St. Lawrence River (Cornwall) AOC







"Weight of Evidence" - Case Study

"Delist" OR "Area in Recovery"-Lessons Learned

2014 River Symposium

Cornwall, Ontario

May 7-8, 2014





Outline



- Case Study- "Weight-of Evidence Approach" used to assess the status of BUIs
- Lessons Learned- "Delist" OR "AOC in Recovery"?

2012 Great Lakes Water Quality Agreement

- A Party may elect to identify an AOC as an AOC in Recovery when all remedial actions identified in the RAP have been implemented and monitoring confirms that the recovery is progressing in accordance with the RAP
- A Party shall remove the designation of an AOC or AOC in Recovery when environmental monitoring confirms that beneficial uses have been restored in accordance with the criteria established by the RAP
- A Party shall solicit review and comments from the State and Provincial Governments, Tribal Governments, First Nations, Metis, Municipal Governments, watershed management agencies, other local public agencies, the Public and the Commission (IJC):
 - 1. Prior to the designation of an AOC in recovery; and
 - 2. Prior to removal of a designation as an AOC or an AOC in Recovery

Cornwall's Industrial Past



- 1871: Pulp and Paper (Toronto Paper Company, Howard Smith Mills, Domtar Fine Papers)
- 1921-1931: Rayon Manufacturing (Courtaulds Fibres)
- 1935-1995: Chlor- Alkali Plant and CIL and ICI Canada Inc)
- 1834-1842: Construction of Cornwall Canal
- 1840's: Emergence of flour mills, tanneries and woolen mills
- 1958: St. Lawrence Seaway Constructed
- Untreated and/or poorly treated industrial and municipal discharges released a legacy of pollutants that includes organics, metals including mercury, suspended solids (wood fibers), bacteria

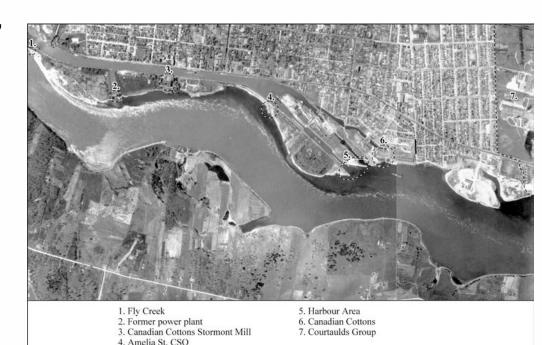
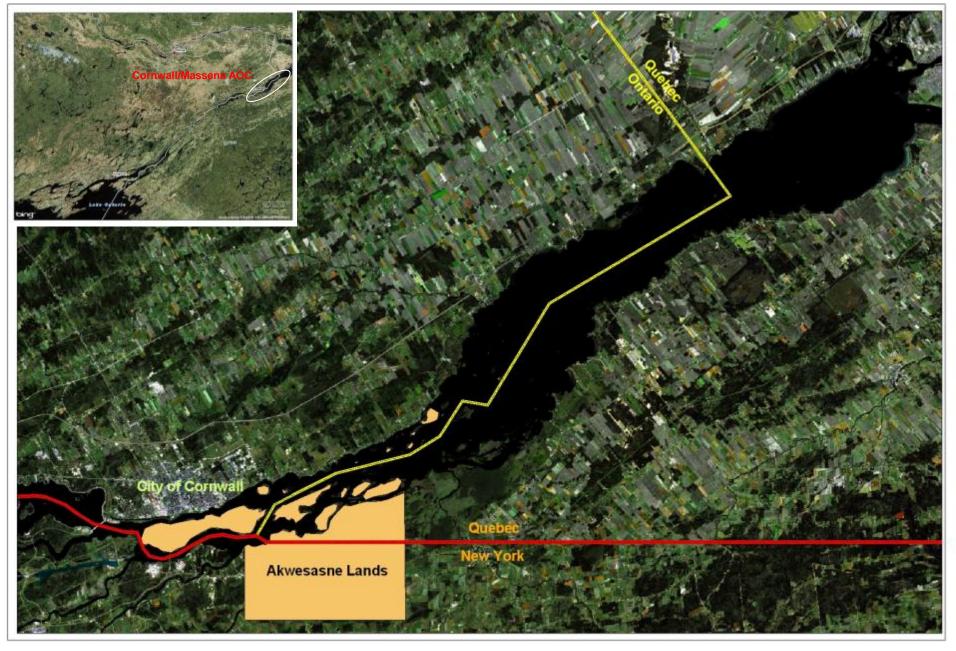
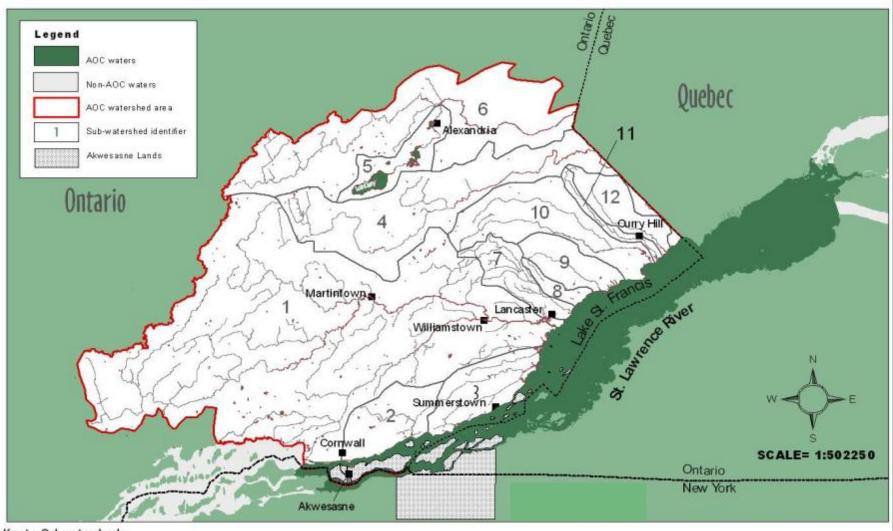


