

***** D R A F T *****

**A Compilation of Remedial Action Plan (RAP)
Stage2 Addenda for New York State Areas of Concern**

December 10, 2010

**Submitted by the following AOC Coordinators:
New York State Department of Environmental Conservation
Monroe County Department of Health
Niagara County Soil and Water Conservation Service
Buffalo-Niagara Riverkeeper**

Executive Summary

The binational Great Lakes Water Quality Agreement (GLWQA), as amended in 1987, established in Annex 2 a systematic and ecosystem-based approach to enabling the United States and Canada, in cooperation with State and Provincial governments, to identify and to restore Areas of Concern (AOCs). Per Annex 2 of the GLWQA, an AOC is:

“... a geographic area that fails to meet the general or specific objectives of the [Great Lakes Water Quality] Agreement where such failure is caused or is likely to cause impairment of beneficial use or of the area’s ability to support aquatic life.”

In response to the Agreement, New York State concurred with the delineation of six AOCs that exhibited substantial evidence of impairment of one or more of the fourteen beneficial uses specified in the GLWQA. The six AOCs included:

Buffalo River – from the confluence of Buffalo and Cazenovia Creeks downstream
Niagara River – the entire length of U.S. waters including the Buffalo Outer Harbor
Eighteenmile Creek – including upstream source areas between Lake Ontario and Erie Canal
Rochester Embayment – including the Genesee River downstream of the lower falls
St. Lawrence River – generally the U.S. waters and lower portions of tributaries in the vicinity of Massena, NY
Oswego River – downstream of lower power dam to Lake Ontario *{No Longer Active}*

Stage 1 and 2 Remedial Action Plan (RAP) reports were prepared during the 1990’s for each AOC according to the GLWQA. These reports described environmental problems and conditions leading to specific, or likely beneficial use impairments (BUIs), defined the causes, if known, of the impairments and specific pollutants involved, and evaluated and outlined general strategies for implementing remedial measures needed to restore the BUIs. Since then considerable implementation efforts have been underway within each AOC. Most significantly, the stage 3 RAP report for the Oswego River AOC was submitted and officially approved for delisting by the U.S. Department of State in 2007.

This document is a compilation of addenda to the five active RAPs. Each addendum describes the current status of the RAP’s BUIs, the known or suspected causes, and discusses strategic or specific remedial measures that continue to be undertaken or are further needed to support a re-designation of the BUI to either “Delisted” or “In Long-term Recovery” phase.

By identifying in a strategic manner the remaining remedial measures needed for a given RAP, each Addendum will serve as a working outline to guide future investments in pollution abatement actions, fish and wildlife population or habit restoration, alternative additional measures, and adaptive monitoring/surveillance needed to evaluate, confirm or resolve the status of the BUIs. AOC Coordinators will update the respective Addendum when needed to serve as an ongoing blueprint for future action. By simply updating the Addenda rather than the entire Stage 2 reports, considerable resource time and funding will be saved which can then be directed towards implementation efforts.

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**December 2010 Addendum to Stage 1/2 Remedial Action Plan
Buffalo River AOC
New York State**

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 1/2 Report published November 1989, and (b) tentatively identifies a series of project-specific actions, either regulatory or non-regulatory, needed to accomplish the remedies and to ultimately justify re-designation 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 a preliminary 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. Current Beneficial Use Impairments, Likely Causes, Planned Remedies, Specific Actions

The Buffalo River Remedial Advisory Committee will be meeting in early 2011 to reevaluate the delisting criteria for the Buffalo River AOC based on updated data.

The Buffalo River AOC will be undergoing a contaminated sediment cleanup funded by the USACE and the Great Lakes Legacy Act (GLLA). The GLLA will provide funding for the first five years of post remediation monitoring. **The Buffalo River AOC will require funding to continue this monitoring (water quality, sediment, fish tissue) beyond the five years to a point when results indicate delisting is feasible.**

The Buffalo River Ecological Restoration Master Plan (funded by USEPA) is nearly complete. **Continued funding via the GLRI** is critical to implementing the sites identified in the Plan which will help move the Buffalo River AOC towards delisting its habitat related BUIs.

A. **BUI – Restrictions on Fish and Wildlife Consumption**

1. Known or Suspected Cause – **PCB's and Chlordane in sediments.** This is an AOC and watershed wide issue.

(a.) Remedies & Specific Actions Needed –

- The planned dredging of contaminated sediment (via USACE and Great Lakes Legacy Act) in the Buffalo River AOC will eliminate the majority of the contaminated sediment.

- Continued funding of the Great Lakes Legacy Act beyond 2012 will ensure that the Buffalo River AOC is dredged as planned and provide for habitat restoration.
- State support for Brownfield and Inactive Hazardous Waste Site cleanups in and upstream of the AOC to prevent recontamination of the AOC water and sediments.
- Coordination with the Department of Health to increase public awareness of fish advisories.

B. BUI – Tainting of Fish and Wildlife Flavor

1. Known or Suspected Cause – **PAH's in sediments.** This is an AOC and lake-wide issue.

(a.) Remedies & Specific Actions Needed –

- The planned dredging of contaminated sediment (via USACE and Great Lakes Legacy Act) in the Buffalo River AOC will eliminate the majority of the contaminated sediment.
- Continued funding of the Great Lakes Legacy Act beyond 2012 will ensure that the Buffalo River AOC is dredged as planned and provide for habitat restoration.
- Perform community based surveys to determine extent of tainting.
- Coordination with NYS Department of Health to increase public awareness.
- Post-dredging fish tissue sampling.

C. BUI – Degradation of Fish and Wildlife Populations

- Need funding to identify a suitable reference community to aid in the delisting process.

1. Known or Suspected Cause – **Low Dissolved Oxygen.** This issue is AOC specific.

(a.) Remedies & Specific Actions Needed –

- Funding for habitat restoration (including overhanging vegetation) at sites identified in Buffalo River Ecological Restoration Master Plan.
- CSO abatement via continued funding of State Revolving Fund.
- Increased funding for Water Quality Monitoring.

