

# OSWEGO RIVER

## REMEDIAL ACTION PLAN

### STAGE 3 - DELISTING



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The Oswego River Remedial Action Plan Stage 3 - Delisting document was prepared by the New York State Department of Environmental Conservation in cooperation with the Oswego River Remedial Advisory Committee. Members of the committee are listed in Appendix A. The development of this Stage 3 document has involved many government agencies, professionals, peers, and the public in review. All substantive comments have been incorporated into this final publication. For information or copies contact Robert Townsend, NYSDEC, Division of Water, Bureau of Water Assessment and Management, 625 Broadway, Albany, New York, 12233-3502, phone (518) 402-8284. Also see the NYSDEC website at: <http://www.dec.state.ny.us/website/dow/oswdlist.html>

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## **I. EXECUTIVE SUMMARY**

The New York State Department of Environmental Conservation (NYSDEC) initiated public input into the development of the Oswego River Remedial Action Plan (RAP) in 1987 with the establishment of an advisory committee. The 1990 Stage 1 RAP identified use impairments and their causes and sources. The main impairments for the RAP Area of Concern (AOC) involved fish consumption restrictions, fish habitat, fish populations, and reported eutrophic conditions associated with non-AOC sources. Lake Ontario exerts a distinct influence on the AOC and has a close relationship. For example, the consumption restrictions are lakewide for Lake Ontario (not AOC specific) and apply to migratory fish entering the Oswego River and Harbor area.

Remedial actions to restore beneficial uses were originally identified in the 1991 Stage 2 RAP report. A comprehensive RAP Update was published in 1996 and includes results of: a fish pathology study, Oswego River and harbor water quality and sediment investigations, remedial activity progress, and delisting criteria. The 1998 RAP Workshop accomplished its objective to obtain an improved understanding of the remedial activities and study results and to identify the next steps and actions to define the restoration and protection of the Oswego River AOC. The importance and close relationships of addressing the fish consumption restrictions and fish habitat/population impairments as part of larger management plans operating external, however influencing the AOC, were recognized.

The workshop proceedings, including comments and recommendations, were published along with a RAP Update in 1999. Summary results of that workshop as well as the subsequent remedial measures and studies that address the use impairment indicators are contained herein. This information establishes the basis of the supporting data and rationale for the resolution of the indicators, preparation of this Stage 3 document, and the delisting of the Oswego River AOC.

Over the years, the Remedial Advisory Committee (RAC) conducted monthly, and later quarterly, meetings on RAP implementation. The committee has consisted of a diverse and multi-stakeholder representation with the task of identifying needed studies and remedial actions, seeking implementation, and then affecting these activities in the watershed and AOC. Reporting on progress, and communicating this information to the public has been an objective of the committee. Recent efforts focused on defining the endpoints to address the use impairments and realizing that significant reductions in pollutant sources have been achieved.

This Stage 3 document verifies that the RAP Process has accomplished its goal to the maximum extent practicable and that the ultimate resolution of the fish consumption, habitat and population concerns are to be addressed by specific larger management plan activities covering the AOC. Fulfilling the endpoints for these beneficial uses is to be addressed respectively by the ongoing Lake Ontario Lakewide Management Plan (LaMP) and the Federal Energy Regulatory Commission (FERC) Oswego River power dam licensing requirements. At the same time, the RAP has provided the data to show that the water quality is not impaired in the AOC, that local beneficial uses are not impaired, and that the RAP and EPA delisting criteria have been achieved.

The Great Lakes RAP program was formalized by the International Joint Commission (IJC) in the 1987 amendments to the United States-Canada Great Lakes Water Quality Agreement. The Agreement calls for the federal governments, in cooperation with states and provinces, to assure that RAPs incorporate a systematic and comprehensive ecosystem approach towards restoring beneficial uses, and to assure that the public is consulted in the process. The Oswego River RAP accomplishes the principles of the Agreement and Annex 2, addresses the restoration of beneficial uses, and substantiates that inclusive responsible management plan activities will resolve the larger issues of the Oswego River RAP that cannot otherwise be fulfilled within the scope of Oswego RAP process. The rigorous approach applied by the RAC and NYSDEC corroborates the quality environment of the Oswego River and harbor area and ensuing delisting conclusion.

## **II. INTRODUCTION**

The purpose of the Oswego River Remedial Action Plan Stage 3 Delisting document is to provide supporting data and rationale that resolves the use impairment indicators and to confirm that desired beneficial uses have been achieved by the RAP in accordance with guidance and criteria. Stakeholder concerns that go beyond the RAP scope are documented as part of the resolution strategy in other inclusive responsible management plan activities (e.g. Lake Ontario Lakewide Management Plan). Potential upstream and Lake Ontario influences are examples of such concerns. Over the years, Oswego River RAP activities have accomplished the identification, development, implementation, and tracking of remedial strategies and priorities. Now, the Stage 3 Delisting document builds on the previous RAP reports and establishes the specifics to resolve the use impairment indicators. Locally derived endpoints are defined as either having been achieved or being addressed by existing “umbrella” program activities operating in support of the RAP process but on a larger regional geographic area than just the Oswego River Area of Concern.

Significant environmental improvements and high water quality achievements for the Oswego River are documented. Delisting criteria and related concerns are addressed in each of the use impairment indicator resolution strategies. With the indicators and impairments addressed, and the remaining concerns under the purview of identified responsible parties, the RAP has accomplished its goal and therefore the delisting of the AOC is appropriate. Through remedial action and studies we now know that this area, the lower Oswego River and harbor, is no longer an Area of Concern contributing to Great Lake’s use impairments and that the supporting data and rationale for delisting provide for the resolution of the Oswego RAP. In a sense, the Oswego River Remedial Advisory Committee and the RAP have accomplished, to the maximum extent practicable, all they can within the AOC. The causes, sources, and impairments are all addressed and comprehensive ongoing environmental program oversight provides continuing enhancement and protection to the beneficial uses of the Oswego River and harbor area.

## **A. Background:**

The International Joint Commission (IJC) identified 43 Areas of Concern (AOCs) in the Great Lakes drainage basin where pollutants had or possibly are impairing beneficial uses of a waterbody. The Oswego River on the southern shore of Lake Ontario was identified as one of these Areas of Concern because: 1) past industrial and municipal discharges had contributed contamination to the river and sediments, and 2) these pollutants from the river's drainage basin had traveled through the river and harbor to Lake Ontario, adding to that lake's environmental problems.

The 1987 amendments to the United States/Canada Great Lakes Water Quality Agreement (GLWQA) calls for Remedial Action Plans (RAPs) to be developed by the respective governments and for them to make recommendations to correct use impairments in the AOCs. Annex 2 of the GLWQA specifies requirements for developing RAPs. The Annex also provides a list of fourteen indicators of use impairment that serve as a guide for analyzing the pollution problems in each AOC. If any one of the indicators was found to exist or if other related use impairments were identified in the AOC, the causes and sources were to be listed and remedial actions developed and implemented to assure restoration and protection of beneficial uses.

In 1987, as a first step in preparing the Oswego RAP, the New York State Department of Environmental Conservation (NYSDEC) formed a Citizens' Advisory Committee (CAC) that included residents of the Oswego River Basin, industry representatives, outdoor sports enthusiasts, research scientists, environmentalists, and local government persons. They completed their task to define the use impairments and to identify causes and remedial actions for the RAP. NYSDEC staff and the subsequently formed Remedial Advisory Committee (RAC) have continued these efforts in the implementation of the Oswego River RAP. Specific “indicator endpoints” were more recently developed by the RAC (Appendix C- Table 4). These endpoints are in addition to the delisting criteria (Table 5) and details developed previously for the Oswego RAP and delineated in Appendices E and F.

The RAP embodies an aquatic ecosystem approach to restore and to protect the biota and water quality in the Area of Concern. The underlying goal of the RAP has been the restoration and protection of the beneficial uses in the Oswego River Area of Concern to the overall improvement of environmental conditions in the river and in the Great Lakes system. The basis for resolving the impairments in the Area of Concern are: remedial actions implemented in the watershed and AOC, investigation and study results, documentation of the supporting data, and the identification of responsible parties to address ongoing concerns beyond the scope of the RAP process.

## **B. Location:**

The Oswego River and the harbor to Lake Ontario are valuable natural resources for industry, commerce, and recreation in central New York State. The lower Oswego River and harbor area can be characterized as a multiple-use resource consisting of manufacturing and commercial storage facilities, canal navigation locks and charter docks, a marina, restaurants, and services for recreational harbor users and tourists. Tourism and commercial activity generated by the sport fishery are important to the area's economy.

The average water flow into the Oswego Harbor from the Oswego River is 4.2 billion gallons per day. This includes runoff from more than three million acres of urban, rural, and agricultural land. **Figure 1 - The Oswego River Watershed** illustrates the drainage basin with its tributaries that drain a 5,100 square mile watershed, the second largest in New York State. The waters of the Oswego River include the drainage from the hills above the Finger Lakes and treated discharge from sewage treatment plants and industries as far from Oswego as Canandaigua and Ithaca. A dominant urban core (Syracuse and its suburbs) is within the basin, as are eight smaller cities and dozens of villages. There are extensive areas of farmland and forest, and scattered shoreline development.

The health of the entire river system is vital to the more than 1.2 million people who live in the drainage basin. A variety of industries use the Oswego River basin's water for processing, cooling, and discharging treated wastewater. The waters of the river also provide habitat for a variety of fish and waterfowl. The Oswego River is second in size only to the Niagara River as a tributary to Lake Ontario; however, the Niagara delivers approximately twenty times the flow to Lake Ontario. Pollutants carried by the Oswego River also can affect the health of Lake Ontario's ecosystem.

The Oswego River watershed includes the Oswego-Oneida-Seneca three rivers system. Within this very large watershed, significant environmental cleanup and protection activities have been accomplished over the years. The result of widespread remedial measures and protection activities in the watershed has been to mitigate and/or eliminate sources of pollution entering or leaving the Oswego River AOC boundaries that can contribute to or cause local impairments.

Even though the Great Lakes RAPs are to focus to address local Area of Concern sources, the Oswego River RAP has many times expanded its purview to accomplish a watershed approach in resolving potential sources and causes of impairments. With AOC causes addressed, the identification of upstream and regional Lake Ontario responsible parties and remedial measures affirms the delisting of the Oswego River AOC.

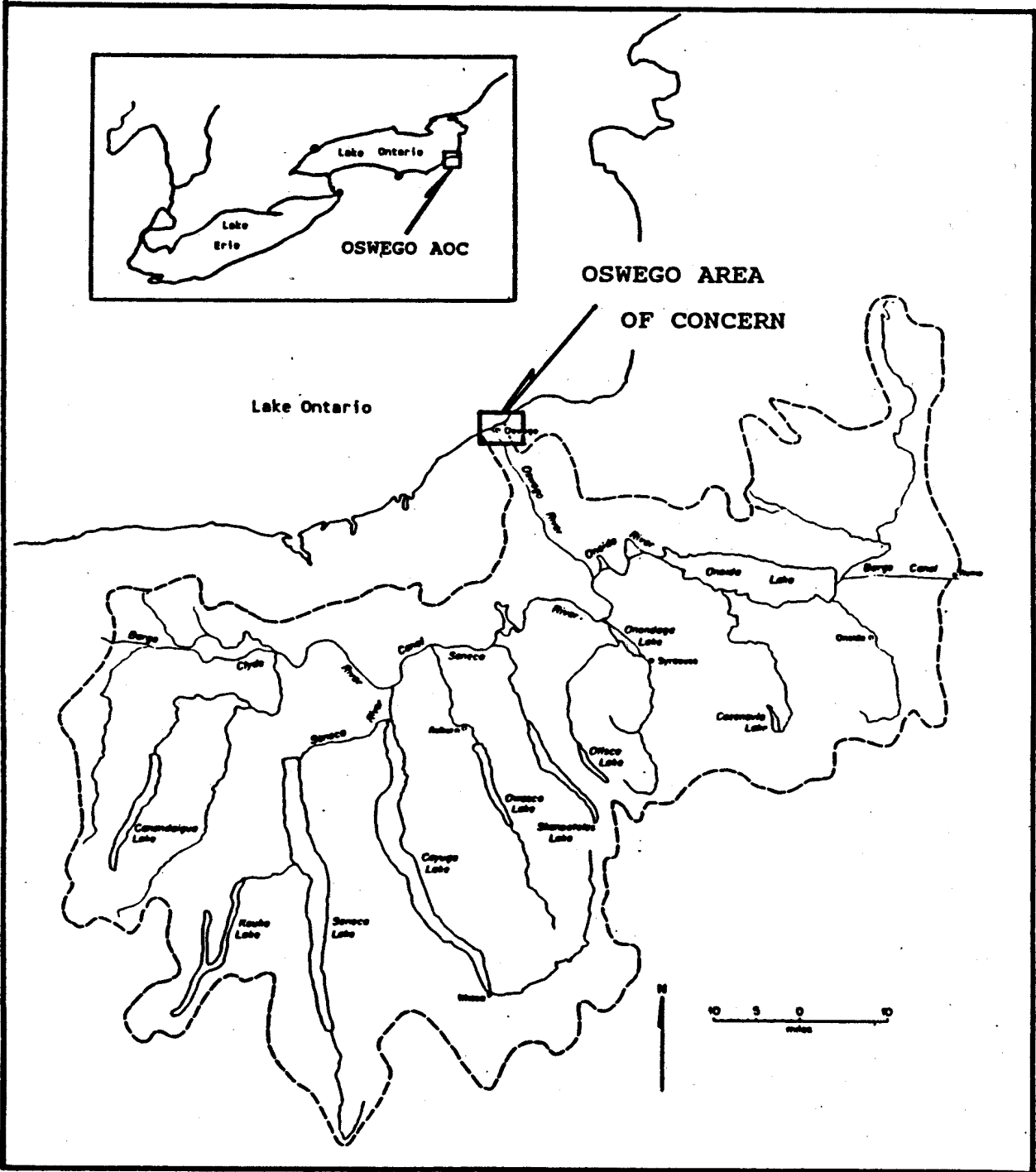


Figure 1 - The Oswego River Watershed

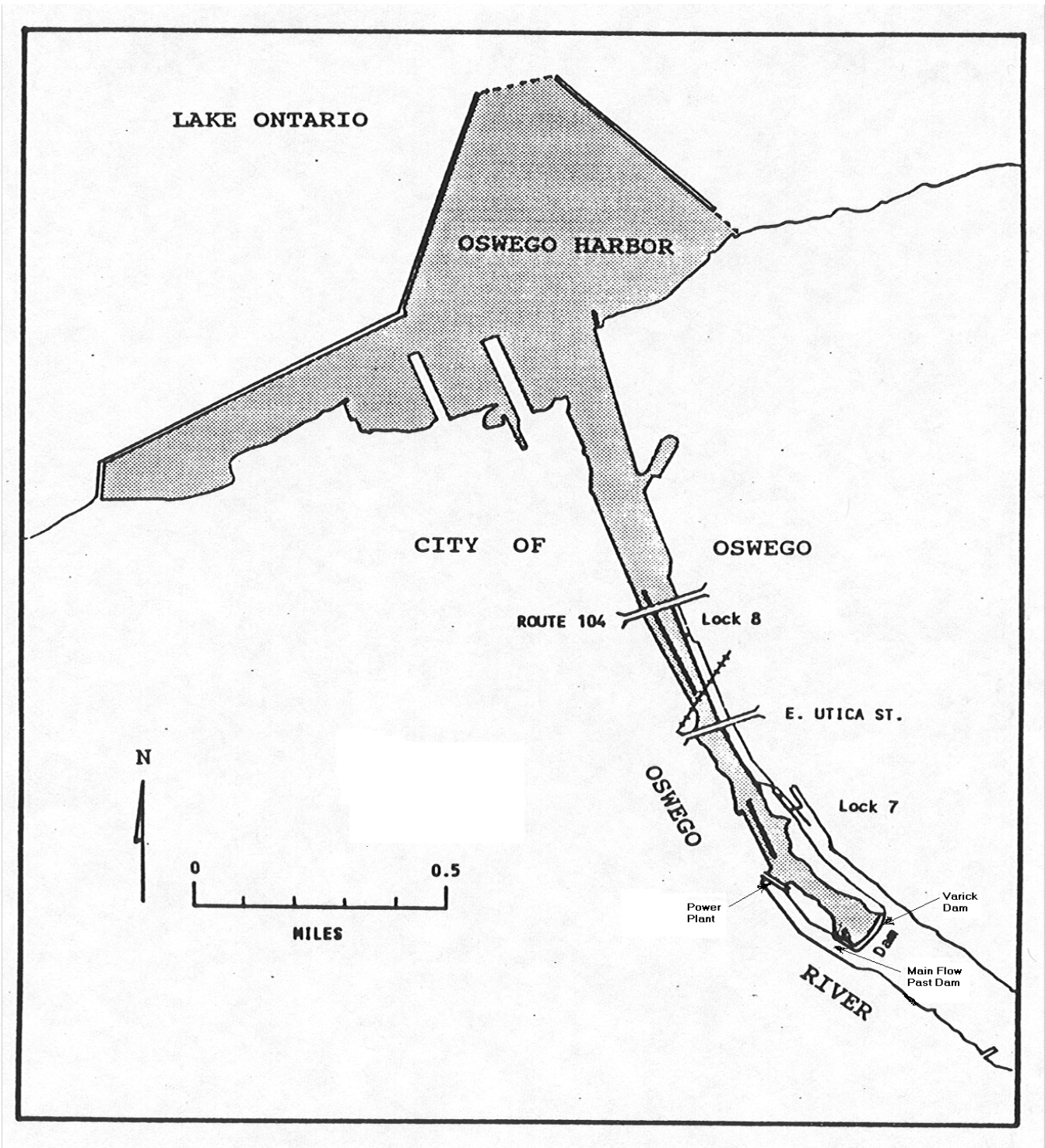


Figure 2 - The Oswego River Area of Concern

The focus of the Oswego River Remedial Action Plan is to resolve the use impairments within the Area of Concern which includes the harbor area and lower Oswego River below the Varick dam. **Figure 2 - The Oswego River Area of Concern** illustrates this area. The Oswego River RAP has identified inputs of pollutants from the Oswego River and its tributaries upstream of the AOC which contributed, or potentially contributed, to impairments in the AOC. Sources and impacts have been addressed. Certain use impairments have been reassessed as not caused by in-place AOC conditions, are related to upstream or downstream influences, and are therefore more appropriately addressed by other management plan activities [e.g. fish advisory addressed the Lake Ontario Lakewide Management Plan (LaMP)]. The LaMP process has also been developed under the Great Lakes Water Quality Agreement and, similar to the RAP process, embraces the fundamental principles of incorporating an ecosystem approach and involving the public in the restoration process. Likewise, watershed issues are to be addressed more appropriately within the framework of ongoing watershed environmental programs.

### **C. The Remedial Action Plan (RAP) Goal:**

The Goal of the Oswego River Remedial Action Plan, as originally established by the Citizens' Advisory Committee (CAC) and the New York State Department of Environmental Conservation (NYSDEC) is three-fold:

- To achieve the purposes of the Great Lakes Water Quality Agreement within the Oswego Area of Concern;
- To restore the water quality of the AOC so that it is capable of supporting swimming and an edible, diverse, and self-sustaining fishery; and,
- To (contribute to\*) the elimination of adverse impacts to Lake Ontario arising from the Oswego-Oneida-Seneca Rivers basin. (\* added to focus on the AOC)

The implementation of ongoing New York State and federal environmental programs that serve to directly achieve this RAP goal include: activities under the State Pollutant Discharge Elimination System (SPDES), New York's Water Quality Classifications and Standards, state and federal Hazardous Waste Remediation Programs, the state Spill Control program, the New York Coastal Management Program, nonpoint source pollution management, multi-media and pollution prevention actions, and activities under the federal Clean Water and Clean Air Acts.

In order to better define and fulfill this multi-faceted goal statement for the Oswego River RAP, the Remedial Advisory Committee (RAC) and NYSDEC needed to define endpoints for the beneficial uses that describe the desired water quality, desired Area of Concern conditions, and desired beneficial uses. The RAC more recently developed and adopted a strategy and endpoints which are delineated in the narrative and table in Appendices B and C respectively. This strategy and endpoints essentially build on and support the earlier developed delisting criteria for the RAP contained in Appendices E and F. Together this information guides the resolution and delisting of each of the use impairment indicators described in detail in Section III of this delisting document.

#### **D. The Remedial Action Plan (RAP) Process:**

The RAP process has accomplished and influenced significant work since an advisory committee formed in 1987. The RAP has embodied an aquatic ecosystem approach to restore and to protect the biota and water quality in the Area of Concern. Implementation of remedial activities, as described in Appendix K that address beneficial uses and protect against threats to human health and the environment, have contributed to the overall improvement of environmental conditions in the Oswego River and to the benefit of Lake Ontario. The Remedial Advisory Committee has applied the ecosystem approach in gathering, understanding, and sharing the knowledge of the Oswego River and harbor area in resolving the use impairment indicators in a most comprehensive manner as detailed herein. Examples of how the committee and NYSDEC influenced and reported on activities while conducting public involvement and the ecosystem approach are further delineated in the Responsiveness Summary to comment #1 in Appendix G.

A Remedial Action Plan is a sequence of steps or a phased process that defines environmental problems and their causes, identifies sources of pollution or disturbances, makes recommendations and implements commitments for remedial measures, and then describes a post-remedial monitoring system to assure protection and document success. Development of a Remedial Action Plan is a three stage process. Each stage has involved the International Joint Commission (IJC) for consultation on content, review comments, and recommendations. IJC reviews of Stage 1 (problem definition), Stage 2 (remedial strategy plans), and finally the Stage 3 (delisting) for the Oswego RAP are complete. An evaluation and strategy response to the Stage 1 and Stage 2 IJC comments is contained in the 1996 Update document. IJC's Letter of Support for the delisting the Oswego River AOC was sent to USEPA Region 2 on June 7, 2005.

The Stage 3 document addresses a consultation process (by the lead agencies, local representatives, and the public) as described herein in Table 3 in Section IV.B entitled Delisting Steps. Broad consultation involving USEPA and IJC, as well as public and peer group review, has been a key part of the preparation for the final Stage 3 document. A responsiveness summary addressing comments has been developed as Appendix G. All substantive changes have been made to the document. With these items addressed, this final Stage 3 RAP document has been prepared to complete the consultation with USEPA, IJC, and stakeholders. Finally, a USEPA statement letter of delisting to the federal Department of State (DOS) is planned, upon which the USDOS is to act on formal delisting.

Highlights of the three stages of the Oswego RAP are described below:

- **Stage 1** - Stage 1 of the Oswego RAP described the environmental problems and the use impairments of the Area of Concern, the pollutants causing the impairments, and the sources of those pollutants. The Stage 1 document was completed in February 1990 by NYSDEC and the Citizens Advisory Committee (CAC). It identified the key AOC use impairment indicators as involving fish consumption restrictions, degradation of fish habitat / population, and eutrophication / algae. (A comprehensive summary of the Stage 1 and Stage 2 RAP is contained in the Oswego RAP 1996 Update.)

- **Stage 2** - Stage 2 in the RAP process described ongoing remedial activities and strategy plans, prioritized investigations, recommended remedial actions, made specific remedial commitments, and described methods for monitoring remedial progress in the AOC. The Stage 2 RAP was completed in June, 1991. Remedial strategies were then further developed and detailed, and kept current, in periodic RAP Update documents. The remedial strategies incorporated an ecosystem approach and addressed the goal to restore the water quality within the Oswego Harbor/River and to prevent adverse impacts to Lake Ontario from pollutants carried by the Oswego River.

Following the completion of the Stage 2 RAP, a Remedial Advisory Committee (RAC) was formed to assist NYSDEC in the RAP implementation process. Much like its predecessor (the CAC), the RAC is representative of concerned groups and individuals within the community that have an interest in the Oswego River Area of Concern. In addition to RAC members, government agencies at the local, state, and federal levels have been informed and involved in RAP remedial activities.

- **Stage 3** - This Stage 3 Delisting document for the Oswego RAP was prepared because significant progress has been achieved in documenting the resolution of the use impairment indicators. Conducting extensive investigations, studies, and ongoing monitoring activities as well as implementing required remedial measures have all been active elements of the strategy to achieve the RAP Stage 3 goal of restoring and protecting beneficial uses. As remedial activities have been implemented, restoration of beneficial uses has occurred, and a success story has emerged on which the Stage 3 document is based. The Indicator Status Resolution Table and narrative summaries describing the resolution of each of the fourteen IJC indicators are presented in Sections III.A and III.B respectively.

This Stage 3 document provides the data to show that the water quality in the AOC is not impaired and that use impairments are addressed. The RAP Process can identify, however it cannot alone provide, the solution to the issues of fish consumption, habitat and population loss. Consistent with the AOC delisting principles and guidance, the resolution of these impairment indicators is part of larger management plans. The goal of the RAP has therefore been achieved to the maximum extent practicable and the final resolution strategy and activities to address fish consumption, habitat and population loss is now part of these larger plans. Within the Oswego River Area of Concern, achieving the endpoints for these fish impairments is being addressed respectively by the Lake Ontario Lakewide Management Plan (LaMP) and the provisions of the Federal Energy Regulatory Commission (FERC) power dam license for the Oswego River and Varick power dam.

Likewise, the resolution of the concern and the control of watershed nutrient input in the Oswego River drainage basin regarding the creation of eutrophic / algae conditions is based on the continuation and improvement of in-place measures to limit all watershed sources. With beneficial uses not impaired in the AOC, nuisance and aesthetic characteristics are balanced with aquatic life development. Assessment determines that the Oswego River RAP

accomplishes the principles of the Agreement, addresses restoration of beneficial uses, and substantiates that inclusive management plan activities resolve the remaining concerns of the Oswego River RAP that cannot otherwise be fulfilled within the Oswego RAP process.

Overall, many persons have contributed to the Oswego River RAP process through the years. These persons are acknowledged following the member listing in Appendix A. This Stage 3 document is posted on NYSDEC external website at: <http://www.dec.state.ny.us/website/dow/oswdlist.html> with an introduction entitled *Dramatic Pollution Cleanup Takes Oswego Harbor Off Remediation "To Do" List*. In addition, USEPA posts summary information on AOCs including the Oswego River RAP at the website: [www.epa.gov/glnpo/aoc/](http://www.epa.gov/glnpo/aoc/).

#### **E. Delisting Document Synopsis - Stage 3:**

In the 1990 Stage 1 RAP publication, specific descriptions addressing the use impairment definitions are presented in detail. A summary of the status of the Stage 1 use impairment indicators, their causes, and the sources of contamination is provided in RAP Update reports. The 1991 Stage 2 RAP publication presents an evaluation and determination of initial remedial activities, environmental control programs, recommendations and commitments. The subsequent RAP Update documents in 1996 and 1999 report on RAP implementation, showing the status of ongoing and planned remedial activities and strategies. In the 1999 Update, Table 4 best summarizes this remedial information.

In this Stage 3 document, a comprehensive summary of the environmental programs providing remedial activity updates affecting the AOC is provided in Appendix K. Section II of this Stage 3 document, summarizes the AOC location, RAP goals, and the RAP Process. The newly developed **Table 1** addresses the IJC Water Quality Agreement Annex 2 requirements. A description of the surveillance and monitoring processes used to evaluate beneficial uses is included. In Section III, the resolution for each of the fourteen IJC Use Impairment Indicators is provided. Each indicator has an introductory narrative followed by topic statements addressing the resolution, supporting data, and rationale for delisting. **Table 2** summarize the resolution of the indicators and includes key information on the definition of impairment endpoints as developed by the advisory committee, original indicator status, revised indicator status, responsible parties, and the supporting data and rationale for each indicator.

Section IV of this Stage 3 document describes the delisting principles and guidance applied to the Oswego RAP, lists the next step activities to accomplish the Stage 3 delisting (**Table 3**), and identifies post-delisting responsibilities. Achieving these next steps completes the formal delisting process. The responsible parties with their activities and commitments are identified to address post-delisting concerns. A continuation of stakeholder input is assured through the identified responsible parties and their existing framework programs and initiatives.

The Appendices contain a listing of the members of the Remedial Advisory Committee, the delisting strategy and endpoints developed by the committee, details of delisting criteria guidance, and updates on remedial activities. The “Use Impairment Indicator Strategy Management Forms” have been completed to show the specific strategies. Descriptions of the Marsh Monitoring Program (MMP) methods/results and the Watershed Restoration and Protection Action Strategies (WRAPS) programs are included. Lists of references and acronyms are provided. A responsiveness summary (Appendix G), description of the power dam license provisions (Appendix J), and copies of the handout slides from a Power Point presentation delisting summary (Appendix P) completes the Stage 3 delisting document. The later parts of the Appendices (K through P) are in a separate document.

#### **F. Addressing IJC Delisting Requirements - Table 1:**

The Great Lakes Water Quality Agreement, Annex 2, as amended in 1987 by the United States and Canada through the International Joint Commission, requires that RAPs include:

- ❶ a process for evaluating remedial measure implementation and effectiveness, and
- ❷ a description of surveillance and monitoring processes to track the effectiveness of remedial measures and the eventual confirmation of the restoration of uses.

**Table 1** addresses these Great Lakes Water Quality Agreement requirements by summarizing the remedial measures and monitoring processes conducted and ongoing to accomplish the conditions that assure restoration and protection of the AOC. The processes are summarized in Table 1 and described in detail for each of the fourteen IJC indicators on in detail in Section III pages 16 to 70.

Details on remedial measures, supporting data, and resolution statements for each indicator confirm that any AOC causes are addressed and that delisting criteria are achieved. Further, responsible parties and ongoing programs and initiatives are identified to address (non-AOC) watershed and Lake Ontario concerns expressed under the RAP process.

**Table 1** is presented on the following three pages containing three key columns of information for each of the indicators. The first column describes ❶ a process for evaluating remedial measure implementation and effectiveness. The second column describes ❷ the surveillance and monitoring processes to track the effectiveness of remedial measures. The last column contains the resolution statement for the indicator summarizing the supporting data and rationale for delisting.

In the surveillance and monitoring processes column ❷, there are numbers in brackets in the lower right corner. These numbers are keyed to identify actual studies referenced at the end of the third page of the table. Specifics from these studies are cited in the details presented in Section III of this Stage 3 document addressing each of the beneficial use indicators.

**Table 1 - Addressing IJC Stage 3 Requirements**

The Great Lakes Water Quality Agreement, Annex 2, Sections 4.(a)(vii) and (viii) requires RAPs for AOCs to include:

- ① a process for evaluating remedial measure implementation and effectiveness,
- ② a description of surveillance and monitoring processes to track the effectiveness of remedial measures and the eventual confirmation of uses

IJC Use Impairment Indicator	① Remedial Measures Evaluation	② Surveillance and Monitoring Processes	Resolution Status
1.Fish & Wildlife* Consumption Restrictions	Fish monitoring data are collected and consumption advisories are assessed and established by New York State Agencies and reported under the Lake Ontario LaMP.	Annual young-of-year fish samples and routine fish flesh data provide the basis for chemical evaluation and risk assessment for health advisories. [1]	Lake Ontario LaMP to address. Fish consumption advisories are not specific to the AOC, but are Lake Ontario lakewide or upstream (out of AOC) advisories.
2.Degradation of Fish & Wildlife* Populations	The beneficial use is linked to the larger Lake Ontario and constructed power dam operation. The FERC power dam license provisions address dam impacts; the LaMP addresses lake impacts.	Fish population is dependent on links to Lake Ontario and the presence of the power dam. The FERC license assures good operation and strictly limits impact on the fish community. [2]	FERC power dam license requires run-of-river flow to resolve fish access and any AOC impact or cause. With restored conditions, the fish pop. is dependent on Lake Ontario, otherwise beyond RAP scope.
3.Loss of Fish & Wildlife* Habitat	Historic fish habitat impact to spawning area below the dam is remedied by FERC license and “run-of-river” flow provisions providing fish access and assuring restored conditions.	Dam impact on fish habitat to be fully addressed and restored by FERC license requirements (Appendix J). No local sources. Not a contamination issue. Wildlife habitat not impaired. [2]	FERC license restores habitat by required river flow during spawning. With restored flow/ fish access/ and conditions, fish community is dependent on Lake Ontario, otherwise beyond RAP scope.
4.Eutrophication or Undesirable Algae	Water quality standards achieved; Beneficial use goals met and maintained; No persistent water quality problem due to cultural eutrophication.	Water quality survey results do not indicate eutrophic conditions; No undesirable weeds or algae present (See Aesthetics indicator for weeds nuisance) [3]	Not Impaired - (seasonal algae observed in lock area is not a natural part of the AOC environment; weeds constitute a managed nuisance condition)

**Table 1 - Addressing IJC Stage 3 Requirements** - continued

IJC Use Impairment Indicator	① Remedial Measures Evaluation	② Surveillance and Monitoring Processes	Resolution Status
5.Degradation of Benthos	Water quality standards achieved; Beneficial use goals met and maintained; No benthos impairment.	Benthic community structure study shows integrity substantially similar to reference communities [4]	Not Impaired - (monitoring data supports)
6.Fish Tumors or Other Deformities	Study shows no abnormal incidence of tumors or deformities observed.	Fish Pathology Study indicates no impairment; AOC equal to or better than reference populations [5]	Not Impaired - (monitoring data supports)
7.Bird or Animal Deformities or Reproductive Problems	Marsh Monitoring Program (MMP) shows no impact; healthy presence of amphibians and birds	Comparative evaluation of deformities and reproductive problems in reference populations indicate no abnormal incidence [6]	Not Impaired - (monitoring data supports)
8.Degradation of Aesthetics	Oswego Harbor Survey shows not impaired. Best uses maintained and intact.	No floatable materials or odors evident; Weed control addressed to non-nuisance level by weed harvesting [3]	Not Impaired - (monitoring data supports)
9.Degradation of Plankton Populations	Harbor Survey shows no impairment. Overall, plankton are healthy and characteristic of riverine environment.	Comparative evaluation of plankton populations to reference populations indicates substantially similar. [3]	Not Impaired - (monitoring data supports)
10.Restrictions on Dredging Activities	Harbor Survey and recent Sediment Study show no impairment; No US Army Corps of Engineers restrictions on dredging.	Navigational dredging approved and Water Quality Certification issued; includes Lake Ontario placement of dredged materials. [3] and [7]	Not Impaired - (monitoring data supports; upstream sediments are not a cause or source of AOC impairment)

**Table 1 - Addressing IJC Stage 3 Requirements** - continued

IJC Use Impairment Indicator	① Remedial Measures Evaluation	② Surveillance and Monitoring Processes	Resolution Status
11. Beach Closings	Water Quality Survey results support status for recreational water use in the AOC although no beaches present.	There are no public beaches in the AOC; Secondary contact is safe and not restricted; boating and fishing uses are supported.	Not Impaired - (not applicable to AOC)
12. Tainting of Fish and Wildlife Flavor	Fish study and community observation confirms no impairment of AOC beneficial use.	Fish Pathology Study supports no evidence of fish tainting; no other abnormality observed.	Not Impaired - (no tainting present)
13. Drinking Water Restrictions, Taste and Odor Problems	No drinking water source in the AOC; studies support other beneficial water uses.	Oswego Harbor Survey and RIBS studies identify no water restrictions, taste, or odor problems [3] and [4]	Not Impaired - (no drinking water source)
14. Added Costs to Agriculture or Industry	Water quality standards achieved; Beneficial use goals met and maintained.	AOC water quality studies identify no abnormal costs to agriculture or industry.	Not Impaired

- [1] = NYSDOH 2005-2006 Health Advisories; NYSDEC Annual Young-of-Year Fish data report
- [2] = Monitoring addressed as part of larger management plans (i.e. Lake Ontario LaMP; FERC license)
- [3] = NYSDEC, 1994, Oswego Harbor Survey
- [4] = NYSDEC, 1999, Rotating Intensive Basin Studies (RIBS) and Water Quality trend studies
- [5] = Jan Spitsbergen, 1995, Fish Pathology Study
- [6] = Environment Canada, Birds Study Canada, and EPA, 1999, Marsh Monitoring Program.
- [7] = NYSDEC, 1997, Oswego River Sediment Study
- \* = Use Impairments for the Oswego River AOC involves only fish (i.e. no wildlife impact identified)

## **G. Surveillance and Monitoring Processes:**

The New York State Department of Environmental Conservation maintains routine and special monitoring activities as part of implementing “core” Environmental Quality Programs in the areas of Water, Air Resources, Solid and Hazardous Waste, Remediation, Spills, and Multi-Media Pollution Prevention. Point and nonpoint sources of pollution are addressed. Inspection and sampling activities are included and are backed up by strong law enforcement.

In the Division of Water, the Rotating Intensive Basin Survey (RIBS) program, as well as special purpose monitoring, provides data and documents trends over a wide range: 1) ambient water quality including conventional and toxic parameters, 2) biological sampling including macroinvertebrate community assessments, toxicity testing, and some fish tissue analysis, and 3) bottom sediment analysis. Under RIBS for the Oswego River AOC, results of water quality and macroinvertebrate tissue analyses indicate predominately non-detects with no action level exceedences. Toxicity testing exhibits no significant mortality or reproductive impairment. In the RIBS study, the benthic community indicates only a slight impact upstream of the AOC, and in a focused study no impact in the AOC. A description of the RIBS program activities is location in Section III.B.5 (re: benthos indicator) herein. Water quality and sediment studies related to toxics are reported in Section III.B.10 (re: dredging indicator). Aquatic plants, algae, and nutrients are addressed in Section III.B.4 (re: eutrophication).

The point source discharge permitting, inspection, and monitoring program provides a regulatory presence to assure the protection of receiving waters. In addition, remedial measures conducted in the Oswego River drainage basin have addressed many nonpoint sources. Examples of activities that reduce and limit pollutants include the implementation of Best Management Practices (BMPs) in the watershed, regulations for confined animal feeding operations, agricultural nutrient and pesticides application requirements, and erosion controls. County Soil and Water Conservation Districts and Water Quality Coordinating Committees, in Oswego and upstream counties, act on environmental projects and assure protective oversight of the Oswego River receiving waters. Hazardous waste site remediation removes the discharge of related non-point source toxic pollutants. Pollution prevention activities accomplish the use of non-polluting materials in manufacturing and the mitigation or ending of the use of certain toxic pollutants of concern by industry. Details of remedial activities are reported on in nine major environmental program areas outlined in Appendix K. References are listed in Appendix H.

Bird and reptile studies conducted around Lake Ontario by concerned citizens have helped to document healthy communities in and surrounding many areas including Oswego (re: Canadian Bird Studies and the Marsh Monitoring Program). Methods and results of these bird and reptile studies are presented in Section III.B.7 (re: bird and animal indicator) and Appendix M. Also in Section III.B, fish consumption advisories are reported under indicator #1; results of progress on the restoration of eagle wildlife in the basin are reported under indicator #2; provisions of the Varick dam license are reported under indicator #3; results of the water quality survey are reported under indicator #4; benthic study results are reported under indicator #5; fish pathology or tumor study results are reported under indicator #6; the aesthetic survey is reported under indicator # 8; plankton data are reported under indicator #9; and sediment studies results are reported under indicator #10. Although four indicators

are not applicable to the Oswego AOC (including beach closings, fish flavor tainting, drinking water restrictions, and added costs to industry or agriculture), the data evaluated to support these conclusions are reported under use impairment indicators #11 through #14. Overall, with the beneficial uses and impairment concerns addressed for the AOC, the described delisting for the Oswego River RAP is therefore a true success story.

### III. USE IMPAIRMENT INDICATOR DELISTING

As an introduction to addressing the fourteen indicators for the Oswego RAP, the interrelationship of the harbor to Lake Ontario is worth noting. The Oswego River AOC and Lake Ontario have changed significantly since the Stage 1 document for the Oswego RAP was first released in 1990. Reductions in nutrient loading and the colonization of zebra and quagga mussels have changed nearshore habitat through greater water clarity, which has promoted increased macrophyte growth. Walleye have been steadily expanding and spreading throughout eastern Lake Ontario, including the Oswego Harbor. Emerald shiners and three-spine sticklebacks, relatively uncommon in 1990, are abundant today. Offshore, a restructuring of food webs that appears to be having profound effects on the lakewide fish community structure is underway. Recent research has revealed that reproductive impairments in trout and salmon species are linked to thiamine deficiencies, most likely of dietary origin. The dynamic nature of the Lake Ontario ecosystem indicates the necessity for adaptiveness and flexibility in planning initiatives. As described below, many remedial measures and management activities involving the Oswego River RAP have provided information with results to evaluate, address, resolve, and protect the beneficial uses for the AOC.

**Table 2 - Use Impairment Indicator Resolution** has been developed to summarize the delisting of the fourteen IJC use impairment indicators. The table columns provide summary information only on impairment endpoints, original indicator status, delisting indicator status, responsible parties, and the supporting data and rationale for resolution of the impairments. Table 2 incorporates input from the Use Impairment Indicator Sub-Committee (of the Oswego River RAP Remedial Advisory Committee) on the definition of desired endpoints that serve to resolve the use impairment indicators. These endpoints summarize a description of the restoration of best uses in order to delist an indicator. The details for the development of the indicator endpoints by the committee are contained in Appendices B and C (re: committee strategy and endpoints Table 4). Further delisting criteria are described in Appendices E and F (re: summary Table 5 and delisting criteria details).

**Table 2** shows the original status of the use impairment indicators from the 1990 Stage 1 RAP and the resolved status of each indicator in order to accomplish delisting of the Area of Concern. The resolution of each indicator is corroborated by a summary description of the supporting data and the rationale to document that the beneficial use has been addressed. The resolution for each of the use impairment indicators for the Oswego RAP are described in detail in this Section III in the following fifty pages:

## **A. Indicator Status Resolution -Table 2:**

Over the years, the waters and river bottoms of the Area of Concern have been affected to some degree by industrial and municipal discharges, physical disturbances including dam construction, upstream sources including nonpoint source discharges, and atmospheric deposition. The Stage 1 RAP identified watershed discharges and contaminated sediments (upstream of the AOC) as the major potential sources of contaminants to the AOC and Lake Ontario. Hazardous waste sites and point source discharges identified in the watershed have been and continue to be eliminated and corrected. Sources noted as nonpoint or diffuse sources from the watershed have also been addressed. Causes and sources are identified in the indicator resolution narratives after Table 2 and in tables presented in the 1996 and 1999 Update documents.

The fourteen beneficial use impairment indicators, developed by the International Joint Commission (IJC) in Annex 2 of the Great Lakes Water Quality Agreement of 1987, were evaluated in the Oswego River Stage 1 RAP document. Largely due to their connection to the surrounding watershed and lake, four of the indicators were identified as impaired and five other indicators were identified as possible or unknown and therefore needing additional study. The remaining five indicators were evaluated as not impaired and, after further current review by the Remedial Advisory Committee, remain with this not impaired status. After nearly fourteen years of conducting studies and influencing remedial measures affecting the AOC, its watershed, and the Lake Ontario region, the RAP participants recognize results of an AOC “rebirth”. The local government and community has dramatically rehabilitated the AOC shoreline. The clean up efforts by ongoing management plan activities has restored and now protects the beneficial uses. The Oswego River AOC is no longer on a remediation “to do” list.

**Table 2** summarizes a description of the supporting data and rationale for the resolution of each of the use impairment indicators for the Oswego River RAP AOC. Within the Area of Concern, achieving the endpoints for the fish habitat/ populations indicators and the fish consumption indicator is being addressed respectively by the Federal Energy Regulatory Commissions (FERC) power dam relicensing requirements and the Lake Ontario Lakewide Management Plan (LaMP). These inclusive management plan activities address the larger issues of the Oswego River RAP that cannot otherwise be fulfilled within the Oswego RAP process. The remaining indicators have been resolved to a “not impaired” status. For all the indicators, responsible parties are identified for ongoing activities and/or post remedial concerns and responsibilities.

In the following summary table and Section B, each of the fourteen IJC use impairment indicators for the Oswego RAP are addressed. The beginning introductory statements are followed by statements on the resolution, then the supporting data, and finally the rationale. Together, these statements establish the basis for the indicator resolution and delisting. The workshop conducted in 1998 contributed significantly to moving the evaluation of the RAP indicators forward to address the resolution of each indicator. Details on the indicator evaluation strategy and indicator endpoints table, as developed by the Remedial Advisory Committee, are contained in Appendices B and C. Together, Table 2 and the following narrative statements for each of the use impairment indicators (listed in the following section under items #1 to #14) provide the description to resolve the use impairment indicators, document that impairments are addressed, and establish the restoration and protection of beneficial uses.

**Table 2 - Use Impairment Indicator Resolution**  
*Endpoints, Status, and Responsibilities*  
 Oswego River Remedial Action Plan

<b>IJC USE IMPAIRMENT INDICATOR</b>	<b>END-POINTS</b>	<b>1990 RAP STATUS</b>	<b>2002 DELISTING STATUS</b>	<b>Responsible Parties</b>	<b>RESOLUTION Supporting Data and Rationale</b>
1. Fish and Wildlife * Consumption Restrictions	Removal of lakewide fish consumption advisory (for humans)	Impaired- (for fish only; due to lakewide fish advisory; not wildlife)	Lakewide Management Plan addresses. (advisory not caused by, or specific to AOC; no AOC source)	NYSDEC; USEPA (and Canada); DFWMR; NYSDOH.	Lakewide fish advisory (not caused by or specific to the AOC). The use impairment is to be addressed in the Lake Ontario LaMP monitoring, trackdown, and corrective actions. (advisory never was specific to AOC)
2. Degradation of Fish and Wildlife * Populations	Populations substantially similar to reference communities	Impaired- (fish only; linked to indicator #3 habitat)	FERC license provisions address. (not due to local sources; wildlife not impaired)	FERC; USFWS; NYSDEC; DFWMR; OCWQCC.	Restoring river flow resolves fish access/ conditions in habitat area below the Varick Dam; resolved by FERC provisions. (AOC fish population ultimately related to dam construction and Lake Ontario fish populations).
3. Loss of Fish and Wildlife * Habitat	No restricted use of fish habitat from flow or contamination	Impaired- (due to periodic dry areas below dam for fish only)	FERC relicense provisions address. (not due to local sources; wildlife not impaired)	FERC; USFWS; NYSDEC; DFWMR; OCWQCC; Industry.	Original impact due to physical change from dam construction and operation; (FERC license requires flow and access to spawning area to address fish habitat / population degradation; no further action pending. Compliance, monitoring, and evaluation by parties).
4. Eutrophication or Undesirable Algae	No persistent WQ problem due to cultural eutrophication; WQ stds. met; Beneficial use goal met and maintained.	Impaired- (due to historical nutrient inputs)	Not Impaired- (actions to limit nutrients resolve and protect against further use impairment)	NYSDEC; OCWQCC; OCSWCD; EMC	1994 Oswego Harbor Survey indicates no eutrophication conditions or impairment; no further action pending. See aesthetics indicator for weed control and exotic species concerns. Nutrient input has been limited by point source reductions and NPS watershed protection activities.

<b>IJC USE IMPAIRMENT INDICATOR</b>	<b>END-POINTS</b>	<b>1990 RAP STATUS</b>	<b>2002 DELISTING STATUS</b>	<b>Responsible Parties</b>	<b>RESOLUTION Supporting Data and Rationale</b>
5.Degradation of Benthos	Community integrity substantially similar to reference communities.	May Exist- (no known cause, low confidence)	Not Impaired- (no significant cause or impact found)	NYSDEC; OCWQCC; OCSWCD; EMC	1997 EPA/DEC Sediment Study results indicate no significant impact; RIBS report documents water quality improvement and no significant benthic impact. Regulatory presence resolves and protects beneficial use.
6.Fish Tumors or Other Deformities	No abnormal high incidence of tumors or deformities.	May Exist- (no known cause, low confidence)	Not Impaired- (study found no significant evidence)	NYSDEC; DFWMR; NYSDOH; USFWS	1995 Fish Pathology Study indicates little impairment; better than controls. (further study to look at reproduction of resident AOC fish not warranted)
7. Bird or Animal Deformities or Reproductive Problems	No abnormal high incidence of deformities or reproductive problems	May Exist- (low level toxics may cause; no evidence; and low confidence)	Not Impaired-	OCWQCC; NYSDEC; DFWMR; NYSDOH	1999 Marsh Monitoring Program (MMP) in the area shows no impact. No significant impairment attributable to reproductive problems. Healthy presence of Amphibians and Birds; Fish addressed above.
8.Degradation of Aesthetics	Floatables and odors absent or min. presence. Weed control and exotic species to non-nuisance levels.	May Not Exist- (low confidence)	Not Impaired- (Nuisance conditions managed)	OCSWCD; OCWQCC; NYSDEC; EMC	From 1994 Oswego Harbor Survey. Study indicates no floatables or odor impairment. Weeds / invasive plants routinely harvested with no significant AOC impact (e.g. in harbor at Wright's Landing). Best uses maintained and intact. Zebra mussels reduce nutrients.
9.Degradation of Plankton Populations	Plankton Populations substantially similar to reference communities.	Unknown- (no known cause)	Not Impaired-	OCWQCC; NYSDEC	1994 Oswego Harbor Survey indicates not impaired. Plankton populations in comparison to references indicate no significant impact. Overall healthy and characteristic of riverine environment.
10. Dredging Restrictions	No Army Corp of Engineers dredge restrict.	Not Impaired- (high confidence)	Not Impaired-	USACE NYSDEC	Maintenance dredging not impaired; Recent dredging permit confirms. Study results support; no further action pending.

<b>IJC USE IMPAIRMENT INDICATOR</b>	<b>END-POINTS</b>	<b>1990 RAP STATUS</b>	<b>2002 DELISTING STATUS</b>	<b>Responsible Parties</b>	<b>RESOLUTION Supporting Data and Rationale</b>
11. Beach Closings	All AOC beaches open to swimming.	Not Impaired- (not AOC applicable)	Not Impaired	NYSDOH; OCWQCC; NYSDEC	No beach in AOC; not applicable and no impairment. Water Quality Survey results support status for secondary-contact recreation in AOC waters.
12. Tainting of Fish and Wildlife Flavor	No evidence of fish and wildlife tainting.	May Not Exist- (low confidence)	Not Impaired	NYSDOH; NYSDEC; USFWS; OCWQCC	1995 Fish Pathology Study by Jan Spitsbergen further supports this status.
13. Drinking Water Restrictions, Taste and Odor Problems	No drinking water restrictions or taste and odor problems.	Not Impaired- (not AOC applicable)	Not Impaired	NYSDOH; NYSDEC; OCWQCC; OCSWCD; EMC	No drinking water source in AOC. Not applicable and no impairment. Water Quality Survey supports good water quality for other best uses.
14. Added Costs to Agriculture or Industry	No abnormal added costs to agriculture or industry.	Not Impaired- (high confidence)	Not Impaired	NYSDEC; OCWQCC	1994 Oswego Harbor Survey supports this status.

Responsible Party Identification Key:

- NYSDEC - New York State Department of Environmental Conservation
- NYSDOH - New York State Department of Health
- USEPA - United States Environmental Protection Agency
- OCSWCD - Oswego County Soil and Water Conservation District
- OCWQCC - Oswego County Water Quality Coordinating Committee
- EMC - Environmental Management Council (Oswego County)
- USACE - United States Army Corps of Engineers
- USFWS - United States Fish and Wildlife Service
- DFWMR - NYSDEC's Division of Fish, Wildlife, and Marine Resources
- FERC - Federal Energy Regulatory Commission
- \* - Use Impairments for Oswego RAP involve only fish (i.e. No wildlife impairments identified for the AOC)

## **B. Indicator Resolution:**

A primary use impairment indicator identified is “restrictions on fish consumption”. The fish advisories are specific to the entire Lake Ontario region based on lakewide fish consumption for humans. The advisories relate to the Oswego River AOC in that the harbor and lower river are connected to the lake; however, the advisories are not specific to the AOC and are not due to any identified resident fish or AOC source of contamination. The primary cause contributing to this lakewide impairment is the presence of PCBs in fish flesh. Issues involving Mirex and dioxin also contribute to the lakewide fish impairment advisory. Other important use impairment indicators involving “loss of fish habitat” and “degradation of fish populations” are associated with the physical disturbances on the river involving the construction/ presence of the dam and the maintenance of sufficient river water flow in an area immediately below the Varick dam.

Results of specific Oswego River AOC studies are presented and cited herein. Report documents are also referenced to the Appendices. Studies involving water quality, sediment, and fish pathology provide supporting data for the reassessment of the following indicators: eutrophication or undesirable algae, degradation of benthos, fish tumors or other deformities, degradation of aesthetics, and degradation of plankton populations. The resolution of these indicators is established below. Clearly, PCBs have been a main cause involving use impairments concerns in the Oswego River AOC. Other pollutants causing concern include Mirex, dioxin, and nutrients (phosphorus).

The identified known and potential sources of the causes of the use impairments have included: upstream point and nonpoint sources, inactive hazardous waste sites, contaminated sediments, erosion, atmospheric deposition, Lake Ontario, and water levels below the Varick dam. In the Oswego River watershed, activities are well underway to address the remediation of all hazardous waste sites (including those in the watershed at Onondaga Lake). The FERC relicensing of the Oswego River power dams including the Varick dam just above the AOC embodies the provisions of the completed Settlement Agreement. The provisions of the settlement address several impairments by establishing a modified “run-of-river” flow that contributes to beneficial use restoration and protection.

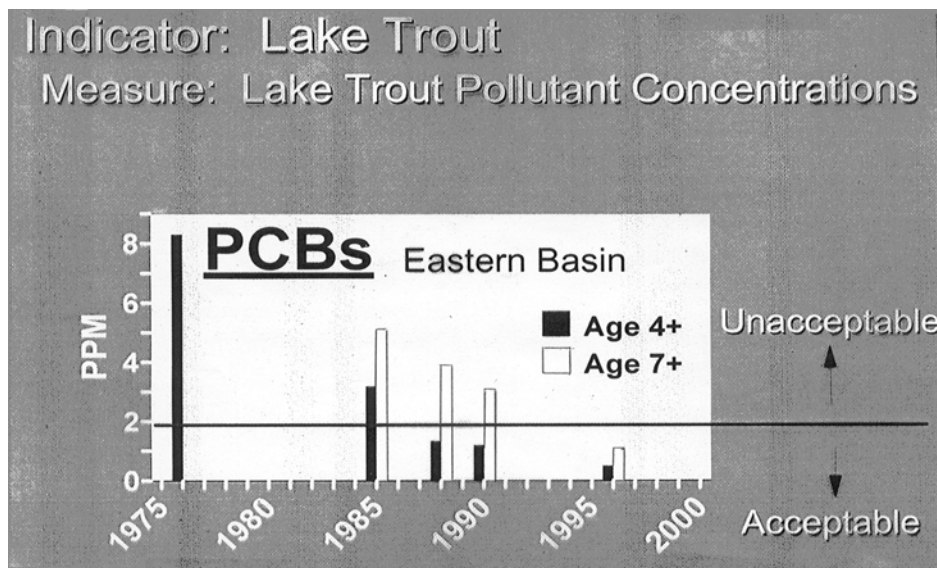
For each of the fourteen indicators discussed below, an introductory narrative has been developed and is followed by statements on: resolution, supporting data, and rationale.

### **1. Fish and Wildlife\* Consumption Restrictions**

A fish consumption advisory was identified in Stage 1 as caused by PCBs, Mirex, and dioxin as part of a Lake Ontario lakewide health advisory (for lakewide sportfish consumption by humans). This advisory is not now nor ever was specific to the AOC. The causes and sources were not identified as in the Area of Concern and were attributed to upstream industrial discharges, inactive hazardous waste sites, contaminated sediments, air deposition, and Lake Ontario. Hence, the advisory addresses migratory fish entering the AOC. [\* indicates a wildlife advisory was not identified for the AOC.]

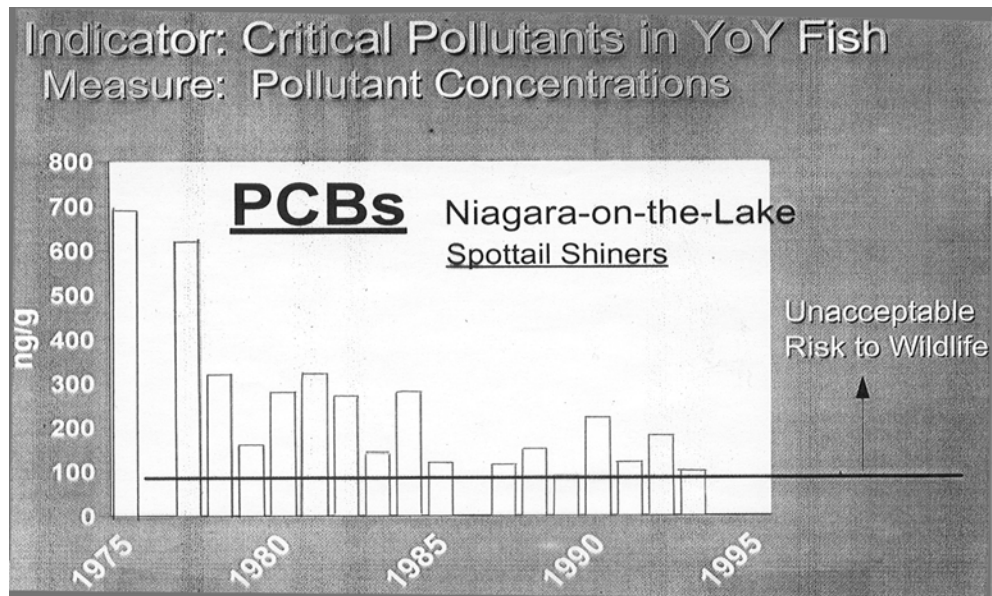
The implementation of municipal and industrial corrective actions regarding point and nonpoint sources of pollutants in communities throughout the Oswego River drainage basin have contributed greatly to the reduction of pollutants entering the environment. Remedial actions associated with Onondaga Lake continue to mitigate the nonpoint source pollution threat to the AOC and Lake Ontario. The expanded implementation of Best Management Practices (BMPs) in the watershed to address fish, aquatic, wildlife, and human health concerns promotes the well being of the ecosystem and beneficial uses in the Area of Concern. The desired endpoint, as identified by the Remedial Advisory Committee (RAC), is the removal of this lakewide fish consumption advisory for fish from Lake Ontario.

When discussing the goals for Lake Ontario and its tributaries one must consider the historic versus the current uses and conditions of the lake and river waters. Some fish species have been lost (e.g. Atlantic Salmon) and there has been a decline in other species (e.g. Sturgeon and Eel). Trend data is very important in assessing environmental health. Some trend data (e.g. pollutant concentrations in fish, and ambient waters) illustrate that the situation is improving. For example, **Figure 3** shows a downtrend in PCB Lake Trout concentrations for the Lake Ontario eastern basin. This is reflective of progress being made under the LaMP process and the related benefit this has on the Lake Ontario fish consumption advisory. Water quality data, presented under indicator #4 for the Oswego River, also indicates improvement. Although the Niagara River delivers over twenty times the flow of the Oswego River to Lake Ontario, the Oswego does have a vast drainage basin area and large flow.