Figure 3.1 Key Historic Discharge Locations: 1957 Air Photo Source: City of Cornwall, Public Works files.



St. Lawrence River Cornwall/Massena Binational AOC

Canadian Portion of the AOC



Key to Subwatersheds

- 1. Raisin River
- 2. Gray's Creek
- 3. Fraser Creek

- 4. Beaudette River
- 5. Garry River
- 6. Delisle River

- 7. Finney Creek
- 8. Ferguson Drain
- 9. Westley Creek

- 10. Sutherland Cree
- 11. Gunn Creek
- 12. Wood Creek

Restored Beneficial Uses



Degradation of benthos

- No impairment of benthic community
- No chronic toxicity of benthos or risk of biomagnification of Hg from sediment along Cornwall Waterfront
- Cornwall Sediment Strategy completed, Administrative Controls in place to ensure sediments not disturbed, commitment to long-term sediment monitoring

Restrictions on dredging activities

Currently no navigational dredging in the AOC or along Cornwall waterfront

Beach postings

Substantial improvements in bacteria levels along Cornwall waterfront and L. St. Francis

Degradation of fish and wildlife populations

- □ Fish and wildlife populations are abundant and diverse
- Amphibian and nesting marsh bird species richness increased
- Osprey have returned to AOC, are nesting and successfully reproducing
- Healthy colonial waterbird community
- Contaminants in birds (e.g. Herring Gulls) and snapping turtles declining and equal to or less than reference sites
- Natural Heritage Strategy and fish management plans in place

Status of Beneficial Uses St. Lawrence River (Cornwall AOC)

