**Addendum to Stage 2 Remedial Action Plan**
**St Lawrence River at Massena, Area of Concern**

## I. Purpose:

This document briefly (a) outlines the existing Beneficial Use Impairments (BUIs), the purported causes and potential remedies as described in the Remedial Action Plan's (RAP) Combined Stage 2 Report published August 1991, and (b) tentatively identifies a series of project-specific actions, either regulatory or non-regulatory, needed to accomplish the remedies and to ultimately justify removal of the BUI.

This document will be used to assist government and non-government organizations in focusing their efforts and funding opportunities on the most immediate "action-oriented" projects needed within the AOC, or its contributing watershed. Because this document has not undergone an extensive public consultation process, it should be considered as an interim planning piece of the overall RAP, subject to future changes as needed. In addition, this document will be used to support a more thorough strategic re-evaluation and planning process, currently underway in each AOC, in order to prioritize implementation projects specifically designed to address BUI delisting targets, and to direct public and non-public support as appropriate.

## II. RAP Management, Coordination and Stewardship

Management of the Massena RAP is provided by the New York State Department of Environmental Conservation (NYSDEC) as part of U.S. EPA Grant # GL97245708-0 and funded through the end of 2014. This grant provides for up to 20 % of a person-year for the Citizen Participation Specialist in the Watertown NYSDEC office. The NYSDEC contact person is Stephen Litwhiler at (315) 785-2252.

This grant provides for up to 20 % of a person-year for the Citizen Participation Specialist in the Watertown DEC office to do coordination of the Massena Remedial Advisory Committee; resolution of the BUIs; develop delisting criteria and targets; develop, direct and coordinate implementation of remedial and restoration activities and measures within the AOC; report on remedial progress towards addressing the BUIs; facilitate the assessment of BUIs previously rated as likely/unknown; identify needed information and methods to obtain necessary data; coordinate data synthesis and with new data involve expert participation to reach decisions on revising the status of BUIs towards the overall goal for each BUI to be "not impaired"; take steps to achieve the overall RAP process goal to delist the entire AOC as documented in a Stage 3 document; promote public participation and organizational concurrence as appropriate; and, liaison with Canadian agencies/RAPs/Tribal governments, to coordinate international aspects.

Coordination of the Massena RAP was augmented in September 2011 with several new state employees with expertise in biological and engineering sciences. The St Regis Mohawk Tribe's (SRMT) Environment Division received a grant through the EPA under the GLRI (U.S. EPA Grant # GL-97221310) to provide essential specific BUI coordination. This will accelerate investigation into the several BUIs of fish and wildlife consumption, degradation of fish and wildlife populations, fish tumors,

bird and animal deformities or reproductive problems and degradation of benthos. Specific projects will be outlined under the BUI section of this document.

## III. Current Beneficial Use Impairments, Likely Causes, Planned Remedies, Specific Actions

### A. **BUI – Restrictions on Fish and Wildlife Consumption** - Impaired

There are 4 specific fish consumption advisories currently in the Massena AOC. The larger part of the advisory applies to the entire St. Lawrence River. The other three parts of the advisory are specific to the AOC. A specific wildlife consumption advisory was not identified for the AOC other than what exists statewide for snapping turtle and fish eating ducks. No advisories are currently in place for the St Regis or Raquette River portions of the AOC.

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

1. Known or Suspected Cause – PCB sources were primarily the result of 3 major industrial sites; ALCOA, Reynolds Metals and General Motors who improperly handled and disposed of contaminated materials and the historical lack of environmental control. Presently these PCB sources are being cleaned up by the Responsible Parties (RP).

