

Prepared in cooperation with the  
U.S. Environmental Protection Agency

Prepared in collaboration with the

St. Regis Mohawk Tribe at Akwesasne  
New York State Department of Environmental Conservation

## Estimating chronic toxicity of waters from the St. Lawrence River at Massena Area-of-Concern using two plankton species

*The results from standardized toxicity tests that expose zooplankton and phytoplankton species to local waters can be used to determine if the plankton beneficial use is currently impaired in the St. Lawrence River at Massena New York Area of Concern.*

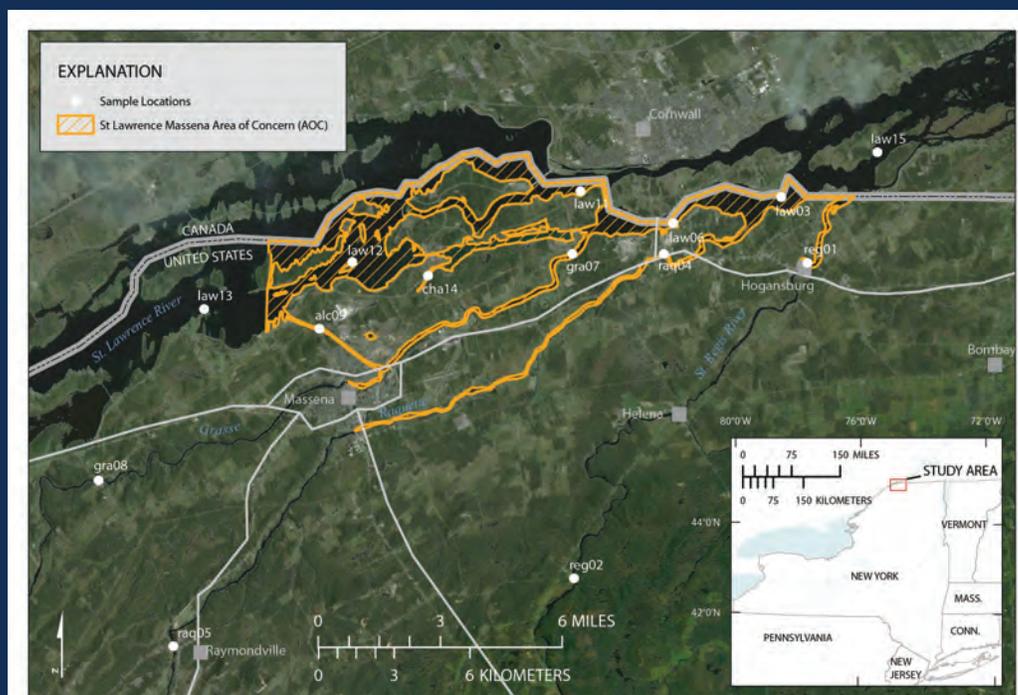
### Background

Past water-quality issues in the St. Lawrence River at Massena, NY resulted in a determination that selected beneficial uses may be impaired in a surrounding **Area of Concern (AOC)** and on the Canadian side of the international boundary (Cornwall, Ontario). The plankton (phytoplankton and

zooplankton) Beneficial Use Impairment (BUI) was so designated because impairment metrics were unavailable or inconclusive. Recent investigations, however, suggest that plankton communities are relatively healthy and no longer threaten the local ecosystem. Thus, the BUI for plankton may now be outdated in

all, or parts of, the St. Lawrence River in the Massena AOC. The primary goal for the Massena (and Cornwall) Remedial Action Plan (RAP) (developed by the [NYSDEC](#), the Massena Citizen Advisory Committee (CAC), the Canadian governments, the Cornwall Public Advisory Committee (PAC), and the [St. Regis Mohawk Tribe at Akwesasne](#)) is to "restore, protect, and maintain the chemical, physical, and biological integrity of the St. Lawrence River ecosystem and in particular the Akwesasne, Cornwall-Lake St. Francis and

### St. Lawrence River at Massena Area-of-Concern



Base from U.S. Geological Survey Digital Data. Universal Transverse Mercator Projection, Zone 18N, NAD83

Massena Area of Concern in accordance with the Great Lakes Water Quality Agreement and other agency laws, regulations, and policies". The RAP established specific criteria in the St. Lawrence River at Massena AOC for delisting (restoring and protecting) the "Degradation of Phytoplankton and Zooplankton Populations" BUI. These criteria are: (1) "phytoplankton or zooplankton community structure does not significantly differ from unimpacted control sites of comparable physical and chemical characteristics", and (2) "in the absence of community structure data, plankton bioassays confirm no toxicity impact in ambient waters (i.e. no growth inhibition)".

### Objectives

The objective of this study is to determine if the phytoplankton and zooplankton beneficial use is impaired, or not impaired, in parts, or all of the St. Lawrence River at Massena AOC. Plankton toxicity data will be used, specifically, to

test whether waters in this AOC meet established criteria for delisting the plankton BUI.

### Approach

This study plans to generate toxicity data needed to test hypotheses that (1) waters at all sample locations in the AOC are not toxic to plankton and (2) the toxicity of waters at all sample locations in the AOC are no more toxic to plankton than are waters from upstream control reaches (in three selected main tributaries and in the St. Lawrence River), which are not within the AOC. Toxicity of waters to plankton from all study sites will be quantified by the (a) growth of the green algae species, *Selenastrum capricornutum* and (b) reproductive capacity (and survival) of *Ceriodaphnia dubia* using standard [USEPA guidelines](#). Statistical analyses that test both hypotheses will be used to determine if waters within the St. Lawrence River at Massena AOC meet the second criterion for delisting the plankton BUI.

### Phytoplankton test organism: *Selenastrum capricornutum*



### Zooplankton test organism: *Ceriodaphnia dubia*



### Related Publications

Baldigo B.P., Duffy B.T., Nally C.J., David T.M., in press. Toxicity of waters from the St. Lawrence River at Massena Area-of-Concern to the plankton species *Selenastrum capricornutum* and *Ceriodaphnia dubia*. *Journal of Great Lakes Research*. volume and pages na. <http://dx.doi.org/10.1016/j.jglr.2012.09.008>

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### For Additional Information

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Project overview and related links:  
<http://ny.cf.er.usgs.gov/nyprojectsearch/projects/2457-E5211-1.html>

### Collecting toxicity-test water on the St. Lawrence River