Beneficial Use Impairment	Stage 2 Status (1997)	Stage 2 Update Status (2007)	Stage 3 Update (2012)
Restrictions on Fish & Wildlife Consumption	Impaired	Impaired	Environmental conditions improved; impaired
Degradation of Benthos	Impaired	Impaired	Notimpaired
Restrictions on Dredging Activities	Impaired	Impaired	Not impaired
Eutrophication or Undesirable Algae	Impaired	Impaired	Environmental conditions improved; partially restored
Beach Postings/Water Contact Sports	Impaired	Impaired	Notimpaired
Loss of Fish & Wildlife Habitat	Impaired	Impaired	Environmental conditions improved; partially restored
Degradation of Fish & Wildlife Populations	Impaired	Impaired	Not impaired
Fish Tumours & Other Deformities	Possibly impaired	Possibly impaired	Not impaired
Bird or Other Animal Deformities or Reproductive Problems	Possibly impaired	Possibly impaired	Not impaired
Degration of Zooplankton & Phytoplankton Populations	Possibly impaired	Possibly impaired	Notimpaired
Tainting of Fish & Wildlife Flavour	Not impaired	Not impaired	Not impaired
Restrictions on Drinking Water Consumption	Not impaired	Not impaired	Not impaired
Added Costs to Agriculture or Industry	Not impaired	Not impaired	Not impaired
Degradation of Aesthetics	Not impaired	Not impaired	Not impaired

Weight of Evidence – Individual BUI Decision Tree **BUI Meets Delisting Criteria?** No More work Have all Stage 2 priority actions to be done been undertaken? No Yes Are AOC conditions comparable to similar non-AOC sites and/or to Yes regional/basin conditions? Yes Are all reasonable risk/impact management measures in place? No Yes Expert &/or Agency &/or public reviews support assessment? **Conditions improved to** "Impaired" "Not Impaired" extent possible; re-designate Recovery to "Not Impaired" continuing Environmental Monitoring,

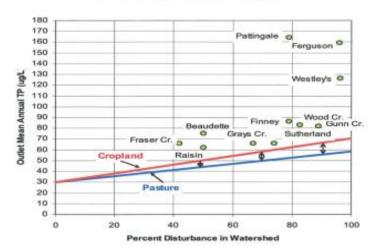
Management and Reporting

Partially Restored Beneficial Uses: Eutrophication or Undesirable Algae

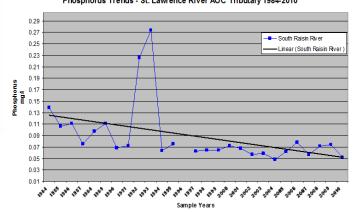
Environmental Status

- Phosphorus (P) levels in main section of St. Lawrence River meet delisting criteria but P levels in tributaries and nearshore waters do not
- P levels in tributaries have improved and are similar or better than non-AOC sites
- 8 of the 11 tributaries close to delisting criteria

Land-use-TP Nomogram for the St. Lawrence (Cornwall) AOC



South Raisin River - Cashions Rd, South of Cashions Glen Phosphorus Trends - St. Lawrence River AOC Tributary 1984-2010



Weight of Evidence: Eutrophication or Undesirable Algae



Delisting criteria met?

- Main section of St. Lawrence River meets phosphorus water quality objectives.
- □ Levels of phosphorus remain elevated in tributaries and nearshore waters of Lake St. Francis. (This is an issue throughout the Great Lakes in AOC and non-AOC areas)
- 8 out of 11 tributaries have improved considerably and are close to delisting criteria.

Have all RAP priority actions been undertaken?

Municipal, industrial and agricultural actions implemented to address P loadings.

Are AOC conditions comparable to/or similar to non-AOC sites and/or regional basin conditions?

☐ Yes. Comparison show conditions are similar or better.

Are all reasonable risk/impact management measures in place?

- □ Long-term monitoring plan in place.
- Local organizations (RRCA and municipalities) have been encouraged to continue education and restoration through federal, provincial, and other funding programs.

Expert and/or agency and/or public reviews support the assessment?

Yes. Review by MOE and EC experts and St. Lawrence River Restoration Council support the eutrophication or undesirable algae technical assessment with some dissention on need for further action..

