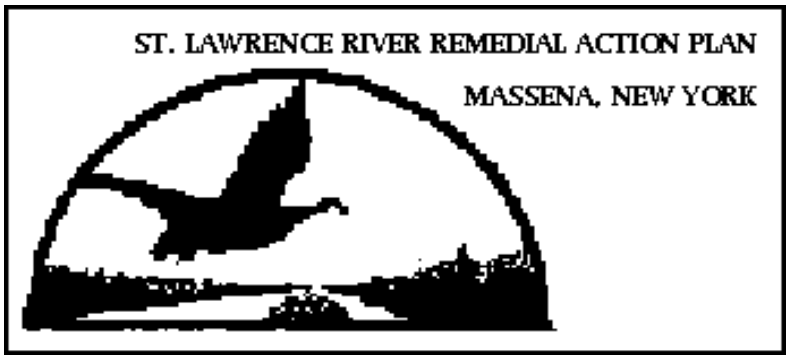
Division of Water

ST. LAWRENCE RIVER AT MASSENA, NEW YORK

REMEDIAL ACTION PLAN

STATUS REPORT

October 2006



New York State Department of Environmental Conservation
and the
St. Lawrence River at Massena Remedial Advisory Committee

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Preparation Notes

The St. Lawrence River at Massena Remedial Action Plan (RAP) Status Report was prepared by the New York State Department of Environmental Conservation in cooperation with the St. Lawrence River at Massena Remedial Advisory Committee. Collaboration includes working with representatives of the Cornwall RAP, the St. Regis Mohawk Tribe at Akwesasne, and local RAP stakeholders. This Status Report provides an update of the use impairment indicators, a progress report on remedial activities, strategies to address each of the beneficial use indicators, resolution /delisting guidance, and a listing of next step or priority remedial activities for the Area of Concern.

The Status Report was first prepared in draft for review. To the greatest extent possible, all substantive comments have been incorporated into this final publication as compiled by NYSDEC RAP Coordinator Robert Townsend. The report strives to reflect all views of the Remedial Advisory Committee while a consensus opinion is sought. Individual committee members may not concur with all statements. As the RAP process is dynamic, modifications are addressed in future update reporting.

Copies of the Status Report, as well as other Remedial Action Plan documents, are available from NYSDEC, Division of Water, Bureau of Water Assessment and Management, 625 Broadway, Albany, New York, 12233-3502, phone (518) 402-8284. A summary of Area of Concern information for the St. Lawrence River is on the EPA website at: http://www.epa.gov/glnpo/aoc/stlawrence.html

I. EXECUTIVE SUMMARY:

As the lead agency for developing and implementing the St. Lawrence River at Massena Remedial Action Plan (RAP), the New York State Department of Environmental Conservation began RAP development in 1988. This process was assisted by the formation of the Massena Citizen Advisory Committee which consisted of members from local government, industry, environmental groups, sporting interests, academia, the St.Regis Mohawk Tribe and Massena communities, and business. The Stage 1 report, which identifies use impairments, their causes and sources, was completed in 1990. The Stage 2 RAP, completed in 1991, includes the development of remedial strategies to restore water quality and beneficial uses of the St. Lawrence River and its tributaries. The RAP strives to eliminate adverse impacts to the Area of Concern (AOC) from sources of pollutants at hazardous waste sites as well as from other sources and activities within the AOC and wateshed.

This final 2006 Status Report continues the update process with a modified format on addressing the beneficial use indicators and taking incremental steps towards resolving individual indicators with the goal of an eventual status change for the entire AOC. High priority has been given to the cleanup of land-based hazardous waste sites and river sediments. Significant progress has been made in the completion of land-based remediation at the ALCOA West and East (formerly Reynolds Metals) sites and the General Motor site as well as with the contaminated river sediment removal in the St. Lawrence River. Point source discharges to the water and air have also been greatly reduced through pollution control and prevention measures. The longer term development and implementation of the restoration strategy for the Grasse River is currently in progress.

This St. Lawrence River Connecting Channel Area of Concern is shared internationally with Canada and the St. Regis Mohawk Tribe. An evaluation of the possible transboundary effects associated with the downstream interests and jurisdictions (Canadian, Provincial, and the Mohawks at Akwesasne) is to be addressed. As New York State has taken the lead to focus on the Massena area impairments, Canadian jurisdictions have taken responsibility for the Cornwall area while the St. Regis Mohawk Tribe has been in collaboration with each part of the AOC.

Environmental monitoring is needed and is essential to the reassessment of the use impairment indicators in the Area of Concern. In order to assure that the watershed and AOC itself are not contributing to impairments in the Area of Concern (and that beneficial uses are restored and protected), the advisory committees for both the Massena and Cornwall RAPs, in conjunction with the St. Regis Mohawk Tribe Environment Division, are sharing monitoring information as well as planning and implementation strategies to address the beneficial use indicators for the entire AOC.

Further, remedial strategies, desired endpoints, and resolution guidance (delisting criteria) have been developed for each part of the AOC. These strategies, endpoints and guidance are being applied to focus attention on priority remedial activities and to document progress as the beneficial uses are reassessed. The Remedial Action Plan process includes regular meetings of the committees and the recording of activities by status reporting. This process facilitates RAP implementation and documents the accomplishment of the incremental steps involving Stage 3 progress that is leading to the resolution of the St. Lawrence River Area of Concern.

II. INTRODUCTION and LOCATION:

The purpose of this Remedial Action Plan (RAP) Status Report 2006 is 1) to provide an update of remedial activities progress, 2) to present strategies and resolution guidance for addressing the beneficial use indicators in collaboration with lead partners, and 3) to describe the next steps necessary to continue to make progress towards fully addressing the indicators within the AOC.

The long-term goal and task at hand is to document that the beneficial uses in the St. Lawrence River AOC have been restored and protected. In addition, this Status Report is designed to fulfill the need of having a "working document" for the Remedial Advisory Committee (RAC) upon which they can base discussions and document progress to achieve restoration endpoints. The participants in the St. Lawrence River at Massena Remedial Advisory Committee are listed in Appendix A.

Following completion of the Stage 2 RAP, a Remedial Advisory Committee (RAC) was appointed to represent all stakeholders and assist NYSDEC in RAP implementation. The first RAP Update was completed in August 1992. A second comprehensive Update was completed in April 1995 that describes Stages 1 and 2, documents progress, and develops remedial strategy tracking. Summary Updates were published in June 1996 and April 2000 that established a format to focus on RAP implementation. These summary update reports identified priority remedial strategies including over thirty remedial measures involving investigative recommendations, assessments, plans, and implementation projects needed to restore beneficial uses.

This 2006 St. Lawrence River at Massena RAP Status Report provides the current status of use impairment indicators and remedial activity progress, updates use impairment restoration strategies and priority remedial activities, describes international cooperation, presents resolution guidance (delisting criteria), and outlines the next steps in the RAP process. The report builds on the problem definition and remedial strategies identified in previous Massena RAP publications and is intended to not only update progress but to track and to guide the implementation of the remaining remedial activities to resolve each of the beneficial use indicators and ultimately address the entire St. Lawrence River at Massena Area of Concern.

The Massena, New York portion of the connecting channel Area of Concern (**Figure 1**), being developed and implemented for the St. Lawrence River at Massena/Cornwall Remedial Action Plan, has the primary goal to restore, protect and maintain the chemical, physical and biological integrity of the river's ecosystem in accordance with the Great Lakes Water Quality Agreement. The RAP process is dynamic. Details for the original identification of the Massena AOC use impairment problems and their potential causes and sources of contamination are described in detail in the Stage 1 RAP in1990. Subsequent documents describe the environmental programs, remedial activities, and commitments that are ongoing, planned or needed to restore and to protect the beneficial uses. In a number of instances additional information is available to assist the RAC and RAP Process in identifying next steps and conducting reassessment of beneficial use indicators regarding impacts to the AOC and the potential causes of any impacts.

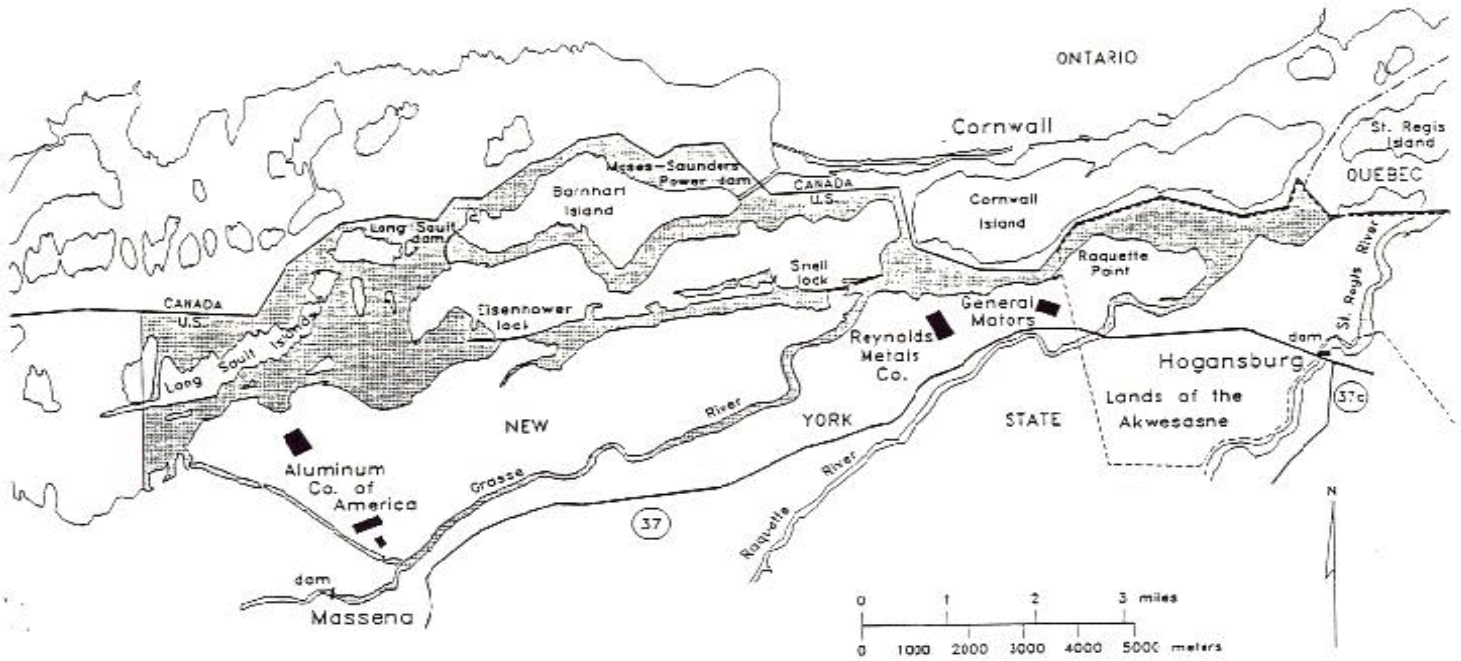

Figure 1 The Massena Area of Concern

III. RESTORING BENEFICIAL USES - Summary

A. Indicator Status Resolution - Table 1

The waters, river bottoms, and fish and wildlife of the Area of Concern have been affected by hazardous waste sites, contaminated river sediments, local and upstream wastewater discharges, physical disturbances (the dam and seaway construction), natural erosion, atmospheric deposition, Lake Ontario waters, and commercial fishing to some degree. The Stage 1 RAP identified hazardous waste sites, contaminated river sediments, and industrial discharges as the major sources of contaminants to the AOC. In Stage 1, the fourteen use impairment indicators as listed in Annex 2 of the Great Lakes Water Quality Agreement of 1978 were assessed. An additional indicator to address the “transboundary impacts” associated with the international boundary with Canada and the St. Regis Mohawk Tribe at Akwesasne has also been evaluated. The St. Lawrence River at Massena RAP currently identifies three of these fifteen use impairment indicators as impaired and five other use impairment indicators as subject to further review, investigation, and assessment.

Table 1 lists the use impairment indicators and then summarizes their Stage 1 status along with their current status of impairment. This status comparison has been added to the listing of use impairments so that, as the RAP process continues, we can document progress and obtain a "quick look" of any changes and identify the remaining impairment priorities.

Table 1 also contains resolution comments for each use impairment indicator relative to establishing restoration and protection of the beneficial use. Supporting data, rationale, and needs to address each use impairment are summarized in this resolution comment column. In summarizing the impairment status from the total list of fifteen use impairment indicators on Table 1 we see that three indicators for the Stage 1 Massena RAP were determined to be "impaired"; five others were rated as “likely or unknown”; and, the remaining seven were rated as “not impaired”.

The five use impairment indicators rated as “likely or unknown”(plus the drinking water taste and odor indicator) need further study and assessment to make status determinations. Also, among those possibly requiring further investigation to update their status are two indicators previously rated not impaired that may need expanded review. These two involve the dredging restrictions and beach closings indicators. Under these two indicators respectively, we desire to evaluate sediment remediation outside the seaway channel and partial body contact in open waters of the Area of Concern. In summary then, three indicators for Massena are rated as impaired, five need further reassessment, and three others have raised some reconsideration concern.

The primary use impairments in the St. Lawrence River at Massena Area of Concern involve fish consumption restrictions, loss of fish and wildlife habitat, and transboundary impacts. Fish Consumption restrictions are associated with contaminated river sediments, hazardous waste sites and industrial discharges, and also involve the larger lakewide advisories associated with Lake Ontario. The primary cause contributing to these restrictions is the evidence involving PCBs. The loss of fish and wildlife habitat is attributed to contaminated sediments, disturbance from the dam and seaway construction, and natural erosion. Transboundary impacts involve primarily downstream considerations, cross river effects to a lesser degree, upstream impacts from Lake Ontario, and atmospheric deposition.

Use Impairment Indicator Resolution - Table 1

Endpoints, Status, and Responsibilities

St. Lawrence River at Massena Remedial Action Plan

USE IMPAIRMENT	END-POINTS	1990 STAGE 1 STATUS	2006 CURRENT STATUS *	Responsible Parties	RESOLUTION Supporting Data and Rationale
1. Fish and Wildlife Consumption Restrictions	Fish consumption advisory(s) part of larger St. Lawrence River System and not AOC specific.	Impaired- 1) County line bay 2) Grasse River 3) Canal 4) Overall St. Law. River	Impaired- ("River Plan" to address)	NYSDEC; DFWMR; NYSDOH	Advisories specific to the Area of Concern must be addressed. The resolution is to be based on overall St. Lawrence Fish monitoring, trackdown, management, corrective actions and a defined "river management plan".
2. Loss of Fish and Wildlife Habitat	No restriction from flow or contamination and no sign. diff. to SLR.	Impaired- (caused by contam. sed. and major construction)	Impaired- (SLR=St. Law River better; and Grasse R. needs work)	FERC; USFWS; NYSDEC; SLCWQCC; SLCSWCD	New FERC license addresses disturbance cause; remediation is to address sediment cause. Grasse River remediation being evaluated; SLR monitoring under FERC.
3. Trans-boundary Impacts	Concerns not due to AOC sources ; no downstream / cross stream effects.	Impaired- (due to down-stream effects from AOC sources)	Impaired- (need to show remedial clean up addresses sources)	NYSDEC NYSDOH USEPA GM, and ALCOA	Resolved when the impact due to contaminant sources from AOC have been remediated; long-term monitoring needed to support and document.
4.Degradation of Fish and Wildlife Populations	Populations substantially similar to reference communities	Likely Impaired-	Reassess- (need survey to show that adequate populations exists)	NYSDEC FERC USFWS (ALCOA-Grasse River)	Resolution based on assessment by fish and wildlife staff; beneficial provisions from new FERC license will address; Remediation to address contamination sources. (goal is no diff. outside the AOC)
5.Fish Tumors or Other Deformities	No abnormal high incidence of tumors or deformities.	Likely Impaired-	Reassess- (need fish studies to show no sign. evidence)	NYSDEC; NYSDOH (ALCOA-Grasse River)	Resolution based on results of contaminated sediment remediation and data indicating little impairment; i.e. better than controls.

USE IMPAIRMENT	END-POINTS	1990 RAP STATUS	2006 CURRENT STATUS	Responsible Parties	RESOLUTION Supporting Data and Rationale
6. Bird or Animal Deformities or Reproductive Problems	**No abnormal high incidence of deformities or reproductive problems**	**Likely Impaired-**	**Reassess- (could change based on Marsh Mon. Prog. and FERC license support data.)**	**SLCWQCC; NYSDEC**	**Many sources of contaminated sediments addressed. Area data shows no impact. No significant impairment attributable to reproductive problems. Fish addressed above. Grasse River still needs remedial work.**
7.Degradation of Benthos	**Community integrity substantially similar to reference communities.**	**Likely Impaired-**	**Reassess- (RIBS supports not impaired; Grasse River still needs remedial work.)**	**NYSDEC; SLCWQCC; SLCSWCD GM, and ALCOA**	**Many sources of contaminated sediments addressed. Need RIBS report to document water quality improvement and no significant benthic impact. Show regulatory presence resolves and protects beneficial use.**
8. Restrictions on Dredging Activities	**No Army Corp of Engineers dredging restrictions.**	**Not Impaired- (navigational)**	**Not Impaired- (Grasse River still needs remedial work.)**	**USACOE NYSDEC**	**Maintenance dredging not impaired; Dredging permits confirm. Study results support; need to complete sediment work and show no action pending.**
9. Beach Closings	**All AOC beaches open to swimming.**	**Not Impaired-**	**Not Impaired-**	**NYSDOH; SLCWQCC; NYSDEC**	**No beach impairment; Beach data and water quality results support status. Partial-body contact use also supported and not impaired.**
10.Degradation of Plankton Populations	**Plankton Populations substantially similar to ref. communities.**	**Unknown- no known cause.**	**Unknown- (Clarkson to propose study)**	**SLCWQCC; NYSDEC**	**Water quality surveys indicates not impaired. Need study to show plankton population assessment to references community for impact evaluation. Clarkson has new fluorometry equipment. .**
11. Tainting of Fish and Wildlife Flavor	**No evidence of fish and wildlife tainting.**	**Not Impaired-**	**Not Impaired-**	**NYSDOH; NYSDEC; USFWS; SLCWQCC**	**St. Lawrence River studies and observation / sports-person reports support this status.**

USE IMPAIRMENT	END-POINTS	1990 RAP STATUS	2006 CURRENT STATUS	Responsible Parties	RESOLUTION Supporting Data and Rationale
12. Eutrophication or Undesirable Algae	**No persistent WQ problem due to cultural eutrophication** **WQ stds. met; Beneficial Use goals met and maintained.**	**Not Impaired-**	**Not Impaired-**	**NYSDEC; SLCWQCC; SLCSWCD**	**Water Quality Survey indicates no eutrophication conditions or impairment; no further action pending. See aesthetics indicator for weed control concerns. Nutrient input has been limited by point source, CSO and NPS watershed control actions. Water clarity improved by zebra mussels.**
13. Drinking Water Restrictions, Taste and Odor Problems	**No drinking water restrictions or taste and odor problems.**	**Not Impaired-**	**Not Impaired- (considered treatment but not a curent health or complaint issue; address as nuisance)**	**NYSDOH; NYSDEC; SLCWQCC; Massena**	**The taste and odor complaint peaked in 1998. The Village of Massena had considered tertiary treatment; however, in recent years this is not an issue. Occurrence attributed to MIB and geosmin compounds in water with seasonal characteristics.**
14.Degradation of Aesthetics	**Floatables and odors absent or minimal presence. Weed control to non-nuisance level.**	**Not Impaired-**	**Not Impaired-**	**SLCWQCC; NYSDEC**	**Water quality data indicates no floatables or odor impairment.**
15. Added Costs to Agriculture or Industry	**No abnormal added costs to agriculture or industry.**	**Not Impaired-**	**Not Impaired-**	**NYSDEC; SLCWQCC**	**Water quality survey data supports this status.**

* All indicator status changes need to be formally adopted by the RAC. Those showing "Reassess" are identified for next step actions and have not yet been formally changed

Responsible Party Key:

NYSDEC = New York State Department of Environmental Conservation
NYSDOH = New York State Department of Health
USEPA = United States Environmental Protection Agency
SLCWQCC = St. Lawrence County Water Quality Coordinating Committee
SLCSWCD = St. Lawrence County Soil and Water Conservation District
USACOE = United States Army Corp of Engineers
USFWS = United Stated Fish and Wildlife Service
DFWMR = NYSDEC's Division of Fish, Wildlife, and Marine Resources
FERC = Federal Energy Regulatory Commission

In the 1996 St. Lawrence River at Massena RAP Update Summary document, strategy management forms were developed for each use impairment indicator. These strategies use the best available information to identify the needed follow-up actions, responsible parties, target dates, and status for each indicator. These "Use Impairment Strategy Management Forms" have been further updated in this 2006 Status Report in Appendix F. Eleven use impairment strategy forms (3 impaired, 5 for reassessment, and 3 for reconsideration concerns) are included. Each form establishes a strategy on which the Remedial Advisory Committee is proceeding.

B. IMPAIRMENT CAUSES AND SOURCES - Table 2

Table 2 has been developed to identify the specific causes and sources of each use impairment in the St. Lawrence River at Massena AOC. This information was developed in the Massena RAP Stage 1 and Stage 2 documents. In this Massena RAP 2006 Status Report, Table 2 lists the use impairment indicators (consistent with Table 1) and then summarizes the likely causes of the impairment and the possible sources of contamination. The data used to identify sources does not always provide direct evidence with complete certainty. The link between an impairment and a source has therefore been logically inferred in some instances. Documented environmental and source evidence data were examined in Chapters 4 and 5 of the Stage I RAP published in 1990.

Tables 1 and 2 are used to summarize the status, causes, and sources of the use impairments as established in the Stage 1 and Stage 2 documents. Clearly, PCBs are a main cause of use impairment in the St. Lawrence River at Massena AOC. Other contaminants of concern include DDE, PAHs, mercury, metals, arsenic, and phosphorus. Other causes include physical disturbances created by the construction of the power dam and the St. Lawrence River Seaway, natural erosion, foreign species (zebra mussels), fish over-harvest, and contaminated sediments.

The sources of the causes of the use impairments shown in **Table 2** include: inactive hazardous waste sites, contaminated sediments, industrial and municipal point source discharges, dredging, atmospheric deposition, nonpoint sources, and Lake Ontario. Land-based hazardous waste site cleanup activities as well as contaminated river sediment dredging projects have been implemented by the major industries in the Area of Concern to address PCBs and the other contaminants of concern. This remediation is addressing the major sources of use impairments identified in the RAP and has already contributed significantly to the restoration and protection of beneficial uses in the Area of Concern.

TABLE 2 - USE IMPAIRMENT CAUSES AND SOURCES

most likely for the St. Lawrence River at Massena Remedial Action Plan

USE IMPAIRMENT	CAUSES	SOURCES
1. Fish and Wildlife Consumption Restrictions	PCBs, Mirex, Dioxin	Inactive hazardous waste sites, Contaminated sediments, Industrial discharges, Lake Ontario
2. Loss of Fish and Wildlife Habitat	Physical disturbances, Natural erosion Contaminated sediments, Foreign species	Dredging, natural erosion
3. Transboundary Impacts	PCBs, DDE, Phosphorus, Metals, Mercury, Sediments, (Cornwall Phos.)	Waste sites, Atmospheric deposition, Pt. source discharges, Lake Ontario
4. Degradation of Fish and Wildlife Populations	PCBs, DDE, Mercury, Physical disturbances, Fish overharvest	If any: point source discharges, waste sites, seaway construction, Cornwall AOC Commercial fishing (historic), L.Ontario.
5. Fish Tumors or Other Deformities	PAHs	If any: Contaminated sediments, waste sites, discharges.
6. Bird or Animal Deformities or Reprod. Problems	PCBs	If any: Contaminated sediments waste sites, discharges.
7. Degradation of Benthos	PCBs, PAHs, Lead, Copper, Physical disturbances	If any: pt. source discharges, contaminated sediments, waste sites, nonpoint sources
8. Restrictions on Dredging Activities	To consider larger area for PCBs, Arsenic, Chromium, Copper, Nickel, Zinc	If any: Contaminated sediments, Inactive haz. waste sites, Industrial discharges
9. Beach Closings	To consider partial body contact down-stream from combined sewer overflows	If any: Municipal discharges, CSOs
10. Degradation of Plankton Populations	Not believed impaired	If any: Contributing sources as in #1 above
11. Tainting of Fish and Wildlife Flavor	Not impaired	None known
12. Eutrophication or Undesirable Algae	Not impaired	None known
13. Drinking Water Restrictions, Taste and Odor Problems	Geosmin and 2-methylisoborneol (MIB); likely a nuisance condition.	Two compounds (geosmin and MIB) naturally occur in some water supplies.
14. Degradation of Aesthetics	Not impaired	None known
15. Added Costs to Agriculture or Industry	Not impaired	None known

C. RESTORING BENEFICIAL USES - Strategy Summaries

Eleven of the fifteen use impairment indicators for the St. Lawrence River at Massena Remedial Action Plan are or have been reassessed for the development and implementation of remedial strategies. For example, due to the 1998 peak in chronic taste and odor concerning the Village of Massena's drinking water supply, the impairment indicator addressing "Drinking Water Restrictions"was reopened for evaluation. The restoration and protection strategies, as applied to each of these eleven use impairment indicators and to the sources of contamination, are further described below in narrative summaries. For additional details addressing each of these use impairment indicators, refer to the eleven "Use Impairment Strategy Management Forms" contained in Appendix F and to Tables 1, 2, 4, and 5 contained in this Massena RAP Update document.

The narrative summaries for each Use Impairment Restoration and Protection Strategy management form for the Massena Area of Concern are described below. The restoration (delisting) criteria are summarized in Appendix D, Table 7, and described in more detail in Appendix E. A primary objective of the Remedial Action Plan is to accomplish the development and implementation of the remedial strategies and to achieve the restoration criteria. The eleven remedial strategies summarized below are designed to restore and to protect the beneficial uses for each of the use impairment indicators that is subject to assessment or reevaluation. In a later part of this report (Section V.B), all of the AOC indicators are further addressed in detail.

1. Fish and Wildlife Consumption Restrictions

The fish consumption use impairment is caused by PCBs, Mirex, and Dioxin in fish flesh. The sources of the historic cause of this use impairment include local and upstream industrial discharges, inactive hazardous waste sites, contaminated river sediments, air deposition, and Lake Ontario. Following the remediation of the St. Lawrence and Grasse Rivers, and the completion of land-based hazardous waste site remediation, investigations and long term monitoring at the three major Massena industrial sites will be needed to evaluate the extent of any remaining impairment. Ongoing land-based and river-based waste site remediation, along with improved treatment of point source discharges, has contributed to the restoration and protection of the beneficial uses. Establishment and implementation of Best Management Practices (BMPs) involving fish, aquatic and wildlife as well as human health, will also benefit fish consumption as well as contributing to the overall restoration and protection of other problems identified by the use impairment indicators.

The three major industries will need to continue to monitor and document restoration accomplishments following announcements of the completion of site remediation. ALCOA and GM will need to verify that hazardous waste site cleanup standards have been achieved. When fish and wildlife studies indicate that contaminant levels are acceptable and when there are no health advisories due to causes from the AOC and its watershed, modification to the use impairment status can be reconsidered. Additional fish and wildlife or human health management strategies may be required.

[Note: Table 1 from Stage 2 of the RAP had previously identified mercury, dioxin, and Mirex as additional likely causes of this use impairment. Some changes have occurred, and mercury is not identified as contributing to advisories in the St. Lawrence River. Currently, PCBs, Mirex and Dioxin are identified as contributing to consumption advisories of fish in the St. Lawrence River.]

2. Loss of Fish and Wildlife Habitat

This use impairment is due to contaminated river sediments and physical disturbances caused by the construction of the power dam and St. Lawrence River Seaway. Loss of habitat involves the presence of elevated levels of PCBs, metals and PAHs that are likely to adversely impact benthic organisms. Dredging, natural erosion, and other sediment disturbances (e.g. ship propeller wash) are other sources that contribute to the cause of this use impairment.

There are three key actions that will contribute to the restoration and protection of habitat: 1) completion of hazardous waste site remediation and implementation of Best Management Practices including wetland restoration projects by the three major industries, 2) the implementation by the New York Power Authority of Federal Energy Regulatory Commission (FERC) licensing requirements affecting habitat concerning the power dam, and 3) the assessment and verification by NYSDEC that the type, quantity, and quality of habitat in the AOC is adequate and that management plans (including seaway dredging) are in-place to protect this beneficial use. Also, the documentation of the enhancements to the existing habitat outside of the AOC will contribute to resolving this use impairment. (Note: the Grasse River presents a longer term resolution issue for the AOC.)

3. Transboundary Impacts

This additional use impairment indicator (used to address intergovernmental considerations) is rated as impaired and is believed to be historically caused by the pollution transport of PCBs, phosphorus, nitrogen, metals and contaminated sediments impacting downstream areas. Transboundary impacts include both the Cornwall AOC and Mohawk Tribe territory located in both the US and Canada boundaries of the St. Lawrence. The completion of remedial measures will address sources of pollutant transport from land-based hazardous waste sites, contaminated river sediments, and point source discharges including combined sewer overflows (CSOs). Sources upstream of the AOC include components outside the scope of the RAP and can be more difficult to address. These sources are nonpoint in nature and involve stormwater runoff, erosion, Lake Ontario inputs, and atmospheric deposition. Drinking water impacts are also to be addressed.

