www.uwex.edu/homeasyst/) as a model for self-assessment (see Appendix N) and education.	O, DW, WQ, N, P, E	RPB, C, CCE, M	50 homeowners and 30 professionals trained within 4 years.	$5,000
D	**Hazardous Waste**				
D1	Identify or develop public educational materials to describe landfill issues, such as the difference between old and new types of landfills, threats to public health and water quality, and the need to ensure that sites are closed properly.	DW, WQ, F, OC, E	USEPA, NYSDEC, IO, CLWN	Identify resources and share locations on web site and with collaborating agencies - 6 months.	$2,500
D2	Use existing public educational materials to describe hazardous material storage issues, threats to public health and water quality, and the need to ensure that materials are stored or cleaned up properly.	DW, WQ, F, OC, E	USEPA, NYSDEC, IO, CLWN	Articles in local media, assist with promotion of hazardous waste clean up dates in Seneca, Cayuga and Tompkins - 1 year.	$2,500

		Related Issue(s)	Potential Responsible Organizations(s)	Measures/ Targets	Approx Cost
D3	Identify or develop educational materials to describe abandoned agricultural properties issues, threats to public health and water quality, and the need to ensure that these properties are inactivated properly. Educational materials or portions of workshops should target the agricultural community and municipal officials.	A, DW, WQ, F, OC, E	USEPA, USDA NYSDEC, IO, CLWN, CCE	Materials available within 5 years.	$2,500
D4	Education program focusing on abandoned wells and the need for proper capping.	A, DW, WQ, E	USEPA, USGS, NYSDEC, IO, CLWN, CCE	Integrate into existing well education programs - ongoing.	$2,500
D5	Integrate household hazardous waste educational material (see Appendix O) into existing and other watershed education programs in the Cayuga Lake Watershed	DW, WQ, OC, E	NYSDEC, C, IO, CLWN, CCE	Integrate into existing programs - ongoing.	$2,500
D6	Distribute hazardous spills information throughout the watershed to various community groups, fire departments, chamber of commerce, citizens, municipalities with names and numbers of the agencies and staff in charge and who has appropriate jurisdiction in emergency situations.	DW, WQ, OC, E	NYSDEC, C, IO, CLWN	Ongoing beginning Fall 2002.	$2,500
D7	Inform local governments of their right to regulate mines. This can be made part of existing local government training opportunities.	SR, DW, WQ, S, E	NYSDOS, RPB, C, NYPF	Integrate into 2 existing trainings within next 2 years.	$1,000
E	**Wastewater and Wastewater Treatment**				
E1	Educate the general public on the role, process, accomplishments, needs, and future strategy of sewer districts and wastewater treatment facilities.	D, O, WW, D, T, WQ, H, N, OC, P, E, ER, I	NYSDEC, WWTF, IO, C, M	Target high priority communities beginning in year 1. Offer assistance and materials as appropriate.	$1,000
F	**Monitoring & Assessment**				
F1	Meet with public to discuss findings and progress of monitoring and assessment programs in the Cayuga Lake Watershed.	A, D, O, SR, WW, DW, WQ, E	AI, NYSDEC, IO, CLWN, WQCCS,	Periodically beginning Spring 2002. Web site interpretation of RUSS data beginning Fall 2001.	$250
F2	Participate in a volunteer monitoring program through the Citizens Statewide Lake Assessment Program (CSLAP). This program gathers trophic state data and a few related parameters in the lake. Four stations should be established on Cayuga Lake: southern and northern segments and two mid-lake stations reflecting the regulatory segmentation of the lake.	A, D, O, SR, WW, DW, WQ, ES, F, H, N, OC, P, S, E,	CLWN, WSS CWQCCs, CCE	4 volunteers per sampling site trained and active by Summer 2002.	$2,500
G	**Wetlands & Riparian Corridor Management**				
G1	Limit encroachment of the riparian buffer zone through education (<10% of the riparian corridor should be allowed to have a buffer width <10 m).	A, D, SR, DW, WQ, ES, OC, N, S, E	C, M, LO, SWCD, NRCS	Distribution of 300 additional erosion control brochures within 8 months. Creation of educational display within 1 year.	$5,000/ year.
H	**Forestry & Silviculture Management**				
H1	Coordinate with the New York State Cooperative Forest Management Program (see http://www.dec.state.ny.us/website/dlf/privland/privassist/help.html), which is a forest program administered by the NYSDEC to encourage the private forest landowners in New York to apply sound forest management practices to their woodlands.				

I	Regulatory Management	Related Issue(s)	Potential Responsible Organizations(s)	Measures/ Targets	Approx Cost
I1	The IO along with each municipality and county agency should be well versed in federal (see Appendix R) and state (see Appendix Q) regulation, programs, and funding as they relate to nonpoint source pollution and water quality.	A, D, O, SR, WW, DW, WQS, WQ, E	IO, C	Ongoing	-
I2	Educate and train municipal decision-makers on land use regulations and controls with particular attention to stormwater management and erosion control (see Section 5), on-site wastewater systems (see Section 6), and preservation tools such as purchase of development rights, transfer of development rights, cluster development and open space preservation (see Section 11).	A, D, O, SR, DW, WQ, E	RPB, C, IO	4 lectures or guest speakers in next 2 years.	$5,000
I3	Municipalities, counties or a watershed-wide approach should consider open space protection. The first step of this process is education.	D, T, WQ, E	NYSDOS, RPB, C, LT	Become aware of existing efforts such as Tompkins County Vital Communities within 6 months. Promote existing efforts - ongoing. Identify gaps within 1 year.	$1,000
J	**General Watershed Education**				
J1	Coordinate education of teachers and students through schools and other programs such as 4H - work with school districts and supply materials to teachers	WQ, E	IO, CLWN, CWQCC, CCE	Ongoing, including providing support for teaching kits and training of volunteer educators	$2,500
J2	Coordinate programs in churches and malls	WQ, E	IO, CLWN, CCE	Develop list of annual public events by year 1. Maintenance ongoing.	$2,500
J3	Drinking Water Well Management. Use Home*A*Syst Program (for more information see http://www.uwex.edu/homeasyst/) as a model.	DW, WQ, E	IO, CLWN, CCE	Periodic beginning Spring 2002	$10,000
K	**Develop, Publish and Distribute Materials**				
K1	Internet web site - use of IO Internet web site <http://www.cayugawatershed.org>	WQ, E	IO, CLWN	Ongoing	$2,000/ year
K2	Interactive CD-ROM (see Appendix K)	WQ, E	IAWWTF, IO, CLWN	Within 18 months	$20,000
K3	Newsletters including use of agency, organization, municipal, and school publications	WQ, E	IO, CLWN	Ongoing	$5,000
K4	Cayuga Lake Book - a guide for residents in protecting the life of the lake	WQ, E	IO, CLWN	Review similar books year 2, seek funding year 3, complete book year 4	$20,000
K5	Video Development - Develop a video on the Cayuga Lake Watershed including history, water quality, issues, uses, and recommendations	WQ, E	IO	Review similar videos from other watershed within 18 months, seek funding 3 years, complete video or alternative media year 5.	$25,000

4. Agricultural Practices

Agricultural Practices (A)	Development (D)	On-site Wastewater Systems (O)	Stormwater Runoff (SR)	Wastewater Treatment (WW)			
Drinking Water (DW)	Tourism and Other Economic Development (T)	Water Quality Standards (WQS)					
Water Quality (WQ)	Exotic species (ES)	Fertilizers and Pesticides (F)	Heavy metals (H)	Phosphorus and Nutrient Loading (N)	Organic compounds (OC)	Pathogens (P)	Sediment (S)
Comprehensive Planning (C)	Education (E)	Economic Revitilization & Sustainability (ER)	Infrastructure (I)				

Introduction

Agriculture is a dominant land use in the Cayuga Lake watershed. As reported in the *Preliminary Watershed Characterization Report*, approximately one-third of the direct drainage is in active agricultural production. Dairy farming is a major industry; about 57% of the agricultural lands in the watershed are dedicated to livestock and products, and 42% are in field crop production. The largest dairy farms are located in Cayuga County. As measured in sales, field crop production is concentrated in Seneca and Cayuga Counties.

Agriculture is an important economic and land use partner in the watershed. The highly valued open space and beautiful vistas in the watershed are a direct result of agriculture shaping the landscape. However, county census data reveal that a diminishing percentage of the work force is directly involved in agricultural production. This decrease reflects the dramatic trend away from the small farm and towards increased size and mechanization of farming operations. At the same time, increasing numbers of watershed residents are choosing to live outside of the more densely populated areas, resulting in rural residents who are unfamiliar with the realities of farming operations and less tolerant of inevitable odors or inconvenience.

The economic and technological trends promoting larger farming operations can increase the challenges associated with careful management of soil and water resources. Even the most environmentally conscious producers are faced with handling an excess of nitrogen and phosphorus; that is, more nutrients enter from feed, fertilizers and (for nitrogen) legume fixation than leave via milk, meat, or crops. The excess increases with the number of cows per acre.

The primary pollutants of concern in the Watershed are nutrients (phosphorus and nitrogen), sediment, pathogens, organic material, and pesticides. As discussed in the *Preliminary Watershed Characterization*, and Chapter II, these substances may originate from many sources including residential lands and urban stormwater. Nutrients, sediment, pathogens, organic material, and pesticides can migrate from agricultural lands to surface and ground water through processes including surface runoff, erosion, infiltration, and aerial drift (for more information see *RPP* On-Line at http://www.cayugawatershed.org).

Monitoring data confirm that agricultural pollutants reach the surface waters (both the tributary streams and the lake) and groundwater of the Watershed. Phosphorus and sediment can degrade the quality of surface water resources. Nitrate-nitrogen, due to its high solubility, is a contaminant of special concern in groundwater. Monitoring data confirm the loss of pesticides to streams and their presence in lake waters. Left unchecked, migration of nutrients, sediment, pathogens, organic material, and pesticides threatens the long-term health of the lake and watershed (for more information see *RPP* On-Line at http://www.cayugawatershed.org)

Goals

- Maintain viability of agricultural land use in the Cayuga Lake watershed.
- Minimize the negative impact of agriculture on the environment and reduce migration of pollutants to surface and groundwater.
- Increase public awareness of agricultural practices and environmental protection activities.

Existing Measures

Soil conservation and land stewardship are important values of the Watershed's agricultural community. A network of technical assistance and financial support for agriculture has been in place for decades. Agencies including County Soil and Water Conservation Districts, the Natural Resources Conservation Service of the U.S. Department of Agriculture, the Farm Services Agency, Cornell Cooperative Extension, and others actively promote measures to reduce the potential adverse impacts of agriculture on the environment. For the most part, producers have adopted measures that are protective of Cayuga Lake and the Watershed. Many of these measures are voluntary, although state and federal regulation of farming practices has increased in recent years. Some important programs are listed below, with examples of how they are implemented in the watershed.

- Agricultural Environmental Management (AEM) (see Appendix H - Agricultural Programs)
- The Environmental Quality Incentives Program (EQIP)) (see Appendix H - Agricultural Programs)
- New York State now requires livestock farms over a certain size (for dairies, more than 210 – 230 milk cows) to develop Comprehensive Nutrient Management Plans (CNMP) that comply with standards developed by New York State and the NRCS. Once the plan has been created and approved, the State issues a permit to the farmer. New York has adopted this measure as part of its implementation of the federal Clean Water Act requirements for Animal Feeding Operations/Concentrated Animal Feeding Operations) (see Appendix H - Agricultural Programs). Tompkins County has received a grant of $120,000 from the Agricultural Nonpoint Source allocation of the NYS Environmental Protection Fund to develop CNMP on 26 farms in the Cayuga Lake watershed. Components of a CNMP include feed management, manure handling, land management, and record keeping. By 2008, all farms with livestock will be subject to these regulations regardless of herd size.
- New York State Clean Water/Clean Air Bond Act has provided funding to implement agricultural BMPs. For example, Tompkins County has received approximately $190,00 to implement livestock grazing practices such as fencing, alternative watering systems, pasture improvements and stream crossings.
- Tompkins County Soil and Water Conservation D istrict has recently purchased a no-till drill through a grant from the Great Lakes Commission in an effort to reduce erosion and sedimentation on watershed farms.

No. 4 ~ Agricultural Practices Recommendations

		Related Issue(s)	Potential Responsible Organizations(s)	Measures/ Targets	Approx Cost
A	**Through the framework of the Agricultural Environmental Management (AEM) (see Appendix H - Agricultural Programs) program, implement whole farm planning (the focus is on individual producers). Critical issues such as water quality and habitat protection within the farm's watershed are central considerations in identifying pollutants and protective measures. Practices are selected based on site-specific conditions of soil type, topography, drainage, cropping practices, and livestock density.** **The four most critical issues in this watershed in need of Best Management Practices (BMP) are: nutrient management, erosion control, manure management, and herbicide application.**				
A1	All farms in the Cayuga Lake watershed should develop a Comprehensive Nutrient Management Plan (CNMP) (for more information see http://www.dec.state.ny.us/website/dow/cafofact2.html) that meets the provisions of NRCS/ New York State Standard 312. The Comprehensive Nutrient Management Plan should include specific recommendations tailored to individual producers and the conditions of soil type, drainage, cropping practices, and livestock density.	A, SR, DW, WQ, N, P	SWCD, NRCS, LO, CCE	100% of livestock operations by 2008 based on federal regulation	$15/acre without soil testing
	The overall objective of the CNMP is to balance the nutrients entering and leaving the farm. In order to reduce phosphorus losses from agriculture, off-farm inputs of phosphorus in feed and fertilizer should be balanced with outputs in products such as milk, meat, and crops. Soils should be managed to retain nutrient resources for crops. Specific elements of the NMP may include the following (NYS Standard 590):				
A1a	Promote nutritional management as a tool to optimize feed efficiency and ultimately reduce nutrient content of animal waste. Nutrient management (590) cost sharing may be available through EQIP or Ag Nonpoint Source programs (see Appendix H)	A, SR, DW, WQ, N, P	SWCD, NRCS, LO, CCE	100% of livestock operations by 2008 based on federal regulation	$25,000
A1b	Test soils and crops to define fertilization rate and timing	A, SR, DW, WQ, F, N, P	SWCD, NRCS, LO, CCE		$10/field/sample $0.50/acre
A1c	Use the phosphorus (available phosphorus) index (currently in final approval stages for application to New York State watersheds) to determine the rate of manure application to specific fields.	A, SR, DW, WQ, N, P	SWCD, NRCS, LO, CCE		
A1d	Plant small grain cover crops in regions with high leaching potential where nutrients need to be controlled.	A, SR, DW, WQ, F, N, P, S	SWCD, NRCS, LO		$30 to $50/acre
	Many of the larger dairy farms in the Cayuga Watershed have begun to develop CNMP that meet the NRCS/*New York State Standard 312 ***as part of the permit requirements for the CAFO program. The CAFO regulations, which currently apply to larger livestock operations, provide a framework for developing and implementing parcel-specific recommendations for cultivation, cropping, and manure spreading practices designed to minimize environmental impact. Under the current implementation timetable, farms with animal herds of all sizes will be subject to the CAFO regulations by 2008.*** ***The recommendation to develop Comprehensive Nutrient Management Plans extends to crop farms as well.***				
A2	**Erosion control**				
A2a	Create and maintain riparian buffer zones for all streams adjacent to agricultural land starting with the critical areas (see Table 2-2) as defined in Areas of Concern section of Chapter II (cost-sharing for this program may be available through the Conservation Reserve Program (see Appendix H - Agricultural Programs).	A, SR, DW, WQ, S	USDA, NRCS, SWCD, CCE, LO	25% of critical areas (see Table 2-2) within 10 years as defined in AoC section of Chapter II and NRCS	$250,000 (landowner contributes 25% of total project)

		Related Issue(s)	Potential Responsible Organizations(s)	Measures/ Targets	Approx Cost
A2b	Restore very severe streambank segments (see Appendix S) using Watershed Stream Restoration Method (see Appendix S) based on Cayuga Lake Watershed Streambank Inventory (2000) (see Cayuga Lake Preliminary Watershed Characterization Section 3.4.1.2). Concentration is on segments of Big Salmon Creek, Cayuga Inlet, and Fall Creek.	A, SR, DW, WQ, S	SWCD, CCE, LO	3 miles/year for 10 years	$30/foot
A2c	Implement contour strip cropping, conservation tillage, terracing, and/or critical area planting (on-field solutions) where appropriate.	A, SR, DW, WQ, S	USDA, NRCS, SWCD, CCE, LO	25% of critical areas (see Table 2-2) within 10 years as defined in AoC section of Chapter II and NRCS	Varies with slope, farm, and possible cost sharing
A2d	Implement vegetated filter strips (edge of field solutions) where appropriate.	A, SR, DW, WQ, S	USDA, NRCS, SWCD, CCE, LO		
A2e	Install fences to keep livestock from critical areas	A, SR, DW, WQ, S	NRCS, SWCD, LO		$1/running foot minimum - 2 strand tensil installed
A3	**Agricultural Waste Management (including manure, barnyard runoff, silage leachate, and milkhouse waste)**				
A3a	Develop waste management plans consistent with the NRCS/New York Standard 312.	A, SR, DW, T, WQ, N, P	NRCS, SWCD, LO, CCE, AI	100% of CAFO operations by 2004 or operations with NOI (with the exception of A3b). A3b - 6 projects within 5 years.	$25/ acre
A3b	Consider the feasibility of technologies that reduce the mass of animal waste material to be handled.	A, SR, DW, T, WQ, N, P	NRCS, SWCD, LO, CCE, AI		$300,000
A3c	Implement BMPs for the following: silage leachate, barnyards, and milkhouse waste where appropriate; separate clean water from wastewater and protect areas from surface runoff; and channel leachate and milkhouse waste through vegetated filter strips to reduce nutrient and organic levels.	A, SR, DW, T, WQ, N, P	NRCS, SWCD, LO, CCE		$50,000/farm (some are done)
A4	**Pesticide management *(in the Cayuga watershed, herbicides are the type of pesticides of greatest concern)* includes enforcing regulatory controls on pesticide application - *(for more information see* http://www.dec.state.ny.us/website/dshm/pesticid/appman.htm#cert*)* and the use of residential and commercial sources of pesticides.**				
A4a	Implement appropriate Integrated Pest Management (IPM) techniques (implementation of practices and reduction) (for additional information see *RPP* On-Line at http://www.cayugawatershed.org).	A, SR, DW, WQ, F, OC	NYSDEC, SWCD, LO, CCE, AI, PC	Already have 100% in some form of IPM. 5 years to develop database and use as baseline data	$10/acre (varies with size of field)
A4b	Implement watershed-wide pickup of hazardous wastes and obsolete/canceled use pesticides using the "Agricultural Clean Sweep" model. (see also Hazardous Waste Management section)	A, SR, DW, WQ, F, OC	NYSDEC, SWCD, LO, CCE	3-4 year cycle based on use	$100,000

		Related Issue(s)	Potential Responsible Organizations(s)	Measures/ Targets	Approx Cost
B	**In addition to the focus on individual producers through the AEM and CAFO (see Appendix H - Agricultural Programs) programs, develop cooperative and/or regional strategies to address problems faced by producers throughout the watershed.**				
B1	Develop markets for agricultural byproducts. Get baseline inventory now and inventory continuously.	A, DW, WQ, N, P, ER,	USDA, NRCS, SWCD, C, LO, CCE, AI	5% in 10 years	$50,000
B2	Promote cooperative arrangements between dairy producers and crop farms to dispose of manure and develop a system to index the value of the resource (manure) that is equitable to both parties.	A, DW, WQ, N, P, ER, CCE	NRCS, SWCD, C, LO		$50,000
B3	Support research and development of innovative animal waste treatment systems such as methane digesters (see http://www.ext.colostate.edu/PUBS/FARMMGT/05002.html), sequencing batch reactor (SBR), vermiculture (*see* http://www.composters.com/docs/worms.html), resource recovery and others.	A, DW, WQ, N, P	USDA, NRCS, SWCD, AI, LO, CCE	6 projects in watershed in 10 years	$300,000
B4	Provide software and training for producers throughout the watershed to help manage the record keeping associated with recommendations related to management of nutrients, agricultural wastes (including manure), and pesticides (use for IPM data).	A, DW, WQ, F, N, OC, P, E	USDA, NRCS, SWCD, AI, LO, CCE	25% in 5 years (training and adopted). NRCS software available May 2001	$1,000/ farm
B5	Provide training and materials for producers throughout the watershed to develop Emergency Action Plans (part of CAFO).	A, DW, WQ, F, N, OC, P, E	USDA, NRCS, SWCD, LO, M, PC, NYSDEC	100% by 2008 based on federal regulations	$5,000
C	**Develop educational materials for producers and the community at large.**				
C1	In cooperation with the IPM program at Geneva, develop and maintain an information repository (or database) of effective IPM techniques used in the Watershed (part of A4a and associated with data clearinghouse).	A, SR, DW, WQ, OC	AI, CCE, SWCD	5 years	$20,000
C2	Document and disseminate locally successful strategies for nutrient management, manure handling, and erosion control using a variety of outreach media. Develop public information materials that discuss agricultural issues of concern to the entire watershed community such as the factors affecting farm size, regulatory and voluntary measures to control agricultural pollution, and the relationships between agriculture and other amenities such as open space. Consider publishing reports in trade journals for the dairy industry.	A, SR, DW, WQ, N, P, S, E, ER	USDA, NRCS, SWCD, AI, CCE, LO	document 3 successes per year	$5,000
D	**Counties and municipalities should consider agricultural programs (see Appendix H - Agricultural Programs) that are both economically and environmentally sustainable. Specific recommendations include the following:**				
D1	Consider agricultural protection and preservation while addressing associated land conservation and water quality concerns though various county, state and federal programs that is consistent with Ag & Farmland Protection Plans	A, D, SR, DW, T, WQ, C, ER	SWCD, NRCS, C, M	Consistent with Regulatory Management Section	
D2	Encourage alternative agricultural uses of land including changing zoning laws to allow additional (mixed use) business enterprises on the farm.	A, T, C, ER	SWCD, C, M	Consistent with Regulatory Management Section	

5. Stormwater Management & Erosion Control

Agricultural Practices (A)	Development (D)	On-site Wastewater Systems (O)	Stormwater Runoff (SR)	Wastewater Treatment (WW)			
Drinking Water (DW)	Tourism and Other Economic Development (T)	Water Quality Standards (WQS)					
Water Quality (WQ)	Exotic species (ES)	Fertilizers and Pesticides (F)	Heavy metals (H)	Phosphorus and Nutrient Loading (N)	Organic compounds (OC)	Pathogens (P)	Sediment (S)
Comprehensive Planning (C)	Education (E)	Economic Revitilization & Sustainability (ER)	Infrastructure (I)				

Introduction

Stormwater runoff is a major pathway for transporting sediment and other materials from the watershed to the surface water network. The porous and varied terrain of natural landscapes like forests, wetlands, and grasslands trap rainwater and snowmelt and allow it to slowly filter into the ground. Runoff tends to reach receiving waters gradually. In contrast, nonporous developed landscapes like roads, bridges, parking lots, and buildings don't let runoff slowly percolate into the ground. Water remains above the surface, accumulates, and runs off in large amounts.

Municipalities install storm sewer systems designed to quickly channel runoff from roads and other impervious surfaces. These engineered solutions are important to control high flows that may be a threat to public safety. Unfortunately, there are adverse ecological consequences to traditional stormwater management.

Runoff gathers speed once it enters the storm sewer system. When the water leaves the sewer system and empties into a stream, large volumes of high velocity runoff can erode streambanks, damage streamside vegetation, and widen stream channels. In turn, this will result in lower water depths during non-storm periods, higher than normal water levels during wet weather periods, increased sediment loads, and higher water temperatures.

Runoff from roads can contribute to water quality and habitat degradation of streams and lakes. Sediment and chemicals originate from winter deicing agents, shoulder ditching practices to maintain swales, and storm drains with inadequate provision for sediment removal.

Development activities can also increase the variety and amount of pollutants transported to receiving waters. Sediment from development and new construction; oil, grease, and toxic chemicals from automobiles; nutrients and pesticides from turf management and gardening; viruses and bacteria from failing septic systems and pet waste; road salts; and heavy metals are examples of pollutants generated in urban areas. Sediments and solids constitute the largest volume of pollutant loads to receiving waters in urban areas.

Conditions in the Cayuga Watershed

As discussed in Chapter II, sedimentation is the major water quality issue in Cayuga Lake. New York State considers urban runoff and/or streambank erosion to be the primary cause of water quality and habitat degradation in the southern basin of Cayuga Lake and three southern tributaries (Fall Creek, Six Mile Creek and Cascadilla Creek). These stream and lake segments are included on the State's Priority Waterbodies List (PWL) (for more information see *RPP* On-Line at http://www.cayugawatershed.org). Streambank erosion is considered a secondary source of water quality impairment in three other streams: Salmon Creek, Yawger Creek, and Cayuga Inlet.

As part of the RPP process, Streambank & Roadbank Inventory was conducted in the summer of 2000 (see *Cayuga Lake Preliminary Watershed Characterization*). Stream segments and roadbank/road ditch sites were

ranked by severity based on erosion potential. Very severe streambank segments (see Appendix S) and roadbank/road ditch sites (see Appendix I) are now being recommended as the highest priority for implementation.

The initial construction phase when land is cleared of vegetation and graded to create a proper surface for construction is one of the largest potential sources of erosion and sedimentation. When natural vegetation and topsoil are removed, the exposed area is particularly susceptible to erosion, causing transformation of existing drainage areas and disturbance of sensitive areas. Sediment loss from developed areas is potentially significant in the Cayuga watershed.

Deicing material, primarily sodium chloride, is used by area highway departments to help de-ice road surfaces during the colder months of the year. Each highway department has individual policies and procedures regarding salt application, salt/sand mixtures and storage.

There are several environmental concerns regarding the use of deicing salts. After application, salts are highly soluble in water. They easily wash off pavement into surface waters and leach into soil and groundwater. High concentrations of salt can damage and kill vegetation, disrupt fish spawning in streams, reduce oxygen solubility in surface water, interfere with the chemical and physical characteristics of a lake, pollute groundwater making well water undrinkable, disintegrate pavement, and cause metal corrosion of bridges, cars and plumbing.

As part of the *RPP*, a road deicing and storage survey (see Appendix E) was conducted throughout the Cayuga Lake watershed. This dataset shows that there are 49 state, county and municipal salt storage pile sites within the Cayuga Lake Watershed. Twenty-one (42%) are exposed directly to the weather and many are significantly close to a stream or the lake itself. The average total amount of deicing material spread in the watershed exceeds 30,000 tons per year.

Goals

- Protect or restore natural hydrology of streams in the Cayuga Lake watershed (see Wetlands, Shoreline, & Riparian Corridor Management Section)
- Reduce frequency of bank-full or flood stages of streams (see Appendix S - Return Frequency of Flood Events in Cayuga Lake Tributaries)
- Keep baseflow conditions as close to natural as possible
- Prevent or reverse habitat and water quality degradation in streams
- Reduce transport of sediment, nutrients, pathogens and other pollutants to Cayuga Lake

Existing Measures

A. *Compendia of Technical Solutions*

Federal guidance: EPA has published a "Handbook on Urban Runoff Pollution Prevention and Control Planning" (see http://www.epa.gov/ttbnrmrl/625/R-93/004.htm

The Natural Resources Conservation Service has developed manuals for stream restoration at http://www.usda.gov/stream_restoration/

State guidance: New York DEC has recently issued a compilation of Best Management Practices (BMPs) for urban and stormwater management (NYSDEC Urban/Stormwater Runoff Management Practices Catalogue for Nonpoint Source Pollution Prevention in New York State, June 2000). NYSDEC also published Reducing the Impacts of Stormwater Runoff from New Development in 1992. NYSDEC has issued a compendium of BMPs for preventing nonpoint source pollution during construction (NYSDEC Construction Management Practices Catalogue for Nonpoint Source Pollution Prevention in New York State, June 2000).

Other resources: There are many university and private organizations focused on technical and regulatory approaches to stormwater management. One example is the Center for Watershed Protection. This organization maintains a highly informative web site of technical information and educational resources <http://www.cwp.org> and <http://www.stormwatercenter.net>.

B. *Regulatory Approaches*

Federal: The Clean Water Act includes provisions for regulating stormwater discharges from urban and developing areas (for more information see *RPP* On-Line at http://www.cayugawatershed.org).

State: New York administers provisions of the Federal Clean Water Act through the State Pollution Discharge Elimination System (SPDES) (for more information see *RPP* On-Line at http://www.cayugawatershed.org).

Planning and permitting of stormwater falls under this state program.

Local: Several municipalities have created committees or boards to address stormwater issues within their local land use regulation and control structure (see Appendix T). The City of Ithaca has taken an active role in stream restoration along Six Mile Creek, the City's drinking water supply.

No. 5 ~ Stormwater Management & Erosion Control Recommendations

A	Prevent adverse water quality and hydrologic effects of runoff from new development	Related Issue(s)	Potential Responsible Organizations(s)	Measures/ Targets	Approx Cost
A1	1) Require new developments to maintain the volume of runoff at predevelopment levels by using structural controls and pollution prevention strategies. This can be done with the adoption of a Stormwater Management & Erosion Control Local Law (see A3 below) and the enforcement of performance standards (see Appendix I - Performance Standards). Municipalities that presently require these controls include City of Ithaca, Town of Caroline, Town of Cortlandville, Town of Covert, Town of Danby, Town of Lansing, Village of Lansing. 2) Integrate into all zoning, subdivision, and/or site plan review controls. 3) If municipality does not have planning board or zoning, subdivision, and/or site plan review controls encourage them to institute Step 1. List of municipalities with controls and description of controls (see Appendix T - Municipal Regulatory Stormwater Management & Erosion Control	D, SR, DW, WQ, C	M	20% in 5 years of ones that presently do not have controls	Cost of training. Cost of implementation covered by developer
A2	Provide education and training of local officials on erosion controls and stormwater management	SR, WQ, E	RPB, C, M, SWCD, NYSDEC, NYSDOS	*see Watershed Education section*	
A3	Adopt Stormwater Management and Erosion Control (Local Law) (see Appendix I) for local stormwater management and erosion control that guide communities through the process in order to protect, maintain and enhance water quality in the watershed.	C	M	*see Regulatory Management section*	
B	**Restore eroding streambanks** (see Wetlands, Shoreline, & Riparian Corridor Management Section)				
B1	Restoration - restore very severe streambank segments (see Appendix S) using Watershed Stream Restoration Method (see *RPP* On-Line at http://www.cayugawatershed.org) based on Cayuga Lake Watershed Streambank Inventory (see *Cayuga Lake Preliminary Watershed Characterization,* 2000). Concentration is on segments of Big Salmon Creek, Cayuga Inlet, and Fall Creek.	A, D, SR, DW, WQ, F, H, N, OC, P, S	SWCD, C, M, NYSDEC, City of Ithaca	3 miles/year for 10 years	$50/foot
B2	Integrate agricultural BMPs such as riparian buffer zones and fencing to prevent livestock access to streams.	A, SR, WQ	NRCS, SWCD	*see Agricultural Practices section*	
B3	Continue and expand the program of streambank inventories throughout the watershed to identify priority segments in need of restoration. Use existing streambank inventory (see *Cayuga Lake Preliminary Watershed Characterization,* 2000) to target implementation.	SR	RPB, C, SWCD, AI	Full inventory of 6 streams/year	$15,000/ year

		Related Issue(s)	Potential Responsible Organizations(s)	Measures/ Targets	Approx Cost
C	**Reduce delivery of sediment and other pollutants from roadways**.				
C1	Require special vegetative measures such as hydroseeding and mulching of roadside swales based on purchasing and sharing of hydroseeder and training and education of municipal, county and state highway departments. Initial hydroseeding should occur on the very severe sites (see Appendix I) based on the Cayuga Lake Watershed Roadbank Inventory ((see *Cayuga Lake Preliminary Watershed Characterization,* 2000) with concentration in the Towns of Caroline, Danby, Enfield, Genoa, Hector, Lansing, Ledyard, Newfield, and Summerhill.	D, SR, DW, WQ, S, C	NYSDOT, C, M	20% of very severe ditches/year	$100,000
C2	Increase training for highway officials in erosion control, roadbank ditch construction and maintenance, hydroseeding, and road deicing.	E	RPB, C, M	*see Watershed Education section*	
C3	Require structural measures in all municipalities to control sediment in steep roads, roadbanks and high flow ditches (*see Existing Measures above*). List of municipalities that have Regulatory Management for Steep Slope & Structural Measures (see Appendix I- Regulatory Management for Steep Slope & Structural Measures)	D, SR, DW, WQ, S, C	NYSDOT, C, M	10%/year	$100,000
C4	Support communities in purchasing and sharing equipment for street sweeping.		IO	1 unit within 1 year	$100,000
C5	Minimize the impact of deicing material on Cayuga Lake and its tributaries	SR, DW, WQ	M, C, NYSDOT		
C5a	Store material in permanently roofed structures, on impermeable surface. There are eight unenclosed municipal deicing storage facilities (see Appendix E - Deicing Material Storage that are in close proximity to the lake or tributaries.	SR, DW, WQ	M, C, NYSDOT, NYSDEC	Enclose all unenclosed facilities within 5 years	$250,000
C5b	Develop containment area from mixing and loading of material. Use existing facility, or extension of existing facility, if possible.	SR, DW, WQ	M, C, NYSDOT, NYSDEC	2/year	$200,000
C5c	Use sensible material application procedure (e.g. intersections, posting of signs, driver education). Develop guidelines and implement sensible deicing procedures.	SR, DW, WQ	M, C, NYSDOT	10%/year	$250,000
C5d	Continue regular survey of deicing material usage	SR, DW, WQ	IO	Yearly	$5,000/yr
C5e	Monitor deicing material concentrations during winter runoff events	SR, DW, WQ	NYSDEC, USGS, AI	10 sites per year	$100,000
C5f	Discourage the use of products, such as IceBan, that reduce dissolved oxygen. Six entities report the use of such products (see Appendix E - Oxygen Demanding Material Used for Road Deicing)	SR, DW, WQ	M, C, NYSDOT, NYSDEC	All within 5 years	
C6	Design and develop a regional stormwater management strategy	A, D, SR, WW, DW, WQ, C, I	M, C, WQCC, NYSDEC	Within 2 years	$25,000
D	**Prevent pollution from the developed landscape from reaching surface and groundwater**				
D1	Increase public awareness of the need to control litter and pet waste in urban and developing areas.	A, D, SR, DW, WQ, N, P, S, E	IO, C, M	*see Watershed Education section*	
D2	Support community or youth projects to mark storm drains		IO, CCE, CLWN	10%/year	$1,000

6. Wastewater Systems Management

Agricultural Practices (A)	Development (D)	On-site Wastewater Systems (O)	Stormwater Runoff (SR)	Wastewater Treatment (WW)			
Drinking Water (DW)	Tourism and Other Economic Development (T)	Water Quality Standards (WQS)					
Water Quality (WQ)	Exotic species (ES)	Fertilizers and Pesticides (F)	Heavy metals (H)	Phosphorus and Nutrient Loading (N)	Organic compounds (OC)	Pathogens (P)	Sediment (S)
Comprehensive Planning (C)	Education (E)	Economic Revitilization & Sustainability (ER)	Infrastructure (I)				

Introduction

Typically wastewater is treated either on-site, through on-site wastewater systems or off-site using sewers and ultimately municipal wastewater treatment facilities (see Appendix F). There are nine regulated municipal wastewater discharges to Cayuga Lake and its tributaries with a combined design flow slightly over 15 million gallons per day (see Appendix F). Outside of these facilities residents and businesses within the watershed of Cayuga Lake are served by on-site wastewater systems. This decentralized treatment is very common in New York State and throughout the United States.

On-Site Systems

The septic tank is an underground, watertight vessel installed to receive wastewater from a home or business. It is designed to allow solids to settle out and separate from the liquid, to allow for limited digestion of organic matter, and to store the solids while the clarified liquid is passed on for further treatment and disposal (EPA 1999). In the Cayuga watershed, effluent wastewater typically leaves the tank and is distributed to a subsurface soil absorption area (the leach field). Here the clarified effluent gradually seeps in to the surrounding soils where biological and physical reactions further reduce the concentrations of nutrients, microorganisms, and oxygen-demanding material. When correctly installed and maintained, septic tank/soil absorptions systems are an effective way to treat and dispose of domestic wastewaters. Nevertheless, even the best systems are designed to release contaminants into groundwater. Siting, design, installation, operation, and maintenance must be focused on reducing the environmental impact of the release. To avoid contamination of drinking water systems and other problems, soil absorption systems must be situated at prescribed distances from wells, surface waters, springs, and property boundaries. In New York, State and County Health Departments have jurisdiction to approve septic systems.

The only county in the Cayuga Lake Watershed with a program to inspect on-site wastewater systems is Cayuga County. The Cayuga County Health and Human Services Department (2000) on-site wastewater inspection program (see Appendix N) reported a failure rate of three to six percent for systems in the Cayuga Lake Watershed. EPA has estimated that anywhere from 10 to 30 percent of onsite systems are failing annually. Failure of systems to adequately treat wastewater may be related to inadequate siting, improper installation, or poor operation and maintenance. A critical factor in optimal system performance is the depth of unsaturated soil beneath the soil absorption field. Based on the County Soil Surveys, large portions of the unsewered areas within the Cayuga Lake watershed have soil and slope characteristics that are not ideal for on-site wastewater systems.

Shoreline cottages can present special challenges to proper operation of on-site wastewater systems. Depth to groundwater is shallow and lot size can be small. Disposal systems may have been installed prior to modern sanitary codes. Systems that may have functioned adequately with limited seasonal use and a prolonged recovery period may not be able to handle the increased demand associated with year-round use and additional appliances.

While it is difficult to measure and document specific cause-and-effect relationships between onsite systems and the quality of Cayuga Lake and its tributaries,

there is little doubt that improperly operating systems can contribute to water quality problems. The Priority Waterbodies List (PWL) (for more information see *RPP* On-Line at http://www.cayugawatershed.org) for Cayuga Lake lists septic effluent as a source of nutrients contributing to impairment of the northern segment of Cayuga Lake.

Goal

Reduce the negative effects of on-site wastewater systems on human health and the environment.

Existing Measures

System selection, design, and installation

Federal Guidance: EPA maintains compendia of management practices (for more information see *RPP* On-Line at http://www.cayugawatershed.org) for alternative on-site wastewater systems . These technology fact sheets are designed to help select an appropriate wastewater technology or practice for single-family residences, clusters of homes, subdivisions, or communities.

State Guidance: The NYSDEC publishes the "On-site Wastewater Treatment Systems Management Practices Catalogue" (for more information see *RPP* On-Line at http://www.cayugawatershed.org). A subcommittee of the New York State Nonpoint Source Management Practices Task Force prepares the document, which was last revised in December 1996.

County/Municipal Reviews and Approvals: At the local level, Codes Enforcement Officers are responsible for approving design and specifications of individual on-site wastewater systems. Article 11 of the Public Health Law and Title 15 of the Environmental Conservation Law provide for review of water supply and sewerage services by the State health department (or County health department where they exist) for tracts of land divided into five or more parcels of five acres of less.

System operation, inspection, and maintenance

Federal guidance: Under the Clean Water Action Plan, EPA committed to developing voluntary national guidelines for decentralized wastewater management systems (for more information see http://www.epa.gov/owm/smallc/guidelines.htm) that address siting, performance, design and maintenance needs and requirements. Voluntary "management guidelines" have been developed in draft form, and will be finalized following a public comment period. The guidelines will help communities meet water quality and public health goals and provide a greater range of options for meeting wastewater needs in a cost-effective manner.