    a. Work Completed and Under Way
        - After some of the remediation of the St. Lawrence and Grasse Rivers, and the completion of land-based hazardous waste site remediation, long term monitoring at the three major Massena industrial sites was implemented.
        - St. Lawrence River (as a whole) – Within the AOC, significant clean-up of contaminated sediment has taken place by a Responsible Party. Most recent activities were related to the Alcoa east remedial site. In 2009 additional sediment removal and capping of areas where cleanup levels of PCBs and PAHs were not achieved in previous cleanup efforts.
        - Bay at St. Lawrence River / Franklin Co. line – This cove was dewatered and all contaminated sediments were removed in 2004-5. Sampling from long term monitoring indicates no additional sources of contaminants to the cove have been discovered. Although fish sampling conducted by GM in 2008 showed considerable PCB contamination remaining in their flesh.
        - Grasse River (mouth to power canal) – Areas of the highest contamination have been removed. Currently awaiting a decision from EPA on how Alcoa is to address remaining contaminated sediments in the lower 6 miles of the river. Alcoa continues a monitoring program of PCB contamination in fish flesh. Sampling indicates upland sources of PCBs within the AOC have been addressed and are not a continuing source of contamination.
        - Massena Power Canal – As part of Alcoa's remedial cleanup it tests fish annually for contaminants.

- Fish collections are planned for 2012 by NYSDEC in a study named *Xenobiotics in Fish from New York's Great Lakes International Waters.* Edible portions (fillets) of several sportfish of legal size will be tested for PCBs, Mirex, and Mercury. Objective is to produce updated contaminant data for consumption advisory reviews. Fish will be collected from 10 different locations in the AOC which include all 4 waterbodies plus the power canal. Additional details for this project are outlined in BUI Progress table.
- The St Regis Mohawk Tribe is sampling wildlife as part of their GLRI grant. Furbearers, birds, turtles, mussels will be tested for PCBs (some for Mirex, Dioxin, Mercury also) as part of the wildlife consumption portion of this BUI. Completion expected in 2014. Additional details for this project are outlined in table 2.
- Alcoa conducts annual collections in the Grasse River and tests fillets of adult brown bullhead and smallmouth bass for PCBs. Additional details for this project are outlined in table 2.

b. Future Needs
- Post restoration monitoring of fish and wildlife contaminants is needed with some being done by industry right now.
- Grasse River (mouth to power canal) – A decision from EPA on how Alcoa is to address remaining contaminated sediments in the lower 6 miles of the river.

## B. BUI – Loss of Fish and Wildlife Habitat - Impaired

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.

1. Known or Suspected Cause – Physical disturbances caused by the construction of the power dam and shipping seaway.

a. Work completed and under way
- St. Lawrence Power Project (FERC) License Provisions have several habitat improvement projects which provide for shoreline stabilization and enhancement to habitat to benefit populations of fish and wildlife species of concern like American eel, lake sturgeon, osprey, common tern.
- A shoreline stabilization project has been funded on St Regis Mohawk Tribal Lands within the AOC.

b. Future Needs
- There needs to be an expert evaluation on what additional measures are needed to protect shoreline habitats or to support a statement that habitat enhancement and protection measures are sufficient.

- Comparison evaluations of wetland habitats in each of the 4 rivers for plants, fish, birds, reptiles and amphibians to determine level of use. Clarkson University has a project proposed. Additional details for this project are outlined in the BUI Progress table 2.

2. Known or Suspected Cause – Contaminated sediments in wetlands associated with Alcoa east and west are one cause of loss of habitat and the documented lack of benthic invertebrates are viewed as loss of fish and wildlife habitat (from Stage 1 RAP).

a. Work completed or under way
- Most recent sediment cleanup activities were off Alcoa east in 2009 involved additional sediment removal and capping in areas where cleanup levels of PCBs and PAHs were not achieved.
- Remediation of contaminated wetlands on Alcoa East is completed and habitat improvement projects have been accomplished by the responsible party.

b. Future Needs
- Grasse River (mouth to power canal) – Areas of the highest contamination have been removed and currently awaiting a decision from EPA on how Alcoa is to address remaining contaminated sediments in the lower 6 miles of the river.
- A specific study is needed to evaluate the habitat, flora and fauna, and compare to a similar wetland area outside of impacted area. No significant difference to habitat outside the AOC is one BUI removal criterion. Clarkson University has a project proposed which will address these needs including a Marsh Monitoring Program. Additional details for this project are outlined in table 2.
- A formal shoreline habitat evaluation is needed for all the costal habitats of the AOC to determine the extent of impairment and methods to rehabilitate those areas.

