Priority Erosion Sites in the Oneida Lake Watershed

Central New York
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In The Oneida Lake Watershed

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PRIORITY EROSION SITES ON STREAM SEGMENTS IN THE ONEIDA LAKE WATERSHED
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I. INTRODUCTION

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 especially in the southern region where soils are derived from shale and limestone.

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 draw down, lack of vegetation buffers, and a lack of bank stabilization. Soil erosion and runoff affects water resources by delivering sediment and 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.

The objective of this report is to review information from various technical reports and then prioritize eroding stream segments throughout the watershed based on loading rates, site accessibility, observations from recent research studies, site visits, and recommendations from county Soil and Water Conservation Districts (SWCD). A watershed map is available in Appendix A.

II. METHODOLOGY

- Information about erosion and sedimentation was compiled from tributary monitoring reports, the Priority Waterbodies List, stream erosion surveys, GIS maps, County Water Quality Strategy reports, and the “Management Strategy for Oneida Lake and its Watershed”.

- Additional information was collected during meetings and telephone calls with Soil and Water Conservation Districts in Onondaga, Madison, Oneida, and Oswego Counties. County SWCDs identified and mapped top priority stream segments. Visits were made to many of the priority sites by SWCD.

- County Health and Planning Departments were consulted for information and recommendations.

- Information about the environmental setting was compiled for each of the four counties that border Oneida Lake (Onondaga, Madison, Oneida, and Oswego).

- Priority stream segments were identified. At the request of the SWCD, homeowner names were removed for this report. A watershed map is found in Appendix A and site locations for Oneida Creek is in Appendix B. Additional information about specific site locations is available at the SWCD and CNY RPDB offices.

- Watershed-wide recommendations relating to erosion and sedimentation were compiled based on numerous discussions with SWCDs and information from technical reports.

- This draft report was sent to the SWCD managers, the Agriculture Coordinator, and several additional county agencies for review and comment. Comments were submitted to CNY RPDB.

- The final edits were incorporated. The final report will be sent to the SWCDs and placed on the Oneida Lake watershed website.

- During 2005 and 2006, project updates were routinely presented at meetings with SWCD managers and staff, the Oneida Lake Watershed Advisory Council, and the Water Quality Coordinating Committee.

III. BACKGROUND

- A primary goal identified in the management plan ("Management Strategy for Oneida Lake and Its Watershed") is to minimize the impacts of soil erosion and sedimentation in the Oneida Lake watershed.

- 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.

- Graduate student interns from the SUNY College of Environmental Science and Forestry conducted streambank characterization surveys on several tributaries flowing into Oneida Lake during the spring and summer of 1999. The interns worked on Madison and Onondaga County tributaries in order to gather information on the environmental setting, to assess potential pollution problem areas, and to document streambank erosion and other land use influences. Streambanks on Butternut, Limestone, Canaseraga, Cowaselon, Canastota, and Chittenango Creeks were characterized.

- Through research conducted in 2000 and 2003, the relative impact of streams was evaluated in terms of water chemistry, discharge, and loading rates for nutrients and soil to Oneida Lake. Water chemistry and soil loss at the base of the primary tributaries flowing into Oneida Lake (including Big Bay, Scriba, East Branch of Fish, Lower Fish, Wood, Oneida, Cowaselon, Canaseraga, Chittenango, Limestone, and Butternut Creeks) were monitored for nutrients and sediment. The 2002-2003 Oneida Lake Tributary Monitoring Program was designed 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 were identified as having the greatest loss of suspended matter from the watershed.

- Point and non-point sources of nutrients and soils within the Oneida Creek watershed were identified in 2004 through a process called segment analysis.

- Based on streambank erosion calculations from an Oneida Creek stream inventory 10 years ago, 420 tons of soil erodes per year from the upper Oneida Creek reaches and 530 tons per year erodes from the lower reaches, for a total of 950 tons per year of streambank erosion.

These figures were determined using the NRCS streambank erosion formula. (J. Faulkner, Oneida County SWCD).