Weight of Evidence: Eutrophication or Undesirable Algae



- Agriculture is the predominant land use in the area
- □ 95% of the land is privately owned
- Development of the St. Lawrence Seaway in the 1950's has resulted in flooding of nutrient rich soils and changes in nearshore flow patterns
- Conditions within the AOC have improved to acceptable levels and all reasonable measures have been implemented



Partially Restored Beneficial Uses: Loss of Fish and Wildlife Habitat



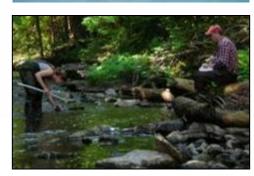
Fish and Wildlife Habitat delisting criteria have a number of targets to be met

Environmental Status

- Targets <u>met</u> for:
 - Tributary and coastal wetlands (form/function)
 - □ Tributary wetland area
 - □ Forest cover (30%)
 - Quantity and quality of littoral fish habitat
 - Tributary fish habitats/communities compared to outside AOC (except Pattingale Creek)
 - □ Adoption of Natural Heritage Strategy into Official Plans
 - ☐ Fish Habitat Management Plan in place
- Targets <u>not</u> met for:
 - No Net Loss in number or area of coastal and provincially significant wetlands (due to infilling, development)
 - □ Number of forest blocks >1000 hectares
 - Riparian cover on private and public lands







Weight of Evidence: Fish and Wildlife Habitat



Delisting criteria met?

□ No- Not all targets met (7 out of 10)

Have all RAP priority actions been undertaken?

- Yes. Considerable enhancement and protection of fish and wildlife habitat accomplished.
 - Over 317,295 native trees and shrubs have been planted
 - Over 81,148 metres of buffer zones planted along streams and drains
 - Implementation of habitat enhancement projects
 - Habitat protection and management plans have been developed under the Natural Heritage Strategy and Lake St. Francis Fish Habitat Management Plan

Are AOC conditions comparable to similar non-AOC sites and/or regional basin conditions?

- Yes. Some wetland loss however, this is a concern throughout Ontario and the Great Lakes Basin, not just within this AOC.
- □ AOC wetland function equal to or better than Great Lakes average.





Weight of Evidence: Fish and Wildlife Habitat



Are all reasonable risk/impact management measures in place?

- ☐ Yes. Natural Heritage Strategy has been adopted into municipal Official Plans,
- ☐ Fish Habitat plans are in place.
- □ Long-term monitoring in place.

Expert and/or agency and/or public reviews support the assessment?

Yes. Review by MOE and EC experts and St. Lawrence River Restoration Council support the technical assessment with some dissention on need for further action.

Challenges to fully restore this BU and meet delisting criteria are:

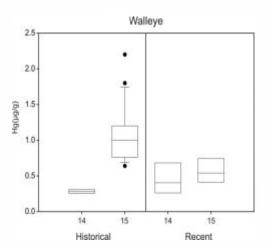
- □ Agriculture is the predominant land use in the area
- □ 95% of the land is privately owned
- ■Conditions within the AOC have improved to the extent possible, all reasonable measures have been implemented to protect and improve fish and wildlife habitat and risk management processes have been put in place. In addition, local organizations have been encouraged to continue education and restoration through federal, provincial and other funding programs.

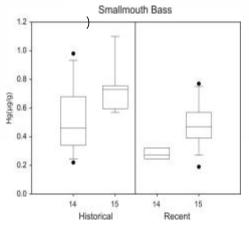
Impaired Beneficial Use: Restrictions of Fish Consumption

Environmental Status

- Mercury levels higher in fish from the AOC (below Moses-Saunders Dam) than upstream
- Consumption advisories more restrictive for fish from the AOC than upstream
- All priority actions have been taken to address sources including additional track down studies to identify and address fugitive releases in the AOC
- Levels of mercury in AOC fish continue to decline however, the delisting criteria is not expected to be met in the foreseeable future

Comparison of Historical and Current Mercury Levels in AOC Fish





Weight of Evidence: Consumption of Fish and Wildlife



Delisting criteria met?