Once the land-based and longer-term contaminated river sediment remediation has been completed, the accomplishment of cleanup levels and the existence of any remaining contributions to downstream impacts will need to be assessed. Achieving ambient water quality standards, air discharge standards, sediment criteria, and flora/fauna objectives will each be important and require evaluation. Upstream watershed plans (e.g. the Lake Ontario Lakewide Management Plan) will need to address the effects of lake water quality on the St. Lawrence River. Monitoring is needed to assess the impact of these waters. For example, under the beach closings indicator, further assessment is needed concerning the existence and extent of any partial-body contact use impairment in non-bathing designated beach areas.

4. Degradation of Fish and Wildlife Populations

This probable use impairment is caused by PCBs, mercury, DDE, physical disturbances and the over-harvesting of fish. The historic sources include industrial discharges, inactive hazardous waste sites, contaminated sediments, Lake Ontario, the Cornwall AOC and the construction and operation of the power dam and international seaway. Further studies are needed to define the extent of any impairment and to assess the results of implementing the required remedial activities that address the fish consumption advisories and habitat impairments above. The construction of the seaway and power dam and introduction of invasive species have had a profound impact on river ecology. At present, a post-1959 fish and wildlife baseline is needed to define the desired fish and wildlife community structure (number and balance). Such a baseline would be useful in establishing any remaining impairment subject to further remedial measure.

The following items need to be addressed in order to resolve this use impairment: demonstrate that environmental threats are addressed; document that fish and wildlife management goals are achieved; document no toxicity from sediments; and, verify that a healthy, reproducing population of benthivores and piscivores exists. Also the fish and wildlife habitat, outside the defined AOC boundary, that was created as a result of the St. Lawrence Seaway construction needs to be assessed in order to evaluate its contribution towards restoration of this beneficial use.

5. Fish Tumors or Other Deformities

This possible use impairment was identified as likely due to PAHs from contaminated St. Lawrence River sediments. Once the sediment removal and capping projects have been determined complete at the ALCOA and former Reynolds sites, a fish pathology study would be appropriate for comparing and making a determination of the existence of tumors. The use impairment indicator is considered

resolved when the incidence rates of fish tumors and other deformities do not exceed non-impacted reference sites, survey data confirm the absence of liver tumors in bullheads or suckers, fish tissue standards are achieved, and there are no deformities observed in resident species. Fish tumor impairment has not been observed in area fish studies or in sporting person reports involving the Area of Concern.

6. Bird and Animal Deformities or Reproductive Problems

This possible use impairment could be due to PCBs from contaminated river sediments. After completing the land-based hazardous waste site and contaminated river sediment remediation work, investigations and longer term monitoring are needed to define the existence and extent of any use impairment. Enhancements to fish/aquatic/wildlife management plans may also be needed.

The restoration criteria are satisfied when studies demonstrate compliance with tissue standards or objectives as a protection level and when wetland assessment indicates healthy communities of significant species. Incidence rates should not exceed control sites. Without sufficient evidence to suggest that deformities or reproductive impairment is probable, an extensive bio-monitoring program is not warranted.

7. Degradation of Benthos

This probable use impairment is due to PCBs, PAHs, lead, copper and physical disturbances that come from industrial discharges, contaminated river sediments, inactive hazardous waste sites, nonpoint sources, and shipping activity. After completing the land-based hazardous waste site and contaminated river sediment remediation work, investigations and longer term monitoring will be needed to define the existence and extent of any use impairment. Enhancements to fish and wildlife community management plans may also be needed. PAHs have been added as a cause of the degradation of benthos because studies show PAHs to have substantially altered benthic populations at Reynolds Metals. These studies were required by NYSDEC as preliminary monitoring for the dredging project which was conducted in 2001. No comprehensive benthic community assessments related to the project have been conducted since that time, however benthic toxicity testing work was conducted in the fall of 2005 and the report from that testing is currently under development.

The restoration criteria will be satisfied when benthic surveys demonstrate a healthy community. In the absence of community data, sediment quality criteria must be achieved such that no threat is evident. The emphasis is placed on demonstrating the absence of toxic effects of sediment associated contaminants and on demonstrating bioassay results comparable to controls.

8. Restrictions on Dredging Activities

Although this use impairment indicator has been determined to be unimpaired for the ongoing St. Lawrence Seaway navigational channel maintenance dredging, it is possible that an impairment could exist when considering expanded dredging proposals outside the seaway maintenance channel. There is a present concern regarding chemicals such as PCBs, arsenic, chromium, copper, nickel and zinc that are known to be present in contaminated river sediments. After implementing the required sediment contamination remediation projects, and further defining the contaminated sediment guidelines, considerations for any followup investigations should be assessed such as: sediment analyses, toxicity tests, benthic studies, bioaccumulation studies, fish surveys and deformity evaluation. Based on these considerations, determinations for any dredging restrictions and/or any further required remedial actions and/or sediment strategy can be determined.

Under the existing federal enforcement orders, the required remedial dredging activities have had substantial controls on conducting the dredging and on the disposal of the dredged materials and associated water effluent. For example, dredged materials have been placed in an approved secure landfill, return water has been treated by flocculants and activated carbon, and certain monitoring activities and studies have been conducted.

Restoration criteria are satisfied when sediment criteria are achieved. This includes no restricted dredging activities due to active AOC or watershed sources. Study results should confirm this. Navigational channel maintenance dredging needs to verify that dredged material disposal does not contribute to use impairments and that beneficial uses are protected.

9. Beach Closings

Although this use impairment indicator has been determined unimpaired for the New York State portion of the AOC, further assessment is needed concerning the existence and extent of any partial-body contact use impairment in non-bathing beach areas downstream of combined sewer overflows (CSOs). Following the development and evaluation of additional data, which should include fecal coliform bacteria enumerations, an assessment of any impairment is to be made.

Restoration criteria are satisfied when bathing beach and partial body contact water standards and guidelines are achieved. Concentrations of fecal coliform and *E. coli* should be consistently below 100 colonies per 100 ml sampled. All AOC beaches are to be open to swimming and beach data and water quality results need to support the not impaired status.

10. Degradation of Plankton Populations

At present, the existence and extent of any plankton use impairment is unknown; certain study is therefore needed. In addition, investigation and long-term monitoring are required to assess the status of this use impairment indicator following the completion of ongoing and planned land-based hazardous waste site and contaminated river sediment remediation. Clarkson University's Great River Center is developing surveying methods using advanced instrumentation to measure phytoplankton community composition and health. These techniques should also be applicable for use in other AOCs in the Great Lakes community.

Restoration criteria are satisfied when a healthy plankton community can be demonstrated. Bioassay data should confirm that no significant toxicity occurs in ambient waters. When compared to non-impacted areas, the plankton community structure should be favorable (population, size and variability). In the absence of community structure data, an evaluation requires plankton health study (bioassay or health index) to confirm no toxic impact in ambient waters. A related indicator is to observe a healthy fish community in the AOC.

11. Drinking Water Restrictions, Taste and Odor Problems

Taste and odor problems were not considered an impairment in the Stage 1 document developed in 1990. The invasion by exotic species dreissenid mussels in the Great Lakes and the St. Lawrence River and concomitant increase in water clarity is hypothesized to contribute to the presence of the compounds geosmin and MIB. This in turn has created a taste and odor events in the drinking water supply that have seasonal characteristics and are considered a nuisance. Because of this, the status of this use impairment indicator needs to be reevaluated. In some years, the condition has occurred more frequently such that localities along the St. Lawrence River, may have to (or have had to) provide additional costly treatment to the drinking water supply to remove the taste and odor. For Massena, complaints on this problem peaked in 1998; it is not currently an actionable issue. The St. Lawrence River Institute of Environmental Sciences at Cornwall, Ontario has conducted research on the cause of taste and odor problems in the St. Lawrence River.

IV. REMEDIAL ACTIVITY PROGRESS - Details

The RAP process strives to identify all remedial activity contributing to the goal to eliminate use impairments in the Area of Concern. This effort includes identifying a sequence of events needed to restore and to protect beneficial uses and then working to achieve and to expedite these activities. Concurrent with this RAP planning and implementation effort, various New York State Department of Environmental Conservation (NYSDEC) and other agency environmental program activities are in place and progressing as part of ongoing environmental programs, protection laws, and policies. The RAP seeks to influence and encourage these program activities to address local area, watershed, and ecosystem concerns involved with the RAP. In turn, these activities do contribute and support progress towards achieving the RAP goals. The progress, accomplishments, and specific needs of the Remedial Action Plan need to be communicated to all involved parties and stakeholders.

The RAP strategies developed in the following section, therefore, make use of all resource commitments and related remedial actions and provide an ecosystem approach for the remedial activities to restore and to protect beneficial uses. By communicating the RAP process, it is desired that remedial activities incorporate this ecosystem approach. One purpose of the Remedial Advisory Committee is to assure that all stakeholders' interests and concerns have been satisfactorily investigated and resolved as much as possible. A key to this is securing implementation commitments to achieve RAP objectives.

To facilitate reporting of remedial activity progress, the RAP subject matter is broken down into the nine major program area/remedial activity topics that follow. Brief summary descriptions of progress in these nine environmental program activity areas are provided below. Additional details of the projects and past progress of implementation in each of these nine areas are also presented in the comprehensive St. Lawrence River at Massena RAP 1995 Update document.

A. Hazardous Waste Site Remediation (land-based)

USEPA and NYSDEC issued Administrative Orders that required land-based as well as contaminated river sediment to be cleaned up. Implementation of these orders remains fundamental to Area of Concern rehabilitation and forms a basis for most initial remedial strategies. Completion and settlement of these remediation activities includes Natural Resource Damage Claims (see Appendix H) to address any damage and injury to the natural resources. Land-based remedial actions were required at each of the three large Massena area industrial sites. Significant progress has been accomplished at each of the two ALCOA sites and most of the General Motors site where some land-based contamination issues remain to be resolved.

- **ALCOA (main plant; west) -** There were two Records of Decision covering a total of fourteen sites; The first ROD was issued in 1991 and addressed eight sites: Spent Potlining Piles “I” and “A”; Dennison Cross Road; Soluble Oil Lagoon; Primary Lagoon and Dredge Spoils Areas; Oily Waste Landfill; West March; and the Unnamed Tributary. All sites in this ROD have been remediated. The second ROD was issued in January and addressed six sites: Waste Lubricating Oil Lagoon;

General Refuse Landfill; Landfill Annex; 60 Acre Lagoon; Sanitary Lagoon; and the East Marsh. All sites in the second ROD have been remediated. Four non-ROD sites were added where remedial measures have been implemented (including the HPM press, ST-51, and West Fill site, as well as Plant Roads.

Costs expended to date by Alcoa for completion of the land-based remediation activities at the Alcoa West Plant are approximately $250 million and when added to the costs for upgrading wastewater and air discharges, substantial and meaningful action has taken place to address this St. Lawrence River area remediation. Constructed wetlands are also in-place. A discussion of the current status of remediation efforts related to the Grasse River is provided in Section IV.B below.

- **ALCOA (east; formerly Reynolds Metals) -** The plant site consists of the entire Reynolds Metal Company facility and adjacent land areas which had been impacted by the handling and disposal of hazardous wastes. Major areas of remediation were the black mud pond, landfill and former potliner storage area, wetlands, north yard, potliner pad, miscellaneous areas including the rectifier yard and adjacent rectifier yard drainage ditch, and an area north of Haverstock Road. The land areas have been remediated by having the waste sent to a secure off-site landfill for disposal.

  The black mud pond was used for the disposal of spent potliner after it had been digested to extract cryolite. Potlining waste is no longer disposed of at this site. The Landfill received both solid and hazardous waste including general mill waste, C&D debris, sludges contaminated with PCBs, and potliner waste. The landfill no longer receives these wastes and there is contained drainage around the landfill to catch all stormwater and eroded sediments from runoff. A new leachate collection system protects the area. Runoff and sediments contaminated with cyanide, fluoride, sulfate, and PCBs (from the potliner storage area and the rectifier yard) were historically allowed to flow into the adjacent wetlands and have now been remediated.

  Remedial measures have addressed the leaks, spills, waste handling, and waste disposal practices that resulted in PCB, cyanide, fluoride, and sulfate contamination at certain site areas. A long-term operation and maintenance program has been initiated which will assess the effectiveness of the remediation at each area of the site. The total estimated cost for land and river remediation at Reynolds Metals is in excess of $100 million.

  There are no residences in the vicinity of the Reynolds Metals facility site. PCB contamination on the north end of the site, which affected the St. Lawrence River, has been remediated. The nearest public water supply downstream of this site is the Akwesasne Mohawk Reservation Site which is approximately 3 miles away. This water supply is closely monitored to protect users. Test results indicate no detectable PCBs present in the treated drinking water. In addition, a large constructed wetland with a variety of wildlife habitat and enhancement features has been constructed as part of the ALCOA east remediation.

- **General Motors -** Ongoing remedial measures at the GM facility are addressing a number of areas including an industrial landfill, north and east sludge disposal areas, an oily waste lagoon, three active wastewater/stormwater lagoons, various areas with soil contamination, and associated sediment contamination in the St. Lawrence and Raquette Rivers and in an unnamed tributary to the St. Lawrence River.

  The 1985 USEPA consent order required General Motors to perform a Remedial Investigation / Feasibility Study to address the entire site, including river sediments. Interim remedial measures were performed on the landfill cap located near the eastern border of the site adjacent to the Mohawk (Akwesasne) lands. USEPA issued a ROD for Operable Unit 1 in1990 addressing all site areas except for the east area and industrial landfill. The remedy included removal and treatment of contaminated river sediment, excavation and treatment of land-based soil and sludge, and groundwater recovery and treatment. In 1992, USEPA issued a ROD for Operable Unit 2 (addressing the landfill and east area) which identified remedies as: containment with an improved cap for the industrial landfill and partial excavation/treatment followed by similar containment for the east area.. Following treatability testing of contaminated materials, USEPA was to determine the best method to achieve goals. Subsequently, a 1999 ROD amendment provided for off-site disposal of soils and/or sediments from the St. Lawrence River, the nearby St. Regis Mohawk Tribal lands, the Raquette River, and Turtle Creek. In addition, USEPA included a contingency should access to the cove and Mohawk land be approved, that these materials would be addressed in the same manner. The following list outlines the considerable amount of remedial work completed by General Motors:

  1. 1995- St. Lawrence River remediation of a 10 acre area of river sediments, removal of miscellaneous soils on plant property, and construction of a storm water collection lagoon and treatment facility.
  2. 1999- Removal of sludges / soils from onsite process/stormwater lagoons an subsequent lining of lagoon bottoms.
  3. 2002- Soil and sediment removal from the Raquette River and banks.
  4. 2003- Removal of soils northeast of the Industrial Landfill.
  5. 2004- Removal of soil and sediments from Cove adjacent to Mohawk lands.

  In 1995 GM constructed a series of stormwater controls at the site including a 2 million-gallon lagoon and a dedicated water treatment system. Sampling during 1999 characterized the extent of PCB contamination in the Industrial Landfill and at the Raquette River. In 1999, the Operable Unit 1 ROD was amended to address the landfill and its groundwater, the Raquette River remedial work, and off-site disposal of St. Lawrence River sediments. In addition EPA included a contingency, should access to the cove and Mohawk land be approved, that these materials would be addressed in the same manner. Remedial work in the cove has since been done.
  Significant progress has been made in site remediation and in negotiations among

GM, EPA, and the St. Regis Mohawk Tribe. As a result, remedial measures continue and further negotiations are needed to complete the remaining issues involving the GM onsite landfill and contamination on Akwesasne lands.

- **Other Watershed Sites** - Remedial activities at other land-based hazardous waste sites within the watershed are associated with localized problems that are believed to have less impact on the Area of Concern use impairments. It is expected that the PCB cleanup activities in the St. Lawrence River watershed (mostly completed except for the Grasse River) will eliminate all significant PCB contributions to the St. Lawrence River and that the use impairment impacts from these historical discharges will cease to exist in the foreseeable future. The Remedial Advisory Committee has developed restoration targets [Appendix B and C(Table 6)]. These targets are further described under each beneficial use indicator resolution strategy addressed in Section V.B. Included is the overall AOC monitoring (surveillance) information described in the supporting data component as well as in Section V.A (Table 3). Each indicator's resolution strategy is applied to determine when the beneficial use has been restored and protected.

B. Contaminated River Sediments (river-based)

USEPA enforcement orders at each of the Alcoa and GM sites require the evaluation and implementation of remedial measures to address potential human health and environmental risks associated with contaminated sediments. Except for the Grasse River, these projects have been completed or are in the end-phase of implementation. The Administrative Orders that require the companies to implement remedial measures to address contaminated sediments are designed so that there is no lapse of responsibility for the remediation of PCB contaminated areas along the Grasse River and into and including downstream portions of the St. Lawrence River. In other words, all major contaminated sediment areas are addressed under one of the three federal orders such that where one facility's investigative and remediation responsibility ends, another facility's responsibility takes over. USEPA has published a contaminated sediment management strategy.

- **General Motors** - Sediments in the St. Lawrence River were dredged by General Motors and its contractors in 1995. An elaborate sheet piling and silt curtain containment system was installed and monitored. Extensive filtrate treatment was provided for dewatered dredge materials. Over 80% of the dredged area had final PCB concentrations below 10 ppm with an average of 3 ppm. The remaining area, with concentrations of PCBs in excess of 10 ppm, was secured by constructing an "armoring layer" composed of sand blended with carbon, then gravel, and then heavy stone. The dredged sediments were dewatered and stockpiled on site. GM then shipped the sediments to an off-site disposal area in accordance with the 1999 amendment to the ROD for Operable Unit 1.

Since the completion of dredging in the St. Lawrence in 1995, GM collected young-of-the year spottail shiners from 1997 to 2001 to assess the localized impact of dredging and partial armoring/capping. PCB concentrations have shown some reduction from pre-dredging data collected by NYSDEC and Environment Canada. GM conducted additional sediment and shoreline remediation in and along the Raquette River in 2002-03. Excavation of sediments from the cove and soils on Mohawk land adjacent to the St. Lawrence River excavation site has also been completed. An agreement among the St. Regis Mohawk Tribe, USEPA, and GM was reached to implement remedial measures in this cove area in 2004. Work was conducted in 2004-05.

- **ALCOA (East Plant; St. Lawrence River) -** The contaminated sediment removal project conducted in 2001 at the former Reynolds Metals facility involved dredging approximately 56,000 CY (in-situ basis, 77,000 CY ex-situ basis) of sediments with PCB concentrations greater than 1.0 ppm. Reynolds (now Alcoa East) dredged the river using the Cable Arm environmental bucket technology in an effort to limit resuspension and installed a sheet pile wall around the dredge area to contain resuspended sediments. A conventional clam bucket and hydraulic bucket were also used in addition to the Cable Arm in an effort to address areas with persistent elevated residual PCB concentrations. The dredging techniques included the use of sophisticated positioning technology for the dredging equipment.

  Sediments with PCB concentrations greater than 50 ppm but less than 500 ppm were shipped off-site to an approved landfill for disposal. Sediments with PCB concentrations greater than 500 ppm were shipped off-site for treatment and then disposed in an approved secure landfill. Sediments with PCB concentrations less than 50 ppm were disposed of in the on-site landfill, which was closed (capped) following the completion of the remedial activities.

  In the river, an interim cap was placed over 15 cells at the completion of work in 2001 based on the presence of elevated PCB concentrations in 12 of these cells following the completion of dredging. To complete the remedial action for the site, a final armoring system cap would be placed over these cells in the following construction season. Subsequent to the 2001 activities, EPA requested additional sampling related to residual PAH concentrations in the area subject to remediation. These activities were carried out in 2002, 2003, and 2004, and the results of this work identified an additional 61 cells that required further evaluation based on remaining PAH levels. Most of the remaining PAH's were found in the top 8 inches of sediment. Alcoa conducted a sediment toxicity study in the fall of 2005 and submitted to EPA a focused feasibility study in this same timeframe which included a list of possible options for bringing the site to closure in conjunction with a recommended approach to the completion of remediation. The feasibility study is currently under review by EPA. Costs to date associated with the investigation and remediation activities associated with the St. Lawrence River Remediation Project are approximately $50 million.

- **ALCOA West (main plant; Grasse River) -** EPA issued an administrative order in 1989 requiring the investigation and remediation of contaminated river sediments. Investigation work related to nature and extent of contamination in the river was conducted in the early 1990's. In response to some of the findings associated with these investigations a non-time critical removal action (NTCRA) was conducted by Alcoa in 1995 adjacent to the main plant discharge in the Grasse River (outfall 001). The NTCRA involved the removal of approximately 3,000 CY of sediments containing high levels of PCBs along with boulders, cobbles, and debris. A series of investigative studies were initiated in 1996 to better understand the fate and transport of PCB's in the river to support the development and evaluation of options for reducing PCB levels in fish. This work was undertaken to address the sources of PCBs, as the land based remediation efforts for the Grasse River progressed at the Alcoa West facility.

  A capping pilot study was conducted over a 7.5 acre area of the Grasse River just upstream of the Route 131 bridge in 2001. The study was designed to evaluate various cap material types and placement techniques. Follow-up monitoring conducted in 2002 indicated that the cap remained in place and was functioning as designed. In February of 2002 Alcoa submitted to EPA a draft Analysis of Alternatives Report which detailed ten potential remedial approaches for addressing the Grasse River sediments.

  Monitoring of the pilot cap area in the spring of 2003 indicated that some of the cap materials and underlying sediments had been disturbed over the intervening winter. Subsequent investigations determined that an ice jam had occurred in the spring of 2003 over the cap area which resulted in the observed sediment disturbance. The occurrence of ice jam related sediment scour was not known prior to 2003, and the pilot cap was not designed to withstand the forces associated with this type of event. A series of follow-up investigations related to ice jam event focused on understanding the cause, frequency, and impact of such events in conjunction with an evaluation of possible preventative measures. Results of follow-up monitoring showed no significant impacts from the event to PCB levels in sediment, water, or fish in the river.

  In 2005 the Remedial Options Pilot Study (ROPS) was conducted on the Grasse River. The study was designed to both develop information to support future decision making related to the final remedy for the site as well as to make progress towards the overall remediation. Major components of the study included: the targeted removal of approximately 65,000 CY of sediments in an ice scour prone section of the river; installation of a one acre armored cap designed to withstand the forces of an ice scour event; and, a comparison of dredging/capping and thin layer capping in the near shore areas of the river. Extensive monitoring was conducted related to each of the components.

  An ice control structure, designed to prevent future ice jams from occurring at least until which time a final remedy for the river was in place, was also proposed for

installation in 2005 as part of the ROPs. Installation of the structure was not implemented, however, due to community concerns related to the initial location identified for the structure, which was several miles upstream of the study area. Work is ongoing with respect to both the identification of alternate locations for structural ice control options and interim measures for ice jam prevention through ice breaking.

The field activities associated with the ROPS project were completed in November 2005. Approximately 40% of the targeted sediments (25,000 CY) were removed from the river as a number of difficulties were encountered during project implementation. All dredged areas were capped with a clean sand/topsoil mixture to address elevated PCB concentrations that remained after the dredging activities. Installation of the armored cap and the work in the near shore (shallow) areas of the river was successfully completed. A draft report detailing the findings from the study was submitted to EPA in the spring of 2006. Monitoring of the ROPS work areas will be conducted in 2006 and an additional pilot study designed to evaluate direct addition of activated carbon to sediments as a remedial option is planned for the fall of 2006.

A revised Analysis of Alternatives Report will be prepared and submitted to EPA once the information from these studies has been evaluated. A proposed plan will be issued by EPA for public comment in advance of the selection of a final remedy, which will be documented in a Record of Decision for the site. Additional information can be found at the Alcoa website for the Grasse River, which is located at www.thegrasseriver.com. The decision on the Grasse River site is very complex in view of the difficulties posed by the site specific considerations.

C. Point Source Discharges

A significant reduction in the mass of PCBs and other contaminants discharged from the Massena area industries (primarily stormwater/site related) has been achieved by the installation of improved wastewater treatment systems, implementation of best management practices, and interim/completed remediation activities. The permit renewal process involving the three major industrial companies has the goal of achieving non-detectable discharge levels of PCBs, as well as reduced discharges of other contaminants for each water discharge. Although PCBs are no longer used, past waste disposal practices contaminated the facility sites such that stormwater runoff discharges were a major concern. With the overall site remediation work requiring the cleanup of PCB contamination nearly complete, and with additional treatment of point source discharges, it is expected that PCB contamination and related issues will be addressed.

The installation of point source discharge controls addresses both water and air pollution. For example, to reduce contaminants, Reynolds (ALCOA east) has installed new state-of-the-art air cleaning equipment and has rebuilt their aluminum reduction facility to increase operation efficiency. The concentration of PCBs in the wastewater discharges has improved to the monitoring level of non-detectable. The cost of these facility upgrades, involving air and water treatment processes, has exceeded $250M in addition to the cleanup costs.

As a result, ALCOA is in significant compliance with water and air discharge standards. In addition, ALCOA has reduced water use dramatically while accomplishing the reduction of PCB discharges to non-detectable levels. New HDPE plastic-lined stormwater impoundments have been installed at ALCOA as part of the current SPDES discharge permit. At General Motors, the treatment of non-process / stormwaters has also resulted in PCB level reductions where samples are non-detectable.

Remedial measures implemented in the watershed contribute to improve beneficial uses in the Area of Concern. For point source discharges, these activities include the regulation of Concentrated Animal Feeding Operations (CAFOs), Combined Sewer Overflow (CSO) abatement actions addressing wet weather flows, and stormwater permit activities to regulate separate storm sewer systems and construction runoff.

D. Nonpoint Source Pollution Control

Excessive nutrients (phosphorus) and sedimentation (erosion) from agriculture and land development are believed to be the main nonpoint source pollution problems in the St. Lawrence River 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, is an ongoing activity. Various funding programs and supporting grants continue to assist in the implementation of these nonpoint source pollution control efforts.

NYSDEC works in cooperation with the St. Lawrence County Soil and Water Conservation District to address water quality problems and to fund implementation projects using federal funds appropriated under Sections 319 and 604(b) of the Clean Water Act. Federal guidance has established 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 (e.g. wetlands, streams, slopes).
- Establish buffers to protect resource areas (construction and management).
- Provide sediment and erosion control (address construction and disturbance).
- Reduce site imperviousness (apply clusters and infiltration to the design).
- Provide stormwater management (address runoff, treatment, protection, and BMPs).
- Provide watershed protection (use inspections, assistance, compliance actions).

NYSDEC's Division of Water has developed a guidance document entitled the Management Practices Catalogue for Nonpoint Source Pollution Prevention and Water Quality Protection in New York State. This "**Management Practices Catalogue"** contains nine completed sections that address the following nine main parts: stormwater runoff, agriculture, construction practices, roadway maintenance practices, on-site wastewater treatment systems, silviculture, spills, resource extraction, and hydrologic/habitat modification.

Implementation of the nine 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 specific Best Management Practices (BMPs) establish fundamental strategies. The cooperative agreements with County Soil and Water Conservation Districts and Water Quality committees are key factors to implementation. Education and training are promoted by these organizations. For example, the Agricultural Environmental Management (AEM) program goal is to support New York's diverse agricultural community in its efforts to reduce NPS pollution while enhancing farm viability. Cost share funds are allocated to support farm efforts to protect water quality and natural resources. Like the RAP program, the AEM program is dynamic in that it surveys current activities, documents and identifies priorities, develops remedial measure plans, implements using education and technical assistance, and conducts evaluations to ensure protection.

E. Air Pollution Control

The remedial strategy calls for the reduction of hydrogen fluoride and other contaminant emissions from the major industrial facilities in the AOC. The National Emission Standard for Hazardous Air Pollutants (NESHAP) for Primary Aluminum Production requires air discharges to comply with emission limits which address hydrogen fluoride and polycyclic organic matter (POM) emissions.

At ALCOA, the main plant (west) is in general compliance with the NESHAP air discharge standards. In the early 1990's Reynolds Metals (ALCOA east) installed a new fume control system that meets the NESHAP requirements. This ALCOA east facility has installed replacements for pot hoods designed for an improved capture of pollutants. When operated properly, the new fume control system and new pot hooding at Reynolds (Alcoa East) provides for meeting air discharge requirements. In the mid 1990's General Motors installed rooftop thermal incinerators to destroy styrene and benzene volatile organic compounds (VOCs).

EPA addresses emissions of Hazardous Air Pollutants (HAP) from Secondary Aluminum Production Processes. ALCOA (west and east) and General Motors are to comply with emission limits for particulate, hydrogen chloride, total hydrocarbons, and dioxin/furans within 3 years of promulgation of a rule. The Clean Air Act Amendments (CAAA) 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. New York State has put together a comprehensive program to improve air quality and to bring the State into compliance with the 1990 federal CAAA; major provisions include:

Title I: Nonattainment - areas that do not meet federal standards for particulate matter, nitrogen dioxide, carbon monoxide, lead, sulfur dioxide, and ozone (VOCs and NOx).

Title II: Mobile Sources - For all types of motor vehicles, this title sets standards for emissions testing, certification, and warranties.

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.
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 plants.

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.

- **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:

    1. **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. These are emission limits on the hazardous air pollutants, regional efforts to address ozone transport, and establishment of a Small Business Assistance Program.

    2. **Air Pollution Program Investigations -** There are several types of investigations involved in the air pollution program that can involve Great Lakes program activities. These include: 1) Ambient Air Monitoring Networks, 2) Fugitive Emissions, and 3) Atmospheric Deposition.