**C. BUI – Degradation of Fish and Wildlife Populations - Likely impaired**

Likely causes are the various contaminants which would impact populations, physical disturbances to the habitat and over harvest of fish. Fish and Wildlife population information is needed to address impairment.

1. Known or Suspected Cause – upland and aquatic contaminants

a. Work completed or under way
- Similar to the previous 2 BUIs, continued cleanups of the upland and aquatic contaminants will help eliminate this source of population impairment. These are RP cleanups.
- In 2011, DEC completed a collection of young-of-year fish to sample for PCB’s, DDT, Aldrin, Chlordanes, Dieldrin, Mirex, Photomirex, and Mercury in several locations inside the AOC and upstream sites. A report is not currently available.

- In 2009-10, USGS conducted an Evaluation of Threatened, Endangered, and Declining Species of the St. Lawrence River and its Tributaries and has published an interim report outlining their results.
- Alcoa conducts annual young-of-year fish in the Grasse River to evaluate trends in PCB contamination uptake for use in river cleanup strategy alternative analysis.
- The SRMT has several population studies underway and planned for furbearers, birds and turtles which addresses this BUI and others. Additional details for this project are outlined in table 2.
- In 2012 USGS will be continuing their Evaluation of Threatened, Endangered, and Declining Species of the St. Lawrence River and its Tributaries further up into the tributaries within the AOC. Additional details for this project are outlined in the BUI Progress table 2.

b. Future Needs
   - Complete cleanup of the Grasse River (mouth to power canal) – Areas of the highest contamination have been removed. Currently awaiting a decision from EPA on how Alcoa is to address remaining contaminated sediments in the lower 6 miles of the river.
   - Expand the Marsh Monitoring Program (MMP) to include points within the AOC. This could help to assess sentinel species and other bird species populations within the AOC, and would facilitate comparisons to any MMP sampling points outside the AOC located within a suitable reference location identified by the RAC.
   - Develop and implement Fish Community Objectives and Environmental Objectives for St. Lawrence River that encompass AOC to promote sustainable fishery populations after remediation completed.
   - Conduct sampling or coordinate with the SRMT to obtain contaminant information for the Raquette and St. Regis Rivers, as recommended by Tetra Tech.

2. Known or Suspected Cause – physical disturbances to the habitat

   a. Work completed or under way
      - Habitat improvements planned or accomplished in the St Lawrence River by New York Power Authority will benefit the American Eel and Lake Sturgeon.
      - Nesting structures being constructed by NYPA will benefit osprey and common tern
      - An evaluation was completed by Tetra Tech on the current studies on fish and wildlife populations to see if we have enough information to determine if populations are impacted. Several data gaps were identified and will be used in supporting studies needed to fill those gaps.
      - A GLRI grant to the St Regis Mohawk Tribe will address Lake Sturgeon including spawning habitat.

b. Future Needs.

- Additional compiling of fisheries data is needed to see where more fish population/presence information is needed, establish an IBI for the 4 rivers and compare that to outside of AOC. This can be done within DEC using the existing staff and data from all sources. Specific recommendations from Tetra Tech include; Obtain specific sampling locations for the data obtained as part of the warm water fisheries assessment and expand the warm water fisheries assessment efforts downstream of the Moses-Saunders Dam in the AOC. This could help to determine if CPUE values are similar within and outside the AOC and; Conduct sampling or coordinate with the SRMT and DEC fisheries to obtain Fish population information for the Raquette and St. Regis Rivers.
- A specific study is needed to evaluate the habitat, flora and fauna, and compare to a similar wetland area outside of impacted area. Clarkson University has a project proposed which will address these needs including a Marsh Monitoring Program as recommended by Tetra Tech. Additional details for this project are outlined in table 2.
- Collect data on sentinel species within the AOC, for example determining the forage and home range of bald eagles, osprey, sturgeon within the AOC as recommended by Tetra Tech.
- Expand RIBS sample locations to areas downstream of industries within the AOC is one of Tetra Tech's recommendations.

