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Management Strategy for Oneida Lake

CNY Regional Planning and Development Board

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A Management Strategy for Oneida Lake and its Watershed



September 2004

*Central New York Regional Planning and Development Board
Oneida Lake and Watershed Advisory Council*

Where To Find Additional Information

Information about the Oneida Lake and Watershed Management Plan can be found at the following website: <http://www.cnyrpdb.org/oneidalake>.

For general program information, contact Anne Saltman, Senior Planner and Program Coordinator, Central New York Regional Planning and Development Board (315) 422-8276.

For information about the Watershed Advisory Council, contact Daniel Ramer, Board Chairman, City of Oneida Wastewater Treatment Plant (315) 363-4860.

Program Funding

The Central New York Regional Planning and Development Board received state and federal funding in 2001 to initiate a six-county Watershed Management Plan for Oneida Lake. The funding included \$325,000 from the NYS DEC via the Environmental Protection Fund and \$300,000 from the U.S. EPA via the FY 2001 VA-HUD Appropriations Bill secured by Congressmen Walsh and Boehlert. The federal and state funds supported activities for a period from April 1, 2001 to September 30, 2004.

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A Management Strategy for Oneida Lake and its Watershed



September 2004

Central New York Regional Planning and Development Board
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The Oneida Lake Watershed

If you live in the area outlined on this map, you are in the Oneida Lake watershed. A watershed is the total land area that drains into a stream, river, or lake. Spanning 872,722 acres (or 1,364 square miles), the Oneida Lake watershed encompasses six counties and 69 cities, towns, and villages. All the surface and ground water from precipitation and snowmelt within the entire region drains into Oneida Lake. Decisions regarding land use within the watershed have a direct influence on the water quality and aquatic biology in the lake. The protection of Oneida Lake involves all land, lakes and streams throughout the entire region.



Figure 1: Oneida Lake Watershed

Municipalities in the Oneida Lake Watershed

CORTLAND COUNTY

Town of Cuyler*
Town of Preble*
Town of Truxton*

LEWIS COUNTY

Town of Lewis
Town of Montague
Town of Martinsburg
Town of Osceola
Town of Turin
Town of West Turin

MADISON COUNTY

City of Oneida
Town of Cazenovia
Town of DeRuyter
Town of Eaton
Town of Fenner
Town of Lenox
Town of Lincoln
Town of Madison*
Town of Nelson
Town of Smithfield
Town of Stockbridge
Town of Sullivan
Village of Canastota
Village of Cazenovia
Village of Chittenango
Village of Munnsville
Village of Wampsville

ONEIDA COUNTY

City of Rome (inner and outer district)
City of Sherrill
Town of Annsville
Town of Augusta
Town of Ava
Town of Camden
Town of Florence

Town of Kirkland*
Town of Lee
Town of Marshall*
Town of Verona
Town of Veron
Town of Vienna
Town of Western*
Town of Westmoreland
Village of Camden
Village of Oneida Castle
Village of Sylvan Beach
Village of Vernon

ONONDAGA COUNTY

City of Syracuse
Town of Cicero
Town of Dewitt
Town of Fabius
Town of Lafayette
Town of Manlius
Town of Onondaga
Town of Pompey
Town of Tully
Village of East Syracuse
Village of Fayetteville
Village of Manlius
Village of Minoa

OSWEGO COUNTY

Town of Amboy
Town of Albion*
Town of Constantia
Town of Hastings
Town of Orwell*
Town of Parish
Town of Redfield
Town of West Monroe
Town of Williamstown
Village of Central Square
Village of Cleveland

** Indicates municipalities that have less than a one-half square mile (0.5 mi²) of land located within the watershed boundary. This list was compiled from data prepared by the Syracuse-Onondaga County Planning Agency, April 2001*

Foreword

As Chairman of the Oneida Lake Watershed Advisory Council Board of Directors, I am pleased to present *A Management Strategy for Oneida Lake and its Watershed*. This report culminates almost four years of research, planning and coordination by the Central New York Regional Planning and Development Board, the Watershed Advisory Council Board of Directors, and many additional watershed leaders. During this time, I have attended nearly 40 meetings addressing the complex political, economic, and environmental issues involved in lake and watershed management planning. The volunteers and professionals that have worked alongside me throughout this process have contributed countless hours of their time and a wealth of knowledge and experience to help preserve and protect our watershed. We hope additional volunteers will become involved. In doing so they will become stewards of a self-sustaining process in which the lake community takes an active role in setting goals and making decisions.

During the month of August, the watershed became a storm attractant. It seemed that every week we received one to two inches of rain. However, the last weekend of the month was the storm that added the proverbial “one drop too many.” Our creeks and storm systems were overwhelmed. The treatment plant that I manage was inundated and processed a one-day record amount of water. As I spent hour after hour with my staff keeping track of the collection system and treatment plant, I sought refuge in thoughts of what it would be like without these systems and the cooperative planning process they represent. The treatment plant is a perfect example of why watershed planning is important. There is power in cooperative stewardship. Rene Dubos, a Pasteur Institute Microbiologist and essayist, authored a book entitled the *Wooing of Earth*. His premise regarding the complex issues of environmental sustainability under pressures from human inhabitants is summed up within the concept of stewardship. *Wooing the Earth*, the romantic phrasing of the book, expresses this dynamic. In participating as a steward one becomes part of the communities’ self-determination. One must romance sustainability from the Earth. In order for us to do this we must place value in our surroundings. We do this through our choices with respect to our water and land based resources. This analysis is always done with a backdrop of both political and economic forces.

Watershed planning is the fundamental way in which to organize these dynamics. A watershed is a unit we can see and understand. For most of us it represents the obvious - streams, lakes, fish, forests and fields. For some of us it represents change - a camp to a year round house, a farm field to a new housing community, the slow subsidence of a stream bank into the creek. Many of these changes become rallying cries for people to stop and think about their actions and impacts on the watershed. A watershed plan allows for change to take place and provides information and knowledge to prepare for the impacts of those changes. The plan can also help us measure those impacts and guide us to better manage water resources in the future. I believe *A Management Strategy for Oneida Lake and its Watershed* represents an important step in creating the path to a sustainable Oneida Lake community. Our water and land resources are some of our most important assets. I hope this report and the others available on the website “woo” your romance for this watershed and the people that live here.

Thank you.

Dan Ramer, City of Oneida Sanitary Engineer
Chairman, Oneida Lake and Watershed Advisory Council

Acknowledgements

This report has been compiled as part of the Oneida Lake Watershed Management Planning and Implementation Project. The project is jointly funded by the NYS Department of Environmental Conservation using dollars from the Environmental Protection Fund, and by the U.S. Environmental Protection Agency with funds secured by Congressmen Walsh and Boehlert. The Central New York Regional Planning and Development Board extends a special thank you to these agencies for their financial support.

Our gratitude and appreciation also goes to the additional agencies, non-profit organizations, municipal representatives, elected officials, homeowners, lake users, and other watershed stakeholders that have contributed time, expertise, and resources to this project over the past few years. Their assistance is greatly appreciated. Their immeasurable hard work, enthusiasm, and dedication serves as the backbone of this report and reflects on the remarkable level of watershed-wide cooperation.

And finally, a special thanks goes out to the hardworking members of the Oneida Lake Watershed Advisory Council Board of Directors who continue to provide leadership and guidance in the protection of our valuable water resources.

The following groups contributed staff time, information, facilities, and additional resources to this Project

Atlantic Salmon Fish Creek Club
Boating Industries Association
Certified Environmental Services, Inc.
CNY Boating Industry Association
CNY Regional Planning and
Development Board
CNY Waterways Association
Cornell Cooperative Extension
Cornell University
Cornell University Biological Field Station
Cornell University School of Industrial and
Labor Relations
County Departments of Transportation
County Health Departments: Madison,
Oneida, Onondaga, and Oswego Counties
County Tourism/Visitors Bureaus: Lewis,
Madison, Oneida, Onondaga, and Oswego
Counties
Eastern Ontario Anglers Association
Genesee/Finger Lakes Regional Planning
Council
Hamilton College

Herkimer-Oneida Counties Comprehensive
Planning Program
Lewis County Chamber of Commerce
Lewis County Planning Department
Madison County Planning Department
Madison County Tourism Department
Municipal Highway Departments
Municipal Officials
New York Rural Water Association
New York Sea Grant
North Shore Council of Governments
Northern Oneida County Council of
Governments
NYS Assembly
NYS BASS Federation
NYS Canal Corporation
NYS Department of Health
NYS Department of Transportation
NYS Dept of Environmental Conservation
Regions 6 and 7 and the Albany office
NYS Emergency Management Office
NYS Office of Parks, Recreation and
Historic Preservation

NYS Office of Real Property Services
NYS Park Police
NYS Police
NYS Senate
NYS Soil and Water Conservation
Committee
NYS Tug Hill Commission
Oneida City Wastewater Treatment Plant
Oneida County Dept. of Public Works
Oneida County Environmental Mgt. Council
Oneida County Convention and Visitors
Bureau
Oneida County Sheriffs Department
Oneida Lake Association, Inc.
Oneida Lake Chamber of Commerce
Oneida Lake Fishing Charters
Oneida Lake Watershed Advisory Council
Oneida Lake Watershed Agriculture
Advisory Committee
Oneida Lake Watershed Agriculture
Program
Oneida Lake Watershed Task Force
Executive Committee
Oneida Lake Watershed Task Force Land
Use Committee
Oneida Shores County Park
Onondaga Community College
Onondaga County Department of Water
Environment Protection
Onondaga County Flood Advisory
Committee
Onondaga County Legislature
Onondaga County Office of the
Environment
Onondaga County Parks

Onondaga County Water Authority
Oswego County Department of Planning
and Community Development
Oswego County Department of Promotion
and Tourism
Oswego County Legislature
Oswego County Sheriffs Department
Project Watershed of CNY
Restaurant and Marina Owners
Salmo Enterprise
Salmon River Council of Governments
Salt City Bassmasters Club
Soil and Water Conservation Districts:
Cortland, Lewis, Madison, Oneida,
Onondaga, and Oswego Counties
South Shore Association
SUNY Brockport
SUNY College of Environmental Science
and Forestry
Syracuse Convention and Visitors Bureau
Syracuse-Onondaga County Planning
Agency
The Great Swamp Conservancy
Tug Hill Resources Investment for
Tomorrow
Tug Hill Tomorrow Land Trust
U.S. Army Corps of Engineers
U.S. Environmental Protection Agency
U.S. Geological Survey
USDA-Natural Resource Conservation
Service
Water Quality Coordinating Committees:
Lewis, Madison, Oneida, Onondaga and
Oswego Counties

Acronyms

| | | | |
|----------|------------------------------------------------------------------------------------|-----------|----------------------------------------------------------------------|
| AAC | Agricultural Advisory Committee | NYSAM | New York State Department of Agriculture and Markets |
| AEM | Agricultural Environmental Management | NYSCC | New York State Canal Corporation |
| AFS | American Fisheries Society | NYS DEC | New York State Department of Environmental Conservation |
| AI | Academic Institutions (Hamilton College, Cornell University, SUNY ESF, and others) | NYS DOS | New York State Department of State |
| APHIS | Animal and Plant Health Inspection Service | NYS DOT | New York State Department of Transportation |
| ASFCC | Atlantic Salmon Fish Creek Club | NY SEMO | New York State Emergency Management Office |
| BASS | Salt City Bassmasters Club | NYS FOLA | New York State Federation of Lake Associations |
| CBFS | Cornell Biological Field Station | NYSG | New York Sea Grant |
| CCE | Cornell Cooperative Extension | NYS OPRHP | New York State Office of Parks, Recreation and Historic Preservation |
| CDS | County Drainage and Sanitation | OLA | Oneida Lake Association |
| CEO | Code Enforcement Officer | OLWAC | Oneida Lake Watershed Advisory Council |
| CGA | Coast Guard Auxiliary | OLWAP | Oneida Lake Watershed Agricultural Program |
| CIRIS | Cornell Institute for Research Information Systems | OMNR | Ontario Ministry of Natural Resources |
| CNMP | Comprehensive Nutrient Management Plan | ORPS | Office of Real Property Services |
| CNY RPDB | Central New York Regional Planning and Development Board | OTN | New York State Onsite Wastewater Treatment Training Network |
| CU | Cornell University | Parks | Parks Department (local/county/state) |
| DFO | Department of Fisheries and Oceans (Canada) | PC | Private Consultant |
| EEB | Ecology and Evolutionary Biology, Cornell University | Planning | County Planning Departments |
| EL | Environmental Lobbying Organizations | Police | State Police/Local Police/Sheriffs Departments |
| FEMA | Federal Emergency Management Agency | POLW | Project Oneida Lake Watershed |
| FL-LOWPA | Finger Lakes-Lake Ontario Watershed Protection Alliance | PWC | Personal Watercraft |
| FSA | Farm Service Agency | RPB | Regional Planning Boards |
| GLFC | Great Lakes Fisheries Commission | SOLWR | State of the Lake and Watershed Report (Oneida Lake) |
| Health | County/State Health Departments | SSPS | Syracuse Sail and Power Squadron |
| Highway | County Highway Departments | SWCD | Soil and Water Conservation Districts |
| HO | Homeowners | TKN | Total Kjeldahl Nitrogen |
| HOCCPP | Herkimer-Oneida Counties Comprehensive Planning Program | TSP | Technical Service Provider |
| LA | Lake Association | USACOE | United States Army Corps of Engineers |
| LO | Land Owner | USDA | United States Department of Agriculture |
| LSU | Louisiana State University | USFWS | United States Fish and Wildlife Service |
| M | Municipalities | USEPA | United States Environmental Protection Agency |
| MS4 | Municipal Separate Storm Sewer System | USGS | United States Geological Survey |
| MVWA | Mohawk Valley Water Authority | WQCC | Water Quality Coordinating Committee (County) |
| NRCS | Natural Resource Conservation Service | | |
| NWS | National Weather Service | | |

CHAPTER 1: INTRODUCTION



(Photo: Saltman)

Overview

Many people throughout the Oneida Lake watershed community have been working hard over the past several years to improve and protect Oneida Lake and its tributaries. This has involved extensive planning, creative program implementation, comprehensive data collection and analysis, and the development of professional partnerships leading to improved cost effectiveness and program efficiency.

The Central New York Regional Planning and Development Board (CNY RPDB) was responsible for coordinating the Oneida Lake Watershed Management Plan and worked with many watershed stakeholders to reach a diverse set of program goals. This has been an action-oriented, local level initiative involving extensive data collection and analysis, identification of priority issues, and the selection of opportunities for effective solutions.



Oneida Lake (Photo: Saltman)

This report, *A Management Strategy for Oneida Lake and Its Watershed (Strategy)*, contains a description of the environmental setting and cultural influences, background information on the priority water resource issues of concern, and recommendations to

address these problems. The Strategy also presents a summary of the additional work (such as monitoring and education projects) that was accomplished as part of the watershed management plan over the past 3½ years.

Eight priority lake and watershed problem areas were initially identified through municipal surveys, stakeholder discussion groups, public comment meetings, and input from county Water Quality Coordinating Committees. Community leaders and agency representatives then met on a regular basis as “Working Groups” during 2003 and 2004 to compile background information and identify short and long-term goals for each of these issues. Recommendations were also developed for the long-term protection and enhancement of Oneida Lake and its tributaries. The findings were reviewed and endorsed by the Watershed Advisory Council and were then presented at six public meetings throughout the watershed. The findings from this effort are presented in this report.

A Management Strategy for Oneida Lake and Its Watershed also provides information about the environmental and economic setting throughout the watershed. This information was taken from *The Oneida Lake State of the Lake and Watershed Report (SOLWR)* that was published in 2003. The SOLWR serves as a reference for local decision-makers. It is used in the identification and prioritization of goals and in the development of action plans for the protection of surface water and groundwater resources. Many watershed partners contributed to the collection of information for the SOLWR, which is now available at municipal offices, public libraries, and agencies throughout the watershed. It can also be found on the Internet at www.cnyrpdb.org/oneidalake.

Project Purpose and Benefits

Ground and surface water, Central New York's most precious natural resource, fuels the region's economic development. The Oneida Lake watershed management planning initiative was launched in order to address water resource issues as a regional partnership, to improve opportunities for state and federal funds for restoration projects, and to establish goals and priorities as a grassroots effort. It has required community-based partners to look beyond county and agency boundaries as they work together to monitor, conserve, and restore Oneida Lake and its watershed.

From the early stages of the project, the management plan has been promoted as an opportunity to protect water resources while strengthening the region's economic viability. We learned from other lake groups that comprehensive, long-term planning would maintain a healthy lake environment while attracting business, tourism, and recreation dollars to strengthen the local economy. Maintaining regional partnerships and moving ahead with natural resource protection is a step in the right direction. The Oneida Lake Watershed Management Plan is providing the following benefits:

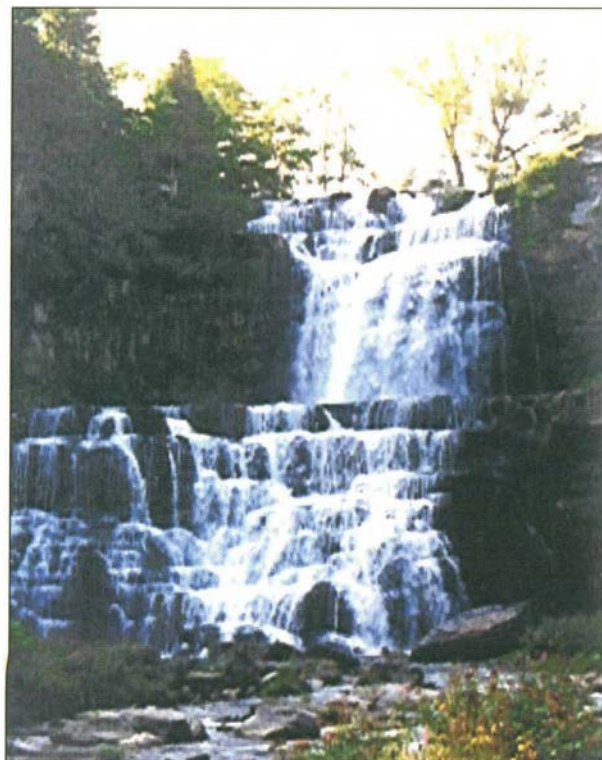
- Cooperation among organizations, pooled services and financial resources, and enhanced communication across municipal borders – all leading to improved regional efficiency;
- Ability to prioritize projects and to develop ecologically based, cost effective solutions within the watershed as a regional effort;
- Improved recreational opportunities and biological diversity in the lake and streams;
- Uniformity, consistency and fairness in program implementation;
- Expanded economic potential and improved quality of life for all watershed residents;
- Improved opportunities to receive state and federal grant funding;
- Reduction of nonpoint source pollution and protection of fisheries, wildlife habitats, and other critical areas;
- Water resource goals are established as a grassroots, locally based effort;
- Involved and informed homeowners and lake users.

Project History

The CNY RPDB initiated the Oneida Lake and Watershed Protection Program during the summer of 1997 with a \$200,000 federal Clean Water Act 604(b) grant through the NYS Department of Environmental Conservation. This watershed initiative, also referred to as *The Southern Region Strategy*, involved working with local organizations to collect, summarize, and map environmental and cultural influences. Due to the large size and diversity of the watershed, the focus of this project was a thorough review of environ-

mental, regulatory, and land use issues in the southern region, including portions of Onondaga, Madison and Oneida counties. The southern region extended from the southern lake border down to Route 5 in the vicinity of Chittenango, Canastota, and Wampsville. This area was selected as a priority due to population growth rates, development pressures, tributary water quality problems, and concerns for water quality impacts.

The grant provided the resources to strengthen watershed partnerships through the development of the Oneida Lake and Watershed Task Force. Educational workshops and conferences were held and brochures and project newsletters were distributed to keep watershed partners well informed. Water quality monitoring programs were also initiated during this time in order to collect information about the streams flowing into Oneida Lake. Survey information was collected to document lake and watershed user perceptions, computer resources, and long-term water quality monitoring goals. "The Oneida Lake Book," a publication containing information about the lake and its watershed, was written as a homeowners guide to lake protection and free copies were distributed throughout the region. *The Southern Region Strategy* continued to the end of 2000, laying the foundation for a comprehensive, six-county watershed planning project that was launched in 2001.



Chittenango Falls (Photo: Saltman)

The Oneida Lake Watershed Management Plan

The Oneida Lake and Watershed Management Plan is a process whereby municipalities, homeowners, citizen groups, and county, state and federal agencies are working together to develop and implement plans for the long-term protection and improvement of our surface and groundwater resources. This project involves data collection and analysis,

identification of high priority lake and watershed issues, pooled funding and staff resources, and the selection of plans for improved water quality. By pooling our resources, we boost our efficiency, reduce our project costs, and enhance our chances for success.

Regional Partnerships

From 2001 to 2004, the CNY RPDB contracted with the following organizations to accomplish the watershed management planning goals and objectives: Cornell Biological Field Station, Madison County Planning Department, Cornell Cooperative Extension of Onondaga County, Herkimer-Oneida Counties Comprehensive Planning Program,

SUNY Research Foundation, Dr. Joseph Makarewicz (SUNY Brockport), Oneida County Soil and Water Conservation District, Hamilton College, the City of Oneida, Project Watershed, and Life Science Laboratories. Many other people have contributed in-kind support and resources to the success of this project.

Committee Structure

Water resource management frequently extends beyond county and agency boundaries, making regional collaborations an absolute necessity. These partnerships serve as a fundamental building block for successful environmental strategies. Oneida Lake Watershed Task Force Committees and the Watershed Advisory Council were developed to encourage working partnerships between state and federal agencies, research institutions, non-governmental organizations, county and municipal representatives, and other primary decision-makers.

The **Oneida Lake Watershed Task Force Committees** have been an influential component in building and maintaining momentum with watershed projects. The Technical Task Force Committee and the Education Task Force Committee represent a partnership of agencies, organizations, and non-profit groups throughout the watershed. These groups have provided advice for projects such as the tributary monitoring program and education initiatives.

The **Oneida Lake Watershed Advisory Council**, formed in the spring of 2002, is responsible for overseeing and guiding the development and implementation of the

Oneida Lake and Watershed Management Plan. For the purpose of conducting official business, the decision-making body includes a Board of Directors with members comprised of county level, local government, and stakeholder representatives. Refer to the section below for additional information.

Several **Working Groups**, consisting of agency representatives, key decision-makers, and interested citizens, played a critical role during 2003 and 2004. These groups researched the priority issues of concern and then compiled recommendations to address them. Their draft recommendations were sent to the Watershed Advisory Council for endorsement and were then presented to the public during the spring of 2004 (refer to Appendix D for public comments). The product of their work is presented in this Strategy.

An **Oneida Lake Watershed Agricultural Advisory Committee** was established in the spring of 2002 to encourage participation from the agricultural community in the Watershed Management Plan and to shape regional activities for agricultural projects. Farmer representatives from Madison, Oneida, Onondaga and Oswego counties participated.

The Watershed Advisory Council

The Oneida Lake Watershed Advisory Council Board of Directors is a group of county and municipal representatives and stakeholders that guide the development and implementation of the Oneida Lake and Watershed Management Plan. Council members have worked closely with the CNY RPDB and the Working Groups in the development of a plan that identifies the priority water resource

issues of concern, summarizes recommendations, and provides opportunities for program implementation. The Advisory Council is committed to the protection and restoration of a multiple-use lake and watershed that sustains healthy ground and surface water, fisheries, aesthetic values, cultural resources, economic vitality, wildlife habitat, and water-based recreation.

Additional Programs

In addition to defining a set of priority issues and recommendations, the Oneida Lake Watershed Management Plan has involved water quality monitoring, GIS mapping, data collection, report preparation, assistance to municipalities, watershed websites, newsletters, conferences and workshops, brochures and fact sheets, innovative watershed improvement projects, and the development of a four-county agricultural program (Figure 2). These programs are summarized below.

Tributary Monitoring

A comprehensive baseline and storm-event sampling program on Oneida Lake tributaries took place during 2002 and 2003. The program represented a successful partnership between CNY RPDB, NYS Department of Environmental Conservation (NYS DEC), Cornell Biological Field Station, SUNY Brockport, and agencies in four counties that border Oneida Lake (Onondaga County Health Department, Madison County Planning Department, Oneida County Soil and Water Conservation District (SWCD), and Oswego County SWCD). J. Makarewicz (SUNY Brockport) prepared a final report that was presented to the Task Force Technical Committee in June 2003.

The Technical Committee selected Oneida Creek for future sampling, based on high levels of sediment loading. The CNY RPDB worked with Technical Committee members to develop maps and compile recommendations for sampling locations. County Planning Departments and Soil and Water Conservation Districts were consulted and helped with homeowner notification and site access on private property. Segment Analysis, representing a year of storm and baseline sampling on Oneida Creek, was completed during the summer of 2004.

Limited grant funding also supported Project Watershed, a non-profit organization dedicated to water resource education in Central New York schools. Project Watershed has worked with high schools and homeowners to monitor Oneida Lake tributaries in Onondaga, Madison and Oneida Counties.



*Water Monitoring on Chittenango Creek
(Photo: Saltman)*

Education and Outreach

Education initiatives have contributed to the success of the Watershed Management Plan. Our goal was to provide opportunities for decision-makers to learn more about the environmental setting and the land use influences that impact water resources. Outreach and education programs also cultivated a sense of local ownership and responsibility for water resource issues. The CNY RPDB subcontracted with Cornell Cooperative Extension (CCE) of Onondaga County to achieve watershed-wide education objectives, and other groups have assisted through participation on the Task Force Education Committee.

ONEIDA LAKE AND WATERSHED MANAGEMENT PLAN

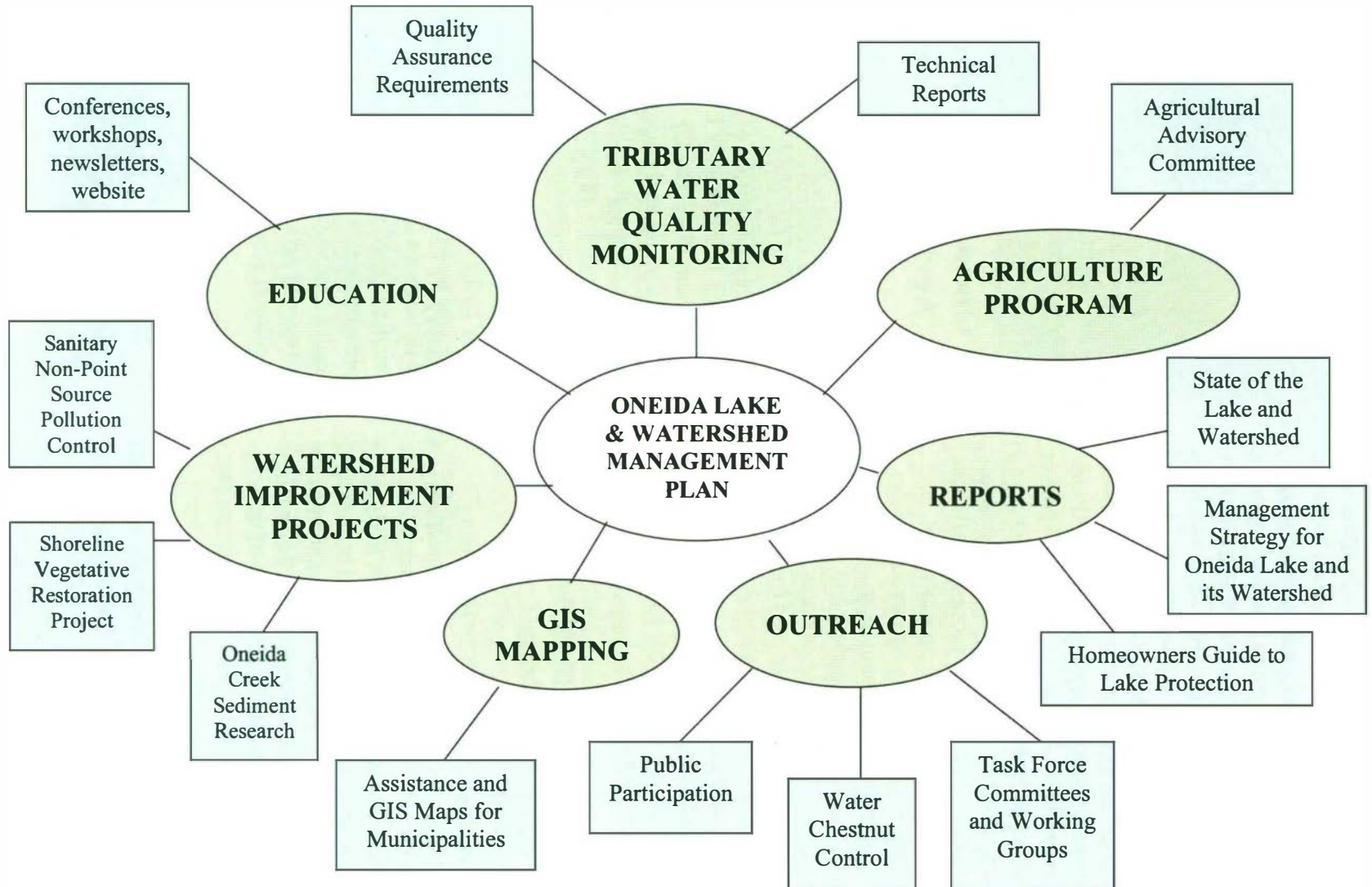


Figure 2: Oneida Lake and Watershed Management Plan

Throughout the past 3½ years, education and outreach initiatives have focused on websites, newsletters, annual conferences, workshops, public meetings, watershed bus tours, brochures, fact sheets, tabletop displays, calendars, and slide shows for municipalities, local groups, and statewide organizations. The CCE designed the “Know Your Lake” lecture series and a regional symposium to address pollution from onsite septic systems. The CNY RPDB worked with the Advisory Council to sponsor annual watershed conferences. Advisory Council members and other watershed stakeholders contributed to the success of all these events by providing slide presentations, resources, and staff time. Numerous articles about the management plan have appeared in regional and local newspapers and in statewide publications. Project updates are routinely sent to federal, state, and local elected officials. The CNY RPDB and Advisory Council Board members also participated in efforts to address regional issues (with impacts beyond the watershed) such as water chestnut and flooding.

Watershed Improvement Projects

With funding from the NYS DEC (using dollars from the Environmental Protection Fund), the CNY RPDB and the Task Force Executive Committee distributed a “Request for Proposals” to solicit watershed improvement projects to restore and protect waterbodies in the Oneida Lake watershed. Several projects were selected as recipients of this grant funding in 2003-2004. The projects are summarized below.

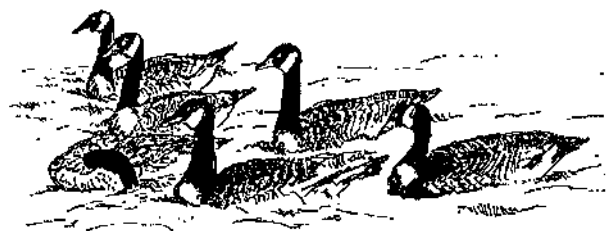
- Oneida Lake Shoreline Restoration Project (grant recipient: Madison County Planning Department).
- Oneida Creek Sanitary Non-Point Source Pollution Control Evaluation / Implementation Plan (grant recipient: the City of Oneida on

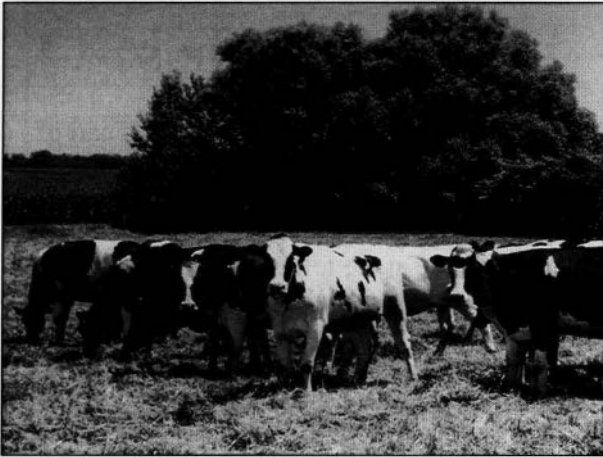
behalf of the Oneida Creek Water Quality Improvement Task Force).

- Analysis of the Oneida Creek Delta in South Bay, Oneida Lake (grant recipient: Hamilton College in cooperation with the Madison County Planning Department).
- The Oneida Lake Watershed Agricultural Program (grant recipient: Oneida County SWCD on behalf of the SWCD managers in four watershed counties).

Oneida Lake Watershed Agricultural Program

The Oneida Lake Watershed Agricultural Program (OLWAP) was established to address water quality concerns originating from approximately 360 farms in the watershed and to ensure representation of the agriculture community in the Oneida Lake Watershed Management Plan. The OLWAP has involved an inventory and analysis of the impact of agriculture on water quality in the Oneida Lake watershed. Comprehensive nutrient management plans and agriculture improvement practices have been developed for farms where manure management is impacting water quality in the streams. An agricultural coordinator was hired to oversee agriculture activities throughout the watershed. Newsletters were distributed and meetings were held with representatives from the farming community in order to maintain communication and to improve the efficiency of watershed-wide agricultural programs.





Agriculture represents 29% of the watershed

Municipal Outreach

The Oneida Lake watershed includes portions of six counties and 69 municipalities, many of which have signed formal resolutions supporting the watershed management planning process.

As a service to the watershed municipalities, the CNY RPDB provided “Sensitive Areas and Development Suitability” maps and other GIS mapping services to several Oneida Lake shoreline communities.

