

*PRIME*

Partnership for Research and Integration in the Missisquoi Ecosystem  
LCRC's Statement of Intent

Missisquoi Bay is an approximately 77.5 km<sup>2</sup>, rather shallow (< 4m) part of Lake Champlain that lies on the Vermont-Quebec border. Most water enters the Bay through the Missisquoi River, which winds along the Vermont-Quebec border through rural and agricultural communities and several towns. There are a few other direct tributaries to the Bay, the largest of which is the Pike River in Quebec. The total watershed of the Bay covers about 3100 km<sup>2</sup>; about 42% is in Quebec, with the remaining 58% in Vermont. Much of the Bay's shoreline is developed with seasonal and year-round homes, and the Quebec municipalities of Bedford and St Armand draw drinking water from the Bay. The Bay is an important vacation area for the region and its condition is therefore important to the economies of both southwestern Quebec and northwestern Vermont.

The water quality of Missisquoi Bay has deteriorated in recent years. The Bay is quite eutrophic, with phosphorus levels in recent years averaging 0.045 mg/l, nearly twice as high as the criteria endorsed by Vermont and New York (IMBTF 2004). The combination of this level of phosphorus and elevated summer temperatures is believed responsible for blooms of cyanobacteria ("blue-green algae") that are not only unpleasant for recreation, but also can be dangerous due to toxins produced by some cyanobacteria. These conditions have led to beach closings during the last few summers, which has negatively impacted the tourism-based economy of the region. Substrate composition is also reported to have changed in recent years - areas that had been mainly sand with patches of vegetation are now covered with organic silt and clogged with aquatic plants.

The Missisquoi Bay Ecosystem, which includes the Missisquoi River and the Missisquoi National Wildlife Refuge, is home to a wide variety of fish and wildlife. This includes several rare species such as lake sturgeon, eastern sand darter, redhorses, spiny softshell turtles, map turtle, mudpuppy, chorus frog, black terns, and perhaps the Indiana bat. In recent years, invasive or nuisance species, such as Eurasian watermilfoil, frogbit, purple loosestrife, yellow iris, flowering rush, and white perch have spread into the area and in some cases present a threat to native plants and animals. We know little of the current status of most of these species, or the impact that the invasive/nuisance species may be having on the others.

Several international efforts in recent years have been made to study and begin to address the problems in Missisquoi Bay, including efforts to reduce phosphorus inputs. As these management efforts continue, and as additional

management strategies are implemented, there is a unique opportunity to more thoroughly study the condition of the Bay and its broader ecosystem from several perspectives. Through the principles of adaptive management, the knowledge gained by ongoing research during implementation of management practices can provide valuable information regarding the effectiveness and response times of different management strategies. In addition, by also studying the broader ecosystem we can simultaneously begin to improve our overall understanding of how this part of the Lake Champlain Ecosystem operates, and also provide a model for continued multidisciplinary approaches to research efforts elsewhere in the Basin.

The Lake Champlain Research Consortium, therefore, proposes a multidisciplinary international research effort to take a comprehensive look at the Missisquoi Ecosystem. This initiative, entitled the Partnership for Research and Integration in the Missisquoi Ecosystem (PRIME), is in no way intended to delay management implementation, but rather to complement management initiatives by putting a research program in place that will allow us to learn as much as we can while addressing the needs of this region of Lake Champlain. We see most research initiatives as falling into one of two main categories, although these are not mutually exclusive. Research related to improving our understanding of the mechanisms linked to eutrophication and toxic algal blooms are considered under the general category of "Adaptive Management" because the knowledge gained should help us better understand what causes the blooms and how management strategies may affect them. Other research would fall into a broader category of "Ecosystem Structure and Function" because it is designed to provide a more fundamental understanding of the many aspects Missisquoi Ecosystem independent of concerns about excessive eutrophication.