3. **Air Pollution Program Initiatives -** There are a number of initiatives concerning the air pollution program that can involve Great Lakes program activities. These include:
   - National Urban Air Toxics Strategy,
   - Source Category Regulation,
   - Source Discharge Air Permits Program,
   - Facility Specific Air Permits, and
   - Amendments to NYSDEC Air Pollution Regulations.

   In order to meet the requirements of Title V of the federal Clean Air Act Amendments of 1990, New York State DEC is in the process of modifying 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.

F. Fish and Wildlife Assessments/Actions

A number of the beneficial use indicators are based on fish and wildlife conditions and considerations. DEC conducts and funds fish and wildlife investigations. The data and findings of these studies need to be shared with the AOC community. Impairments caused by contamination from area industries affecting fish habitat, populations, and consumption are evaluated separately. A collaborative team effort has formed among NYSDEC, Environment Canada, and the St. Regis Mohawk Tribe to address the fish consumption restrictions, and impairments to fish and wildlife habitat and populations. Monitoring data is to be shared, strategies are to be developed, and resources combined to address the use impairments for this international AOC. See Appendix L for NYSDEC studies.

The relicensing of the power dam by the Federal Energy Regulatory Commission will assist in addressing fish impacts and restoring beneficial uses. As part of the relicensing, money is planned to create a Future Habitat Improvement Fund and a Future Fisheries Management Fund as well as the rehabilitation of a boat launch at Hawkins Point.

Results of fish and wildlife investigation, environmental monitoring, and habitat restoration and protection activities in the St. Lawrence River Area of Concern are being generated as part of remedial actions. Deformity, transboundary impacts, and adequate population studies require data synthesis and evaluation by program experts. Habitat assessment also requires close examination. Below are some aspects of fish and wildlife implementation progress:

1. **Investigations** - can include studies involving: Fish Tumors, Young-of-the-Year Fish Studies, Fish Flesh Analysis, and Deformity and Populations.

2. **Environmental Monitoring** - As part of implementing the approved remedial actions, the major industries are required to perform various monitoring activities. For example, the Alcoa Remedial Options Pilot Study project conducted in 2005 included river sediment sampling, water quality monitoring, air quality monitoring, fish sampling, and benthic community characterization. The project also included a corrective action plan in the event that pre-established threshold levels for air and water quality were exceeded during the conduct of the project.

3. **Habitat** - Habitat protection and pollution prevention are two high priorities. Habitat protection includes the implementation of 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. Contamination of water and sediment of the wetlands is directly related to loss of habitat. Remedial activities conducted for the hazardous waste sites in the Massena area have removed significant amounts of contamination so that desirable fish and wildlife habitat conditions can be and are restored and protected.

   The North American Waterfowl Management Plan identifies the St. Lawrence River as part of one of five "Priority Habitat Ranges" for waterfowl habitat restoration in North America. Activities, pursued by governments and required of industries pursuant to program and legal requirements, create and restore useful habitat for waterfowl. Such actions are to be consistent with the plan objectives and RAP goals.

   The construction of the St. Lawrence Seaway dramatically altered habitat after its 1958 completion. New and modified habitat areas, outside the immediate AOC but within the St. Lawrence River drainage basin, provide an additional remedy to address and improve upon the habitat areas in the basin. Some of area projects receive federal funding. For example, the Fish Creek Wildlife Management Area involves construction of a $500,000 dam (dike) that will impound 8 million gallons of water and create new habitat. Such a water level control structure is important to many habitat areas. An inventory of waterfowl species is also being conducted in the Fish Creek area.

   Great Lakes water levels is an issue that involves many organizations and people. A multi-million dollar five year study on Lake Ontario/St. Lawrence River water level control has been completed and three alternative plans have been submitted to the IJC for their consideration. Lower fall and winter levels and higher spring and summer water levels benefit the marsh habitats. Some water level control structures have been completed on the Lake Ontario and the St. Lawrence River which will hold the spring high water levels longer through the summer for water bird brood protection and fish nursery cover. Other areas that would benefit from greater fluctuations in water levels include:

- French Creek Wildlife Management Area (near Clayton, NY)
- Point Peninsula Wildlife Management Area (near Cape Vincent, NY)
- Eastern Lake Ontario Dunes and Wetlands (in Jefferson and Oswego Counties including Lakeview Marsh, Deer Creek Marsh, and Black Pond Wildlife Management Areas.

The New York State Coastal Program, administered by the Department of State, includes two significant habitat areas within the AOC that have been identified for the development of fish and wildlife management plans. These are the Power Dam Tailwaters and the NE Long Sault Islands. Along the St. Lawrence River, forty habitat areas are designated as Significant Fish and Wildlife Habitat.

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.

G. Health and Environmental Assessments/Actions

Three studies and the resulting report documents that evaluate human health risks and focus on the Akwesasne Mohawk population have been completed, as well as the summary document published in January 1995. The reports conclude that the health risks to the Mohawk Nation at Akwesasne from the consumption of PCB contaminated fish are greater than those of anglers on major New York State waterbodies. Mohawk risks are larger primarily because the average PCB levels in the St. Lawrence River fish are higher than those in fish from some of the other waterbodies. Higher consumption rates of locally caught fish also contribute to higher risks. The results of the studies confirm the value of the health advisories for fish and wildlife consumption and call for the continuation of educational and outreach efforts until contaminant levels, particularly PCBs, decrease. Maintaining a good level of fish consumption advisory information serves to reduce exposure of user groups, particularly young women having or intending to have children. Funding is needed for follow-up investigations. Other ongoing studies are being conducted by the “Superfund Basic Research Program” with the School of Public Health at the University at Albany.

1. General Motors (RI/FS) Studies/Assessments - Human health risk assessments were required to be performed as part of the Remedial Investigation / Feasibility Study conducted under the GM Consent Order. A four part Health Risk Assessment (HRA) study was conducted and reported on as follows:

- "Chemical Contaminants in Fish from the St. Lawrence River Drainage on Lands of the Mohawk Nation at Akwesasne and Near the General Motors Corporation/Central Foundry Division Massena, New York Plant", NYSDEC, April 1990. -

  This study involved sampling at twelve locations within the Area of Concern. The purposes were to provide information to assist in the development of a health risk assessment of fish species utilized by the populace, and to evaluate spatial relationships of contaminants with respect to sources. PCB concentrations in fish at all locations exceeded published New York criterion of 0.1 ppm established for the protection of fish-eating wildlife.

- "Chemical Contaminants in Wildlife from Akwesasne and the Vicinity of the General Motors Corporation/ Central Foundry Division Massena, New York Plant", NYSDEC, October 1992. -

  This study involved tissue samples analysis from wildlife species used as food by residents of the Mohawk Nation at Akwesasne that were analyzed for PCBs, dioxins, dibenzofurans, chlorinated hydrocarbon pesticides, and heavy metals. The purposes were to provide information to assist in the development of a health risk assessment and health advisories on the consumption of wildlife, and to evaluate the relationship between wildlife contaminant levels and potential contaminant sources. Elevated concentrations of PCBs occurred in all common mergansers sampled and in frogs, turtles, and waterfowl collected in the proximity of General Motors. Piscivorous wildlife contained the greatest PCB and organochlorine pesticide concentrations followed by water borne wildlife within close proximity to chemical sources. Land based herbivorous wildlife have a much reduced propensity for accumulation of persistent organochorine compounds.

- "Chemical Contaminants in the Milk of Mohawk Women From Akwesasne", NYSDOH, October 1992. -

  This study was conducted to investigate the levels of 68 PCB congeners, total PCB, dichlorodiphenyl dichloroethene (DDE), mirex, and hexachlorobenzene (HCB) in the milk of Mohawk women from Akwesasne. The results indicated that local fish consumption has declined significantly over time among the Mohawks. That is, the mothers reported an average of two local fish meals per month for the period more than one year before the index pregnancy, compared to less than 0.5 local fish meals per month during pregnancy. This decrease is probably related to the advisories that have been issued by Mohawk, state, and federal agencies against the eating of any fish from that area of the St. Lawrence River by women of child-bearing age. The study concludes that future efforts should focus upon the role of locally produced foodstuffs in addition to fish and wildlife, as well as congener-specific exposure through inhalation and dermal contact. Evaluation of these pathways will require detailed environmental sampling of air, soil, and drinking water near the residences

of study participants. Such efforts should include Cornwall Island and other areas of the Reserve that to date have not been well characterized environmentally.

- "Health Risk Assessment for the Akwesasne Mohawk Population from Exposure to Chemical Contaminants in Fish and Wildlife from the St. Lawrence River Drainage on Lands of the Mohawk Nation at Akwesasne and Near the General Motors Corporation Central Foundry Division Facility at Massena, New York", NYSDOH, Final December 1994. -

  This report is a summary health risk assessment that uses the results of the three previous studies described above to estimate Mohawk exposure to chemical contaminants in fish, wildlife, and breastmilk and to characterize the health risk from eating these foods. Exposure and risk were also estimated for recreational anglers eating fish from five major New York State waterbodies. Because the average Mohawk eats more sportfish, and PCB levels in local rivers are elevated, the Mohawks were found to have greater health risks. The report concludes, as the three reports above detail, that the greatest exposure to PCB for the Mohawks comes from eating fish and wild ducks, and that public education decreases this exposure.

2. **ALCOA Remediation Assessments (west and east facility locations)** - Formal health/environmental studies and assessments at the ALCOA site are an ongoing part of all remedial activities. Requirements for specific studies and assessments need to be identified as part of project implementation and long-term monitoring and extended for applicability to the RAP. Pursuant to specific remedial activities, the following assessments and needs have been conducted or determined:

- Dennison Road Area Water Wells - Samples of drinking water wells indicate low levels of contamination related to the ALCOA site. Carbon filters were installed as an interim measure on all potentially affected homes. Now, a municipal water supply has been installed as a permanent remedy for the residents.

- Grasse River - ALCOA's PCB discharges have impacted wildlife and fishing: contaminants are in the food chain and a fish consumption advisory is in affect. Annual sampling of PCB levels in resident fish has been conducted since the early 1990's and is currently ongoing. Results from this sampling are used to track trends in PCB levels in fish and are also useful in assessing impacts from the various remediation pilot studies which have been conducted on the river, including the dredging activities associated with the 2005 Remedial Options Pilot Study (ROPS) program described earlier. General trends have shown decreasing PCB levels in fish over time, with increases noted after the 1995 and 2005 dredging events. The Grasse River Community Advisory Panel has reported that signs have been posted along the reach of the Grasse River covered by the advisory which notify the public of the fish consumption advisory. A pilot project removing up to 75,000 cubic yards of

sediments was conducted in 2005. This $25 million project will assist in determining the fate of other river sediments.

- Site Groundwater, Surface Water, and Site Soil Contamination - Contravention of groundwater standards has been documented. Site remediation is to address this problem. Waterfowl and biota inhabiting lagoons and marsh areas have been impacted by contaminants. Site remediation has addressed these soil contamination issues. Extensive excavation, use of the large on-site secure landfill and other in-place remedial actions have been implemented.

- Akwesasne Water Supply - The nearest public water supply, downstream three miles of the ALCOA east (Reynolds) facility, is the Mohawk intake for the Reservation's water treatment plant. This water has been closely monitored by NYSDOH and no detectable PCBs are present in finished water.

- Site Contamination - Addressed by the Records of Decision and Consent Orders requiring remedial action implementation. With extensive air emission controls now installed at the production facilities, air deposition is no longer an issue.

3. Fish and Wildlife Consumption Advisories - Contamination of river sediments has been confirmed and addressed in the St. Lawrence River at facility discharge points. The Grasse River remains an issue. Bio-accumulation of contaminants in fish and wildlife, and the threat this poses to human health, are to be assessed for any significant difference in this area and compared to reference communities. For protection, consumption advisories are in effect. Long-term monitoring, studies and assessment reports will continue to be needed to define trends, the extent of residual contamination, and further requirements for health/environmental controls or investigations. The specific type of investigations, remedial activities and reports that have been conducted and may be needed are described in Table 3 and discussed in Sections V.A and V.B. herein. Remedial activities are also listed as strategies on the Use Impairment Restoration and Protection Strategy management forms that addresses the consumption restrictions use impairment (Form #1 in Appendix F).

4. Other Hazardous Waste Site Health Studies/Assessments

- Mineral Processing - The site contained PCB contaminated soil and an abandoned building. GM remediated the site in 1995 and installed 3 groundwater monitoring wells. Testing of groundwater since that time has been non-detect for PCBs. (Location: Route 37 off GM Circle, Massena, NY)

- York Oil Co. - The site is securely fenced. NYSDOH sampling of private wells in the area has shown no contamination; however, off-site groundwater contamination has been documented. Contamination of downgradient soils and wetland areas and any threat this presents to groundwater and wildlife habitat is under review. (Location: County Road #6, Moira, NY)

- Sealand Restoration - Low-level groundwater contamination by aromatic hydrocarbons found in 1987 has been investigated by EPA who has installed bedrock monitoring wells around the former waste disposal pit to monitor groundwater quality in the deep aquifer. NYSDOH has sampled downgradient private water wells and found no contamination. (Location: Pray Road, Lisbon, NY)

- North Lawrence Oil Dump - Although this site is in a remote location, and no homes or private drinking water supplies are near the site, a possible threat to the nearly wetland environment is under review. Groundwater contamination appears to be limited to the disposal pit area. Results of the remedial investigation do not indicate that off-site exposures to site contaminants is occurring. Access restrictions and long-term monitoring are employed to limit the potential for exposure to residual contamination and to assure that no significant environmental or health risk exists. (Location: McAusien Rd. Lawrence, NY)

5. **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 Congressionally mandated study is being conducted by USEPA and the Agency for Toxic Substances and Disease Registry (ATSDR) in the Great Lakes basin. A Human Health Network (HHN) has been formed and the Great Lakes Lakewide Management Plans (LaMPs) are to assist in this process.

H. Investigations and Monitoring Activities

As part of remediation activities, monitoring plans have been established for contaminated river sediment removal and land-based hazardous waste site projects. The development and implementation of these plans are subject to regulatory review and approval. The focus of these projects and environmental monitoring is to minimize the local and downstream impacts resulting from the remedial activities and to assure that compliance with cleanup criteria is achieved.

In addition to the remedial activity monitoring required of the industries addressing post-cleanup evaluations, the RAP process requires monitoring and expert assessments on which to make determinations on the status of the beneficial use indicators. Further health, fish, wildlife, plankton, sediment, water quality, macroinvertebrate, etc. research, study and investigation is to assist in evaluating the status of the beneficial uses by the Remedial Advisory Committee members. This is to be coordinated with resolution (delisting) criteria and endpoints.

The newly developed **Table 3** (on page 37) "Monitoring Information and Report Sources" list the monitoring activities being conducted or planned for the St. Lawrence River at Massena Area of Concern. A wide range of monitoring activities is listed. This table provides an update of NYSDEC information that was first presented in the document: "Proceedings of the St. Lawrence Joint Monitoring Workshop" (1994). The monitoring information is updated to form a matrix now focused on each of the fifteen use impairment indicators.

I. Public Participation and Outreach

Regular meetings of the Remedial Advisory Committee (RAC) throughout the implementation of the Stage 2, and documentation of achievements for an eventual Stage 3 Remedial Action Plan have continued to keep stakeholders informed of remedial activities and progress while maintaining a forum for local concerns to be heard, responded to, and addressed. Field trips are used to learn more about the specifics of remedial activities. These field trips are coordinated with current implementation activities and committee interests. An informational video describing the Massena Area of Concern has been prepared to increase public awareness about the restoration and protection activities and the needs of this important geographic area. A newsletter, promotional brochure, and RAP display are other examples of outreach activities that have been incorporated into the public participation activities involving the Massena AOC. More current collaboration with the Cornwall RAP and St. Regis Mohawk Tribe Environment Division has established a strategy to address the restoration and protection concerns for each of the indicators for the AOC on an international basis. The Remedial Advisory Committee continues to provide advice and consultation to the St. Lawrence River at Massena RAP process. Affected jurisdictions include New York State, the Ontario and Quebec Provinces, the Mohawk Tribe, and local governments.

EPA's Great Lakes National Program Office grant funding for RAP Coordination and research project(s) funding was unsuccessful for the Massena AOC in the 2005 grant year. Unfortunately, the Aquarium and Ecological Center has closed. Plans are underway for a stronger proposal in 2006. In following up, Clarkson University's Great Rivers Center (Appendix J), the St. Lawrence County Soil & Water Conservation District (SLC-SWCD), the St. Regis Mohawk Tribe, and the St. Lawrence Discovery Center (SLDC) plan to coordinate roles. The St. Lawrence County Planning Office is to assist as appropriate while

the final results of the IJC water levels study may have some bearing on the RAP, management of the AOC, and next steps for implementation.

The Massena Remedial Advisory Committee continues to advise NYSDEC during the implementation of Remedial Action Plan recommendations. The committee meets quarterly with community representatives, area stakeholders, and DEC staff to discuss RAP related issues and activities. NYSDEC and the Massena Remedial Advisory Committee continue the commitment to public participation and public outreach for the St. Lawrence River at Massena RAP. Below are examples of the public outreach and public participation activities undertaken for the St. Lawrence River at Massena Remedial Action Plan.

1. **Video and Slide Show** - A video has been produced from the Massena RAP slide show. Each provides information about the St. Lawrence River at Massena Area of Concern, local industries and the cultural diversity of the area, and also, to increases public awareness and involvement for the RAP. The video is 25 minutes long, and although ten years old, it remains a useful tool for interested persons to learn more about the St. Lawrence River RAP at Massena. For more information, please contact: Steve Litwhiler, Citizen Participation Specialist, State Office Building, Watertown, NY 13601, phone (315) 785-2252.

2. **New York State RAP Display** - NYSDEC produced a RAP display depicting the six New York State Areas of Concern along Lake Ontario and Lake Erie. The exhibit introduces the public to Remedial Action Plans in New York State and highlights key remedial actions applicable to each of the Areas of Concern. The display has been used at Great Lakes and RAP functions across the basin. Also, a brochure, entitled *RAPs in Action*, was developed to augment the message of the exhibit. The brochure provides more detailed information on remedial activities that are being implemented to restore and to protect beneficial uses. Because the brochure and display are somewhat dated, use of the video is recommended for the best overview information. For more information, please contact: Steve Litwhiler, Citizen Participation Specialist, State Office Building, Watertown, NY 13601, phone (315) 785-2252.

3. **RAP Promotional Brochure -** A RAP promotional brochure entitled, *Getting the Word Out*, was developed and used extensively during the RAP development stages. In the 1990's. The brochure provided 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 was 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. For current use, the brochure would need to be updated for the AOC.

4. ***River Rap* Newsletter** - The *River Rap* was a periodic newsletter dedicated to increasing awareness about water quality and RAP issues in the St. Lawrence River at Massena Area of Concern. To keep people informed, the *River Rap* articles addressed the plans and progress of remedial activities, local economic development projects, and stewardship initiatives. The newsletter was produced by the New York Department of Environmental Conservation and the Massena Remedial Advisory Committee. Although, more current annual issues of the newsletter have not been maintained for the Massena AOC, the RAC has expressed interest in resurrecting the newsletter. NYSDEC has discussed initial plans to prepare a draft of an updated four page newsletter during 2006.

5. **Remedial Advisory Committee (RAC) Meetings** - NYSDEC and the Remedial Advisory Committee continue to conduct 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 to learn more about ongoing remedial activities at Massena's local industries are often conducted in conjunction with the committee meetings. In August 2005, a tour of the ALCOA 's Grasse River dredging was conducted. The year before this, a tour of the General Motors remediation sites was conducted. Area stakeholders, citizens, Cornwall PAC, EPA, and IJC representatives are welcome and attend these tours and RAP meetings.

6. **International Cooperation** - The St. Lawrence River at Massena and Cornwall RAP advisory committees, as well as the St. Regis Mohawk Tribe Environment Division have agreed to share information on remedial activities occurring in each of their respective portions of the international Area of Concern and to partner in addressing the beneficial use indicators. Committee meetings, on both sides of the river, are attended by representatives from each others RAP advisory committee. The RAP advisory committees and government officials have a common goals in identifying monitoring information, defining endpoints, and evaluating their respective restoration (delisting) criteria to address each use impairment indicator.

7. **Keeping up on RAP Information and Progress** - If you would like to receive remedial advisory committee meeting minutes, newsletters, announcements and updated reports about the Massena RAP, please send your name, address and specific request to: Steve Litwhiler, Citizen Participation Specialist, State Office Building, Watertown, NY 13601, phone (315) 785-2252. Other AOC contacts are listed in App. A and on the EPA website: http://www.epa.gov/glnpo/aoc/stlawrence.html

V. Addressing Indicators

The members of the St. Lawrence River at Massena Remedial Advisory Committee working in conjunction with members of the St. Lawrence River at Cornwall RAP and the St. Regis Mohawk Tribe Environment Division have been meeting together and sharing information in order to address the multi-national aspects of the Area of Concern. The International Joint Commission and federal governments of Canada and the United States define this St. Lawrence River Area of Concern as a Connecting Channel Binational RAP; however, participation in the RAP process has involved the St. Regis Mohawk Tribe at Akwesasne from the start. According to the Great Lakes Water Quality Agreement, RAPs are to involve the public and apply an ecosystem approach. Because of its proximity to the Mohawk lands, the St. Lawrence Area of Concern has accomplished the sharing of information to become a true three party or "multi-national" RAP. Because the word "binational" is limiting and perceived as exclusive of the Mohawk Tribe, we will refer to the AOC as "intergovernmental, international, or multinational". In the spirit of intergovernmental collaboration among the multi-national agencies, we plan to move ahead on resolving (delisting) individual use impairment (beneficial use) indicators within the AOC. In so doing, participants in the RAP process have been sharing monitoring information. The goal is to make progress and seek a consensus while representing all points of view on the status of each of the AOC's environmental indicators.

A. Monitoring Information and Report Source

Throughout 2004 and into 2006, the Massena Remedial Advisory Committee has been compiling known monitoring information that can be useful in the reassessment of the fifteen beneficial use indicators for the St. Lawrence River Area of Concern. It is the goal of RAP participants to have sufficient information to reach an informed decision on the status of each of the indicators for the Area of Concern. Because the RAP process is dynamic, this list of information sources is continuously subject to updating.

To accomplish the reassessment of beneficial use indicators, RAP participants know that expert evaluation is necessary. Appropriate position statements are to be developed in order to achieve this evaluation of an individual use impairment or beneficial use indicator. Environmental experts are to be consulted, and decisions sought, regarding the relationship of the monitoring information to one or more of the fifteen use impairment indicators.

Table 3 (next page) provides the most current compilation of the monitoring information and sources under each of the indicators for the Area of Concern. It is planned that with the evaluation of this information, and with the development of identified information needs, that a reassessment and ultimate resolution of each of the indicators can be accomplished.

Coordination of the monitoring and reporting information from the Massena and Cornwall RAPs and the St. Regis Mohawk Tribe is being incorporated to assess next steps while addressing the resolution (delisting) of individual beneficial uses for the entire Area of Concern. This intergovernmental collaboration provides for efficient use of participating resources and benefits the multi-national RAP community in the St. Lawrence River AOC.

Monitoring Information and Report Sources - Table 3
St. Lawrence River Area of Concern

Use Impairment	Organization	Nature of Information	Report Source
1. Fish & Wildlife Consumption Restrictions *- Impaired*	**NYSDEC**	**Raw data from fish tested and recommendations to the DOH**	**Technical reports on chemical contamination in fish – Lawrence Skinner, Bureau of Habitat, Albany**
	NYSDOH	**Annual Health Advisories on Chemicals in Sportfish and Game**	**Annual DOH Health Advisory report on Chemicals in Sportfish and Game**
	ALCOA	**Grasse River studies on understanding of the sources, nature, and extent of various chemicals, primarily PCBs especially in fish**	**www.thegrasseriver.com report with information on contaminant levels in different fish over several years**
	OME (Ontario Ministry of the Environment)	**Health advisory on chemicals in sportfish. Data collected in Lake St. Lawrence and Lake St. Francis.**	**Guide to eating Ontario Sportfish. http://www.ene.gov.on.ca/envision/guide/**
2. Loss of Fish and Wildlife Habitat *- Impaired*	**USFWS and others**	**Agreement under NY Power Authority FERC license in 2003 provides $37.9 million for Ecological Mitigation and Enhancement Measures to address four part (for more detail see Appendix I)**	**Includes ten Habitat Improvement Projects, Future HIP Funding, Wilson Hill Rehab, and Research/Education $**
	Natural Resource Conservation Service	**Wetland Reserve Program, the numbers of wetlands and acreage created/restored in the watershed**	**Report from NRCS**
	Ducks Unlimited		

Use Impairment	Organization	Nature of Information	Report Source
	NYSDEC OMNR	**Report on historic fish communities and current fish communities**	**http://www.dec.state.ny.us/website/dfwmr/fish/stlawrivfshobjectives.pdf "Fish-Community Objectives For The St. Lawrence River" - 2002**
	OMNR	**Studies of wetland size in Cornwall AOC**	**ONR Kemptville District Office - Anne Bindig 613-476-8303**
3. Transboundary Impacts – *Impaired*	**ALCOA, General Mot. OME**	**Industrial post-remediation monitoring. OME contaminated sediment strategy.**	
4. Degradation of Fish and Wildlife Populations - *Likely*	**NYSDEC**	**Water quality information**	**RIBS Reports and Priority Waterbody listings – Current 1999 report, 2004 report due soon**
	NYSDEC OMNR	**Report on historic fish communities and current fish communities**	**http://www.dec.state.ny.us/website/dfwmr/fish/stlawrivfshobjectives.pdf "Fish-Community Objectives For The St. Lawrence River" - 2002**

Use Impairment	Organization	Nature of Information	Report Source
	NYSDEC	Young of the year Spottail Shiners monitored for organochlorines every 5 years	Report from Lawrence Skinner, Bureau of Habitat, Albany
	Ducks Unlimited		
	NYSDEC	Annual Fisheries Sampling data from Lake St Lawrence	2004 Lake St Lawrence Warmwater Fisheries Assessment
	OMNR	Fish community index in Lake St. Francis	Chapter 5 in 2002 Annual Report at http://www.glfc.org/lakecom/loc/mgmt_unit/index.html
	NYSDEC	Breeding Bird information from 1984 and 2004, blocks – 5097a, 5097b, 5098d, 5197a, 5197b, 5198c, 5198d contained in AOC	Breeding bird atlas reports conducted every 20 years
	SUNY ESF NYSDEC	Sturgeon studies Lake Sturgeon restoration	Graduate student 2004 DEC Report
	Canadian Wildlife Service	For various bird, mammal, amphibian and reptile species, contaminant levels and health assessments	4-7-03 "Summary of work by the Canadian Wildlife Service-Ontario Region in the St Lawrence AOC"
	Environment Canada	Great Blue Heron egg contaminate levels	2002 report on Great Blue Heron, part of the Monitoring the State of the St Lawrence River
	Great Lakes Sustainability Fund and Canadian Wildlife Service	Marsh Monitoring Program - baseline survey of marsh birds and amphibians abundance and diversity	1995-2002 Summary report on the St. Lawrence AOC - February 2004

Use Impairment	Organization	Nature of Information	Report Source
	USFWS	**Agreement under NY Power Authority FERC license in 2003 provides $24 million to USFWS. (See Appendix I)**	**USFWS to address project impacts on aquatic resources**
5. Fish Tumors or Other Deformities - *Likely*	**NYSDEC**	**Annual Fish Collections in AOC**	**Annual reports available in DEC Regional office**
	ALCOA's consultants	**Data compilation on fish anomalies in the Grasse River.**	**A memo "Summary of External Anomalies Observed on Smallmouth Bass and Brown Bullhead Resident Fish Samples - Grasse River, Massena, New York**
6. Bird or Animal Deformities or Reproductive - *Likely*	**NYSDEC**	**Amphibian deformities studies**	**DEC Rome Lab**
	Canadian Wildlife Service	**For various bird, mammal, amphibian and reptile species, contaminant levels and health assessments**	**4-7-03 "Summary of work by the Canadian Wildlife Service-Ontario Region in the St Lawrence AOC"**
	Birds Studies Canada	**Marsh Monitoring Reports**	

Use Impairment	Organization	Nature of Information	Report Source
7. Degradation of Benthos - *Likely*	**NYSDEC**	**Macroinvertebrate studies under the RIBS monitoring program**	**NYSDEC**
8. Restrictions on Dredging Activities – *Not Impaired*	**USACE; NYSDEC**	**Navigational dredging studies and Army Corps of Engineers reporting; NYSDEC environmental permits**	**USACE; NYSDEC**
9. Beach Closings – *Not Impaired*	**St. Lawrence County DOH, Town of Massena and OPRHP**	**-Interviews with persons in charge of testing water quality and closing the beaches if needed. -NYPA Contract for new Beach Facilities in Massena, Waddington (2) and Lisbon – $3.7 million – to be completed in 2005. -Beach monitoring report records**	**-Interviews conducted by RAC member Luke Daily and filed a report to the RAC. -NYPA license requirement**
	USFWS	**Agreement under NY Power Authority FERC license in 2003 provides $12 million to Off. of Parks, Rec. And Hist. Preservation**	**Robert Moses and Coles Creek State Parks rehabilitation.**
10. Degradation of Plankton Populations - *Unknown*	**Clarkson Univ.**	**Proposed study using new "state of the art" fluorometry equipment**	
	Environment Canada	**Planktonic comparison studies (Ora Johannsson)**	

Use Impairment	Organization	Nature of Information	Report Source
11. Tainting of Fish and Wildlife Flavor ***– Not Impaired***	**NYSDEC, Canadian Wildlife Service, St Lawrence Fisheries Advisory Board**	**Angler surveys and reports by anglers to NYSDEC**	**Summary reports of Angler Surveys**
12. Eutrophication or Undesirable Algae ***– Not Impaired***	**Rob Badger – Geology Prof. SUNY Potsdam**		
	Meier – former SLU Geology Prof.		
13.Drinking Water Restrictions, Taste and Odor Problems ***– Not Impaired***	**St. Lawrence County DOH; Village of Massena**	**Based on interviews with officials by member who reported back to the Massena RAC. Status of Plans for upgrading treatment by the Village of Massena.**	**None**

Use Impairment	Organization	Nature of Information	Report Source
14. Degradation of Aesthetics – *Not Impaired*	**Massena (V); NYSDEC**	**Define Environmental quality vs. nuisance condition(s)**	
15. Added Costs to Agriculture or Industry – *Not Impaired*	**SWCD**	**Based on interviews with officials by member who reported back to the Massena RAC**	**None**
	Ag. And Farmland Protection Board	**Based on interviews with officials by member who reported back to the Massena RAC**	**None**
	Farm Bureau	**Based on interviews with officials by member who reported back to the Massena RAC**	**None**

B. Indicator Resolution

A primary impairment identified for the RAP is "restrictions on fish consumption". There are four advisories addressing fish consumption in the Massena Area of Concern; three of these are specific to the area and one applies to the St. Lawrence River at large. The endpoint or goal for the RAP and AOC is to address the causes and sources from within the AOC so that beneficial uses are restored to the maximum extent practicable. In addition, any remaining use impairment (consumption advisory) would therefore be part of the larger St. Lawrence River system at large and not specific to the AOC.