Goals for 2005

The completion of this report represents a significant milestone in the management planning process. The current priority for the Watershed Advisory Council and the CNY RPDB is to generate funding for the implementation phase of the management plan. Agencies, municipalities, colleges, businesses and other primary stakeholders will be asked to contribute. With sufficient funding, the following priorities (based on the recommendations found in the Strategy) will be the focus in 2005:

- Improve Oneida Lake recreation and fishing habitat by reducing soil erosion.

Website

A website was developed in order to improve communication and to facilitate the exchange of information concerning the Oneida Lake watershed. Information about the Oneida Lake Watershed Management Plan is available at: www.cnyrpdb.org/oneidalake/.

Local Laws Project

During 2003 and 2004, the CNY RPDB met with several municipalities in the Oneida Lake watershed to discuss the Management Plan recommendations that refer to improving, amending and enforcing local laws. Recommendations from the Flooding and Water Level Management, Septics, and Soil Erosion and Sedimentation Working Groups were the focus of this project. Recognizing that a law is only as good as its enforcement, the CNY RPDB met with municipal representatives, including the Mayor/Supervisor, Code Enforcement Officer and Highway Superintendent or Department of Public Works officials from the following communities: the Towns of Cicero, Constantia, Dewitt, Manlius, Sullivan, West Monroe and the Villages of East Syracuse, Fayetteville and Minoa.

- Reduce the current and potential impacts from exotic species, especially water chestnut.
- Minimize flood damage to shoreline homes while maintaining water levels for navigation, recreation, fish habitat, and lake ecology.
- Implement a comprehensive watershed education program for the benefit of shoreline homeowners, agencies and organizations, municipalities, and school students.
- Protect and maintain public health and property values and improve aquatic habitat through better installation, maintenance and regulation of on-site septic systems.

- Control cormorant populations to reduce their impacts on fish populations, island habitat, and colonial nesting birds.
- Provide safe storage and usage of road salt and explore economically viable alternatives.
- Fund scientific research to ensure the long-term stability of Oneida Lake fisheries.
- Encourage safe boating practices and the responsible use of boats and motorized watercraft.
- Maintain the agricultural program for the control of non-point source pollution and the continuation of the New York State Agricultural Environmental Management Program.
- Provide assistance to municipalities in the review of local laws as they pertain to erosion and sedimentation.
- Continue the CNY RPDB and the Watershed Advisory Council's leading role in watershed management, thereby ensuring that project priorities remain locally driven initiatives.
- Hire a Watershed Coordinator to maintain program direction and regional communications and for continued staff assistance to the Watershed Advisory Council.
- Review and evaluate implementation projects each year to ensure that the Strategy goals are met.



*Shoreline vegetation will minimize erosion
(Photo: www.tva.gov)*

PUBLICATIONS

The following reports were written as part of the Oneida Lake and Watershed Management Plan. These reports, in addition to annual program summaries and newsletters, are available at the following location: cnypdb.org/oneidalake/publications.asp.

Sediment Analysis of Oneida Creek: The Location of Sources of Pollution, by Joseph C. Makarewicz and Theodore W. Lewis, September 2004.

Sediment Dynamics of the Oneida Creek Delta, Oneida Lake New York
By Eugene Domack (Hamilton College), Scott Ingmire (Madison County Planning Department), Katie Arnold (Hamilton College), anticipated September 2004.

Oneida Lake Watershed Agriculture Program Final Report, by Jo-Anne Faulkner (Oneida County Soil and Water Conservation District), anticipated September 2004.

Oneida Creek Sub-Basin Sewer System Evaluations, O'Brien and Gere Engineers, Inc., December 2003.

Oneida Lake State of the Lake and Watershed Report, Edited by the CNY RPDB, June 2003.

Nutrients and Suspended Solid Losses from Oneida Lake Tributaries, 2002 – 2003, by Joseph C. Makarewicz and Theodore W. Lewis, June 2003.

Oneida Lake Native Shoreline Restoration Incentive Program, by Scott Ingmire (Madison County Planning Department), October 2000.

CHAPTER 2: ONEIDA LAKE AND ITS WATERSHED



Madison County Farm (Photo: Saltman)

Environmental Setting

The information in this chapter was taken from the 2003 document titled, *The Oneida Lake State of the Lake and Watershed Report* (SOLWR). For additional information about these topics please refer to the SOLWR, which is available at municipal offices, public libraries, and agencies throughout the watershed. It can also be found on the Internet at www.cnyrpdb.org/oneidalake.

Limnology and Ecology

Oneida Lake has undergone significant ecological changes over the last four decades. The most notable changes have been associated with the collapse of the mayfly *Hexagenia limbata*, reductions in phosphorus concentrations, invasion by zebra mussels, declines in the walleye (*Stizostedion vitreum vitreum*) and yellow perch (*Perca flavescens*) sport fisheries, expansion of a population of double-crested cormorants, and the recent establishment of the water chestnut. The response to these ecological events has been the following: improved water quality conditions, increased water clarity, increased aquatic macrophytes at greater depths, increases in bottom dwelling macroinvertebrates, the extinction of three species of unionid bivalve clams, high mortality of walleye and yellow perch in their mid-life stages, and significant predation impacts by double-crested cormorants on the Oneida Lake fishery. As we move into the future, much of the uncertainty of the state of Oneida Lake rests in unwanted “pest organisms,” and their impact on the food chain. Proper management practices in Oneida Lake and its watershed must remain a high priority to maintain a healthy ecosystem and high water quality. Ecological surprises in Oneida Lake's future are expected as climate warming and the introduction of new exotic species create increasing demands on water resources.

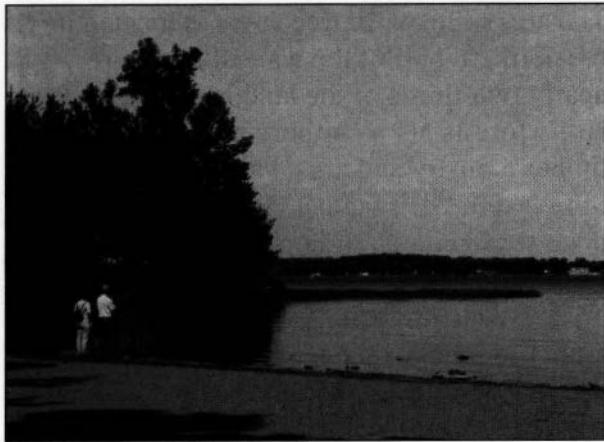
The Oswego River Basin

The Oneida Lake watershed is part of the Oswego River Basin, a diverse system made up of many hydrologic components that flow

together. Water flows from upland streams down to Oneida Lake and the Finger Lakes, then to low-gradient rivers and the New York State Canal System, and eventually to Lake Ontario.

The Oswego River Basin drains an area of approximately 5,100 square miles and encompasses three physiographic regions: the Appalachian Uplands, the Tug Hill Uplands, and the Lake Ontario Plain. The Clyde/Seneca River-Oneida Lake trough is an “unofficial” geographic designation for the belt of lowlands that runs through the basin from west to east. The trough is key to understanding the Oswego River Basin flow system in its natural and human altered state. The New York State Barge Canal was constructed in this area due to its exceptionally low gradient. As it is very difficult to move large volumes of water through this low gradient, the area poses a challenge to water resources management.

The additive contribution of each stream and lake to the Canal results in a bottleneck at the Three Rivers Junction -- the confluence of the Seneca, Oneida, and Oswego Rivers. At this junction, 96 percent of the land area in the Oswego River Basin is represented. This is also the flattest, slowest moving stretch within the Oswego Basin. At times, the water discharged to the trough exceeds the channel capacity, resulting in flooding within Seneca, Cayuga, and Oneida Lakes, and along the Seneca and Oneida Rivers. Once the water reaches the Oswego River, downstream of Fulton, the gradient increases and the water has the potential to move more readily toward Lake Ontario.



Oneida Lake (Photo: Saltman)

The Oneida Lake Watershed

Oneida Lake, the largest waterbody entirely within New York State, is located approximately 11 miles northeast of Syracuse. It is 20.9 miles long and 5.5 miles at its widest point. The average depth is 22.3 feet. Many seasonal and permanent homes are located along the 54.7 miles of shoreline. The Oneida Lake watershed (all of the land that drains to the lake) comprises the eastern most part of the Oswego River Basin and contains 872,722 acres (approximately 1,364 square miles) of land draining parts of Lewis, Madison, Oneida, Onondaga, Oswego, and Cortland Counties. The watershed contains portions of 69 municipalities and has a population of 262,164 based on the 2000 U.S. Census.

The Oneida Lake watershed encompasses parts of the Appalachian Uplands, Tug Hill Uplands, and Lake Ontario Plain regions. The New York State Canal System traverses the Lake Plain Region as it flows east to west through the Oneida Lake watershed. The watershed has seven primary subwatersheds: Chittenango Creek subwatershed, Cowaselon Creek subwatershed, Fish Creek subwatershed, Limestone/Butternut Creek subwatershed, Oneida Creek subwatershed, Oneida Lake North Shore subwatershed, and Wood Creek subwatershed. Water exits the watershed through the western end of Oneida Lake

via the Oneida River where it eventually makes its way to Lake Ontario.

Bedrock Geology

The Oneida Lake watershed is underlain by bedrock with significant variation in its resistance to erosion. It ranges in age from Middle Ordovician (beginning approximately 460 million years ago) to Upper Devonian (beginning approximately 365 million years ago) geologic periods. The bedrock is youngest in the southern part of the watershed and grows older with distance northward. The bedrock pattern is very important because it affects the nature of landforms, groundwater, soils, and land use. The watershed contains several geologically significant landforms, including beach ridges, alluvial plains, gorges, waterfalls, and unique mineral deposits.

Areas in the southern portion of the Oneida Lake watershed, including a large portion of the Cowaselon Creek subwatershed and along the deep valleys of the Appalachian Uplands, are composed of geologic units that have a significant impact on water chemistry. These highly erodible units (Vernon Shale, Syracuse Salt, Camillus Shale, and Bertie Limestone) contribute large amounts of dissolved minerals to surface waters draining the southern watershed region. In contrast, the northern half of the watershed largely contains erosion resistant bedrock that generally does not influence water quality.

Soils

The Appalachian Uplands are characterized by highly productive limestone soils formed in glacial till. Soil management efforts in the southern portion of the watershed are mainly restricted to improving natural drainage and controlling farmland erosion. Streams that flow into Oneida Lake from the south flow over Onondaga limestone through productive agricultural lands and concentrated population centers, and therefore tend to be nutrient-rich.

Soils in the Lake Plain region are typically flat, deep, have high lime content, and were formed in glacial till. Organic soils formed in glacial outwash, commonly referred to as “muck” soils, are found in this region, especially near the Village of Canastota. Soil management in the lowlands of the Lake Plain is generally restricted to improving natural drainage.

Soils in the Tug Hill region tend to be wet, stony, shallow, sandy or steeply sloping. The soils in the region are poorly drained and the soil fertility decreases in the upland areas. These soils are generally unfit for agriculture and are dominated by forests. Streams that flow into Oneida Lake from the northern uplands flow over erosion resistant sandstone and are characteristically nutrient poor.

Forests

The forest community in the Oneida Lake watershed reflects human activity as well as natural history. Land management practices, the introduction of non-native species, disease, and insect infestations have defined the current forest community that exists as private and public holdings. Regardless of ownership, forested lands improve the quality of life in the watershed by generating valuable renewable resources, improving water quality, providing opportunities for outdoor recreation, and providing a variety of wildlife habitats.

The once heavily forested southern areas of the watershed previously served as a source of fuel and construction materials for early settlers. Large tracks of forested land were eventually cleared for agricultural use in Onondaga and Madison counties but were later abandoned due to marginal productivity. These areas have naturally reverted back to forest land. In 1929, New York State initiated soil conservation and reforestation efforts on abandoned farmland and much of the land was replanted with coniferous species.

The area of heaviest tree cover is located in the northern half of the watershed where nearly two-thirds of the land is forested. Tug Hill’s forests are an important resource of the timber industry and are a valuable component of the New York State economy. Approximately 88 percent of the Tug Hill region forests are privately owned. As more parcels of forestland are being managed privately, the ability to monitor the land becomes more difficult and thus increases the potential of impacting water quality. However, an agreement for the sale of 45,000 acres of property in the East Branch of Fish Creek subwatershed was negotiated in 2002 between Hancock Timber Resource Group and The Nature Conservancy. Some of the land will be under a conservation easement, part will be managed as state forestland, and the remainder will be kept in timber management and will be available for a mix of private leased hunting and public access.

Climate

The Oneida Lake watershed has a continental climate characterized by warm, dry summers and cold, snowy winters. Major climatic influences include topography, prevailing westerly wind direction, and proximity to Lake Ontario. In most years, the rate and distribution of precipitation in the watershed are sufficient for agriculture and domestic water supplies. Because the watershed is located in the Eastern Lake Ontario snowbelt, it is subject to significant lake effect snow events. Historical climatic records of precipitation and air temperatures for the northeastern United States show a generally calm and cyclic seasonal weather pattern. Between 1890 and 1960, relatively few extreme departures from the norm were recorded. More recently, however, regional weather patterns have displayed frequent extremes, including droughts, floods, and periods of very cold or very warm temperatures. Such extreme conditions add to the difficulty of maintaining ideal hydrologic conditions in the watershed.



*Water from Cazenovia Lake flows into Oneida Lake
(Photo: Saltman)*

Surface Water

The Oneida Lake watershed has an extensive surface water network. Approximately 56 percent of the precipitation that falls in the watershed reaches the lake through surface inflow. The rest is lost through evaporation, absorption by trees and plants, and groundwater recharge. The Tug Hill region in the northern portion of the watershed contributes approximately 67 percent of total surface inflows, in part, as a result of the large volume of snowfall. Water that is stored in the snowpack slowly recharges wetlands and streams throughout the winter months.

Although surface inflow from the northern watershed region represents most of the total water volume entering the lake, the majority of the nutrients entering the lake are introduced from tributaries that flow through the nutrient rich farmlands and wetlands of the southern watershed. The significant volume of surface inflow from the northern watershed

helps to dilute nutrient levels in the lake. Water flows out of Oneida Lake into the Oneida River, which is located at the western edge of the lake. Annual discharge to Lake Ontario from the Oneida River is estimated at 2.13 billion cubic meters per year.

In addition to the streams, there are also numerous small lakes and ponds scattered throughout the Oneida Lake watershed. Many are concentrated in the northern watershed, especially the Tug Hill Uplands. Some of the watershed's larger lakes (Cazenovia, DeRuyter, and Tuscarora) are located in the southern half of the watershed in the Appalachian Upland region.

Groundwater

Appropriate geologic settings combined with a suitable climate result in the Oneida Lake watershed having a wealth of groundwater resources throughout much of its watershed. An extensive system of aquifers was created when thick layers of unconsolidated deposits were laid down by glaciers during their retreat, approximately 10,000 years ago. These deposits overtop underlying bedrock aquifers of sedimentary rock formed millions of years earlier. Precipitation is the ultimate source of the groundwater recharging these aquifers. The Oneida Lake watershed receives an average of 35 inches of precipitation each year, with considerably higher amounts originating in the northern watershed and Tug Hill Uplands as lake-effect snowfall. These groundwaters are not static reservoirs. Rather, a growing body of evidence indicates that significant quantities of groundwater flow centrally from the northern and southern watersheds and discharge along the shallow shorelines of Oneida Lake. Despite the overall abundance of groundwater, dry wells and limitations on groundwater availability are arising more frequently. This is due to spatial variability in aquifer yield, seasonal and interannual fluctuations in precipitation recharge, and complications associated with



*Catching crayfish in Chittenango Creek
(Photo: Saltman)*

land use, overwithdrawal, and groundwater contamination as development pressures increase, particularly in the southern portion of the watershed.

Flora and Fauna

Geology, topography, soil, climate, and land use patterns influence the distribution of flora and fauna. From uplands to lowlands, the Oneida Lake watershed provides diverse habitats that sustain a healthy and productive assemblage of plant and animal species. Changes in land use patterns have the potential to threaten the health, well being, and in some cases, the survival of several plant and animal wildlife species. Despite these changes, the Oneida Lake watershed is home to a number of rare, threatened, and endangered plants and animals of state, national, and global significance. For example, the Chittenango ovate amber snail, Bog Turtle, and Hart's-Tongue fern, all species on the United States Threatened Species List, are found in the Oneida Lake watershed. The Indiana bat, also found in the watershed, is a federally listed endangered species.

Wetlands

Wetlands are found throughout the Oneida Lake watershed but are especially concen-

trated in the Lake Plain region, an area characterized by a high water table and flooding. Wetland types found in the Oneida Lake watershed vary from forested, seasonally flooded swamps to open marshes of grasses, sedges, and other low growing species. Wetlands provide excellent habitat for migratory waterfowl and serve as wintering yards for many animal species that utilize the low growing vegetation for cover and a year-round food source. Wetlands also act as sedimentation areas and filtering basins to remove impurities, thereby enhancing water quality. By slowing runoff and temporarily storing excess surface water, wetlands protect downstream areas from flooding. Under certain hydrological conditions, wetlands can recharge groundwater and augment surface water flow. Wetlands adjacent to waterbodies also provide spawning and nursery grounds, supply food, and lend protection to fish and other aquatic species. As an added benefit, wetlands provide excellent recreational, aesthetic, and educational opportunities.

A significant threat to the wetlands of the Oneida Lake watershed is commercial and residential development. The impacts from urbanization have degraded wetlands near the lake as well as in upland areas. Reduced wetland acreage has decreased the potential for runoff retention of urban and agricultural pollutants, and has reduced water storage capacity during periods of excessive precipitation. Stormwater problems in the watershed are also more prevalent due to the conversion of wetlands to urban and agricultural land. Wetland losses reduce the ability of the watershed to store water and consequently increase the region's susceptibility to high water damage. Another threat to wetlands in the Oneida Lake watershed is a non-native plant called purple loosestrife. This plant thrives in marshes and ditches, out-competes indigenous flora, and makes wetlands less suitable for wildlife habitat.

Fisheries of the Oneida Lake Tributary System

Streams, lakes, and ponds throughout the Oneida Lake watershed provide habitat for warmwater and coldwater fish species. Several warmwater stream segments found in the lower sections of Oneida, Fish, Chittenango, Limestone, Butternut, Cowaselon, and Canaseraga Creeks provide seasonal walleye, perch, and bass fisheries. Warmwater fish species inhabit the Barge Canal at Sylvan Beach year-round. Numerous ponds and medium sized lakes (up to 1,280 acres) in the Oneida Lake watershed also support warmwater fisheries. Thirty-one ponds and lakes over ten acres in size, totaling 4,848 acres, provide fishing for warmwater species, primarily largemouth bass, chain pickerel, yellow perch, and panfish. Although warmwater species are stocked in the Oneida Lake watershed, the majority of these waterbodies are supported by natural reproduction.

Coldwater fisheries are also present throughout the Oneida Lake watershed. Trout require cool, clean water to survive and are often the first species to disappear from polluted waters; therefore the presence of trout in the watershed is highly regarded. Brown trout streams dominate Oneida Lake tributaries. The headwaters of the tributaries generally contain brook trout, especially in the Fish Creek section of the Tug Hill region in Lewis and Oneida Counties. There are 850 miles of trout streams in the Oneida Lake watershed, including 141 miles of stocked streams. Water quality is generally high and virtually all trout streams support natural reproduction. Many streams provide high quality fishing for brown trout.

According to the 1996 Statewide Angler Survey, Fish Creek and Chittenango Creek, two of the larger tributaries in the Oneida Lake watershed, are very popular trout

streams, ranking 66th and 80th of all waters in New York in terms of angler use. New York State has acquired extensive Public Fishing Rights (permanent easements for access for fishing) along the larger trout streams in the watershed. A total of 70.5 miles of easements have been acquired in the watershed, primarily in the Fish Creek and Chittenango Creek subwatersheds.

Monitoring Programs

Several water quality monitoring programs have been implemented in Oneida Lake and its tributaries over the past decade. Extensive research on the water quality and biological characteristics in the Lake basin continues to be spearheaded by the staff at the Cornell Biological Field Station. Regional tributary water quality monitoring and biological monitoring programs throughout the watershed have been implemented by groups such as the NYS DEC (the Rotating Intensive Basin Studies), Project Watershed CNY, and the CNY RPDB.

Counties throughout the Oneida Lake watershed have conducted additional tributary water quality monitoring and stream erosion surveying programs. The United States Geological Survey (USGS) collects hydrologic measurements within the Oneida Lake watershed and at the Oneida River to measure outflow from the lake.

Priority Waterbodies List

The Priority Waterbodies List (PWL), last updated in 1996 for the Oswego-Seneca-Oneida Rivers Drainage Basin, includes surface waters that cannot be fully used as a resource and/or have problems that can damage their environmental integrity. There are 23 segments with known or suspected problems listed on the PWL for the Oneida Lake watershed.

Economic Profile

Spanning portions of six counties, the Oneida Lake watershed is a demographically diverse ecosystem that offers a variety of recreational and economic opportunities. Extending from the Tug Hill region in the north to the DeRuyter Reservoir in the south, and from the City of Syracuse in the west to the City of Rome in the east, the geographic diversity of the watershed is reflected in everything from population trends to local economic influences. The region boasts of a well-developed and extensive infrastructure, abundant wildlife, strong aesthetic appeal, and a wide range of tourism and recreational opportunities. Collectively, these features form the basis of a healthy, regional economy.

Population

Portions of six counties and 69 municipalities are located within the Oneida Lake watershed. According to the U.S. Census Bureau's 2000 statistics approximately 262,164 people live in the watershed (Table 1). The City of Rome in Oneida County and the City of Syracuse in

Onondaga County are significant population centers. Onondaga County, located in the southwestern portion of the watershed, is the most densely populated (698.2 persons per

square mile of land area). A significant contributor to Onondaga County's population density is the City of Syracuse. At 5,834 persons per square mile, Syracuse is the single most densely populated municipality in the watershed. In direct contrast, Lewis County, located in the northern portion of the watershed, is the least densely populated county (11.7 persons per square mile). The Lewis County Town of Montague, with a population density of less than 2 persons per square mile, is the least densely populated municipality in the watershed.

Watershed Infrastructure

The Oneida Lake watershed infrastructure supports economic growth and development throughout the area. Affordable and abundant housing and an advanced transportation network of highways, railways, air transportation facilities, and the New York State Canal System make this region easily accessible and economically attractive. According to the 2000 U.S. Census of Population and Housing, there are 189,662 housing units located in the municipalities of the Oneida Lake watershed. In 1990, the last year for which this type of Census data is available, 81.2 percent of the housing units in watershed municipalities obtained their water from a public system or private company, the remaining relied on individual wells or other water source. For wastewater disposal, the vast majority of housing units (72.2 percent) in the municipalities that comprise the Oneida Lake watershed use public sewers. All of the remaining housing units rely on septic tanks or other on-site wastewater disposal systems.

Tourism, Recreational Opportunities and Economic Impacts

A variety of tourism and recreational opportunities are available in the Oneida Lake watershed.

Table 1: Estimated Oneida Lake Watershed Population

| <i>County</i> | <i>Population</i> |
|------------------------|-------------------|
| Cortland | 74 |
| Lewis | 996 |
| Madison | 50,607 |
| Oneida | 59,557 |
| Onondaga | 110,078 |
| Oswego | 40,852 |
| Watershed Total | 262,164 |

Population was computed by HOCCPP from 2000 block-level Census data.



Bridge over Chittenango Creek (Photo: Saltman)

Regional attractions, annual events, extensive park and recreational facilities, excellent boating and fishing access, and other tourism opportunities greatly enhance the watershed's value. The numerous municipal, county, and state parks and other recreational facilities located throughout the watershed offer a wide range of activities such as swimming, hiking, bird watching, fall foliage viewing, golfing, cross-country skiing, snowshoeing, snowmobiling, hunting, fishing, trapping, and camping. The NYS DEC operates the Oneida Lake Fish Cultural Station in Constantia. The station is the largest state-of-the-art walleye hatchery in the country. There are also two public piers on the lake, located in Sylvan Beach and Brewerton, and 12 state-run public fishing access sites throughout the watershed.

Throughout history, fishing and boating has played a major role in the social and economic development of the region, and today, is one of the main recreational uses of Oneida Lake. Over 75 fish species were identified in the lake in the 20th century. The lake's fishery is a major contributor to the region's tourism industry. Oneida Lake has been identified as the most important inland fishery and the fourth most important sport fishery in New York State. According to the *NY Statewide Angler Survey*, the 1996 net economic value of Oneida Lake's freshwater fishery was estimated to be over \$9.4 million, ranking it first among New York State's inland waters. Millions of people from all over New York State and beyond annually spend millions of dollars throughout the watershed as they recreate on Oneida Lake, its tributaries, and other smaller lakes in the watershed. For this reason, the integrity of the lake and watershed has a direct impact on the economic livelihood of local municipalities.

In the Tug Hill region, fishing and hunting are enjoyed by many local homeowners and out of town visitors, and many industrial landowners sell fishing and hunting leases to clubs to provide sportsmen access to forestland. The money raised by these leases helps offset tax assessments against the property, making it easier for businesses to maintain ownership of large tracts in the northern part of the watershed. During the winter, approximately 10-15 thousand snowmobiles each weekend use the trails on Tug Hill according to the Lewis County Chamber of Commerce. A 1990 study found that snowmobiling generates \$8 million each season in the Tug Hill region. Throughout the watershed, tourism benefits extend to surrounding businesses as visitors take advantage of the region's lodging, restaurants, shops, and other facilities.

Human Influences

Land Use

The Oneida Lake watershed covers 872,722 acres (about 1,363 square miles) of land area in Lewis, Madison, Oneida, Onondaga, Oswego, and Cortland counties (Figure 3). Approximately 15,000 acres (23 square miles) of land in the watershed within Madison and Oneida counties is owned by the Oneida Indian Nation and is primarily used for commercial and residential purposes as well as open space.

According to 2002 data from the NYS Office of Real Property Services, there are approximately 120,225 parcels (a plot or tract of land) in the watershed that vary greatly in size. The more populated cities and villages typically have a greater number of parcels that are smaller in size, while parcels in the more rural areas of the watershed tend to be much larger in size and consequently fewer in number.

Agricultural activity is concentrated in the southern portion of the watershed, especially Madison County and the southern portions of Oneida and Onondaga counties. Commercial and industrial activities and residential land uses are primarily centered in and around the cities and villages. There is a predominance of wild, forested, conservation lands, public parks, public and community service, and recreation and entertainment property in the Tug Hill Upland region (Lewis County and northern Oneida and Oswego counties), though isolated occurrences of this property can also be found throughout the watershed. Figure 4 shows the breakdown of land use for the watershed.

Agricultural Land Use

Much of the Oneida Lake watershed is characterized by productive soils, favorable climate, and good market outlets for agricultural products. Over 300 commercial, full-time farms currently operate almost one-third of the land within the watershed (Table 2). No operating farms are currently known to exist in the watershed portion of Cortland and Lewis counties. The majority of the farms are dairies located within Madison, Oneida, and Onondaga counties. These dairies have an average herd size of 159 cows and grow a crop rotation of corn and hay used for livestock feed. Non-dairy operations within the watershed include a thriving vegetable trade as well as burgeoning sheep, beef, and equine industries.

According to data from the NYS Office of Real Property Services, approximately 29 percent of the total land area in the Oneida Lake watershed is classified as agricultural and is primarily located in Madison, Oneida, and Onondaga counties (Table 3). Agriculture's economic impact in the Oneida Lake watershed is at least \$126 million (data is not yet available for all

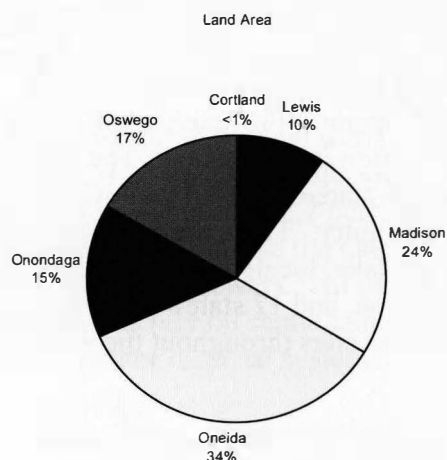
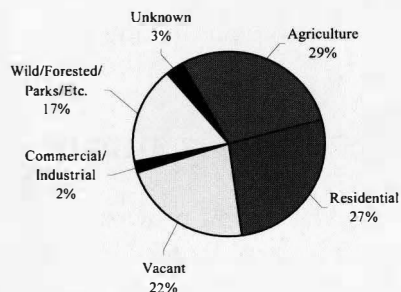


Figure 3: Oneida Lake Watershed Land Area by County



Source: NYS ORPS, 2002

Figure 4: Oneida Lake Watershed Land Use

farms in the watershed). According to county-level statistics in Madison, Oneida, and Onondaga, where the watershed’s farms are concentrated, agriculture has a combined economic impact of over \$500 million annually and employs a workforce of over 5,000 people.

Agriculture’s diversity and prosperity within the southern portion of the Oneida Lake watershed is due in large part to a favorable mix of physiographic and climatic conditions. While these conditions can be assets to a farm, they can also present farm management challenges. Soils on steep slopes on the Appalachian Uplands are subject to erosion. Heavy rainfall and snowmelt contribute to runoff from barnyards and cropland where manure is spread. High precipitation in the watershed coincides with a high rate of nutrient leaching, whereby they can be washed downward through the soil profile, below the roots of plants. Erosion, runoff, and leaching from farms are collectively known as agricultural non-point sources of pollution. Natural resource management challenges are one of many issues faced by the modern farmer. Nationally and locally within the Oneida Lake watershed, farmers are plagued by low profitability, high taxes, high costs of land and machinery, biosecurity, unstable prices, and suburban sprawl.

Watershed farmers voluntarily participate in a variety of available programs to alleviate agricultural non-point source pollution. Many farmers are participating in the Oneida Lake Watershed Agricultural Program where the NYS Agricultural Environmental Management (AEM) Program is being utilized. AEM is New York State’s official tool to address agricultural non-point source pollution and is a key component of whole farm planning. Participants in the Oneida Lake Watershed Agricultural Program have improved their opportunities to receive state, regional and national funding to implement conservation management practices on their farms. This is due to the regional cooperation within the Agricultural Program and the statewide success of AEM.

Table 2: Farms in the Oneida Lake Watershed

| County | Farms (#) |
|----------|-----------|
| Cortland | 0 |
| Lewis | 0 |
| Madison | 169 |
| Oneida | 93 |
| Onondaga | 43 |
| Oswego | 11 |
| Total | 316 |

Table 3: Percent Agricultural Land Use in the Oneida Lake Watershed

| County | Agriculture |
|----------|-------------|
| Lewis | 4% |
| Madison | 44% |
| Oneida | 26% |
| Onondaga | 23% |
| Oswego | 5% |

Source: Prepared by Herkimer - Oneida Counties Comprehensive Planning Program with data from the NYS Office of Real Property Services. Note: Percentages are based on the number of acres classified as agricultural.

Water Supply Systems

Residents of the Oneida Lake watershed receive drinking water from either municipal or private surface water or groundwater supplies from within as well as outside of the watershed. In addition to providing water to communities within the watershed, Oneida Lake tributaries are also used to provide water for communities beyond the watershed boundary. Under ordinary conditions, these supplies are ample for agriculture, industrial, and domestic use. However on occasion, such as the summer of 1999, drought conditions reduce surface water and groundwater supplies to the region.

The availability of a clean and dependable water supply is essential for human health and the economic survival of the Oneida Lake region. As water travels over the surface of the land or through the ground, it dissolves naturally occurring minerals and can pick up pollutants resulting from the presence of animals or from human activity. These contaminants can result in waterborne diseases that afflict humans as well as the ecosystem. Fortunately, water hardness and the presence of salt in the deeper bedrock wells are the primary naturally occurring water quality nuisances facing users in the watershed. Naturally occurring sulfur is also a common nuisance found in wells throughout the Oneida Lake watershed.

Contaminants such as *E. coli* and nitrates, and disease-causing organisms such as *Cryptosporidium parvum* and *Giardia lamblia*, come from human and animal wastes. In the Oneida Lake watershed, failing septic systems and agricultural runoff are two potential sources of these contaminants. In addition to microbial contaminants, fertilizers, pesticides, and other chemicals applied to the land may enter groundwater or runoff into surface water. All of these contaminants are harmful to

human health at certain levels, and water containing them is considered unsuitable for human consumption if the pollutants exceed established limits.

Wastewater Treatment

The collection and treatment of wastewater is important to safeguard public health, protect water quality, and ensure the overall survival of a region. In the Oneida Lake watershed, sewage and septic systems have increased in number and capacity due to urbanization, development, and increased population. There are 17 municipal wastewater treatment plants serving communities in the watershed. Two treatment plants discharge directly into Oneida Lake, and 12 discharge to tributaries of the lake. The remaining three serve municipalities within the watershed, but discharge their treated wastewater to waterbodies outside the watershed. The treatment of municipal wastewater is highly regulated by the state and federal governments through wastewater discharge permits.

In rural and sparsely populated suburban areas it may not be economically feasible to construct community wastewater treatment facilities. In these areas, on-site septic systems are traditionally used to dispose of wastewater. Overall, properly sited and maintained individual on-site wastewater treatment systems can treat wastewater effectively and not threaten water quality. However, poor site conditions, improper system installation and maintenance, as well as overloading can drastically decrease the life of the system and pose a significant threat to water resources.