2. Known or Suspected Cause – **River Channelization.** This is an AOC specific issue.

(a.) Remedies & Specific Actions Needed –

- None – The USACE will continue to maintain the Buffalo River to support lake freighter traffic.

3. Known or Suspected Cause – **Contaminated Sediments**

(a.) Remedies & Specific Actions Needed –

- The planned dredging of contaminated sediment (via USACE and Great Lakes Legacy Act) in the Buffalo River AOC will eliminate the majority of the contaminated sediment.
- Continued funding of the Great Lakes Legacy Act beyond 2012 will ensure that the Buffalo River AOC is dredged as planned.

D. **BUI – Fish Tumors and Other Deformities** - This is an AOC and lake-wide issue.

1. Known or Suspected Cause – **Contaminated Sediment**

(a.) Remedies & Specific Actions Needed –

- The planned dredging of contaminated sediment (via USACE and Great Lakes Legacy Act) in the Buffalo River AOC will eliminate the majority of the contaminated sediment.
- Continued funding of the Great Lakes Legacy Act beyond 2012 will ensure that the Buffalo River AOC is dredged as planned.

2. Known or Suspected Cause – **Navigational Dredging**

(a.) Remedies & Specific Actions Needed –

- None – The USACE will continue to maintain the Buffalo River to support lake freighter traffic.

E. **BUI – Bird or Animal Deformities or Reproductive Problems**

1. Known or Suspected Cause – **Contaminated Sediment**

(a.) Remedies & Specific Actions Needed –

- The planned dredging of contaminated sediment (via USACE and Great Lakes Legacy Act) in the Buffalo River AOC will eliminate the majority of the contaminated sediment.
- Continued funding of the Great Lakes Legacy Act beyond 2012 will ensure that the Buffalo River AOC is dredged as planned.
- Identification of a suitable reference community.
- Increased communication with general public.
- Funding for sampling and studies.

F. **BUI – Degradation of Benthos**

1. Known or Suspected Cause –
Contaminated Sediments

(a.) Remedies & Specific Actions Needed –

- The planned dredging of contaminated sediment (via USACE and Great Lakes Legacy Act) in the Buffalo River AOC will eliminate the majority of the contaminated sediment.
- Continued funding of the Great Lakes Legacy Act beyond 2012 will ensure that the Buffalo River AOC is dredged as planned.

2. Known or Suspected Cause – **Navigational Dredging**

(a.) Remedies & Specific Actions Needed –

- None – The USACE will continue to maintain the Buffalo River to support lake freighter traffic.

G. **BUI – Restrictions on Dredging**

1. Known or Suspected Cause – **Contaminated Sediment**

(a.) Remedies & Specific Actions Needed –

- The planned dredging of contaminated sediment (via USACE and Great Lakes Legacy Act) in the Buffalo River AOC will eliminate the majority of the contaminated sediment.
- Continued funding of the Great Lakes Legacy Act beyond 2012 will ensure that the Buffalo River AOC is dredged as planned.
- Long term monitoring of sediment in AOC to determine its potential for beneficial reuse.

H. **BUI – Degradation of Aesthetics**

1. Known or Suspected Cause – **Floatables, debris, and foul odors from CSOs and upper watershed.**

(a.) Remedies & Specific Actions Needed –

- Continued funding of the State Revolving Fund to implement CSO abatement.
- Promotion and incorporation of Green Infrastructure techniques into development projects to reduce the burden on the aging sewer system.
- Increased public awareness of watershed issues.

I. **BUI – Loss of Fish and Wildlife Habitat**

1. Known or Suspected Cause – **Physical Disturbances and Lack of Suitable Substrate**

(a.) Remedies & Specific Actions Needed –

- Continued funding for habitat restoration projects in and upstream of the AOC via GLRI or alternate source.
- Funding for post sediment remediation monitoring.

- Funding for land acquisition.
- Identification of a suitable reference community to aid in the delisting process.

**December 2010 Addendum to Stage 1/2 Remedial Action Plan
Niagara River Area of Concern
New York State**

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 1/2 Report published September 1994, and (b) tentatively identifies a series of project-specific actions, either regulatory or non-regulatory, needed to accomplish the remedies and to ultimately justify re-designation 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 a preliminary 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. Current Beneficial Use Impairments, Likely Causes, Planned Remedies, Specific Actions

A. BUI – Restrictions on Fish and Wildlife Consumption

Restrictions exist for the entire River and its tributaries. The causes vary. For the Upper River, the only advisory is against consuming carp with the chemical of concern being PCBs (an exception is Cayuga Creek, where the restriction applies to all species due to dioxin). For the Lower River, restrictions apply to a number of species and PCBs, mirex and dioxin are all chemicals of concern.

1. Known or Suspected Cause – PCBs

(a.) Remedies & Specific Actions Needed –
ASSESSMENT

- Complete a trend analysis of existing fish contaminant data
- Evaluate the extent to which sources of PCBs within the AOC contribute to the impairment in comparison to outside sources
- Conduct sediment assessments, then develop and implement a strategy to address PCB contamination if necessary

REMEDIATION

- Complete remediation of hazardous waste sites
 - Mobil Oil
 - Frontier Chemical - Royal Ave.
 - Vanadium Corporation

- Bethlehem Steel Corporation
- Buffalo Color Corporation Plant Site

VERIFICATION

- Reassess loadings of contaminants from hazardous waste sites to confirm effectiveness of remedies
 - Compile recent groundwater monitoring data
 - Collect additional groundwater monitoring data where necessary
 - Compile most recent hydrogeology data
 - Install new monitoring wells if necessary
 - Assess the certainty of loading estimate results
- Continue periodic fish sampling and analysis

2. Known or Suspected Cause – Mirex

(a.) Remedies & Specific Actions Needed –

ASSESSMENT

- Determine whether mirex is still present in groundwater near the 102nd Street Landfill
- Conduct sediment assessments, then develop and implement a strategy to address mirex contamination if necessary

3. Known or Suspected Cause – Dioxin

(a.) Remedies & Specific Actions Needed –

ASSESSMENT

- Conduct sediment assessments, then develop and implement a strategy to address dioxin contamination if necessary

B. BUI – Fish Tumors and Other Deformities

The extent to which this impairment exists in the AOC is not known. It was found to exist because fish tumors and other deformities were reported to be above the natural background level in localized study areas in the upper River. However, this finding was actually based on only two localized studies, and the RAP states that “additional research is necessary to more comprehensively address the question of the extent of this impairment indicator in the Niagara River.”