**Figure 3** - PCBs in Lake Ontario Lake Trout (Eastern Basin)

Similarly, PCB critical pollutant concentrations in **Figure 4** for young-of-the-year Spottail Shiners at the mouth of the Niagara River in Lake Ontario illustrate a downtrend. Assuming this location represents “a potential worse case”, this is an overall positive reflection on larger management plan activities (such as the LaMP, the Niagara River Toxics Management Plan, and the RAP process) for Lake Ontario and the positive effects that remedial measures are having on the ecosystem. Therefore, the Lake Ontario LaMP is well established as a responsible process to address the fish consumption advisories which includes the lakewide advisories influencing the Oswego River.



**Figure 4** - Lake Ontario PCBs in Young-of-Year Fish

**Resolution** - The fish consumption advisories, upon which the identification of this use impairment in the Oswego River Area of Concern is based, are in effect as part of a Lake Ontario lakewide fish consumption advisories. The larger Lake Ontario Lakewide Management Plan (LaMP) is the appropriate responsible environmental program to provide the forum and necessary implementation follow-up for the ultimate resolution of the fish consumption restrictions impairment in the Lake which apply to the migratory fish in Oswego River AOC. The fish advisories and sources are not specific to the AOC. Under these circumstances, resolution of the fish consumption restriction use impairment indicator under the Lake Ontario LaMP is consistent with the federal EPA delisting principles and guidance. The final delisting guidance is posted on the USEPA website: [www.epa.gov/glnpo/aoc.delist.html](http://www.epa.gov/glnpo/aoc.delist.html)). Herein, Section IV.A applies this federal guidance to the Oswego River Area of Concern.

**Support Data** - Results of periodic examination of chemical residues, principally PCBs, organochlorine pesticides and mercury, in Lake Ontario fish are presented below. These points are cited from the 1998 workshop presentation by NYSDEC fisheries expert Larry Skinner. Bullets #1 and #6 are also cited in the NYSDOH Health Advisories entitled *Chemicals in Sportfish and Game*.

- In 1998, due to reduced concentrations of PCBs and Mirex, the health advisories for Lake Ontario lake trout and coho salmon were changed to permit additional consumption by women over childbearing age and men. The health advice for women of childbearing age and children under 15 years of age remains the same (i.e., eat no fish taken from Lake Ontario and its tributaries to the first impassable barrier). The former and new health advisories for men, and women over childbearing age, are listed below (see Appendix H.60 for the specific 2005-2006 Health Advisories reference and website).

<u>Species</u>	<u>Old health advice</u> (pre 1998)	<u>New health advice</u> (1998)
Lake trout	Eat none for all sizes	Over 25", eat none  Smaller lake trout, one meal per month
Coho salmon	Over 21", eat none  Smaller coho salmon, one meal per month meal	Over 25", one meal per month  Smaller coho salmon, one meal per week (statewide advisory)

- Chemical concentrations in salmonids have experienced a decline since monitoring began in the mid-1970's. However, chemical concentrations, particularly PCB, Mirex, dioxins and furans, remain elevated which necessitates retaining health advisories which cause restrictions on fish consumption for humans on a lakewide basis.
- Chemical residue trends in Young-of-Year fish (Oswego River tributary sampling in Lake Ontario) indicate significant declines in PCBs and Mirex from 1984 through 1997. The findings are valuable since they demonstrate a reduction in the accumulation of chemicals from watershed sources. With no identified AOC sources, fish flesh contamination is addressed as a lakewide impairment. (Note: the limited detection of Mirex is in contravention of the Great Lakes Water Quality Agreement objective where Mirex should not be present in detectable quantities.) See Appendix H.31 for Young-of-Year study references.
- Chemical residue concentrations in legal or edible sizes of fish (Oswego River tributary sampling in Lake Ontario) show that concentrations seldom exceed criteria established by the US Food and Drug Administration for fish in commerce; American eels are an exception particularly for total Mirex. Mirex, PCBs, and mercury residues exceed objectives of the Agreement in at least some species of fish and are being addressed on a lakewide basis.

- Results of other fish studies (alewives, catfish, eels) are provided in Appendix K.6.
- Statewide human health advisories also exist for wild waterfowl (eat no Merganser ducks and trim fat on others eating no more than two meals per month). For Snapping Turtles, women of childbearing age and children should avoid eating due to PCBs. Causes and specific wildlife impairments are not identified for Lake Ontario or the Oswego AOC.

***Rationale*** - The workshop conclusion, Remedial Advisory Committee recommendation, and NYSDEC position to continue chemical residue sampling and assessment of fish tissue and to evaluate the impact on fish consumption advisories as related to Lake Ontario and the lower Oswego River and harbor area as part of the Lake Ontario Lakewide Management Plan (LaMP) is consistent with the federal delisting guidance. This is a responsible and appropriate method to address the longer-term full restoration of the beneficial use. Because the advisories are not caused by the RAP Area of Concern (no specific AOC sources) and use impairment is being addressed on a lakewide basis, there is no further action to be taken by the RAP. This fish consumption restriction indicator is therefore to be resolved by means of actions taken on behalf of the Lake Ontario LaMP. The desired endpoint, as identified by the Remedial Advisory Committee, is the removal of the fish consumption advisory under the Lake Ontario Lakewide Management (LaMP) Plan. The assumption of responsibility by the LaMP for the ultimate resolution of this indicator is consistent with the delisting principle and guidance point developed by USEPA stating that RAPs can only address impairments caused by local sources. The advisory is part of lakewide Lake Ontario conditions.

***NYSDEC Fisheries' Position Statement on Fish Consumption Advisory*** - Fish monitoring of Lake Ontario and its tributaries includes the Oswego River flow by sampling young-of-year as well as adult fish flesh. This monitoring and analyses provide a level of protection for the Oswego area and the Lake in the assessment of the presence of toxic contamination in the water column and its effects on the aquatic environment. Studies indicate that fish advisories are not impacted by toxics in the water or sediments of the AOC but are attributable to non-AOC sources. The adult fish sampling include steelhead and salmon. These fish range freely for their lives in Lake Ontario and were originally hatchery spawned.

## **2. Degradation of Fish and Wildlife\* Populations**

The identified fish population impairment is predominately linked to and due to the habitat impairment caused by the periodic dry river areas created below the Varick Dam. It is also influenced by the natural conditions in Lake Ontario. The physical disturbance created by the presence and operation of the power dam is the main cause of the impairment identified in the RAP. The fish populations impairment is fully addressed by the remedial measures required in the dam relicensing process described under the habitat use impairment indicator below. The desired endpoint, as identified by the RAC, is to have fish populations substantially similar to that of reference communities. [\* indicates no wildlife population or wildlife habitat impairments are identified for the Oswego AOC.]

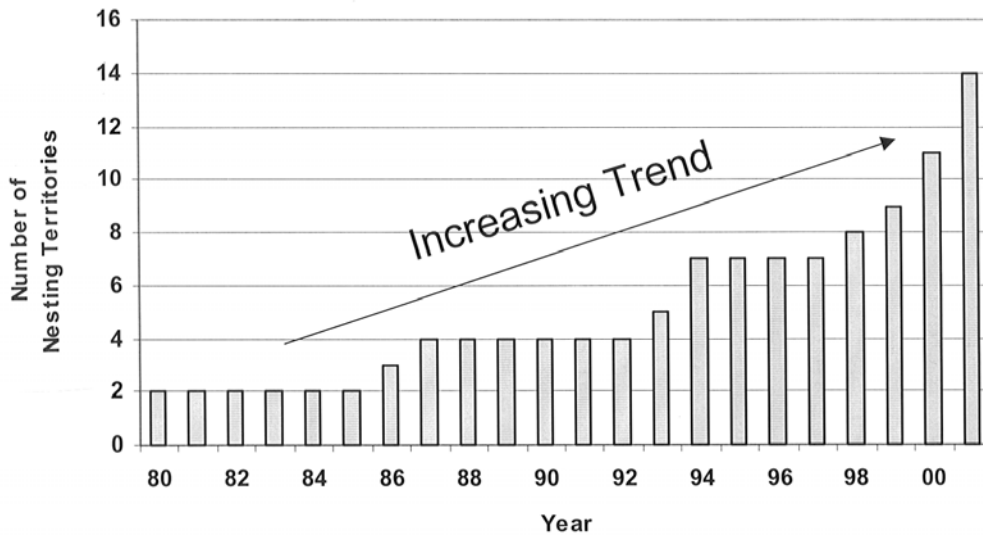
**Resolution** - The periodically dry areas below the Varick Dam, on which the identification of this use impairment in the Area of Concern is based, are directly related to the loss of habitat impairment. The requirements of the power dam relicensing (40 year license issued 11/30/04), on behalf of the Federal Regulatory Commission (FERC) with input from the US Fish and Wildlife Service and NYSDEC, has established the long term conditions addressing the use impairment. The degree of the restoration of the fish habitat and populations is directly related to the decision on the maintenance of sufficient river flow during fish spawning season. The provisions established by the FERC license and Settlement Agreement provide for a modified “Run-of-River” requirement that fully satisfies the flow needed for restoration as identified by federal and state fisheries staff personnel in the 1994 Fisheries Enhancement Plan. The FERC license modified run-of-river flow requirement provides the necessary solution and fish access for the resolution of the fish population and habitat impairments. Therefore, the Run-of-River and fish protection and passage provisions under the FERC relicensing process restore and protect, to the maximum extent practicable, the beneficial use to fish populations. Implementation oversight to assure the desired conditions and fish access are in-place is to be provided by FERC, USFWS, NYSDEC, and local agency and environmental interests. Reporting and compliance actions under the FERC license will be noted; however, are not part of the RAP process. A springtime observation is to be conducted.

**Support Data** - Even though the area below the Varick Dam is limited in size, it has been identified as a critical fish habitat area and linked to the fish population impairment for the Area of Concern. Alternate high quality spawning habitat in the AOC is not known to exist and therefore this area, subject to low flows by dam operation, was identified as a priority. Although changes have occurred at other locations of the lower river and harbor which serve to increase habitat, we cannot state that these locations provide sufficient supplemental habitat to offset this known critical habitat area below the dam. Even though the regulation of the river flow can be viewed as an out-of-AOC source of impairment, this issue is now fully addressed by the license provisions. With fish access provided and since there are no other causes of fish population impairment specific to the AOC, no further action under the RAP is warranted. The FERC requirements establish minimum flow, fish protection, and fish passage provisions to restore fish conditions and access and resolve the use impairment indicator relating to fish populations for the AOC. Regardless of these measures, we should note that existing lakewide conditions and characteristics of the Lake Ontario waters and its ecosystem will continue to have a dominate effect on the AOC and its fish population.

For example, Lake Ontario and the Oswego River AOC have changed significantly since the Stage 1 RAP document was published in 1990. Reductions in nutrient loading and the colonization of zebra and quagga mussels have altered lake nearshore habitat through greater water clarity, which has promoted increased macrophyte growth. Observations indicate that the fish populations of Lake Ontario influence the tributaries. Throughout eastern Lake Ontario, walleye fish have been steadily expanding and spreading which includes the Oswego River area. Some fish species in Lake Ontario that are abundant today (e.g. emerald shiners and three-spine sticklebacks) were relatively uncommon in 1990. In the open lake, a restructuring of food webs is underway that appears to be having profound effects on fish community structure. Interestingly, recent Lake Ontario research has revealed that reproductive impairments in trout and salmon species can be linked to other causes such as thiamine deficiencies, most likely of dietary origin. Also, sea lamprey control and fish passage protection measures in the Lake Ontario region serve to protect fish populations.

Although no wildlife population impairment was identified for the Oswego River AOC, Bald Eagle data developed for the Lake Ontario drainage basin reflects that wildlife populations are ever improving. This Lake Ontario ecosystem indicator, reported in the Lake Ontario Lakewide Management Plan (LaMP) Update 2001 in **Figure 5** below, illustrates an increasing trend in the number of Bald Eagle Nesting Territories (eagle pair plus eaglets). Healthy and increasing populations of such top predator species would indicate the presence of suitable habitat, healthy populations of prey organisms, and low levels of environmental contaminants. The number of eaglets fledged per nest has also been documented as increasing. A nesting territory is documented upstream of the Oswego River AOC. Another example reported by the Derby Hill Bird Observatory Newsletter (Fall 2001) located in Oswego County near the City of Fulton, states that anecdotal records tell of Bald Eagle nesting counts in the 1920's that were as many as 25 nests along the Lake Ontario shoreline (these nests were substantially reduced to near zero in the 1950's). Further, the newsletter reports that 224 separate Bald Eagles sightings were recently counted over a period of time in the Derby Hill area. Although this count includes migratory and nesting eagles, the numbers indicate tremendous recovery of an endangered species!

Additional data supporting healthy wildlife populations and habitat can be derived from the multi-year study results (Marsh Monitoring Program; Appendix M) for marsh birds and amphibians under impairment indicator #7. Together, these indicators further support a healthy ecosystem for the Oswego River area and exhibit progress in New York State and local area government commitment to responsible stewardship through actions taken to restore and protect beneficial uses.



**Figure 5** - Bald Eagle Nesting Territories

**Rationale** - The Oswego RAP and related planning and regulatory initiatives, including the FERC power dam relicensing process, have provided vehicles to evaluate and resolve impairments of beneficial uses. The dynamic nature of the Lake Ontario ecosystem indicates the necessity for adaptiveness and flexibility in planning initiatives. It is therefore recognized that RAP protection and restoration strategies need to be adaptive and flexible to the changing dynamics of the Lake Ontario and the Oswego River nearshore ecosystem. The FERC requirements addressing river flow, fish passage, fish access, and protection address the fish population and habitat needs as well as restoring other ecosystem conditions for the AOC. Key is the modified “run-of-river” requirement satisfying needs identified by USFWS and NYSDEC fishery staff. Compliance is to be monitored and enforced by FERC. All entities will observe results. The assumption of responsibility for the long-term resolution of this indicator by the FERC license under the auspices of the Lake Ontario LaMP is consistent with the delisting principles and guidelines developed by USEPA.

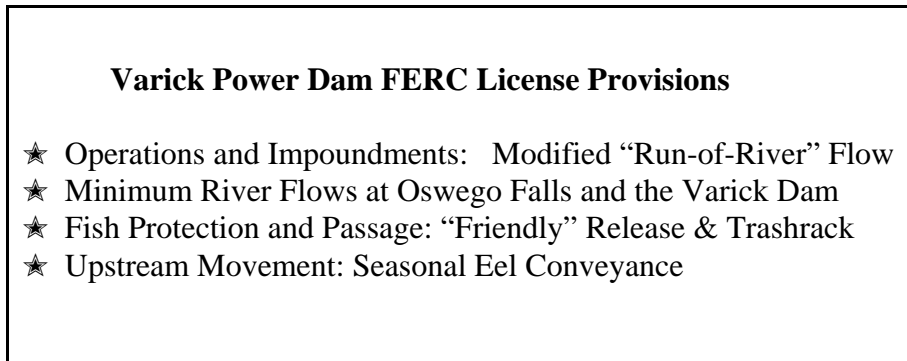
**NYSDEC Fisheries’ Position Statement on Fish Population** - Fish populations in the AOC are directly linked through their association with Lake Ontario. The fish populations of the lake actually have the greatest influence on the AOC fish populations. Fish movement in and out of the AOC is dominated by the lake characteristics. With river flow and fish habitat addressed in the AOC under the FERC license, the fish populations will reach a level consistent with natural conditions allowed by Lake Ontario. The FERC license will require the power dam operator to monitor operations for compliance with prescribed terms addressing river flow and fish passage.

### **3. Loss of Fish and Wildlife\* Habitat**

The fish habitat impairment is due to the periodic dry river area created below the Varick Dam. The physical disturbance created by the presence and operation of the power dam is the cause of the use impairment. Chemical causes are related to the lakewide fish consumption advisory and are not identified as direct causes of habitat impairment in the AOC. Remedial measures associated with the requirements of relicensing of the Varick Power Dam fully address the fish habitat use impairment which in turn will address the fish population impairment. The level of restoration is dependent on out of AOC sources (i.e. the overall river flow and the conditions of Lake Ontario). The desired endpoint for the AOC, as identified by the Remedial Advisory Committee, is to have no restricted use of fish habitat from flow or contamination (contaminants are discussed further under the restrictions on dredging use impairment indicator #10). [\* indicates no wildlife population or wildlife habitat impairments are identified for the Oswego AOC.]

**Resolution** - The impacted habitat area below the Varick Dam is directly caused by the restricted river flow from the presence and operation of the dam. The requirements of the power dam relicensing, on behalf of the Federal Regulatory Commission (FERC) with input from the US Fish and Wildlife Service and NYSDEC, establishes the long term (40 year license) conditions addressing fish habitat. The degree of the restoration of the fish habitat, and associated populations, is directly related to the maintenance of sufficient river flow during fish spawning season as is now required under the renewed FERC license issued 11/30/04. **Figure 6** below summarizes the

provisions to be established by the FERC license that establish a modified “run-of-river” flow requirement needed for restoration as identified by federal and state fisheries personnel. The FERC license is the appropriate responsible environmental program to address the restoration. The license provisions restore and protect, to the maximum extent practicable, the beneficial uses for fish. Implementation oversight is to be provided by FERC, USFWS, NYSDEC, and local agency and environmental interests. Reporting and compliance actions are under the FERC license. Under the RAP process, a springtime observation is to be conducted. In the fall, a fish creel survey is planned.



**Figure 6** - Summary of FERC License Provisions

**Support Data** - The **1994 Fisheries Enhancement Plan** (reference Appendix H.59) for the Oswego River was prepared by the US Fish and Wildlife Service Lower Great Lakes Laboratory staff and NYSDEC. DEC contributed mainly to the Management Goals and Objectives section. There are five major goals in the Plan:

- Restore and maintain a healthy aquatic community.
- Restore the New York State threatened species, Lake Sturgeon.
- If ecologically feasible, restore Atlantic Salmon to the Oswego River watershed with adults ascending the system from Lake Ontario and reproducing naturally in the headwaters.
- If ecologically feasible, restore American Eel to the Oswego River above the Varick Dam and provide passage for adults and juveniles.
- Provide adequate angler access to all portions of the Oswego River.

Ecological change is occurring rapidly in Lake Ontario, affecting the fisheries that are being produced. These changes and changes in angler use may render some of the objectives not fully attainable. The most limiting aquatic habitat in the Oswego River RAP Area of Concern is the Varick bypass reach, over 1,500 feet in length. Restricted flow over the dam has caused much of the reach stream bed to be dry during spring/ summer flows. The upper part consists primarily of bedrock. This bedrock area can be utilized by a number of species for spawning (steelhead, Atlantic

salmon, chinook salmon, brown trout, smelt, walleye and panfish consisting of catfish, bullhead, bluegill, bass, and perch) and can offer excellent fishing for migratory salmonids at desired flows.

An In-stream Flow Incremental Methodology (IFIM) study was conducted in 1993 as part of the hydro-relicensing efforts. Several different minimal flow levels were used to calibrate the model for the upper bypass reach. The results of the study have been useful to the relicensing process. NYSDEC identified minimal resource needs of the aquatic community and the anglers who utilize the waters. The license requirements address a seasonal modified “run-of-river” flow for protection needs of desired resident fish (panfish) and forage fish species, and higher fall/winter flows for migratory salmonids/fishing and higher flows yet for walleye spawning and incubation. Fish passage and protection is also addressed by requiring a bar rack or trashrack with spaced openings and overlays. Upstream fish passage is to have seasonal protection and ramps. In the Great Lakes, fish ladders have been successful in combating sea lamprey and providing selected species fish passage. Additional details on the FERC license provisions are in Appendix J.

***Rationale*** - The new FERC license has incorporated the Fisheries Enhancement Plan objectives to restore adequate flow, while assuring the fish conditions and access, to address the fish habitat impairment below the Varick Dam. The FERC requirements addressing river flow, fish passage, fish access, and protection address the fish population and habitat needs as well as restoring other ecosystem conditions for the AOC. Key is the modified “run-of-river” requirement satisfying needs identified by USFWS and NYSDEC fishery staff. Compliance is to be monitored and enforced by FERC. All entities will observe results. The assumption of responsibility for the long-term resolution of this indicator by the FERC license is consistent with the delisting principles and guidelines developed by USEPA.

***NYSDEC Fisheries’ Position Statement on Fish Habitat*** - The fish habitat is addressed by the flow requirements of the FERC license. Maintaining the required flow will satisfy the fish habitat needs to the maximum extent practicable and also result in benefits to the fish populations of the AOC and Lake Ontario. In fact, with the upstream source of water flow to the Oswego AOC addressed, there is no AOC source for further impairment of fish habitat. Lake Ontario exerts the largest influence on the AOC, and with the river flow addressed there is no significant cause of habitat impairment in the Oswego River AOC. Essentially, with the flow and habitat conditions addressed in the AOC under the FERC license, the fish habitat will produce fish populations consistent with natural conditions allowed by Lake Ontario. Under FERC, the dam operation will be monitored for compliance with prescribed terms addressing river flow and fish passage. The provisions will enhance the fisheries resource in and above the AOC. Limiting fluctuations of water levels behind the dam should result in increased nesting success of centrarchid species here (bass, bluegills, etc.). Maintaining minimum flows in the bypass reaches will provide riffle habitat required by many species life stages and should increase diversity of species. The result is designed to provide spawning habitat for walleye and other fish. Fishing opportunities are to be enhanced. Downstream fish passage will reduce mortality. Required seasonal upstream eel passage provides for fish species population restoration.

#### **4. Eutrophication or Undesirable Algae**

This use impairment was identified in the early RAP stages as caused by excessive phosphorus attributable to point source discharges from wastewater treatment facilities and nonpoint discharges related to urban/rural land runoff in the watershed. Significant actions and improvements have been implemented to address point and nonpoint flows thereby greatly mitigating nutrients, solids, and floatables discharged to the waters of the Oswego River. The unplanned introduction of the exotic species zebra mussels in the Three Rivers System (the Oswego, Seneca, and Oneida Rivers) also serves to improve water quality. Zebra mussels filter the water removing nutrients and improve water clarity although they can lower dissolved oxygen content. The 1994 Oswego River Water Quality Survey found no eutrophication or algae impairment in the AOC; however, algae has been reported in certain upstream river segment waters and associated directly with some of the waters in the locks along the river. The desired endpoints as identified by the Remedial Advisory Committee are: no persistent water quality problem due to cultural eutrophication, water quality standards achieved, and the beneficial use goals met and maintained.

Although the Water Quality Survey did determine no impairment in the AOC, some nuisance conditions were identified in the shallower western part of the harbor where boats are docked and in upstream non-AOC locations. In the western harbor area, weed harvesting is conducted to address this nuisance. The benthic community and aesthetics are discussed and addressed respectively under use indicators # 5 and # 8. In the AOC there is a healthy balance between the aquatic plant growth and the algae that constitutes an important relationship in the water quality as discussed below.

Practically all of our northeastern lakes support a diversity of large aquatic plants attached to the bottom (benthic macrophytes) which are an important factor in maintaining potable, recreational, and aesthetic characteristics, as well as the ecological functioning of most waters. These plants compete directly with algae in the water column (phytoplankton) for nutrients, thereby maintaining water clarity. The plants protect shorelines from erosion and stabilize deeper substrates thus limiting turbidity from silts and clays in physical disturbances. By preventing the resuspension of sediments which have nutrients attached to them, algal growth is thereby limited. Aquatic macrophytes also provide food and cover and/or supplement oxygen supplies for all of the organisms (fish, mammals, amphibians, reptiles, and invertebrates) that make up shallow water (littoral) aquatic communities. Plants are the basis of aquatic food webs in these areas, providing indispensable links between the sun's energy and animals that eat them which are, in turn, eaten by predators. In these ways, plants regulate the size and character of game fish and waterfowl populations as well as impact other biotic resources we cherish.

In the Great Lakes region, including Oswego, there are a few introduced plant species (e.g. Eurasian milfoil, water chestnut, and pondweed) that can aggressively out-compete our native flora under conditions of excess nutrient loading which destroys biodiversity and causes beneficial use loss. The dense beds commonly formed by these plants often can reduce the recreational quality of the waters. These introduced exotic plants are responsible for the great majority of the complaints heard from recreational users of the waters. Aquatic plant management depends on protocols that usually vary from one water body to another dependent on the expectations of the stakeholders and their

concurrency regarding the appropriate missions of their management plans. Education programs are important to assure that expectations are developed into equally realistic plant management goals.

Introductions of exotic plants are most aggressive when native plants or substrates are disturbed. If rooted plants are completely removed, algae will grow unimpeded, clouding the water and preventing further macrophyte growth which results in de-stabilization of substrates and loss of food and cover for higher organisms. Managing non-native plants must therefore be selective. Recreational navigation has been the main reason for intervention and mechanical harvesting the main remedy. Several problems result from harvesting nuisance plants. Since the majority of exotic species are more competitive in disturbed situations, harvesting enhances growth of these undesirable plants. Because harvesting is non-selective, native plants are also removed allowing for the exotics to grow faster. Herbivorous insects which potentially serve as natural bio-control agents for the exotics are also removed. Increased harvesting to maintain trouble-free utilization of an area can be expensive. The use of herbicides is additionally complicated because of potential toxicity in trying to attain control without killing non-target species.

Ecological succession occurs naturally in all water bodies. It is the process whereby one type of plant community, through its impact on the environment, actually changes conditions so that they become more optimal for an entirely new community, which eventually displaces the first. Many bottom areas become muddy with a high organic content and clear waters become more turbid with algae as populations rise. Conditions range from few plants rarely reaching the surface to those with surfaces covered with vegetation. Shallow areas over time fill in and become wetlands. Under normal conditions, management activities should be avoided since nutrient levels (that drive the process) cannot practically be expected to be reduced below natural baseline levels. However, if the process is enhanced by human activities to the degree where undesirable conditions exist, then intervention is reasonable. In the presence of excess nutrient loading (phosphorus and nitrogen) both planktonic algae and rooted macrophytes will grow.

Recreational and other stakeholder users of the waters are concerned about aquatic weed growth, but must recognize the benefits derived from rooted plants. By taking steps to eliminate the rooted plants, planktonic algal populations will flourish (bloom) and vice-versa. The algal or plant growth can become very abundant without reducing nutrient loading. Remedial measures to reduce nutrients and other pollutants have been accomplished in the Oswego River watershed and AOC. Such activities are expensive, long-term, social, and political undertakings. Likewise, in the Great Lakes drainage basin significant steps have been taken to reduce loadings of pollutants including nutrients to the receiving waters. Lake Ontario and the Oswego River Area of Concern have benefitted from the implementation of the Clean Water Act and the Great Lakes Water Quality Agreement. To a large extent, watershed nutrient and contamination sources have been addressed that affect the Area of Concern.

Overall, sources of pollutants that could contribute to use impairments in the AOC can be classified as either 1) point or nonpoint sources within the Seneca-Oneida-Oswego River basin or 2) from Lake Ontario. This is because the waters of the Area of Concern are made up partly of what comes down the Oswego River and partly of what enters the AOC from Lake Ontario. Little is known about

the dynamics of interchange of Lake and river waters, but that it occurs is certain. Waters entering the AOC from Lake Ontario can carry contaminants with them, as can the fish that swim from Lake Ontario into the AOC. Likewise, waters from upstream can carry contaminants which may effect the AOC and Lake Ontario. Therefore, remedial actions on the sources of pollutants throughout the Oswego River drainage basin must and have been coordinated and implemented to properly address the problems within the Area of Concern as well as effects on Lake Ontario.

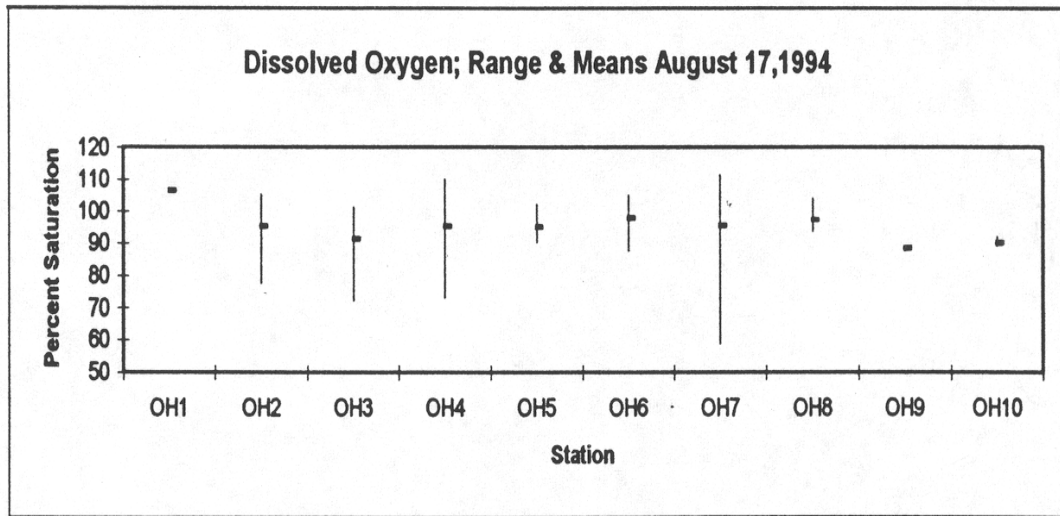
Point sources of pollutants include municipal and industrial discharges of wastewater that are regulated by point source discharge permits (State Pollution Discharge Elimination System or SPDES permits). Current point source discharge permitting practices provide extensive control of point source discharge wastewaters. Nonpoint sources of pollution are also a focus for remedial and preventive measures that primarily include implementation of improved management practices. Nonpoint pollution is characterized by releases from contaminated sediments, runoff/leachate from hazardous waste sites, erosion and storm flow in developing areas, or poor agricultural land practices. See Appendix K (parts 3 and 4) for additional details on progress in point and nonpoint pollution control. Measures to reduce nutrients and provide watershed protection have addressed environmental impacts from eutrophication and undesirable algae in the Oswego River Area of Concern.

**Resolution** - The remedial actions taken by State and Local government agencies over the past ten to twenty years have served to limit and address the nutrient input into the Area of Concern. The nutrient control, reduction, and remedial measures have resolved the AOC sources contributing to a eutrophic stress condition and provided the protection of best uses for the waters in the AOC. Water quality surveys confirm that no eutrophic condition or impairment from undesirable algae is present. The long term monitoring of the Rotating Intensive Basins Survey (RIBS) program, as well as the regulatory presence of NYSDEC environmental quality surveillance and monitoring staff, provides protection to assure the beneficial uses of the waters of the AOC are maintained. The desired endpoints of no persistent water quality problem due to cultural eutrophication, water quality standards achieved, and the beneficial use goals met and maintained, have all been accomplished. Although nuisance conditions and aesthetics from nutrients are affected in certain areas of the Oswego River, no further remedial action is planned or warranted under specific oversight of the Remedial Action Plan to address eutrophication or algae in the Area of Concern.

**Support Data** - NYSDEC published the EPA grant funded **Oswego Harbor Survey** in 1994 (Appendix H.35). The main objectives of the survey were to investigate the potential causes, the possible sources, and the current status of several use impairment indicators. Eutrophication or undesirable algae, beach closings, and degradation of plankton populations were the main conditions investigated. It was known that past anthropogenic loads to the upper Oswego River drainage basin had contaminated some sediments in the river and had carried contamination in the flow to receiving waters in Lake Ontario. Results from the data indicate that the AOC is a healthy environment concerning dissolved oxygen, eutrophication, nutrients, coliforms, pathogens, and the planktonic

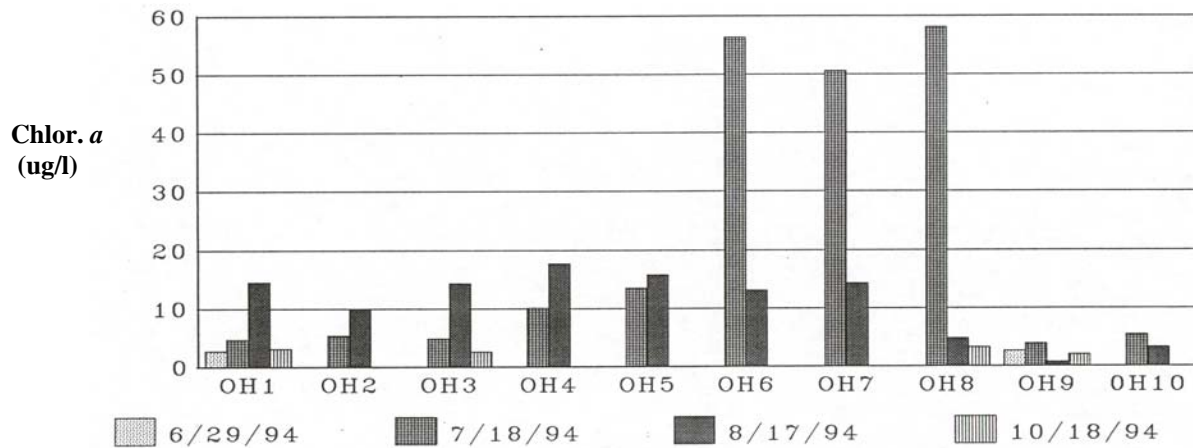
community. What appeared to be toxicity effects were encountered when conducting some BOD and biological toxicity tests. The cause, extent, and effect of this earlier observed toxicity was never identified and not replicated in future sampling. In the subsequent toxicity test sampling and analyses that were conducted, the results indicate no statistically significant reproductive or survival effects when compared to control samples.

**Figure 7** shows the Dissolved Oxygen (DO) concentrations at all sample locations in the Area of Concern were high and did not indicate a eutrophication problem. The observed concentrations ranged from 5.3 mg/l to 13.3 mg/l. Out of 176 dissolved oxygen measurements made through out the summer at the various stations and depths through out the water column, none of the measurements were below the desired New York State standard of 5 mg/l. In fact, only three measurements were below the 6.0 mg/l. level. Most of the DO measurements were made at or near the saturation value. DO is reported as % saturation in figure 7 because it is a function of temperature and concentration.



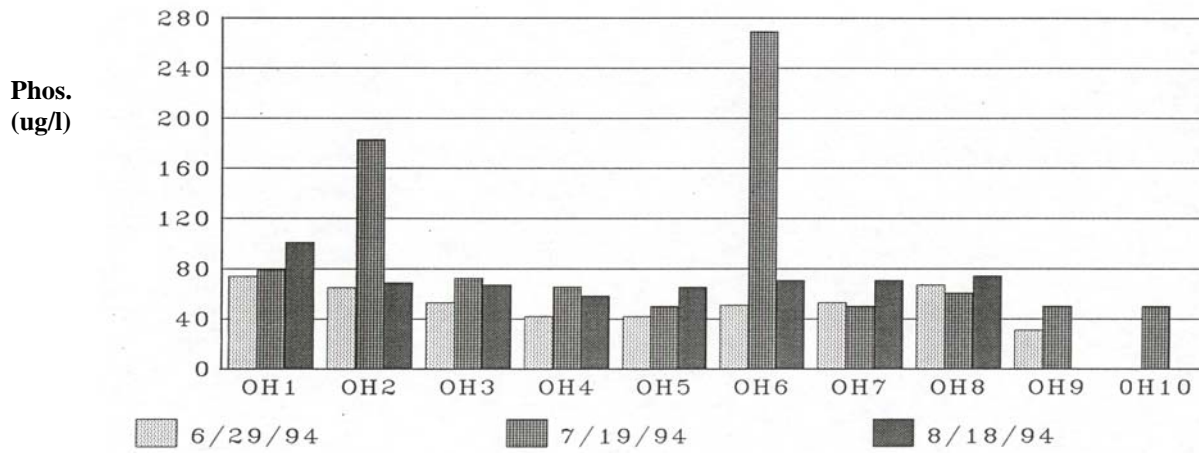
**Figure 7** - Dissolved Oxygen at Depths and % Saturation

When supersaturated DO conditions are observed in a waterbody, one usually expects to find algal blooms. However, the Chlorophyll *a* measurements in **Figure 8** and field observations did not indicate an over-abundance of free-floating algae in the harbor (see rationale page 37). The Harbor's shallower areas did support an abundant vascular macrophyte (water chestnut) crop. These rooted plants were so prolific in the shallower areas that they had to be harvested mechanically in order to keep the boating marina operational. It is these plants that are photosynthesizing the oxygen that keeps the oxygen concentrations at or above saturation.



**Figure 8** - Chlorophyll *a* in the Oswego Harbor (ug/l)

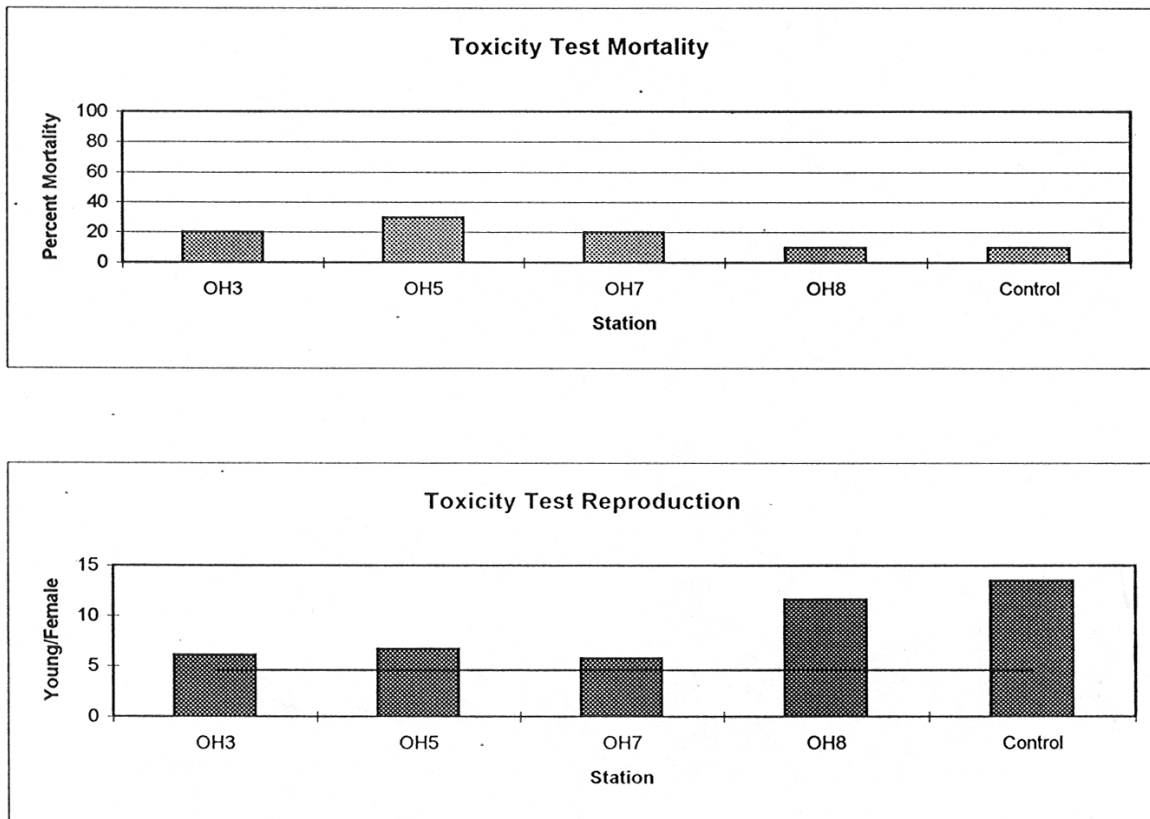
The phytoplankton populations do not appear to be limited by the available nutrients in the Oswego Harbor. Phosphorus is identified as the nutrient of concern for this area and sampling results are shown in **Figure 9**. Although the nutrient concentrations are sufficient to support a much larger algal population, the concentrations do not appear to be excessive for a river flow. Under the GLWQA the 10 ug/l goal is being achieved in open lake waters.



**Figure 9** - Total Phosphorus in the Oswego Harbor (ug/l)

The 1999 RIBS study report provides water column results for phosphorus at Minetto, five miles upstream from the harbor, in a range similar to the average concentrations in Figure 9 (40 to 80 ug/l). This indicates that upstream (out of AOC) sources therefore account for the majority of phosphorus loading to the AOC and Lake Ontario.

In the 1994 study, ammonia results were low and there was no evidence of ammonia toxicity. The initial toxicity test results conducted during the summer months of June and July in 1994 identified a potential toxic effect in the ambient waters. Algae was observed in the samples prior to testing. Certain blue-green algae are known to produce cyanobacteria toxins that can affect fish, wildlife, and sample results. Examples of such algae (*Aphanocapsa*) were identified in the Oswego samples. Sample bottle testing for contamination did not identify a problem. The toxicity was not observed in repeat samplings conducted later that summer, again in the fall, and the following year. Filtering of the algae was also applied to the testing, but no difference was noted. Even some controls exhibited mortality in the test results as noted in the bar diagrams in **Figure 10** below from September 1994. In this set of samples, no statistically significant reproductive or survival effects were identified. Subsequent toxicity testing conducted during the 1995 season did not identify toxicity. Overall, toxicity test results do not support a chronic toxicity problem.



**Figure 10** - Oswego Harbor Toxicity Tests  
(% Mortality and # of Young /Female)

**Rationale** - The Oswego River watershed is very large; it encompasses over 5,100 square miles. The riverine characteristics contribute to preventing eutrophication in the AOC by being subject to “flow through” conditions. The waters of the AOC meet the DEC water quality narrative standard for phosphorus by not impairing best uses. From several perspectives, the AOC is not eutrophic because: 1) wastewater treatment and watershed practices greatly reduce nutrients; 2) the growth of zebra mussels and closings of industrial discharges, such as the local paper mill (International Paper) and upstream brewery (Miller), reduce nutrients to the AOC; 3) fishery management and sport-fishery persons are not calling for added nutrient controls, in fact, additional phosphorus is expressed as a need; 4) tourist best uses of the water are intact; and, 5) water quality and other AOC related use indicators are not impaired due to nutrients.

When applying watershed protection and remediation strategies we need to break the work down into manageable parts. The Oswego River receives discharges from point and nonpoint sources. For example, heavy metals and organics can be present in some municipal wastewater discharges as well as runoff. The Great Lakes Water Quality Initiative (addressing bioaccumulative chemicals of concern or BCCs) requires strict standards necessitating source trackdown and pretreatment implementation. NYSDEC has been and continues to work with municipalities to meet pretreatment, pollution prevention, and discharge requirements and goals.(see Appendix K for point and nonpoint source controls).

Ongoing watershed monitoring and surveillance activities assure that protection and remedial measures are effective. The RIBS sampling program for ambient waters and specific hazardous waste site monitoring for remediated sites addresses these needs. Project funding provided under the Clean Air / Clean Water Environmental Bond Act, the Great Lakes Protection Fund, and nonpoint source program activities has and continues to benefit the Oswego AOC. NYSDEC is maintaining effective monitoring and surveillance activities to assure beneficial uses are protected.

The AOC is not impaired for eutrophication and algae; however, some nuisance conditions exist in isolated areas (upstream locks and western shallow harbor area). These have included some algae and weed conditions. The locks are not part of the AOC. Weed harvesting is conducted to address the weed nuisance in the western harbor area. In the Oswego River AOC and watershed, nonpoint source remedial activities are being conducted by the Oswego County Soil and Water Conservation District, the Oswego County Water Quality Coordinating Committee, and other government and public organizations working on various projects. These include monitoring activities, studies, implementation of best management practices, stream corridor protection actions, weed control, and input into the FERC relicensing process and the Lake Ontario Lakewide Management Plan.

Again, the assumption of responsibility for the continuation of monitoring and implementation efforts to assure the maintenance of beneficial uses involving eutrophication, algae, and weeds by NYSDEC and county governmental organizations is consistent with the RAP delisting principles and guidance developed by USEPA which states that RAPs can only address impairments caused by local sources and that it is recognized and permissible that a beneficial use may not be capable of fully restoring to pristine conditions even though all remedial actions have been implemented.

## **5. Degradation of Benthos**

The early stages of the RAP identified with low confidence that a benthos impairment may exist. Although no cause was known, sediment contamination was suspected because toxicity tests carried out on sediments in 1987 suggested benthic macroinvertebrate populations may be impaired. Subsequently, the 1997 results of the Oswego River Sediment Study indicated a benthic community in the AOC (harbor) as diverse, well balanced and typical of minimally impacted conditions. In this study, no impact on the benthos upstream at Battle Island and Phoenix was found. Some benthic

impacts were however identified upstream of the second dam above the AOC, in some of the sediments around Fulton, and at the Onondaga Lake outlet. The desired endpoint for delisting the Area of Concern, as identified by the Remedial Advisory Committee, is a benthic community having an integrity substantially similar to unimpacted reference communities.

Sampling results and trend data from the NYSDEC's Rotating Intensive Basin Studies (RIBS) program can also be very useful to the Oswego River AOC benthos assessment. RIBS is a statewide monitoring, evaluation, and reporting program that is currently conducted and repeated every five years on a selected drainage basin. In order to address the number and variety of monitoring objectives, the RIBS Sampling Program is actually composed of three separate monitoring networks. Each of these statewide networks operates concurrently, yet somewhat independently, to provide data and contribute to the overall RIBS assessment.

- The **Routine Network** provides continuous sampling (4-6 samples annually) of water column chemistry at 19 selected sites across the state in order to monitor basic stream characteristics and determine long-term trends in water quality.
- The **Intensive Network** employs more frequent water column sampling along with multimedia (macroinvertebrates, fish, toxicity testing, bottom sediment chemistry) sampling to provide more detailed assessments of water quality in selected basins.
- The **Biological Screening Network** employs "on-site" macroinvertebrates sampling to provide a qualitative assessment of water quality at a larger number of sampling sites with minimal analytic expense.

The Seneca-Oneida-Oswego (Three Rivers) drainage basin now has eleven total sites that are monitored under the RIBS program. The closest to the Area of Concern is the Minetto site which is five miles upstream from the AOC. Minetto is a sampling site for each network and over a five year sampling cycle receives routine, intensive, and biological screening monitoring. The watershed covers an area of over 5,100 square miles. There are nine major lakes located in the basin: Canandaigua, Keuka, Seneca, Cayuga, Owasco, Skaneateles, and Otisco (all seven in the Finger Lakes group), and Onondaga and Oneida.

Because there is no RIBS sampling site directly in the AOC, the upstream Minetto site is used to represent and document the Oswego River's discharge flow into the AOC and Lake Ontario. The community surrounding this site is rural residential. This segment of the stream is deep and wide having a muddy bottom and shore line. Boat traffic is heavy here because of the close proximity to the lock used for navigation. This location is also a Lake Ontario enhanced monitoring site where additional water column sampling has been performed for PCBs, PAHs, and organochlorine pesticides to support the former Lake Ontario Toxics Management Plan which is now embodied in the Lake Ontario Lakewide Management Plan (LaMP). The most recent sampling of the Minetto site was during 1995-1996 and is reported on in the April 1999 RIBS "Three Rivers" drainage basin report. This area received repeat RIBS biological and intensive monitoring over the years 2002-2003. The RIBS sampling includes a wide range of studies addressing: 1) conventional and toxic

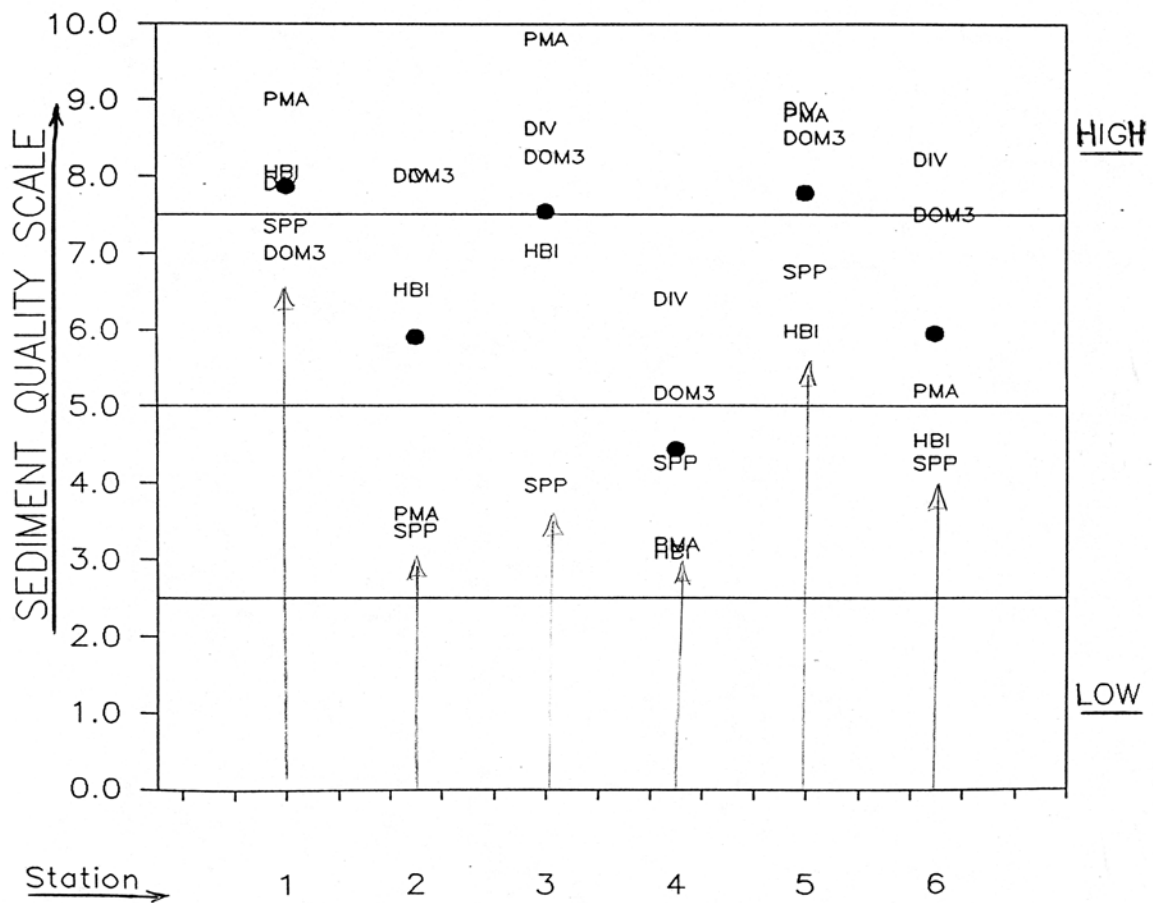
water column parameters, 2) macroinvertebrate community and tissue assessment, and toxicity testing, and 3) some bottom sediment and fish tissue analyses. Sampling data is provided in the RIBS reports referenced in Appendix H, item #48. To complete a five year sampling cycle assessment report, data is combined from the three network samplings described above.

Since the first RIBS sampling in 1987, enhancements to the five year monitoring cycle have been implemented to focus on priorities and use resources most effectively in a given drainage basin. The biological screening network has been expanded to provide qualitative macroinvertebrate assessment at more sites. The intensive network uses a more focused set of parameters, applies a more rigorous quality control sampling program, and performs benthic community assessment and tissue analysis. Both networks have an expanded use of ambient toxicity testing. Finally sediment toxicity testing and fish tissue are included where it is needed and can be coordinated. The set of permanent routine sampling sites has been further refined to improve the statewide coverage.

**Resolution** - The results of the 1997 Oswego River Sediment Study and RIBS studies data provide the data needed to establish that the benthic community in the AOC is not impacted and is representative of a healthy reference community. The benthic community is documented as having an integrity substantially similar to unimpacted reference communities. The beneficial use is therefore not impaired and is further protected by ongoing agency surveillance and monitoring activities including the RIBS sampling program.

**Support Data** - The 1997 sediment study was a special study conducted under the RAP (funded by USEPA) to assess sediments in the Area of Concern. The 1997 final report results for this Oswego River Sediment Study indicate no impact to the benthic community in the Area of Concern. The sediment study further defined the benthic communities in the harbor as diverse and well balanced, typifying minimally impacted conditions. The Rotating Intensive Basin Survey (RIBS) macroinvertebrate study results support this conclusion for the Area of Concern.

Details of the 1997 Oswego River Sediment Study establishing that the benthic community in the Oswego River AOC is not impacted are provided below. Sediments sampled in the study were typical of large river sediments, dominated by silt, clay, and sand. Organic material such as mollusk shells, macrophytes, and wood chips were also present in most samples. In **Figure 11**, the Biological Assessment Profile of index values for the Oswego River is shown. Index values include: SPP= species richness; DIV = species diversity; HBI = Hilsenhoff Biotic Index; DOM3 = % contribution of top three species; and, PMA = Percent Model Affinity. The index values are plotted on a normalized scale of sediment quality. Station 1 is the Oswego Harbor; Station 2 is upstream of Canal Lock 6 above the AOC and Varick power dam; Station 3 is near Battle Island downstream from Fulton; Station 4 is at Big Island; Station 5 is at Phoenix; and, Station 6 is in the Seneca River downstream of the Onondaga Outlet. Test results follow:



**Figure 11** - Biological Assessment Profile of Index Values for Oswego River

SPP= species richness; DIV= species diversity; HBI = Hilsenhoff Biotic Index

DOM3= %contribution of top three species; PMA= Percent Model Affinity

Values are plotted on a normalized scale of sediment quality

**Macroinvertebrates** (the Benthic Community) at Stations 1 (Area of Concern), 3 (Battle Island), and 5 (Phoenix) were diverse and well balanced, typifying minimally impacted conditions. These samples contained representatives of many groups, and the communities were generally diverse and well balanced. The other upstream sites had some impacts.

**Zebra Mussels** (*Dreissena polymorpha*) entered the Great Lakes in 1986, and most likely entered the Oswego River in 1991. These prolific mollusks require hard substrate for attachment. In the sediment study, Zebra Mussels were found at two of the sampling sites (Oswego Harbor and at Phoenix) where clam shells were also present for attachment. At this time, the observed low number of individuals at these sites was considered to have little impact on the benthic community or water quality assessments.

**Toxicity Testing** was conducted with *Daphnia magna* (water flea) or *Pimephales promelas* (fathead minnow). Ten-day solid phase acute elutriate toxicity testing results indicate the only statistically significant difference in survival and growth between the Oswego River and control sediment exposures was reduced *Chironomus tentans* (midge) growth in surficial sediment samples collected at Lock 6 (station #2) and Battle Island (station #3). The Area of Concern (station #1) was found to have no impact.

**Microtox** sediment assay tests were performed to assess relative toxicity among locations. The pore water and sediment were tested for all stations. All sediment samples elicited a response in the Large Sample Procedure at the detection limit. No relationship between relative toxicity and concentration of contaminants in sediments could be established. Some PAH toxicity was noted upstream of the AOC. Pore water elicited a low toxicity only at the Battle Island sample station, but with unacceptable confidence levels. Sediment core results for PAHs are shown later in Figure 15 and discussed under the Restrictions on Dredging Activities use impairment indicator # 10. Along with results from sediment analyses for PCBs, metals, dioxin/furan, Mirex, and OCR the assessment concludes that there are no active sources and that upstream sediments are not significant.

In the 1999 RIBS report, addressing the permanent Minetto sampling site, the water quality in the Oswego River going to the AOC and Lake Ontario was rated as fair. Overall, the RIBS data supports no impact in the AOC. Details of this upstream data follow: a slight impact to macroinvertebrates was indicated by using the multi-plate artificial substrate sampler. Zebra mussels were found at Minetto, and water clarity had increased greatly from previous years. No organic compounds or metals were measured in the mollusks that exceed tissue assessment criteria. PAHs which have no criteria were however detected in the tissue and at low levels in the sediment.

Also detected in the bottom sediments at Minetto, were manganese, lead, and DDD. In the 1992 RIBS report, the fauna were identified as dominated by midges, scuds, and filter-feeding caddisflies, indicating sufficient levels of suspended plankton at that time at Minetto. The 1992 RIBS study results involving macroinvertebrate tissue analysis found some detection of chromium (not exceeding background level). Metals testing included aluminum, mercury, zinc, iron, manganese, cadmium, copper, lead, and nickel. DDE and PCBs were detected in caddisflies but none exceeding tissue assessment criteria. Water column analysis results were mostly non-detects with no assessment criteria exceedences. The 1990 study found only iron present at background levels. Toxicity testing results at this time indicated no significant mortality or reproductive impairment.

The documentation (of no impact to the AOC) provided in these two RIBS drainage basin reports is further supported by several other RIBS produced trend reports. The 20 Year Trends in Water Quality document, based on macroinvertebrate data (1972-1992; Appendix H.45), describes improving environment trends based on repeat water quality sampling. The slight impact on macroinvertebrate at Minetto includes notes of a high standing crop, species richness, and species diversity. The 1995 Trends in Water Quality document (Appendix H.44), based on long-term RIBS routine monitoring network data, corroborates the RIBS data and water quality improvements described in discussion of the eutrophication and algae use impairment indicator in #4 above.

***Rationale*** - Because an unimpacted benthic community endpoint as defined by the Remedial Advisory Committee and supported by the delisting criteria has been documented and achieved, the status of the use impairment indicator is resolved by the revised designation of “not impaired”. The monitoring and surveillance programs conducted by NYSDEC’s RIBS program provide sufficient protection of the beneficial use. In addition, the State Pollution Discharge and Elimination System (SPDES) has accomplished source control protection measures in the AOC and its watershed. Discharger sampling and reporting requirements under the federal and state Permits Compliance System (PCS), along with annual field inspections and monitoring, provide additional restoration and protection mechanisms for New York State’s receiving waters including the Oswego River and the AOC.

Although certain pollutants of concern are not detected in sufficient quantities to warrant remedial action in the Area of Concern itself, the strategy to address these pollutants (and the opportunity for public involvement) exists as part of ongoing environmental programs and new initiatives to address watershed restoration and protection. See Appendix K for public outreach activities having involved the RAP and Appendix N for the initiative entitled Watershed Restoration and Protection Action Strategies (WRAPS). The purpose of a WRAP Strategy is to develop and/or compile and document a strategy for the entire watershed that brings together all appropriate agencies and stakeholders to focus support in the form of grant dollars, technical assistance and other resources to address the priority water and natural resource needs in that watershed.

New guidance values are being applied to identify upstream potential sources that are subject to current environmental protection laws and regulations. For example, bioaccumulation guidance values for characterizing PCB concentrations in sediments for human and wildlife protection are shown in Figure 16 under the dredging restriction use indicator #10. By applying these guidance values, remedial actions and trackdown activities in the watershed can be further identified, developed, pursued, and implemented to address threats from upstream sources.