- According to M. Johnston (Madison County SWCD) cropland soil loss on agricultural land can be conservatively estimated at four tons per acre per year in the Oneida Lake watershed.

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)

Segment Name	*Subwatershed*	*Primary Use Affected*	*Severity*	*Primary Pollutant**	*Primary Source*
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 & Trib	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 Sconondoa Creek.***

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:

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.

IV. BIOLOGICAL AND CULTURAL IMPACTS

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

- Erosion degrades soil quality and reduces productivity, especially when fertile topsoil is lost.

- Sediment deposited on the land can smother crops and other vegetation and can fill in roadside ditches leading to poor drainage and a shortened life span of road surfaces.

- Excess sediment loading at the mouth of tributaries and in Oneida Lake can result in negative impacts on aquatic biota, fish and fish habitat (by covering fish eggs), filling in spawning beds and pools, and reducing food supplies.

- Sediment loading contributes to a decline in macroinvertebrate populations and submergent aquatic vegetation by increasing turbidity and reducing light availability.

- As areas of the lake bottom become shallow as a result of heavy sedimentation, boating and other recreational activities are impaired.

- Sedimentation reduces the capacity of streams and can cause an increase in flooding.

- 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).

- Soil erosion was positively correlated with total phosphorus and nitrogen loss in all of the tributaries sampled.

- Row crops on sloping fields have been cited as the prime contributor of sediment to Oneida Lake and its tributaries.

- Soil erosion from dairy operations is a greater problem in the southern portion of the watershed due to slopes and soil types and a greater emphasis on agriculture. As of 2003, the Oneida Lake watershed had 316 full-time commercial farms that operated about 1/3 of the land within the 872,722-acre watershed.

- The water quality of Oneida Lake is directly influenced by land use practices in the lake's watershed. If efforts are made to protect a lake's watershed, then water quality (as well as fish spawning and nursery areas of sport fishes) is also protected and even enhanced over the long term.

V. HIGH PRIORITY SEGMENTS ON ONEIDA LAKE TRIBUTARIES

PRIORITY AREAS ON LIMESTONE CREEK, Onondaga County

Town of Manlius, adjacent to the Cavalry Club Golf Course
Priority for Remediation: High.
In an October 2006 correspondence, Doug Fisher of the Onondaga County SWCD reported that the Village of Fayetteville owned Ledyard Canal recently breeched it's berm/dike and is now draining directly into the Limestone Creek. Access to this area is through the Stickley Furniture parking lot. Jim Craw is currently working with Stearns and Wheeler Engineering on a repair design and DEC has been notified. D. Fisher is providing assistance.

Town of Pompey Route 20
Priority for Remediation: High.
Doug Fisher (Onondaga County SWCD) reported that severe erosion is occurring along Limestone Creek, immediately south of Route 20. In the same area, a very large deposit of sediment is located immediately north of Route 20. This is creating new and equally important concerns. (E-mail communication with D. Fisher, May 2006) Refer to photos in Appendix C.

Cardner Road in the southeast corner of Onondaga County
Priority for Remediation: High.
The Onondaga County SWCD reported that severe erosion is occurring at two sites along Cardner Road in the upper reaches of Limestone Creek in the spring of 2006.
(E-mail communication with D. Fisher, Onondaga County SWCD, May 2006)

290 Minoa Road Bridge (Based on 1999 stream erosion surveys)
Priority for Remediation: High.
This reach was difficult to walk do to depth and soft substrate. There is some landscaping or machinery work on the land at the beginning of this reach. In general there were silt substrates with a lot of stream meandering and riffle habitat.

Minoa Road Bridge, Conrail railroad (Based on 1999 stream erosion surveys)
Priority for Remediation: High.
This area has a lot of erosion per a mile of stream and comparatively moderate in reach length. A lot of residential area bordering the stream on this reach, but most of the stream is back in a hundred yards or more of forest from town with poor access.

Manlius Road Bridge, Chittenango Creek merge (Based on 1999 stream erosion surveys)
Priority for Remediation: High.
In this small segment of stream there is a lot of erosion. Stream gradient seems to increase and banks are numerous and long. This would be a good place to control erosion because several banks could be repaired with out traveling far. The stream is almost shallow enough for walking but some areas are deep and prevent easy movement from bank to bank for soil sampling.