Flooding

Flooding occurs in the region surrounding Oneida Lake, often after major storm events or rapid winter thaws. No organization has the authority or responsibility for controlling Oneida Lake water levels to prevent flooding or to reduce the frequency and duration of flooding. The New York State Canal Corporation



*Oneida Lake Task Force Conference
(Photo: Westervelt)*

assumes a limited role by monitoring the canal system throughout the year and making adjustments to the Caughdenoy Dam during the navigation season to meet their primary responsibility of navigation.

Flooding is not unique to Oneida Lake. The Federal Emergency Management Agency (FEMA) reports that floods have caused a greater loss of life and property, and have disrupted more people in the United States than the impact of all other natural hazards combined. Flooding on Oneida Lake and within its watershed is a naturally occurring and routine phenomenon. The majority of the high water levels occur during the spring runoff period when rain and melting snow result in runoff rates that exceed the combined storage and outlet discharge capacity, resulting in rising water levels. It is very rare to observe high water levels outside of the spring runoff period. Consequently, the impact associated with annual snowmelt runoff phenomenon is a driving force on high water levels observed on Oneida Lake.

Management of Oneida Lake for flood control either directly or indirectly involves several state and federal agencies, including the New York State Canal Corporation, the New York State Department of Environmental Conservation, the United States

Federal Emergency Management Agency, and the United States Army Corps of Engineers as well as individual local communities. No organization is capable of preventing flooding on Oneida Lake; however, there are a variety of regulatory programs and strategies that attempt to reduce the impacts associated with flooding. The current floodplain management strategy that utilizes federal, state and local groups attempts, through various regulatory programs, to reduce the disruption and damage caused by floods while protecting the natural resources and functions of the floodplains. This approach is achieved through efforts to avoid the risks that exist within the floodplain; minimize the impacts of unavoidable risks; and mitigate the impacts of damages as they occur, all in a manner that protects and enhances the natural environment.

Water Level Management

Oneida Lake is a multi-use waterbody that serves as the primary navigation link in the heart of the New York State Canal System. The lake's shore also has numerous residential properties; marinas and fishing charters; and a complex ecosystem that contains an exceptional fishery, extensive wetlands, and waterfowl. Proper water level management for Oneida Lake is crucial to the lake's multiple uses. A balanced approach is used to maintain the primary navigation function along with the other secondary uses.

This discharge is regulated at the Caughdenoy Dam, located five miles downstream from the lake along the Oneida River. The Caughdenoy Dam is a movable dam that spans the Oneida River that includes seven 52-ft wide by 12-ft high water control gates. The New York State Canal Corporation is responsible for operating these gates to achieve desired levels during the navigation season. Oneida Lake level regulation efforts are aimed at providing sufficient water for navigation throughout the navigation season while minimizing flood damage.

Oneida Lake water levels are lowered after the navigation season to provide storage for spring snowmelt and storm runoff. This is accomplished by fully opening each of the seven water control gates that create the Caughdenoy Dam near the beginning of December each year. These gates remain open throughout of the winter and the observed lake levels are a function of precipitation and runoff. Given the uncertainty of the timing of spring rain and snowmelt, lake levels at times can rise above flood levels even with the Caughdenoy dam fully open. In the summer, levels are regulated to provide reserve capacity sufficient to contain moderate runoff.

NYS DEC Regulated Environmental Activities

Under the Federal Clean Water Act a permit is required to discharge point-source pollutants into waters of the United States. In New York State, the NYS DEC is the permitting authority of the State Pollutant Discharge Elimination System (SPDES) program. The program requires a permit for point-source discharges of wastewater into surface or ground waters of New York State; construction or operation of a disposal system, such as a sewage treatment plant; discharge of stormwater associated with industrial activity, including construction activities disturbing one or more acres; and discharge of ballast from ships. Under the SPDES program, 157 facilities are permitted to discharge to the Oneida Lake watershed. This list includes solid waste facilities, inactive hazardous waste sites, underground and above-ground storage tanks, hazardous spills, mines, and oil and gas wells.

Institutional and Regulatory Influences

Federal

The United States Environmental Protection Agency (US EPA) was created in 1970 in response to the growing public demand for cleaner water, air and land. More than a dozen major statutes or laws form the legal basis for the programs of the US EPA. In 1972, the Clean Water Act (CWA) was passed and signaled the creation of a centralized federal legislation to protect and restore the biological, chemical, and physical properties of the nation's water. The act was amended in 1977 and again in 1987, shifting focus to non-point sources of pollution, as well as point sources. Under the CWA, the stormwater program requires the implementation of programs and practices to control polluted stormwater runoff

from urban areas and construction sites. Section 404 of the Clean Water Act establishes a program to regulate the discharge of dredged and fill material into waters of the U.S., including wetlands. Other important federal programs include the National Flood Insurance Program, the Safe Drinking Water Act, and the Farm Bill.

State

There are numerous other regulations and programs that also influence land use activities in the Oneida Lake watershed. Some of these are adopted and applied on a statewide basis. Regulations and programs administered by the NYS Department of Environmental Conservation, NYS Department of Agriculture and Markets, and the NYS Department of Health uniformly apply to all municipalities within the

watershed and are not subject to local modification.

County

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. Every county in the watershed also has a soil and water conservation district (SWCD). SWCDs protect soil, water and other natural resources by reducing agricultural and non-agricultural non-point sources of pollution through the use of best management practices. Madison, Oneida, Onondaga, and Oswego counties each have a county health department that oversees drinking water supplies, implementation of the Source Water Assessment Program, inspection of on-site wastewater systems, and enactment of watershed rules and regulations. In Lewis County, the NYS Department of Health's District Office in Watertown oversees these activities. Advisory agencies at the county level include water quality coordinating committees and environmental management councils.



*Oneida Lake Task Force Conference
(Photo: Westervelt)*

Local

In New York State and the Oneida Lake watershed, the majority of land use control is accomplished at the local level of government. In most instances, the broad authority to adopt regulations to control the use of land is given by the State Legislature to the individual local unit of government – the towns, villages and cities. Through laws established by New York State, local governments have been authorized to establish planning boards and zoning boards of appeal. These municipalities also have the authority to prepare and adopt comprehensive plans, site plan review, zoning, subdivision, and other regulations such as those governing open space, erosion and sediment control, flood prevention, and wellhead or water supply protection. In the process of passing and enforcing these laws, it is necessary for local governments to work cooperatively with both the federal and state levels of government, which share in the responsibility for the planning and management of land and water resources.

Since specific land use controls are developed, adopted, and implemented at the local government level they can vary dramatically from one municipality to the next. Enforcement of these existing local regulations may also be inconsistent from one municipality to the next. Municipalities within the watershed have differing expertise, personnel, and financial resources. It may not be possible for municipalities to adequately review plans or enforce standards within existing manpower and budgetary constraints. It is important to note that possessing a solid regulation is no guarantee that the regulation will be applied. Therefore, it is necessary that all watershed communities have a commitment to applying these regulations in order for the standards to achieve the desired, uniform effect. The regulations must include methods to ensure that adequate review of development occurs and that development plans are implemented as proposed.



*Oneida Lake Task Force Conference
(Photo: Westervelt)*

Other

The NYS Association of Regional Councils is composed of ten locally created Regional Councils throughout New York State. New York's Regional Councils provide comprehensive planning for the coordinated growth and development of their regions. Two Regional Councils serve the Oneida Lake watershed -- the Central New York Regional Planning and Development Board (CNY RPDB) and the Herkimer-Oneida Counties Comprehensive Planning Program (HOCCPP). The CNY RPDB and HOCCPP have been fundamentally involved with the Oneida Lake and Watershed Management Planning and Implementation Project.

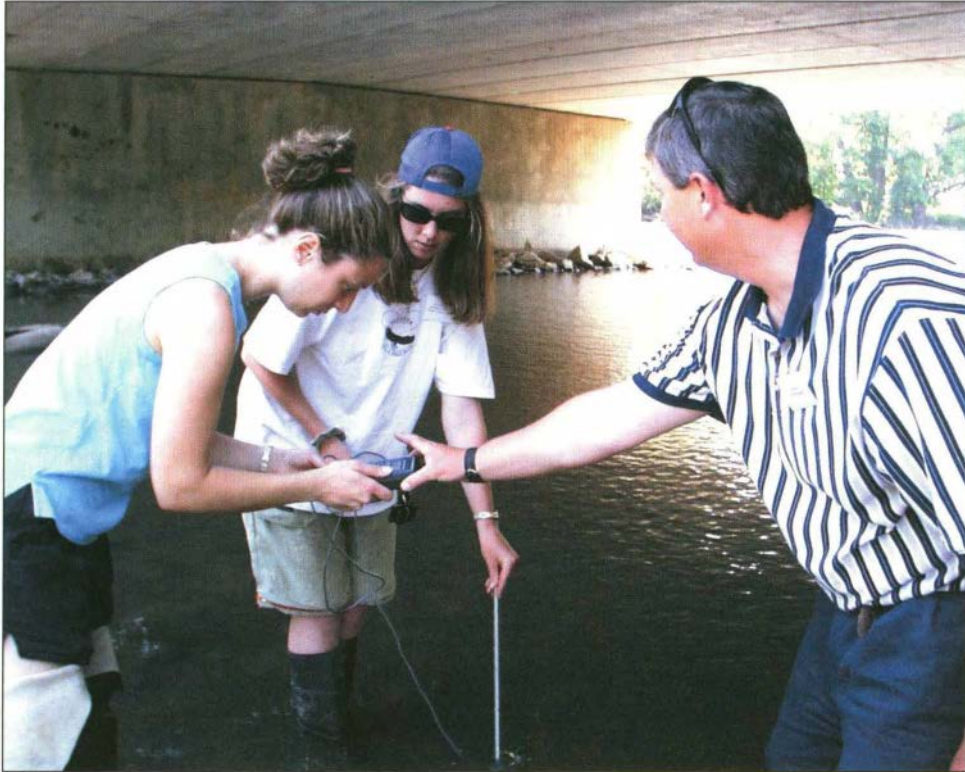
The Finger Lakes – Lake Ontario Watershed Protection Alliance (FL-LOWPA) is a coalition of all 25 counties in New York State's Lake Ontario drainage basin, which includes all counties within the Oneida Lake watershed. FL-LOWPA fosters coordinated watershed management programs across the Lake Ontario Basin based on local needs. Funding for FL-LOWPA is provided

through an annual appropriation by the New York State Legislature through the Environmental Protection Fund. Funding from the FL-LOWPA program has been used to undertake a variety of projects in the Oneida Lake watershed including barnyard, streambank stabilization, pasture management, aquatic weed harvesting, and tributary monitoring projects.

The Tug Hill region is represented by a number of agencies and organizations. The primary organization in the region is the Tug Hill Commission – a non-regulatory state agency charged with helping local governments, organizations, and citizens to shape the future of the region, especially its environment and economy. The Tug Hill region is also represented by five councils of government that help foster communication between communities and help individual towns and villages achieve a more regional perspective to enhance their communities. Another significant group in the region is the Tug Hill Tomorrow Land Trust, a regional, non-profit land trust and education organization helping to retain Tug Hill's farm, forest, recreation, and wild lands through education, research, and voluntary land protection. The East Branch of Fish Creek Working Group is composed of a variety of groups and individuals that have an interest in protecting the East Branch of Fish Creek.

The Oneida Lake Association (OLA) was founded in 1945 to protect, restore and preserve the natural resources of Oneida Lake and its surrounding ecosystem. The Association has a history of environmental activism and its efforts have promoted water quality, a renewable supply of game fish, and increased access to the lake. Other lakes located within the Oneida Lake watershed (Cazenovia, Tioughnioga, Tuscarora, Panther, and Kasoag Lakes) also have very active lake associations.

CHAPTER 3: PRIORITY AREAS



Water Quality Monitoring (Photo: Saltman)

Eight priority lake and watershed areas of concern were identified 2½ years ago through municipal surveys, stakeholder discussion groups, public meetings, and input from county Water Quality Coordinating Committees. A group of community leaders and agency representatives then met on a regular basis as “Working Groups” during 2003 and 2004 to compile background information and identify short and long-term goals for each of these issues. Recommendations were also developed for the long-term protection and enhancement of Oneida Lake and its tributaries. The Working Group findings were then endorsed by the Watershed Advisory Council and were presented at six public meetings throughout the watershed. This chapter provides the findings from this grassroots effort.

**GROUPS THAT PARTICIPATED IN COMPILING THE BACKGROUND INFORMATION
AND RECOMMENDATIONS FOUND IN CHAPTER 3**

Atlantic Salmon Fish Creek Club
Boating Industries Association
Certified Environmental Services, Inc.
CNY Boating Industry Association
CNY Regional Planning and Development Board
CNY Waterways Association
Cornell Cooperative Extension
Cornell University
Cornell University Biological Field Station
Eastern Ontario Anglers Association
Hamilton College
Herkimer-Oneida Counties Comprehensive Planning Program
Madison County Dept. of Environmental Health
Madison County Planning Department
Madison County Soil and Water Conservation District
Madison County Tourism
New York Rural Water Association
New York Sea Grant
North Shore Council of Governments
Northern Oneida County Council of Governments
NYS Assembly
NYS BASS Federation
NYS Canal Corporation
NYS Department of Transportation
NYS Dept. of Environmental Conservation, Regions 6 and 7 and the Albany office
NYS Emergency Management Office
NYS Office of Parks, Recreation and Historic Preservation
NYS Park Police
NYS Police
NYS Tug Hill Commission
Oneida City Wastewater Treatment Plant
Oneida County Convention and Visitors Bureau
Oneida County Department of Public Works
Oneida County Environmental Management Council
Oneida County Health Department
Oneida County Sheriff's Department
Oneida County Soil and Water Conservation District
Oneida Lake Association, Inc.
Oneida Lake Chamber of Commerce
Oneida Lake Fishing Charters
Oneida Lake Watershed Advisory Council
Oneida Shores County Park
Onondaga Community College
Onondaga County Dept. of Water Environment Protection
Onondaga County Flood Advisory Committee
Onondaga County Legislature
Onondaga County Office of the Environment
Onondaga County Parks
Onondaga County Soil and Water Conservation District
Oswego County Dept. of Promotion and Tourism
Oswego County Legislature
Oswego County Sheriff's Department
Oswego County Soil and Water Conservation District
Project Watershed of CNY
Restaurant and Marina Owners
Salmo Enterprise
Salt City Bassmasters Club
South Shore Association
Syracuse Convention and Visitors Bureau
Town of Cicero
Town of Constantia
Town of Lenox
Town of Pompey
Town of Stockbridge
Town of Sullivan
Town of West Monroe
Tug Hill Resources Investment for Tomorrow
U.S. Army Corps of Engineers
U.S. Geological Survey
Village of Cleveland
Village of Sylvan Beach

Reducing Soil Erosion and Sedimentation

Program Goal

Minimize the impacts of soil erosion and sedimentation in the Oneida Lake watershed without significantly impacting economic conditions

Problem Identification

Accelerated erosion and the delivery of sediment and sediment-absorbed pollutants are issues of concern in the Oneida Lake watershed. Sediment from erosion and overland runoff is a major pollutant that transports organic compounds including pesticides, nutrients from fertilizers or animal waste, heavy metals, and microbiological inputs. Erosion is of particular concern on agricultural land, in urban areas, on construction sites, along roadways, and along the lake shoreline and tributary streambanks. Water is the principle driving force of erosion in the Oneida Lake watershed, but land use, soil type, slope, land cover, and conservation practices also influence erosion rates. Shoreline and streambank erosion is particularly affected by wave action, exposure from drawdown, lack of vegetation buffers, and a lack of bank stabilization.

Results from the Oneida Lake Tributary Monitoring Program (2002-2003) indicate that Chittenango, Cowaselon, Oneida, Limestone, and Fish Creek subwatersheds consistently delivered greater amounts of suspended matter (a measure of soil erosion) compared to the other subwatersheds. Soil erosion was positively correlated with total phosphorus and total kjeldahl nitrogen (TKN) loss in all of the tributaries sampled (additional monitoring information is provided below).

Erosion and sedimentation resulting from agricultural activities is a concern primarily in the southern and eastern portions of the

watershed. To address those issues, there are numerous agricultural programs that encourage farmers to incorporate soil conservation practices into the management of their operations in an effort to reduce soil erosion rates.

Urban activities, such as construction, also cause soil erosion and downstream problems with sedimentation. Erosion on construction sites may affect a relatively small acreage of land in the watershed, but development sites can contribute to erosion at rates 100 times greater than from agricultural land.¹ Also, development that results from certain construction activities increases the amount of impervious surfaces thus increasing runoff to the lake. This heightened flow rate may result in erosion and sedimentation problems downstream.

As development increases, highway drainage systems can be subjected to increased flows that result in erosion and sedimentation. Erosion around bridge structures, road pavements and drainage ditches can damage and weaken these structures. During the winter season, sanding practices may leave substantial concentrations of these particles on the road surface. Runoff from highways and other roads can contain large amounts of sediment, not to mention other pollutants such as heavy metals, pesticides, oil and grease, road salts and other debris. Road ditch

¹ Brady, N.C., and R.R. Weil. 1999. *The Nature and Properties of Soils*. 12th ed. Prentice Hall. Upper Saddle River, NJ.

maintenance practices are also a significant source of sediment, as the ditches provide a direct route to streams. Although the beaver provides various ecological benefits, the burrowing activities of beavers can cause shoreline erosion, and the breaching or breaking apart of beaver dams can result in increased sediment loads downstream.

Identification of Priority Areas:

Priority areas for erosion and sedimentation were identified based on existing information from four different sources: tributary monitoring results, Priority Waterbodies List, stream erosion surveys, and County Water Quality Strategy reports. These programs are fully described in the *Oneida Lake State of the Lake and Watershed Report*.

Tributary Monitoring: The 2002-2003 Oneida Lake Tributary Monitoring Program involved sampling at the base of 11 tributaries flowing into Oneida Lake to document nutrient and sediment loading to the lake and to prioritize streams. Of the 11 tributaries sampled, Chittenango, Cowaselon, Oneida, Limestone and Fish Creeks have the greatest loss of

suspended matter from the watershed. Soil erosion is one of the major sources of nutrient loss from watersheds and is positively correlated with total phosphorus and TKN loss in all of the Oneida Lake tributaries studied. Additional information is available in the full report, "Nutrient and Suspended Sediment Losses From Oneida Lake Tributaries, 2002-2003," which can be found at www.cnyrpdb.org/oneidalake. For the next phase of the monitoring program, additional sampling is being done on Oneida Creek. Segment analysis, a technique to identify the sources of pollutants along a stream, is being applied. In addition, research studies, including the *Analysis of the Oneida Creek Delta in South Bay* project, will continue to analyze the bed load (sand fraction) contribution of Fish and Oneida Creeks to the total sediment load.

Priority Waterbodies List: A summary of waterbodies affected by sediment, as listed in the NYS DEC's 1996 Priority Waterbodies List (PWL), is presented in the table below. Efforts are currently underway to add sediment as a primary pollutant of Oneida Lake in the next edition of the PWL.

| PWL Segment Summary for the Oneida Lake Watershed (1996) | | | | | |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|-----------------------------|-----------------|---------------------------|-----------------------|
| <i>Segment Name</i> | <i>Subwatershed</i> | <i>Primary Use Affected</i> | <i>Severity</i> | <i>Primary Pollutant*</i> | <i>Primary Source</i> |
| Chittenango Creek | Chittenango Creek | Fish Propagation | Threatened | Silt (Sediment) | Construction |
| Lower Oneida Ck. | Oneida Creek | Fish Propagation | Impaired | Silt (Sediment) | Agriculture |
| Wood Creek | Wood Creek | Fish Survival | Stressed | Silt (Sediment) | Agriculture |
| Jamesville Res. | Limest./Butternut | Bathing | Impaired | Silt (Sediment) | Agriculture |
| Limestone Creek | Limestone / Butternut | Fish Propagation | Impaired | Silt (Sediment) | Resource Extraction |
| Poolsbrook Tributary | Chittenango Creek | Fish Propagation | Threatened | Silt (Sediment) | Construction |
| Source: NYS DEC (1996) Priority Waterbodies List for the Oswego-Seneca-Oneida River Basin | | | | | |
| * Note: In the Oneida Lake watershed, the following segments are also listed on the PWL because silt/sediment is a secondary pollutant affecting water quality: Butternut Creek Tributary, Canada Creek, Meadow Brook, Pools Brook, and Sconodoa Creek. | | | | | |

Stream Erosion Surveys: Four studies between 1995 and 2002 were initiated for the specific purpose of identification and prioritization of critically eroding streambanks in 11 perennial streams in the Oneida Lake watershed. The streambank erosion inventories were undertaken in the following creeks: Oneida, Sconodda, Taylor, Butter-nut, Limestone, Canaseraga, Cowaselon, Canastota, Chittenango, Cascade, and Conklin.

County Water Quality Strategy Reports: The following waterbodies/ segments/ subwatersheds were identified in County Water Quality Strategy Reports as priority areas affected by erosion and sedimentation problems:

- *Madison County:* Streambank erosion in the Oneida Creek subwatershed and DeRuyter Reservoir, and road ditch erosion throughout the watershed.
- *Oneida County:* The entire Fish Creek subwatershed (including east, west and lower branches), Oneida Lake direct drainage, Wood Creek subwatershed, NYS Barge Canal, and the Oneida Creek subwatershed (including Sconodda and Taylor Creeks).
- *Onondaga County:* Chittenango Creek, Jamesville Reservoir, Limestone Creek, Pools Brook and Pools Brook Tributary.
- *Oswego County:* Sediment loading to the lake is a general concern throughout the watershed.

Impacts

Soil erosion and runoff affects water resources directly by delivering sediment, pollutants attached to sediment, and dissolved pollutants to downstream surface waters. Indirect effects occur through changes in stream channel dynamics and watershed functions. The impacts of erosion and sediment damages can occur both on and off site:

- Erosion degrades soil quality and reduces productivity, especially when fertile topsoil is lost.
- Sediment deposited on the land may smother crops and other vegetation and can fill in roadside drainage ditches and create hazardous driving conditions.
- Excess sediment loading in wetlands, at the mouth of tributaries, and in Oneida Lake can result in negative impacts on aquatic biota, fish and fish habitat by covering fish eggs, filling in spawning beds and pools, and reducing food supplies.
- Sediment loading contributes to a decline in macroinvertebrate populations and submergent aquatic vegetation by increasing turbidity and reducing light availability.
- As areas of the lake bottom become shallow as a result of heavy sedimentation, boating and other recreational activities are impaired.
- Sedimentation reduces the water storage capacity of wetlands and streams and can cause an increase in flooding.
- Nutrients (such as phosphorus), microbiological inputs, and toxicants adhere to sediments. Excessive nutrients promote the growth of aquatic vegetation, creating an oxygen demand for the other organisms in the stream or lake. Microbiological inputs and toxicants can affect wildlife and threaten human health.
- The clean up of sediment-damaged areas can result in a financial burden (e.g. dredging of waterways, removing sediment from public roads or culverts).

Participating Organizations

The following agencies and organizations play a major role in water resource decision-making in the Oneida Lake watershed and are specifically equipped to address erosion and sedimentation problems. Contact information is provided in the SOLWR, Chapter VIII Agencies and Organizations:

- Cornell Cooperative Extension
- County Planning Departments

- County Soil and Water Conservation Districts (SWCD)
- Local Municipalities
- New York Rural Water Association
- New York State Department of Agriculture and Markets
- New York State Department of Environmental Conservation (NYS DEC)
- New York State Soil and Water Conservation Committee (NYS SWCC)
- Oneida Lake Watershed Agriculture Advisory Committee
- Regional Planning Boards
- State and County Health Departments
- State, County and Local Departments of Transportation
- United States Geological Survey (USGS)
- USDA Natural Resources Conservation Service (NRCS).

Current Programs, Regulations and Guidelines

Programs: The key objective of erosion and sediment control is to retain soil, nutrients, and other by-products of erosion on the land and minimize losses to receiving waters whenever possible. To help understand the problem, erosion surveys, biological and water quality monitoring programs have been conducted within the Oneida Lake watershed by a variety of groups. Summaries of these programs are provided in the *Oneida Lake State of the Lake and Watershed Report (SOLWR), Chapter II Section 4.3 Monitoring Programs*. In addition to these programs, a number of other notable programs are under way to either study or address erosion and sediment transport in the watershed including the following:

- Hamilton College, with assistance from the Madison County Planning Department, is conducting research on sediment loading

- and transport in Oneida Creek and the delta in South Bay.
- County Soil and Water Conservation Districts (SWCDs) play an integral role in the control of both urban and agricultural sources of erosion and sedimentation.
 - In the agricultural setting, SWCDs and their conservation partners USDA Natural Resources Conservation Service (NRCS) and Cornell Cooperative Extension (CCE), work with farmers to install management practices to curb erosion and runoff from cropland, pasture land and farmsteads.
 - In urban settings, SWCDs work with local municipalities and the NYS DEC to prevent runoff from construction sites.
 - Regional Planning Boards and SWCDs are working with the NYS DEC to implement the Phase II Stormwater Permit Program – including the development of land use and regulatory controls to reduce erosion and sedimentation.
 - The Oneida Lake Watershed Agricultural Program is addressing agricultural sources of erosion and sediment. The Agricultural Watershed Resource Specialist coordinates this regional program. Data are being collected using the NYS Agricultural Environmental Management (AEM) Program and funding opportunities for farm planning and conservation best management practices are being explored. The Agricultural Watershed Resource Specialist, County Soil and Water Conservation Districts and the watershed Agricultural Advisory Committee are helping shape regional activities for agricultural projects.

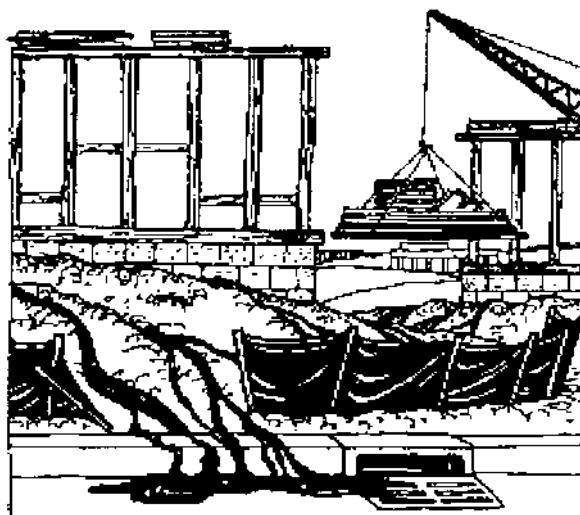
Potential funding opportunities to help address erosion and sedimentation problems in the watershed include, but are not limited to, the following sources:

- Federal Emergency Management Agency
- Finger Lakes-Lake Ontario Watershed Protection Alliance
- Great Lakes Commission
- NYS Emergency Management Office
- NYS Dept. of Environmental Conservation, Environmental Protection Fund

- NYS Revolving Loan Fund
- U.S. Environmental Protection Agency
- U.S. Department of Agriculture.

Regulations (Agriculture): A Concentrated Animal Feeding Operation (CAFO) is a farm that meets a size or pollution threshold that requires the operation to adopt a farm plan, sometimes referred to as a Comprehensive Nutrient Management Plan (CNMP), to address resource concerns on the farm including erosion and sediment control. In New York State CAFOs are regulated by the DEC under the State Pollutant Discharge Elimination System (SPDES) Permit Program. In addition to requiring the development of CNMPs, the general permit also establishes effluent limitations, requires the implementation of best management practices, and outlines monitoring and reporting requirements.

Regulations (Urban): Under the New York State Pollutant Discharge Elimination System (SPDES) Stormwater Phase II Program, operators of small municipal separate storm sewer systems (MS4s) in urbanized areas must have a Stormwater Management Program (SWMP) fully developed and implemented by 2008. As part of their SWMP, MS4s must educate and involve the public, eliminate illicit discharges, enact ordinances or other regulatory measures, control construction site stormwater runoff, manage post-construction stormwater, and develop good municipal operation and maintenance procedures. Similarly, operators of construction sites disturbing



(Source: www.mcps.k12.md.us/clipart)

one or more acres of land must develop and implement a Stormwater Pollution Prevention Plan (SWPPP) to reduce the discharge of pollutants.

SWMPs and SWPPPs are designed to protect water quality by reducing runoff and the discharge of pollutants. Pollutants of concern associated with stormwater include eroded soil, soil particles from construction and municipal operations, and phosphorus, nitrogen and other materials that can attach to the soil particles. Fifteen municipalities in the Oneida Lake watershed are regulated under the Phase II MS4 program (1 in Madison, 3 in Oswego, and 11 in Onondaga County). The Phase II construction program affects all construction activities, statewide, disturbing at least one acre of land. Additional information about the SPDES Phase II Stormwater Program is available from the NYS DEC (www.dec.state.ny.us/website/dow/mainpage.htm).

Recommendations

| Recommendation | Potential Responsible Organization(s) | Timeline/Goal <i>(contingent upon funding)</i> |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------|---------------------------------------------------|
| Agriculture/Forestry | | |
| Prioritize farms in the watershed based upon pollution potential using the NYS Agricultural Environmental Management (AEM) process. | OLWAP, SWCD | In progress |
| Develop Comprehensive Nutrient Management Plans (CNMPs) on farms identified as priorities by the Oneida Lake Watershed Agriculture Program (OLWAP) Prioritization System to improve soil tilth (water infiltration and organic matter) on cropland and reduce erosion rates. Focus will be directed upon farms that are at or near the Concentrated Animal Feeding Operation (CAFO) threshold as well as farms that intend to install manure storage facilities. | CCE, NRCS, SWCD, TSP, | 8 farms/year |
| Install management practices on farms identified as priorities by the OLWAP Prioritization System. Specifically, implement agricultural erosion and sediment control practices on cropland, hayland, pastureland, forestland, and intensively used land. Practices on agricultural land will be designed to reduce sheet, rill and gully erosion, streambank erosion, soil mass movement, and soil deposition. Practices may address tillage practices, crop rotations, strip cropping systems, diversions, terraces, water and sediment control basins, riparian buffers, conservation buffer strips, fencing for the preclusion of livestock from riparian areas, critical area planting, streambank stabilization, vegetative filter strips, and field borders. | CCE, NRCS, OLWAP, SWCD, TSP, USDA | 4 farms/year |
| Seek funding to offset the high costs of farm planning and management practice implementation on small and large farms. | NRCS, NYSAM, OLWAP, SWCD, USDA | On-going |
| Contribute articles to local media sources, including CCE, SWCD and OLWAP newsletters, about the erosion and sediment control practices installed by farmers. Include reports on successful strategies to address erosion and sediment control issues. | CCE, NRCS, SWCD | Annually |
| Recognize farms in the watershed for the positive practices they have implemented and environmental benefits they have created. This could be accomplished through the initiation of an "Oneida Lake Watershed Farmer of the Year" award. | AAC, CCE, NRCS, OLWAP, SWCD, USDA | 1 farm/year |

| Recommendation | Potential Responsible Organization(s) | Timeline/Goal (contingent upon funding) |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------|----------------------------------------------------------|
| Promote the development of Forest Management Plans via newsletter articles and the NYS AEM Tier II Worksheets. | AI, NYS DEC, OLWAP, SWCD | Annually |
| Prioritize municipalities based upon pollution potential using Community Environmental Management (CEM) and other programs. | CCE, Health, M, Planning, SWCD | Prioritize all cooperating municipalities |
| Assist regulated MS4 communities with the implementation of the 6 minimum measures of their Stormwater Management Programs. | CCE, Planning, RPB, SWCD | On-going; Full implementation by March 2008 |
| Provide education and training for local officials on erosion controls and stormwater management and the benefits and process of adopting and/or updating local stormwater and erosion control ordinances. | CCE, NYS DEC, NYS DOS, Planning, RPB, SWCD | On-going; Full implementation by March 2008 |
| Assist MS4s with ordinance development for construction site runoff control in accordance with the Phase II Stormwater regulations. | NYS DEC, NYS DOS, Planning, RPB, SWCD | On-going; Full implementation by March 2008 |
| Educate zoning inspectors and planning boards about the benefits of reviewing and how to review construction Stormwater Pollution Prevention Plans (SWPPPs). | CCE, NYS DEC, NYS DOS, Planning, RPB, SWCD | 2 workshops held in diff. parts of the watershed by 2008 |
| Increase training for highway employees in erosion control, roadbank ditch construction and maintenance, hydroseeding, catch basin maintenance, and road deicing to reduce the delivery of sediment and other pollutants from roadways and ditches. | CCE, Highway, NYS DOT, RPB | Annually |
| Promote/facilitate communities in purchasing and sharing equipment for street sweeping and hydroseeding for use with local highway departments. | Highway, M, NYS DOT, SWCD | On-going |
| Streambank/Shoreline | | |
| Prioritize eroding stream segments based upon loading rates using existing stream inventories on Oneida, Sconondoa, Taylor, Butternut, Cascade, Conklin, Limestone, Canaseraga, Cowaselon, Canastota and Chittenango Creeks. Prioritization should also be based on the location of flood prone areas and the influence of flooding on erosion and sedimentation rates. | SWCD | Within 1 year |
| Complete stream inventories on Fish and Wood Creeks in an effort to identify and prioritize additional critically eroding streambanks and pollution sources in the watershed. | Planning, RPB, SWCD, USGS | 1 inventory/year |
| Use stream inventories previously completed throughout the watershed to identify and restore priority segments using natural channel design. | NYS DEC, Health, Planning, SWCD, USGS | 3 miles/year |

| Recommendation | Potential Responsible Organization(s) | Timeline/Goal (contingent upon funding) |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------|----------------------------------------------------|
| Restore landslide area of Limestone Creek using natural channel design. | NYS DEC, Planning, SWCD, USGS | System currently being studied |
| Characterize and stabilize reaches in the Oneida-Lenox-Furnace area of Cowaselon Creek using natural stream design methods. ¹ Establish stable reference reaches in Cowaselon Creek to serve as models for the stable reaches that are trying to be produced. | NYS DEC, Planning, SWCD, USGS | Within 3 years |
| Stabilize severely eroding streambanks along Lower Oneida Creek. ² | SWCD | Stabilize approx. 5,000 linear feet |
| Encourage and assist with the maintenance/ expansion of littoral vegetation in priority areas identified in the stream erosion surveys. | CCE, LO, Planning, SWCD | 20% of priority segments/year |
| Continue installing vegetated riparian buffers on farmland via the Conservation Reserve and Conservation Reserve Enhancement Programs and encourage the maintenance of riparian buffer zones. | FSA, NRCS, SWCD | On-going |
| Encourage the enforcement of near-shore boating speed limits to reduce shoreline erosion. | NYS DEC, OLA, M, Police | On-going |
| Educate riparian/lakeshore property owners and other stakeholders about the implications of erosion and sedimentation and ways to control it. | CCE, OLA | 1 workshop/ year |
| Locate areas that are impacted by logjams, beaver dams, and other stream obstructions, and prioritize them according to their impacts on the stream ecology Promote the removal of stream obstructions by formalizing and expanding existing stream channel maintenance programs and encouraging the NYS DEC to relax regulations regarding beaver dam removal. | NRCS, Planning, SWCD, AI, NYS DEC, M, OLA | On-going |
| Promote educational programs that encourage students to plant vegetation along streambanks in order to stabilize the shoreline and reduce erosion. | County Env. Field Days, After School Programs, Envirothon, POLW | On-going |
| Lake Basin | | |
| Continue sampling lake sediments to document historical input of pollutants and sediment rates in the delta areas near major tributaries in order to assess inputs of sediment loading within the lake system and shoreline. | AI, NYS DEC, Planning | On-going |

| Recommendation | Potential Responsible Organization(s) | Timeline/Goal <i>(contingent upon funding)</i> |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------|----------------------------------------------------------|
| Review current research on sedimentation and explore viable approaches to sediment removal and alternative remediation efforts. Develop a discussion group to explore options and opportunities for improved recreation and fisheries based on current research. | AI, NYS DEC, Planning, SWCD, USGS | Initiate after completion of above |
| Erect educational posters/displays/kiosks at public parks along the lakeshore to highlight environmental conditions and current projects. | CCE, NYS DEC, NYSCC, Parks | 1/year |
| Other | | |
| Continue supporting tributary monitoring efforts to document success of implemented measures. | AI, Health, Planning, RPB, SWCD | Monitor for 2 years post construction |
| Work with state and federal agencies to establish a funding program to address the smaller erosion problems that effect individual properties. | M, Planning, SWCD, OLWAC, CNY RPDB | Continual |
| Encourage/arrange aerial photography to document the problem of erosion and sedimentation. | Possible sources of airplane / helicopter: NYS DEC, Police | Concurrent with large storm events over the next 5 years |

Notes:

¹ Very serious problems with bank erosion exist on Cowaselon Creek. Natural stream design in accordance with the principles of fluvial geomorphology needs to be incorporated. This involves characterizing the reaches according to a reference by David L. Rosgen titled, "A Classification of Natural Rivers."