- □ No. Current fish mercury values for the AOC remain higher than upstream section of the St. Lawrence River.
- ☐ Fish consumption advisories for AOC are generally more restrictive than upstream.

Have all RAP priority actions been undertaken?

- Yes. All direct discharges of mercury within the AOC have ceased, including closure of 3 main industries.
- Cornwall sediment management strategy completed.

Are AOC conditions comparable or similar to non-AOC sites and/or regional basin conditions?

 Recent mercury comparisons of mercury in AOC and other Ontario lakes/rivers fish suggest that AOC mercury values are within the 75th percentile of values for other Ontario water bodies for three of the four species examined (walleye remains elevated).

Are all reasonable risk/impact management measures in place?

- □ Long-term monitoring of sport fish contaminants in place.
- Risk management provided through publishing of the Guide to Eating Ontario Sport Fish.
- Cornwall Sediment Strategy Administrative Controls protect against release of mercury from sediment along Cornwall waterfront.

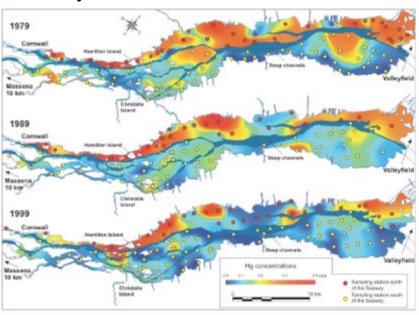
Weight of Evidence: Consumption of Fish and Wildlife



Expert and/or agency and/or public reviews support the assessment?

- Yes. Expert review by MOE and EC experts and Restoration Council support the assessment of impaired.
- Challenges to meeting the de-listing criteria are:
 - □ Fish mercury concentrations continue to decline however, due to the broad-based low level mercury contamination throughout the north section of this binational AOC and ongoing tributary loadings, the rate of decline is slow and recovery of this BU will take a longtime.
- ■Conditions within the AOC have improved, all reasonable measures have been implemented to address mercury loadings to this AOC and long-term risk management processes are in place.

Mercury Distribution In Lake St. Francis Sediment



Status of Beneficial Uses St. Lawrence River (Cornwall AOC)

Beneficial Use Impairment	Stage 2 Status (1997)	Stage 2 Update Status (2007)	Stage 3 Update (2014)
Restrictions on Fish & Wildlife Consumption	Impaired	Impaired	Impaired
Degradation of Benthos	Impaired	Impaired	Not impaired
Restrictions on Dredging Activities	Impaired	Impaired	Not impaired
Eutrophication or Undesirable Algae	Impaired	Impaired	Environmental conditions improved; Not Impaired
Beach Postings/Water Contact Sports	Impaired	Impaired	Notimpaired
Loss of Fish & Wildlife Habitat	Impaired	Impaired	Environmental conditions improved; Not Impaired
Degradation of Fish & Wildlife Populations	Impaired	Impaired	Not impaired
Fish Tumours & Other Deformities	Possibly impaired	Possibly impaired	Not impaired
Bird or Other Animal Deformities or Reproductive Problems	Possibly impaired	Possibly impaired	Not impaired
Degration of Zooplankton & Phytoplankton Populations	Possibly impaired	Possibly impaired	Not impaired
Tainting of Fish & Wildlife Flavour	Not impaired	Not impaired	Not impaired
Restrictions on Drinking Water Consumption	Not impaired	Not Impaired	Not impaired
Added Costs to Agriculture or Industry	Not impaired	Not impaired	Not impaired
Degradation of Aesthetics	Not impaired	Not impaired	Not impaired

Status of St. Lawrence (Cornwall) AOC



- Stage 3 RAP report drafted and COA technical and St. Lawrence River Restoration Council (SLRRC) reviews completed.
- All priority actions have been completed.
- Three "Impairments" will remain for a long time, possibly "forever"
- AOC conditions comparable to or better than regional conditions.