PRIORITY AREAS ON BUTTERNUT CREEK, Onondaga County

THE FOLLOWING HIGH PRIORITY SEGMENTS ARE BASED ON EROSION SURVEYS AND COMMENTS SUBMITTED BY D. FISHER, ONONDAGA COUNTY SWCD.

Meyers Road Bridge – Limestone Creek merge

Priority for Remediation: very high, based on 1999 stream erosion surveys,

This area has very high erosion rates due to the presence of sandy soils. There are some tall, long banks of erosion in this area that are sandy which contribute 40 – 50 percent of the total erosion calculate for all the reaches surveyed on Butternut Creek.

Old Quarry Rd at Reservoir to Pallidino

Priority for Remediation: high, based on the "Erosion Survey of Butternut Creek and its Tributaries" 2002

Severe erosion is occurring at 11 stream banks along this segment. The stream's high sinuosity is probably the cause for the high erosion. An enormous clay bank is located at this site. The homeowner owns a landscaping business and has access roads to the stream and across to the other side. The bank itself is prone to slumping and less clay-like soils at the top are being undermined as the clay base moves down and out towards the stream. Images and GPS coordinates were recorded, and erosion calculations were made. This site should be re-evaluated to determine current conditions.

Route 91, Jamesville

Priority for Remediation: high, based on based on observations by Onondaga County SWCD and the Department of Transportation (DOT)

Erosion and bank movement is occurring adjacent to the Glen Lock Restaurant, located on the east side of Route 91 (North Street) in Jamesville (Onondaga County). This is a high priority site due to the impact that further erosion may have on the highway and the restaurant. SWCD is currently working on a restoration plan in cooperation with the DOT and a stream expert with the Army Corps of Engineers.

Kinne Rd Bridge – Utility Road Bridge near Pyle Drive.

Priority for Remediation: high, based on 1999 stream erosion surveys.

Walking in the stream was very easy for this reach and there is good access to the stream from Butternut Drive, which runs parallel with the creek. The end of this reach became very difficult to walk and a canoe was used in the next reach due to the depth of the stream. A lot of erosion is located at the upstream section of the reach in Ryder Park below the Old Erie Canal. This site should be evaluated to determine current conditions.

Dodge Road bridge and downstream

Priority for Remediation: high

This section of Butternut Creek was surveyed from the bridge to the "camel's back" section that runs directly behind a farm on Apulia Road Accessibility in this reach is difficult, although the two banks identified along the homeowner's property are easily accessible through his horse pasture. The stream is cutting very deep here, and the homeowner stated that he had lost 10 ft. of land over the last few years. GPS coordinates were recorded and erosion calculations were made.

FOLLOW-UP ASSESSMENTS NEEDED ON BUTTERNUT CREEK

Cascade Falls (Based on the "Erosion Survey of Butternut Creek and its Tributaries" and conversations with D. Fisher, SWCD in 2006)

A survey was conducted after talking with a local farmer who mentioned that the falls in the upper reaches of Cascade Creek were bordered by a clay bank that was flowing into the creek. Access to the upper reaches was gained via the farmer's vehicle stream crossing and skirting two open fields to a GPS location on the backside of the second field. The clay bank has ground water flow and due to the resulting sheer and bank failure, could be considered a slide. Images and GPS coordinates were recorded, but no erosion calculations were made. Based on the 2002 survey, this site was identified as a high priority. According to the SWCD in June 2006, work has recently been done to stabilize the shoreline using FL-LOWPA funding. A follow-up assessment is needed.

Cascade Creek Farm (Based on the "Erosion Survey of Butternut Creek and its Tributaries", 2002 and conversations with D. Fisher, SWCD in 2006)

This is a dairy farm has approximately 120 cows. The survey begins at the vehicle stream crossing on Clark Hollow Road and ends at the bridge downstream. Cows have free access to the stream and erosion in this reach is severe – eight banks were identified. Images and GPS coordinates were recorded, and erosion calculations were made. This site was once identified as high priority in 2002 and the SWCD reported that stream stabilization work had been done in June 2006. A follow-up assessment is needed.