² In 1995, Oneida and Madison County SWCDs completed a streambank erosion inventory on Oneida Creek. Approximately 17 areas along the creek were identified as eroding more than 10 tons of soil per year. These stream segments contribute to the estimated erosion rate of 1,000 tons per year generated from streambank erosion.

Managing Flooding and Water Levels

Program Goal

The program goal is to provide water level management recommendations to minimize flood damage to properties along the Oneida Lake shoreline while maintaining levels that are beneficial and necessary for navigation, water-based recreation, fish and wildlife habitat, and lake ecology. To accomplish this goal, the following objectives were developed: protect human life, health, property, and public services such as water, sewer and gas systems; reduce the intensity and duration of high water levels; minimize flood damage to existing flood control structures such as dams, levees, breakwalls, riprap, and other channel improvements; reduce flood damage to bridges, roads and culverts; protect aquatic resources from unnecessary impacts from flooding or dewatering; and manage water levels to encourage water-based recreation, maintain current fish and wildlife habitat, and protect the basic ecology of Oneida Lake. Additional information compiled by this Working Group can be found in Appendix A.

Problem Identification

There are many (frequently conflicting) uses of Oneida Lake. The question has been repeatedly debated whether water level management decisions should be made to facilitate tourism, recreation, fisheries and wildlife habitat, commercial navigation, boat launch and marina profitability or, last but certainly not least, flood control. Lake water levels are perceived as either too high or too low, depending on different interest groups.

Flooding occurs along the Oneida Lake shoreline and in several areas throughout the watershed, often after major storm events or rapid winter thaws. Water level fluctuations on Oneida Lake and within its watershed are a naturally occurring phenomenon further exacerbated by human factors, which is a chronic concern along various portions of the lake shoreline. The majority of the high water levels occur during the spring runoff period when rains and melting snow result in runoff rates that exceed the combined storage and outlet discharge capacity, resulting in rising water levels. The majority of the annual high water levels occur during the months of March, April and May. It is unusual to ob-

serve high water levels outside of the spring runoff period. Consequently, the impact associated with annual snowmelt runoff phenomenon is a driving force on high water levels observed on Oneida Lake.

Many upstream and downstream factors contribute to lake shoreline flooding. The Oneida River downstream of the Caughdenoy Dam is also very flood prone and there is considerable development in the Horseshoe Island area that is susceptible to flooding. Flood damages to this area could potentially increase if high volumes of water were released to reduce flooding along the Oneida Lake shoreline. The entire region is hydrologically connected. The upstream and downstream areas and the impacts of water level management, therefore, need to be considered when any decisions are made for Oneida Lake.

Water levels have been historically observed and recorded on Oneida Lake. Water level fluctuation has continued with the construction of the New York State Barge Canal System, where levels have risen above and fallen below desired levels due to natural hydrometeorological circumstances and

human influences. New York State Canal Law requires a minimum Canal depth of 14 feet. The fixed sill level at Lock E-23 in Brewerton sets a minimum water level of 369.9 ft BCD at the lock. This translates into a minimum navigation level of 370.3 ft BCD on Oneida Lake given the average hydraulic backwater observed along the Oneida River between the lake and Lock E-23. The New York State Canal Corporation's summer target level of Oneida Lake is 0.9 feet higher to provide sufficient water to account for variable losses due to evaporation and lockages during the most extreme drought to assure that the minimum navigation level of 369.9 ft BCD at Lock E-23 (370.3 ft BCD on Oneida Lake) is available throughout the navigation season. This equates to a maximum target navigation level on Oneida Lake of 371.2 ft BCD. Refer to Appendix A for additional information.

Impacts

Low Oneida Lake water levels in the winter may contribute to problems associated with fisheries and wildlife habitat. High and low water levels can also have negative impacts to navigation and recreation. Spring rainfall coupled with snowmelt can raise the level of Oneida Lake to levels that can be problematic, especially in flood prone shoreline areas.

The impact associated with elevated water levels is complicated by seiche and wave action. Seiches are tide-like rises and drops in lake levels caused by prolonged strong winds that push water toward one side or end of the lake, causing the water level to rise on the downwind side of the lake and to drop on the upwind side. Seiches further increase the potential for high water levels in certain areas of the lake and therefore negatively impact flooding.

Wave action is problematic during high water levels since it can increase the actual observed water levels and cause damage to shorelines,

walls and buildings due to the physical energy contained in the moving wave. The impact of wind on lake levels can also be problematic when elevated water levels are observed in the spring coupled with the accumulation of lake ice at the downwind end of the lake, normally the eastern end, further increasing the water levels. This rise in water levels has temporary impacts on lake recreational uses. Refer to Appendix A for additional information.



*Flooding impacts many shoreline homeowners
(Photo: www.news.sctimes.com)*

Participating Organizations

The following agencies and organizations take a leading role in management decisions pertaining to flooding and water level management in the Oneida Lake watershed:

- Central New York Boating Industry Association
- Central New York Regional Planning and Development Board
- Central New York Waterways Association, Inc.
- Cornell Cooperative Extension of Onondaga County
- Federal Emergency Management Agency, Region II
- Herkimer-Oneida Counties Comprehensive Planning Program
- Local Government Representatives
- Madison County Planning Department
- New York State Canal Corporation
- New York State Department of Environmental Conservation, Bureau of Flood Protection
- New York State Department of Environmental Conservation, Division of Water, Reg. 6 and 7
- New York State Emergency Management Office
- Oneida Lake Association, Inc.
- Oneida Lake Watershed Advisory Council
- Onondaga County Flood Advisory Committee
- Onondaga County Office of the Environment
- United States Army Corps of Engineers, Buffalo District
- United States Geological Survey

Current Programs, Regulations, and Guidelines

Programs, regulations, and guidelines relating to flooding and water level management are found in Appendix A.

Recommendations

The Working Group focused on three primary categories that members felt could realistically be addressed during a twelve-month period. These include: A. Education and Outreach, B. Lake Level Management, and C. Control Structures and Operations. Although most members agreed with the recommendations that were developed for the problem areas within these categories, full group endorsement was not reached. It should be noted that several people did not agree with the information presented or with the manner in which historical data was interpreted. A summary of the recommendations is presented in the table below. This information is not presented in priority order. Following the table is a detailed description of each problem, followed by an explanation of the corresponding recommendations.

| Recommendation | Potential Responsible Organization(s) | Timeline/Goal (contingent upon funding) |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------|-----------------------------------------|
| Education and Outreach | | |
| Develop an early warning forecast system for the Oneida Lake watershed to alert the public of daily water levels, precipitation, and inflows to Oneida Lake. This information will ultimately serve to provide public warning of high water levels, flood conditions, and low water levels on Oneida Lake on a real-time basis as they occur. | NYSCC | 1 - 4 years |

| Recommendation | Potential Responsible Organization(s) | Timeline/Goal (contingent upon funding) |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------|------------------------------------------------|
| Notify the public and water resource managers about flooding and water level benchmarks, the rule curve and daily lake levels on a real-time basis via the Internet, television, and public radio advisories. | OLWAC, CNY RPDB | On-going |
| Offer information and training sessions for realtors, code enforcement officers, and the general public, consistent with the National Flood Insurance Program (NFIP), to discourage development in flood prone areas. | NYS DEC, FEMA | On-going |
| Inform the public on the difference between Barge Canal Datum and U.S. Geological Survey Datum. | NYSCC | On-going |
| Encourage the Post Standard to publish a daily water level and flood report, similar to the weather report, when hydrological data permits. | OLWAC, CNY RPDB | Concurrent with flooding |
| Compile a bibliography of technical reports and other educational materials to post on the Internet. | OLWAC, CNY RPDB | In progress |
| Develop publications, workshops, and other educational opportunities that emphasize the interrelationship between land use and flooding. | OLWAC, CNY RPDB | In progress |
| Seek funding to review alternatives for decreasing flood contributions of upstream influences in tributary streams. | OLWAC, CNY RPDB, NYS DEC | On-going |
| Work with local communities to promote compliance with the Stormwater Phase II Construction Program in order to reduce sediment runoff from construction sites, to minimize sediment deposits in stream channels, and to reduce the resulting impacts on flooding. | NYS DEC | In progress |
| Create GIS watershed maps that will assist with lake level management decisions. | NYS DEC, FEMA, USGS | As updated data becomes available |
| Request that the NYS DEC and the Federal Emergency Management Agency (FEMA) prioritize the Oneida Lake watershed at a higher ranking for FEMA mapping considerations. | NYS DEC, FEMA | In progress |
| Identify flood plain and flood prone areas of Oneida Lake and discourage municipalities, developers and landowners from inappropriate development within flood prone areas. Develop strategies to educate individuals and groups to the fact that Oneida Lake is a regulated natural body of water and not a man-made reservoir. | NYS DEC, OLWAC, CNY RPDB | As updated data becomes available |

| Recommendation | Potential Responsible Organization(s) | Timeline/Goal (contingent upon funding) |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------|------------------------------------------------|
| <p>Encourage shoreline and upland watershed municipalities to:</p> <ul style="list-style-type: none"> – Enforce local laws that prohibit new development in flood prone areas. – Adopt ordinances that prevent new development within flood prone areas and along riparian corridors in an effort to protect flood prone areas and fisheries habitat. – Follow shoreline protection guidelines (Article 15 NYS DEC regulations) when construction projects are planned. – Comply with regulations in order to take advantage of FEMA’s flood mitigation grant program. – Educate developers and the general public on the correct use of flood and elevation maps when development plans are considered. – Educate realtors, builders, homeowners, architects, and code enforcement officers on building code requirements or techniques specifically designed to protect structures in flood prone areas. | <p>NYS DEC, M, FEMA, NYS DOS</p> | <p>1 – 2 years</p> |
| <p>Encourage municipal participation in FEMA’s Flood Hazard Mitigation Program, specifically in terms of flood proofing and retrofitting existing structures. Distribute NFIP educational literature and hold workshops that describe methods to flood-proof structures in flood prone areas.</p> | <p>FEMA, NYS DEC, Planning</p> | <p>On-going</p> |
| Lake Level Management | | |
| <p>Develop a hydrologic model of the Oneida Lake watershed to estimate the response of precipitation and snow-melt on Oneida Lake based on the variable discharge capacity of the Oneida River.</p> | <p>US ACOE, NWS, NYSCC, NYS DEC, USGS, OLWAC, CNY RPDB</p> | <p>1 – 2 years</p> |
| <p>Encourage local, state, and/or federal governmental units in cooperation with the USGS to fund the repair of existing stream and stage gages on Fish Creek, Limestone Creek, Chittenango Creek, and at Sylvan Beach, and to consider the potential for adding additional gages in other areas.</p> | <p>USGS, OLWAC, CNY RPDB</p> | <p>On-going</p> |
| Control Structures and Operations | | |
| <p>Solicit the U.S. Army Corps of Engineers to restudy current Oneida Lake flooding characteristics in terms of alternative water level control options and anticipated cost benefit analyses.</p> | <p>USACOE, M</p> | <p>1 – 2 years</p> |

| Recommendation | Potential Responsible Organization(s) | Timeline/Goal (contingent upon funding) |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------|-----------------------------------------|
| Explore the feasibility of extending the time period during which the New York State Canal Corporation is responsible for water level controls, as long as the extension does not impact current navigation law. Water level management might begin when the lake is declared ice-free by the Oneida Fish Cultural Station, or by March 20 in years when the ice is out early or there is no ice. Water level management might end when the lake is designated as ice covered by Cornell University, or January 1 st if the lake is not covered. | NYS CC, OLWAC, CNY RPDB | 1 – 2 years |
| Encourage the formation of a Regional Water Resources Council to provide central management and control throughout the Oswego River Basin. The Regional Water Resources Council would, among other duties, be responsible for coordinated lake level/flow regulation, flood plain management, and flood damage reduction programs throughout the Oswego River Basin. Promote the inclusion of Council representation from local, State, and Federal agencies and organizations, and lake communities in this regional partnership. | OLWAC, CNY RPDB | 1 – 2 years |

The following information provides a more detailed description of each problem identified by the Working Group, followed by an explanation of the corresponding recommendations that are presented in the table above.

A. Education and Outreach

- **PROBLEM:** *There is a general lack of information available to the public and divergent opinions about the available information relating to flooding and water level management. This makes it difficult to separate fact from hearsay.*

Recommendation: Develop an early warning forecast system for the Oneida Lake watershed to alert the public of daily water levels, and precipitation, and inflows to Oneida Lake. This information will ultimately serve to provide public warning of high water levels, flood conditions, and low water levels on Oneida Lake on a real-time basis as they occur. This system will contain the following inputs:

- Establish a standalone hydrometeorological data collection, analysis and distribution network for the Oneida Lake watershed, including presentations using appropriate flooding and water level benchmarks.
- Reestablish and/or upgrade existing monitoring stations to obtain streamflow, river and lake levels, and precipitation data including ground based rain gages, Doppler precipitation estimates, and ground-based snow sampling, including estimates in equivalent inches of water.
- Link these data with the real-time data presently gathered by with NYS Canal Corporation (NYS CC), including levels, gate openings and flow rates. This information will be analyzed as a

comprehensive set of data to ultimately direct operational decision-making and to provide forecasts of projected water levels on Oneida Lake.

- Include a feature to notify appropriate emergency response personnel and the media when Oneida Lake levels reach set targets to provide appropriate public notification, when hydrological modeling permits.
- Include a notification for high winds and wave action during high water periods.

Potential Responsible Organizations: The NYSCC should be considered as a potential repository and disseminating organization for the collected data. Consultation will be made with the National Weather Service (NWS), State Emergency Management Office (SEMO), U.S. Army Corps of Engineers (ACOE), Federal Energy Regulatory Commission (FERC), U.S. Geological Survey (USGS), and the NYS Department of Environmental Conservation (NYS DEC) to request their participation in the development of the early warning system for the Oneida Lake watershed.

Recommendation: Notify the public and water resource managers about flooding and water level benchmarks, the rule curve and daily lake levels on a real-time basis via the Internet, television, and public radio advisories. Maintain the Oneida Lake website and make it available for public access. Include important reports and information relating to flooding and water level management.

Potential Responsible Organizations: OLWAC, CNY RPDB

Recommendation: Offer information and training sessions for realtors, code enforcement officers, and the general public, consistent with the National Flood Insurance Program (NFIP), to discourage development in flood prone areas. Distribute NFIP educational literature and hold workshops that describe methods to flood-proof structures in flood prone areas.

Potential Responsible Organizations: NYS DEC, FEMA

Recommendation: Inform the public on the difference between Barge Canal Datum and U.S. Geological Survey Datum.

Potential Responsible Organization: NYSCC

Recommendation: Encourage the Post Standard to publish a daily water level and flood report, similar to the weather report, when hydrological data permits.

Potential Responsible Organizations: OLWAC, CNY RPDB

Recommendation: Compile a bibliography of technical reports and other educational materials to post on the Internet and when practical, include each report's executive summary and conclusions.

Potential Responsible Organizations: OLWAC, CNY RPDB

- **PROBLEM:** *The watershed has flooded in the past and will continue to flood, especially as development in the watershed continues. Many upstream and downstream factors con-*

tribute to flooding. Land use changes in one part of the Oneida Lake watershed can exacerbate flooding in other parts of the watershed.

Recommendation: Develop publications, workshops, and other educational opportunities that emphasize the interrelationship between land use and flooding.

Potential Responsible Organizations: OLWAC, CNY RPDB

Recommendation: Seek funding to review alternatives for decreasing flood contributions of upstream influences in tributary streams.

Potential Responsible Organizations: OLWAC, CNY RPDB and NYS DEC

Recommendation: Work with local communities to promote compliance with the Stormwater Phase II Construction Program in order to reduce sediment runoff from construction sites, to minimize sediment deposits in stream channels, and to reduce the resulting impacts on flooding.

Potential Responsible Organization: NYS DEC

- **PROBLEM:** *Geographic Information System (GIS) maps are not available to assist with lake level management decisions.*²

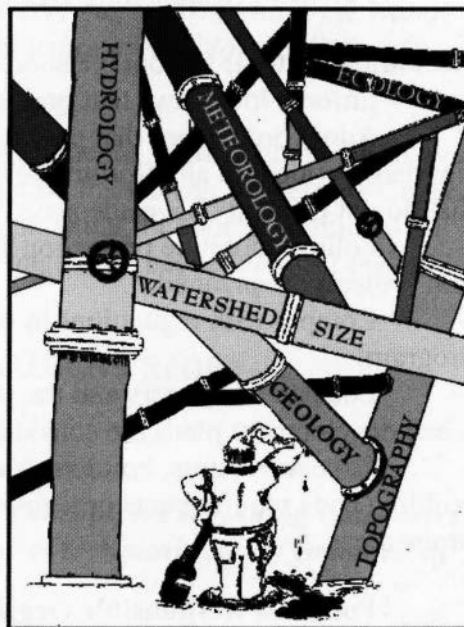
Recommendation: Create GIS watershed maps that will assist with lake level management decisions.

Potential Responsible Organizations: NYS DEC, FEMA and USGS

Recommendation: Request that the NYS DEC and the Federal Emergency Management Agency (FEMA) prioritize the Oneida Lake watershed at a higher ranking for FEMA mapping considerations.

Potential Responsible Organizations: NYS DEC and FEMA

- **PROBLEM:** *The population that lives on Oneida Lake or along the Oneida River has increased due, in part, to seasonal cabins changed to year-round homes and the general appeal of shoreline access for recreational usage. Consequently, many dwellings are now located in areas that are affected by river/lake-level changes. Also, development continues in floodplain areas around the lake and upland areas that affect the floodplain. Some*



Many factors contribute to flooding

¹ The entire state will be flown in a few years and a base map will be created. FEMA flood maps already exist and are in the process of being updated to include this information.

people are still building in low-lying areas simply by raising their structures and drive-ways.

Recommendation: Identify flood plain and flood prone areas of Oneida Lake and discourage municipalities, developers and landowners from inappropriate development within flood prone areas. Develop strategies to educate individuals and groups to the fact that Oneida Lake is a regulated natural body of water and not a man-made reservoir.

Potential Responsible Organizations: NYS DEC, OLWAC, CNY RPDB

Recommendation: Encourage shoreline and upland watershed municipalities to:

- Enforce local laws that prohibit new development in flood prone areas;
- Adopt ordinances that prevent new development within flood prone areas and along riparian corridors in an effort to protect flood prone areas and fisheries habitat in municipalities that do not presently have adequate local laws;
- Follow shoreline protection guidelines (Article 15 NYS DEC regulations) when construction projects are planned.
- Comply with regulations in order to take advantage of FEMA’s flood mitigation grant program;
- Educate developers and the general public on the correct use of flood and elevation maps when development plans are considered (DEC, FEMA, DOS).
- Educate realtors, builders, homeowners, architects, and code enforcement officers on building code requirements or techniques specifically designed to protect structures in flood prone areas.

Potential Responsible Organizations: NYS DEC and local municipalities

Recommendation: Encourage municipal participation in FEMA’s Flood Hazard Mitigation Program, specifically in terms of flood proofing and retrofitting existing structures. Distribute NFIP educational literature and hold workshops that describe methods to flood-proof structures in flood prone areas.

Potential Responsible Organizations: FEMA, NYS DEC, Planning

B. Lake Level Management

- **PROBLEM:** *There is a lack of understanding of the response of precipitation and snow-melt throughout the Oneida Lake watershed to Oneida Lake levels. There is inadequate data available, including real-time gauging of the streams tributary to Oneida Lake, real-time precipitation gauging and snow monitoring at adequate locations throughout the watershed. Further, a robust hydrologic model, linking these inputs with the fixed stage-storage relationships on Oneida Lake coupled with the variable discharge capacity of the Oneida River does not presently exist.*

Recommendation: Develop a hydrologic model of the Oneida Lake watershed to estimate the response of precipitation and snowmelt on Oneida Lake based on the variable discharge capacity of the Oneida River.³

Potential Responsible Organizations: US ACOE, NWS, NYSCC, NYS DEC, USGS, OLWAC, CNY RPDB

- **PROBLEM:** *There is a lack of stream and stage gages in the Oswego River Basin. The absence of funding has led to the discontinuation of several gages throughout the watershed and the lack of historical data poses a limitation to using models for predicting future flooding patterns.*

Recommendation: Encourage local, state, and/or federal governmental units in cooperation with the USGS to fund the repair of existing stream and stage gages on Fish Creek, Limestone Creek, Chittenango Creek, and at Sylvan Beach, and to consider the potential for adding additional gages in other areas. These stage gages, coupled with stream gages, are needed to meet the requirements outlined in A1.⁴

Potential Responsible Organizations: USGS, OLWAC, CNY RPDB

C. Control Structures and Operations

- **PROBLEM:** *There is a lack of understanding among stakeholders regarding water level management control structures and the potential impact of technical reports compiled by groups such as the U.S. Army Corps of Engineers.*

Recommendation: Solicit the U.S. Army Corps of Engineers to restudy current Oneida Lake flooding characteristics in terms of alternative water level control options and anticipated cost benefit analyses.

Potential Responsible Organizations: US ACOE and local municipalities

- **PROBLEM:** *The NYS Canal Corporation regulates water levels during the navigation season, as required by law, and is responsible for the conditions of the canal navigation channel, not the depths of the entire width of the Canal or Oneida Lake. The majority of*

² As per W. Kappel of the USGS (12/15/03 e-mail correspondence), the development of a real-time data network provides not only the pulse of the watershed to its residents, but can provide the critical data needed to develop a hydrologic and hydraulic model of the watershed. Hydrologic in this sense is a watershed model 'tuned' to the natural conditions (stream and land slopes, stream cross-sections, soils, land-use, etc.) within the watershed. This model needs to be coupled to a hydraulic model (i.e., the plumbing of the system) as water levels and flows are controlled by man-made structures within and downstream of the watershed.

³ According to W. Kappel of the USGS (12/15/03 e-mail correspondence), funding has been cut both by USGS funding cooperators and by the Federal government. USGS does not choose where gages are situated on streams, rivers, and lakes. A funding agency (usually a local, state, or federal governmental unit) determines where USGS establishes its stations and pays USGS for this service. USGS assists in these costs through a cooperative funding program, but cuts in funding at all governmental levels has caused a diminishment in the number of gaging stations across the United States.

boats using the canal are recreational, but commercial vessels also use the canal system. Oneida Lake levels during the navigation season normally can be managed close to the regulation curves. However, high water levels are normally observed during the non-navigation season in the spring when the Caughdenoy Dam is fully open, or during unusual weather events.

Recommendation: Explore the feasibility of extending the time period during which the New York State Canal Corporation is responsible for water level controls, as long as the extension does not impact current navigation law. Water level management might begin when the lake is declared ice-free by the Oneida Fish Cultural Station, or by March 20 in years when the ice is out early or there is no ice. Water level management might end when the lake is designated as ice covered by Cornell University, or January 1st if the lake is not covered.

Potential Responsible Organizations: NYSCC, OLWAC, CNY RPDB

- **PROBLEM:** *Oneida Lake is part of the Oswego River Basin. Water level modifications to minimize flooding on Oneida Lake could have negative impacts on downstream communities. Also, recommendations relating to control structures and operations on the Oswego River (or in any area downstream from Oneida Lake) have minimal impact unless they are considered in relation to the flow of water from other areas within the Oswego River Basin. There are presently no formal programs that provide regional coordinated management of the water resources throughout the Oswego River Basin.*

Recommendation: Encourage the formation of a Regional Water Resources Council to provide central management and control throughout the Oswego River Basin. The Regional Water Resources Council would, among other duties, be responsible for coordinated lake level/flow regulation, flood plain management, and flood damage reduction programs throughout the Oswego River Basin. Promote the inclusion of Council representation from local, State, and Federal agencies and organizations, and lake communities in this regional partnership.

Potential Responsible Organizations: OLWAC, CNY RPDB

Preventing Septic Waste Runoff From On-Site Sewage Disposal Systems

Program Goal

Protect public health and prevent environmental degradation by reducing non-point source pollution to surface water and groundwater from septic waste throughout the Oneida Lake watershed

Problem Identification

The US Environmental Protection Agency (EPA) estimates that anywhere from 10 to 25 percent of onsite systems are failing annually (Source: www.epa.gov/owm/mtb/decent/summary.htm). Poor site conditions contribute to the problem. Environmental constraints include limited soil permeability, seasonally high groundwater levels, limited topographic relief, and poor drainage. It has been estimated that only 32% of the total land area in the United States has soils suitable for on-site systems that utilize the soil for final treatment and disposal of wastewater (*US EPA. 1980. Design Manual: Onsite Wastewater Treatment and Disposal Systems*).

Improper system installation and poor maintenance can cause system failure. Failure to upgrade the on-site septic system when a summer cottage is converted to a year round home can lead to problems. Full-time or high use of vacation homes served by systems installed under outdated practices or designed for part-time occupancy often results in poor water quality.

Pumpout and disposal of wastewater from boats and marinas pose a non-point source pollution threat. Close proximity of individual septic systems to waterbodies and drinking water wells can also pose a threat to human health.

A lack of adequate homeowner education needs to be addressed, as some residents are not aware and/or concerned about failing septic systems.

Limited financial resources make it difficult for families to maintain or replace failing systems. Many homeowners with inadequate sewage disposal systems do not have the financial resources to make repairs and/or are not aware of state and federal funding assistance opportunities.

Some residential lot sizes are inadequate to support on-site septic systems. There is also an overall lack of enforcement due to limited staff and monetary resources.

Impacts

Failing septic systems release nutrients and pathogens to the environment, subsequently posing human health problems and degrading the aesthetic values and recreational potential for Oneida Lake and its tributaries. Bacteria, parasites and viruses present in effluent can result in health problems for both humans and animals. Septic systems sited too close to wells and ground water supplies can contaminate drinking water. Nitrogen and phosphorus from failing septic systems can enter the lake and tributaries and cause algae to proliferate and reach dense populations, causing a bloom to occur. When the bloom dies off, dissolved oxygen levels can be severely depleted and the amount of oxygen available to fish and other

aquatic life is compromised. The dead algal cells then get washed to shore where they further decompose, creating an unpleasant odor and an unsightly mess. Pollutants from failing septic systems not only impact the health of humans, plants and animals, but can also impact the economy as well. Success of the watershed's tourism and recreation industry relies on high quality natural resources. Furthermore, the presence of unsanitary conditions throughout a community, especially on-site septic system failures and discharges to roadside ditches, tends to decrease property values. Such decreases are applicable not only to those who have inadequate wastewater disposal systems, but also to neighbors who may have adequate systems. The presence of standing sewage and the associated odors decrease the quality of life in the community.

Participating Organizations

The following agencies and organizations take a leading role in management decisions concerning on-site septic systems in the Oneida Lake watershed:

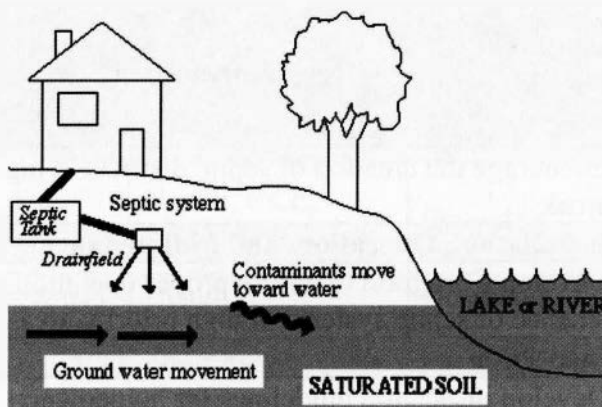
- NYS Department of Environmental Conservation, Regions 6 and 7
- CNY Water Education Group
- Cornell Cooperative Extension
- Lewis County Health Department
- Madison County Health Department
- Onondaga County Health Department Division of Environmental Health
- NYS Department of Health
- Oneida County Dept. of Health
- Oswego County Health Department Environmental Division
- Project Watershed

Current Programs, Regulations, and Guidelines

- Project Watershed monitors several Oneida Lake tributaries for coliform bacteria.
- The towns and villages surrounding Oneida Lake conduct bacterial monitoring programs to ensure that bathing beaches are not contaminated.
- County Health Departments test for fecal Coliform bacteria and E-coli in response to public complaints when there is a public health concern.
- All public bathing beaches are tested annually by County Health Departments.
- Verona Beach is tested monthly by the NYS Health Department.
- Sylvan Beach is tested annually by the Oneida County Health Department.
- The New York State Onsite Wastewater Treatment Training Network (OTN), in cooperation with the NYS DEC, provides training courses and hands-on instruction for wastewater and onsite system professionals. Courses cover system design and inspection, installation and maintenance, and alternative treatment system technologies.
- Design and construction of systems discharging less than 1,000 gallons/day to groundwater must follow Title 10 of the New York Codes, Rules and Regulations (10NYCRR) Part 75 and Appendix 75-A.
- According to State Sanitary Codes, areas lower than the 10-year flood level and slopes greater than 15% are unacceptable for on-site systems.
- There must be at least four feet of usable soil above rock, unsuitable soil and high seasonal groundwater for the installation of a conventional septic system absorption field.
- All components of the on-site system must be separated from buildings, property lines, utilities, and wells in order to maintain system performance, permit repairs,

and reduce undesirable effects of underground sewage flow and dispersion.

- Environmental review prior to development in areas with steep slopes, shallow soils and high water tables is required.
- Some counties have a permitting and inspection program for siting and installation.
- Additional information (including a NYS DOH Fact Sheet) is available in Appendix C and at the following website: http://www.corporateservices.delhi.edu/wastewater_home.htm
- Refer to the “Managing Flooding and Water Levels” section for recommendations regarding phosphorus levels and a nutrient budget.



Septic System Graphic (source: www.extension.umn.edu)

Recommendations

The recommendations in the following table are based on the following priority areas in the watershed:

Priority Area A – Areas that have current, known problems with non-point source pollution from failing on-site septic systems. Recommendations will largely target these highest priority areas.

Priority Area B – Areas that have a high potential for future non-point source pollution problems from failing on-site septic systems based on population growth, development trends, and environmental constraints such as limited soil permeability, seasonally high groundwater levels, limited topographic relief, and poor drainage.