## D. BUI – Fish Tumors or Other Deformities - Likely impaired

1. Known or Suspected Cause – Environmental contamination

a. Work completed or under way

- Similar to the previous 3 BUIs, continued cleanups of the upland and aquatic contaminants will help eliminate this source of population impairment. These are RP cleanups. The only known inputs of contaminants to fish from within the AOC are the Grasse River and Power Canal.
- St Regis Mohawk Tribe has received GLRI grant money to study and report out on this BUI, which includes a pathology study of internal anomalies of brown bullheads, compare occurrence of liver tumors and external tumors in brown bullhead within AOC v. outside of AOC. Test bullhead tissue for PCBs and PAHs. Additional details for this project are outlined in table 2.
- Alcoa's ongoing Grasse River project monitors trends in levels of contaminants in fish tissue (also water quality monitoring) and includes observations of external abnormalities on adult brown bullhead and smallmouth bass and the information can be used in the report.

b. Future Needs

- Similar to the previous 3 BUIs, additional cleanups and monitoring of the upland and aquatic contaminants will help eliminate this source of population impairment.

## E. BUI – Bird and Animal Deformities or Reproductive Problems - Likely impaired

1. Known or Suspected Cause – 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.

    a. Work completed or under way
        - Similar to the previous 4 BUIs, continued cleanups of the upland and aquatic contaminants will help eliminate this source of population impairment. These are RP cleanups.
        - 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.
        - St Regis Mohawk Tribe has received GLRI grant money to study and report out on this BUI. That grant includes wildlife studies to address multiple BUIs including furbearers, turtles, and bird reproduction studies. Turtle and bird eggs will be tested for contaminants as well as furbearers and fish.
        - In 2011, DEC completed a collection of young-of-year fish to sample for PCB's, DDT, Aldrin, Chlordanes, Dieldrin, Mirex, Photomirex, and Mercury in several locations inside the AOC and upstream sites. Levels of these chemicals in fish indicates inputs to the food chain which can have deformities and reproductive problems. A report is not currently available.

    b. Future Needs
        - "Delisting the Animal Reproduction BUI in Five NYS AOCs" is a project that was not funded under the 2011 RFA solicitation of the GLRI. Dr. James Haynes is the principal researcher under this proposal which would collect and analyze jaws from mink to determine exposures to chemicals which effect reproduction that would provide additional information to further the removal of this BUI.

## F. BUI – Degradation of Benthos - Likely impaired

1. Known or Suspected Cause – 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.

    a. Work Completed or under way
        - Remediation of contaminated sediment cleanup still upcoming will likely benefit this BUI.

- The most recent sampling results and trend data from the NYSDEC's Rotating Intensive Basin Studies (RIBS) program for both the Intensive and Routine Sites, were collected in 2010, inside and outside the AOC. Toxicity testing was also done which is all is very useful to the St. Lawrence River AOC benthos assessment. Report is not yet available.
- A NYSDEC and USGS joint study evaluating benthos and sediment toxicity in the AOC is currently funded and slated to commence spring 2012. Additional details for this project are outlined in table 2.

a. Future Needs
   - RIBS data sets need to be retrieved for analysis for the AOC and identify where additional sampling and if toxicity tests need to be conducted. This can be done within DEC using the existing staff and data from all RIBS sources.

