
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 His-
toric 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 Scononoda Creek.					

Stream Erosion Surveys: Four studies between 1995 and 2002 were initiated for the specific purpose of identification and prioritization of critically eroding stream-banks in 11 perennial streams in the Oneida Lake watershed. The streambank erosion inventories were undertaken in the following creeks: Oneida, Sconondoa, 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 Sconondoa 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:

- š Erosion degrades soil quality and reduces productivity, especially when fertile topsoil is lost.
- š Sediment deposited on the land may smother crops and other vegetation and can fill in roadside drainage ditches and create hazardous driving conditions.
- š 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.
- š Sediment loading contributes to a decline in macroinvertebrate populations and submergent aquatic vegetation by increasing turbidity and reducing light availability.
- š As areas of the lake bottom become shallow as a result of heavy sedimentation, boating and other recreational activities are impaired.
- š Sedimentation reduces the water storage capacity of wetlands and streams and can cause an increase in flooding.
- š 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.
- š 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:

- š Cornell Cooperative Extension
- š County Planning Departments

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

- š 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.

š 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.

š 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.

š 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.

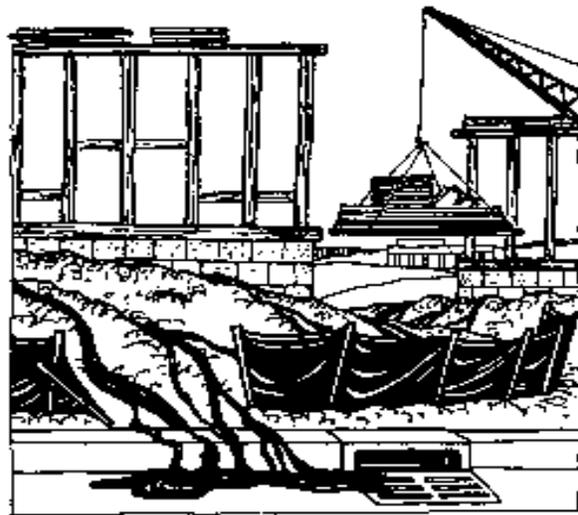
Potential funding opportunities to help address erosion and sedimentation problems in the watershed include, but are not limited to, the following sources:

- š Federal Emergency Management Agency
- š Finger Lakes-Lake Ontario Watershed Protection Alliance
- š Great Lakes Commission
- š NYS Emergency Management Office
- š 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 <i>(contingent upon funding)</i>
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 <i>(contingent upon funding)</i>
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.	NYSCC, 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 (NYSCC), 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

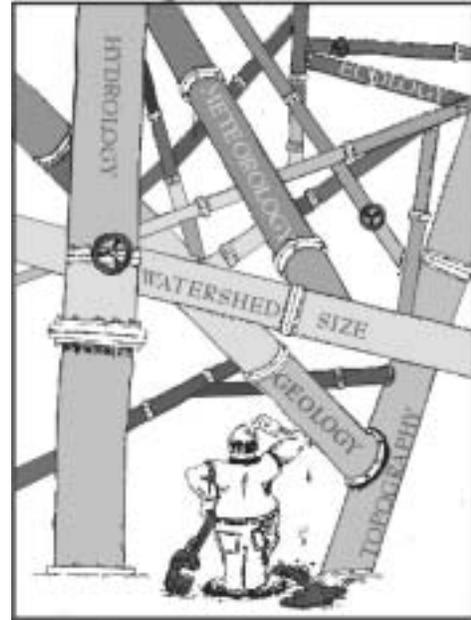
Recommendation: Seek funding to review alternatives for decreasing flood contributions of upstream influences in tributary streams.

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

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



Many factors contribute to flooding

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

š **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*

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:

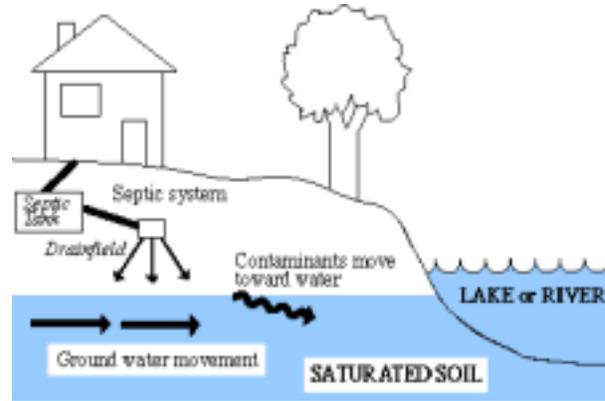
- ☞ NYS Department of Environmental Conservation, Regions 6 and 7
- ☞ CNY Water Education Group
- ☞ Cornell Cooperative Extension
- ☞ Lewis County Health Department
- ☞ Madison County Health Department
- ☞ Onondaga County Health Department
Division of Environmental Health
- ☞ NYS Department of Health
- ☞ 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 <i>(contingent upon funding)</i>
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 <i>(contingent upon funding)</i>
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 <i>(contingent upon funding)</i>
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.