Pallidino to Wallberger Road (Based on the "Erosion Survey of Butternut Creek and its Tributaries", 2002 and conversations with D. Fisher, SWCD in 2006)

This section has some significant erosion occurring and ten banks were recorded. Clay is prominent in several areas, and an exposed clay layer is evident along the banks and stream bottom in some areas. Accessibility is excellent for banks 1, 4, 5 and 6, which have pasture or lawn extending from the stream to a major road. The pasture is used to graze Longhorn cattle. A fence separates the cattle from the stream, but is down in some areas. Images and GPS coordinates were recorded, and erosion calculations were made. Based on the 2002 survey, this site was once identified as high priority. According to SWCD in June 2006, stream stabilization work has recently been done. A follow-up assessment is needed.

PRIORITY AREAS ON CHITTENANGO CREEK, bordered by Madison and Onondaga Counties

THE FOLLOWING INFORMATION IS BASED ON THE STREAM EROSION SURVEYS

Hoag Road Bridge – Kirkville Road Bridge

Priority for Remediation: Very High.

This reach is covered with debris dams, is very long, and is experiencing an enormous amount of erosion. Canoeing and walking this section is difficult. Ground cover is dense, and fallen trees make the land difficult to walk while canoeing requires constant climbing around debris dams. Unfortunately there are no roads that come close to the stream between the start point and end point. (*)

Kirkville Road Bridge– Bridge near Flyer Road
Priority for Remediation: Very High.
This site has significant erosion problems. The reach has good access and is easier to canoe because debris dams are less numerous or incomplete enough to allow passage. (*)

Peck Road – Black Creek on Marsh Mills Road
Priority for Remediation: High.

Access to the stream is possible for many parts of this stream, but some sections are located far from the road. There are many debris dams in this area. Walking was not an option here due to depth of the stream. The total erosion contributed to the surveyed portion of this creek is about twenty-five percent of the total erosion placing this as a very high priority area for erosion control. (*)

* To address the logjams identified in this stream erosion survey and others along Chittenango Creek, the Madison County SWCD developed an agreement with the neighboring municipalities of Cicero, Manlius, and Sullivan for routine logjam removal. Continued funding for this type of intermunicipal agreement is recommended.

ADDITIONAL CHITTENANGO CREEK SITE IDENTIFIED BY MADISON COUNTY SWCD

Mike Johnston of the SWCD recommended that local willows be planted on a homeowner's property on Chittenango Creek, north of the Town of Chittenango.

PRIORITY AREAS ON ONEIDA CREEK (bordered by Madison and Oneida Counties)
The high priority sites that are summarized below were identified during a detailed segment analysis of Oneida Creek in 2004. Refer to Appendix B for a map.

Taylor Creek
Priority for Remediation: High.

A tributary of Oneida Creek, Taylor Creek (site 10 and upstream), was noted as having several priority erosion problems. For example at site 10b, elevated levels of total suspended solids and total Kjeldahl nitrogen were observed and were associated with exposed soil at a new housing development. Construction at these sites was not properly contained as large losses of soil were observed during one event. Similarly, levels of total suspended solids (81.5 mg/L), total Kjeldahl nitrogen (1,330 µg N/L), total phosphorus (167 µg P/L) and sodium (37.95 mg/L) were elevated above site 10g. A source was not noted, but the high values were indicative of soil loss from fields in agriculture. Also, site 10d had high levels of dissolved nutrients including soluble reactive phosphorus (52.8 µg P/L) and nitrate (7.78 mg N/L). No obvious source was observed as the area was forested.

Follow up work is recommended in order to check on the current status and to pinpoint additional sources of nutrient and sediment loading. Samples within these segments should be collected during spring tillage. The landowner owns a CAFO farm in this area. He currently has a CNMP but buffers and "no spread zones" should be included to prevent close proximity of manure spreading to Oneida Creek.

Sites 16, 16C, and 16D

Priority for Remediation: High.