## G. BUI – Degradation of Zooplankton and Phytoplankton - Unknown/Likely impaired

1. Known or Suspected Cause – No specific causes of impairment or remedy have been identified.

a. Work Completed or under way
   - Clarkson University Plankton studies in 2007 and 2008 led to a preliminary recommendation that Plankton are not impaired in the AOC. Objective of examining differences in plankton communities and water quality characteristics above and below the Moses-Saunders power dam, and between St. Lawrence River and tribs. BUI removal document was drawn up in 2010 based on this study, but was determined to not be adequate for the federal agency reviewers.
   - USGS conducted a study in 2011 with the objective of determining if the phytoplankton and zooplankton BUI is impaired in parts of or in all of the AOC. Compare water toxicity to plankton within and outside of AOC. *C. dubia* zooplankton and *S. capricornutu* phytoplankton were used.

b. Future Needs
   - Results from the USGS phytoplankton and zooplankton study are expected in 2012. Upon review of that study the results may support the removal of the BUI later in the year, after preparation of a BUI removal document.

**TABLE .1 - BUI Delisting Targets St. Lawrence River at Massena AOC**

| Beneficial Use Impairments (BUIs) | Desired Endpoints and Management Activities | Relevant Information and Monitoring Activities | BUI Status and Other Notes |
|---|---|---|---|
| Fish and wildlife consumption restrictions<br><br>. | Removal of fish and wildlife consumption advisory<br><br>Sources not specific to the AOC and watershed sources addressed (i.e. advisory part of larger St. Lawrence River system and not AOC specific). | Monitoring (fish and wildlife tissue sample and data results),<br><br>Health advisories established by NYS Dept. of Health,<br><br>LaMP can address long-term regional advisory | Impaired -<br>(In Area of Concern and upstream river due to fish advisories -see 2006 report narrative) |
| Loss of fish and wildlife habitat | No restricted use of fish habitat from flow or contamination<br><br>No significant difference to habitat outside the AOC. | Caused by contamination, development, and disturbance.<br><br>Need desired amount and quality determination and assessment by experts | Impaired –<br>(FERC license addresses. See 2006 report narrative; further evaluation required)<br>(consider "threshold values" and unique habitats) |
| Trans-boundary Impacts | AOC Sources eliminated; Up/downstream impacts addressed.<br><br>Remaining concerns not due to AOC sources] | Land and River Based Remediation ongoing by responsible parties; need to assess success | Impaired –<br>(Downstream concerns predominate - see 2006 report narrative). |

| Beneficial Use Impairments (BUIs) | Desired Endpoints and Management Activities | Relevant Information and Monitoring Activities | BUI Status and Other Notes |
|---|---|---|---|
| Degradation of fish and wildlife populations | Healthy & sustainable population similar to reference community<br><br>[no sign. difference to F&W outside the AOC] | Community structure comparison to ref. area populations<br><br>Chemical monitoring data of area F&W | Likely -<br>(linked to Habitat indicator - see 2006 report narrative)<br>(consider "threshold values" and unique habitats) |
| Fish tumors or other deformities | No abnormally high incidence of tumors and deformities | Comparative evaluation of deformities in reference populations | Likely –<br>(see 2006 report narrative) |
| Bird or animal deformities or reproductive problems | No abnormally high incidence of deformities or reproductive problems | Comparative evaluation of deformities and reproductive problems in reference populations* | Likely –<br>(see 2006 report narrative) |
| Degradation of benthos | Benthic community integrity substantially similar to reference communities | Comparative community structure study results * | Likely –<br>(Study by USGS planned for 2012) |

| Beneficial Use Impairments (BUIs) | Desired Endpoints and Management Activities | Relevant Information and Monitoring Activities | BUI Status and Other Notes |
|---|---|---|---|
| Restrictions on dredging activities | No US Army Corps of Engineers restrictions.<br><br>Consistent with criteria and no active sources. | Assure dredging approved with required certification<br>(e.g. 401 Water Quality cert.) | Not Impaired –<br>[refers to navigational areas; in-place sediments addressed separately - see 2006 report narrative] |
| Beach closings | All beaches in AOC open to swimming | Swimming water quality standards achieved; | Not Impaired –<br>(see 2006 report narrative) |
| Degradation of plankton populations | Substantially similar plankton populations to reference populations | Comparative evaluation of plankton populations in reference populations. | Unknown –<br>(study underway by USGS, results anticipated in 2012) |
| Tainting of fish and wildlife flavor | No evidence of fish or wildlife tainting<br><br>[observation by fishing community supports] | Assessed as not impaired in Stage 1; no change indicated. | Not Impaired –<br>(see 2006 report narrative) |