State Guidance: The "On-site Wastewater Treatment Systems Management Practices Catalogue" includes only limited discussion of operation, maintenance and inspection. However, NYS Department of Health, NYSDEC, and Cornell Cooperative Extension sponsor education and training throughout the State on wastewater related issues.

County Programs: The six counties in the Cayuga Lake Watershed have varying levels of inspection and permitting requirements for on-site wastewater systems. Cayuga County Health Department has developed a comprehensive program that includes specific requirements for inspection and testing, pumping, and timelines for bringing non-conforming uses into compliance developed under the Sanitary Code of the Cayuga County Health District. There are provisions for inspection (see Appendix N) and pumpout on a regular basis and on property transfer.

Recommendations

Improvements in the design, siting, operation, inspection, and maintenance of on-site wastewater systems are needed to protect and maintain the integrity of the water resources. This is an area of active research nationally. New technologies are being applied to onsite systems, resulting in higher treatment levels, greater reliability and more flexibility than ever before. In many communities onsite and decentralized systems are the most appropriate, least costly treatment option, and they allow maximum flexibility in planning for future growth.

EPA has identified five major barriers to the successful implementation of decentralized wastewater technologies. These include: (1) misinformation and limited public knowledge about onsite systems; (2) legislative and regulatory constraints; (3) lack of system management; (4) existing engineering practices; and (5) restricted access to funding.

The recommended practices are designed to address these barriers.

No. 6 ~ On-Site Waste Water Systems Recommendations

		Related Issue(s)	Potential Responsible Organizations(s)	Measures/ Targets	Approx Cost
A	Adopt uniform sanitary law throughout the Cayuga Lake watershed based on the Cayuga County model *(Sanitary Code of the Cayuga County Health District)* or the model Local Law for On-Site Individual Wastewater Treatment (see Appendix N). Residences within 500 feet of the Lake and 150 feet of tributaries should be considered in a "critical environmental zone" and subject to more frequent inspection. Substandard systems in this zone should be required to install holding tanks until systems can be brought into compliance.	D, O, DW, WQ, N, P, C, I	C, M	100% compliance within 7 years	$10,000
B	Hold regular educational/training forums for the following: • Contractors and others associated with septic system design and construction; • Municipal boards (e.g. elected, zoning, and planning),; • Enforcement officers; • Home owners, using the Home*A*Syst program (see Appendix N - Home*A*Syst Program) as a model for self-assessment (see Appendix N - Septic System Assessment) and education; and • Design professionals and representatives of State and County Health Departments responsible for evaluating alternative and innovative technologies (see *RPP* On-Line at http://www.cayugawatershed.org).	O, DW, WQ, N, P, E	RPB, C, CCE, M	Three/year (rotate around watershed)	$10,000

7. Hazardous Waste Management

Agricultural Practices (A)	Development (D)	On-site Wastewater Systems (O)	Stormwater Runoff (SR)	Wastewater Treatment (WW)			
Drinking Water (DW)	Tourism and Other Economic Development (T)	Water Quality Standards (WQS)					
Water Quality (WQ)	Exotic species (ES)	Fertilizers and Pesticides (F)	Heavy metals (H)	Phosphorus and Nutrient Loading (N)	Organic compounds (OC)	Pathogens (P)	Sediment (S)
Comprehensive Planning (C)	Education (E)	Economic Revitilization & Sustainability (ER)	Infrastructure (I)				

Introduction

The *Cayuga Lake Preliminary Watershed Characterization* documented permitted above and below ground storage tanks, inactive hazardous waste sites, mines, wells, household hazardous waste and reported hazardous spills. While these need further attention there is also a need for inventory, clean up, and education for the many unpermitted and/or unenforced dumps, material storage facilities, abandoned agricultural areas, mining operations, wells, and unreported hazardous spills. Most of these took place before the advent of the permitting process, while others need follow-up to ensure that planned practices are being followed. The combination of these hazardous materials has threatened ground and surface water quality in the watershed.

Inactive and Unpermitted Landfills and Dumps

Unpermitted landfills and dumps include farm dumps, municipal/neighborhood dumps, and landfills sited before the advent of the permit process. The NYSDEC database show seven inactive hazardous waste sites and 25 municipal waste sites in the watershed. There is no data available on old farm and municipal dumps or unpermitted landfill sittings.

These sites pose a potential human health risk from exposure to toxic and pathogenic contaminants, including heavy metals, pathogens, nutrients and a wide variety of organic chemicals. While pathogens and nutrients are generally not considered a major threat from landfills, heavy metals and organic chemicals can remain toxic for years, having a lasting effect on both groundwater and surface water supplies.

In recent years, there has been a growing recognition by the public and elected officials that inactive landfills and dumps are a potential threat to human health and water quality. Since remediating a landfill is an expensive process and money available from federal and state sources is limited, it is necessary to rank these sites in the watershed to determine how best to allocate available funding.

Unpermitted Hazardous Material Storage

Hazardous material storage includes above and below ground storage tanks. Based on NYSDEC databases there are 14 permitted chemical bulk storage facilities with 31 active tanks in the watershed. These include storage terminals, retail sales, manufacturing, utility, municipal, school, and other facilities. Based on NYSDEC databases there are approximately 320 active and inactive petroleum bulk storage facilities with 441 tanks. These include storage terminal/petroleum distributor, retail, manufacturing, utility, trucking/transportation, apartment building, school, farm, private residence, and other facilities.

While regulations exist for hazardous material storage, in recent years there has been recognition that old, unpermitted, leaking, or inactive storage of hazardous material is effecting ground and surface water quality. In some cases groundwater usage in the watershed has been severely limited due to improper storage of hazardous material. These sites pose a potential human health risk from exposure to toxic contaminants, including a wide variety of organic chemicals.

Mining Operations

Permitted mines are required to have reclamation plans and performance bonds. Operating permits include specifications for the protection of adjacent surface and groundwater. The NYSDEC permitted mines are in varying stages of excavation.

Many gravel pits in the watershed were operated and abandoned before the permit system was started. Such inactive, non-permitted and poorly regulated mines may pollute surface and groundwater. Unrestricted runoff from bare mine banks may carry significant sediment loading. Once bare, mine banks are difficult to revegetate and can remain a problem for decades.

Based on NYSDEC data, there are approximately 30 mines in the watershed. The vast majority of these (all but 3) are sand and gravel mines. Sand and gravel mining poses the greatest threat to water resources. Because of their relatively permeable nature, sand and gravel deposits are generally coincident with recharge areas. In order to mine these deposits, the topsoil is first removed, eliminating an important buffer zone between the ground surface and the underlying aquifer. Lowering the ground surface decreases the relative depth of the water table, thereby making it more susceptible to contamination from mining apparatus and vehicles. The loss of vegetation exposes sediment, making it more easily removable by wind and surface runoff.

Unpermitted pits will only be addressed by the NYSDEC Bureau of Minerals under two conditions: 1) if there is a contravention of New York State water quality standards or, 2) if a previously unpermitted pit is re-opened to mining in quantities of over one thousand cubic yards per year. Citizens living in the vicinity of these pits who wish to see them reclaimed should monitor activity in the mines. Documented surface water quality problems from runoff, renewed mining activity, or well-water test results indicating illegal dumping may trigger regulatory action.

Abandoned Agricultural Areas

With the large amount of agricultural land use in the watershed and recent trends in the agricultural industry, much previously productive agricultural lands are now abandoned. As an example, in the Six Mile Creek Watershed 38 Agricultural Environmental Management Surveys were conducted. Twelve of these surveys indicted inactive properties.

Spills

There are twelve categories of spills based on the NYSDEC reporting system. The are gasoline stations, vehicle, commercial vehicle, tank truck, private dwelling, vessel, railroad car, non major facility > 1,100 gallons spilled, major facility > 400,000 gallons spilled, other commercial/industrial, other noncommercial/industrial, and unknown. Based on the NYSDEC reporting system there are five potential resources affected by reported spills. They are land, in sewer, groundwater, surface water, and air. Generally, surface water will ultimately be affected by all of these.

With hazardous spills, it is important to consider the resource affected and the type of spill. Of the approximately 550 reported hazardous spills in the watershed in the last 15 years, 360 were on land, 15 in sewers, 105 into groundwater, 60 directly into surface water, and 10 into the air. Of the total spills in the watershed approximately 30 were at gasoline stations, one was major facility related, 7 were non-major facility related, 140 were other commercial/industrial related, 105 other noncommercial/industrial related, 10 were passenger vehicle related, 50 were commercial vehicle related, 20 tank truck related, 105 were at private dwellings, 2 were vessel related, and 80 were unknown.

Wells for Oil and Gas and Solution Salt Mining Operations

NYSDEC lists over 330 wells in the watershed. These include dry wells, brine wells, stratigraphic wells, and gas development and extension wells. These wells are fairly well dispersed throughout the watershed, with a pronounced density of over 70% in the northeast portion in the Aurelius, Fleming, and Springport area. These are mainly active gas wells. Approximately 5% of the wells in the watershed are brine wells, almost all of which are in the Town of Lansing. Approximately 18% of the wells in the watershed are dry wells, approximately 25% of which are plugged and abandoned.

Household Hazardous Waste

Most residents of New York State generate waste in their homes which contains some of the same chemical components as the hazardous waste generated by industry. Often, this is stored for extended periods of time or is mixed with other solid waste intended for disposal. This waste is called household hazardous waste (HHW), and includes many household cleaners, paint and related products, automobile maintenance wastes,

pesticides, batteries, hobby chemicals, and other items. Industrially-generated hazardous wastes are subject to stringent management and disposal standards that are designed to be protective of human health and the environment. However, all household waste, regardless of its hazardous characteristics, is excluded from the regulatory definition of hazardous waste and is currently exempt from all State and federal hazardous waste regulations.

Household hazardous waste is any household waste which would be regulated as a hazardous waste if it were not generated by a household and includes all waste pesticides from a household. Many products used in households with the words "CAUTION," "WARNING," "DANGER," or "POISON" on the label may meet this definition and eventually become HHW. It is conservatively estimated that of approximately 30 million tons of solid waste generated annually in New York State, about one half of one percent, or 150,000 tons, is HHW. The effects of improperly discarded HHW on the environment and human health are hard to quantify, but the potential effects should not be ignored.

The most environmentally sound method of disposal for many hazardous products is through a community HHW collection program. These programs collect and recycle the wastes or transport them to a hazardous waste treatment, storage, or disposal facility. HHW collection can be done in one of two ways: collection days or permitted facilities.

A collection day is a one-day program where residents can bring HHW to a central location where it is packaged by a contractor and transported off-site. Collected wastes can be stored on site for no more than three days. These programs are usually not available on a regular basis and may not meet the needs of all local residents. However, some municipalities conduct these days several times a year. A collection day plan must be approved in advance by the NYSDEC.

A permitted collection and storage facility, which receives a permit to store HHW, occupies a fixed site and is traditionally open on a regular schedule. Permitted facilities are regulated under 6 NYCRR Subparts 360 and 373-4, and often operate without the day-to-day involvement of a contractor.

Costs for a single day in 1999 ranged from $10,000 to about $55,000 depending on the location and scope of the event. These costs can be reduced by focusing program planning on the preferred waste management hierarchy: source reduction, reuse, recycling, treatment, or incineration, and land disposal as a last resort.

Goal

To minimize the impact of hazardous material on the water quality of the watershed and to alleviate and remove the threat to human health.

Existing Measures

A. Hazardous Substance Bulk Storage Regulations and Permitting Process - NYSDEC Regulations 6NYCRR, Part 596.

B. Mining

The New York State Mined Land Reclamation Law (Environmental Conservation Law §23-2703 et seq.) regulates mining operations which remove more than one thousand tons or 750 cubic yards (whichever is less) of minerals from the earth. Mines coming within this statute's regulation require approval by the New York State Department of Environmental Conservation (DEC). Smaller mines may be regulated by a local mining or zoning regulation. However, even though DEC regulates larger mines, a municipality may regulate the location of all mines through its zoning regulations.

Local authority - State law specifies the role of local governments in reviewing and regulating mining activity. Specifically, local governments enforce zoning laws and specify conditions relating to mine roads and haul roads. In addition, local ordinances may regulate aspects of mining or mine reclamation that are not regulated by the state. Local governments are also empowered to enforce the special conditions and reclamation requirements listed in NYSDEC mining permits.

When a municipality permits state-regulated mining to occur within its borders through a special use permit process, conditions placed on the permit may pertain to entrances and exits to and from the mine on roads controlled by the municipality, routing of mineral transport vehicles on roads controlled by the municipality, enforcement of the reclamation conditions set forth in the NYSDEC mining permit, and certain other requirements specified in the state permit (ECL § 23-2703).

C. Spills

NYSDEC Manages the Spill Prevention and Response Program to respond to, investigate and remediate petroleum, chemical and hazardous spills, regulate petroleum and chemical bulk storage facilities; and regulate Underground Storage Tanks (UST) and Major Oil Storage Facilities (MOSF).

Local Emergency Management Agencies

D. Wells - NYSDEC Regulations 6NYCRR, Part 552 and permitting process.

E. Household Hazardous Waste

- Existing collection days in the Cayuga Lake Watershed (for more information see *RPP* On-Line at http://www.cayugawatershed.org)
- Educational materials (see Appendix O)
- NYSDEC Household Hazardous Waste Web Site (for more information see http://www.dec.state.ny.us/website/dshm/redrecy/hhw.htm)
- The NYS Environmental Protection Act (Title 7 of Article 54 of the Environmental Conservation Law), enacted on August 4, 1993, authorized the NYSDEC to develop regulations to implement a program to reimburse municipalities up to fifty percent (50%) of the costs of HHW collection programs incurred after April 1, 1993.

No. 7 ~ Hazardous Waste Management Recommendations

A	Inactive and Unpermitted Landfills, Dumps and Hazardous Material Storage	Related Issue(s)	Potential Responsible Organizations(s)	Measures/ Targets	Approx Cost
A1	Conduct a preliminary study to determine the location of each site, its dates of operation, the type of materials disposed at each and the vulnerability of water resources.	DW, WQ, F, OC	USEPA, USGS, NYSDEC, IO	10 municipalities per year	$50,000/ year
A1a	Conduct designated surface and groundwater quality tests as needed based on A1 and B1 (second year based on preliminary study).	DW, WQ, F, OC	USEPA, USGS, NYSDEC, IO	5/year	$110,000
A2	Identify public educational materials and develop workshops to describe landfill issues, such as the difference between old and new types of landfills, threats to public health and water quality, the need to ensure that sites are closed properly, hazardous material storage issues and the need to ensure that materials are stored or cleaned up properly, and abandoned agricultural properties issues, and the need to ensure that these properties are inactivated properly.	DW, WQ, F, OC, E	USEPA, NYSDEC, IO, CLWN	1/year	$2,500
B	**Abandoned and Active Agricultural Areas** - Continue Agricultural Environmental Management (AEM) (see Appendix H - Agricultural Programs) Surveys for all subwatersheds in the Cayuga Lake Watershed. Inventory the number and location of inactive agricultural properties and the water quality characteristics of these properties due to hazardous material storage.	A, DW, WQ, F, OC	SWCD	Based on county AEM survey schedule	$50,000
C	**Wells** - Education program focusing on abandoned wells and the need for proper capping	A, DW, WQ, E	USEPA, USGS, NYSDEC, IO, CLWN, CCE	Integrate with A2	
D	**Household Hazardous Waste**				
D1	Increase the number and area coverage of HHW collection days (Tompkins County has a permanent facility)	DW, WQ, OC	NYSDEC, C	One every 1 to 2 years where there is no facility	$100,000/ site
D2	Integrate educational material (see Appendix O) into existing and other watershed education programs in the Cayuga Lake Watershed	DW, WQ, OC, E	NYSDEC, C, IO, CLWN, CCE	*See Watershed Education*	$2,500

		Related Issue(s)	Potential Responsible Organizations(s)	Measures/ Targets	Approx Cost
E	**Spills** - Distribute information throughout the watershed to various community groups, fire departments, cham bers of commerce, citizens, municipalities with names and numbers of the agencies and staff in charge and who has appropriate jurisdiction in emergency situations.	DW, WQ, OC, E	NYSDEC, C, IO, CLWN	*See Watershed Education*	$2,500
F	**Mining Operations** • Inventory unpermitted mines in the watershed; exist ing aerial photography can be used to assist in this process. • Prioritize and rank mines for potential to pollute sur face or groundwater. • Share information on permitted mines with regulatory officials and IO • Contact owners of mines regarding reclamation. • Inform local governments of their right to regulate mines. This can be made part of existing local government training opportunities.	SR, DW, WQ, S	IO	Within 2 years	$25,000

8. Monitoring & Assessment

Agricultural Practices (A)	Development (D)	On-site Wastewater Systems (O)	Stormwater Runoff (SR)	Wastewater Treatment (WW)			
Drinking Water (DW)	Tourism and Other Economic Development (T)	Water Quality Standards (WQS)					
Water Quality (WQ)	Exotic species (ES)	Fertilizers and Pesticides (F)	Heavy metals (H)	Phosphorus and Nutrient Loading (N)	Organic compounds (OC)	Pathogens (P)	Sediment (S)
Comprehensive Planning (C)	Education (E)	Economic Revitilization & Sustainability (ER)	Infrastructure (I)				

Introduction

A well-designed monitoring program is an essential element for effective stewardship and management of Cayuga Lake and the watershed. Data from monitoring can help the IO and the Watershed Steward identify or confirm areas of concern within the watershed, and set priorities for implementing best management practices. Monitoring can be used to measure the effectiveness of specific control actions and the need for further controls to meet water quality objectives. Ultimately, trend analysis of lake and tributary monitoring data, will be the soundest evaluation of the effectiveness of the *RPP*.

There are important linkages between monitoring and public education. Citizen monitoring programs can focus community support on the resource, and instill life-long lessons on how actions on the landscape affect receiving water quality. A well-designed monitoring program may address public concerns such as “is water quality getting better or worse”, “why are there weeds at my camp”, “can I eat the fish I catch”, or “is the water safe to drink”.

A monitoring plan for a large, deep lake with an extensive network of tributaries must be carefully designed to reflect spatial and temporal heterogeneity.

The Technical Committee has drafted a Monitoring Framework (see *RPP* On-Line at http://www.cayugawatershed.org) outlining an approach to an integrated monitoring plan for the Cayuga Lake Watershed. This framework will continue to be developed through the implementation phase of the *RPP*.

Goals

- Improve the scientific basis for managing Cayuga Lake and watershed
  - Address data gaps identified in the *Preliminary Watershed Characterization*
  - Confirm pollution sources and priority areas
  - Document the effectiveness of Best Management Practices
  - Provide data that can be used to develop or verify management tools such as models
- Provide information to lake managers and the watershed community regarding:
  - Trends in quality of surface water and ground water in the Cayuga Lake basin
  - Suitability of water quality for human uses (such as drinking and swimming)
  - Status of the lake's food web
  - Coordinate monitoring activities to maximize resources and eliminate redundancies

Existing Measures and Gaps

A number of agency and academic scientists conduct research or monitoring in the Cayuga Lake watershed. Each program is designed to meet specific objectives. The Cayuga Lake Projects Directory (see *RPP* On-Line at http://www.cayugawatershed.org) provides a list of the major investigations of the lake and watershed.

Additional monitoring is done by surface water suppliers (for more information see *RPP* On-Line at http://www.cayugawatershed.org) and groundwater water for more information see *RPP* On-Line at http://www.cayugawatershed.org), the Cayuga County Health Department for on-site wastewater testing (see Appendix N), and wastewater treatment plants discharge monitoring reports (see Appendix F - Summary Of Permitted Point Source Loads To Cayuga Lake And Tributaries).

The *Preliminary Watershed Characterization* report Chapter 6, Watershed and Subwatershed Technical Findings (see Appendix C) lists important data gaps that limit our ability to define priority areas and select appropriate BMPs. An important data gap is the limited groundwater testing.

Recommendations

Programmatic recommendations:

Monitoring and assessment are a means to evaluate whether water quality and resource-related goals for the Cayuga Lake Watershed are being met. Monitoring activities will occur over time, and individual participants will change over the years. It is very important to identify a program leader committed to making monitoring program a priority. There will always be competition for funding and allocation of staff time, and successful implementation of a long-term monitoring program will requires a strong advocate.

No. 8 ~ Monitoring & Assessment Recommendations

A	Programmatic Recommendations	Related Issue(s)	Potential Responsible Organizations(s)	Measures/ Targets	Approx Cost
A1	One agency and individual within the agency should be identified to serve as the overall program manager. This leader would be responsible for coordinating activities of the multitude of agency, university, and citizen-based monitoring programs and serving as a point of contact for data and information. Examples of responsibilities of the program manager include: • develop a central clearinghouse (see Appendix K) or Web site dedicated to Cayuga Watershed monitoring; • convene an annual planning meeting to discuss monitoring activities, quality assurances/quality control measures, and opportunities for coordination; • maintain a central database of results (including groundwater data); • convene meetings to discuss findings, identify gaps, and determine priorities for monitoring; • advocate for funding; • prepare an annual summary "State of the Cayuga Lake Watershed" report; and • meet with the public to discuss progress.	A, D, O, SR, WW, DW, WQ, E	IO Technical Committee (lead for detailed strategy), WSS, AI, NYSDEC, IO, CLWN, WQCCS	Develop detailed strategy within 1 year.	Strategy development: $20,000 Annual cost for coordinator: $25,000
B	**Technical Recommendations (Top Priority)**				
B1	Increased focus on tributary monitoring to refine estimates of pollutant loading and confirm priority subwatersheds. Details to be developed as part of A1.	A, SR, WW, WQ, N, P, S	AI, C, CLWN, M, NRCS, NYSDEC, SWCD, USGS	Coordinated watershed monitoring program developed as part of A1	$50,000/ year
B2	Re-establish the UGSG gauging station on Salmon Creek.	A, D, O, SR, DW, WQ, F, H, N, OC, P, S	IO, USGS	Gauge reestablished by October 2003	Start-up cost: $12,000 Annual cost: $10,000 – $13,000 (USGS may match 30% of this)
B3	Participate in the Citizens Statewide Lake Assessment Program (CSLAP). This program gathers trophic state data and a few related parameters in the lake. Four stations should be established on Cayuga Lake: southern and northern segments and two mid-lake stations reflecting the regulatory segmentation of the lake.	A, D, O, SR, WW, DW, WQ, ES, F, H, N, OC, P, S, E	CLWN, WSS CWQCCs, CCE	In progress, led by WSS (CLWN)	$5,000/yr
B4	Work with colleges to design and implement an annual program to sample macroinvertebrates (aquatic insects and worms) in the tributaries to Cayuga Lake and calculate standard NYSDEC indices of pollution tolerance.	WQS, WQ	AI	Within 2 years	$50,000/yr
	Technical Recommendations (Lower Priority)				
B5	Sample lake sediments in the delta areas near major tributaries for organic compounds and heavy metals	D, SR, WW, DW, WQ, H, OC, S	NYSDEC	Within 10 years	$50,000

9. Wetland, Shoreline & Riparian Corridor Management

Agricultural Practices (A)	Development (D)	On-site Wastewater Systems (O)	Stormwater Runoff (SR)	Wastewater Treatment (WW)			
Drinking Water (DW)	Tourism and Other Economic Development (T)	Water Quality Standards (WQS)					
Water Quality (WQ)	Exotic species (ES)	Fertilizers and Pesticides (F)	Heavy metals (H)	Phosphorus and Nutrient Loading (N)	Organic compounds (OC)	Pathogens (P)	Sediment (S)
Comprehensive Planning (C)	Education (E)	Economic Revitilization & Sustainability (ER)	Infrastructure (I)				

Introduction

Wetlands and riparian (stream-side) corridors provide an important transition from the terrestrial to the aquatic environment. These areas represent a unique habitat for the community of plants and animals. Wetlands and healthy, vegetated streamsides, or riparian zones, improve water quality by filtering out contaminants from groundwater, removing sediment and sediment-attached phosphorus by filtration, transforming nitrate to nitrogen gas, acting as a sink by storing nutrients for an extended period of time, providing a source of energy for aquatic life and retarding floodwaters. Because of the critical role played by riparian and wetland areas the *RPP* focuses on their protection and restoration.

Wetlands

The Cayuga Lake Watershed contains approximately 6,575 acres of New York State Department of Conservation regulated wetlands (NYSDEC, 2000) and approximately 16,402 acres of federally designated wetlands (National Wetlands Inventory, 2000). NYSDEC freshwater wetlands are lands and waters of the State that cover an area of 12.4 acres (5 ha) or more unless they have unusual importance. Wetlands form in a range of environmental conditions and include familiar areas such as marshes, swamps, and bogs. They are formally defined in Federal law as areas "that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions"

As Map 3-9-1 Cayuga Lake Watershed Wetlands indicates, the state designated wetlands are, in general, evenly distributed from the north to the south within the watershed with slightly more located toward the south end. In the east west direction, the wetlands are clustered along the edges of the watershed away from the lake. In the northwestern edge of the watershed, in the upper reaches of the Red Creek watershed, there is

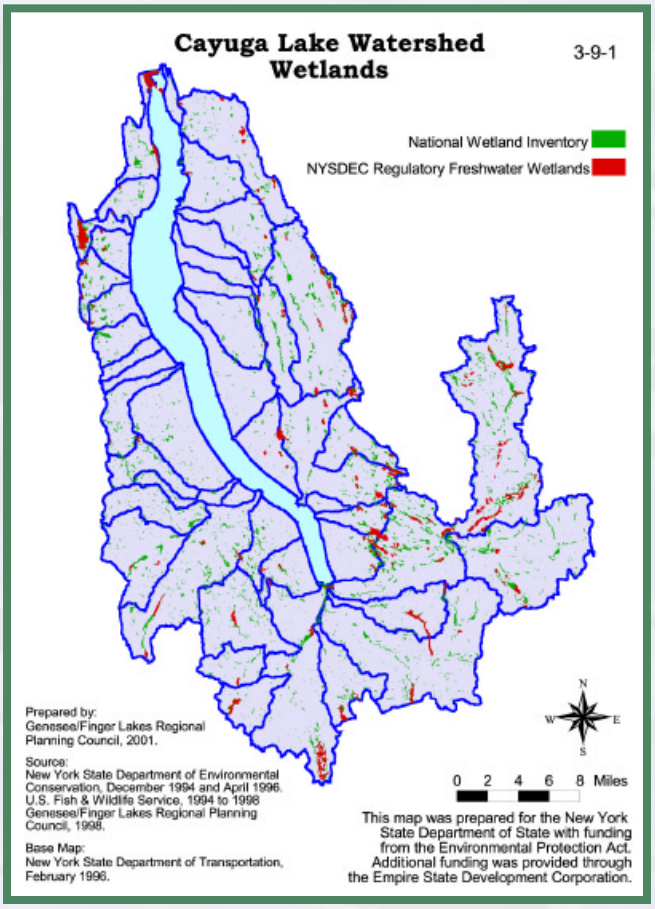


Table 3-9-1.
Percent (%) Land-use Within 150 ft. Riparian Corridor

Ind	Junkyard	Institutional	Res	Ag Res	Ag Open	Developed	Total of Preceeding Categories	Recreational	Forest	Wetland	Unknown	Undeveloped
Great Gully	0	0.13	0	1	2	78	**81.13**	0	19	0	0	19
Yawger Cr.	0.02	0	0	3	0	74	**77.02**	0	23	0	0.02	23.02
Sheldrake	0	0	0	3	1	70	**74**	0	25	0	0	25
Hicks Gully	2	0	0	4	0	68	**74**	0	27	0	0	27
Paines Cr.	0.35	0	0	3	0.38	70	**73.73**	0	26	0	0	26
Ledyard	0.05	0	0	2	1	68	**71.05**	0	29	0	0	29
68	1	0	0	4	1	64	**70**	0	30	0	0.04	30.04
Direct Drainage	2	0	0	6	1	61	**70**	0	31	0.01	0.01	31.02
Mack Creek	0.04	0	0	1	0	63	**64.04**	0	36	0	0	36
Trumansburg	0.32	0	0	5	1	57	**63.32**	0.46	37	0	0	37.46
Salmon Cr.	0.39	0.03	0	3	1	58	**62.42**	0	38	0	0	38
Canoga Creek	0	0	0	16	0.32	46	**62.32**	0.47	24	9	4	37.47
Renwick	11	0	0.08	27	0.4	23	**61.48**	1	38	0	0	39
Taughannok	0.06	0	0	3	1	50	**54.06**	0.3	46	0	0.07	46.37
Glenwood	0.31	0.42	0	9	1	41	**51.73**	0	48	0	0	48
Willow Cr.	0	0	0	0.03	1	48	**49.03**	0	51	0	0.21	51.21
Fall Creek	0.61	0	0.54	7	0.23	39	**47.38**	0.53	51	0	0	51.53
Gulf Creek	0	0.39	0	9	0	37	**46.39**	0	54	0	0	54
Inlet	2	0	0.24	8	0.07	28	**38.31**	0.06	63	0	0	63.06

a large wetland area. At the very north end of the lake is the Montezuma National Wildlife Refuge, a wildlife refuge covering approximately 6820 acres.

Smaller wetlands are scattered throughout the upper watershed area. These smaller wetland areas tend to be clustered more in the outer edges of the watershed but are more evenly distributed in the east west direction than the larger wetlands. Other than those associated with the very large streams and at the southern and northern ends of the lake, very few wetlands are found adjacent to the lake's shoreline.

A number of wetland types are found throughout the watershed. The Fish and Wildlife service has mapped wetland cover types throughout the United States and documented these wetlands on the National Wetland Inventory (see Map 3-9-1) maps (labeled by cover-type codes). Based on these maps, the wetlands found within the Cayuga Lake Watershed include Palustrine Forested, Broad-leaved Deciduous, Seasonally Flooded/Saturated Areas (PFOIE), Palustrine Shrub-scrub, Broad-leaved Deciduous, Semi-Permanently Flooded Areas (PSSIF), and Open Water Excavated Wetlands (POWZh). The degree to which wetlands provide society with ecological, social, and economic functions is influenced by these wetland characteristics.

Riparian Corridors

Riparian zones are the lands bordering surface waters; under natural conditions these zones represent a transition from aquatic to terrestrial ecosystems. Riparian

Table 3-9-2.
Percent Total Wetlands Areas to Total Subwatershed Area

Subwatershed	Total area (ha)	Percent total wetland area per class			
		1	2	3	4
Canoga	2387.9	6.7	na	na	na
Direct Drainage	22388.8	na	na	na	na
Fall	33507.4	0.4	1.5	0.1	0.09
Glenwood	2487.7	na	0.8	0.03	na
Great Gully	3861.9	na	0.2	0.4	na
Gulf	1598.2	2.7	0.9	na	1.7
Hicks	1812	na	0.5	1.7	na
Inlet	41229	1	0.3	0.03	na
Interlaken	6727.2	na	na	na	na
Ledyard	5224.8	na	na	0.04	na
Mack	1922.9	na	na	na	na
Paines	3851.8	na	na	0.2	na
Renwick	2946.3	1.2	1	na	na
Salmon	23860.6	na	0.8	1	na
Sheldrake	2620.9	na	0.3	na	na
Taughannok	17539.2	na	0.3	0.09	0.07
Trumansburg	3749.8	na	0.3	na	na
Willow	2893	na	0.2	na	na
Yawger	6313.2	na	1	0.3	na

Table 3-9-3.
Percent (%) Developed Area Landuse Within 150 ft. Riparian Corridor

	Developed Categories	ENCROACH. RANK	Undev. Categories
Great Gully	81.1	**H**	19.0
Yawger Cr.	77.0	**H**	23.0
Sheldrake	74.0	**H**	25.0
Hicks Gully	74.0	**H**	27.0
Paines Cr.	73.7	**H**	26.0
Ledyard	71.1	**H**	29.0
68	70.0	**H**	30.0
Direct Drainage	70.0	**H**	31.0
Mack Creek	64.0	**M**	36.0
Trumansburg	63.3	**M**	37.5
Salmon Cr.	62.4	**M**	38.0
Canoga Creek	62.3	**M**	37.5
Fall Creek	61.8	**M**	37.4
Renwick	61.5	**M**	39.0
Taughannok	54.1	**M**	46.4
Glenwood	51.7	**L**	48.0
Willow Cr.	49.0	**L**	51.2
Gulf Creek	46.4	**L**	54.0
Inlet	38.3	**L**	63.1

zones vary in width. For the *RPP* the riparian zone is defined as 150 ft. from the centerline of each major stream. Table 3-9-1 indicates the percentage of each land use within this buffer area for the major subwatersheds. The amount of developed area varies from about 40% to 80%, indicating significant development along most of the tributaries.

See also: Cayuga Lake Watershed Roadbank & Streambank Inventory (Cayuga Lake Preliminary Watershed Characterization) *and Map 2-3 Land Use in the Riparian Corridor*

Functional Assessment - Streamside Vegetation and Wetland Functions

While the physical, biological, and chemical characteristics of wetlands largely determines how they function, the impact wetlands have on water quality depends on their position within the watershed. Because of the steep nature of the Cayuga watershed, wetlands tend to be located in the headwaters of streams, serving more as baseflow stream augmentation than flood reduction. The few wetlands in the lower portion of the landscape provide flooding attenuation. Each wetland cover type will provide a different set of functions to the watershed and downstream water quality. As a general rule the amount of nutrients that can be trapped by a wetland is directly proportional to the amount of flow going through.

Restoration Priorities

Setting Watershed-wide Priorities For Restoring and Creating Wetland Areas

As a means of setting restoration priorities, each major subwatershed was analyzed for the area of NYSDEC wetland by class. Table 3-9-2 indicates the percentage of each class by subwatershed (Class 1 indicates wetlands with the greatest ecological significance and the most restrictive standard for disturbance). The subwatersheds with the highest percentage of NYSDEC wetlands are: Canoga (6.7%), Gulf (5.2%), Hicks (2.3%), Renwick (2.2%) and Fall Creek (2.1%). These subwatersheds would be candidates for wetland restoration and protection. The other subwatersheds contain less than 2% NYSDEC wetlands and would be candidates for restoration and wetland creation.

Setting Watershed-wide Priorities For Restoring Riparian Zones

The role riparian zones play in protecting water quality is determined by characteristics including vegetation, slope, soils and land use. The percentage of land use class within the riparian zone is the best measure of condition within these areas. Table 3-9-3 ranks each major subwatershed in order of percentage-developed land within the 150-foot buffer zone. Subwatersheds with over 70% development are assigned to a “high” category, from 70% to 54%, to a “medium”, and below 53% to “low”. Watersheds with the highest percent of developed area should be given the highest priority for riparian zone restoration.

In addition to the *RPP* project, there is a coordinated project to develop and implement a methodology to quantify the restoration potential of wetland and riparian corridors in this watershed. Two subwatersheds, Taughannock Creek and Yawger Creek, have been used to develop and test the approach.

Goals

- Preserve existing wetlands and restore degraded wetlands with the watershed
- Restore degraded streams to a natural condition for the purposes of reducing streambank erosion and restoring aquatic habitat.
- Develop and maintain streamside vegetation corridors; for the purposes of reducing streambank erosion, trapping sediments and nutrients, and providing shading and cool water during the summer.

- Construct and/or restore wetlands for natural water treatment and moderation of flood flows.
- Protect a full range of wetlands and riparian functions by preventing development activity in hydrologically sensitive areas.

Existing Measures

State and Federal Regulations: NYSDEC freshwater wetlands are lands and waters of the State that are subject to state wetland regulations (Article 24 and Title 23 of Article 71 of the Environmental Conservation Law (see http://www.dec.state.ny.us/website/dcs/freshwet/freshwet01.html)) because they extend over an area of at least 12.4 acres (5 ha), or have some unusual local importance. These wetlands, and areas within 100 feet of their boundaries, are subject to regulation by the NYSDEC. The Map 3-9-1 shows the approximate location of the wetland boundaries at a scale of 1"=24,000.

At the federal level, the Army Corps of Engineers (ACOE) regulates the filling of "waters of the United States." This includes streams, lakes, impoundments, intermittent drainage ways, and associated wetlands. Authority is granted to the ACOE by Section 404 of the Clean Water Act (see http://www.epa.gov/owow/wetlands/facts/fact10.html). The Federal wetlands regulations do not stipulate a buffer zone.

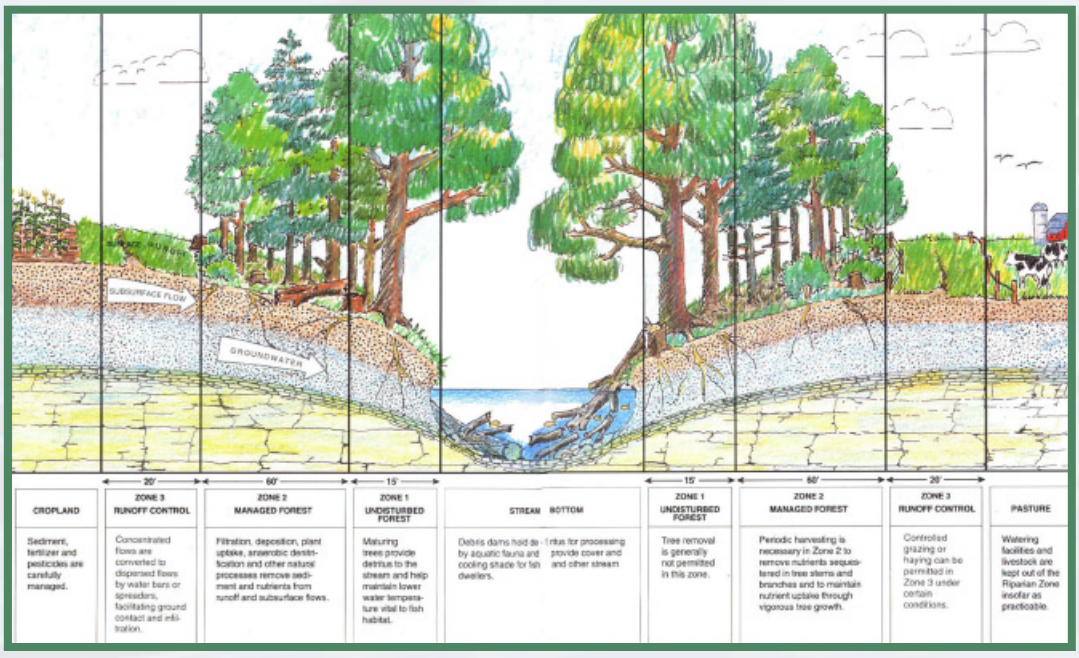
Preservation of Wetlands - Several programs administered by government agencies control development activities that could affect wetlands by providing financial assistance to those who wish to protect these areas.

Wetland and Riparian Zone Education – Cornell Cooperative Extension along with a number of counties within the watershed carry out very active educational programs aimed at the protection of wetlands and riparian zones. One example is the booklet "Finger Lakes Landscape: Landscaping for Erosion Control" that focuses methods for protection and restoration of riparian areas.

Recommendations

Develop a wetland and riparian corridor management strategy for incorporation into the overall Cayuga Lake Watershed Restoration & Protection Plan. Strategies, which include both regulatory and non-regulatory approaches, can be implemented by local agencies and incorporated into educational initiatives.