The primary cause contributing to the fish advisory impairment is the presence of PCBs in fish flesh. Issues involving Mirex and dioxin also contribute to an upstream Lake Ontario lakewide fish impairment advisory that carries into the St. Lawrence River. Other important use impairment indicators for the Massena RAP involve the "loss of fish habitat" and "transboundary impacts". These impacts were attributed to the physical disturbances on the river involving the building of the dam and shipping seaway. Others causes are the historical waste disposal practices that contaminated local land areas and river sediments and if not remediated will continue to threaten the downstream environmental community by leaching.

Results of relevant St. Lawrence River studies are presented and cited herein. Report documents are also referenced in the Appendices. It is planned that studies involving water quality, sediment, and fish sampling can eventually provide supporting data for the reassessment of these and other beneficial use indicators within the AOC including: degradations involving fish populations, benthos, fish tumors, and plankton populations. The strategy for resolution of all the indicators is addressed below. Clearly, PCBs have been a main cause involving use impairments concerns in the St. Lawrence River AOC. Other pollutants causing concern include Mirex, dioxin, DDE, PAHs, and metals.

The identified known and potential sources of the causes of the use impairments include: upstream point and nonpoint sources; inactive hazardous waste sites; contaminated sediments; physical disturbance from construction; natural erosion; atmospheric deposition; water levels management; and, invasive species. In the St. Lawrence River watershed, plans are well underway to address the remediation of all hazardous waste sites. The FERC relicensing of the Moses-Saunders power dam in the AOC embodies the provisions of the license and settlement agreement that will greatly benefit the AOC. The provisions of the settlement provide for a USFWS fish enhancement fund, ten habitat projects, the return of certain project including shoreline stabilization and recreation, annual funding for community governments, and a future habitat improvement fund. (Note: unfortunately, the Aquarium and Ecological Center could not meet matching fund requirements.)

For each of the fifteen 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 the problem statement of Stage 1 as caused by PCBs, Mirex, and dioxin. The sources were identified as inactive hazardous waste sites, contaminated sediments, industrial discharges, and Lake Ontario. The larger part of the advisory applies to the entire St. Lawrence River. We know that significant clean-up has taken place to address each of these sources and that, as with the Lake Ontario watershed, air deposition and sediment resuspension now form a main part of the sources. A wildlife consumption advisory was not identified for the AOC. The other three parts of the advisory are specific to the AOC and involve PCB contamination. Among these the Grasse River presents the most complicated problem to resolve in view of the size of the study area and the complexity of site conditions. The four fish consumption advisories for the St. Lawrence River at Massena AOC are:

- St. Lawrence River (as a whole) - various for certain species - PCBs, Mirex, Dioxin
- Bay at St. Lawrence River / Franklin Co. line - all species - PCBs
- Grasse River (mouth to power canal) - all species - PCBs
- Massena Power Canal - smallmouth bass - PCBs

Supporting data on fish that anglers would be taking and eating (e.g. smallmouth bass and brown bullhead) is needed. Through further evaluation of the information on Table 3 (the matrix of monitoring information and report sources), we plan to obtain a better understanding of the available monitoring data to determine what additional study is recommended to address the fish consumption advisories in the AOC.

The implementation of municipal and industrial corrective actions regarding point and nonpoint sources of pollutants in upstream communities as well as the corrective actions addressing the combined sewer overflows at upstream sources have contributed greatly to the reduction of pollutants entering the environment. Remedial actions associated with three major industrial sites in the Massena area continue to mitigate the nonpoint source pollution threat to the AOC and the St. Lawrence River. The expanded implementation of Best Management Practices (BMPs) in the watershed serve to address fish, aquatic, wildlife, and human health concerns and promote the well being of the ecosystem and beneficial uses in the Area of Concern.

When discussing the goals for the St. Lawrence River and its tributaries, one must consider the historic, versus the current, uses and conditions of the river waters. Some fish species have been in decline (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 2** (next page) shows a downtrend in PCB 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 and overall St. Lawrence River fish consumption advisory.

Water quality data (presented under indicator #12 for eutrophication and undesirable algae for the St. Lawrence River) also indicates improvement.

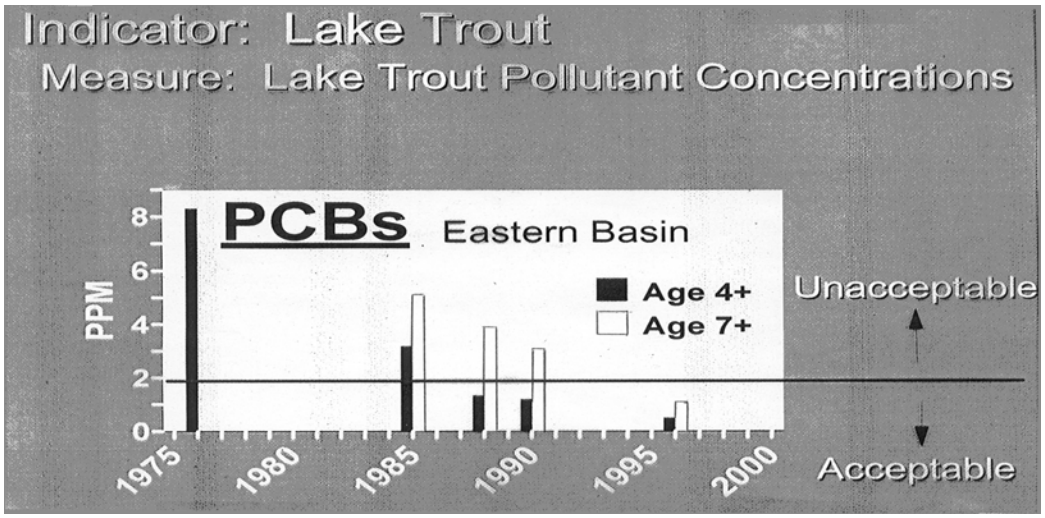

Figure 2- PCBs in Lake Ontario Lake Trout (Eastern Basin)

Similarly, PCB critical pollutant concentrations in **Figure 3** (below) for young-of-the-year Spottail Shiners in the Niagara River illustrate a downtrend. This same trend has occurred in Lake Ontario and is expected for the St. Lawrence River. Overall, this is a positive reflection on the success of the larger management plan activities (such as the LaMP, the Niagara River Toxics Management Plan, and the RAP process) for the Great Lakes and the positive effects that remedial measures are having on the ecosystem.

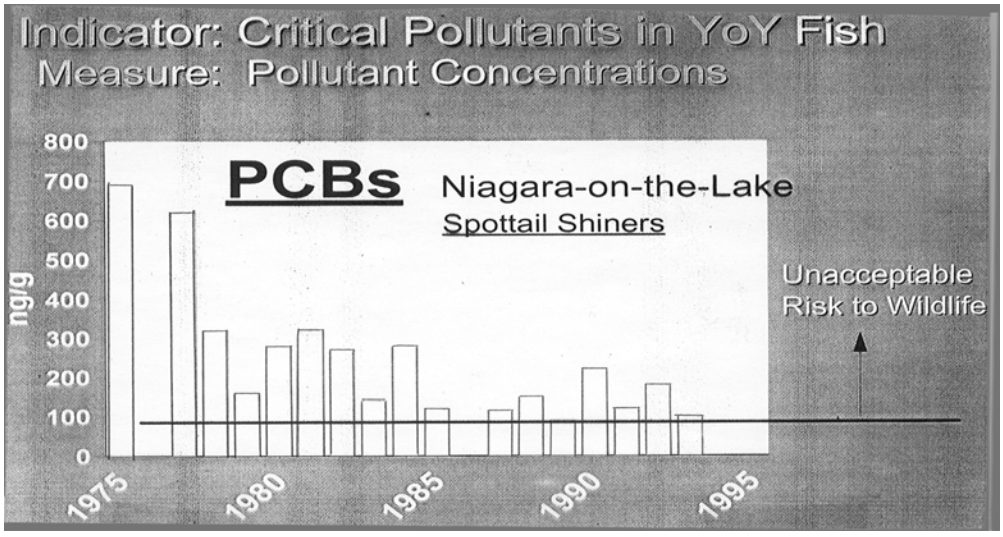

Figure 3 - Lake Ontario PCBs in Young-of-Year Fish

Resolution - The fish consumption advisories apply to the St. Lawrence River at large as well as to specific parts of the AOC (e.g. Grasse River). Following completion of remedial measures, assessment and management of the specific advisories for the AOC will need to be addressed under the definition of an "Area of Recovery". Conditions common to the entire river can be managed by an overall St. Lawrence River management plan. This approach is consistent with the federal USEPA delisting principles and guidance. This delisting guidance is posted on the USEPA website at: www.epa.gov/glnpo/aoc.delist.html).

Support Data - Results of periodic examination of chemical residues, principally PCBs, in St. Lawrence River fish flesh are presented below. These points are cited from multi-year trend study by NYSDEC fisheries.

- 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 (Lake Ontario tributary sampling) 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 the completion of all AOC remediation, the goal is to eliminate all sources such that any remaining advisory is riverwide.

- Chemical residue concentrations in legal or edible sizes of fish 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.

- 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 the St. Lawrence River AOC.

Rationale - The Remedial Advisory Committee recommendation, and NYSDEC position is to continue chemical residue sampling and assessment of fish tissue and to evaluate the impact on fish consumption advisories as related to the St. Lawrence River and its tributaries. This is a responsible and appropriate method to address the longer-term full restoration of the beneficial use. The desired endpoint, as identified by the Remedial Advisory Committee, is the removal of the fish consumption advisory specific to the AOC.

NYSDEC Fisheries' Position Statement on Fish Consumption Advisory - Fish monitoring in the St. Lawrence River and its tributaries includes sampling young-of-year as well as adult fish flesh. This monitoring and analyses provide a level of protection for the

Massena area and the larger St. Lawrence River in the assessment of the presence of toxic contamination in the water column and its effects on the aquatic environment. Assessment indicates that fish advisories will take time to reevaluate following remedial measure completion and that the designation of "Area of Recovery" will be correct and useful at an appropriate point in time (particularly for the Grasse River).

2. Loss of Fish and Wildlife Habitat

The fish habitat impairment is due to the physical disturbances caused by the construction of the power dam and shipping seaway. Natural erosion, contaminated sediments, and invasive species have further impacted the habitat of the St. Lawrence River. The desired endpoint for the AOC, as identified by the Remedial Advisory Committee, is to have no restricted use of habitat from flow or contamination.

Resolution **-** The impacted habitat area is directly related to the physical disturbances from the dam and seaway construction and 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 (50 year license) conditions addressing fish and wildlife habitat. The degree of the restoration of the habitat, and associated populations, is more directly related to the surrounding area characteristics. Expert evaluation is needed to support a statement that habitat enhancement and protection measures are sufficient to support a not impaired status and that area contamination has been addressed.

The provisions of the new FERC license go a long way to establish restored and protected habitat. Numerous projects are well funded to address the beneficial use to the maximum extent practicable. Implementation oversight is to be provided by USFWS, NYSDEC, FERC, NYPA, and local agency and environmental interests. Operation and maintenance of the power dam as well as reporting and compliance actions are under the FERC license and are not part of the RAP process. **Figure 4** (below) summarizes the FERC license provisions:

St. Lawrence Power Project License Provisions

- ★ Establishes Fish Enhancement, Mitigation, and Research Fund
- ★ Funds Habitat Improvement Projects, Rehabilitation, and Education
- ★ Provides Local Government Project Funding and Land Return
- ★ State Park Rehabilitation and Local Community Funding

Figure 4 - Summary of FERC License Provisions
(also see Appendix I)

The new 50 year license was issued in October 2003 to the New York Power Authority (NYPA) for operation and maintenance of the St. Lawrence - FDR Power Project. Relicensing negotiations used a Cooperative Consultation Process (CCP) approach to involve the public, to develop environmental issues and responses, and to draft license provisions. The process was very comprehensive and produced a settlement agreement consisting of five parts addressing: 1) fish enhancement and research funding, 2) Fund to provide $24 million to the USFWS for project impacts on aquatic resources such as the American Eel; 2) ten habitat improvement projects and rehabilitation of the Wilson Hill Wildlife Management Area; 3) return of project lands to local governments with funds for shore stabilization, navigation, and local recreation; 4) local area state parks rehabilitation and community enhancement funding. A further description of the provisions is presented in Appendix I..

Support Data - A fish management plan for the St. Lawrence River was written by the US Fish and Wildlife Service Lower Great Lakes Laboratory staff. NYSDEC contributed to the Management Goals and Objectives section. There are a number of 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 St. Lawrence River watershed
- If ecologically feasible, restore American Eel to the St. Lawrence River system and provide passage for adults and juveniles.
- Provide adequate angler access to all portions of the St. Lawrence River.

Rationale - NYSDEC and the USFWS have incorporated in the relicensing process objectives to restore and protect fish and wildlife habitat and populations in the St. Lawrence River AOC. The FERC requirements address flow through the dam, fish passage, fish access, and protection of the overall fishery as well as restoring other ecosystem conditions for the Area of Concern.

NYSDEC Fisheries' Position Statement on Habitat - Fish and wildlife habitat are addressed by the flow and water level requirements of the FERC license and forthcoming IJC Water Levels Study results. Lake Ontario waters exert the largest influence on the AOC. With the physical disturbance of the dam and seaway construction accepted as establishing the future conditions for the AOC and River, and with the eventual completion of contamination remedial measures, there is no remaining significant cause of habitat impairment in the St. Lawrence River at Massena AOC. Essentially, the fish and wildlife habitat conditions are addressed by the FERC license and completion of remediation. The fish habitat will then produce fish populations consistent with natural conditions allowed by the River and Lake Ontario. The dam operation is to be monitored for compliance with prescribed terms. These activities will protect the fisheries resource both within and outside of the Massena AOC. Fishing opportunities are to be enhanced. Ecological change is occurring rapidly in Lake Ontario, affecting the fisheries that are being produced. These changes as well as a modification of angler use can affect goal attainment.

3. Transboundary Impacts

Resolution **-** The completion of the AOC remedial measures will essentially address local contamination sources. Certain provisions of the FERC license may also contribute to this process. With the Massena AOC addressed, the respective conditions present in the other intergovernmental jurisdictions of the AOC become the key to the identification of any transboundary concerns regarding downstream territories.

Support Data **-** The AOC above and below the Moses Saunders Dam is extensive in size. At some point in time, recognition of this area as restored and protected is desired and therefore no longer warranting the designation as an environmental contamination focus area. Management planning and study results are needed to support resolution.

Rationale **-** The St. Lawrence 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 and management 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 St. Lawrence River nearshore ecosystem. (Note: the IJC water levels study results support "adaptive management"). With sufficient environmental protection strategies and supporting study results, resolution can be declared.

4. Degradation of Fish and Wildlife Populations

Identification of the desired level or endpoints and then assessment of the status of the indicator is essential. There needs to be a plan, reference, and objective measure of the fish community. The cause of any identified impairment needs to be put in context with the construction of the power dam and shipping seaway and the historical disturbance and contamination. The desired endpoint is a healthy balanced fish community. A fishery position statement is to be developed to address if the existing data is adequate and if the fishery overall is acceptable to the fishing community. An investigative study could identify selected species and compare these to a fishery management plan for the larger St. Lawrence River extending into Lake Ontario. Because the Fish Habitat indicator was identified as impaired in the RAP, this fish population indicator is to be further assessed. Expert evaluation is needed.

Resolution **-** The requirements of the power dam relicensing (50 year license), on behalf of the Federal Regulatory Commission (FERC) with input from the US Fish and Wildlife Service and NYSDEC, establishes the long term conditions addressing the use impairment indicator. The degree of restoration of fish habitat and populations is directly related to the larger River and Lake Ontario ecosystem. Implementation oversight to assure restoration is provided by FERC, USFWS, NYSDEC, and local agency and environmental interests. Reporting and compliance actions are required under the FERC license.

Support Data **-** The AOC above and below the Moses Saunders Dam is extensive in size and has been identified as supportive of fish habitat and linked to the restoration of fish populations in the St. Lawrence River. Hazardous waste site remediation is near completion (except the Grasse River). Many sources of in-place and nonpoint source pollution have been addressed. With fish access provided and a healthy community identified, no further action under the RAP will be warranted. The dam construction has altered the ecosystem; however, the FERC requirements address corrective action through improved flow regulation, fish protection, and fish passage provisions to resolve the use impairment indicator relating to fish populations for the AOC. Regardless of these measures, we should note that existing St. Lawrence River conditions and upstream characteristics of the Lake Ontario waters and its ecosystem will continue to have a dominant effect on the AOC and its fish population. At some point, expert fish assessment is to be developed to reassure us that the fish population indicator is not impaired by sources in the AOC and that a desired fish community is present.

For example, Lake Ontario and the St. Lawrence River AOC have changed significantly since the Stage 1 RAP document was published in 1991. Reductions in nutrient loading and the colonization of zebra and quagga mussels have altered nearshore habitat through greater water clarity, which has promoted increased macrophyte growth. Observations indicate that the fish populations of the St. Lawrence River influence the tributaries. Throughout eastern Lake Ontario, walleye fish have been steadily expanding and spreading which includes the St. Lawrence 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 St. Lawrence 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) in **Figure 5** (next page) 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. Additional data supporting healthy wildlife populations and habitat can be derived from the multi-year study results (Marsh Monitoring Program by Bird Studies Canada in Appendix K) for marsh birds and amphibians under impairment indicator #6.

Together, these indicators further support a healthy ecosystem for the St. Lawrence 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.

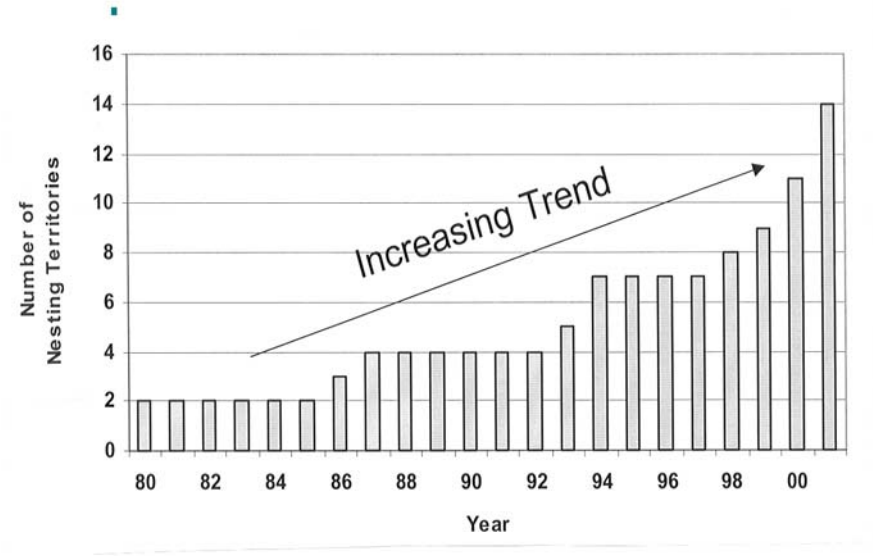

Figure 5 - Bald Eagle Nesting Territories

Rationale **-** The St. Lawrence 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 apply adaptive management and be flexible to the changing dynamics of the Lake Ontario and the St. Lawrence River nearshore ecosystem. 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 Population - Fish populations in the AOC are directly linked through their association with Lake Ontario and the St. Lawrence River at large. The fish populations of the lake and river actually have the greatest influence on the AOC fish populations. Fish movement throughout the AOC is dominated by the lake and river characteristics. The FERC license requires power dam operations to monitor for compliance with prescribed terms addressing river flow, fish entrainment, and fish passage thereby benefitting fish populations to the maximum extent practicable. Support is therefore expressed for no impairment of the fish populations directly attributable to the AOC.
(See Appendix L for NYSDEC fishery studies and reference to website.)

5. Fish Tumors or Other Deformities

Upstream of the Moses-Saunders Power Dam, reference community observations indicate no tumor impairment. Assessment below the dam for tumors is needed. Any existence of tumors would most likely be clean-up related, and not in-place contamination. Surface skin tumor identification is different than in-body. Further study could identify resident fish and, if appropriate, evaluate this indicator by sampling a number of fish species and comparing them to non-impacted conditions. Methuselah sturgeon would be a special case.

No definitive statement about any impairment could be made in the early Massena RAP Stage 1 and 2 documents. Using the Oswego AOC as a reference, where a fish pathology study was conducted, we can relate some useful information. A final report for Oswego was completed by Dr. Jan Spitsbergen (Cornell University) using samples over a two year period. The results indicated 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 river to those fish in Lake Ontario. The original status of the "unknown" use impairment indicator was revised to a status of "not impaired" based on the study results, expert assessment, comparison to Lake Ontario, and consultation with the Remedial Advisory Committee. Any further research, if conducted, was recommended to be targeted at fish reproductive health. Reference to fish studies in the St. Lawrence River as a whole and to the discussion and observations made under the "Bird and Animal Deformity/Reproductive Problems" use impairment indicator is made in support of a "not impaired" conclusion. As identified by the Remedial Advisory Committee, the desired endpoint of no abnormal incidence of tumors or deformities in the Area of Concern needs to be assessed based on any significant deformities documentation to-date in the AOC.

Resolution - Based on the comparative fish pathology study, the reduction of toxics in the environment, and the observance of no occurrence of tumors and an overall lack of evidence for impairment of fish health observed in the St. Lawrence River, the beneficial use in the Massena AOC is considered unimpacted and the beneficial use intact, and therefore the indicator status for fish tumors is rated as "not impaired". Study results and expert assessment are needed to further support and confirm this conclusion.

Support Data - In the Oswego study, a number of species of fish were 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 are not likely to be observed for the tumor study in the Massena AOC. By examining the fish at hand, fishery staff may select the brown bullhead and white sucker as good study candidates due to their feeding characteristics (bottom) and environmental sensitivity. When the contaminated sediment remediation has been completed, a fish pathology study for the Massena AOC will be appropriate.

In the Oswego River AOC harbor area, 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 commented that the findings 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.

Rationale - Although no specific AOC study has been conducted, the fishery information from the source of the river at Lake Ontario to the Moses Saunders Power Dam, indicates no significant tumor impact of fish species. Because no fish tumor impairment has been identified in the entire U.S. portion of the St. Lawrence River AOC, the use impairment indicator is considered not impaired and therefore resolved. Routine monitoring and surveillance activities for the St. Lawrence River provide adequate protection to assure the beneficial use is maintained. This is consistent with the delisting principles and guidance. Except for the Grasse River where in-place contaminated river sediments are to be further

remediated, the St. Lawrence River AOC is likely to be rated as not impaired for fish tumors. Following Grasse River remedial measures, a fish tumor assessment is recommended.

6. Bird and Animal Deformities or Reproductive Problems

The "likely and possible" status of this use impairment indicator was not based on any definitive studies reported. The presence of PCBs in fish flesh associated with the St. Lawrence River fish consumption advisory was the possible cause and connection to other use impairment indicators. At some point, it is anticipated that study results and program initiatives are to adequately address all the indicators as well as the concern for bird and animal deformities or reproductive problems. The Marsh Monitoring Program by Bird Studies Canada already goes a long way to support a not impaired status for the St. Lawrence River 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. Above, Figure 4 under the Fish and Wildlife Populations indicator shows the increased eagle nesting.

The oversight and protection provided by NYSDEC's ongoing regulatory environmental programs involving monitoring, inspection, and enforcement activities for the 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 abnormally high incidence of deformities or reproductive problems. It is anticipated that evidence will indicate the endpoint has been achieved and maintained.

Resolution - The delisting criteria are to be 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. At some point a change of the indicator to "not impaired" is foreseen.

Support Data - The 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 initiation 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. 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 St. Lawrence River AOC marsh bird and amphibian survey scored above the average of the AOC marshes in the Lake Ontario basin in terms of the number of species richness and therefore was rated as not impaired. This conclusion was reached under the Marsh Monitoring Program surveys conducted by Bird Studies Canada between 1995 and 2002. Further, this healthy assessment for habitat under this Bird and Animal Deformities or Reproductive Problems indicator #6 provides support for the not impaired status for both the Fish and Wildlife Populations and Habitat Indicators (#4 and #2 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. The data collected in the St. Lawrence River AOC includes bird and amphibian species identification, volunteers and routes tabulation, species composition and abundance recording, and diversity assessments.

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 beneficial use indicator is not impaired and that sufficient monitoring and surveillance exists to provide protection against an impairment.

7. Degradation of Benthos

The early stages of the RAP identified with probable confidence that a benthos impairment may exist due to a number of parameters including PCBs, PAHs, lead, copper, and physical disturbances. Localized impacts on benthic invertebrate populations were reported in 1989; however, these impacts had not occurred at the mouths of the Grasse, Raquette, and St. Regis Rivers. A 1979 study indicated physical conditions had influenced benthic populations somewhat in relative numbers and diversity when compared to upstream sites. Although toxicity tests have not been conducted in the Massena AOC, macroinvertebrates impacts are rated as slight and therefore not impaired.

Sampling results and trend data from the NYSDEC's Rotating Intensive Basin Studies (RIBS) program is very useful to the St. Lawrence 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.

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 St. Lawrence sampling site downstream of Massena was located near St. Regis in 1977 and 1983 and moved upstream to the Massena-Cornwall Bridge in 1986 and 1992. All four samplings have consistently shown communities dominated by filter-feeding caddisflies and toxics-tolerant midges, and have been assessed as slightly impacted. Species richness and standing crop were always higher than those found upstream of Massena at Wilson Hill Island. This newer site remains the favorable monitoring location for the lower St. Lawrence River. Because the benthic community is documented as having only a slight impact (its is neither moderately nor severely impacted and represents level 2 among 4 ratings to severe), the status of the indicator is therefore not impaired and not precluded. The beneficial use is further protected by ongoing agency surveillance and monitoring activities including the RIBS sampling program and is therefore intact.

Support Data **-** The 1999 St. Lawrence River Basin Waterbody Inventory and Priority Waterbody List supports the not impaired rating. The slight impact rating is further detailed in the "20 Year Trends in Water Quality" based on macroinvertebrate data up to 1992 and the 1995 "Trends in Water Quality based on Long-Term Routine Network Data".

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 significant control of combined sewer overflows and other point source discharges in and along the entire St. Lawrence River basin. 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 St. Lawrence River and the Massena AOC.

Historically, certain pollutants of concern (PCBs) were detected in sufficient quantities to warrant remedial measures at sites within the Area of Concern. The strategy to address these pollutants (and the opportunity for public involvement) has been implemented as part of ongoing environmental programs and new initiatives to address watershed restoration and protection. Significant progress has been achieved in environment cleanup activities.

8. Restriction on Dredging Activities

Periodic navigational maintenance dredging in the St. Lawrence River 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 main navigation channel of the St. Lawrence River in the Massena AOC. The presence of contaminants has been detected near industrial outfalls in non-navigational areas. However overall, sediment quality and toxicity are acceptable and federal and state requirements for dredging and disposal related the navigation dredging 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 navigation dredging (of the St. Lawrence Seaway through the Massena area) by the United States Army Corp of Engineers (USACE) was approved and performed without restrictions on the dredging and disposal. An assessment of sediment sampling data supports the not impaired status for the AOC.

Resolution - No dredging restrictions exist in the navigational areas of the St. Lawrence River Area of Concern. Industrial river sediment areas have been remediated (including the cove area at General Motors); however, certain closure is incomplete in several locations. These areas need to be addressed for full resolution. In the interim, the approved navigation channel dredging, and sediment core analyses data support the status of not impaired for this use impairment indicator in the ship navigation areas.

Support Data - The US Army Corp of Engineers (USACE) dredges the St. Lawrence River seaway navigational channel approximately every three to five years. The most recent permitted navigational dredging activity proceeded without dredging restrictions. 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 this St. Lawrence River area. No significant impact is indicated.