| Beneficial Use Impairments (BUIs) | Desired Endpoints and Management Activities | Relevant Information and Monitoring Activities | BUI Status and Other Notes |
|---|---|---|---|
| Eutrophication or undesirable algae | 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) |
| Drinking water restrictions, Taste and odor problems | No drinking water restrictions, taste, or odor problems | Not impaired based on water quality standards; Seasonal impact noted. Consider treatment. | Not Impaired - (seasonal impacts addressed as nuisance condition. See 2006 report) |
| Degradation of aesthetics | Absence or minimal presence of floatable material or odors; Weeds controlled to non-nuisance level | No floatable materials or odors evident; Weed nuisance addressed by weed harvesting | Not Impaired – (see 2006 report narrative) |
| Added costs to agriculture or industry | No abnormal added costs to agriculture or industry. | No added costs to industry and no agriculture use of AOC waters. | Not Impaired – (see 2006 report narrative) |

## Table 2 St. Lawrence AOC Status and Actions Needed for BUIs Removal

| BUI | Current Status | Additional Needs | Potential Lead Organization | Est. $/Source | Years needed to complete BUI Removal |
|---|---|---|---|---|---|
| **1. Restrictions on Fish and Wildlife Consumption** | Impaired | {Ongoing study: NYSDEC Xenobiotics in Fish. This will re-assess contaminant levels in fish in the AOC and SLR for the first time in 20 years. Final report expected 2014}<br><br>Remediation of sediments and upland sites for Grasse River<br><br>Assessment and possible remediation for sediments in Power Canal<br><br>Assessment of contaminant levels in fish after Grasse River and Power Canal remediation is completed.<br><br>Periodic re-assessment of contaminants in fish in County Line Cove if current study finds they are still contaminated.<br><br>Examine RIBS data for evidence of upstream sources<br><br>Develop a bibliography of previous studies<br><br>Long-term monitoring needs: Periodic monitoring of contaminants in fish, birds, turtles, and furbearers. | RP (ALCOA with EPA)<br><br>unknown<br><br>DEC /DOH<br><br>DEC /DOH<br><br>DEC<br><br>DEC | RP, cost depends on remediation selected<br><br>unknown<br><br>EPA GLRI? ~50k?<br><br>EPA GLRI? ~20k? | 5+ years for Grasse River Remediation and full delisting<br><br>(0-2 years to delist just Raquette and St. Regis Rivers) |

## Table 2 St. Lawrence AOC Status and Actions Needed for BUIs Removal

| BUI | Current Status | Additional Needs | Potential Lead Organization | Est. $/Source | Years needed to complete BUI Removal |
|---|---|---|---|---|---|
| 2. Tainting of Fish and Wildlife Flavor | Unimpaired | N/A | N/A | N/A | N/A |
| 3. Degradation of Fish and Wildlife Populations | Likely Impaired, needs further assessment | {Ongoing studies: SRMT (Furbearers, turtles, mussles, ospreys, common terns) Final report expected 2013. USGS / SRMT Fish community and Threatened Fish assessments. Field sampling 2011 and 2012.}<br><br>Establish Citizen Science programs (Marsh Monitoring, Breeding Bird Surveys, Amphibian Road Call Count Surveys) to assist in monitoring<br><br>Long Term Monitoring: Periodic monitoring of fish communities, wildlife, and endangered and threatened animals | NYS DEC? | EPA /GLRI? ~10k? | 2-5 years, if current studies find no evidence of impairment. |