- Risk/impact management measures are in place.
- Weight of Evidence Decision: conditions improved to extent possible; delisting recommended.
- Currently consulting with COA and U.S. agencies on this recommendation.
- The Draft Stage 3 RAP Report has been circulated for review by Canadian agencies, U.S. and IJC (staff)

Implications of Delisting



- AOC is formally taken off list of most degraded areas in Great Lakes (remove stigma/"assist in rebranding" Cornwall community)
- Timeframe for the St. Lawrence River AOC delisting is late Summer/Fall 2014(?)
- Ongoing funding commitment is the same as AOC in Recovery
- Monitoring & Reporting commitment is the same as AOC in Recovery
- Community is divided on de-listing of the AOC.
- Mohawks concerned traditional use of the area is still restricted (e.g. can't eat the fish) therefore AOC is still impaired



Implications of "Area of Concern in Recovery"



- AOC remains on list of most degraded areas in Great Lakes
- Timeframe for recovery is unknown (maybe never)
- Funding commitment is the same as delisting
- Monitoring and reporting commitment is the same as delisting
- AOC in Recovery may address possible concerns: "haven't met delisting criteria"
- May address Mohawks concerns on de-listing however, may need to negotiate a role for them under AOC in Recovery

Lessons Learned



- Easy to get on the list- hard to get off.
- Institutional Memory Is Important.
- Be open, transparent (engage public/explain)
- Delisting criteria- should be "Reasonable", "Measureable", "Achievable".
- Clearly articulate- what does "Delisting" vs. "Area in Recovery" mean? Who makes final decision?
- Need clear set of commitments post delisting (criticalesp. re- funding and long-term monitoring)
- Need to stay focused. Keep "eye on the prize".
- Need Patience- Process of delisting takes time





Questions/Comments?



2012 Great Lakes Water Quality Agreement

- A Party may elect to identify an AOC as an AOC in Recovery when all remedial actions identified in the RAP have been implemented and monitoring confirms that the recovery is progressing in accordance with the RAP
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 - 1. Prior to the designation of an AOC in recovery; and
 - Prior to removal of a designation as an AOC or an AOC in Recovery

Overview of Comments From COA-AIC and IJO

What we Heard?

- Executive Summary TOO Long/Detailed
- Status = "Partially Restored"- Not recognized
- No Conclusion re- Weight of Evidence Decision Tree
- Missing- "Area of Concern in Recovery" Discussion
- Fish Consumption Section needs further analysis
- DFO, MNR, MOE and EC Agencies support "Delisting" (Others- Silent)
- Concerns re- negative reactions especially from Mohawks (need to seek ways to address concerns)





Overview of Comments From COA-AIC and IJO

What We Did?

- New/Shorter Executive Summary (24 p vs. 75+p)
- Weight of Evidence Decision Tree used to assess status of "problematic" beneficial uses-
 - Conclusion= "Impaired" OR "Not Impaired"
- Area of Concern in Recovery- added to discussion
- Fish Consumption Section Updated/Revised/ More Stats



Status of Beneficial Uses St. Lawrence River (Cornwall AOC)

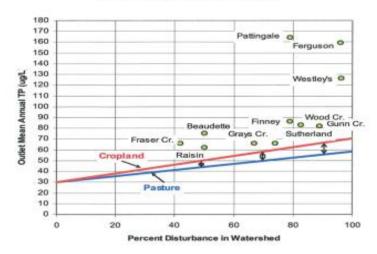
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Partially Restored Beneficial Uses: Eutrophication or Undesirable Algae

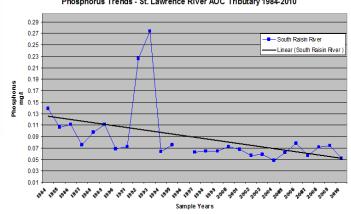
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Land-use-TP Nomogram for the St. Lawrence (Cornwall) AOC



South Raisin River - Cashions Rd, South of Cashions Glen Phosphorus Trends - St. Lawrence River AOC Tributary 1984-2010



Weight of Evidence: Eutrophication or Undesirable Algae



Delisting criteria met?