The following table recommends establishing guidelines for the riparian zone. It must be wide enough to filter sediment from surface runoff and needs to be protected from encroachment. Adoption of a comprehensive and integrated set of environmental restrictions to govern the development process can be critical to maintaining the integrity of stream corridors and wetlands. Figure 3-9-1 illustrates a recommended riparian zone system that could be established along streambanks (USDA, 1991). Urban stream buffers vary from 20 to 200 feet in width on each side of the stream according to a national survey of 36 local buffer programs, with a median of 100 feet (30.5 meters).



No. 9 ~ Wetland, Shoreline & Riparian Corridor Management Recommendations

		Related Issue(s)	Potential Responsible Organizations(s)	Measures/ Targets	Approx Cost
A	**Wetland protection and restoration**				
A1	All municipalities that have land use control ordinances should require review of disturbances within 100 ft of all natural wetlands and all municipalities should prohibit discharge of stormwater to wetlands without prior treatment (for example, using vegetated filter strips). The following municipalities have some protection of wetlands within their local law: City of Ithaca (zoning), Town of Danby (subdivision), Town of Homer (zoning), Town of Ithaca (zoning), Town of Lansing (zoning and subdivision), Town of Romulus, Town of Seneca Falls (zoning), and Town of Spencer (subdivision).	A, D, SR, WQ, F, H, N, OC, P, S, C, E, I	M, LO	First 5 years - all municipalities with wetlands adjacent to riparian corridors Second 5 years - 20% of all other municipalities with highest population and household units	
A2	Inventory all wetlands in watershed to establish priorities. Restore degraded wetlands (based on watershed-wide analysis of potential benefit to water quality, habitat, and hydrology).	A, D, SR, WQ, F, H, N, OC, P, S, C, E, I, ES	NYSDEC, USEPA, SWCD, NRCS	20 acres/year at $5,000/acre	$50,000
A4	Incorporate wetlands as an important component of regional stormwater management.	A, D, SR, WQ, F, H, N, OC, P, S, C, E, I	NYSDOT	*see Stormwater Management & Erosion Control*	
B	**Riparian zone management**				
B1	Restoration - restore very severe streambank segments (see Appendix S) based on Cayuga Lake Watershed Streambank Inventory (2000) (see *Cayuga Lake Preliminary Watershed Characterization)* using Watershed Stream Restoration Method (see *RPP* On-Line at http://www.cayugawatershed.org). Concentration is on segments of Big Salmon Creek, Cayuga Inlet, and Fall Creek.	A, D, SR, DW, WQ, F, H, N, OC, P, S	SWCD, C, M, NYSDEC, City of Ithaca	3 miles/year for 10 years	$50/foot
B2	All municipalities that do not presently deal sufficiently with riparian corridors within local law should adopt ordinances defining riparian zone as "critical environmental area" requiring review of disturbances. Minimum size of the riparian corridor is 100 ft, with wider areas around more sensitive or valuable resources. At minimum no new development should be allowed on uninhabitable land subject to flood. Resource-related goal is to retain 60-70% of riparian corridor in native vegetation. List of municipalities that deal with riparian corridors within local law (see Appendix S).	A, D, SR, WQ, F, H, N, OC, P, S, C, E, I	M, LO	20% within 5 years	
B3	All municipalities that do not presently deal sufficiently with flood plain development within local law should adopt ordinances prohibiting development in 100- year floodplain. List of municipalities that deal with flood plain development within local law (see Appendix S).	A, D, SR, WQ, F, H, N, OC, P, S, C, E, I	M, LO	1 municipality per year	
B4	Limit stream crossings by utilities or roadways to 2 per km of stream channel. Develop guidelines for the location of stream crossings and siting.	A, D, SR, WQ, F, H, N, OC, P, S, C, E, I	NYSDOT	1/year	$25,000

10. Forestry and Silviculture Management

Agricultural Practices (A)	Development (D)	On-site Wastewater Systems (O)	Stormwater Runoff (SR)	Wastewater Treatment (WW)			
Drinking Water (DW)	Tourism and Other Economic Development (T)	Water Quality Standards (WQS)					
Water Quality (WQ)	Exotic species (ES)	Fertilizers and Pesticides (F)	Heavy metals (H)	Phosphorus and Nutrient Loading (N)	Organic compounds (OC)	Pathogens (P)	Sediment (S)
Comprehensive Planning (C)	Education (E)	Economic Revitilization & Sustainability (ER)	Infrastructure (I)				

Introduction

Forestry and timber harvesting is an important industry in the Cayuga Watershed, with an annual removal of over six million board feet. Survey records from the late 18th century indicate that more than 97% of the 785 square mile Cayuga Watershed was forested prior to European settlement. By late in the 20th century, only about a third of the watershed was forested.

The Nature of the Problem

Undisturbed forests are highly conservative ecosystems, with minimal loss of sediments and nutrients to downstream waters. Forestry activities have the potential to greatly increase erosion and sedimentation. Because sediment is the pollutant of highest priority in the Cayuga watershed, it is important that both commercial interests and individuals manage forestry practices to minimize sediment loss.

Goals

- Minimize erosion from forestry/timber harvesting operations;
- Prevent sediment originating from forestry practices from reaching water bodies;
- Avoid altering physical characteristics of the stream from improperly constructed stream crossings and/or felling practices;
- Keep streamside vegetation intact to avoid thermal modification.

Existing Measures

NYSDEC has developed programs for both private and commercial woodland managers to manage the resource and protect environmental quality. The focus of the programs is education and voluntary compliance with incentives.

Recommendation

The existing regulatory programs and associated outreach materials are very well suited for application to the Cayuga Watershed. The IO and its associated Committees, Watershed Steward, and the CLWN should include information regarding these resources in their public outreach materials. They include the following:

Best Management Practices (BMPs)

Landowners, resource managers, and timber harvesters are responsible for evaluating specific harvest sites and selecting management practices that will protect water quality. A Forest Management Plan that accounts for specific site conditions should be developed before any harvesting operation. This is a voluntary plan designed to protect the health and future regeneration of the forest, and nearby aquatic resources. Proper site-specific planning for the use of BMPs before forestry operations are begun can prevent or minimize soil erosion and sedimentation of waters from improperly designed and constructed logging roads, skid trails, log landings, and stream crossings. For more information

and specific recommendations see Timber Harvesting Guidelines: What are they? >http://www.dec.state.ny.us/website/dlf/privland/privassist/bmp.html> and Got trees? Call before you cut <http://www.dnr.cornell.edu/ext/forestrypage/call_before_you_cut/online_brochure.htm>

Financial Assistance

The Environmental Quality Improvement Program(EQIP) (see Appendix H - Agricultural Programs) is a USDA-NRCS initiative authorized by the 1996 Farm Bill that has several programs for forest improvement. Also see Agricultural Practices section of this report.

The Stewardship Incentive Program (for more information see http://www.dec.state.ny.us/website/dlf/privland/forprot/icestorm/iceinfor.html) (SIP) is a federal cost share program to encourage landowners of small to medium-sized tracts (between 5 and 1,000 acres) of forest or other land suitable for stewardship management to use holistic forest management. Landowners must first have a NYSDEC-approved stewardship management plan that has been developed by a forester to be eligible. In addition, owners can apply for deferment of local tax payments.

Forest landowners owning 50 acres or more and who commit to and implement a long-term forest management plan developed by a forester, are eligible for tax relief under Section 480-a of the New York State Real Property Tax Law (RPTL 480-a). This program provides up to an 80% reduction in property taxes in exchange for a rolling ten-year commitment to a NYSDEC-approved forest management plan. For more information see Taxation of forest lands <http://www.dec.state.ny.us/website/regs/199.htm>.

Technical Assistance

The NYS Cooperative Forest Management Program (for more information see http://www.dec.state.ny.us/website/dlf/privland/privassist/help.html) is a forest program administered by the NYSDEC to encourage the private forest landowners in New York to apply sound forest management practices to their woodlands.

The New York State Cooperating Timber Harvester Program (CTH) (for more information see http://www.dec.state.ny.us/website/dlf/smallbusiness.html#programs) is sponsored by the NYSDEC and is designed to improve relations between landowners and timber harvesters in New York State, and to help protect our forest, land and water resources by promoting the use of the Timber Harvesting Guidelines for New York and

Forest Practice Standards.

NYSDEC provides a directory of Cooperating Consultant Foresters (for more information see http://www.dec.state.ny.us/website/dlf/privland/privassist/consulting.pdf) who have agreed to follow established management standards. Private landowners are encouraged to hire consultants from this list. For more information see NYSDEC Cooperating Forester Program (for more information see http://www.dec.state.ny.us/website/dlf/privland/privassist/coopprogram.html).

11. Regulatory Management

Agricultural Practices (A)	Development (D)	On-site Wastewater Systems (O)	Stormwater Runoff (SR)	Wastewater Treatment (WW)			
Drinking Water (DW)	Tourism and Other Economic Development (T)	Water Quality Standards (WQS)					
Water Quality (WQ)	Exotic species (ES)	Fertilizers and Pesticides (F)	Heavy metals (H)	Phosphorus and Nutrient Loading (N)	Organic compounds (OC)	Pathogens (P)	Sediment (S)
Comprehensive Planning (C)	Education (E)	Economic Revitilization & Sustainability (ER)	Infrastructure (I)				

Introduction

There are various federal regulations (see Appendix P) that provide the foundation for New York State (NYS) agencies (see Appendix Q) to develop, administer, regulate, and enforce programs that improve water quality by controlling nonpoint source pollution (NPS). In some cases these programs are then delegated by NYS to county agencies (see Appendix U). These programs involve a great deal of participation at the local level by municipal boards and elected officials, citizens, and businesses. While not always directly related to NPS, land use regulations and controls at the municipal level play an important part in controlling and reducing NPS.

One of the most powerful tools in the local government arsenal is the power to regulate the physical development of the municipality. This power is exercised through a variety of available authorizations and regulatory mechanisms. Through control of land use, each community is able to develop and display the most desirable physical features, protect the public health and welfare and environmental quality of the community. In terms of water quality, this is especially important in the area of development activity, which when left unregulated and unenforced tends to significantly increase the amount of sedimentation carried off-site to surface waters, and ultimately to Cayuga Lake.

Goals

Municipalities and counties in the Cayuga Lake Watershed, along with the IO should use federal and state programs and funding along with municipal land use controls to ensure the following:

- Land use and economic development plans, and plan implementation strategies, such as zoning are based on sound assessment of natural and environmental resources constraints.
- Development is precluded from environmentally sensitive areas in the watershed, such as stream corridors, wetlands, steep slopes, and areas having highly erosive soils.
- Effective watershed management plans, and storm water management and erosion control programs have been adopted to protect water resources in the watershed.

Existing Measures

Federal Regulations (see Appendix P)

State Regulatory Authority (see Appendix Q)

County Regulatory Authority (see Appendix U)

Municipal Land Use Regulation & Control (analysis) (see Appendix T)

No. 11 ~ Regulatory Management Recommendations

A	Education	Related Issue(s)	Potential Responsible Organizations(s)	Measures/ Targets	Approx Cost
A1	The IO along with each municipality and county agency should educate themselves about specifics of federal (see Appendix P) and state regulations (see Appendix Q), programs, and funding as they relate to nonpoint source pollution and water quality.	A, D, O, SR, WW, DW, S WQS, WQ, E	IO, C, M	Representative of each municipality attend 2-3 workshops per year	$100/ municipality/ year
A2	Stormwater Management & Erosion Control Phase II Regulations All municipal elected officials, enforcement officers, highway superintendents, boards, and related professional staff should attend training on existing (Stormwater Phase I) and new (Stormwater Phase II) state and federal regulations. Municipalities covered under the new Stormwater Phase II regulations for stormwater control (Cayuga Heights (V), Dryden (T), Ithaca (C), Ithaca (T), Lansing (T), and Lansing (V)) should undergo training toward implementation.	A, D, SR, DW, WQ, S, E	C, M	Four workshop series within one year of new state regulations	$5,000/ series
A3	Educate and train municipal decision-makers on land use regulations and controls with particular attention to stormwater management and erosion control, on-site wastewater systems, and preservation tools such as conservation easements, purchase of development rights, transfer of development rights, cluster development and open space preservation. To do this offer a series of four workshops every two years and distribute information on existing workshops.	A, D, O, SR, DW, WQ, E	RPB, C, IO	Do first series by February 2002	$5,000/ series
B	**Through the enforcement and adoption of proper stormwater management, erosion, sedimentation, and wetland and riparian vegetation-clearing controls, a community can protect development from costly damage, retain valuable soils, protect water quality, and preserve aesthetics within the community.**				
B1	Some municipalities in the watershed have local laws that require municipal boards to consider development impact on erosion and sedimentation through local regulatory stormwater and erosion control, regulatory management of steep slopes and structural measures, regulatory management of impervious surfaces, regulatory management of wetlands and riparian corridors, and regulatory management of open space (as an effective means to filter surface water before it reaches the groundwater level) (see Appendix I, S, and T and for more information see *RPP* On-Line at http://www.cayugawatershed.org). Developers are often required to adopt adequate designs and measures to mitigate development impact. However, adequacy is very often not specified and for the most part the controls are not sufficient or uniform. Depending on how strict they are, mitigation measures and design standards can help to preserve and improve water quality. To deal with this priority issue all municipalities in the watershed should adopt the following: A uniform Stormwater Management and Erosion Control Law and enforce its performance standards (see Appendix I). Controls for the amount and ratio of impervious surfaces (see Appendix I - municipalities with Regulatory Management of Impervious Surfaces). Considerations for each municipality should include regulations on impervious surfaces including parking areas of four or more vehicles (proper drainage and construction material (as pervious as possible) with approval of engineer) and percent of structure to parcel (agricultural and residential single < 20%, commercial and industrial < 40%, multifamily < 50%)	A, D, SR, DW, WQ, S, C	M, IO	All municipalities in the watershed working through the IO should adopt guidelines for adopting local law within 1 year. Thereafter, the uniform Stormwater and Erosion Control Local Law should be adopted by each municipality within 5 years starting with the critical areas of defined on Table 2-2.	

		Related Issue(s)	Potential Responsible Organizations(s)	Measures/ Targets	Approx Cost
	Cluster development (see *RPP* On-Line at http://www.cayugawatershed.org) techniques for municipalities that are experiencing regular requests for subdivision (> 2 per year or > 10 building permits per year). This would allow for less impervious surface, more open space, and less soil loss due to disturbance and runoff.				
B2	Some municipalities have local law that regulates activities in wetlands, riparian corridors, and flood plains (see Appendix S - Regulatory Controls for Wetlands, Shoreline & Riparian Corridors). Because this is a key natural erosion and sediment control all municipalities should consider Wetlands, Shoreline, & Riparian Corridor Management recommendations that require changes to local law (see Wetlands, Shoreline & Riparian Corridor Management section).	A, D, SR, DW, F, H, N, OC, P, S	M, C, IO	Within 1 year	$1,500
C	**Agriculture is important to the watershed. Counties and municipalities should consider agricultural programs that are both economically and environmentally sustainable. Specific recommendations include the following:**				
C1	Counties and municipalities should consider agricultural protection and preservation (see Appendix H - Agricultural Programs) while addressing associated land conservation and water quality concerns though various county, state and federal programs such as CAFOs. IO should help to develop methods to assist in implementation of plans.	A, D, T, C, ER	C, M, IO	Within 1 year	$1,000,000
C2	Municipalities should encourage alternative agricultural uses of land within comprehensive planning and zoning structure. IO will assist with guidelines for municipalities.	A, D, T, C, ER	M, IO	Within 1 year	$500
C3	Municipalities should consider changes to zoning laws to allow agriculturally related business enterprises on the farm. IO will assist with identifying and developing model laws.	A, T, C, ER	M, IO	Within 1 year	$1,500
D	Municipalities, counties or a watershed-wide approach should consider open space protection. Produce a watershed open space plan including an assessment of open space resources. Develop a natural resources inventory to aid in the comprehensive planning process, development of appropriate regulations, identification of sensitive areas for development, and develop policies to protect open space and public lake access. The IO should provide available data.	D, DW, T, WQ, C, ER	IO, C	Plan and assessment within 3 years, implementation within 5 years	$120,000
E	Local sanitary codes can be adopted to regulate on-site wastewater systems through regular inspections. Adopt County Sanitary Codes enabling On-Site Septic Inspections or adopt Municipal On-Site Wastewater Local Law (see Appendix N) that will ensure that wastes are disposed of in a manner that will not create a health hazard, adversely affect the environment, create a nuisance, or impair the enjoyment or use of property. The IO could run a fee-based program for the watershed. Municipalities would sign on to use program. Currently the only municipalities in the watershed that have an inspection program are in Cayuga County based on the *Sanitary Code of the Cayuga County Health District.*	D, O, DW, WQS, WQ, N, P, I	C, M, IO	Using existing models, reach agreement on law, guidelines and program within 1 year	$50,000

		Related Issue(s)	Potential Responsible Organizations(s)	Measures/ Targets	Approx Cost
F	All municipalities in the watershed should adopt junkyard regulations or zoning regulations addressing the siting of junkyards (the Towns of Groton and Ledyard are the only municipality with a Junk Yard Ordinance) . In the absence of such local control all municipalities should apply the standards set forth in General Municipal Law §136 for automobile junkyards. IO should provide model ordinance and siting guidelines.	WQ	M	Within 1 year	$1,500
G	The municipalities of the Cayuga Lake Watershed should sign an Intermunicipal Cooperative Agreement (see Appendix T) that acts as the basis for implementing the specific actions and recommendations of the Cayuga Lake Watershed Restoration and Protection Plan.		IO, C, M	80% of the land area in the watershed within 1 year, 100% within 5 years	$1,500
H	The Intermunicipal Organization working with municipalities and through County Health Departments should consider adopting Watershed Rules and Regulations, which could lead to the development of a Watershed Inspector (see Appendix R) position.	DW, WQ	IO, C, M	Written within 1 year, approval of NYSDOH within 2 years	$50,000
I	Municipalities should update or develop comprehensive plans. Additionally, all municipalities should fully implement the goals and objectives outlined in their existing comprehensive plans through the use of local law such as zoning, subdivision, and site plan review .	C	M	Within 5 years	
J	Do a study that considers the economic impact of protection of water resources including the impact of lakeshore properties on local tax base. In order to have useful data municipalities should code real property data for lakeshore properties.	E	M	Within 2 years	$25,000

Appendices

Appendix A

Intermunicipal Organization

Introduction

Mission Statement: *To create, modify, and implement a watershed management plan to allow local governments within the watershed to work together for the purposes of accessing dollars, cost savings, cost sharing, and efficiency of activities among municipalities. This plan when completed will prioritize water quality problems and solutions. The Intermunicipal Organization will provide direction for the regional planning boards and other staff, and oversee the entire project.*

Intermunicipal Organization (IO) membership is comprised of watershed municipalities (counties, cities, towns and villages) that have signed the Call for Cooperation and Resolution to Endorse a Watershed Study for Cayuga Lake (see Call for Cooperation in this Appendix). Presently 28 of 44 municipalities and four of the six counties have signed the Call for Cooperation and are therefore IO members. While 28 of 44 represents only 64% of the municipalities, they cover a combined 76% of the land area in the watershed. If you included land area in the watershed that is covered by either a municipality or a county on the IO, the percent is approximately 90.

Call For Cooperation and Resolution to Endorse a Watershed Study For Cayuga Lake

WHEREAS, the Intermunicipal Organization is being formed to create, modify and implement a watershed management plan to allow counties, towns, villages, and cities in the watershed to work together for the purpose of accessing dollars, cost savings, cost sharing and efficiency of activities among the municipalities, prioritize water quality issues, and

WHEREAS, the Intermunicipal Organization is made up of municipalities within the watershed to oversee the development of a watershed management plan, and

WHEREAS, this Board acknowledges the importance of water quality and natural resources of the Cayuga Lake Watershed, and

WHEREAS, the size of the watershed dictates that cooperation between varied user groups will be essential in protecting this natural resource,

NOW THEREFORE, BE IT RESOLVED that this Board of the Town/Village/City/County of: will participate in the efforts of the Intermunicipal Organization to: 1) define the structure of the Intermunicipal Organization; 2) promote scientific analysis of the watershed's resources in order to determine the state of the watershed; 3) develop an education and awareness program to educate local residents and stimulate their interest in protecting the watershed; 4) develop coalitions for cooperation and participation in projects relevant to the protection of the watershed; 5) prioritize water issues within the watershed; and 6) participate in solutions to water quality problems, including possible sources of funding.

THIS IS TO CERTIFY that the foregoing Resolution was duly adopted on_____, is hereby appointed as the delegate to represent_____on the Intermunicipal Organization

Signature and Title of Presiding Officer:_____

IO Structure Prior to July 2001 (Inception through final RPP)

Introduction

Generally, the IO meets monthly with a set agenda. The IO has defined organizational issues such as quorums, voting and committees. Committees that function under the IO include Technical, Education/ Public Participation/Outreach, Finance and Agriculture Committees. Non-municipal stakeholders can participate via avenues such as membership on IO committees, the Cayuga Lake Watershed Network, and forums that have occurred throughout the project.

See also: The Intermunicipal Organization Cayuga Lake Watershed Web Site at http://www.cayugawatershed.org

Agricultural Advisory Committee

The Agricultural Committee was formed by the IO and the Cayuga Lake Watershed Network. The mission of the committee is as follows:

> *Since agriculture is recognized as a preferred land use in maintaining and protecting water quality, the mission of the Cayuga Lake Watershed Agricultural Committee will be to enhance agriculture through sound environmental stewardship and provide guidance for an agricultural program within the Cayuga Lake Watershed.*

Representatives of the following organizations developed the structure of the committee: County Soil & Water Conservation Districts, Natural Resource Conservation Service, and Cornell Cooperative Extension. These organizations agreed on a structure of individual county producer representation according to a percent of agricultural land in the watershed on the whole. It was a consensus of the group that the Committee should consist of 11 agricultural producers

CAYUGA LAKE WATERSHED INTERMUNICIPAL ORGANIZATION REPRESENTATIVES

MUNICIPALITY	DESIGNATED REPRESENTATIVE/ ALTERNATE	NON-REP ATTENDEE
Cayuga County		Sara Young
Aurelius (T)	Edward Ide	
Aurora (V)	Robert Fitzgerald	
Cayuga (V)	Ronald Erickson	
Fleming (T)	Jim Young	
Genoa (T)	Don Franklin Don Potter	
Ledyard (T)	Dave Morehouse Sylvia Hurlbut	
Locke (T)*	Not participating at this time.	
Scipio (T)	Chuck Howell	
Sempronius (T)		
Springport (T)	Robert Bower	
Summerhill (T)	Deborah Davenport	
Union Springs (V)	Eli Shockey	
Venice (T)	Jack Rejman	
Cortland County	Sandra Price	
Cortlandville (T)		
Harford (T)		Ed Drake
Homer (T)	Not participating at this time.	
Scott (T)*	Not participating at this time.	
Virgil (T)	Ed Eaton	
Schuyler County		
Catharine (T)*		
Hector (T)		
Seneca County	Tom Fox 315-539-9241	Jim Malyj
Covert (T)	John Sipos	
Fayette (T)	Patrick Morrell	
Interlaken (V)	Barbara Stewart Doug Burlew	
Lodi (T)	Not participating at this time.	
Ovid (T)		
Romulus (T)	Raymond Zajac	
Seneca Falls (T)	Jeffrey Warrick	
Varick (T)	John Sipos	
Tioga County*	Not participating at this time.	
Spencer (T)*	Not participating at this time.	
Tompkins County	Dan Winch Sharon Anderson	
Caroline (T)	Jackie Cassaniti	
Cayuga Heights (V)	Dave Allee Dooley Kiefer	
Danby (T)		
Dryden (T)	Deb Grantham	
Dryden (V)		
Enfield (T)		
Freeville (V)	Steve Adams	
Groton (T)	Teresa Robinson/ Lyle Raymond	
Ithaca (C)	Larry Fabbroni	
Ithaca (T)	Carolyn Grigorov	
Lansing (T)	Jerry Codner Katrina Greeley	
Lansing (V)	Lynn Leopold	
Newfield (T)		
Trumansburg (V)		
Ulysses (T)	Krys Cail George Kennedy	

* Municipalities with less than 3 sq. mi. in watershed

according to the following membership: Tompkins County (3), Cayuga County (3), Seneca County (2), Cortland County (1), Schuyler County (1), and one seat determined by the other ten committee members as at-large.

Voting Members

Judi Bough, Producer

Ken Burr, Producer

Janice Degni, Producer

John Fessenden, Producer

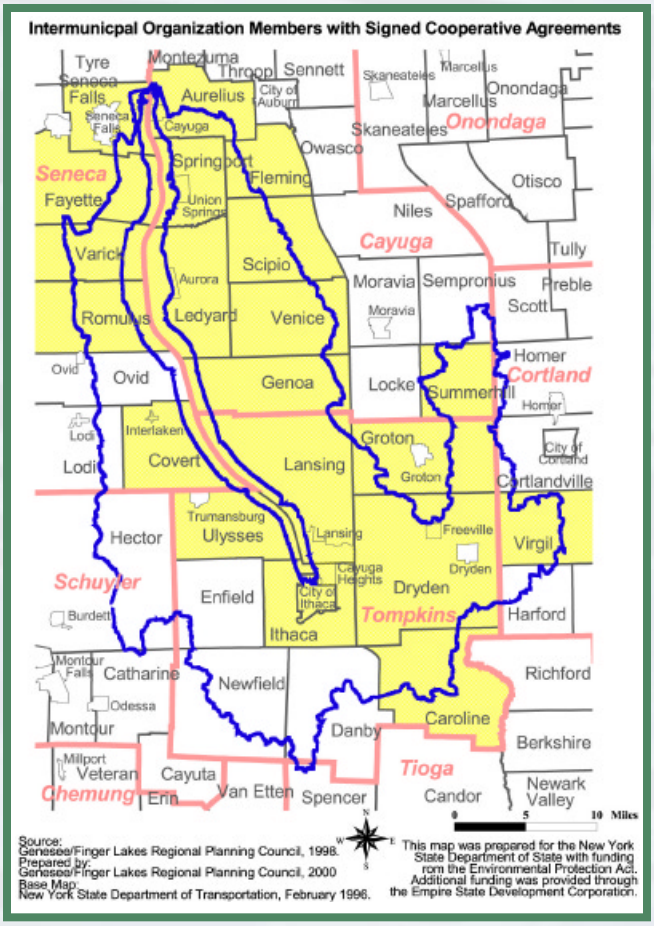
John Fleming, Producer

John George, Producer

Lyn Odell, Producer

Jack Persoon, Producer

Jim Young, Producer



Non-voting Members

Amanda Barber, Cortland County Soil & Water Conservation District

Elaine Dalrymple, Schuyler County Soil & Water Conservation District

Sherry Forgash, Tompkins County Soil & Water Conservation District

Jim Malyj, Seneca County Soil & Water Conservation District

Craig Schutt, Tompkins County Soil & Water Conservation District

Dave Zorn, Technical Committee

Education, Public Participation, & Outreach Committee (EPPOC)

The Education/Public Participation/Outreach Committee was formed by the IO to undertake activities that interface between the IO and the general public. The group consists of members of the IO and the CLWN. To date, the main task of the group has been planning the public forums and overseeing the public review process for the *Preliminary Watershed Characterization* and the *RPP*.

Members

Sharon Anderson, Cayuga Lake Watershed Network, Watershed Steward

Jerry Codner, Alternate IO member for Town of Lansing

Deb Grantham, IO member for Dryden

Karin Harjes, CCETC volunteer

Lynn Leopold, IO member for Village of Lansing

Jim Skaley, Representative for the Cayuga Lake Watershed Network

Technical Committee

The Technical Committee was formed by the IO to oversee the technical findings portion of the Watershed Management Plan project. The Technical Committee is comprised of a representative of the following: each County Water Quality Coordinating Committee, New York State Department of State (NYSDOS), New York State Department of Environmental Conservation

(NYSDEC) Division of Water, NYSDEC Regional Water Engineers, Montezuma Wildlife Refuge, Cayuga Lake Watershed Network (CLWN), United States Geological Survey (USGS), United State Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS), Wells College, Cornell University Center for the Environment, and the Atlantic Legal Services Foundation.

The main functions of the Technical Committee is data and information identification, technical education and public participation review, interim recommendation criteria and project review, and *Preliminary Watershed Characterization* and *RPP* development.

Members

Amanda Barber, Cortland County S&WCD/Water Quality Coordinating Committee

Elizabeth Boyer, Syracuse University

Clifford Callinan, NYSDEC, Division of Water

Steve Eidt, NYSDEC Region 7, Regional Water Engineer

Kate Hackett, Tompkins County Planning/WRC

Tom Jasikoff, Montezuma National Wildlife Refuge

Bill Kappel, United States Geologic Survey

George Kennedy, Intermunicipal Organization

Daniel Loucks, Cornell University

Jose Lozano, City of Ithaca, Tompkins County Water Resources Council (WRC)

Jim Malyj, Seneca County S&WCD/WQCC

Elizabeth Moran, EcoLogic

Tom Pearson, NYSDEC Region 8, Regional Water Engineer

Craig Schutt, Tompkins County S&WCD/WRC, Agricultural Advisory Committee

A. Thomas Vawter, Wells College

Linda Wagenet, Cornell Center for the Environment

Dan Winch, Tompkins County WRC

David Zorn, Genesee/Finger Lakes Regional Planning Council, Technical Project Manager

Technical Committee Liaisons

Sharon Anderson, Cayuga Watershed Network/ Watershed Steward (Education/Public Participation Committee)

Sylvia Hurlbut, Town of Ledyard (Intermunicipal Organization)

Kathy Bertuch, Central NY Regional Planning & Development Board, Project Administrator

IO/Cayuga Lake Watershed Network Joint Strategy Committee

On 23 August, 2000, the Cayuga Lake Watershed Intermunicipal Organization (IO) and the Cayuga Lake Watershed Network (the Network) participated in a joint meeting at the Ithaca Area Wastewater Treatment Facility in Ithaca, New York. The stated purpose of the meeting was to settle any outstanding differences between the two groups and to begin the process of defining a joint strategy to promote future cooperative efforts.

To facilitate increased effectiveness and efficiency of both organizations it was suggested that the IO/Network Joint Strategy Committee take the following actions:

Develop a statement of common goals based on identification of organizational issues and priorities.

Statement of common goals should then form the basis for developing a long-term plan of action that fits the visions and expectations of a ten-year manage-ment planning process into the reality of the NYSDOS three-year contract.

To aid in Joint Committee tasks, it was recommended that the Joint Committee develop and maintain a set of organizational charts that clarify the decision-making processes and committee structures of each organization.

Develop a communications protocol for the purpose of keeping both Executive Committees apprised of the all sub-committee actions and findings. This might include taking responsibility for circulating committee-meeting minutes to the Executive Committees. Additional communication responsibilities should include timely distribution of all pending publications for review by the non-publishing organization prior to publication.

Maintain an active and open dialog on organizational differences and work to build an intermediate process that will allow each organization to meet not only its own needs, but the interdependent needs of the other organization as well. (An example of an interdepen-dent needs is timely provision of financial documen-tation for in-kind services provided.)

Develop a separate Joint Finance Committee be formed for the purpose of keeping both organizations informed of pending grant applications. This will increase opportunities for collaborative grant applications and reduce the risk of duplicate applications.

Intermunicipal Organization Organizational Facilitator

Introduction

The IO will be overseeing the implementation of the *Cayuga Lake Watershed Restoration and Protection Plan* (RPP). To ensure that implementation of the RPP is maximized a Consultant/Organization Facilitator has been hired. The Organizational Facilitator/Consultant (Consultant) will work closely with the IO and other key stakeholder groups in the watershed to identify the structural characteristics of a self-sustaining organization capable of advancing the following goals and objectives:

Studies and Investigations

Meet with a subcommittee of the Cayuga Lake Intermunicipal Organization (IO) to understand its current structure and associated benefits and problems

Based on input from the IO, the Cayuga Lake Watershed Network and other stakeholder groups and agencies, determine what functions an imple-menting organization will be required to perform and identify any potential watershed partner organizations and groups currently suited to fulfill those requirements

Facilitate the IO as they determine the financial and legal relationships among stakeholder groups; the willingness of watershed municipalities to participate in an Intermunicipal organization; and, future funding needs

Conduct a comparative analysis of other mullet-jurisdictional organizations in New York State and evaluate against the structure of the IO

Develop a list of private and public funding sources

Maintain active communication with IO subcommittee

Attend monthly IO meetings and provide progress report updates

Provide a list of structural recommendations to the IO for comment and feedback

Assist the IO as they develop a model for determining IO membership dues

Incorporate IO comments and feedback and prepare draft report for IO approval that includes suggestions for changes to the existing bylaws as indicated

Prepare final report containing organizational recommendations

Tasks

Consultant activities, determined in consultation with DEC-Region 7, the IO and the Consultant, may consist of the following priorities during the funding period (June-October, 2001). It should be noted that because a main objective of this program is to allow flexibility and responsiveness to issues that may arise from the organizational structural analysis, it is possible and acceptable that tasks may change as the program progresses. Tasks identified in this section are reflective of the anticipated direction of the Consultant's program. Any modifications will be made in consultation with the project administrator (Central New York Regional Planning & Development Board) and NYSDEC-Region 7.

The following sections list the anticipated tasks under the program, which can be grouped generally into three categories (Communications and Administration; Studies and Investigations; and Recommendations and Reporting):

Communications and Administration

DEC Region 7 and the IO have identified activities that they would like to have conducted by the Consultant. The activities envisioned are noted below. These could change and are ultimately based on needs defined

between DEC Region 7, CNY RPDB, and resources available to supplement them.

Establish regular communication mechanisms with the IO and its sub-committees including attendance at monthly meetings, phone and e-mail access and mailings as needed.

Set agendas and time frames and structure task groups as determined useful or desirable by the IO. Anticipated activities include:

Administrative Assistance – This will entail organizing, planning and facilitating three half-day strategic planning sessions and structured discussions, e.g., conference phone calls, workshops, provision of reading material as deemed appropriate, and preparation and distribution of written preparatory and summary documentation materials for each strategy session. Half-day strategic planning sessions will focus on the following: 1) Objective setting, resource assessment, decision criteria setting; 2) Consideration of options, consultations with experts, e.g., funding formulas; 3) Review of draft recommendations, determination of action steps. One half-day strategic planning session will be held in each area (1, 2, 3). Smaller forums and other communications as needed will supplement strategic planning sessions.

Facilitation Assistance – This will entail facilitating communication efforts between the IO, its members and other watershed partners that may be necessary for decision-making. This will also entail working directly with the IO to guide them in determining existing relationships among stakeholder groups, the willingness of watershed municipalities to participate in an intermunicipal organization and the development of a model for determining municipal membership dues.

Contract funds will also cover reporting and administration needs of the contract. The consultant is required to submit monthly progress reports and claims. Monthly reports will include documentation of: work accomplished during the reporting period; status of each task; financial status of project; problems encountered and how resolved; description of task modifications and corresponding CNY RPDB approvals; and work anticipated in the upcoming month. The final monthly progress report will be the final report for the project.

Studies and Investigations

Studies and investigations can be grouped into three categories (IO Related; Other Watershed Management Agency/Stakeholder Related; and Funding Related). Activities are envisioned to include:

IO Related – Assess the IO's organizational landscape (past, current and preferred future) including structural strengths and weaknesses; tasks; authority and accountability; current relationships with other organizations; and, areas for improvement. It is anticipated that this will involve review of IO publications, meeting minutes, the draft and final RPP, conducting individual interviews with IO members and other watershed partner groups, attending monthly meetings and developing, distributing and analyzing a mail questionnaire in preparation for the first strategic planning meeting in July.

Determine the functions an implementing organization will be required to perform and assess against the IO's perception of its own future mission, objectives, tasks, authority and accountability.

Assess the regulatory and legal parameters that might constrain an intermunicipal implementation organization.

Assess the need to modify the existing IO bylaws.

Other Watershed Management Agency/Stakeholder Related – Collect, analyze and prepare a synthesis of a sampling of representative watershed cooperative arrangements (i.e., guiding elements that characterize successful and troubled arrangements of other watershed management groups/organizations).

Identify watershed stakeholder groups key to successfully implementing the RPP.

Funding Related – Identify and assess private and public funding resources available for administrative and implementation activities.

Assess funding structures of other watershed management organizations in order to facilitate IO discussions leading to the development of a formula for assessing municipal membership dues.

Recommendations and Reporting

The Consultant will produce and present to the IO for comment, a printed draft recommendations report containing organizational structure options, funding options and other elements. The Consultant will incorporate the IO's comments into a final printed report containing the recommended organizational structure for implementing the Cayuga Lake watershed RPP and present the final report to the IO.

IO Structure After July 2001 (Institutionalization of IO Based on RPP)

Officers

Chair – The IO shall elect a chair annually from among its voting members. The Chair shall preside at all meetings of the IO and the IO Executive Committee and work closely with administrative staff to set agendas. The Chair or his/her delegee shall be the official spokesperson for the IO. An individual can serve as Chair for a maximum of three consecutive terms at a time.

Vice Chair – The IO shall elect a vice chair annually from among its voting members. The Vice chair shall assist the Chair and, in the absence of the Chair, act as Chair.

Executive Committee (Ex Com)

Membership – The Executive Committee shall be composed of at least 7 IO members. At least 3 of the Ex Com members shall come from the three waterfront counties. The Chair of the IO and one representative each from each of the IO Standing Committees shall be members of the Ex Com. The Chair of the IO shall be the Chair of the Ex Com. The Ex Com will annually elect a vice chair, to assist the Chair and act as Chair in the absence of the Chair.

Term – Ex Com members shall be appointed for a one-year term at the last meeting of the IO each year to take office the next January 1.

Powers and Duties – It is understood that the members of the Board are appointed to represent the interests of the watershed as a whole and not the special interests of the represented party. The Ex Com shall conduct business on behalf of the membership of the IO between meetings of the IO, and shall inform the membership periodically of important matters.

More specifically, the Ex Com shall:

Implement the annual work plan and budget.

Approve requests for funding consistent with the established priorities.

Review technical and fiscal summary reports.

Review the performance of the staff and Center.

Recommend changes in workplan, priorities, staffing, budget, organizational structure, bylaws, policies, etc., to the IO for action.

Receive regular reports from the Committees and ensure that these reports are shared with IO members in a timely fashion.

Carry out the policies adopted by the IO.

Quorum – The quorum shall be two thirds of the Ex Com membership. Actions shall require a simple majority of the full Ex Com membership.

Meetings – The Ex Com shall meet on a regular basis, between meetings of the IO, at least every two months and as often as necessary to meet deadlines and deal with the business of the IO.

Minutes – The Ex Com shall ensure that its minutes are distributed to all IO members within 10 days of each meeting.

Committees

Membership on committees – Every IO Committee shall have at least three members, and at least one shall be a voting IO member. Committees can have both voting and non-voting IO members as well as non-IO members as appropriate. However, the committee representative to the Executive Committee shall only be a voting IO member.

Chair – Each committee may elect its own Chair.

Duties – Every IO Committee shall keep a record of its meetings and activities and report regularly to the Ex Com. All actions of committees shall be recommendatory only, unless otherwise specified. More specifics

are given in the following subsections, which address specific committees.

Technical Advisory Committee (TAC)

Membership – This committee shall have at least 11 members (as specified in the MoU establishing the IO) who bring water quality-related expertise relevant to the Cayuga Lake Watershed. It is desirable that they have experience and interest in Cayuga Lake and its drainage area. Membership will likely be drawn from local, state, and federal agencies, non-profit organizations specializing in land-use matters and water issues, and local citizen-interest groups or individuals, and academia. Members shall include representatives of county Water Quality Coordinating Committees, NRCS, SWCDs, NYS DEC, and USGS.