## Table 2 St. Lawrence AOC Status and Actions Needed for BUIs Removal

| BUI | Current Status | Additional Needs | Potential Lead Organization | Est. $/Source | Years needed to complete BUI Removal |
|---|---|---|---|---|---|
| **4. Fish Tumors or Other Deformities** | Likely Impaired, needs further assessment | {Ongoing study: SRMT Targeted Fish Tumor Survey}<br><br>Remediation needed: Grasse River sediments. See above under Consumption BUI.<br><br>Long-term monitoring needs: PAHs in sediment, incidence of fish tumors. | | | 0-2 years if SRMT study finds no evidence of impairment<br><br>5+ years if impairment is found, do reassessment after Grasse River remediation. |
| **5. Bird / Animal Deform. or Reproductive Problems** | Likely Impaired, needs further assessment | {See above: Ongoing SRMT study of furbearers, ospreys, and common terns under Populations BUI}<br><br>Compile and evaluate previous studies<br><br>Long-term monitoring needs: could be combined with monitoring for Populations and Habitat BUIs | NYSDEC? | | 2-5 years if current SRMT studies find no evidence of impairment |

## Table 2 St. Lawrence AOC Status and Actions Needed for BUIs Removal

| BUI | Current Status | Additional Needs | Potential Lead Organization | Est. $/Source | Years needed to complete BUI Removal |
|---|---|---|---|---|---|
| **6. Degradation of Benthos** | Likely Impaired, needs further assesment | {Proposed study: USGS, Baldigo. Macroinvertebrate community assessment and sediment toxicity testing. Final report expected 2013}<br><br>If impacts found, will need to re-assess after remediation of sediments.<br><br>Long-term Monitoring: periodic macroinvertebrate community and sediment toxicity testing. NYS DEC RIBS does this. | {USGS} | {$123,220 EPA GLRI grant} | 0-2 years if USGS study finds no evidence of impact. |
| **7. Restrictions on Dredging Activities** | Unimpaired | N/A | N/A | N/A | N/A |
| **8. Eutrophication or Undesirable Algae** | Unimpaired | N/A | N/A | N/A | N/A |
| **9. Drinking Water Consumption Restrictions, or Taste and Odor Problems** | Unimpaired | N/A | N/A | N/A | N/A |
| **10. Beach Closings** | Unimpaired | N/A | N/A | N/A | N/A |
| **11. Degradation of Aesthetics** | Unimpaired | N/A | N/A | N/A | N/A |
| **12. Added Costs to Agriculture or Industry** | Unimpaired | N/A | N/A | N/A | N/A |

## Table 2 St. Lawrence AOC Status and Actions Needed for BUIs Removal

| BUI | Current Status | Additional Needs | Potential Lead Organization | Est. $/Source | Years needed to complete BUI Removal |
|---|---|---|---|---|---|
| **13. Degradation of Phytoplankton and Zooplankton Populations** | Unknown, needs further assessment | {Proposed study: USGS, Barry Baldigo. Toxicity study of AOC waters to phytoplankton and zooplankton.}<br><br>Long Term monitoring: periodic studies of water toxicity and plankton communities. NYS DEC RIBS program does this | {USGS} | {$71,639, EPA GLRI grant} | 0-2 years if Baldigo study shows no impact |
| **14. Loss of Fish and Wildlife Habitat** | Impaired | {Ongoing projects: NYPA relicensing includes habitat restoration for American eel, lake sturgeon, osprey, and common tern in/around the SLR)<br><br>Proposed study: Clarkson U, Dr. Langen. Wetlands evaluation. Final report 2013?<br><br>Need to conduct a shoreline habitat evaluation.<br><br>Need to compile and evaluate existing information<br><br>Long-term monitoring needs: Periodic habitat studies | Clarkson U.<br><br>Unknown<br><br>NYSDEC? | $20,000, applied to NYPA SLRREF<br><br>Unknown ~35k? | 2-5 years |