These priority areas are graphically displayed on Figure 5. Please note that not all on-site septic systems within a Priority Area are failing or have the potential to fail. Conversely, not all on-site septic systems located outside of Priority Areas are necessarily functioning properly.

| Recommendation | Potential Responsible Organization(s) | Time-line/Goal (contingent upon funding) |
|---------------------------------------------------------------------------------------------------------------------|---------------------------------------|------------------------------------------|
| Design and Siting | | |
| Encourage the improvement of local enforcement of existing guidelines for design and siting in high priority areas. | Health, M | On-going |
| Research funding options for the construction of alternative wastewater systems in high priority areas. | M, LA | On-going |

| Recommendation | Potential Responsible Organization(s) | Time-line/Goal (contingent upon funding) |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------|-----------------------------------------------------|
| Encourage the creation of septic districts in high priority areas. | OLWAC, Health, RPB, M, Planning | On-going |
| Installation, Operation, and Maintenance | | |
| Develop a program to ensure proper operation and maintenance of septic systems in high priority areas. ¹ | Health, CEO, LA | On-going |
| Inspection | | |
| Develop inspection guidelines for homeowners. | OTN | 1-2 years |
| Develop uniform guidelines for inspection of onsite systems in high priority areas (based on availability of local laws). | M, OLA, LA, OLWAC, RPB | 1-2 years |
| Regulations | | |
| Review what sanitary laws are currently available in watershed counties and conduct a gap analysis to identify deficiencies. | RPB, OLWAC | On-going |
| Encourage counties to adopt sanitary regulations in high priority areas. | M | On-going |
| Review EPA's <i>Guidelines for Management of On-site/Decentralized Wastewater Systems</i> and evaluate the feasibility of implementing the guidelines within high priority areas. ² | All relevant agencies, organizations, and municipalities | On-going |
| Water Quality Monitoring | | |
| Conduct baseline water quality monitoring (including Coliform analyses) on high priority streams identified through the Oneida Lake Watershed Monitoring Program. | SWCD, POLW, Planning, M, CDS | As needed |
| Conduct follow-up water quality monitoring in areas identified through the stressed stream analysis (Phase II of the Oneida Lake Watershed Monitoring Program) to determine the success of implemented remedial efforts. | SWCD, POLW, Planning, M, CDS | As needed |
| Support continued research efforts to differentiate between human and animal wastes. | AI, OLWAC, RPB, OLA, MVWA | As needed |
| Support water quality testing conducted by high school students through Project Oneida Lake Watershed. | OLWAC, RPB, OLA, Planning | On-going |
| Consider development of a septic testing program along the shoreline and in high priority areas. | M, OLWAC, RPB, OLA | 1 – 2 years |
| Education and Training | | |
| Compile and distribute existing guidelines for proper installation, operation and maintenance of on-site wastewater systems in high priority areas. | Health, CCE, OTN, RPB | On-going |
| Distribute educational literature that provides examples of good septic system use and maintenance practices. | Health, CCE, OTN, RPB | On-going |

| Recommendation | Potential Responsible Organization(s) | Time-line/Goal (contingent upon funding) |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------|---------------------------------------------|
| Encourage regular maintenance of septic systems throughout the watershed through educational seminars/workshops. | Health, CCE, OTN, RPB | On-going |
| Distribute a septic maintenance log sheet for homeowners. | Health, CCE | On-going |
| Offer training sessions for code enforcement and other personnel that work with homeowners in identifying problem areas. | OTN, RPB | On-going |
| Funding and Future Needs | | |
| Seek funding to conduct annual water quality testing in high priority areas. | All relevant agencies, organizations, and municipalities | On-going |
| Explore and promote Federal and State legislation to fund assistance to replace and upgrade septic systems for rural and small communities and for families with limited income. ³ | All relevant agencies, organizations, and municipalities | On-going |
| Research the benefits/obstacles of creating an Oneida Lake district for septics. The creation of a special benefit district could provide funding for improvement projects. | OLWAC, RPB, OLA | 1-2 years |
| Enhance coordination and communication among agencies that oversee land use planning, zoning, development, water resource protection, public health initiatives, and on-site systems. | OLWAC, RPB, OLA | On-going |

Notes:

¹ For example, charge a fee to inspect and pump systems unless the homeowner provides proof of proper maintenance and/or at the sale of a home, require that the seller either produce maintenance records proving that the system was inspected and pumped within a certain time frame or identify inspection needs to be completed prior to closing.

² The purpose of the guidelines is to assist communities in establishing comprehensive management programs for properly functioning onsite/decentralized wastewater systems. These voluntary management guidelines address siting, performance, design, operation and maintenance needs and requirements.

³ For example, use the Catalog of Federal Domestic Assistance to explore what grants and loans are available for water and waste disposal systems for rural communities; review opportunities through the EPA Office of Wastewater Management's "Small Communities Team" for technical and financial assistance to small communities; review New York Rural Waters Association's on-site technical assistance for small and rural wastewater and treatment collection systems through the Wastewater Technical Assistance Program and Wastewater Training and Technical Assistance Program; and review other federal funding opportunities for decentralized wastewater treatment systems through programs such as the Clean Water State Revolving Fund, Nonpoint Source Pollution Grants, USDA Rural Utilities Service, and the US Dept. of Housing and Urban Development, etc.

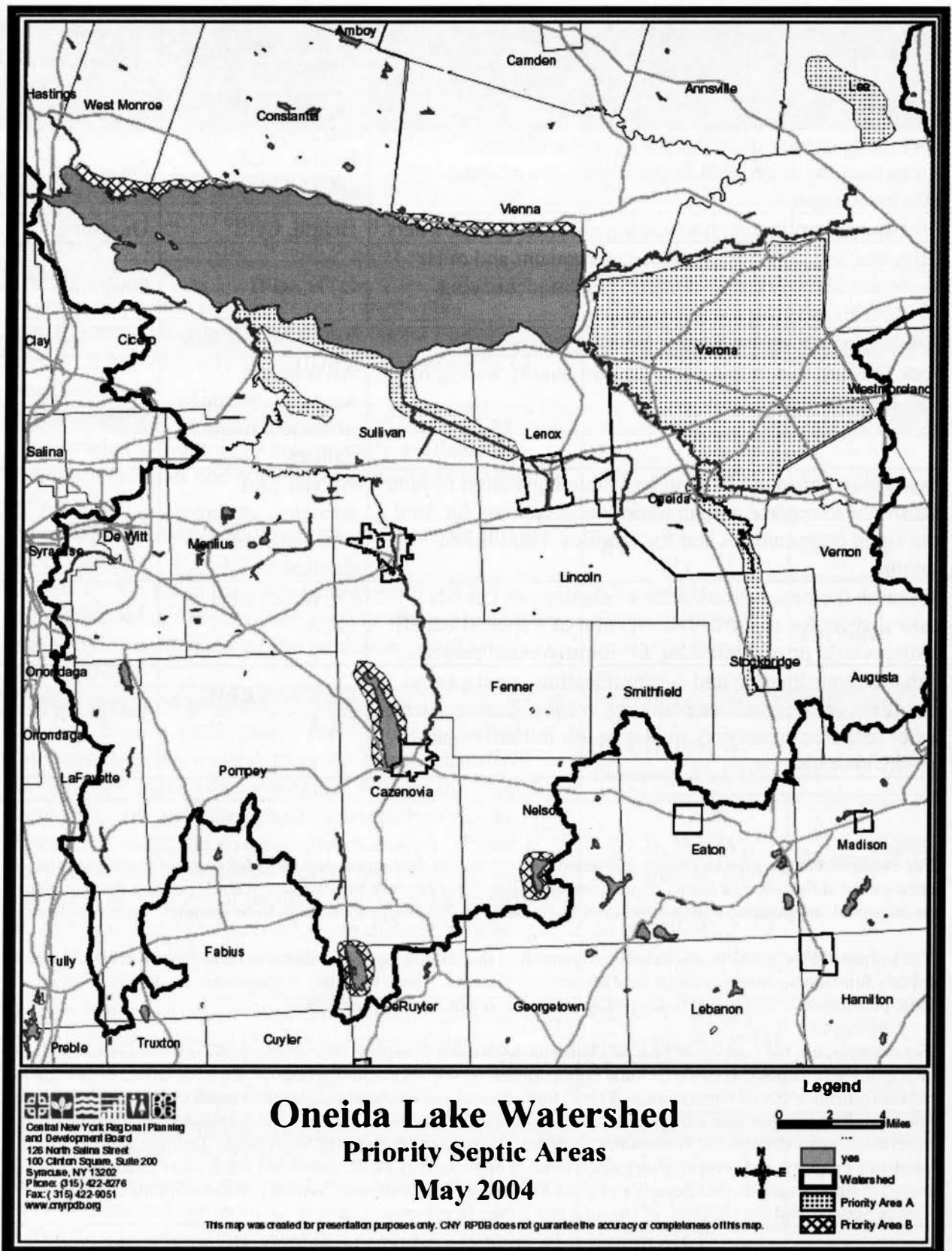


Figure 5: Oneida Lake Watershed, Priority Septic Areas

Controlling and Preventing Exotic Species

Program Goal

Contain or reduce current populations of exotic species and prevent the introduction of new exotics into the Oneida Lake watershed

Problem Identification

There are several exotic species in Oneida Lake (e.g. zebra mussels, Eurasian water milfoil, water chestnut and purple loosestrife) that have caused significant impacts on the lake's ecology.

There are also many additional exotic species that pose a potential threat to the Oneida Lake watershed. Oneida Lake is vulnerable to exotic species from throughout the world and planners should expect ecological surprises in the future with additional human mediated exotic species introductions. Some of these species have already been identified in other New York waterbodies such as Lake Ontario, the Saint Lawrence Seaway, and Lake Champlain.

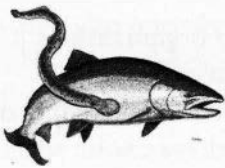
Many exotic, aquatic plants and animals are purchased over the Internet for home water gardens and aquariums. When the homeowners release these organisms into the natural environment, they introduce the exotic species into a new area that can result in negative impacts on food web interactions. Currently, there are very few laws that prohibit the sale,

transport or transplanting of most of these organisms. Therefore homeowners are strongly encouraged to select only native plants and animals for use in their water gardens and aquariums.

Exotic bivalves, fish and invertebrates are transported to new areas via bait buckets, live wells, boating/fishing gear, water currents and by the shipping vector. These inadvertent introductions can be detrimental to the fisheries and recreational value of Oneida Lake, as well as to native species present in the lake.

Priority Species of Concern: The establishment of the following non-indigenous species in Oneida Lake and its watershed would be detrimental to the native aquatic plants and animals. Through public education and outreach programs, every effort should be made to keep these invaders out of our watershed.

- ✓ Eurasian ruffe, *Gymnocephalus cernuus*
- ✓ Round goby, *Neogobius melanostomus*
- ✓ Fishhook water flea, *Cercopagis pengoi*
- ✓ Asian clam, *Cobricula fluminea*
- ✓ Hydrilla, *Hydrilla verticillata*



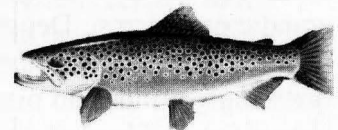
sea lamprey
(attached to a salmon)



zebra mussel



Eurasian
water milfoil



brown trout

Non-Native Species Identified in Oneida Lake

| Species | Common name | Native to |
|------------------------------------|------------------------|-----------------------------------------|
| Fish | | |
| <i>Alosa aestivalis</i> | blueback herring | Atlantic |
| <i>Alosa pseudoharengus</i> | alewife | Atlantic |
| <i>Cyprinus carpio</i> | common carp | Asia |
| <i>Morone americana</i> | white perch | Atlantic |
| <i>Petromyzon marinus</i> | sea lamprey | Atlantic |
| <i>Salmo trutta</i> | brown trout | Eurasia |
| <i>Scardinius erythrophthalmus</i> | rudd | Eurasia |
| Mollusks | | |
| <i>Bithynia tentaculata</i> | faucet snail | Eurasia |
| <i>Dreissena polymorpha</i> | zebra mussel | Eurasia |
| Crustaceans | | |
| <i>Eubosmina coregonia</i> | water flea | Eurasia |
| <i>Gammarus fasciatus</i> | gammarid amphipod | Atlantic |
| <i>Echinogammarus ischnus</i> | amphipod | Eurasia |
| Plant/Plant Hosts | | |
| <i>Acentria ephemerella</i> | aquatic moth | Eurasia |
| <i>Lythrum salicaria</i> | purple loosestrife | Asia, Eurasia, Britain, southern Europe |
| <i>Myriophyllum spicatum</i> | Eurasian water milfoil | Eurasia |
| <i>Potamogeton crispus</i> | curly pondweed | Eurasia |
| <i>Phragmites australis</i> | common reed | Eurasia, Africa |
| <i>Trapa natans</i> | water chestnut | Eurasia |

Source: Oneida Lake State of the Lake and Watershed Report

Impacts

When released into the environment, exotic aquatic plants and animals can be highly aggressive, form dense monotypic populations, and out-compete our native aquatic organisms for food and space. Some plants can form dense mats on water surfaces, shade native vegetation, hinder swimming, fishing and boating activities, and deplete oxygen levels that are needed by fish and other aquatic organisms. Dense floating plant beds provide optimal conditions for mosquito breeding grounds and marginal habitat for native fish and birds.

The exotic organisms that have the greatest likelihood of invading Oneida Lake have the potential to cause detrimental impacts on the native fisheries. These organisms can cause a shift in trophic food web interactions, deplete food supplies for native fish, plankton and invertebrates, and out-compete our native fish for spawning areas.

Participating Organizations

The following agencies and organizations play a major role in water resource decision-making in the Oneida Lake watershed and are specifically equipped to address exotic species problems.

- Cayuga County Cornell Cooperative Extension
- Central New York Regional Planning and Development Board
- Cornell Biological Field Station
- Cornell University
- Finger Lakes – Lake Ontario Watershed Protection Alliance
- Granby Clear Waters Association
- Madison County Planning Department
- New York State Department of Environmental Conservation
- New York Sea Grant
- Oneida County Health Department
- Oneida Lake Association
- Onondaga County Cornell Cooperative Extension
- Onondaga County Department of Health
- Oswego County Soil and Water Conservation District

Current Programs, Regulations and Guidelines

Water Chestnut Programs:

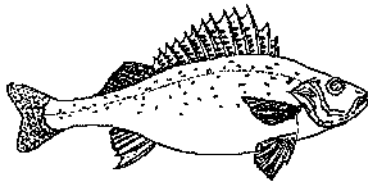
- Oswego County Soil and Water Conservation District harvests water chestnut in the Oswego River and parts of Oneida Lake, depending on funding.
- Cornell Cooperative Extension of Onondaga County has organized hand-pulling events and educational seminars to remove water chestnut from Oneida Lake.
- The Central New York Water Chestnut Task Force was established in 2002 to coordinate the efforts of agencies and organizations that are trying to eradicate or prevent the spread of water chestnut. The group meets quarterly to transfer information and collectively secure funding for education, mechanical harvesting, hand-pulling, and chemical control.

- Cornell University is investigating the use of *Galerucella birmanica*, a beetle native to China, as a biocontrol agent.
 - Informational brochures mailed by Cornell Cooperative Extension to shoreline homeowners in Onondaga, Oswego and Madison counties, along with portions of the Seneca and Oswego Rivers, help to identify water chestnut, instructs residents how to remove and properly dispose of the plants, and provides an opportunity to report new water chestnut infestations.
 - Large, informative signs, created by the Madison County Planning Department, have been posted at boat launches around Oneida Lake to instruct lake users and residents how to identify and remove the plants and methods to report new sightings.
 - The Oswego County Department of Planning and Community Development, through the Environmental Management Council, developed 8x10 information sheets describing water chestnut, identification techniques and control measures. A colored pocket identification card was also created and distributed to boaters, lake users and shoreline homeowners.
 - In June 2003, seven acres of water chestnut were chemically treated in Oneida Lake with the granular form of Aqua-Kleen. New water chestnut plants have emerged and are estimated to cover a few acres.
 - A \$60,000 grant from the Great Lakes National Program Office was awarded to Onondaga and Cayuga County Cornell Cooperative Extension offices in conjunction with other agencies for their “Weeds Watch Out” program from 10/03 to 04/05. This program includes educational programs as well as training for volunteers, data sharing, and other outreach programs related to the identification, reporting, and control of aquatic nuisance plants.

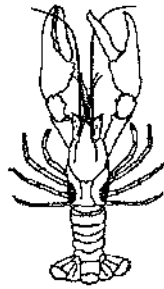
**Other Non-Indigenous Species That Could Become Established
in the Oneida Lake Watershed**

| Species | Common Name |
|----------------------------------|--------------------------|
| <i>Gymnocephalus cernuus</i> | Eurasian ruffe |
| <i>Gasterosteus acculeatus</i> | three spined stickleback |
| <i>Proterorhinus marmoratus</i> | tubenose goby |
| <i>Neogobius melanostomus</i> | round goby |
| <i>Orconectes rusticus</i> | rusty crayfish |
| <i>Ctenopharyngdon idella</i> | grass carp |
| <i>Cercopagis pengoi</i> | fishhook water flea |
| <i>Cobricula fluminea</i> | Asian clam |
| <i>Potamopyrgus antipodarum</i> | New Zealand mud snail |
| <i>Dreissena bugensis</i> | quagga mussel |
| <i>Bythotrephes cederstroemi</i> | spiny water flea |
| <i>Hydrocharis morsus-ranae</i> | European frog's bit |
| <i>Hydrilla verticillata</i> | hydrilla |
| <i>Butomus umbellatum</i> | flowering rush |
| <i>Iris pseudacorus</i> | yellow flag iris |
| <i>Cabomba caroliniana</i> | fanwort |
| <i>Egeria densa</i> | Brazilian elodea |
| <i>Nymphoides peltata</i> | yellow floating heart |
| <i>Myriophyllum aquaticum</i> | parrot's feather |

Source: Cornell University and New York State Sea Grant



Eurasian ruffe



rusty crayfish



spiny water flea



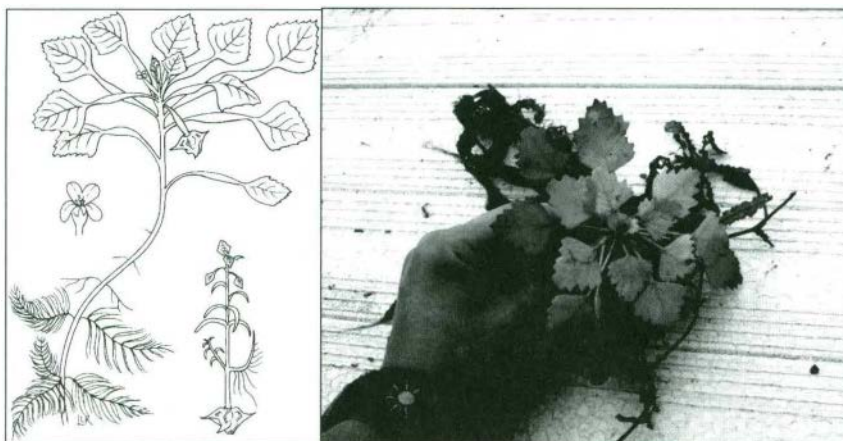
three spined stickleback



fishhook water flea



round goby



Water Chestnut

Other Exotic Species Programs:

- Extensive public education programs conducted by state and non-profit agencies encourage recreational boaters and fishermen to take preventative measures when entering and leaving infested waters, especially where zebra mussels have colonized.
- “Don’t Pick up Hitchhikers” is a control campaign implemented by New York State Sea Grant. Brochures and signs are posted at marinas and are distributed to citizens and lakeshore homeowners. The New York State Department of Environmental Conservation helps to post and distribute the signs.
- Researchers at the Cornell Biological Field Station are conducting studies to determine how exotic species are introduced and ways to mediate ballast water and residue transfers to eliminate future introductions.
- New York Sea Grant distributes “Watch Cards” (pocket sized identification cards) which instruct lake users on the prevention of exotic species infestations and actions to take if a new species is detected in the Oneida Lake watershed.

Funding and Administrative Support:

- The Finger Lakes – Lake Ontario Watershed Protection Alliance (FL-LOWPA) has

provided funding through Onondaga, Madison and Oswego counties for mechanical harvesting. They have also served as project administrator for the “Pulling it Together” grant.

- Through the FL-LOWPA Special Funds Grant Program, the three counties received money to support the chemical treatment of water chestnut.
- The Great Lakes National Protection Office has provided funding to address aquatic nuisance plant species in the Oswego River Basin.
- Onondaga, Madison and Oswego counties, the Central New York Regional Planning and Development Board, Madison County Planning Department, Oswego County Soil and Water Conservation District, Onondaga County Department of Health, Cornell Cooperative Extension of Onondaga County, Oneida Lake Association, and the Granby Clear Waters Association have all contributed funds for mechanical harvesting, public education and chemical treatment programs.

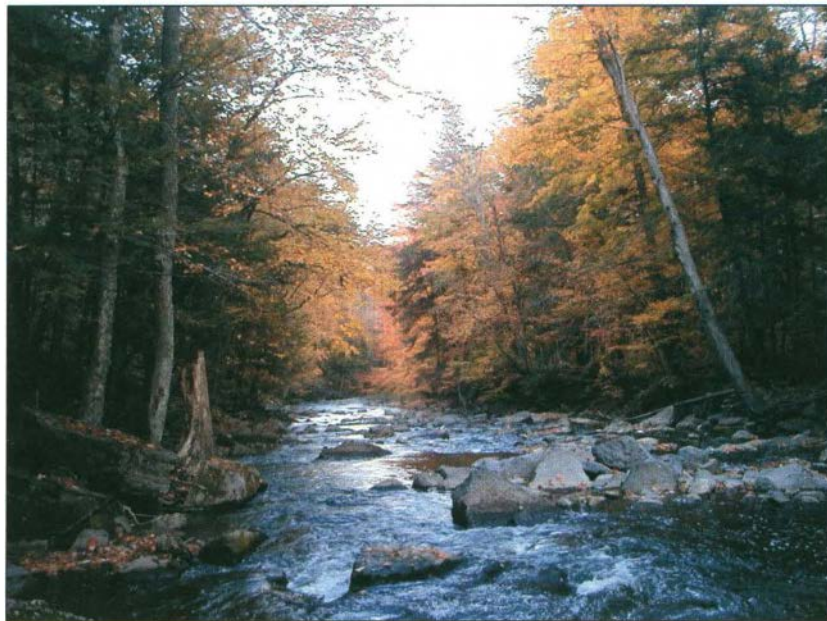
Regulation (NYS DEC Water Chestnut Regulation 11.0509):

No person shall plant, transport, transplant or traffic in plants of the water chestnut or the seeds or nuts thereof nor in any manner cause the spread or growth of such plants.

Recommendations

| Recommendation | Potential Responsible Organization(s) | Timeline/Goal <i>(contingent upon funding)</i> |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------|---------------------------------------------------|
| Continue mechanical harvesting of Oneida Lake. | SWCD, Planning, Health | Annual, as needed |
| Continue to apply chemicals in NYS DEC approved areas for control of water chestnut. | OLA, LO, CNY RPDB, CCE | Annual, as needed |
| Develop and continue educational programs to inform homeowners and lake users about the spread and characteristics of water chestnut: <ul style="list-style-type: none"> - Create brochures, signs, restaurant placemats, and informative lectures. - Distribute educational materials within the watershed to reduce and prevent the spread of water chestnut. - Organize and support volunteer group activities. | CCE, CNY RPDB, SWCD, NYSG, Planning, Health, OLA | Annual |
| Continue educational programs to prevent the spread of other exotic species into non-infested waters: <ul style="list-style-type: none"> - Post signs, distribute pamphlets and brochures. - Continue lecture series and education sessions dedicated to identifying new exotic species. | CCE, NYSG, CNY RPDB | Annual |
| Display information/bulletins on billboards, bait and tackle shops, sporting good stores and pet stores (aquariums). | LA, NYSG, CCE | Annual |
| Conduct annual surveys to monitor the extent of water chestnut populations in Oneida Lake and other parts of the watershed. | OLA, CCE, Volunteers | Annual |
| Continue to research the use of a biological control options for water chestnut such as the water chestnut beetle. | CU | Annual, as needed |
| Pursue and support funding requests for research of biological control methods to decrease other invasive pest species, including zebra mussels. | CCE, NYS DEC, LA, CNY RPDB, OLWAC, OLA | Annual |
| Create a map to document the extent of aquatic plant growth based on annual plant survey results and sightings from lake users. | CIRIS | Annual, as needed |
| Propose and support state legislation: <ul style="list-style-type: none"> - For stronger ballast water legislation and tank residue control treatments. - To strictly enforce restrictions on the sale of exotic species, especially website, plant nurseries and the aquarium stores. | LA, HO, EL | As needed |
| Create programs to distribute literature and brochures on invasive species when registering boats and applying for fishing licenses. | CCE, NYSG, NYS DEC | Annual |

| Recommendation | Potential Responsible Organization(s) | Timeline/Goal <i>(contingent upon funding)</i> |
|----------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------|---------------------------------------------------|
| Continue the “Watch Card” program by creating and distributing cards focused on potential invaders to make people aware before infestations occur. | NYSG, NYS DEC | Annual |
| Support and continue educational programs to encourage youth involvement in the prevention of additional exotic species in Oneida Lake. | CCE, NYSG, POLW, OLA | Annual |



Fish Creek (Photo: Saltman)

Strengthening the Fish Community

Program Goal

Maintain a healthy, diverse sport fishery in Oneida Lake and its tributaries

Problem Identification

The Oneida Lake fish community has been faced with several issues over the past few years, such as declining walleye and yellow perch during the 1990s due to high mortality in early and mid-life stages; increased vulnerability and predation of young fish due to clear water caused by zebra mussels; the potential threat of other exotic species; and predation by double-crested cormorants.

Throughout recorded history, fisheries have played a significant ecological and socio-economic role in Oneida Lake and its surrounding watershed. Changes in Oneida Lake contributed to the increase of the walleye population and the decline of other native species. By the 1940s, walleye prospered and became the dominant piscivore. Yellow perch also thrived in association with walleye, and Oneida Lake became known as a walleye-yellow perch lake. In the 1950s, walleye populations exhibited substantial year-to-year variability, and concerns were raised about the sustainability of the fishery. Such high annual variability prompted New York State and Cornell University to conduct studies to monitor populations of both yellow perch and walleye and to assess factors leading to years of high and low recruitment. Since 1957, recruitment has been highly variable for both yellow perch and walleye; peak recruitment years have produced nearly six million yellow perch and nearly one million walleye. Between 1992 and 2000, however, recruitment of both walleye and yellow perch was poor, and population densities through most of the 1990s were below the historic levels.

The cause of the decline of walleye and yellow perch populations in the 1990s appears to be associated with high mortality in their early and mid-life stages. These include high mortality for ages one to three for both yellow perch and walleye, and for larvae to the first fall of life for walleye. The lack of young walleye recruitment prevented the establishment of a strong year class for over a decade. This low recruitment led to a population dominated by older individuals (age 7 and older). A walleye population that is dominated by older adults and exhibits poor recruitment is of utmost concern – planning and management strategies must focus on efforts to turn this condition around. A contributing cause for high mortality of walleye and yellow perch beyond age-1 is predation by double-crested cormorants. In the case of Oneida Lake, walleye and yellow perch are the most abundant fish and a common prey item of cormorants. The second leading cause of walleye decline is associated with their population dynamics during their first year of life. Contemporary thinking is that prolonged clear-water conditions associated with zebra mussels have fostered increased vulnerability of young walleye to predation, particularly in June and July.

A strong walleye year class was produced in 2001 and the last three to four years have seen better survival of juvenile walleye and yellow perch. This increase in juvenile survival coincides with the hazing program of cormorants initiated in 1998. It is not known if the 2001 year class indicate a return to the strong year classes every three to five years that traditionally maintained the walleye population in Oneida Lake, or a result of favorable

conditions in that particular year. Cornell Biological Field Station and NYS DEC continue to monitor these populations and a more detailed analysis of these interactions is in progress.

Population levels of other fish species in the Oneida Lake watershed are fluctuating. Bullhead populations may be declining and although lake water level drawdown may be a contributing factor, the exact cause is unknown. Other fish species are either increasing or relatively stable. White perch (an exotic), lake sturgeon (a population re-established by stocking), smallmouth bass, largemouth bass and probably panfish are increasing in the lake. Interests for bass fishing is increasing, as exemplified by a Bassmaster northeast regional competition in 2003 and many local bass tournaments.

Several different angling interests exist that are species specific. The best available biology has maintained that a body of water is most healthy when its biomass displays the greatest population diversity in species and age. In order to maintain Oneida Lake and its tributaries at their most healthy levels, the watershed should be managed as a habitat for a diverse community of aquatic species that changes in response to changes in that habitat.

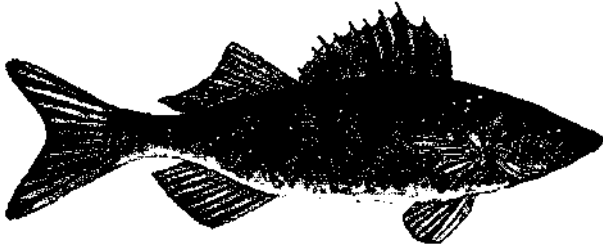
Impacts

Throughout history fishing has played a major role in the social and economic development of the region and today is one of the main recreational uses of Oneida Lake. The lake's fishery is a major contributor to the region's tourism industry. Oneida Lake has been identified as the most important inland fishery and the fourth most important sport fishery in New York State. Fisheries supplement the economy year-round. For this reason, the integrity of the Oneida Lake watershed fishery has a direct impact on the economic livelihood of local municipalities.

To determine the fisheries impacts on the local economy, the NYS DEC conducted a state-wide survey of 1996 angler effort and expenditures. The report documented 573,000 angler days for Oneida Lake, ranking it first in the number of angler days out of all inland waters in NYS. Walleye, yellow perch, and bass were documented as the most popular among anglers. In 1996, anglers spent over \$2.6 million en route and over \$7.6 million on site during fishing trips to Oneida Lake. Over \$600,000 in "at-site" expenditures was generated during the winter ice-fishing season despite the fact that ice conditions were considered to be poor that year. The 1996 net economic value of Oneida Lake's freshwater fishery was estimated to be over \$9.4 million, again ranking it first among New York State's inland waters. People from all over NYS and beyond annually spend millions of dollars throughout the watershed as they recreate on Oneida Lake.



Competitive fishing tournaments are popular on Oneida Lake (Source: www.saltcitybass.com)



Walleye (Source: www.fws.gov)

In addition to the monetary loss that results from a declining fishery, the resulting ecological ramifications may be profound. The Oneida Lake fishery is in flux. New species colonization (such as zebra mussels and double-crested cormorants) change interactions among established species and will likely result in changes to the fish community. The proliferation of zebra mussels since 1992 has resulted in clearer water. Increased water clarity has both direct and indirect effects on the fish community:

- One indirect effect is the expansion of habitat more suitable for species such as sunfish and bass. This expansion is accommodated by increased plant growth at greater depths, a direct effect of increased water clarity.
- Clearer water may also affect fish populations directly by increasing the vulnerability of young fish to predation. Increased mortality at young ages may decrease their recruitment to the adult stock, which, in turn, will eventually reduce the number of adult fish available to anglers. However, increased cover provided by aquatic vegetation may offset this.
- Finally, clear water may affect the behavior of light-sensitive species like walleye. Low-light habitats, such as deep water or structure (for example vegetation), may then play a more important role in determining their distribution.

Changes in the fish composition are likely to continue because Oneida Lake is connected to both the Great Lakes and the Hudson River systems. Exotic species in either of these systems will make it to the lake eventually. Some of these species may have little effect

on the rest of the fish community; others may have major effects.

Phosphorus Management: Phosphorus is an essential nutrient for most aquatic plant and animal life and is necessary for maintaining the Oneida Lake food web. Levels of phosphorus have declined by nearly 50% in Oneida Lake over the last 30 years resulting from mandated controls established in the 1970s. The 50% reduction was a substantial gain for the Oneida Lake environment and resulted from upgrading of primary to secondary (and in some cases beyond) levels of wastewater treatment for several municipalities in the Oneida Lake watershed.



(Source: www.pinetreeweb.com)

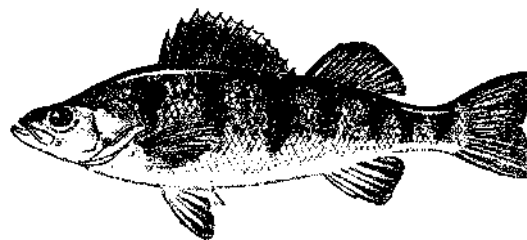
Throughout Oneida Lake's recorded history, the fishery has played a significant role in its ecology and heritage. The maintenance of a strong fishery in Oneida Lake is dependent on a phosphorus management plan that balances the need for clear water and for a productive fishery. In the decade of the 1990s, total phosphorus concentrations averaged nearly 20 ppb ($\mu\text{g/l}$). Cornell Biological Field Station scientists believe that fish production in Oneida Lake has not been compromised at current total phosphorus levels (20 ppb ($\mu\text{g/l}$))

but further reductions in phosphorus may decrease fish production. Given these uncertainties, it is recommended that a plan for Oneida Lake and its watershed maintain a mean May through October total phosphorus level of 20 ppb ($\mu\text{g/l}$). It is also recommended that a total phosphorus budget be developed as a first action step in the planning process. This budget will identify contributing sources of phosphorus to the Oneida Lake ecosystem and will guide future phosphorus management in the watershed.