Between sites 16 and 16d in October 2003 near the Morrisville Eaton Central School, significant increases in soluble reactive phosphorus (8,909%), total phosphorus (528%), nitrate (520%), total Kjeldahl nitrogen, (103%) and total suspended solids (143%) were observed. The small increase in particulate fractions (TP and TSS) compared to dissolved fractions suggested that some soil was being lost through erosion but that other non-soil sources were likely. In fact, school officials did confirm to K. LaManche and S. Harrington (CNY RPDB) in April 2004 that construction occurred and that some soil loss had occurred. However, another source also existed. A horse farm located on this segment and near a drainage ditch had heavily grazed fields with exposed soil. Sampling in April 2004, after the construction was completed, demonstrated that soluble reactive phosphorus and total phosphorus increased from site 16 to site 16d by 526% and 482%, respectively. The horse farm was the most likely cause in the observed increase in April while construction practices were the major source in October.

Point and non-point sources of nutrients and solids can be remediated using Best Management Practices (BMPs). At site 16d, install buffer strips near the culvert and rotational grazing pens. Better communication with members of the local college community on construction practices is recommended. The Madison County SWCD recently contacted the property owner to encourage the development of a Comprehensive Nutrient Management Plan (CNMP) for the property.

Upstream of site 16c on Pleasant Valley Road south of Oxbow Road, a source of total phosphorus, SRP and TSS existed in fall 2003. Small increases (<100%) in nitrate and total phosphorus were again observed in this area in April 2004. Total suspended solids were almost 400% higher at the most upstream site (site 16C1). At present, we have not been able to locate a source.

Segment 14

Priority for Remediation: High.

Segment 14 is a series of small tributaries at the far southern portion of the Oneida Lake watershed. The high loss of soil (64.8 mg/L) in September 2003 suggested erosion of a stream bank or loss from a field being tilled within this segment. Elevated levels of particulate fractions (TSS and TP) were observed on Blue Creek from sites 14a and 14c downstream to site 14. The elevated levels of TSS and TP observed downstream at site 14 were partially caused by losses in the segment between sites 14c and 14b.

More specifically, the samples taken in April 2004 suggested that source was located within the tributary represented by site 14e. Compared to the downstream site 14b, levels at site 14e were 205%, 286%, 546%, and 192% higher in total phosphorus, total Kjeldahl nitrogen, nitrate and total suspended solids, respectively, from the downstream site. Site 14b smelled heavily of manure while site 14e was visibly turbid. This segment was in an area identified by the Madison County Planning Department as possessing high soil erosion potential. Higher nitrate levels were also observed at site 14c (1.75 mg/L).

Site 14d at South Quarry Road drains a small sub-watershed that moves from east to west before entering segment 14. Levels of TKN (800µg N/L) were slightly elevated but nitrate (1.6 mg N/L), SRP (18.7 µg P/L) and TP (108.9 µg P/L) were high compared to upstream sites within the

segment in October. Similarly in April, nitrate levels were again elevated with concentrations just below 3mg/L. The high losses of nitrate and the slightly elevated levels of TKN suggested an animal source.

A Comprehensive Nutrient Management Plan is currently available for the landowner at 14a. Stream restoration work (including shoreline buffers and vegetative planting) needs to be incorporated into this plan. Landowners at 14c and 14b should be encouraged to plant local willows along streambanks to reduce erosion rates.

Segment 16
Priority for Remediation: High

The headwater tributary represented by segment 16 contributed both nutrients and soil from several locations to the main stem of Oneida Creek. An increase in total phosphorus (e.g., 46 to 62 µg/L, October) and total suspended solids (6.4 to 14.1 mg/L, October) was observed in October 2003 and April, 2004 between sites 16a (Glass Factory Road) and 16 on South Butler Road. An unidentified source existed.

Mud Creek
Priority for Remediation: High

Mud Creek is a tributary (site 9c, Middle Road) of Oneida Creek and appeared to be a source of soil and nutrient loading. Results were not conclusive as to a single source, but TKN, TP and nitrate were elevated at sites 9c1, 9c3 and 9c4. Nitrate was particularly high at site 9c2, which is near a large dairy farm. Follow up work is recommended in order to locate sources of nutrient and sediment loading. Sample water within these segments should be collected during spring tillage.