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. Although contaminants of concern were 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. Watershed Restoration and Protection Strategies (WRAPS) are developed 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. Following are statements on environmental contaminants sampled as part of overall Great Lakes program activities:

Octachlorostyrene has not been detected in most recent samples performed in Great Lakes studies. The NYSDOH laboratory reported results (minimum detection limit is 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 in the Lake Ontario LaMP and its watersheds as an environmental contaminant is considered not significant.

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.

In sediment assessment, an overall level of threat to the environment is applied to the evaluation 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. St. Lawrence River navigational dredging is therefore regulated and permitted but not restricted as a use impairment in the AOC's seaway passage. 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.

Rationale - No dredging restriction use impairment exists in the St. Lawrence 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.

9. Beach Closings

The Stage 1 document described one public beach in the Massena AOC and several upstream on the St. Lawrence River. The Beach Closings use impairment indicator was determined to be not applicable to the Area of Concern. There is no history of beach closings in the Town of Massena or in the upstream Towns of Louisville or Waddington. The beach in the Massena AOC is located on New York Power Authority (NYPA) property and has not experienced any closings due to bacteria problems.

Remedial Advisory Committee member Luke Dailey conducted an investigation into Beach Closings in the entire binational AOC in January of 2004 and reported no closings at the NYPA beach or at the Massena beach just upstream of the Massena part of the AOC. No public designated beaches were identified in the Mohawk territory. However, on the Cornwall side, upstream at the "Upper Canadian Village Provincial Park, a beach closure was reported in the summer of 2003. The Ontario St. Lawrence Parks Commission confirmed the closure and also noted no closures on the US side. Eight public beaches were identified on the Canadian side and each being tested on the Tuesday of each week with five samples per beach. The NYPA notes tests are conducted five times per month.

It is reported that the beaches on the Canadian side have clay soils that foster weed beds, trap organic material and provide good habitat for waterfowl. Heavy rain and strong winds contribute to closing the beaches with organic material in various stages of decomposition. This contributes to high bacteria counts and results in beach closings. A beach is officially reopened after three clean water samples counts are achieved.

In addition, for the Massena AOC, secondary or partial-body contact within the open 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 beach closures associated with the Massena 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 - For the Massena AOC, St. Lawrence River water quality monitoring data at the beach and in the open waters supports swimming and other body contact with in the AOC. 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 Massena Area of Concern.

10. Degradation of Zooplankton and Phytoplankton

The St. Lawrence River Area of Concern is lacking an evaluation of phytoplankton and zooplankton data. A study designed for the RAP would provide needed baseline data and perhaps a more definitive evaluation and documentation of the status of the plankton community. With the purchase of the new fluorometry equipment by Clarkson University, field testing is in the development and implementation stages.

The early RAP documents had no plankton data in the Area of Concern on which to base a status determination. The "unknown" status of this use impairment was identified by stating: "there are no data on plankton assemblages in the Massena AOC. Upstream St. Lawrence River and Lake Ontario data indicate the influence of Lake Ontario Phytoplankton populations on St. Lawrence River plankton populations. Studies downstream of the AOC in the St. Lawrence River also indicate that shifts in the plankton communities are reflective of physical habitat changes due to the construction of the power dam and St. Lawrence Seaway."

Earlier studies indicate that phytoplankton assemblages in nutrient rich nearshore Lake Ontario areas were/are represented by many species widely associated with eutrophic environments. These assemblages have higher nutrient and chloride ion concentrations than that found in other less nutrient rich areas of Lake Ontario. Watershed remedial measures implemented since 1980, in addition to the closure of many industrial operations, have contributed to nutrient reductions. Major construction on sewer systems, including interceptors and combined sewer overflow corrections, have also greatly abated nutrients as well as other contaminants. Upstream nutrient sources have also been reduced by similar actions as well as nonpoint source reduction measures.

The desired endpoint, as identified by the Remedial Advisory Committee, is plankton populations substantially similar to reference communities. For the Massena Area of Concern, a comparison to other rapidly flowing riverine environments would likely 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. In the absence of specific supporting data, a not impaired status is inferred 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). This includes 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 St. Lawrence River at Massena Area of Concern has experienced these stresses to varying degrees.

As described in a discussion under the “not impaired” Eutrophication and Algae use impairment indicator, 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 St. Lawrence 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 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 and Supporting Data **-** To answer the question: "Are Plankton Communities in the St. Lawrence 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. Upstream and downstream data can assist in these determinations. Toxicity testing associated with the St. Lawrence River at large has not identified a problem or source of contamination. Upstream watershed and Lake Ontario LaMP activities provide responsible program areas to pursue further concern for impacts on the planktonic community. Clarkson University plans to conduct a phytoplankton assessment. ***In conclusion, with sufficient data, we desire to support the statement that " the related riverine environmental studies provide evidence that the plankton community of the St. Lawrence River AOC is not significantly impacted nor impaired".***

Rationale **-** 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 the AOC, and out of AOC studies, support a not impaired status for the plankton indicator in the St. Lawrence River 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. A supporting study is needed.

11. Tainting of Fish and Wildlife Flavor

The Stage 1 document determined this beneficial use is not impaired. Although no formal study has been conducted, public input from sports-people confirms no impairment. The desired endpoint, as identified by the Remedial Advisory Committee, of no evidence of fish and wildlife tainting, has been confirmed by associated environmental investigations, 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 discharge permits 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 the point source 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 St. Lawrence 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 this 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 documentation in 1990.

Support Data - Results of a fish pathology study can serve to support the not impaired status. In the sport fisheries community, the Remedial Action Plan (RAP) process has not been well known. 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 remediate, mitigate, and cease contamination. Habitat loss due to the construction of the power dam and seaway has long been recognized and attributed to affecting the fish habitat and populations in the AOC. However, fish tainting is not reported as a problem in the St. Lawrence River AOC.

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.

12. Eutrophication or Undesirable Algae

This use impairment indicator was rated in the Stage 1 document as not impaired and is supported by water quality data from the RIBS program. Eutrophication and excess algal growth are not problems of this area probably because of the high flow rates in the St. Lawrence River. In addition, efforts have been successful in reducing excessive phosphorus attributable to point source discharges from wastewater treatment facilities, combined sewer overflows, 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 any floatables historically discharged to the waters of the St. Lawrence River. The unplanned introduction of the exotic species zebra mussels in the rivers system has been identified as improving water clarity and may also serve to reduce nutrients. Zebra mussels filter the water removing organic matter and improve water clarity although they can lower dissolved oxygen content. St. Lawrence River water quality monitoring data indicate dissolved oxygen content well above water quality standards with no impairment in the AOC. Algae may appear from time to time in certain stagnant river segment waters (e.g. locks in the seaway). 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.

In a waterbody system such as the Great Lakes, a healthy balance between the aquatic plant growth and the algae 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 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 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 the St. Lawrence, 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. This 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 such 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 concurrence regarding appropriate missions. 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. When action has been determined necessary, recreational navigation is usually the main reason for intervention and mechanical harvesting is usually the main remedy. This is not the case for the St. Lawrence River and its tributaries; however, in waters where this occurs, several problems result from harvesting nuisance plants.

Because the majority of exotic species are more competitive in disturbed situations, harvesting enhances growth of these undesirable plants. Harvesting is non-selective in plant removal and native plants can also be destroyed thus allowing for the exotics to grow faster. Herbivorous insects which potentially serve as natural bio-control agents for the exotics are also removed through harvesting. Increasing 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. In such cases, 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.

In lakes and river segments where recreational and other stakeholder users of the waterbody are concerned about aquatic weed growth, they must also 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. In many watersheds, remedial measures to reduce nonpoint pollution have been implemented to the benefit of the receiving waters and Areas of Concern. Such activities are expensive, and can be long-term social and political undertakings. 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 St. Lawrence River Area of Concern have benefitted from the implementation of the Clean Water Act and the Great Lakes Water Quality Agreement. We know that significant actions have been taken to address watershed nutrient and contamination sources that potentially affect the St. Lawrence River Area of Concern.

Resolution **-** Water quality surveys confirm that no eutrophic condition or impairment from undesirable algae is present in the AOC. 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.

Support Data **-** The water quality monitoring that produced the 1999 St. Lawrence River Waterbody Inventory and Priority Waterbody List makes use of water column results confirming a not impaired status for the AOC.

Rationale **-** The St. Lawrence River watershed is large. 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. In addition, from several other perspectives, the AOC is not eutrophic because: 1) wastewater treatment and CSO controls greatly reduce nutrients; 2) the growth of zebra mussels and closings of industrial discharges in the watershed contribute to reduced 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) recreational and tourist best uses of the water are intact; and, 5) water quality and other AOC related use indicators are not impaired due to nutrients.

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 New York State Environmental Bond Act, the Great Lakes Protection Fund, nonpoint source program activities, and EPA federal project funding all contribute to the environmental benefit of the St. Lawrence River AOC. NYSDEC is maintaining effective monitoring and surveillance activities to assure beneficial uses are protected.

13. Drinking Water Restrictions; Taste and Odor Problems

The Stage 1 RAP document identified this beneficial use indicator as not impaired for the AOC because of no restrictions on drinking water in the Massena exist. The Massena drinking water intake is just upstream of the AOC boundary. The desired endpoint, as identified by the Remedial Advisory Committee, is no drinking water restrictions or taste or odor problems. In some areas of the Great Lakes used as a drinking water source, taste and odor has been observed as a seasonally occurring problem. From studies, we know that river conditions and increased water clarity (from the invasive species zebra mussels) have 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, these taste and odor problems are seasonal and, if necessary, can be treated with activated carbon filtration in the water supply. In some instances, this seasonal problem is treatable with chlorination.

For the Village of Massena this taste and odor concern reached a peak in 1998. Although not a health issue, it did present quite a nuisance condition. Currently the taste and odor problem has subsided. Local complaints are not present. Massena's water facility is planned for a major rehabilitation. Upgrading the diatomaceous earth treatment is to be conducted, but the cost or need for carbon filtration is not part of the plan nor can it be justified. Depending on the year, taste and odor conditions may recur in the Village of Massena's supply; however, it has been determined that this nuisance condition does not warrant capital expenditure.

Resolution **-** There are no restrictions on drinking water consumption in the AOC. Taste and odor of drinking water had been identified as a nuisance condition in Massena but has not been a complaint since 1998. The upgrading of the Village's treatment facilities , including the diatomaceous earth filtration should help to address the taste and odor nuisance condition.

Support Data **-** The beneficial use involving drinking water restrictions and taste and odor has been observed as not impaired. Following up on complaints that peaked in 1998, the Village of Massena has determined that carbon filtration treatment is not needed. The federal Safe Drinking Water Act of 1996 required the village 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 (which have been voluntary) and to provide additional treatment where needed. Local governments continue to focus considerable effort on the control of nonpoint sources of pollution (nutrients and pesticide application) to protect drinking water supplies and recreational uses of local water resources. Historic groundwater contamination concerns have caused two local areas to be connected to alternate safe supplies. These areas include along Dennison Road adjacent to Alcoa West and on Raquette Point within the Mohawk at Akwesasne lands. For the Massena RAP, issues related to downstream effects, such as drinking water, are to be addressed under the Transboundary Impacts indicator.

Specifically, algae is not observed in Massena's drinking water source and taste/odor has not been an 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, and other environment controls, 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 **-** Taste and odor of the drinking water source has been observed as a seasonal nuisance problem for the Village of Massena. This AOC indicator has been reassessed and a determination has been made that carbon ultra-filtration water treatment is not warranted and is not planned for installation. The Village of Massena has evaluated the benefits and costs associated with the planned upgrade of their diatomaceous earth water treatment facility. Downstream effects on St. Regis Mohawk lands are to be addressed under the Transboundary Impacts indicator.

14. Degradation of Aesthetics

There remains a high confidence that the aesthetics use impairment indicator is rated as not impaired. No oil spill, turbidity problems, or unsightly conditions have been reported in the Massena AOC. The high flow rate of the St. Lawrence River contributes to this determination. 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. Use impairment conditions do not exist in the AOC and therefore aesthetics are not an issue.

In an AOC with aesthetic concerns, the general spread of invasive species including weeds, fish, and mussels contribute to aesthetic problems. These exotic species have a life cycle and impact on the waters in an area 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 can be controlled by harvesting. One important method to limit the introduction of exotic species is through Great Lakes program activities addressing ship ballast water.

Resolution **-** The desired endpoint and restoration (delisting) criteria for this aesthetics indicator have been achieved for the Area of Concern. The original status of the indicator as "not impaired" remains. Under NYSDEC's Priority Waterbody List (PWL) the St. Lawrence River is not identified as having impairments or stresses involving aesthetics.

Support Data **-** Since the development of the Stage 1 RAP, many remedial activities have been accomplished by NYSDEC and others that benefit the environmental conditions of the St. Lawrence River. The New York State Environmental Bond Act as well as EPA federal grant funding provide funding for a number implementation projects in the watershed that benefit the AOC. These include treatment plant upgrades, combined sewer overflow improvements, aquatic habitat projects, Brownfield development, landfill closures, recycling initiatives, air quality projects, Open Space Preservation, and nonpoint source projects.

Further, NYSDEC watershed strategies benefits AOCs. The management of Great Lakes areas involves balancing the demands of land and water use issues. In both cases fact finding is 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) also embraces these activities.

Rationale **-** Because no significant aesthetics problem has been identified in the 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 by providing an ample level of protection to assure that beneficial uses are maintained. The St. Lawrence County Soil and Water Conservation District (SLC-SWCD), the St. Lawrence County Water Quality Coordinating Committee (SLC-WQCC), and NYSDEC provide protection oversight and activity implementation addressing aesthetics.

15. Added Costs to Agriculture or Industry

Because there are not identified causes and 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 St. Lawrence 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 St. Lawrence River watershed, nonpoint source activities involve implementing stream protection projects including buffer zones, vegetation controls, farm management, homeowner sewage improvements, stream conservation, fish stairs and other BMPs involving farmland and stream corridor protection. The SLC-SWCD and SLC-WQCC and NYSDEC all focus on controlling nonpoint source pollution from the watershed. Many beneficial projects have been implemented by the county organizations.

In assessing a watershed and where to apply limited resources, NYSDEC considers the Priority Waterbodies List (PWL) and includes the local knowledge of environmental conditions and impacts of planned actions. Coordination with local officials is therefore a key to project success and to assure the most efficient funding. The desired endpoint (identified by the Remedial Advisory Committee) of having no abnormal added costs to agriculture or industry has been achieved.

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 St. Lawrence 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 St. Lawrence 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 was established in the problem definition Stage 1 document and remains the case today.

C. Intergovernmental Cooperation

There are actually three governmental agency groupings around which the St. Lawrence River Area of Concern shares jurisdictional responsibilities. These are 1) the Canadian jurisdiction consisting of the Provinces of Ontario and Quebec, and the Canadian federal government (Environment Canada) ; 2) the United States jurisdiction consisting of New York State and the US federal government (USEPA); and, 3) the St. Regis Mohawk Tribe at Akwesasne. Although the Great Lakes Water Quality Agreement between the federal governments of Canada and the US identifies the Area of Concern as binational, it is truly a multi- national representation that will ultimately lead to restoring the AOC and addressing the watershed impacts and transboundary assessment. Hence the need for a "transboundary impact" indicator and also the inclusion of the jurisdiction of the St. Regis Mohawk Tribe.

Below, are two headings describing links to the Cornwall RAP and the Mohawk Tribe. Strategies to address the beneficial uses and restore the AOC are identified. Sharing information and data in implementing the strategies is important to each jurisdiction as we work to make incremental progress in addressing each of the indicators. The third heading describes the IJC's Status Assessment of the AOC published in 2003.

1. Links to Cornwall RAP

The 1994 report entitled "Cornwall-Lake St. Francis & Massena Remedial Action Plans Stage 1 Summary" was published as a joint problem statement by the federal governments of Canada and the United States. This document also provides a joint goal statement, maps and description of the shared AOC, a description of the RAP process, and future activity guidance including a diagram for continued RAP development. The first three columns of **Table 4** (following next page)show a comparison of the status of the use impairment indicators in the St. Lawrence River Area of Concern as included in the 1994 report. A fourth column has been added to assist in the identification of "needs" to move the entire RAP forward.

Members from each of the three intergovernmental jurisdictions (Canada, US, and Mohawks) met in May 2004 to focus on four discussion objectives: 1) understanding the status of each RAP area; 2) reviewing delisting criteria status; 3) identifying monitoring and next step needs; and, 4) identifying opportunities for collaboration in delisting efforts. Discussions included reference to the International Joint Commission's 2003 Status Assessment Report for the Area of Concern as well as highlighting the challenges anticipated by the RAP coordinators. A brief review of the advisory committees' goals and progress reporting benefitted the attendees. Both Cornwall and Massena have completed Stage 1 and Stage 2 documents and have prepared delisting criteria with their Remedial Advisories Committees. Current implementation activities for Cornwall and Massena are:

a. Cornwall - The 1997 Stage 2 report contains 64 recommended actions. Detailed delisting criteria are also developed in this document as well as activity status. A Strategy Plan and Sediment Strategy for the Cornwall AOC is currently being formulated. Further, a monitoring plan for the AOC is also under development. The St. Lawrence River Restoration Council has an annual workplan that lists project implementation activities.

b. Massena - The 1995 Update identifies commitments to the eleven broad Stage 2 recommendations. Delisting Criteria were developed and presented in the 2000 Update. The advisory committee is currently working on refining the criteria and identifying monitoring needs. The working versions for the criteria and needs are contained in this 2006 Status Report. Certain persons from the Cornwall RAP have participated in the development of the Massena RAP since 1989. Elaine Kennedy continues to serve as a leader in this responsibility and has many times added practicality and technical expertise to the RAP process.

2. Links to the St. Regis Mohawk Tribe

The St. Regis Mohawk Tribe (SRMT) has had a member appointed to the Massena Remedial Advisory Committee since the beginning of the RAP process in 1989. Currently the Jessica Jock represents the SRMT Environment Division. At the May 2004 intergovernmental (multi-national) meeting on the St. Lawrence Area of Concern, Ms. Jock identified useful information to share among the agencies. She continues the long tradition of thoughtful watershed planning for the St. Lawrence River and its Area of Concern as envisioned by the Mohawk's "seven generation" planning. In the best interest of the Tribe and Akwesasne lands, Jessica is dedicated to assure the restoration and protection of beneficial uses.

Table 4 on the following page shows a comparison of the status of the use impairment indicators in the St. Lawrence River Area of Concern in each of the Canadian and United States parts. The fourth column was added to assist in the comprehensive identification of "needs" to assist the governments and stakeholders in RAP implementation.

The activities of the SRMT Environment Division are essential to the restoration and protection of the lands surrounding the St. Lawrence River. The St. Regis Mohawk Tribe at Akwesasne shares the goals of the RAP process and is participating in the collaboration to ultimately resolve each of the use impairment indicators locally as well as the overall Area of Concern. Environmental studies and plans are brought to the meeting table so that a comprehensive plan and corrective strategy can be developed and implemented. These efforts are ongoing.

Table 4 - Links to the Cornwall RAP

St. Lawrence River Remedial Action Plan
Beneficial Use Status and Resolution Needs

INDICATOR	Canada Status	U.S. Status	NEEDS
Fish and Wildlife Consumption Restrictions	**Impaired** (Mercury in fish flesh exceeds Ontario guidance above dam)	**Impaired** (historic waste sites, sediments, discharges e.g. PCBs, Mirex and Dioxin.	Post remediation study and non-AOC determination.
Loss of Fish and Wildlife Habitat	**Impaired** (Cornwall waterfront hab. restored; re: Natural Heritage Strat.; Fish Hab. Mgt. Plan, Littoral Zone Project.)	**Impaired** (due to physical disturbances, natural erosion, contamination)	Seaway & Dam changed area; need data and expert assessment.
Transboundary Impacts (Not a Cornwall indicator; added by Massena)	**Not an Indicator** (but addressed by AOC encompassing NY and Quebec waters to ensure no sources.	**Impaired** (defined as historic down-stream effect from waste sites, air deposition, point and nonpoint sources)	Water quality data and downstream impact assessment.
Degradation of Fish and Wildlife Populations	**Impaired** (Cornwall to apply delist. criteria and a Lake St. Francis Mgt Plan to address)	**Needs Assessment** (point, nonpoint, and hazardous waste sites addressed.)	Define desired community, evaluate (Causes: physical disturbance, PCBs, DDE, mercury, commercial fishing)
Fish Tumors or Other Deformities	**Possibly Impaired** (fish study ongoing; results expected in 2007.)	**Needs Assessment** (need study, reference site and evaluation)	To Reassess
Bird or Animal Deformities or Reproduction Problems	**Not Impaired** (Status reviewed in 2003-04-05; no sign. impact)	**Needs Assessment** (need study, reference site and evaluation)	Reassess Massena
Degradation of Benthos	**Not Impaired** (Cornwall has verified criteria met)	**Needs Assessment** (address benthic community, toxicity, bioaccumulation)	Reassess Massena
Restrictions on Dredging Activities	**Not Impaired** (Cornwall sediment strategy addresses; no navigat. dredging)	**Not Impaired** (St. Law. Riv. sediment remediation complete)	Navigational dredging not an AOC issue; Admin. controls help.
Beach Closings	**Impaired -** (Improvements noted; criteria and actions under review)	**Not Impaired**	To consider partial body contact and any CSO impacts
Degradation of Plankton Populations	**Possibly Impaired** (Cornwall study done 2006; report in draft)	**Needs Assessment** (Clarkson Univ planning next phase of study)	To Reassess
Tainting of Fish and Wildlife Flavor	**Not Impaired** (1990s odour study indicates no impact.)	**Not Impaired** (tumor assess/study will further support)	To Reassess; obtain sportsman and expert input.
Eutrophication or Undesirable Algae	**Impaired** (Cornwall tribs. have elevated phosphorus)	**Not Impaired** (partial body contact review under beach closings may help)	To Reassess action items versus nuisance conditions
Drinking Water Restrictions, Taste and Odor Problems	**Not Impaired** (Cornwall City has carbon filtration at the water treatment plant; not an AOC specific problem)	**Not Impaired** (Massena has historic seasonal issue; not a current problem)	Odor attributed to Geosmin and MIB compounds commonly occurring in water supplies.
Degradation of Aesthetics	**Not Impaired** (no further assessment required for Cornwall)	**Not Impaired**	Survey would be useful
Added Costs to Agriculture or Industry	**Not Impaired** (no further assessment required for Cornwall)	**Not Impaired** (verify no transboundary impacts)	Reassess impact versus problem.

3. International Joint Commission (IJC) Status Assessment 2003

What is the Status Assessment and Overall Rating:
In May, 2003 the International Joint Commission (IJC) reported to the Governments of the United States and Canada on the ongoing remedial and preventive efforts relative to restoring and protecting the water quality of the St. Lawrence River Area of Concern. Overall, the findings acknowledge the extensive efforts in New York to remediate contamination. Recommendations call for further assessment of certain use impairment indicators and the completion of remedial measures to address environmental concerns.

Background:
The International Joint Commission (IJC) and Great Lakes community are working on 42 Areas of Concern (AOC) in the Great Lakes basin where beneficial uses of a waterbody have been identified as impaired. AOCs include harbors, river mouths, and Great Lakes connecting channels where Remedial Action Plans (RAPs) have been developed and are being implemented to restore and to protect beneficial uses. Fourteen IJC Use Impairment Indicators have been applied to define water quality problems. In New York State there are six Areas of Concern. Two of these are connecting channels: the Niagara River and the St. Lawrence River at Massena. The other four New York AOCs are: the Buffalo River, Eighteenmile Creek, the Rochester Embayment, and the Oswego River.

The Great Lakes Remedial Action Plan program originated in a 1985 recommendation from IJC's Great Lakes Water Quality Board and was formalized in the 1987 amendments to the Great Lakes Water Quality Agreement between the United States and Canada. The Agreement calls for the federal governments, in cooperation with state and provincial governments, to ensure that RAPs incorporate a systematic and comprehensive ecosystem approach in restoring beneficial uses, and that the public is consulted in all actions undertaken pursuant to RAPs. The ecosystem approach accounts for the interactions among land, air, water, and all living things, including humans. RAPs are to apply this approach to implement a comprehensive watershed cleanup and management plan that involves all stakeholders. Annex 2 of the Agreement lists RAP process requirements.

The Status Assessment Process:
For over a decade, IJC has reviewed and assisted in the development of RAPs, and has expressed concern with overall progress in the development and implementation of cleanup and prevention strategies in some AOCs. In 1996, the Commission adopted a new initiative called the Status Assessment process to further examine progress toward restoration of beneficial uses in specific AOCs or open lake waters.

Status Assessments are intended to: examine and encourage progress toward restoration and protection of beneficial uses; assess program implementation relative to remedial and preventive actions; and identify and make recommendations on specific activities that could be taken to overcome obstacles and make measurable progress in restoring beneficial uses in the area. Status Assessments are not comprehensive environmental audits, but rather, assessments of ongoing efforts and activities of the responsible governments and

organizations. The Status Assessment process is intended to promote the restoration of beneficial uses through the collection of information and transfer of successful methods and experiences among different AOCs, and facilitation of constructive interaction among various agencies and organizations that may have limited opportunity to exchange ideas. The Commission's evaluation of the St. Lawrence River Area of Concern is the fifth conducted through the Status Assessment process.

St. Lawrence River AOC Status Assessment:
The Status Assessment of the St. Lawrence River RAPs was conducted between May 2000 and February 2003 and included consultation between Commission representatives (including Commissioners, staff members and Great Lakes Science Advisory Board members) and citizens, representatives of government agencies, local industries, representatives of St. Lawrence River Restoration Council, representatives of the St. Lawrence River Remedial Advisory Committee, and representatives of the Mohawk Nation of Akwesasne. The consultation process included a public meeting that was conducted in Cornwall, Ontario. The Status Assessment process included an examination of funding, institutional structure, roles of the Parties, jurisdictions and other sectors, and public consultation. This evaluation examines activities occurring within the AOC that foster restoration and protection of beneficial uses and those that may not be conducted or considered as RAP functions.

Findings:
IJC's Status Assessment revealed successes as well as challenges in the restoration of beneficial uses within the St. Lawrence River Area of Concern. Observations are noted during the information gathering process. Comments on selected activity areas are outlined below:

1) Current and historical major industrial dischargers to the St. Lawrence River are identified. Major industrial dischargers located within the New York portion of the AOC include: the Aluminum Company of America (ALCOA), Reynolds Metal Company (now ALCOA east), and a General Motors (GM) facility, and involve mainly PCB contamination.

2) While PCBs are the primary contaminant in the Massena area, mercury from the Cornwall area has also been identified as a cause of use impairments. In New York, major remedial measures have taken place to clean up contamination. Some groundwater contamination and sediments remain in conjunction with the General Motors site and on the St. Regis Mohawk Reservation. Concerns about the transboundary impacts of pollutants are identified and include the downstream area in the St. Lawrence River known as Lake St. Francis.

3) Studies have shown that the northern portion of Lake St. Francis is affected by high concentrations of mercury and the southern portion contaminated by PCBs with little mixing across the shipping channel. Reductions of environmental contamination are noted over the past thirty years. Measured PCB concentrations on the south shore of Lake St. Francis are several times higher than those found in the center and the north shore. Alternatively, the highest mercury concentrations were measured on the north shore with lower values identified in the center and on the southern shore.

Notable Successes:
Advances toward restoration of the St. Lawrence River Area of Concern are recognized:

1) Remedial efforts by New York industries have significantly reduced the volume of contaminated sediment in the Area of Concern.

2) A framework has been established for the Ontario portion of the Area of Concern and implementation is underway (i.e. Environment Canada and the Ontario Ministry of Environment, in cooperation with the St. Lawrence River Institute of Environmental Sciences, formed the St. Lawrence River Restoration Council in 1998)

3) Development of a Cornwall sediment management strategy has provided a framework for decision-making. The strategy provides a unique opportunity for agency, industry and public collaboration. Consultation with the general public is planned in 2003.

Challenges in Restoring of Beneficial Uses and Recommendations:

1) In addressing the management of contaminated sediment, a timely decision on what is the most appropriate course of action for any sites with significant mercury contamination in the Cornwall area. The completion of PCB remediation on the U.S. side of the AOC is an equal concern. This includes the decision in addressing the Grasse River PCB contamination.

Methyl-mercury and polychlorinated biphenyl concentrations in sport fish within the St. Lawrence River AOC and their potential threat to human health are continuing concerns of the Commission. Downstream locations, such as Lake St. Francis, are of particular interest. Long-term monitoring of the aquatic ecosystem recovery as a result of the removal of contaminants is extremely important.

Recommendation: Make decisions regarding potential remedial actions for the remaining contaminated sediment sites in both the U.S. and Ontario portions of the Area of Concern. As remediation is completed, ensure that suitable monitoring of reductions in contaminant levels in fish tissue is undertaken and maintained.

2) Prioritization of remedial actions and tracking of the restoration of beneficial uses. There are four potential beneficial use impairments in the New York portion of the AOC for which there is uncertainty regarding their status. In the Ontario portion of the AOC, two potential beneficial use impairments require further assessment. It is difficult to assess progress or prioritize potential remedial actions without confirmation of the existing environmental conditions.

New York remedial activities have appropriately focused on the remediation of contaminated sediment and hazardous waste sites. While remediation continues to progress, disputes over selection of remedial actions and access to Mohawk lands adjacent to the GM site have caused delays. The Stage 2 RAP Report for the Ontario portion of the AOC details 64

actions that are recommended as a result of extensive technical investigation and consultation with the public. Actions therefore need to be prioritized based on their likely contribution to restoration.