PAH contamination in sediment was identified as a likely cause of the BUI, though possibly not the only cause.

1. Known or Suspected Cause – PAHs

(a.) Remedies & Specific Actions Needed –

ASSESSMENT

- Complete the USFWS study of fish tumor prevalence

- Note: Using the statistical methodology developed by Dr. Rutter of Penn State Erie will require a change to the delisting criteria.

REMEDATION

- If tumor rates are unacceptably high, actions will be needed to locate and address sources of PAHs:
 - Complete remediation of hazardous waste sites (see list above)
 - Determine whether PAHs are still present in groundwater
 - Conduct sediment assessments, then develop and implement a strategy to address PAH contamination if necessary

C. BUI – Degradation of Benthos

This impairment was found to exist at certain tributary mouths and nearshore areas based on the observed macroinvertebrate community structure and sediment toxicity testing. It does not exist in the main channel of the River, which does not contain substantial deposits of fine-grained sediments. The likely cause of the impairment is BHC and PCB contamination in the sediment.

1. Known or Suspected Cause – PCBs

(a.) Remedies & Specific Actions Needed –

ASSESSMENT

- Through the DEC RIBS program, and possibly supplemental sampling, determine the current level of impact to macroinvertebrate community structure
- Conduct sediment assessments, then develop and implement a strategy to address PCB contamination if necessary
- Investigate the extent of bioaccumulation of priority contaminants in fish inhabiting selected sediment depositional zones

REMEDATION

- If macroinvertebrate community structure is more than slightly impacted, conduct actions to address sources of PCBs (plus actions listed below to address BHC sources):
 - Complete remediation of hazardous waste sites (see list above)

2. Known or Suspected Cause – BHC

(a.) Remedies & Specific Actions Needed –

ASSESSMENT

- Determine whether BHC is still present in groundwater
- Determine whether BHC is still present in the influent to the BSA treatment plant; if so, actions will be needed to address combined sewer overflows
- Conduct sediment assessments, then develop and implement a strategy to address BHC contamination if necessary

REMEDATION

- If necessary, implement actions to address combined sewer overflows
 - Actions identified in the final BSA Long-Term Control Plan
 - Green infrastructure projects

D. BUI – Restrictions on Dredging

Dredging is necessary in the Buffalo Harbor and the Black Rock Canal for the purpose of commercial navigation. Open lake disposal of this sediment is not possible due to the high levels of metals and cyanide present.

1. Known or Suspected Cause – Metals and cyanide

(a.) Remedies & Specific Actions Needed –
ASSESSMENT

- Determine whether the contaminants are still present in groundwater
- Determine whether the contaminants are still present in the influent to the BSA treatment plant; if so, actions will be needed to address combined sewer overflows
- Conduct sediment assessments, then develop and implement a strategy to address the contamination if necessary

REMEDIATION

- Complete remediation of hazardous waste sites (see list above)
- If necessary, implement actions to address combined sewer overflows
 - Actions identified in the final BSA Long-Term Control Plan
 - Green infrastructure projects

E. BUI – Loss of Fish and Wildlife Habitat

Habitat loss has occurred to a lesser degree in the lower River than in the upper River, where the loss has been dramatic. The most noticeable loss was that of emergent marsh, shrub wetland and wooded wetland adjacent to the River. Significant loss of shoreline habitats including areas of beach, mudflat and cobble shore had also occurred. Forested shoreline was also greatly reduced along the upper river.

Habitat loss was caused by human activities such as bulkheading, filling, dredging, development of marinas and private docks, water diversion, and the creation of barriers to migration on tributaries.

1. Known or Suspected Cause – Physical disturbances

(a.) Remedies & Specific Actions Needed –

- Policy needs
 - Evaluate methods for protecting priority habitats through regulation or other land-use controls

- Evaluate approaches to incorporating protection objectives for submerged aquatic vegetation habitats into development policies affecting the Outer Harbor and upper river
- Planning needs
 - Create and implement long-term management plans and programs for the priority habitats, where necessary and achievable
 - Create and implement a long-term conservation management plan for the Upper Niagara River Island Complex (Strawberry, Motor, Beaver Islands)
 - Perform an ecosystem inventory of the Niagara Gorge; create and implement a long-term conservation management plan
 - Develop measurable targets for habitat types in the AOC (submerged aquatic bed, wetland, riparian forest, natural sand/gravel beach and grass/shrubland); evaluate options for programs to reach these targets
- Restoration
 - Complete the NYPA habitat improvement projects
 - Invasive species mitigation projects

F. BUI – Degradation of Fish and Wildlife Populations (LIKELY IMPAIRED)

Populations clearly had declined from historic levels. However, this impairment was considered “likely” due to a lack of sufficient evidence to show whether the habitat and toxicity issues specific to the area of concern were significant enough to be the cause of the declines.

Possible causes of declines in fish populations are human-induced alterations to the River, exotic species introductions, and significant water diversions and withdrawals. Possible causes for loss of wildlife population are uptake of contaminants, loss and degradation of physical habitat, and human disturbance. However, the RAP states that no *likely* causes of declining populations were identified.

1. Known or Suspected Cause –

No known causes identified. See list of possible causes directly above.

(a.) Remedies & Specific Actions Needed –

ASSESSMENT

- Some indication of trends in factors affecting populations might be obtained through DEC’s RIBS program and Bird Studies Canada’s Marsh Monitoring Program
- Survey wildlife populations in the AOC and compare diversity and abundance of species to a suitable reference site

REMEDIATION

- All possible causes are related to habitat loss or toxicity issues. Therefore, if this use is impaired, the remedial actions listed for the Loss of Fish and Wildlife Habitat BUI and those relating to toxins for the other four known BUIs would address this impairment as well.