Duties include:

- Help establish a draft watershed characterization report.
- Recommend watershed priorities.
- Evaluate project applications seeking IO endorsement and recommend prioritization to the IO.
- Make recommendations to the IO on requests for funding.
- Review, evaluate and annually report on projects to the IO.
- Review any other projects and activities requested by the IO for technical merit.
- Make other recommendations to the IO.
- Help develop the Cayuga Lake Management Plan and serve in an advisory capacity in the implementation of the Management Plan.

Organization – The TAC shall initially be coordinated by the Genesee/Finger Lakes Regional Planning Council.

Education/Public Participation/Outreach Committee (EPPOC)

Membership – This committee shall have 5 members.

Duties include:

- Keep the public informed about the activities of the IO [see also Article VII, Communications].
- Set up public participation meetings for the general public.
- Identify issues that the public should be aware of and bring them to public attention.
- Solicit public input as requested by the IO.

Finance Committee (Fin Com)

Membership – This committee shall have 5 voting members of the IO.

Duties include:

- Recommend to the Board the amount of annual dues assessment to be paid by IO members.
- Assist the IO Chair and the staff director in preparing an annual budget.
- Review budgets for IO committees and IO projects.
- Seek funding sources, in conjunction with staff, for various projects approved by the IO and/or Board.

Membership/Nominating Committee (Mem Com)

Membership – This committee shall consist of at least five voting members of the IO.

Duties include:

- Working to maintain representation by all eligible municipalities, such as notifying municipalities when terms expire.
- Reviewing and making recommendations to the IO on non-voting member applications.
- Preparing a slate of officers for election (IO Chair and Vice Chair).

Administrative/Personnel Committee (Ad Com)

Membership – This committee shall have three voting IO members.

Duties include:

- Reviewing staffing needs and performance annually.
- Making staffing recommendations to the IO Board of Directors.

Performing other administrative oversight as assigned by the Ex Com.

Agriculture Committee (Ag Com)

Membership – This committee shall have at least seven members, including one each representing conventional agriculture, organic agriculture, large-scale agriculture, small-scale agriculture, and at least one voting IO member. An effort shall be made to have to proportional geographic representation as well as representation of the diversity of agricultural crops. It is desirable that the Soil and Water Conservation Districts, the Natural Resources Conservation Service, and Cornell Cooperative Extension have non-voting membership on the Committee. The Committee shall elect its own chair. The Committee shall be represented on the Ex Com by a voting IO member.

Duties include:

Identify agricultural issues related to the watershed, including economic and environmental sustainability.

Make recommendations to the IO on ways to address agricultural issues.

Review relevant management plan implementation projects and make recommendations to the IO and/or Technical Committee based on Ag Com's agricultural expertise.

Review, evaluate and report on Committee projects at least annually.

eview any other projects and activities requested by the IO.

Serve in an advisory role in the implementation of the Management Plan.

Recruit Ag Com nominees and present slate directly to IO for approval.

Environmental Review Committee (ERC)

Membership – This committee shall have at least 5 members, of which at least one shall be a voting IO member; most shall be non-voting members of the IO.

Duties – This committee can function as a citizen version of the Technical Advisory Committee, providing a forum for interested and concerned citizens to:

Recommend watershed priorities to the IO.

Review and evaluate municipal and IO projects.

Review and comment on any EISs for development projects within the Watershed.

Legislative Committee (Leg Com)

Membership – This committee shall have at least 3 members.

Duties – Its charge shall include:

Review model zoning and natural resource ordinances and recommend specific sections for consideration of IO members.

Review state legislation relevant to IO concerns and recommend to the IO or Board specific comments to send to state legislators.

Special Committees

The IO and/or the Ex Com may from time to time create special committees to deal with specific topics or concerns. Special Committees shall be created by Resolution of the IO or Ex Com, which shall specify membership, purpose(s), and duties. These special committees may be continued from year to year as necessary or may be given a deadline by which to complete work. They shall be advisory to the IO or Ex Com, unless otherwise specified.

Appendix B

Public Forums

There have been several opportunities for public participation over the last four years that have led to significant input into the Cayuga Lake Watershed Restoration & Protection Plan process. These include the following:

1997 Finger Lakes-Lake Ontario Watershed Protection Alliance (FL-LOWPA) Conference

1997 Neighbors Around Cayuga Lake Watershed Mini-Conference I

1998 Cayuga Lake Watershed Network Stakeholders Survey

1998 Neighbors Around Cayuga Lake Watershed Mini-Conference II/Cayuga Lake Watershed RPP Public Forum I

1999 Intermunicipal Organization Water Quality Issues Identification

2000 Cayuga Lake Draft Preliminary Watershed Characterization, RPP Public Forum II

2001 Watershed Issues and Strategies, RPP Public Forum III

2001 Draft Restoration & Protection Plan Input, RPP Public Forum IV

For more information see the RPP on-line at http://www.cayugawatershed.org

Appendix C

Findings of the Cayuga Lake Preliminary Watershed Characterization

Cayuga Lake has a rich history of research activities. Physical, chemical, and biological conditions of the lake and its tributary streams have been investigated for decades. The lake and its watershed remain the focus of several long-term monitoring initiatives. However, several important data gaps remain.

Cayuga Lake's water quality is generally very good. The lake is a valued and visible resource, serving as a public water supply and focal point for recreation. The fish community is diverse and productive. Overall, the tributary streams exhibit moderate to high water quality and habitat conditions that support a balanced biological community.

Despite the general conclusion that water quality of the lake and its tributary streams is high, a number of specific areas of concern are evident. These are summarized below, along with a discussion of additional data needed to identify specific priority areas and define effective remedial strategies.

Fertilizers and Pesticides

Fertilizers and pesticides have been detected in both tributary streams and the lake. Recent data provide direct evidence of chemical loss from the landscape and transport to the lake. Almost half of the land in the watershed is in active agriculture, and this land use contributes nitrate-nitrogen and pesticides (most notably, herbicides used in corn cultivation) to the lake. Using analytical methods with low detection limits, scientists from USGS and NYSDEC have documented trace concentrations of pesticides in the streams and lake. The chemicals are present at levels far below ambient water quality standards or guidelines based on toxicology and risk assessment. No exceedances of standards or guidelines developed to protect human health and the environment have been detected.

Data Needs: Pesticides and Nitrates

Long-term effects of exposure to trace concentrations of many of these chemicals are unknown. It is important to continue to track these chemicals in all components of the ecosystem: water column, sediments, and throughout the food web.

Additional monitoring of pesticides in streams draining mixed land uses (agricultural and residential) is needed to further our understanding of the sources, fate, and significance of these chemicals. Stream monitoring must be designed to reflect the hydrologic cycle, the agricultural cycle, and the mix of land use and geology in the subwatersheds.

The potential for agricultural chemicals to be adsorbed to sediment particles and transported to the lake has not been fully assessed. Limited testing of lake sediments has not detected agricultural residues. However, testing has not been conducted in depositional areas of streams draining agricultural watersheds, nor in the lake at the mouths of tributaries.

Groundwater concentrations of pesticides and nitrates are not well documented. Since much of the watershed relies on groundwater, this data gap is significant.

Sediment

Sediment is a significant water quality, habitat, and use impairment issue, particularly in the southern tributaries and southern Cayuga Lake. Destruction and fill of the extensive wetland areas in southern Cayuga Lake in the early 1900s has exacerbated this problem by removing a natural filtration process that captured sediment before it flowed into the lake. In the southern tributaries, the primary source of sediment appears to be streambank erosion, not runoff from construction sites or cultivated fields. The primary sources of sediment in other tributaries are not known and may differ based on land use and geology.

Data Needs: Sediment

Before and after monitoring is lacking on tributaries where remedial measures such as streambank stabilization or stormwater controls has been implemented. Monitoring should occur over a range of hydrologic conditions, particularly high flow events.

Heavy metals

Heavy metals are present in at elevated concentrations in sediments of Fall Creek and nearshore areas of southern Cayuga Lake. Heavy metals may enter the aquatic system from industrial discharges, stormwater runoff, or atmospheric deposition.

Data Needs: Heavy Metals and Stormwater Quality

The quality of urban stormwater has not been assessed in the Cayuga Lake watershed. The concentration of heavy metals, phosphorus, sediment, petroleum compounds, and pathogens in stormwater is not characterized; moreover, the significance of this source in relation to other sources is not known.

There are no recent data characterizing chemical quality of precipitation (wetfall and dry fall) in the basin. This is important for load calculations as well as for general surveillance of acid precipitation.

Additional sampling of tributary sediment in subwatersheds and stream reaches with different mixes of land use might help identify factors contributing to the presence and concentration of heavy metals.

Phosphorus

Phosphorus is the limiting nutrient for algal growth in Cayuga Lake as it is for most inland lakes in the Northeast. Recent monitoring data confirm that Cayuga Lake is mesotrophic, with moderate levels of primary productivity. However, the shallow areas at the northern and southern ends of the lake exhibit higher levels of phosphorus and productivity. Both of these segments are listed by New York State as priority areas, indicating water quality concerns. Phosphorus sources include the two wastewater treatment plants discharging to the southern lake basin and runoff from residential and agricultural areas. Septic systems are considered by NYSDEC to be significant sources of phosphorus to the northern segment.

Data Needs: Phosphorus

Annual monitoring of a limited suite of limnological parameters will provide a basis for long-term trend analysis. These parameters include total phosphorus, soluble reactive phosphorus, total soluble phosphorus, dissolved oxygen profiles, chlorophyll a, Secchi disk transparency, and turbidity.

Biological parameters can provide information regarding trends as well. Species composition and abundance of the macroinvertebrate community (aquatic insects and worms found in the stream bed) of the tributary streams can be used to indicate water quality conditions and assess site-specific impacts of point and nonpoint discharges. Sampling tributaries in various geologic and land use settings can identify areas where the biological community is stressed.

A mathematical model would provide a tool for linking the inputs from the tributaries to the lake's water quality response.

Exotic species

Because of its connections to the Great Lakes through the Seneca River, Cayuga Lake is vulnerable to invasion by nonindigenous species of plants and animals. There have been a number of exotic species invading Cayuga Lake over the years. Three recent invaders are a focus of special concern due to their potential to alter the food web. These organisms are the zebra and quagga mussel *(Dreissena polymorpha and Dreissena bugensis)* and a predatory cladoceran zooplankton *(Cercopagis pengoi)*. The macrophyte Eurasian water milfoil *(Myriophyllum spicatum)* is another introduced species that has, until recently, been a nuisance in Cayuga Lake.

Data Needs: Exotic Organisms

The impacts of exotic organisms on the food web and ecology of Cayuga Lake will be an important area of research. The macrophyte data illustrate the need for long-term monitoring to differentiate trends from year-to-year variability.

Pathogens and indicators

The presence of pathogenic microorganisms in the lake and its tributary streams is a potential area of concern. Pathogens originate from untreated or inadequately treated human sewage and wild and domestic animal waste. Human exposure to pathogens can occur from direct contact with or ingestion of contaminated waters. The potential presence and abundance of pathogenic microorganisms is assayed using indicator organisms such as coliform bacteria.

Data Needs: Pathogens and Indicators

Measurements of pathogens and indicator organisms in Cayuga Lake are very limited. Storm event monitoring in the lake and streams could help define the importance of urban runoff as a source of pathogens. The importance of waterfowl as a source of microorganisms is not known.

Based on generalized geology and soils maps, there are large areas of the watershed with severe constraints to on-site wastewater disposal systems (septic systems). There has been no watershed-wide effort to characterize the performance of these individual systems and how leachate from septic systems contributes to nitrate, phosphorus, and pathogen levels. The experience of Cayuga County, which has a comprehensive inspection program, could serve as a guide.

Impacts of non-Permitted, pre-permitted or unenforced uses

Data Needs: Sources

Additional field work could provide useful information on pre-permit and unpermitted underground storage tank sites, waste sites, junk yards and dumps, mines and wells. There is a need for better and more accurate recreational data including the impact of boating and fishing on water quality.

Floodplain delineation, management and mitigation

Water level management and flooding are important issues. The loss of wetlands and increase in impervious areas have altered the natural hydrology.

Impacts of Cornell Lake Source Cooling

The return of noncontact cooling water to southern Cayuga Lake by Cornell University's Lake Source Cooling (LSC) facility has been an issue of concern to the community. The LSC system will not add chemicals to Cayuga Lake. However, during the period of thermal stratification, the transfer of slightly warmed water from deep in the lake to the shallow southern basin will also transfer dissolved and suspended substances. The potential ecological significance of this load depends on concentration gradients between the upper and lower waters; the mass of material transferred, and impacts of these substances on lake ecology and suitability for human use. The most significant potential environmental impact of LSC on the Cayuga Lake ecosystem hinges on the amounts and chemical forms of phosphorus transferred to the upper waters.

The environmental impact assessment and permitting of the LSC project included an extensive program of monitoring and analysis of the magnitude and implications of the phosphorus transfer. Data collected since the project came on line in July 2000 support the finding of no significant impact. Monitoring will continue. Because of the uncertainties associated with this innovative project and the current water quality conditions of southern Cayuga Lake, the LSC permit has detailed requirements for monitoring and assessment. There are "reopener" clauses in the 5-year permit requiring Cornell to take action if the LSC return flow causes water quality degradation.

Appendix D

Cayuga Lake Watershed Issues Prioritization

Please discuss Cayuga Lake Watershed Issues Prioritization with your municipal board. Each Intermunicipal Organization representative has a total of 15 points, which can be used in any combination to rank the following items:

Use Concerns

__Access to the lake

__Aesthetics/scenic beauty/viewsheds

__Lake water levels

__Water quantity

__Fisheries

__Swimming

__Drinking water

__Invasive/exotic plants and animals

__Sewage smell and bacteria

__Weed growth

__Algae blooms

__Groundwater and groundwater/surface water interaction

__Other – specify_____

Management Issues

__Economic revitalization and sustainability

__Tourism and other economic development

__Comprehensive planning (vs. short-term, site specific planning)

__Funding

__Sampling and monitoring (tributaries and lake)

__Modeling (loading)

__Water quality standards

__Municipal resources (including expertise, time, funding)

__Enforcement of existing law

__Indian land claims

__Permitting process

__Regulations – give example_____

__Infrastructure (public sewer and water)

__Watershed Education

__Other – specify_____

Environmental Threats

__Development (including urban/rural sprawl, shoreline development)

__Natural areas (including loss of open space, diminishing natural habitat

__Shoreline and riparian corridor degradation

__Sediment loading (including siltation and streambank/roadbank erosion

__Nutrient loading

__Heavy metals

__Organics (including pesticides and chemical and petroleum storage systems)

__Pathogens & viruses (including coliform, giardia and cryptosporidia)

__Thermal loading

__Land fills, dumps and hazardous spills and materials

__Agriculture sources of contamination

__Industry (including material stockpiles, transport and transfer stations, wells, mines and industrial processes)

__Commercial sources of contamination

__Municipal sources of contamination (including road deicing material)

__Residential lawn care and household hazardous waste

__Stormwater runoff (including impervious surfaces and roadside ditches)

__Waste water and waste water treatment plants

__On-site septic

__Motorized recreational vehicles (including noise)

__Habitat protection

__Other – specify_____

Municipality:_____

Representative:_____

Appendix E

Deicing Material Storage

The following municipal deicing material is stored unenclosed near tributaries to Cayuga Lake:

- Town of Covert
- Town of Danby
- Town of Dryden
- Town of Genoa
- Town of Ovid
- Town of Summer Hill
- Town of Venice

The following municipal deicing material is stored unenclosed near the Cayuga Lake shore:

- Village of Aurora

Oxygen Demanding Material Used for Road Deicing

The following have noted the use of IceBan for deicing roads:

- Town of Danby
- Town of Ithaca
- Town of Lansing
- Cayuga County Highway Department
- New York State DOT Region 6
- New York State DOT - Tompkins County

Appendix F

Wastewater and Wastewater Treatment Plants

Introduction

NYSDEC requires that every point source discharger obtain a State Pollution Discharge Elimination System (SPDES) permit in order to legally discharge sanitary, industrial, or commercial wastewater. The permit is a comprehensive legal document, and all of its provisions and conditions are enforceable under the law. Under SPDES, NYSDEC reviews permit applications to develop the limits for types and quantities of pollutants in the effluent. The permit also includes the schedules and conditions under which discharges are allowed. Owners or operators of facilities must treat wastewater in order to meet the limits listed in their SPDES permit. In the case of municipal facilities, permits also require industries discharging into the municipal collection system to pre-treat their wastes. Compliance and self-monitoring reports are a major part of this program. Permits are reviewed and reissued every five years.

Goals

Continue to lower point source pollution through upgrades and improvements in size of sewer districts and processes at wastewater treatment facilities.

Existing Measures

There are nine regulated municipal wastewater discharges to Cayuga Lake and its tributaries with a combined design flow slightly over 15 million gallons per day. These include the following:

Ithaca Area Wastewater Treatment Plant

Cayuga Heights Wastewater Treatment Plant

Village of Union Springs

Village of Aurora

Village of Trumansburg

Village of Dryden

Village of Freeville

Village of Interlaken

Town of Newfield

Future Strategy

The communities of Ithaca, Dryden, Cayuga Heights and Lansing have recently submitted an application to NYSDEC for funding assistance with upgrades and expansion of their municipal wastewater treatment systems. The funding program is the state's Clean Water Clean Air Bond Act. The intermunicipal proposal of August 1999 includes expansion of the service area into Lansing, with wastewater flows from the new service area directed to the Cayuga Heights Plant. Excess flows from Cayuga Heights would be directed to the Ithaca Area Wastewater Treatment Plant, which serves the City and Town of Ithaca and the Town of Dryden. The flow capacity of this plant would be increased from 10 to 13 mgd.

One element of the proposal is to increase the phosphorus removal capacities of both the Ithaca Area and Cayuga Heights treatment plants by adding filtration to the treatment process. Both plants currently hold a TP limit of 1.0 mg/l in their SPDES permit, consistent with the requirements of the International Joint Commission for wastewater treatment plants within the Great Lakes basin with a capacity greater than 1 mgd. Performance of the Ithaca Area Wastewater Treatment Plant is well below the 1 mg/l TP limit; average effluent concentrations are in the range of 0.5 – 0.6 mg/l. The Cayuga Heights plant has historically operated close to its permit limit of 1 mg/l for TP although improvements have been made in recent months (Nick Hatala, Stearns & Wheler personal communication September 1999).

NYSDEC policy for new discharges to lakes can require an effluent limit of 0.5 mg/l for TP, recognizing the central role of phosphorus in eutrophication of inland lakes. When existing plants request an increase in permitted flow, it is NYSDEC policy to hold the discharge to the existing mass limit for TP, thus reducing allowable concentration proportional to the flow increase.

With filtration, both Cayuga Heights and the Ithaca Area wastewater treatment plants will be able to meet or exceed a TP limit of 0.5 mg/l. Effluent concentrations from filtration can be 0.2 mg/l or less, depending on the amount of chemical addition and flow rates through the filters.

Summary of Regulated Municipal Wastewater Discharges to Cayuga Lake and its Tributaries

Facility	Type	Discharge Segment	Permitted Flow (mgd)
Ithaca Area Wastewater Treatment Plant *Serving Ithaca, Cayuga Heights and portions of the Towns of Dryden and Lansing*	Municipal wastewater	Class A segment, Cayuga Lake	10 *
Cayuga Heights Wastewater Treatment Plant	Municipal wastewater	Class A segment, Cayuga Lake	2
Village of Union Springs	Municipal wastewater	Class A(T) segment, Cayuga Lake	0.33
Village of Aurora	Municipal wastewater	Paines Creek at confluence with Lake, Class D	0.3
Village of Trumansburg	Municipal wastewater	Trumansburg Creek, Class D	0.25
Village of Dryden and Village of Freeville	Municipal wastewater	Fall Creek, Class B	0.27 (Dryden) 0.125 (Freeville)
Village of Interlaken	Municipal wastewater	Minors Creek, Class D	0.1
Town of Newfield	Municipal wastewater	Groundwater (Class GA)	0.03

Appendix H

Agricultural Programs

Farmland Protection/Agricultural Districts Program (NYS)

One of the critical issues involved in land use planning decisions for agricultural uses is to ensure that agriculture protection deals primarily with the preservation of agriculture as an economic activity and not just as a use of open space. Traditionally, agricultural uses are part of large lot, low density, residential zoning districts. With increased residential development, however, conflicts between agricultural and residential uses have increased. Complaints about noise, odors, dust, chemicals, and slow-moving farm machinery may occupy enough of the resources of a farmer so as to have a negative impact on the viability of his or her farming activities.

Article 25-AA of the Agriculture and Markets Law is intended to conserve and protect agricultural land for agricultural production and as a valued natural and ecological resource. Under this statute, territory can be designated as an agricultural district. To be eligible for designation, an agricultural district must be certified by the county for participation in the State program. Once a district is designated, participating farmers within it can receive reduced property assessments and relief from local nuisance claims and certain forms of local regulation. Agricultural district designation under Article 25-AA does not generally prescribe land uses. Under section 305-a of Article 25-AA, municipalities are, however, restricted from adopting regulations applicable to farm operations in agricultural districts which unreasonably restrict or regulate farm structures or practices, unless such regulations are directly related to the public health or safety (Agriculture & Markets Law, §305-a(1); Town Law §283-a; Village Law §7-739). The law also requires municipalities to evaluate and consider the possible impacts of certain projects on the functioning of nearby farms. Projects that require "agricultural data statements" include certain land subdivisions, site plans, special use permits, and use variances. Farm operations within agricultural districts also enjoy a measure of protection from proposals by municipalities to construct infrastructure such as water and sewer systems, which are intended to serve non-farm structures. Under Agriculture and Markets Law, §305, the municipality must file a notice of intent with both the State and the county in advance of such construction. The notice must detail the plans and the potential impact of the plans on agricultural operations. If, on review at either the county or State levels, the Commissioner of Agriculture and Markets determines that there would be an unreasonable adverse impact, he or she may issue an order delaying construction, and may hold a public hearing on the issue. If construction eventually goes forward, the municipality must make adequate documented findings that all adverse impacts on agriculture will be mitigated to the maximum extent practicable. "Right-to-farm" is a term which has gained widespread recognition in the State's rural areas within the past several decades. Section 308 of the Agriculture and Markets Law grants protection from nuisance lawsuits to farm operators within agricultural districts or on land outside a district which is subject to an agricultural assessment under section 306 of the Law. The protection is granted to the operator for any farm activity which the Commissioner has determined to be a "sound agricultural practice." Locally, many rural municipalities have used their home rule power to adopt local "right-to-farm" laws. These local laws commonly grant particular land-use rights to farm owners and restrict activities on neighboring non-farm land which might interfere with agricultural practices.

Environmental Quality Incentives Program (EQIP)

The Environmental Quality Incentives Program (EQIP) is a USDA-NRCS initiative authorized by the 1996 Farm Bill that provides farmers with technical, financial, and educational assistance to address soil, water, and natural resource concerns in an environmentally beneficial and cost-effective manner. A conservation plan is required to receive EQIP funding. EQIP addresses natural resource concerns through the implementation of structural, vegetative, and land use practices such as manure management facilities, abandoned well capping, tree planting, filter strips, nutrient, pest, and grazing management, and wildlife habitat protection and enhancement. Agricultural producers enter into five-to-ten year contracts with federal funding limited to $10,000 per year with a maximum of $50,000 for the total contract.

Additional Environmental Quality Incentives Program (EQIP) Information

http://www.nhq.nrcs.usda.gov/PROGRAMS/COD/cit/eqipsmry.htm

Agricultural Environmental Management (AEM)

Agricultural Environmental Management (AEM) is a program to assist farmers in identifying environmental issues on their farms and implementing measures to maintain their economic viability while simultaneously protecting natural resources. Farmers voluntarily enter into these partnerships and remain the primary decision-maker throughout the AEM process. The AEM program focuses on helping farmers comply with federal, state and local regulations relating to water quality and other environmental concerns. The NRCS and County Soil and Water Conservation Districts coordinate the program.

AEM is designed to provide a system for planning and implementing environmentally suitable farming practices through the following steps or tiers:

Tier 1 – Farmers complete a survey that includes questions regarding current farm activities, future activities or plans, and areas of possible environmental concern. Where no concerns are identified, the AEM process ends and the farmer's good stewardship is documented.

Tier 2 – Areas for environmental concern identified in the Tier 1 survey are further detailed through the completion of a corresponding worksheet. Technical assistance in completing the worksheet is often provided by a local agricultural agency. Through the worksheet, the need for a management plan is determined. If the related environmental concerns can be easily remedied the farmer's good stewardship is documented and the AEM process ends.

Tier 3 – A plan to remedy the specific environmental concerns identified in Tiers 1 and 2 is developed and completed. The plan takes into account the economic concerns of the farmer as well as environmental concerns resulting from current agricultural processes. Existing waste management, nutrient management, and conservation plans may be included in the AEM plan.

Tier 4 – The plan developed in Tier 3 is implemented through Best Management Practices (BMPs) to reduce nonpoint source pollution. Agricultural agency staff provide technical, educational, and (when available) financial assistance to farmers in implementing these BMPs.

Tier 5 – On-going evaluation of the AEM program at the individual farm, county, watershed, and state level is conducted to insure that environmental concerns related to nonpoint source pollution and the economic viability of agriculture production are addressed.

Additional Agricultural Environmental Management (AEM) Information

http://www.agmkt.state.ny.us/soilwater/AEM.html

Animal Feeding Operations

Animal Feeding Operation (AFO) means a lot or facility (other than an aquatic animal production facility) where animals have been, are, or will be stabled or confined and fed or maintained for a total of 45 days or more in any 12-month period, and the animal confinement areas do not sustain crops, vegetation, forage growth, or post-harvest residues in the normal growing season. Two or more animal feeding operations under common ownership are a single animal feeding operation if they physically adjoin each other, or if they use a common area or system for the disposal of wastes.

AFOs include Concentrated Animal Feeding Operations (CAFO). CAFOs are point sources of pollution under the National Pollution Discharge Elimination System (NPDES) and are regulated under Section 301 of the CWA. CAFO General Permit GP-99-01 is a single permit which covers all CAFOs (who apply for coverage) Statewide. Therefore, all CAFOs who are covered by General Permit GP-99-01 will have identical permit language and requirements. Unique facility-specific requirements will be detailed in the Agricultural Waste Management Plan, a requirement for all CAFOs.

For CAFO definitions and additional Animal Feeding Operation (AFO) Information <http://www.epa.gov/owmitnet/afo.htm>

Conservation Reserve Enhancement Program (CREP)

The Conservation Reserve Enhancement Program (CREP) is a State-federal conservation partnership program targeted to address specific State and nationally significant water quality, soil erosion and wildlife habitat issues related to agricultural use. The program uses financial incentives to encourage farmers and ranchers to voluntarily enroll in contracts of 10 to 15 years in duration to remove lands from agricultural production. This community-based conservation program provides a flexible design of conservation practices and financial incentives to address environmental issues.

Additional Conservation Reserve Enhancement Program (CREP) Information

http://www.fsa.usda.gov/dafp/cepd/crep/fact_sheet.htm

Wildlife Habitat Incentives Program (WHIP)

The Wildlife Habitat Incentives Program (WHIP) is a voluntary program for people who want to develop and improve wildlife habitat primarily on private lands. It provides both technical assistance and cost-share payments to help establish and improve fish and wildlife habitat. Participants who own or control land agree to prepare and implement a wildlife habitat development plan. The U.S. Department of Agriculture's (USDA) Natural Resources Conservation Service (NRCS) offers participants technical and financial assistance for the establishment of wildlife habitat development practices. In addition, if the landowner agrees, cooperating State wildlife agencies and nonprofit or private organizations may provide expertise or additional funding to help complete a project.

Additional Wildlife Habitat Incentives Program (WHIP) Information

http://www.nhq.nrcs.usda.gov/PROGRAMS/wwd/whipindex.htm

APPENDIX I

MODEL LOCAL LAW

STORMWATER MANAGEMENT AND EROSION CONTROL LAW

Section One: Short Title

This Ordinance shall be known as the "Stormwater Management and Erosion Control Law."

Section Two: Findings of Fact

The **(City/Town/Village)** finds that uncontrolled drainage and runoff associated with land development has a significant impact upon the health, safety and welfare of the community.

Specifically,

Stormwater runoff can carry pollutants into receiving waterbodies, degrading water quality;

The increase in nutrients in stormwater runoff such as phosphorus and nitrogen accelerates eutrophication of receiving waters;

Improper design and construction of drainage facilities can increase the velocity of runoff thereby increasing streambank erosion and sedimentation;

Construction requiring land clearing and the alteration of natural topography tends to increase erosion;

Siltation of waterbodies resulting from increased erosion decreases their capacity to hold and transport water, interferes with navigation, and harms flora and fauna;

Impervious surfaces increase the volume and rate of stormwater runoff and allow less water to percolate into the soil, thereby decreasing groundwater recharge and stream base flow;

Improperly managed stormwater runoff can increase the incidence of flooding and the level of floods which occur, endangering property and human life;

Substantial economic losses can result from these adverse impacts on community waters;

Many future problems can be avoided if land is developed in accordance with sound stormwater runoff management practices.

Section Three: Purpose and Objectives

In order to protect, maintain and enhance both the immediate and the long-term health, safety and general welfare of the citizens of **(City/Town/Village)**, this Ordinance has the following objectives:

Prevent increases in the magnitude and frequency of stormwater runoff so as to prevent an increase in flood flows and in the hazards and costs associated with flooding;

Prevent decreases in groundwater recharge and stream base flow so as to maintain aquatic life, assimilative capacity, and potential water supplies;

Maintain the integrity of stream geometry so as to sustain the hydrologic functions of streams;

Control erosion and sedimentation so as to prevent its deposition in streams and other receiving water bodies;

Facilitate the removal of pollutants in stormwater runoff so as to perpetuate the natural biological functions of streams; and,

To the extent practical, secure multiple community benefits such as groundwater replenishment, open space protection, and increased recreational opportunity through integrated land use - stormwater management planning.

Section Four: Authority

In accordance with **(Article 10 of the municipal Home Rule Law, Article 20 of the General City Law, Article 9 of the Town Law, and Article 4 and 20 of the Village Law)** of the State of New York (choose appropriate law and delete inappropriate laws), the **(City/Town/Village)** has the authority to enact **(local laws/ordinances)** for the purpose of promoting the health, safety or general welfare of **(City/Town/Village)**. The **(City/Town/Village)** may include in any such **(local law/ordinance)** provisions for the appointment of any municipal officer or employees to effectuate and administer such **(local law/ordinance)**.

Section Five: Jurisdiction

Upon approval of this Ordinance by the **(City/Town/Village)**, all site preparation and construction activities requiring approval under this Ordinance shall be in conformance with the provisions set forth herein.

Section Six: Definitions

Unless specifically defined below, words or phrases shall be interpreted so as to give them the meaning they have in common usage and to give this Ordinance its most effective application. Words used in the singular shall include the plural and the plural the singular; words used in the present tense shall include the future tense. The word "shall" connotes mandatory and not discretionary; the word "may" is permissive.

Critical Environmental Area - A specific geographic area designated by a state or local agency having exceptional or unique characteristics that make the area environmentally important.

Development - To make a site or area available for use by physical alteration. Development includes but is not limited to providing access to a site, clearing of vegetation, grading, earth moving, providing utilities and other services such as parking facilities, stormwater management and erosion control systems, and sewage disposal systems, altering landforms, or construction of a structure on the land.

Drywell - Similar to infiltration trench but smaller with inflow from pipe; commonly covered with soil and used for drainage areas of less than 1 acre such as roadside inlets and rooftop runoff.

Erosion - The removal of soil particles by the action of the water, wind, ice or other geological agents.

Exfiltration - The downward movement of runoff through the bottom of an infiltration system into the soil.

Extended Detention - A practice to store stormwater runoff by collection as a temporary pool of water and provide for its gradual (attenuated) release over 24 hours or more. A practice which is used to control peak discharge rates, and which provides gravity settling of pollutants.

First Flush - The delivery of a disproportionately large load of pollutants during the early part of storms due to the rapid runoff of accumulated pollutants. The first flush in these guidelines is defined as the runoff generated from a one year 24 hour storm event from land which has been made more impervious from pre-development conditions through land grading and construction/development activities.

Flood Plain - For a given flood event, that area of land temporarily covered by water which adjoins a watercourse.

Forebay - An extra storage area or treatment area, such as a sediment pond or created wetland, near an inlet of a stormwater management facility to trap incoming sediments or take up nutrients before they reach a retention of extended detention pond.

Impervious Area - Impermeable surfaces, such as pavement or rooftops, which prevent the percolation of water into the soil.

Infiltration - A practice designed to promote the recharge of groundwater by containment and concentration of stormwater in porous soils.

Infiltration Basin - An impoundment made by excavation or embankment construction to contain and exfiltrate runoff into the soil layer.

Outfall - The terminus of a storm drain where the contents are released.

Peak Flow - The maximum rate of flow of water at a given point and time resulting from a storm event.

Peak Flow Attenuation - The reduction of the peak discharge of storm runoff by storage and gradual release of that storage.

Retention - A practice designed to store stormwater runoff by collection as a permanent pool of water without release except by means of evaporation, infiltration, or attenuated release when runoff volume exceeds the permanent storage capacity of the permanent pool.

Riprap - a combination of large stone, cobbles and boulders used to line channels, stabilize stream banks, reduce runoff velocities.

Riser - A vertical pipe that is used to control the discharge rate from a pond for the specified design storm.

Stream Corridor - The landscape features on both sides of a stream, including soils, slope and vegetation, whose alteration can directly impact the streams physical characteristics and biological properties.

Swale - A natural depression or wide shallow ditch used to temporarily route, or filter runoff.

Section Seven: Applicability

It has been established that the land cleaning, land grading, earth moving or development activities can have a significant effect on the environment, therefore, no person, corporation, organization, or public agency shall, on or after the effective date of the ordinance:

Initiate any land clearing, land grading, earth moving or development activities without first preparing a stormwater management and erosion control plan and obtaining approval of said plan from the **(City/Town/Village)**, or;

Alter any drainage system without first preparing a stormwater management and erosion control plan and obtaining approval of said plan from the **(City/Town/Village)**.

Exemptions. The following activities are exempt from the Stormwater Management and Erosion Control Plan requirements:

Agricultural activities, including household gardening and timber harvesting that is not part of a development project;

Development of less than five single-family or duplex residential dwelling units and their accessory structures such as garages and storage sheds in an existing subdivision;

Development of one single-family or duplex residential structure not in an existing subdivision;

Industrial and/or commercial development projects which result in an impervious surface less than 10,000 square feet;

Any maintenance, alteration, use or improvement to an existing structure which will not change the quality, rate, volume or location of surface water discharge or contribute to erosion and sedimentation.

Section Eight: Contents of the Stormwater Management and Erosion Control Plan

It is the responsibility of an applicant to prepare a Stormwater Management and Erosion Control Plan so that the **(City/Town/Village)** can evaluate the environmental characteristics of the affected areas, the potential and predicted impacts of the proposed activity on community waters, and the effectiveness and acceptability of those measures proposed by the applicant for reducing or mitigating adverse impacts.

The Stormwater Management and Erosion Control Plan shall contain the name, address, and telephone number of the owner and developer. In addition, the legal description of the property shall be provided, and its location with reference to such landmarks as major waterbodies, adjoining roads, railroads, subdivisions, or towns shall be clearly identified on a map.

The structure and content of the Stormwater Management and Erosion Control Plan shall be as follows:

Background Information

- Project description
- Existing (pre-development) conditions
- Proposed future (development) conditions

Comparison of pre-development with post-development runoff

- Methodology
- Calculations

Stormwater Management

- Stormwater management facilities
- Stormwater conveyance system
- Recreational and/or landscape features (optional)

Erosion and Sediment Control

- Temporary erosion and sediment control facilities
- Permanent erosion and sediment control facilities

Implementation Schedule and Maintenance

Section Nine: Plan Review Process

Provisions for stormwater management and erosion control should be considered in a three-stage process:

Pre-submission Phase - which provides an opportunity for the community to learn of the developer's intent and for the developer to learn of the community's requirements and standards for development.

Preliminary Site Development Plan Phase - which includes the submission of an application for preliminary site development plan approved for a developer. The application shall be accompanied by information about the proposal as set forth in Section Eight of this Ordinance. Because it is a preliminary action and not final, action on the proposal shall be given as tentative approval, tentative approval with modification or disapproval.

Final Site Development Plan Phase - if approval or approval with modification is tentatively given in the preliminary site development phase, the next step can be submission of a final application, including the necessary documentation for final approval. It is this phase that any requested modifications be satisfied as part of final application submission.

The Stormwater Management and Erosion Control Plan shall not be approved unless it is consistent with the Purposes and Objectives of this Ordinance in Section Three and the Performance Standards described in Section Ten.

Inspections. No Stormwater Management and Erosion Control Plan will be approved without adequate provision for inspection of the property before development activity commences. The applicant shall arrange with the **(City/Town/Village)** for scheduling the following activities:

Initial Inspection: prior to approval of the Stormwater Management and Erosion Control Plan;

Erosion Control Inspection: to ensure erosion control practices are in accord with the Plan;

Bury Inspection: prior to backfilling of any underground drainage or stormwater conveyance structures;

Final Inspection: when all work including construction of stormwater management facilities has been completed.

The **(City/Town/Village)** shall inspect the work and either approve it or notify the applicant in writing in what respects there has been a failure to comply with the requirements of the approved Stormwater Management and Erosion Control Plan. Any portion of the work which does not comply shall be promptly corrected by the applicant or the applicant with be subject to the bonding provisions of Section Thirteen and the penalty provisions of Section Fourteen. The **(City/Town/Village)** may conduct random inspections to ensure effective control of erosion and sedimentation during all phases of construction.

Section Ten: Performance Standards

Stormwater Management and Erosion Control Plans shall be prepared in accordance with performance standards (see model Performance Standards in the Appendix) which have been structured to achieve the purposes and objectives of this Ordinance as well as to ensure that the quality and quantity of runoff after development is not substantially altered from pre-development conditions.

Section Eleven: Off-Site Stormwater Management Facilities

The **(City/Town/Village)** may allow stormwater runoff that is of unacceptable quality or which would be

discharged in volumes or rates in excess of those otherwise allowed by this Ordinance, to be discharged into stormwater management facilities off the site of development if all of the following conditions are met:

It is not practicable to completely manage runoff on-site in a manner that meets the Performance Standards in Section Ten;

The off-site drainage facilities and channels leading to them are designed, constructed and maintained in accordance with the requirements of this Ordinance;

Adverse environmental impacts on the site of development will be minimized;

Adequate provision is made for the sharing of construction and operating costs of the off-site facilities. The developer may be required to pay a portion of the cost of constructing the facilities as a condition to receiving approval of the drainage plan.

Use of regional off-site stormwater management facilities does not eliminate the requirement that the first-flush be captured and treated on-site pursuant to the Section Ten Performance Standards.

A request to use off-site stormwater management facilities and all information related to the proposed off-site facilities shall be made a part of the developer's stormwater management plan.

Section Twelve: Maintenance

The **(City/Town/Village)** shall determine whether stormwater management facilities are to be maintained by the developer/owner, a homeowner's association, or by the **(City/Town/Village)**.

If maintenance is to be performed by a homeowner's association, the homeowner's association must be registered pursuant to Section 352-E of the New York State General Business Law.

If maintained by an owner or homeowner's association, a maintenance plan containing a maintenance schedule shall be provided by the developer, owner and/or homeowner's association for approval by the **(City/Town/Village)** (see Section Eight (3)).