- J · Eurasian ruffe, *Gymnocephalus cernuus*
- J · Round goby, *Neogobius melanostomus*
- J · Fishhook water flea, *Cercopagis pengoi*
- J · Asian clam, *Cobocula fluminea*
- J · 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
<i>Fish</i>		
<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
<i>Mollusks</i>		
<i>Bithynia tentaculata</i>	faucet snail	Eurasia
<i>Dreissena polymorpha</i>	zebra mussel	Eurasia
<i>Crustaceans</i>		
<i>Eubosmina coregonia</i>	water flea	Eurasia
<i>Gammarus fasciatus</i>	gammarid amphipod	Atlantic
<i>Echinogammarus ischnus</i>	amphipod	Eurasia
<i>Plant/Plant Hosts</i>		
<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:

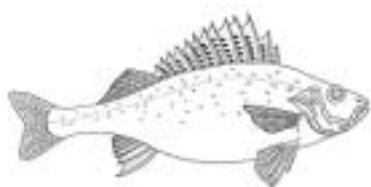
- ☞ Oswego County Soil and Water Conservation District harvests water chestnut in the Oswego River and parts of Oneida Lake, depending on funding.
- ☞ Cornell Cooperative Extension of Onondaga County has organized hand-pulling events and educational seminars to remove water chestnut from Oneida Lake.
- ☞ 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.

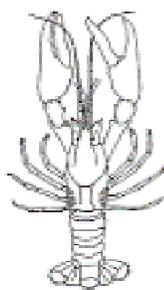
**Other Non-Indigenous Species That Could Become Established
in the Oneida Lake Watershed**

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>Cobicula 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



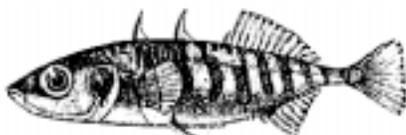
Eurasian ruffe



rusty crayfish



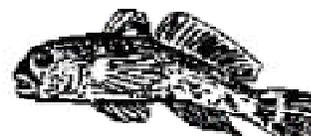
spiny water flea



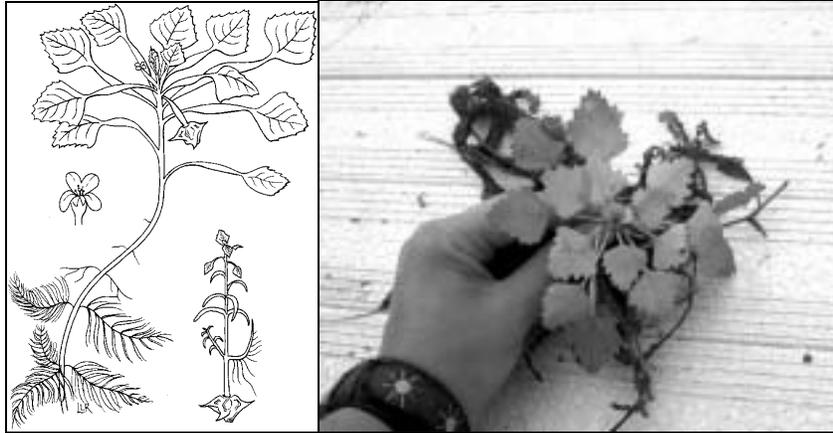
three spined stickleback



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.

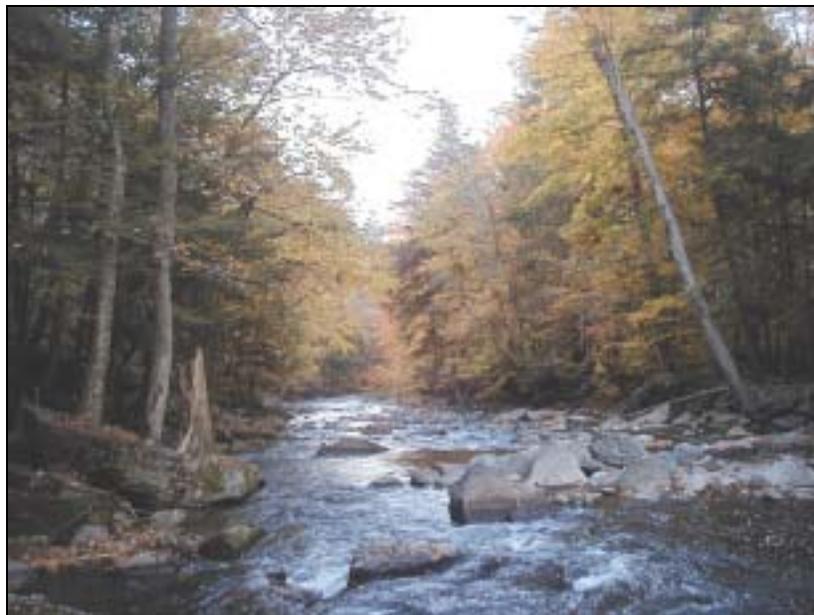
Regulation (NYS DEC Water Chestnut Regulation 11.0509):

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 (µg/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 <i>(contingent upon funding)</i>
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 NYS DEC, 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/dfwmr/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
Water Quality: Fuel Losses, Spills and Boat Wastes		

Recommendation	Potential Responsible Organization(s)	Timeline/Goal <i>(contingent upon funding)</i>
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 impact 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 <i>(contingent upon funding)</i>
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