## 6. Fish Tumors or Other Deformities

No definitive statement about any fish tumor/ deformity impairment could be made in the early Oswego RAP stage documents. A recommended study was designed, funded, and conducted involving fish samples from the AOC in 1993 and 1994. A final report of the Oswego River Fish Pathology Study was completed by Dr. Jan Spitsbergen, Cornell University, for the Oswego Harbor AOC using samples over this two year period. The results indicate no significant occurrence of tumors and little evidence for impairment of fish health by anthropogenic contaminants in the AOC. In this study, some difficulty was encountered in finding resident fish, which underscores the close link of fish in the harbor area to Lake Ontario. The original status of the “unknown” use impairment indicator has been revised to a status of “not impaired” based on the study results and consultation with the Remedial Advisory Committee. Although suggested as a potential next study (and requiring resources not available or warranted at this time), further research targeted at studying fish reproductive health and deformity has been deemed unnecessary to resolve this use impairment indicator. Reference to the discussion and observations made under the “Bird and Animal Deformity/Reproductive Problems” use impairment indicator #7 is made in support of this conclusion. As identified by the Remedial Advisory Committee, the desired endpoint of no abnormal incidence of tumors or deformities in the Area of Concern has been achieved.

**Resolution** - Based on the fish pathology study completed in 1994, no significant occurrence of tumors and little evidence for impairment of fish health was observed in the Oswego River Area of Concern. The beneficial use is therefore considered unimpacted and the use impairment indicator status “not impaired”.

**Support Data** - Dr. Jan Spitsbergen conducted a fish pathology study in 1993 and 1994 in the Oswego Harbor Area of Concern (AOC). During that time, Dr. Spitsbergen investigated the health of a number of fish from the AOC and from control sites. Her techniques consisted of necropsy and microscopic evaluation (histopathology) of tissues of collected fish. Although the study focused on three target species of fish (brown bullhead, white sucker, and rockbass), a number of other species of fish were also examined. As Dr. Spitsbergen stated, one would ideally want to focus on species of fish that have a relatively small home range, are relatively easy to collect and are relatively sensitive to environmental contaminants. Ideally such a species would be a resident solely of the AOC for its entire life. Unfortunately, such a species of fish was not observed for the tumor study of the Oswego River AOC. The alternative was that Dr. Spitsbergen did the best that could be done in examining a reasonable number (40+ per species) of the three target species. Data from these fish were compared to fish collected from a number of other locations designated as control/ non-impacted areas. Given the realities of the environment at hand, this was certainly a logical approach. The brown bullhead and white sucker have been identified and recommended in other lake tumor studies as good study candidates due to their feeding characteristics (bottom) and environmental sensitivity.

The results of the Spitsbergen investigations indicated that a variety of tumors and other pathological conditions were found in fish from both the AOC and from the control/ non-impacted areas. However, statistical evaluation of tumor-prevalence did not indicate a significant difference in the prevalence of tumors between the fish from the AOC and the control/ non-impacted areas. In some cases, tumor prevalence was actually higher in fish from the control / non-impacted areas. This finding may appear surprising, but it is certainly consistent with past investigations conducted at Cornell by Dr. Spitsbergen and by her predecessor, Dr. Marilyn Wolfe.

Dr. Paul Bowser, also from Cornell University, was actively involved in some of these fish tumor investigations. Dr. Bower reviewed the Spitsbergen study and results for a presentation at the 1998 Oswego River RAP Workshop. He commented that the findings of the Oswego Harbor Fish Pathology Study bring to light some of the problems associated with using fish tumors as an indication of pollution of the aquatic environment. This is not to say that toxic compounds cannot cause tumors in fish. They certainly can. The literature has many laboratory-based studies in which tumors are caused in fish following exposure to a toxic compound. On the other hand, there are few studies where a definitive experiment was conducted proving that a raw contaminant in the environment caused a specific fish tumor. One that comes to mind is the study where Dr. Jack Black of Roswell Park “painted” river bottom sediments on bullheads. One must essentially complete a controlled exposure experiment where the specific candidate toxicant (or mixture) from the environment is used to cause the specific tumor on the fish following a controlled exposure. This is not a trivial matter. But it was done by Dr. Black. One must also keep in mind that a number of other factors can also cause, or be involved in, the development of tumors.

As is stated in the report, such factors as diet, genetics, age, and viruses have been implicated in the development of tumors. The presence of naturally occurring nitrosamines, radon, nickel, chromium and arsenic have also been hypothesized as potential contributors to the development of tumors on fish. In the natural environment, where these factors cannot be controlled (as in the laboratory), one has to be extremely careful not to jump to a conclusion regarding the cause(s) of a tumor. These latter factors (and maybe some others) may be responsible for the presence of the tumors on the fish from the control/non-impacted sites. Dr. Bower agreed with Dr. Spitsbergen's conclusions that, on the basis of the data she collected, there was no statistically significant basis upon which to conclude that the presence of tumors on fish from the AOC was caused by environmental pollution. Given the “real world” limitations of the Oswego Harbor environment and the lack of an “ideal candidate fish species”, it is not certain that more would be gained by continuing to look at tumor prevalence as an indicator of general fish health and the impact of the present contaminants. Even though a potential avenue of investigation might be studying the impact of the contaminants on the reproductive capabilities of the target species, this is not recommended at this time. In conducting further studies, one must keep in mind that there is not an ideal candidate fish species present in the Oswego AOC on which to base a study.

**Rationale** - Because no fish tumor impairment was found in the Oswego River Fish Pathology Study, the use impairment indicator is considered not impaired and therefore resolved. Routine monitoring and surveillance activities for the Great Lakes Program provide adequate protection to assure the beneficial use is maintained. This is consistent with the delisting principles and guidance.

## **7. Bird and Animal Deformities or Reproductive Problems**

The “unknown” status of this use impairment was based on no definitive studies reported. The presence of PCBs in fish flesh associated with the Lake Ontario fish consumption advisory was the possible cause and connection to other use impairment indicators. Since the early stages of the RAP, we now have study results and program initiatives in place that resolve the other indicators and address this “unknown” concern for bird and animal deformities or reproductive problems. The Marsh Monitoring Program supports the not impaired conclusion for the Oswego AOC. In addition, trend data from reporting on the status of use impairments for the Lake Ontario LaMP indicate significant improvement in several environmental indicators. For example the reported number of eagle nests and the number of eaglets per nest for the Lake Ontario watershed have increased. See Figure 5 under the Fish and Wildlife Populations indicator showing increase eagle nesting.

The oversight and protection provided by NYSDEC’s ongoing regulatory environmental programs involving monitoring, inspection, and enforcement activities for the media of air, water, hazardous waste, spills, remediation, and multimedia pollution prevention also serve to address this indicator. The desired endpoint, as identified by the Remedial Advisory Committee, is no abnormal high incidence of deformities or reproductive problems. All evidence indicates the endpoint has been achieved and is maintained and protected.

**Resolution** - The delisting criteria have been satisfactorily addressed by study results and information available through marsh monitoring and ongoing program initiatives. Environmental trend data associated with the larger Lake Ontario LaMP watershed supports this conclusion. The indicator status is therefore “not impaired”.

**Support Data** - The Canadian Marsh Monitoring Program (MMP) was initiated in 1994 by Long Point Bird Observatory (now Bird Studies Canada) and Environment Canada in response to a recognized need for information on the status and trends of marsh breeding amphibian and bird populations, particularly in some highly impacted Great Lakes coastal wetlands (Areas of Concern). The Marsh Monitoring Program (MMP) is a binational, long-term monitoring program that coordinates the skills, interests and stewardship of hundreds of citizens across the Great Lakes basin to help understand, monitor and conserve the region’s wetlands and their amphibian and bird inhabitants. Since its initiated in 1994, the MMP has been developed and expanded through the additional support of the U.S. Environmental Protection Agency and the Great Lakes Protection

Fund. The MMP depends on the commitment of individuals, foundations, governments, and non-governmental organizations that together form a strong partnership working towards effective conservation of wetlands and their inhabitants.

The Marsh Monitoring Program is a volunteer-based program focused on surveying birds and calling frogs and toads in coastal and inland marsh habitats in the Great Lakes basin. From 1995 through 1997, ten MMP participants have surveyed a total of nine routes associated with the Oswego River Area of Concern. Seven of these routes have been surveyed for both amphibians and marsh birds and two routes for birds only. Considered as a whole, species richness values of amphibians and marsh birds were high in surveyed marshes of the Oswego River AOC relative to those observed outside the AOC. A number of individual routes, however, were lower in species diversity than routes external to the AOC. Abundance indices of marsh birds and amphibians in the Oswego River AOC tended to be similar to the average values for MMP routes outside the AOC. Analyses of the Oswego River AOC based on this first set of monitoring data from current MMP routes provide useful measures of Area of Concern recovery.

The information gained through the MMP fills a need for baseline data on habitat associations and populations trends of Great Lakes marsh birds and amphibian species. Based on input from experts in marsh birds and amphibian ecology, a set of species were selected as indicators (i.e., surrogate measures) of marsh function and habitat provision. Species were selected as indicators based on their population being sufficiently common, their breeding dependent on a diverse marsh vegetation, their need for relatively undisturbed habitat conditions, knowledge concerning population declines, and amphibians having both early and late season callers. Volunteers were trained and diversity measures of species were recorded over several years. As part of the MMP assessment of AOC marshes, a ranking system was developed to compare amphibian and marsh bird occurrence in surveyed marshes within each AOC relative to that recorded in other marshes in the same lake basin referred to as non-AOC marshes. Expected values were developed for comparison to the AOC with results indicating either healthy (above), not impaired (similar), or impaired (below expected).

The Oswego River AOC marsh bird and amphibian habitat survey scored above the average of the non-AOC marshes in the same lake basin in terms of the number of species present. This healthy assessment for habitat under this Bird and Animal Deformities or Reproductive Problems indicator #7 provides further support for the not impaired status for both the Fish and Wildlife Populations and Habitat Indicators #2 and #3 above. Efforts should be made to continue to maintain and rehabilitate Great Lakes marsh habitat, monitor populations, and improve migration routes.

Additional multi-year monitoring surveys of marsh bird and amphibian populations and habitat are recommended to continue proper assessment and to document that AOC health conditions are intact. **Figure 12** below lists the marsh bird and amphibian indicator species composing the assessed high quality marsh habitat that exists for the Oswego River AOC and provides summary results of the 1995-1996 surveys. Further Marsh Monitoring Program methods and results are delineated in Appendix M.

## Indicator Species

The presence of the following suite of marsh bird and amphibian species indicates high quality marsh habitat.

“✓” “indicates species in the Oswego River AOC marshes.”

### Birds

- ✓ Pied-billed Grebe
- ✓ American Bittern
- ✓ Least Bittern
- ✓ Blue-winged Teal
- Black Tern
- American Coot
- ✓ Common Moorhen
- ✓ C. Moorhen/A. Coot
- ✓ Virginia Rail
- ✓ Sora
- Common Snipe
- ✓ Marsh Wren

### Amphibians

- ✓ Bullfrog
- ✓ Leopard Frog
- ✓ Chorus Frog
- Mink Frog
- ✓ Spring Peeper

## Highlights of the MMP's Oswego River Results

- In 1995, one route was monitored for marsh birds only in the Oswego River AOC. In 1996, 7 routes were monitored for marsh birds and 5 routes were monitored for amphibians. In total, 7 marsh bird routes and 5 amphibian routes have been established in the Oswego River AOC.
- Overall, 8 amphibian species were present in the AOC — a high level of diversity. Gray treefrog, green frog and spring peeper were present in high densities (CLC-3 \*). American toad and bullfrog were present in moderate densities (CLC-2 \*). Chorus frog, northern leopard frog and wood frog were present in low densities (CLC-1\*).
- Four amphibian indicator species were present in the AOC. Bullfrog abundance scored above average. Northern leopard frog and spring peeper abundance scored as average; only chorus frog abundance was lower than expected.
- Overall, 20 species of marsh nesters were recorded in the Oswego River AOC — again a high level of diversity. Densities of many marsh nesting species were greater than the Great Lakes basin non-AOC averages.
- In total, 9 marsh bird indicator species were recorded in the Oswego River AOC. Only Common Moorhen/American Coot was below average in abundance; the abundances of the other species scored as average.
- Most marshes in the Oswego River AOC watershed were deficient in terms of marsh bird and amphibian diversity. Overall, however, the marsh habitat in the Oswego River AOC appears to have healthy marsh bird and amphibian communities.



\* Call Level Codes (CLC):

1 = Individuals can be counted; calls not simultaneous

2 = Calls distinguishable, some simultaneous calls

3 = Full chorus; calls continuous and overlapping

**Figure 12** - Marsh Bird and Amphibian Indicator Species & Results - Oswego AOC

In a presentation given at the State of the Lakes Ecosystem Conference (SOLEC), New York State DEC Lake Ontario LaMP staff provided indicator monitoring results that document evidence of a number of improvements in the watershed environment. Among these is an increase in the number of Herring Gull nests, a decrease in the sea lamprey wounding rate for Lake Trout, an increase in the observation of the presence of Mink and Otter, an increase in the number of nesting territories for bald eagles, and an increase in the number of bald eagle eaglets produced per nest. Current New York State DEC field observations note that the bald eagle shoreline nest east of Oswego has produced two eaglets, which is great news since one eaglet per nest is typically considered good. A nest is also observed in Irondequoit Bay near Rochester, New York.

**Rationale** - No evidence of bird or animal deformities or reproductive problems exist to suggest a use impairment. Supporting data provides the evidence to indicate that the best use is not impaired and that sufficient monitoring and surveillance exists to provide protection against an impairment.

## **8. Degradation of Aesthetics**

There was a low confidence of any aesthetics use impairment in the early stages of the RAP. Any concern would involve the observance of periodic excessive algae in certain upstream shoreline and calm river areas. Although turbidity occurs occasionally during high flow, it is not excessive, and is largely of natural origin and is not an aesthetic problem. It is noted that the turbidity associated with the Oswego River is much less than in other rivers of similar character (e.g. Genesee River). The 1994 Oswego Harbor Survey identified no aesthetics impairment in the Area of Concern. The desired endpoint, as identified by the Remedial Advisory Committee, is the absence or minimal presence of floatables and odors, and includes weed control to non-nuisance levels.

During RAP implementation, concern developed about the general spread of nuisance and invasive species including weeds, fish, and mussels. These exotic species have a life cycle and impact on the waters in the AOC that is both beneficial and detrimental. For example, the zebra mussel improves water clarity, but can decrease dissolved oxygen content for fish and increase sunlight penetration for weed and algae growth. Invasive aquatic weeds and plants (e.g. water chestnut) can be extremely prolific to the detriment of recreation and habitat. Excessive aquatic plants in the Oswego harbor (at Wright's Landing) are controlled by harvesting. One important method to limit the introduction of exotic species is through Great Lakes program activities addressing ship ballast water.

Under NYSDEC's Priority Waterbody List (PWL) the lower Oswego River historically is classified as stressed for aesthetics. The main cause and source was identified as the City of Oswego's wet weather municipal discharges. Projects to address wet-weather, floatables, and turbidity discharge sources have been and continue to be implemented. The 1995 PWL classification of "stressed" is under management by the NYSDEC Regional Office in cooperation with USEPA Region 2. Implementation of an approved long term control plan by both the City of Oswego's East Side and West Side municipal discharges is being pursued. Even though no environmental or beneficial use

impairment has been identified, the wet-weather conditions must be addressed. For additional detail, refer to the remedial activity updates for point and nonpoint source management controls in Appendix K under sections 3 and 4.

The delisting of the Area of Concern, however, is not dependent on a PWL classification of stressed or threatened. Under both the PWL and the RAP use assessments, the water uses of the lower Oswego River and harbor are not classified as “impaired” or “precluded” (the more severe classifications under PWL). The ongoing “lower level” PWL classification for the harbor area is consistent with the RAP “not impaired” assessment. This in turn is consistent with a continuation of NYSDEC, Oswego County, and the City of Oswego’s responsibility in maintaining the best uses by taking actions to control the nuisance conditions associated with aesthetics. The beneficial uses are therefore able to be enjoyed even though there has been some impact in the shallow harbor area which has caused the aesthetics to historically be identified as stressed and which are currently managed as a nuisance. Over the years the reductions in floatables, solids, and phosphorus have resulted in significantly improved conditions such that there is no aesthetic impairment.

**Resolution** - The delisting criteria and desired endpoint for this aesthetics indicator have been achieved for the Area of Concern. The original status of the indicator as “may not exist” has been confirmed as “not impaired”.

**Support Data** - Since the early stages of the development of the RAP, many remedial activities have been accomplished by NYSDEC and others that have had a positive impact on the Oswego River and the Area of Concern. The 1996 Clean Water/Air Environmental Bond Act has providing funding for a number of environmental projects in the watershed. These include wastewater treatment plant upgrades, combined sewer overflow improvements, aquatic habitat projects, Brownfields development, landfill closures, recycling initiatives, air quality projects, Open Space Preservation, and nonpoint source projects. The Onondaga Lake cleanup projects are moving forward. New initiatives in pollution prevention (re: mercury) and on-going core environmental protection programs are underway to address the control, cleanup, and use of hazardous substances. Monitoring and inspection activities in the water, air, and hazardous/solid waste programs continue to provide a significant level of protection to the local environment. Conducting a bio-diversity study for the Oswego River corridor is under review for funding. In September 2002, the City of Oswego, was awarded grant money from the Environmental Protection Fund to continue the development of the Oswego River west side riverbank and establish itself as a major harbor center.

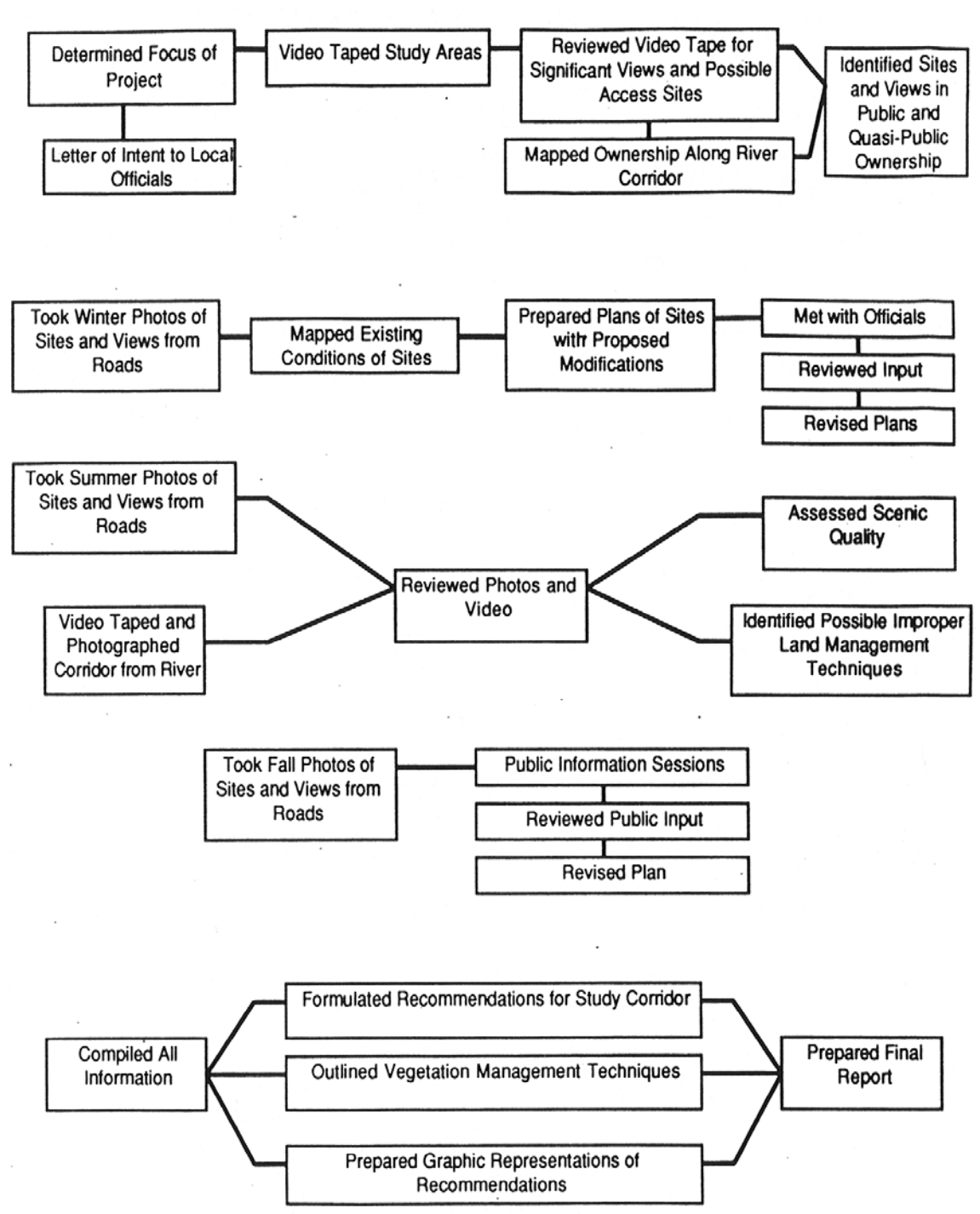
Upstream in the Oswego River drainage basin, the Seneca River is the major river that does exhibit eutrophic conditions in certain areas; however, it is generally in good shape. Contributing to this condition is the presence of excessive nutrients, aquatic weed growth, and low dissolved oxygen. This upstream area also has zebra mussels and fish consumption advisories. Much progress has been made in the last ten years including activities involving Oneida Lake and Onondaga Lake. Management of these lakes involves balancing the demands of land and water use issues. In both cases fact finding is recommended as a key initial step. The “Comprehensive Watershed Approach” involves the following categories of activities: first, establish a management team consisting of the water users; then, collect data; assess the data and target activities to include in an action plan; develop strategies to implement the action plan; conduct the activities; evaluate results and make adjustments to continue implementation. NYSDEC’s Watershed Restoration and Protection Strategies (WRAPS - see Appendix N) embraces these activities.

Results of the Oswego Harbor Survey in 1994, which are presented in use impairment indicator #4 above as part of the supporting data to resolve the Eutrophication and Undesirable Algae, also provide useful information supporting a not impaired status for aesthetics in the AOC. For example, dissolved oxygen is not a problem in the AOC. Although nutrient levels may be considered high, inputs have been curtailed. Aquatic weed and algae growth have been assessed as not impaired based on an improved understanding of what characterizes a healthy environment. We know there is a balance between the macrophytes and algae and that the reduction of excess nutrients and prevention of toxic inputs to the system are fundamental to accomplishing restoration and protection of the best uses of the water resources. Actions have been taken to address these concerns as well as document achieving the primary endpoints of an absence or minimal presence of floatables and odors, and for weed control to non-nuisance levels through mechanical harvesting. Observations of the water quality and intact multi-purpose uses in the AOC corroborate the not impaired status. Further, the influence of Lake Ontario and the “flow-through” characteristics of the Oswego River AOC provide for maintaining good water quality now and into the future.

The Oswego County Planning Board acted to further improve and protect the best uses of the Oswego River. Their recommendations were provided in the 1992 Oswego River Scenic Assessment report. A study to increase the appreciation of the Oswego River corridor from Phoenix to Oswego was conducted to improve and provide visual and physical access to the river. The study lasted over one year to include consideration for seasonal changes. The study methodology was extensive and included mapping, photos, video, land use assessment and inventory, river access, river transportation use, planning, public information sessions, public officials involvement, reporting, and recommendations.

This Oswego River Scenic Assessment study identified landscapes with similar physical features (character areas). Techniques for maintaining scenic quality were discussed (e.g. development practices, land use planning, and vegetation management). Recommendations address modifications to the Riverside Park and improvements to the Varick Overlook. Enhancements to the Minetto Park and Boat Launch, Apple Landing, South End Lock Island Park, and Canal Lock facilities are described. Creation of a Riverway Trail as part of a proposed recreationway is also noted. Additional proposed new or improved public access areas include: Granby Community Park, Scriba/Volney Community Park, Black Creek Fishing Access, and Battle Island State Park. Ten viewsheds and bridge view locations are identified. The role of local communities in planning and developing strategies for implementation are included in the report with a list of responsible agencies for project sites.

**Figure 13**, on the next page, depicts the various components of the Oswego River Scenic Assessment Action Plan and illustrates the comprehensive planning and public involvement.



**Figure 13** - Oswego River Scenic Assessment Action Plan

**Rationale** - Because no significant aesthetics problem has been identified in the Oswego AOC and water quality survey data support the not impaired status for the indicator, concern for aesthetics as a use impairment is considered resolved. Routine monitoring and surveillance activities in all environmental quality program areas benefit the Great Lakes Program in providing an ample level of protection to assure the beneficial use is maintained. The Oswego County Soil and Water Conservation District (OCSWCD), the Oswego County Water Quality Coordinating Committee (OCWQCC), and NYSDEC provide protection oversight and activity implementation.

## **9. Degradation of Zooplankton and Phytoplankton**

The early stages of the RAP had no plankton data in the Area of Concern on which to base a status determination. The “unknown” status of this use impairment was due to this lack of data. Earlier, in a 1987 report, Dr. Makarewicz of SUNY Brockport noted that the phytoplankton assemblages observed in the Oswego Harbor and river in 1981 were represented by many species widely associated with eutrophic environments. These assemblages had higher nutrient and chloride ion concentrations than that found in the nearshore areas of Lake Ontario. Since then, watershed remedial measures have been implemented and major industrial operations have ceased. Point source discharge improvements have been made. The occurrence of zebra mussels has contributed to improved water clarity. Upstream nutrient sources have also been reduced by similar actions as well as nonpoint source reduction measures. Further, the open-air salt storage operation in the harbor area was discontinued, and chloride output from upstream Onondaga Lake dropped markedly when Allied Chemical’s discharge ceased. Other remedial measures in the watershed have improved conditions for healthy plankton populations in the Oswego River. The desired endpoint, as identified by the Remedial Advisory Committee, is plankton populations substantially similar to reference communities. For the lower river and harbor Area of Concern, more recent observations indicate the plankton are healthy although not diverse or abundant. In other words, riverine waters can possess such characteristics and be healthy without indicating impairment. A not impaired status is concluded herein and further described in the plankton resolution, supporting data, and rationale statements below.

In keeping with the definitions of ecosystem health and biological integrity, we understand the beneficial use of plankton communities to be the conversion of solar energy to chemical energy (biomass), the incorporation of nutrients into biomass and the conveyance of these materials to normal, diverse fish and wildlife communities and ultimately to human populations by a plankton community that is balanced and adaptive to change. Impairment of the beneficial use is defined as a decrease in the ability of these communities to perform these functions as a result of stresses within the ecosystem caused by anthropogenic activities. Anthropogenic stresses on plankton populations can result (and range) from the addition of nutrients and toxicants to aquatic environments, fish harvesting and stocking practices, introduction of exotic species, and habitat alterations which could include changes in ultraviolet light conditions and increased temperature associated with climate change (Johannsson 1998). The Oswego River Area of Concern has experienced these stresses to varying degrees.

As described in the Eutrophication and Algae use impairment indicator #4, practically all of our northeastern lakes support a diversity of large aquatic plants attached to the bottom (benthic macrophytes) which are an important factor in maintaining potable, recreational, and aesthetic characteristics, as well as the ecological functioning of most waters. These plants compete directly with algae in the water column (phytoplankton) for nutrients, thereby maintaining water clarity. They (the plants) protect shorelines from erosion and stabilize deeper substrates and thereby limit turbidity from silts and clays in physical disturbances. By preventing the resuspension of sediments which have nutrients attached to them, algal growth is limited. Aquatic macrophytes provide food and cover and /or supplement oxygen supplies for all of the organisms (fish, mammals, amphibians, reptiles, and invertebrates) that make up shallow water (littoral) aquatic communities. They are the basis of aquatic food webs in these areas, providing indispensable links between the sun's energy and animals that eat plants which are, in turn, eaten by predators. In these ways, plants regulate the size and character of game fish and waterfowl populations as well as impact other biotic resources we cherish.

Recreational and other stakeholder users of the waters are concerned about aquatic weed growth, but must recognize the benefits derived from rooted plants. By taking steps to eliminate the rooted plants, planktonic algal populations will flourish (bloom) and vice-versa. The algal or plant growth can become abundant without reducing nutrient loading, which is usually an expensive, long-term, social, and political undertaking to address. In the Great Lakes drainage basin significant steps have been taken to reduce loadings of pollutants including nutrients to the receiving waters. Lake Ontario and the Oswego River Area of Concern have benefitted from the implementation of the Clean Water Act and the Great Lakes Water Quality Agreement. Contamination sources have been greatly reduced and in many cases eliminated.

According to the International Joint Commission's (IJC) Listing and Delisting Criteria for the fourteen use impairment indicators for Great Lakes Areas of Concern, plankton are impaired when the phytoplankton or zooplankton community structure significantly diverges from unimpacted control sites of comparable physical and chemical characteristics. In addition, plankton will be considered impaired when relevant field validated plankton bioassays (with appropriate quality assurance/quality controls) confirm toxicity in ambient waters. In the absence of community structure data, the beneficial use is considered restored when phytoplankton and zooplankton bioassays confirm no significant toxicity in ambient waters.

**Resolution** - To answer the question: “Are Plankton Communities in the Oswego River Area of Concern Impaired?”, we must weigh any “individual indications of impairment” against an overall assessment of impairment and derive a “determination of significance” based on the observed data and by comparison to the control / reference plankton communities. Although earlier data provide indications of impairment, more recent data and an improved understanding of the planktonic community in the environment suggest otherwise. Toxicity testing associated with the Oswego Harbor Survey did not identify a chronic problem or AOC sources of contamination. Upstream watershed and Lake Ontario LaMP activities provide responsible program areas to pursue

further concern for impacts on the planktonic community. ***In conclusion, the preponderance of the evidence indicates that plankton community of the Oswego River AOC is not significantly impacted nor impaired.***

Together, the status of remedial measures, influences outside of the AOC, and the data support a not impaired status for the plankton indicator in the AOC. Routine monitoring and surveillance activities in all environmental quality program areas benefit the Great Lakes Program by providing an ample level of protection to assure the beneficial use is maintained. The Oswego County Water Quality Coordinating Committee (OCWQCC) and NYSDEC will continue to provide protection oversight. This is consistent with the delisting criteria.

***Support Data*** - In 1981 Oswego River phytoplankton assemblages were observed as influenced by higher nutrients and chloride ion concentrations than in the nearshore areas of Lake Ontario. However with improvements to the City of Oswego's wastewater treatment facilities and municipal discharges, along with the decrease in chloride output from Onondaga Lake from industrial shutdown, as well as the ceasing of the practice of open-air salt storage in the Oswego harbor, these former influences have been greatly decreased and/or eliminated. The 1994 Oswego Harbor Survey report found no use impairment involving eutrophication, algae, beach closings, or degradation of plankton populations. Overall, the data indicates there is a healthy environment in the AOC. One has to consider other information in addition to the water quality survey data to arrive at a conclusion of no plankton impairment in the AOC. The health of the planktonic community is based on a number of factors including the factors affecting the indicator assessments for eutrophication, algae, toxicity, water quality, and upstream watershed and downstream Lake Ontario influences. Results from plankton sampling from the Oswego River harbor, represent a mix of harbor, river, and Lake Ontario waters. River waters are known to have less abundance of plankton populations and nearshore areas of Lake Ontario waters may have stressed plankton populations.

Bioassays were a part of the 1994 Oswego Harbor Survey and according to the IJC delisting criteria are recommended in the absence of community structure data or as follow-up to a known plankton impairment that may have a toxic cause. Results of the bioassays, addressed under the eutrophication and algae use impairment indicator #4 above, indicated no statistically significant reproductive or survival effects when compared to control samples. In the 1994 study, Dr. C. Siegfried, of the New York State Museum, made the observation that the plankton populations in the AOC are highly variable and fluctuate over time and space, making it difficult to draw conclusions from limited sampling. He noted that the phytoplankton community of the harbor area are generally quite different from the open lake. This is especially shown in the June and July samples. The August samples were dominated by a large population of dense *Aphanocapsa*, a blue-green species (known to produce toxins). The zooplankton community in the river was noted as always low, with no rotifers, which can reflect flowing river water conditions which are not usually abundant in plankton. The August populations in the harbor were also low and the blue-green algae presence suggests the possibility of *cyanobacteria* toxins. Since this sampling occurred at a low point in the seasonal dynamics, it was noted as difficult to draw any conclusion from the low populations in the sample results.

The preponderance of evidence indicates that the planktonic community of the lower Oswego River and harbor area are not significantly impacted as a result of conditions in the lower river and harbor. A tributary river environment with Lake Ontario influence, combined with seasonal changes, sample timing, and other local site characteristics involving the growth of macrophytes can be challenging in data assessment and reference site comparison. The limited plankton sample data are noted as inconclusive. Although a diverse and abundant community was not identified, a degraded community is not demonstrated, thereby indicating no overall degradation or impairment in the planktonic populations from pollutant sources in the Oswego River AOC. In any event, a remedy for plankton restoration and protection in the AOC would not be directed at an AOC source, but would be focused on upstream watershed and downstream Lake Ontario causes and effects. The upstream actions by the FERC licensing process creating additional year round "run-of-river" flow in the AOC should also benefit the plankton populations. Associated stresses on the AOC related to Lake Ontario are to be addressed through the Lake Ontario LaMP. Therefore, upstream and downstream actions by responsible environmental watershed (WRAPS) and LaMP programs will provide the solution and forum for any additional remediation or resolution regarding the planktonic community in the AOC. Further action by NYSDEC and the Remedial Advisory Committee under the RAP process has been determined not warranted. There are no known sources of significant impact specific to the plankton in the AOC. Under these circumstances, resolution of the plankton impairment indicator by watershed management activities and the Lake Ontario LaMP is consistent with the federal EPA delisting criteria.

***Rationale*** - In the 1980's study, Phytoplankton species richness in the Oswego River in August was almost three times as high as species richness at Eighteenmile Creek (another AOC on Lake Ontario 100 miles west of Oswego). The more recent data in the 1994 Oswego Harbor Survey did not identify this same richness (as compared to the 1980 study) which is most likely due to noted improvements in water quality in the Oswego River water and the influences of the upstream watershed and Lake Ontario waters on the Area of Concern over twenty years.

Ecologists have grappled with the concepts of biological integrity, ecosystem health, and biodiversity in trying to define the normal condition of ecosystems. The capability of the ecosystem to support and maintain a balanced, integrated, adaptive community of organisms having a species composition, diversity, and functional organization comparable to that of natural habitat in the region is most desired. If the system has this integrity, it will be healthy; however, the lack of diversity does not imply impairment. Therefore, using comparable sites having known healthy and unimpacted characteristics are key to such evaluations.

Overall, the status of remedial measures, influences outside AOC, and the data support a not impaired status for the plankton indicator in the AOC. Routine monitoring and surveillance activities in all environmental quality program areas benefit the Great Lakes Program by providing an ample level of protection to assure the beneficial use is maintained.

## 10. Restriction on Dredging Activities

Periodic navigational maintenance dredging in the Area of Concern has been determined to be not impaired. The early stages of the RAP assessed this dredging restrictions indicator as not impaired with high confidence based on no restrictions on the disposal of dredged materials from the harbor. The presence of contaminants (PCBs, PAHs, mercury, Mirex, dioxin and furan) has been detected in the Oswego River; however overall, sediment quality and toxicity are acceptable and federal and state requirements for dredging and disposal are achieved. The most recent sediment surficial and core sampling results are consistent with this finding. The concentrations identified in the Area of Concern sediments (particularly the navigational channel) are not of a level or threshold where their dredging and disposal involves contamination restrictions.

The most recent harbor area dredging (of the western and outer harbor channel) by the United States Army Corp of Engineers (USACE) for navigational purposes was approved and performed without restrictions on the dredging and disposal in the summer of 1999. An assessment of sediment sampling data supports the not impaired status for the AOC. Investigation of upstream sediments as potential sources was recommended and conducted as part of source trackdown studies. Although no AOC threat was identified from upstream sources, an additional study in the vicinity of upstream Battle Island (near Fulton, NY) to assess the local environmental impact of these sediments has been proposed by SUNY Oswego for a USACE matching grant (see Appendix O). For the AOC the desired endpoint (as identified by the Remedial Advisory Committee) of no USACE dredging restrictions on the harbor dredging has been achieved. This is documented by sediment study results and recent approval / certification for navigational dredging of the harbor channel area.

**Resolution** - No dredging restrictions exist in the Oswego River Area of Concern. The approved navigation channel dredging, and sediment core analyses data support the status of not impaired for this use impairment indicator.

**Support Data** - The US Army Corp of Engineers (USACE) dredges the Oswego harbor navigational channel approximately every five years. This permitted navigational dredging activity was most recently conducted in the summer of 1999. Sediment samples have been conducted that assess four tiers: past chemistry and site history, new chemical uses, sediment toxicity and bioaccumulative testing, and special testing. Records summarize results of the physical, chemical, and biological testing in the Oswego harbor. No significant impact is indicated. The disposal of dredge material in Lake Ontario has not been a problem for the Oswego harbor dredging. Bioassay results for water and sediment have produced 10 to 20 percent mortality rates which are not considered significant. The USACE considers the Oswego harbor dredged material to not be problematic and has noted this dredged material as one of the cleanest currently dredged in the Great Lakes. Below, a description of a hypothesis raised by academic study is subsequently addressed by DEC water quality studies. Details of the 1997 and 2002 sediment reports are also presented.

**Academic Study and Mass Balance Modeling** of Mirex developed a suspended sediment model for the Oswego River which tracks observed suspended solids concentrations in the river. The model however fails to account for the high mirex loads observed in an independent academic study because the observed bottom sediment contamination was not high enough. Based on the study data, these results indicate the inventory of mirex present in the river and in the sediments of its discharge are an influence on Lake Ontario. The data and model prove two (of three) reasonable causative hypotheses false. The remaining conclusion is that there is likely an ongoing external source of mirex to the river that is most likely from an upstream source. The study model concludes that the Oswego River was and may still be a source of mirex to Lake Ontario (reference Appendix H.2 by DePinto). Loading events are likely episodic and related to extreme flow events in the river. Some evidence indicates that high loading occurs via highly contaminated particles. Attempts to locate the exact source of the continued loading have not been successful. In general, during low-flow, low concentration periods, substantial conversion of mirex to photomirex in the environment has been observed and is known to occur.

**NYSDEC Water Quality Studies** conducted sampling studies of tributaries to Lake Ontario in 1993 and 1994 using passive samplers for dissolved PCBs, PCBs on suspended solids, and whole water mercury. These intensive water column sampling efforts included a sample site in the lower Oswego River at Lock 6 above the AOC known to accumulate upriver sediments. Results indicate that among the multiple sampled areas, PCBs were consistently lowest in the Oswego River. Mirex was occasionally detected in the Oswego but was found in higher concentrations in the Genesee River and Eighteenmile Creek (reference Appendix H.17 by Litten). Mercury concentrations were also low in the Oswego River. In other sampling specifically involving Lake Ontario in 1997, using large volume water sampling with a quantitative sampling system (TOPS), exceedences of the GLI water quality criteria for dioxins, PCBs, dieldrin, DDE, and a-HCH were found. With such results, source trackdown and trend analyses become increasingly important. Trend analyses activities indicate overall improving trends in the Oswego River. Follow-up on contaminated sediment source trackdown investigation has focused on the Battle Island area, eight miles upstream of the Area of Concern, where some sediment contamination has been identified. A sediment core taken near Battle Island in the Oswego River found historically higher mercury levels but recently deposited sediments were much less.

Although contaminants of concern are not detected in sufficient quantities to warrant remedial action in the Area of Concern itself or in upstream sediments, the strategy to address these pollutants (and the opportunity for public involvement) exists as part of ongoing environmental programs and new initiatives to address watershed restoration and protection. See Appendix K, Section 8, for public outreach activities involving the RAP and a transfer of stewardship. Further, Appendix N describes an initiative entitled Watershed Restoration and Protection Action Strategies (WRAPS) to coordinate watershed activities. The purpose of a WRAP strategy is to develop and/or compile and document a strategy for the watershed that brings together all appropriate agencies and stakeholders to focus support in the form of grant dollars, technical assistance, and other resources to address the priority water and natural resource needs in a selected watershed.

As reported in the **Oswego River Sediment Study 1997** (Appendix H.28), sediment cores and surficial sediment samples were taken at six sites on the Oswego and Seneca Rivers. All samples were collected from depositional areas located outside of navigational channels which are normally dredged. Report conclusions addressed a number of parameters. Measurable concentrations of trace metals for cadmium, copper, lead, and mercury were measured in a sediment core collected adjacent to Battle Island (upstream of Fulton, NY). Very few samples collected during the study were found to have pesticide concentrations greater than analytical detection limits. Therefore any presence of DDT and metabolites are considered the result of past application and are not a major or widespread current problem. PCB assessment looked at human health and wildlife bioaccumulation and secondly for wildlife bioaccumulation which are derived using equilibrium partitioning methodology. PCB concentrations were detected in the upper sections of all core samples except the farthest upstream. The largest PCB concentrations were detected near Battle Island (also detected at Battle Island were dioxins, furans, PAHs, and Mirex). Specific results from the 1997 Oswego River Sediment Study indicated the following findings:

**Metals** had their highest concentrations encountered in the sediment core at Battle Island. Cadmium, copper, lead, and mercury exceeded NYSDEC sediment guidance. Radionuclide dating results indicate that the 28-48 cm. core layer represents pre-1950' s sediments and contaminants deposited during a major depositional event.

**Mirex**, of relatively high concentrations, was measured in two sediment cores at Battle Island and Canal Lock 6; the highest being at the Battle Island sampling site. Additional core sampling was recommended and subsequently conducted in 2000 with a focus on this Battle Island area. Elevated concentrations of Mirex (1,500 to 2,100 ppb) were found in core samples, as well as DDT (40 to 90 ppb) in various layers of the core samples. These sediments may appear to present a potential source of contamination for downstream waters; however, after further assessment, the mirex is not present in concentration or in amount that meets remediation criteria. Further, water column study has not identified an active source nor has an environmental impact been determined. This localized condition has not met remedial action thresholds. The presence of this upstream contamination does not necessarily prevent delisting. This is consistent with the EPA Delisting Principles and Guidance.

In the 1997 study, mirex was detected in surficial and near surface samples in the Oswego Harbor but below guidance values. **Figure 14** illustrates mirex detection at the six sample locations along the Oswego River from the 1997 study. The presence of contaminated sediments upstream at Battle Island is not causing a use impairment in the AOC. In any event, further upstream investigation and possible remedial work can proceed independent of the RAP. Any accompanying stakeholder concern and public involvement on mirex contamination is more appropriately addressed as a separate individual site remediation project, or local watershed planning/ investigation, or under the larger regional Lake Ontario Lakewide Management Plan (LaMP) process. If a condition of “pass through” of contamination to Lake Ontario can be identified, the LaMP will need to address this source and load. Photo-mirex was not specifically addressed as part of the sediment studies. (Note: Station No. 2 is upstream of the AOC above canal lock 6).

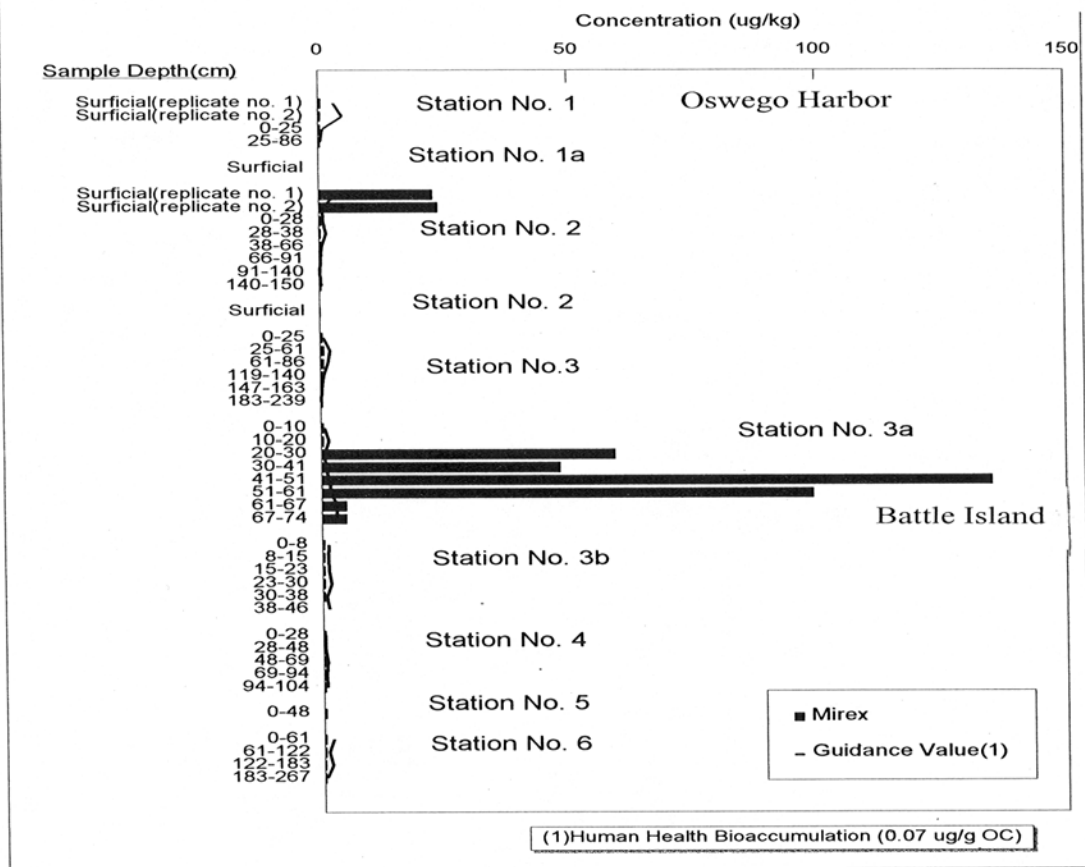


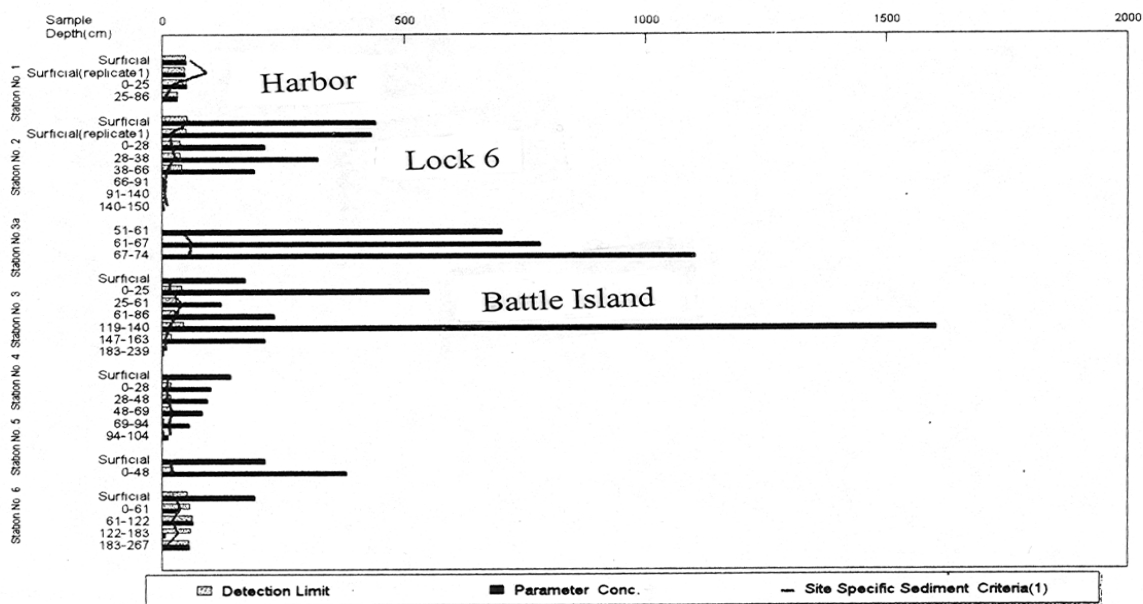
Figure 14 - Oswego River Mirex Results

**Octachlorostyrene** was not detected in any of the samples performed by the contract lab in the 1997 Oswego River Sediment Study. The NYSDOH laboratory reported similar results (minimum detection limit less than 0.5 ng/g) except for a few samples where only trace amounts of the compound were detected present but less than the reported concentration. Overall, Canadian and US fish tissue monitoring experts do not regard OCS as a significant problem for Lake Ontario and no longer include analyses for OCS as part of routine fish monitoring programs. As a result, concern for OCS as an Oswego River RAP or Lake Ontario LaMP contaminant is considered not significant.

**PAHs** (Polynuclear Aromatic Hydrocarbons) had their most apparent pattern observed in the major spike in concentration analyzed in the 119 to 140 cm. (middle and below) core section of station #3

(Battle Island). PAH compounds exceeding DOW and DFW guidance include acenaphthene, anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene and indeno(1,2,3-cd) pyrene. Upstream samples in the Seneca River at the Onondaga Lake Outlet suggest a history of PAH contamination with PAH presence throughout the core sample. The AOC harbor sediment core sample indicated a slight surface or near-surface presence of PAHs. **Figure 15** illustrates the concentrations for Benzo(a)pyrene at the 6 sampling stations along the Oswego River and is representative of the PAH findings overall.

As addressed under mirex above, the USEPA Delisting Principles and Guidance state that an upstream source of contamination may not prevent delisting the AOC. In the event, the identified sediment contamination in the core samples upstream at Battle Island and in the Seneca River becomes a cause of contamination to downstream receiving waters including Lake Ontario, further upstream remedial investigation and possible remedial work can proceed independently of the RAP. Public outreach would also be more appropriately addressed under an individual remedial project involving local agencies and perhaps the larger Lake Ontario Lakewide Management Plan (LaMP). In the event a “pass through” of contamination to Lake Ontario is identified, the LaMP could address this pollution source.



**Figure 15** - PAH Sediment Core Concentrations - Benzo(a)pyrene (ug/kg)

**PCB** sampling and assessment involved two independent sediment evaluation protocols that provide guidance values for characterizing PCBs in sediments: NYSDEC Division of Fish and Wildlife 1993 publication entitled “Technical Guidance for Screening Contaminated Sediments” and the Canadian 1993 publication by Persaud, et.al. entitled “Guidelines for the Protection and Management of Aquatic Sediment Quality in Ontario”. The DEC assessment applies two guidance values: one for human health bioaccumulation and a second for wildlife bioaccumulation which are derived using equilibrium partitioning methodology. The Canadian guidance applies three guidance values: one for a no-effect level, another for a lowest-effect level, and a third for severe-effects. **Figure 16**, from the 1997 sediment study, on the following page shows sample results and these guidance values for characterizing PCBs in sediments.

PCB Aroclors and congeners were detected in five of the six core sample stations along the Oswego River. Two surficial sample stations detected PCBs: the Oswego Harbor and the next sample site upstream at the canal lock. The sample results document relatively low concentrations and many “non-detects” for PCBs. For the surficial and core sediment these guidance values are quite low. Applying the guidance values does not directly translate to a final decision on sediment contamination or dredging restrictions. An overall level of threat to the environment is applied to the assessment of a detected contaminant in the sediment to determine any restrictions for dredging. Considerations include the concentration present, the potential for release, bioaccumulation pathway, the toxicity, and potential remedial cost and benefits. Navigational dredging for the Oswego harbor is therefore regulated and permitted but not restricted as a use impairment. Lake disposal of dredged materials is provided for navigational channel dredged materials. The most recent sediment surficial and core sampling results are consistent with and support this determination. The sediment sampling data does identify upstream sources as a potential threat to the ecosystem and Lake Ontario. However, the concentrations identified in the Area of Concern sediments are not of a level or threshold where their dredging and disposal involves contamination restrictions. USACE testing of sediments for dredging were all non-detects for organochlorine pesticides and PCBs.

It should be noted that basically any detectable level of PCBs would exceed the sediment guidance for human bioaccumulation, since the analytical reporting levels for both methods are generally greater than the corresponding human bioaccumulation guidance values. Sample results for PCB concentrations in sediments show detected values at Battle Island in the 25 to 61 centimeter core depth and in the Oswego Harbor near the surface. These PCB sample results are in line with the findings for the other parameters and could support the academic proposal for further investigation of environmental impact at the upstream Battle Island location. The concentration and amount of contaminated sediments do not however warrant any current further action by DEC.

Overall, upstream causes and sources of PCB contamination are the primary concern regarding downstream locations in the river, harbor, and Lake Ontario. Because the identified sediment contamination upstream is not causing an identified use impairment in the AOC, any upstream investigation and possible remedial work can proceed independently of the RAP. Contaminated sediments in the watershed involving PCBs are more appropriately addressed under an individual remedial project, Oswego River watershed planning by responsible government agencies, or the larger Lake Ontario Lakewide Management Plan (LaMP).

Station No.	Sample Depth (cm.)	Analytical Results			DEC Technical Bioaccumulation Guidance		Persaud Provisional Sediment Guidelines			DEC Interim Dredge Guidance	
		Sum of 91-11 Congener	Sum of 8080(1) Aroclor	TOC (%)	Human	Wildlife	NEL	LEL	SEL	No Appreciable Contamination	High Contamination
1 Harbor	0-25	0.20591	0.270	1.29	0.00001032	0.01806	0.01	0.07	6.837	0.1	10
	25-86	0.00042	ND	0.577	0.00000462	0.008078	0.01	0.07	3.0581	0.1	10
2 Lock 6	0-28	0.11084	0.073	1.26	0.00001008	0.01764	0.01	0.07	6.678	0.1	10
	28-38	0.07195	ND	1.95	0.0000156	0.0273	0.01	0.07	10.335	0.1	10
	38-66	0.0049	ND	0.695	0.00000556	0.00973	0.01	0.07	3.6835	0.1	10
	66-91	0.00036	ND	0.416	0.00000333	0.005824	0.01	0.07	2.2048	0.1	10
	91-140	ND	ND	0.26	0.00000208	0.00364	0.01	0.07	1.378	0.1	10
140-150	ND	ND	0.601	0.00000481	0.008414	0.01	0.07	3.1853	0.1	10	
3 Battle Island	0-25	0.09646	0.220	1.03	0.00000824	0.01442	0.01	0.07	5.459	0.1	10
	25-61	0.6253	0.440	2.88	0.00002304	0.04032	0.01	0.07	15.264	0.1	10
	61-86	0.17666	ND	2.12	0.00001696	0.02968	0.01	0.07	11.236	0.1	10
	119-140	ND	ND	0.89	0.00000712	0.01246	0.01	0.07	4.717	0.1	10
	147-163	ND	ND	0.395	0.00000316	0.00553	0.01	0.07	2.0935	0.1	10
183-239	ND	ND	0.308	0.00000246	0.004312	0.01	0.07	1.6324	0.1	10	

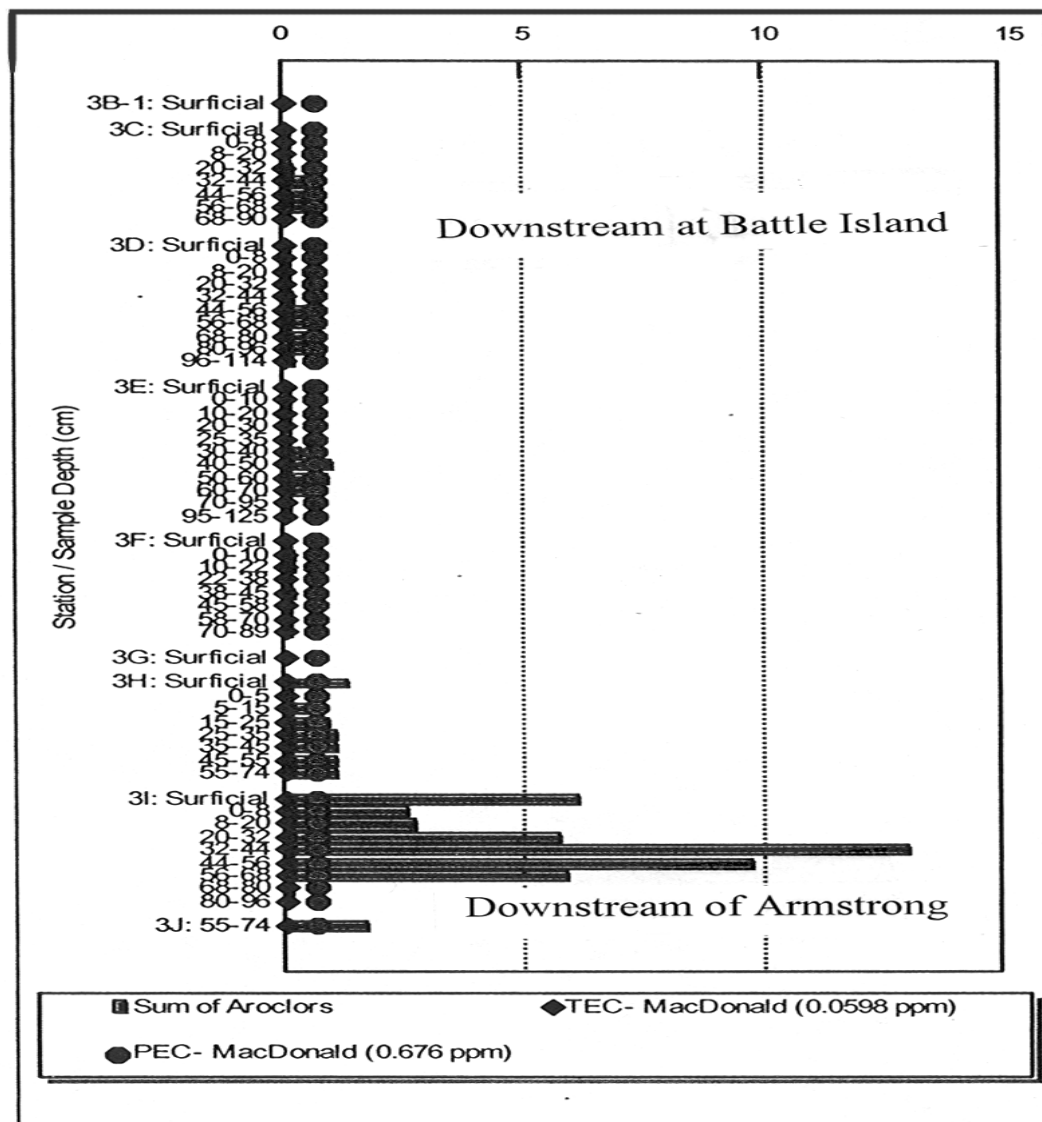
**Figure 16** - PCB Sediment Concentrations (Core & Surface - ug/g) showing Selected Guidance Values for Characterization in Sediments at site 1=harbor; 2=Lock 6; and 3=Battle Island. Shaded areas exceed guidance values.

After to the 1997 study, a focused sediment sampling study on the Battle Island area was conducted. The **2002 Final Draft Battle Island Sediment Assessment** document reports results of this year 2000 study. Sediment samples were collected at eight sites and analyzed for heavy metals, pesticides, PCBs, PAHs, dioxins and furans. Sediment toxicity tests and a biological assessment of the benthic invertebrates were also performed in this study. Concentrations of heavy metals were measured for chromium, copper, lead, mercury, nickel, silver, and zinc immediately downstream of the Armstrong Industrial Specialties, Inc. facility. This is believed to be due to historic practices and spills as the higher levels were found deeper in the sample cores. Surficial concentration for metals parameters of concern were found for copper and mercury.