Stormwater management facilities maintained by an owner or home owner's association shall have adequate easements to permit the **(City/Town/Village)** to inspect and, if necessary, to take corrective action should the owner fail to properly maintain the system. Before taking corrective action, the **(City/Town/Village)** shall give the owner or home owner's association written notice of the nature of the existing defects. If the owner or homeowner's association fails within thirty (30) days from the date of the notice to commence corrective action or to appeal the matter to the **(City/Town/Village)**, the **(City/Town/Village)** may take necessary corrective action, the cost of which shall be borne by the owner or developer pursuant to Section Thirteen of this Ordinance or by the homeowner's association. If, in the event the homeowner's association fails to pay for required corrective action, the **(City/Town/Village)** shall have a lien placed on the real property of members of the homeowner's association until payment is made.

Stormwater management facilities may be dedicated to the **(City/Town/Village)** for purposes of maintenance by mutual consent and agreement of the developer/owner and **(City/Town/Village)**.

Section Thirteen: Performance Bond

In order to ensure the full and faithful completion of all construction activities related to compliance with all conditions set forth by the **(City/Town/Village)** in its approval of the Stormwater Management and Erosion Control Plan, the **(City/Town/Village)** may require the developer to provide, prior to construction, a performance bond, escrow account certification, or irrevocable letter of credit from an appropriate financial or surety institution which guarantees satisfactory completion of the project and names the **(City/Town/Village)** as the beneficiary. The security shall be in an amount to be determined by the **(City/Town/Village)** based on submission of final design plans, with reference to actual construction costs.

Where stormwater management and erosion and sediment control facilities are to be operated and maintained by the developer or by a corporation that owns or manages a commercial or industrial facility, the developer, prior to construction, may be required to provide the **(City/Town/Village)** with an irrevocable letter of credit from an appropriate financial institution or surety to ensure proper operation and maintenance of all stormwater management and erosion control

facilities for the life of the project.

The letter of credit shall remain in force until the surety is released from liability by the **(City/Town/Village)**.

Per annum interest on the letter of credit will be reinvested in the account until the surety is released from liability.

The operation and maintenance letter of credit shall remain in force for the life of the project.

If the developer or owner fails to properly operate and maintain stormwater management and erosion and sediment control facilities, the **(City/Town/Village)** may draw upon the account to cover the costs of proper operation and maintenance.

Section Fourteen: Enforcement

Nuisance. Any development activity that is commenced without prior approval of a Stormwater Management and Erosion Control Plan or is conducted contrary to an approved Stormwater Management and Erosion Control Plan as required by this Ordinance, may be restrained by injunction or otherwise abated in a manner provided by law.

Civil and Criminal Penalties. In addition to or as an alternative to any penalty provided herein or by law, any person who violates the provisions of this Ordinance shall be punished by a fine of not less than One Hundred Dollars ($100) nor more than One Thousand Dollars ($1000) or by imprisonment for a period not to exceed sixty (60) days, or by both such fine and imprisonment. Such person shall be guilty of a separate offense for each day during which the violation occurs or continues.

Any violator may be required to restore land to its undisturbed condition. In the event that restoration is not undertaken within a reasonable time after notice, the **(City/Town/Village)** may take necessary corrective action, the cost of which shall become a lien upon the property until paid.

Notice of Violation. When the **(City/Town/Village)** determines that development activity is not being carried out in accordance with the requirements of this Ordinance, it shall issue a written notice of violation to the owner of the property. The notice of violation shall contain:

The name and address of the owner or applicant;

The street address when available or a description of the building, structure, or land upon which the violation is occurring;

A statement specifying the nature of the violation;

A description of the remedial actions necessary to bring the development activity into compliance with this Ordinance and a time schedule for completion of such remedial action;

A statement of the penalty or penalties that shall or may be assessed against the person to whom the notice of violation is directed;

A statement that the determination of violation may be appealed to the **(City/Town/Village)** by filing a written notice of appeal within fifteen (15) days of service of notice of violation.

The notice of violation shall be served upon the person(s) to whom it is directed either personally, in a manner provided for personal services of notices by the court of local jurisdiction, or by mailing a copy of the notice of the violation by certified mail, postage prepaid, return receipt requested to such person at his or her last known address.

A notice of violation issued pursuant to this section constitutes a determination from which an administrative appeal may be taken to the **(City/Town/Village)**.

Section Fifteen: Appeals

Any person aggrieved by the action of any official charged with the enforcement of this Ordinance, as the result of the disapproval of a Stormwater Management and Erosion Control Plan, issuance of a written notice of violation, or an alleged failure to properly enforce the Ordinance in regard to a specific application, shall have the right to appeal the action to the **(City/Town/Village)**. The appeal shall be filed in writing within twenty (20) days of the date of official transmittal of the final decision or determination to the applicant, shall state clearly the grounds on which the appeal is based, and shall be processed in the manner prescribed for hearing administrative appeals under **(state/local code prevision)**.

Section Sixteen: Severability
Each separate provision of this Ordinance is deemed independent of all other provisions herein so that if any provision or provisions of this Ordinance is declared invalid, all other provisions thereof shall remain valid and enforceable.

Section Seventeen: Variance
The **(City/Town/Village)** may grant a written variance from any requirement of this Ordinance using the following criteria:

There are special circumstances applicable to the subject property or its intended use; and

The granting of the variance will not result in:

An increase or decrease in the rate or volume of surface water runoff;

An adverse impact on a wetland, water course or waterbody;

Degradation of water quality; or

Otherwise impair attainment of the objectives of this Ordinance.

Section Eighteen: Effective Date
This Ordinance shall become effective on_____

Stormwater Management & Erosion Control Local Law Performance Standards

Erosion Control Plans shall be prepared in accordance with performance standards which have been structured to achieve the purposes and objectives of a Stormwater Management & Erosion Control Local Law as well as to ensure that the quality and quantity of runoff after development is not substantially altered from pre-development conditions. The following performance standards must be satisfied:

Existing vegetation on a project site shall be retained and protected as much as possible to minimize soil loss from the project site.

Sediment control practices/measures, where necessary, shall be designed to protect the natural character of waterbodies on-site as well as off-site. The practices must be in place from the start of land disturbance activities to establishment of permanent stabilization.

The off-site impacts of erosion and sedimentation from the development site shall not be any greater during and following land disturbance activities than under pre-development conditions.

Water in stream reaches on-site and downstream of construction areas shall not have substantial visible contrast relative to color, taste, odor, turbidity and sediment deposition from the water in reaches upstream of the construction area.

Sediment laden runoff shall not be allowed to enter any waterbody and result in deposition on the bottom of the waterbody, degrade its natural biological functions, or be deleterious to the classified usage of the water.

Erosion and sediment control measures shall be constructed prior to beginning any land disturbances. All runoff from disturbed areas shall be directed to the sediment control devices. These devices shall not be removed until the disturbed land areas are stabilized.

Specific guidance.

Exposure Restrictions: No more than 10 acres of unprotected soil shall be exposed at any one time. Previous earthwork shall be stabilized in accord with approved design standards and specifications referenced in Section 4.h before additional area is exposed.

Grading: Perimeter grading shall blend with adjoining properties.

Vegetative Protection: Where protection of trees and/or other vegetation is required, the location shall be shown on a Erosion Control Plan or on the drawings for the proposed development project. The method of protecting vegetation during construc-

tion shall conform to the design specifications referenced in Section 4.h.

Drainage Control.

Surface runoff that is relatively clean and sediment free shall be diverted or otherwise prevented from flowing through areas of construction activity on the project site. This will greatly reduce sediment loading in surface runoff.

A fill associated with an approved temporary sediment control structure or permanent stormwater management structure, shall not be created which causes water to pond off-site on adjacent property, without first having obtained ownership or permanent easement for such use from the owner of the off-site or adjacent property.

In general, natural drainage channels shall not be altered. Pursuant to Article 15 of the Environmental Conservation Law, a protected stream and banks thereof shall not be altered or relocated without the approval of the Department of Environmental Conservation.

Runoff from any land disturbing activity shall not be discharged or have the potential to be discharged off-site or into storm drains or into water courses unless such discharge is directed through a properly designed, installed and maintained structure, such as a sediment trap, to retain sediment on-site. Accumulated sediment shall be removed when it takes up 60% of the storage capacity of the sediment retention structure. (See Section 4.h below for design specifications.)

For finished grading, adequate gradients shall be provided so as to prevent water from standing on the surface of lawns for more than 24 hours after the end of a rainfall, except in a swale flow area which may drain as long as 48 hours after the end of rainfall.

Permanent swales or other points of concentrated water flow shall be stabilized. Biotechnical approaches using certain types of grasses, such as reed canary grass, are preferable to using sod, gabions and rip-rap where water quality enhancement is a high priority and the swale design allows. However, sod, gabions, or rip-rap may be used to stabilize swales where soils and gradient preclude the use of reed canary grass. Use of grasses may require an erosion control matting as provided for in the design specifications referenced in Section 4.h below.

Surface lows over cut and fill slopes shall be controlled as provided for in the design specifications for vegetating waterways referenced in Section 4.h.

Timing.

Except as noted below, all sites shall be seeded and mulched with erosion control materials such as rye grass, straw mulch, jute, or excelsior (wood shavings) within 15 days of initial disturbance. If construction has been suspended, or sections completed, areas shall be seeded immediately and stabilized with erosion control materials. Maintenance shall be performed as necessary to ensure continued stabilization.

For active construction areas, such as borrow or stockpile areas, roadway improvements, and areas within 50 feet of a building under construction, a perimeter sediment control system consisting, for example, of silt fencing or hay bales, shall be installed and maintained to contain soil.

On cut sides of roads, ditches shall be stabilized immediately with rock rip-rap or other non-erodible liners, or where appropriate, vegetative measures such as sod. When seeding is approved, an anchor mulch shall be used and soil shall be limed and fertilized in accord with recommendations referenced in Section 4.h.

Permanent seeding shall optimally be undertaken in the spring from April 1 through June 15, and in late summer from August 1 to October 15. During the peak summer months and in the fall after

October 15 when seeding is found to be impracticable, an appropriate mulch shall be applied. Permanent seeding may be undertaken during summer if plans provide for adequate watering of the seedbed.

Option 4A: Ground cover can be required as stated in the above subsection during the winter months;

Option 4B: Stricter requirements for ground cover and erosion control for late autumn - early spring construction can be put in place to make it more difficult to build in the non-growing season;

Option 4C: A moratorium for construction in the winter months could be established.

All slopes steeper than 15%, as well as basin or trap embankments, and perimeter dikes shall, upon completion, be stabilized with sod, seed and anchored straw mulch, or other approved stabilization measures. Areas outside of the perimeter sediment control system shall not be disturbed. Maintenance shall be performed as necessary to ensure continued stabilization.

Temporary sediment trapping devices shall be removed within thirty (30) calendar days following establishment of permanent stabilization in all contributory drainage areas. Stormwater management structures used temporarily for sediment control shall be made permanent within this time period as well. Accumulated sediments removed from temporary sediment traps or permanent stormwater management facilities shall be disposed of such that they will not erode and enter a waterbody.

Stream Corridor Management. The bed and banks of all on-site and off-site streams which may be impacted by land clearing, grading, and construction activities shall be protected to prevent sedimentation, stream bank erosion, stream enlargement, or degradation of loss of fisheries habitat. Measures for protecting the bed and/or banks of a stream may include gabion baskets, rip-rap, log cribbing, and vegetative measures. Whenever possible, vegetative stream bank stabilization practices are recommended over structural practices such as rip-rap and gabion linings that may unnecessarily alter the existing stream ecosystem. Native species of vegetation shall be used for stream bank stabilization wherever practical. In undertaking stream bank stabilization activities for protected streams, the Applicant shall comply with appropriate protection of water provisions in Article 15 of the Environmental Conservation Law.

Maintenance

All points of construction ingress and egress shall be protected to prevent the deposition of materials onto traversed public thoroughfares either by installing and maintaining a stabilized construction entrance or by maintaining a vehicle wash area in a safe disposal area to wash vehicle shells and undercarriage. All materials deposited onto public thoroughfares shall be removed immediately. Proper precaution shall be taken to assure that the removal of materials deposited onto public thoroughfares will not enter catch basins, storm sewers, or waterbodies.

Accumulated sediment shall be removed when 60% of the storage capacity of sediment retention structures is reached. All removed sediment shall be disposed of in a spoil area where it can be graded, mulched and seeded to prevent erosion and sedimentation.

Design specifications. The designs, standards and specifications for controlling erosion and sedimentation found in the most recent version of the following publication are acceptable for use and shall be identified and shown in the Erosion Control Plan: New York Guidelines for Urban Erosion and Sediment Control, Urban Soil Erosion and Sediment Control Committee.

Adopted from the Conesus Lake Watershed
Erosion Control Model Law

Roadbank/Road Ditch Erosion

Very Severe

Location	Town	Sub-water-shed	Intersection	Distance from Intersection (mi)	Eroded Distance	Slope	Side (l,r,b)	Depth (m)	Width (m)	Exposed Roots	Collapsing Banks	Washed Out Gravel	Newly Dug/Bare Soil (nd,bs)	Veg Cover	Private	Next to Crop
Townline Road	Aurelius	Yawger Creek	Oakwood Road	2.35	0.05	11%	R	1.7	3.7	Y	Y	Y	BS	Some		
Braley Road	Caroline	Sixmile Creek	Central Chapel Road	0.1	0.45	4%	B	4.9	13	Y	Y	Y	BS	None		
Braley Road	Caroline	Sixmile Creek	Central Chapel Road	0.1	0.45	4%	B	4.9	13	Y	Y	Y	BS	None		
Grove School Road	Caroline	Sixmile Creek	Central Chapel Road	0.65	0.05	5%	R	4.7	15	Y	Y	Y	BS	None		
Bald Hill Road	Caroline	Sixmile Creek	Dead End	1.45	0.2	10%	L	1.8	3	Y	Y	Y	BS	Little		
Middaugh Road	Caroline	Sixmile Creek	Coddington Road	0.85	0.05	6%	L	1	3.2	Y	Y	Y	BS	None		
Bailor Road	Caroline	Sixmile Creek	Valley Road	0.6	0.05	4%	L	2.4	9.3	Y	Y	Y	BS	None		
Old 76 Road	Caroline	Sixmile Creek	Valley Road	0.6	0.1	1%	B	1.4	16.3		Y	Y		None		
Deer Crossing Lane	Covert	Interlaken Area	Rt. 89	0.4	0.05	19%	L			Y	Y	Y	BS	Little	Y	
Vanbuskirk Gulf Road	Danby	Cayuga Inlet	Kelloggs Corner Rd.	3.05	0.05	7%	B	1.7	8.6	Y	Y	Y	BS	Little		
Beach Hill Road	Danby	Cayuga Inlet	Maple Avenue	0.65	0.65	10%	L	1.5	3.8	Y	Y	Y	BS	Some		
Statton Road	Danby	Cayuga Inlet	Rt. 96	0.9	0.05	7%	B	4.2	14	Y	Y	Y	BS	Little		
Statton Road	Danby	Cayuga Inlet	Rt. 96	1	0.05	9%	L	1.7	7.3	Y	Y	Y				
Statton Road	Danby	Cayuga Inlet	Rt. 96	1	0.05	9%	L	1.7	7.3	Y	Y	Y				
Yellow Barn Road	Dryden	Sixmile Creek	Midline Road	0.2	0.25	1%	R	3.4	11	Y	Y	Y	BS	Some		
Bostwick Road	Enfield	Enfield Creek	Rt. 13A	4.4	0.45	10%	R	1	4	Y	Y	Y	BS	Little		
Bostwick Road	Enfield	Enfield Creek	Rt. 13A	4.4	0.45	10%	R	1	4	Y	Y	Y	BS	Little		
Fish Road	Enfield	Enfield Creek	Rt. 327	0.15	0.35	2%	L	3.9	11.6	Y	Y	Y	BS	Moderate		
Van Ostrand Road	Enfield	Cayuga Inlet	Rt. 13	0.7	0.15	1%	B	5.2	16.2	Y	Y	Y	BS	Little		
Trumbull Corner	Enfield	Enfield Creek	Rt. 13	5.25	0.15	3%	R			Y	Y	Y	BS	None		
Hill Road	Genoa	Little Salmon Creek	Atwater Road	0.75	0.05	7%	R	2.2	13	Y	Y	Y	BS	Little		
Center Road	Genoa	Little Salmon Creek	Dead End	0.45	0.05	9%	L	2.6	10.6	Y	Y	Y	BS	Little		Y
Clearview Road	Genoa	King Ferry Sta. Area	Rt. 34B	1.4	0.05	13%	R	1.8	3.3		Y	Y		Some		
Bedrock Lane	Genoa	King Ferry Sta. Area	Dead End	0	1.65	1%	L			Y	Y	Y		Some		
Bedrock Lane	Genoa	King Ferry Sta. Area	Dead End	0	1.65	1%	L			Y	Y	Y		Some		
Cemetery Lane	Groton	Fall Creek	Lafayette Road	0.6	0.05	0%	R			Y	Y	Y	BS	Little		
Bower Road	Hector	Spring Brook	Stillwell Road	1.9	0.1	7%	L	4	11.5	Y	Y	Y	BS	None		
Voorheis Road	Hector	Spring Brook	Rt. 227	1.95	0.1	10%	L	4.5	12.4	Y	Y	Y	BS	Little		
Bergen Road	Hector	Taughannock Creek	Newtown Road	0.95	0.05	7%	R	4.5	11.4	Y	Y	Y	BS	None		
Burns Road	Ithaca	Sixmile Creek	Coddington Road	0.85	0.05	4%	R	4.3	11	Y	Y	Y	BS	Some		
Caldwell Road	Ithaca	Fall Creek	Forest Home Drive	0.1	0.05	10%	B	1.1	3.1	Y	Y	Y	BS	Little		
Rt. 13	Lansing	Lansing Area	Cayuga Heights Line	0	0.35	4%	R					Y		Little		
East Lake Road	Lansing	Lansing Area	Rt. 34	0.45	0.05	6%	R	2	7.5	Y	Y	Y		Little		
East Lake Road	Lansing	Lansing Area	Rt. 34	0.5	0.2	8%	L	2.9	10.5	Y	Y	Y	BS	Some		
East Lake Road	Lansing	Lansing Area	Rt. 34	0.55	0.05	0%	R	2.3	10	Y	Y	Y	BS	Little		
Reach Run	Lansing	Lansing Area	Dead End	0	0.1	6%	L				Y	Y	BS	None		
Reach Run	Lansing	Lansing Area	Dead End	0.1	0.05	5%	R				Y	Y	BS	Little		
Waterplant Road	Lansing	Lansing Area	Rt. 34	0.45	0.15	6%	R				Y	Y	BS	Little		
Brownhill Road	Lansing	Locke Creek	Gulf Road	0.05	0.1	11%	R			Y	Y	Y	BS	None		
Ludlowville Road	Lansing	Salmon Creek	Rt. 34B	0.3	0.1	4%	R	2.5	9.6		Y	Y	BS	Little		
Sunset Beach Road	Ledyard	King Ferry Sta. Area	Rt. 90	0.1	0.1	1%	L				Y	Y	BS	Some	Y	
Honoco Lane	Ledyard	King Ferry Sta. Area	Lake Road	0.2	0.9	0%	L			Y	Y	Y	BS	Some	Y	
Honoco Lane	Ledyard	King Ferry Sta. Area	Lake Road	1.3	0.1	0%	L			Y	Y	Y	BS	Some	Y	
Honoco Lane	Ledyard	King Ferry Sta. Area	Lake Road	1.6	0.7	0%	L			Y	Y	Y	BS	Some	Y	
Honoco Lane	Ledyard	King Ferry Sta. Area	Lake Road	2.4	1.2	0%	L			Y	Y	Y	BS	Some	Y	
Kings Corners Road	Ledyard	Great Gully	Rt. 90	3.6	0.05	4%	R	2.5	11.2	Y	Y	Y	BS	Little		
Van Ostrand Road	Newfield	Cayuga Inlet	Rt. 13	0.2	0.1	10%	R	1.7	4.5	Y	Y	Y	BS	None		
Protts Hill Road	Newfield	Fish Kill	Millard Hill	1.35	0.3	10%	L	1.9	6.7	Y	Y	Y	BS	Little		
Cox Road	Newfield	West Branch	Rt. 13	0.1	0.1	6%	R	4.8	13	Y	Y	Y	BS	Little		
Tupper Road	Newfield	Cayuga Inlet	Seely Hill Road	0.95	1	8%	L	1.5	3.8	Y	Y	Y	BS	Little		
Vanbuskirk Road	Newfield	Cayuga Inlet	Vanbuskirk Gulf Rd.	0	0.1	10%	B	4	12.3	Y	Y	Y	BS	Little		
West Wycoff Road	Ovid	Sheldrake Creek	Hall Road	0.65	0.1	3%	L	8 ft	14.5	Y	Y	Y	BS	Little		Y
South Cayuga Lake Rd.	Romulus	Big Hollow Area	Rt. 89	0	0.05	8%	L	2.6	6.1	Y	Y	Y	BS	Moderate		
Elm Beach Road	Romulus	Big Hollow Area	Rt. 89	0	0.1	9%	R	5	10.2	Y	Y	Y	BS	Little		
Filmore Road	Summerhill	Fall Creek	Lake Como Road	0.15	0.2	5%	L			Y	Y	Y	BS	Some		
Filmore Road	Summerhill	Fall Creek	Lake Como Road	0.15	0.2	5%	L			Y	Y	Y	BS	Some		
Filmore Road	Summerhill	Fall Creek	Lake Como Road	0.35	0.1	6%	B	1.6	4.4	Y	Y	Y	BS	Some		
Willow Creek Point	Trumansburg	Willow Creek Area	Rt. 89	0.025	0.05	16%	R	1.8	3.9	Y	Y	Y	BS	Some		

Source: Cayuga Lake Watershed Roadbank Inventory, 2000, Genesee/Finger Lakes Regional Planning Council

Regulatory Management for Steep Slope & Structural Measures

Comprehensive Plan	Zoning	Subdivision
Town of Caroline		Avoid cross streams and ditches with roads and driveways to handle potent future upland runoff and prepare for 100yr flood. Consider landscape slope instead of retaining wall
Town of Catherine		Planning Board may require larger lot sizes when slope >15%
Town of Covert		Grading plan if natural contours to be changed more than 2 feet
Town of Danby	Appropriate topography for development	No development when >15% poses threat to environment, residents. Construction at >15% need Code Enforcement approval for stabilization and revegetation measures. When land disturbed: no slope steeper than 1 foot vertical rise to 3 feet horizontal distance, except when slope grade existed before development, even than Planning Board approval necessary (threats to nature and residents). Use terraces and diversions on long slopes to minimize erosion, also sedimentation; basins, traps
Town of Groton	Avoid development on steep slopes to minimize effects on soil stability and water quality	
Town of Ithaca	No construction over 25% with minimum horizontal slope length of 25 feet	
Town of Lansing	Site Plan Review: development on erodible soils and slopes >10% shall include erosion plan	
Town of Romulus	Least possible development	
Village of Cayuga		No development over 10%
Village of Lansing	Permit for development >25%	
Village of Trumansburg		Protection from destructive development

Municipal Regulation & Control Related to Stormwater Management & Erosion Control

Stormwater Management & Erosion Control	Steep Slope & Structural Measures	Impervious Surfaces Controls	Wetlands & Riparian Coordor Controls	Open Space Controls
City of Ithaca	Town of Caroline	City of Ithaca	City of Ithaca	City of Ithaca
Town of Caroline	Town of Catherine	Town of Aurelius	Town of Caroline	Town of Cortlandville
Town of Catherine	Town of Covert	Town of Caroline	Town of Catherine	Town of Danby
Town of Cortlandville	Town of Danby	Town of Catherine	Town of Corlandville	Town of Fayette
Town of Covert	Town of Groton	Town of Danby	Town of Covert	Town of Groton
Town of Danby	Town of Ithaca	Town of Dryden	Town of Danby	Town of Homer
Town of Dryden	Town of Lansing	Town of Fleming	Town of Dryden	Town of Ithaca
Town of Fayette	Town of Romulus	Town of Homer	Town of Fayette	Town of Lansing
Town of Groton	Village of Cayuga	Town of Ithaca	Town of Groton	Town of Romulus
Town of Homer	Village of Lansing	Town of Virgil	Town of Homer	Town of Seneca Falls
Town of Ithaca	Village of Trumansburg	Village of Aurora	Town of Ithaca	Town of Spencer
Town of Lansing		Village of Dryden	Town of Lansing	Town of Ulysess
Town of Seneca Falls		Village of Freeville	Town of Romulus	Town of Varick
Town of Spencer		Village of Lansing	Town of Seneca Falls	Town of Virgil
Town of Ulysess		Village of Trumansburg	Town of Spencer	Village of Dryden
Town of Varick			Town of Summer Hill	Village of Lansing
Town of Virgil			Town of Varick	Village of Trumansburg
Village of Aurora			Village of Aurora	
Village of Cayuga			Village of Cayuga	
Village of Dryden			Village of Dryden	
Village of Freeville			Village of Trumansburg	
Village of Lansing				
Village of Trumansburg				

Appendix J

Cayuga Lake Watershed Steward

The Cayuga Lake Watershed Steward serves as a facilitator and coordinator for the watershed. The role of the Watershed Steward may change over time and as the needs for education, communication and leadership change with the watershed. Specific roles include:

Provide a highly visible source for citizens to seek information or referrals to the best source for information about the watershed.

Provide a common presence at many meetings throughout the watershed to facilitate communication between groups.

Assist and engage citizen participation in the development of the watershed management plan.

Facilitate collaborations and coalitions within the watershed related to specific issues.

Help identify emerging issues and problems within the watershed.

Assist in structuring the Cayuga Lake Watershed Network and other sub-watershed groups and providing leadership for citizen and organizational involvement in watershed issues.

Actively pursue funding opportunities and foster partnerships to implement the emerging management plan, maximize water quality improvement activities, provide education and outreach to a variety of audiences, address appropriate infrastructure enhancement needs, improve land use practices including agriculture, and conduct much needed research.

Contribute to the research dialogue by encouraging research that is relevant and useful in the Cayuga Lake Watershed including community-based research, citizen monitoring, agricultural best management practices research, and other practical approaches. Additionally, work with agency and institutional researchers to determine existing research data that could and should be made available to the public.

Appendix K

Data and Information Clearinghouse

Introduction

The Cayuga Lake Watershed Restoration & Protection Plan project, as well as many other organizations and programs throughout the watershed, have acquired and developed data and information for the purposes of characterizing, planning, and implementing in the Cayuga Lake Watershed. The data and information is in digital (computerized) and non-digital (hardcopy only) format and is presently not available or linked in one location. The data and information includes geographic information system (GIS) data used for spatial analysis and mapping purposes throughout the life of the project, monitoring data, program data, and reports.

Goal

To have a central and/or accessible location or all of the past, present, and future data and information or metadata characterizing the Cayuga Lake Watershed.

Recommendations

Have a point person and central location that collects and catalogs information and data or metadata (data about the data and link to the original data) for all information and data pertaining to the Cayuga Lake Watershed including, among other things, the data and information that has been acquired or developed as part of the RPP project. Information and data types include the following:

- Reports, publications and studies
- Spatial data (geographic information systems and remotely sensed data)
- Metadata (data describing data)
- Sampling and monitoring data
- Agricultural Data including effective Integrated Pest Management (IPM) techniques, and management of nutrients and wastes
- Periodicals (news releases, newspaper articles, newsletters)
- Educational materials
- Grant applications
- Bylaws
- Minutes and agendas

Tasks include inventorying, acquiring, database and cataloging, and maintaining/updating. Options include the following:

- Physical library and database (for hardcopy information, data, and metadata)
- Cayuga Lake Watershed Intermunicipal Organization Internet Web Site <http://www.cayugawatershed.org>
- Interactive CD-ROM (presently funded through the IO and the Cayuga Lake Watershed Network) (see *Web-Linked Interactive CD-ROM* section of this Appendix)
- The use of the New York State GIS Data Sharing Cooperative (for spatial digital data) (see *NYS Data Clearinghouse* section of this Appendix)
- Priority Waterbodies List (PWL) (see Appendix L)

Web-Linked Interactive CD-ROM

One of the most important aspects of watershed management is education and public participation. In order to provide useful educational material packaged in an understandable, useful, and motivating format and also to disseminate information and data developed and collected for the Cayuga Lake watershed, the Cayuga Lake Watershed Intermunicipal Organization (IO) and the Cayuga Lake Watershed Network are committed to the development and production of the Cayuga Lake watershed educational program. The development of a Watershed Assessment web-linked Interactive CD-ROM is one of the main tools to accomplish these objectives.

The Watershed Assessment compact disk (CD), is a web-linked educational resource that is interactive and offers a comprehensive information-delivery capability. This capability includes on-line access to recent and real-time watershed information data, as well as on-line GIS-based maps. The main objective of this program is to help the general public, elected officials, students, and highway maintenance staff to make well-informed decisions, consistent with the watershed management plan.

The opening screen of the watershed assessment CD will begin with an introduction to the concepts of watershed-based natural resources management, watershed assessment, indicators and analyzes the impact of urbanization, agriculture, deforestation, and erosion. The case study of Cayuga Lake is presented here as an option for navigating the contents of the CD and associated web site links.

Because the contents of the CD will be compiled, the information, graphics, maps and models run in the host computer, without the need of any extra or special software.

Great effort will be placed on organizing eight workshops to present the contents of this CD and enhance the learning experience of the residents of the Cayuga Lake Watershed. The information to be accessed on-line, from the CD platform, as well as the recent and real-time monitoring data has been carefully matched to the presentation format of the CD. The web content will be mirrored at more than one server for faster access, and to minimize the potential risk of information losses or the inconvenience of a busy, or "crashed" server. The CD platform also offers a lively session even without access to the web, a faster navigation using a modem connection, than without a CD platform in the user's computer, and a very rewarding experience with cable connection to the web.

At the end of each workshop, participants will complete a brief survey designed to evaluating their knowledge of watershed management and decision making abilities. Workshop participants will receive a follow-up survey approximately six months later that will attempt to gauge changes in participant behavior as a result of their participation on the present program.

All project partners will convene to discuss the successes and areas of improvement for this educational collaboration. This discussion will also help to improve cooperation for future efforts and implementation of the Cayuga Lake Management Plan.

Appendix N

MODEL LOCAL LAW

ON-SITE INDIVIDUAL WASTEWATER TREATMENT LAW

TABLE OF CONTENTS

ARTICLE 1
INTRODUCTORY PROVISIONS

Section 101 Title

1. This local law shall be known as the "On-Site Individual Wastewater Treatment System Law of the City, Town, Village of _____.

Section 102 Applicability

1. This local law shall govern the treatment of sewage by regulating all on-site individual wastewater treatment systems (hereinafter referred to as a wastewater treatment system).

Section 103 Purpose

1. The purpose of this local law is to promote the health, safety, and general welfare of the community, including the protection and preservation of the property of its inhabitants, by regulating wastewater treatment systems so that human sewage and other wastes are disposed of in a manner that will not create a health hazard, adversely affect the environment, create a nuisance, or impair the enjoyment or use of property.

Section 104 Authority

1. Enactment of this local law is pursuant to *Article 2 of Municipal Home Rule Law*, and *Article 3 of the Public Health Law.*

ARTICLE 2
DEFINITIONS

Section 201 Words and Terms

1. In addition to the definitions contained in the *New York State Public Health Law and Uniform Fire Prevention and Building Code*, which are incorporated herein by reference, the following words and terms shall be defined as follows:

ADEQUATELY FUNCTIONING shall mean a wastewater treatment system inspected pursuant to section 502 of this local law that is determined by the authority having jurisdiction as not posing a public health threat by virtue of above ground seepage, or contamination of surface or ground water. For the purpose of this local law an "adequately functioning" system shall always include a watertight vessel.

AUTHORITY HAVING JURISDICTION shall be the Code Enforcement Officer, Health Officer, Watershed Inspector, or other official(s) designated by a local municipality, or other regulatory agency, having the responsibility to enforce the provisions of this local law.

CHANGE OF USE shall mean a use of land with an associated building and wastewater treatment system that is modified so as to likely cause an increase in hydraulic loading (e.g. – change from an existing commercial use to residential use; change of an existing residential use to commercial use; change of a commercial use to a different type of commercial use). A change of use shall also include the removal and replacement of a manufactured or mobile home dwelling.

CONVEYANCE OF REAL PROPERTY shall mean the transfer of the title of real estate from one to another, in the form of a deed or other legal instrument, filed in the Office of the County Clerk.

DESIGN PROFESSIONAL shall mean a person licensed or registered in the State of New York and authorized by *New York State Education Law* to design the systems described in *10NYCRR Appendix 75-A.*

LOCAL GOVERNING BODY shall mean the municipal corporation charged with authority to act as the Local Board of Health as defined by *New York State Public Health Law.*

MINOR ALTERATIONS shall mean routine maintenance and repairs to the wastewater treatment system, including but not limited to the following: replacement of septic tank covers or baffles, replacement of distribution box covers, replacement of

cracked pipes, pumping of the septic tank, and replacement of mechanical pumps and devices. "Minor alterations" shall not include replacement of a septic tank, distribution box, or any addition, alteration or rearrangement of water distribution or drainage piping. Like examples of "minor alterations" not specifically listed in this definition shall be determined by the authority having jurisdiction.

NEW CONSTRUCTION shall mean any building constructed or placed on an undeveloped site requiring the installation of a wastewater treatment system and currently not utilizing the same.

ON-SITE WASTEWATERTREATMENT SYSTEM PERMIT shall mean a written permit issued by the authority having jurisdiction.

ON-SITE WASTEWATER TREATMENT SYSTEM shall mean a complete system of piping, watertight vessels or other facilities for the on-site collection, transport and treatment of sewage.

SEWAGE shall mean the combination of human and household waste with water which is discharged to the plumbing system, including the waste from a flush toilet, bath, shower, sink, lavatory, dishwashing or laundry machine, or the water-carried waste from any fixture, equipment or machine.

ARTICLE 3
GENERAL REGULATIONS AND REQUIREMENTS

Section 301 Prohibitions

1. It shall be unlawful to install, construct, alter, replace, enlarge, extend, or otherwise modify any wastewater treatment system unless a wastewater treatment permit is issued by the authority having jurisdiction, except as specifically exempted in section 304 of this local law.

2. It shall be unlawful to change the use of real property, convey real property, or expand a building or dwelling, including its use, by greater than fifty (50) percent, without an inspection of the wastewater treatment system by the authority having jurisdiction, pursuant to sections 501 and 502 of this local law.

3. It shall be unlawful to use or maintain any wastewater treatment system that is not adequately functioning.

4. It shall be unlawful to discharge anything but sewage into a wastewater treatment system. Surface and subsurface water including roof, cellar, foundation and storm drainage shall not be discharged into the wastewater treatment system and shall be disposed of so as to in no way affect the proper functioning of the system.

Section 302 Design Standards for Wastewater Treatment Systems – New Systems

1. Individual Household Systems

(a) Any wastewater treatment system for new individual household construction shall be designed and built according to the requirements of this local law and the requirements, as they may from time to time be amended, of the NYSDOH standards for sewage disposal for individual household systems. Those design requirements are found in *Appendix 75-A of Part 75 of Title 10 of the New York Code of Rules and Regulations (10 NYCRR).*

2. Intermediate-sized Sewerage Systems

(a) Any wastewater treatment system for new commercial or institutional construction, as well as cluster housing or other multi-home developments, shall be designed and built according to the requirements of this local law and the requirements, as may be from time to time be amended, of the NYSDEC standards for sewage disposal for intermediate-sized sewerage facilities. Those design requirements are found in *NYSDEC manual "Design Standards for Wastewater Treatment Works: Intermediate-sized Sewerage Facilities."*

Section 303 Design Standards for Wastewater Treatment Systems – Existing Systems

1. Individual Household Systems

(a) Any installation, construction, alteration, replacement, enlargement, extension, repair, or other modification of an existing on-site individual household wastewater treatment system shall be designed and built according to the requirements of this local law and the requirements, as they may from time to time be amended, of the NYSDOH standards for sewage disposal for individual household systems. Those design requirements are found in *Appendix 75-A of Part 75 of Title 10 of the New York Code of Rules and Regulations (10 NYCRR).*

2. Intermediate-sized Sewerage Systems

(a) Any installation, construction, alteration, replacement, enlargement, extension, repair, or other modification of an existing intermediate-sized sewerage system, shall be designed and built according to the requirements of this local law and the requirements, as may be from time to time be amended, of the NYSDEC standards for sewage disposal for intermediate-sized sewerage facilities. Those design requirements are found in *NYSDEC manual "Design Standards for Wastewater Treatment Works: Intermediate-sized Sewerage Facilities."*

Section 304 Exemptions

1. Minor alterations to wastewater treatment systems shall not require a wastewater treatment permit provided such repairs are made with like or similar materials so as to replace existing conditions in need of repair, and are done in a safe and sanitary manner.

2. The design standards found in section 303 of this local law shall not apply to existing wastewater treatment systems legally installed, repaired or approved by the authority having jurisdiction, prior to the date of adoption of this local law and after the dates identified in *Paragraphs a and b* identified below, or those systems determined by the authority having jurisdiction to be adequately functioning.

(a) Individual Household Wastewater Treatment Systems legally installed or repaired prior to December 1, 1990.

(b) Intermediate-sized Wastewater Treatment Systems legally installed or repaired prior to January 1, 1988.

Section 305 Site Limitations

1. On sites with topographic, physiographic or other limitations, the authority having jurisdiction shall utilize current technology and design methods to remedy failed or improperly functioning systems, provided that applicable state standards, to the greatest extent possible, are complied with. In considering site limitations, the authority having jurisdiction shall take the following into consideration:

(a) Distance separations to drinking water supplies and watercourses;

(b) The imminent health hazards resulting from a currently failed system;

(c) Existing lot line setbacks and area requirements as related to individual properties; and

(d) The extent to which the limitations are self-created.

Section 306 Maintenance and Protection

1. Wastewater treatment systems shall be maintained in good working order. There shall be no activities or conditions permitted which would interfere with the proper operation of wastewater treatment systems. It is specifically prohibited to construct or place buildings, to install paving, to plant trees or shrubs, to regrade or place fill, to allow crossing by vehicles, to install above ground pools, or to install driveways or parking areas over sanitary disposal fields.

Section 307 State or Other Agency Approvals

1. In addition to approvals required herein, a review and approval by the New York State Department of Health (NYSDOH) or the New York State Department of Environmental Conservation (NYSDEC), if appropriate, shall be required for the following conditions:

(a) Any realty subdivision as defined by *Article 11, Title II of the NYS Public Health Law or Article 17, Title 15 of the NYS Environmental Conservation Law*;

(b) Any alternative system as defined by *Appendix 75-A of Part 75 of Title 10 of the New York Code of Rules and Regulations (10 NYCRR);*

(c) Any facility required to be permitted by the NYSDOH; and

(d) Any on-site individual wastewater treatment system or other system with effluent in excess of 1,000 gallons per day.

2. In addition to approvals required herein, wastewater treatment systems are subject to review and approval by the Canandaigua Lake Watershed Inspector pursuant to *New York State Public Health Law, Section 132.1 of Part 132 of Title 10 of the New York Code of Rules and Regulations (10 NYCRR).*

Section 308 Use of Design Professionals and the Ontario County Soil and Water Conservation District

1. The authority having jurisdiction shall have the right to require that the property owner retain the services of a design professional to conduct site and soil appraisals (percolation tests and deep holes) and to design and certify that the wastewater treatment system meets the requirements of this local law and the standards of applicable state laws.