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- □ Levels of phosphorus remain elevated in tributaries and nearshore waters of Lake St. Francis. (This is an issue throughout the Great Lakes in AOC and non-AOC areas)
- □ 8 out of 11 tributaries have improved considerably and are close to delisting criteria.

Have all RAP priority actions been undertaken?

Municipal, industrial and agricultural actions implemented to address P loadings.

Are AOC conditions comparable to/or similar to non-AOC sites and/or regional basin conditions?

☐ Yes. Comparison show conditions are similar or better.

Are all reasonable risk/impact management measures in place?

- □ Long-term monitoring plan in place.
- Local organizations (RRCA and municipalities) have been encouraged to continue education and restoration through federal, provincial, and other funding programs.

Expert and/or agency and/or public reviews support the assessment?

Yes. Review by MOE and EC experts and St. Lawrence River Restoration Council support the eutrophication or undesirable algae technical assessment with some dissention on need for further action.

Weight of Evidence: Eutrophication or Undesirable Algae



Challenges to fully restore this BU and meet delisting criteria are:

- Agriculture is the predominant land use in the area
- □ 95% of the land is privately owned
- Development of the St. Lawrence Seaway in the 1950's has resulted in flooding of nutrient rich soils and changes in nearshore flow patterns
- Conditions within the AOC have improved to acceptable levels and all reasonable measures have been implemented
- Recommend Re-Designation to "Not Impaired"

Partially Restored Beneficial Uses: Loss of Fish and Wildlife Habitat



Fish and Wildlife Habitat delisting criteria have a number of targets to be met

Environmental Status

- Targets <u>met</u> for:
 - Tributary and coastal wetlands (form/function)
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 - □ Number of forest blocks >1000 hectares.
 - Riparian cover on private and public lands







Weight of Evidence: Fish and Wildlife Habitat



Delisting criteria met?

□ No- Not all targets met (7 out of 10)

Have all RAP priority actions been undertaken?

- Yes. Considerable enhancement and protection of fish and wildlife habitat accomplished.
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Are AOC conditions comparable to similar non-AOC sites and/or regional basin conditions?

- Yes. Some wetland loss however, this is a concern throughout Ontario and the Great Lakes Basin, not just within this AOC.
- AOC wetland function equal to or better than Great Lakes average.



Weight of Evidence: Fish and Wildlife Habitat



Are all reasonable risk/impact management measures in place?

- ☐ Yes. Natural Heritage Strategy has been adopted into municipal Official Plans,
- ☐ Fish Habitat plans are in place.
- □ Long-term monitoring in place.

Expert and/or agency and/or public reviews support the assessment?

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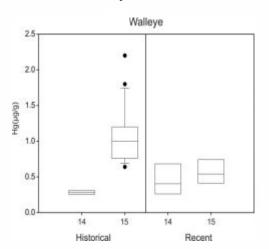
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- Recommend re-designation to "Not Impaired"

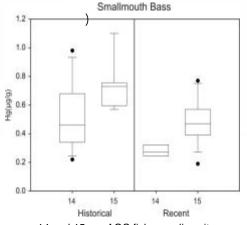
Impaired Beneficial Use: Restrictions of Fish Consumption

Environmental Status

- Mercury levels higher in fish from the AOC (below Moses-Saunders Dam) than upstream
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- All priority actions have been taken to address sources including additional trackdown studies to identify and address fugitive releases in the AOC
- Levels of mercury in AOC fish continue to decline however, the delisting criteria is not expected to be met in the foreseeable future

Comparison of Historical and Current Mercury Levels in AOC Fish





Weight of Evidence: Consumption of Fish and Wildlife



Delisting criteria met?