G. BUI – Bird or Animal Deformities or Reproductive Problems (LIKELY IMPAIRED)

During development of the RAP, no data was found that indicated the presence of bird or animal deformities or reproductive problems. The impairment was considered “likely” though due to the levels of contaminants that had been found in both young-of-the-year and adult fish, specifically:

- the exceedance of PCB, BHC, hexachlorobenzene and dioxin wildlife criteria in young-of-the-year fish, and
- the exceedance of PCB, DDT, DDE, dieldrin, chlordane and dioxin criteria in adult fish

1. Known or Suspected Cause – PCBs

(a.) Remedies & Specific Actions Needed –

See the actions listed for PCBs under the Degradation of Benthos BUI.

2. Known or Suspected Cause – BHC

(a.) Remedies & Specific Actions Needed –

See the actions listed for BHC under the Degradation of Benthos BUI.

3. Known or Suspected Cause – Hexachlorobenzene

(a.) Remedies & Specific Actions Needed –

ASSESSMENT

- Determine whether hexachlorobenzene is still present in groundwater
- Conduct sediment assessments, then develop and implement a strategy to address hexachlorobenzene if necessary

REMEDIATION

- Complete remediation of hazardous waste sites (see list above)

4. Known or Suspected Cause – Dioxin, DDT & DDE, Dieldrin, and Chlordane

(a.) Remedies & Specific Actions Needed –

ASSESSMENT

- Conduct sediment assessments, then develop and implement a strategy to address these contaminants if necessary

December 2010 Addendum to Stage 1/2 Remedial Action Plan
Eighteenmile Creek Area of Concern
New York State

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 in September 1997, and (b) tentatively identifies a series of project-specific actions, either regulatory or non-regulatory, needed to accomplish the remedies and to ultimately justify re-designation 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 a preliminary 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. Current Beneficial Use Impairments, Likely Causes, Planned Remedies, Specific Actions

Beneficial Use Impairment (BUI) at Eighteenmile Creek is largely due to PCB contamination. The reduction or elimination of BUIs at Eighteenmile Creek hinges upon the identification and control of the sources of this contamination. There are known PCB source areas in Lockport, New York. Secondary source areas also exist downstream from Lockport, such as in the sediments behind Burt Dam and numerous sediment deposition "hot spots" throughout the main branch of the creek.

A. **BUI – Restrictions on Fish and Wildlife Consumption**

This is a Lake-Wide impairment. The consumption restrictions present in the impact AOC are the same as the lake-wide restrictions. However, Eighteenmile Creek is a source of PCBs to Lake Ontario and the consumption restriction in the source (AOC) is far worse than the lake-wide restrictions.

This BUI and its causes apply consistently throughout the AOC.

1. **Known or Suspected Cause** – PCBs and dioxins

(a.) **Remedies & Specific Actions Needed:**

- *Inactive Hazardous Waste Site Remediation: Eighteenmile Creek Corridor – Site #932121; Cost estimate - \$22 Million*
- *Sediment Remediation Feasibility Study/Remedial Design Cost estimate - \$1 Million*

- *Remediation of In-Stream Contaminated Sediments;*
Cost estimate - \$25 Million
- *Long term monitoring of fish species from various trophic guilds;*
Cost estimate - Undetermined

B. BUI – Degradation of Fish and Wildlife Populations

The impairment of fish and wildlife populations at Eighteenmile Creek is the result of high levels of PCBs in fish. Whole-body concentrations of PCBs in brown bullheads collected from Eighteenmile Creek were: (1) 10 times greater than in bullheads collected from control sites, (2) often exceeded the critical PCB tissue concentration for effects on fish, and (3) great enough to possibly affect reproduction of fish-eating mammals. Regarding fish populations, an additional line of evidence that suggests impairment is the significantly greater prevalence of raised mouth lesions and barbell deformities in bullheads from Eighteenmile Creek compared with control sites.

This BUI and its causes apply consistently throughout the AOC for fish and mammal populations.

1. Known or Suspected Cause – PCBs

(a.) Remedies & Specific Actions Needed:

- *Mammalian PCB Exposure Assessment*
Cost estimate - Undetermined
- *Inactive Hazardous Waste Site Remediation: Eighteenmile Creek Corridor – Site #932121; Cost estimate - \$22 Million*
- *Sediment Remediation Feasibility Study/Remedial Design*
Cost estimate - \$1 Million
- *Remediation of In-Stream Contaminated Sediments;*
Cost estimate - \$25 Million
- *Long term monitoring of riparian mammals and various creek fish species;*
Cost estimate – Undetermined
- *Continued Annual Fish Stocking & Pen Rearing*
Cost estimate - Undetermined

C. BUI – Bird or Animal Deformities or Reproductive Problems

The impairment of bird/animal deformities or reproductive problems fish at Eighteenmile Creek is the result of high levels of PCBs in fish. PCB levels in fish from Eighteenmile Creek are great enough to adversely affect reproduction of fish-eating mammals. Fish-eating birds do not appear to be at risk due largely to their lower sensitivity to PCBs compared with mammals.

This BUI and its causes apply consistently throughout the AOC for mammalian populations.

1. Known or Suspected Cause – PCBs, DDT & metabolites, dioxins, dieldrin

(a.) Remedies & Specific Actions Needed:

- *Continued Discharge Permit Monitoring and Renewal (SPDES);*

- *Cost estimate – Undetermined (Regulatory Actions)*
- *Mammalian PCB Exposure Assessment*
Cost estimate - Undetermined
- *Inactive Hazardous Waste Site Remediation: Eighteenmile Creek Corridor – Site #932121; Cost estimate - \$22 Million*
- *Inactive Hazardous Waste Site Remediation: Upper Mountain Road – Site #932112; Cost estimate – Undetermined*
- *Sediment Remediation Feasibility Study/Remedial Design*
Cost estimate - \$1 Million
- *Remediation of In-Stream Contaminated Sediments;*
Cost estimate - \$25 Million
- *Long Term Monitoring of AOC Mammals and Various Creek Fish Species;*
Cost estimate – Undetermined

D. BUI – Degradation of Benthos

The impairment of degraded benthic organism populations at Eighteenmile Creek is the result of PCB and heavy metals contamination present in creek sediments.