Toxicity testing results showed no statistically significant reduction in survival or growth for test organisms. The macroinvertebrate fauna was assessed as moderately impacted at the one site just downstream from Armstrong since it was limited to worms, midges, and crustaceans, with few species represented. All other sites were biologically assessed as slightly impacted. Few samples were found to have pesticide concentrations exceeding analytical detection levels. None of the

pesticides encountered exceeded their respective PEC or Severe Effect Level sediment quality guidance values. High Mirex concentrations in the sediments were detected downstream from (and on the same side of the river as) the Armstrong facility site. More than half of the PCB samples exceeded guidance values and the guidance value concentrations identified. As discussed above in Figure 16, the bioaccumulation guidance values are so stringent that simply a detected value in the lab analyses is most likely identified as an exceedence.

**Figure 17**, from the recent 2002 report, shows the PCB sample results identifying some high concentrations just downstream from the Armstrong site with the other sites relatively low compared to the guidance values; however, these higher levels were generally found in deeper core samples.



**Figure 17** - Battle Island Area PCB Concentrations (ppm) and Sediment Guidance

**Dioxins and Furans** (polychlorinated dibenzo dioxins and furans) sample results were evaluated from three different perspectives in the 1997 Study. Battle Island again is identified as a sampling site of concern as described below by the analytical concentrations, toxic equivalents, and percent abundance patterns:

- **Analytical Concentrations** - The deep subsamples were very low or non-detect for the dioxin/furan analytes. Only two cores (stations #2 and #3) contained other than low or non-detect concentrations in the subsamples collected near the sediment surface. The concentrations at Battle Island (station #3) likely warrant further investigation to delineate the depths and breadth of the dioxin and furan contamination. The concentrations in the Oswego Harbor core sample had low background levels with no distinguishing characteristics.
- **Toxic Equivalents** - Toxic equivalency is a methodology that quantifies the toxicity of 2,3,7,8-substituted dioxin and furan congeners by proportionalizing their toxicities to 2,3,7,8-TCDD. These values can then be added and the total represents the aggregate toxicity of the various substituted congeners. To provide some evaluation of these values, they are compared to human health and wildlife bioaccumulation sediment guidance values present in the already referenced 1993 DEC publication entitled "Technical Guidance for Screening Contaminated Sediments". The guidance values are based on equilibrium partitioning methodology and are a function of the organic carbon content of the sediment being evaluated.

Results indicate no pollutant concern in the Oswego Harbor at station #1. At station #2, the upper third of the sample was above the wildlife guidance value. The mid portion of the station #3 sample exceeded the wildlife and human guidance values. Station #4 had low toxic equivalence in the upper half of the sample. Stations #5 and #6 did not indicate a toxic concern. There is likely minimal significant environmental impact from these dioxin/furan concentrations as they are buried by many centimeters of cleaner sediment.

- **Percent Abundance Patterns** - Percent abundance patterns help characterize the composition of complex compounds such as dioxins, furans and PCBs. The dioxins are dominated by OCDD and the furans by the HpCDF and OCDF. For the Oswego Sediment Study two separate patterns were established. The homolog ratios show the furans are more abundant in the lower chlorinated homologs while the dioxins dominate the higher chlorinated. The patterns showed characteristics that are typically found in sediments thought to be produced by contamination from multiple combustion sources.

**Rationale** - No dredging restriction use impairment exists in the Oswego River Area of Concern. Responsible agencies (NYSDEC, USEPA, USACE, and locals) are present to identify and implement remedial measures necessary to address an identified source of contaminated sediments. Overall, upstream contaminated sediments at the Battle Island area in the Oswego River were identified as the primary source of contamination responsible for inclusion of this upstream segment of the Oswego River on the NYSDEC Priority Waterbodies List. Although the 2002 sampling

results do not identify the Battle Island area as a hazardous waste site, nor as an active source of contamination downstream (remedial measure threshold criteria are not met) further study may be called for to assess this potential based on the identification of a local environmental impact.

A study (food uptake impact and environmental threat) has been discussed for proposal by SUNY at Oswego and USACE and is endorsed by NYSDEC as within the scope of the RAP delisting (see Appendix O). In addition, with certain more restrictive regulation changes, NYSDEC's remediation division could reassess remedial requirements for this area. In the event further investigative action, study, or remedial activity is ultimately undertaken, such action is to be conducted as a site specific environmental cleanup project or as part of a larger watershed or Lake Ontario management planning action. As the source of this potential upstream contamination is outside the RAP Area of Concern and there is no use impairment in the Area of Concern, the Remedial Action Plan has accomplished its objective. Further, there is no identified dredging restriction use impairment within the Area of Concern and open lake disposal of dredged materials from the AOC is approved.

In conclusion, because the identified sediment contamination upstream is not causing a use impairment in the AOC, an upstream investigation and possible remedial work can proceed independently of the RAP. Stakeholder concern and public outreach on an upstream / watershed contaminant of concern is more appropriately addressed under an individual remedial project, or Oswego River watershed planning by responsible government agencies, or the larger Lake Ontario Lakewide Management Plan (LaMP). In the event a "pass through" of contamination to Lake Ontario can be identified, the LaMP will need to address this source and impact. Designation of the dredging restrictions use impairment indicator as not impaired is consistent with the USEPA delisting principles and guidance.

## **11. Beach Closings**

In the Stage 1 document, the Beach Closings use impairment indicator was determined to be not applicable to the Area of Concern. Because there are not beaches within the Area of Concern, this impairment indicator has been evaluated as not impaired. At one time, there was a concern regarding the classification of the waters in the AOC for swimming. In New York State the waterbody classifications A, B, C, etc. denote best usage and should not be misrepresented as a specific rating of water quality. For example, the AOC is classified as "C" with the best usage of the waters as fishing. Class C waters shall be suitable for fish propagation and fish survival under this best use. The water quality of Class C waters shall also be suitable for the other uses of primary and secondary contact recreation, although other factors may limit the specific use for these purposes in a designated area or river segment. For Class "B" waters the best usages are primary (swimming) and secondary contact recreation and fishing. Class B waters shall also be suitable for fish propagation and survival. Therefore the best usages of a water segment are designated by the classification of "highest" use which does not necessarily or directly rate the water quality or differ significantly.

Because of the boat and ship traffic, swimming is not encouraged in the harbor. As Class C waters, the AOC is suitable for partial-body contact and perhaps swimming; however, in the interest of safety, swimming is not a designated use for the lower Oswego River and harbor area. The 1994 Oswego Harbor Survey data supports a not impaired status for partial-body contact. The desired endpoint, as identified by the Remedial Advisory Committee, is to have swimming areas in the AOC open to swimming. Since there are no such areas in the AOC, the beach closings use impairment indicator is not applicable to the AOC. In support of this status for the indicator is the fact that secondary or partial-body contact within the waters of the AOC is safe and not restricted.

**Resolution** - The Beach Closings use impairment indicator has been determined to be not impaired because there are no designated beaches in the AOC. Water quality survey results support this status and indicate that partial body-contact of the AOC waters is an on-going activity that is not impaired.

**Support Data** - The Oswego Harbor (water quality) Survey data supports body contact with the AOC waters as acceptable although there are no designated beaches in the AOC to provide public swimming access. Water quality for partial-body contact has also been determined acceptable.

**Rationale** - The resolution statement and supporting data provide the necessary information to support the not impaired status for the Beach Closings use impairment indicator in the Area of Concern.

## **12. Tainting of Fish and Wildlife Flavor**

The Stage 1 document determined this use impairment may not exist and since that time no significant study reports or public information has been reported to indicate a use impairment. The desired endpoint, as identified by the Remedial Advisory Committee, of no evidence of fish and wildlife tainting, has been confirmed by associated studies, stakeholder observation, and local fishing reporting.

**Resolution** - Associated fish and wildlife studies, water quality data, local person comments, and local discharge requirements indicate no cause for tainting as a use impairment. NYSDEC water quality guidance values and standards address tainting in discharges to protect fish and wildlife for consumption. In the New York State Water Quality Regulations modifications of 1998, the requirements for tainted were reorganized to enhance application in water discharge permits. The narrative requirements for tainting is part of the standards and guidance values based on aesthetic considerations in NYSDEC Codes, Rules, and Regulations, Title 6, Chapter X, Part 702.14; the parameters and standards are delineated in Part 703.5. The Oswego River does not have a tainting restriction and therefore the use impairment indicator is assessed as not impaired. Further, long term concern for tainting monitoring and surveillance is part of the Lake Ontario LaMP. The lack of reports from sports persons on tainting in a popular fishing and hunting area indicates that it is highly unlikely a tainting impairment exists. This has and continues to be the case since the development of the Stage 1 document in 1990.

**Support Data** - Results of the **Fish Pathology Study** support the not impaired status. In the sport fisheries community, the Remedial Action Plan (RAP) process has not been well known. Onondaga Lake has been viewed as a pollution source with a bad reputation and as having a negative impact on the downstream Oswego River fish. Local, state and federal government and agencies are responsible for sport fishery controls. The questions have been: what is being done to solve pollution problems and how does the average person get involved in the process? The answer is that through environmental protection program activities, including the Great Lakes program and RAPs, the identification of pollution sources has resulted in corrective and preventive measures being implemented to mitigate, end, and remediate contamination. Habitat loss below the Varick dam has long been recognized and attributed to the dewatering of the bypass regions below the dam due to dam operational procedures. The presence of the dam and resulting dewatering has led to the crowding of fish in other areas of the river and inadequate upstream and downstream passage for the fish. An occasional Lake Ontario Walleye caught in the river has been reported to have a tainted flavor that is to be addressed as part of the Lake Ontario LaMP.

The 1996 Oswego River Remedial Action Plan Update document includes: a description of the RAP goals and RAP process; a summary of the status of the use impairments and their causes and sources; reporting on remedial activity progress including investigation results; restoration and protection strategies; delisting criteria; identification of priorities; a description of other RAP enhancing initiatives; and figures, tables, and appendices. The 1998 RAP Workshop and Oswego River RAP Workshop Summary and Update document in 1999 concluded that tainting is not an impairment of the Oswego RAP.

**Rationale** - Observation and associate study results support the not impaired status for the tainting of fish and wildlife flavor use impairment indicator. The Lake Ontario LaMP and ongoing environmental programs provide the necessary monitoring and surveillance to address a future concern for this beneficial use. Priority needs, for the stakeholders of the RAP process, are to have a means to continue to receive new information and to have a voice on environmental concerns. The Lake Ontario LaMP and watershed activities provide stakeholders both a participation process to maintain a voice on environment issues and concerns and to have access to information to identify and address issues.

### **13. Drinking Water Restrictions; Taste and Odor Problems**

The early RAP stages identified this indicator as not applicable to the AOC because there are no drinking water supply intakes in the AOC and none has been proposed. The waters in the AOC are not classified for human consumption by New York State. The AOC is a working harbor, a boat recreation access area, and sport fishery. The use impairment indicator is therefore not applicable to the Oswego River Area of Concern.

The desired endpoint, as identified by the Remedial Advisory Committee, is no drinking water restrictions or taste or odor problems. Taste and odor problems have not been observed as problematic and the AOC is not a drinking water source. In some areas of the Great Lakes used as a drinking water source, taste and odor has been observed in more recent years. With the occurrence

of the exotic species zebra mussels, increased water clarity has contributed to the presence of the compounds “Geosmin and MIB”. Research has indicated that these compounds can create a taste and odor in drinking water supply that is considered a nuisance. Typically, taste and odor problems are seasonal occurrences and are treatable with activated carbon treatment in the water supply. Algae can also contribute to the generation of seasonal taste and odor problems that are treatable with chlorination. Local governments focus much effort on the control of nonpoint sources of pollution (nutrients and pesticide application) to protect drinking water supplies and recreational uses of water resources.

**Resolution** - The restrictions on drinking water consumption or taste and odor impairment indicator is not applicable to the AOC because there are no drinking water supply intakes in the AOC and no intakes are planned for the harbor area. In addition, the waters in the AOC are not classified for human consumption by New York State. The AOC is a working harbor, a boat recreation access area, and sport fishery. In the event an additional drinking water source is needed, Lake Ontario would be a likely source. Lake Ontario already serves as a drinking water source for many communities such as Onondaga County which is upstream of the AOC. Because there are no drinking water restrictions or taste and odor problems, this use impairment indicator is considered not impaired.

**Support Data** - The use impairment indicator involving drinking water restrictions or taste and odor problems has been assessed as not applicable and therefore not a use impairment in the Oswego River Area of Concern. In New York State and the Oswego River watershed, a number of water supply protection measures are in place that maintain good drinking water quality for both groundwater and surface water sources. The Safe Drinking Water Act of 1996 requires the City of Oswego to develop a “Source Water Assessment Program” or SWAP to identify potential sources of water supply, to determine protection threats/needs, to expand monitoring, and to streamline testing procedures. These requirements are in response to a real need to implement measures for the protection of drinking water sources (formerly voluntary) and to provide additional treatment where needed. In general, algae observed in drinking water sources and the occasional water quality taste must be watched so as not to become a burdening use impairment. Beyond monitoring, a “multi-barrier” approach to drinking water supply protection has included the Wellhead Protection Program and the Watershed Protection Approach. These programs, along with several others, put a strong emphasis on trying to prevent contamination of a water supply. Most recently, this same general approach called, “Source Water Protection” focused attention on identifying the sources of water supply, the possible sources of contamination to a supply, and the susceptibility of that supply to inventoried contaminants. These contaminants and their potential pathways for entry into a stream, river, lake, or aquifer are the same sources of degradation with which natural resource managers have traditionally been concerned. We all must support environmental protection measures to protect our drinking water supplies.

**Rationale** - The described uses of the Area of Concern do not include use of the waters as drinking water. Taste and odor are not observed as a problem in the Oswego River AOC community. The indicator is therefore considered not impaired.

#### **14. Added Costs to Agriculture or Industry**

Because there are not identified causes or additional costs required to treat the water of the AOC prior to use for agriculture purposes (i.e. including but not limited to livestock feeding, irrigation, and crop spraying) or industrial purposes (i.e. intended for commercial or industrial applications and non-contact food processing), this use impairment indicator is not impaired in the AOC.

To maintain good ambient water quality in the Oswego River and the Area of Concern, significant resources have been committed to implement projects involving conservation landscape and Best Management Practices (BMPs) to address the causes and sources of nonpoint pollution. In the Oswego River watershed, Lake Neatahwanta is a good example of having a number of projects implemented in its watershed to remediate and protect against environmental damage to beneficial uses. Stream protection projects including buffer zones, vegetation controls, farm management, homeowner sewage improvements, stream conservation, fish stairs and other BMPs involving farmland and stream corridors are examples of the types of projects utilized.

In assessing a watershed and where to apply limited environmental protection resources, we need to consider the Priority Waterbodies List (PWL) developed by NYSDEC and include the local knowledge of environmental conditions and impacts of planned actions (see indicator #8 for PWL discussion). Coordination with local officials is therefore a key to project success and to assure the most efficient funding. The desired endpoint, as identified by the Remedial Advisory Committee, is no abnormal added costs to agriculture or industry.

**Resolution** - The early stages of the RAP assessed this indicator as not impaired. This status is supported by current information and the Remedial Advisory Committee. Further, the endpoint of no abnormal added costs to agriculture or industry as established by the Remedial Advisory Committee is noted as achieved.

**Support Data** - There is no agricultural uses of the water from the AOC and there are no known additional costs to industry for treatment of waters taken from the AOC. In the Great Lakes, zebra mussels have created a problem for some water intakes and therefore to some degree an added cost. Although this has not had a significant impact on the Oswego River AOC, there are strength and duration components to the growth and life cycle of zebra mussels. Overall, the strength of growth of zebra mussels in the Great Lakes has been very high where as the duration in a given area can vary (i.e. the growth cycle peaks and then reduces to a lower level of presence in an area of the environment). Exactly where we are along the cycle in the Oswego River RAP Area of Concern and in the watershed is difficult to determine. In the long term, an overall lower level of zebra mussel populations is expected as a more steady state is reached.

**Rationale** - Because there is no added costs to agriculture or industry for uses of the Area of Concern waters, the indicator is considered not impaired. This status was established in the problem definition Stage 1 document and remains the same today.

#### IV. DELISTING FOLLOW-UP

The Great Lakes community including USEPA, IJC, Great Lakes States, RAP Remedial Advisory Committees, and Canadian counterparts have conducted numerous meetings in the development of principles and guidance towards accomplishing delisting. Consistent with this guidance as it applies to the Oswego Area of Concern, NYSDEC and RAP Remedial Advisory Committee have adopted the following key delisting principles and guidance points, formulated a schedule of delisting steps or actions, and identified responsibilities in conducting post-delisting activities. The guidance, schedule, and responsibilities identification are each necessary and appropriate for moving ahead to accomplish delisting of the Oswego River AOC:

##### A. Delisting Principles and Guidance:

- 1. The International Joint Commission's (IJC) responsibility in the delisting process is to review and comment on the Local/State/Federal position to delist an Area of Concern.** Under the Great Lakes Water Quality Agreement, AOCs were designated (listed) by the respective federal governments. Therefore, the federal governments ultimately decide to delist. Local/ State governments can and should provide the basis for delisting. IJC is not an approval authority; however, their consultation is to be sought and their comments addressed. The Stage 3 RAP Process has accomplished IJC, EPA, and peer review, coordination, and liaison. A collaborative effort moving forward delisting is proceeding. In addition, for the Oswego RAP, comments are to be gathered through a public involvement/ review process and responded to in the preparation of the final Stage 3 document and a responsiveness summary (comments/ responses are addressed in Appendix G).
- 2. IJC and EPA have taken the position that there may still be some use impairment indicators where the beneficial uses may not be fully restored for justifiable reasons, and that this should not prohibit the delisting of an AOC** (e.g. natural conditions exist; boating disturbances; all remedial work implemented and beneficial use not expected to be restored). When these conditions occur and ongoing concerns exist, the resolution of the use impairment indicator can be resolved by a larger management plan activity that is responsible to the issue. An "assignment of responsibility" is appropriate to accomplish this resolution and is based on the fact that the RAP Process cannot provide the solution to the concern (i.e. within the Oswego RAP Area of Concern, achieving the endpoints for the fish habitat/ population and fish consumption impairments is being addressed respectively by the FERC power dam license requirements and the Lake Ontario LaMP human health advisories addressing fish).

For the Oswego RAP, the goals or endpoints have therefore been achieved to the maximum extent practicable and the ultimate resolution strategy for "out of AOC" causes or sources concern are now part of these larger or alternate plans and actions.

The Oswego RAP has provided the data to show that the Area of Concern is not impaired by local sources. The RAP needs to (and for Oswego, it does) establish that inclusive management plan activities will resolve any larger concerns that cannot otherwise be fulfilled within the RAP process. Other examples of a larger management plan activity accepting oversight responsibility include: the Great Lakes Binational Toxics Strategy, watershed management strategies (WRAPS Appendix N), lead agencies for fish consumption advisories, local oversight groups, and agencies for licensing or permitting processes. For the Oswego RAP, all applicable RAP process activities have been accomplished to the maximum extent practicable and no further action is planned under the RAP process.

- 3. Remedial Action Plans can only address impairments caused by local sources; impacts from outside an AOC (either upstream, downstream, via air deposition, or from the open lake waters) which cause use impairments should not impinge on the ability to delist the AOC.** A source issue outside the AOC presents a concern that needs to be addressed by a larger management plan and the accompanying acceptance of responsibility. It is important that stakeholders continue to have a voice on their issues of concern and that an opportunity for public input exists. In order to delist, these types of impairments (i.e. concerns relating to non-AOC causes) and their attendant sources need to be assigned to a responsible party, environmental project, or program area for follow-up action and resolution. For the Oswego RAP, all appropriate action has been taken within the AOC under the RAP process, remedial activities have been accomplished to the maximum extent practicable, responsibilities have been identified, and no further action is planned under the RAP process. The Stage 3 document substantiates that the Oswego AOC is not impaired by contamination from local or upstream sources. The upstream river flow does affect the fish habitat and fish population in the AOC and is addressed by the FERC license requirements.
- 4. The preparation of a draft Stage 3 document is fundamental to the delisting process. The preparation of the document must involve a public consultation process (by the lead agencies and locals).** There needs to be a peer group review incorporated into the document preparation. Consultation with IJC and USEPA (for content and review comments) must be accomplished. With these items addressed, a final Stage 3 RAP document can be prepared for delisting the Area of Concern. For the Oswego RAP, the public consultation has involved presentations at local environmental group meetings, consultation with peers, and government agency review. A final draft Stage 3 delisting document, website posting, power point presentation, summary handout, and formal Environmental Notice Bulletin comment period for the public at large will assure the delisting information is communicated and comments responded to in the completion of the AOC delisting steps (in the next section, Table 3 lists the next steps to delisting).

5. **With the completion of the final Stage 3 RAP document, the next step is for the State and Federal leads to declare the AOC as delisted.** To realize this, certain steps need to be accomplished which include: State submittal of the final Stage 3 document to USEPA (review by EPA may involve a federal management committee or review team); final consultation with IJC; completion of minor adjustments to the document based on EPA and IJC review; statement letter of delisting to the Federal Department of State by USEPA; and, Federal Department of State announcement and action on the delisting. As described below, significant progress has been accomplished in these next step activities.

**B. Oswego AOC Delisting Steps:**

In order to accomplish delisting, the steps to address the finalization of the Stage 3 delisting document and the coordination with other government agencies are listed in **Table 3** below. Several public involvement activities are identified to support this process which leads to the completion of the final report. The steps include a formal notice for final public comment with peer group and government agency review. Finally, the US Secretary of State acts on delisting. A check list column is provided in the delisting steps below:

**Table 3 - Oswego River AOC Delisting Steps**

1. ✓ 4/02 DEC in consultation with RAC completes the preparation of the draft Stage 3 delisting proposal and public slide (Power Point) presentation on the Area of Concern delisting with handout materials.
2. ✓ 4/02 DEC conducts slide presentation at meetings of the Great Lakes Basin Advisory Council, the Oswego County Soil and Water Conservation District, the Oswego County Water Quality Coordinating Committee, the RAP Remedial Advisory Committee, and to members of the Environmental Management Council.
3. ✓ 5/02 DEC conducts peer review including internal DEC and state agencies (Departments of Health and State). Draft Stage 3 delisting proposal posted on internal website.

4. ✓ 5/02 DEC begins informal consultation with USEPA Region 2 and IJC on the draft stage 3 delisting proposal.
5. ✓ 8/02 DEC addresses comments to date in revised draft Stage 3 delisting proposal and public slide (Power Point) presentation.
6. ✓ 9/02 DEC meets with RAC on September 6<sup>th</sup>. Committee endorses Stage 3 document, slide presentation, and next steps. Subsequently, DEC posts draft Stage 3 delisting proposal on external DEC website.
7. ✓ 9/02 Consultation among GLNPO, EPA Region 2, and DEC achieves agreement to continue with delisting steps based on conditions (i.e. FERC license progress).
8. ✓ 9/03 DEC in consultation with the RAC and EPA Region 2 completes revised draft of Stage 3 delisting proposal and receives informal comments from IJC.
9. ✓ 8/04 Verify the FERC Settlement Agreement signed and relicense issuance certain.
10. ✓ 10/04 DEC in consultation with RAC completes revisions (addressing informal IJC and EPA comments), adds provisions of FERC license in Appendix J, and produces a final draft Stage 3 delisting document for formal transmittal to IJC and further approval by EPA (Region 2 and GLNPO).
11. ✓ 3/05 Complete final draft Stage 3 document & formal submission to IJC by EPA Reg. 2.
12. ✓ 7/05 Receive IJC formal response and support for delisting. DEC, EPA, and GLNPO collaborate on delisting steps.
13. ✓ 10/05 EPA coordinates internal briefings with Directors, RA, DRA, and GLNPO.
14. ✓ 10/05 DEC prepares final draft Stage 3 delisting document (being readied for public notice). DEC proceeds with preparations for formal public notice including web posting update.
15. ✓ 11/05 EPA consults with the Directors of GLNPO, IJC Great Lakes Regional Office, DEC's Division of Water and the City of Oswego on the draft final document and recommendation to delist the Oswego AOC.
16. ✓ 12/05 IJC Regional Office, EPA Regions 2, 5, and GLNPO, and DEC collaborate on plans and final document prior to formal public notice period.

17. ✓ 1/06 DEC, in consultation with the RAC and EPA, conducts a formal public review to include all stakeholders in a final review and comment period. A New York State formal Environmental Notice Bulletin (ENB) 45-day comment period is to be utilized to assure restoration conditions exist.
18. ✓ 2/06 DEC, in consultation with the RAC and EPA, finalizes the Stage 3 delisting document (no comments received as a result of the ENB process). The existing extensive Responsiveness Summary (Appendix G) is also finalized as NYSDEC's response to all comments. USEPA Region 2 and GLNPO to brief Washington HQ and US Department of State on delisting. NYSDEC to send transmittal letter requesting formal delisting of the Oswego River AOC.
19. ✓ 3/06 USEPA Region 2 and GLNPO to further coordinate delisting with EPA's Office of International Affairs (OIA). This includes coordination with Canadian and Provincial agencies, NYSDEC and GLNPO representatives.
20. 4/06 Delisting readiness: this step involves completing all preparations for the formal announcement of delisting. During April and May observation of the "modified run-of-river" flow habitat restoration and fish access is to be accomplished. With the confirmation of the flow and fish use, formal delisting can proceed; therefore this readiness step is essential to the June - July, 2006 announcements.
21. 5/06 May provides for the observation of the minimum flow in the area below the Varick dam and the observation of fish use and fish spawning. Combined with the readiness of the agencies, as June announcement of the delisting is planned the International Joint Commission.
22. 6/06 Delisting and IJC transmittal. During June, the formal announcement of the AOC delisting is planned. Transmittal of the final Stage 3 document to the U.S. and Canadian Co-chairs of the IJC by the U.S. Secretary of State are planned. Coordination of official announcements and press releases, etc. is planned.
23. 7/06 Commemoration activity - discussion involves the dedication of tree planting(s) and commemorative plaque along river walk area in the AOC and coordination with other local events such as the annual Oswego Harbor Festival in late July 2006. (Re: "30 year celebration and rebirth of the Oswego")

### C. Post-Delisting Responsibilities:

Post-delisting activities are to be conducted by responsible parties to implement the actions that are to address the remaining concerns of the Oswego RAP Process. The RAP identifies four specific concerns resolvable by larger management plan activities as delineated below. These four concerns are the fish consumption advisory, the fish habitat/population restoration, the upstream (out-of-AOC) Battle Island Sediments, and the weed and algae growth. Specifically, fulfilling certain actions under the larger management plans will assure: accomplishing the maximum removal of the fish advisories as part of Lake Ontario LaMP process; the highest level possible of restoration of the fish habitat and populations under provisions of the FERC license requirements; a satisfactory remedial decision for the fate of the Battle Island contaminated sediments; and, the best reduction and control of weed and algal growth in upstream and nearshore Lake Ontario area. Each of the four concerns described below are followed by a brief description of how each is to be addressed. Sub-listings of the responsible parties and implementation actions are then developed. These identified responsible parties and actions are to address the restoration and assure the protection of beneficial uses for the Area of Concern.

1. **Lakewide Fish Consumption Advisory:** The endpoint defined by the Remedial Advisory Committee is the removal of the lakewide fish consumption advisory. Continued reductions of contaminant inputs through point and nonpoint pollution control is being pursued under the Lake Ontario Lakewide Management Plan (LaMP). Continued monitoring of adult fish flesh for levels of contamination, along with young-of-year fish assessments are conducted by NYSDEC Fisheries in the development of data needed by NYSDOH in establishing human health advisories for fish consumption. The fish monitoring and analyses provide a level of protection for the Oswego area and the Lake in the assessment of the presence of toxic contamination in the water column and its effects on the aquatic environment. Studies indicate that the lakewide fish consumption advisories are not impacted or caused by toxics in the water or sediments of the Oswego AOC but are attributable to non-AOC sources predominately in Lake Ontario. NYSDEC implements the human health advisory for fish consumption in New York State.
  - **New York State Department of Environmental Conservation** - Continue to pursue reductions in sources and loads while monitoring fish flesh and young-of-year. Assure that fish consumption restrictions are removed or reduced to the maximum extent practicable while coordinating the establishment of the advisories with the NYSDOH.
  - **New York State Department of Health** - Assess fish data as provided by NYSDEC and determine human health advisories. Assist in development of informational material for public information and protection.
  - **United States Environmental Protection Agency** - USEPA is one of the four parties to the Lake Ontario LaMP (the other 3 parties are NYSDEC, Environment Canada, and Ontario Ministry of the

Environment). The scope of the LaMP includes resolving lakewide beneficial use impairments such as the “restrictions on fish consumption”. One focus of the LaMP activities is the identification and reduction of critical pollutants to the lake.

- **International Joint Commission** - Assure that the federal governments (Canada and United States) fulfill their responsibilities under the Great Lakes Water Quality Agreement to address Areas of Concern in the Great Lakes. Assist states in RAP and LaMP activities and comment on the progress and actions in order to provide lakewide consistency in assuring the restoration and protection of beneficial uses.
- **Lake Ontario LaMP** - Report on use impairment indicator monitoring of beneficial uses as developed and documented by the state, provincial, and federal governmental workgroup and management committee. Continue to develop and implement the workplan for the restoration and protection of beneficial uses for the lake, nearshore areas, and the drainage basin.

2. **Fish Habitat and Populations below the Varick Dam:** The endpoint defined by the Remedial Advisory Committee is no restricted use of fish habitat from flow or contamination, and fish populations substantially similar to reference communities. Continued monitoring of the FERC license requirements and implementation of the provisions to address a “modified run-of-river” minimum flow, fish passage, and fish protection is to be conducted. Implementation and maintenance of these provisions will address the fish habitat and fish populations concerns. The fish habitat is addressed by the flow requirements of the FERC license providing the desired conditions and fish access in the AOC. Maintaining the required flow will satisfy the fish habitat needs to the maximum extent practicable and also result in benefits to the fish populations of the AOC and Lake Ontario. The fish population in the AOC is directly linked through its association with Lake Ontario. The fish populations of the lake actually have the greatest influence on the AOC fish populations. Fish movement in and out of the AOC is dominated by the lake characteristics. With river flow and fish habitat addressed in the AOC under the FERC license, the fish populations will reach a level consistent with natural conditions allowed by Lake Ontario. Compliance, monitoring and reporting activities will be performed under the FERC license and various divisions within DEC. Fish access to the “critical habitat area” restored by river flow is verified by delisting.

- **New York State Department of Environmental Conservation** - Maintain that fish habitat issues (i.e. river flow and fish access) are addressed to the maximum extent practicable by the FERC license. Maintain a regulatory presence to protect water quality, the benthic community, fish (and wildlife) survival and propagation, and best uses of the water including aesthetics. Complete remediation of upstream hazardous waste sites and continue implementation of watershed protection strategies. Confirm with

other agencies and the fishing public that (lakewide) fish populations are restored to satisfactory levels.

- **FERC Licensing Provisions** - License provisions require the operating permittee to comply with minimum river flows, fish passage, and fish protection. FERC is the primary monitor and enforcer of these provisions. NYSDEC, USFWS, and the fishing public will oversee that compliance with the dam relicensing provisions is achieved. Assure that fish habitat and fish populations are restored to the maximum extent practicable under the FERC license. Report on progress through monitoring to verify conditions and fish access.
  - **United States Fish and Wildlife Service** - In conjunction with NYSDEC, assure that provisions and operating schedule for the Varick Power Dam are achieved. Coordinate with the New York State Canal Corporation (dam owners) to reinforce operating conditions for the Varick Dam and to assure fish access in the waters below the dam.
  - **United States Environmental Protection Agency** - The EPA is one of the four parties to the Lake Ontario LaMP (the other are: NYSDEC, Environment Canada, and Ontario Ministry of Environment). The scope of the LaMP includes resolving lakewide beneficial use impairments such as the “restrictions on fish consumption. One focus of LaMP activities is the identification and reduction of critical pollutants to the lake.
  - **Watershed Restoration and Protection Strategy or “WRAPS” Implementation** - Observe monitoring data and set goals and objectives to restore and to protect beneficial uses for Oswego River watershed. Conduct routine, special, and new monitoring to assure adequate assessment data. Report on trends. Implement corrective actions. Refer to Appendix N for a description of WRAPS.
3. **Upstream Battle Island Area Contaminated Sediments:** For the Oswego River Area of Concern, the endpoint is to have no United States Army Corps of Engineers’ restrictions on dredging. This has been achieved and is the case for the Oswego River AOC. However, at this upstream Battle Island location, the goal is to reassure that contaminated sediments are not a source or significant threat of contamination to the immediate river segment or to downstream areas including Lake Ontario. Follow-up activities identified to address the Battle Island sediment concerns are: determine any change in the status of the contaminated sediments present as to their activity as a source and their presence in consequential amounts so as to cause a significant threat to the environment; facilitate a local biological study proposal to address food uptake; provide for a strategy to address the fish consumption advisory

in this upstream Priority Waterbody Listing (PWL) location; and, completion of the TMDL evaluation for the Oswego River as applicable. Further assessment of the 2002 Battle Island sediment study results by DEC has determine no need for remedial action or further priority governmental monitoring at this time.

- **New York State Department of Environmental Conservation** - Monitor and assess data to evaluate the threat of the presence of contaminated sediments in the Oswego River. Based on any new information, reassess if further remedial action is needed to restore and/or protect beneficial uses in this upstream segment or as a threat to downstream locations. Further develop strategy to address fish consumption advisory in the PWL segment. Conduct TMDL evaluation as appropriate (see \* note next page). Review ongoing new RIBS sampling data that addresses upstream sources (through the RIBS network site at Minetto that addresses potential watershed sources.)
- **WRAP Strategy Implementation** - As resources permit, NYSDEC is to conduct this initiative in conjunction with local jurisdictions. Observe monitoring data and set goals and objectives to restore and to protect beneficial uses for the Oswego River watershed. Evaluate existing monitoring and conduct any needed additional monitoring to assure adequate assessment of watershed data. Report on trends. Implement corrective actions as determined from the fish consumption advisory, area hazardous waste site remediation considerations, TMDL evaluation, and Priority Waterbody List (PWL).
- **United States Army Corp of Engineers** - Consider academic proposal to develop a feasibility study and conduct an investigative plan (possibly in conjunction with a local sponsor) for a matching grant to address the threat of contaminated sediments to the environment in the area of Battle Island.
- **SUNY at Oswego** - Pursue matching grant funding proposal, as a sponsor, to develop a feasibility study and conduct an investigative plan to address contaminated sediments upstream of the AOC near Battle island in the PWL segment of the Oswego River. Coordinate with USACE the intentions of developing a biological food uptake analyses in this upstream of the AOC river segment. Seek corrective action as necessary to address suspect pollutant release from contaminated sediments and/or any suspect area hazardous waste site.

**\*Note:** NYSDEC is to conduct a review of the Oswego River (upstream of the AOC) regarding the 303(d) listing and TMDL requirements. The fish consumption restriction, upstream of the AOC to Fulton, is for Channel Catfish and is PCB related attributed to contaminated sediments. Water quality monitoring has not documented an active PCB source in this area although sediment study has identified limited contamination in several sites around Battle Island. If there were an active

source of priority organics, then the implementation of a TMDL would likely result in further reductions of these pollutants subject to allocation in the watershed. Downstream receiving waters would benefit. However, the need to implement a TMDL is not certain based on the fish advisory for Channel Catfish caused by contaminated sediments.

4. **Weeds and Algae Nuisance:** The endpoint defined by the Remedial Advisory Committee is to maintain water quality standards, beneficial uses, and to have no persistent water quality problem due to cultural eutrophication. This is the case for the Oswego River AOC. Water quality monitoring indicates good water quality while maintaining best uses with no weed or algae impairment. Nuisance weed conditions are managed by weed harvesting equipment. Nonpoint source controls and Best Management Practices implementation in the watershed continue to reduce pollutant loadings. Beneficial uses are maintained in receiving waters. The concern is to assure that the overall condition is monitored, continues to improve, and does not deteriorate. The presence of bottom weeds and/or algae in other upstream (stagnate) or in nearshore areas of Lake Ontario during summer months heightens this concern and has spawned action by citizens and professionals along the lake shore.

- **Lake Ontario Coastal Initiative (LOCI)** - Restoring the ecological integrity of New York's North Coast—Lake Ontario's 300 miles of southern and eastern shoreline, embayments, river and creek mouths, wetlands and ponds—is key to the region's economic vitality. Remediation requires collaboration among public and private sectors and local, state, and federal agencies and elected officials. Actions are to address public commitment, mitigation measures, land use, habitat protection; and water quality research.

The locally driven **Lake Ontario Coastal Initiative (LOCI)** is responding to these needs. The initiative, spearheaded by the Center for Environmental Information (CEI), has received federal funding in 2004 and 2005 for strategic plan development and implementation activities. CEI is working with its partners, the Finger Lakes-Lake Ontario Water Protection Alliance (FL-LOWPA), SUNY Brockport Department of Environmental Sciences and Biology, and the LOCI Steering committee, representing public and private stakeholders. Projects are to remediate, restore, protect and sustain the Lake Ontario, New York Great Lakes Coastal region including the St. Lawrence.

As part of the strategic plan, a set of maps to characterize the watershed and, with local input from the seven coastal counties is planned to identify and start priority projects where current funding and resources have critical needs. It will be possible to continue research and monitoring to evaluate the effectiveness of actions and to inform community decision makers about sources and appropriate water quality correction actions. For additional information about the LOCI program visit the CEI website at <http://www.ceinfo.org/> or call 585-262-2870.

- **New York State Department of Environmental Conservation** - Continue to conduct environmental monitoring under DEC's core environmental quality programs (water, air, hazardous substances, remediation, etc.). Implement WRAP Strategies for the Oswego River watershed to compile data, set goals, and measure objectives. Further, weed and algae concerns are addressed by the watershed management practices and local area weed harvesting. NYSDEC maintains a regulatory presence to protect water quality, the benthic community, fish and wildlife survival and propagation, and best uses of the water including the aesthetics. Completing remediation of hazardous waste sites in the drainage basin, continuing efforts to further improve municipal discharges, and continuing implementation of watershed protection strategies to manage weeds and algae together contribute to improved downstream conditions and protect against deterioration.
- **WRAP Strategy Implementation** - NYSDEC to conduct WRAP in conjunction with local jurisdictions. Observe monitoring data and set goals and objectives to restore and to protect beneficial uses for the Oswego River watershed. Evaluate existing monitoring and conduct any needed additional monitoring to assure adequate assessment of watershed data. Report on trends. Implement corrective actions as determined needed by state and local agencies, through hazardous waste site remediation considerations, by TMDL evaluation, and in PWL evaluations.
- **Oswego County Soil and Water Conservation District** - Continue implementation projects to protect against erosion and provide stream bank protection and best management practices in Oswego County as resources permit. Assist NYSDEC in monitoring and surveillance activities for improved water quality. Implement SWCD mission to protect, promote, and improve natural resources. Continue to work with land users to educate and encourage actions that mitigate erosion and runoff.
- **Oswego County Department of Planning and Development** - Implement actions to further the protection and planned development of the lands around the Oswego River. Maintain a healthy balance between environmental and economic interests.
- **Oswego County Water Quality Advisory Committee** - Work to maintain and restore the quality of Oswego County's water resources, through a cooperative, coordinated manner which includes educational and technical efforts.
- **Oswego County Environmental Management Council** - Work with citizen support and with county governments to achieve environmental goals of the local community in conjunction with the county government.

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## APPENDIX A

### Oswego River Remedial Action Plan List of Active Remedial Advisory Committee (RAC) Members -2002

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- |    |               |                                   |
|----|---------------|-----------------------------------|
| 5. | Ed Marx       | Former Oswego Co. Planning Dept.  |
| 6. | Greg Neal     | Former Oswego Waterfront Revital. |
| 7. | Frank Page    | Armstrong World Industries        |
| 8. | Terry Hammill | Former Oswego Mayor               |
| 9. | Steve Murphy  | Brascan Power New York            |

**Other Stage 1, Stage 2, CAC and RAC Past Members:**

- |                       |                     |                   |
|-----------------------|---------------------|-------------------|
| - Samuel Sage         | - Muriel Allerton   | - Eli Rapaport    |
| - Dr. Ronald Scudato  | - Gary Schoonmaker  | - Thomas Young    |
| - Auralie Ashley-Marx | - Michael Stoll     | - Mike Rosen      |
| - Michele Bielman     | - Sandy Weston      | - John Sullivan   |
| - Michael Cole        | - Robert Burch      | - Dr. Donald Ross |
| - Dr. Helen Daly      | - Tim Eder          | - Carolyn Rush    |
| - John Fitzgibbons    | - Mark Lichtenstein | - Jack Khun       |
| - Julia Portmore      | - Ronald Woodward   |                   |

**Other persons contributing to the RAP Process :**

- |                   |   |
|-------------------|---|
| - Ken Lynch       | DEC Region 7 Regional Director  |
| - Steve Eidt      | DEC Region 7 Water Engineer   |
| - Bob Townsend    | DEC RAP Coordinator   |
| - Benjamin Manton | RAC Committee Facilitator, CNYRPDB  |
| - Les Wedge       | DEC Region 7 Fisheries, Cortland  |
| - Dan Bishop      | DEC Region 7 Fisheries, Cortland  |
| - Steve Effler    | Upstate Freshwater Institute  |
| - Mike Goldych    | Oswego Co. Dept. of Planning  |
| - Russ Nemecek    | Onondaga. Co. Health Dept.  |
| - Dave White      | NY Sea Grant Ext.,SUNY Oswego   |
| - Dave Melfi      | US Army Corps of Engineers  |
| - John Hassett    | SUNY ESF at Syracuse  |
| - James Haynes    | SUNY Brockport  |
| - Paul Bowser     | Cornell University  |
| - Dieter Busch    | United States Fish and Wildlife Service   |
| - Russ Weeber     | Marsh Monitoring Program of Bird Studies Canada   |
| - Helen Domske    | Great Lakes Program / Great Lakes Research Consortium   |
| - Joe DePinto     | Great Lakes Program   |
| - John Dergosits  | New York Canal Corporation  |
| - Bruce Kirschner | International Joint Commission  |
| - Margit Brazda   | Monroe County, New York (Rochester Embayment RAP)   |
| - DEC Authors     | Wendy Rosenbach, Richard Draper, Lois New, Gerry Mikol, Tom Cullen, Marna Gadoua.   |
| - DEC Research    | Simon Litten, Bob Lange, Larry Skinner, Tim Sinnott, Frank Estabrooks, Bruce Garabedian, Phil O'Brien, Jay Bloomfield, Bob Collins. |
| - DEC Assistance  | Colby Tucker, Sharon Thatcher, Libby Smith, Sue Balmuth, Rich Georgeson, Fran Verdoliva, Norm Boyce, Charles Branagh                |

\* current RAC members who were also original committee members

## APPENDIX B

### Oswego River Remedial Action Plan Remedial Advisory Committee Indicator Evaluation Strategy

**Context:** The systematic evaluation of impairments in the context of the Oswego River Area of Concern (AOC) is considered an administrative (dynamic and diverse multipurpose group) process supported by defensible scientific information. As such, designation of an impairment as “Not Impaired” may not meet the rigors of a scientific investigation and associated statistical evidence requirements. By the very nature of this program (addressing use impairments), actions taken by the Remedial Action Committee (RAC) require public input and we will strive to achieve public acceptance of any outcomes. (The RAP delisting criteria in Appendices E and F herein are designed to meet the scientific, public, and ecosystem considerations needs for the RAP Process.)

**Primary Objective:** It is the mandate of the RAC to support the New York State Department Environmental Conservation (DEC) in addressing use-impairments in the AOC and restoring beneficial uses by ensuring that the water quality is capable of supporting swimming and edible, diverse, and self-sustaining fish and wildlife populations. Once the RAC has achieved closure on all the use impairments, it will recommend to the DEC that the AOC be delisted.

**Area of Concern (AOC):** The Area of Concern is delineated by geographical boundaries without reference to ecological, chemical or other riparian characteristics. This AOC is defined as including the Oswego River downstream from the Varick Dam to and including the Oswego Harbor.

**Use Impairments:** Fourteen (14) use impairment indicators were developed by the International Joint Commission as a common means to assess all Great Lakes’ AOC use impairments. Their status in the Oswego River AOC is given in (Table 2 of the Stage 3 document). In 1990, the status of each impairment indicator has been categorized as “Impaired”, “Likely Impaired”, “Not Impaired”, or “Unknown”. (Use impairment status was defined without conducting new study and was determined by assessing available technical information and the RAC member’s understanding of the AOC and its watershed.) In Stage 3 each indicator has been resolved.

**Objectives and Measurable Endpoints:** In the context of the International Joint Commission, “re-designation” (or resolved) shall mean that the beneficial uses for each use impairment are considered restored and protected and that the re-designation criteria have all been achieved. In order to evaluate the status of each use impairment it is therefore necessary to have agreed upon re-designation criteria. Each criterion shall have measurable and unambiguous endpoints that when evaluated will indicate whether a use impairment can be considered for assignment to another agency or re-designation. The rationale for re-designation should be recorded along with the supporting data and any stipulation for further monitoring requirements.

**Strategy Conditions:** The following conditions will be held by the Remedial Advisory Committee in conducting an evaluation of the status of each use impairment:

- A. The programmatic assessment (systematic evaluation) of use impairments is limited to the confines of the Area of Concern, as defined by DEC. The RAC will only evaluate use impairments for re-designation which are caused by an activity or condition originating from within the AOC. However when a use impairment within the AOC is the result of an activity or condition outside the AOC the Oswego RAC will address it as indicated in item #1, of the indicator evaluation strategy (strategic approach) below.
- B. Based on the Stage 1 definitions, all 14 programmatic use impairments in the Oswego AOC had status designations ranging from “Impaired” to “Unknown” to “Not Impaired”. However, as re-designation criteria have been developed and finalized each of the status designations has also been reevaluated.
- C. “Re-designation” in the context of this RAC is defined as meeting one or more of the following conditions:
1. Sufficient scientific and public input information exists such that the evaluation with the re-designation criteria supports a re-designation to that of “Not Impaired”.
  2. Where the source of a use impairment is an activity or condition outside the AOC, the RAC can recommend to DEC its reassignment if an organization can be identified as being responsible for addressing the source. Where the source of the impact or organization can not be determined by the Oswego RAC, notification will be made to DEC of such status. Any reassignment by the DEC shall not eliminate the responsibility for tracking progress of remediation activities and ultimately re-designating of the use impairment when such is verifiable (in the AOC as well as lakewide or in the watershed).
  3. A recommendation by the RAC for a use impairment re-designation within the jurisdiction of the RAC shall include public input as determined by any acceptable and agreed upon method for soliciting input from the public.
- D. Delisting of the entire AOC is the responsibility of the DEC once it is assured that all the use impairments have been either reassigned or re-designated to “Not Impaired”. This will include specifically all impairments in the AOC that were addressed by the RAC, and upon recommendation to the DEC were reassigned by DEC to another agency or responsible organization.

This proposed strategy contains an overall philosophy that recognizes that the AOC is geographically defined and that the RAC is not responsible for activities and conditions outside the designated AOC. It also places a high value on public input in determining the status of each use impairment within RAC jurisdiction and also the overall delisting of the AOC. Ultimately recommendations made by the RAC fall within the responsibility of the DEC to provide for the final disposition of the Area of Concern.

# OSWEGO AREA OF CONCERN IMPAIRMENT EVALUATION

## RAC Indicator Evaluation Strategy [STRATEGIC APPROACH]

**Background:** This evaluation strategy is to be used to evaluate the status of the fourteen (14) current use impairment indicators identified for the Oswego River Area of Concern (AOC) and to develop a systematic process for re-designating each impairment and delisting the AOC.

The strategy is formulated around five primary issues. These issues are identified and briefly discussed below:

1. How do we address use impairments that are caused by activities outside the AOC?  
*Remedial Advisory Committee (RAC) members should be concerned with use impairments affecting the AOC that are caused by activities either from within or from outside the AOC. Where a use impairment is caused by activities or conditions upriver or in Lake Ontario, the RAC should attempt to identify an organization that is responsible for addressing the cause of the impairment. The RAC is responsible for making recommendations to the NYS Department of Environmental Conservation (DEC); however, corrective action in such cases is beyond the scope of the Oswego RAC.*
2. How do we address impairments to determine if they are ripe for closure and re-designation?  
*To address impairments the RAC is responsible for developing “re-designation criteria” and determining if the current state of the impairment meets the criteria. The RAC should finalize the criteria, evaluate existing data, and identify monitoring requirements (if any) required to fully assess the status of all the use impairments. Determinations made by the RAC relative to the criteria shall be used to support the “re-designation” of the use impairments.*
3. What does “delisting” mean in dis-positioning impairments?  
*Closure in this strategy means that all re-designation criteria for a given impairment have been achieved and/or the responsibility for addressing said impairment has been identified as that of another party (e.g. dis-positioning of the fish advisory to the Lake Ontario LaMP).*
4. How do we interact more comprehensively with the public?  
*Interaction with the public will require public information meetings at each significant juncture of the re-designation process. Additional information can be collected through the development and dissemination of a questionnaire.*
5. How do we communicate RAC results to the public?  
*Communicating with the public to inform them of the RAC progress can be accomplished through the use of the newspapers, newsletters, brochures, and perhaps even a video that could be made available to the public. A public information meeting is recommended to accomplish delisting of the Area of Concern.*

12/6/00

## APPENDIX C

**TABLE 4 - OSWEGO RIVER AREA OF CONCERN**

***Remedial Advisory Committee Endpoints and Status***

<b>IJC USE IMPAIRMENT INDICATOR</b>	<b>ENDPOINTS</b>	<b>RELEVANT INFORMATION</b>	<b>STATUS</b>
1.Fish and wildlife* consumption restrictions	Removal of (lakewide) fish consumption advisory (for humans).	Monitoring (sample and data results); Health advisories by NYS Dept. of Health [1]	Impairment due to lakewide and upstream advisories; Not specific to Area of Concern.
2.Degradation of fish and wildlife* populations	Fish and wildlife populations substantially similar to reference area communities	Comparative community structure evaluation of reference area populations [2]	Impairment linked to Habitat indicator; Lack of evidence for impaired status in the Area of Concern
3.Loss of fish and wildlife* habitat	No restricted use of fish habitat from river flow or contamination	FERC "Run-of-River" proposal and final license requirements. [2]	Impairment due to river flow; FERC license to rectify. Evaluate and monitor to verify.
4.Eutrophication or undesirable algae	Water quality standards achieved; Beneficial use goal met and maintained; No persistent water quality problem due to cultural eutrophication	Water quality survey results do not indicate eutrophic conditions; No undesirable weeds or algae present [3] (See Aesthetics indicator for nuisance)	Not Impaired - (seasonal algae observed in lock area is not a natural part of the AOC environment; weeds constitute managed nuisance condition)
5.Degradation of benthos	Benthic community integrity substantially similar to reference communities	Comparative community structure study results [4]	Not Impaired - (monitoring data supports)
6.Fish tumors or other deformities	No abnormally high incidence of tumors and deformities	Comparative evaluation of deformities in reference populations [5]	Not Impaired - (monitoring data supports)
7.Bird or animal deformities or reproductive problems	No abnormally high incidence of deformities or reproductive problems	Comparative evaluation of deformities and reproductive problems in reference populations [6]	Not Impaired - (monitoring data supports)

8.Degradation of aesthetics	Absence or minimal presence of floatable material or odors; Weeds controlled to non-nuisance level	No floatable materials or odors evident; Weed nuisance addressed by weed harvesting	Not Impaired - (Harbor Survey monitoring data supports) [3]
9.Degradation of plankton populations	Substantially similar plankton populations to reference populations	Comparative evaluation of plankton populations in reference populations	Not Impaired - (Harbor Survey monitoring data supports) [3]
10.Restrictions on dredging activities	No US Army Corps of Engineers restrictions on dredging	NYSDEC dredging approval and 401 Water certification with lake disposal	Not Impaired - (Harbor Survey monitoring data and actions support) [3]
11.Beach closings	All beaches in AOC open to swimming	There are no public beaches in the AOC; Secondary contact is safe and not restricted	Not Impaired - (not specifically applicable to AOC)
12.Tainting of fish and wildlife flavor	No evidence of fish or wildlife tainting	Fish and wildlife pathology studies confirming status	Not Impaired - (study addressed fish; no evidence of wildlife tainting)
13.Drinking water restrictions, Taste and odor problems	No drinking water restrictions, taste, or odor problems	Not impaired based on water quality studies in Harbor Survey and RIBS studies	Not Impaired - (Harbor Study and RIBS monitoring data supports)
14.Added costs to agriculture or industry	No abnormal added costs to agriculture or industry.	No added costs to industry and no agriculture use of AOC waters.	Not Impaired -

[1] = NYSDEC, 2002, Young-of-Year report and NYSDOH Fish Advisory pamphlet

[2] = Study not yet available; to be addressed under larger management plan (e.g. LaMP; FERC)

[3] = NYSDEC, 1994, Oswego Harbor Survey

[4] = NYSDEC, 1999, Rotating Intensive Basin Studies and Water Quality trend studies

[5] = Jan Spitsbergen, 1995, Fish Pathology Study

[6] = Environment Canada, Birds Study Canada, and EPA, 1999, Marsh Monitoring Program.

\* = Use Impairments for the Oswego RAP involve only fish (i.e. no wildlife impact identified)

## APPENDIX D

### Workshop Summary Results

(Conducted in Oswego, New York on June 18-19, 1998)

#### I. The purpose of the Oswego River RAP Workshop was to:

- ◆ Report on study results and environmental program activities in the Oswego Area of Concern and the Seneca-Oneida-Oswego Rivers drainage basin as they directly relate to the use impairments identified in the RAP; and to
- ◆ Use this information and the improved understanding to better define the next steps and needed actions to restore and to protect the Oswego River AOC; and to
- ◆ Report on the workshop proceedings such that the Remedial Advisory Committee may apply the information to review the use impairment indicator status, assess progress, further define delisting criteria, and refine remedial strategies to achieve the goal of restoring and protecting the Area of Concern.

#### II. Results [*Comments, Recommendations, and Impressions*]

A summary of the results of the Oswego RAP workshop are presented below in three sections: overall comments, a list of recommendations, and impressions/concluding statements.

##### ◆ **Comments**

The Oswego River RAP Workshop provided a (an):

1. Wonderful two day learning session
2. Forum to clarify mis-information
3. Opportunity to ask questions and obtain clarification
4. Opportunity to meet and discuss with technical experts
5. Opportunity for new contacts (e.g. Canadian Marsh Monitoring Program)
6. Good exchange of ideas
7. Good cross section of presenters and presentations
8. Step forward in integrating water quality and fish/wildlife natural resource information

Suggested Improvements for future workshops and RAP activities are:

1. Additional citizen participation
2. Better Communications among RAP area technical persons (e.g. study results)
3. Additional time to discuss subject matter
4. Implementation activities that go beyond receiving and collecting information

##### ◆ **List of Recommendations**

The Oswego River RAP Workshop included many presentations. Presentation abstracts were provided to the participants as handouts at the beginning of the workshop. Some abstracts were developed after the workshop. Below is a brief version of the recommendations which are excerpts of the presentation abstracts. Complete narratives of the abstracts and the recommendations are presented in the May 1999 Oswego River RAP Workshop Summary and RAP Update and Appendix documents. The summary listing of the recommendations from the presentations / abstracts follows. Below, a check (✓) has been added to each to show the concern/ action has been addressed to a satisfactory degree.

1. Focus on the Area of Concern to resolve use impairment status.✓
2. Pursue stakeholder involvement.✓
3. Develop delisting criteria.✓
4. Work on the implementation of selected achievable projects.✓
5. Involve the research community more in data review and recommendations.✓
  
6. Apply a watershed approach to address water quality problems in L. Ontario.✓
7. Coordinate nonpoint project implementation with local officials.✓
8. Obtain professional recommendations and leadership for decisions.✓
9. Communicate progress, recommendations, and decisions to the public.✓
10. Work through watershed organizations (FL-LOWPA) to achieve RAP goals.✓
  
11. Restore habitat below the Varick Dam.(FERC license does) ✓
12. Implement DEC's Fisheries Enhancement Plan.(under FERC provisions) ✓
13. Apply a "whole system approach" to the basin to address use impairments.✓
14. Convene a conference: assess environment, report on health. (too big for RAP) ✓
15. Report on new air regs. progress; relate regional data to impacts on the AOC.✓
  
16. Increase representation on the Remedial Advisory Committee.✓
17. Increase level of and specificity of studies. (e.g. contaminant sources) ✓
18. Report on human health information to benefit all AOCs. ✓
19. Define sound remedial strategies regardless of cost. ✓
20. Maintain protection and remedial efforts; increase monitoring activities.✓
  
21. Develop local watershed plans for waterbodies not yet addressed.(e.g. WRAPS) ✓
22. Obtain commitments and funding (local & other) to implement local plans. ✓
23. Repeat toxicity testing (Re: cause/source of any toxicity).✓
24. Conduct further water quality sampling (Re: plankton or BOD problem).✓
25. Conduct add'l mirex study (Re: possible Lake Ontario loading source).✓
  
26. Conduct add'l quantitative sampling (Re: identify possible loading sources).✓
27. Continue to implement drinking water source protection programs.✓
28. Conduct add'l sediment sampling (Re: harbor, lower river, and Battle Island)✓
29. Complete hazardous waste site remediation; assure no ongoing impact.✓
30. Investigate the Armstrong site for an ongoing source of mirex leachate.✓
  
31. Continue chemical residue sampling of fish and advisory assessment.✓
32. Implement Fisheries Enhancement Plan and restore flow and habitat.(FERC) ✓
33. Use trend data and fish and wildlife goals to address impairments.✓
34. Additional marsh monitoring data (bird and amphibian) is needed.(obtained) ✓
35. No fish tumor impairment found; if needed, pursue fish reproduction study.✓
  
36. New power dam owners (or others) need to address habitat issues.✓
37. RAP strategies need to be adaptive and flexible to changing dynamics.✓
38. Complete the delisting criteria and apply to use impairment reassessment.✓
39. Involve the public in the RAP process and get out the information.✓

◆ **Impressions / Concluding Statements**

These are key results from participants of the workshop provided as impressions and concluding statements to observing the workshop presentations and panel discussions:

1. The loss of fish habitat appears to be the only use impairment that the Remedial Action Plan and the Advisory Committee will be able to take action on and cause an effect. The resolution of other use impairments are either dependent on larger regional actions, require more information to make a determination, or are considered not impaired. The suggested “White Hypothesis” by definition dictates that we pursue remedial activities only on this known fish habitat impairment for which we can cause improvement.
2. One result of the workshop is the perception and understanding that the data indicate that most problems and causes are coming from outside the Oswego River Area of Concern (AOC).
3. There is a frustration with the AOC vs. a watershed focus in dealing with the Oswego River use impairments. (i.e. the AOC limits the scope of the impairment).
4. We need to apply both a watershed and ecosystem approach and make a connection. The RAP cannot proceed without recognizing the watershed link.
5. The major unique problem of the Oswego River RAP is the habitat impairment below the Varick dam which needs to be resolved; other problems are watershed related and a watershed approach is needed.
6. Workshop participant notes: impressed with the number of people that are disappointed with the lack of resolution of the power dam relicensing process and the restoration of the habitat impairment.
7. Outside of the dam relicensing process under FERC, the Thruway Authority needs to be contacted regarding resolving the minimum flow issue. (The New York State Canal Corporation was involved in the process to address this concern.)
8. Fish habitat restoration should be a concrete action item to focus on and get money for and gain recognition for to restore the beneficial uses.
9. It’s interesting how the AOC groups (RACs/PACs) struggle with aligning the AOC definition with the work to be done and the problems and causes. At the same time larger scope environmental groups (e.g. Bird Studies Canada) operate on a watershed basis and are willing to assist and work with RAP efforts.
10. We need to improve the integration of information and data from water quality, habitat, sediment, and fish to better define what we do and do not know, and what needs to be accomplished.