2. The local governing body shall have the right to contract with the County Soil and Water Conservation District through its *Uniform Inspection Procedures Program* for site and soil appraisals and inspections performed pursuant to section 501of this local law.

3. Wastewater treatment systems that are defined as an alternative system pursuant to *10 NYCRR Appendix 75-A* shall be certified by a design professional.

Section 309 Access

1. The authority having jurisdiction shall be permitted by the property owner to make a physical inspection of the lands and premises for which a wastewater treatment system permit or inspection has been requested, in order to determine that all of the requirements of this local law have been complied with.

2. The authority having jurisdiction, upon complaint or show of cause, shall be permitted by the property owner to make a physical inspection of the lands and premises for which a wastewater treatment system is believed to be a cause or potential cause of pollution, or health hazard.

ARTICLE 4
REQUIREMENTS FOR NEW WASTEWATER TREATMENT SYSTEMS

Section 401 Application Material

1. Applications for wastewater treatment system permits shall be by the property owner or a duly authorized agent, accompanied by the appropriate fee, to the authority having jurisdiction, which shall include the following information:

(a) The name, address and telephone number of the applicant;

(b) Specific location of the property on which the wastewater treatment system is located or proposed, including the tax map number for said property;

(c) A sketch plan on a tape location map or survey map of the premises on which the wastewater treatment system is located or proposed, showing the location of wells, springs and other sources of water supply, and the location of all watercourses on the premises;

(d) Evidence to demonstrate that there is no public sewer available into which the sewage can be discharged or that it is impractical to discharge sewage into a community sewerage system;

(e) Documentation of substantiating data relating to site conditions, percolation tests, deep hole data, and topography of land; and

(f) The authority having jurisdiction may conduct such investigations, examinations, tests and site evaluations as it deems necessary to verify information contained in the application.

Section 402 Administrative Review

1. The authority having jurisdiction shall not issue a wastewater treatment system permit unless:

(a) All pertinent site data has been submitted, verified and certified as required by this local law; all permit fees have been paid and that the wastewater treatment system complies with all specifications of state and local laws.

2. The authority having jurisdiction may disapprove an application if it is determined that any of the following requirements have not been met:

(a) That the wastewater treatment system, as proposed, will not conform to the requirements of state and local laws;

(b) That the applicant has failed to supply all the data necessary to make a determination as to whether or not such wastewater treatment system conforms to state and local laws; and

(c) The applicant has failed to pay all necessary fees.

3. When the authority having jurisdiction shall deny the application for a wastewater treatment permit, within

seven (7) working days after taking such action, the authority having jurisdiction shall furnish the applicant with a written notice of denial setting forth in detail the reason for such action.

4. No Certificate of Occupancy shall be issued and no persons shall occupy any building unless the wastewater treatment system has been approved in accordance with the provisions of this local law.

Section 403 Inspection Certifications

1. Installation of the wastewater treatment system shall be under the direct supervision of the authority having jurisdiction.

2. The applicant shall be prohibited from covering any component of the system without proper authorization. Any change of construction approved by the authority having jurisdiction shall be noted on the original drawings before the system is back filled. As built plans shall be provided to the authority having jurisdiction.

3. The authority having jurisdiction may, by written notice, order all work stopped on any wastewater treatment system, which is in violation of this local law.

Section 404 Fees

1. The fees for any permit or inspection performed pursuant to this local law shall be determined from time to time by the local governing body.

ARTICLE 5
REQUIREMENTS FOR EXISTING WASTEWATER TREATMENT SYSTEMS

Section 501 Circumstances Requiring Inspection of Existing Systems

1. The authority having jurisdiction shall conduct an on-site inspection of an existing wastewater treatment system as follows:

(a) Prior to a change of use - The owner of the property shall arrange for a wastewater treatment system inspection before any change of use is undertaken. The authority having jurisdiction shall determine whether the change represents an increased hydraulic loading to the system. In instances where a site plan approval, special use permit, or variance is required the authority having jurisdiction shall incorporate the wastewater treatment system inspection report into the review process of the appropriate Planning Board, Zoning Board of Appeals, or Board of Appeals;

(b) Prior to a conveyance of real property - The owner of the property shall arrange for a wastewater treatment system inspection prior to the conveyance of real property. In addition, property owners may request a wastewater treatment inspection for real estate transactions or other certifications to lending institutions, purchase offer conditions of buyers of real property, or other requests, or investigations; and

(c) Expansion greater than fifty (50) percent - The owner of the property shall arrange for a wastewater treatment system inspection as an integral part of the building permit application process. The authority having jurisdiction shall determine whether expansion of the building or dwelling, including its use, represents an increased hydraulic loading to the system. For the purpose of this local law an existing wastewater treatment system shall be defined as an accessory structure and as such subject to regulation pursuant to *Part 1230 of Subchapter E, Conversions, Alterations, Additions and Repairs to Existing Buildings of the New York State Uniform Fire Prevention and Building Code.*

Section 502 Inspection Procedure

1. All existing on-site wastewater treatment systems requiring an inspection pursuant to this local law shall be performed by the authority having jurisdiction in accordance with the specifications established as follows:

(a) The septic tank, inspection ports, distribution boxes, or other distribution devices shall be uncovered and accessible to the inspector. In the event any component of the system cannot be reasonably located, the inspector shall so note on the inspection report;

(b) Sanitary disposal fields shall be staked out or otherwise identified by general area of location;

(c) At the discretion of the authority having jurisdiction, the septic tank shall be pumped at the expense of the property owner, in order to ensure that the tank is not leaking, and that the inlet and outlet baffles are in place and properly functioning;

(d) At the discretion of the authority having jurisdiction, drop and distribution boxes shall be checked for blockages and function;

(e) The authority having jurisdiction shall visually inspect buildings on the property noting the number of bedrooms, the layout and location of all water-using fixtures and plumbing, including but not limited to faucets, sinks, toilets, drains, overflows, laundry equipment, floor drains, sump pumps, water softeners, and related systems that may impose an improper or potential adverse hydraulic loading on the disposal field;

(f) Verify connection of all drains to an appropriate disposal system;

(g) All outside areas, to include nearby lawns, slopes, hillsides, ditches and watercourses, swales, and the shoreline of ponds, lakes and wetlands shall be observed for above ground seepage and to note the quantity and general quality of surface water where it occurs;

(h) Conduct dye testing, and other methods as may be necessary to determine system function.

Section 503 Report of Findings

1. Upon completion of the inspection, the authority having jurisdiction shall document all procedures and furnish the owner with a report of findings.

2. The report of findings shall contain, at a minimum, the location, address, name of owner, representative present, dates of testing/inspection, procedures used, observations and sketches showing fixture, drain and system layout to adequately document the wastewater treatment system inspection.

ARTICLE 6
COMPLIANCE AND REPORTING

Section 601 Deficiencies and Corrections

1. Upon discovery of a wastewater treatment system which is not adequately functioning or determined to have been illegally installed, the authority having jurisdiction, shall immediately notify the property owner in writing of the failure or unacceptable condition. It shall be the responsibility of the property owner to forward notice of such report to other involved or interested parties. As part of the report, the authority having jurisdiction shall determine a course of corrective action and establish a reasonable time frame for completion of necessary remedies.

2. Upon receipt of such notice the property owner shall be given thirty (30) days to obtain a wastewater treatment permit.

3. Remedy of a wastewater treatment system, which is not adequately functioning or determined to have been illegally installed, shall require the property owner to submit an application for a wastewater treatment permit in accordance with section 401 of this local law.

ARTICLE 7
COMPLAINTS

Section 701 Notification

1. Complaints shall be made to the authority having jurisdiction with supporting information that a wastewater treatment system may be deficient (i.e. - observed failure to ground water, surface water, or aboveground seepage, odor, or otherwise creating a public nuisance).

2. Upon receipt of a bonafide complaint or upon personal observation of said wastewater treatment system, the authority having jurisdiction shall notify the property owner and the inhabitants of said property in writing, within seven (7) business days of receipt of the complaint or personal observation, that an inspection pursuant to section 502 of this local law is required. A copy of such notice shall be sent to the Clerk of the local governing body.

ARTICLE 8
ADMINISTRATIVE RELIEF

Section 801 Appeals

1. Appeals of any actions, omissions, decisions or rulings of the authority having jurisdiction shall be made to the Clerk of the local governing body and must be instituted within (30) days of the act, omission, decision, or ruling from which relief is sought.

2. Within thirty (30) days of receipt of a written appeal of an action, omission, decision, or ruling of the authority having jurisdiction the local governing body, convening as the Local Board of Health, shall give notice of a public hearing to be held on the appeal.

3. Within thirty (30) days of final adjournment of a

public hearing, the local governing body shall affirm, modify or deny the action, decision or ruling of the authority having jurisdiction or correct any omission, approve, or approve with conditions or disapprove the appeal.

4. The decision of the local governing body shall be in writing and shall contain findings and the factual basis for each finding from the record of the hearing, which shall support the decision of the local governing body. The local governing body's discretion in considering an appeal under this local law shall not extend to granting variances from this local law but shall rather be limited to reviewing the authority having jurisdiction's interpretation or applications of the terms hereof. Variances from the substantive requirements (e.g. septic tank sizes, setback distances, etc.) remain under the jurisdiction of the NYSDOH and the NYSDEC.

ARTICLE 9
ENFORCEMENT

Section 901 Violation
1. In any instance where a wastewater treatment system is located, installed, constructed, altered, enlarged, or extended in violation of this local law, or in any instance where this local law is otherwise violated, the local governing body may maintain an action or proceeding in the name of the municipality in a court of competent jurisdiction to compel compliance with the terms of this local law or to restrain by injunction, the violation of this local law.

Section 902 Alternative Remedies
1. Any violation or threatened violation of any of the provisions of this local law, in addition to other remedies herein provided, the local governing body may institute any appropriate action or proceeding to prevent unlawful construction, alteration, repair, or reconstruction, to restrain, correct or abate such violation to prevent the use of the wastewater treatment system or to prevent any illegal act, conduct, business or use regarding such wastewater treatment system.

Section 903 Misrepresentation
1. Any permit or approval granted under this local law which is based upon or is granted in reliance upon any material misrepresentation, or upon failure to make material fact or circumstances known, by or on behalf of an applicant, shall be void.

Section 904 Penalties
1. Any person who violates any provision of this local law shall be subject to a fine not to exceed the sum of $250 or by imprisonment of not more than seven (7) days, or both. Each week such violation continues after notification to the person in violation shall constitute a separate violation. Such violation notice shall be served by certified mail, return receipt requested, or by personal service.

ARTICLE 10
MISCELLANEOUS PROVISIONS

Section 1001 Conflict of Law
1. In any case where a provision of this local law is found to be in conflict with a provision of any ordinance or local law, or with a provision of any statute, rule, regulation, or order of the State of New York, the provision which established the higher standard for the promotion of the health, welfare and safety of the citizens of the municipality shall prevail. In any case where a provision of this local law is found to be in conflict with a provision of any other ordinance or local law existing on the effective date of this local law, which established a lower standard for the promotion of the health, welfare and safety of the citizens of the municipality, the provisions of this local law shall be deemed to prevail.

Section 1002 Severability
1. The provisions of this local law shall be several, and if any clause, sentence, paragraph, subdivision, section, or part of this local law shall be judged by competent jurisdiction as being invalid, such judgement shall not affect, impair, or invalidate the remainder thereof, but shall be confined to the part thereof directly involved in the controversy in which such judgement shall have been rendered.

Section 1003 Savings Clause
1. The adoption of this local law shall not affect or impair any act done, offense committed or right accrued or acquired or liability, penalty, forfeiture or punishment incurred prior to the time this local law takes effect.

Section 1004 Effective Date
1. This local law shall take effect immediately upon filing with the New York State Secretary of State pursuant to *Article 3 of Municipal Home Rule Law*

Source: Ontario County Planning Department

Septic System Assessment

Your Risk

☐ low ☐ medium ☐ high

Depth to Water Table

☐ Over 20ft ☐ 10-20ft ☐ Less than 10ft

☐ low ☐ medium ☐ high

Septic System Capacity

☐ Tank is designed to handle more wastewater than required, based on the size of the home.

☐ Capacity just meets load requirements, but I watch out for factors indicating system overload.

☐ The capacity of the system is not known. Rooms, or water-using appliances are added without reexamining the capacity of the system.

☐ low ☐ medium ☐ high

Separation Distance

☐ Leachfield is at least 100 feet from any well or surface water.

☐ Leachfield is between 50 and 100 feet from a well or surface water.

☐ Leachfield is less than 50 feet from a well or surface water.

☐ low ☐ medium ☐ high

Maps and Records

☐ I keep a map and good records of repairs and maintenance.

☐ The location of my tank and date of last pumping are known but not recorded.

☐ The location of my system is unknown. I do not keep a record of pumping and repairs.

☐ low ☐ medium ☐ high

Tank Pumping (including holding tanks)

☐ The septic tank is a pumped every 3-5 years. The holding tank is pumped as needed.

☐ The septic tank is pumped, but not regularly.

☐ The septic tank is not pumped. The holding tank overflows or leaks between pumpings.

☐ low ☐ medium ☐ high

*Source: Home*A*Syst*

Use **Home*A*Syst Program** (for more information see http://www.uwex.edu/homeasyst/) as a model for education and assessment of on-site systems. This includes the following:

Develop funding source (see Appendix N - On-Site Wastewater Systems Funding)

Acquire workbook, education materials, and homeowner survey material (for more information see http://www.uwex.edu/homeasyst/).

Use of interns for personal resident surveys (especially lakeshore) and book distribution

Have homeowners use Self Assessment (see Appendix N - Septic System Assessment)

Use Home*A*Syst Guide Chapter - Household Wastewater: Septic Systems and Other Treatment Methods - with assistance in developing homeowner on-site wastewater education.

Run regular education workshops on Household Wastewater Systems

Cayuga County Health & Human Services
Environmental Division

Elane Daly R.N., B.S.N., Director
Eileen A. O'Connor P.E., Director of Environmental Health

Inspection Type_____
Routine_____
Property Transfer_____
Refinance_____

Sewage Disposal System Site Assessment Inspection Document

As part of its **QUALITY CONTROL** service the Environmental Division of the Cayuga County Health & Human Services Department may revisit the site for verification of statements.

I. GENERAL INFORMATION

A. Property and System Information

1. Tax Map #:_____
   Town/ Village:_____
2. Owner:_____
3. Property exact location:_____
4. Owner's 911 Mailing Address:_____
   _____
   Zip Code:_____
5. Telephone:
   Home:_____
   Work:_____
   Property:_____
6. Prior Owner:_____
7. Select one that best describes location of sewage disposal system:
   - ☐ Borders MHWM of Owasco Lake or Little Sodus Bay.
   - ☐ Does not border Lake or Bay but is within 500 ft. of MHWH of Lake or Bay.
   - ☐ System located in Owasco Lake or Little Sodus Bay Watershed.
   - ☐ None of the above mentioned.
8. Property Use:
   - ☐ Residence
   - ☐ Multiple Residence
   - ☐ Vacant
   - ☐ Commercial: Type_____
   - ☐ Other - describe:_____
9. Does the Health Department have a construction or modification plan of the system on record?
   ☐ yes ☐ no
10. SPEDES permit? ☐ yes ☐ no
    Date SPEDES permit expires_____

B. System Information (Mark All That Apply)

11. Type of Wastewater System:
    - ☐ Septic Tank with Absorption Trenches
    - ☐ Septic Tank with Absorption Bed
    - ☐ Septic Tank with Seepage Pit (dry well)
    - ☐ Septic Tank with Sand Filter (effluent discharge to surface ☐ yes ☐ no)
    - ☐ Aerobic Septic Tank with Absorption Field
    - ☐ Seepage Pit (dry well) <u>without</u> Septic Tank)
    - ☐ Holding Tank
    - ☐ Privy
    - ☐ Commercial System
    - ☐ Unknown
12. Septic/Holding tank size_____(gallons)
    Date last pumped_____
    By whom_____
13. Absorption Field:
    Number of laterals_____
    Length of each lateral_____
    Total lateral length_____
    Overall bed dimensions_____
14. Dry Wells/Seepage pits: Number_____
    Size of each_____
15. Pump ☐ yes ☐ no;
    Dosing siphon ☐ yes ☐ no
    Is pump or dosing siphon equipped with an alarm? ☐ yes ☐ no
    Storage Capacity per pump cycle_____(gallons)

II. OWNER INTERVIEW

A. History (Show Certification I.D. card to owner and inform owner that signature will be required)

16. Date of system construction:_____
    Year house was built:_____
17. Date of any modifications to system:_____
18. Is the property used seasonally? ☐ yes ☐ no
19. Is the property currently occupied? ☐ yes ☐ no
20. How long has the property been currently occupied?_____(days/months/years)
21. Describe periods of maximum occupancy:
    _____
22. Average number of persons using the property
    _____

23. Number of:
a. Bedrooms (total # for multiple homes)_____
Bathrooms_____Hot Tubs_____
b. Toilets_____ Type: ☐ Old Standard
☐ New Standard ☐ Water Saving ☐ Other
c. Sinks_____Faucet Type:
☐ Old Standard ☐ Water Saving ☐ Other
d. Showers/Tubs_____Faucet Type:
☐ Old Standard ☐ Water Saving ☐ Other
e. Dishwashers_____Garbage Disposal_____
Washing Machines_____
f. Water Softener/Treatment Equipment
☐ yes ☐ no
Backwash Discharges into Septic System
☐ yes ☐ no

24. Has the septic system had any problems?
a. Odors ☐ yes ☐ no
b. Slow draining plumbing ☐ yes ☐ no
c. Backing up of sewage into house ☐ yes ☐ no
d .Surfacing of sewage ☐ yes ☐ no
e. Other, such as seasonal ☐ yes ☐ no
f. Describe any problems:_____

25. If system has an Aerobic Tank, when was tank last serviced_____(date)
_____(by whom) ☐ not applicable

26. Is holding tank equipped with alarm or other device to detect leakage or overflow?
☐ yes ☐ no ☐ not applicable

27. Does homeowner maintain log of holding tank or septic tank pump-out? ☐ yes ☐ no

28. Was log of holding tank or septic tank pump outs reviewed by inspector?
☐ yes ☐ no ☐ not applicable

29. If system has holding tank, what is frequency of pumping (eg. weekly, monthly, etc.)?
_____ ☐ not applicable

30. Are there any separate disposal systems (seepage pits/drywells) for the kitchen, second bath, laundry, etc.? ☐ yes ☐ no;
If yes, describe these drains and their location:
_____
_____

31. Are there any drainage pipes or storm drains on the property? ☐ yes ☐ no;
Are they private? ☐ yes ☐ no

32. What is your water supply;
☐ Public ☐ Lake ☐ Well ☐ Creek
☐ Other_____
Is the quantity of flow adequate? ☐ yes ☐ no

B. Owner Verification of Interview
Notice: In a written statement filed with the County, any person who knowingly makes a false statement which such person does not believe to be true has committed a crime under the laws of the State of New York punishable as a Class A Misdemeanor (PL Sec. 210.45).

I certify that to the best of my knowledge the information I have provided in this interview is correct.
Signature of Owner/Agent:

_____Date:_____
(must be an adult)

Agents title_____

III. SITE INSPECTION

A. Date and Review of System Plans
33. Date of Inspection:
_____
(If a three day test, enter all dates)

34. Did Inspector review construction or modification plans of system on file with the Health Department?
☐ yes ☐ no

B. Interior Plumbing
35.Does all wastewater discharge to the septic system? ☐ yes ☐ no

C. Sewage Disposal System
Provide comments and system/site sketch as described in the procedures guide. Use the designated "SYSTEM/SITE COMMENT AND SKETCH SHEET" attached to this form.

D. General Information (enter the following information based on the inspection)
36. Evidence of system problems:
a. Odors ☐ yes ☐ no
b. Saturated soils ☐ yes ☐ no
c. Lush vegetation ☐ yes ☐ no
d. Changes in vegetation ☐ yes ☐ no
e. Other ☐ yes ☐ no
Describe:_____

37. Were all drainage pipes inspected for dye?
☐ N/A ☐ yes ☐ no

38. Evidence of wastewater discharge to water course or ground surface: ☐ yes ☐ no
Describe:_____

39. Evidence of storm water ponding on system: ☐ yes ☐ no
Describe:_____

40. Evidence of storm water discharge to system: ☐ yes ☐ no
Describe:_____

41. Evidence of rock outcroppings: ☐ yes ☐ no
Describe:_____

42. Shortest distance from absorption area to (in feet):
a. Lake or Bay (MHWM), stream, spring, pond, etc.
_____
b. Nearest Property Line_____
c. Nearest Well-including those on adjacent property_____
d. Nearest Dwelling_____
e. Elevation of Lake or Bay (i.e. Owasco Lake, Little Sodus Bay, Cross Lake, etc.) at the day of inspection_____(feet)
f. Other pertinent features
_____

43. If the system has a pump: ☐ not applicable
a. Does the pump appear to operate properly? ☐ yes ☐ no
b. Does the pump basin have any visible overflows? ☐ yes ☐ no

E. Dye Testing (inform owner regarding the quantity of water to be used)

44. Which fixtures were turned on:
a. toilet ☐ yes ☐ no
b. bathtub/shower ☐ yes ☐ no
c. bathroom sink ☐ yes ☐ no
d. kitchen sink ☐ yes ☐ no
e. washing machine/utility sink ☐ yes ☐ no

45. Where was the dye introduced:
a. toilet ☐ yes ☐ no
b. bathtub/shower ☐ yes ☐ no
c. bathroom sink ☐ yes ☐ no
d. kitchen sink ☐ yes ☐ no
e. washing machine/utility sink ☐ yes ☐ no

46. Volume of water entered into system (Calculations)
Calculate flow rate (e.g. gallons per minute), the time dye introduced and the fixtures turned on, and the time fixtures turned off.
a. Routine Inspection: 20 gal/bedroom
flow rate_____ start time_____
stop time_____ total time_____
total volume_____(gals)
b. Property Transfer or Refinance Inspection (dwelling occupied for at least 15 consecutive days prior to test):
75 gal/bedroom; 150 gallons Minimum;
(Requires Septic Tank Pump-Out Report)
flow rate_____ start time_____
stop time_____ total time_____
total volume_____(gals)
c. Property Transfer or Refinance Inspection (dwelling unoccupied):
150 gal/bedroom x 3 days; (Requires Septic Tank Pump-Out Report)
Day 1: flow rate_____ start time_____
stop time_____ total time_____
volume_____(gals)
Day 2: flow rate_____ start time_____
stop time_____ total time_____
volume_____(gals)
Day 3: flow rate_____ start time_____
stop time_____ total time_____
volume_____(gals)

47. Evidence of dye: ☐ yes ☐ no
Describe location:_____

48. Date of re-visit:_____
(remember you must re-visit if a holding tank)

49. Evidence of dye: ☐ yes ☐ no
Describe location:_____

50. Does system pass inspection? ☐ yes ☐ no

F. Drainage Pipe Discharge Testing ☐ not applicable
For properties bordering the mean high water mark of Owasco Lake or Little Sodus Bay ONLY Note: Use additional sheets if more than one drainage pipe.

51. Describe location, diameter, length of private drainage pipe(s) sampled:_____
_____(also indicate on sketch)

52. Name of laboratory testing sample:
_____

53. Results of fecal coliform test:
_____
Date and time of sampling:
_____
(attach Chain of Custody and Report from Lab)

54. Results of second fecal coliform test(s):
_____
Date and time of sampling:
_____
(attach Chain of Custody and Report from Lab)

IV. INSPECTOR INFORMATION

_____TOWN

TAXMAP #_____

A. General Comments and /or Problems:

_____

_____

_____

_____

_____

_____

_____

B. Differences Between Information From Owner Interview, Health Department Records, And From Site Inspection.

Findings_____

_____

_____

_____

_____

_____

C. Inspector's Verification of Inspection

Notice: In a written statement filed with the County, any person who knowingly makes a false statement which such person does not believe to be true has committed a crime under the laws of The State of New York punishable as a Class A Misdemeanor (PL Sec. 210.45).

CERTIFICATION STATEMENT

I certify that I have personally inspected the sewage disposal system at this address and that the information reported below is true, and accurate and completed as of the time of inspection. The inspection was based on my training and experience in the proper function and maintenance of on-site sewage disposal systems.

Signature:_____Date:_____

(please sign)

Inspector:_____

Certification No:_____

(please print)

Disclaimer of Assessment: Neither the Inspector nor the County warranty operation of the sewage disposal system described in this assessment.

This report must be submitted to the Cayuga County Health Department within 30 business days of the site assessment. The inspector is required to notify the Cayuga County Health Department of a failed system within one business day of the site assessment inspection.

Appendix O

Household Hazardous Waste Educational Materials

Available by accessing the *Cayuga Lake Watershed Restoration & Protection Plan* on-line at http://www.gflrpc.org/cayhhwedmaterials.htm (Adobe Reader is required to print and view .pdf files)

Automotive Product Disposal

Cleaning & Maintenance Product Disposal

Household Hazardous Waste Disposal & Alternative Chart

Managing & Disposing of Household Hazardous Waste

Paint Disposal

Pesticide Disposal

Solvent Disposal

Appendix P

Major Federal Regulations Effecting Nonpoint Source Pollution

Clean Water Act

The Clean Water Act (CWA) (for more information see http://www.epa.gov/region5/defs/html/caa.htm) was passed in 1972 and signaled the creation of federal legislation to protect and restore the biological, chemical, and physical properties of the nation's water. This protection was to be achieved though legislation requiring a permit for the discharge of pollutants, the encouragement of best management practices to control pollution, and funding for the construction of sewage and wastewater treatment plants and facilities. The act was amended five years later and placed more stringent controls on the discharge of toxic materials and allowed states to assume responsibility over federal clean water programs.

The primary focus of the CWA and the 1977 amendments was the prevention of pollution discharges from point sources. In 1987 the act was again amended, this time to focus on nonpoint sources of pollution (NPS). The Section 319 Nonpoint Source Management Program was enacted to aid states, territories and tribal lands in reducing NPS. This is accomplished through technical and financial assistance, training, education, and the monitoring of projects aimed at curbing NPS. In addition, the EPA has requested that funding provided under section 106 of the act for water quality program assistance grants be used by states, territories, and tribal lands for the inclusion and development of programs that reduce NPS. In 1996, Section 319 funding was used in place of Clean Lakes Program (Section 314 Federal Water Pollution Control Act) funding to provide technical and financial assistance for restoring public lakes.

Stormwater and Erosion Control

Phase I of the USEPA's Storm Water Program (for more information see http://www.epa.gov/owm/sw/index.htm) was promulgated in 1990 under the CWA. Phase I relies on National Pollution Discharge Elimination System (NPDES) (for more information see http://www.epa.gov/owm/sw/index.htm#program) permit coverage to address storm water runoff from: (1) "medium" and "large" municipal separate storm water systems (MS4s) generally serving populations of 100,000 or greater, (2) construction activity disturbing 5 acres of land or greater, and (3) ten categories of industrial activity. In NYS NPDES permitting is under the purview of the NYSDEC, which issues a State Pollution Discharge Elimination System (SPDES) permit (for more information see Appendix I - Stormwater Management Regulations).

The Storm Water Phase II Final Rule (for more information see http://www.epa.gov/owm/sw/phase2/) was published on December 8, 1999. The permitting authority of the Storm Water Phase II Rule will be phased in over a 5-year period. The Phase II program expands the Phase I program by requiring additional operators of MS4s in urbanized areas and operators of small construction sites, through the use of NPDES permits, to implement programs and practices to control polluted storm water runoff.

Phase II is intended to further reduce adverse impacts to water quality and aquatic habitat by instituting the use of controls on the unregulated sources of stormwater discharges that have the greatest likelihood of causing continued environmental degradation, the environmental problems associated with discharges from MS4s in urbanized areas and discharges resulting from construction activity including lowering the construction activity threshold for a permit from 5 acres to 1 acre or more.

Additional Stormwater and Erosion Control Information (for more information see Appendix I - Stormwater Management Regulations)

Section 404 Wetlands

Section 404 of the CWA (for more information see http://www.epa.gov/owow/wetlands/facts/fact10.html) establishes a program to regulate the discharge of dredged and fill material into waters of the United States, including wetlands. EPA and the Army Corps of Engineers (Corps) jointly administer the program. In addition, the U.S. Fish and Wildlife Service, the National Marine Fisheries Service, and State resource agencies have important advisory roles. Activities in waters of the United States that are regulated under this program include fills for development, water resource projects (such as dams and levees), infrastructure development (such as highways and airports), and conversion of wetlands to uplands for farming and forestry.

The basic premise of the program is that no discharge of dredged or fill material can be permitted if a practicable alternative exists that is less damaging to the aquatic

environment or if the nation's waters would be significantly degraded. In other words, when you apply for a permit, you must show that you have a) taken steps to avoid wetland impacts where practicable; b) minimized potential impacts to wetlands; and c) provided compensation for any remaining, unavoidable impacts through activities to restore or create wetlands.

Regulated activities are controlled by a permit review process. An individual permit is usually required for potentially significant impacts. However, for most discharges that will have only minimal adverse effects, the Army Corps of Engineers often grants up-front general permits. These may be issued on a nationwide, regional, or state basis for particular categories of activities (for example, minor road crossings, utility line backfill, and bedding) as a means to expedite the permitting process.

Section 404(f) exempts some activities from regulation under Section 404. These activities include many ongoing farming, ranching, and silviculture practices. Farmers who own or manage wetlands are directly affected by two important Federal programs: (1) Section 404 of the CWA, which requires individuals to obtain a permit before discharging dredged or fill material into waters of the United States, including most wetlands, and (2) the Swampbuster provisions of the Food Security Act, which withholds certain Federal farm program benefits from farmers who convert or modify wetlands. Together, these two programs have helped to reduce the rate at which wetlands are converted to agriculture and other uses.

Total Maximum Daily Loads (TMDL)

Section 303(d)(1)(C) of the Clean Water Act and EPA's implementing regulations (40CFR Part 130) require states to identify those waterbodies that do not meet water quality standards after application of the technology-based effluent limitations required by the Act. The states are then required to develop a Total Maximum Daily Load (TMDL) (for more information see http://www.epa.gov/owow/tmdl/) analysis for the pollutants that are not meeting water quality standards in those waterbodies.

By definition, a TMDL specifies the allowable pollutant loading from all contributing sources (e.g., point sources, nonpoint sources, and natural background) at a level necessary to attain the applicable water quality standards with seasonal variations and a margin of safety that takes into account any lack of knowledge concerning the relationship between the sources of the pollutant and water quality.

Additional TMDL Information (for more information see http://www.dec.state.ny.us/website/dow/tmdl.html)

Clean Water Action Plan (CWAP)

In 1997, twenty-five years after the passage of the CWA, the Clean Water Action Plan (CWAP) was launched. As part of President Clinton's Clean Water Initiative, the CWAP provides funding for programs developed by the EPA and USDA in conjunction with other federal agencies and state and local governments focusing on restoring and sustaining the quality and health of water resources. The CWAP is based upon four primary elements:

Watershed Approach – more effective means of planning and managing water resources compared to approaches based on political boundaries.

Stricter Standards – tighter controls and enforcement of NPS regulations as they relate to water quality at the federal and state levels.

Stewardship – greater public and private involvement in the planning and management of natural resources and their protection from NPS at the state and local levels.

Informed Citizens and Officials – increase the monitoring and reporting of water quality and the effects of NPS with greater involvement of state and local officials and agencies.

Safe Water Drinking Act

The Safe Drinking Water Act (for more information see http://www.epa.gov/region5/defs/html/sdwa.htm) was passed in 1974 to protect drinking water supplies from harmful contaminants. The legislation attempts to provide safe drinking water through primary drinking water regulations, underground injection control regulations, and protection of sole source aquifers. In 1986 the act was revised to speed up implementation and included additional provisions for regulating contaminants, filtration systems, distributions systems, and wellhead protection systems.

The Safe Water Drinking Act establishes both health-related (primary) and nuisance-related (secondary) standards for public drinking water. Under the original legislation, the EPA set primary standards for 25

contaminants. The 1986 amendments required the EPA to include an additional 48 contaminants, raising the total number of chemicals regulated in drinking water to 83.

In August 1996, the Safe Water Drinking Act was amended to include a program that requires states to monitor and evaluate the quality of sources of drinking water supplies through the Source Water Assessment Program (SWAP) (for more information see http://www.epa.gov/safewater/sdwa/summ.html#1A). In addition, more stringent standards for drinking water and reporting of contaminant levels by water providers to their customers were also included. Other amendments passed in 1996 included financial assistance to communities attempting to upgrade or replace existing water treatment facilities and train and certify water treatment plant operators. The 1996 amendments also granted states the authority to require public water suppliers with over 10,000 customers to annually disclose the levels of contaminants in public water.

The Safe Drinking Water Act is important in that it not only protects the water humans consume directly, but also water used for agriculture and the production of livestock. The identification and control of NPS is a major consideration in attaining the standards set by the EPA to ensure the quality of water used for drinking and agricultural purposes.

Additional Information on Safe Water Drinking Act - 25 Years of the Safe Drinking Water Act: History and Trends (see http://www.epa.gov/safewater/sdwa/trends.html)

Coastal Zone Act

In 1990 under the Authority of Section 6217(g) of the Coastal Zone Act Reauthorization Amendments (CZARA) (for more information see http://www.epa.gov/owow/nps/czmact.html), the EPA issued Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters (for more information see http://www.epa.gov/owow/nps/MMGI/). This document is intended to serve as a compilation of technical measures that states should include in their coastal NPS control programs.

The management measures outlined therein are not designed to replace existing programs, but rather to compliment existing programs through updated technical documentation and the introduction of newly developed management measures. Management measures are defined in the CZARA as:

> *economically achievable measures for the control of … nonpoint sources of pollution, which reflect the greatest degree of pollutant reduction achievable through the application of the best available nonpoint pollution control practices, technologies, processes, siting criteria, operating methods, or other alternatives. (Section 6217(g)(5))*

The guidance provided is an attempt to focus on nonpoint sources that are regarded as large contributors to reduced water quality in coastal areas. The management measures apply to five main sources of NPS that threaten water quality throughout the nation. The five main sources are:

Agricultural runoff

Urban runoff

Forestry (silviculture) runoff

Marinas and recreational boating

Hydromodification (channelization and channel modifications, dams, and streambank and shoreline erosion)

Management measures are also included for wetlands, vegetated treatment systems, and riparian areas as applicable to NPS. The EPA has recognized that the most effective means of controlling NPS include measures aimed at controlling point source pollution as well. The overlap between point and nonpoint sources is substantial in many instances.

Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA)

Also passed in 1972, the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) (for more information see http://www.epa.gov/region5/defs/html/fifra.htm) provides for the control of the distribution, sale, and use of pesticides. Enforcement is accomplished through the regulations requiring users of pesticides to register at the time of purchase. Amendments to the law now require that persons applying pesticides be certified to reduce accidents and misuses that may result in increased NPS.

Appendix Q

State Agencies With Water Resources Regulatory Authority Effecting NPS

Department of State

The NYDOS, Division of Coastal Resources provides financial and technical assistance and promotes initiatives at the local, regional, and state level to protect and enhance the coastal ecosystems and economies of New York State. A large portion of the funding for the RPP is funded through the NYDOS, Division of Coastal Resources' Local Waterfront Revitalization Program. Technical assistance includes information and data on programs including CZARA, GIS data, and land use.

The NYDOS has a tremendous influence on land use regulation in New York State. While New York is a "home rule" state, the enabling legislation for the development of land use regulations and the process for developing, implementing, and appealing decisions based on them is the product of the NYSDOS.

Department of Environmental Conservation

NYSDEC is charged with conserving, improving, and protecting natural resources and the environment, and controlling water, land and air pollution, in order to enhance the health, safety and welfare of the people of the state and their overall economic and social well being. The NYSDEC attempts to reduce NPS through a number of activities including technical assistance for prevention, education, and monitoring and financial assistance for demonstration programs, improvement of existing facilities, and the construction of new ones.

The NYSDEC provides technical assistance and funding for programs aimed at preventing NPS through watershed management, dissemination of resources on best management practices, water quality monitoring, and assessing waterbodies throughout the state.

The New York Environmental Conservation Law (NYECL) contains several provisions relating to the implementation, monitoring, and enforcement of measures aimed at eliminating or reducing NPS. The NYECL establishes enforcement of penalties pertaining to the discharge of matter if such discharge violates the standards set in section 17-0101 regarding water quality and the endangerment of fisheries set in sections 17-0503, 11-1301 (1)(a), 71-01-919 (1)(b), 71-0923, and 71-0925.

Unified Watershed Assessments and Watershed Protection and Restoration Strategies

The NYSDEC has developed the Unified Watershed Assessments (UWA) (for more information see http://www.dec.state.ny.us/website/dow/uwa/index.htm) and Watershed Protection and Restoration Strategies (WRAPS) as a result of the federal Clean Water Action Plan (see Appendix P). Each of the watersheds within the state has been classified into one of four categories based on groundwater and surface water quality and impairments. The watersheds were then ranked according to the level of impairments and targeted for WRAPS and improvements based on these rankings.

Priority Waterbodies List (PWL)

Section 17-0301 of the New York Environmental Conservation Law (NYECL) establishes water quality standards and classifications of waterbodies in relation to these standards also known as the Priority Waterbodies List (PWL). Section 17-0101 requires "the use of all known available and reasonable methods to prevent and control the pollution of the waters of the state" to guarantee the quality of water in New York State waterbodies meets acceptable standards based on these classifications.

For more information see Appendix L

Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA)

The NYSDEC oversees implementation of the FIFRA (for more information see Appendix L) and groundwater protection.

State Environmental Quality Review Act (SEQRA)

The State Environmental Quality Review Act (SEQRA) (for more information see http://www.dec.state.ny.us/website/dcs/seqr/index.html) is a preventive measure that requires the completion of an Environmental Impact Assessment (EIA) and Environmental Impact Statement (EIS) for proposed state and local development. SEQRA requires investigation into alternative actions and the mitigation of harmful effects of the proposed development. Potential NPS can be remediated through revised design or other measures.

State Pollution Discharge Elimination System (SPDES)

In NYS, NPDES permitting is under the purview of the NYSDEC, which issues a State Pollution Discharge Elimination System (SPDES) permit.

Additional SPDES Information (see Appendix I)

Neighbor Notification Law

The Neighbor Notification Law, formally known as Chapter 285 of the Laws of 2000, added Sections 33-1004 and 33-1005 the Environmental Conservation Law. These new sections add requirements for 48 hour notice to neighbors for certain commercial lawn applications, posting of visual notification markers for most residential lawn applications, providing notice to occupants of multiple dwellings and other occupied structures, and posting of an information sign by retailers who sell general use lawn pesticides. New regulations (6 NYCRR Part 325 Section 41) to implement the Neighbor Notification Law go into effect on March 1, 2001.

The amendments to the Environmental Conservation Law and the new regulations are only effective in a County, or in New York City, that has adopted a local law to "opt into" the Neighbor Notification Law in its entirety and without any changes.

Additional Neighbor Notification Law Information (see http://www.dec.state.ny.us/website/dshm/pesticid/neighbor.htm)

Department of Agriculture & Markets

In addition, the NYS Department of Agriculture and Markets provides administrative support to the State Soil & Water Conservation Committee (SWCC) which in turn provides guidance to the county Soil & Water Conservation Districts (SWCD). SWCD's receive guidance from the SWCC in administering the NYS Agricultural Nonpoint Source Abatement and Control Program and planning and implementing Agricultural Environmental Management (AEM) programs (see Appendix H). The Agricultural Nonpoint Source Abatement and Control Program funds the Graze New York Program which assists farmers in select counties to implement more intensive grazing, practices.