Recommendation: Implement remedial actions that will provide the greatest contribution to restoration of beneficial uses at the lowest costs. Confirm time frames for remedial actions (e.g. remedial measures at Cornwall's sewage treatment plant and GM hazardous waste site). Undertake monitoring suitable for tracking the restoration.

3) Enhance and protect the Health of the Akwesasne Community. Residents of the Area of Concern including the Mohawk Nation community of Akwesasne have faced and continue to face a threat to human health due to the exposure to persistent toxic substances. Historically, most exposure to these substances has occurred through the consumption of locally-caught fish. Detailed environmental monitoring is needed.

Recommendation: Encourage cooperative efforts to address outstanding issues that impede remediation of PCB-contaminated areas. Ensure support for continued monitoring of human exposure at Akwesasne to persistent toxic substances by ATSDR, NYSDOH or others.

Specific Use Impairment Indicators Needing to be Addressed:

Stage 1 (problem identification) and Stage 2 (selection of remedial measures) RAPs have been prepared for both the Ontario and New York portions of the St. Lawrence River AOC. For the 14 IJC indicators in the Massena AOC, IJC concludes the follow status and needs:

* Restrictions on fish and wildlife consumption, rated as impaired - Enhanced risk communication within the AOC is needed.

* Loss of fish and wildlife habitat, rated as impaired - Better quantification is needed.

* Degradation of fish and wildlife populations, rated as impairment likely - Level of degradation should be detailed.

* Bird or animal deformities or reproductive problems, rated as needing study - Status should be confirmed and communicated to the public.

* Restrictions on dredging activities, rated impaired for Cornwall - Restrictions regarding any activities and areas subject to disturbance should be communicated to the public.

VI. Next Steps

Based on the use impairment restoration and protection (delisting) strategies and the criteria developed in the preceding two sections, necessary priority remedial activities can be identified and listed. In order to accomplish the RAP goals and to restore beneficial uses, these priority remedial activities are fundamental to continuing progress with remedial strategies that involve each use impairment. Priority remedial activities will be most important to keep in mind as "next step items" for the year 2006 and beyond. These activities are essential to addressing the endpoints and restoration criteria applied to assess beneficial use indicator status.

A. Priority Remedial Activities

Remedial activities consist of the following three activity groups: physical construction and actual remedial work; investigation, monitoring, and assessment; and, management plans, controls, and documentation. The June 1996 Massena RAP Update document first presented this information in table and listings by activity. **Table 5** (on page 83) has been further updated and listings in each of three remedial activity groups are provided. By updating the status of remedial activities and by including current study results with current strategy components, the priorities or next step items can be identified. Listings of the remedial activities in the three activity groups follow to assist in this strategy development and implementation.

■ Physical Construction / Actual Remedial Work

Previous RAP Update documents identified the completion of construction work at the three major industries as key remedial measures to the RAP. The work includes land-based and river-based remediation as well as wetland restoration projects. Most work is complete except for the Grasse River sediment remediation at the Alcoa West Main Plant, the final landfill closure at General Motors, and contamination on Akwesasne lands.

1. Complete land remediation (GM landfill closure and Akwesasne land sites).
2. Implement Grasse River sediment remediation (large project by ALCOA).
3. Closure on St. Lawrence River sediments sites (removal and capping).
4. Assess wetland restoration for completion.

■ Investigation, Monitoring, and Assessment Activities:

Twenty investigative and information assessment activities are identified below; many have been completed. Expert consultation is an important component in evaluating the results of remedial measures, assessing the environmental data, and in determining the relationship to the status of the beneficial use indicators. The endpoints and restoration (delisting) criteria help in this assessment.

1. Assessment of land-based remedial measures (for contaminant release).
2. Assessment of sediment remediation and criteria (for completion and release).
3. Conduct fish pathology study(s) for tumors/deformities determination.
4. Conduct fish tissue sampling for meeting fish consumption goals.
5. Establish F&W habitat and community structure goals and assess accomplishments.

6. Verify/document acceptable fish and wildlife population levels present.
7. Confirm wetlands support a healthy community.
8. Obtain/assess plankton community structure data.
9. Confirm no significant toxicity in AOC water and/or sediment.
10. Verify achieving ambient water quality standards.

11 Assess non-bathing beach water quality for any use impairment.
12. Document any deformities, assure occurrence less than inland controls.
13. Establish and monitor status of transboundary impact(s).
14. Conduct benthic community structure study(s).
15. Conduct biomonitoring study and assess contamination.

16. Verify flora/fauna health acceptable.
17. Conduct aesthetics survey to assure beneficial uses intact.
18. Nonpoint source study and impact assessment.
19. Dioxin (and fluoride) source evaluation and impact assessment.
20. Assess human health studies (Superfund Research) results. Determine any next steps to address human, aquatic, and/or wildlife health in the Area of Concern.

■ **Management Plans, Controls, and Documentation:**

As noted above, each Use Impairment Restoration and Protection Strategy management form lists the remedial strategies identified to address a use impairment, its contamination sources, and the causes. Below are excerpts of the action items that call for the development of certain management plans, controls, or needed documentation to accomplish the endpoints and delisting criteria for the restoration and protection of beneficial uses:

1. Observe FERC relicensing project implementation (New York Power Authority) and determine applicability of project plans and actions towards resolving beneficial uses.
2. Assess the environmental permit requirements at the major industries and evaluate toxic control(s) and reduced loading(s) to the AOC.
3. Obtain environmental data and compare this to standards, criteria, and guidelines to assess the status of the beneficial use indicators.
4. Implement BMPs associated with specific site remedial projects as well as in the watershed to benefit achieving RAP goals.
5. Confirm that the Lake Ontario LaMP addresses lake effects on the St. Lawrence River and downstream Area of Concern.
6. Confirm AOC navigational dredging is protective of beneficial uses.
7. Document RAP process accomplishments (Re: public participation, monitoring, and project implementation to meet restoration criteria).

■ **Table 5 - Summary of Sources, Impairments, Causes, and Remedial Strategies:**

Table 5 (next page) has been developed to summarize the remedial activity strategies that address the sources, causes, and use impairment concerns and to show their interrelationship. For example, a cause (e.g. PCBs) may contribute to more than one source of contamination or impairment concern. Similarly, specific remedial strategies (e.g. investigation, management plan, or physical improvement) may contribute to addressing more than one contamination source, use impairment concern, or cause of an impairment.

In addition to describing the remedial strategies needed to address the sources and use impairment concerns, Table 5 also identifies the needed documentation and provides an overall status of the remedial strategies for each source or impairment concern. These strategies and needs have been identified by the RAC committee and NYSDEC as necessary steps to restore and to protect beneficial uses and to work towards achieving the restoration criteria for the AOC. Table 5 is linked to the three lists of priority remedial activities above.

In **Table 5** (on page 83), the remedial activity strategies are identified to address the sources of contamination to restore and to protect beneficial uses. These activities are involved with the three areas of priority remedial activities: 1) conducting investigation and assessment activities, 2) the development and implementation of plans, controls, and physical construction improvement activities, and 3) the documentation of the progress and the ultimate success story that needs to be communicated as part of the Stage 3 RAP document.

■ **Workplan Activities**:

1. Accomplish obtaining EPA grant funding (GLNPO) for RAP Coordination.
2. Continue Remedial Advisory Committee meetings and involve the committee to address strategies, emerging issues, membership, and RAP goals.
3. Evaluate remedial measure success at Alcoa (East & West, and General Motors)
4. Assure the restoration criteria and remedial action identification are complete and address opinion and scientific fact.
5. Improve RAP monitoring, overview, and reporting; involve added resources.
6. Enhance public participation activities involving the RAP (meetings, outreach).
7. Share information (Canadian and Mohawk Tribe) to accomplish joint goals.
8. Proceed with incremental progress, individual indicator delisting, and celebration.
9. Track and influence Grasse River remedial strategy to benefit the AOC.
10. Develop strategy for “Area of Recovery” designation for the AOC.
11. Identify project priorities and provide input; seek to expedite implementation.

TABLE 5 - SUMMARY OF SOURCES, USE IMPAIRMENTS, CAUSES, AND REMEDIAL STRATEGIES
St. Lawrence River at Massena Remedial Action Plan

Source or Use Impairment	Cause	Remedial Activity Strategies			Status
		Investigation/Assessment	Plans / Improvements	Documentation	
Land-based Hazardous Waste Sites	PCBs, Dioxin, Mercury	Assess achievement of cleanup standards; check if restoration criteria met.	Closure on GM landfill and Akwesasne sites and verify; Evaluate health needs.	Record project status; obtain supporting data and expert assessment.	O, R
Contaminated Sediments	PCBs, Dioxin, Mercury, Metals	Assess achievement of cleanup standards; check if restoration criteria met.	Implement Grasse River remedial plan; Evaluate endpoints and health needs.	Record project status; obtain supporting data and expert assessment.	O, R
Other Non-point (AOC & Watershed)	Dredging, Construction, Physical Disturbances, Spills (Haz. sub.), Natural Erosion, and Sediments.	Identify remedial measure projects (watershed and County) and evaluate the effect(s).	Define ongoing and needed practices (BMPs) / controls. Implement actions.	Report on remedial measures; obtain supporting data and expert assessment.	O
Point Source [Industrial & Municipal discharge permits (SPDES)]	Phosphorus, PCBs, Organic Compounds, Metals and Sediments.	Identify, measure and evaluate the effect(s) of remedial actions.	Complete permit renewals; define new controls; monitor for compliance.	Report on compliance and trends.	O
Combined Sewer Overflows	Metals, Phosphorus	Identify, measure and evaluate the effects of remedial actions.	Complete permit renewals and CSO controls; determine adequacy.	Conduct long-term monitoring; document trends and other needs.	O
Other Point Sources	None known	Identify any sources and assess loadings as appropriate.	Further development based on new information and/or mass balance discrepancy.	Conduct long-term monitoring; document trends.	O
Lake Ontario	PCBs, Dioxin, Mirex, DDE	Sample water column and assess loadings .	Encourage added source control and pollution prevention practices.	Conduct long-term monitoring; document trends.	O

Source or Use Impairment	Cause	Remedial Activity Strategies			Status
Air Deposition	**PCBs, Fluoride, Organic Compounds**	**Transport study of air to assess deposition and source load contributions.**	**Encourage added source control and pollution prevention practices.**	**Conduct monitoring; document trends.**	**O**
Fish & Wildlife Consumption Restrictions	**PCBs**	**Measure fish and wildlife concentrations for trends; verify criteria & cleanup standards achieved.**	**Complete site remediation; Implement BMPs/controls; Assess added needs.**	**Achieve criteria and cleanup standards. Define no health advisory (due to AOC).**	**O**
Fish & Wildlife Habitat Loss and Impairment	**Physical Disturbances, Contaminated Sediments, Natural Erosion, Sediments, Introduced Species, Water Level Controls.**	**Develop habitat use plans. Assess (non)indigenous and (non)AOC habitat use. [address Zeb.Mus., purple loosestrife, and others.)**	**Assess type, quantity, and quality of habitat; verify adequate. Develop/implem. habitat improvement plan(s) and define needs.**	**Document remedial trends and implementation of FERC relicensing requirements.**	**N**
Transboundary Impacts	**PCBs, DDE, Metals, Mercury, Phosphorus, and Cornwall AOC**	**Measure water/air column, and remedial sites; meet standards & criteria; trackdown sources.**	**Complete site remediation; Develop/implement BMPs; Verify protection.**	**Document no effect to Cornwall/downstream from the AOC; verify LaMP addresses upstream issues.**	**N**
Other possible impairments: [Contaminated Benthos; Tumors or Deformities; Dredging Restrictions; Bathing (Beach) Restrictions; Reproduction or Population problems (fish/wildlife/birds); Drinking Water Taste/Odor]	**PCBs, DDE, PAHs, Metals, Mercury, Physical Disturbances, Overharvest of Fish, Contaminated Sediments, Geosmin and MIB.**	**Perform studies to verify attainment of restoration (delisting) criteria and/or a no impairment status.**	**Complete site remediation; Develop/implement BMPs; Implement needs to meet standards and criteria.**	**Record project status; obtain supporting data and expert assessment. Provide beneficial use indicator resolution statements to achieve a not impaired status.**	**N**

NOTES: Metals could include: Aluminum, Arsenic, Cadmium, Chromium, Copper, Cyanide, Iron, Lead, Mercury, Nickel, Zinc.

STATUS KEY:
C = Completed
O = Ongoing implementation/ assessment/ documentation
N = Needs development/ assessment/ documentation
R = Required by enforcement/permit/agreement

B. Delisting Principles and Guidance

The Great Lakes community, including USEPA, IJC, Great Lakes States, RAP Remedial Advisory Committees, and Canadian counterparts, have and continue to conduct sessions in the development of principles and guidance (as well as specific criteria) towards accomplishing Area of Concern delisting in the Great Lakes. Consistent with the principles and guidance developed by USEPA for the restoration of United States' AOCs, the St. Lawrence River at Massena RAP has adopted the following key delisting principles and guidance points. This guidance supports the further definition of restoration (delisting) criteria developed by NYSDEC in cooperation with the Massena RAP Remedial Advisory Committee as presented herein in Appendices D and E.

Further, a projected time-line of events or actions leading to the resolution of the AOC has been developed. This time-line identifies responsible parties for implementing these activities and projects a schedule leading to resolution in 2013. Although an estimate, the schedule shows the sequence of events needed to accomplish an "Area of Recovery" designation. This guidance and time-line are designed to assist in moving the St. Lawrence River stakeholders ahead to accomplish reassessment of the indicators within the AOC. The key principles and guidance points follow:

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. In addition, for the St. Lawrence River RAP, comments are to be gathered through a public involvement and peer review process and responded to in the preparation of the final Stage 3 document and a responsiveness summary.

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 responsive 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 St. Lawrence River AOC, achieving the endpoints for the fish habitat, population, and consumption impairments may ultimately need to be deferred to an existing management plan framework).

For example, upstream sources can be addressed by the Lake Ontario LaMP process. In the St. Lawrence River RAP process, we may reach a point where the goals or endpoints have been achieved to the maximum extent practicable and the ultimate resolution strategy for "out of AOC" causes or sources of concern are now part of larger or alternate plans and actions. Therefore, the RAP would need to establish that some other inclusive management plan activity resolves concerns that cannot otherwise be fulfilled within the local RAP process. Other examples of a larger management plan activity accepting oversight responsibility include: the Great Lakes Binational Toxics Strategy (BTX), watershed restoration and protection strategies (WRAPS), lead agencies for fish consumption advisories, local oversight groups, and agencies for licensing or permitting processes (e.g. the FERC power dam license).

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.

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 local stakeholders). 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 St. Lawrence RAP, the public consultation is envisioned as involving presentations at local environmental group meetings, consultation with peers, and government agency review. A final draft Stage 3 delisting (or Area of Recovery) document, website posting, power point presentation, summary handout, and formal Environmental Notice Bulletin comment period for the public at large would follow. This assures the delisting information is communicated and comments are responded to in the completion of the delisting steps.

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 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.

6. **Specific Criteria Development -** For the St. Lawrence River Area of Concern, both the Cornwall RAP document and Massena RAP document have defined delisting criteria for respective parts of the AOC. Ultimately the criteria, in conjunction with the evaluation of experts and stakeholders, will serve to assess and resolve the status of each of the beneficial uses. The goal of the intergovernmental team working on the Area of Concern is to make as much progress as possible in delisting an individual use impairment indicator. By focusing on individual beneficial uses, committee persons have agreed that progress for the shared jurisdictions of the AOC can be maximized. Some progress and strategies for the Cornwall and Massena RAPs follows:

   a. Cornwall - Environment Canada has developed a Sediment Strategy for the Cornwall AOC that implements technical and administrative controls to address in-place mercury contamination. A consultant's report supports this strategy. A sediment workshop was conducted to evaluate options and further reinforce the management decision on the sediment strategy.

   b. Massena - As noted above, the 1995 Update identifies commitments to the eleven broad Stage 2 recommendations and Delisting Criteria introduced in the 2000 Update and further updated herein. The advisory committee has worked on refining the criteria and identifying existing monitoring information as well as needs. This information has been compiled and reported on herein. Endpoints for each of the beneficial uses have been defined and a course of resolution proposed.

C. Progress and Projected Time-line:

In order to accomplish beneficial use indicator reassessment (and designation as an "Area of Recovery") for the St. Lawrence River at Massena Area of Concern, the following progress and projected time-line of events has been developed for stakeholders to identify the flow of activities and accomplishments. Preparation of a Stage 3 "Area of Recovery" document and major coordination with governmental agencies are necessary components. Several public involvement activities are also needed to support the process leading to the completion of a final document. These 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 also provided in the steps outlined below:

St. Lawrence River at Massena, New York
Area of Concern Progress and Projected Time-line

1.	✔ 8/91	Stage 2 document published (Stage 1completed 11/90)
2.	✔ 9/94	Binational Statement (problems, goals, process)
3.	✔ 4/95	Comprehensive RAP Update document
4.	✔ 5/00	Status Report Update (delisting criteria introduced)
5.	✔ 5/03	IJC Area of Concern Status Assessment
6.	✔ 5/04	Binational AOC Meeting on next steps
7.	✔ 4/05	Draft RAP Update (focus on Intergovernmental Cooperation and Delisting)
8.	✔ 1/06	Final RAP Status Report 2006 Update (working document for delisting)
9.	1/07	RAP Coordination and Project Grant awards (RFPs due in October 2006)
10.	12/07	RAP Coordinator Annual Progress Report #1 including Data Synthesis report (to address monitoring and assessment), Public Participation report (outreach) and Intergovernmental Report (Tribal Liaison and Cornwall RAP).
11.	12/08	RAP Coordinator Annual Progress Report #2 addressing topics above, plus use impairment indicator resolution progress.
12.	12/09	RAP Coordinator Annual Progress Report #3 in addition to above topics, develop a draft Stage 3 resolution (delisting) proposal and public (Power Point) presentation on the Area of Concern for an "Area of Recovery" status (knowing that the completion of the Grasse River remediation could cause delays).
13.	6/10	Conduct outreach on "Area of Recovery" proposal - RAP Coordination and managers conduct presentations at meetings of the Great Lakes Basin Advisory Council, the St. Lawrence County Soil and Water Conservation District, the St. Lawrence County Water Quality Coordinating Committee, the RAP Remedial Advisory Committee, the St. Lawrence County Environmental Management Council and others. (Based on completion of Grasse River Remediation or a revised RAP implementation strategy.) RAC to develop other outreach.

Note: Continuing with the "Area of Recovery" proposal and proceeding with the next steps in the time-line is based on completing remedial measures addressing the Grasse River as part of the Area of Concern as it was originally defined in 1990 or use of a revised RAP implementation strategies:

14. 9/10 DEC conducts peer review including internal DEC and state agencies (Departments of Health and State) on draft Stage 3 Area of Recovery proposal and posts information on the DEC website.

15. 12/10 RAP Coordinator and DEC foster informal consultation with USEPA Region 2 and IJC on the draft Stage 3 Area of Recovery proposal.

16. 3/11 RAP Coordinator and DEC addresses comments to date in revised draft Stage 3 Area of Recovery proposal and public (Power Point) presentation.

17. 4/11 DEC meets with RAP Coordinator and RAC Advisory Committee to endorse the Stage 3 Area of Recovery document, presentation, and next steps.

18. 6/11 Consultation among RAP Coordinator, GLNPO, EPA Region 2, and DEC achieves agreement to continue with Area of Recovery steps. Consult with IJC.

19. 9/11 RAP Coordinator complete revised final draft Stage 3 Area of Recovery addressing comments from IJC and EPA. Submit for formal IJC endorsement.

20. 12/11 RAP Coordinator and DEC in consultation with RAC completes revisions (addressing IJC and EPA comments) and produces a final draft Stage 3 Area of Recovery document for further approval by EPA (Region 2 and GLNPO).

21. 1/12 DEC to prepare letter of recommendation to change the status of the Massena AOC to Area of Recovery and transmits to EPA Regional Administrator (Reg.2).

22. 3/12 EPA then completes internal briefings with Directors, RA, and DRA.

23. 6/12 EPA consults with DEC Director on draft final Stage 3 document and recommendation to proceed with preparations for formal public notice.

24. 7/12 EPA consults with the Directors of GLNPO and IJC Great Lakes Regional Office on the draft final document and recommendation for Area of Recovery status.

25. 9/12 RAP Coordinator in consultation with DEC and RAC completes any necessary revisions to produce a draft final Stage 3 Area of Recovery document in preparation for formal public notice.

26. 1/13 RAP Coordinator and DEC, in consultation with the RAC and EPA, conduct a formal public review to include all stakeholders in a final review and comment period. A New York State formal Environmental Notice Bulletin (ENB) 60-day comment period is to be utilized to assure restoration conditions exist.

27. 4/13 RAP Coordinator and DEC in consultation with the RAC and EPA, incorporate revisions to the Stage 3 document based on the formal public review comments.

28. 5/13 RAP Coordinator and DEC in consultation with the RAC, complete the final Stage 3 Area of Recovery document and submits to EPA Region 2. (EPA then conducts further internal briefings with EPA Director, Regional Administrator (RA), Deputy RA and prepares letter of transmittal for RA).

29. 7/13 EPA Region 2 Regional Administrator, transmits final Stage 3 Area of Recovery document and letter recommending AOC status change to Area of Recovery to the U.S. Department of State with copies to NYSDEC Commission and appropriate Canadian Federal and Provincial agencies, and the International Joint Commission.

30. 9/13 U.S. Secretary of State officially re-designates the Area of Concern water body at Massena to an Area of Recovery.

31. 10/13 U.S. Secretary of State sends formal notice of formal status change to IJC.

32. 12/13 Announcement(s) and commemoration activity (outreach suggestions are needed to address the dedication of a planting (re: Massena “Tree City” award in 2013), commemorative plaque, and/or coordination with other local events such as an annual winter festival, or spring / fall event. A creative title could address twenty-five plus years of restoration and now a natural recovery to complete the process to restore and protect the Massena rivers area .

D. Opportunities for Collaboration:

Between the federal governments of Canada and the United States, work efforts to date include 1) production of a Joint Problem Statement; 2) development of a comprehensive monitoring activities list; 3) attending advisory committee meetings for each side of the AOC; and, 4) joint participation in the annual Ecosystem Conference. As each side has the same goal to restore and protect beneficial uses and to ultimately delist the AOC, opportunities exist to share information and make joint incremental progress towards this goal. In forming an intergovernmental relationship, the St. Regis Mohawk Tribe participates with the federal governments in the RAP process and collaboration. Participants at the May 2004 meeting identified that this can be accomplished through the following:

- **Update the Joint Monitoring Listing** - progress can be made through data compilation that benefits the entire Area of Concern and reflects current information on the status of the fourteen IJC beneficial use indicators.

- **Assess Monitoring Data and Collaboration**– working together on data assessment and development of future monitoring plans can be most efficient and beneficial to the entire Area of Concern.

- **Resolution of Individual Indicators** – arriving at a joint statement on one or more of the impairment indicators is practical and less resource intense. Incremental delisting of individual indicators in the AOC is provided for in federal guidance.

- **Focus on Remaining Needs to Make Progress** – completing certain work makes accomplishing the remaining challenges more manageable.

- **Cooperate on Intergovernmental Efforts** - The Ontario, New York, and Mohawk jurisdictions would each benefit from joint efforts and remedial measure progress in the Area of Concern.

- **Conduct Monitoring and Implement Next Steps:** Between the Cornwall and Massena RAPs, several common impairments have been identified (fish consumption and degradation of habitat). Other indicators share a common need for further investigation and/or monitoring data (fish populations, fish tumors, degraded benthos, plankton, and bird or animal deformities). Some next steps needs were identified:

a. **Cornwall -** Once the monitoring plan and sediment strategy are adopted, implementation projects linked to support the AOC can be designed. The sediment workshop results can assist in these efforts. Meeting attendees noted an opportunity for binational cooperation and information sharing here. The Sediment Strategy is planned to address in-place contamination. Completed and ongoing studies need to be coordinated to identify with RAP objectives and accomplishments. The scope of certain studies should benefit both the Cornwall and Massena RAPs.

b. **Massena -** Once the major remedial measures are completed and a RAP Coordination grant is awarded, beneficial use reassessment can move forward. Assessment of fish contamination and habitat impact indicators will be critical to the AOC status. Conducting some current monitoring and performing data synthesis and trend analysis with this information is needed to reassess indicator status and/or reinforce a "not impaired" status for certain AOC indicators. Information sharing is recognized as helpful to documenting progress within the AOC. Two longer-term significant actions remain: Grasse River Remediation by ALCOA and completion of site remediation at General Motors which influences Akwesasne lands.

- **Transboundary impacts**: address downstream impacts to both the Cornwall AOC and the Mohawks at Akwesasne Lands in both the US and Canada stretches of the St. Lawrence River. As such, the Mohawks at Akwesasne are a sovereign nation seeking restoration from ecological as well as cultural impacts. The Great Lakes Water Quality agreement supports this goal. A separate Natural Resource Damage Claim addresses many of these issues (see Appendix H)

- **Annual Ecosystem Conference**: An annual conference is conducted each Spring and has been spearheaded by the St. Lawrence River Institute of Environmental Sciences (SLRIES). The 13th annual "International Conference on the St. Lawrence River Ecosystem"was held May 16-18, 2006 with the theme of *Source Water Pollution.* Information is available at the website: http://www.riverinstitute.com/

VII. LIST OF APPENDICES:

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APPENDIX A

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APPENDIX B

Indicator Evaluation Strategy and Endpoints

St. Lawrence River at Massena Remedial Action Plan

As developed by the Remedial Advisory Committee - January 2005

Context: The evaluation of each of the use impairment indicators in the context of the St. Lawrence River at Massena Area of Concern (AOC) is considered an important team assessment process supported by defensible scientific information. As such, the rating process is dynamic in considering all desired endpoints as well as scientific investigation and statistical evidence. This evidence may be limited; however, the public and regulatory review is thorough. The very nature of the Remedial Action Plan (RAP) process that addresses the fourteen International Joint Commission (IJC) Use Impairment Indicators applies an ecosystem approach while involving the public. The Remedial Advisory Committee (RAC) strives to achieve public understanding and support for endpoints defined by in the RAP process.

Objective: It is the mandate of the RAC to support the New York State Department Environmental Conservation (DEC) in restoring and protecting the beneficial uses to assure that the water quality is capable of supporting safe swimming and drinking water, and edible, diverse, and self-sustaining fish and wildlife populations. Once the RAC has assessed that the endpoints for each indicator have been achieved, the AOC will be recommended for a change in status.

Area of Concern (AOC): The Area of Concern is delineated by geographical boundaries. This St. Lawrence River at Massena AOC is defined as the area from the Village of Massena's water intake in the St. Lawrence River downstream to the international boundary. It includes portions of the Grasse, Raquette, and St. Regis Rivers.

Use Impairments: In applying the fourteen IJC use impairment indicators to the Massena AOC, two indicators were assessed as impaired: those addressing fish consumption and loss of habitat. Four other indicators were assessed as having likely impairments, these involve: fish and wildlife populations, degradation of benthos, fish tumors, and bird/animal reproduction. The plankton populations indicator was assessed as unknown. The causes associated with these indicators include chemical contamination (affecting land and sediment) and physical disturbance of the large power dam/ seaway construction completed in 1959. Finally, a 15th indicator was added to address the transboundary imparts from pollutant of concern identified in the RAP.

Objectives and Measurable Endpoints: The RAC intends to build on the restoration (delisting) criteria developed and define endpoints for each beneficial use indicator. Achieving the endpoint(s) will therefore be cause for "re-designation" of an indicator as restored, not impaired, or resolved by another responsible party. Achieving the endpoint(s) and criteria means that the beneficial uses for the indicator are now considered restored and protected under ongoing environmental program oversight. The endpoints are intended to be agreed to by the RAC members and supported by DEC. Each criterion is to be measurable, as much as practicable, and/or be able to meet a defined narrative endpoint. In the evaluation process, certain indicators, when evaluated, may be considered restored and protected within the AOC, but may have an outside source of continuing concern. In such cases, resolving the indicator for the AOC is acceptable, as long as the source of concern and/ or remedial activity is an accepted responsibility of another recognized party. To be delisted then, each indicator needs to have a resolution statement, supporting data, and rationale. Additional monitoring data may be needed to achieve the endpoints and delisting criteria.

Indicator Assessment Guidance: The following guidance and conditions will be held by the Remedial Advisory Committee in conducting an evaluation of the status of each use impairment indicator:

A. The assessment of the use impairment indicators is limited to the confines of the Area of Concern, as defined by RAP and New York State DEC. The Remedial Advisory Committee 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, source, or condition outside the AOC the Massena RAP process apply the "Strategic Approach" to address the indicator as described in item #1 below.

B. Based on the Stage 1 definitions, all fifteen use impairments indicators in the St. Lawrence River at Massena AOC have status designations that range from "Impaired", "Likely", "Unknown", to "Not Impaired". With the use of the developed endpoints, delisting criteria and related Great Lakes guidance, the status of each indicator can and will be reevaluated for re-designation.

C. "Redesignation" 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 an evaluation can determined that endpoints have been achieved and the indicator is resolved.

    2. Where the source of a use impairment is an activity or condition outside the AOC, the Remedial Advisory Committee can recommend to the RAP Coordinator a resolution for the indicator. This may include the identification of another responsible organization for addressing the source.