11. The Oswego RAP has created a good foundation of public information but there needs to be an update to the slideshow (to a video). The workshop needs to have a brief executive summary of the proceedings prepared and distributed broadly among the public. (Power Point presentation and summary developed.)
12. The RAP and the implementation of remedial actions should move ahead and not wait for International Joint Commission actions or positions.
13. Delisting criteria are needed to be defined. The RAP committee should work on things that they can influence or control and not deal with other issues.
14. Additional citizen education and involvement with the RAP is needed. A workshop or forum format provides a good opportunity to increase public participation. Summary materials are needed in libraries and academic locations.
15. Overall, people do not have a good understanding of the issues. Is this needed? (Developed in Power Point presentation and delisting document)
16. A distillation of the important projects to focus on and achieve the goals of the RAP is needed. The workshop contributed to this effort.
17. Improved distribution of RAP related information is needed. The Area of Concern designation should not “scare one away”.
18. The workshop met the expectation to have a tool to assess the status of the RAP. There is a tremendous amount of information. Future workshop efforts should “trim” some material.
19. If done again, a workshop like this may be good to have prior to a Stage 2 report. There is no need to wait for the International Joint Commission to recognize this RAP effort.
20. The City of Oswego can provide boat access to researchers interested in conducting river/harbor studies and sampling. (Note: additional toxicity testing was conducted in early September 1998 with the City’s assistance; results were negative.)

◆ **Stakeholder Comments (Concluding Workshop Panel Discussion)**

Time constraints limited detailed responses to a prepared sequence of questions in the workshop. Stakeholder comments did focus on key elements noting accomplishments to date and emphasizing the needs to move the RAP process forward. Also, most of the prepared workshop questions had already been addressed in the course of the two-day workshop presentations and therefore additional focus and discussion during this final panel session was focused on stakeholder comments. Following is a narrative of these stakeholder comments provided by workshop participants in this concluding panel discussion session.

## 1. Water Quality and Remedial Activities Comments:

**G. Neal:** Significant water quality changes have been observed in the harbor area. Water clarity is improved due to the zebra mussels; however, rooted weed growth has increased. The main problem area is the shallow western part of the harbor. Weed harvesting is performed, but because it is labor intensive, the positive effects are limited.

**L. Monostory:** Because of the municipal wastewater discharge improvements throughout the Oswego River watershed, the use of the river by fishermen has increased (e.g. walleye fishing good).

**J. Haynes:** We have concluded that there is a relatively small number of impairments in the Area of Concern that can be acted upon by local organizations or that we can actually do something about. Applying the watershed and ecosystem approaches further expands the scope of work for a RAP. For example, human health issues are involved with and influenced by much more than just the Area of Concern. In this sense, it is extremely difficult to have the RAP act on human health effects. Except for specific site remediation, we are not even sure the Lakewide Management Plans (LaMPs) can adequately address the human health issues. (i.e. may need larger regional approach)

**B. Lange:** We need to question, that after 12 years of collecting fish data, where do we expect closure of the RAP to be. In the process of trying to prove an area is unimpaired, the next data point may be a smoking gun. The alternative is to establish the null hypothesis (i.e. there is no impairment) and then study the area. Failure to reject the null hypothesis would maintain that environmental goals are intact. (i.e. either way a not impaired conclusion is reached)

**L. Wedge:** The FERC relicensing for the power dams is the process that is needed to address and resolve the fish habitat and population use impairments in the Area of Concern. Primarily, we need to solve the fish habitat problem. A release flow of 400 cubic feet per second (cfs) is needed; we currently estimate a leakage of 15 cfs. (note: the FERC license fully addresses this concern)

## 2. Public Participation and Next Steps Comments:

**J. Allerton:** On the subject of expanding the Remedial Advisory Committee's membership: We need to answer these questions first ourselves before going public.

**H. Domske:** We need to sell our successes and communicate the trends in the process. Let the public know we have accomplished something and that steps have been taken to address the use impairments in the AOC. The overall strategy and results do not have to be all sorted out; however, the public needs to know the status of the RAP and the problems in order to "buy into" the process and maintain active participation.

**M. Goldych:** Apply the “White Hypothesis” which is to say that we pursue remedial activities on the one known fish habitat impairment for which we can cause improvement. This one issue, and the defined remedial activities, should be communicated to the public as progress is made as an indication of RAP success.

**G.Neal:** We would need direction from the International Joint Commission (IJC) to apply the White Hypothesis. It has to do with choosing a path of selecting direct and/or indirect impact effects of the RAP. We do not desire to be accused of “delisting by definition”.

**H. Domske:** Get the information we know out to the public. Establish a confidence in what we know to advance the RAP process.

**L. Monostory:** We need to look at our role and responsibility. What is there we can really do as a RAP committee. We need to look at the Oswego River as a watershed. A lakewide watershed approach is needed. The proper organization to address this is the Finger Lakes - Lake Ontario Watershed Protection Alliance (FL-LOWPA). There is a unique weed problem to the AOC.

**D. Draper:** The Oswego RAP should not try to deal with comprehensive watershed planning as some other RAPs may do; the RAP can however clarify that there is a need for good planning. The “white hypothesis” is not suggesting we go forward without a strategy and restoration actions. The weed problem needs to be added to the RAP.

**B. Lange:** The weed problem may not be permanent at the level we have now; harvesting and composting contribute to reductions.

**J. Ferrante:** We need a watershed approach. There is a lot we are not sure of. The workshop has raised questions on the interpretation of study results.

**J. Haynes:** There are chemicals of concern identified in Remedial Action Plans. There is no significant evidence of tumors in the Oswego River RAP, nor in the nearby Rochester Embayment RAP caused by chemicals of concern. Overall, the effects level at which we provide protection for aquatic life is much lower (i.e. more protective) than the effects level for humans. We need to communicate this protective level to the public.

## APPENDIX E

**Table 5 - Use Impairment Delisting Criteria Summary**

Oswego River Remedial Action Plan  
(See Appendix F for Criteria Details)

Impairment Indicator	DELISTING CRITERIA	STATUS
1. Fish Consumption Restrictions	<ul style="list-style-type: none"> <li>* No AOC restrictions due to in-place sources.</li> <li>* Compliance with lakewide fish tissue standards.</li> <li>* Contaminant sources addressed by other Mgt. Plan (e.g. LaMP).</li> <li>* Attain sediment criteria and waste site standards for AOC. (not applicable to AOC; achieved for non-AOC sites)</li> </ul>	<ul style="list-style-type: none"> <li>* Not Impaired</li> <li>* LaMP to Address</li> <li>* LaMP to Address</li> <li>* Not Impaired</li> </ul>
2. Degradation of Fish Populations	<ul style="list-style-type: none"> <li>* Conditions provide for healthy and self-sustaining communities.</li> <li>* AOC consistent with other Great Lakes ecosystem objectives.</li> <li>* Attain quantitative fishery targets (biomass, percent, richness)</li> <li>* In the absence of community structure data, bioassays confirm no significant toxicity from AOC water column or sediments.</li> </ul>	<ul style="list-style-type: none"> <li>* FERC to Address</li> <li>* FERC to Address</li> <li>* FERC to Address</li> <li>* Data Supports</li> </ul>
3. Loss of Fish Habitat	<ul style="list-style-type: none"> <li>* Habitat (amount and quality) provided below Varick Dam.</li> <li>* FERC relicensing requirements accomplished; habitat protected.</li> <li>* Management plans are established to restore and to protect habitat.</li> <li>* Amount and types of AOC wetlands and other riparian vegetation are adequate and protected.</li> </ul>	<ul style="list-style-type: none"> <li>* FERC to Address</li> <li>* FERC to Address</li> <li>* Completed</li> <li>* Not Impaired</li> </ul>
4. Eutrophication or Undesirable Algae	<ul style="list-style-type: none"> <li>* No persistent water quality issue due to cultural eutrophication.</li> <li>* Ambient water quality standards, criteria, guidelines attained.</li> <li>* Beneficial goals are achieved and maintained (boating, fishing)</li> <li>* Weed growth controlled to a non-nuisance level</li> </ul>	<ul style="list-style-type: none"> <li>* Not Impaired</li> <li>* Not Impaired</li> <li>* Data Supports</li> <li>* Data Supports</li> </ul>
5. Degradation of Benthos	<ul style="list-style-type: none"> <li>* Macroinvertebrate structure similar to unimpacted control sites.</li> <li>* Mesotrophic species present where suitable substrates are located</li> <li>* Absent community data, toxicity of sediments parallels controls.</li> <li>* Resident fauna do not have elevated contaminants.</li> </ul>	<ul style="list-style-type: none"> <li>* Data Supports</li> <li>* Data Supports</li> <li>* Data Supports</li> <li>* Data Supports</li> </ul>
6. Fish Tumors or Other Deformities	<ul style="list-style-type: none"> <li>* Incidence rates do not exceed rates in unimpacted control sites.</li> <li>* No neoplastic or preneoplastic liver tumors in bullheads/suckers.</li> <li>* Attain IJC, state, and federal tissue standards/objectives.</li> </ul>	<ul style="list-style-type: none"> <li>* Study Supports</li> <li>* Study Supports</li> <li>* Study Supports</li> </ul>
7. Bird or Animal Deformities or Reproductive Problems	<ul style="list-style-type: none"> <li>* Attain IJC, state, and federal tissue standards/objectives.</li> <li>* Attain appropriate AOC sediment quality criteria.</li> <li>* Deformity or reproductive incident rates less than inland controls</li> <li>* Wetlands support healthy communities of significant species.</li> <li>* Biomonitoring results better than unimpacted control sites.</li> </ul>	<ul style="list-style-type: none"> <li>* Data Supports</li> <li>* Data Supports</li> <li>* Data Supports</li> <li>* Data Supports</li> <li>* Data Supports</li> </ul>

<b>Impairment Indicator</b>	<b>DELISTING CRITERIA</b>	<b>STATUS</b>
8. Degradation of Aesthetics	<ul style="list-style-type: none"> <li>* AOC waters devoid of substances producing aesthetic problems.</li> <li>* No increase in turbidity causing a visible contrast to natural.</li> <li>* No visible residue of oil or floating substances.</li> <li>* Acceptable response to spills with preventive measures.</li> </ul>	<ul style="list-style-type: none"> <li>* Study Supports</li> <li>* Not Impaired</li> <li>* Not Impaired</li> <li>* Not Impaired</li> </ul>
9. Degradation of Plankton Populations	<ul style="list-style-type: none"> <li>* Plankton community structure similar to unimpacted control sites</li> <li>* Absent community data, no plankton bioassay toxicity impact.</li> <li>* Healthy fish communities present in the AOC.</li> </ul>	<ul style="list-style-type: none"> <li>* Study Supports</li> <li>* Study Supports</li> <li>* Study Supports</li> </ul>
10. Restrictions on Dredging Activities	<ul style="list-style-type: none"> <li>* AOC sediments (metals, organics, nutrients) meet stds./criteria.</li> <li>* Restrictions not due to AOC sources; beneficial use protected.</li> <li>* Dredge material disposal does not contribute to use impairments, activities registered and approved, beneficial uses protected.</li> </ul>	<ul style="list-style-type: none"> <li>* Data Supports</li> <li>* Not Impaired</li> <li>* Not Impaired;</li> <li>Data Supports</li> </ul>
11. Beach Closings	<ul style="list-style-type: none"> <li>* Waters do not exceed standards, guidelines, or objectives of use.</li> <li>* For beaches: no toxic irritants, numerical and clarity standards attained, and free from public health advisories.</li> <li>* For beaches: daily geometric mean for fecal coli &lt; 100 colonies.</li> <li>* Attain ambient water quality standards for total and fecal coli.</li> <li>* Demonstrate stormwater areas present no threat (see detail).</li> </ul>	<ul style="list-style-type: none"> <li>* Not Impaired</li> <li>* Not Impaired</li> <li>* Not Impaired</li> <li>* Data Supports</li> <li>* Data Supports</li> </ul>
12. Tainting of Fish and Wildlife Flavor	<ul style="list-style-type: none"> <li>* No complaints about fish tainting.</li> <li>* Survey results confirm no tainting.</li> <li>* Ambient water quality standards and criteria not exceeded.</li> </ul>	<ul style="list-style-type: none"> <li>* Not Impaired</li> <li>* Not Impaired</li> <li>* Not Impaired</li> </ul>
13. Drinking Water Restrictions, Taste and Odor Problems	<ul style="list-style-type: none"> <li>* No taste and odor problems for treated drinking water supplies.</li> <li>* Attain treated drinking water health standards and criteria.</li> <li>* Drinking water treatment requirements not excessive.</li> </ul>	<ul style="list-style-type: none"> <li>* Not Impaired</li> <li>* Not Impaired</li> <li>* Not Impaired</li> </ul>
14. Added Costs to Agriculture or Industry	<ul style="list-style-type: none"> <li>* No additional costs to treat water due to AOC or spill conditions.</li> <li>* No treatment impact due to watershed / AOC contamination.</li> </ul>	<ul style="list-style-type: none"> <li>* Not Impaired</li> <li>* Not Impaired</li> </ul>

## APPENDIX F

### Use Impairment Delisting (Restoration and Protection) Criteria

A detailed description of the delisting (restoration and protection) criteria for each use impairment indicator is provided below. The indicators are divided into three groupings based on the Stage 1 evaluation of the impairment status for each indicator. The Group 1 use impairment indicators had a status of impaired; the Group 2 indicators had a status of needing further study; and, the Group 3 indicators had a status of not impaired. A description of the rationale and supporting data needed to address the use impairment is included for each indicator's restoration and protection criteria. The objective, of course, is to achieve each criteria as much as practicable so that the beneficial uses can be evaluated as restored and protected.

[Note: for reference, examples of quantitative objectives and targets for delisting were developed at the Water Environment Federation's 1994 Conference. These are build on with International Joint Commission qualitative guidance criteria for listing and delisting AOCs. This table is reproduced as Appendix E in the 1996 Oswego RAP Update on page 155 of that report.]

Below, the specific narrative standards and guidelines have been developed as the delisting criteria for the Oswego RAP. The desired endpoints and supporting data needed to declare a use impairment indicator as resolved are included. The delisting criteria are presented in three rating groups based on the original indicator's identification as impaired, needing further study, or not impaired. In this Stage 3 document, Table 4 (shown just above as Appendix E) provides a summary of the delisting criteria bullets listed below for use each use impairment indicator for the Oswego River Area of Concern. Table 4 also shows the resolution status of each of these criteria.

**Use Impairments rated as IMPAIRED (from Stage 1):** Four use impairment indicators for the Oswego AOC were originally identified as impaired. These are discussed below as indicators 1 to 4. The numbering of the indicators is kept consistent throughout the Stage 3 document. Each restoration and protection criteria starts with a "★" point. Wildlife impairments were not identified in the original Stage 1 document and are therefore not addressed in the delisting criteria. Each indicator will be considered resolved and its beneficial use protected by addressing each of the criteria, achieving the needs of the endpoints, and providing supporting data.

#### 1. Fish Consumption Restrictions -

★ Restrictions on fish consumption in the Area of Concern due to in-place contaminants are absent. Contaminant levels created by anthropogenic chemicals do not exceed current standards, objectives, or guidelines in all non-migratory fish (none found in AOC).

★ From IJC criteria: a short term target based on U.S. Food and Drug Administration (FDA) Action Level of 2 mg/kg PCBs in the edible portion of the fish; and, a long-term target of 0.05 mg/kg in fish tissue. For the AOC, no NYSDOH public health advisories are in effect for human consumption. The Lakewide health advisory applies to the AOC.

★ Any remaining restrictions on fish consumption are due to upstream or downstream sources that are addressed by or are part of other management plans such as the Lake Ontario Lakewide Management Plan (LaMP).

★ Site specific cleanup standards have been accomplished both in contaminated river sediments and land-based hazardous waste sites of the AOC (none as sources in the AOC).

**Endpoints:** Delisting criteria are satisfied with the absence of fish consumption advisories due to sources in the AOC. The lakewide fish consumption advisory is addressed under the Lake Ontario Lakewide Management Plan (LaMP). State and federal fish standards and objectives addressing chemical contamination in fish flesh are monitored and reported on under the LaMP.

**Supporting Data:** The fish advisory is not specific to the AOC; it is part of Lake Ontario. The fish consumption restrictions are addressed as a lakewide impairment under the Lake Ontario LaMP which applies to the Oswego AOC. There are no AOC causes or sources.

## 2. Degradation of Fish Populations -

★ Environmental conditions exist to support healthy, self-sustaining communities of desired fish at predetermined levels of abundance that would be expected from the amount and quality of suitable physical and biological habitat present.

★ In general, fish objectives for the AOC are consistent with other Great Lakes ecosystem objectives (e.g. Annex 2 GLWQA and Great Lakes Fishery Commission goals).

★ Quantitative fishery targets are achieved indicating a self-sustaining community. References: NYSDEC Fisheries Enhancement Plan and other IJC targets which include: kg/ha units of biomass of fish, percent of native species, and species richness.

★ In the absence of community structure data, fish bioassays confirm no significant toxicity from water column or sediment contaminants.

**Endpoints:** Delisting criteria are satisfied for fish populations when the fish community is determined to be healthy and self-sustaining under the “run-of-river” flow and fish assess is achieved. The environmental impairments to all species are addressed by compliance with the FERC license provisions and are consistent with the GLWQA, Great Lakes Fishery Commission goals, ecosystem objectives, and the NYSDEC Fisheries Enhancement Plan.

**Supporting Data:** Fish community structure data (number and balance) supports conclusions; abundance and composition is not impaired based on historical data. Desired levels within a statistical range achieved. Sediment bioassays with fish confirm no significant toxicity. Surveys indicate healthy, reproducing populations of benthivores and piscivores. Goals are to have a catch rate ranging from 0.1 to 0.5 fish per hour of legal size, and 150,000 annual fishing trips (70% salmonid, 25% gamefish, 5% panfish).

### 3. **Loss of Fish Habitat -**

- ★ Amounts and quality of physical, chemical, and biological habitat required to meet fishery management plans has been provided below Varick Dam
- ★ Federal Energy Regulatory Commission (FERC) relicensing requirements are accomplished to enhance and protect habitat.
- ★ Fisheries enhancement management plan and/or local plans established to restore and to protect habitat in the AOC.
- ★ Amount and type of AOC wetlands and other riparian vegetation adequate with beneficial uses protected.

**Endpoints:** Delisting criteria are satisfied when there is no restricted use of fish habitat from flow or contamination below the Varick Dam. By employing “run-of-river” flow, proper dam operation assures fish access and restored conditions such that the fish community is dependent of Lake Ontario. The goal is to achieve the fisheries enhancement plan objectives. The habitat creation will be based on compatibility with other use goals having an acceptable balance among habitat, fishing, and boating interests. The post-power dam construction habitat requires a minimum flow to prevent dewatering below the dam during fish spawning. Stakeholders, Remedial Advisory Committee members, and biological habitat assessment professionals have identified minimum flows are required to produce acceptable habitat levels and restore and protect fish populations.

**Supporting Data:** The desired habitat and fishery objectives are described in the NYSDEC Fisheries Enhancement Plan. The restoration of a modified “run-of-river” flow will provide the necessary conditions for habitat rehabilitation and protection. Supporting information documents that the end result of restoring the habitat below the Varick Dam will address the fishery impairment (i.e. adequate habitat will be present with no additional loss attributable to water or sediment quality). The FERC relicensing provisions address the impairment. The goals include accommodating 1000 smelt fishing trips with a mean harvest of 50/ trip.

### 4. **Eutrophication or Undesirable Algae -**

- ★ No persistent water quality problems attributed to cultural eutrophication (e.g. none of the following present: dissolved oxygen depletion of bottom waters, nuisance algal blooms or accumulation, decreased water clarity).
- ★ Ambient water quality survey data consistently equal to or better than standards, criteria, or guidelines.
- ★ Beneficial goals are achieved and maintained including boating, fishing, sightseeing, nature observation, aesthetics, passive and active recreational activities.
- ★ Undesirable weed growth has emerged as a problem. Ongoing weed harvesting is performed to combat weed growth. Maintenance of weed harvesting must achieve weed control to a non-nuisance level.

**Endpoints:** Delisting criteria are satisfied when survey results indicate phosphorus concentrations and loadings, chlorophyll, ammonia, water clarity, dissolved oxygen and other ambient water quality levels are consistently better than standards, criteria, and guidelines. The observation of algal blooms in the AOC or downstream needs to be evaluated as to the cause, the undesirable nature and any proposed remedial action.

**Supporting Data:** Suggested thresholds for ambient water quality comparisons in the AOC include lake parameters and values: phosphorus concentration < 20 ug/l (lake), Secchi disc transparency > 1.2 meters, dissolved oxygen > 6 mg/l, unionized NH<sub>3</sub> < 0.02 mg/l.

**Use Impairments rated as NEEDING FURTHER STUDY (from Stage 1):** Five use impairment indicators had an impairment status of likely, unknown, or under expanded review. Further investigation and evaluation was identified and conducted to certain degrees. With sufficient information to address the restoration and protection criteria, the status of each indicator was reassessed by the Remedial Advisory Committee and NYSDEC to indicate not impaired. The revised status shows the indicator as resolved by the RAP process, with the RAP goals satisfied, and the beneficial use(s) restored and protected. [Note: the Stage 1 indicators resolved by further study are numbered from 5 to 9. Each restoration and protection criteria starts with a “★” point. The desired endpoints and description of the supporting data are included.]

## 5. Degradation of Benthos -

- ★ Benthic macroinvertebrate community structure does not significantly diverge from unimpacted control sites of comparable physical and chemical characteristics.
- ★ In the absence of community structure data, the toxicity of sediment-associated contaminants is not significantly higher than unimpacted control sites.
- ★ Populations of mesotrophic species are present in the benthos where suitable substrates are located (i.e. waters with moderate nutrients have species diversity).
- ★ Resident fauna do not have elevated levels of contaminants.

**Endpoints:** Delisting criteria are satisfied when benthic surveys demonstrate a healthy community. In the absence of community data, sediment quality criteria are to be achieved such that no threat is evident. Because of boating and shipping, the emphasis is placed on demonstrating the absence of acute and chronic toxic effects of sediment associated contaminants and on demonstrating bioassay results comparable to controls.

**Supporting Data:** Results from the benthic macroinvertebrate community structure surveys conducted under the 1997 Oswego River Sediment Study and the Rotating Intensive Basins Survey (RIBS) document a healthy benthic community in the AOC. Water quality studies reinforce the conclusion and further support the AOC as comparable to unimpacted control site composition. To assure protection an expanded biological screening network is being sample by NYSDEC.

## 6. Fish Tumors or Other Deformities -

- ★ Incidence rates of fish tumors or other deformities do not exceed rates at unimpacted control sites.
- ★ Survey data confirm the absence of neoplastic or preneoplastic liver tumors in bullheads or suckers.
- ★ Compliance with IJC, state and federal biological tissue standards or objectives.
- ★ No reproductive deformities in observed resident species.

**Endpoints:** Delisting criteria are satisfied when survey results are consistent with expert opinion on tumors and there are no reports of tumors or other deformities based on acknowledged background incidence.

**Supporting Data:** The 1994 Fish Pathology Study results confirm the absence of tumors and demonstrate no significant difference from control sites. Other studies document that the AOC and watershed sources are not the cause of any reported incidence specific to the Area of Concern. Fishing and nature observation goals are met.

## 7. Bird or Animal Deformities or Reproductive Problems -

- ★ Compliance with IJC, state and federal biological tissue standards or objectives.
- ★ Compliance with the establishment of appropriate sediment quality criteria.
- ★ Incidence rates of deformities (e.g. cross-bill syndrome) or other reproductive problems (e.g. egg-shell thinning) in sentinel wildlife species do not exceed background levels of inland control populations.
- ★ Wetlands support healthy communities of significant species.
- ★ When conducted, biomonitoring study results are better than standards or objectives when compared to unimpacted control sites.

**Endpoints:** Delisting criteria are satisfied when studies demonstrate compliance with tissue standards or objectives which indicates healthy communities; this protection level serves to prevent the initiation of tumors and deformities in species and their consumers. Incidence rates should not exceed control sites. Without sufficient evidence to suggest further study, an extensive biomonitoring program is not warranted.

**Supporting Data:** Survey results from the Canadian Marsh Monitoring Program show that bird, animal, and amphibian populations confirm the absence of deformities or reproductive problems and demonstrate no significant difference from control sites. AOC and watershed sources are not the cause of any incidence. Measurements verify a healthy community and population balance. Habitat and nature observation goals are achieved.

## 8. Degradation of Aesthetics -

- ★ AOC waters are devoid of any substance which produces a persistent objectionable deposit, unnatural color, or turbidity, or unnatural odor (e.g. oil slick, surface scum).
- ★ No increase in turbidity that would cause a visible contrast from natural conditions.
- ★ No visible residue of oil or floating substances.
- ★ Any sightings of oil, scum, floating objects, or reports of objectionable odors are spill related and at a frequency of occurrence and cleanup response acceptable to the public (instances of repeated spills require improved response and prevention measures).

**Endpoints:** Delisting criteria are satisfied when the narrative standards for ambient water quality parameters such as suspended solids, oil, and color are achieved. These require no presence that would adversely affect the waters best use or interfere with achieving the beneficial use goals.

**Supporting Data:** Document that the quantitative targets established for dischargers having the potential to cause such conditions are achieved: 3 mg/l for suspended solids, 15 mg/l for oil and no floating substances. Verify that water clarity data, bioassay, and bacteria survey data support aesthetic use goals. Document that the implementation of remedial measures involving physical construction provide protection of beneficial uses and improve AOC aesthetics. Apply the Priority Waterbody List (PWL) to characterize conditions.

## 9. Degradation of Plankton Populations -

- ★ Phytoplankton or zooplankton community structure does not significantly diverge from unimpacted control sites of comparable physical and chemical characteristics.
- ★ In the absence of community structure data, plankton bioassays confirm no toxicity impact in ambient waters (i.e. no growth inhibition).
- ★ Healthy fish communities are present in the Area of Concern which indicates a viable plankton community.

**Endpoints:** Delisting criteria are satisfied when plankton community information support no significant impact. A healthy fish community can assist in demonstrating healthy plankton. Bioassay data should confirm no significant toxicity in ambient waters in accordance with AOC beneficial use goals.

**Supporting Data:** Plankton community structure data and bioassay toxicity data (from the 1994 Oswego Harbor Survey) support the observation of no significant impact to the plankton community structure. This favorable conclusion is reached when comparing the AOC to unimpacted sites in population, composition, and statistical variability and considering the flow through environment of the lower Oswego River and harbor.

**Use Impairments rated as NOT IMPAIRED:** From the Stage 1 document, five use impairment indicators have a status of not impaired. Upon confirming that all defined restoration and protection delisting criteria have been achieved, these five use impairment indicators have been further verified as not impaired with beneficial use protected. [Note: the Stage 1 indicators identified as not impaired are numbered below from 10 to 14. Each restoration and protection criteria starts with a “★” point. The desired endpoints and description of the supporting data are included.]

#### **10. Restrictions on Dredging Activities -**

★ Concentrations of metals, trace organic compounds and nutrients in the sediment within the AOC (located within the actual or potentially expanded areas of shipping and maintenance dredging) do not exceed the sediment quality standards, criteria, or guidelines for acceptable dredge and disposal material (lowest effect levels), except where background concentrations exceed levels.

★ When sediment criteria are exceeded, any restrictions on dredging are specific to in-place conditions located within the actual or potential shipping routes and are not attributable to current AOC watershed contributions. Restricted dredging activities are registered with and have appropriate authority approval. Restrictions do not contribute to other use impairments and assure beneficial use protection.

★ When restricted dredging is approved, sediment disposal activities are also registered and approved by appropriate authority. These disposal activities do not contribute to other use impairments and assure beneficial use protection.

**Endpoints:** Delisting criteria are satisfied when contaminants in sediments do not exceed standards, criteria, or guidelines such that they are not causing restrictions on the dredging. In cases where restrictions exist, dredging and disposal activities are approved such that activities do not contribute to other use impairments while use protection is provided. Restricted dredging areas can only be due to in-place conditions and can not be the result of a currently active AOC source or other watershed source.

**Supporting Data:** For the AOC, the 1997 Oswego River Sediment Study core sample results show compliance with sediment quality standards, criteria and guidelines. No dredging restrictions exist. Data reported for various sites along the river indicates certain upstream local sites may be contaminated. Further sampling and assessment was conducted which determined no significant threat to the environment. Additional upstream local non-AOC biological research is under consideration. Maintenance dredging and disposal activities for the AOC are permitted and monitored which assures beneficial use protection. Toxicity testing supports the not impaired status.

#### **11. Beach Closings -**

★ When waters, which are commonly used for total body contact or partial body contact recreation, do not exceed standards, objectives, or guidelines for such beneficial use.

★ For public swimming beaches, the waters must be free of chemical substances capable of creating toxic reactions or irritations to skin/membranes, must achieve numerical and clarity standards for safety, and must be free of public health advisories.

★ Beaches are considered safe for swimming when the daily geometric mean of a minimum of five fecal coliform samples collected from different sites within the beach area is less than 100 colonies per 100 ml. based on standardized sampling protocols.

★ Ambient water quality standards are not exceeded: The monthly median value for total coliforms per 100 ml., and more than 20 percent of the samples, from a minimum of five samples, does not exceed 2,400 and 5,000 respectively. The monthly geometric mean of fecal coliforms per 100 ml. from a minimum of five samples, does not exceed 200.

★ Exceptions may apply to stormwater events in non-bathing beach areas. As a result, monitoring may indicate some standard or guideline exceedence; however, these non-bathing partial body contact areas must present no threat to downstream designated bathing areas.

**Endpoints:** Delisting criteria are satisfied when bathing beach and partial body contact water standards and guidelines are met. Concentrations of fecal coliform and E. coli should be consistently below 100 colonies per 100 ml. sampled.

**Supporting Data:** Since there are no bathing beaches in the AOC, this indicator is not applicable. AOC open water quality surveys indicate the beneficial use of partial body contact in the non-bathing area of the lower river and harbor is not impaired. In fact primary contact uses are known to be supported. Compliance with water quality regulations is documented and therefore protection against health threats is assured.

## 12. Tainting of Fish and Wildlife Flavor -

★ There are no complaints about fish tainting.

★ Survey results confirm no tainting of fish and wildlife flavor.

★ The presence of tainting contaminants (such as phenols) in the water column do not exceed ambient water quality standards and criteria.

**Endpoints:** Delisting criteria are satisfied when there is an absence of reports of fish tainting and surveys support this conclusion. Compliance with ambient water quality standards, objectives, and guidelines indicates no tainting problem.

**Supporting Data:** Documented reports and ambient water quality data support beneficial use goals for the AOC. No tainting is reported by sporting interests.

### 13. **Drinking Water Restrictions, Taste and Odor Problems -**

- ★ The absence of taste and odor problems for treated drinking water supplies.
- ★ No exceedence of human health standards, guidelines, or objectives for treated drinking water supplies for densities of disease causing organisms or concentrations of hazardous or toxic chemicals or radioactive substances.
- ★ For treated drinking water, the treatment needed to make raw water suitable for drinking does not exceed the standard treatment used in other comparable portions of the Great Lakes which are known not to be degraded (e.g. settling, coagulation, and disinfection treatment is standard).

**Endpoints:** Delisting criteria are satisfied when standard drinking water treatment practices are employed and human health standards and guidelines are achieved. Contaminants from the Area of Concern watershed and the AOC should not be causing drinking water quality problems in the AOC or contributing to impacts on drinking water quality in areas outside of the AOC.

**Supporting Data:** The AOC is not a source of drinking water, therefore the indicator use is not applicable to the AOC. If it were, ambient water quality and treated drinking water quality survey data for the AOC waters would confirm compliance with the New York State standards and guidelines. Further, we know that there is no significant health impact from the area surrounding the Area of Concern.

### 14. **Added Costs to Agriculture or Industry -**

- ★ No additional costs are required to treat water prior to use due to contamination or spills within the Area of Concern.
- ★ No downstream impact due to watershed or AOC contamination.

**Rationale:** Delisting criteria are satisfied when there are no additional costs required to treat the water prior to use for agricultural or industrial purposes (e.g. livestock watering, irrigation, crop-spraying, non-contact food processing, industrial application).

**Supporting Data:** There are no reports of increased costs to agriculture or industrial business due to spills or in-place contamination affecting water use in the AOC. No known added costs are identified.

## APPENDIX G

### Responsiveness Summary on Comments

Note: The Comments and Responses are grouped into common topics. Each group starts with the symbol “➡” and is identified under the following six topics: RAP Process and Document, AOC and Sources, Delisting Considerations, Fish Impairments, Upstream Contaminated Sediments, and Eutrophication, Algae and Water Quality.

#### ➡ RAP Process and Document:

*I. Comment* - Section II.E; Synopsis - “... progress has been achieved in documenting the resolution of the use impairment indicators.” What would a simple list be of what we have changed?

*Response* - The RAP Process has involved the public for over 15 years in the awareness of activities affecting Oswego and in taking positions and making recommendations on these activities and surrounding issues. By representing stakeholder interests in the Oswego River/ Harbor area, the Remedial Advisory Committee (RAC) accomplished the recognition of the importance of this area as a natural resource and thereby encouraged others to act responsibly. For example, the City of Oswego has revitalized the downtown area, the Port Authority has made many improvements, boating and fishing interests have grown, and water quality has improved. The RAC stakeholders have identified, influenced, and observed the implementation of many corrective actions in the Oswego watershed. Upstream hazardous waste site remedial decisions and clean up actions (see Appendix K, first bullet, for 9 sites) have taken into consideration downstream impacts including effects on the Oswego River AOC. The sediment and water quality investigative studies (Appendix H.28 and H.35 respectively) were conducted and concluded no impairments are present in the AOC. The academic community has received research funding based on the AOC designation and is concerned about upstream watershed contamination. Municipal wastewater treatment discharge improvements have occurred partly because of the committee’s emphasis on restoring beneficial uses to the AOC [see Appendix K, item #3 (point sources) and item #4 (nonpoint sources)] . Recreational interests have been protected by the AOC designation and responsible agencies’ oversight.

As a result of contamination concern, State and Federal health agencies conducted a “Health Consultation” involving the Armstrong Cork Landfills to address Mirex and PCBs. This action lead to further contaminated sediment investigation activities upstream in the Oswego River. More recent sediment studies have identified contaminated sediments in the Battle Island area of the Oswego River and downstream of the Armstrong site. The academic community remains concerned about the existence of any environmental impact regarding upstream out-of-AOC contamination. Currently, the contamination amount, concentration, and threat as assessed by DEC do not warrant any action. A Health Consultation report was developed in 1996 by NYSDOH in cooperation with the US Agency for Toxic Substances and Disease Registry (Appendix H.61) to assess concerns about the Armstrong landfill remediation, the impact on the Oswego River, and how information on the fish consumption advisories is distributed. The report did not identify any significant issue or follow-up action. Previous landfill remediation at the Armstrong site included draining, filling, and capping a lagoon as well as capping two site landfills.

Progress has been documented in the reduction of pollutants into the watershed and AOC through the following activities: hazardous waste site remediation (Appendix K, first bullet), contaminated river sediment study (Section III.B.10), fish population and habitat study (Section III.B.2&3), related Lake Ontario LaMP study (Appendix H.27), Bird Studies and Marsh Monitoring from Canada (Section III.B.7 and Appendix M), point source discharge control for industrial and municipal wastewater treatment facilities (Appendix K, third bullet), air pollution control implementation (Appendix K, fifth bullet), environmental and human health assessments (Appendix K, seventh bullet), water quality and benthic studies (Section III.B.4&5), fish pathology study (Section III.B.6), public participation, newsletters, workshop, and committee meetings (Appendix K, eighth bullet). Each of these topics is addressed under one of the nine major bullet points contained in Appendix K or in the identified Section in the Stage 3 document.

What the RAC has performed is the application of the body of knowledge, through an ecosystem approach, to the Area of Concern. In so doing, the RAC has resolved the status of the use impairment indicators with the understanding that a significant impairment and/or threat to the AOC environment no longer exists, and therefore no longer warrants the AOC designation. In addition, we now understand better that the long term conditions in the larger watershed and Lake Ontario settings are more appropriately addressed under existing framework watershed activities including the Lake Ontario LaMP and the FERC Oswego River dam licensing processes.

**2. Comment** - It is difficult to try to get the public to understand the significant improvements in water quality for the Oswego River AOC between 1985 and 2002. Early on in the RAP Process, there existed a visual presence of garbage and sewage in the area. I can attest to the changes (RAC member Les Monostory).

**Response** - It is rewarding to document the restoration and protection of beneficial uses in the Oswego River AOC. The visual changes have been tremendous; even the harbor and lower river shoreline are markedly improved to accommodate public use. The City of Oswego has accomplished much through the implementation of their Waterfront Revitalization Program. Fishing and boating uses are great resources currently enjoyed by numerous persons in the lower Oswego River and Harbor area.

**3. Comment** - How can I be assured that the RAP and Remedial Advisory Committee are not leaving something undone (RAC member Joe Allerton).

**Response** - Through the RAP Process we can be assured that the identified concerns and issues have been addressed or are to be addressed by identified responsible parties. The RAP Process is comprehensive in that it takes on an ecosystem approach and involves the public. Backing up the confidence that this process has been successful are the ongoing environmental program protection laws and regulatory presence exerted by DEC and EPA. The existence of environmental groups and citizens providing a protective mechanism further support assurance of beneficial uses remaining intact. Core environmental protection program activities as well as newer program initiatives and response capabilities reinforce confidence in maintaining goals for the Oswego River AOC.

Section IV.C has been further developed to identify the responsible parties and actions to address the four expressed concerns regarding the long term sustainability of the AOC which include:

- 1) the lakewide fish consumption advisory,
- 2) fish habitat and populations below the Varick Dam,
- 3) upstream out-of-AOC Battle Island area contaminated sediments, and
- 4) the weed and algae nuisance.

**4. Comment** - Will the RAP group be “reactivated” to ensure that comments are addressed and work to produce a final delisting document.

**Response** - The Remedial Advisory Committee conducted its last formal meeting leading to the preparation of the delisting proposal document on Sept 6, 2002. Committee members have agreed to provide further comments on document revisions and to facilitate the delisting process. It is not anticipated the committee will need to reconvene; however, members are willing to assist as necessary and will reorganize if warranted.

**5. Comment** - Three out of four impairments are still impaired; the RAP successfully corrected one impairment. This leaves the impression that the RAP did not do much; add some details about what the RAP did.

**Response** - Wording has been added to describe that in addition to the four indicators identified as impaired there were five other indicators identified with possible or unknown impairment and therefore needing additional study. After nearly fourteen years of conducting studies and influencing remedial measures affecting the AOC, its watershed, and the Lake Ontario region, the RAP participants recognize the results of an AOC “rebirth” and have worked to resolve the use impairment indicators. The local government and community has dramatically rehabilitated the AOC shoreline. The clean up efforts by ongoing management plan activities has restored and now protects the beneficial uses. The Oswego River AOC is no longer on a remediation “to do” list. What the RAP did is further described in the document starting on page 8 under the heading “The Remedial Action Plan Process”.

**6. Comment** - In the Appendix, the sub-groups are identified by a mix of letters and numbers.

**Response** - The Appendices now has all letters headings, and the use of numbers for added detail has been deleted. The Appendices has been expanded, updated, and includes copies of the Power Point presentation used in the stakeholder consultation meetings. The Appendices are so large that Appendices K to P are now contained in a separate document.

➡ **AOC and Sources:**

**7. Comment** - Introduction, top paragraph: “...the area is no longer an Area of Concern contributing to Great Lakes use impairments .” How about PCBs?

**Response** - The AOC is not a source of PCB contamination presenting an environmental threat to Lake Ontario. The Stage 1 document states this as a possibility; however, investigative studies do not identify the AOC as a problem source of contamination to the lake or to itself. Historically, the upstream Oswego River watershed was a significant source of contamination; however, remediation has eliminated and mitigated sources to a great degree. As the AOC use impairment indicators have been redesignated as not impaired or identified as resolved by larger management plan activities under the Stage 3 - Delisting document, any upstream sources of contamination are to be addressed as possible remedial sites independent of the RAP.

**8. Comment** - Introduction, third paragraph, last sentence - “Focusing on the AOC has been a challenge” Meaning not clear.

**Response** - Statement to be omitted; however, the meaning is that in adopting an ecosystem approach in the RAP process, Great Lakes RAP committees have undertaken a more watershed approach to problem identification and remedial activity. The resolution of the impairment indicators for the RAP requires one to focus on the boundaries of the AOC. Some Great Lake’s RAP committees have struggled with drawing geographic boundaries to environmental problems; hence the challenge. Committee members and government representatives both share an improved understanding of the need to address the watershed and larger drainage basin concerns and issues through existing watershed management and new basin initiatives.

**9. Comment** - What about Mirex being a point source or cause of a use impairment in the AOC. If a point source still exists upstream of the physical AOC why the delisting? We know that contaminated sediments are present at Battle Island.

**Response** - Because of past Mirex discharge to the Oswego River (and the Niagara River), Mirex is an identified contributor cause to the fish consumption advisory in Lake Ontario. It is not part of the fish advisory in the Oswego River segment upstream of the AOC in the vicinity of Battle Island. Mirex is not (and has not been) a contaminant causing a use impairment specific to the Area of Concern. Two years of water column monitoring by NYSDEC did not identify an active upstream source; however, an academic study has concluded an upstream source of Mirex to Lake Ontario is likely to exist based on mass balance relationships. In any event, any upstream source of Mirex to Lake Ontario is to be addressed by the Lake Ontario Lakewide Management Plan (LaMP) as a critical pollutant load.

Further, remedial measures at upstream sources are defined by DEC’s Division of Environmental Remediation independent of any Area of Concern designation. This is consistent with the Oswego River RAP Stage 1 statement “Mirex has been identified (with low confidence) as having a small

net export to Lake Ontario. The Lake Ontario Toxics Management Plan (now the Lake Ontario LaMP) lists Mirex as causing an impairment in Lake Ontario.” This is also consistent with the Delisting Principles and Guidelines as developed by USEPA. In the interim, a study to assess environmental impact from the presence of contaminated sediments (upstream out of the AOC) is in the planning stage. A food chain uptake investigation has been proposed for consideration.

➤ **Delisting Considerations:**

**10. Comment** - Part IV.C, Post Delisting Responsibilities - The agencies and responsibilities identified are not specific enough. Weed and algae problems should be specifically mentioned under the County Soil and Water Conservation District. The County Water Quality Advisory Committee and Environmental Management Council are too general. What RAP responsibilities will they be taking? Sorry to repeat, but I think a most important part of the Stage 3 report is to state exactly and clearly just what responsibilities are being transferred and to whom.

**Response** - The entire Part IV.C has been rewritten based on the identification of the remaining concerns and specifically lists the strategy and the responsibilities to address each. The concerns correlate with the four originally designated impaired indicators and include the fate of contaminated sediments upstream in the Battle Island area. The weed and algae oversight has been identified as partly the responsible activities for the Soil and Water Conservation District. The Priority Waterbody Listing (PWL) for the lower Oswego River and Harbor area is identified as “stressed for aesthetics due to phosphorus”. This classification does not define an impaired or precluded beneficial use in the AOC. The environmental oversight provided by existing program activities and initiatives at DEC along with Oswego County government and area environmental groups will cause responsibly actions in the Oswego River corridor. As noted above, this is reinforced by the WRAP Strategies, the PWL for the Oswego River, the Fish Consumption Advisory, the 303(d) listing requiring TMDL development, and potential investigations by the USACE and SUNY at Oswego. We know that the Lakewide Management Plan (LaMP) for Lake Ontario as well as the FERC licensing process and resulting provisions contribute to further improvements in the quality of the Area of Concern waters and towards maintaining beneficial uses. The response to comment #26 addresses what has changed regarding the sources and causes of eutrophication to warrant a use impairment status change.

**11. Comment** - I am concerned by what NYSDEC means with delisting the Oswego River as related to water quality standards. Will delisting the AOC drive a Clean Water Act (CWA) action; for example, a TMDL or variance in classification, etc?

**Response** - The "delisting" of the Oswego River Area of Concern (AOC), under the Great Lakes Program activities, is separate and unrelated to any "delisting" of the Oswego River from the CWA 303(d) list, because of the following: Under Great Lakes Program activities, the geographical focus of the Oswego River AOC is from Oswego’s Varick power dam downstream and including the Oswego Harbor. The CWA 303(d) listing for the Oswego River is from Oswego’s Varick power dam upstream to the upper Fulton power dam in Fulton. Despite using the same terminology, the

"delisting" of an area from the International Joint Commission's (IJC) list of AOCs is a separate process with different criteria from that of any "delisting" of a water segment from the state's list of impaired waters that require TMDLs under CWA Section 303(d). The key differences from a 303(d) point of view are the following:

A CWA 303(d)-listed water can be delisted when data show that water quality standards have been met. An AOC can be delisted when all reasonable remedies have been applied to correct local sources that were impairing beneficial uses (not necessarily limited to water quality standards). The decision on what remedies are "reasonable" can be based on the availability of resources. If there are sources outside of the AOC causing impairments within the AOC (which is not the case in the Oswego RAP), the AOC could hand the problem off to an outside remedial plan and then propose delisting. In the case of the Oswego River AOC, the lakewide fish consumption advisories still apply to migratory fish that may enter the AOC. The impairment therefore is related to and is to be resolved by the Lake Ontario LaMP (the advisory is a lakewide advisory and not specific to the AOC) because the sources of the restrictions are Lake Ontario-wide problems.

**12. Comment** - The following addition to the Stage 3 AOC delisting document would make the distinction between TMDL and AOC delisting clearer: In Section IV, Part C ("Post-Delisting Responsibilities"), the requirement for a TMDL to address the C.A. 303(d) listing of the Oswego River upstream of the AOC should be added to NYSDEC's responsibilities, because implementation of the TMDL will result in reductions of priority organics that will help restore the AOC long after it is delisted from the IJC's programs.

**Response** - The requirement to conduct a review of the Oswego River (upstream of the AOC) regarding the 303(d) listing will be added. The fish consumption restriction upstream to Fulton is for Channel Catfish and is PCB related most likely due to contaminated sediments. Water quality monitoring has not indicated an active PCB source in this area. If there were an active source of priority organics, it is true that the implementation of a TMDL would likely result in further reductions of priority organics subject to allocation in the watershed and that this would further benefit the lower Oswego River and Lake Ontario waters. However, the need to implement a TMDL is not certain based on the fish advisory for Channel Catfish caused by local in-place organics involving contaminated sediments. NYSDEC is responsible to monitor the environment upstream of the AOC to determine if remedial measures are warranted. Pollutants of concern have not been determined to be present in significant amounts nor do they present a significant threat to the environment for remedial action.

**13. Comment** - In Section IV "Delisting Follow-Up", the following statement is made that is too broad: "The RAP has provided the data to show that the Area of Concern is not impaired." My understanding is that the AOC is still impaired, because Section III of the document states that concentrations of priority organics in fish tissue still exceed US FDA criteria and Great Lakes Water Quality Agreement objectives, such that (lakewide) fish consumption advisories are still in effect in the AOC.

**Response** - This sentence in Section IV has been deleted in the updated version of the document. The fact that the advisory is lakewide and is not specific to the Area of Concern allows for the

delisting by having the Lakewide Management Plan address this impairment. This assumption of responsibility by the LaMP is consistent with the USEPA delisting principles addressing the source of impairment which also provides for a beneficial use not being fully restored for justifiable reasons. In the case of Oswego, achieving the ultimate endpoints for fish consumption and fish habitat impairments are to be addressed respectively under the Lake Ontario LaMP and by the FERC power dam relicensing process. Under the Lake Ontario LaMP, the fish consumption advisory is established by NYSDOH based on fish data provided by NYSDEC. In addition, the responsible agencies and tasks are identified in the post delisting section to document that the ultimate resolution of these specific use impairment indicators are now part of these larger management plan activities. The sources of the Lake Ontario fish consumption advisory are the underlying lakewide contaminated sediments, upstream Great Lakes drainage basin inputs, and atmospheric deposition.

**14. Comment** - The Stage 3 Delisting Proposal for the Oswego RAP will not help in terms of continuing research associated with the Area of Concern and may be viewed as even contributing to the loss of research dollars involving the RAP.

**Response** - The fact is that the larger regional concerns involving the focused Oswego River Area of Concern are better addressed by the larger regional Great Lakes program initiatives involving Lake Ontario and its tributary watersheds. The concern about the loss of identity in association with the Area of Concern for research funding for RAP activities is to be addressed by identification with the larger watershed and Great Lakes Program lake activities and issues so that nothing is “lost”.

As funding priorities are adjusted each year, the link for the Oswego River corridor to Great Lakes funding will now need to be made through the Lake Ontario LaMP, Watershed (WRAPS) priorities, PWL priorities, and Fish Consumption Advisories involving the larger Lake Ontario Region of which the Oswego Harbor is a part of the Lake environment and related impairments.

The delisting of the Oswego Area of Concern is to document the restoration and protection of beneficial uses in the geography of the AOC. The Great Lakes community, including its funding mechanisms, must recognize the focus on the AOC and the context of the success story for the Oswego River AOC being communicated. The RAP was not designed to resolve specific lakewide and drainage basin issues. Contamination sources in the Great Lakes, Lake Ontario, lake drainage basins, and respective watersheds maintain a continuing link for funding and research support under Great Lakes program activities as well as other environmental priority clean-up activities.

**15. Comment** - Does delisting mean that things are OK?

**Response** - Yes, in the Area of Concern things are OK. Delisting means that the beneficial uses are not impaired for the geographic AOC. Specifically, this means that causes and sources of use impairments within the AOC have been addressed and that remaining concerns are addressed by larger watershed or Lake Ontario regional program activities. Responsibilities for these larger program activities have been identified.

**16. Comment** - Discuss the pros and cons of delisting with consideration for designation as an “Area of Recovery”.

**Response** - The fish consumption advisory is tied to the Lake Ontario advisory and not under the control of the AOC nor specific to the AOC. The FERC license will resolve the fish habitat and population impairments. The issue becomes one of: “is the issuance of the license, with the provisions to be implemented over a period of time, sufficient to provide for delisting now?”. The FERC license and Settlement Agreement were issued in November 2004 thus providing the necessary provisions and conditions to address the fish population and habitat concerns.

Fishery staff fully agree that the modified run-of-river flow provisions provide the needed water flow for full term spawning and incubation in the area below the dam. Further, the recruitment and population development are more dependent on Lake Ontario conditions than the AOC. The answer then is to determine what constitutes the necessary observation and level of success in reporting on the recovery of fish habitat and populations. With no sources of impairment in the AOC, one could argue that the delisting criteria are met (i.e. the river flow affecting the habitat and the contaminants affecting the advisory are both from “out of AOC” sources). A consensus opinion has formed that by providing the needed conditions and fish access, the FERC license resolves the historically identified use impairments.

Overall, the most likely threshold for recovery could be defined as the observation that the habitat area is restored and adequate spawning conditions now exist in the AOC. Although NYSDEC’s position is that the issuance of the FERC license provides the conditions and meets the delisting criteria, stakeholders are likely to insist that the actual observation of the conditions be verified. The RAP process has accomplished all in can in the resolution of the impairments and has further identified the responsible parties to address sources outside the Area of Concern. In conclusion, the AOC does not fit the intent of an Area of Recovery, nor is it immediately ready for delisting at this time (2002); therefore, the delisting will most likely be dependent on some degree of observation of recovery for fish habitat.

**17. Comment** - Emphasis on post-listing monitoring should be built into the document.

**Response** - The post-listing monitoring is defined in the 1991 Stage 2 document and updated in the 1992, 1996, and 1999 RAP Update documents. Post-delisting responsibilities are defined in Section IV.C of the Stage 3 document and address the remaining concerns of the RAP. Monitoring activities related to the responsible parties are identified as they address the remaining concerns. With delisting, the monitoring and reporting on these remaining concerns is not intended to be conducted under the RAP. This monitoring, compliance surveillance, regulatory oversight, and reporting are provided on the part of FERC and various DEC divisions and will be supported by other government agencies and fishing interests. Together these activities become the means to achieve the goals and objectives of the Fisheries Enhancement Plan.

**18. Comment** - Explain Mr. Lange’s statement involving additional data and the null hypothesis.

**Response** - This statement refers to addressing the question of how much investigation is necessary to state (prove) that an area is not impaired. If investigation is never-ending, a single data point can raise concern (the smoking gun) to continue investigation. Significance therefore becomes important. Mr. Lange goes on to state that after 12 years of collecting fish data, where do we expect closure of the RAP to be. We are still trying to “find a problem like a witch hunt”. The alternative would be to establish the null hypothesis (there is no impairment) and then study the area for 12 years. In summary, Mr. Lange is stating that in either approach of studying an area for 12 years, the same conclusion should be reached. By stating that “failure to reject the null hypothesis would maintain that environmental goals are intact” the conclusion should be there is no impairment. In other words, in both cases the same conclusion is reached that goals are intact and that there is no need to study the area further to define a problem.

**19. Comment** - Are you considering the White Hypothesis - what is it?

**Response** - The White hypothesis comes from Mr. Dave White’s statement while participating in the RAP Workshop in 1998 that RAC members need to focus on taking actions on what they can affect or have an effect on (and essentially defer the remainder to other responsible parties and existing framework organizations). This statement established a fundamental strategy in the RAP process by workshop participants and RAC members that when implemented was and is now consistent with DEC and EPA delisting criteria and has lead to the Stage 3 delisting proposal.

➡ **Fish Impairments:**

**20. Comment** - For the fish consumption advisories, the document should explain why the original impairment was imposed on the AOC. The advisory needs to be explained such that it is clear that it is a lakewide fish consumption advisory that applies to migratory fish entering the AOC. The fish consumption advisory is not specific to the AOC as to its source. Has the endpoint of “removal of fish consumption advisory” therefore been achieved?

**Response** - Table 1 summarizing the use impairment resolution has been revised and rewording to clarify that the identified impairment involves only fish and that the fish health advisory is for a lakewide Lake Ontario impairment that applies to the AOC but is not specific to the AOC due to sources. The narrative under indicator #1 has also been revised to clarify the applicability of the impairment to the migratory fish from Lake Ontario and the sources. The endpoint for removal of the lakewide advisory still applies and will ultimately be addressed under the Lake Ontario LaMP. For the RAP and AOC, the fish consumption advisory is therefore resolved.

**21. Comment** - Add an Appendix to detail how the FERC dam relicensing process will resolve the fish impairments; when it will be effective; the wording in the agreement; how subsequent monitoring will be done.

**Response** - Appendix J has been added to provide details on the FERC license provisions. These are contained in the Settlement Agreement which was embodied into the issued FERC license on 11/30/04 having a final compliance date of 5/30/06. Flow and water level monitoring with gaging and ancillary equipment are required.

**22. Comment** - Since there are no fish advisories for the AOC, this impairment should be considered resolved, without having to make a statement that it is being passed onto the LaMP.

**Response** - Although there are no fish consumption advisories specific to the AOC, the lakewide advisories for Lake Ontario apply to the migratory fish that enter the AOC. The link is the basis for the original identification of this use impairment in the AOC in the Stage 1 document.

**23. Comment** - In the course of document review, some concern has been expressed that certain verification of fish populations (and fish habitat) restoration is needed to assure restored beneficial uses. The question is: to what extent is this verification needed, if at all.

**Response** - The required compliance with the FERC license provisions (in May 2006) assures restoration of fish habitat conditions. The “run-of-river” flow provides for restoration to the maximum extent practicable based on the improving health and fish populations of Lake Ontario. The level of recovery is therefore based on Lake Ontario because the desired conditions are present.

Remedial measures and wet weather contribute to the observance of a restored minimum flow located in the Varick power dam by-pass in both the Springs of 2005 and 2006. NYSDEC and RAP process participants know that the provisions of the FERC license and Settlement Agreement provide for the restoration and protection of fish populations and habitat in the AOC. We also know that the Lake Ontario fishery has a dominant influence on the Oswego AOC, and that fish populations will reach a level consistent with the natural conditions provided by Lake Ontario. Because the Oswego AOC does not have its own identified resident fish population and because the desired conditions and access for fish habitat and population restoration are to be verified as in-place (including spawning use), a further formal fish population study has been determined not essential, nor the best use of limited resources, to the verification or to the delisting of the AOC.

The Oswego State 3 document describes the desired endpoints and their achievement in great detail under the fish populations indicator #2 starting on page 25 and the fish habitat indicator starting on page 28. In addition, the Fish Pathology Study described on page 44, under the fish tumor indicator, clearly established that the ideal condition of studying resident fish in the Oswego Harbor is not a reality. Ideally, species of fish that have a relatively small home range, are easy to collect, and that are sensitive to environmental conditions are best for a fish population study. Unfortunately for study purposes, and because of the influence of Lake Ontario, a species of fish that is resident solely to the AOC for its entire life is not the case.

As a result of this sampled and observed characteristic in the Oswego AOC (no resident fish), the Fish Pathology Study had to be continued into a second year and was instead based on observation of 40 + species. Brown bullhead and white sucker were identified as best for observing tumors due to their environmental sensitivity and bottom feeding characteristics. No impairment was identified in the study. The study report notes that such factors as diet, genetics, age, viruses, and other conditions of the fish in the environment of Lake Ontario play a dominant role in fish health and population development. In addition, because of the influence of Lake Ontario, the report notes that there is not an ideal candidate fish species that could be linked solely to the lower Oswego River on which to base a study and that any future study should instead focus on the fish health of the variety of fish that enter the AOC from Lake Ontario.

We also know that from the Stage 1 document that the original identification of the fish populations impairment was identified with “low confidence”. The report also states that based on the observed populations, there is no direct evidence and it is unlikely that water quality has adversely affecting fish populations in the AOC. The fish population in the AOC is known to be closely linked to Lake Ontario and consists of American eels, and naturally reproducing lake sturgeon, trout, Atlantic Salmon, smallmouth bass, and other warm water species. For the fish habitat concern, the Stage 1 document simply states that the habitat impairment (caused by the low flow in the spawning area) is considered a cause for the identification of the fish population impairment.