This BUI and its causes apply consistently throughout the AOC.

1. Known or Suspected Cause – PCBs, heavy metals

(a.) Remedies & Specific Actions Needed:

- *Continued Discharge Permit Monitoring and Renewal (SPDES);*
Cost estimate – Undetermined (Regulatory Actions)
- *Baseline/Long Term Monitoring of AOC Benthic Populations;*
Cost estimate - Undetermined
- *Continued Rotating Integrated Basin Studies (RIBS) assessments*
Cost estimate - Undetermined
- *Inactive Hazardous Waste Site Remediation: Eighteenmile Creek Corridor – Site #932121; Cost estimate - \$22 Million*
- *Inactive Hazardous Waste Site Remediation: Upper Mountain Road – Site #932112;*
Cost estimate – Undetermined
- *Sediment Remediation Feasibility Study/Remedial Design*
Cost estimate - \$1 Million
- *Remediation of In-Stream Contaminated Sediments;*
Cost estimate - \$25 Million

E. BUI – Restriction on Dredging

The impairment of restricted dredging at Eighteenmile Creek is the result of high levels of PCBs, heavy metals and dioxins in creek sediments. There have been some dredging restrictions placed on Eighteenmile Creek under the EPA's *Guidelines for the Pollution Classification of Great Lakes Harbor Sediments* and the NYSDEC *Guidance on Freshwater Navigational Dredging*. The area surrounding a Corps of Engineers (USACE) site located approximately at the mid-point of Olcott Harbor was classified as unsuitable for open lake disposal. The sediments from this site were classified as polluted with chromium, copper, lead, manganese, nickel, zinc, and cyanides.

In addition, USACE Buffalo District collected sediment samples from 3 locations within Olcott Harbor in August 2003. A composite sample of those 3 sites exceeded EPA guidelines for copper, lead, manganese, and zinc. Furthermore, total PCB concentrations significantly exceeded lake reference levels.

This BUI only applies to the actual or potential dredging areas identified for the improvement of ship navigation in Olcott Harbor. However, the causes of this BUI apply consistently throughout the AOC.

1. Known or Suspected Cause – PCBs, heavy metals, dioxins

(a.) Remedies & Specific Actions Needed:

- *Continued Discharge Permit Monitoring and Renewal (SPDES);
Cost estimate – Undetermined (Regulatory Actions)*
- *Inactive Hazardous Waste Site Remediation: Eighteenmile Creek Corridor – Site #932121; Cost estimate - \$22 Million*
- *Inactive Hazardous Waste Site Remediation: Upper Mountain Road – Site #932112;
Cost estimate – Undetermined*
- *Sediment Remediation Feasibility Study/Remedial Design
Cost estimate - \$1 Million*
- *Remediation of In-Stream Contaminated Sediments;
Cost estimate - \$25 Million*
- *Olcott Harbor Sediment Dredging;
Cost estimate - Undetermined*

December 2010 Addendum to Stage 1 and 2 Remedial Action Plans
Rochester Embayment Area of Concern
New York State

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 in September 1997, and (b) tentatively identifies a series of project-specific actions, either regulatory or non-regulatory, needed to accomplish the remedies and to ultimately justify re-designation 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 a preliminary 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. Current Beneficial Use Impairments, Likely Causes, Planned Remedies, Specific Actions

A. BUI – Restrictions on Fish and Wildlife Consumption

This is a Lake-Wide impairment. It is listed in the REAOC RAP documents because they were watershed based, and there are two individually listed waters in the non-AOC contributory watersheds, Canadice Lake, listed for PCBs, and Irondequoit Bay, originally listed for chlordane but recently listed for PCB's and Mirex.

1. Known or Suspected Cause – Mirex, PCBs, and Dioxin

(a.) Remedies & Specific Actions Needed:

- The main source of Mirex to LO is the Niagara River. There is documentation of contamination in sediments from Niagara to the Embayment (Scrudato and DelPietre, 1982). However, as these plumes are of large area and are in areas that may be likely to naturally encapsulate, and are not unique to the Embayment, mitigation is not an AOC based project.
- PCB impacting the Lake originates in nearly all watersheds where it was employed, and is likely carried via atmospheric processes. Recent study around the Lake (Litton 2009) indicated that the two major sources to the Lake were 18 Mile Creek and the Black River and suggested that PCB's found in the Genesee River above the AOC and the CSOAP system might originate in 18 Mile Creek with transport via the Erie Canal. Areas of PCB contamination on the Westside of Rochester have been identified and the main source is in remediation, but this area is upstream of the AOC. PCB equipment removal is being undertaken by

the local utility. A recommended project to accelerate PCB removal in industries and commercial operations is listed in the Stage II. Cost for removal, accomplished at the three SUNY Schools at SUNY expense during generation of Stage II, was 3 million dollars. 1997 estimate for inventory was approximately \$35,000.

- Dioxin is not indicated as originating from any specific manufacturing or disposal situation, but is a by product of incomplete combustion. Litton 2009 indicates that the larger rivers like the Genesee are bigger sources to the Lake, but this is as much a factor of contributory watershed and larger flow as a mitigatable source within the AOC.

Recommended Action: With the exception of the Niagara River, which is a documented source of Mirex, and 18 Mile Creek, which is documented as a PCB source and is undergoing remediation, this BUI should be declared a lake-wide impairment and delisted for individual AOC's.

B. BUI – Tainting of Fish and Wildlife Flavor

1. Known or Suspected Cause – Phenol is indicated by NYSDEC sources as the usual cause of tainting complaints

(a.) Phenol in the Genesee River likely originates from Coal Tar seeping through the fractured bed rock from 19th-early 20th century coal gasification sites, and could be associated with industrial discharges to the river.