    3. A recommendation by the RAC for a use impairment status change or redesignation shall include public input at some point as determined by an acceptable and agreed upon method for soliciting input from the public. The RAP Coordinator and Advisory Committee should develop a Public Participation Plan. At a minimum this would involve use of the "Environmental Notice Bulletin" to seek formal comments.

D. Resolution (re-designation) of the entire AOC is the responsibility of the DEC and EPA once the RAC has assured that all the use impairments have been either re-designated to restored, not impaired, or addressed by another responsible party.

This strategy contains an overall philosophy, consistent with USEPA, 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 resolution of the AOC. Ultimately recommendations made by the RAC fall within the responsibility of the DEC and USEPA to provide for the final disposition of the AOC.

MASSENA AREA OF CONCERN IMPAIRMENT EVALUATION
RAC Strategic Approach for Indicator Evaluation

Background: This evaluation strategy is to be used to evaluate the status of the use impairment indicators applied to the St. Lawrence at Massena AOC and to assist in indicator resolution. The "Strategic Approach" used by the RAC is formulated around responding to five primary questions:

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 Massena RAC.

2. How do we address impairments to determine if they are ready for closure and re-designation?
   To address impairments the RAC is responsible for developing "endpoints and delisting criteria" and determining if the current state of the beneficial use indicator meets the criteria. The RAC should finalize the endpoints and criteria, evaluate existing data, and identify monitoring requirements (if any) required to fully assess the status of each the use impairment indicators. Indicators need to be reassessed by the RAC and DEC to assure that the endpoints and criteria are achieved.

3. What does "delisting" mean in the resolution of use impairment indicators*?*
   Delisting or closure in this strategy means that all endpoints and restoration (delisting) criteria for a given indicator have been achieved within the AOC and/or where applicable, a responsible party has been identified for addressing an indicator where concerns remain. Contributing sources identified within the AOC are to be addressed so as they are not the cause of an ongoing beneficial use impairment.

4. How do we interact more comprehensively with the public?
   Interaction with the public will require public information meetings at appropriate juncture of the re-designation process and finally delisting process. Additional information can be collected through the development and dissemination of a questionnaire, public information meeting, and/or formal public notice and comment period.

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, presentations, and public outreach initiatives. A public information meeting and/ or notification process that includes a reasonable comment period is needed to accomplish re-designation of an Area of Concern.

APPENDIX C

TABLE 6 - St. Lawrence River at Massena AOC
Remedial Advisory Committee Endpoints and Status

USE	ENDPOINTS	RELEVANT	STATUS
Fish and wildlife consumption restrictions **Steve L.**	Removal of fish consumption advisory ***[advisory(s) part of larger St. Lawrence River system and not AOC***	Monitoring (sample and data results); Health advisories established by NYS Dept. of Health	Impaired - (In Area of Concern and upstream river due to fish advisories -see 2006 report narrative)
Loss of fish and wildlife habitat ***Bruce C.***	No restricted use of fish habitat from flow or contamination ***[no sign. difference to F&W outside the AOC]***	Caused by disturbance. Need desired level determination and assessment by experts	Impaired -(FERC licence addresses. See 2006 report narrative; further evaluation required)
Transboundary Impacts ***Doug P.***	AOC Sources eliminated; Up/downstream impacts addressed. ***[remaining concerns not due to AOC sources]***	Land and River Based Remediation near completion; need to assess success	Impaired - (Downstream concerns predominate - see 2006 report narrative).
Degradation of fish and wildlife populations ***Steve L.***	Healthy & sustainable population similar to reference community ***[no sign. difference to F&W outside the AOC]***	Community structure comparison to ref. area populations [and chemical monitoring data of area F&W]	Likely - (linked to Habitat indicator - see 2006 report narrative)
Fish tumors or other deformities ***Pat B.***	*No abnormally high incidence of tumors and deformities*	*Comparative evaluation of deformities in reference populations **	*Likely - (see 2006 report narrative)*

Bird or animal deformities or reproductive problems ***Pat B.***	*No abnormally high incidence of deformities or reproductive problems*	*Comparative evaluation of deformities and reproductive problems in reference populations **	*Likely – (see 2006 report narrative)*
Degradation of benthos ***Mike T.***	*Benthic community integrity substantially similar to reference communities*	*Comparative community structure study results **	*Likely - (see 2006 report narrative)*
Restrictions on dredging activities ***Bob T.***	*No US Army Corps of Engineers restrictions on dredging*	*NYSDEC dredging approval and 401 Water quality certification*	*Not Impaired - [refers to navigational areas; in-place sediments addressed separately - see 2006 report narrative)]*
Beach closings ***Luke D.***	*All beaches in AOC open to swimming*	*Swimming water quality standards achieved;*	*Not Impaired - (see 2006 report narrative)*
Degradation of plankton populations ***Mike T***.	*Substantially similar plankton populations to reference populations*	*Comparative evaluation of plankton populations in reference Populations **	*Unknown - (study needed to quantify; grant proposal to be developed by Clarkson Univ.- see 2006 report narrative)*
Tainting of fish and wildlife flavor ***Tom G***.	*No evidence of fish or wildlife tainting* *[observation by fishing community supports]*	*Assessed as not impaired in Stage 1; no change indicated.*	*Not Impaired - (see 2006 report narrative)*
Eutrophication or undesirable algae ***Bob T.***	*Water quality standards achieved; Beneficial use goal met and maintained;*	*Water quality survey results do not indicate eutrophic conditions;* *No undesirable weeds or algae present*	*Not Impaired - (No persistent water quality problem due to cultural eutrophication; also refer to Aesthetics indicator - see 2006 report narratives)*

Drinking water restrictions, Taste and odor problems ***Dawn H.***	*No drinking water restrictions, taste, or odor problems*	*Not impaired based on water quality standards;* *Seasonal impact noted. Consider treatment.*	*Not Impaired -* *(Some seasonal impact on taste and odor - see 2006 report narrative) - address as nuisance condition*
Degradation of aesthetics ***Bob T.***	*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 - (see 2006 report narrative)*
Added costs to agriculture or industry ***Dawn H.***	*No abnormal added costs to agriculture or industry.*	*No added costs to industry and no agriculture use of AOC waters.*	*Not Impaired - (see 2006 report narrative)*

Note: * mark indicates the need to identify the actual study, if one exists, that will provide the information required for making the decision relative to use impairment status.

Appendix D

Table 7 - Restoration (Delisting) Criteria - Bullet Summary
St. Lawrence River at Massena Remedial Action Plan

USE IMPAIRMENT	RESTORATION CRITERIA	STATUS
Fish and Wildlife Consumption Restrictions	* No AOC restrictions due to inplace or watershed sources. * Compliance with fish and wildlife tissue standards. * Other upstream sources addressed by LaMP. * Attain sediment criteria and waste site standards.	* Impaired * Need data * Need to verify * Need data
Loss of Fish and Wildlife Habitat	* Amount and quality of habitat exists and protected to meet goals * Amount and type of wetlands and riparian vegetation adequate with beneficial use protected. * Management plans in place to restore and protect habitat. * FERC relicensing requirements met.	* Impaired * Need to verify * Need to verify * License Pending
Transboundary Impacts	* River and land-based remediation complete; no contribution from AOC/watershed to Cornwall RAP/downstream use impairments. * Attain ambient water quality standards and sediment criteria. * Attain flora and fauna environmental and health criteria. * Other upstream St. Lawrence River sources addressed by LaMP. * Downstream contamination concerns addressed.	* Impaired * Need to verify * Need to verify * Need to verify * Need to assess
Degradation of Fish and Wildlife Populations	* Attain desired level of healthy and self-sustaining communities. * AOC consistent with Great Lakes ecosystem objectives and Great Lakes Fishery Commission fish community goals. * In the absence of community structure data, bioassays confirm no significant toxicity from the water column or sediments. * Attain quantitative fishery targets (biomass, percent, richness)	* Need to verify * Need to verify * Need to verify * Need to verify
Fish Tumors or Other Deformities	* Incidence rates do not exceed rates in unimpacted control sites. * No neoplastic or preneoplastic liver tumors in bullheads/suckers. * Attain IJC, state, and federal tissue standards/objectives.	* Need to verify * Need to verify * Need to verify
Bird or Animal Deformities or Reproductive Problems	* Attain IJC, state, and federal tissue standards/objectives. * Attain appropriate sediment quality criteria. * Deformity or reproductive incident rates less than inland controls. * Wetlands support healthy communities of significant species. * Biomonitoring results better than unimpacted control sites.	* Need to verify * Need to verify * Need to verify * Need survey * Need to verify
Degradation of Benthos	* Macroinvertebrate structure similar to unimpacted control sites. * Mesotrophic species present where suitable substrates are located. * Absent community data, toxicity of sediments parallels controls. * Resident fauna do not have elevated contaminants.	* Need to verify * Need survey * Need to verify * Need to verify
Restrictions on Dredging Activities	* AOC sediments (metals, organics, nutrients) meet stds./criteria. * Restrictions not due to AOC watershed; beneficial use protected. * Dredge spoil disposal does not contribute to use impairments, activities registered and approved, beneficial uses protected.	* Not Impaired + * Not Impaired * Not Impaired

Beach Closings	* Waters do not exceed standards, guidelines, or objectives of use. * For beaches: no toxic irritants, numerical and clarity standards attained, and free from public health advisories. * For beaches: daily geometric mean for fecal coli < 100 colonies. * Attain ambient water quality standards for total and fecal coli. * Demonstrate stormwater CSO areas present no threat.	* Not Impaired + * Not Impaired * Not Impaired * Not Impaired * Not Impaired +
Degradation of Plankton Populations	* Plankton community structure similar to unimpacted control sites * Absent community data, no plankton bioassay toxicity impact. * Healthy fish communities present in the AOC.	* Not Impaired + * Not Impaired * Not Impaired
Tainting of Fish and Wildlife Flavor	* No complaints about fish tainting. * Survey results confirm no tainting. * Ambient water quality standards and criteria not exceeded	* Not Impaired * Not Impaired * Not Impaired
Eutrophication or Undesirable Algae	* No persistent water quality problems from cultural eutrophication * Ambient water quality standards, criteria, guidelines attained. * Beneficial goals are achieved and maintained (boating, fishing)	* Not Impaired * Not Impaired * Not Impaired
Drinking Water Restrictions, Taste and Odor Problems	* No taste and odor problems for treated drinking water supplies. * Attain treated drinking water health standards and criteria. * Drinking water treatment requirements not excessive.	* Seasonal Impact * Not Impaired * Not Impaired
Degradation of Aesthetics	* AOC waters devoid of substances producing aesthetic problems. * No increase in turbidity causing a visible contrast to natural. * No visible residue of oil or floating substances. * Acceptable response to spills with preventive measures.	* Not Impaired * Not Impaired * Not Impaired * Not Impaired
Added Costs to Agriculture or Industry	* No added costs to treat water due to AOC or spill conditions. * No transboundary impact due to watershed/AOC contamination.	* Not Impaired * Not Impaired

NOTE: Achieving all delisting criteria would indicate the preparation of a Stage 3 document is appropriate.

\+ = Additional survey data may be appropriate to verify and assure protection.

Appendix E

Restoration (Delisting) Criteria - Detailed Guidance

In addition to providing a summary of specific restoration (delisting) criteria definitions for each use impairment indicator, this section will expand on defining the goal(s), beneficial uses, and RAP strategy for the Massena Area of Concern.

A. Goals and Beneficial Uses for the Massena AOC

For the St. Lawrence River (Cornwall/Massena) AOC, the development of the RAP is proceeding as two separate documents: the Cornwall (Ontario, Canada) RAP and the Massena (New York, United States) RAP. NYSDEC, the Massena RAC, the Cornwall RAP team and the Cornwall Public Advisory Committee (PAC), in consultation with Quebec and the Mohawk Nation at Akwesasne, developed a single goal for the two RAPs. The goal recognizes that pollution affects more than the immediate area of a particular jurisdiction and that attention should also be turned to downstream and cross-stream areas that are impacted by pollution from the Area of Concern.

The goal of the Cornwall and Massena Remedial Action Plans is to restore, protect and maintain the chemical, physical and biological integrity of the St. Lawrence River ecosystem and in particular the Akwesasne, Cornwall-Lake St. Francis and Massena Area of Concern in accordance with the Great Lakes Water Quality Agreement. The Remedial Action Plans include protecting the downstream aquatic ecosystem from adverse impacts originating in the AOC and its watershed. This goal was agreed upon by NYSDEC, the Massena Citizen Advisory Committee (CAC), the Canadian governments, the Cornwall Public Advisory Committee (PAC) and the Mohawks at Akwesasne. The 1994 Binational Statement, which summarizes the Stage 1 Massena and Cornwall RAP documents, endorses this goal.

In order to implement this broad goal statement for the Massena RAP, the Remedial Advisory Committee has further defined specific RAP goals and beneficial uses that describe the desired water quality, AOC conditions, and stakeholders' uses. This expanded breakdown of the RAP goal(s) and the beneficial uses are listed below:

■ RAP Goals:

1. Water quality in the St. Lawrence River that achieves best use standards and is not adversely affected by tributary rivers and streams.

2. All river waters are aesthetically pleasing so as to encourage active and passive recreation.

3. Fish and wildlife levels in the AOC that are sustained and free of consumption restrictions.

4. Remedial activities that provide for the restoration of use impairments and the long term protection of beneficial uses.

■ Beneficial Uses:

1. Commercial uses include shipping, normal marine traffic, and business activities, such as tourism and trade, including related recreational uses.

2. Recreational uses include boating, sport and ice fishing, nature observation, public marinas, charters, sightseeing, and stewardship activities.

3. Municipal and public uses include drinking water, recreational activities, educational opportunities, and treated wastewater disposal.

4. Industrial uses include transportation and treated wastewater disposal.

5. Non-human uses: fish and wildlife habitat for resident and migratory species, food production for fish and wildlife, the preservation of natural resources, and the protection of watershed ecology uses.

■ RAP Strategy

Implementation of the St. Lawrence River at Massena Remedial Action Plan is a dynamic process that will incorporate improvements, identify use impairment changes and provide periodic update reports as knowledge on the status of the use impairments, location of sources, and effectiveness of remedial action implementation advances. Ultimately, the RAP must document the implementation of restoration and protection activities regarding the Area of Concern that indicate the delisting criteria have been achieved.

Implementation of the remedial measures at the three large local industry sites has already been identified as critical to the success of the RAP. The remedial measures have, however, be encouraged to address the larger ecosystem approach of the RAP. Because of the international nature of this Area of Concern, a joint U.S./Canadian statement of progress and resolution of use impairments is also desired and planned. Cleaning up the known sources of pollutants of this shared multi-use waterbody is fundamental to reclaiming and maintaining the valuable resource of the St. Lawrence River.

Once significant progress has been made in the improvement of use impairment status and/or significant details of remedial activity implementation have been accomplished that can document resolution of contamination sources, an expanded RAP Update document can be

produced to report on these activities. Ultimately, Stage 3 will require documentation of the resolution of all use impairments and satisfactory evidence that contamination sources are no longer impacting beneficial uses in the Area of Concern.

To evaluate the extent to which the Area of Concern will support the goals, beneficial uses, and RAP strategy, the Remedial Advisory Committee has developed restoration and protection criteria for each use impairment indicator. These criteria are to provide the definition of the goal or restoration target that is desired to satisfy each use impairment and ultimately lead to the delisting of the Area of Concern. The following section describes these criteria:

B. Table 7 - Beneficial Use Restoration and Protection (Delisting) Criteria

For each of the fifteen use impairment indicators, restoration and protection (delisting) criteria have been developed. Together, these criteria provide the necessary mechanism to evaluate the extent to which a beneficial use has been restored and protected against future impairment. By evaluating the status of each of these criteria (restoration targets) and by providing a discussion of the rationale and supporting data, the specific needs have been determined for all use impairments in order to accomplish the RAP goals.

Herein, Appendix E provides a detailed description of the restoration and protection criteria for each use impairment indicator. In Appendix E, the use impairment indicators are separated into three groups based on the current status evaluated for each use impairment: Group 1) indicators have a status of impaired; Group 2) indicators need further study; and, Group 3) use impairment indicators are rated as not impaired. A description of the rationale and supporting data needed to address the individual criteria for each use impairment indicator is included.

Table 7 has been developed as a summary of the listing of the restoration and protection criteria for use each use impairment and the status of each criteria. Table 7 precedes this section. The further definition of the criteria, their updated status, and reporting their supporting data needs are all subject to progress updates and modifications based on recommendations by the Remedial Advisory Committee as coordinated by NYSDEC.

The restoration and protection criteria (delisting criteria) have been developed by listing specific standards and guidelines needed to declare a use impairment indicator as not impaired. As such, certain aspects of these criteria are dynamic and are subject to revision as progress is made in further defining the restoration targets for Great Lakes Areas of Concern. The three groups of use impairment indicators follow:

1. **Use Impairments rated as IMPAIRED:** These use impairment indicators have a status of impaired. Upon achieving all defined restoration and protection criteria, the use impairment indicator will be considered no longer impaired with its beneficial use protected. [Note: Each use impairment indicator that follows is underlined. Each restoration and protection criteria that follows starts with *]

Fish and Wildlife Consumption Restrictions -

* Restrictions on fish and wildlife consumption in the Area of Concern due to watershed or in-place contaminants are absent. Contaminant levels created by anthropogenic chemicals do not exceed current standards, objectives or guidelines in all non-migratory fish and wildlife. No public health advisories are in effect for human consumption.

* U.S. Food and Drug Administration Action Level of 2 mg/kg PCBs in the edible portion of the fish; and, 0.05 mg/kg in fish tissue accomplished to protect human health in New York State. (Determine chemicals of concern and allowable levels for all consumed species. FDA levels and AOC levels may differ; need to verify standards and specify acceptable levels)

* Any remaining restrictions on fish and wildlife consumption are due to upstream sources that are addressed by other management plans such as Lakewide Management Plans (LaMPs).

* Cleanup standards have been accomplished in remedial measures to the maximum extent practicable.

Rationale: Delisting criteria are satisfied when the absence of consumption advisories due to sources from the AOC and its watershed are in accordance with IJC guidelines and address jurisdictional, state, and federal standards.

Supporting Data: Document fish and wildlife study reports that indicate satisfactory consumption result levels. Verify remediation results assure protection.

Loss of Fish and Wildlife Habitat -

* Amounts and quality of physical, chemical, and biological habitat required to meet fish and wildlife management goals have been achieved and protected.

* Amount and type of wetlands and riparian vegetation adequate with beneficial uses protected.

* Local plans or other management plans in place to restore and protect habitat.

* Federal Energy Regulatory Commission (FERC) relicensing process requirements accomplished to enhance and protect habitat.

Rationale: Delisting criteria are satisfied when fish and wildlife management goals have been achieved and protected. The location of habitat creation will be based on compatibility with other use goals, such that an acceptable balance among habitat, shipping and boating interests is achieved. A post-seaway/power dam construction habitat baseline needs development. Stakeholders, Remedial Advisory Committee members, and biological professionals all have roles in identifying acceptable habitat levels.

Supporting Data: Describe desired habitat and management goals. List specific habitat creation and/or rehabilitation projects and the status of each in the AOC. (For example, additional littoral shore may be provided by the creation of islands.) Describe fish and wildlife management programs. Demonstrate rehabilitation and protection of habitat. Document that current habitat surveys indicate an adequate amount of habitat is present with no additional loss attributable to water or sediment quality. Document FERC relicensing requirements and accomplishments.

Transboundary Impacts -

* River and land-based remediation is accomplished such that the Massena AOC and its watershed do not contribute as a source to the use impairments in the Cornwall portion of this connecting channel AOC. Cleanup levels are achieved.

* Specific ambient water quality standards, air discharge standards, and contaminated sediment criteria have been achieved to define no contributory effect to use impairments in the entire U.S./Canadian AOC.

* Flora and fauna meet established environmental and health criteria to define no contributory effect to use impairments in the entire U.S./Canadian AOC.

* Any remaining impacts to the entire AOC are attributable to upstream effects not associated with the AOC and its watershed and are being addressed by some other management plan such as a Lakewide Management Plan (LaMP). Includes water/air impacts.

***** Downstream contamination concerns are acknowledged and addressed to the maximum extent practicable under the RAP.

Rationale: Delisting criteria are satisfied when all potential transboundary impacts from the Massena AOC and its watershed are determined to have no significant effect on the use impairments in the Cornwall portion of the AOC or downstream.

Supporting Data: Studies providing ambient water quality, air discharge, and sediment data demonstrate no AOC or downstream effects. Flora and fauna surveys also indicate no AOC or downstream effects to the environment or health.

2. Use Impairments rated as NEEDING FURTHER STUDY: These use impairment indicators have a status of likely, unknown impairment, or expanded review and require further investigation or assessment. Upon achieving all defined restoration and protection criteria, the beneficial use will have been enhanced by the RAP process, the RAP goals satisfied, and the use impairment indicator considered no longer impaired with its beneficial use protected. [Note: Each use impairment indicator that follows is underlined. Each restoration and protection criteria that follows starts with *]

<u>Degradation of Fish and Wildlife Populations -</u>

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

***** Fish and wildlife objectives for the AOC are consistent with Great Lakes ecosystem objectives and Great Lakes Fishery Commission fish community goals.

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

***** Quantitative fishery targets achieved indicating a self-sustaining mesotrophic community. Targets include: kg/ha units of biomass of fish in littoral habitats, percent of native species, and species richness per survey transect.

Rationale: Delisting criteria are satisfied for fish when populations are determined to be healthy and self-sustaining in a mesotrophic environment. Effort is needed to demonstrate that environmental threats to all species are addressed by fish and wildlife management programs consistent with the GLWQA, Great Lakes Fishery Commission goals, and Great Lakes ecosystem objectives. The construction of the seaway and power dam changed the ecology significantly such that a post 1959 fish and wildlife baseline needs to be developed.

Supporting Data: Fish and wildlife 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 Bentivores and piscivores. Bird preservation guidelines, nature observation, aesthetics, and resident and transitory species guidelines are achieved.

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.
Rationale: 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: Survey results confirm the absence of tumors and demonstrate no significant difference from control sites. Studies document that the AOC and watershed sources are not the cause of any reported incidence. Fishing and nature observation goals met.

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.

Rationale: 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 that deformities or reproductive impairment is probable, an extensive biomonitoring program is not warranted.

Supporting Data: Survey results from 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.

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 controls at unimpacted sites.

* Populations of mesotrophic species are present in the benthos where suitable substrates are located.

* Resident fauna do not have elevated contaminants.

Rationale: 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: Benthic macroinvertebrate community structure surveys, at representative locations in the AOC, are desired with results comparable to unimpacted control site composition. When performed, bioassay results comparable to control site values are desired. Demonstrate that appropriate sediment quality criteria requirements are achieved. Need to determine acceptable statistical deviation of benthic community structure and control site relationship.

Restrictions on Dredging Activities -

***** Concentrations of metals, trace organic compounds and nutrients in the sediment within the AOC (located within the actual or potential dredging areas and current shipping routes) 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.

Rationale: 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. Where restrictions exist, dredging and disposal activities are approved, do not contribute to other use impairments, and provide use protection. Restricted dredging areas are due to inplace conditions and are not the result of currently active AOC or other watershed sources.

Supporting Data: Sediment core results are in compliance with IJC and state sediment quality standards, criteria and guidelines. Where data is available, provide graphic displays of trends. Restricted dredging and disposal activities must be monitored to assure beneficial use protection. Assure against sediment toxicity.

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.

Rationale: Delisting criteria are satisfied when a healthy fish community can be demonstrated. This incorporates the ecosystem approach. 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 support observations of the presence of healthy fish communities. Plankton community structure favorable when compared to unimpacted sites in population, composition, and statistical variability.

3. Use Impairments rated as NOT IMPAIRED: These use impairment indicators have a status of not impaired. Upon confirming that all defined restoration and protection criteria have been achieved, the use impairment indicator will be verified as not impaired with beneficial use protected. [Note: Each use impairment indicator that follows is underlined. Each restoration and protection criteria that follows starts with *]

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 apply to stormwater events in non-bathing beach areas located downstream below combined sewer overflows. Monitoring may indicate some standards and guideline exceedences; however, these non-bathing partial body contact areas must present no threat to downstream designated bathing areas.

Rationale: 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: Coliform data, bathing beach reports, and AOC open water quality surveys indicate the beneficial use of bathing in beach areas and partial body contact in non-bathing areas is in compliance with regulations and protected against health threats.

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.

Rationale: 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.

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.

Rationale: 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 in the AOC include: phosphorus concentration < 20 ug/l, Secchi disc transparency > 1.2 meters, dissolved oxygen > 6 mg/l, unionized NH3 < 0.02 mg/l.

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).

Rationale: 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 transboundary impacts.

Supporting Data: Ambient water quality and treated drinking water quality survey data confirm compliance with the New York State standards and guidelines. Document that there is no significant health impact from transboundary effects.

Degradation of Aesthetics -

***** Area of Concern 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 or 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).

Rationale: 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.

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 transboundary 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, noncontact food processing, industrial application).

Supporting Data: No reports of increased costs to agriculture or industrial business due to spills or inplace contamination pairing water use.

Appendix F
Indicator Strategy Management Forms

Use Impairment Restoration and Protection Strategy Management Forms

With the actions that have been taken or are in progress or planned, we have developed an integrated strategy for managing each use impairment indicator to assure the restoration and protection of beneficial uses as 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 is defined as well as a projected completion date and an identification of a responsible party (as much as possible). This information for each use impairment indicator is then consolidated on a single page form entitled the "Use Impairment Restoration and Protection Strategy" management form. These strategy management forms are maintained separately and are updated periodically to document the status of remedial activity progress and any strategy modifications.

Each Use Impairment Restoration and Protection Strategy management form therefore targets a specific use impairment and provides impairment descriptive data, a remedial strategy plan with status, and narrative comments. Summary descriptions of the remedial strategies for the eleven use impairments identified as impaired or as requiring further assessment for the St. Lawrence River at Massena Area of Concern are Section III.C of the 2006 Update. Each use impairment strategy management form describes its use impairment indicator status as either impaired, likely impaired, unknown impairment, or reopened for further assessment. The eleven use impairments and their status are:

1. Fish and wildlife consumption restrictions	-impaired
2. Loss of fish and wildlife habitat	-impaired
3. Transboundary impacts	-impaired
4. Degradation of fish and wildlife populations	-likely
5. Fish tumors or other deformities	-likely
6. Bird and animal deformities/reproductive prob.	-likely
7. Degradation of benthos	-likely
8. Dredging restrictions (not impaired)	-review activity
9. Beach closings (not impaired)	-assess downstream
10. Degradation of plankton populations	-unknown
11. Drinking Water Taste and Odor (not impaired)	-reassess as nuisance

["Delisting" Criteria are further developed in Appendices D and E which contains additional details for these criteria for each of the fifteen use impairment indicators.]

APPENDIX F

Strategy Management Forms

Presented below is the shell of the Use Impairment Restoration and Protection Strategy management form. This blank form is provided as a worksheet to update the completed strategy management forms that follow:

USE IMPAIRMENT RESTORATION and PROTECTION STRATEGY

REMEDIAL ACTION PLAN: FORM#:

USE IMPAIRMENT INDICATOR:
IJC#: AOC LOCATION:

IMPAIRMENT RATING & CAUSES:

POLLUTION SOURCES:

TARGET DATE:	RESP. PARTY	REMEDIAL STRATEGY / ACTION ITEM:	STATUS:
1.			
2.			
3.			
4.			
5.			
6.			

COMMENTS:

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: ST. LAWRENCE AT MASSENA, NY FORM#: **1**

USE IMPAIRMENT INDICATOR: **Fish & Wildlife Consumption Restrictions**
IJC#: 1 AOC LOCATION: St. Lawrence, Grasse & Raquette Rivers

IMPAIRMENT RATING & CAUSES: IMPAIRED - PCBs

POLLUTION SOURCES: AOC industrial discharges, inactive hazardous waste sites, Lake Ontario, contaminated sediments

	TARGET DATE:	RESP. PARTY	REMEDIAL STRATEGY / ACTION ITEM:	STATUS:
1.	Ongoing	NYSDEC	Renew major industrial SPDES permits	I
2.	06/00	GLRC	Evaluate Aquaculture Contam. Study (Grant)	U
3.	10/00	Indust.	Complete haz. waste rem. & implement BMPs	I
4.		Indust.	Verify site cleanup standards achieved	I
5.		Indust.	Report on success of remediation in AOC	N
6.	Ongoing	NYSDEC	Document F & W study contam. levels	N
7.		NYSDEC	Determine any needed management plan	N
8.		NYSDOH	Determine Advisory non-AOC specific	N
9.		DEC/DOH	Agree on strategy	N
10.		RAC/DEC	Reassess use impairment status	N

COMMENTS: Four advisories affect the AOC where levels in fish exceed current standards. Land based remediation almost complete; Grasse River remains to be done. Added Fish management plans to enhance community may be developed. Investigations and long term monitoring needed to document improvements and endpoint of advisory not specific to AOC but part of larger St. Lawrence River. DFWMR determined in 1994 that Mirex is no longer considered a significant impairment cause. Hg and Dioxin have not contributed to health advisories on fish and are also deleted.

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

USE IMPAIRMENT RESTORATION and PROTECTION STRATEGY

REMEDIAL ACTION PLAN: ST. LAWRENCE RIVER AT MASSENA FORM#: **2**

USE IMPAIRMENT INDICATOR: **Loss of Fish and Wildlife Habitat**

IJC#: 14 AOC LOCATION: Within AOC

IMPAIRMENT RATING & CAUSES: IMPAIRED - contaminated sediments and physical disturbances from construction of dams and seaway.