To address the restoration of fish habitat and related fish populations, NYSDEC staff have observed the river at a flow magnitude of 800 cfs as significant flow for successful walleye spawning in the bypass reach. This bypass area is located just below the Varick power dam and is the focus of improving the beneficial use for fish habitat. (Note: the Oswego River Fisheries Enhancement Plan identifies this restored flow condition as necessary for spawning and also as the one need for fish population restoration. The Settlement Agreement / FERC license requires that this flow condition be met for spawning). NYSDEC fishery staff have observed this 800 cfs level of flow in the past and note this flow as a dramatic improvement over status quo during the entire spawning season which will assure adequate habitat conditions for complete spawning.

In summary, a lot of water comes down the Oswego River in the spring, and it is maintaining this minimum flow after eggs are deposited (in the bypass reach just below the dam) that is critical to successful spawning. With the restoration of the river flow and resulting conditions for fish habitat improvement during the entire spawning season, the beneficial use for the fish habitat and populations in the AOC are addressed to the maximum extent possible for the RAP process. There is no doubt that this flow will provide walleye with adequate spawning habitat and full term incubation. The recruitment of the resulting fry is closely linked to the conditions in the AOC as a whole and therefore dependent on the influence(s) of Lake Ontario. The AOC is known to be closely linked to the fish populations of Lake Ontario. Therefore, these supporting position statements made by fishery experts as well as the river flow restoration actions taken by the power dam operations together serve as the verification that restored conditions for fish populations and habitat are in place.

➡ **Upstream Contaminated Sediments:**

**24. Comment** - There is a real concern regarding the follow-up on Battle Island “being lost” or not maintaining an identification as a priority for remedial consideration at DEC with the delisting (i.e. the upstream area at Battle Island will lose its identity as a contaminated sediment site without the link to the Great Lakes Program and the RAP).

**Response** - Results of the 2002 Sediment Study that identifies contaminated sediments in the Battle Island area were referred to DEC’s Environmental Remediation Division for follow-up. This Battle Island area is upstream of the AOC and therefore linked to the RAP area as a concern in the watershed. No link has been established and it is therefore treated independent from the AOC. Discussion with DEC’s Division of Environmental Remediation indicates that the contamination is not present in sufficient amount or concentration and does not present a significant threat to the environment. Demonstration of environmental impact is therefore needed to require site follow up or remedial measure considerations. The path identified by Jim Pagano at SUNY Oswego in pursuing further investigation such as a “food uptake” study is consistent with demonstrating environmental impact. Given an environmental impact, further consideration of active vs. in-place sources would need to be made. DEC has determined no action or further study is warranted at this time. The following ongoing activities will continue to provide environmental oversight to the Battle Island sediment contamination concern:

- The Priority Waterbody Listing (PWL) for the Oswego River segment having contaminated sediments near Battle Island identifies PCBs as the primary pollutant causing the current fish consumption advisory in this upstream segment.
- By definition, this same upstream local river segment is listed on the 303 (d) list for development of a TMDL due to the fish consumption advisory. NYSDEC’s responsibility and need to conduct a TMDL to address the CWA 303(d) listing of this Oswego River segment upstream of the AOC is independent of the AOC designation. Such development would have the goal to result in further watershed reductions of priority organics. This in turn would benefit Lake Ontario and the lower Oswego River even after delisting the AOC.
- The New York State Department of Health (DOH) maintains the identification of the Fish Consumption Advisory due to PCBs for Channel Catfish in this priority waterbody segment of the Oswego River (Segment #0701-0006 which extends from the upper dam at Fulton to the Varick power dam at Oswego).
- The Watershed Restoration and Protection (WRAP) Strategies planning will identify priority goals and objectives for the Oswego River watershed [e.g. as does the Lakewide Management Plan (LaMP) for Lake Ontario.]
- The 2002 Sediment Study that identifies contaminated sediments in the Battle Island area was referred to DEC's Environmental Remediation Division for follow-up. The amount and significant of contamination has been determined not to be a priority. Pending legislative changes dealing with the definition of hazardous waste and State Superfund reauthorization may change the follow-up action in the Battle Island vicinity.
- The United States Army Corp of Engineers (USACE) in conjunction with SUNY Oswego may conduct a study to demonstrate environmental impact in the area of the contaminated sediments. A food uptake study is under consideration by the academic community.

**25. Comment** - Battle Island is upstream of the AOC and is identified as a concern. Why is this a follow-up concern and what about fish populations?

**Response** - Battle Island sediment is one of the four concerns identified in Section IV.C by the RAC as a priority that need to be addressed by responsible parties. Additional narrative has been developed in this section to clarify the intent of addressing these four concerns for the RAC. Although these concerns extent beyond the geographic boundary of the AOC, they need to be identified in order to be consistent with the ecosystem approach employed in the RAP Process. The lakewide fish consumption advisory concern is to be addressed by the Lake Ontario LaMP. The fish populations concern is closely related to and in fact dependent on habitat restoration and larger lakewide fish conditions and access. Both of these concerns are linked and addressed by the FERC relicensing provisions for the Oswego AOC. Battle Island sediments are out of the AOC and are not an identified source of impairment to the AOC. Because the RAC members expressed concern regarding these upstream Battle Island contaminated sediments, the responsible parties and possible actions have been identified. This information addresses this concern and serves to assure protection to the Oswego River and downstream areas including Lake Ontario.

➡ **Eutrophication, Algae, and Water Quality:**

**26. Comment** - Use Impairment Resolution, indicator #4 eutrophication and algae - “I still am uncomfortable walking away from the problem of Eutrophication or Undesirable Algae. I understand the difference between the AOC and the river, but the latter (upstream river) certainly has some very bad spots. I went to the Oswego Harbor specially today to look at the harbor water. At Wrights Landing, the water has no floating algae but does have a greenish appearance and no floating weeds but does have submerged weeds. At the marina on the other side of the harbor (next to Admiral Woolsley), the water is greenish too (as is also the main river stream). The Stage 3 report, I think, should make it very clear that this condition will be monitored and improved by another succeeding agency.”

**Response** - The eutrophication and algae concerns have been defined by the RAP as not impaired for the Area of Concern. This is consistent with the study findings and the classification of this waterbody on the State’s PWL list as not impaired. Aesthetic concerns associated with weeds (and algae) are of a nuisance condition that is being addressed by weed harvesting and nutrient reduction / control efforts. The algae (greenish color) have been determined to be not overabundant and therefore do not cause an impairment. This discussion for each of these topics has been expanded significantly under two of the use impairment indicators in Section III.B of the Stage 3 document: first under indicator #4 addressing eutrophication and algae, and second under indicator #8 addressing aesthetics.

Environmental monitoring is conducted under DEC’s core environmental quality programs (water, air, hazardous substances, remediation, etc.). Implementation of Oswego River watershed restoration activities (e.g. WRAPS) will compile data, set goals, and measure objectives. Results of upstream contaminated sediment core study in the Oswego River (at Battle Island) are to be addressed by

DEC's Divisions of Environmental Remediation and Solid and Hazardous Materials. The existing PWL listing for this upstream segment identifies the need to address contaminated sediments to assure restoration of local water quality best use.

The State's DOH fish advisory for this segment reinforces the need to reduce contaminants in this Battle Island segment of the river. Further, the Clean Water Act 303(d) listing of this Oswego River segment upstream of the AOC should result in further watershed reductions of priority organics that will benefit Lake Ontario and the lower Oswego River even after delisting the RAP Area of Concern.

**27. Comment** - What has changed regarding eutrophication to change the status to not impaired?

**Response** - Stage 1 identified phosphorus as the likely source and algae blooms as the likely cause of the eutrophication impairment. The location of the algae blooms was limited in the Area of Concern (western shallow harbor area) and extended well outside the AOC to include the nearshore of Lake Ontario and upstream river areas (e.g. some stagnate shoreline and upstream canal lock areas). Phytoplankton from a 1981 study were identified as associated with an eutrophic environment. Plankton data from the NYSDEC 1994 Oswego Harbor Survey (Appendix H.35) indicated low abundance and diversity with an overall healthy assessment for a riverine environment. Riverine waters can possess such characteristics and be healthy without indicating impairment, therefore a not impaired status is concluded for the plankton community. Data shows a high dissolved oxygen content and the presence of zebra mussels. Nutrient concentrations are identified as sufficient to support a much larger algal population; however, neither are excessive. The survey concluded that the AOC is not impaired due to eutrophication and algae. This is consistent with the current Priority Waterbody Listing for the AOC as "stressed for aesthetics". Stressed is not impaired because the beneficial uses are intact (i.e. fish survival, water quality, boating, fishing, secondary contact recreation). What has changed is that through the improved control of point (municipal and industrial) and nonpoint sources of phosphorus in the watershed along with the introduction of the zebra mussel and heavy industrial shutdowns, the AOC is not impaired for eutrophication or algae. The concern therefore relates to the quality of the best use as related to aesthetics (i.e. control of floatables, wastewater treatment, and weeds). Through mechanical harvesting in isolated areas of the AOC, weeds are managed to maintain the best use. Nutrient reduction is achieved through point and nonpoint source control measures. Overall, the algae concern is one of aesthetics in shallow areas and is not representative of the AOC or an impairment listing. Therefore, through nutrient controls and aesthetic management practices, eutrophication and algae are not impaired because best uses are intact for the AOC.

**28. Comment** - Table 1, Eutrophication, Resolution - "NPS watershed control activities", What were they?

**Response** - NPS activities are those conducted by New York State and the Soil and Water Conservation District and other government and public organizations to reduce nonpoint sources in the watershed. These include monitoring activities, studies, implementation of best management

practices (BMPs), stream corridor protection actions, weed harvesting, and input into the FERC relicensing process, and the Lake Ontario Lakewide Management Plan. DEC has implemented “Combined Animal Feeding Operation” and stormwater control regulations to address nonpoint sources that can contribute to point source problems. Farmers have implemented BMPs in a wide range of farming practices including stream corridor use, barnyard runoff, and fertilizer and pesticide applications. Citizens and local governments have acted to limit erosion in the watershed. Nonpoint sources associated with hazardous waste sites have been remediated as further described in Appendix K (bullets #1 to #4). In addition, Agricultural Environmental Management (AEM) partnership of local, state, and federal agencies work to provide farmers with new opportunities to manage nonpoint source pollution sources and causes. The goal is to reduce pollution and enhance farm viability. The Oswego County Soil & Water Conservation District allocates funds and assists in efforts to protect water quality and natural resources in the public’s interest.

**29. Comment** - Data should be presented in the document to show, where appropriate, that water quality standards have been met. For example, the text currently indicates that water quality standards are met for DO, nutrients, coliforms, pathogens, and phytoplankton and zooplankton. A few graphs of real data would help make a stronger case.

**Response** - A description and detailed results of water quality data from the Oswego Harbor (water quality) Survey are presented under the Eutrophication and Undesirable Algae use impairment indicator #4 in Section III.B.4 in the Stage 3 document. Figures and graphs have also been added.

**30. Comment** - Need to be more clear on whether the plankton community is impaired.

**Response** - This indicator’s discussion has been reorganized and rewritten to lead up to responding to the impairment. Under this Degradation of Plankton indicator, the “resolution” statement (now following a lengthy introductory discussion) responds directly to the question “are the plankton communities impaired?” The confusion and/ or contradictory concern has been eliminated. Essentially, up-front in the resolution statement, it is now stated: “In conclusion, the preponderance of the evidence indicates that plankton community of the Oswego River AOC is not significantly impacted nor impaired.” The supporting data are then provided to reinforce the conclusion. The rationale statements are made last. In reviewing the consistent method used to address each indicator: an introductory discussion is followed directly by the resolution statement, supporting data, and finally the rationale.

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# APPENDIX I

## LIST OF ACRONYMS

AOC	Area of Concern
ATSDR	Agency for Toxic Substances and Disease Registry
BCC	Bioaccumulative Chemicals of Concern
BMP	Best Management Practice
CAFO	Concentrated Animal Feeding Operation
CAC	Citizen Advisory Committee
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CLC	Call Level Code
CSO	Combined Sewer Overflow
CWA	Clean Water Act
DO	Dissolved Oxygen
DOW	Division of Water
DFWMR	Division of Fish, Wildlife and Marine Resources
EMC	Environmental Management Council
EPF	Environmental Protection Fund
FERC	Federal Energy Regulatory Commission
FIFRA	Federal Insecticide, Fungicide, and Rodenticide Act
GLIN	Great Lakes Information Network
GLBAC	Great Lakes Basin Advisory Council
GLNPO	Great Lakes National Program Office
GLWQA	Great Lakes Water Quality Agreement
GLWQG	Great Lakes Water Quality Guidance
GLWQI	Great Lakes Water Quality Initiative
HRA	Health Risk Assessment
IFIM	In-stream Flow Incremental Methodology
IEP	Industrial Effectiveness Program (DED)
IFM	Integrated Facility Management (M2P2)
IJC	International Joint Commission
IRM	Interim Remedial Measure
LaMP	Lakewide Management Plan
M2P2	Multimedia Pollution Prevention
MACT	Maximum Achievable Control Technology
MDL	Method Detection Limits
MMP	Marsh Monitoring Program (Bird Studies Canada)
NAFTA	North American Free Trade Agreement
NAWMP	North American Waterfowl Management Plan

NESHAP	National Emission Standards for Hazardous Air Pollutants
NOAA	National Oceanic and Atmospheric Administration
NPL	National Priorities List
NRA	Natural Resource Damage
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	NYS Department of Health
NYSDOS	NYS Department of State
OCWQCC	Oswego County Water Quality Coordinating Committee
OCSWCD	Oswego County Soil and Water Conservation District
OCS	Octachlorostyrene
PAHs	Polynuclear aromatic hydrocarbons
PCBs	Polychlorinated Biphenyls
PCS	Permits Compliance System
PEC	Probable Effects Concentration (greater than TEC)
PWL	Priority Waterbody List
RAC	Remedial Advisory Committee
RACT	Reasonably Available Control Technologies
RAP	Remedial Action Plan
RCRA	Resource Conservation and Recovery Act
RIBS	Rotating Intensive Basin Studies
ROD	Record of Decision
SARA	Superfund Amendment and Reauthorization Act
SOLEC	State of the Lakes Ecosystem Conference
SPDES	State Pollution Discharge Elimination System
SRF	State Revolving Fund
SUNY	State University of New York
TEC	Threshold Effect Concentration (less than PEC)
TMDL	Total Maximum Daily Load
TRI	Toxic Releases Inventory
TSCA	Toxic Substances Control Act
USACE	United States Army Corps of Engineers
USEPA	United States Environmental Protection Agency
USFDA	United States Food and Drug Administration
USFWS	United States Fish and Wildlife Service
VOC	Volatile Organic Compounds
WRAPS	Watershed Restoration and Protection Strategies
WQEPP	Water Quality Enhancement & Protection Policy
WWW	World Wide Web
YOY	Young-of-the-Year (fish Study)

## APPENDIX J

### Provisions for the Varick Dam FERC Relicensing

Provisions that address the resolution of the fish habitat and fish population use impairments in the lower Oswego River and Area of Concern are contained in the Settlement Agreement as part of the Federal Regulatory Energy Commission (FERC) relicensing of the Oswego River Project. This forty year new license (FERC #2474) amends and replaces the existing license (FERC #5984). The Settlement Agreement resolves the outstanding issues for the Oswego River Project and was signed by the eleven parties listed below. The provisions of the Settlement Agreement that follow are effective with the signing of the Agreement and are further incorporated into the FERC power dam license.

- Adirondack Mountain Club (ADK)
- Erie Boulevard Hydropower, L.P. (Erie) and its General Partner, Reliant Energy (Reliant)
- Isaack Walton League
- New York Rivers United (NYRU)
- New York State Canal Corporation (Canal Corp)
- New York State Conservation Council (NYSCC)
- New York State Department of Environmental Conservation (NYSDEC)
- Trout Unlimited (TU)
- U.S. Department of the Interior (DOI), U.S. Fish and Wildlife Service (USFWS)
- U.S. Department of the Interior (DOI), National Park Service (NPS)
- U.S. Department of the Interior (DOI), Bureau of Indian Affairs (BIA)

**1.0 Introduction** - The comprehensive measures addressing the licensing of the Oswego River Project are described in detail in the Settlement Agreement. These conditions of the agreement and FERC license are the result of extensive discussion and consultation with the involved parties and signatories to the Agreement. The goal is to provide for the continued operation of the projects with appropriate long-term environmental and recreational protection and mitigation measures that meet diverse objectives for maintaining a balance of non-power and power values in the Oswego River. The Settlement Agreement and subject Oswego River Project licensing address the lower Oswego River power developments at Fulton, Minetto., and Varick. The provisions at Varick, specifically address the restoration of beneficial uses for the Oswego River Remedial Action Plan in the Area of Concern. The new requirements for the river flow entering the AOC fully meet the requirements of the Oswego River Fishery Enhancement Plan to restore beneficial uses.

**2.0 General Agreements of the Parties** - The provisions of the Settlement Agreement become conditions of the new FERC license. The new license is for forty years and is enforceable by FERC. Further, the parties have agreed to support the issuance of a Section 401 Water-Quality Certification by NYSDEC that is consistent with the provisions of the Settlement Agreement. Modifications to power dam structures and/or lands under the jurisdiction of the New York State Canal Corporation and the subsequent implementation of Settlement Agreement measures are subject to the approval and issuance of work permits by the Canal Corporation. Compliance with the National Historic Preservation Act and Endangered Species Act is included. The licensee is to develop a Cultural Resources Management Plan in consultation with the New York State Office of Parks, Recreation, and Historic Preservation, and Federally recognized Indian tribes.

**3.0 Measures Required** - Fifteen pages of specific measures required as provisions of the Settlement Agreement are described. These measures are to be incorporated into the FERC license for the Oswego River Project to address a wide range of actions:

- Mode of Operation - Within eighteen months of license issuance and acceptance, the Licensee will begin to operate the Oswego River Project in a “Modified Run-of-River” mode. Compliance with specific water levels and flows is required by 5/30/06.
- Impoundment Fluctuations – Again, within eighteen months, a limit on impoundment fluctuation ranging from one-half to one foot at Fulton, Minetto, and Varick is required based on the crest of the dam and flashboard measurements. Table 3-1 in the Settlement Agreement states these requirements. Conditions are also described in FERC’s Order Modifying and Approving Run-of-River Monitoring Plan. Pond level control is to be further enhanced by the installation of pneumatic flashboards.
- Base Flows - Also within eighteen months, the Licensee is to begin releasing the base flow described in Table 3-2. The base-flow below the Fulton development (above Oswego and the Varick Dam) during the walleye spawning season creates over 9,000 square feet of relatively high quality walleye spawning. The specified cubic feet per second flows are to be maintained in the river immediately downstream of the development’s powerhouse. Together these measures will address the protection of fish habitat, benthic invertebrate production, sustained wetland vegetation, fish spawning, fishing opportunities, and water quality considerations.
- Bypass Flows - Within eighteen months, the Licensee is to release bypass flows as describe in Table 3-3 in the Settlement Agreement. Seasonal minimum bypass flows required to be maintained at Varick will restore fish and wildlife habitat conditions for many species and life stages, increase the benthic population, benefit vegetation, provide spawning area, enhance riffle habitats for fish passage, decrease stranded fish, and promote safe and legal fishing. Significant improvements are to be observed by multiple site visits. The agreement contains a seasonal flow reevaluation provision after 5 years.

- Low-level Flow Diversion Structure - Again within eighteen months, the Licensee is to install a low-level flow diversion structure at the Varick dam. This structure is to assure flow in the lower bypass reach from June through September.
- Fish Passage, and Movement - Specific installation measures with implementation schedules are listed in Table 3-4. Downstream fish movement routes are address by minimum flows through sluice gates. An upstream Eel conveyance system is to be field located and seasonally operated.
- Fish Protection - To protect against fish entrainment and mortality from the power structures, the Licensee is to install seasonally operated overlays in the form of one-inch spaced trashracks or one and one-half inch perforated plates according to an implementation schedule as described in Table 3-5. Compensation for fish mortality is also required.
- Flow and Water Level Monitoring - The Licensee is to develop stream-flow and water-level monitoring within fifteen months of the FERC license issuance and acceptance. The monitoring plan is to include all gages and equipment. The plan is to measure base flow, bypass flow, headpond and tailwater elevations and provide appropriate on-site visual verification of water levels. Monitoring is to be performed as outlined in the “Order Modifying and Approving Run-of-River Monitoring Plan”. Records are to be maintained subject to inspection and the Licensee is to maintain a seven-day-per-week contact person for monitoring verification and emergency action.
- Recreation - Opportunities for recreation are provided by the Settlement Agreement and are to supplement existing public access to and the use of impoundments, bypass reaches, and adjacent lands associated with the Oswego River Project developments.

# APPENDIX K

## REMEDIAL ACTIVITY UPDATES

Since 1991, the Remedial Action Plan (RAP) process has identified and encouraged many of the remedial activities that have been conducted to address the use impairment indicators for the RAP. Ongoing environmental protection laws, regulations, and policies, by New York Department of Environmental Conservation (NYSDEC) and other agency environmental program activities have benefitted the RAP program. The RAP planning and implementation effort has worked to identify the needed sequence of events and then to influence those actions to address local area, watershed, and ecosystem concerns. As a result, these activities have contributed to and supported progress towards achieving the RAP goal. The RAP strategies have therefore made use of all resource commitments and related remedial actions and sought to incorporate an ecosystem approach into remedial activities to restore and to protect beneficial uses.

By communicating and implementing the desired RAP process, it has been observed that remedial activities have taken on the ecosystem approach. A main purpose of the Oswego Remedial Action Plan and its Advisory Committee has been and remains to assure that all stakeholders' interests and concerns are satisfactorily investigated and resolved as much as possible and that a forum is provided for opinion expression and discussion. A key to this has been securing commitments to conduct and achieve RAP objectives.

Significant remedial activity progress has occurred in the implementation of the Oswego River RAP. Details of current programs and remedial activity progress affecting the RAP are described below as they have been linked or directed by remedial action strategies. To facilitate reporting of remedial activity progress, the RAP subject matter has been broken down into nine major program areas or manageable remedial activity reporting topics. More recent program updates of these nine major environmental program areas / remedial activity topics are presented below in the following order:

- ① Hazardous Waste Site Remediation
- ② Contaminated River Sediments
- ③ State Pollution Discharge Elimination System (SPDES)
- ④ Nonpoint Source Pollution Control
- ⑤ Air Pollution Control
- ⑥ Fish and Wildlife Assessments/Actions
- ⑦ Health and Environmental Assessments/Actions
- ⑧ RAP Public Participation and Outreach
- ⑨ Investigations and Monitoring Activities

As appropriate, when the details of a remedial activity description go beyond the scope of one program area to include topics in other program areas, cross-referencing among these nine areas is made in order to avoid duplicate reporting. Reference is also made to other sections in this Stage 3 document as well the 1996 Update, the 1999 Update, and investigative study reports. This nine program area / remedial activity topic breakdown is necessary to present an organized and current report that describes the details of the activities involving RAP progress.

The progress in each of these nine environmental program areas involves various stakeholders, issues, and concerns that contribute to and affect the implementation of remedial activities. The Remedial Advisory Committee has defined a strategy (Appendix B), endpoints (Appendix C), and criteria (Appendix E and F) to assist in addressing the indicators and the RAP delisting. Members agreed there are certain activities the RAP can and cannot address. As delineated in Section IV.A, the delisting principles and guidelines support this approach. Further, Appendix L presents the “Use Impairment Restoration and Protection Strategy management forms” used to list the remedial activities implemented to resolve each of the use impairment indicators originally rated as impaired or requiring further investigation. Below, the details of these remedial activities are reported on under each of the nine bullet points representing the nine major areas of program reporting:

❶ **Hazardous Waste Site Remediation (Land-Based):**

As experience and expertise have grown in remediation work, a goal of shortening the time and lessening the costs of implementing a remedial program without sacrificing the protection of public health and the environment has been achieved. Steps have been taken to rapidly clean up sites by using Interim Remedial Measures (IRMs) which are actions that can be taken without long, formal investigations. The result has been that the site investigation process has undergone major changes: the former time-consuming Phase I and Phase II Investigations are now combined into a single, condensed, comprehensive Preliminary Site Assessment (PSA). Built into a PSA are decision points which allow the classification or delisting of a site as soon as enough information exists to evaluate the situation against the state's criteria for defining an inactive hazardous waste site. The number of class “2a” sites (those requiring more information) has been dramatically reduced and of those sites remaining, most are currently under investigation. NYSDEC’s priority ranking system, for inactive hazardous waste sites listed as class “2” (those requiring remedial action), contains a RAP component that can raise the priority of implementing remediation based on the relationship to a Remedial Action Plan. Improvements in public interaction have been enhanced by state regulation requiring a citizen participation plan for every hazardous waste site undergoing remediation. Public comment opportunities are also provided prior to a site’s class change. Useful fact sheets are available that describe the stages of the remediation process.

NYSDEC has issued various Administrative Orders requiring land-based hazardous waste site remediation in the Oswego River drainage basin. Implementation of these orders has been a key to watershed area rehabilitation and protection. Completion and settlement of these remediation activities includes Natural Resource Damage Claims that address recovery for damages and injury to the natural resources. Land-based remedial actions have been required at several large industrial facility sites in the Syracuse area. Many sites are completed; others are in different phases of implementation such as Onondaga Lake. Remediation has resulted in significant progress in drainage basin cleanup which in turn has contributed to the restoration and protection of the Area of Concern. Because of the large 5,100 square mile watershed, and based on water quality and sediment surveys, the impact of remediation activities at most local hazardous waste sites within the watershed is limited

to the local area. Sites do not present a significant threat of impact to the Area of Concern. Although there are no sites specifically within the AOC, details of a number of site remedial activities that are in closer proximity to the AOC are described below. These sites are land-based remediation projects only and were high priorities thought to have been possible sources of contaminants that could have had an impact on the use impairment indicators in the AOC and Lake Ontario.

## **1. Columbia Mills**

This abandoned manufacturing facility site is located in Minetto, Oswego Co. Columbia Mills was a factory that manufactured vinyl window shades and coverlets. The company closed in 1977, and the buildings on the property fell to ruin. Organic contamination from buried tanks and high levels of heavy metal contamination were confirmed on the plant property. Several underground storage tanks were removed in 1988. Asbestos was found on site and the USEPA initiated an emergency response to remove it. The EPA also took down the huge on-site chimney which was structurally unsound. Following the completion of the Remedial Investigation/ Feasibility Study (RI/FS), the 1992 Record of Decision (ROD) required the consolidation and capping of wastes and site sediments in the drum disposal area, the removal of sediments in the plant sewers, and the treatment of groundwater in a contaminated hot spot area near a former underground storage tank. The three parts of the Interim Remedial Measure (IRM) involving contaminated soil remediation have been completed. A Consent Order for a Remedial Design/Remedial Action (RD/RA) was signed and has been completed. Construction activities addressing sewer and underground storage tanks have been completed and the landfill has been capped. As a result, the site boundaries have been reduced to encompass only the landfill. Monitoring and maintenance of the landfill is presently underway. The environmental threats posed by this site have been eliminated by the remedial program; however, the site continues to be monitored.

## **2. Ley Creek PCB Dredge Material**

The Ley Creek PCB Dredge Material sub-site of the Onondaga Lake site consists of PCB-contaminated dredged materials on an approximately 4,300-foot section on the banks of Ley Creek. The PCBs were discharged at the site of the former Inland Fisher Guide Division of a General Motors facility along Factory Avenue west of Town Line Road in Salina, Onondaga County. Groundwater contamination resulted. A Consent Order was issued requiring a remedial investigation and feasibility study (RI/FS) that was completed in 1993. As part of an Interim Remedial Measure, contaminated materials were removed from an area where a new municipal sewer line was being installed. A Record of Decision (ROD) was signed in 1997, requiring the off-site disposal of the PCB-contaminated dredge material and the grading of the remaining dredge material out of the creek flood way area. Construction activities were performed from 1999 through 2001. Groundwater underlying the Ley Creek PCB Dredging site is being investigated under an RI/FS for the Former Inland Fisher Guide Facility and Ley Creek Deferred Media site.

### **3. Miller Brewing**

A 1991 Consent Order requires Miller to develop, construct, and contribute to the operation of a long-term treatment system for a major portion of the City of Fulton's (Oswego Co.) water supply. Earlier enforcement orders required site remediation work. Contamination resulted when organic solvents leaked from a concrete spill containment tank and from drum storage areas in the 1970's. The site is about 1400 feet upgradient of the City of Fulton's municipal drinking water wells. Several monitoring wells have been impacted. NYSDOH analytical results revealed low levels of contamination. There is a hydraulic connection with the Oswego River. An investigation revealed a plume of contaminants about 1300 feet in length. Recovery wells and an air stripper were put in operation in an attempt to impede the migration of contaminants in the groundwater. Portions of the contaminant plume needed to be addressed by further remedial measures. A Proposed Remedial Action Plan (PRAP) for this site was completed, and a Record of Decision (ROD) was signed 1995. The ROD specifies a remedy consisting of a groundwater collection system, soil vapor extraction (SVE) and treatment of the collected groundwater. Remedial design activities have been completed. Construction of the SVE was completed in late 1996 and operation of it began in 1997. Operation and maintenance of the system is ongoing. The discovery of the soil and groundwater contamination lead to the installation of the recovery wells and the air stripper to slow the migration of contaminants. Monthly monitoring reports show the public water treatment system provided for the City of Fulton public water supply wells is of satisfactory quality. Exposure potentials have been eliminated. The remedy removes additional quantities of contaminants from the aquifer. Since this time Miller has ceased manufacturing at the site.

### **4. Onondaga Lake**

The Onondaga Lake site includes the Lake itself, seven major and other minor tributaries, and upland sources of contamination to the Lake (sub-sites). The Lake has an areal extent of about 4.5 square miles, with a drainage basin of approximately 233 square miles. Effluent from the Metropolitan Syracuse Sewage Treatment Plant discharges into the southeastern end of the Lake. The Lake flows to the northwest into the Seneca River. Historically, industrial processing plants and municipal wastewater treatment plants routinely discharged their wastes into the Lake. The availability of salt and limestone led to the location of the Solvay Process Company, the predecessor to Allied Signal, Inc. (Honeywell International, Inc. is a successor corporation of the former Allied Signal, Inc.), on the west shore of the Lake for the production of soda ash. Today, vast areas on the western shoreline are occupied by the "Solvay waste beds" which contain years of by-products of the company's soda ash production. In 1946, Allied Signal initiated a mercury cell process which produced chlorine, sodium hydroxide, and potassium hydroxide at its facility on Willis Avenue, and later expanded to include a facility on Bridge Street. Waste streams containing mercury and other heavy metals were discharged by these facilities. Honeywell's Semet Residue Ponds, which contain volatile organic compounds (VOCs) from facilities associated with the production of benzene and chlorinated benzene, are another source of contamination to the Lake.

Other industrial and manufacturing facilities are also located along the shore or tributaries to the Lake and may be sources of contamination to the Lake. Onondaga Lake adjoins park lands owned by Onondaga County. A 1992 Federal Consent Decree with Allied Signal required the development of an RI/FS to determine the best method of lake remediation. Field work for the ongoing RI, which began in 1992, is largely complete. The Lake was added to the federal National Priority List (NPL) in late 1994. The restoration of Onondaga Lake is a long-term project that many interested parties are striving to achieve. Resolving the Syracuse Metropolitan Wastewater Treatment Facility and associated combined sewer overflow discharges to the lake is fundamental to the project to restore this valuable resource. Onondaga County is subject to a Federal Consent Decree to complete upgrades to meet strict discharge limits. The contaminated sediments are a potential source of exposure through direct contact. Public fishing was banned from the Lake in 1970, but the Lake was opened to allow catch-and-release fishing in 1986. There are no swimming facilities open to the public on the lake. Surface water from the lake is not used for drinking water. USEPA and New York's Environmental Bond Act are both supplying funding to complete treatment plant upgrades and infrastructure improvements.

## **5. Volney Landfill**

The 85-acre Volney Landfill site is located in a rural area of the Town of Volney, New York. A ROD was issued in 1987. The selected remedy, as modified by a 1989 Post-Decision Document, a 1997 Explanation of Significant Differences (ESD), and a 2001 ESD consisted of the installation of a supplemental side-slope landfill cap (the top of the landfill was capped in the early 1980s), intermittent groundwater extraction and treatment on an as-needed basis (the levels of the contaminants in the groundwater downgradient from the landfill only intermittently exceed standards), and long-term groundwater monitoring. The implemented remedy will be reviewed no less often than each five years after its initiation. A leachate collection system was installed in the early 1980s. Areas encompassing the landfill are fenced. The Oswego County Health Department continues to monitor nearby private water supplies and site contaminants have not been detected. Oswego County has purchased adjacent property to serve as a buffer. The remedy was completed in late May 2002.

## **6. Clay Town Landfill**

In the early 1990's, this 38 acre site was evaluated as not closed nor capped properly. Citizens sued the Town for possible health risks due to the landfill. Subsequently, NYSDEC approved the prepared RI/FS reports; the ROD was issued in late 1994; the final plans were approved in 1995; and the work on the landfill capping system was completed in the fall of 1996. Quarterly monitoring was started in June of 1997 and is ongoing. The groundwater in this area was once used as a drinking water source. The Oneida River is located near this landfill, and a protected wetland is located across the road. There is documented groundwater contamination in monitoring wells at the site; however public water was extended to the area and residences are connected. The site has since been determined remediated.

## **7. Clothier**

The Clothier Disposal site, located in the Town of Granby, Oswego County, New York, is a 15-acre parcel of land, of which six acres were used for waste disposal. During 1986, drums were moved to a centralized on-site location. A number of potentially responsible parties removed 1,858 drums of waste. In 1987 and 1988, EPA removed the remaining drums and visibly-contaminated soil and debris associated with the drums. In 1989, a ROD was signed, selecting a remedy for the site. The selected remedy called for regrading and placement of a one foot deep soil cover over the residually-contaminated areas and re-vegetation of the site, installation of erosion control devices on the embankment sloping toward Ox Creek, implementation of institutional controls to prevent the use of the underlying ground water or any land use involving significant disturbance of the soil cover, and long-term groundwater, soil, sediment, and surface-water monitoring. During grading activities for the soil cover, seven additional drums were uncovered. The drums and soil surrounding them were removed from the site in October 1992. Long-term monitoring and inspection of the site, which commenced in April 1994, led to the discovery of three more buried drums. These drums were excavated, overpacked, and removed from the site. As a precaution, a limited-area geophysical investigation was undertaken to determine the possible presence of other buried drums. This investigation led to the discovery of buried metallic debris, which was subsequently removed from the site. Since the site no longer poses a threat to public health and the environment, it was deleted from the NPL list in 1996.

## **8. Fulton Terminals**

Millions of gallons of waste oils and sludges were stored in tanks at this one and one-half acre Fulton Terminals site. Actions conducted in 1986 by EPA and the Potentially Responsible Parties (PRPs) consisted of constructing a 7-foot perimeter fence around the site and posting warning signs, removing two above ground tanks and two underground tanks, removing approximately 300 cubic yards of visibly-contaminated soil and tar-like wastes, and excavating storm drains that were acting as a conduit for contaminated runoff entering the Oswego River during storms. An additional removal action in 1990 involved the construction of earthen barriers for the prevention of surface runoff from the contaminated portion of the site. In 1989, a ROD was signed, selecting a remedy for the site which included low temperature thermal extraction to remove volatile organic compounds from the soils and ground water extraction and treatment, followed by the reinjection of the treated water. The cleanup of 16,500 tons of contaminated soil was performed from April 1995 through March 1996. Full-scale pumping and treatment of the ground water was performed through a temporary treatment system from February 1997 through May 1997. Subsequent geophysical investigations indicated that the freeze wall (a construction process whereby the ground was frozen at depth to allow the dry excavation of contaminated soils below the water table) remained intact in one downgradient location. Following the forced thaw of the freeze wall (via steam injection) by the potentially responsible parties (PRPs) in May 1998, the temperature of the ground water and the concentrations of contaminants were monitored. Ground water samples collected in March 1999 indicated that the freeze wall was no longer intact (i.e., monitoring wells were free of ice) and that the contamination in this location continued to show a decreasing trend.

Following the collection of ground water quality samples in early September 1999, EPA determined that the ROD requirements for the ground water remedy had been substantially met, and no further response, other than long-term ground water monitoring, was anticipated. Ground water long-term monitoring began in March 2000. Three years of monitoring, as required by the ROD, which will conclude in September 2002. At that time, EPA will assess the groundwater cleanup of the site. To date, the on-site well that monitors the core of the former plume area has been consistently clean, and the low levels of contamination detected in one downgradient location continues to decrease. The area is served by public water and exposure to groundwater contamination is unlikely. The site is fenced and access is limited.

## **9. Pollution Abatement Services - Main Plant**

Pollution Abatement Services (PAS), Inc. was originally built to serve as a high temperature liquid chemical waste incinerator. The site is located near the eastern border of the City of Oswego. It is within one half mile of Lake Ontario. It is partially surrounded by wetlands. During the time the facility was in business, it continuously had serious operational problems. There were numerous air and water quality violations and area residents mounted public opposition. A large number of drums of chemicals were collected and stored on site. Liquid chemical wastes were dumped into several on-site lagoons. In 1977, the entire business was abandoned with the large quantities of waste left uncovered on the property. Shortly thereafter, a number of emergency remedial actions were implemented to limit site access and contain and remove materials. In 1982, EPA removed the site's superstructures and approximately 10,000 drums of contaminants from the site. A ROD was signed on July 6, 1984. The selected remedy included limited excavations and removal of contaminated soil; removal of subsurface tanks and remaining drums to an EPA-approved landfill; containment of the wastes through the construction of an impermeable cap; perimeter slurry wall and leachate collection; on-site treatment of the leachate and contaminated groundwater; and, groundwater monitoring. These remedial activities were conducted by NYSDEC and, with the exception of the on-site treatment system, were completed in 1986. 500,000 gallons of contaminated groundwater were pumped from the site and sent off-site for treatment in 1987.

In September 1991, EPA and a group of PRPs entered into an interim leachate and groundwater removal administrative consent order. This order requires the routine removal of leachate and groundwater from within the containment system until a permanent treatment system is constructed. The extracted leachate and ground water (approximately 15,000 gallons every two weeks) is currently transported to an EPA-approved treatment and disposal facility.

Since the construction of the containment system, various post-closure investigations indicated the presence of VOCs in the ground water outside of the containment system. Under EPA supervision, the PRPs completed an RI/FS to determine the nature and extent of this groundwater contamination and to identify remedial alternatives. The investigation

was completed in the fall of 1993. A ROD was signed in December 1993. The selected remedy to address this contamination problem includes, enhancing the present source control system by optimizing operating parameters, bedrock groundwater extraction and treatment, and connecting downgradient residents in the Smith's Beach area (who are using residential wells) to the public water supply to ensure that potential future exposure to contaminants in the bedrock groundwater does not occur. A Phase I Supplemental Pre-Remedial Design Study to evaluate the potential effectiveness of bedrock pumping to contain impacted groundwater in the bedrock outside the containment system, and to determine potential impacts of bedrock groundwater pumping on the existing containment system and the creeks and wetlands was completed in 1994. This study determined that pumping of the bedrock groundwater was not necessary and perhaps not even possible without impacting the adjacent wetlands. A Phase II Supplemental Pre-Remedial Design Study, completed in September 1996, concluded that the Pollution Abatement Services site is not the source of pesticides in the surface water of Wine Creek and is not presently a source of PCB contamination in the sediments in the adjacent wetlands and Wine and White Creeks (although it was a likely source of PCB contamination before the construction of the containment facility in 1986).

The Phase II Supplemental Pre-Remedial Design Study also identified two additional potential sources of PCBs in the sediments in the wetlands and creeks in the vicinity of the Pollution Abatement Services site. The findings of the Phase I and II Supplemental Pre-Remedial Design Studies were documented in a September 1996 Explanation of Significant Differences. Since residual PCBs from the Pollution Abatement Services site may remain in the sediments in the vicinity of the site and, therefore, may act as a continuing source of contamination, a focused feasibility study was completed in August 1997. The purpose of this study was to identify and evaluate remedial alternatives to address the PCB contaminated sediments. A ROD addressing the PCB contaminated sediments was signed on September 30, 1997. The selected remedy requires no further remedial action; however, it does require long-term monitoring of the PCB-contaminated sediments at the site (which is ongoing).

## ② **Contaminated River Sediments:**

Contaminated sediments are not an issue in the Area of Concern. In 1999, the United States Army Corps of Engineers performed a maintenance navigational dredging in the Oswego Harbor AOC and determined that open lake disposal of dredged materials was acceptable. NYSDEC issued a water quality certification for this dredging. To certain degrees, we know that contaminated sediments are present in the watershed, upstream of the AOC in parts of the Oswego River, and in Onondaga Lake. Hazardous waste site remediation surrounding Onondaga Lake is well underway to clean up sources of contamination. In the lower Oswego River, further investigation has been conducted to identify the threat of any in-stream contamination and its potential downstream threat. If a significant source is identified, classification as a hazardous waste site would occur with follow-up action required.

Sediment studies show that some contaminated sediments are present upstream of the AOC that have raised water quality concerns; however, additional study and assessment has not determined a remedial need. Also, water quality studies have not identified a problem. In 1994, sediment cores and surficial sediment samples were collected at six sites on the Oswego and Seneca Rivers. The broad sediment study was designed to evaluate trace metals and organic chemical concentrations in Oswego River sediments. This project also included some toxicity testing and benthic study and was funded by a grant from USEPA's Great Lakes Nation Program Office (GLNPO). Details of the study and results are contained in the referenced report with a Quality Assurance Project Plan. A summary is provided below:

The **Oswego River Sediment Study** (Summary Results from 1994 Sampling) was published by NYSDEC in April 1997. All sediment samples (cores and surficial) were collected from depositional areas located outside of navigational channels which are normally dredged. Station #1 is in the harbor, station #2 is above the Varick Dam, station #3 is adjacent to Battle Island which is downstream of the Armstrong World Industries facility, station #4 is at Big Island closer to Armstrong, station #5 is at the Phoenix Dam to define the upstream conditions of the Oswego River, and station #6 is in the Seneca River two miles downstream from the Onondaga Lake outlet. The reference is listed in Appendix H item 28. The report conclusions are presented below in a listing of ten study result discussions:

## **1. Metals**

Trace metals exceeded NYSDEC guidance values for cadmium, copper, lead, and mercury. These exceedences occurred with greatest frequency and magnitude at stations #2 and #3. Chromium, nickel, silver, and zinc concentrations also exceeded NYSDEC sediment guidance values, but with less frequency and lower magnitude. The highest concentrations of most metals were encountered at station #3 (Battle Island). Peak concentrations were measured near the middle of the core collected at most of the stations. The pattern suggests that the current levels of trace metal contamination to the Oswego River, as represented by the recently deposited surficial sediments is lower than the historical levels. However, when surface and near surface sediment results are compared to the oldest (deepest) sediments, the most recent sediments were almost always higher than the deepest core sections.

In order to better understand the period in which peak trace metals concentrations occurred in depositional sediments, radionuclide dating was employed. Results indicate that the current rate of sediment accumulation at station #3 is very rapid; on the order of a few cm. per year. There is an observed major depositional event of old sediments (pre-1950s) at the 28 to 48 cm. core depth. It is estimated this event occurred between the mid-1960s and the mid-1980s. Some of the highest concentrations of trace metal observed in the Oswego River occurred above station #3 (Battle Island). The radiodating analysis suggests this peak discharge period occurred in the 1950s.

## **2. Pesticides**

All sediment core samples and surficial samples at stations #1 and #2 were evaluated for PCBs and pesticides. Very few samples collected during the study were found to have pesticide concentrations greater than analytical detection limits. Therefore any presence of DDT and metabolites are considered the result of past application and are not a major or widespread problem.

## **3. PCBs**

Two independent sediment assessment protocols were used: NYSDEC Division of Fish and Wildlife 1993 publication entitled "Technical Guidance for Screening Contaminated Sediments" and the Canadian 1993 publication by Persaud, et.al. entitled "Guidelines for the Protection and Management of Aquatic Sediment Quality in Ontario". The DEC assessment applies two guidance values; one for human health bioaccumulation and a second for wildlife bioaccumulation and are derived using equilibrium partitioning methodology. The Canadian guidance applies three guidance values; one for a no-effect level, another for a lowest-effect level, and a third for severe-effects.

PCB concentrations were detected in the upper sections of all core sample stations except #6. Larger concentrations were detected in stations #1, #2 and #3 with the highest being at station #3 in the 25-61 cm. section. A detailed discussion with sample results and tables is presented on pages 62 through 64 in the report. Of concern is the presence of PCBs in the top section samples of the lower river and in the surficial samples from the harbor. The report recommended additional sampling to better define the depth, breadth, and biological impacts of the PCB concentrations. As a result, a focused sediment study on the Battle Island area was conducted in 2000 and reported on in the 2002 Final Draft Battle Island Sediment Assessment. The study concluded upstream sediments are not causing use impairments in the AOC. Unrestricted navigational dredging last occurred in the harbor area in 1999.

## **4. Dioxins and Furans**

- Analytical Concentrations

The deep subsamples were very low or non-detect for the dioxin/furan analytes. Only two cores (stations #2 and #3) contained other than low or non-detect concentrations in the subsamples collected near the sediment surface. The concentrations at station #3 likely warrant further investigation to delineate the depths and breadth of the dioxin and furan contamination.

- Toxic Equivalents

Toxic equivalency is a methodology that quantifies the toxicity of substituted dioxin and furan congeners by proportionalizing their toxicities to 2,3,7,8-TCDD. These values can then be added and the total represents the aggregate toxicity of the various

substituted congeners. To evaluate these values, they were compared to human health and wildlife bioaccumulation sediment guidance values present in the 1993 DEC publication entitled “Technical Guidance for Screening Contaminated Sediments”. The guidance values are based on equilibrium partitioning methodology and are a function of the organic carbon content of the sediment being evaluated.

Results indicate no problem at station #1. At station #2, the upper third of the sample was above the wildlife guidance value. The mid portion of the station #3 sample exceeded the wildlife and human guidance values. Station #4 had low toxic equivalence in the upper half of the sample. Stations #5 and #6 did not indicate a toxic concern. There is likely minimal significant environmental impact from these dioxin/furan concentrations as they are buried by many centimeters of cleaner sediment.

- **Percent Abundance Patterns**

Percent abundance patterns help characterize the composition of complex compounds. The dioxins are dominated by OCDD and the furans by the HpCDF and OCDF. The homolog ratios show the furans are more abundant in the lower chlorinated homologs while the dioxins dominate the higher chlorinated. The findings at station #3 suggest additional sampling is needed to delineate the depth and breadth of contamination.

## **5. PAHs (Polynuclear Aromatic Hydrocarbons)**

The most apparent pattern observed is the major spike in concentration for most PAH compounds analyzed in the 119 to 140 cm. (middle and below) core section of station #3 (Battle Island). PAH compounds exceeding DOW and DFW guidance include acenaphthene, anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene and indeno(1,2,3-cd) pyrene. This may have been caused by a limited historical oil spill. The harbor sediment core sample indicated a slight surface or near-surface presence of PAHs. Station #6 (upstream near the Onondaga Lake Outlet) indicated a PAH presence throughout the core sample.

## **6. Mirex**

The highest concentrations of mirex encountered were found in the sub-surface sections (20-74 cm.) of the sediment core collected at station #3 at Battle Island. No mirex was detected in the sample collected immediately upstream of the Armstrong World Industries facility. Mirex was also measured in the surface samples at station #2 collected immediately upstream of Lock 6 on the Oswego River. As a source of potential contamination to Lake Ontario, a more focused study of the Battle Island area was further planned and conducted in 2001. Results indicate no significant threat to the environment exists from this area. To demonstrate environmental impact, an upstream out-of-AOC food uptake study has been proposed by academia.

## 7. Octachlorostyrene

Octachlorostyrene (OCS) was not detected in any of the samples performed by the independent lab in this study (limit range: 0.27-0.75 ug/kg). The NYSDOH lab reported similar results with some exceptions where only trace amounts of the compound were detected at station #3. These amounts were not quantifiable as only a presence at less than the detection level of 0.5 ng/g was indicated.

Independent of the Oswego River Sediment Study, technical assessment and discussion involving Lake Ontario and the Lakewide Management Plan (LaMP) indicate that analyzing for OCS has been difficult due to the lack of analytical standards over the years, and the fact that other contaminants such as PCBs and pesticides can in some cases give the same instrument response as OCS.

OCS was identified as a contaminant in the Lake Ontario Toxics Management Plan (LOTMP) that exceeded the piscivorous fish standard for wildlife. This result was based on applying piscivorous fish criteria (Newell, A.J., NYSDEC, 1987) to lake trout samples collected in 1988-1990. USEPA lake trout data (reference #77, Appendix H) for these same years showed fish tissue levels to be below NYSDEC criteria as did chinook salmon, coho salmon, brown trout, white sucker, and smallmouth bass data sets.

Overall, Lake Ontario U.S. and Canadian fish tissue monitoring experts do not regard OCS as a significant problem for Lake Ontario and, as a result, do not include analyses for OCS as part of their routine fish tissue monitoring programs. It should also be noted that lake trout are not considered available as a food source for wildlife. Therefore due to the overall nondetection of OCS in sampling results and the lack of supporting data that raises any research interest involving the detectability of OCS, it is recommended that the concern for OCS as an Oswego River RAP and Lake Ontario contaminant be considered nonsignificant.

## 8. Sediment Toxicity

Observed results of the acute sediment toxicity testing indicate no statistically significant toxicity to the Daphnia magna (water flea) or Pimephales promelas (flathead minnow). Ten-day solid phase toxicity test results indicate the only statistically significant difference in survival and growth between the Oswego River and control sediment exposures was reduced Chironomus tentans (midge) growth in surficial sediment samples collected at Lock 6 (station #2) and Battle Island (station #3).

## 9. Microtox

These tests were performed to assess relative toxicity among locations. The pore water and sediment were tested for all stations. All sediment samples elicited a response in the Large Sample Procedure at the detection limit. No relationship

between relative toxicity and concentration of contaminants could be established. Pore water elicited low toxicity only at station #3 but with unacceptable confidence.

## 10. Macroinvertebrate Sampling

This study was conducted to analyze resident communities and assess possible contaminant impact on organisms. Macroinvertebrates are good indicators of environmental quality because they are sensitive to environmental impacts and are less mobile than fish. In the absence of standardized procedures, several criteria are applied to assess the benthic community. Sample assessment ratings range from no impact to severely impacted. The five criteria selected in this study are:

- \* Species richness - the number of species in a sample (group ranges applied).
- \* Biotic index - measures an organism's pollution tolerance (uses a scale).
- \* Species diversity - combines species richness and community balance (range).
- \* Species dominance - measures the community relationship or balance (a high number of few species means an unstable community).
- \* Model affinity - measure of similarity in comparison to a model non-impacted community based on a reference using percent abundance (range).

The Oswego Harbor, Battle Island, and Phoenix area benthic community samples were identified as diverse and well balanced and therefore assessed as non-impacted. The lower river and Onondaga Lake outlet samples were assessed as slightly impacted, and the area above Fulton was moderately impacted. Sediment differences (particle size) and the presence of contaminants can also contribute to the identification of impacted areas.

A comprehensive **Contaminated Sediment Management Strategy** has been developed by the United States Environmental Protection Agency (USEPA). The proposed strategy describes specific actions that EPA will take to reduce environmental and human health risks associated with contaminated sediment. The strategy does not propose new regulation. The intent is to implement policies to consistently assess, prevent, and remediate contaminated sediments. EPA has requesting public comment on this strategy.

EPA's proposed Contaminated Sediment Management Strategy describes actions that the agency will take to accomplish the following four strategic goals: 1) prevent further sediment contamination that may cause unacceptable ecological or human health risks; 2) cleanup existing sediment contamination, when practical, that adversely affects the Nation's waterbodies or their uses, or that causes other significant effects on human health or the environment; 3) ensure that sediment dredging and dredged material disposal continue to be managed in an environmentally sound manner; and 4) develop and consistently apply methodologies for analyzing contaminated sediments.

The Strategy is comprised of six component sections: assessment, prevention, remediation, dredged material management, research, and outreach. In each section, EPA describes actions that are to be taken to accomplish the four broad strategic goals:

- **Assessment**

EPA program offices are to use standard sediment toxicity test methods and chemical-specific sediment quality criteria to determine whether sediments are contaminated. A national inventory of sites and sources of sediment contamination (National Sediment Inventory) is proposed to be used to target sites for remedial activities.

- **Prevention**

To prevent the spread of contaminated sediments and regulate the use of pesticides and toxic substances that accumulate in sediment, EPA proposes the use of acute sediment toxicity tests to support registration of chemicals under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) and the Toxic Substances Control Act (TSCA). In the Strategy, EPA also proposes: developing effluent guidelines for industries that discharge sediment contaminants in significant amounts; using pollution prevention policies to reduce or eliminate sediment contamination resulting from noncompliance with permits; preparing guidelines for the design of new chemicals to reduce the bioavailability and the partitioning of toxic chemicals to sediment; and implementing point and nonpoint source controls that will protect sediment quality. Preventive actions are intended to stop further contamination of sediments and to reduce ecological and human health risks.

- **Remediation**

EPA proposes using multiple statutes to require contaminated sediment remediation by parties responsible for pollution. These statutes include the Comprehensive Emergency Response, Compensation, and Liability Act (CERCLA), the Resource Conservation and Recovery Act (RCRA), Superfund Amendment and Reauthorization Act (SARA), the Clean Water Act (CWA), the Toxic Substances Control Act (TSCA), the Rivers and Harbors Act, and the Oil Pollution Act (OPA). The proposed strategy states that EPA will not proceed with a cleanup if a combination of pollution prevention and source controls will allow the sediments to recover naturally in an acceptable period of time. EPA's remedial actions are designed to cleanup sediment contamination that adversely affects the Nation's waterbodies.

- **Dredged Material Management**

EPA proposes the development of technical guidance regarding dredged material testing, disposal alternatives consideration, and dredged material disposal site

selection to ensure continued disposal of dredged material in an environmentally sound manner. (Note: NYSDEC has developed and is using a July 1994 publication, "Technical Guidance for Screening Contaminated Sediments" listed in Appendix H as reference #47.

- **Research**

EPA proposes a program of investigative research that is needed to: develop and validate new chemical-specific sediment criteria and other sediment assessment methods; improve EPA's understanding of the transfer of sediment contaminants through the food chain; and develop and evaluate a range of technologies for remediating contaminated sediments.

- **Outreach**

Public outreach activities are planned to demonstrate EPA's commitment to, and accountability for, sediment management efforts. Regular status reports on sediment management activities are to be provided.

### ③ **State Pollution Discharge Elimination System (SPDES):**

With the initiation of the Division of Water's Environmental Benefit Permit Strategy (EBPS) in April 1992, point source discharge permits are now given priority for renewal modifications based on the identification of environmental/water quality benefits. A ranking system has been implemented that provides higher priority for permit modifications based on permit need factors and their impact towards environmental improvements. A Great Lakes Area of Concern (AOC) component based on bioaccumulation and persistent toxic chemicals is one element of this priority system. An identification with an AOC based on this bioaccumulative/persistence factor will therefore provide additional weight in the priority ranking system for working on a point source discharge permit renewal/modification. The EBPS is proving to be very successful. Aspects of priority industrial and municipal SPDES permit renewals and modifications in the Oswego River area that are likely to have an impact on the restoration and protection of beneficial uses are discussed below.

In addition, as part of EPA's Contaminated Sediment Management Strategy described above, EPA is developing a sediment quality criteria user's guide to assist in interpreting sediment chemistry. The goal is to apply this EPA technical guidance in evaluating dredged material testing, dredged material disposal site selection, and disposal alternatives to ensure continued disposal of dredged material in an environmentally sound manner. At the same time, NYSDEC has developed and is using guidance from a July 1994 publication entitled: "Technical Guidance for Screening Contaminated Sediments". The application of sediment quality criteria can be very useful in making hazardous waste site assessments and proposed sediment dredging and disposal decisions. The criteria could also be adopted as part of state water quality standards and applied to help establish water permit discharge limits.

A significant reduction in the mass of PCBs and other contaminants discharged within the Oswego River drainage basin by certain area industries (primarily stormwater /site related) has been achieved by 1) hazardous waste site remediation activities, 2) the implementation of best management practices (BMPs), 3) improvements to wastewater treatment facilities, and 4) industrial facility closures resulting in discharge eliminations. The permit renewal process involving major industrial companies and municipal facilities has the goal of achieving non-detectable discharge levels of PCBs, as well as reduced discharges of other toxic and conventional contaminants for each water discharge. Resolving the issues concerning PCBs that involve the sampling method and the level of detection are a priority for NYSDEC (current policy uses a detection level of .065 ug/l). Although PCBs are no longer used, past waste disposal practices had so contaminated some facility sites such that stormwater runoff was contaminated. In these certain cases in the watershed, site remediation was required to cleanup PCB contamination. Priority concerns for industrial and municipal permits are:

## **1. Industrial Point Source Permits**

The major industries in the Oswego River watershed drainage basin are in various stages of the SPDES permit renewal/modification process (based on a five year cycle). Overall, with the focus on toxic substances and with consideration for the requirements proposed under the Great Lakes Water Quality Guidance, we can expect to see continued additional stringent permit discharge limits with the primary emphasis on parameters identified as bioaccumulative chemicals of concern (BCCs). Process and pretreatment discharge controls as well as stormwater discharge management practices require industries to comply with best available technology (BAT) and water quality based effluent limits.

## **2. Municipal point source permits**

The City of Oswego operates two wastewater treatment facilities: the East Side and West Side plants. Implementing extensive sewer rehabilitation and separation projects began on the East Side system in 1996. Addressing wet weather flows has been a priority and includes the goals of eliminating surface stormwater inflows, groundwater infiltration, and overflows. The Environmental Facilities Corporation (EFC) provided important funding through low interest loans. These goals were considered as necessities and factored into the provisions of the discharge permits at both facilities at the time the permits were modified. Both permits require a Long Term Control Plan (LTCP) and Best Management Practices (BMP) plan for the collection systems and treatment facilities operation.

The municipal permits in the Oswego area tend to not score high as a priority on the discharge permit ranking system for environmental impact benefits of permit modifications; however, requirements to comply with the Clean Water Act are necessary and must be accomplished. These requirements include completing and implementing a LTCP to address combined sewer overflow (CSO) correction and abatement, stormwater management, and pretreatment program elements. For the City of Oswego, the two SPDES discharge permits have been reviewed and modified to include additional work for both the City of Oswego East Side (#NY-0029114) and City of Oswego West Side (#NY-0029106) treatment facilities. Provisions of the permits also address pollution prevention considerations and impose additional reporting requirements for the Long Term Control Plans. The East Side sewer-shed (sewer collection network) is currently under a consent order agreement to address wet weather flows.