(b) a survey is recommended in earlier RAP documents to define if this problem exists. A check with Regional and Lake Ontario fisheries units indicates that no complaints have been received in the recent past.

(a.) Remedies & Specific Actions Needed :

- Resumption of Genesee River Water Column Phenol testing~\$5,000 per year
- Survey of anglers with non-AOC control group- This is found in the Delisting Criteria ~\$10,000 (The RAP Oversight Committee has indicated that this may not be the most reliable method for delisting due to the subjectivity of the respondents, based on other surveys conducted this would cost in the neighborhood of \$12,000)
- Panel Taste test- this has been suggested as an alternative to water column testing or angler survey- There are issues with using humans to check taste on material that has an advisory against consumption. This would also require a modification of the delisting criteria and monitoring methods.

C. BUI – Degradation of Fish and Wildlife Populations

1. Known or Suspected Cause – Listed due to mink, which were reported in a NYSDEC study to be down on population and reproductive success all around the Lake, due to consumption of PCB contaminated fish.

(a.) Remedies & Specific Actions Needed:

- Studies completed by SUNY at Brockport researchers indicates that mink are present and surviving.
- Suggestion has been made that habitat improvement for mink could be undertaken in BBFWMA (western Embayment) and lower GR wetlands. We would also need a habitat expert to design project..

D. BUI – Fish Tumors and other Deformities

1. Known or Suspected Cause – This BUI was not listed in the Stage I and has been identified as undetermined up until the 2009 E+E report, when all BUI's were either listed or not, and undetermined BUI's were listed. If this were determined to be a problem, a likely cause would be PAH's, especially in the Genesee River, where the coal tar seeps would be likely source. However, brown bullhead, the species for determination is not common in the Genesee River, so all examined fish came from the Braddock Bay section of the AOC.

E. BUI – Bird or Animal Deformities or Reproductive Problems

1. Known or Suspected Cause – This was listed as impaired for Mink reproduction.

The BUI was written with water column chemical analysis as the preferred method of determination of status, but NYSDEC Standards for Wildlife were modified during the period of approval for the Stage II and Addenda, and are now set at levels that are below analytical detection limits (Litten pers com.)

The same studies by SUNY at Brockport that support delisting of the Degradation of Fish and Wildlife Populations BUI might support delisting this for mink, although the studies did report higher incidence of jaw lesions in shore area mink.

If questions remain concerning additional species, some entity should undertake a study applicable to all AOC's to determine if deformities or reproductive problems do exist, and if they are found what the causes are or might be. Especially for birds, who move so easily, documentation of a specific area causing any identified problem could be difficult.

F. BUI-Degradation of the Benthos

1. Known or Suspected Causes- Contaminants in the Genesee River or in the sediment of the Embayment.

(a.) Remedies & Specific Actions Needed –

Genesee River- the River met its Delisting Criteria of being assessed as un-impacted or slightly impacted in RIBS data collected (but not yet published) in 2005, and in 2010.-
DELIST

Embayment- Sampling conducted under GLNPO grant GL97582701 (2007) found all sites to be slightly to moderately impacted. They were approximately equally distributed

in the River and Embayment and Braddock Bay with no apparent pattern to the distribution. After an appropriate amount of time, a similar study could be conducted to see if anything has changed if it is judged that sufficient time has elapsed for further recovery.

G. BUI – Restrictions on Dredging Activities

1. Known or Suspected Cause – High coliforms in sediments resuspended and discharged to the river by the overflow process in use when the Stage I was initiated.

(a.) Remedies & Specific Actions Needed – A formal agreement between Monroe County and the USACE to prohibit overflow dredging is called for in the Delisting Criteria. However, both agencies have withdrawn from discussion of the formal agreement as NYSDEC has made it policy to include the prohibition on overflow dredging as part of any permit to dredge the navigation channel.

2. Known or Suspected Cause – When MCDPH suggested delisting for this BUI, USACE objected that when sampling for the Patrick O’Rorke Bridge construction project was undertaken, sediments that had to be removed for the bridge pilings were too contaminated for Open Lake disposal, meaning that Delisting criteria # 2 was not met. While it was deemed unlikely that a private or municipal entity would have any need to dredge deeper than the 22-24 foot depth of the navigation channel, there was some concern that sediments in the 18-24 foot range could contain residual contamination that would render them unsuitable for open lake disposal. In a conference call including NYSDEC, EPA Region 2 and GLNPO, USACE, the City of Rochester, and the RAP Coordinator, a discussion of possible approaches to this issue was held. It was decided that for purposes of the BUI, dredging discussion would be limited to the area from the Turning Basin to the mouth as virtually all riparian areas upstream of that point were in public ownership and the likelihood of any development that would require sediment removal was unlikely, and that a Legacy Act determination for depth of contaminants in non-navigation channel areas of the river downstream of the Turning Basin would be sought, with the condition that if contaminants were found at levels deeper than the navigation channel they would be treated as candidate for natural encapsulation and not disturbed. Since that discussion, A NYSDEC response to a report generated by Arcadis Engineers for Eastman Kodak, indicating no significant sediment related problems in the river, cited bioaccumulation of silver in sturgeon as a problem requiring resolution. As the major habitat for sturgeon in the river is upstream of the Turning Basin and downstream of Veteran’s Bridge, an expansion of the determination to include some samples from this area should also be considered

(a.) Remedies & Specific Actions Needed – Determination of the status of deeper, non-navigation channel sediments in the River as part of the Great Lakes Legacy Act. If the determination finds areas in need of remediation/removal, a full Legacy Act project should be pursued

H. BUI – Eutrophication or Undesirable Algae

1. Known or Suspected Cause – Phosphorus discharged mainly from the Genesee River and AOC tributaries, but also suspected of reaching the Embayment from uplake sources like Oak Orchard Creek. This surfeit of nutrients, trapped in the near nearshore in the spring by the

thermal bar, causes luxuriant growth of filamentous algae. Area available for algal growth has expanded due to filter feeding by Dreissinid mussels which creates clearer water, allowing sunlight to reach greater areas of the Lake bottom.