POLLUTION SOURCES: Elevated levels of contaminants including PCBs, metals and PAHs most likely impact benthos; dredging and potentially natural erosion disturbances are sources.

	TARGET DATE:	RESP. PARTY	REMEDIAL STRATEGY / ACTION ITEM:	STATUS:
1.		NYSDEC	Establish habitat baseline (post 1959) *	N
2.	10/00	Indust.	Complete haz. waste rem. & implement BMPs	I
3.		NYPA	Implement FERC relicensing requirements	R
4.		NYSDEC	Assess quantity & quality of habitat areas	N
5.		NYSDEC	Verify adequate habitat (amt./type/quality)	N
6.		NYSDEC	Verify mgt. plans inplace to protect habitat	N
7.		RAC/DEC	Reassess use impairment status	N

COMMENTS: Localized habitat impairment within the AOC has been identified as part of fish and wildlife management programs. Contamination of water and sediment of wetlands is directly related to loss of habitat. * The construction of the power dam and the St. Lawrence Seaway dramatically altered habitat after its 1959 completion. Changed habitat areas within and outside the Area of Concern need to be assessed and a habitat baseline established. The creation of new habitat areas will also serve to restore this impairment. Overall habitat assessment should include the development of non-indigenous and non-AOC habitat use plans as well as an assessment of the cause impacts from zebra mussels and purple loosestrife.

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: ST. LAWRENCE RIVER AT MASSENA FORM#: **3**

USE IMPAIRMENT INDICATOR: **Transboundary Impacts**

IJC#: 15 AOC LOCATION: Binational issues; downstream St. Lawrence River impacts.

IMPAIRMENT RATING & CAUSES: IMPAIRED - Probable causes are downstream transport of PCBs, phosphorus, nitrogen, metals and sediments. Cross-river transport not likely.

POLLUTION SOURCES: Inactive hazardous waste sites, point source discharges, CSOs, Lake Ontario and potentially atmospheric deposition and nonpoint sources. No direct evidence documented.

TARGET DATE:	RESP. PARTY	REMEDIAL STRATEGY / ACTION ITEM:	STATUS:
1. 10/00	Indust.	Complete haz. waste rem. & implement BMPs	I
2.	Indust.	Verify cleanup levels achieved	N
3. Ongoing	EPA/DEC	Verify ambient water quality stds. achieved	N
4. Ongoing	EPA/DEC	Verify contam. river sediment criteria met	N
5.	EPA/DEC	Establish no transboundary effect *	N
6.	EPA/DEC	Verify flora/fauna health criteria met	N
7.	EPA/DEC	Verify LaMP addresses Lake Ontario effects	N
8.	NYSDEC	Dev./Impl. any add'l needed BMP's	N
9.	RAC/DEC	Reassess use impairment status	N

COMMENTS: Indirect evidence exists for downstream St. Lawrence River impacts from the Massena AOC, Cornwall AOC and upstream (Lake Ontario) sources. Cross-river impacts are not likely. * Need to establish no contributory effect from the Massena portion of the AOC and its watershed to the Cornwall portion of the AOC and downstream and document that the LaMP addresses any upstream (Lake Ontario contributions.

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: ST. LAWRENCE AT MASSENA FORM#: **4**

USE IMPAIRMENT INDICATOR: **Degradation of Fish and Wildlife Populations**

IJC#: 3 AOC LOCATION: St. Lawrence, Grasse & Raquette Rivers

IMPAIRMENT RATING & CAUSES: LIKELY - PCBs, Mercury, DDE, physical disturbances and fish overharvesting

POLLUTION SOURCES: AOC industrial discharges, Lake Ontario, Cornwall AOC, international seaway, inactive haz. waste sites and contaminated sediments

TARGET DATE:	RESP. PARTY	REMEDIAL STRATEGY / ACTION ITEM:	STATUS:
1.	NYSDEC	Develop baseline community data (post 1959)	N
2.	NYSDEC	Assess F & W numbers and balance goals	N
3.	Indust.	Complete haz. waste rem. & implement BMPs	I
4.	NYSDEC	Verify acceptable F & W population levels	N
5.	NYSDEC	Confirm no significant toxicity	N
6.	NYSDEC	Document F & W targets/mgt. goals achieved	N
7.	RAC/DEC	Reassess use impairment status	N

COMMENTS: This use impairment was identified by fish and wildlife management programs. YOY trend analyses and management goals are needed to provide for the assessment and protection of piscivorous wildlife. In the vicinity of the AOC, haz. waste site remediation and habitat mgt. plans (for fish/aquatic/wildlife) will be key elements. The RAP needs to document that environmental threats are addressed by the remediation. Fish and Wildlife community survey and structure data (number & balance) are needed to document that goals are achieved, that there is not toxicity from sediments present, and that a healthy reproducing population of bentivores and poscivores exists.

STATUS KEY:

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

USE IMPAIRMENT RESTORATION and PROTECTION STRATEGY

REMEDIAL ACTION PLAN: **ST. LAWRENCE AT MASSENA** FORM#: 5

USE IMPAIRMENT INDICATOR: Fish Tumors or Other Deformities

IJC#: 4 AOC LOCATION: Within AOC

IMPAIRMENT RATING & CAUSES: LIKELY - PAHs

POLLUTION SOURCES: Potentially contaminated sediments

TARGET DATE:	RESP. PARTY	REMEDIAL STRATEGY / ACTION ITEM:	STATUS:
1.	NYSDEC	Dev./Imp. fish pathology study(tumors/def.)	N
2.	Indust.	Complete haz. waste rem. & implement BMPs	I
3.	NYSDEC	Conduct fish survey (liver tumors)	N
4.	NYSDEC	Verify compliance (fish tissue stds./objs.)	N
5.	NYSDEC	Verify no observed reproductive deformities*	N
6.	RAC/DEC	Reassess use impairment status	N
7.			

COMMENTS: Limited data and reports have indicated tumor rates exceed those in unimpacted areas. A current fish pathology study and fish survey are needed to verify compliance with fish tissue standards and objectives and to verify no observed reproductive deformities. Studies should be conducted before and after sediment removal. The most significant concentration of PAHs is located in the river off of the Reynolds site. The use impairment is resolved when the incidence rates of fish tumors and other deformities do not exceed unimpacted areas; survey data confirm the absence of liver tumors in bullheads or suckers; fish tissue stds. are achieved; and, there are no deformities observed in resident fish.

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C = Completed	I = Implementation progressing
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USE IMPAIRMENT RESTORATION and PROTECTION STRATEGY

REMEDIAL ACTION PLAN: ST. LAWRENCE AT MASSENA FORM#: **6**

USE IMPAIRMENT INDICATOR: **Bird or Animal Deformities or Reproductive Problems**

IJC#: 5 AOC LOCATION: Within AOC

IMPAIRMENT RATING & CAUSES: LIKELY - PCBs

POLLUTION SOURCES: Potentially contaminated sediments

TARGET DATE:	RESP. PARTY	REMEDIAL STRATEGY / ACTION ITEM:	STATUS:
1.	Indust.	Complete haz. waste rem. & implement BMPs	I
2.	Indust.	Verify cleanup levels attained	I
3. Ongoing	NYSDEC	Attain State, Fed, IJC tissue stds./objs.	I
4. Ongoing	NYSDEC	Confirm incident rates < inland controls	I
5. Ongoing	NYSDEC	Confirm wetlands support healthy community	I
6. Ongoing	NYSDEC	Biomonitoring results better than controls*	N
7.	RAC/DEC	Reassess use impairment status	N
8.			

COMMENTS: Indirect evidence relative to fish tissue, frog coordination and reduced mink animal populations exists. No data on unusual incidents of cross-bill syndrome, egg-shell thinning or eagle populations exists. The delisting criteria are satisfied when studies demonstrate compliance with tissue standards and objectives and healthy communities of significant species are observed. Incidence rates should not exceed control sites. An extensive * biomonitoring program is not warranted unless sufficient evidence suggests that deformities or reproductive impairment is probable.

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USE IMPAIRMENT RESTORATION and PROTECTION STRATEGY

REMEDIAL ACTION PLAN: ST. LAWRENCE AT MASSENA FORM#: **7**

USE IMPAIRMENT INDICATOR: **Degradation of Benthos**
IJC#: 6 AOC LOCATION: St. Lawrence, Grasse & Raquette Rivers

IMPAIRMENT RATING & CAUSES: LIKELY - PCBs, lead, copper, PAHs and physical disturbances

POLLUTION SOURCES: Potentially industrial discharges, contaminated sediments, inactive hazardous waste sites, nonpoint sources and physical disturbances.

TARGET DATE:	RESP. PARTY	REMEDIAL STRATEGY / ACTION ITEM:	STATUS:
1._____	____Indust.	__Complete haz. waste rem. & implement BMPs	___I_
2._____	____Indust.	__Verify cleanup levels attained	_____I_
3._____	NYSDEC	___Conduct benthic community structure studies_	I_
4._____	NYSDEC	___Confirm sediment quality criteria achieved__	I_
5._____	NYSDEC	___Verify populations of mesotrophic species	____I_
6._____	NYSDEC	___Bioassay results better than controls	_____D_
7._____	RAC/DEC	__Reassess use impairment status	_____N_
8._____			

COMMENTS: PAHs were added as a cause. A 1979 study indicated somewhat declining benthic populations. Data is needed to document that the macroinvertebrate community structure does not significantly diverge from unimpaired area. Also, data is needed to document no significant toxicity (bioavailability) of sediment-associated contaminates. The 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. The emphasis is on demonstrating the absence of toxic effects of sediment associated contaminants and on demonstrating bioassay results comparable to controls.

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USE IMPAIRMENT RESTORATION and PROTECTION STRATEGY

REMEDIAL ACTION PLAN: ST. LAWRENCE AT MASSENA FORM#: **8**
USE IMPAIRMENT INDICATOR: **Restrictions on Dredging Activities**
IJC#: 7 AOC LOCATION: AOC beyond navigation channel

IMPAIRMENT RATING(S) & CAUSES: UNIMPAIRED - (seaway channel navigational maintenance dredging only)
Concern for expanded dredging proposals outside the seaway channel for: PCBs, Arsenic, Chromium, Copper, Nickel & Zinc.

POLLUTION SOURCES: Contaminated sediments from hazardous waste sites and industrial discharges.

TARGET DATE:	RESP. PARTY	REMEDIAL STRATEGY / ACTION ITEM:	STATUS:
1.	Indust.	Complete haz. waste rem. & implement BMPs	I
2.	Indust.	Verify cleanup levels attained	I
3.	EPA/DEC	Define contaminated sediment criteria	I
4.	NYSDEC	Define span of AOC remedial area	I
5.	NYSDEC	Conduct sediment analyses and evaluate	I
6.	NYSDEC	Confirm criteria/ sediment goals met	N
7.	NYSDEC	Assure dredging restrict. safe/approved*	N
8.	RAC/DEC	Verify no impairment status	N

COMMENTS: Seaway dredging is not impaired. Need to review expanded dredge area for restrictions on dredging and/or disposal activities. Because disposal of dredged material in the St. Lawrence River is prohibited, proper disposal plans for dredge spoils must be approved. * Delisting criteria are satisfied when the sediment criteria are achieved and any restricted dredging activities are approved & registered. Studies should confirm that the cause of any restrictions is not the result of currently active AOC or watershed sources. Spoil disposal must not contribute to use impairments and beneficial uses must be protected.

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USE IMPAIRMENT RESTORATION and PROTECTION STRATEGY

REMEDIAL ACTION PLAN: ST. LAWRENCE AT MASSENA FORM#: **9**

USE IMPAIRMENT INDICATOR: **Beach Closings**

IJC#: 10 AOC LOCATION: Downstream of Massena area CSOs, downstream in the St. Lawrence River, and in the Canadian AOC (beach closure impairment).

IMPAIRMENT RATING(S) & CAUSES: UNIMPAIRED - (defined by Stage 1 and Stage 2 documents for the New York State portion of the AOC)

FURTHER ASSESSMENT (desired) - (needed for partial body contact downstream of CSOs, for bacteria in Canadian AOC, and for downstream St. Lawrence River bathing and partial-body contact area impacts)

POLLUTION SOURCES: none documented

TARGET DATE:	RESP. PARTY	REMEDIAL STRATEGY / ACTION ITEM:	STATUS:
1.	DEC/RAC	Assess Canadian beach closing indicator	P
2.	NYSDEC	Obtain water quality data (partial contact)	C
3.	NYSDEC	Evaluate WQ data against stds./guidelines	C
4.	NYSDEC	Verify coliform standards achieved	C
5.	NYSDEC	Assess CSO impact (on part.body contact)	N
7.	RAC/DEC	Verify No impairment status	N

COMMENTS: Further documentation of water quality data is needed to evaluate any exceedance of standards or guidelines in the St. Lawrence River near: 1) Canadian beaches; 2) Mohawk Nation at Akwesasne non-bathing beach areas; 3) partial-body contact areas downstream of CSOs. Delisting criteria are satisfied when bathing beach and partial body contact water standards and guidelines are achieved. The concentrations of fecal coliform and E. coli are to be consistently below 100 colonies per 100 ml samples.

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USE IMPAIRMENT RESTORATION and PROTECTION STRATEGY

REMEDIAL ACTION PLAN: ST. LAWRENCE AT MASSENA FORM#: **10**

USE IMPAIRMENT INDICATOR: **Degradation of Plankton Populations**

IJC#: 13 AOC LOCATION: Investigation needed

IMPAIRMENT RATING & CAUSES: UNKNOWN

POLLUTION SOURCES: Past hazardous waste disposal areas; physical habitat changes.

TARGET DATE:	RESP. PARTY	REMEDIAL STRATEGY / ACTION ITEM:	STATUS:
1.	Indust.	Complete haz. waste rem. & implement BMPs	I
2.	NYSDEC	Obtain plankton community structure data	P
3.	NYSDEC	Confirm no sign. divergence from controls	P
4.	NYSDEC	Bioassays confirm no toxicity (No #2 *)	D
5.	RAC/DEC	Reassess use impairment status	N
6.			

COMMENTS: Phytoplankton and Zooplankton population data are needed to evaluate if plankton community structure significantly diverges from unimpacted control sites of comparable physical and chemical characteristics. * In the absence of community structure data, an evaluation requires plankton bioassays to confirm no toxicity impact in ambient waters. A helpful indicator is to observe a healthy fish community in the AOC. Delisting criteria are satisfied when a healthy fish community can be demonstrated. Bioassay data should confirm no significant toxicity in ambient waters. A favorable comparison to unimpacted areas should be observed for the plankton community structure.

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USE IMPAIRMENT RESTORATION and PROTECTION STRATEGY

REMEDIAL ACTION PLAN: ST. LAWRENCE AT MASSENA FORM#: **11**

USE IMPAIRMENT INDICATOR: **Taste & Odor Problems - Drinking Water**
IJC#: 9 AOC LOCATION: From Massena Water Intake

IMPAIRMENT RATING & CAUSES: UNIMPAIRED- Seasonal concern expressed (1995-2000- - studies show Geosmin, MIB are causes

POLLUTION SOURCES: bluegreen algae, zebra mussels, and bacteria

	TARGET DATE:	RESP. PARTY	REMEDIAL STRATEGY / ACTION ITEM:	STATUS:
1.		Massena	Develop Corrective Strategy	I
2.		Massena	Implement Corrective Action	D
3.		NYSDEC	Inform RAC of Progress	C
4.		NYSDEC	Verify resolution(i.e.Seasonal Nuisance?)	
5.		RAC/DEC	Verify not impaired status	
6.				
7.				

COMMENTS: This taste and odor problem has been progressing worse over ten years. It is known that the chemical compounds geosmin and MIB are the cause. Contributiong sources include bluegreen algae, zebra mussels, and a bacteria *actinomycetes.* Three treatments are thought to work best to combat this problem: 1)add activiated carbon to the existing filtration process, 2) Construct separate carbon filtration, and 3) ozonation treatment.
The water is currently pre-chlorinated in a mile long intake pipe which complicates carbon filtration effectiveness. The Village of Massena is working with Stearns & Wheeler Consultants to resolve this taste and odor problem. 2005-06 reported as seasonal nuisance that is not currently a public complaint issue; 2006 = no action planned.

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R = Required by enforcement/permit/agreement

APPENDIX G

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APPENDIX H

Natural Resource Damage (NRD)Claim

State and Federal law provides that Trustees may recover damages for the injury to, loss of, and/or destruction of natural resources caused by a release of hazardous substances. Damaged resources can include land, fish, wildlife, biota, air, water, groundwater, drinking water supplies, and other such resources. Assessment may include the resource injury and the residual injury following remediation.

The "St. Lawrence Environment Trustee Council" includes trustee parties from New York State (NYSDEC and the Department of Law), the St. Regis Mohawk Tribe, the United States Department of Commerce (National Oceanic and Atmospheric Administration), and the United States Department of the Interior (USFWS). Trustees for natural resources are required to act on behalf of the public to assess damages (injury) to natural resources, recover the damages from responsible parties, and implement a plan to restore, rehabilitate or acquire the equivalent of the injured natural resources.

As Lead Administrative Trustee (LAT), the St. Regis Mohawk Tribe undertakes a variety of tasks to recommend strategic next step activities. Liaison activities include enhancing communication among programs involving the claim assessment, coordinating agency activities, securing participation from specialists, and facilitating the pursuit of the case. The natural resources affected include the St. Lawrence River, the Grasse River, the Raquette River, and St. Regis Mohawk Tribal Lands.

The Responsible Parties, ALCOA (main plant west), Reynolds Metals (now ALCOA east), and General Motors, previously provided the Trustee Council with funding for the development of an NRD Assessment Plan. The Plan is to adhere to 43 CFR Part 11 and address identified contaminants including PCBs, PCDDs, PCDFs, PAHs, Flourides, etc.

A Cooperative Assessment Process and Team approach are being utilized. Progress has been in two segments: the original funding agreement proceeded from 1990 to 1999 and since 2000 is being continued under a Letter Agreement to expedite the assessment process. The draft assessment is not yet developed and will be subject to Environmental Trustee Council review. The focus is on restoration and targets selected injuries to birds, fish, sediments, recreation, and cultural aspects. The process involves collaboration and integration of different world views and different trustee impacts. The following components are under development: Restoration Planning and Scaling; Cultural Impact Assessment; and, Ecological Injury Assessment. The cooperative process and teams are working on resolving and agreeing on issues, concerns, and needs.

APPENDIX I

Federal Energy Regulatory Commission (FERC) License

A new 50 year license was issued in October 2003 to the New York Power Authority (NYPA) for operation and maintenance of the St. Lawrence –FDR Power Project. Relicensing negotiations use a Cooperative Consultation Process (CCP) Team approach to involve the public, identify and scope environmental impact issues, respond to study requests, and draft the license application. This process was more involved than the normal six step FERC process and commenced in 1996. The end result was a Comprehensive Relicensing Settlement Accord with five agreements to satisfy the majority of concerns.

The five agreements are: 1) Fish Enhancement, Mitigation and Research Fund to provide 24 million to the USFWS for project impacts on aquatic resources such as the American Eel; 2) Ecological Mitigation and Enhancement Measures Settlement including ten habitat improvement projects, rehab of the Wilson Hill Wildlife Management Area, and funds for habitat, research, and education; 3) Local Government Task Force Agreement addressing the return of project lands, shoreline stabilization, navigation hazards, and local recreation facilities; 4) funding for the St. Lawrence Aquarium and Ecological Center based on matching grant funds which were not secured; and, 5) Funding for the Robert Moses and Coles Creek State Park (Office of Parks, Recreation and Historic Preservation Agreement) and annual payment to local governments (Community Enhancement Fund).

Under agreement 2) above, $23 million is provided for ten Habitat Improvement Projects:

1. Coles Creek Control and Level Pond
2. Nichols Island Control and Level Pond
3. Little Sucker Brook Control and Level Pond
4. Blandings Turtle Habitat Improvements
5. Lake Sturgeon Spawning Bed in Brandy Brook
6. Walleye Spawning Bed in Brandy Brook
7. Grassland Bird Nesting Habitat Management
8. Osprey Nesting Program
9. Common Tern Nesting Program
10. Common Loon Nesting Rafts

In addition, $3.9 million is provided for a future Habitat Improvement Project (HIP) Fund; $10 million is provided for rehabilitation of the Wilson Hill Wildlife Management Area, and $1 million to a St. Lawrence River Research and Education Fund. Noteworthy is that approximately 25 percent of the original project lands are to be returned to the local areas which equates to 3,360 acres, which is significant. Also, $12 million is earmarked for State Parks and $100 million for Community Enhancement projects. The park and community funds will assist local area sustainability.

APPENDIX J

Great Rivers Center (GRC) of Clarkson University

Mission statement:

The St. Lawrence River is the conduit through which the Laurentian Great Lakes flow to the ocean. The explicit mission of the Great Rivers Center (GRC) is to ensure that the quality of this freshwater resource is the highest possible. Water quality is defined by chemical purity, ecosystem health, and water ethics. To meet this task the GRC will be a focal point for creative multidisciplinary research, scholarly activity and community outreach.

The Great Rivers Center is an integral component of Clarkson University's Center for the Environment. As part of Clarkson's commitment to excellence in research in the area of energy and the environment, the Great Rivers Center has a focus on environmental quality in the St. Lawrence River and its headwaters and understanding human interactions with natural systems in this environment.

Sophisticated sampling and analytical equipment and a research vessel have been purchased using funds received from the New York Power Authority. Funding to continue research on the St. Lawrence River is actively sought. Collaborations with regional universities (SUNY-Potsdam, St. Lawrence University, SUNY-Canton, SUNY-ESF) and institutes (St. Lawrence River Institute of Environmental Sciences, Cornwall, Ontario; SLRIES) are sought to broaden the activities that be directed to studying this complex system.

Current projects:

Projects conducted so far this field season all involved assessment of phytoplankton community composition and health. Project areas (and collaborators) involve: the Cornwall RAP sites (SLRIES); a ground-truthing exercise in Lake St. Lawrence with an aircraft-borne hyper-spectral instrument (Rochester Institute of Technology); St. Lawrence River/coastal Lake Ontario study (from Massena to Galloo Islands (in conjunction with a Type E botulism outbreak survey funded by the Clarkson Center for the Environment); near shore/channel gradient analysis from Brandy Brook (Waddington) to the Canadian shoreline; three lake wide surveys of phytoplankton community composition and health in Lake Erie (International Field year Lake Erie; NOAA-Great Lakes Environmental Research Laboratory) in 2005). Current water quality issues in the St. Lawrence River involving microbes are: Type E botulism outbreaks, taste and odor issues, harmful algal/cyanobacterial blooms (*Spirogyra*, *Microcystis*), and eutrophication.

Description of field equipment and scientific instrumentation:

- R/V *Lavinia* (25 foot, 150 hp × 2, Boston Whaler – Challenger model, with Raytheon DGPS, 25 mile radius radar, marine radio, davit and winch, 141 gallon gas tank, reinforced hull, dive door)
- Heavy duty ¾ ton tow vehicle and 30 foot boat trailer
- Field fluorometer (Turner Designs AU-10 CE) (with flow through cell and capability to measure chlorophyll-a, extracted phycocyanin, CDOM, and ammonium)
- Fluoroprobe (bbe Moldaenke) pigment specific submersible fluorometer (to quantify in situ the mass of phytoplankton pigments: Chlorophyta, Cyanophyta, Heterokontophyta & Dinophyta, Cryptophyta; in addition to depth and temperature)
- Fast Repetition Rate Fluorometer (Chelsea Instruments, Mk I) capable of measuring photosynthetic efficiency and primary productivity *in situ*
- Electronic particle analyzer (Coulter Multi-Sizer 3, with IBM ThinkPad computer)
- Dissolved organic carbon and dissolved organic nitrogen analyzer (Shimadzu, with IBM ThinkPad computer)
- Temperature (2-40˚C) and light-controlled incubators (two; Percival)
- Range finder (Bushnell; IR)
- Geographic Information System software (ArcGIS, Arc Hydro, Spatial Analyst, 3D Analyst)
- Field computer (CF-29 Panasonic; fully ruggedized, waterproof/shockproof, with GPS and wireless communication)
- Navigational software (Offshore Navigator, ver 5.07; electronic charts of St. Lawrence River and Lake Ontario)
- Gasoline-powered 900W electric generator (Yamaha)
- Storage facility (70' × 30' × 15').

Appendix K

Marsh Monitoring Program (Bird Studies Canada)

The Marsh Monitoring Program (MMP) was established to provide baseline surveys of marsh bird and amphibian populations and their habitats in marshes within Areas of Concern (AOCs), in the Great Lakes basin, in sites where rehabilitation and restoration efforts have taken place or are planned in AOCs, and in many other Great Lakes basin wetlands. Marsh bird surveys were first implemented in the Canadian and bi-national AOCs in 1994. In 1995, the program expanded throughout the basin to include surveys of calling amphibians. To date, over 650 MMP volunteers have surveyed marsh bird and/or amphibian populations and their habitats. Information about abundance and diversity of these species provides useful, and easily obtainable indicators of habitat quality, structure and areal extent. Highlights include:

- Since the programs initiation, five amphibian, five marsh bird and two routes surveyed for both amphibians and marsh birds have been monitored in the St. Lawrence River AOC. During the period from 1995 through 2002, the number of routes surveyed and volunteers used were relatively stable.
- Overall, ten amphibian species were recorded, including all five amphibian indicator species (Bullfrog, Chorus Frog, Mink Frog, Northern Leopard Frog, Spring Peeper). The most common species occurring at St. Lawrence River marshes were Bullfrog, Green Frog, Northern Leopard Frog and Spring Peeper, occurring at seven of eight routes surveyed.
- The number of marsh nesters at St. Lawrence River AOC routes ranged from five to 21. Overall, 29 species of marsh nesters were recorded in the St. Lawrence River AOC – a very high level of diversity. Further, all 12 marsh bird indicator species were recorded. Red-winged Blackbird was the most abundant nesting species, followed by Swamp Sparrow, Yellow Warbler and Marsh Wren. Common Tern was the most abundant water forager species and Tree Swallow was the most abundant aerial forager.
- Five amphibian indicator species were present in the AOC: Bullfrog and Mink Frog occurrence scored above the average, Northern Leopard Frog and Spring Peeper scored within the average and Chorus Frog scored below the average. The abundance of five marsh bird indicator species identified in the AOC (Common Snipe, Least Bittern, Marsh Wren, Common Moorhen/American Coot, Virginia Rail), scored within the average. The abundance of seven other marsh bird indicator species (American Bittern, American Coot, Black Tern, Blue-winged Teal, Common Moorhen, Pied-billed Grebe, Sora), scored below the average (for species in Great Lakes basin non-AOC routes).
- St. Lawrence River marsh bird indicator species diversity scored within the average and marsh nesting bird species diversity scored below the average. Total amphibian species diversity and amphibian indicator species diversity scored below the average of basin non-AOC routes.

The AOC report identified some stressed condition or at least a threatened ability of the marsh to support some marsh dependent species. The report refers the reader to the main Summary Report for an understanding of the context and analyses description of the Marsh Monitoring Program results 1995-2002.

The MMP Areas of Concern Summary Report 1995-2002 lists a provisional status for 40 assessed AOCs based on amphibian and marsh bird species richness. In this report, the St. Lawrence River Area of Concern is assigned a status of “Not Impaired”.

Appendix L

St. Lawrence River Fish and Wildlife Studies

A number of studies conducted in the St. Lawrence River and Lake Ontario waters provide useful information for indicator assessment in the Area of Concern. Summaries of the following studies have been reported to the Remedial Advisory Committee by the author, Rodger Klindt (from NYSDEC in Watertown). These reports are part of the annual 2004 fisheries report:

- Lake St. Lawrence Warm-water Fisheries Assessment, 2004 - A cooperative fisheries assessment program for Lake St. Lawrence was initiated between the New York State Department of Environmental Conservation (NYSDEC) and the Ontario Ministry of Natural Resources (OMNR) in 1986. This program originated as an extension of the Thousand Islands and Middle Corridor assessment programs and is intended to measure long term trends in relative abundance, growth, age structure and condition of the fish community. Since 1996 the Lake St. Lawrence program has been maintained by NYSDEC. Results indicate that Yellow Perch "catch per unit effort (CUE)" has declined. Cormorant predation is noted. Walleye CUE also decreased while the smallmouth bass CUE has increased.

- Lake Sturgeon Restoration and Botulism E, 2004 - A restoration program began in 1993. Over 8,000 fingerling sturgeon were produced and stocked in the waters of New York in 2004. The recent occurrence Botulism E in the lower Great Lakes is noted as a having a potential effect on fish mortality because of the suspected link to dreissenid mussels and round gobies, both of which are consumed by adult sturgeon.

In the 2004 Annual Report, NYSDEC's Bureau of Fisheries Lake Ontario Unit and the St. Lawrence River Unit to the Great Lakes Fishery Commission's Lake Ontario Committee provides details on the two above studies. These and other related study report information are located on the NYSDEC website at: http://www.dec.state.ny.us/website/dfwmr/fish/lou04rpttblcont.html.

In addition, a Comprehensive Wildlife Conservation Strategy is under development. This strategy addresses the St. Lawrence River and its characterization by three distinct segments (the Thousand Islands, the middle corridor, and Lake St. Lawrence). Lake St. Lawrence is a 30-mile long reservoir created by the Moses-Saunders Power Dam and subject to significant water level fluctuations. These water level changes discourage the establishment of wetlands and submergent aquatic vegetation in the nearshore area and result in diminished spawning and nursery habitat for warm-water fish.