Tributaries: The Oneida Lake watershed covers portions of six counties and land use along the tributaries that flow into the Lake should be carefully considered when planning for the future of the Oneida Lake fish populations. Many of the creeks flowing into Oneida Lake along the north shore pass through relatively unspoiled and undeveloped lands, while the southern and eastern tributaries flow through more populated regions. These streams provide an excellent coldwater fishery throughout most of the year. In order to maintain the quality fisheries in the Oneida Lake tributaries, development decisions and land use patterns must be carefully monitored to avoid changes that would negatively affect flow rates, temperatures and water quality.

Fish Creek, together with its many tributaries, is a classic fly-fishing venue covering many square miles of undisturbed land. At one time in its history, the Fish Creek system held one of the largest populations of Atlantic salmon (*Salmo salar*) in the eastern U.S. These fish and the eastern brook trout (*Salvelinus fontinalis*) are the only salmonines native to the watershed. The success of current efforts by the Fish Creek Atlantic Salmon Club to restore a naturally spawning population of Atlantic salmon to the Fish Creek system is dependent on the maintenance of existing low impact land use patterns.

Typically, watershed management tends to focus upstream from a lake for inclusion in the total system. Because Oneida Lake is part of a system that extends downstream to Lake Ontario via the Canal and the Oswego River, the focus should not ignore these downstream areas and the possible fish migration and other movement that could take place. The effect of such things as the recent installation of upstream passage facilities for American Eel on the Oswego River and water level controls are examples of downstream activities that have an upstream impact.



Yellow perch (Source: www.stuartarnett.com)

Participating Organizations

The following agencies and organizations play a leading role in fisheries decision-making in the Oneida Lake watershed.

- Atlantic Salmon Fish Creek Club
- Cornell Univ. Biological Field Station
- Cornell Cooperative Extension
- Eastern Lake Ontario Anglers Association
- Natural Resource Conservation Service
- NYS Dept of Environmental Conservation
- Oneida Lake Association, Inc.
- Project Oneida Lake Watershed
- Soil and Water Conservation Districts
- SUNY College of Environmental Science and Forestry
- Salt City Bassmasters Club / NYS BASS Chapter Federation
- US Fish and Wildlife Service

Current Projects Associated with Fish and Fisheries in Oneida Lake and its Tributaries

| Project | Goal | Funding source |
|----------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Creel survey - CBFS | Measure angler use of lake and harvest/catch rates | NYS DEC |
| Warmwater fish management - CBFS | Monitor fish populations with particular attention to walleye and yellow perch. Recommend management strategies | NYS DEC |
| Limnology monitoring - CBFS | Monitor lower trophic levels and physical/chemical variables | Cornell |
| Ecopath/EcoSim models - CBFS | Ecosystem approach to fisheries management through models. Comparison with Bay of Quinte | GLFC With OMNR, DFO |
| Population dynamics models for walleye and yellow perch - CBFS | Understand compensatory effects of management and ecosystem changes on a coupled predator-prey system | GLFC, NYS DEC With OMNR, DFO, LSU, Univ. Michigan |
| Benthification - CBFS | Understand effects of increased water clarity and decreased nutrient input to lakes. Effects of increased macrophytes | NY Sea Grant Cornell/Syracuse |
| Hydrodynamics models - CBFS | Effect of climate change on stratification | Internally funded With scientist in Australia, New Zealand, Israel and Wisconsin |
| Sturgeon habitat use - CBFS | Population dynamics of a successful reintroduction | Cornell, USDA |
| Cormorant biology - CBFS | Cormorant habitat utilization, diving pattern, diet selection, effect on fish populations | USGS –Sport Fish Restoration funds. With Cornell Fish Wildlife Coop Unit (USGS) |
| Common terns - CBFS | Effects of cormorant hazing on terns | APHIS Through Cornell USGS Coop Unit |
| Zooplankton ecology - CBFS | Diapausing eggs controlling population biology | Cornell With EEB |
| Water chestnut control | Control / eradication | CNY RPDB, SWCD, OLA, Cornell, CCE Onondaga Co. |
| Rotating Intensive Basin Studies (RIBS) | Water quality and fisheries monitoring | NYS DEC |
| Tributary Monitoring Program | Baseline and storm event monitoring | CNY RPDB, SWCD, Planning and Health Departments, CBFS |

Current Programs, Regulations, and Guidelines

Oneida Lake and various tributaries throughout the watershed are stocked with fish on an annual basis by NYS DEC and Onondaga

County Carpenter’s Brook Fish Hatchery in cooperation with County Federated Sportsmen. A variety of fish species are planted, including walleye, brown trout, rainbow trout, brook trout, and sturgeon. The NYS DEC stocks fish for two main reasons – to enhance recreational fishing and to restore native



(Source: www.metsa.fi/hiking/boating/fishing.htm)

species to waters they formerly occupied. Fish distribution in the Oneida Lake watershed (number and species) is available on the Internet at www.dec.state.ny.us/website/dfwmr/fish/foe4clst.html.

The Oneida Fish Cultural Station located on Scriba Creek in the Town of Constantia has a goal of stocking 150 million newly hatched walleye fry each year in Oneida Lake. This number is sometimes exceeded depending on the success of the egg take. For example, 2001 was a successful year and 160 million fry were released. Almost 200,000 summer fingerlings were also stocked in 2001 and 100,000 walleye that over wintered in the hatchery were stocked in 2002.

The Atlantic Salmon Fish Creek Club, Inc. (ASFCC), a non-profit organization that was formed for the enhancement and protection of salmonides species native to New York State, participates in many activities such as stocking Atlantic salmon fry in tributaries, electro-

shocking streams to determine population, and taking measurements to document stream ecology. Native Atlantic salmon populations in the Oneida Lake watershed were likely eliminated due to the construction of dams and the introduction of alewives in the Lake Ontario system. Additional information about the ASFCC can be found on their website <http://www.dreamscape.com/flyman>, or by calling toll-free (888) 531-5080.

The Cornell Biological Field Station has a long history of research on the fish and fishery of Oneida Lake. There are over 200 publications in the scientific literature associated with this lake since the 1950s. The table found on the previous page provides a summary of the current projects at the Cornell Biological Field Station.

Studies by Cornell University and the NYS DEC led to criteria established in 1978 that have been the basis for the management of Oneida Lake's walleye fishery. The goal of walleye management in Oneida Lake is to optimize recreational fishing opportunities for both walleye and yellow perch by maintaining the walleye population at levels that have proven to produce acceptable perch recruitment in the past. Too low of a walleye population is detrimental to the fishery and can lead to overabundance of slow growing yellow perch. Conversely, too many walleyes may restrict perch recruitment. Bag limits and length limits for other Oneida Lake fish species follow the statewide regulations. The statewide regulation for walleye is five fish of 15 inches or larger per day per angler.

Recommendations

| Recommendation | Potential Responsible Organization(s) | Timeline/Goal <i>(contingent upon funding)</i> |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------|---------------------------------------------------|
| Fisheries Management | | |
| Promote management strategies that will strengthen populations including, but not limited to walleye, perch, and bass in the lake, and salmonids in the tributaries. | OLWAC, CNY RPDB, CBFS | On-going |
| Encourage NYS DEC to review and implement regulation changes on an annual basis instead of every two years. | OLWAC, CNY RPDB, CBFS | 1-2 years |
| Promote the restoration of historic native species in Oneida Lake and its tributaries, including but not limited to Atlantic salmon, sturgeon, and American eel. | NYS DEC, US FWS, CBFS | On-going |
| Acquire, develop and maintain additional public access sites including the public fishing rights network and waterway access sites. | NYS DEC, OLA, US FWS | On-going |
| Continue cormorant and aquatic plant management strategies to reduce negative impact on fish populations. | US Dept. of Ag. (APHIS), NYS DEC | On-going |
| Encourage greater enforcement of laws relating to watercraft use. | NYS DEC | On-going |
| Encourage greater enforcement of Articles 15 (Protection of Water Resources) and 24 (Freshwater Wetlands) of the Environmental Conservation Law to protect fish habitat. | NYS DEC | On-going |
| A water level strategy that uses the current "rule curve" (April 1 to December 1) is recommended as most beneficial to fisheries in Oneida Lake. During the period not controlled by the "rule curve" including the fall dewatering period, water levels are recommended that minimize loss of fish habitat and late-season access to the fishery, and a spring refilling that allows access to spawning grounds for tributary and marsh-dependent fish species. | NYSCC | 1-2 years |
| Support full staffing of the hatchery system and the Environmental Conservation Officers. Also full staffing at the Division of Fish, Wildlife, and Marine Resources. | OLWAC, CNY RPDB | On-going |
| Nutrients | | |
| Maintain a mean May through October total phosphorus level of 20 ppb ($\mu\text{g}/\text{l}$) for the benefit of Oneida Lake fish populations and overall lake productivity. | CBFS, NYS DEC, OLWAC, CNY RPDB | On-going |
| Develop a nutrient budget to determine the sources of phosphorus and the potential impacts from land use changes. | SWCD, CBFS, AI | 1-2 years |

| Recommendation | Potential Responsible Organization(s) | Timeline/Goal (contingent upon funding) |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------|----------------------------------------------------|
| Continue water quality monitoring in Oneida Lake tributaries in order to identify sources of phosphorus (based on land use activities throughout the watershed) and to document future changes in nutrient loading to the lake. | CNY RPDB, CBFS, AI | 1-2 years |
| Publicity | | |
| Improve public perception of Oneida Lake fisheries through press coverage and articles in newsletters. | OLA, RPB, OLWAC, County tourism agencies | On-going |
| Encourage County tourism agencies to promote tourism to out-of-town visitors. | OLA, OLWAC, RPB, County tourism agencies | On-going |
| Encourage the local business community to promote Oneida Lake recreational opportunities, keep the lake shoreline clean, and improve vacation rental properties and dining opportunities for out-of-town visitors. | OLA, OLWAC, CNY RPDB, Business community | On-going |
| Promote education programs for adults and school students. | CBFS, POLW, CCE, RPB, OLA | On-going |
| Research | | |
| Investigate the use and importance of tributaries for spawning of important fish populations in the lake, including walleye, gizzard shad, salmon and sturgeon. Identify important spawning areas and evaluate the need for habitat protection. | BASS, AFS, AI | 1-4 years |
| Identify important spawning and nursery areas for bass in the lake and evaluate the need for habitat protection. | AI | 1-4 years |
| Investigate the effects of prolonged clear-water conditions associated with zebra mussels and the subsequent increased vulnerability of young walleye to predation. | NYS DEC, AI | 1-4 years |
| Investigate the impacts of varying water levels on spawning habitat and other requirements of important fish species using a GIS based approach. | AI | 1-4 years |
| Determine if the bullhead population is declining and determine the causes of such a decline. | NYS DEC, AI | 1-4 years |
| Investigate the response of walleye and yellow perch populations to increased cormorant control. | AI | 1-4 years |
| Investigate the coupling between fish production and nutrient reduction. | AI | 1-4 years |
| Investigate factors affecting the survival of early life stages of fishes as they relate to recent changes in the Oneida Lake ecosystem. | AI | 1-4 years |

Managing Double-Crested Cormorants

Program Goal

Manage the Oneida Lake cormorant population in order to alleviate and prevent conflicts with other public resources including other colonial-nesting waterbird species and economically important recreational fisheries

In 2003 the Oneida Lake Watershed Advisory Council identified double-crested cormorants as one of eight primary issues of concern in the Oneida Lake watershed. In response to this issue, the Watershed Advisory Council Board of Directors formally voted to endorse the recommendations of the NYS Department of Environmental Conservation Cormorant Task Force and the actions identified in the publication titled, "Management of Double-Crested Cormorants to Protect Public Resources in New York – Statement of Findings" (revised May 14, 2004). A summary of the findings is found below.

Problem Identification

The double-crested cormorant, *Phalacrocorax auritus*, is a large, fish-eating waterbird native to North America that has been federally protected since 1972 by amendments to the Migratory Bird Treaty Act. Cormorants are colonial birds that nest in high densities in areas with abundant fish. These areas are often the same habitats used by other colonial-nesting bird species.

Double-crested cormorants were first observed in significant numbers on Oneida Lake in 1984. Cormorant numbers have grown from a single breeding pair in 1984 to a maximum of 365 documented breeding pairs in Oneida Lake in 2000. Resident cormorant populations are seasonally augmented by migrating flocks in the spring and especially fall. Populations have reached historic highs due to a combination of factors including water quality improvements (including reduction in pesticide residues such as DDT which interfered with reproduction), increased food availability in breeding and wintering areas, and federal and state protection.

Walleye and perch are the major components in the diet of Oneida Lake cormorants. Their

diet also consists of gizzard shad, log perch, emerald shiners, pumpkinseed sunfish, burbot, white perch, rock bass, mudpuppies, small-mouth bass, white bass, white suckers, black crappie, and tessellated darters.

Impacts

In 2001, cormorants on Oneida Lake consumed an estimated 2.8 million fish of which 2 million were subadult yellow perch and 350,000 were subadult walleye.⁵ Loss of highly valued recreational fish species including walleye and yellow perch negatively impact the economy of the Oneida Lake region.

Other impacts of high cormorant populations include their denuding of vegetation on islands and their competition for food and habitat with other colonial nesting birds. Cormorants threaten the existence of other colonial-nesting waterbirds by physically

⁵ VanDeValk, A.J., C.M. Adams, L.G. Rudstam, J.L. Forney, T.E. Brooking, M.A. Gerken, B.P. Young, and J.T. Hooper. 2002. Comparison of angler and cormorant harvest of walleye and yellow perch in Oneida Lake, NY. *Tran. Am. Fish. Soc.* 131: 27-39.

taking over nest sites or by destroying woody vegetation that is essential for nesting. Specifically, loss of nesting habitat due to competition from cormorants on Long, Wantry, and Little Islands has been detrimental to the common tern population, a New York State-listed threatened species.

Since 1998 the NYS DEC has managed the number of breeding cormorants on Oneida Lake by limiting reproduction through destruction of nests and treating eggs (with vegetable oil). The strategy was designed to reach a population goal of no more than 100 successful breeding pairs each year. This has been carried out under a permit issued by the U.S. Fish and Wildlife Service to reduce competition between cormorants and nesting common terns. In 2003 there were approximately 300 nesting pairs of cormorants on Long Island. Cormorants were kept off the other islands by exclusion devices (e.g. fencing, mylar tape, pyrotechnics) and nest destruction.

Participating Organizations

- Citizen Task Force on Cormorants
- Cornell University
- NYS Department of Environmental Conservation, Division of Fish, Wildlife and Marine Resources
- Oneida Lake Association
- U.S. Department of Agriculture, Wildlife Services / Animal and Plant Health Inspection Service
- United States Fish and Wildlife Service
- United States Geological Survey

Current Programs, Regulations and Guidelines

Regulations: The Migratory Bird Treaty Act, originally passed in 1918, provides protection for migratory birds. Under the Act, it is unlawful to take, import, export, possess,

buy, sell, purchase, or barter any migratory bird. Feathers or other parts, nests, eggs, and products made from migratory birds are also covered by the Act. “Take” is defined as pursuing, hunting, shooting, poisoning, wounding, killing, capturing, trapping, or collecting. It is legal to hunt under this act during the designated seasons or with a permit. Amendments to the Act in 1972 afforded protection to the double-crested cormorant.

Programs and Guidelines: A Citizen Task Force was convened in 1994 by NYS DEC to develop management objectives for the double-crested cormorant on Lake Ontario and Oneida Lake. The Task Force was made up of individuals representing sport fishermen, tourism, environmental interests and other stakeholders.

In 1998, the fall hazing program began under USDA Wildlife Services and NYS DEC Division of Fish, Wildlife and Marine Resources. The aggressive harassment program discourages cormorants from stopping over and reduces their time spent on Oneida Lake. In addition, nests are destroyed and eggs are treated to limit cormorant reproduction on Oneida Lake. It has been effective in moving birds off Oneida Lake during the first week of September (one month earlier than natural migration occurs). The NYS DEC and the USDA Wildlife Services Unit have also investigated the use of sound and visual deterrents to alter cormorant migration and roosting patterns on Oneida Lake.

The U.S. Fish and Wildlife Service released a Final Rule and Record of Decision in October 2003 that allows more flexibility in the control of cormorants in areas where they are causing damage to public resources such as fisheries, vegetation, and other wildlife. The rule allows state wildlife agencies, Tribal governments, and USDA Wildlife Services to manage cormorants without having to obtain individual annual permits; however they must

comply with specific annual monitoring and reporting requirements.

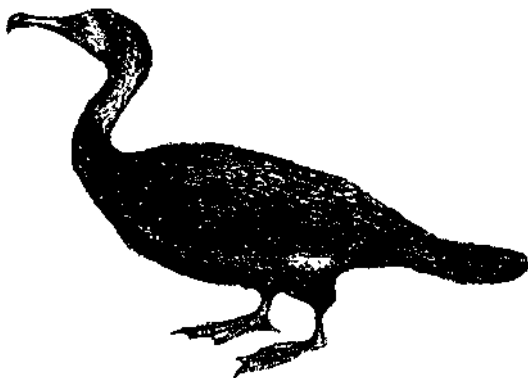
In 2003 the NYS DEC convened a group of waterbird biologists and another Citizen Task Force to establish a cormorant population goal for Oneida Lake. Task Force participants included Citizen's Campaign for the Environment, Eastern Lake Ontario Salmon and Trout Association, Izaak Walton League, NYS Federation of Bird Clubs, NYS Conservation Council, Oneida Lake Association, Oneida Lake Chamber of Commerce, and Onondaga Audubon. After evaluating the complex environmental, economic, and recreational impacts, the final recommendation was for a cormorant population limit of 50 nesting pairs or a total of 100 birds on Oneida Lake during the nesting season. This recommendation is intended to minimize the negative effects of cormorants on both fish populations and the threatened common tern.

Based on input received by the NYS DEC from public meetings, letters, and citizen task forces dealing with this issue, there is strong public support for expanded cormorant management in New York. In response to growing concerns about impacts of cormorants on fish and other wildlife and the habitats they utilize, the NYS DEC developed plans to expand cormorant management in

affected areas of New York, including Oneida Lake, beginning in spring 2004. The goal of these management actions is to reduce the impact of cormorants on other natural resources by limiting cormorant numbers and productivity in areas where conflicts are occurring.

In the spring of 2004, the NYS DEC in cooperation with the USDA began conducting cormorant management activities on Oneida Lake. The management objectives include: a minimum of 20 cormorant nests will be left on Long Island to maintain presence of some birds throughout the breeding season; all eggs in these nests will be oiled to prevent hatching; and the number of cormorants on the lake will be limited to no more than 100 birds, as recommended by a citizen task force finding of summer 2003.⁶ Cormorants will not be eliminated from any local area as a result of management efforts. A description of actions to be conducted annually is provided in the following table.

⁶ NYSDEC, March 24, 2004 press release, "DEC Announces Cormorant Management Plans: Comprehensive Program Seeks to Reduce Conflicts With Fish and Other Wildlife" and "Management of Double-Crested Cormorants to Protect Public Resources in New York – Statement of Findings," March 18, 2004 (www.dec.state.ny.us/website/dfwvr/cormorant).



(Source: www.wnhs.org.uk)

Recommendations

| Recommendation | Potential Responsible Organization(s) | Timeline/ Goal <i>(contingent upon funding)</i> |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------|----------------------------------------------------|
| Initiate a spring (pre-nesting) hazing program, continue egg oiling and nest destruction, and take a limited number of cormorants (no more than 100) to make hazing more effective and to prevent cormorants from pioneering new nesting areas on the lake. | NYS DEC, USDA | Spring, annually |
| Continue the fall hazing program to disperse cormorants from Oneida Lake during migration. | NYS DEC, USDA | Fall, annually |
| Implement measures to prevent displaced birds from pioneering to new nesting locations on other lakes in the vicinity and to minimize potential impacts on public resources in other areas. | NYS DEC, USDA | On-going |
| Continue monitoring/research of cormorant ecology and response to management activities to evaluate success of efforts and determine plans for cormorant management in future years. | NYS DEC, USDA, Cornell University | On-going |
| Coordinate management and research efforts with colleagues in Vermont and Ontario, Canada to ensure a cooperative regional approach. | NYS DEC | On-going / as needed |



(Source: nyfo.fws.gov/fwc/migbirds.htm)



(Source: www.camacdonald.com/birding)

Promoting Responsible Boating

Program Goal

Promote the responsible use of boats and motorized craft on Oneida Lake in a manner that balances economic, environmental, recreational and residential needs, as well as personal safety

Problem Identification

Boating and the use of personal watercraft are popular pastimes on Oneida Lake that positively affect the economy of local municipalities and businesses. However, there are a number of safety, environmental, and quality of life issues that are of concern. These include:

Excessive Speed – high speeds and reckless driving is a safety concern for both boaters and other user groups;

Excessive Noise – loud engines, buzzing jet skis, and noisy partiers disturb other lake users and homeowners;

Lack of Boating Courtesy – inconsiderate behavior amplifies conflicts between and among different user groups;

Navigation Issues – uprooted trees and aquatic weeds, low water levels, and misplaced buoys can cause dilemmas for boaters;

Water Quality Impacts – fuel spills, emissions, boat waste, soil erosion, litter, and exotic species can have negative effects on lake water;

Damage of Lake Bottom – boats degrade the lake bottom and undermine the ramp structure when they “power load” at ramp sites;

Jurisdictions/Law Enforcement – many residents and lake users are unclear about who to call to receive assistance or report incidents.

Impacts

Excessive Speed: Boaters engaging in excessive speeds can pose a danger to themselves, other watercraft operators, and swimmers. The New York State Office of Parks, Recreation, and Historic Preservation (NYS OPRHP) reports excessive speeds as the cause of watercrafts capsizing, colliding with both fixed and floating objects, colliding with other vessels, grounding, sinking, losing passengers overboard, and striking non-boaters. The collision of two or more watercraft vessels is the most common boating accident resulting in injury. The NYS OPRHP reported that approximately 20% of boating accidents in 2002 were caused by careless and reckless operation, or excessive speed. Other major causes for accidents include the absence of a proper lookout and, operator inattention. Accident reports also show that the increasingly popular personal watercraft (PWC), otherwise known as the jet ski, is involved in nearly 30% of all accidents despite the fact that they comprise less than 10% of the state’s registered boats.

Excessive Noise: For lake-side homeowners, the noise from motorboats, personal watercrafts, and boating partiers can easily impede on their choice of recreational activities as well as nighttime peace and quiet. While the State of New York has established noise level regulations for recreational boats, even the sound of watercraft that meet specifications or of multiple PWCs (which are not especially loud but emit a particular buzzing frequency) can turn a quiet lake into a con-

flict-of-use issue between homeowners, boaters, and other user groups.

Lack of Boating Courtesy: Boating courtesy issues can pose problems between fellow boaters and PWC users, motorized watercraft and non-motorized paddlers/sailboats, as well as between boaters and other user groups. Typical examples of a lack of courtesy between lake users include watercraft speeding past other boats that are at anchor, adrift, or moored. (Because New York State limits vessel speed to 5 mph when within 100 feet of the shore, a dock, pier, raft, float, or anchored boat, it is also against regulation). This kind of behavior can disturb fishing activities, and also creates strong wakes that may overpower smaller watercrafts. Courtesy for other boaters and lake users is an important component in a multiple-use recreation situation and the disrespect of others in regard to speed, noise, right-of-way rules, and launching can result in tension and aggravation that takes away from lake enjoyment.



Fishing Derby on Oneida Lake (Photo: Saltman)

Navigation Issues: Oneida Lake boaters face a number of navigation issues that can cause problems or inconvenience. Misplaced buoys can misinform users about necessary speeds, directions, or danger. Seasonal water levels are an issue of concern for many boat users and are also associated with lake bottom damage and shoreline erosion. Navigation

issues also arise when storms cause downed trees, logs or debris limit or block routes and access ramps. The cutting of submerged aquatic vegetation by watercraft propellers can result in dense mats of weeds washing into bays or along shorelines. Thick vegetative mats can also impede watercraft mobility and clog propellers.

Water Quality Impacts: The water quality of the lake can be negatively impacted by boat activity. Fuel loss and small spills from boats create only minor problems since slicks quickly volatilize into the air. While fuel spills may not significantly degrade water quality, they can however, decrease people's enjoyment of the lake and impair the swimming value of affected areas. Similarly, litter and trash in the water and along the shores decreases the aesthetic value of the lake and can change the type of recreational experiences people have. Discharge of boat wastewater and sewage is not permitted and can contribute to lake pollution. Bank erosion is a source of sediment pollution that increases the turbidity of lake water and can be amplified by the wave action caused by boat wake. High speeds too close to shore can result in waves that damage shorelines, sea walls and lead to long-term property loss. Personal watercraft also allow traffic in shallow areas of water that were previously unutilized.

The National Marine Manufacturers Association has documented increasing trends in both the number of recreational boats owned, and also in the average watercraft horsepower. Water turbidity can be exaggerated with speed as bottom sediments are stirred up and re-suspended by the scouring action of propellers. The average recreational watercraft has a minimal influence on the lakebed in depths greater than 6-8 feet. PWC have the least impacts in waters greater than 3 feet deep. The greatest turbulence associated with boat wake was recorded at the 'near plane' operating speeds. Therefore, the greatest damage by

boat wake is associated by watercraft driving too close to shore (particularly when over the five mph New York State speed limit) and fast acceleration in inadequate water depths (such as from a dock or hoist).

Boating can also impact the aquatic environment of Oneida Lake. Dr. Edward Mills, Director of the Cornell Biological Field Station, reported that “there are already more than 70 invasive aquatic species in the inland waters of Central New York that came via the Great Lakes and another 70 or so species are on their way.” Boats can introduce exotic species into a water body by carrying plants, such as water chestnut, on their engines and propellers, and aquatic organisms in their ballast. Once established in the lake, boats transporting these species can help them spread by aiding in their movement. Boaters can both facilitate the spread of exotics, as well as feel the effects of changes invasive species cause in the lake environment. For example, invasive aquatic plants may out-compete native plants, change the type of spawning habitat for fish, and create changes in water clarity that have impacts on fishermen.

Lake Bottom Damage: Boats that “power load” scrape and damage the lake bottom at entry and exit points and ramps. The turbulence created by high horsepower engines undermines the boat ramps by creating large holes in the lake bottom. As a result, \$100,000 is needed for renovations at Oneida Shores County Park to repair and stabilize the ramps (scheduled for February-August 2004). Lake bottom damage and disturbance around the ramps and within the surrounding buoyed areas can also increase sediment suspension in the water and modify plant growth and aquatic habitat. State and public ramps may be particularly susceptible to damage since marina owners are not present to oversee boat launching.

Jurisdictions/Law Enforcement: Many residents and lake users do not know who to notify with boating issues, problems, and concerns.

Participating Organizations

To report a problem that is currently happening with boats or motorized watercraft on Oneida Lake, call 911 – regardless if it is an emergency or non-emergency - and they will route the information to the appropriate agency. To report an upcoming event that may require a directed patrol (such as a scheduled fireworks show or local boat race), call one of the following agencies:

Cicero Town Police Department
(Onondaga County)
Joseph Snell, Chief
8236 Brewton Road
Cicero, NY 13039
Telephone: (315) 699-3677
Fax: (315) 699-8128
E-mail: jsnell@ciceropd.us

Central Headquarters
(Onondaga County)
Richard D. Smith, Major
New York State Park Police
Clark Reservation State Park
6105 East Seneca Turnpike
Jamesville, NY 13078
Telephone: (315) 492-6422
Fax: (315) 492-8519

Onondaga County Sheriff's Department
Kevin E. Walsh, Sheriff
407 South State Street
Syracuse, NY 13202
Telephone: (315) 435-3044
Fax: (315) 435-2942
Website: www.sheriffwalsh.com

Troop D
Major Steven T. White
Troop Commander
New York State Police Troop D
Route 5, P.O. Box 30
Oneida, NY 13421-0030
Telephone: (315) 366-6000
Emergency: 1 (877) 851-6086
E-mail: swhite@troopers.state.ny.us

Madison County Sheriff's Department
Ronald I. Cary, Sheriff
North Court Street, P.O. Box 16
Wampsville, NY 13163
(315) 366-2318

NYS DEC 24-Hour Spill Hotline
To report a chemical or petroleum spill:
1 (800) 457-7362 (within New York State)
OR (518) 457-7362 (outside New York State)

Oneida County Sheriff's Department
Daniel Middaugh, Sheriff
Judd Road
Oriskany, NY 13424
Telephone: (315) 765-2200
Fax: (315) 765-2205
Website: <http://oneidacountysheriff.us/>

New York State Department of Environmental
Conservation
Elwood Erickson, Captain
Division of Law Enforcement, Region 7
615 Erie Boulevard West
Syracuse, NY 13204-2400
Telephone: (315) 426-7431
Fax: (315) 426-7417
E-mail: edericks@gw.dec.state.ny.us

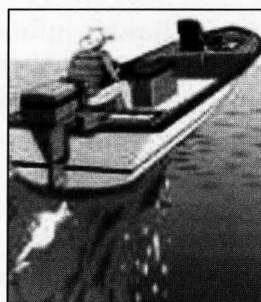
Oswego County Sheriff's Department
Reuel A. Todd, Sheriff
39 Churchill Road
Oswego, NY 13126-6613
Telephone: (315) 349-3307
Fax: (315) 349-3483

State Police Local Contact Numbers:
State Police N. Syracuse: 455-2826
(Onondaga County)
State Police Marcy: 736-0122
(Oneida County and Madison County)
State Police Watertown: 298-5162
(Oswego County)

NYS DEC 24-Hour Spill Hotline
To report a chemical or petroleum spill call
1-800-457-7362 (within New York State) OR
518-457-7362 (outside of New York State)

Current Programs, Regulations and Guidelines

The Office of Parks, Recreation and Historic Preservation is the lead agency in New York for the coordination of marine law enforcement efforts. Through the Bureau of Marine and Recreational Vehicles, NYS OPRHP oversees the distribution of registration funds to qualifying counties and municipalities. Appendix B contains a summary of boating rules that pertain to age, speed, equipment, personal watercraft, and education.



(Source: www.nws.noaa.gov)

Recommendations

| Recommendation | Potential Responsible Organization(s) | Timeline/Goal <i>(contingent upon funding)</i> |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------|---------------------------------------------------|
| Law Enforcement and Jurisdiction | | |
| Develop and distribute a brochure to educate residents about law enforcement agencies around the lake and that 911 is the number to call in emergency and current non-emergency situations. Emphasis will be placed on the appropriateness of calling 911 during a present/on-going incident that is not an emergency in nature, but requires the presence of a dispatched patrol. Patrols needed for future/planned events will not be identified to 911, but to the specific patrol. | OLA, CCE, RPB, NYS DEC | Within 1 year |
| Inform residents about how to make use of directed patrols/law enforcement and report future situations to the appropriate agency, which will be provided in a list of contacts. | OLA, CCE, LO, NYS DEC | Continual |
| Navigation | | |
| Designate a volunteer group to annually determine which buoys are misplaced each spring, and then send that information to the Marine and Vehicle Unit of NYS Office of Parks, Recreation and Historic Preservation (OPRHP). | OLA, Rotary Club, CGA | Within 3 years |
| Establish a central agency responsible of receiving calls from lake users who wish to report a misplaced buoy. The agency will relay information to the Marine and Vehicle Unit of NYS OPRHP (The associated telephone number will be promoted in educational materials/Enforcement Guide). | OLA, CGA, Rotary Club | Within 1 year |
| Boating Safety | | |
| Distribute New York State Boaters Guide to marinas, parks and boat dealers around the lake and in the watershed. | OLA, SSPS | Annually |
| Encourage lake groups, Chambers of Commerce, and civic groups to provide boating safety information and boating courses on their websites and to offer links to related sites. | RPB, SSPS | Within 1 year |
| Encourage legislators to support legislation that would require all boat operators to take a boating safety course and distribute course information in a brochure (Parent/Children Attendance). | OLA, NYS FOLA, NYS OPRHP, SSPS | Continual |

| Recommendation | Potential Responsible Organization(s) | Timeline/Goal (contingent upon funding) |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------|---------------------------------------------------------------------|
| Water Quality: Fuel Losses, Spills and Boat Wastes | | |
| Include the Spill Hotline number in the Education Brochure. | OLA, CCE, NYS DEC | Within 1 year |
| Develop a water quality monitoring program to determine if fuel pollution is a problem at marinas and provide those in need with absorbent fuel pads (“pigs”). | OLA, NYS DEC, AI | Within 3 years |
| Stakeholder Conflicts: Noise, Speed | | |
| Develop a coordinated appreciation/education program that includes: courtesy rules/signs at marinas and parks, flyers distributed to shoreline property owners, rental of signs along major roads, placemats for restaurants, public service announcements, etc. | OLA, CCE, RPB, CGA, Police | Initial concentration of programs and outreach, maintained annually |
| Inform boaters when sheriff places additional speed restrictions during periods of high water levels. | Police, Marinas | When applicable |
| Lake Bottom and Shoreline Damage | | |
| Post signs at marinas warning against power loading. Target efforts at public and state launches. | NYS OPRHP, Marinas, NYS DEC | Continually |

Encouraging Safe Road Deicing Application and Storage

Program Goal

Minimize negative environmental impacts of road deicers on water resources in the Oneida Lake watershed

Problem Identification

Snow and ice on winter roads in the Oneida Lake watershed is a public safety issue. To remove this danger for drivers, municipalities rely on road salt (NaCl) because it is cost-effective (\$30/ton) and efficient.

National research has shown that road salt can have negative environmental impacts on waterways. However, groundwater contamination and negative impacts on fish and wildlife have not been determined in the Oneida Lake watershed.

Transportation agencies may be asked in the future to use more environmentally friendly alternatives to road salt but few guidelines currently exist to determine which alternative products are effective, economical, and non-detrimental to the environment.