Department of Health

The NYS Department of Health (DOH) monitors the impacts of NPS as it relates to the health of the citizens of New York through water quality monitoring and reporting programs. The New York Public Health Law includes statutes regulating the protection of public water supplies from contaminants due to source and nonpoint source pollution including the enactment of Watershed Rules and Regulations (see Appendix R). The commissioner of the NYSDOH and commissioners of County DOH's determine violations and subsequent penalties.

The 1996 amendments to the SWDA require states to evaluate the quality of sources of public drinking water. Beginning in 1998 and continuing through 2001, the NYSDOH will administer the Source Water Assessment Program (SWAP) (for more information see http://www.health.state.ny.us/nysdoh/water/swap.htm) to aid local and state efforts to develop and implement strategies to protect drinking water supplies from both point and nonpoint source pollutants. Under the enabling legislation and the Source Water Assessment Program, the NYSDOH is responsible for overseeing public water supply supervision and wellhead protection among other programs.

Appendix R

Watershed Rules and Regulations

Introduction

The New York State Public Health Law allows local water supply officials to initiate a process leading to enactment of watershed rules and regulations by the Commissioner of the State Health Department. These rules were first developed in the late 19th century to protect tributary streams and reservoirs used to supply drinking water. They were later applied to public well-fields and adjacent aquifer areas. Most of the nearly 200 public supply systems that have adopted watershed rules did so prior to 1940.

Watershed rules specify minimum linear setbacks for different uses. For example, many regulations prohibit the location of salt storage sites within 500 feet of public supply wells, reservoirs or tributary streams to reservoirs. Since 1972, setback standards have been promoted for activities involving synthetic organic chemicals; however, for this class of contaminants, a minimum distance may not be effective because of their persistence and ability to effect large areas over extended periods of time.

The limitations of existing watershed rules were documented in the 1981 NYSDOH sponsored study "Water Supply Source Protection Rules and Regulations Project." The report concludes that water supply protection regulations should be customized to the particular hydrogeologic conditions existing at the public supply wellfield or reservoir; and that the concept of minimum acceptable distance does not address the differences between types of potential contaminants such as pathogens and synthetic organic chemicals, nor the inherent characteristics of groundwater transport found in different geologic and hydrologic situations.

Watershed rules and regulations are unique in being the only controls specifically designed to protect public water supplies. These regulations are prepared jointly by the water purveyor and the NYSDOH local public health engineer. Enforcement responsibility, such as with the use of a Watershed Inspector, rests with the water purveyor, the district NYSDOH health officer, and in some cases, the city or county health department. This joint administration and enforcement is an advantage for small communities that may lack necessary resources and expertise.

Goal

Use existing watershed rules and regulations to assisting in preserving water quality in Cayuga Lake.

Recommendations

Watershed Inspector Potential Responsibilities:

Supervises on or more of several environmental health programs involving watershed areas, private water suppliers, private sewage disposal, bathing beaches and swimming pools, etc.

Responsible for the inspection of the watershed and enforcement of the rules and regulations governing the watershed

Participates in the watershed management planning process and implementation of approved practices

Conducts air and water pollution studies and soil percolation tests

Makes inspections and investigations and prepares reports and recommendations for protection of the environment

Serves notice of violation of environmental rules, regulations and statutes on appropriate parties and seeks corrections of violations observed and documented

Serves as consultant to local jurisdictions involving discussions, instructions and demonstrations

Studies present and proposed local regulations to determine conformity with state and federal environmental laws and regulations and confers with local officials regarding regulations which do not conform

Prepares and maintains records of activities

Conducts educational sessions regarding the environment and its protection for citizens, agencies and municipalities

Assists in law enforcement agencies, the Department of Environmental Conservation, and other similar agencies concerned with the protection of environment by reporting environmental violations, signing complaints, and testifying at prosecutions

Trains Public Health Sanitarians and Environmental Health Technicians

Performs other related tasks as directed

Intermunicipal Agreement

An INTERMUNICIPAL AGREEMENT between the following Municipalities hereafter referred to as Municipalities, and _____, a_____, with offices at _____, hereafter referred to as the Cooperative as authorized by:

WHEREAS, the Cooperative and the Municipalities are desirous of working together to implement watershed rules and regulations for the Cayuga Lake Watershed, and

WHEREAS, the Cooperative and the Municipalities are desirous of working together to implement the Cayuga Lake Watershed Restoration and Protection Plan, and

WHEREAS, the Municipalities and the Cooperative have an interest in protecting water quality and actively participating in the Cayuga Lake Watershed Cooperative, and

WHEREAS, the Municipalities and the Cooperative recognize the benefits of cooperating to achieve improved water quality; all have agreed to enter into a cooperative effort, which shall be, The Cayuga Lake Watershed Cooperative.

Pursuant to Section 7-741 of Village Law, the Board of Trustees may enter into agreements with other municipal corporations to undertake all or a portion of the powers, functions and duties vested in the Villages.

Pursuant to Section 284 of Town Law, the Town Board may enter into agreements with other municipal corporations to undertake all or a portion of the powers, functions and duties vested in the Town.

Section 10 Municipal Home Rule Law provides in part that a Town and/or a Village may adopt and amend local laws for the protection and enhancement of its physical and visual environment, and the government, protection, order, conduct, safety, health, and well-being of persons or property therein.

Section 1100 of the Public Health Law provides that the Department of Health may make rules for the protection from contamination of any public supplies of potable water.

BACKGROUND

Cayuga Lake is situated in parts of the Counties of Cayuga, Cortland, Schuyler, Seneca, Tompkins, and Tioga. The Cities, Towns and Villages of , are purveyors of public water. Cayuga Lake is of high scenic, aesthetic, recreational, environmental, and economic value to residents and visitors alike. Shoreline and lake-view property tax revenues are increasingly important to the municipalities along the lake and in the watershed. Cayuga Lake, with its watershed, is a Community Resource within the meaning of Town Law Section 284 and Village Law 7-741.

PURPOSE

The purpose of the Cayuga Lake Watershed Cooperative is to protect and improve the purity of waters in the Cayuga Lake Watershed.

STAFFING

The Municipalities will contract with the Cooperative for the implementation of the Cayuga Lake Watershed Rules and Regulations, and by this agreement will financially participate in the implementation plan.

The Cooperative, through the _____ Heath Department, will hire a person who will be responsible for the inspection of the Watershed and enforcement of the Rules and Regulations governing the Cayuga Lake Watershed.

The Watershed Inspector will participate in the Watershed Management Planning process and implementation of approved practices.

ANNUAL BUDGET

The accounting year of the Cayuga Lake Watershed Cooperative is a calendar year beginning January 1 and ending December 31.

The first year budget and financial obligations for each municipality are outlined in Attachment ___. Financial obligation for Year 1 will be prorated.

On or before each August 1, the Cooperative will adopt and recommend to the municipalities a preliminary budget of income, expenses, and capital expense for the next accounting year and a similar budget for all subsequent years.

Annual payment by municipalities to the Cooperative will be made no later than February 1.

Payments made by the municipalities to the Cooperative may serve, in part and permitted by law and grant requirements, as a portion of the required local match for grants approved and coordinated by the Cooperative.

REPORTING

The Cooperative will provide each municipality with a quarterly report which will include activities, violations, outcomes, fines, and a financial (budget) report.

The Cooperative will provide each municipality with a work plan outlining activities planning for the year on February 1 of each year.

The Cooperative and municipalities will meet each February for an Annual Report and discussion of the previous and next year's activities.

All complaints received by the municipalities pertaining to violations or potential violations of the watershed should be forwarded to the Cooperative immediately.

Municipalities will submit to the all copies of permit applications upon receipt.

AMENDMENT/EXPIRATION OF MUNICIPAL AGREEMENT

This agreement shall remain in effect for an initial five (5) year period. It shall commence in the with an automatic five year renewal thereafter. Cancellation by any of the parties shall be by written notice delivered to all the other parties one year prior to any five year renewal date.

FISCAL ADMINISTRATION

EFFECTIVE DATES

WATERSHED INSPECTION PROGRAM

Approximate Annual Cost

Budget Item	Budget Amount	Totals
Personal Services	32,000.00	32,000.00
Other Services		
Data Processing/Communication Eqpt.	2,500.00	
Training	1,000.00	
Phone	1,000.00	
Office Supplies & Copies	750.00	
Motor Eqpt. Repair/Supplies	500.00	
Gasoline	1,000.00	
Printing/Advertising	2,000.00	
Uniform Expense	400.00	
Laboratory Fee - Env. Health	1,000.00	
Field Supplies	250.00	10,400.00
Fringes	8,000.00	8,000.00
Total		$50,400.00

Source: Livingston County Department of Health

Appendix S

Cayuga Lake Watershed

Very Severe Streambank Segments/Riparian Corridors

Sub Watershed Name	Location	Tributary Miles	Stream Rank (Formula)
Big Salmon Creek	E side of Stewart Corners Rd., 75'	64.29	390.9
Big Salmon Creek	W side of Rt. 34, 200'	64.29	712.4
Big Salmon Creek	W side of Rt. 34, 200'	64.29	712.4
Cayuga Inlet	W side of Dassance Rd., 25'	83.65	354.8
Cayuga Inlet	W side of Sheffield Rd., 100'	83.65	362.4
Cayuga Inlet	100' downstream from convergence of Inlet and Enfield Creek	83.65	365.7
Cayuga Inlet	NW side of Dug Rd., 300'	83.65	381.9
Cayuga Inlet	E side of Taggert Rd., 75'	83.65	393.0
Cayuga Inlet	E side of Seven Mile Dr., 10'	83.65	393.8
Cayuga Inlet	E side of Seven Mile Dr., 350'	83.65	393.8
Cayuga Inlet	S side of Smith Rd., 50'	83.65	395.4
Cayuga Inlet	W side of Brown Rd., 200'	83.65	398.8
Cayuga Inlet	E side of Rt. 96, 75'	83.65	400.0
Cayuga Inlet	W side of Barnes Hill Rd., 50'	83.65	409.6
Cayuga Inlet	W side of Culver Rd., 150'	83.65	421.8
Cayuga Inlet	N side of Vanbuskirk Gulf Rd., 50'	83.65	430.6
Cayuga Inlet	W side of Brown Rd., 50'	83.65	434.6
Cayuga Inlet	E side of Rt. 13, 300'	83.65	435.4
Cayuga Inlet	E side of Rt. 96, 75'	83.65	435.9
Cayuga Inlet	S side of Rt. 79, 100'	83.65	439.2
Cayuga Inlet	600' upstream from railroad	83.65	443.3
Cayuga Inlet	500' upstream from railroad	83.65	443.3
Cayuga Inlet	W side of Rt. 13A, 150'	83.65	449.3
Cayuga Inlet	SE side of Town Line Rd., 300'	83.65	473.5
Cayuga Inlet	W side of Rt. 96, 75'	83.65	484.7
Cayuga Inlet	W side of Rt. 96, 25'	83.65	484.7
Cayuga Inlet	W side of Shaffer Rd., 75'	83.65	486.3
Cayuga Inlet	W side of Calkins Rd., 200'	83.65	495.1
Cayuga Inlet	SE side of Rt. 79, 200'	83.65	504.8
Cayuga Inlet	W side of Rt. 13, 100'	83.65	625.6
Cayuga Inlet	S side of Rt. 79, 200'	83.65	631.6
Cayuga Inlet	W side of Bruce Hill Rd., 200'	83.65	633.6
Cayuga Inlet	E side of Sandbank Rd., 200'	83.65	747.0
Cayuga Inlet	W side of Seely Hill Rd., 150'	83.65	902.0
Cayuga Inlet	E side of Sandbank Rd., 100'	83.65	1109.5
Cayuga Inlet	N side of Blackslee Hill Rd., 75'	83.65	1130.4
Cayuga Inlet	W side of Elm St., 100'	83.65	1315.5
Fall Creek	N side of Nye Rd., 100'	150.79	375.5
Fall Creek	E side of Youngs Rd., 200'	150.79	376.6
Fall Creek	W side of Ringwood Rd., 100'	150.79	381.4
Fall Creek	E side of Pinckney Rd., 100'	150.79	384.8
Fall Creek	N side of Cemetery Rd., 50'	150.79	397.9
Fall Creek	S side of Lake St., 100'	150.79	398.5
Fall Creek	N side of Rt. 13, 100'	150.79	400.0
Fall Creek	W side of Rt. 366, 100'	150.79	587.1
Fall Creek	E side of Atwood Rd., 100'	150.79	762.7
Sixmile Creek	At confluence of trib., about 1/4 mile into woods	80.75	375.1
Sixmile Creek	Right trib at confluence	80.75	375.1
Taughannock Creek	W side of Rt. 89, 40'	62.67	385.5
Virgil Creek	N side of Ferguson Rd. Ext., 100'	79.03	386.8

Source: Cayuga Lake Watershed Streambank Inventory, 2000, Genesee/Finger Lakes Regional Planning Council

Municipal Regulatory Controls for Wetlands, Shoreline & Riparian Corridors

	Comprehensive Plan	Zoning	Subdivision	Site Plan
City of Ithaca		Wetlands, floodplains, steep slopes or other areas not normally appropriate for building		
Town of Caroline			Establish buffers along streams and water courses, any disturbance shall be mitigated	
Town of Catherine			>100 ft. from normal high W line of any stream	
Town of Cortlandville			No development approval on uninhabitable land subject to flood	
Town of Covert			No development approval on uninhabitable land subject to flood	
Town of Danby			Wetland preservation	
Town of Dryden			Planning Board may require bank stabilization. No development approval on uninhabitable land subject to flood	
Town of Fayette			No development approval on uninhabitable land subject to flood. Wherever possible retain large trees, groves, water courses, water falls	
Town of Groton			No development approval on uninhabitable land subject to flood	
Town of Homer	Encourage to preserve	Establishment of Aquifer Protection District, including Wellhead Protection Area (Area I), Primary Aquifer Area (including Environmental Conservation Law wetlands) (Area II), and Principal Aquifer Area (including Environmental Conservation Law wetlands (area III), Tributary Watershed Area) (Area IV). Prohibited uses include pavement/impervious parking with area >12,000 sq feet in Areas I and II.	No development approval on uninhabitable land subject to flood	
Town of Ithaca		Six Mile Creek Valley Conservation District: Planning Board requires adequacy --protection of wetlands, water courses. Six Mile Creek Valley Conservation District: no construction within 100yr flood area (200 ft distance) and 50ft away from centerline of area that carries water 6months a year		

	Comprehensive Plan	Zoning	Subdivision	Site Plan
Town of Lansing		Construction and development shall be adequate and in accordance with NYS Environmental Conservation Law, Article 24, Clean Water Act and US Army Corps of Engineers and EPA requirements	Planning Board decides if construction and realignment of wetland	
Town of Romulus	Least possible development on wetlands			
Town of Seneca Falls		Permitted uses on wetlands: deposit or removal of natural products by recreation or sport fishing, hunting etc., ag practice (crops, livestock), selective cutting timber. Development in accordance with PUD provisions, preserving it as open space. Special uses on wetlands: drainage, dredging, excavation, construction and reconstruction of structures, obstructions for any purpose. No permanent structure w/in 50ft of the edge of the bank of any water course	No development approval on uninhabitable land subject to flood	
Town of Spencer			Leave wetlands unaltered and protect by easements, etc	
Town of Summer Hill				Shoreline standards: on-site sewage tile system >100 feet and septic systems >50feet away from shore line (high water mark). Boat service facility including oil tanks within 100 feet of shoreline must prevent leaks, spills (raised earthen or paved berm or dike)
Town of Varick		No development approval on uninhabitable land subject to flood		
Village of Aurora		Subdivision: where vegetation has been removed or damaged		
Village of Cayuga		Lake Residential District: build 10 feet away from high water line		
Village of Dryden		All water courses adjacent to the subdivision must have erosion control. Maximum retention		
Village of Trumansburg	Protection of wetlands from destructive development			No development approval on uninhabitable land subject to flood

Appendix T

Model Intermunicipal Agreement Regarding

The Cayuga Lake Watershed Restoration and Protection Plan

THIS AGREEMENT, made _____ by and between the City of _____ and the Towns of _____ and the Villages of_____.

WITNESSETH THAT:

WHEREAS, each of the parties to this agreement has formally adopted the Cayuga Lake Watershed Restoration and Protection Plan, hereafter referred to as the Plan, which will provide for the long term protection of waters of Cayuga Lake Watershed; and

WHEREAS, the parties of this agreement, desire to form and send representatives to an organization call the Cayuga Lake Watershed Intermunicipal Organization, hereinafter referred to as the IO, that will administer and oversee the continuation of the planning process and the implementation of the Plan; and

WHEREAS, the parties to this agreement desire to provide for the day to day coordination of the Plan; and

WHEREAS, the Council will have ultimate authority over all municipal contributions and the dispersal of those funds; and

WHEREAS, under Article 5-G Section 119-o of the General Municipal Law of the State of New York, municipalities have the authority to enter into intermunicipal agreements and jointly perform services regarding subjects each separately has the power to perform; and

WHEREAS, this intermunicipal agreement is voluntary and will not be construed so as to interfere with or diminish any municipal powers, authority, or regulatory authority of any of the participating municipalities.

NOW, THEREFORE, in consideration of the terms and conditions herein contained, the parties to this agreement do hereby agree as follows:

FIRST: This agreement superseeds all previous IO Cooperative Agreements

SECOND: The participating municipalities will work together cooperatively in the decision-making process and share the leadership and ownership in continuing the planning process and implementing the Plan.

THIRD: Employees or contractors hired for the performance of the work under the Plan will be hired with no discrimination by reason of race, creed, color, sex, age, physical disability, or national origin.

FOURTH: The participating municipalities will provide the necessary funding based on a formula attached in Addendum ____, by _____ date of each year to assist in continuing the planning process and implement the Plan.

FIFTH: If the IO should cease to exist the funds still available will be returned to the parties to this agreement under the same formula originally gained.

SIXTH: Through the continuation of the planning process and the implementation of the Plan the various benefits conveyed by Cayuga Lake and its watershed will be maintained or enhanced.

SEVENTH: That any party to this agreement may terminate its participation within the IO at any time but must do so by notifying within thirty (30) days all other parties in writing of the determination, reasons for the termination, and the effective date thereof. Withdrawal from the agreement by one party shall not operate to terminate the agreement, which shall continue in full force and effect with respect to all other parties.

EIGHTH: That the Bylaws of the IO may only be modified upon the consent of the IO (Addendum _____)

NINTH: This agreement shall be for a _____ year period commencing on _____ and ending on _____.

TENTH: This agreement authorizes the IO to enter into contracts within the limits of, and subject to, the appropriations provided by the participating municipalities and other available secured funding sources.

ELEVENTH: If any term or provision of this agreement or the application thereof shall, to any extent, be invalidated or unenforceable, the remainder of this agreement or the application of such term or provision, other than those to which it is held invalid or unenforceable, shall be unaffected thereby, and each term and provision of the agreement shall be valid and enforceable to the fullest extent permitted by law.

IN WITNESS WHEREOF, the following parties through their Chief Elected Officials have executed this agreement.

Adopted from the Canandiagua Lake Watershed Intermunicipal Agreement

Municipal Land Use Regulation and Control in the Cayuga Lake Watershed

Cayuga County	Sediment & Erosion Control Laws	Other Municipal Boards and Committees	Comprehensive Plan	Subdivision Ordinance	Drainage Plan	Vegetation Retention Laws	Other Plans	Other Ordinances	Planning Board	Board of Appeals	Municipal Board	Conservation Board	Zoning
Town of Aurelius	Yes	No	No	No	No	No	No	No	Yes	Yes	Yes	No	No
Village of Aurora	Yes	Yes	Yes	No	Yes*	No	No	Yes	Yes	Yes	Yes	No	Yes
Village of Cayuga	Yes	No	Yes	No	No	No	Yes	Yes	Yes	Yes	Yes	No	No
Town of Fleming	Yes	No	Yes	No	No	No	No	No	Yes	Yes	Yes	No	
Town of Genoa	No	No	No	No	Yes*	No	Yes	Yes	No	Yes	Yes	No	No
Town of Ledyard	Yes	No	No	No	No	No	No	Yes	Yes	Yes	Yes	No	Yes
Town of Locke	*Did not return survey*												
Town of Scipio	Yes	No	No	No	No	No	No	No	Yes	Yes	Yes	No	No
Town of Sempronius	No	No	No	No	No	No	No	Yes	Yes	Yes	Yes	No	Yes
Town of Springport	Yes	No	No	No	No	No	No	No	Yes	Yes	Yes	No	No
Town of Summer Hill	No	No	Yes	No	No	No	Yes	Yes	Yes	Yes (Variance Board)	Yes	No	Yes
Village of Union Springs	Yes	Yes	Yes	No	No	No	No	No	Yes	Yes	Yes	No	No
Town of Venice	No	No	No	No	No	No	No	No	No	No	Yes	No	No
Cortland County													
Town of Cortlandville	Yes	Yes	Yes	No	No	No	No	No	Yes	Yes	Yes	No	
Town of Harford	Yes	Do not Know	No	No	No	No	Yes	Yes	Yes	Yes	Yes	No	No
Town of Homer	Yes	Yes	Yes	No	No	No	Yes	No	Yes	Yes	Yes	No	Yes
Town of Scott	Yes	No	Yes	No	No	No	Yes	No	Yes	Yes	Yes	No	Yes
Town of Virgil	Yes	No	Yes	No	No	No	No	Yes	Yes	Yes	Yes	No	Yes
Schuyler County													
Town of Catharine	Yes	No	Yes	No	No	No	No	No	Yes	Yes	Yes	No	No
Town of Hector	No	No	No	No	No	No	No	Yes	No	No	Yes	No	Yes
Seneca County													
Town of Covert	No	No	Yes	No	No	No	No	Yes	Yes	No	Yes	No	No
Town of Fayette	Yes	Yes	Yes	No	No	No	No	No	Yes	Yes	Yes	No	No
Village of Interlaken	No	No	No	No	No	No	No	Yes	No	No	Yes	Yes	No
Town of Lodi	No	No	No	No	No	No	No	No	Yes	No	No	No	No
Town of Ovid	No	No	No	No	No	No	No	No	No	No	Yes	No	No
Town of Romulus	No	Yes	No	No	No	No	No	Yes	Yes	No	No	No	No
Town of Seneca Falls	Yes	Yes	Yes	No	No	No	No	Yes	Yes	Yes	Yes	No	No
Town of Varick	Yes	No	Yes	No	No	No	No	Yes	Yes	Yes	Yes	No	No
Tioga County													
Town of Spencer	No	No	Yes	No	No	No	No	No	Yes	No	Yes	No	No
Tompkins County													
V of Cayuga Heights	Yes	Yes	Yes	No	No	No	No	Yes	Yes	Yes	No	No	Yes
Town of Caroline	No	No	Yes	No	No	No	No	Yes	Yes	No	Yes	No	Yes
Town of Danby	Yes	Yes	Yes	No	No	No	No	No	Yes	Yes	Yes	No	No
Town of Dryden	Yes	Yes	Yes	No	No	No	No	No	Yes	Yes	Yes	No	No
Village of Dryden	Yes	Yes	Yes	No	No	No	No	No	Yes	Yes	Yes	No	No
Town of Enfield	No	No	Yes	No	No	No	No	Yes	Yes	No	Yes	No	No
Village of Freeville	Yes	Yes	Yes	No	No	No	No	Yes	Yes	Yes	Yes	No	No
Town of Groton	Yes	Yes	Yes	No	No	No	No	Yes	Yes	Yes	Yes	No	No
City of Ithaca	Yes	Yes	Yes	No	No	No	Yes	Yes	Yes	Yes	Yos (Common Council)	No	Yes
Town of Ithaca	Yes	Yes	Yes	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Town of Lansing	Yes	Yes	Yes	No	No	No	No	Yes	Yes	Yes	Yes	No	Yes
Village of Lansing	Yes	Yes	Yes	Yes*	Yes*	Yes*	Yes	Yes	Yes	Yes	No	No	Yes
Town of Newfield	No	No	Yes	Yes	No	No	No	No	No	No	Yes	No	No
Village of Trumansburg	Yes	Yes	Yes	No	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Town of Ulysses	Yes	Yes	Yes	No	No	No	No	No	Yes	Yes	Yes	No	Yes

• Part of zoning ordinance

Source: Genesee/Finger Lakes Regional Planning Council Land Use Regulation & Control Inventory (2001)

For a complete analysis of all municipal land use regulations and controls in the Cayuga Lake Watershed see the *RPP* On-Line at http://www.cayugawatershed.org

Appendix U

County Agencies and Programs

The counties in the Cayuga Lake Watershed each have a committee or council responsible for providing guidance and monitoring of issues related to county water quality and resources. Each of the groups consists of members from various agencies including planning, DOH, SWCD, and others. NPS is an oft-discussed topic among the committees, agencies, and councils. Studies and reports conducted in each county have monitored and assessed NPS to assist in developing guidance for controlling NPS.

County Water Quality and Resource Groups

Cayuga County Water Quality Management Agency

Cortland County Water Quality Coordinating Committee

Schuyler County Water Quality Coordinating Committee

Seneca County Water Quality Committee

Tioga County Water Quality Coordinating Committee

Tompkins County Water Resources Council

Each county has a SWCD responsible for implementing the NYS Agricultural Nonpoint Source Abatement and Control Program. The New York Soil and Water Conservation Law administered by the SWCC requires owners of agriculture, livestock, or timber producing lands to apply to their respective county's SWCD for a soil and water conservation plan. The SWCD is obligated to produce such a plan upon request by the owner of the land, but there is no penalty for not implementing the plan upon its completion. The Agricultural Nonpoint Source Abatement and Control Program is often included as part of the Agricultural Environmental Management (AEM) (see Appendix H - Agricultural Programs) program that produces such plans.

Each county or region has a Health Department which oversees the drinking water supplies. This can include implementation of the Source Water Assessment Program (SWAP) *(for more information see http://www.dec.state.ny.us/website/dow/uwa/index.htm)*, inspection of on-site wastewater systems, and enactment of Watershed Rules and Regulations (see Appendix R).

Each county in the watershed has a Planning Department that oversees the development of planning activities, planning boards, and supports municipal local land use regulation and control efforts. The following table outlines the counties land use regulation and control activities:

Other countywide ordinances, laws, plans, and programs that address NPS are also in place within the Cayuga Lake Watershed. The *Cayuga County Sanitary Code* requires periodic inspection of all septic systems within the watershed. In Seneca County a countywide drainage plan assists in the management of NPS through standards set to protect and enhance water.

County	Comprehensive Plan	Drainage Plan	Sediment & Erosion Control Laws	Vegetation Retention Laws	Other County Plans	Other County Ordinances	Planning Board/ Commission
Cayuga	No	No	No	No	Yes (Land Use)	Yes (Sanitary Code)	Yes
Cortland	Yes	No	No	No	No	No	Yes
Schuyler	Yes	No	No	No	Yes (Water Quality)	Yes (Watershed Protection)	Yes
Seneca	No*	No	No	No	Yes (Agriculture)	No	Yes
Tioga	Yes	No	No	No	Yes (Agriculture and Future Use)	No	Yes
Tompkins	Yes	No	No	No	Yes	Yes	No

* Prepared but not adopted

Through the 1994 *Watershed Protection Law of Schuyler County*, NPS management is attained through regulation and enforcement of sewage disposal and wastewater treatment systems throughout the county. Provisions are stipulated for the discharge and disposal of sewage and the design, construction, and certification of wastewater treatment facilities.

Five of the six counties in the watershed have planning boards or commissions responsible for conducting reviews and issuing approval for proposed development. The Tompkins County Planning Department, under provisions of their Charter, is responsible for reviewing development proposals. Although they do not have a planning board or commission at the county level, they do have a Planning Advisory Board that assumes the functions of a planning board. Cayuga, Cortland, Schuyler, and Tompkins Counties each have an environmental management council while Tioga County has a conservation board. These groups monitor and advise on issues related to development and sustaining/improving the environmental character of their respective counties. None of the counties in the watershed currently have sediment and erosion control laws or vegetation retention laws.

In addition to its comprehensive plan, Tioga County has a future land use plan and an agriculture and farmland protection plan. The *Tioga County Agriculture and Farmland Protection Plan* focuses on retaining and building upon the economic benefits of agriculture in the county through more viable farming practices. Tompkins County has an approved Farmland Protection Plan.

Appendix V

Glossary of Terms

Adsorption. The adhesion of one substance to the surface of another.

Aeration. A process that involves pumping or lifting water from a lake bottom (hypolimnion) for exposure to the atmosphere, with the oxygenated waters being returned back to the bottom.

Agricultural Conservation and Stabilization Service. Federal government agency that works with farmers to improve the efficiency of agricultural operations and protect the long-term condition of the farmers' soil and water resources.

Agricultural Management Practices. Practices whose goals are to maintain soil fertility, increase farm productivity, and reduce pollutant loading in receiving waters. Pollutants from agricultural sources that can be controlled through the use of management practices include sediment, nutrients, pesticides, and pathogens.

Algae. Microscopic plants, considered primary producers in the lake food web, capable of photosynthesis.

Algal blooms. Massive growths of phytoplankton, commonly occurring in lakes in the spring. When the phytoplankton are profuse, the water may be stained bright green or blue and the lake rendered unfit for swimming or drinking.

Alluvium. A general term for unconsolidated material deposited by a stream or other body of running water.

Animal unit. A unit of measurement for any animal feeding operation calculated by adding the following numbers: the number of slaughter and feeder cattle multiplied by 1.0, plus the number of mature dairy cattle multiplied by 1.4, plus the number of swine weighing over 25 kilograms (approximately 55 pounds) multiplied by 0.4, plus the number of sheep multiplied by 0.1, plus the number of horses multiplied by 2.0.

Aquatic herbicides. Chemicals, such as Diquat and 2,4-D, used to eradicate aquatic plants.

Aquifer. A water-bearing rock unit (unconsolidated or bedrock) that will yield water in a usable quantity to a well or spring.

Artesian aquifer. Groundwater that rises to an elevation above the water-bearing unit from which it is released, as a result of a confining layer. In common usage, artesian usually means discharging above the land surface.

Backflow prevention device: A safety device used to prevent water pollution or contamination by reventing flow of water and/or chemicals in the opposite direction of that intended (ASAE, 1989).

Baseflow. Sustained or fair-weather flow of a stream.

Bedding plane. In bedrock a fracture that is parallel to the bedrock unit, usually found where two bedrock units of different origins (i.e., shale and limestone) are in contact. Potentially a zone of water movement.

Bedrock. The massive formations that underlie the soil and other unconsolidated surficial materials.

Best Management Practices. A series of approved practices that can be used to address specific pollution problems. Examples include changes in land use activities, a ban on pesticides, or following design standards for installing a septic system.

Best use. A series of classifications designating the most desired use of the water and bordering lands. 14 classifications are used, ranging from AA (source of water supply for drinking, culinary, or food processing purposes) to II (waters which constitute the Interstate Sanitation District).

Bioaccumulate. The process by which toxic pollutants (such as heavy metals, inorganic chemicals, and organic chemicals) amass in the tissues of organisms after repeated intake or exposure.

Biochemical Oxygen Demand (BOD). The consumption of oxygen caused by decomposition or metabolism of biodegradable organic compounds by microbes.

Biodegradation. The metabolic breakdown of materials into simpler components by living organisms.

Bog/Marsh/Swamp. Land that has less than 10.0 percent stocking with live trees and which characteristically supports low, generally herbaceous or shrubby vegetation, and which is intermittently covered with water during all seasons; includes tidal areas that are covered with brackish water during high tides.

Buffer strips. Strips of land along water courses that contain natural and (or) planted grasses, plants and trees that filter out sediment and increase uptake of nutrients in runoff.

Clean Water Act. National environmental law enforced by the United States Environmental Protection Agency (USEPA) that regulates water pollution.

Cluster septic systems. Method of waste disposal where wastewater is transported via small-diameter sewers to a drainfield, mound or sand filter which is used by several residences. Used where site conditions prohibit the use of on-lot systems.

Coliform. Bacteria group often involved in contamination of water. Can be associated with the intestinal tract of humans (fecal coliform) or from feces and decaying lake matter (total coliform). Coliform can also be an indicator organism and not necessarily a pathogen.

Combined Sewage Overflow (CSO). A water drainage pipeline that receives surface runoff as well as sanitary or industrial wastewater.

Composting. A controlled process of degrading organic matter by microorganisms

Cone of depression. The drawdown of the water table caused by the withdrawal of water by a well. Usually a circular depression (cone) but may vary in shape dependent on the properties of the material from which the water is being taken.

Confined aquifer. An aquifer bounded by materials having a distinctly lower hydraulic conductivity than the aquifer itself.

Conservation easements. A legal document that restricts the type and amount of development that may take place on a parcel of land. They are often developed for open space preservation, historic preservation, protection of natural habitats, and preservation of areas for public recreation or education.

Contaminant plume. An elongated and mobile column or band of a pollutant moving through the subsurface.

Cover crops. Grasses and other close-growing crops grown on fields during the winter to provide soil protection between harvest and spring plowing. Cover crops are also used to enrich soils.

Crop rotation. Growing different crops in a sequential pattern on the same field. Crops that conserve soil and nutrients, alternated with those that deplete them provide opportunities for maintaining soil productivity, reducing soil erosion, and re- ducing fertilizer usage. Rotations may prevent the build-up of large pest populations that can occur when single crops are grown continuously on a field.

Cropland. Land that currently supports agricultural crops including silage and feed grains, bare farm fields resulting from cultivation or harvest, and maintained orchards.

Cubic-foot stand-volume class. A classification of forest land based on net cubic-foot volume of all live trees per acre.

Denitrification. The chemical or biochemical reduction of nitrate or nitrite to gaseous nitrogen, either as molecular nitrogen or as an oxide of nitrogen

Dense Non-Aqueous Phase Liquids (DNAPLs). Organic compounds more dense than water that tend to sink to the bottom of a water column.

Deposition. The accumulation of material dropped because of a slackening movement of the transporting material water or wind.

Detention basin. A constructed holding area for storm-water runoff. Basins can protect streams and lakes from sediment and other pollutants derived from up-gradient land use activities. The removal rate for particulate pollutants depends on the volume of runoff, length of time provided for sedimentation, and the settleability characteristics of the particulate matter. Artificial marshes can be incorporated within the basins to provide additional biological removal of pollutants.

Dilution. A lowering of the concentration of a chemical constituent in a water column through mixing with a less concentrated water column.

Discharge area. An area in which water is lost from the zone of saturation.

Dissolved oxygen. The quantity of oxygen dissolved in the water. In lakes, the amount of oxygen dispersed in the water helps determine the degree of stratification, and the potential for depletion of oxygen, fish and other aquatic organisms. Dissolved oxygen is affected by temperature (as water temperature decreases, increasing amounts of oxygen can be dissolved in water), time of day (photosynthetic plants create oxygen during the day, and use oxygen at night), and pollution (*aerobic* bacteria and other organisms require oxygen for the consumption of wastes).

Diversion. A channel, embankment, or other man-made structure constructed to divert water from one area to.

Drainage basin. Used interchangeably with *catchment* or *watershed.* The term can also imply a larger area containing several watersheds or *sub-basins.*

Drainage class (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:

Excessively drained.---Water is removed from the soil very rapidly. Excessively drained soils are commonly very coarse textured, rocky, or shallow. Some are steep. All are free of the mottling related to wetness.

Somewhat excessively drained.---Water is removed from the soil rapidly. Many somewhat excessively drained soils are sandy and rapidly pervious. Some are shallow. Some are so steep that much of the water they receive is lost as runoff. All are free of the mottling related to wetness.

Well drained.---Water is removed from the soil readily, but not rapidly. It is available to plants throughout most of the growing season, and wetness does not inhibit growth of roots for significant periods during most growing seasons. Well drained soils are commonly medium textured. They are mainly free of mottling.

Moderately well drained.---Water is removed from the soil somewhat slowly during some periods. Moderately well drained soils are wet for only a short time during the growing season, but periodically for long enough that most mesophytic crops are affected. They commonly have a slowly pervious layer within or directly below the solum, or periodically receive high rainfall, or both.

Somewhat poorly drained.---Water is removed slowly enough that the soil is wet for significant periods during the growing season. Wetness markedly restricts the growth of mesophytic crops unless artificial drainage is provided. Somewhat poorly drained soils commonly have a slowly pervious layer, a high water table, additional water from seepage, nearly continuous rainfall, or a combination of these.

Poorly drained.---Water is removed so slowly that the soil is saturated period- ically during the growing season or remains wet for long periods. Free water is commonly at or near the surface for long enough during the growing season that most mesophytic crops cannot be grown unless the soil is artificially drained. The soil is not continuously saturated in layers directly below plow depth. Poor drainage results from a high water table, a slowly pervious layer within the profile, seepage, nearly continuous rainfall, or a combination of these.

Very poorly drained.--- Water is removed from the soil so slowly that free water remains at or on the surface during the growing season. Unless the soil is artificially drained, most mesophytic crops cannot be grown. Very poorly drained soils are commonly level or depressed and are frequently ponded. Yet, where rainfall is high and nearly continuous, they can have moderate or high slope gradients, as for example is "hillpeats" or "climatic moors."

Drainage, surface. Runoff, or surface flow of water, from an area.

Drawdown. A technique that involves manipulating the water level of a lake to expose rooted aquatic vegetation and sediments to freezing and drying conditions, which serves to affect the growth of plants. Can also be used in the context of surface water in defining rule curves and safe yields.

Dredging. Form of sediment removal that involves clearing bottom sediment from a lake to increase the depth, control nuisance aquatic vegetation, control nutrient release from sediments, and to remove toxic substances.

Drumlin. A low, smooth, elongated oval hill, mound, or ridge of compact glacial till. The longer axis is parallel to the path of the glacier and commonly has a blunt nose pointing in the direction from which the ice approached.

Ecosystem. A group of living organisms that behave as a unit.

Effluent. Wastewater that flows into receiving water by way of a domestic or industrial point source.

Eluviation. The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

Environmental Impact Statement (EIS). A report containing a description of some proposed action, the environmental setting, potential environmental impacts, ways to minimize the impacts, and reasonable alternatives. The EIS also serves as a public disclosure of the record used by an agency in its environmental decision-making process.

Eolian soil material. Earthy parent material accumulated through wind action; commonly refers to sandy material in dunes or to loess in blankets on the surface.

Epilimnion. Surface layer of lake

Erosion. The wearing away of the land surface by running water, wind, ice , or other geologic agents and by such processes as gravitational creep.

Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of the actions of man or other animals or of a catastrophe in nature, for example, fire, that exposes a bare surface.

Esker (geology). A narrow, winding ridge of stratified gravelly and sandy drift deposited by a stream beneath a glacier.

Eutrophic. A stage of nutrient availability and biological productivity, the natural result of the aging of a lake. The highest stage of nutrient availability is hypereutrophic.

Eutrophication. The process of natural lake aging, nutrient enrichment, and basin fill-ing. Human activities that increase nutrient and sediment loadings to a lake are called *cultural eutrophication.*

Evaporation. Conversion of water from the liquid phase to the gaseous phase.

Evapotranspiration. The combined loss of water from water bodies (evaporation) and plants (transpiration – plant uptake, consumption and release of soil water through leaves).

Fallow. Allowing cropland to lie idle, either tilled or untilled, during the whole or greater portion of the growing season.