Wet weather flows occur during stormwater runoff events and as such are limited and subject to significant flushing action. Because of the large Oswego River flow dilution factor, no environmental impact has been defined; however, these conditions must be remedied by the City of Oswego under the Clean Water Act. This is consistent with regulatory oversight and is not an issue affecting the AOC delisting.

#### ④ **Nonpoint Source Pollution Control:**

Excessive nutrients (phosphorus) and sedimentation (erosion) from agriculture have been identified to be the main nonpoint sources of pollution causing impacts in the Oswego River Drainage Basin. County Water Quality Management Strategies have been developed to address nonpoint source pollution. Implementation of these County Water Quality Management Strategies and related Best Management Practices (BMPs), including improvements to stormwater management, are ongoing and progressing in the watershed. Various funding programs (grants) now support and assist in the implementation of these nonpoint source pollution control efforts.

Nonpoint sources have been identified as the primary source of water quality problems in more than 1,300 water body segments (90+%) included on New York's Priority Waterbody List (PWL). NYSDEC maintains descriptive data on each on these priority waterbody segments. There are over 40 subcategories of sources that are considered nonpoint sources contributing to water quality problems. These range from sources such as atmospheric deposition and contaminated sediments, that will have to be addressed by state and/or federal level programs, to categories such as on-site wastewater treatment systems and agricultural runoff that are best addressed through local implementation efforts and involve land use decisions and management practices.

Nonpoint source pollutants include pathogens, sediments, nutrients, toxics, thermal energy, and oxygen-demanding organics. For example, pathogens have been identified as responsible for the closing of shellfish beds and bathing beaches on Long Island. Sediment can destroy fish habitat through the blanketing of fish spawning and feeding areas and the elimination of certain food organisms. Nutrients contribute to eutrophication in lakes, reservoirs and marine waters. Animal feeding and agriculture have an impact.

Within the Oswego River watershed, which drains an area of over 5,100 square miles, continued vigilance in addressing nonpoint source causes of use impairments is maintained through federal, state, local, and private environmental interests. Physical disturbances, contaminated sediment causes, land-based hazardous waste sites, and watershed practices concerning fertilizer and pesticide use are examples of sources of nonpoint source pollution that are monitored and regulated. The result of addressing these nonpoint sources and causes in the Oswego River drainage basin has provided significant improvement to the ambient river water quality as well as protection to move ahead with the resolution of the use impairment indicators for the Area of Concern.

Passage of the federal Water Quality Act of 1987 led New York State to take a more active role in dealing with nonpoint source pollution problems. As required by Section 319 of the Act, NYSDEC coordinated the preparation of a Nonpoint Source Assessment Report and a Nonpoint Source Management Program. In the years since 1989, NYSDEC has: developed guidance materials on source categories and public outreach; joined forces with the USDA Natural Resources Conservation Service (formerly the USDA Soil Conservation Service) to provide technical training; formed cooperative agreements with the Natural Resources

Conservation Service and the NYS Soil and Water Conservation Committee; funded aspects of County Water Quality Coordinating Committees efforts; funded specific county-based implementation projects in the Great Lakes Basin; and, supported various other nonpoint source pollution projects including groundwater protection across the state. Since 1994, NYSDEC has been identifying projects to address water quality problems in New York State and funding some of these activities using federal funds appropriated under Sections 319 and 604(b) of the Clean Water Act. Several million dollars has been made available for locally-based nonpoint source pollution control activities.

Working in conjunction with the NYS Soil and Water Conservation Committee, DEC has encouraged the development of county water quality strategies. Grants have been made available to each county that completed a strategy; in fact, almost all NYS counties developed strategies. These strategies therefore have become a part of RAP strategies and provide blueprints for actions to address nonpoint source pollution in a particular watershed. In applying the RAP Process to provide an ecosystem approach to protect and to restore beneficial uses, a watershed approach is necessary to track down sources and to implement remedial and preventive measures. Nonpoint source pollution control is essential to remedial strategies. Significant work has been accomplished in the development and implementation of nonpoint source pollution projects and management. Remedial action is continuing based on implementing the plans and guidance that have been established.

Federal guidance has established some fundamental elements that form the basis for the application of best management practices used in a nonpoint source pollution control program. These elements have been incorporated into an EPA guidance document entitled **“The Stream Protection Approach”**. The Stream Protection Approach incorporates the integration of six elements into a cyclic development, planning, implementation and review process. This guidance document provides us with a model that can be applied to New York State nonpoint source pollution control efforts. The six broad elements encompass the following protection strategies:

- Protect key resource area from development (these include wetlands, floodplains, steep slopes, streams, forests, habitat, and open space).
- Establish buffers to protect resource areas (includes aspects of delineation, construction, and management).
- Provide sediment and erosion control (address clearing, grading, sediments, construction sequence, disturbance limit, and revegetation).
- Reduce site imperviousness (use cluster development, provide infiltration and design requirements such as porous pavement and concrete grid).
- Provide stormwater management (address quantity and quality of runoff, treatment, controls, protection, and BMPs).
- Provide watershed maintenance (employ inspections, enforcement, maintenance, assistance, and restoration activities).

NYSDEC's Division of Water has developed nine guidance document sections for the Management Practices Catalogue for Nonpoint Source Pollution Prevention and Water Quality Protection in New York State. All of the nine parts of this Management Practices Catalogue have been finalized that deal with: stormwater runoff, agriculture, construction practices, roadway maintenance practices, on-site wastewater treatment systems, silviculture, spills, resource extraction, and hydrologic/habitat modification.

Implementation of the initiatives outlined in the Nonpoint Source Management Program includes many elements and is an ongoing effort of nonpoint source control. Local involvement is essential and Best Management Practices establish fundamental strategies. The cooperative agreements with county districts and the State Soil and Water Conservation Committees are key factors to implementation. Education and training are promoted by these organizations.

## ⑥ **Air Pollution Control:**

The remedial strategy calls for the reduction of contaminant emissions from the major industrial facilities in the AOC. The Clean Air Act Amendments of 1990 require air discharges to comply with Maximum Achievable Control Technology (MACT) limits. When further developed, NYS Air Standards may require treatment beyond MACT to be phased in over a period of time. The Oswego County and Onondaga County waste incinerators are two facilities that will involve further investigation concerning their air discharges involving dioxin. Air toxics discharges are discussed further in item #2 below.

New York State has put together a comprehensive program to improve air quality and to bring the State into compliance with the 1990 federal Clean Air Act Amendments (CAAA). The amendments address chronic air pollution and require states to bring their air quality into compliance with federal standards by specific dates. Substantial new obligations to control urban smog, acid rain, toxic pollution, and pollution from smokestacks are required to be implemented under meaningful, and often rigorous timetables. States that fail to meet these obligations will be subject to federally-imposed economic sanctions. Major provisions of the 1990 CAAA include:

Title I: Nonattainment - This title classifies geographic areas that do not meet federal standards for particulate matter, nitrogen dioxide, carbon monoxide, lead, sulfur dioxide, and ozone (VOCs and NOx). It also sets acceptable air quality limits, progress requirements, and emissions control guidelines for both mobile sources (cars, trucks) and stationary sources (utilities, industries).

Title II: Mobile Sources - For all types of motor vehicles, this title sets standards for emissions testing, certification, and warranties. It also directs the federal Environmental Protection Agency (EPA) to develop regulations for formulating motor fuels and to set standards for clean alternative fuels.

Title III: Air Toxics - This program lists 189 chemicals to be regulated and includes a procedure for EPA to add and delete chemicals from this list. It directs EPA to identify toxic source categories and to establish emissions limits and siting requirements for municipal waste incinerators.

Title IV: Acid Rain - This title describes plans for reducing emissions of sulfur dioxide and oxides of nitrogen, and it directs EPA to establish limits on electric utility plant emissions of these pollutants.

Title V: Permits for Stationary Sources - States are directed to adopt and implement an air pollution permit program that includes emissions limits and standards, compliance schedules, and reporting requirements. Provisions are made for assistance to small businesses to help them comply. Fees are required to be established and collected for the support of the program. Amendments to NYSDEC air pollution regulations are described below under initiatives item #4.

## **1. Source Strategies for Air Pollution Control**

In order to meet the goals of the CAAA, New York State's air pollution control program will concentrate on mobile sources (cars and trucks), stationary sources (utilities and industries), and area sources (consumer products). Strategies for the implementation of these three air pollution control activities are:

- **Mobile Sources**

For vehicles, increase the amount of oxygen contained in gasoline sold in areas with carbon monoxide pollution problems; adopt strict emissions standards for new passenger vehicles; enhance the State's motor vehicle inspection and maintenance programs; and, require motor vehicle trip reduction plans for companies that have 100 or more employees and are located in areas with severe air quality problems.

- **Stationary Sources**

For companies, require the installation of basic air pollution controls that use reasonably available control technologies (RACT). These requirements include offsets for major new sources of air pollution at a ratio which is greater than 1.15 to 1, or 1.3 to 1 in areas of severe nonattainment.

- Area Sources

For products, regulate the amount of solvent in paints, inks, and other consumer products such as hair spray.

## **2. Air Pollution Programs Affecting RAP Strategies**

There are three areas of the air pollution control program that, through improved requirements, can assist in further restoring and protecting beneficial uses in the Area of Concern:

- Air Toxics

The air toxics program is required to set emissions limits for 189 hazardous air pollutants that affect the public health. Provisions call for the use of maximum achievable control technologies (MACT). EPA is required to develop, implement, and enforce regulations establishing requirements for air pollution control technology, pollutant trading, and the assessment of residual health risks caused by pollutants in the air. These requirements apply to stationary sources which discharge specific amounts or types of air pollutants. For major and area sources, the CAAA lists 189 hazardous air pollutants that take into account toxicity, reaction with other substances, and persistence in the environment.

Major sources are any stationary source or group of stationary sources that emit 10 tons per year or more of any single hazardous air pollutant, or 25 tons per year or more of any combination of hazardous air pollutants. Area sources are smaller sources which emit less than either the 10 or 25 tons per year thresholds.

Changes to the hazardous air pollutant list can be made. EPA is required to establish separate standards for municipal waste incinerators that provide maximum reductions in air emissions, taking into account cost, health/environmental impacts, and energy requirements. It is expected that the new control standards will require additional emissions reductions of 75-90 percent below current levels.

After the control technologies are in place, New York State must assess the public health risk which remains and oversee the permit, program modification, and offset programs as required by the CAAA. New facilities are subject to emissions standards that are tighter than those applicable to existing facilities.

NYSDEC has a comprehensive air toxics program that accommodates the 1990 CAAA. State air regulation Part 212 and New York's Air Guide-1 provide the foundation. Air Guide-1 contains specific chemical control guidance for over 240 chemicals categorized as either high, moderate, or low toxicity air contaminants. Stack testing to assure compliance is provided.

EPA intends to apply the data obtained from the studies on toxic air pollutants to Lake Ontario to the Lake Ontario Mass Balance Model for the lake. This model will be used as a tool for NYSDEC to develop TMDL's for the lake. The model contains factors such as air pollution, point and non-point sources, sediment loadings, inputs and outputs from the lake.

- Ozone Transport

Recognizing that a combined and coordinated effort among states would be needed to solve the ozone transport problem in the Northeast, Congress established the Ozone Transport Commission (OTC) as part of the 1990 CAAA. The OTC addresses the regionwide transport of ground-level ozone and its precursor emissions of volatile organic compounds (VOCs) and nitrogen oxides (NO<sub>x</sub>). The OTC includes members from Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New York, Pennsylvania, Rhode Island, Vermont, Virginia, and Washington, D.C.

Under the CAAA, the following control measures are required by the OTC states: an enhanced vehicle emissions inspection program in all areas with populations greater than 100,000; basic controls on most stationary sources; new source review for offsets of major stationary sources; and, cleaner fuels.

- Small Business Assistance Program

The Small Business Assistance Program is an opportunity for businesses to obtain the information and technical assistance necessary for compliance with the CAAA. In order to meet the many new air quality standards and to control toxic emissions, which requires installation of air pollution controls and knowledge of complex regulations, Congress ordered EPA and the states to help small businesses by providing technical assistance and compliance information. The three key components of the program are an Ombudsman's Office, a Technical Assistance Program, and a Compliance Advisory Panel.

The Ombudsman Office will serve as the representative of small businesses. The office will be located at the New York State Department of Economic Development. The office will handle complaints, provide outreach and help small businesses gain access to program services.

The Technical Assistance Program, located within the New York State Environmental Facilities Corporation, will work independently from NYSDEC. This program will aid small businesses in understanding federal and state requirements, assist in filling out permit applications, and provide technical advice on compliance with the regulations.

A Compliance Advisory Panel will be established to render advisory opinions, determine the overall effectiveness of the technical assistance program, and review information to assure it is easily understood.

Any business which is independently owned and employs less than 100 people and is not a major source of air pollution (as defined by appropriate regulations) will qualify for assistance.

### **3. Air Pollution Program Investigations**

There are several types of investigations involved in the air pollution program that can involve Great Lakes program activities:

- Ambient Air Monitoring Networks

NYSDEC Division of Air conducts routine air monitoring through two statewide air monitoring networks: air toxics and acidic deposition. The networks provide data to identify New York State air quality in terms of heavy metals and volatile and semivolatile organics. Transport and conversion mechanisms are also better understood from the networks data. In addition a mobile air laboratory, that operates a Trace Atmospheric Gas Analyzer (TAGA), is used to monitor ambient air. Compiling ambient air study results and assessment of this data needs further development.

- Fugitive Emissions

Air discharges that are not captured by a pollution control system and thus are released to the atmosphere at the source rather than a stack are fugitive emissions. In some cases such emissions may be a significant source of atmospheric pollution. Therefore, NYSDEC is promulgating a fugitive emission regulation which calls for a 50 percent reduction of all unregulated air releases from a 1987 baseline emission inventory.

- Atmospheric Deposition

USEPA intends to apply the results of studies on toxic pollution of the Great Lakes resulting from atmospheric deposition to develop a control strategy and regulations (if necessary) to combat the air toxics problem.

The Great Waters Report (May 1994) provides a discussion of the problems and recommendations relative to the deposition of air pollutants to the Great Lakes. Atmospheric deposition has been further recognized as a significant nonpoint source of pollution to the Great Lakes basin; however, direct evidence of the sources and

impacts needs further study. Such work is beyond the scope of the Oswego River RAP Area of Concern.

#### **4. Air Pollution Program Initiatives**

There are a number of initiatives concerning the air pollution program that can involve Great Lakes program activities:

- National Urban Air Toxics Strategy

USEPA is responsible to propose a national urban air toxics strategy which contains specific actions designated to reduce cancer risks from urban sources by 75 percent. Although development of the strategy is behind schedule, full implementation has been called for. Because the Oswego area is not in a designated national urban area, New York State regulations under the maximum achievable control technology (MACT) requirements will apply.

- Source Category Regulation

USEPA is responsible to list sufficient area source categories of air pollution to regulate 90 percent of emissions of the 30 most hazardous area source pollutants. Regulations requiring generally available control technology for the sources must be adopted. Maximum achievable control technology (MACT) requirements are also being developed for various source categories.

- Source Discharge Air Permits Program

The CAAA Title V requires that individual facilities whose emissions of certain contaminants exceed specified thresholds or that are subject to specific federal New Source Performance Standards (NSPS), National Emission Standards for Hazardous Air Pollutants (NESHAP), or other federal standards, obtain facility operating permits under Title V. Individual emission point permits (as currently administered by NYSDEC) are not required, although there are provisions for the control of emissions from individual process operations within a facility. The intent is to incorporate the federal facility discharge permit strategy into NYSDEC's permitting program while maintaining the state's already enhanced discharge controls. Facilities not required to obtain a facility permit will be regulated by the current emission point program with some major improvements: separate construction permits will not be needed and long term permits will be provided for unchanged processes.

A separate category of facility permit, referred to as a general permit, will also be available for certain facilities through the proposed permit revisions that are intended to integrate the two programs (i.e. facility permit and emission point permits). Under this system, a single permit will be issued to cover a category of operation after the fulfillment of public participation requirements. Facilities within that category

wishing to operate under the general permit must submit an application similar to that required for conventional facility permits, but are not required to undergo further public review in most cases. The elimination of this step will simplify the permitting process for these facilities, and relieve some of the administrative burden.

- Facility Specific Air Permits

Some facility permits require an identification, trackdown, minimization, and elimination program for discharge contaminants. Determinations are based on the design of the new air discharge permit to meet Clean Air Act Amendments and NYSDEC implementation strategy. Some facilities need to develop a fugitive emissions plan that outlines best management practices (BMPs) to control fugitive emissions. BMP requirements are expected to be incorporated as special permit conditions in the facility's air discharge permit.

- Amendments to NYSDEC Air Pollution Regulations

In order to meet the requirements of Title V of the federal Clean Air Act Amendments of 1990, NYSDEC will modify its Environmental Conservation regulations parts 200, 201, 231, and 621. These changes are necessary to establish an operating permit program for sources of air pollution as required by USEPA regulations. A number of important reforms to the State air permitting program are in the making: establishment of a registration program, the combining of both construction and operation approval requirements under one permit, and the ability to issue permits with no set expiration date.

Facilities subject to air emissions permitting under Title V are to obtain a "Title V facility permit" while others will need to register or obtain a "state facility permit". A general permit provision is included for source categories subject to common emission control.

## ⑥ Fish and Wildlife Assessments/Actions:

Several of the use impairment indicators are based on the status of fish conditions and considerations. Wildlife impairments are not identified in the AOC for the Oswego RAP. Sufficient fish investigative information has been reported to assess the indicators. The 1995 Fish Pathology Study conducted by Jan Spitsbergen of Cornell University (Appendix H.68) found little evidence of impairment of fish health by contaminants in the Oswego River harbor. Lakewide fish consumption advisories and fish habitat impairments are identified; however, contaminant levels are below those causing an increase in fish tumors or other abnormalities. Conducting further fish reproduction rate evaluations could be an area for further investigative funding. The provisions of the Federal Energy Regulatory Commission (FERC) relicensing process involving the Oswego River are to address the fish habitat use impairment concern immediately below the Varick Dam.

Results of fish investigation, environmental monitoring, and habitat restoration requirements and protection activities involving the Oswego River, the AOC, and Lake Ontario have been generated as part of remedial activities. Studies have been and, on a limited basis, are continuing to be performed/funded by USEPA, NYSDEC, NYSDOH, Cornell University and other interested organizations such as the Long Point Bird Observatory in Canada. The benefit of conducting further investigative studies concerning deformity and population diversity has been questioned. Habitat assessment also requires closer examination as to the real impairment versus the overall habitat available in a given regional area. The IJC water level study may provide information applicable to the Oswego AOC. Some low summer water levels in the harbor area do present a concern for boating interests. Lake levels have limited impact on the habitat area below the Varick Dam that the FERC license will address through modified Oswego River flows. Below are details of the progress in implementing current fish assessment activities. Protection of fish and wildlife habitat is also noted.

## **1. Investigations**

- **Fish Pathology**

Fish tumor and lesion studies were reported on by Jan Spitsbergen in the 1995 Fish Pathology Study (Appendix H.68) for the Oswego Harbor. Results indicate that Oswego Harbor fish have not been significantly affected when compared to control groups from uncontaminated areas. Because contaminant levels in the fish were found to be below those causing an increase in tumors or other deformities, little evidence of the impairment of fish health was found. Details of this investigation are further discussed under use impairment indicator # 6 in Section III.B, page 44.

- **Young-of-the-Year (YOY) Fish Studies**

YOY fish data was sampled in 1992 and published by DEC in August 1994 in a document entitled "Identification of and Changes in Chemical Contaminant Levels in Young-of-the-Year Fish from New York's Great Lakes Basin" (Appendix H.67). This monitoring was expanded in scope in the 1997 sampling and is reported in the 2002 YOY report by DEC (Appendix H.31). Several factors contributed to the final report delay. Because of the expanded number of sampling sites, expanded parameter list, and extensive evaluation and report writing needs, the final 2002 involved significant preparation work; however, interim summary information requests were fulfilled. As a result, improved data management and reporting methods have been learned. Assessment of the YOY data for the Oswego site (located in a Lake Ontario nearshore area west of the harbor outlet) shows a continued downtrend in the level and detection of contaminants in fish. Although these fish are not directly sampled from the Oswego harbor, they are considered associated with the Oswego River tributary flow. The YOY sampling is reviewed under the Lake Ontario Lakewide Management Plan (LaMP) as related to the status of fish consumption use impairment indicator and the lakewide health advisory established by NYSDOH. Since the AOC does not have a specific health advisory and is addressed by the larger lakewide

advisory, it is appropriate to have the advisory resolution addressed under the Lake Ontario LaMP. The LaMP's role to take action to further decrease the loadings of critical pollutants to the lake are expected to continue to be observed in trends that indicate improvements.

- Fish Flesh Chemical Residue Analyses

a. Alewives and Rainbow Smelt - As part of the special Great Lakes fish contaminant program, supplemental collections of two forage fish species were requested to help provide chemical residue linkages in food web dynamics for salmonids. Data for composites of whole alewives and rainbow smelt collected in Lake Ontario off Oswego in the Spring of 1993 were produced. Results indicate that none of the samples exceed a federal limit (2000 ng/g) for PCB or organo-chlorine pesticides (although these limits do not strictly apply to whole fish data, unless the fish is eaten whole). Mercury was not analyzed in this test. The PCB data do however exceed the PCB value for the protection of sensitive piscivorous wildlife of 100 ng/g. For the fish in Lake Ontario in the vicinity of the Oswego tributary PCBs in fish flesh ranged from 100 to 1300 ng/g. For open Lake Ontario and nearshore areas, it is apparent that certain species may contribute to the impairment of the well being of sensitive wildlife if certain fish are significant part of the diet. For humans, the federal limit for PCBs is being achieved near Oswego; however, the lakewide human health advisories remain in effect as applying to migratory fish entering the Oswego area.

b. Channel Catfish - Catfish analyses in the Oswego River (the segment upstream of the AOC) were performed in 1986 and 1993. In 1988, a health advisory (eat no more than one meal per month; women of childbearing age and children under 15 years should eat none) was implemented for channel catfish in the Oswego River between the Varick power dam and the upper dam at Fulton. This action was based on Summer 1986 collections of channel catfish which contained mean concentrations of PCB substantially in excess of the US Food and Drug Administration (USFDA) tolerance of 2000 ng/g. The 1993 data indicates that average values for each class of chemical contaminants are significantly below respective guidelines for human consumption of channel catfish. Only two fish (10%) contained PCB values greater than the 2000 ng/g tolerance whereas only one fish contained total mirex concentrations in excess of the 100 ng/g wildlife protection value. Comparing fish size and samples with the 1993 we observe the total PCB (wet weight basis) concentrations are significantly lower in 1993; however, the apparent decline appears to be solely due to the significantly lower lipid values in the fish flesh of the more recent samples. At this time, apparent declines in total PCBs are a false indicator of the changes in chemical residue concentrations over time. In this case, a return to higher lipid values, based on the availability of forage fish, is likely to produce a concurrent increase in total PCB residue concentrations and therefore a more extensive contravention of the Federal tolerance limit. This data was provided to the NYSDOH for evaluation in the human health advisory deliberations, where it

has been determined to keep the channel catfish advisory in effect for the 2001-2002 health advisory bulletin.

c. American Eels - Samples were collected in Lake Ontario outside the Oswego AOC and in Chaumont Bay during the Spring of 1994. Commercial fisheries in the eastern basin desire a market for eels that includes foreign trade. Results indicate that total mirex concentrations continue to exceed the federal action level of 100 ng/g. Fifty percent of the thirty fish analyzed had excessive total mirex. Six fish exceeded the Federal tolerance for PCBs of 2000 ng/g. Unfortunately, the data suggests it would be inappropriate to reopen the commercial fishery for American Eels at this time. Although this data does not relate directly to the Oswego AOC, it is provided here as historic reference and follow-up under the Lake Ontario LaMP. The issue with the American Eel population decline is due to harvesting. The female “elvers” migrate back to their spawning area and are harvested. Eels are a fatty bottom dweller fish and are more subject to benthic contamination.

- Deformity and Populations

There is no identified deformity impairment for birds, amphibians, fish and wildlife. Some population data is reported along with the fish analyses noted above. Specific deformity data is difficult to acquire. Routine deformity observation notes are now made as part of other investigations and evaluations. The need and funding for more extensive data is not established. Under the Marsh Monitoring Program, Bird Studies Canada has provided useful information for the AOC that is described under the discussion of use impairment indicator #7 on page 46.

- Fisheries Enhancement Plan

This DEC approved plan establishes the conditions needed to restore the fish habitat and populations impairments identified in the RAP for the Varick power dam and Oswego River. The Fisheries Enhancement Plan is listed in Appendix H as item# 59. Concerns for the fishery conditions along the Oswego River are not simply focused on fish species composition and abundance, but also on the physical, chemical, and biological factors affecting fish habitat. In general, hydropower facilities pose a threat to fishery resources due to increased water temperatures, decreased dissolved oxygen concentration, and drastic fluctuations in flow regime. These factors result in a reduction of aquatic vegetation and limited species composition which are tolerant only to these conditions. Upstream fish migration is hindered by dams. In addition, downstream migration is affected by entrainment at hydropower facilities which can cause mortality of young-of-the-year and juvenile fish species.

The loss of species is of particular concern to natural resource managers. Reasons for loss of species could be the result of habitat degradation due to land use practices and

pollution, competition among species, introduction of aquatic nuisance species, overharvest, or a combination of all of these. Challenges to enhancing fisheries include assessing current information gaps and setting ecosystem requirements to improve and to protect the fishery. Enhancement requirements include maintaining minimum instream flow and minimum water quantity criteria, and assuring that adequate habitat and riparian vegetation are available. Corrective actions involving the implementation of measures to address minimum river flow for habitat areas or “modified run-of-river” flows , as well as fish protection and passage provisions are all required in the FERC relicensing process involving the Varick Dam just above the Oswego River and Harbor AOC. These provisions are to resolve the concern regarding the fish habitat and populations use impairment indicators. This is further discussed in Section III.B under indicators #2 and #3.

## **2. Environmental Monitoring**

As part of implementing remedial activities in the AOC watershed, responsible parties are to be required to perform various monitoring activities. For example, the power dam operator is required to monitor and sample according to the FERC license requirements. NYSDEC monitors water quality and sediments. The USACE monitors sediments for maintenance dredging. Aspects of this monitoring include:

- River sediment sampling/survey
- Water column sampling (local and fixed)
- Biota sampling (resident and caged fish, benthic community)
- Bioaccumulation
- Corrective action analysis (turbidity and visual)

Other monitoring activities are being conducted by interested parties and volunteers, some of which is supported by grant funding:

- Environmental impact and health assessment by SUNY campuses
- Special studies by the Finger Lake - Lake Ontario Watershed Protection Alliance (FL-LOWPA)
- Point source discharges by industries and municipalities (water)
- The Long Point Bird Observatory Marsh Monitoring Program

The Marsh Monitoring Program is a cooperative project of the Long Point Bird Observatory and Environment Canada, with the support USEPA and the Great Lakes Protection Fund. The objective of the program is to monitor the health of marshes by surveying indicator species that utilize these habitats during the breeding season. Two groups of vertebrates, birds and amphibians, are used as target groups because they are susceptible to environmental deterioration and easily surveyed.

Data collected in the Oswego area is reported on in Appendix M and discussed under use impairment indicator #7 in Section III.B.

### **3. Habitat**

Habitat protection is a high priority for the New York State Department of Environmental Conservation. Habitat protection includes the implementation of natural resource protection objectives and Best Management Practices involving all environmental quality programs. Localized habitat impairment within the AOC has been identified as part of fish and wildlife management programs. Remedial activities completed and ongoing to address hazardous waste sites in the Oswego River watershed have contributed to the removal of significant amounts of contamination so that contributions to the AOC and Lake Ontario have essentially been eliminated. Achieving the requirements of the power dam relicensing is to restore and protect fish access while providing productive fish habitat conditions.

Historically, the construction of dams along the Oswego River altered fish and wildlife habitat. As a result, alternate habitats were established. We know this to be true although it is not well documented. For example, in the larger Lake Ontario drainage basin, as development occurred, new and modified habitat areas (outside the AOC) were identified to provide an additional remedy to address and improve upon any stressed habitat areas within the basin. Some of these projects may receive federal funding support. The creation and maintenance of the Montezuma National Wildlife Refuge provides over 6,000 acres of habitat for the Lake Ontario basin. Efforts to restore and to preserve this marsh habitat continue today in cooperation with NYSDEC, corporate sponsors, conservation organizations, and private landowners. An example of partnership agreement, known as the Northern Montezuma Wetlands Project, involves an international agreement among the US, Canada, and Mexico. This agreement project provides for the restoration, conservation, and enhancement of wetland habitat and waterfowl populations on over 36,000 acres. Therefore stewardship and cooperation among different interests are very important to establishing and maintaining habitat areas. Such a partnership agreement forms the basis of the FERC relicensing provisions to restore fish habitat to the Oswego River and its AOC.

### **4. Guidance**

The EPA reference document entitled "Wildlife Exposure Factors Handbook" provides guidance, data, and references for conducting exposure assessments for wildlife species exposed to toxic chemicals in their environment. A consistent approach to wildlife exposure and risk assessments is fostered. This USEPA Wildlife Exposure Factors Handbook was produced in 1993 as EPA document 600/R-93/187a, in volumes I and II, by the Office of Research and Development.

## ⑦ **Health and Environmental Assessments/Actions:**

Maintaining current and useful contaminated fish consumption advisory information serves to reduce exposure of user groups. Over the years, NYSDEC in conjunction with NYSDOH, has prepared and distributed updated fish consumption advisory pamphlets and/or leaflets to assist with public outreach and education. Funding is needed to assist in the continuation and enhancement of this outreach effort to address the implementation of the fish consumption advisory and the continuation of necessary research to monitor long-term trends in regard to the Lake Ontario advisory.

Human health and environmental risk assessments and actions have been pursued that address the concerns of the Oswego RAP. These involve fish, wildlife, and humans. The academic community at SUNY Oswego has undertaken human health studies with follow-up for longer term assessment of the study group. These issues are to be addressed more appropriately by the larger Lakewide Management Plans (LaMPs) for the Great Lakes. Some ongoing initiatives, results, and risk assessment considerations are discussed below:

### **1. Fish Consumption Advisories**

NYSDEC and NYSDOH continue to conduct annual fish flesh sampling and analyses to evaluate fish consumption advisories. Fish study results are reported under the bullet topic heading #6 for Fish and Wildlife Assessments/Action in the section above starting on page 158. References are also noted therein.

### **2. Remediation Assessments**

Several health/environmental studies and assessments related to remedial actions have been accomplished in the watershed upstream of the AOC (e.g. the Armstrong Cork Landfill Health Consultation and the installation of public water supply near the Miller Brewery site in Fulton). Health considerations and evaluations are an ongoing part of all remedial activities. In the AOC watershed, specific studies and assessments have been conducted to address environmental protection and health concerns as part of hazardous waste site remediation. These activities assure contamination is no longer a threat to the following:

- Area Water Wells
- Site Groundwater
- Site Surface
- Site Soil

### **3. USEPA Health Study**

USEPA has made the protection of human health one of the cornerstones of its environmental protection activities and has incorporated this into all of its programs. The Agency is particularly concerned with the potential health effects of consuming Great Lakes fish. To address this, a study mandated by Congress is being conducted by USEPA and the Agency for Toxic Substances and Disease Registry (ATSDR) in the Great Lakes basin. This study will identify human populations residing in the Great Lakes who may be at risk due to contact with chemical contaminants and what to do to prevent adverse health effects. Some of the studies are being conducted in Great Lakes Areas of Concern and the findings are to be disseminated throughout the basin. More recent discussion concerning this topic focus on the development of a “Human Health Network” for the Great Lakes.

### **4. NYSDOH Health Consultation**

The Health Consultation for the Armstrong Cork Landfills was finalized January 12, 1996. The purpose of the health consultation was to evaluate the potential human exposure to contaminants from the landfills. The document was developed by the NYSDOH in cooperation with the US Agency for Toxic Substances and Disease Registry. The main concerns expressed about the landfills were regarding the impact of the site on the Oswego River and how information on the fish consumption advisory is distributed.

The contaminant of concern in fish from the Oswego River is PCBs. Because the past remedial actions involving the Armstrong landfills have addressed possible exposures, and the fish advisory on channel catfish is in place and is believed to be effective, the site poses no apparent public health hazard. More recent contaminated sediment investigation results indicate the presence of PCBs, mirex, and some metals in core samples in the vicinity of Battle Island upstream of the AOC. A historic association with the Armstrong site is suspected; however, the present concentration and hazardous waste site guidance, do not warrant further remedial action at this time. Further study involving environmental impact assessment by food uptake study has been proposed as part of a USACE project study.

### **4. Other Health Studies/Assessments**

- Inactive Hazardous Waste Sites

Direct contact and inhalation concerns arise involving remedial activities at these sites. Measures are taken to minimize exposure before, during, and after remediation. Concerns involve the contamination of surface and groundwater as well as the

integrity of the remedial actions. An example of these crucial decisions is the extent of requiring the dredging of contaminated river sediments versus the approval of in-place remedial capping with follow-up monitoring and assessment. For the Oswego River, an academic mass balance study identified mirex loading to Lake Ontario; however, follow up by NYSDEC water quality assessments indicates no ongoing downstream AOC or Lake Ontario loadings or impacts.

- The Oswego Newborn and Infant Development Project

Preliminary results of a three-year ongoing study by Helen Daly et.al. at the State University of New York (SUNY) at Oswego indicated that a newborn child's behavior is affected by mothers who regularly consume Lake Ontario fish contaminated with a wide range of persistent toxic chemicals including PCBs. Based on a sample group on nearly 700 newborns, it was reported that the greater number of abnormal reflexes, less mature autonomic responses (startles and tremors) and less developed attention to visual and auditory stimuli distinguished babies born to mothers who had eaten high amounts of Lake Ontario fish. These babies also appeared to be over-reactive to stimulation. It is premature to predict whether these babies will continue to show behavioral differences (reference Appendix H.1).

The Great Lakes community was saddened to learn of the passing of Dr. Helen Daly on November 23, 1995 after a long struggle with cancer. Dr. Daly presented a keynote address on her research at the IJC Biennial Meeting on Great Lakes Water Quality in Duluth, Minnesota in September 1995. Paul Stewart et.al. has continued the study of PCB effects on maternal woman and their children in several studies. The 1999 Assessment of Prenatal Exposure to PCBs from Maternal Consumption of Great Lakes Fish: An Analysis of PCB Pattern and Concentration. Environmental Research Section is referenced in Appendix H.69.

- Research Initiatives

Descriptions of research initiatives are contained in the 1996 RAP Update. These include “Virtual Elimination”, the Great Lakes Information Network, the “Great Lakes Research Review” publication, and human health considerations in RAPs.

## **5. Comparative Risk**

The New York State Department of Environment Conservation is undertaking a “Comparative Risk Project” to assist in pollution prevention management decisions. The environmental release of harmful substances poses some degree of risk to human health, ecosystems, or the quality of life. The substances that are released to the environment can be thought of as stressors on the environment. The New York State Comparative Risk Project is a planning tool that will identify, evaluate, and

compare the risks posed by these stressors, and will develop a strategy to reduce the risks. This project will only look at pollution prevention as a means of reducing the risks they pose. Phase I will identify potential risks to human health, ecosystems, and quality of life that result from releases to the environment. Once these risks are evaluated, Phase II will develop pollution prevention strategies to reduce those risks. Those pollution prevention measures determined to be the most worthwhile will be recommended to the DEC Commissioner for implementation. This project is coordinated by the Pollution Prevention Unit at the DEC, and will be used to provide a sound basis for prioritizing pollution prevention activities.

The Comparative Risk Project will help to identify those problem areas where current regulatory and pollution prevention efforts have so far failed to adequately reduce risk to human health, ecosystems, and quality of life for New Yorkers. Only problem areas that can be addressed through pollution prevention will be considered in this project. The problem areas will be characterized and compared based on "residual risk," that is, the risk that remains given current levels of regulation and control. Each of the problem areas, but especially those determined to be higher risk, will be closely examined for pollution prevention opportunities that will reduce the risks. All identified pollution prevention measures will be evaluated on the basis of cost, expected effectiveness, practicality, and fairness; and those that are determined to be most worthwhile will be recommended to the Commissioner for implementation.

Comparative Risk will serve as one of the agency's primary mechanisms for building better understanding, positive relationships, and support for DEC's mission and goals by soliciting broad public input throughout the project. It will assist in providing education to increase public awareness and understanding of agency programs and will create partnerships among those groups and agencies that participate in the project. The project will involve many people both within and outside of DEC, and will seek to achieve consensus from a broad range of viewpoints.

**PROJECT ORGANIZATION:** The New York State Comparative Risk Project is broken into two phases. Phase I will identify the most significant threats to human health, ecosystems, and quality of life that result from toxic releases to the environment. Phase II begins once these risks are characterized. In Phase II, management strategies that incorporate pollution prevention methods will be developed and prioritized for implementation. The project will be led by a Steering Committee, which will oversee all aspects of the project. Their work is to be supported by four technical work groups, which are to focus on: human health, ecosystems, quality of life, and public participation. The NYSDEC Pollution Prevention Unit is to have lead responsibility for the project and is to provide management and logistical support.

Work Group descriptions:

- a. Human Health Work Group - The Human Health Work Group is to evaluate for each problem area all of the known health risks, including both the cancer and non-cancer effects. The socio-economic and hardship impacts of health effects are to be evaluated by the Quality of Life Work Group. The Human Health Work Group is to evaluate health risks for each group of stressors. The analysis is to include risks caused by acute and chronic exposure.
- b. Ecosystems Work Group - The Ecosystems Work Group is to evaluate risks to the ecosystems that exist throughout New York State. The health and preservation of the plants, animals, and aquatic and terrestrial landscapes that make up the ecosystem, as well as ecosystem processes, will be considered. Use of the ecosystem by humans and risk to human health that results from ecosystem damage will not be part of the analysis.
- c. Quality of Life Work Group - The Quality of Life Work Group is to evaluate risks or damages resulting from the problem areas that are not considered by the Human Health or Ecosystems Work Groups. The Quality of Life Work Group will strive to incorporate the values of New York State residents into its analysis through cooperative efforts with the Public Participation Work Group. The Quality of Life Work Group is to evaluate factors including, but not limited to, individual and societal costs (such as the cost of health care), recreational opportunities, the unequal distribution of risks among New Yorkers, peace of mind, and impacts on future generations.
- d. Public Participation Work Group - The Public Participation Work Group is to provide advice and identify appropriate strategies to disseminate information and solicit input from the public. It will serve as a resource to the technical work groups. The Public Participation Work Group is to work with the Steering Committee and other work groups to develop processes and to select and carry out activities to facilitate a dialogue between the public and the Project participants.
- e. Risk Reduction Strategies Work Group - The Risk Reduction Strategies Work Group is to evaluate the sources associated with the stressors that are characterized by the other work groups, and is to develop a comprehensive list of pollution prevention policies, programs, and strategies that can be taken to reduce the risks identified by the other work groups and the Steering Committee. These strategies may include a variety of specific measures for reducing risk at the generator, local, or State level. Each proposed strategy is to be evaluated by a set of criteria developed by the work group. The Risk Reduction Strategies Work Group is to use the risk comparisons developed by the other work groups to recommend a list of potential risk reduction strategies that DEC can use in its pollution prevention efforts.

**STRESSORS To Be EVALUATED:** Stressors that are released into the environment, grouped into chemical categories as follows:

- 1) Acidic and alkaline substances - This category includes substances that have a pH less than 2 or greater than 12.5. It does not include substances that react once in the environment to form acids or bases or to cause acid rain.
- 2) Atmospheric gases (NO<sub>x</sub>, SO<sub>2</sub>, CO, CO<sub>2</sub>, and CH<sub>4</sub>) - This category includes nitrogen oxides and sulphur dioxide, which are common by-products of combustion and which contribute to acid rain. They are also precursors to ambient ozone, which is considered in this category. Greenhouse gases, except for CFCs, are also included in this category. CO and CO<sub>2</sub> are combustion by-products and CH<sub>4</sub> is emitted from various sources, including landfills.
- 3) Halogens - This category includes elemental halogens, such as chlorine and bromine. Drinking water chlorination by-products and waste water disinfection by-products, such as trihalomethanes, are included in this category.
- 4) Metals and cyanide - This category includes both elemental and organic forms of metals. Lead, mercury, and cadmium are the three that are most often cited as posing environmental risk. Other metals, such as silver, nickel, chromium, and manganese, have sometimes been implicated as causing harm and may be considered as well. In addition, cyanide will be considered here because of its similar properties. These substances enter the environment through a wide variety of sources, including combustion, wastewater discharges, and manufacturing facilities.
- 5) Non-volatile halogenated organic compounds - This category includes dioxin, certain pesticides, PCB's, and a variety of other compounds that are generally of high molecular weight and contain at least one halogen atom. These compounds are likely to be both highly bioaccumulative and toxic.
- 6) Non-volatile and semi-volatile organic compounds - This category includes phthalates, alkylphenols, and glycol ethers, among other compounds, that may produce harmful effects such as endocrine disruption. This category includes all non- and semi- volatile organic compounds that are not halogenated.
- 7) Nutrients - This category includes substances containing various elements, such as phosphorous, potassium, and nitrogen, that act to promote the growth of certain unwanted aquatic species, often to the detriment of

other beneficial species. These primarily reach the environment through non-point sources, including agricultural activities.

8) Particulates - This category includes dust, soot, and other small air particles (PM-10) that become suspended. Asbestos will be considered as well. Combustion is the primary source of particulates. Toxic substances that are associated with particulates, such as benzo(a)pyrene, are not included here.

9) Pesticides - This category includes all pesticides, including insecticides, herbicides, fungicides, and others, that are not included in other categories on this list. Certain pesticides are found in the non-volatile halogenated organic compounds and heavy metals categories. This category includes carbamates and organophosphates.

10) Petroleum products - This category includes petroleum product mixtures such as oil, gasoline, and diesel fuel. It does not include the substances that are released when these products are burned or the individual components such as benzene, toluene, and xylene which are considered in the VOC category.

11) Polynuclear aromatic hydrocarbons (PAHs) - This category includes aromatic compounds that contain three or more closed rings. A typical example is benzo(a)pyrene, which is a potent carcinogen. The primary source of these compounds in the environment is combustion.

12) Radionuclides - This category includes radiation released by human activities, but not radon or other naturally-occurring radiation.

13) Suspended and settleable solids - This category includes nontoxic solid particles, such as silt, that have the ability to cause physical or mechanical damage to surface waters.

14) Volatile organic compounds (VOCs) - This category includes many low molecular weight solvents used in a variety of commercial processes, such as dry cleaning, degreasing, manufacturing, painting, and printing. Common solvents include perchloroethylene, TCE, and benzene.

## ⑧ **RAP Public Participation and Outreach:**

Regular meetings (minimum quarterly) of the Remedial Advisory Committee (RAC) throughout the implementation of the Stage 2 and documentation of the Stage 3 Remedial Action Plan process have continued to keep stakeholders informed and involved in the remedial activities, progress, and strategy to address the use impairment indicators. Presentations of planning actions and study results were provided at these meetings. Field trips were organized to learn more about the specifics of a remedial activity and to respond to committee members interests as necessary. An informational slide show describing the Oswego River Area of Concern was prepared to increase public awareness about the restoration and protection activities and needs of this important geographic area. A newsletter, promotional brochure, RAP display, and Power Point presentation are other examples of outreach activities that have been incorporated into the public participation activities involving the Oswego River AOC. The Remedial Advisory Committee has continued to provide advice and consultation on all activities involving the RAP.

During Stage 3, the Oswego Remedial Advisory Committee advised NYSDEC on investigative needs, study results, and endpoint planning to complete implementation of Remedial Action Plan recommendations and resolution of use impairments. The RAC committee met with DEC staff to discuss RAP related issues and activities. NYSDEC and the Oswego Remedial Advisory Committee have continued the commitment to public participation and public outreach for the Oswego River RAP. Below are examples of the public outreach and public participation activities undertaken for the Oswego River Remedial Action Plan. For additional information, contact Robert Townsend at NYSDEC, Division of Water, Bureau of Water Assessment and Management, 625 Broadway, Albany, New York 12233-3502, phone (518) 402-8284.

### **1. Slide Show**

A slide show was produced for the Oswego River RAP during Stage 1 and Stage 2 development and implementation. The purposes of the slide show were to provide information about the Oswego River Area of Concern, local industries, and the cultural diversity of the area, and also, to increase public awareness and involvement in the Oswego River Remedial Action Plan. The slide show is approximately 15 minutes in length and is suitable for community groups, high school classes and other interested organizations and individuals that want to learn more about the Oswego River RAP, what the potential stressors are on the river and how to get involved to make a difference in caring for the Oswego River.

### **2. New York State RAP Display**

NYSDEC's Public Participation staff produced a New York State RAP display. The purpose of the exhibit is to introduce the public to Remedial Action Plans in New York State and to illustrate what actions are needed and are currently underway to

effectively clean up New York's RAP Areas of Concern. The display has been useful to Great Lakes and Remedial Action Plan functions across the Lake Ontario drainage basin.

### 3. **RAP Promotional Publications**

- The brochure entitled, *RAPs in Action*, was developed to augment the message of the New York State RAP Display. The brochure provides more detailed information on remedial activities that are being implemented to restore and to protect beneficial uses in New York State's RAP Areas of Concern. This publication was most useful during the development of the Stage 1 and Stage 2 documents and subsequent implementation.
- A promotional brochure entitled, *Getting the Word Out*, was also developed to provide a description of public outreach and educational materials (audiovisuals, brochures, fact sheets, etc.) produced by and/or for the RAPs or the Lake Ontario Lakewide Management Plan (LaMP). The brochure is targeted at RAP coordinators, educators, environmental/advocacy groups and community groups in New York State so they are able to choose among diverse materials when promoting New York State RAPs, the Lake Ontario LaMP, and general Great Lakes issues. This publication was most useful during the development of the Stage 1 and Stage 2 documents and subsequent implementation.
- The brochure entitled, *The Oswego River Remedial Action Plan - Past Present and Future*, was developed to summarize the RAP process as it is being implemented in the Oswego River Area of Concern. The role of citizen committees and public participation activities are provided as well as the status of the Oswego RAP prior to the delisting proposal.

### 4. ***Watershed Watch* Newsletter**

The *Watershed Watch* is an annual newsletter that is dedicated to increasing awareness about water quality and RAP issues in the Oswego River Area of Concern. To keep people informed, the *Watershed Watch* articles address the plans and progress of remedial activities, local economic development projects, and stewardship initiatives. The newsletter is produced by the New York Department of Environmental Conservation and the Oswego River Remedial Advisory Committee. The annual Oswego newsletter has been replaced by the less frequent periodic progress or status update reports that are produced for each Area of Concern.

**5. Fish Consumption Advisory Brochure**

NYSDEC in cooperation with NYSDOH has produced an informational handout advising specific limits and prohibitions concerning eating certain Lake Ontario fish. Child bearing women have been identified as a high risk group and should particularly heed these warnings. This advisory is now published on the web at: <http://www.health.state.ny.us/nysdoh/environ/fish.htm> .

**6. Remedial Advisory Committee (RAC) Meetings**

NYSDEC and the Remedial Advisory Committee hold quarterly meetings to provide updates and gain input on current and planned RAP activities. The meetings also provide an opportunity for the committee to address local concerns as related to remedial activities being implemented in the Area of Concern. Field trips and investigative study presentations, to learn more about ongoing remedial activities in the river basin, are often planned in conjunction with regular committee meetings.

**7. Keeping up on RAP Information and Progress**

If you would like to inquire about Remedial Action Plan documents try the NYSDEC, Division of Water website at: [www.dec.state.ny.us/website/dow](http://www.dec.state.ny.us/website/dow) or please send your name, address and specific request to: NYSDEC, Division of Water, Bureau of Water Assessment and Management, 625 Broadway, Albany, NY 12233-3502, Attn. Great Lakes RAPs.

**8. Power Point Presentation**

A 39 slide Power Point Presentation was developed by the NYSDEC in consultation with the Remedial Advisory Committee to convey the message of the Stage 3-delisting document to the public. During 2002, this presentation was delivered to the RAC committee, the Great Lakes Basin Advisory Council, the Oswego County Water Quality Coordinating Committee, the Oswego County Soil and Water Conservation District, and members of the Oswego County Environmental Management Council. In 2005, it was presented at the IJC Biennial Meeting. A copy of the PDF file (readable in Adobe Acrobat) is now available as Appendix P in the Stage 3 document. This is to be posted on DEC's Division of Water website along with the entire delisting document. A formal comment period is planned to be conducted in early 2006 by use of the website and announcement in New York State's Environmental Notice Bulletin (ENB).

## ⑨ **Investigations and Monitoring Activities:**

The results of conducting various investigations and monitoring activities have been instrumental in making progress towards resolving the Oswego River Area of Concern use impairments. Some monitoring plans are part of planned hazardous waste site remediation projects; others are part of ongoing environmental program oversight; and a number have been project specific to the Oswego River because of the RAP. The development and implementation of investigations and monitoring plans are subject to regulatory review and approval. Where use impairments have been directly caused by specific sources, chemicals and/or sites, the investigative activities have been closely monitored for the RAP. A focus of environmental monitoring involving hazardous waste site remediation is to minimize the local and downstream impacts resulting from these activities and to comply with cleanup criteria. Some remedial site monitoring may be so specific to the site that it does not encompass the larger RAP beneficial use indicator perspective. Although the goal is to encourage the ecosystem approach, project money may very well have specific requirements attached that limit the benefits to the Remedial Action Plan. The RAP then needs to “go that extra step” to conduct additional monitoring and assessment activities.

For the Oswego RAP, in addition to the monitoring activities required from industries conducting remediation at upstream sites within the watershed, other environmental assessments have been conducted in the downstream receiving waters to evaluate the impact on use impairments and the effect that restoration activities have on the beneficial uses in the local Area of Concern. These further investigations have involved health, fish, wildlife, plankton, macroinvertebrate, water quality, and sediment studies and have been utilized to better define a change in status of use impairment indicators under the RAP process. Funding for these additional investigations and assessments has also been limited and subject to specific priorities which has resulted in the RAP not always being able to accomplish all the monitoring goals of all the stakeholders. Overall however, the monitoring results tell us that significant progress has been accomplished in restoring and protecting the beneficial uses in the AOC. Summary results of these more recent investigative and monitoring studies that do contribute towards resolving use impairment are presented below:

### **1. Oswego Harbor Fish Pathology Report**

This study was conducted by Jan Spitsbergen, a veterinary pathologist from Cornell University, during 1993 and 1994 (Appendix H.68). Brown bullhead, white sucker, and rock bass were selected to study lesions. Very few pollution-associated lesions were observed. This tumor study for the Oswego AOC did not indicate exposure of the studied fish populations to potent anthropogenic carcinogens. For tumors that were observed, their occurrence was not statistically significant when compared to reference sites. This study was peer reviewed by Dr. Paul Bower, also of Cornell, who came to the same conclusion for the Oswego AOC.

Results of the study for tumors and other lesions found little evidence of impairment of fish health by contaminants in the Oswego River AOC. Although fish from the Area of Concern and Lake Ontario contain contaminant levels sufficient to warrant an advisory limiting human consumption of fish, these contaminant levels are below those causing an increase in tumors or other abnormalities in the fish.

A variety of factors other than toxicants are known to influence rates of neoplasia in mammals and fish; such factors include diet, genetics, age of the animals studied, natural carcinogens such as radon, metals from bedrock, or naturally-formed cancer-causing agents such as nitrosamines which can occur in rotting plant material in watersheds. Further tumor study was not recommended; however, if funds were available, more sophisticated tests involving the reproductive health of fish would be appropriate. Specialized studies of reproductive hormones, egg and sperm production and quality, and embryo and larval viability would be required in order to properly assess the reproductive health of fish entering the AOC.

For the AOC, toxicity testing involving reproduction of indicator organisms, indicated no impairment and water quality testing shows good quality. With the restoration of spawning habitat below the Varick Dam under the FERC license, the fish habitat and population impairments will cease. Based on the Cornell pathology study, the Remedial Advisory Committee has reassessed the status of the fish tumor use impairment indicator in the AOC as “not impaired”. Further discussion of deformity or reproduction occurs under the resolution of the bird and animal deformity or reproduction use impairment indicator #7.

## 2. Oswego Harbor (Water Quality) Survey

NYSDEC conducted the **Oswego Harbor Survey** for the AOC which was funded by an EPA grant and published in 1994 (Appendix H.35). The main objectives were to investigate the causes and status of several use impairment indicators. Eutrophication or undesirable algae, beach closings, and degradation of plankton populations were the main conditions investigated. Data indicates that there are no problems concerning dissolved oxygen, eutrophication, nutrients, coliforms, pathogens, or phytoplankton/ zooplankton. All measurements were indicative of a healthy environment; however, toxic effects did occur when conducting BOD and biological toxicity tests.

Follow-up toxicity sampling was conducted using the *Ceriodaphnia dubia* mortality and reproductive toxicity testing. Results showed no statistically significant reproductive or survival effects. The overall results of the water quality testing are presented under the eutrophication and algae use impairment indicator #4 in the main body of the Stage 3 document on page 31.

### **3. Lake Ontario Source Contaminant Study**

New York State sources of waterborne contaminants to Lake Ontario were studied and reported on by NYSDEC's Simon Litten (Appendix H.17). Water quality sampling conducted during 1992-1994 using the "Passive In Situ Concentration-Extraction Sampler" or PISCES indicates no active sources of contaminants in the water column that are currently contributing to use impairments in the Oswego River AOC. Some sample analyses did detect contaminants at low levels in the water column; however, these are not considered problematic nor are they inconsistent with water quality samples of Lake Ontario. At the locations where the passive sampling results indicate a water column presence, follow-up source study is recommended.

PCB sample results obtained from the Oswego Harbor suggest that normal maritime traffic has far more effect on contributing to whole water PCB contaminant concentration than does dredging. Moderate levels of dissolved phase PCBs (10-25 ng/l) were observed in some of the study samples in the lower Oswego River. There was no evidence for a PCB source from the Armstrong facility site.

Of the four primary sites studied for Mercury, concentrations were the lowest in the Oswego River; however, due to high volume of water flow in the Oswego River, mercury loads to Lake Ontario were identified as highest from the Oswego River. In general, wastewater treatment plant influents were observed as relatively high in mercury concentration; this indicates the need for pretreatment program follow-up and/or additional work on stormwater / nonpoint source reductions. Sediment analysis showed evidence of historical mercury contamination of the Oswego River depicted by a display of a pattern of concentrations that increase with core depth (maximum observed at 29 cm.). These more historical sources of mercury contamination have been greatly reduced. Further mitigation of sources to Lake Ontario via tributaries is to be addressed by the Lake Ontario LaMP.

The discovery of mirex at Lock 6 and off the lower end of Armstrong property was expected. Mirex (pesticides) detection was, however, isolated and at very low levels of concentration and amount; not sufficient for mapping or remedial action.

### **4. Oswego River Sediment Study**

Use impairment indicator #10 addressing "restrictions of dredging activities" in Section III.B contains a summary of the results from the Oswego River Sediment Study published in 1997 (Appendix H.28). Overall, metals and organic contaminants were found in the sediment cores that were mostly attributable to historical practices. Further study of the upstream river area at Battle Island was recommended and subsequently acted upon to determine the presence, extent, and threat of upstream sources. Although PCBs, mirex, and metals were identified by sediment coring and

analyses, assessment did not warrant further action by NYSDEC. Food uptake study is under consideration as a next step research project proposal to determine the presence of an environment impact due to these upstream contaminants. Consistency with delisting criteria is maintained since there is no impact on the AOC beneficial uses.

## **5. Mirex Study**

“A Screening-Level Mass Balance Analysis of Mirex Transport and Fate in the Oswego River” report was published in the Journal of Great Lakes Research in 1995 (Appendix H.2). The abstract reads “A mass balance approach was used to evaluate the fate of mirex in the Oswego River. The objectives of this research were 1) to assess the magnitude and extent of mirex contamination in the Oswego River, 2) to quantify the transport, fate, and distribution of mirex in the river, and 3) to estimate mirex export to Lake Ontario via the Oswego River.

Field data collected as part of a 1990 Oswego River mirex study, in addition to other existing data, were used to develop a water quality model describing the transport and fate of chlorides, total suspended solids, and mirex in the Oswego River from Fulton to Lake Ontario. Long-term and short-term loading scenarios were evaluated to assess the possible magnitude of the initial mirex discharge to the Oswego River in 1965 as well as the subsequent export resulting from a given loading. Field data and model results suggest that a short-term mirex discharge occurring in the mid-1960s cannot account for the water column concentrations observed in 1990 or the mirex mass in Lake Ontario sediments attributable to the Oswego River. Similarly, field data and model results suggest that resuspension of the 1990 in-place mirex mass cannot account for the water column mirex concentrations observed in 1990. This suggests that there may be a continuing mirex source to the Oswego River. Based on the 1990 field data, the estimated Oswego River mirex inventory was 10 kg and export to Lake Ontario averaged 42 g/day.”

The above study conclusions are not consistent with DEC’s Lake Ontario Source Contaminant Studies discussed above in item #3. A recent sediment study completed at Battle Island in 2002 does not indicate an active source nor warrant hazardous waste site remedial measures. This is consistent with NYSDEC not identifying any follow-up involving the RAP or LaMP processes. A worse case scenario for this Battle Island area and historic Armstrong sites may identify further remedial investigation and clean up activity; however, this would be based on a local environmental impact or a change to the considerations (criteria) for in-place wastes triggering remediation. In either case, this would be addressed as a local remedial measure independent of RAP purview.

## Appendix L

### Use Impairment Strategy Summaries and Management Forms

An integrated strategy system for managing each use impairment indicator was established to identify the sequence of actions that needed to be taken as part of RAP implementation. Management forms were adopted to assure that the steps were adequately identified and to facilitate, influence, and track the actions to the benefit of the Remedial Action Plan and the restoration and protection of beneficial uses. The use of the management forms is described below.

The development of the remedial strategies for each use impairment was initiated by identifying the specific actions and needs that should restore and protect the beneficial uses. Further, the current status of these remedial strategies was noted and where possible a completion date and responsible party were defined. This information for each use impairment indicator was then consolidated on a single page form entitled the “Use Impairment Restoration and Protection Strategy” management form. On the next five pages, use impairment strategy summaries are described. Following these summaries, the strategy management forms are presented which have been updated to document the status of remedial activity progress showing resolution of each indicator to achieve the RAP goals.