This is a lakewide impairment, documented by the Lake Ontario Coastal Initiative Monitoring Program and others to be occurring all along the shoreline of western Lake Ontario.

Numerous NPS BMP implementation projects could be proposed, but virtually all would have to be upstream of the AOC. If ongoing studies on the near nearshore present credible evidence that Oak Orchard Creek is a nutrient source to the Embayment, agricultural BMP implementation would also be required

I. BUI – Restrictions on Drinking Water Consumption or Taste and Odor Problems

DELISTED.

J. BUI – Beach Closings

1. Known or Suspected Causes – Indicator Bacteria, algae, turbidity

- Near nearshore nutrient reduction would be hoped to curtail or reduce growth of filamentous algae.
- Erosion in the main channel and tributaries of the Genesee River, mainly upstream of the AOC and Monroe County, fine particulate remaining from decomposition of filamentous algae.
- Sources of Indicator bacteria include gulls and geese at the beaches, wildlife in the upstream areas of Durand Beach, improper pet waste disposal in upstream areas, stormwater falling on the beach itself and carrying bacteria to the near shore. NPS runoff from areas up-lake or tributary, possible failing infrastructure or onsite wastewater systems in areas up-lake or upstream from the beach, occasional (average of one per year per release point) CSO discharges, and re-growth of indicator organisms in algae mats or sand.

(a.) Remedies & Specific Actions Needed:

- Numerous NPS BMP implementation projects could be proposed, but all would have to be upstream of the AOC. If ongoing studies on the near nearshore present credible evidence that Oak Orchard Creek is a nutrient source to the Embayment, agricultural BMP implementation would also be required.
- Actions to reduce sediment loads in the Genesee River would be expected to reduce turbidity in the Embayment. These would have to be undertaken mainly in upstream, non-AOC areas. Results of current research by NRCS in the watershed should better pinpoint areas where action will be most effective.
- Action by or in concert with wildlife management agencies to understand the attraction of the area for large numbers of gulls and develop a means of discouraging the use. Similar action to prevent buildup of Canada Geese (use of

Border Collies has been discussed with Monroe County Parks). Support for creation of sewer districts and installation of associated infrastructure to replace aging and possibly faulty onsite wastewater systems. Public Education (ongoing).

- Actions evaluated in the USACE/URS Studies of Ontario Beach could be considered, but based on the results of that study, another source of match would need to be identified as local support for the levels of funding identified as necessary in that study were unacceptable.

K. BUI – Degradation of Aesthetics

1. **Known or Suspected Cause** – Decomposing algae along Lake Ontario shoreline

(a.) Remedies & Specific Actions Needed: Nutrient reduction as detailed in sections H and J, or algae removal .

2. **Known or Suspected Cause** – Objectionable odors from Coal Tar seeps in the area of the lower falls of the Genesee River

(a.) Remedies & Specific Actions Needed – Stage II calls for monitoring which is difficult and potentially dangerous due to the location of the seeps in the rock face of the gorge. A project to define the extent of the seeps and sources, with follow-up of blocking the seeps with plugs or dams was presented as possible by USACE but did not get traction with the RAP Oversight Committee when discussed. Costs are currently undefined.

3. **Known or Suspected Cause-** Alewife die-offs

(a.) Remedies & Specific Actions Needed- These were thought to be related to poor adaptation to the Lake by an invasive species. Food web interactions and habits of this species have been better defined, and as a result of the Salmonid stocking program in the Lake, die offs are rare, of short duration and magnitude, and not associated with any particular area of the lake. - DELIST

4. **Known or Suspected Cause** – Discarded Salmonids along the shoreline of the Genesee River due to fishing practices

(a.) Remedies & Specific Actions Needed: A poor practice of many anglers when snagging of spawning salmon was legal was to remove the eggs for sale, then leave the remains on the bank, or throw them back into the water. Enactment by NYSDEC of regulations prohibiting snagging of fish, and prohibiting the discarding of fish carcasses or entrails along streambanks have remedied this situation. - DELIST

5. **Known or Suspected Cause** – Litter along the lower river and lakeshore

(a.) Remedies & Specific Actions Needed –Coastal Cleanups have been held at numerous sites along the river and along the lakeshore every fall for more than 10 years. It is thought that we have reached the practical limits of behavior change through outreach in a developed area. An outreach is in discussion to be done under current funding linking access to fishing spot issues to litter in hopes that fisherpeople will begin to understand that in many cases where access has been curtailed, it has been as a reaction to complaints about abuse of the area from other users. DELIST as at practical limits of remediation for an urban area

6. Known or Suspected Cause – Genesee River sediment loading - Erosion in the main channel and tributaries of the Genesee River, mainly upstream of the AOC and Monroe County.

(a.) Remedies & Specific Actions Needed: Numerous NPS BMP implementation projects could be proposed, but all would have to be upstream of the AOC.

L. BUI - Added Costs to Agriculture and Industry

1. Known or Suspected Cause – Dreissinid mussels

(a.) Remedies & Specific Actions Needed – This BUI is in process of being delisted as a lakewide Use Impairment.

M. BUI –Degradation of Phytoplankton and Zooplankton Populations

1. Known or Suspected Cause – The Stage I does not discuss specific causes of this BUI, only presents evidence of its existence in the Genesee River. Stage II indicates that the likely source is sediment contamination in the Genesee River.

Status was listed as unknown in Lake Ontario. Reports of the “Status of the Lake Ontario Ecosystem: A Biomonitoring Approach” Project during the period 1998-2000, when the Rochester Embayment and Irondequoit Bay were included in the monitoring plan, indicate that in 1998 zooplankton were more numerous and more robust in the Rochester area nearshore, and chlorophyll A levels that could be seen as a surrogate for phytoplankton were also greater, that in 1999 zooplankton numbers were lower than for two other nearshore and embayment areas (Sandy Pond and Sodus Bay), while chlorophyll A remained high and that in 2000 these indices were similar to the lakewide numbers. While the language of the IJC guidance only speaks to significant differences, their allowance of toxicity testing to determine impact implies that they are concerned with degraded populations or community structure, while the data from these studies indicate populations at least the equivalent of other nearshore areas of the Lake.