Alternative products for road de-icing such as urea, potassium acetate, magnesium chloride, calcium chloride, have not been extensively studied to determine the environmental impacts. In addition, many of these products are very expensive (\$500/ton in some cases vs. \$30/ton for road salt) and are not as efficient as road salt.

Urea, which is commonly used around bridges to decrease corrosion, may increase nutrient loading to waterways. The use of abrasives, such as sand, also increases cleanup and road maintenance costs for Highway Departments and negatively impacts storm sewers.

A comprehensive tributary monitoring study was conducted on all of the major streams flowing into Oneida Lake during 2002–2003. Of the eleven subwatersheds studied, four were found to contribute the largest amount of chloride, a component of de-icing salt, to downstream habitats during storm events. These include Butternut Creek (2,554 g/ha/day) Chittenango Creek (2,467 g/ha/day), Limestone (1,875 g/ha/day), and Big Bay (1,800 g/ha/day).

Impacts

NaCl is the most commonly used road deicer in the nation. According to the National Research Council, road salt use in the United States ranges from 8 million–12 million tons per year. New York's annual road salt usage is 500,000 tons/yr. More recently, the use of NaCl has come under the scrutiny of environmental regulators because of its long-term impacts on the aquatic environment and potential implications to people that rely on groundwater resources for drinking water.

Despite negative public perception, the influence on fish and wildlife, well contamination, and other potentially harmful impacts of road deicers in the Oneida Lake watershed have not been scientifically researched or formally documented as a significant problem. Research conducted by the University of Toronto, however, found that in metropolitan Toronto, 45% of the salt applied to roads runs off in the first flush and the remaining 55% seeps into groundwater. Most of this salt reemerges in local streams within a 50 year time span, increasing salt concentrations in

surface waters threefold over time. Prolonged retention of salt concentrations in streambeds or lakes decreases dissolved oxygen and can increase nutrient loading.⁷

Impacts from winter salt use are thought to be more significant in local tributaries than in Oneida Lake. Some of the potential environmental impacts could include:

- Groundwater contamination
- Damage to stream ecology
- Secondary components of road salt (3-5%) include nitrogen, phosphorus, and metals in concentrations exceeding those in natural waters.

Road salt is a popular de-icing agent because of its efficient deicing ability, utility at low temperatures, and low cost. National studies suggest that the corrosive effects from road salt can be mitigated through practices that minimize runoff into sensitive environmental areas.⁸

Another environmental impact from road deicing operations is the improper storage of salt and chemicals used for road deicing operations. Bulk storage of these chemicals is necessary because highway departments need to have enough chemicals to meet anticipated winter needs with contingency. Negative impacts on the environment may occur when rain and snowmelt causes brine to runoff to local waterways. Madison County estimates a 5 to 10% loss of uncovered, stockpiled sand/salt or pure salt mixture over the course of a season due to stormwater runoff. Housing

the material in a covered facility can minimize this danger.⁹

Participating Organizations

The following agencies take a leading role in decisions regarding salt application and storage.

- Municipal Highway Departments
- NYS Department of Transportation
- County Departments of Transportation



Winter roads
(Photo: www.theaveryhomepage.com)

⁹ Advantages of covered salt structures have been documented in two Finger Lakes communities. The Canandaigua watershed Town of Middlesex was successful in obtaining a state-matching grant to build a permanent salt storage facility to reduce the amount of salt runoff to the West River (a major tributary of Canandaigua Lake - classified as AA drinking water supply for more than 50,000 citizens) by up to 40 tons. The construction of this facility, along with ongoing highway deicing education programs, are listed as high priorities in the Canandaigua Lake Watershed Management Plan and Yates County Water Quality Strategy. Based on monitoring data indicating high levels of salt downstream of the Town of Canandaigua's outdoor salt storage area the Town proactively installed an impressive salt storage building. Salt now stored at this facility will not leach into the nearby wetland and Sucker Brook.

⁷ Howard, Ken. 1993. Road Salt Impacts on Groundwater Quality. GSA Today. Vol. 3 No. 12.

⁸ Technical Note #55 from Watershed Protection Techniques 1(4):217-220.

Current Programs, Regulations, and Guidelines

Highway departments in the watershed limit their use of salt when possible. A brine solution is used on the highway during snow events. Vehicular-installed thermometers that record pavement and air temperatures are occasionally used, and some success has been seen with custom devised prewetting equipment, designed to enhance salt/sand and pure salt mixtures to melt ice/snow at temperatures below 20° F. Use of liquid calcium chloride and liquid magnesium chlorides are effective at low temperatures near 0° F.

The National Cooperative Highway Research Program is conducting a study and developing guidelines for municipalities for the selection of snow and ice control materials to mitigate

environmental impacts. This study should be concluded in 2004.

The New York State Department of Transportation (NYS DOT) recommends that NaCl be used when the temperatures are above 20° F. When temperatures go below 20° F DOT recommends using a liquid deicer. When it is below 10° F they recommend the use of a mixture of salt and sand for temporary traction control.

NYS DOT has also installed road sensors along some state highways such as Rt. 81 to detect concentrations of salt on the roads and current temperatures. This prevents contractors from spreading more salt than needed. Many municipalities are starting to install sensors on their trucks.

Recommendations

| Recommendation | Potential Responsible Organization(s) | Timeline/Goal (contingent upon funding) |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------|----------------------------------------------------|
| Identify uncovered deicing storage piles in the watershed and prioritize them according to proximity to ground and surface water resources. | RPB, Planning, Highway | 1-2 years |
| Seek grant funding for Highway Departments to cover priority storage facilities in order to reduce potential contamination of water resources. | RPB, Planning, Highway | On-going |
| Place uncovered deicing storage piles on impermeable pads to prevent groundwater contamination. Provide positive drainage away from the stockpile or storage facility and provide a containment system for chemically contaminated liquid runoff. | Highway | On-going |
| Evaluate the potential use of locally-produced stone dust as an alternative (or used in combination with) deicing agents, with consideration for efficiency, economics, and environmental impacts on aquatic ecosystems. | AI | 1-4 years |

CHAPTER 4: CONCLUSIONS



Restored wetland (Photo: Ingmire)

The completion of *A Management Strategy for Oneida Lake and Its Watershed* represents a significant milestone in the management planning process. The current priority for the Watershed Advisory Council and the CNY RPDB is to generate funding to implement the recommendations presented in Chapter 3. Agencies, municipalities, colleges, businesses and other primary stakeholders will be asked to contribute funding and resources.

Our goal is to implement the projects that are outlined in this report. Funding is also needed for the continuation of many of the successful projects that were initiated throughout the past 3½ years such as municipal outreach and the education, agriculture, and local laws programs. Funding has recently been awarded to the Town of Cicero from the New York State Department of State to continue lake and watershed activities. This will be used for the Local Laws Project, municipal outreach, and the Agriculture Program. Additional grant applications are being submitted for a comprehensive education program that was developed for the benefit of agencies, municipalities, and homeowners.

Throughout the project duration, the Oneida Lake Watershed Management Plan has served as a catalyst to protect water resources through the strength of regional cooperation and program efficiency. The true success of these

initiatives will be based on continued partnerships and local-level participation. Efforts will be made to strengthen alliances with primary watershed decision-makers to achieve program goals.

Not only does planning for the future make sense, but in most lake communities, local-level participation and a well-orchestrated strategy for watershed management can improve opportunities for state and federal funding. We have learned from other lake groups that comprehensive, long-term planning will protect the value and character of local lakes and streams while attracting business, tourism, and recreation dollars to enhance the region's economic viability.

On behalf of the Watershed Advisory Council and the Central New York Regional Planning and Development Board, our gratitude, thanks, and appreciation goes to the agencies, organizations, municipalities, and homeowners that have contributed to the success of this report. Watershed management planning is a step in the right direction and with your continued support we can maintain our positive momentum in the protection of our lakes and streams. We'll take one step at a time, committed to cooperation, communication, and teamwork, as we now forge ahead with the implementation phase of the management plan.

APPENDICES



Madison County farm with windmill in the background (Photo: Saltman)

- Appendix A** FLOODING AND WATER LEVEL MANAGEMENT
Process
Accomplishments
Groups and Responsibilities
Flood Definitions
Presentation Summaries
Literature Citations
- Appendix B** BOATING RULES
- Appendix C** NEW YORK STATE DEPARTMENT OF HEALTH FACT SHEET
- Appendix D** PUBLIC COMMENTS

Appendix A: Flooding and Water Level Management

The Flooding and Water Level Management Working Group met on a regular basis for a twelve-month period during 2003 and 2004. Special emphasis was placed on research and education and several guest speakers were invited to present at the meetings. The following information was compiled by the Working Group members and most agreed with the contents of these documents. Full group endorsement was not reached, however, as several people did not agree with the information presented or with the manner in which historical data was interpreted.

Process

Organizations, businesses, and homeowners throughout the watershed have expressed many differing opinions regarding flooding and water level management. The Flooding and Water Level Management (F/WLM) Working Group was comprised of a diverse collection of representatives that met on a monthly basis for approximately 12 months with the assistance of a meeting facilitator from Cornell University.

Education was identified as an integral component of the Working Group process and a considerable amount of time was therefore spent reviewing documents and hearing presentations from guest speakers. Education and outreach ideas for homeowners, elected officials, and other primary stakeholders are emphasized in the list of recommendations.

Throughout the duration of this period, the Working Group agreed on several important points:

- A specific timeline was established for compiling the recommendations;

- Several important issues relating to flooding and water level management were determined to be beyond the scope of the Working Group because of time restrictions, inadequate availability of information, conflicting opinions, and/or because the appropriate stakeholders were not participating in the discussions. This includes the following topics: downstream (beyond the watershed boundary) issues, upstream water storage and flooding, dam remnants removal, dredging of the shoals, interpretation of several technical reports, rulings from recent law suites, water level regulation by hydropower companies on the Oswego River, and GIS mapping of flood prone areas;

- Although upstream and downstream impacts were considered and recognized to be potentially relevant factors, the current priority was to develop recommendations to address only flooding and water level management along the Oneida Lake shoreline;

- Effective surface water management is a regional issue and decisions to alleviate flooding in the Oneida Lake watershed require regional partnerships with lake communities throughout the Oswego River Basin.

Accomplishments

Throughout the course of 12 months, the Working Group accomplished the following tasks:

- Educational programs and opportunities were discussed at length for primary decision-makers as well as the general public. Recommendations were developed to provide greater assistance to home and business owners prior to flooding and after the flooding has occurred.
- Flooding definitions were developed for improved communication among Working Group members. Because stakeholder groups frequently interpret the terms “flooding” and “flood damage” differently, the Working Group defined levels of flooding and discussed methods to evaluate flood damage. Definitions were developed for nuisance high water, minor flooding, and major flooding levels in both US Geological Survey and Barge Canal datum.
- Working Group stakeholders were surveyed to determine the optimum numeric water level objectives and the information was presented in graphic format.
- There are many uses of the lake. The Working Group debated on whether water level management decisions should be made to facilitate tourism, recreation, fisheries and wildlife habitat, commercial navigation, flood control, and/or boat launch and marina profitability. To learn more about this issue, a guest speaker from the United States Geological Survey (William Kappel) was invited to present to the Working Group. Diverse lake uses were considered when the recommendations were compiled.
- The timing of water level fluctuations has a direct impact on lake ecology. Discussions focused on the challenging task of managing the lake water levels for maximum protection of aquatic habitat, while acknowledging diverse recreational uses and recognizing existing statute and liability concerns. A guest speaker from the Cornell Biological Field Station (Dr. Edward Mills) was invited to discuss aquatic impacts from water level fluctuations. The protection of aquatic habitat was considered when water level recommendations were developed.
- Working Group members attended Fisheries Working Group meetings to facilitate communication and to discuss recommendations that were consistent between the two groups. The Fisheries Working Group was asked to coordinate with the F/WLM Working Group to establish water levels that are beneficial to fish habitat and spawning.
- There was an initial lack of understanding among Working Group members regarding the control structures regulating water level in the lake. In response to this need, Howard Goebel, a representative from the New York State Canal Corporation, was invited to present information on what structures are in place and who is responsible for their operation.
- The Working Group reviewed the timing of the navigation regulations (the dates the NYS Canal Corporation begins and ends their control of the system each year) and evaluated the impacts of flooding in relation to the navigation season. Recommendations were based on these findings.
- Accurate GIS mapping was identified by the Working Group as a critical need in order to evaluate the current flooding problems and to set water level goals. H. Goebel (NYS Canal Corporation) and S. Ingmire (Madison County Planning Department) researched current mapping capabilities and determined that there was insufficient coverage in the current digital elevation model (DEM) to provide a graphical

depiction of lake levels for varying (approximately 1 foot increments) water levels. In a July 1, 2003 e-mail correspondence, Goebel stated that unless a 1-foot DEM is available, this method is not capable of producing

accurate results. Given the inherent uncertainty of the current DEMs (only precise to 40 feet), the ultimate end product would be very unreliable with considerable error.

Groups and Responsibilities

Central New York Boating Industry Association

Ray Cooper, Board Member
2302 West Genesee St., Baldwinsville, NY,
13027 Phone: (315) 635-7371
Email: CNYBIAMailbox@Gisco.net
Website: cnybia.com

The Central New York Boating Industry Association (CNYBIA) is a group that is dedicated to the ways and means of enjoying boating in Central New York. The CNYBIA helps both the federal and state government spread information about rules and regulations that concern boating or use of water resources in NYS, Lake Ontario, the Canal System, or the St. Lawrence Seaway. CNYBIA looks to promote the resources within their membership and protect the local waterways. Membership includes a variety of boat related small businesses in CNY.

Central New York Regional Planning and Development Board

David Bottar, Director
126 N. Salina Street, 100 Clinton Square,
Suite 200, Syracuse, New York 13202
Phone: (315) 422-8276 Fax: (315) 422-
9051 Website: www.cnyrpdb.org

The Central New York Regional Planning and Development Board (CNY RPDB), a public agency established in 1966 under state municipal law, is supported by Cayuga, Cortland, Madison, Onondaga and Oswego counties. Through communication, planning, policy-making, coordination, advocacy, and technical assistance, the CNY RPDB serves its member-counties by helping to address regional issues on an intermunicipal basis. With US EPA and

NYS DEC funds, the CNY RPDB is coordinating the three-year Oneida Lake Watershed Management Planning Project (www.cnyrpdb.org/oneidalake). Under the guidance of the Watershed Advisory Council, the CNY RPDB worked with agencies, organizations and stakeholders throughout the watershed to identify goals and compile recommendations for the long-term management of Oneida Lake and its watershed. Flooding and water level management are high priority issues of concern that were identified in the *Oneida Lake State of the Lake and Watershed Report*.

Central New York Waterways Association Inc.

Samuel P. Cimilluca, President
P.O. Box 33, Baldwinsville, New York, 13027
Phone: (315) 437-4663

The Central New York Waterways Association was formed in July of 2001, after the Cross Lake Seneca River Association retired. In the last two years the board has been researching canal problems and its history. In July of 2002 the Association set goals to get the state and canal representatives to act on the settlement from the class action lawsuit initiated by Kent Partridge. The Judge, after agreement by both parties, issued the following: install a bladder dam at Baldwinsville; install two additional floodgates at Phoenix; and remove the old dam base at Caughdenoy.

Cornell Cooperative Extension of Onondaga County

Amy M. Samuels, Extension Educator
220 Herald Place, 2nd Floor, Syracuse, New York, 13202-1045 Phone: (315) 424-9485
Fax: (315) 424-7056

Website: www.cce.cornell.edu/onondaga
Cornell Cooperative Extension (CCE) of Onondaga County offers educational programs, resources, and services for communities, families and individuals. The CCE educational system builds partnerships and coalitions with individuals, communities, organizations, government agencies, and businesses around issues of mutual concern. While CCE of Onondaga County has not been actively involved in lake level issues, CCE has worked with some watershed municipalities and citizens to help them understand the connection between land-use and flooding.

Federal Emergency Management Agency Region II

26 Federal Plaza, Suite 1307, New York, New York, 10278-0001
Phone: (212) 680-3600 Fax: (212) 680-3681
Website: www.fema.gov

The Federal Emergency Management Agency (FEMA) – a former independent agency that became part of the newly established Department of Homeland Security in March 2003 – is tasked with responding to, planning for, recovering from, and mitigating against disasters. FEMA is the federal agency in charge of the National Flood Insurance Program (NFIP). The NFIP is a collaboration between local communities and the federal government, where the federal government issues flood insurance to communities that formally adopt floodplain management regulations to reduce the risks associated with flooding.

Herkimer-Oneida Counties Comprehensive Planning Program

Jessica Breiten, Chief Planner
The Boehlert Center at Union Station, 321 Main Street, Utica, NY 13501
Phone: (315) 798-5710 Fax: (315) 798-5852
Website:
www.co.oneida.ny.us/oneidacty/gov/dept/planning/planningindex.htm

The Herkimer-Oneida Counties Comprehensive Planning Program (HOCCPP) is one of nine Regional Planning Councils in New York State established under State municipal law. Through communication, planning, policy-making, coordination, advocacy, and technical assistance, HOCCPP serves its member-counties by helping to address regional issues on an intermunicipal basis. The Regional Planning Program routinely provides assistance in the study of both structural and non-structural flood mitigation alternatives for area creeks and waterways. The program offers local governments assistance in flood hazard mitigation activities - acting as a liaison between the local governments and the NYS DEC and Army Corps of Engineers. HOCCPP routinely coordinates efforts with the NYS DEC, the US Army Corps of Engineers, the State Emergency Management Office (SEMO), the Federal Emergency Management Agency (FEMA) in the development of Community Flood Hazard Mitigation Plans and other flood hazard mitigation activities. HOCCPP also maintains close working relationships with other agencies involved in flooding and water level management such as Soil and Water Conservation Districts, the NYS Canal Corporation, and Cooperative Extension.

New York State Canal Corporation

Howard M. Goebel, P.E., Hydrologist
200 Southern Boulevard, P.O. Box 189,
Albany, New York, 12201-0189
Phone: (518) 471-5888 Fax: (518) 471-5936
Website: www.canals.state.ny.us

The NYS Canal Corporation (NYSCC) operates the NYS Canal System (formerly the Barge Canal, and previously the Erie Canal). The NYSCC continually monitors the canal system and makes adjustments to the Caughdenoy Dam to meet their primary responsibility of navigation. The relative importance of the numerous secondary uses, including fish and wildlife, irrigation, drought and flood control, and recreation are also considered. Each of the seven taintor gates at the Caughdenoy Dam are fully opened at the end of each navigation season and remain fully open and out of the water throughout the winter and the spring runoff seasons allowing the lake to revert to a run-of-river mode based on variations of uncontrolled precipitation and runoff. The gates are placed back into operation following spring runoff period and managed prior to the start of the navigation season to achieve targeted water levels.

New York State Department of Environmental Conservation, Bureau of Flood Protection

William Nechamen, Floodplain Management
Section Chief
625 Broadway, 4th Floor, Albany, New York,
12233-3507
Phone: (518) 402-8146 Fax: (518) 402-9029
Website: www.dec.state.ny.us

The NYS DEC, Bureau of Flood Protection (BFP) is the floodplain coordination agency in New York State. The mission of the BFP is to:

- Reduce loss of life from flooding, dam breaks, and erosion
- Reduce economic loss to new and existing development

- Encourage appropriate floodplain development planning and wise choices by local officials, developers, and private citizens
- The BFP attempts to meet these directives through their role in the National Flood Insurance Program (NFIP). The BFP provides technical support to the local communities who have actual jurisdiction over development. The BFP does not function in a regulatory capacity in this program, but is essentially a facilitator between local communities and FEMA.

New York State Department of Environmental Conservation, Division of Water, Region 6

Steve Botsford, P.E., Regional Water
Engineer
207 Genesee Street, Utica, New York
13501-2885
Phone: (315) 793-2554 Fax: (315) 793-2748
Website: www.dec.state.ny.us

NYS DEC Region 6 covers the Oneida Lake watershed counties of Lewis and Oneida. The lakeshore communities include the Towns of Vienna and Verona and the Village of Sylvan Beach. They are responsible for the following tasks:

- Administer the National Flood Insurance Program consistent with the requirements of the Federal Emergency Management Agency; audit local communities for compliance with development in special flood hazard areas; where review of construction activities is compared to acceptable development codes, publish floodway and flood insurance rate maps and flood insurance studies; and provide technical guidance relative to floodplain management and local development.
- Administer Article 36 of the Environmental Conservation Law throughout the region; provide assistance to local governments in the adoption of flood prevention laws and ordinances; train local officials on flood preven-

tion requirements upon initial entry into the National Flood Insurance Program.

- Complete program specific review of Article 15 permit applications, Environmental Conservation Law - Protection of Water, relative to activities in special flood hazard areas.

- Pursue violations of the Environmental Conservation Law and National Flood Insurance Regulations using formal and informal enforcement action; reporting to the Federal Emergency Management Agency.

New York State Department of Environmental Conservation, Division of Water, Region 7

Steven P. Eidt, P.E., Regional Water Engineer
615 Erie Boulevard West, Syracuse, New York, 13204

Phone: (315) 426-7500 Fax: (315) 426- 7459
Website: www.dec.state.ny.us

NYS Department of Environmental Conservation (NYS DEC) Region 7 covers the Oneida Lake watershed counties of Madison, Onondaga, Oswego, and Cortland. NYS DEC Division of Water responsibilities are described under Region 6.

New York State Emergency Management Office

Charles Wright, Region IV Office
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The New York State Emergency Management Office (SEMO) coordinates emergency management services with other federal and state agencies to support county and local governments to protect lives, property and the environment. SEMO is responsible for coordinating all activities necessary to protect New York's communities from natural,

technological and manmade disasters and other emergencies that threaten the State, including flooding. SEMO coordinates emergency management services for the State by providing leadership, planning, education and resources to protect lives, property and the environment. In times of emergency or disaster, SEMO coordinates the response of State agencies ensuring the most appropriate resources are dispatched to the impacted area. Through its major programs, SEMO works with local governments, volunteer organizations and the private sector across NYS to develop disaster preparedness plans and mitigation projects.

Oneida Lake Association, Inc.

Kurt Snyder, President, P.O. Box 3536,
Syracuse, NY 13220

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The Oneida Lake Association was formed in 1945 and currently has over 3,000 members. The purpose of the organization is to: "advocate work for the improvement of the conditions affecting or pertaining to Oneida Lake, including conditions affecting or pertaining to fishing, hunting, boating or camping on the shores of Oneida Lake. To endeavor to bring about, through proper channels, correction of any conditions found to be detrimental to the maintenance of the natural resources of Oneida Lake and to the streams tributary thereto." To this end, the Oneida Lake Association supports consistent and environmentally sound water level management.

Oneida Lake Watershed Advisory Council

Dan Ramer, Chairman,
City of Oneida Wastewater Treatment Plant
109 N. Main Street, Oneida, NY 13421
Phone: (315) 363-4860

The Oneida Lake Watershed Advisory Council Board of Directors is a group of county and municipal representatives and stakeholders that guide the development and implementa-

tion of the Oneida Lake and Watershed Management Plan. Council members have worked closely with the CNY RPDB in the development of a plan that identifies the priority water resource issues of concern, summarizes recommendations, and provides opportunities for program implementation. The Advisory Council was responsible for reviewing and endorsing all recommendations that address the water resource issues of concern in the Management Plan. The Advisory Council is committed to the protection and restoration of a multiple-use lake and watershed that sustains healthy ground and surface water, fisheries, aesthetic values, cultural resources, economic vitality, wildlife habitat, and water-based recreation.

Onondaga County Flood Advisory Committee

David Coburn, Director Onondaga County Office of Environment
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Phone: (315) 435-2647

The Onondaga County Flood Advisory Committee was created after the damaging floods of 1993. The Committee was created to help keep county officials apprised of water levels during critical high water periods, and to afford the county with another vehicle to provide affected communities with information on water level management efforts by the State, flood preparedness efforts carried out by the County Office of Emergency Management and related public safety concerns.

United States Army Corps of Engineers, Buffalo District

Larry Sherman, Hydrologist,
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The U.S. Army Corps of Engineers (ACOE) is a federal agency that provides engineering

services throughout the nation for planning, designing, building and operating water resources and other civil works projects, including flood control. The ACOE authority for flood control is provided in Section 205 of the 1948 Flood Control Act, as amended. This legislation provides the ACOE authority for investigation and construction (if deemed feasible) of flood protection projects. The ACOE has extensively studied Oneida Lake flooding and its impacts. Flood reduction measures have been proposed but have been deemed not feasible due to their limited benefits for Oneida Lake flooding, increases in flooding downstream of the lake in the Oneida River, negative impacts on fish and wildlife resources, and their high cost. The NYS DEC is the local cooperator with the ACOE for flood control projects in New York State.

United States Geological Survey

Bill Kappel, Hydrogeologist
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Phone: (607) 266-0217 Fax: (607) 266-0521
Website: waterdata.usgs.gov/nwis/

The United States Geological Survey (USGS) investigates the occurrence, quantity, quality, distribution, and movement of surface and underground waters and disseminates the data to the public, state and local governments, public and private utilities, and other federal agencies involved with managing our water resources. USGS has collected water-resources data at approximately 1.5 million sites across the United States, Puerto Rico, and Guam. Surface-water data, such as gage height (stage) and streamflow (discharge), are collected at major rivers, lakes, and reservoirs. Ground-water data, such as water level, are collected at wells and springs. Water-quality data is available for both surface water and ground water. USGS provided advice and a technical review of information that was compiled by the Flooding and Water Level Management Working Group.

Flood Definitions

Flood: “A great flowing or overflowing of water, especially over land not usually submerged.” (The Random House College Dictionary).

A “flood”, as defined by the National Flood Insurance Program (NFIP) by the Federal Emergency Management Agency (FEMA) is, "a general and temporary condition of partial or complete inundation of two or more acres of normally dry land area or of two or more properties (at least one of which is your property) from overflow of inland or tidal waters, unusual and rapid accumulation or runoff of surface waters from any source, or a mudflow.

[The] collapse or subsidence of land along the shore of a lake or similar body of water as a result of erosion or undermining caused by waves or currents of water exceeding anticipated cyclical levels that result in a flood."

Major flood: “A general term indicating high water that causes extensive inundation and property damage, usually characterized by evacuation of people and animals and closure of highways.” (U.S. Army Corps of Engineers (ACOE))

Nuisance High Water: Water above “normal levels” that may temporarily impact docks, seawalls, shorelines, lawns and roads in low-lying shoreline areas but that does not cause structural damage to homes and businesses.

Minor Flooding: Flooding above “Nuisance High Water” at which structural damage may occur but that does not represent a serious threat to life or substantial commercial or residential damage. Flooding in this category may enter into some residential and commercial structures and basements with very limited structural damage. This flooding may also result in closure of some roads and require the rerouting of traffic. Further, minor flooding may have temporary impacts on in ground septic systems, wells, electrical supplies, and HVAC systems. This level of flooding would trigger a response from county and local emergency managers.

* Minor flooding begins at elevation: 371.0 feet (ACOE “Level where flooding begins”).

Major Flooding: Flooding that has a high potential for loss of life and total property loss. Water levels that are sufficiently high to enter into a large percentage of shoreline residential and commercial structures and result in considerable structural damage. Major flooding would trigger a response from the full breath of emergency response agencies, including but not limited to FEMA, ACOE, New York State Emergency Management Office (SEMO), and county and local emergency managers.

* Major flooding begins at elevation: 372.4 feet (ACOE Major Flood Damage Level).

The terms “Nuisance”, “Minor” and “Major” flooding are derived from a basin-wide planning perspective (big picture) and not from the individual property owner perspective. It is understood that even minor flooding can be a catastrophe to individual property owners.

Presentation Summaries

CONTROL STRUCTURES THAT INFLUENCE ONEIDA LAKE LEVELS

By Howard Goebel - NYS Canal Corporation, Albany, NY

Control Structures

- Caughdenoy Dam (7 taintor gates that span the Oneida River and 1 slide gate that is part of the old Oswego Steamboat Canal) along the Oneida River, the Oneida Lake outlet.
- Lock E-23 at Anthony's Cut, (navigation lock only, no flow releases at any time).
- Lock E-24 in Baldwinsville along the Seneca River, one taintor gate, 350-foot long concrete overflow spillway, and 2 hydropower generation facilities.
- Lock O-1 in Phoenix along the Oswego River, 6 taintor gates, 540-foot long concrete overflow spillway, and 1 hydropower generation facility.
- Lock O-2 in Fulton along the Oswego River, 6 taintor gates, 200-foot long concrete overflow spillway, and 2 hydropower generation facilities.

Primary Control Structures

The Caughdenoy Dam is the primary control structure during the Navigation Season (May through October). During non-navigation season (November through April), all gates of the Caughdenoy Dam are completely open. The observed lake levels are a function of the natural precipitation and runoff cycle, including snowmelt coupled with the hydraulic capacity of the Oneida River with the Caughdenoy Dam fully opened.

Secondary Control Structures

The hydraulic capacity of the Oneida River during the non-navigation season may be partially affected by any or all:

- The natural Caughdenoy Shoals along the Oneida River.
- The remnants of the original Caughdenoy Dam that was taken out of service in 1952.
- The NYS-DOT bridge (Route 33) immediately downstream of the existing Caughdenoy Dam. Considerable sediment is present on the upstream side of this bridge that reduces the hydraulic capacity of the river.
- Flows from the Seneca River at the Three Rivers junction (impacted by controls at Lock E-24 in Baldwinsville).
- Operation of the hydropower generation facility at Lock O-1 in Phoenix owned by Oswego Hydro Partners in concert with operation of 6 taintor gates owned by the New York State Canal Corporation (NYSCC) that are part the dam that creates the navigation pool above Lock O-1. Oswego Hydro Partners operates and maintains the 6 taintor gates in accordance with operation and maintenance agreement with the NYSCC that is part of their Federal Energy Regulatory Commission (FERC) license.
- Operation of two hydropower generation facilities at Lock O-2 in Fulton owned by Reliant Energy in concert with operation of 6 taintor gates owned by the New York State Canal Corporation that are part the dam that that creates the navigation pool above Lock O-2. Reliant Energy operates and maintains the 6 taintor gates in accordance with operation and maintenance agreement with the NYSCC that is part of their Federal Energy Regulatory Commission (FERC) license.

Oneida Lake Level Control Issues

The NYSCC is required to provide minimum water levels for navigation purposes and is responsible for the conditions of the canal

navigation channel, not the entire width of the Canal or Oneida Lake. The minimum navigation level for Oneida Lake is 370.3 feet Barge Canal Datum (BCD) and the maximum target level of the lake is 371.2 feet BCD. During June and July, the difference between minimum and maximum levels less than 0.4 feet.

During the navigation season, Oneida Lake levels are controlled by the NYSCC to specified rule curves through adjustments to the Caughdenoy Dam. The rule curves were originally established to ensure that the minimum navigation level for Oneida Lake are provided even during the most severe droughts.

Oneida Lake levels during the navigation season normally can be managed close to the regulation curves. However, high water levels are normally observed during the non-navigation season in the spring when the Caughdenoy Dam is fully open.

The unpredictability of the weather, especially during the spring snowmelt period, is an issue that further complicates management decisions.

A High Flow Operating Procedure (HFOP) exists between the NYSCC and Oswego Hydro Partners and Reliant Energy. The HFOP calls for a drawdown of six inches below the normal headpond levels at Phoenix (Lock O-1) and Fulton (Lock O-2) when the flows in the Oswego River at Phoenix exceed 10,000 cubic feet per second and when the Seneca River elevation downstream of Lock E-24 reaches 366.0 ft BCD. The hydropower companies voluntarily participate in this program. The plan increases the slope in the Seneca, Oneida, and Oswego Rivers that increases the rates of flow in the rivers.

Presently the NYSCC has a good working relationship with and Oswego Hydro Partners (Lock O-1, Phoenix) and Reliant Energy (Lock O-2).

The U.S. Army Corps of Engineers (ACOE) is the agency responsible for investigation and

construction (if feasible) of flood projection projects. The ACOE has extensively studied Oneida Lake for flood reduction and has created a Final Feasibility Study in 1984 and a Reconnaissance Report in 1989. These reports identified considerable options for reducing the frequency and magnitude of Oneida Lake flooding; however, no options were found to be cost-effective primarily due to environmental consequences to the Oneida Lake ecosystem and negative impacts to downstream areas.

The Oneida River downstream of the Caughdenoy Dam is very flood prone. There is considerable development in the Horseshoe Island area along the Oneida River. Flood damages to this area would be realized if more water was released from Oneida Lake.

SOME RANDOM THOUGHTS ON WATER LEVEL MANAGEMENT IN THE FINGER LAKES REGION

By Bill Kappel - US Geological Survey, Ithaca, NY

The following are some thoughts that summarize my experiences in working with watershed groups when trying to come to 'grips' with the issue of water-level regulation. The task at hand is how to educate ourselves and others living in the watershed -- especially those who live along the rivers, streams, and lakeshores. The educational process should emphasize what we can do as individuals and as lake organizations to understand and live with the changes in river/stream flow and lake levels and anticipate or prepare for them before they occur. While I will use Oneida Lake as an example, much of what is put forth below is true in many of the Finger Lakes watersheds.