Each Use Impairment Restoration and Protection Strategy management form has targeted a specific use impairment indicator and provided impairment descriptive data, a remedial strategy plan with status, and narrative comments. As completed, each use impairment strategy management form now describes its use impairment indicator status as not impaired or resolved by others. There were a total of eleven use impairments indicators for which a strategy management form was applied for the Oswego AOC. These included the nine indicators from the original Stage 1 status of impaired and/or needing further study, and two indicators later considered for an expanded evaluation as determined warranted by interest of members of the Remedial Advisory Committee. These indicators, their Stage 1 status, and their final RAP status determinations are listed below:

<u>Use Impairment Indicator</u>	<u>Earlier Status</u>	<u>Final Status</u>
1. Fish consumption restrictions	impaired	resolved by other
2. Degradation of fish populations	impaired	resolved by other
3. Loss of fish habitat	impaired	resolved by other
4. Eutrophication or Undesirable Algae	impaired	not impaired
5. Degradation of benthos	likely	not impaired
6. Fish tumors or other deformities	unknown	not impaired
7. Bird and animal deformities/reproductive prob.	unknown	not impaired
8. Degradation of Aesthetics	unknown	not impaired
9. Degradation of plankton populations	unknown	not impaired
10. Restrictions on dredging activities	expanded assess.	not impaired
11. Beach closings	expanded assess.	not impaired

## **Use Impairment Strategy Summaries:**

The narrative summaries for each Use Impairment Restoration and Protection Strategy management form for the Oswego River Area of Concern are described below. The eleven use impairment strategy management forms follow. These remedial strategies had the goal to restore and to protect the beneficial uses concerning each of the use impairment indicators.

### **1. Fish Consumption Restrictions**

This use impairment was identified in Stage 1 as caused by PCBs, mirex, and dioxin as part of a Lake Ontario lakewide advisory. The sources are not identified as in the Area of Concern and are attributed to upstream industrial discharges, inactive hazardous waste sites, contaminated sediments, air deposition, and Lake Ontario. The implementation of municipal and industrial corrective actions regarding point and nonpoint sources of pollutants in communities throughout the Oswego River drainage basin have contributed greatly to the reduction of pollutants entering the environment. Remedial actions associated with Onondaga Lake continue to mitigate the nonpoint source pollution threat to the AOC and Lake Ontario. The expanded implementation of Best Management Practices (BMPs) in the watershed to address fish, aquatic, wildlife, and human health concerns promotes the well being of this and other beneficial uses in the Area of Concern.

The fish consumption advisories, upon which the identification of this use impairment in the Oswego River Area of Concern is based, are in effect as part of a Lake Ontario lakewide fish consumption advisory. The larger Lake Ontario Lakewide Management Plan (LaMP) is the appropriate responsible environmental program to provide the forum an implementation process for the ultimate resolution of the consumption restrictions impairment in the Lake and the connected Oswego River AOC. There are no known sources or fish and wildlife consumption advisories specific to the AOC. Under these circumstances, resolution of the fish consumption restriction use impairment indicator by the Lake Ontario LaMP is consistent with the federal EPA delisting criteria.

### **2. Degradation of Fish Populations**

This use impairment is predominately due to periodic dry river areas created below the Varick Dam. The resulting decreased fish habitat is considered a cause of the fish population impairment. The physical disturbance created by the presence and operation of the power dam are the main cause of the impairment. The degradation of fish populations use impairment indicator is closely linked to the fish habitat loss use impairment indicator discussed below. Remedial measures associated with the requirements of relicensing of the Varick Power Dam fully address the fish

population use impairment as well as the habitat impairment. The FERC license is the appropriate responsible environmental program initiative that provides the solution and forum for the resolution of the fish population and habitat impairments. The Run-of-River and fish protection and passage requirements under the FERC relicensing process are to protect and restore the beneficial use to fish populations. There are no identified wildlife impairments in the AOC.

### **3. Loss of Fish Habitat**

Closely related to the degradation of fish populations indicator above, this use impairment is also predominately due to periodic dry river areas created below the Varick Dam and the resulting decreased fish habitat and associated fish population loss. The physical disturbance created by the presence and operation of the power dam are the main cause of the impairment. Chemical causes are related to the fish consumption advisories and are not identified as direct causes of the degradation of fish habitat or populations in the AOC. The degradation of the fish habitat use impairment indicator is closely linked to the fish population loss use impairment indicator and the periodic low flow and dry area in the Oswego River below the dam. Remedial actions, including “Run-of-River” requirements associated with the relicensing of the Varick Power Dam fully address the fish habitat use impairment as well as the fish population impairment by providing fish access and suitable conditions. There are no identified wildlife impairments in the AOC.

### **4. Eutrophication or Undesirable Algae**

The remedial actions taken by State and Local government agencies over the past fifteen years have served to limit and address the nutrient input into the Area of Concern and the watershed. The control on nutrient input has resolved the concern of an eutrophic condition in the AOC and provides the protection against further use impairment. Water quality surveys confirm that no eutrophic condition or impairment from undesirable algae is present. The long term monitoring of the Rotating Intensive Basins Survey (RIBS) program, as well as the regulatory presence of NYSDEC environmental quality surveillance and monitoring staff, provides protection to assure the beneficial uses of the waters of the AOC are maintained. The desired endpoints have all been accomplished in that no persistent water quality problem exists due to cultural eutrophication, water quality standards are achieved, and the beneficial use goals are met and maintained for the AOC. Although nuisance conditions from nutrients exist in certain areas of the Oswego River, no further remedial action is planned or warranted under specific oversight of the Remedial Action Plan.

## **5. Degradation of Benthos**

The results of the 1997 final report on the Oswego River Sediment Study and RIBS studies data provide the data needed to establish that the benthic community in the AOC is not impacted and is representative of a healthy reference community. The benthic community is documented as having an integrity substantially similar to unimpacted reference communities. The beneficial use is therefore not impaired and is further protected by ongoing agency surveillance and monitoring activities.

## **6. Fish Tumors or Other Deformities**

Based on the fish pathology study completed in 1994 by Cornell University, no significant occurrence of tumors and little evidence for impairment of fish health was observed in the Oswego River Area of Concern. The results also indicate little evidence for impairment of fish health by anthropogenic contaminants in the AOC. The beneficial use is therefore considered unimpacted and the use impairment indicator status “not impaired”. In this study, some difficulty was encountered in finding resident fish, which underscores the close link of fish in the harbor area to Lake Ontario.

## **7. Bird and Animal Deformities or Reproductive Problems**

The delisting criteria have been satisfactorily addressed by study results and information available through marsh monitoring and ongoing program initiatives. Environmental trend data associated with the larger Lake Ontario watershed supports this conclusion. The indicator status is therefore not impaired.

## **8. Degradation of Aesthetics**

There was a low confidence of any use impairment in the early stages of the RAP. Any concern would involve the observance of periodic excessive algae in certain upstream shoreline and calm river areas. Although turbidity occurs occasionally during high flow, it is not excessive, and is largely of natural origin and is not an aesthetic problem. It is noted that the turbidity associated with the Oswego River is much less than in other rivers of similar character (e.g. Genesee River). The 1994 Oswego Harbor (water quality) Survey identified no aesthetics impairment. The desired endpoint, as identified by the Remedial Advisory Committee, is the absence or minimal presence of floatables and odors, and includes weed control to non-nuisance levels. No aesthetics impairment is defined for the AOC.

## **9. Degradation of Zooplankton and Phytoplankton**

The health of the planktonic community is based on a number of factors including the factors affecting the indicator assessments for eutrophication, algae, toxicity, water quality, and upstream watershed and downstream Lake Ontario influences. Results from plankton sampling from the Oswego River harbor, represent a mix of harbor, river, and Lake Ontario waters. River waters are known to have less abundance of plankton populations and nearshore areas of Lake Ontario waters may have stressed plankton populations. The preponderance of evidence suggests that the planktonic community of the lower Oswego River and harbor area are not significantly impacted as a result of conditions in the lower river and harbor.

Based on the plankton study data in the Oswego Harbor Survey, it is difficult to make a conclusive finding on the status of the plankton population; however, when considering other supporting information a not impaired status for the AOC is concluded. Consideration is given to the tributary river environment associated with the Lake Ontario influence, seasonal changes affecting the region, sample timing, and other local area site characteristics involving the growth of macrophytes. In any event, a remedy for plankton restoration and protection in the AOC would not be directed at AOC sources, but would be focused on upstream watershed and downstream Lake Ontario causes and effects. The upstream actions by the FERC relicensing process to create additional year round “run-of-river” flow in the AOC will most likely benefit the plankton populations. Associated stresses on the AOC related to Lake Ontario are to be addressed through the Lake Ontario LaMP. Therefore, upstream and downstream actions by responsible environmental watershed and LaMP programs will provide the solution and forum for any additional remediation or resolution regarding the planktonic community in the AOC. This is consistent with delisting criteria. The plankton community is not impaired for the AOC and any further action under the RAP process has therefore been determined not warranted.

## **10. Restriction on Dredging Activities**

Periodic maintenance dredging in the Area of Concern has been determined to be not impaired. The early stages of the RAP assessed this dredging restrictions indicator as not impaired with high confidence based on no restrictions on the disposal of dredged materials from the harbor. The presence of contaminants of concern (PCBs, PAHs, mercury, mixex, dioxin and furan) has been detected in the Oswego River; however overall, sediment quality and toxicity are acceptable and USEPA guidelines for dredging and disposal are achieved. The most recent sediment surficial and core sampling results are consistent with this finding. The sediment sampling data does identify upstream sources as a potential threat to the ecosystem and Lake Ontario. However, the concentrations identified in the Area of Concern sediments (particularly the navigational channel) are not of a level or threshold where their

dredging and disposal involves contamination restrictions. The most recent harbor area dredging (of the western and outer harbor channel) by the United States Army Corp of Engineers (USACE) for navigational purposes was approved and performed without restrictions on the dredging activities in the summer of 1999. No dredging restrictions exist in the Oswego River Area of Concern. The approved navigation channel dredging, and sediment core analyses data support the status of not impaired for this use impairment indicator.

## **11. Beach Closings**

In the Stage 1 document, the Beach Closings use impairment indicator was determined to be not applicable to the Area of Concern. Because there are no beaches within the Area of Concern, this impairment indicator has been evaluated as not impaired. At one time, there was a concern regarding the classification of the waters in the AOC for swimming. In New York State the waters classifications A, B, C, etc. denote best usage and should not be misrepresented as a specific rating of water quality. For example, the AOC is classified as “C” with the best usage of the waters as fishing. Class C waters shall be suitable for fish propagation and survival under this best use. The water quality of Class C waters shall also be suitable for the other uses of primary and secondary contact recreation, although other factors may limit the use for these purposes in a specific area or river segment.

Because of the boat and ship traffic, swimming is not encouraged in the harbor. As Class C waters, the AOC is suitable for partial-body contact and perhaps swimming; however, in the interest of safety, swimming is not a designated use for the lower Oswego River and harbor area. The 1994 Oswego Harbor (water quality) Survey data supports a not impaired status for partial-body contact. The Beach Closings use impairment indicator (originally determined not impaired) has been reassessed to be not impaired because there are no designated beaches in the AOC. Water quality survey results support this not impaired status.



**USE IMPAIRMENT RESTORATION and PROTECTION STRATEGY**

REMEDIAL ACTION PLAN: **OSWEGO RIVER**

FORM#: 1

USE IMPAIRMENT INDICATOR: Fish Consumption Restrictions

IJC#: 1

AOC LOCATION: Lower Oswego River, Oswego Harbor, and Lake Ontario

STAGE I IMPAIRMENT STATUS & CAUSES: IMPAIRED - PCBs and Dioxin; Potentially Mirex and Chlordane

POLLUTION SOURCES: Lake Ontario, point and nonpoint source discharges upstream of the AOC (industrial discharges, inactive waste sites, contaminated sediments).

=====

<u>TARGET DATE:</u>	<u>RESP. PARTY</u>	<u>REMEDIAL STRATEGY / ACTION ITEM:</u>	<u>STATUS:</u>
1.10/94	NYSDEC	Sample Sediment (core & surficial)	C
2. 8/95	DFW	Eel & Catfish Study Results (to NYSDOH)	C
3. 4/97	NYSDEC	Final Report on Sediment Sample Results	C
4. Ongoing	DEC/Ind.	Complete Haz. waste rem. (Watershed)	I
5. Ongoing	DEC/Ind.	Continue BMP implement. (Watershed)	I
6. Ongoing	NYSDEC	Document F & W study contam. levels	I
7. Ongoing	NYSDEC	Establish any add'l F & W management Plans	I
8. 4/02	NYSDEC	Observe no health advisories (AOC caused)	C
9. 4/02	RAC/DEC	Reassess Indicator "LaMP to Address"	C
10. 7/05	DEC/EPA	Liaison/Obtain IJC delisting support	C

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COMMENTS: Fish consumption advisory issued by NYSDOH for all of Lake Ontario including streams up to first barrier. No advisories specific to the AOC. PCBs exceed FDA fish consumption guideline and on downtrend; dioxin exceeds State fish guideline; PCBs and mirex exceed FDA wildlife (duck) guideline. No specific data for AOC guidelines. Lake Ontario LaMP identified as appropriate responsible environmental program to address lakewide fish advisory

STATUS KEY: I = Implementation progressing  
 C = Completed U = Under development/assessment/investigation  
 P = Planned N = Needs development/assessment/investigation  
 D = Deferred R = Required by enforcement/permit/agreement

USE IMPAIRMENT RESTORATION and PROTECTION STRATEGY

REMEDIAL ACTION PLAN: **OSWEGO RIVER**

FORM#: 2

USE IMPAIR. INDICATOR: Degradation of Fish Populations

IJC#: 3 AOC LOCATION: Lower Oswego River, Oswego Harbor

STAGE I IMPAIRMENT STATUS & CAUSES: IMPAIRED (for fish) - Periodically dry areas and to a lesser extent chemical causes from watershed and Lake Ontario; no wildlife impairment identified.

POLLUTION SOURCES: Watershed wastewater discharges, inactive hazardous sites, upstream contaminated sediments?, Lake Ontario.

=====

<u>TARGET</u>	<u>RESP.</u>		
<u>DATE:</u>	<u>PARTY</u>	<u>REMEDIAL STRATEGY / ACTION ITEM:</u>	<u>STATUS:</u>
1. _9/94_	NYSDEC	Conduct Water Quality Study Sampling	_ C _
2. _4/95_	CORNELL	Perform Fish Study & Complete Report	_ C _
3. _9/95_	NYSDEC	Water Quality Survey Results Report	_ C _
4. _12/98_	NYSDEC	Population levels based on FERC req'ts	_ C _
5. _12/98_	NYSDEC	Confirm no water quality toxicity	_ C _
6. _4/02_	DFW	Assess Fish numbers and balance goals	_ C _
7. _4/02_	DEC/RAC	Reassess: "FERC provisions fully address"	C
8. _11/04_	PowerCo.	FERC License Issued; fish pop. addressed	_ C _
9. _5/05_	NYSDEC	License Provisions resolve fish conditions	_ I _

=====

COMMENTS: This use impairment was identified by fish management programs; Restoration based on FERC relicensing, fish habitat restoration, and link to Lake Ontario. The fish populations and fish habitat impairments are to be addressed by the FERC license requirements fully incorporated into issued FERC license Nov. 2004; compliance under FERC/LaMP assured by fish access/conditions.

STATUS KEY: I = Implementation progressing  
 C = Completed U = Under development/assessment/investigation  
 P = Planned N = Needs development/assessment/investigation  
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USE IMPAIRMENT RESTORATION and PROTECTION STRATEGY

REMEDIAL ACTION PLAN: **OSWEGO RIVER**

FORM#: 3

USE IMPAIRMENT INDICATOR: Loss of Fish Habitat

IJC#: 14 AOC LOCATION: Within AOC

STAGE I IMPAIRMENT STATUS & CAUSES: IMPAIRED (for fish) - Dry area below Varick Dam; physical disturbances, and potential upstream watershed nonpoint pollution sources (under remediation); water levels may contribute. No wildlife impairment identified.

POLLUTION SOURCES: Elevated levels of contaminants in some upstream sediments can impact benthos; natural erosion can add to disturbance. Watershed and LaMP initiatives address.

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TARGET      RESP.
DATE:       PARTY   REMEDIAL STRATEGY / ACTION ITEM:      STATUS:
-----
1. 4/96     NYSDEC  Assess Habitat / Refine Restoration    C_
2. 4/02     NYSDEC  Monitor FERC Relicensing Process      I_
3. 4/02     Local   Define any Needed Land Use Controls    I_
4. 4/02     PowerCo. Obtain/Implement FERC Dam Relicense  I_
5. 12/98    DFW     Assess Fish Habitat goals              I_
6. 12/98    NYSDEC  Confirm no water quality toxicity      C_
7. 4/02     DEC/RAC Reassess: "FERC provisions fully address" C
8. 11/04    PowerCo. FERC License Issued; fish hab. addressed C_
9. 5/05     NYSDEC  License Provisions resolve fish access  I_
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COMMENTS: This use impairment was identified by Fish management programs; Restoration based on FERC relicensing, fish habitat restoration, and link to Lake Ontario. The fish habitat and population impairments are to be addressed by the FERC license requirements fully incorporated into issued FERC license Nov. 2004; compliance under FERC/LaMP assured by fish access/conditions.

STATUS KEY:  
 C = Completed            I = Implementation progressing  
 P = Planned             U = Under development/assessment/investigation  
 D = Deferred            N = Needs development/assessment/investigation  
                           R = Required by enforcement/permit/agreement

USE IMPAIRMENT RESTORATION and PROTECTION STRATEGY

REMEDIAL ACTION PLAN: **OSWEGO RIVER**

FORM#: 4

USE IMPAIRMENT INDICATOR: Eutrophication or Undesirable Algae

IJC#: 8                    AOC LOCATION: Lower Oswego River, AOC and Lake Ontario nearshore

STAGE I IMPAIRMENT STATUS & CAUSES: IMPAIRED - Phosphorus

POLLUTION SOURCES: Point and nonpoint watershed sources (Municipal wastewater discharges and stormwater runoff)

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  TARGET   RESP.
  DATE:    PARTY   REMEDIAL STRATEGY / ACTION ITEM:      STATUS:
=====
1. 9/94    NYSDEC  Conduct AOC Water Quality Sampling    C_
2. 9/95    NYSDEC  Water Quality Survey Results Report   C_
3. 12/98   NYSDEC  Confirm no water quality toxicity     C_
4. 5/99    RAC/DEC Define Delisting Crit. ('99 Update)   C_
5. 12/01   NYSDEC  Confirm indicator not impaired by discharges C_
6. 4/02    RAC/DEC Reassess Use Impairment Status       C_
7. 4/02    RAC/DEC Eutrophication Indicator "not impaired" C_
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COMMENTS: Reports of algal blooms in the AOC and Lake Ontario nearshore areas and lower Oswego River above the AOC. 1994 Water Quality Survey indicates no eutrophication problem in AOC. No observed over abundance of free floating algae in harbor; however, shallow harbor areas do support abundant rooted plants; weed harvesting is used. Other sampling indicates no impairment with nuisance condition managed. Zebra Mussels contribute to water clarity. Dissolved oxygen in the AOC is not impacted; however, some upstream areas may be. Although nuisance conditions from nutrients exist in certain areas of the Oswego River, no further remedial action is planned or warranted under specific oversight of the Remedial Action Plan.

STATUS KEY:                    I = Implementation progressing  
 C = Completed                U = Under development/assessment/investigation  
 P = Planned                  N = Needs development/assessment/investigation  
 D = Deferred                 R = Required by enforcement/permit/agreement

USE IMPAIRMENT RESTORATION and PROTECTION STRATEGY

REMEDIAL ACTION PLAN: OSWEGO RIVER

FORM#: 5

USE IMPAIRMENT INDICATOR: Degradation of Benthos

IJC#: 6 AOC LOCATION: Oswego Harbor and River up to Dam

STAGE I IMPAIRMENT STATUS & CAUSES: LIKELY - unknown

POLLUTION SOURCES: Potentially past industrial discharges, contaminated sediments, inactive hazardous waste sites, and nonpoint sources.

=====

<u>TARGET</u>	<u>RESP.</u>	<u>REMEDIAL STRATEGY / ACTION ITEM:</u>	<u>STATUS:</u>
<u>DATE:</u>	<u>PARTY</u>		
1. 4/97	NYSDEC	Final Report on Sediment Sample Results	C
2. 5/99	RAC/DEC	Define Delisting Crit. ('99 Update)	C
3. 12/01	NYSDEC	Confirm no significant AOC impact	C
4. 4/02	RAC/DEC	Reassess Use Impairment Status	C
5. 4/02	RAC/DEC	Benthos Indicator "not impaired"	C

=====

COMMENTS: Toxicity tests conducted on sediments in 1987 suggest benthic macroinvertebrate populations may be impaired. A survey of macroinvertebrates in 1972 and 1978 found a greater number of species in the AOC than the upper reaches of the river. 1997 Results of the Oswego River Sediment Study indicate the harbor area as not impacted. Lower river (above AOC) assessed as slightly impacted. The AOC benthic community is documented as having an integrity substantially similar to unimpacted reference communities. The beneficial use is therefore not impaired and is further protected by ongoing agency surveillance and monitoring activities.

STATUS KEY:

C = Completed	I = Implementation progressing
P = Planned	U = Under development/assessment/investigation
D = Deferred	N = Needs development/assessment/investigation
	R = Required by enforcement/permit/agreement

USE IMPAIRMENT RESTORATION and PROTECTION STRATEGY

REMEDIAL ACTION PLAN: OSWEGO RIVER

FORM#: 6

USE IMPAIRMENT INDICATOR: Fish Tumors or Other Deformities

IJC#: 4 AOC LOCATION: Within AOC

STAGE I IMPAIRMENT STATUS & CAUSES: UNKNOWN - reassessing as not impaired

POLLUTION SOURCES: Potentially contaminated sediments

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=====
  TARGET   RESP.
  DATE:    PARTY   REMEDIAL STRATEGY / ACTION ITEM:      STATUS:
1. -4/95   CORNELL  Perform Fish Study & Complete Report  C_
2.  8/95   DFW      Eel & Catfish Study Results (to NYSDOH) C_
3.  9/95   NYSDEC   Water Quality Survey Results Report    C_
4.  4/97   NYSDEC   Final Report on Sediment Sample Results C_
5.  6/98   RAC/DEC  Evaluate Sampling & Fish Study Results  C_
6.  4/02   RAC/DEC  Reassess Use Impairment Status         C_
7.  4/02   RAC/DEC  Fish Tumor/deform. Indicator "not impaired" C_
=====

```

COMMENTS: Limited initial Stage 1 data and reports indicated rates exceed those in unimpacted areas. Recent study by Cornell indicates little evidence of impairment of fish health by contaminants in the Oswego Harbor. Although fish from the AOC contain contaminant levels sufficient to warrant the fish consumption advisory, these contaminant levels are below those causing any increase in tumors or other abnormalities in the fish. Based on this new tumor data, a use impairment status change to "not impaired" has been recommended by DEC and supported by the Remedial Advisory Committee.

STATUS KEY:            I = Implementation progressing  
 C = Completed        U = Under development/assessment/investigation  
 P = Planned          N = Needs development/assessment/investigation  
 D = Deferred         R = Required by enforcement/permit/agreement

USE IMPAIRMENT RESTORATION and PROTECTION STRATEGY

REMEDIAL ACTION PLAN: OSWEGO RIVER

FORM#: 7

USE IMPAIRMENT INDICATOR: Bird and Animal Deformities  
or Reproductive Problems

IJC#: 5 AOC LOCATION: Within AOC

STAGE I IMPAIRMENT STATUS & CAUSES: UNKNOWN - Potentially PCBs,  
dioxin, and octachlorostyrene; no definitive data reported.

POLLUTION SOURCES: Potentially contaminated sediments

=====

<u>TARGET</u>	<u>RESP.</u>		
<u>DATE:</u>	<u>PARTY</u>	<u>REMEDIAL STRATEGY / ACTION ITEM:</u>	<u>STATUS:</u>
1_12/96	RAC/DEC	Define Restoration (delisting) Criteria	C_
2._6/98	DEC	Workshop: Bird Studies CAN = (no impact)	C_
3._12/01	DEC	Summary Bird Studies Report = no impact	C_
4._12/01	DEC	Confirm incident rates < inland controls	C_
5._12/01	DEC	Confirm wetlands support healthy community	C_
6._4/02	RAC/DEC	Reassess Use Impairment Status	C_
7._4/02	RAC/DEC	Bird/Animal deform.Indicator "not impaired"	C_

=====

COMMENTS: The delisting criteria have been satisfactorily addressed by study results and information available through marsh monitoring and ongoing program initiatives. Environmental trend data associated with the larger Lake Ontario watershed supports this conclusion. Even though certain contaminant levels in fish flesh exceed DEC criteria for protection of fish-eating wildlife, deformities and other problems are not identified. The indicator status is therefore "not impaired". Note: An extensive biomonitoring program is not warranted unless sufficient evidence suggests that deformities or reproductive impairment are probable.

STATUS KEY:  
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U = Under development/assessment/investigation  
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USE IMPAIRMENT RESTORATION and PROTECTION STRATEGY

REMEDIAL ACTION PLAN: OSWEGO RIVER

FORM#: 8

USE IMPAIRMENT INDICATOR: Degradation of Aesthetics

IJC#: 11            AOC LOCATION: AOC

STAGE I IMPAIRMENT STATUS & CAUSES: UNKNOWN - Potentially algae and turbidity

POLLUTION SOURCES: Stormwater, spring runoff

=====

<u>TARGET</u>	<u>RESP.</u>	<u>REMEDIAL STRATEGY / ACTION ITEM:</u>	<u>STATUS:</u>
<u>DATE:</u>	<u>PARTY</u>		
1. 9/94	NYSDEC	Conduct AOC Water Quality Sampling	C
2. 9/95	NYSDEC	Water Quality Survey Results Report	C
3. 9/95	NYSDEC	Study Results: No Harbor Pathogen Problem	C
4. 4/02	RAC/DEC	Reassess Use Impairment Status	C
5. 4/02	RAC/DEC	Aesthetics Indicator "not impaired"	C

=====

COMMENTS: Any concern would involve the observance of periodic excessive algae in certain upstream shoreline and calm river areas. Although turbidity occurs occasionally during high flow, it is not excessive, and is largely of natural origin and is not an aesthetic problem. The desired endpoint, as identified by the Remedial Advisory Committee, is the absence or minimal presence of floatables and odors, and includes weed control to non-nuisance levels.

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USE IMPAIRMENT RESTORATION and PROTECTION STRATEGY

REMEDIAL ACTION PLAN: OSWEGO RIVER

FORM#: 9

USE IMPAIRMENT INDICATOR: Degradation of Plankton Populations

IJC#: 13      AOC LOCATION: AOC

STAGE I IMPAIRMENT STATUS & CAUSES: UNKNOWN - May need add'l investigation

POLLUTION SOURCES: Past hazardous waste disposal areas; physical habitat changes.

=====

<u>TARGET</u>	<u>RESP.</u>		
<u>DATE:</u>	<u>PARTY</u>	<u>REMEDIAL STRATEGY / ACTION ITEM:</u>	<u>STATUS:</u>
1. 9/94	NYSDEC	Conduct AOC Water Quality Sampling	C
2. 9/95	NYSDEC	Water Quality Survey Results Report	C
3. 9/95	NYSDEC	Study Results: No Impact but Inconclusive	C
4. 12/96	RAC/DEC	Define Restoration (delisting) Criteria	C
5. 12/98	NYSDEC	Confirm no water quality toxicity	C
6. 4/02	RAC/DEC	Reassess Use Impairment Status	C
7. 4/02	RAC/DEC	Plankton Indicator "not impaired"	C

=====

COMMENTS: Phytoplankton and zooplankton population data needed to evaluate if plankton community structure significantly diverges from unimpacted control sites. Results of 1994 Water Quality Survey notes phytoplankton of the harbor quite different from that of the open lake. Large population of "Aphanocapsa" (may produce cyanobacteria toxins) was found in the harbor that may account for toxicity that interfered with the BOD tests. Zooplankton in the AOC were low which may reflect river conditions (plankton is usually not abundant in rivers). Water clarity was good and attributed to zebra mussels. Upstream watershed and Lake Ontario LaMP activities provide responsible program areas to pursue further concern for impacts on the planktonic community. In conclusion, the preponderance of the evidence suggests that plankton community of the Oswego River AOC is not significantly impacted nor impaired.

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P = Planned	U = Under development/assessment/investigation
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USE IMPAIRMENT RESTORATION and PROTECTION STRATEGY

REMEDIAL ACTION PLAN: OSWEGO RIVER

FORM#: 10

USE IMPAIRMENT INDICATOR: Restrictions on Dredging Activities

IJC#: 7                    AOC LOCATION: AOC harbor - expanded area

STAGE I IMPAIRMENT STATUS & CAUSES: NOT IMPAIRED - navigational maintenance dredging only.

EXPANDED REVIEW - for other dredging proposals in the AOC.

POLLUTION SOURCES: Contaminated sediments from upstream hazardous waste sites and point and nonpoint source discharges

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=====
  TARGET   RESP.
  DATE:    PARTY   REMEDIAL STRATEGY / ACTION ITEM:      STATUS:
1. 4/99   EPA/DEC   Define sediment criteria (narrative)   C
2. 4/99   USACE     Define span of AOC dredge area         C
3. 4/99   ACE/DEC   Conduct sediment analyses and evaluate C
4. 7/99   ACE/DEC   * Assure dredging restrict. safe/approved C
5. 4/02   RAC/DEC   Reassess Use Impairment Status         C
6. 4/02   RAC/DEC   Dredge Restrict.Indicator "not impaired" C
=====

```

COMMENTS: Shipping channel maintenance dredging is not impaired. Expanded dredging for harbor not applicable. Open Lake disposal of dredged materials reviewed and approved. USACE conducted maintenance dredging in 1999 that included open Lake disposal assessed at no significant impact. No dredging restrictions exist in the Oswego River Area of Concern. The approved navigation channel dredging, and sediment core analyses data support the status of not impaired for this use impairment indicator.

\* Delisting could be satisfied when the sediment criteria are achieved and dredging restrictions(if any)are applied and study results confirm that the cause of any restrictions is not the result of currently active AOC sources.

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D = Deferred

I = Implementation progressing  
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N = Needs development/assessment/investigation  
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USE IMPAIRMENT RESTORATION and PROTECTION STRATEGY

REMEDIAL ACTION PLAN:            **OSWEGO RIVER**

FORM#: 11

USE IMPAIRMENT INDICATOR: Beach Closings

IJC#: 10

AOC LOCATION: Oswego Harbor AOC

STAGE I IMPAIRMENT STATUS & CAUSES: NOT IMPAIRED - as defined by Stage 1 and Stage 2 documents.

EXPANDED REVIEW - needed for partial body contact in harbor area.

POLLUTION SOURCES: no beaches in the AOC, no sources documented

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=====
  TARGET      RESP.
  DATE:      PARTY      REMEDIAL STRATEGY / ACTION ITEM:      STATUS:

1. 9/95  ___ NYSDEC  ___ Water Quality Survey Results Report  ___ C  ___
2. 9/95  ___ NYSDEC  ___ Study Results: No Impact  ___ C  ___
3. 12/96 ___ RAC/DEC ___ Define Restoration (delisting) Criteria  ___ C  ___
4. 6/98  ___ RAC/DEC ___ Define Add'l Study & Implement (None)  ___ C  ___
5. 4/02  ___ RAC/DEC ___ Reassess Use Impairment Status  ___ C  ___
6. 4/02  ___ RAC/DEC ___ Beach Closings Indicator "not impaired"  ___ C  ___
=====

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COMMENTS: The 1994 Water Quality Survey bacterial data indicates no partial-body non-bathing contact concern in the harbor AOC. Therefore the "Beach Closings" use impairment indicator status of "Not Impaired" remains unchanged after this additional consideration. The Beach Closings use impairment indicator has been determined to be not impaired because there are no designated beaches in the AOC. Water quality survey results support this status and indicate that partial body-contact of the AOC waters is an on-going activity that is not impaired. (Note: Best Use Classification restricts swimming for safety reasons).

STATUS KEY:

C = Completed	I = Implementation progressing
P = Planned	U = Under development/assessment/investigation
D = Deferred	N = Needs development/assessment/investigation
	R = Required by enforcement/permit/agreement

# Appendix M - Marsh Bird and Amphibian Communities in the Oswego River AOC, 1995-96



## Purpose of the MMP

The Marsh Monitoring Program (MMP) was established to provide a baseline survey of marsh bird and amphibian populations and their habitats in marshes within the Areas of Concern (AOCs) in the Great Lakes basin, at sites where rehabilitation and restoration efforts have taken place or are planned in the AOCs, and in many other sites across the Great Lakes basin. Marsh bird surveys were first undertaken in the Canadian and binational AOCs in 1994. In 1995, the program expanded to include surveys of calling amphibians. Over 300 volunteers have surveyed marsh bird and amphibian populations and their habitats under the MMP to date. Information on the abundance and diversity of these species provides useful, and fairly easily obtainable, indicators of habitat quality, structure and areal extent.

## MMP Methods

**Table 1. Marsh Monitoring Program Survey Methods.**

Survey	Time commitment	Skills Required	Survey Duration	Weather Conditions
<b>Birds</b>	2 evenings, 10 days apart, between May 20 and July 5	ability to identify about 50 common birds	10 minutes at each station	warm, dry weather with little or no wind
<b>Amphibians</b>	3 nights, 15 days apart, between April 1 and July 15	ability to learn about 10 frog calls	3 minutes at each station	warm, wet weather with little or no wind

A route, consisting of up to 8 semi-circular stations (100 m radius for marsh birds and unlimited distance for amphibians), is established in each marsh being surveyed. Stations are usually accessed on foot, but can be surveyed by canoe or boat. Marshes must be a minimum of 2 hectares and if very large, may support more than one route. The stations must be 500 m apart for amphibian surveys and 250 m apart for bird surveys. The number of marsh birds heard calling or seen in the station are recorded. At amphibian stations, one of three Call Level Codes is used to record calling intensity of each species; abundance estimates are also made. Each MMP volunteer is provided with a training kit which fully explains the survey methods. The kit also includes a copy of the MMP Training Tape which aids volunteers in learning the songs and calls of the common marsh birds and amphibians. For further information on the methods, please refer to the 1997 edition of the *MMP Training Kit and Instructions for Surveying Marsh Birds, Amphibians And Their Habitats*, which is available from the Long Point Bird Observatory.

## MMP in Oswego River

In 1995, one route was monitored for marsh birds in the Oswego River AOC; amphibian surveys were not conducted. In 1996, 7 routes were monitored for marsh birds and 5 routes were monitored for amphibians. In total, 7 marsh bird routes and 5 amphibian routes have been established in the Oswego River AOC. Habitat rehabilitation projects have been initiated in the Oswego River AOC which address loss of marsh habitat. One of these sites, Lakeshore Marsh, is being monitored under the MMP.

There are additional marshes in the Oswego River AOC where survey routes could be established. On existing routes a complementary amphibian survey would permit a more definitive analysis of the AOC's wetland-dependent wildlife. Volunteer recruitment to fill these needs is ongoing.

**Table 2. Marsh Monitoring Program Routes in the Oswego River AOC.**

Year	Route Type	# Routes	# Volunteers
1995	Amphibian	0	0
	Bird	1	1
	Both	0	0
1996	Amphibian	0	0
	Bird	2	2
	Both	5	4

## Results

The marshes in the Oswego River AOC were mainly dominated by cattail. Purple loosestrife occurred as a co-dominant species in several sample areas. Bur-reed, grass/sedge, rush/bulrush, pickerel weed, arrowhead, smartweed and common reed were co-dominant species in a few sample areas.

The number of species of calling amphibians ranged from 3 to 7 per marsh (Table 3). Overall, 8 species were present — a high level of diversity. Four of the 5 amphibian indicator species, bullfrog, chorus frog, northern leopard frog and spring peeper, were present in the AOC (Table 3). Gray treefrog, green frog and spring peeper were present in high levels (Call Level Code 3). American toad and bullfrog were present in moderate levels (Call Level Code 2). Chorus frog, northern leopard frog and wood frog were present in low levels (Call Level Code 1). Bullfrog and gray treefrog were the most common species; both species were present in 7 of the 8 marshes sampled. Green frog and spring peeper were each present in 6 marshes.

The number of marsh nesters ranged from 3 to 14 species per marsh (Table 4). Overall, 20 marsh nesters were recorded in the Oswego River AOC — again a high level of diversity. In total, 9 marsh bird indicator species were present in the Oswego River AOC (Table 4); American Coot, Black Tern and Common Snipe were not recorded. Densities of 13 marsh nesting species were greater than the Great Lakes basin non-AOC averages. Red-winged Blackbird was the most common and most abundant species. Other common species included Common Grackle, Swamp Sparrow, Yellow Warbler and Common Yellowthroat.

Four species of water foragers and 4 air foragers were recorded in the AOC (Table 4). Great Blue Heron was the most common and most abundant water forager and Tree Swallow was the most common air forager. With the exception of Green Heron and Tree Swallow, the densities of the water and air foragers present in the sample areas were greater than the Great Lakes basin non-AOC averages.

## Conclusions

Of the 9 marsh bird indicator species present, only Common Moorhen/American Coot (the calls of these two species are hard to distinguish) scored below average in abundance; the abundances of the other species scored as average (Table 5). Bullfrog abundance scored above average; northern leopard frog and spring peeper abundance scored as average (Table 5). Chorus frog was the only amphibian indicator species which occurred in lower than expected abundance.

Marsh nesting bird diversity scored above average or average in most marshes; Rice Creek Field Station Marsh and Three Rivers/Potter Marsh had lower than average marsh nesting bird diversity (Table 6). Overall, the marsh nesting bird diversity in the Oswego River AOC scored above average. Conversely, the marsh bird indicator species diversity scored below average in the individual marshes and overall in the AOC (Table 6). The overall amphibian diversity was above average or average in the majority of marshes sampled (Table 6). With the exception of the

Lakeshore Marsh 1 and Marsh 2, amphibian indicator species diversity scored as average or above average (Table 6). Overall, both the amphibian diversity and amphibian indicator species diversity scored above average in the AOC (Table 6).

The Oswego River AOC did not contain a full complement of expected marsh bird indicator species. However, the AOC supported a rich diversity of amphibian indicator species. With only one exception, the marshes sampled were medium, large or huge in size. This is a positive feature of the AOC as the amount of continuous suitable habitat is extremely important to many wildlife species. It would appear that, while the bird and amphibian communities in many Oswego River AOC marshes were less diverse than non-AOCs, overall, this watershed was relatively species rich and can be considered healthy with respect to the measures reported here (Table 6).

## Recommendations

Efforts should be made to continue to rehabilitate marsh habitat and to monitor marsh bird and amphibian populations to properly address loss of habitat in the Oswego River AOC. MMP routes should be established in all marshes and in any marsh rehabilitation projects. Complementary amphibian and marsh bird surveys should be conducted on all routes.

**Table 3. Amphibian species composition and abundance (maximum Call Level Code<sup>1</sup>) in the Oswego River AOC in 1995 and 1996. Shading denotes indicator species.**

Amphibian Species	Lakeshore Marsh 1	Lakeshore Marsh 2	Lakeshore Marsh 3	Lakeshore Marsh 4	Montezuma NWR Marsh	Rice Creek Field Station Marsh	Three Rivers/Potter Marsh	Toad Harbor Marsh
American Toad	—	—	—	—	2	—	—	—
Bullfrog	1	1	1	1	1	2	1	—
Chorus Frog	—	—	—	—	—	1	—	—
Gray Treefrog	3	3	3	3	3	—	2	1
Green Frog	3	3	3	3	1	—	—	1
Northern Leopard Frog	—	—	—	—	1	—	1	1
Spring Peeper	—	—	1	1	3	3	3	3
Wood Frog	—	—	—	—	1	1	—	—

<sup>1</sup> Call Level Code 1: Individuals can be counted; calls not simultaneous. Call Level Code 2: Calls distinguishable, some simultaneous calling. Call Level Code 3: Full chorus; calls continuous and overlapping.

To become involved, please contact the MMP Coordinator, Long Point Bird Observatory at (519) 586-3531 (phone), (519) 586-3532 (fax) or by email at [aqsurvey@bsc-eoc.org](mailto:aqsurvey@bsc-eoc.org)

## Volunteer Efforts

Five participants contributed over 96 person hours in 1995 and 1996 to the program. In addition, many volunteer hours on non-AOC routes were required to produce results which were used for comparison purposes. Our thanks go to the dedicated volunteers who conducted the Oswego River surveys: Morton Adams, Mary Alice Koeneke, Sheila Sleggs and Molly Thompson.

The MMP is a joint program of Environment Canada (Canadian Wildlife Service and Great Lakes 2000 Cleanup Fund) and Long Point Bird Observatory, with considerable financial support from the Great Lakes Protection Fund. Additional funding for the development of these reports was provided by the Laidlaw Foundation.

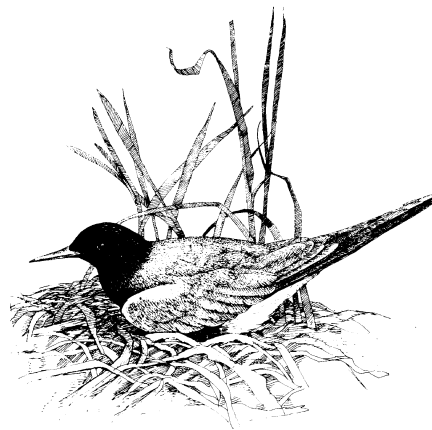
*Prepared by: Long Point Bird Observatory, P.O. Box 160, Port Rowan, Ontario, N0E 1M0.*

**Table 4. Marsh bird species composition and abundance (mean number per 10 stations) in the Oswego River AOC in 1995 and 1996. Shading denotes indicator species and “p” indicates that a species was present only outside of the sample stations.**

Marsh Bird Species	Lakeshore Marsh 1	Lakeshore Marsh 2	Lakeshore Marsh 3	Lakeshore Marsh 4	Montezuma NWR Marsh	Rice Creek Field Station Marsh	Snake Swamp Marsh	Three Rivers/Potter Marsh	Toad Harbor Marsh	Oswego River AOC Mean	Great Lakes Basin Mean
<i>Marsh Nesters</i>											
Alder Flycatcher	—	—	—	3.3	—	—	—	—	—	0.8	0.3
American Bittern	—	—	—	1.7	1.0	—	—	—	—	0.6	0.8
Blue-winged Teal	—	—	—	—	4.0	—	—	—	—	0.8	1.0
Canada Goose	—	60.0	—	—	4.0	7.5	10.0	—	—	7.9	4.2
Canvasback	—	—	—	—	1.0	—	—	—	—	0.2	0.1
Common Grackle	5.0	70.0	30.0	35.0	—	—	—	—	—	16.3	6.8
Common Moorhen	—	—	—	1.7	—	—	—	—	—	0.4	2.2
C. Moorhen/A. Coot											1.0
Common Yellowthroat	25.0	20.0	10.0	3.3	6.0	—	20.0	—	10.0	8.3	6.3
Eastern Kingbird	10.0	5.0	—	—	—	—	p	10.0	—	1.7	1.5
Least Bittern	5.0	—	—	3.3	—	—	—	—	—	1.3	0.4
Mallard	5.0	—	p	11.7	p	p	5.0	—	—	3.8	5.7
Marsh Wren	5.0	20.0	10.0	11.7	9.0	—	—	—	—	7.3	8.0
Pied-billed Grebe	—	—	—	1.7	—	—	—	—	—	0.4	2.4
Red-winged Blackbird	90.0	255.0	280.0	65.0	43.0	5.0	30.0	60.0	30.0	72.7	49.2
Song Sparrow	5.0	5.0	10.0	3.3	8.0	15.0	10.0	—	—	7.1	5.1
Sora	—	—	—	—	2.0	—	10.0	—	—	1.3	1.1
Swamp Sparrow	30.0	25.0	50.0	3.3	27.0	—	20.0	—	10.0	15.2	11.1
Virginia Rail	p	—	—	6.7	4.0	—	5.0	—	—	2.9	3.5
Willow Flycatcher	—	—	—	—	—	p	5.0		10.0	0.8	0.5
Yellow Warbler	35.0	20.0	20.0	6.7	3.0	20.0	30.0	10.0	30.0	15.2	6.7
<i>Water Foragers</i>											
Belted Kingfisher	—	—	—	—	—	—	—	p	—	p	0.5
Black-crowned Night-Heron	—	—	—	—	—	p	—	—	—	p	0.4
Great Blue Heron	—	15.0	—	p	1.0	p	—	—	—	1.5	1.5
Green Heron	—	—	—	—	1.0	—	p	—	—	0.2	0.4
<i>Air Foragers</i>											
Barn Swallow	45.0	50.0	160.0	65.0	2.0	—	—	—	—	31.3	10.3
Cliff Swallow	10.0	—	20.0	—	—	—	—	—	—	1.7	0.2
Purple Martin	5.0	25.0	—	1.7	—	—	—	—	—	2.9	2.2
Tree Swallow	70.0	95.0	70.0	5.0	31.0	10.0	55.0	40.0	10.0	32.7	36.0

**Table 5. Assessment of the status of individual species abundance in the Oswego River AOC in 1995 and 1996. “-” denotes values below the non-AOC average. “0” denotes values within the non-AOC average. “+” denotes values above the non-AOC average. Blank indicates that the species was not present and “p” indicates that a species was present only outside of the sample stations.**

Marsh Name	Marsh Bird Indicator Species												Amphibian Indicator Species				
	AMBI	AMCO	BLTE	BWTE	COMO	COSN	LEBI	MAWR	MOOT	PBGR	SORA	VIRA	BULL	CHFR	NLFR	MIFR	SPPE
Lakeshore Marsh 1							0	0				p	+				
Lakeshore Marsh 2								0					0				
Lakeshore Marsh 3								0					0				0
Lakeshore Marsh 4	0				0		0	0	0	0		0	0				0
Montezuma NWR Marsh	0			0				+			0	0	0		+		0
Rice Creek Field Station Marsh													0	0			0
Snake Swamp Marsh											+	0					
Three Rivers/Potter Marsh													0		0		0
Toad Harbor Marsh															0		0
<b>Oswego River Overall Assessment</b>	0			0	0		0	0	—	0	0	0	+	—	0		0



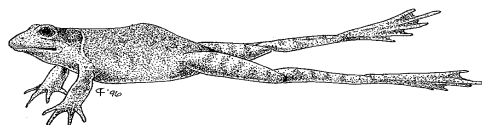
**Table 6. Status of Oswego River AOC Marshes in 1995 and 1996<sup>1</sup>. “-” denotes values below the non-AOC average. “0” denotes values within the non-AOC average. “+” denotes values above the non-AOC average.**

Marsh Name <sup>2</sup>	Latitude/ Longitude	Survey Type	Year	Number of Stations	Assessment of Marsh Bird and Amphibian Species Diversity				Overall Assessment <sup>3</sup>
					Marsh Nesting Bird Diversity	Marsh Bird Indicator Species Diversity	Amphibian Species Diversity	Amphibian Indicator Species Diversity	
Lakeshore Marsh 1 N, Medium	43°17'58" 76°46'54"	Amph Bird	96	4 2	+	—	—	—	2
Lakeshore Marsh 2 N, Large	43°17'58" 76°46'54"	Amph Bird	96	2 2	+	—	—	—	2
Lakeshore Marsh 3 N, Small	43°17'58" 76°46'54"	Amph Bird	96	1 1	0	—	0	0	3
Lakeshore Marsh 4 N, Medium	43°17'58" 76°46'54"	Amph Bird	96	1 6	0	—	0	0	3
Montezuma NWR Marsh I, Huge	42°57'00" 76°47'00"	Amph Bird	96 95/96	5 5	0	—	+	+	5
Rice Creek Field Station Marsh I, Large	43°20'00" 76°30'00"	Amph Bird	96 96	6 4	—	—	—	0	1
Snake Swamp Marsh I, Medium	43°28'00" 76°30'00"	Bird	96	2	+	—			2
Three Rivers/Potter Marsh I, Large	43°11'00" 76°22'30"	Amph Bird	96 96	1 1	—	—	0	0	2
Toad Harbor Marsh I, Huge	43°16'00" 76°07'30"	Amph Bird	96	2 1	0	—	—	0	2
<b>Oswego River Overall Assessment</b>					+	—	+	+	6

<sup>1</sup> See the Marsh Monitoring Program’s 1997 Final Technical Report for a detailed description of the scoring system.

<sup>2</sup> R = rehabilitation site, C = coastal, N = nearshore, I = inland. Tiny ( 2 - 2.5 ha), Small (2.5 - 5 ha), Medium (5 - 25 ha), Large (25 - 50 ha), Huge (>50 ha).

<sup>3</sup> A score of 0, 1 or 2 indicates impairment, a score of 3, 4 or 5 indicates no apparent impairment and a score of 6, 7 or 8 indicates an above average marsh.



[See References in Appendix for Marsh Monitoring Program]

## APPENDIX N

### Watershed Restoration and Protection Action Strategies (WRAPS)

The purpose of a Watershed Restoration and Protection Action Strategy is to develop and/or compile and document a strategy for the watershed that brings together all appropriate agencies and stakeholders to focus support in the form of grant dollars, technical assistance and other resources to address the priority water and natural resource needs in that watershed. A Watershed Restoration and Protection Action Strategy is a concise, and action-oriented document that:

- Compiles currently available information about the state of the watershed and ongoing assessment, outreach and implementation activities, and
- Proposes environmental and natural resource priorities or goals and measurable objectives for achieving those goals.

**Clean Water Action Plan** - Watershed Restoration and Protection Action Strategies are rooted in the 1998 federal Clean Water Action Plan, a plan to accelerate watershed restoration across the country. The Action Plan strives to fulfill the original goals of the 1972 Clean Water Act to accomplish fishable, swimmable, and safe waters for all Americans. The Action Plan lays out a broad vision of watershed protection, encompassing protection of coastal and estuarine waters; fresh waterbodies; wetlands; groundwater; natural resources; and drinking water sources.

**Unified Watershed Assessment** - As one of the first steps toward achieving that vision in the new millennium, in 1998, EPA required states, as a condition for supplemental funding, to prepare Unified Watershed Assessments (UWAs) to identify watersheds in need of restoration and develop a schedule for addressing them. In New York, the Unified Watershed Assessment provided an opportunity to demonstrate the proactive approach the state has taken toward watershed protection in the last decade and to qualify for over \$6 million in federal funds to complement the major investment that the state already makes in water quality. After categorizing the watersheds, DEC prepared a schedule for developing Watershed Restoration and Protection Action Strategies in each watershed in need of restoration and for each watershed that needed action to sustain water quality.

New York's 1998 Unified Watershed Assessment brings together water quality and natural resource factors in each of the state's 54 watersheds. For each watershed area at the USGS 8-digit Hydrologic Unit Code (HUC) scale, technical staff of DEC and the USDA Natural Resources Conservation Service used evaluation data, expertise and public input to identify restoration priorities. The UWA built on the state's existing water program and natural resource initiatives, especially the Rotating Intensive Basin Studies (RIBS). The strong partnerships that New York already enjoyed among state, tribal, and local agencies; conservation districts; federal and interstate agencies; county districts; watershed-based organizations; and other key stakeholders proved to be invaluable.

Based on a number of water quality and natural resource factors and assessment, the UWA assigned each of New York's 8-digit HUC watersheds (called sub-basins) to one of four categories in the EPA framework:

- Category I: Watersheds in need of restoration (26 sub-basins)
- Category II: Watersheds meeting goals including those needing action to sustain water quality (22 sub-basins)
- Category III: Watersheds with pristine or sensitive aquatic system conditions on lands administered by federal, state, and tribal governments. (None at this time)
- Category IV: Watersheds with insufficient data to make an assessment. (6 sub-basins).

Under the Watershed Restoration and Protection Action Strategy (WRAPS), many of the areas that meet USEPA's definition of Category I watersheds are existing priorities for the State of New York. In 21 of the state's 26 Category I watersheds, restoration and protection efforts are already underway through such federal and state programs as the National Estuary Program; Natural Heritage Rivers; priority TMDL; stakeholder involvement; availability of state resources and on-going planning activities by partner agencies and local organizations.

Working together with federal, state, and local partners, the New York State Department of Environmental Conservation completed a draft Watershed Restoration and Protection Action Strategy for the Susquehanna and Chemung River Basins in April 2001. Federal guidance and New York State's Unified Watershed Assessment both encourage that strategies be built upon existing strategies and plans, such as the National Estuary Program's Comprehensive Conservation Management Plans (CCMPs). The Long Island Sound CCMP and the New York-New Jersey Harbor Estuary CCMP have been accepted by EPA as New York's 1999 strategies submissions. The draft Peconic Estuary Program CCMP and the draft South Shore Estuary Comprehensive Management Plan were submitted to EPA in April 2001.

In cooperation with stakeholders, strategies for other areas of the state are intended to be developed based on existing management planning efforts to the greatest extent possible. The schedule for developing strategies is based largely on the cycle for updating the state Waterbody Inventory/ Priority Waterbody List (WI/PWL), allowing the use of current information. The Department of Environmental Conservation, working in partnership with the Natural Resources Conservation Service and the New York State Association of Regional Councils, first completed the framework for developing strategies.

The pilot basin, the Upper Susquehanna / Chemung was selected based on the availability of recent monitoring data and strong stakeholder support. The process for developing the pilot and a WRAP strategy includes: 1) contacting watershed stakeholders and gathering information on existing activities and local issues; 2) compiling a GIS and inventory of water quality, natural resources, land use and other data in the watershed; 3) holding workshops to analyze the information and set directions; 4) creating a draft State of the Basin report; and, 5) formulating and reviewing a WRAP Strategy.

## APPENDIX O

### **Proposal to Address Upstream Contaminated Sediments In the Oswego River by exploring U.S. Army Corps of Engineers Grant Funding developed in 2003 by NYSDEC, USACE, and SUNY Oswego**

**Proposed Project Description:** Under USACE Section 401, a Feasibility Study is planned to be proposed to conduct further investigation on the sediment contamination at Battle Island and the Armstrong site. Collecting additional information, such as a food uptake study, has been suggested for this upstream Oswego River area by SUNY Oswego. The overall and long term objective is to assist in the determination of the fate of the known contaminated sediments in the Battle Island area. NYSDEC has preliminary determined that the contamination is not present in amounts or exposed at its location to present a significant threat to the environment. Regardless, NYSDEC endorses the proposed study by the academic community at SUNY Oswego within the scope of the RAP delisting document and funded as a USACE approved project. No impact from this proposed upstream study area on the AOC has been identified.

**Oswego RAP and Funding Issues:** Currently, the delisting of the Oswego RAP is moving forward in 2003 and is likely to extend into 2006 depending on the issuance of the FERC power dam license and incorporation of provisions that fully address the fish habitat and fish population restoration and protection. In conjunction with the SUNY Oswego proposal, the USACE had expressed interest in conducting an initial feasibility study under Section 401 funding prior to the delisting but funding was not available. Because this particular grant must be linked to the AOC, a study project prior to delisting is a possibility; afterwards, a different grant would be needed. For the Oswego RAP Area of Concern, these upstream contaminated sediments are defined as “out of AOC” sources and have been identified as not contributing to or causing use impairments in the AOC\*. The academic community believes there is a local exposure threat as well as a long term loading threat to Lake Ontario.

If the local government and/or SUNY Oswego can provide the matching grant, funding of the study under Section 401 could be implemented. Traditional USACE planning assistance funding could be considered at that time; however, this is a much more complicated application process unlikely to occur for this Oswego project. The 35% matching funds under Section 401 can include in-kind services. At this time, NYSDEC has no funding to support this matching grant. In order to be considered a project proposal must be submitted to secure a place in line with other grant project proposals.

**Project Focus:** 1) To provide additional information to determine if removal or in-place remediation is appropriate to reduce the impact of contaminated sediments at Battle Island; and, 2) To assist in determining if further source trackdown is needed for CERCLA to address.

**Next Steps:** With the identification of a local sponsor and commitment of the 35% matching grant, the USACE would prepare a preliminary feasibility study that could further recommend a longer term course of action and may include collection of field data. SUNY Oswego, in conjunction with SUNY Syracuse, is the most likely sponsor for the project lead and in securing the matching grant. DEC will endorse the project to provide additional information to address remaining concerns for the upstream sediment

contamination at Battle Island and the Armstrong site. At the same time, DEC is proceeding with the delisting of the Oswego AOC because criteria and guidance provide for this course of action \*. In the interim no project proposal has been prepared to secure a funding position.

**Contacts:** This project was initiated through participation by: Phil Berkeley, USACE; Tony Friona, USACE; Jim Pagano, SUNY Oswego; Steve Eidt, NYSDEC; Bob Townsend, NYSDEC.

**Comments:** This 401 grant project will assist in addressing upstream sediment contamination for the Oswego River and RAP. In the event of delisting, the project is still viewed as important and worthwhile by all participants towards collecting further data and making recommendations on the fate of sediments in this upstream segment of the Oswego River. Known information about the Battle Island and Armstrong site is listed below to assist decision making:

1. Limited contaminated sediments are present around Battle Island in the Oswego River.
2. Evidence of elevated contamination in the river exists directly downstream from the Armstrong site.
3. There is a series of dams and canal lock system from this contaminated sediment area downstream for six miles to the Oswego Harbor and Area of Concern. These dams are known to catch contamination behind them.
4. Harbor area sediments in the Area of Concern are not contaminated for navigational dredging and disposal of dredged material in Lake Ontario.
5. For the contaminated sediments at Battle Island, there is a concern to determine if an environmental impact exists and if remedial action is warranted. The contamination amount, concentration, and threat are assess as not warranting action by DEC. SUNY Oswego is concerned about this “non-action”.
6. For the contaminated sediments in the Oswego River directly downstream from the Armstrong site, there is a concern to determine if this is more widespread, whether source trackdown is needed, and if CERCLA action is warranted. The contamination amount, concentration, and threat are assess as not warranting action by DEC. SUNY Oswego is concerned about this “non-action”.
7. The 401 feasibility study should focus on providing information on data gaps to address contaminated sediments at Battle Island and raise attention to a source trackdown concern under CERCLA if necessary.

**Background:** The basis for the academic community concern is discussed in the Stage 3 document in Section III.B under use impairment indicator #10 addressing dredging restrictions. Although there are no dredging restrictions in the AOC, the academic community has modeled some data that concludes there is likely an ongoing upstream source of mirex to Lake Ontario (reference Appendix H.2 by DePinto). NYSDEC has conducted intensive water column sampling to identify loads to Lake Ontario and the Oswego River indicates consistently low results (reference Appendix H.17 by Litten). NYSDEC has therefore not identified an ongoing loading issue for the Oswego River to Lake Ontario.

\* USEPA delisting principles and guidance provide for delisting with the existence of sources outside the Area of Concern. Also, beneficial uses may be recognized as not being capable of full restoration. For the Oswego AOC, the isolated upstream sediments have not been identified as contributing to or causing any use impairments in the AOC.

## **APPENDIX P**

### **Power Point Presentation Oswego River Remedial Action Plan - Stage 3 - Delisting Proposal**

A copy of the Power Point Presentation (39 slide .pdf file) is provided below. The presentation addresses the AOC listing; what was learned from the RAP process; facts about the Oswego AOC and RAP; Oswego RAP activities, investigations, and priorities; workshop results; the use impairment resolution process; the next steps to delisting; and what is next for this Oswego AOC to maintain and enhance beneficial uses.