(a.) Remedies & Specific Actions Needed – Sediment remediation as discussed earlier would be expected to have positive impact in the Genesee River. No possible remedies for the open Lake portion of the AOC were discussed in Stage I or Stage II

If the current toxicity study is not satisfactory, a study of phytoplankton and zooplankton in the Embayment using the methodology summarized in Stage II section 4.7.2 could resolve this issue.

N. BUI – Loss of Fish and Wildlife Habitat

1. Known or Suspected Cause – actions such as wetland filling in the lower Genesee River, filling and drainage of other wetlands, deforestation and agriculture, and shoreline development associated with growth of the City of Rochester and suburbanization of the areas bordering and upstream of the waters of the AOC.

(a.) Remedies & Specific Actions Needed – Indicators of improvement were selected, including Mink, Sturgeon, Amphibian community structure, aquatic macroinvertebrate community structure, Loss of acreage of wetlands in the immediate drainage basin, loss of riparian buffers in the immediate drainage areas. It is unlikely that developed areas can be restored to habitat, but efforts can be made to preserve remaining undeveloped areas. Lower

areas of the Genesee River where riparian wetlands have become established could be candidate for habitat improvement. Undeveloped parcels contiguous to the Braddock Bay Fish and Wildlife Management area could be acquired and incorporated into the unit.

2. Known or Suspected Cause – Loss of Black Tern nesting habitat in western AOC due to boat wake disturbance.

(a.) Remedies & Specific Actions Needed – As part of the Delisting criteria setting process, it was determined that the AOC was on the southern border of the species' breeding range and what was being viewed as decline in the population could be a natural shifting in the breeding range. Similar declines in nesting pairs were noted in Rose's Marsh, an area contiguous to the western border of the embayment that is not subject to boat wakes. No action is currently indicated, but if discussion with NYSDEC wildlife management personnel reveals an action that could have positive benefit, a project could be developed.

**December 2010 Addendum to Stage 1/2 Remedial Action Plan
St Lawrence River at Massena, Area of Concern
New York State**

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 re-designation 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 a preliminary 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. 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 3 major industries where the historical lack of environmental control and improper disposal contaminated upland and water areas. These are responsible party cleanups.

(a.) Remedies & Specific Actions Needed –

- St. Lawrence River (as a whole) – Within the AOC significant clean-up of contaminated sediment has taken place and has reached cleanup objectives. Remaining sources come from upriver from the AOC and the Lake Ontario

watershed and air deposition now form a main part of the sources and not within the scope of the Massena RAP.

- Bay at St. Lawrence River / Franklin Co. line – This cove was dewatered and all contaminated sediments were removed. Currently waiting for fish to clean up. Additional fish testing is planned by RP.
- 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. Continuing monitoring of PCB contamination in fish flesh has indicated that levels are lessening. All upland sources of PCBs have been addressed and are not a continuing source of continuation.
- Massena Power Canal - No information is available on the source of PCBs in smallmouth bass in the canal nor strategy to address.

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.) Remedies & Specific Actions Needed –

- St. Lawrence Power Project 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.
- Discussions with USACE to line up 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.
- A shoreline stabilization project has been funded on Mohawk Tribal Lands within the AOC.

2. Known or Suspected Cause – Contaminated sediments are one cause of loss of habitat.

(a.) Remedies & Specific Actions Needed –

- The sediment cleanups as explained under Restrictions on Fish and Wildlife Consumption will go a long way to enhance this suspected cause.
- Contaminated wetlands on Alcoa East have been cleared up and restored and a specific study is needed to evaluate the habitat, flora and fauna, and compare to a similar wetland area outside of impacted area.

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

1. Known or Suspected Cause – upland and aquatic contaminants

(a.) Remedies & Specific Actions Needed –

- 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.
- No additional specific contaminants have been identified as cause of population stressors

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

(a.) Remedies & Specific Actions Needed –

- Habitat improvements planned and accomplished in the St Lawrence River by New York Power Authority will benefit the American Eel and Lake Sturgeon.
- A GLRI grant to the St Regis Mohawk Tribe will address Lake Sturgeon.
- Nesting structures being constructed by NYPA will benefit osprey and common tern
- There is a current evaluation 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
- Design additional population surveys as needed to determine if specific sentinel species have impaired populations like the marsh monitoring program and breeding bird atlas studies and fish surveys.

D. BUI – Fish Tumors or Other Deformities
Likely impaired

1. Known or Suspected Cause – Environmental contamination

(a.) Remedies & Specific Actions Needed –

- Based on a comparative fish pathology study, the reduction of toxics in the environment, and the observance of no occurrence of external tumors and an overall lack of evidence for impairment of fish health observed in the St. Lawrence River this may no longer be impaired.
- A pathology study of internal anomalies is needed of brown bullheads with results and expert assessment to support any conclusion about this BUI.
- St Regis Mohawk Tribe has received GLRI grant money to study and report out on this BUI.

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.) Remedies & Specific Actions Needed –

- As upland and aquatic contamination get cleaned up and fewer sources of the chemicals which can cause these problems.
- 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.

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.) Remedies & Specific Actions Needed –

- Improvements in contaminant levels as cleanups occur will also benefit this BUI
- 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. These data sets need to be retrieved for analysis for the AOC and identify where additional sampling and if toxicity tests need to be conducted.

G. BUI – Degradation of Zooplankton and Phytoplankton

Unknown/Likely impaired

1. Known or Suspected Cause – 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.”

(a.) Remedies & Specific Actions Needed –

- No specific causes of impairment or remedy have been identified, but the ongoing efforts to clean up contamination and restore habitat should be of benefit to the plankton.
- Clarkson Plankton Study in 2007 and 2008 led to the conclusion that Plankton are not impaired in the AOC.

- Redesignation documentation was prepared in 2010, reviewed and currently being evaluated if additional population study is needed.