The Oneida Lake and River system is a part of a larger water-flow and water-level-regulated Oswego River Basin. A basin comprised of large watersheds and reservoirs (Finger Lakes). It is a natural system that had large

fluctuations in flow and water levels (in the past) that early settlers learned to live with. “We” then decided that we were going to use this resource to fit our needs (transportation, drinking water, waste-water assimilation, recreation, and so on). The control we imposed upon the waters of the basin; regulating the highs and lows of water levels and the flow within this system lead us to believe it was safer to live closer to the waters edge. Somewhere along this path of getting closer to the water we love, we forgot that we don’t have control over the weather and the resulting river flows and lake levels. During extreme conditions (too much water or too little) we’re just spectators to the whims of Mother Nature and hope for the best.

As such, the specter of “control” leads to the assumption that we can, and do control the water resource system (at all times) to meet our diverse needs. The term control leads to several assumptions that get us to the heart of the riverside and lakeshore homeowners concerns:

1. Once a population feels that the water level is “under control” they move to the waters’ edge feeling that there will not be any problem (The Mt. Olympus mode of thinking -- “everything is perfect, all the time”). The fact that living on a water body makes one feel better is another matter -- as long as the water stays where it is supposed to stay.
2. Oneida Lake levels and flows have been “controlled” for over a century and within that time there were floods and droughts, but now people feel that flooding and lower water periods have become more prevalent. Whether this ‘fact’ is due to our continued utilization and harnessing of a natural system, to changes in our climate and weather patterns, or due to an entity (The Canal Corp) “not doing its’ job”, is constantly being debated, but our society has moved from assuming personal responsibility to finding someone to blame. We need to return to assessing the situation and learning what we can do and cannot do (individually and as a group) to reduce the damages to our property and livelihood.
3. The population that lives ‘on the lake or along the river’ has dramatically increased -- from seasonal cabins to year-round homes; from homes near the lake/river to homes on the lake/river, and the increase in the number of homes has been dramatic. All of these actions put our dwellings into a zone that is affected to a greater degree by river/lake-level changes (even small ones). These homes also impact water quality due to the location of their septic systems and manicured lawns adjacent to the water body (but that’s another story).
4. People tend to forget that the lake (its ecology, its water level, its water quality) does not remain static. The life cycle of a lake is one of growth to ultimate demise (albeit this process occurs over many of our life times, although we do have a way of speeding up the process)! A lake naturally becomes more productive (eutrophic), filling with sediment, and changing its ecology along the way. Man has altered these processes to the point that people don’t like what they see and therefore someone (else) has to be responsible for the change.
5. The control of water levels in a managed water-resource system is probably 95 percent or more efficient (or non threatening), but the remaining 5 percent is responsible for 100 percent of the heartburn we have when we find that we really can’t control the water resource for that 5 percent of the time.
6. The presentation by Howard Gobel (Canal Corp.) during one of the last water-level-management meeting highlighted the wa-

ter level conditions in Oneida Lake and outlet channels during navigation and the non-navigation seasons. The greatest amount of water level variation (which exceeds our “control”) occurs during the non-navigation season -- especially during the spring freshet or January thaw periods.

This water (precipitation) is placed into natural storage (snow and ice) that then melts. Little water can be stored in the soils or uptaken by vegetation, which lies dormant during the winter and early spring, therefore most of the ‘stored’ water is available as runoff. Sometimes the melting of this stored water is increased by heavy rains that further add to the sum total of water available as runoff within the watershed. At this point, runoff begins its rapid descent from the surrounding hills down to the lake and adjacent wetlands, but this water does not readily leave the lake as the gradient downstream of the lake outlet is many times less than that of the surrounding upland areas.

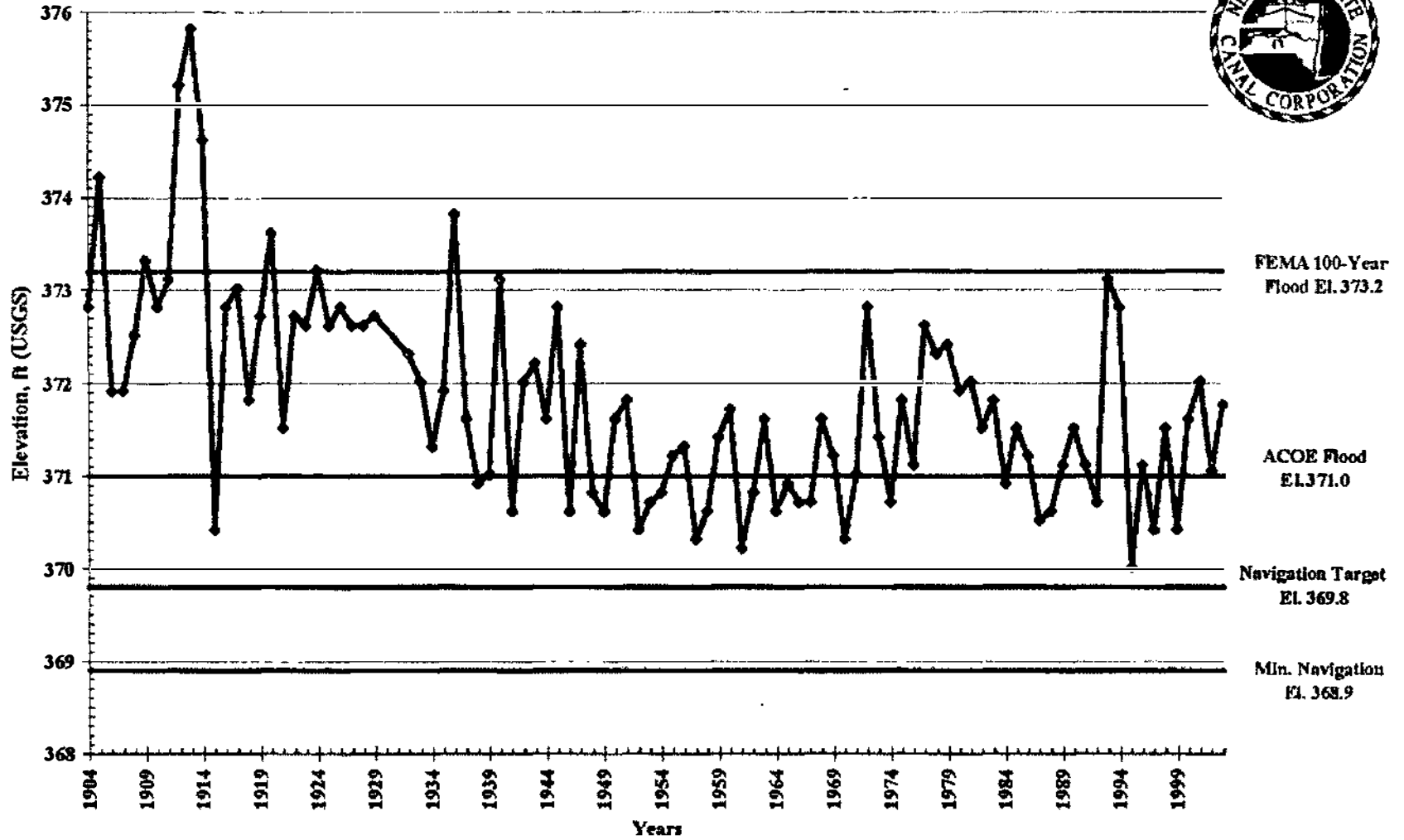
Therefore we have two aspects to be aware of when trying to understand what is happening in our watershed:

Watershed conditions: The response of the lake to its’ watershed -- the amount of water available to run off within the upland watershed, how quickly the water can get to the downstream end of the watershed, how much water can be held within the lake, and what lake elevation is it acceptable (high and low levels) before ‘adverse’ damages occur?

Water-control (structural) conditions: What are the physical features of the structure that holds the water in the lake, how quickly could it be released from that structure, and what controls the volume of water that can be carried (discharged) downstream of the structure?

A surprising revelation during the May 2003 water-level management meeting was that the group (all parties) appeared to feel that during the navigation season, natural high water events do occur, that we can’t control these, and we have to live with them. But, the spring freshet period (usually a longer duration “event”) appears to be a different case, one in which we could do a better job of controlling, either through getting the water out of the lake faster, or lowering the lake in anticipation of the “event” to reduce/mitigate its effects. Unfortunately you can’t have it both ways -- it is the same watershed, it is the same rapid movement of water from the headwaters to the lake, but the difference is that the ‘runoff event’ usually occurs basin-wide. The lack of a means to get this water out any one particular sub-basin is compounded across the entire Oswego River Basin and the entire system ‘bogs-down’ due to the overall volume of water that is running off. Navigation season events are usually not basin wide, therefore the Oswego system can handle sub-basin storms more readily. The exception is the Hurricane Agnes type of event that was basin-wide.

Annual Peak Oneida Lake Levels



Ranking of Annual Peak Oneida Lake Water Levels

| No. | Year | USGS Elevation | No. | Year | USGS Elevation | No. | Year | USGS Elevation |
|-----|--------------|----------------|-----|-------|----------------|-----|-------|----------------|
| 1 | 1913* | 375.8 | 38 | 1930* | 371.8 | 75 | 1938* | 370.9 |
| 2 | 1912* | 375.2 | 39 | 1975 | 371.8 | 76 | 1965 | 370.9 |
| 3 | 1914* | 374.6 | 40 | 1906* | 371.9 | 77 | 1984 | 370.9 |
| 4 | 1905* | 374.2 | 41 | 1907* | 371.9 | 78 | 1974 | 370.7 |
| 5 | 1936* | 373.8 | 42 | 1935* | 371.9 | 79 | 1992 | 370.7 |
| 6 | 1920* | 373.6 | 43 | 1980 | 371.9 | 80 | 1948* | 370.8 |
| 7 | 1909* | 373.3 | 44 | 1960 | 371.7 | 81 | 1954 | 370.8 |
| 8 | 1993 | 373.1 | 45 | 1918* | 371.8 | 82 | 1962 | 370.8 |
| 9 | 1924* | 373.2 | 46 | 1951* | 371.8 | 83 | 1953 | 370.7 |
| 10 | 1911* | 373.1 | 47 | 1983 | 371.8 | 84 | 1966 | 370.7 |
| 11 | 1940* | 373.1 | 48 | 2003 | 371.8 | 85 | 1967 | 370.7 |
| 12 | 1917* | 373.0 | 49 | 1990 | 371.5 | 86 | 1941* | 370.6 |
| 13 | 1972 | 372.8 | 50 | 1937* | 371.6 | 87 | 1946* | 370.6 |
| 14 | 1994 | 372.8 | 51 | 1944* | 371.6 | 88 | 1949* | 370.6 |
| 15 | 1904* | 372.8 | 52 | 1950* | 371.6 | 89 | 1958 | 370.6 |
| 16 | 1910* | 372.8 | 53 | 1963 | 371.6 | 90 | 1964 | 370.6 |
| 17 | 1916* | 372.8 | 54 | 1968 | 371.6 | 91 | 1988 | 370.6 |
| 18 | 1926* | 372.8 | 55 | 2000 | 371.6 | 92 | 1987 | 370.5 |
| 19 | 1945* | 372.8 | 56 | 1973 | 371.4 | 93 | 1970 | 370.3 |
| 20 | 1919* | 372.7 | 57 | 1921* | 371.5 | 94 | 1915* | 370.4 |
| 21 | 1922* | 372.7 | 58 | 1982 | 371.5 | 95 | 1952* | 370.4 |
| 22 | 1929* | 372.7 | 59 | 1985 | 371.5 | 96 | 1997 | 370.4 |
| 23 | 1923* | 372.6 | 60 | 1998 | 371.5 | 97 | 1999 | 370.4 |
| 24 | 1925* | 372.6 | 61 | 1959 | 371.4 | 98 | 1961 | 370.2 |
| 25 | 1927* | 372.6 | 62 | 1931* | 371.3 | 99 | 1957 | 370.3 |
| 26 | 1928* | 372.6 | 63 | 1934* | 371.3 | 100 | 1995 | 370.0 |
| 27 | 1977 | 372.6 | 64 | 1956 | 371.3 | | | |
| 28 | 1908* | 372.5 | 65 | 1955 | 371.2 | | | |
| 29 | 1947* | 372.4 | 66 | 1969 | 371.2 | | | |
| 30 | 1979 | 372.4 | 67 | 1986 | 371.2 | | | |
| 31 | 1932* | 372.3 | 68 | 1971 | 371.0 | | | |
| 32 | 1978 | 372.3 | 69 | 1976 | 371.1 | | | |
| 33 | 1943* | 372.2 | 70 | 1989 | 371.1 | | | |
| 34 | 1933* | 372.0 | 71 | 1991 | 371.1 | | | |
| 35 | 1942* | 372.0 | 72 | 1996 | 371.1 | | | |
| 36 | 1981 | 372.0 | 73 | 2002 | 371.1 | | | |
| 37 | 2001 | 372.0 | 74 | 1939* | 371.0 | | | |

Above 100-Year Flood Elevation

Above ACOE Flood Elevation

Above ACOE Flood Elevation

Below Flood Elevation



- 373.2 FEMA: 100-Year Flood Elevation
- 371.0 ACOE: Elevation where flooding begins
- 369.8 NYSOC: Target Navigation Elevation
- 368.9 NYSOC: Minimum Navigation Elevation

* Denotes data prior to construction of the existing Caughdenoy Dam in 1952

Summary of Targeted Oneida Lake Levels, by Source

| Target Level | Elevation USGS NGVD 29 (MSL) ft | Source | Description |
|---------------------------------------------------------|---------------------------------------|--------|------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 100-Year Flood Elevation (Base Flood Elevation) | 373.2 | FEMA | Level that statistically has a one percent chance of being equaled or exceeded in any given year Used to define the extent of the Regulatory Floodplain |
| Major Flood Damage Level | 372.5 | ACOE | Level where considerable damage to habitable structures begins to occur (unpublished ACOE action level) |
| Top of Flood Control Zone (Minor Flood Damage Level) | 371.0 | ACOE | "The level where flooding begins" |
| Recreation Optimum | 370.0 | ACOE | "Optimal elevation at which the lake should be kept" |
| Normal Summer Level (Top of Rule Curve) | 369.8 | NYSCC | Level that the lake is normally kept during the summer months |
| Minimum Navigation Level (Bottom of Rule Curve) | 368.9 | NYSCC | Minimum lake level to provide the required navigation depth at Lock E-23, Brewerton |

Notes: FEMA: Federal Emergency Management Agency
 ACOE: United States Army Corps of Engineers
 NYSCC: New York State Canal Corporation

ONEIDA LAKE DATUM CONVERSIONS

| Location | To convert Barge Canal Datum (BCD) levels to UGSG datum levels (NGVD 29), add the following correction. |
|-----------------------|---------------------------------------------------------------------------------------------------------|
| Cleveland | -1.38 ft |
| Sylvan Beach | -1.18 ft |
| Brewerton (USGS Gage) | -1.06 ft |
| Lock E-23 | -1.01 ft |

Literature Citations

Caughdenoy Dam Study, Oswego County, NY, D212290 – Term Agreement Assignment #6, TAMS Consultants, Inc. February, 1999.

Cross Lake / Seneca River Flood Damage Reduction Measures, Final Detailed Project Report and Environmental Assessment, US Army Corps of Engineers, January 1999.

Operational Audit for the New York State Canal System: Oswego River Basin, Baker Engineering, NY, September 1997.

Review of Project Operation and Local Flooding, Federal Energy Regulatory Commission, Phoenix Hydroelectric Project FERC No. 4113, December 1996.

Oneida Lake, Oswego and Oneida Counties, New York, Reconnaissance Report, Section 205 of the 1958 Flood Control Act, as amended, April 1989.

Oneida Lake, Beach Road Flood Study, Town of Cicero, Onondaga County, New York, Calocerinos and Spina Consulting Engineers, October 1985.

Oneida Lake N.Y. (Final Feasibility Report), Oswego River Basin, N.Y., Management Plan Analysis, US Army Corps of Engineers, January 1984.

Preliminary Institutional Studies, Oswego River Watershed, New York, Volume 1, Main Report, Acres American Incorporated, (for Department of Army, Buffalo District, Corps of Engineers), December 1979.

Appendix B: Boating Rules

Age

If you wish to operate a motorboat (excluding personal watercraft) and you are:

Under 10 years old: you must have a person 18 or older on board;

10 to 18 years of age: you must have a person 18 or older on board, or hold a safety certificate;

18 years or older: you may operate a motorboat alone (excluding personal watercraft).

Speed

In New York State, vessel speed is generally limited to 5 mph when within 100 feet of the shore, a dock, pier, raft, float, or anchored boat. On some specific bodies of water the 5 mph limit has been extended to 200 feet, and there may also be a 45 mph daytime and 25 mph nighttime speed limit. Local ordinances may further regulate the speed of boats operated within specific areas.

Required Equipment

Every pleasure vessel operated upon the waters of New York must carry at least one USCG approved Type I or II or III Personal Flotation Device (PFD), or Life Jacket as they are more commonly known, for each person on board.

Personal Watercraft Rules

As of 1/1/2004 anyone operating a personal watercraft (PWC) will need to complete a

boating safety course. For the most part, the laws that apply to all boats will also apply to personal watercraft. There are some restrictions placed on PWC however, that do not apply to other boats.

- Operation of a PWC is prohibited from sunset to sunrise.
- A personal flotation device (life jacket) must be worn by the operator and all passengers. A Type III PFD is recommended.
- If equipped, the engine cut-off lanyard must be attached to the operator.
- Visual distress signals and a sound signaling device (horn or whistle) must be carried.
- Personal watercraft are not allowed within 500 feet of a marked swim area.
- Reckless operation, defined as wake jumping, playing "chicken," and weaving in and out of congested traffic is forbidden, and constitutes a misdemeanor.

Mandatory Education

As of January 1, 2004 all operators of personal watercraft will be required to earn a safety certificate before they may operate PWCs. In addition to teaching the particulars of handling a PWC, this course will also be beneficial for any boater wishing to learn more about the rules of the road, reading buoys, boat handling, and other boating safety related topics. A listing of available state courses may be accessed through the following link.
<http://www.nysparks.com/boats/pwc/>

All of the information on current laws and programs to address the problem is taken from the NYS OPRHP website
<http://www.nysparks.com/boats/index.shtml>.

Appendix C: New York State Department of Health Fact Sheet

Bureau of Water Supply Protection
Flanigan Square, 547 River Street, Troy, New York 12180-2216
January 13, 2004

Need for Licensed Design Professionals - Residential Onsite Wastewater Treatment Systems

Purpose: Provide guidance to regulatory officials and interested parties regarding the need for a licensed professional engineer or architect to design residential onsite wastewater treatment systems (OWTSs). The State Education Department has reviewed this document with the State Department of Health and offers the following as guidance in applying the requirements of the New York State Education Law relating to the design of OWTSs.

Licensed Design Professional: The Department of Health and the State Education Department recognize that, generally, OWTS design activities come within the definition of the practice of professional engineering or architecture under Article 145 or 147 of Title VIII of the New York State Education Law and that OWTS designs must be prepared by a design professional appropriately licensed or otherwise authorized under such law. Please be advised that licensees providing OWTS design services must be qualified to provide those services based upon education, training, and experience. Any licensee providing services that they are not qualified to provide may be subject to professional misconduct charges. OWTS design activities include the evaluation of surface and subsurface site conditions at a defined parcel of land, which may include the investigation of soil characteristics, the performance of soil percolation tests, the determination of subsurface boundary condition and depths, the measurement and recording of existing surface features both natural and manmade, and the subsequent application of these data and the data related

to proposed wastewater generation to design an OWTS. These activities generally fall within the scope of practice of professional engineering or architecture.

New Residential Construction: The design of all new residential OWTSs (including conventional systems) shall be performed by an appropriately licensed design professional, as defined above. The design may also be issued/approved by county health departments where such issuance/approval is performed and authorized by an appropriately licensed design professional on staff. Private practice engineers and architects, and engineering and architectural firms with appropriately licensed design professionals may also provide such services.

Additions or Alterations: An OWTS evaluation shall be performed and submitted by a licensed design professional for home alterations resulting in an increase in the number of bedrooms, for complete home replacements (including those resulting in the same number of bedrooms) and for alterations resulting in significant increases in wastewater generation. The evaluation must document if the existing OWTS complies with applicable State and local design standards, if the OWTS and its components are in satisfactory condition and functioning properly and if the existing OWTS can properly treat the proposed increase in wastewater generation. If the existing OWTS does not comply with regulatory design standards or needs significant modification, the licensed design professional shall prepare plans and oversee the installation

of the alterations to the OWTS. This may include incorporating appropriate mitigative measures and/or designs as such ordinarily come within the scope of practice of professional engineering.

Repairs and Replacements: The repair or replacement of OWTS components "in kind" or "like-for-like" may not require the involvement of a licensed design professional. However, repair or replacement of any type of absorption field that involves relocating or extending an absorption area to a location not previously approved for such, does require a licensed design professional. A licensed design professional is required when repair or replacement involves installation of a new subsurface treatment system at the same location or the use of an alternative system (i.e., raised system, mounds, or sand filter) or innovative system design or technology.

Note: In all cases: 1) local government, watershed protection agencies or other jurisdictional agency rules and regulations may also apply; 2) All OWTS design plans must be prepared by a design professional licensed to practice in New York State; 3) When no regulatory agency is responsible for inspection of a constructed OWTS, it is recommended that a written certificate of compliance be submitted by a New York State licensed professional engineer or architect prior to occupancy.

For questions concerning this Fact Sheet:
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Bureau of Water Supply Protection
New York State Department of Health
(518) 402-7650 or FAX (518) 402-7659
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Appendix D: Public Comments

Working Groups met over the course of a year to conduct research and compile recommendations for the high priority issues of concern throughout Oneida Lake and its watershed. Once the recommendations were developed, members of the Watershed Advisory Council reviewed, discussed, and eventually endorsed them. During May and June 2004 the recommendations were then presented at six public meetings held throughout the watershed. The schedule for these public meetings, referred to as the “Know Your Lake and Watershed Series,” is found below.

Topic: Exotic Species

Title: Nuisance Neighbors: Invasive Plants and Animals in Our Community

Monday, March 29 Brewerton Public Library Meeting Room

Guest Speaker: Ed Mills

Topic: Erosion/Sedimentation and Deicing/Salt Storage

Title: Losing Ground: When Property and Pollution Wash Out into Local Waters

Thursday, April 8 Verona Town Hall

Guest Speaker: Joanne Faulkner

Recommendations: Anne Saltman

Topic: Septic Systems

Title: Everything You Wanted To Know About Septic Systems But Were Afraid to Ask

Thursday, May 13 Canastota Village Hall Court Room

Guest Speaker: Kelly Somerlot

Recommendations: Dan Ramer

Topic: Fishing and Boating

Title: Recreational Review: Current News and Old Concerns Involving Fishing and Boating

Date: Thursday, May 27

Location: Sullivan Town Hall

Guest Speaker: Lars Rudstam Recommendations: Ed Mills (Fishing) and CCE (boating)

Topic: Flooding and Water Level Management

Title: The Highs and Lows of Managing Water Levels

#1-Thursday, June 3 #2-June Tuesday, June 8

#1-Sylvan Beach Village Hall #2-Arrowhead Lodge

Guest Speakers: Steve Eidt and Bill Kappel

Recommendations: Howard Goebel Facilitator: Ron Seeber

The meetings were designed to encourage public review, participation, and comments concerning the recommendations. Guest speakers, many from the Watershed Advisory Council, gave presentations at each meeting. This Appendix contains a summary of the written comments that were submitted during the public comment period.

Topic: Erosion/Sedimentation

- Comment submitted by Greg Tupper, Brewerton, NY
Volmer/Black Creek in the Town of Cicero during periods of moderate to heavy rainfall or during spring runoff causes 1/2 to 3/4 of the total surface area of the Lower South Bay area of Oneida Lake to turn chocolate brown. The duration of heavy silt depositing into Oneida Lake can continue for a few days to as long as a few weeks. I recommend that Volmer/Black Creek be added to the list of creeks in the watershed that are monitored and that contribute to excessive quantities of silt into the lake.

Topic: Exotic Species

- Comment submitted by Mr. Williams
I am very concerned about animal changes – fishing, bait, waterfowl, etc.

Topic: Flooding and Water Level Management

Public meetings were held at Sylvan Beach and Cicero to present the Flooding and Water Level Management recommendations. Homeowners at the Sylvan Beach meeting emphasized their concern for beach erosion, logjams and vegetative debris, potential impacts from the Ava land-fill, liquid fertilizer and agricultural runoff, septic waste, and the impacts of water level changes on shoreline erosion.

- Comment submitted by Leo Bitz, Verona Beach, NY
Oneida Lake lies west to east and prevailing winds blow west of northwest. I'm in favor of present water levels for the following reasons:

If you lower water levels we (on east shore) end up with sand bars about 200 feet out from shore and we have stagnant water from sand bars to break walls.

Wildlife is better off because seaweed grows in patches in sandy bottom which they feed on and they also travel close to shore and clean up anything edible next to shore.

Also, if we have sand bars out front and we have strong winds for a long period of time, we can end up with sand accumulation on our lawns.

However, I do not think water levels should be maintained any higher than what we have at present. Present water conditions also have a cleansing action for debris built up in limestone in from of breakwalls.

- Comment submitted by Samuel P. Cimilluca, CNY Waterways
Many comments on why and how we flood for the last 15-20 years. One thing many and myself express is nothing has been done to help us rid the floodwaters. That is one of our biggest problems. We have been made known the Corps of Engineers recommendations but no one, Canal Corporation, DEC or T-way, want to do anything to help. Thank you.

- Kent Partridge submitted the following document.

Flooding and Water Level Management Working Group

Items Undiscussed or Tabled

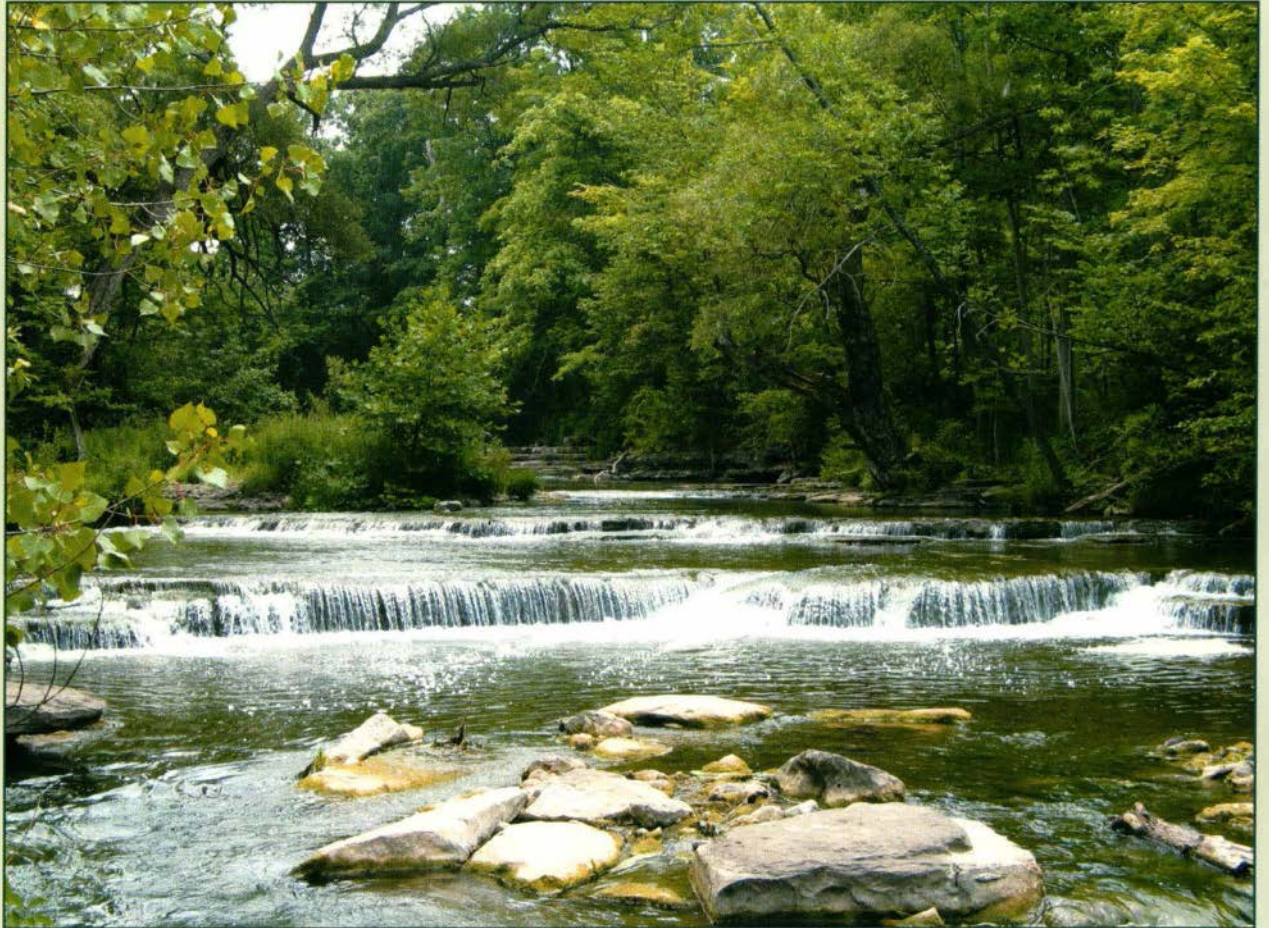
1. **Facilities or control outside of the Oneida Lake basin were refused discussion, however specific topics that affect the levels in Oneida Lake should be recommended for discussion by the wider area working group.**
2. **Downstream facilities or control subjects for the Oneida Lake basin were rejected even though the effects of large releases downstream from Oneida Lake were presented.**
3. **The discussion of the original natural state of Oneida Lake was dismissed. A graph, "Lake Level Variation" was presented instead, purportedly showing early conditions. This graph defined "Mean Lake Level (by Grouped Years)" with groups starting with one for 1904-1910. This selection of years is misleading as Contract #45 for the construction of the Caughdenoy Dam was let May 6, 1908. Dams are created to increase water levels upstream therefore Oneida Lake had a significant increase in level with the installation of a solid dam more than six foot high. The levels and conditions prior to the dams construction were not discussed even when a New York State map of 1865 was presented showing the level of Oneida Lake at 367.33 TWD. The years 1926-1950 are missing on this graph and contain some of the most serious flooding and times of many successful suits against the state for flood damages. The group of 1951-1960 is also misleading as Contract # 29 for the removal of the Caughdenoy Dam and the installation of the present Tainter Gate controlled dam was let in 1952 to reduce flooding. There are also clarity issues which were not discussed.**
4. **People were blamed for settling in the wrong place but the repeated systematic raising of the level of the lake by mechanical means were not to be discussed. The drawings show that each succeeding control structure effectively raised the lake level.**
5. **The discussion of the naturally occurring variations in level were considered at some length. The capacity changes as a result of these changes was not considered nor the storage changes as a result of the ever increasing mean level.**
6. **Higher levels over the years were deemed necessary to compensate for drought and evaporation but a verification of those years in which the level fell below the navigation minimum and at what location were sidetracked.**
7. **The specific levels at which flood damage starts was not determined. Instead of accepting the professional research and report of Acres America for the ACOE it was suggested that we poll individual towns for the figures which many of them would not understand.**
8. **FEMA was mentioned as a source for obtaining flooding levels but not discussed was their upgrading of levels after each increasing flooding event and providing future possibilities to allay damage payments. Each local area therefore has a different a level though on the same body of water. The recent levels assigned to the town of Cicero are an example. They project a 500 year flood level which when converted to BCD is 375.58 feet. (5.28 feet above Minimum Navigation level) Consider that when you are standing on the shoreline everything below eyelevel may be underwater.**

9. The subject of who the levels are managed for repeatedly came up and that commercial traffic on the canal is no longer a factor. The legality and necessity of maintaining the 14 foot canal depth throughout its length was sidetracked.
10. Ronald Seeber, Facilitator, proposed the submittal of a list of actions that the NYSCC could undertake to alleviate flooding. Specific suggestions such as proactive response to weather conditions, channel maintenance, rule curve modifications, navigation period, etc. were discounted and not discussed.
11. The specific subject of how to reduce flooding was sidelined as unattainable in spite of considering many accepted causes of flooding. The technical expertise of many specialists was questioned. Among them was DEC on upstream control, ACOE Acres America control levels, NYSCC list of impediments to the Oneida River, NYSCC Arbitration Agreements to reduce flooding, Hydropower emergency tests and agreements and reports by TAMS, Baker, and FERC. These were considered beyond the scope of the working group even though the Goal of the group was "To minimize flood damage" and one of the Objectives was to "Minimize the intensity and duration of high water levels on Oneida Lake".
12. The discussion regarding the GIS mapping of flood prone areas in the future was tabled due to the absence of data.
13. Several suggestions were made that were detrimental to reducing flooding but favored special interest groups. The changes necessary to accommodate these suggestions were not specified or accepted under discussion.
14. There was a visit to a meeting of the fisheries working group in an effort to widen our information. During this meeting some of their sport fisherman questioned the benefits of stocking Sturgeon and American Eel in Oneida Lake. The plus and minus impacts on the ecological balance were questioned in view of the expense of time and money required when other programs needed more success. To date we have not been informed of a discussion on this subject or an answer to those questions.

American Aerial Scenes in Pompey NY (315-422-4722) provided the aerial photographs.

The Herkimer Oneida Counties Comprehensive Planning Program
developed the GIS map of the watershed.

Although the information in this document has been partially funded by the US EPA under assistance agreement X-982346-00 to the Central New York Regional Planning and Development Board, it has not gone through the US EPA's publications review process and therefore may not necessarily reflect the views of the US EPA. No official endorsement should be inferred.



Chittenango Creek

Committed to the protection and restoration
of Oneida Lake and its watershed