Fecal coliform. A type of bacteria whose natural habitat is the colon of warm-blooded mammals, such as man. The presence of this type of bacteria in water, beverages, or food is usually taken to mean that the material is contaminated with solid human waste.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Fertilizer. Any organic or inorganic material of natural or synthetic origin that is added to a soil to supply elements essential to plant growth.

Field capacity. The soil-water content after the force of gravity has drained or removed all the water it can, usually 1 to 3 days after rainfall

Filter (see buffer) strips.

First flush. Stormwater runoff, usually early in the storm, that contains the majority of accumulated sediments and chemical constituants (pollutants) derived from the upstream watershed.

Fish habitat. The zone where environmental conditions are spatially uniform and ideal for supporting fish life.

Flocculate. Phosphorus located in the water column, assisting in algal growth.

Flooding. The temporary covering of soil with water from overflowing streams, runoff from adjacent slopes, and tides. Frequency, duration, and probable dates of occurrence are estimated. Frequency is expressed as none, rare, occasional, and frequent. *None* means that flooding is not probable; *rare* that it is unlikely but possible under unusual weather conditions; *occasional* that it occurs on an average of once or less in 2 years; and *frequent* that it occurs on an average of more than once in 2 years. Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, and *long* if more than 7 days. Probable dates are expressed in months; *November-May*, for example, means that flooding can occur during the period November through May. Water standing for short periods after rainfall or commonly covering swamps and marshes is not considered flooding.

Floodplain. The area that borders a water body and is subject to flooding on a periodic basis.

Forest land. Land that is at least 10 percent stocked with trees of any size, or that formerly had such tree cover and is not currently developed for a nonforest use. The minimum area for classification of forest land is one acre. The components that make up forest land are timberland and all noncommercial forest land.

Forest-type group. A classification of forest land based on the species forming a plurality of live-tree stocking. A combination of forest types that share closely associated species or site requirements are combined into the following major forest-type groups (the descriptions apply to forests in this state):

White/red pine. Forests in which eastern white pine, red pine, or eastern hemlock, singly or in combination, make up the plurality of the stocking; common associates include red maple, oak, sugar maple, and aspen.

Spruce/fir. Forests in which red, white, black, or Norway spruces, balsam fir, northern white-cedar, tamarack, or planted larch, singly or in combination, make up a plurality of the stocking; common associates include white pine, red maple, yellow birch, and aspens.

Hard pine (also called loblolly/shortleaf pine). Forests in which eastern redcedar or pitch pine, singly or in combination, make up a plurality of the stocking; common associates include white pine, paper birch, sugar maple, and basswood.

Oak/pine. Forests in which hardwoods (usually hickory or upland oaks) make up a plurality of the stocking and in which pines or eastern redcedar contribute 25 to 50 percent of the stocking.

Oak/hickory. Forests in which upland oaks, hickory, yellow-poplar, black locust, sweetgum, or red maple (when associated with central hardwoods), singly or in combination, make up a plurality of the stocking and in which pines or eastern redcedar make up less than 25 percent of the stocking; common associates include white ash, sugar maple, and hemlock.

Oak/gum/cypress. Bottomland forests in which tupelo, blackgum, sweetgum, oaks, or southern cypress, singly or in combination, make up a plurality of the stocking and in which pines makes up less than 25 percent of the stocking; common associates include cottonwood, willow, ash, elm, hackberry, and maple.

Elm/ash/red maple (also called elm/ash/cottonwood). Forests in which elm, willow, cottonwood, or red maple (when growing on wet sites),

singly or in combination, make up a plurality of the stocking; common associated include white ash, sugar maple, aspens, and oaks.

Northern hardwoods (also called maple/beech/birch). Forests in which sugar maple, beech, yellow birch, black cherry, or red maple (when associated with northern hardwoods), singly or in combination, make up a plurality of the stocking; common associated include white ash, eastern hemlock, basswood, aspens, and red oak.

Aspen/birch. Forests in which aspen, paper birch, or gray birch, singly or in combination, make up a plurality of the stocking; common associates include red maple, white pine, red oaks, and white ash.

Fragipan. A loamy, brittle substance horizon low in porosity in content of organic matter and low in moderate in clay but high in silt or very fine sand. A fragipan appears cemented and restricts roots. When dry, it is hard or very hard and has a higher bulk density than the horizon or horizons above. When moist, it tends to rupture suddenly under pressure rather than to deform slowly.

Freshwater. Water containing only small quantities (generally less than 1,000 mg/L) of dissolved minerals.

Freshwater Wetlands Act. Law passed in 1975 that regulates the use and development of the State's freshwater wetland resources for the purpose of preserving, protect- ing, and conserving the wetlands and the benefits derived from them. Provides for the regulation of all wetlands over 5 hectares (12.4 acres) in size, and for smaller ones if they have been determined by the DEC to be of unusual ecological importance.

Geographic Information (GISs). Software that is used for digitizing and accessing hydrologic information.

Glacial drift (geology). Rock and associated materials (sorted and unsorted) which is transported and deposited by glacial processes.

Glacial outwash (geology). Gravel, sand, and silt, commonly stratified, deposited from melt water as it flows from glacial ice.

Glacial till (geology). Unassorted, nonstratified, compact glacial drift consisting of clay, silt, sand, and boulders transported and deposited by glacial ice.

Glaciofluvial deposits (geology). Material moved by glaciers and subsequently sorted and deposited by streams flowing from the melting ice. The deposits are stratified and occur as kames, eskers, deltas, and outwash plains.

Glaciolacustrine deposits (geology). Material ranging from fine clay to sand derived from glaciers and deposited in glacial lakes by water originating mainly from the melting of glacial ice. Many are interbedded or laminated.

Grab sample. Type of water sample usually taken from either the surface alone, or the bottom waters alone. They can be collected by hand, or with specialized collection devices that minimize surface layer contamination and maximizes reproducibility. They involve a discrete sample time, which can be latter aggregated as a composite sample.

Grade. (1) The slope of a road, channel, or natural ground. (2) To finish the surface of a canal bed, roadbed, top of embankment, or bottom of excavation.

Gravel. Rounded or angular fragments of rock up to 3 inches (2 millimeters to 7.5 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Material from 15 to 50 percent, by volume, rounded or angular rock fragments, not prominently flattened, up to 3 inches (7.5 centimeters) in diameter.

Grazing unit. An area of public or private pasture, range, grazed woodland, or other land that is grazed as an entity.

Ground cover. Maintenance of a vegetative cover for silviculture (forestry) activities in order to reduce sediment and nutrient runoff from an activity site as well as control weeds.

Ground water (geology). Water filling all the unblocked pores of underlying material below the water table, which is the upper limit of saturation.

Ground water divide. A ridge in the water table or potentiometric surface from which ground water moves away at right angles in both directions. The line of highest hydraulic head in the water table or potentiometric surface.

Growing-stock trees. Live trees of commercial species

classified as sawtimber, poletimber, saplings, or seedlings; that is, all live trees of commercial species except rough and rotten trees.

Growing-stock volume. Net volume, in cubic feet, of growing-stock trees 5.0 inches d.b.h. and larger from a 1-foot stump to a minimum 4.0-inch top diameter outside bark of the central stem, or to the point where the central stem breaks into limbs. Net volume equals gross volume less deduction for cull.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

Habitat. A zone where environmental conditions are rather uniform spatially.

Hardpan. A hardened cemented soil horizon, or layer. The soil material is sandy, loamy, or clayey, and is cemented by iron oxide, silica, calcium carbonate, or other substance.

Hardwater. Water that is high in calcium, magnesium, and (or) other minerals. In lakes, hard water can cause "whiting events", when changes in water pH causes the calcium to precipitate from the water column.

Herbaceous. A vascular plant that does not develop woody tissue

Herbicides. Chemical compounds, applied in either liquid or granular form, used to kill undesired rooted vegetation and restrict further vegetation growth.

Herding. The guiding of a livestock herd to desired areas or density of distribution.

Hazardous Waste. The Resource Conservation and Recovery Act (RCRA) defines hazardous waste as a solid waste that may cause an increase in mortality or serious illnes or pose a substantial threat to human health and the environment when improperly treated, stored, transported, disposed of, or otherwise managed, A waste is hazardous if it exhibits characteristics of ignitability, corrosivity, reactivity, and/or toxicity.

Holding pond. A reservoir, pit, or pond, usually made of earth, used to retain polluted runoff water for disposal on land.

Hydraulic conductivity. The capacity of a rock to transmit water; expressed as the volume of water that will move in unit time under a unit hydraulic gradient through a unit area measured at right angles to the direction of flow.

Hydraulic gradient. The slope of the water table or potentiometric surface; that is, the change in water level per unit of distance along the direction of maximum head decrease. Determined by measuring the water level in several wells.

Hydraulic head. In ground water, the height above a datum plane (such as sea level) of a column of water. In a ground water system, it is composed of elevation head and pressure head.

Hydrogeology. The science of the interactions between water and geologic materials.

Hydrologic budget. A mass balance expression of hydrologic inputs and outputs (precipitation, condensation, evapotranspiration, surface and ground water storage, gains and losses, etc.)

Hydrologic cycle. An abstraction of water's movement, in solid, liquid and gaseous states, through the atmosphere, lithosphere, and biosphere.

Hydrology. The science of water. It describes the movement, distribution, chemistry, and occurrence of water.

Hypolimnion. Bottom layer of lake.

Idle farmland. Former cropland or pasture that has not been tended for within the last 2 years and has less than 10 percent stocking with live trees (established seedlings or larger trees), regardless of species.

Igneous rock. A rock that solidified from molten or partly molten material.

Impervious soil. A soil through which water, air, or roots penetrate slowly or not at all. No soil is absolutely impervious to air and water all the time.

Incineration. The controlled process by which solids, liquid, or gaseous combustible wastes are burned and changed into gases; the residue produced contains little or no combustible material.

Industrial and commercial land. Supply yards, parking lots, factories, etc.

Inert. A substance that does not react with other substances under ordinary conditions.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Infiltration capacity. The maximum rate at which water can infiltrate into a soil under a given set of conditions.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

In-lake control techniques. Treatment actions that are conducted in the lake itself. There are four major types of in-lake control techniques. *Physical techniques* alter the physical structure of the land or water, examples being sediment dredging, aquatic plant harvesting, and the construction of stormwater sediment traps. *Chemical techniques* involve the use of chemicals that either change the behavior of the lake or poison some of the lakes' plants and animals. *Biological techniques* consist of introducing or removing specific types of plants and/or animals. *Institutional techniques* involve methods that focus on society, including regulating the actions of individuals by law.

Insecticide. A pesticide compound specifically used to kill or control the growth of insects.

Integrated pest management. A technique that uses two or more control methods to minimize pesticide pollution of surface or ground waters and provide an economic control of pests.

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are---

Basin.---Water is applied rapidly to nearly level plains surrounded by levees or dikes.

Controlled flooding.---Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.

Corrugation.---Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops or in orchards so that it flows in only one direction.

Furrow.---Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.

Sprinkler.---Water is sprayed over the soil surfaces through pipes or nozzles from a pressure system.

Subirrigation.---Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.

Kame (geology). An irregular, short ridge or hill of stratified glacial drift.

Karst. A landscape or region characterized by rock dissolution (generally in limestone).

Kettle (geology). A depression in the ground surface formed by the melting of an ice block buried in glacial drift.

Lacustrine deposit (geology). Material deposited in lake water and exposed when the water level is lowered or the elevation of the land is raised.

Lagoon. A reservoir or pond built to contain water and animal wastes until they can be decomposed either by aerobic or anaerobic action.

Lake plain. An area dominated by low-lying relief that formed at the bottom of a glacial lake during part of the glacial period.

Lake stratification, also thermal stratification. During ice-free season, lake are warmer at the top and colder at the bottom. Deeper lakes tend to exhibit a warm layer of water of uniform temperature at the surface, a region of water exhibiting rapid temperature decrease beneath, and a uniformly cold layer of water at the bottom.

Land trust. A private, not-for-profit group, controlled by local citizens, that acquires land or interests in land for the protection of open space, recreation, or resource lands. There are currently over 25 land trusts in New York State.

Land use planning. A method of watershed regulation where a program is developed in order to effectively

manage growth and development within the watershed.

Leachate. Liquids that have percolated through a soil and that contain substances in solution or suspension.

Leaching. The removal of soluble material from soil or other material by percolating water.

Legume. A member of a large family that includes many valuable food and forage species, such as peas, beans, peanuts, clovers, alfalfas, sweet clovers, lespedezas, vetches, and kudzu.

Light Non-Aqueous Phase Liquids (LNAPLs). Organic compounds less dense than water that tend to float or pool at the surface of a waterbody or water table, and migrate in the direction of water flow.

Light textured soil. Sand and loamy sand.

Limestone. A rock that is formed chiefly by accumulation of organic remains (as shells and coral), consists mainly of calcium carbonate.

Liming. The process by which calcium-based products are added to acidified lakes or their surrounding watershed to bring the pH closer to neutral and to restore the alkalinity levels to buffer future acidic inputs.

Limiting nutrients. Those nutrients that restrict or limit algal growth when not sufficiently present or utilized. In most lakes, either phosphorus or nitrogen serve as the limiting nutrient.

Limnologist. A scientist involved in the study of freshwaters.

Limnology. The study of freshwaters--- lakes, ponds, reservoirs, streams and wetlands.

Littoral zone. The area between land and open water, can also be described as that portion of the lake where rooted aquatic plants exist. One of the three important habitats of a lake, consisting of the shoreline. This zone is very similar ecologically to terrestrial habitats, and is very productive and rich in diversity.

Livestock. Domestic animals.

Load. The quantity (i.e., mass) of a material that enters a waterbody over a given time interval.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Losing stream. A stream or reach of a stream that contributes water to the zone of saturation.

Macronutrient. Nutritional necessities of algae, required and available in larger amounts (the classic examples are carbon, nitrogen, phosphorus, hydrogen, sulfur, oxygen)

Macrophyte. Rooted aquatic plants in the lake ecosystem that grow and propagate by photo-synthesis.

Management practices. Techniques implemented in order to improve the quality of a certain area. In a lake environment, techniques implemented to improve water quality.

Manure. The fecal and urinary defecations of livestock and poultry; may include spilled feed, bedding litter, or soil.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Mesotrophic. An intermediate stage of nutrient availability and biological productivity. Less nutrient-rich than eutrophic but more than oligotrophic.

Metamorphic rock. Rock of any origin altered in mineralogical composition, chemical composition, or structure by heat, pressure, and movement. Nearly all such rocks are crystalline.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is greater than that of organic soil.

Mineralized water. Water containing dissolved materials in concentrations large enough to affect the use of the water for some purposes. A concentration of 1,000 mg/L of dissolved solids is used commonly as the lower limit for mineralized water.

Mining and waste land. Surface mining, gravel pits, dumps.

Mixing zone. The transition boundary between the fresh groundwater and saltwater zones. Also used to describe the transition zone where a pollutant load mixes with the receiving water.

Moderately coarse textured (moderately light textured) soil. Sandy loam and fine sandy loam.

Moderately fine textured (moderately heavy textured) soil. Clay loam, sandy clay loam, and silty clay loam.

Monitoring program. Strategy which uses and analyzes water quality data to build a representation of conditions present in the lake.

Monomictic. Monomictic lakes have one period of complete mixing each year, separated by one period of thermal stratification. Cayuga Lake typically mixes completely from late November through early June. Thermal stratification develops in June and persists through November.

Mooring regulations. Restrictions on the number, size, and location of docks, or the materials to construct them. These restrictions help to reduce overcrowding and strain on the lake ecosystem.

Moraine (geology). An accumulation of earth, stones, and other debris deposited by a glacier. Types are terminal, lateral, medial, and ground.

Morphology

Soil - The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Lake – Lake morphological characteristics such as depth and shape (e.g. bathymetry).

Mottling, soil. Irregular spots of different colors that vary in number and size. Mottling generally indicates poor aeration and impeded drainage. Descriptive terms are as follows: abundance--- *few, common, and many; size--- fine, medium, and coarse*; and contrast--- *faint, distinct, and prominent*. The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium*, from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse*, more than 15 millimeters (about 0.6 inch).

Muck. Dark colored, finely divided, well decomposed organic soil material mixed with mineral soil material. The content of organic matter is more than 20 percent.

National Forest lands. Federal lands legally designated as National Forests or purchase units and other lands administered as part of the National Forest System by the USDA Forest Service.

Nonpoint source pollution. Type of pollution involving complex transport and delivery mechanisms within the lake watershed. Unlike point source pollution, where the pollutants are discharged directly to the lake of tributaries. Thus, this pollution is much more difficult to control.

Nutrient, plant. Any element taken in by a plant, essential to its growth, and used by it in the production of food and tissue. Plant nutrients are nitrogen, phosphorus, potassium calcium, magnesium, sulfur, iron, manganese, copper, boron, zinc, and perhaps other elements obtained from the soil; and carbon, hydrogen, and oxygen obtained largely from the air and water.

Outwash, glacial. Stratified sand and gravel produced by glaciers and carried, sorted, and deposited by water that originated mainly from the melting of glacial ice. Glacial outwash is commonly in valleys on landforms known as valley trains, outwash terraces, eskers, kame terraces, kames, outwash fans, or deltas.

Outwash plain. A land form of mainly sandy or coarse textured material of glaciofluvial origin. An outwash plain is commonly smooth; where pitted, it is generally low in relief.

Overland flow. The flow of rainwater or snowmelt over land surface toward receiving waters.

Pan. A compact, dense layer in a soil. A pan impedes the movement of water and the growth of roots. The word "pan" is commonly combined with other words that more explicitly indicate the nature of the layer; for example, *hardpan, fragipan, claypan, plowpan, and traffic pan.*

Parent material. The great variety of unconsolidated organic and mineral material in which soil forms. Consolidated bedrock is not yet parent material by this concept.

Pasture. Grazing lands planted primarily to introduced or domesticated native forage species that receives periodic renovation and/or cultural treatments such as tillage, fertilization, mowing, weed control, and irrigation. Not in rotation with crops.

Peat. Unconsolidated material, largely undecomposed

organic matter, that has accumulated under excess moisture.

Pelagic zone. The open water portion of a lake.

Percolation. The downward movement of water through the soil.

Permeability. The quality that enables the soil to transmit water or air, measures as the number of inches per hour that water moves through the soil. Terms describing permeability are *very slow* (less than 0.06 inch), *slow* (0.06 to 0.20 inch), *mod-erately slow* (0.2 to 0.6 inch), *moderate* (0.6 to 2.0 inches), *moderately rapid* (2.0 to 6.0 inches), *rapid* (6.0 to 20 inches), and *very rapid* (more than 20 inches).

Pesticide. A chemical compound used to eliminate or control insects which may include herbicides.

pH. A number used by chemists to express the acidity of solutions, including water. A pH value lower than 7 indicates an acidic solution, a value of 7 is neutral, and a value of higher than 7 indicates an alkaline solution. Most ground waters in the United States have pH values ranging from about 6.0 to 8.5.

Phosphorus. An element which is an essential macro-nutrient for plant growth. Phosphorus is often the limiting nutrient for freshwater lakes in New York State.

Phosphorus budget. A biogeochemical cycle that accounts for the major sources of phosphorus to a lake (soil erosion, transport by streams, human waste) and from the lake (withdrawals, surface and groundwater outflows).

Phosphorus inactivation. A method of removing phosphorus from the water column in order to limit algal growth. A chemical is added to the water in order to bind with phosphorus present in the bottom sediments, minimizing the release of biolog- ically available phosphorus from sediments when oxygen is depleted from the hypolimnion.

Phosphorus precipitation. A method of removing phosphorus from the water column in Order to limit algal growth. Certain chemicals (usually alum salts) are added to the lake that will bind the phosphorus in the water column and sink it to the lake bottom.

Photic zone. The zone of a lake between the lake surface and the depth where light is about 1 percent of surface levels.

Photosynthesis. The process by which plants convert the sun's energy into biomass or chemical energy. The primary way that energy enters the lake ecosystem.

Phytoplankton. The scientific designation for the class of organisms known as algae and some bacteria (e.g. cyanobacteria) which are the base of the food chain.

Pieziometric surface. The level to which water would rise if a well were installed at a particular depth.

Piezometer. A nonpumping well used to observe the elevation of the water table or the potentiometric surface.

Plankton. Microscopic plants and animals that drift with the movement of the water and are a major source of food for aquatic life.

Planning basins. Watershed boundaries for major rivers.

Plume. A relatively concentrated mass of emitted chemical contaminants spreading in the environment.

Point source pollution. Form of pollution where the pollutants are discharged directly ("pipe" discharge) to a lake or its tributaries.

Poletimber stand. A stand-size class of forest land that is stocked with at least 10 percent of minimum full stocking with live trees with half or more of such stocking in poletimber or sawtimber trees or both, and in which the stocking of poletimber exceeds that of sawtimber.

Poletimber tree. A live tree of commercial species meeting regional specifications of soundness and form and at least 5.0 inches in d.b.h., but smaller than a sawtimber tree.

Pollutant. Any particle or substance that disturbs the operation of an ecosystem.

Pollution. Any activity that causes an impairment in the environment.

Polychlorinated biphenyls (PCBs). Synthetic organic compounds that can accumulate in the bodies of fish and other organisms and cause death with enough exposure. Probable human carcinogen.

Poorly graded. Refers to soil material consisting mainly of particles or nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Porosity. The volume of openings in a rock. When expressed as a fraction, porosity is the ratio of the volume of openings in the rock to the total volume of the rock.

Potable water. Water that is suitable for drinking.

Potentiometric surface. An imaginary surface representing the level to which water will rise in a well.

Primary wastewater treatment. The first step in the treatment process, involving screens to remove the larger floating solids (such as sticks, seeds, rags, or paper). Skimming tanks remove excess oil or grease, and settling or sedimentation basins remove settleable suspended matter such as sand, gravel, and some organic solids.

Producers. Organisms, such as phytoplankton, that provide energy for other members of the food web. Photosynthetic organisms are classified as producers.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Public access. The principle that non-resident visitors have full admittance to use a lake. Restricting public access is one of the techniques frequently discussed as a method to protect water quality.

Recharge. The water that infiltrates the water table. Recharge is the leftover precipitation after losses to surface runoff and evapotranspiration.

Recharge area. The area where water reaches the saturated zone by surface infiltration.

Recreation site. Parks, campgrounds, playing fields, tracks, etc.

Regolith. The unconsolidated mantle of weathered rock and soil material on the earth's surface; the loose earth material above the solid rock. Soil scientists regard as soil only the part of the regolith that is modified by organisms and other soil-building forces. Most engineers describe the whole regolith, even to a great depth, as "soil".

Relief. The elevations or inequalities of a land surface, considered collectively.

Removals. The net growing-stock volume harvested or killed in logging, cultural Operations (such as timber stand improvement) or land clearing, and the net growing-stock volume neither harvested nor killed but growing on land that was reclassified from timberland to noncommercial forest land or nonforest land during the period between surveys. The volume is decided by the number of growing seasons to produce average annual removals.

Request for Proposals (RFPs). A problem statement and a detailed scope of proposed services to be provided by a consultant.

Residence time. Also called Detention time. The inverse of flushing rate, which is the time it takes a lake to complete one full exchange of water.

Respiration. The process that photosynthetic plants undertake, when oxygen is used to burn up the chemical fuels that were produced during photosynthesis. As a result, carbon dioxide and water are produced.

Retention basin. Much like a detention basin, where water is stored and pollutants are removed through sedimentation.

Rill. A steep sided channel resulting from accelerated erosion. A rill is generally a few inches deep and not wide enough to be an obstacle to farm machinery.

Riparian area. Vegetated ecosystems along a waterbody through which energy, materials, and water pass. Riparian areas characteristically have a high water table and are subject to periodic flooding and influence from the adjacent waterbody.

Riprap. Rock and stone rubble used as a blanket or liner to prevent erosion in highly susceptible areas. This practice is used on sites that are subjected to large volumes of water that cannot be stabilized with less expensive vegetative measures.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Root zone. The part of the soil that is, or can be, penetrated by plant roots

Runoff. The precipitation discharged in stream channels from a drainage area. The water that flows off the land surface without sinking in is called surface runoff; that which enters the ground before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Salinity. The concentration of dissolved solids or salt in water.

Salmonid. A class of fish, including lake trout and brown trout, best suited for a deep, cold water portion of oligotrphic lake with a small littoral zone.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sandstone. Sedimentary rock containing dominantly sand-size particles.

Sapling. All live trees 1.0 through 4.9 inches d.b.h.

Sapling/seedling stand. A stand-size class of forest land that is stocked with at least 10 percent of minimum full stocking with live trees with half or more of such stocking in saplings or seedlings or both.

Saturated. When referring to soil, the maximum amount of water that can be held either when the soil is frozen or the spaces between the soil particles are filled with water. Any additional seepage over saturated soil will result in runoff.

Saturated zone. The zone (below the unsaturated zone) where interconnected openings contain only water.

Sawtimber stand. A stand-size class of forest land that is stocked with at least 10 percent of minimum full stocking with all live trees with half or more of such stocking in poletimber or sawtimber trees or both, and in which the stocking of sawtimber is at least equal to that of poletimber.

Sawtimber tree. A live tree of commercial species at least 9.0 inched d.b.h. for softwoods or 11.0 inches for hardwoods, containing at least one 12-foot sawlog or two noncontiguous 8-foot sawlogs, and meeting regional specifications for freedom from defect.

Secchi disk. A 20cm steel or heavy plastic disk, composed of alternating black and white quadrants, used to measure the transparency of lakes. The transparency is considered the average of the depths at which the disk first disappears from view, and first reappears, respectively.

Secondary wastewater treatment. This intermediate step is used to reduce high oxygen demand before the wastewater is discharged into a lake or stream. Filtration and biological and chemical processes are used to remove a high percentage of organic matter from the wastewater.

Sediment. The deep water bottom or suspended material that may be rocky, sandy, or muddy.

Sediment basins. Depressions that can be constructed to protect lakes and streams from upstream land use activities. Stormwater is detained and released at a controlled rate, which can be modified to optimize sedimentation.

Sediment removal. Management technique that involves dredging bottom sediment from a lake to increase the depth, control nuisance aquatic vegetation, control nutrient release from sediments, and to remove toxic substances.

Sedimentary rock. Rock made up of particles deposited from suspension in water. The chief kinds of sedimentary rock are conglomerate, formed from gravel; sandstone, formed from sand; shale, formed from clay; and limestone, formed from soft masses of calcium carbonate. There are many intermediate types. Some wind-deposited sand is consolidated into sandstone.

Sedimentation. The process or act of depositing sediment.

Seedling. A live tree less than 1.0 inch d.b.h. and at least 1 foot tall.

Seepage. Water escaping through or emerging from the ground along an extensive line or surface as contrasted with a spring, where the water emerges from a localized spot.

Septic leachate detector. A hand held fluorometer that can locate effluent plumes and domestic waste water in lakes. When the probe is submersed in lake water in front of a shoreline home, a response can be noted if

human sewage, detergents, or whiteners are detected. Also known as a septic snooper.

Septic tank mound. An alternative method to the septic tank-leach field system, used in areas where soil conditions are not well suited for subsurface soil absorption. An above-ground mound is created with fill material, usually a porous sandy soil. Wastewater from the tank is allowed to seep through the soil in the mound, which then filters back through the ground. Clay barriers around the mound serve to reduce the seepage of wastewater to the surrounding ground.

Septic tank sand filter. Used in area where soils are unsuitable for conventional drain fields. The wastewater filters from the septic tank to a second tank, which periodically releases the water through a sand filter. The filter is lined with clay or plastic to prevent wastewater leakage, and the filtrate is collected and piped to a disinfection unit.

Septic tank. The most common on-site system for the treatment and disposal of domes-tic wastewater from individual residences, involving the transport of wastewater from a residence to a buried tank. Perforated pipes then transport the wastewater to a subsurface drainage system where it percolates into the soil.

Settleable solids. Solids in a liquid that can be removed by stilling a liquid. Settling times of 1 hour (APHA/ AWWA/WPFC, 1975) or more are generally used

Sewer system. A replacement for small scale treatment systems such as on-lot septic tanks and cluster systems. Used at many larger lake communities, most involve pumping or carrying the outflow of septic tanks to a treatment facility or large interceptor sewer.

Shale. Sedimentary rock formed by the hardening of a clay deposit.

Sheet flow. Water, usually storm runoff, flowing in a thin layer over the ground surface.

Silage. A fodder crop that has been preserved in a moist, succulent condition by partial fermentation; such crops include corn, sorghums, legumes, and grasses

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Siltstone. Sedimentary rock made up of dominantly silt-sized particles.

Silviculture. A branch of forestry dealing with the cultivation and management of trees in order to produce a crop resource on a continuing basis.

Sinkhole. A depression in a landscape where limestone has been locally dissolved.

Slope. The inclination of the land surface form the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance.

Sludge. The material resulting from chemical treatment of water or coagulation.

Soil. A natural, three-dimensional body at the earth's surface that is capable of support-ing plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil profile. A vertical section of the soil from the surface through all its horizons, including C horizons.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes of separates recognized in the United States are as follows: *very coarse sand* (2.0 millimeters to 1.0 millimeter); *coarse sand* (1.0 to 0.5 millimeter); *medium sand* (0.5 to 0.25 millimeter); *fine sand* (0.25 to 0.10 millimeter); *very fine sand* (0.10 to 0.05 millimeter); *silt* (0.05 to 0.002 millimeter); and *clay* (less than 0.02 millimeter).

Soil survey. A general term for the systematic examination of soils in the field and in laboratories; their description and classification; the mapping of kinds of soil; the interpretation of soils according to their adaptability for various crops, grasses, and trees; their behavior under use or treatment for plant production or for other purposes; and their productivity under different management systems.

Solubility. The relative capacity of a substance to dissolve in liquid. Sugar has a high solubility in water, whereas gold has a low solubility in water.

Stand. A group of forest trees growing on forest land.

Stand-size class. A classification of forest land based on the size class (that is, seedlings, saplings, poletimber, or sawtimber) of all live trees in the area.

Stocking. The degree of occupancy of land by trees, measured by basal area and/or number of trees in a stand compared with the basal area and/or number of trees required to fully use the growth potential of the land (or the stocking standard). In the Eastern United States this standard is 75 square feet of basal area per acre for trees 5.0 inches d.b.h. and larger, or its equivalent in numbers of trees per acre for seedlings and saplings. Two categories of stocking are used in this report: all live trees and growing- stock trees. The relationships between the classes and the percentage of the stocking standard are: nonstocked (0 to 9); poorly stocked (10 to 59); moderately stocked (60 to 99); fully stocked (100 to 129); and overstocked (130 to 160).

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter.

Storage. Available capacity for temporarily removing water from circulation.

Stratified. Arranged in strata, or layers. The term refers to geologic material. Layers in soils that result from the processes of soil formation are called horizons; those inherited from the parent material are called strata.

Strip cropping. A means of reducing soil erosion on tilled cropland. The intent is to Break the length of slope into segments by laying out strips across the natural slope of the land. Strips of close-growing crops or meadow grasses are planted between tilled row crop strips to serve as sediment filters or buffer strips in controlling erosion. The strips increase water infiltration, retain soil particles, and reduce velocity of runoff.

Strip mine. Area devoid of vegetation due to current or recent general excavation.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates that are separated from adjoining aggregates. The principal forms of soil structure are--- *platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or sub- angular), and *granular. Structureless* soils are either *single grained* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Sublimation. The process by which a solid vaporizes directly to a gas.

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Subsurface layer. Technically, the A2 horizon. Generally refers to a leached horizon lighter in color and lower in content of organic matter than the overlying surface layer.

Surface soil. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the “plow layer,” or the “Ap horizon”.

Surface water. All water whose surface is exposed to the atmosphere.

Suspended sediment. The very fine soil particles that remain in suspension in water for a considerable period of time

Taxonomy. The identification of living organisms.

Temperature profile. The temperature of a water column at specific points. Used in lake profiling to determine the degree of stratification, and the potential for depletion of oxygen, fish and other aquatic organisms.

Terminal moraine. A belt of thick glacial drift that generally marks the termination of important glacial advances.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea. A stream terrace is frequently called a second bottom, in contrast with a flood plain, and is seldom subject to overflow. A marine terrace, generally wide, was deposited by the sea.

Terraces. Earth embankments, channels or a combination ridge and channel construct-ed across the slope of a field to control runoff. They are generally applied where contouring, strip cropping and reduced tillage operations do not offer adequate protection from soil erosion and are most practical on deep soils. By breaking the length of slope into smaller segments and intercepting the flow of runoff, terraces effectively reduce soil erosion and the transport of sediment off-site. In reducing the volume and velocity of runoff, water is retained on the land for moisture conservation.

Tertiary wastewater treatment. The third step in treatment is used to significantly reduce nutrient concentrations in the wastewater. These advanced treatment processed usually involve a combination of chemical (alum or iron salt addition), biological (biological treatment columns), and physical (filtration and/or settling) techniques. This may provide more than 90% removal of phosphorus.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt, silt loam, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay, and clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Thermocline. The region of rapid temperature decline in a lake, related to the trans-parency of the lake water and how exposed the lake is to the wind. A clear lake will have a deeper thermocline than a turbid lake. A wind-exposed lake will have a deeper thermocline than a protected lake.

Thin layer. Otherwise suitable soil material too thin for the specified use.

Till. A compact, unsorted and unstratified mixture of clay, silt, sand, gravel, and boulders deposited directly by glaciers.

Till plain. An extensive flat to undulating area underlain by glacial till.

Tillage. The operation of implements through the soil to prepare seedbeds and rootbeds, control weeds and brush, aerate the soil, and cause faster breakdown of organic matter and minerals to release plant foods.

Tilth. The physical condition of the soil as related to its ease of tillage, its fitness as a seedbed, and its impedance to seedling emergence and root penetration.

Timberland. Forest land producing or capable of producing crops of industrial wood (more than 20 cubic feet per acre per year) and not withdrawn from timber utilization (formerly known as commercial forest land).

Time of travel. The amount of time it takes for water to reach a well or stream from a certain distance.

Topographic map. A map that shows contours of elevation above sea level.

Topography. The relative positions and elevations of the natural or man-made features of an area that describe the configuration of its surface.

Topsoil (engineering). Presumably a fertile soil or soil material, or one that responds to fertilization, ordinarily rich in organic matter, used to topdress roadbanks, lawns, and gardens.

Toxicity. A gauge of how detrimental a substance is to a living organism. Toxic effects can either be *acute* (causing immediate death or impairment) or *chronic* (causing subtle damage that may not show up until years after exposure).

Transmissivity. The rate of groundwater flow through a unit area of an aquifer under a hydraulic gradient of 1.

Transpiration. The process by which trees, shrubs, and grasses in a watershed draw water out of the soil and emit water vapor to the air.

Transportation right-of-way. Land associated with highways and railroads.

Tree class. A classification for the quality or condition of trees for sawlog production.Tree class for sawtimber trees is based on their current condition. Tree class for poletimber trees is a prospective determination—a forecast of their potential quality when they reach sawtimber size (11.0 inches d.b.h. for hardwoods, 9.0 inches d.b.h. for softwoods)

Trenches. An infiltration practice that provides an opportunity for surface water to filter runoff through the surface soil. A trench involves infiltration through uncovered soil.

Trickling filter. A fixed bed of rock over which wastewater is applied for aerobic bio-logical treatment. Slimes form on the rocks and treat the wastewater. A distrib- utor system continues dosing the filter beds, and the treated wastewater is collect- ed by an underdrain system.

Trophic state classifications. Using the Trophic State Index, a value is determined that classifies a water sample as being either oligotrophic (low-nutrient), mesotrophic (average nutrients), or eutrophic (high-nutrient). Oligotrophic lakes often provide an excellent

drinking water supply, while eutrophic lakes often support excellent warmwater fisheries.

Turbidity. A water chemistry parameter, caused by suspended materials such as clay, silt, algae, and other materials that cause light to be scattered and absorbed, not transmitted in straight lines through water. It has a major influence on Secchi disk transparency and therefore the clarity of the lake.

Turn over. The upper layer cools down in the fall, until the lake reaches uniform temperature. The thermal barrier to mixing is gone and the lake will mix, or turn over, from top to bottom. This process is called fall overturn. In the spring, the ice melts and the lake again becomes one uniform temperature and mixes, called spring overturn.

Unconfined aquifer. An aquifer that contains both an unsaturated and a saturated zone (i.e., an aquifer that is not full of water) and does not have a confining layer at its top.

Underground Storage Tanks (USTs). A tank with at least 10 percent of its volume beneath the ground, including attached pipes.

Unsaturated. When referring to soil, any sample that has still has the capability to hold more water without experiencing runoff.

Unsaturated zone. The subsurface zone, usually starting at the land surface, that contains both water and air.

Upland (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Use impairment. When referring to a lake, a "problem" in the complete functioning of the lake ecosystem.

Valley fill. In glaciated regions, material deposited in stream valleys by glacial melt water. In nonglaciated regions, alluvium deposited by heavily loaded streams emerging from hills or mountains and spreading sediments onto the lowland as a series of adjacent alluvial fans.

Vegetative cover. A management technique that involves growing grasses, trees or shrubs in areas where slope and soils are particularly vulnerable to erosion and runoff damage. Because permanent protection is provided, it is an effective control for most pollutants, especially sediments.

Volatile Organic Compounds (VOCs). A category of volatile organic compounds with relatively high vapor pressures.

Waste. Material that has no original value or no value for the ordinary or main purpose of manufacture or use; damaged or defective articles of manufacture; or superfluous or rejected matter or refuse.

Water table. The upper limit of the soil or underlying rock material that is wholly saturated with water.

> ***Water table, apparent.*** A thick zone of free water in the soil. An apparent water table is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil.
>
> ***Water table, artesian.*** A water table under hydrostatic head, generally beneath an impermeable layer. When this layer is penetrated, the water level rises in an uncased borehole.
>
> ***Water table, perched.*** A water table standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower one by a dry zone.

Watershed. The area that consists of all the land, streams, rivers, lakes, and other water bodies that contributes water to the lower end of that watershed at its point of discharge.

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in dis- integration and decomposition of the material.

Weir. A device for measuring or regulating the flow of water.

Well graded. Refers to a soil or soil material consisting of particles well distributed over a wide range in size or diameter. Such a soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

Wetland. An area with some open water and much shoreline and emergent vegetation. The water in a wetland may be only a few inches deep.

Zone of aeration. Also called the unsaturated zone. The portion of the subsurface between the water table and the ground surface.

Zone of saturation. The portion of the subsurface that is saturated with groundwater.

Zoning. A method by which local governments can protect natural resources by using regulations to control land use activities. Through zoning, an area is divided into districts. The local government then established laws that govern the use of land with these districts.

Zoning variances. A method that can be developed in some areas to facilitate unusual landscape features, such as steep hillsides, scenic vista, erosive sites, and natural drainage that may restrict development.

Zooplankton. The primary consumers of the lake food web. Small, microscopic animals that drift with the movement of the water.

The Cayuga Lake Watershed Intermunicipal Organization would like to thank the following organizations for additional assistance with the printing of the *Cayuga Lake Watershed Restoration & Protection Plan:*

Cayuga Lake National Bank
3 North Cayuga Street
Union Springs, NY 13160
315-889-7358
clnb@relex.com
www.cayugalakenationalbank.com

TOMPKINS COUNTY HEALTH DEPARTMENT
Your Partner for a Healthy Community

Tompkins County Health Department
401 H. Dates Drive
Ithaca, NY 14850
www.tompkins-co.org/health/tchdhome.htm