Sconondoa Creek
Priority for Remediation: High.

Significant flooding and streambank erosion was reported on Sconondoa Creek, a tributary to Oneida Creek, during the summer of 2006. Erosion is especially severe in fields with row crops along Houck Road near the junction with Route 31.

PRIORITY AREAS ON FISH CREEK, Oneida, Lewis, and Oswego Counties
THE FOLLOWING INFORMATION IS BASED ON COMMENTS FROM P. MILLER, MADISON COUNTY PLANNING DEPARTMENT AND J. FAULKNER, ONEIDA COUNTY SWCD

There are several major erosion sites and even more generalized erosion on the banks of Fish Creek from the confluence of the east and west branches downstream to Oneida Lake. Erosion is particularly problematic in agricultural fields where row crops are grown. (Personal communication with P. Miller, Madison County Planning/Fish Creek homeowner)

Willows and other native vegetative plants are recommended on Fish Creek to control streambank erosion and improve water quality. Planting vegetation could provide short-term stabilization for the streambanks. Local willows are recommended to minimize project costs. Oneida County SWCD cautioned that restoration efforts to reduce the erosion rates on Fish

Creek would have minimal long-term impact due to the high water volume, unique stream characteristics, sandy soils, and topography of the region. Restoration work would not be effective and would most likely exceed the design capacity. Fish Creek is also a protected waterbody and needs special permitting for any restoration work.

VI. WATERSHED-WIDE RECOMMENDATIONS

1. **GRANT FUNDING**
   Submit Environmental Protection Fund and Great Lakes Commission grant proposals to support watershed restoration work on high priority sites listed in this report. Also pursue funds through Finger Lakes Lake Ontario Watershed Planning Alliance (FL-LOWPA).

2. **STRESSED STREAM ANALYSIS**
   Since phosphorus is generally considered to be the limiting nutrient of phytoplankton growth in freshwater lakes and soil loss is the likely vector of this loss, two subwatersheds are suggested as potential targets for stressed stream analysis: Cowaselon and Chittenango Creeks. These subwatersheds had higher losses of total suspended solids, total phosphorus and total Kjeldahl nitrogen than other tributaries. Consideration should be given to identifying sources if these are anthropogenic losses (de-icing salt usage, improper storage). Stressed stream analysis is a technique that identifies the sources of pollutants within a subwatershed by subdividing the impacted subwatershed into small distinct geographical units. Samples are collected at the beginning and end of each stream unit to determine if a nutrient (or other contaminant) source occurs within that reach (Makarewicz 1993).

3. **CONSERVATION RESERVE ENHANCEMENT PROGRAM (CREP)**
   Promote expanded funding for vegetative buffers and streambank stabilization to reduce erosion and nutrient loading. The Conservation Reserve Enhancement Program (CREP)

   CREP uses federal and state resources to safeguard environmentally sensitive land through the Conservation Reserve Program (CRP). Producers enrolled in CRP remove lands from agricultural production and plant native grasses, trees, and other vegetation to improve water quality, soil, and wildlife habitat. CREP provides rental payments and other financial incentives to encourage producers to voluntarily enroll in 10- to 15-year CRP contracts.

   The CREP program helps producers install and restore riparian buffers that reduce sediment, nutrients, and pollutants from entering the lake. The buffers protect water quality and provide wildlife habitat for a wide array of wildlife species.

4. **WATER QUALITY MONITORING**
   Many stream restoration projects and agricultural improvement initiatives have been implemented throughout the watershed in the past three years in response to recommendations in the watershed management plan. Water quality monitoring is now needed at the base of the primary tributaries in order to evaluate these improvements. The results should be compared with historical chemistry data and site evaluations. The level of sediment and nutrient loading should be documented in order to evaluate the success of agriculture and non-agriculture erosion control improvement projects. The monitoring program should be consistent with the methodology applied during the 2002-'03 sampling, which was accomplished through a regional partnership with CNY RPDB and county SWCD, Health Department, and Planning Department in the four counties bordering Oneida Lake.