- No. Current fish mercury values for the AOC remain higher than upstream section of the St. Lawrence River.
- ☐ Fish consumption advisories for AOC are generally more restrictive than upstream.

Have all RAP priority actions been undertaken?

- Yes. All direct discharges of mercury within the AOC have ceased, including closure of 3 main industries.
- Cornwall sediment management strategy completed.

Are AOC conditions comparable or similar to non-AOC sites and/or regional basin conditions?

 Recent mercury comparisons of mercury in AOC and other Ontario lakes/rivers fish suggest that AOC mercury values are within the 75th percentile of values for other Ontario water bodies for three of the four species examined (walleye remains elevated).

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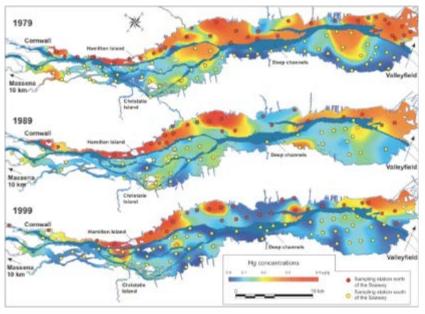
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Expert and/or agency and/or public reviews support the assessment?

- Yes. Expert review by MOE and EC experts and Restoration Council support the assessment of impaired.
- Challenges to meeting the de-listing criteria are:
 - □ Fish mercury concentrations continue to decline however, due to the broad-based low level mercury contamination throughout the north section of this binational AOC and ongoing tributary loadings, the rate of decline is slow and recovery of this BU will take a long time.
- ■Conditions within the AOC have improved, all reasonable measures have been implemented to address mercury loadings to this AOC and long-term risk management processes are in place.
- "Impaired"- recovery continuing

Mercury Distribution In Lake St. Francis Sediment



Weight of Evidence – AOC Delisting Decision Tree All BUIs Meet Delisting Criteria? No More work Have all Stage 2 priority actions to be done been undertaken? No Yes Are AOC conditions comparable to similar non-AOC sites and/or to Yes regional/basin conditions? Yes Are all reasonable risk/impact management measures in place? No Yes Expert &/or Agency &/or public reviews support assessment? Yes **Identify as Area of Conditions improved to** Delist-Concern in extent possible; recommend No Longer an **Delisting** AOC Recovery Environmental Monitoring, Management and Reporting

Status of St. Lawrence (Cornwall) AOC



- Stage 3 RAP report drafted and COA technical and St. Lawrence River Restoration Council (SLRRC) reviews completed.
- All priority actions have been completed.
- Three Beneficial Uses will remain "Impaired" for a long time, possibly permanently.
- AOC conditions comparable to or better than regional conditions.
- Risk/impact management measures are in place.
- Weight of Evidence Decision: conditions improved to extent possible; delisting recommended.
- The Draft Stage 3 RAP Report has been circulated for review by Canadian agencies (COA-AIC), U.S. and IJC (staff)
- Next Steps: COA-MC Decision and Formal Submission to IJC

Implications of "Delisting"



- AOC is formally taken off list of most degraded areas in Great Lakes (remove stigma/"assist in rebranding" Cornwall community)
- Timeframe for the St. Lawrence River AOC delisting is late Summer/Fall 2014
- Ongoing funding commitment is the same as AOC in Recovery
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- Community is divided on de-listing of the AOC.
- Mohawks concerned traditional use of the area is still restricted (e.g. can't eat the fish) therefore AOC is still impaired



Implications of "Area of Concern in Recovery"



- AOC remains on list of most degraded areas in Great Lakes
- Timeframe for recovery is unknown (maybe never)
- Funding commitment is the same as delisting
- Monitoring and reporting commitment is the same as delisting
- AOC in Recovery may address possible concerns: "haven't met delisting criteria"
- May address Mohawks concerns on de-listing however, may need to negotiate a role for them under AOC in Recovery



Questions/Comments?