5. **STREAM CHANNEL MAINTENANCE**
   Expand existing stream channel maintenance partnerships between local townships and SWCDs in order to locate and promote the removal of logjams and other stream obstructions. This would reduce flooding and streambank erosion. A county SWCD / municipal partnership is currently established in Madison County. To address the logjams identified in stream erosion surveys along Chittenango Creek, the Madison County SWCD developed an agreement with the neighboring municipalities of Cicero, Manlius, and Sullivan for the routine removal of stream debris. Continued funding for this type of intermunicipal agreement is recommended. Landowners should also be encouraged to plant willows along streambanks to reduce erosion rates.

6. **NATURAL STREAM DESIGN**
   Characterize and stabilize targeted reaches with known recurring problems using natural stream design methods to correct serious problems with bank erosion. Use Cowaselon Creek site (Route 20 and Lenox Furnace) as a demonstration project. Incorporate natural stream design in accordance with the principles of fluvial geomorphology. Characterize the reaches according to a reference by David L. Rosgen titled, "A Classification of Natural Rivers." Establish stable reference reaches in Cowaselon Creek to serve as models for the stable reaches that are trying to be produced.

7. **EDUCATION**
   Arrange for educational workshops and training for the following target groups:

   a) Local officials on erosion controls and stormwater management and the benefits and process of adopting and/or updating local stormwater and erosion control ordinances

   b) Code Enforcement Officers and planning boards to promote better construction practices. Teach methodologies for reviewing sites and how to review construction Stormwater Pollution Prevention Plans (operators of construction sites disturbing one or more acres of land must develop and implement a SWPPP to reduce the discharge of pollutants)

c) Highway Superintendents 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. Invite participation by Cornell University's Local Roads Program (http://www.clrp.cornell.edu/) and request the use of their Traveling Road Show. These courses are intended for highway superintendents, commissioners of public works, road managers, highway crews, motor grader operators, and others who are responsible for the construction and maintenance of roads.

Encourage continued communication and sharing among local highway departments interested in sharing equipment purchase costs and sharing equipment for street sweeping and hydroseeding. This is currently being done in Madison County. Communication could be facilitated through the Oneida Lake website, correspondences with municipal officials, and newsletter announcements (Soil and Water Conservation Districts, Oneida Lake Agricultural Program, etc).

d) Lakeshore property owners and other stakeholders Highlight the impacts of erosion and sedimentation, and methods to control it. Work with students at the Syracuse University Art Department to design educational posters and brochures and distribute them at shoreline marinas and parks.

Post signs at marinas and parks to encourage enforcement of near-shore boating speed limits to reduce shoreline erosion and inform boaters when additional speed restrictions are in place during periods of high lake water levels.

Post signs at marinas warning against "power loading" (speeding during powerboat takeoff which displaces lake bottom sediment).

8. **ZONE TILLAGE**

Evaluate the zone tillage program currently implemented in Madison County. If successful, promote similar practices in Oneida and Onondaga Counties in order to reduce soil erosion from corn and other row crops on sloping fields. Madison County SWCD received a Year 2006 grant from the Great Lakes Basin Program to promote zone tillage in Madison, Oneida, and Onondaga Counties. The plan is to complete 600 acres each year in 2007 and 2008. Funding from the FL-LOWPA budget is also available for this project.

9. REGIONAL PARTNERSHIPS

Whenever possible, encourage stream restoration partnerships with the county Soil and Water Conservation Districts, New York State Department of Transportation, Department of Environmental Conservation, CNY Regional Planning and Development Board, and Fish & Wildlife Service, County Planning Departments, and other relevant organizations.

VII. REFERENCES

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Numerous meetings and individual contacts were made with the Soil & Water Conservation District and staff from other county agencies.

Appendix A

Oneida Lake Watershed Map

Appendix B

Oneida Creek Sampling Sites

Appendix C

Erosion Sites on Limestone Creek
Pompey Hollow Road
Onondaga County