

## Key Site 77: Upper St. Lawrence River, Ontario

**Location:** 44°19'19"N, 76°1'26"W

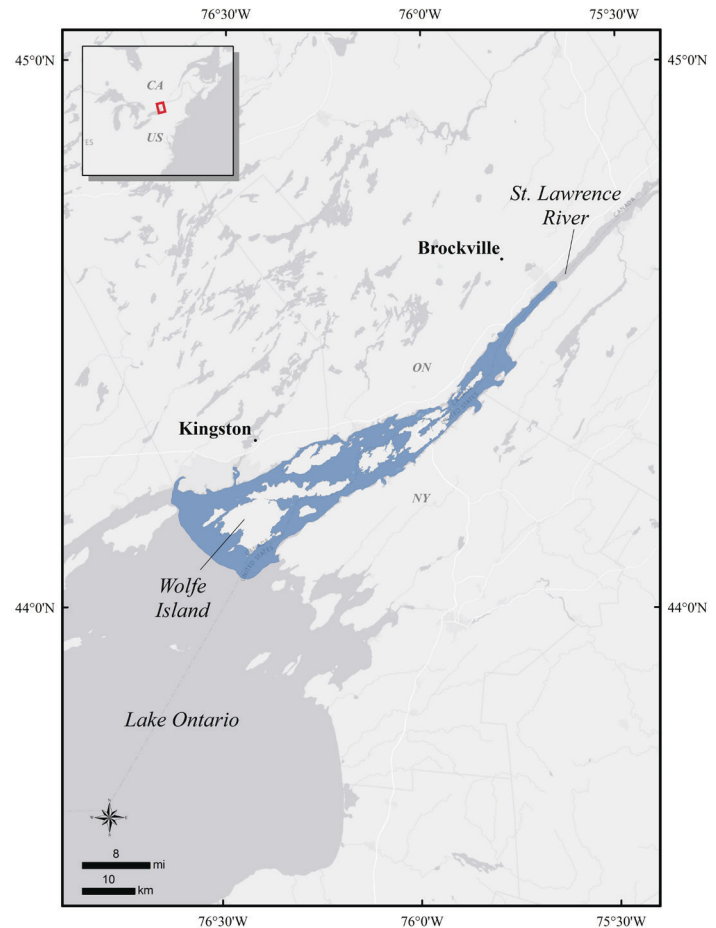
**Size:** 602 km<sup>2</sup>

**Description:** The St. Lawrence River flows north-east from Lake Ontario to the Atlantic Ocean, a distance of about 1200 km, where it forms the Gulf of St. Lawrence. This large river connects the Great Lakes with the Atlantic Ocean and is an important international shipping route. This site is located in the upper portion of the river known as the Thousand Islands – Frontenac Arch region. The Thousand Islands are an archipelago of approximately 1800 islands and numerous shoals within the first 80 km of Canada-U.S. international waters where the river emerges from the northeast corner of Lake Ontario near Wolfe Island and Kingston, Ontario. Specifically, this site includes the Canadian waters of the river extending from the Wolfe Island/Kingston area to Brockville, Ontario. For more detailed information about waterfowl and wetland habitats in the Great Lakes region and the benthic community, limnology, and geomorphology of this part of the St. Lawrence River, see Prince et al. (1992), Lean (2000), Twiss (2007), Farrell et al. (2010), and Marty et al. (2010).

### Precision and Correction of Abundance

**Estimates Presented:** Abundance values are based on several sources: (1) Shoreline surveys conducted as part of the Mid-Winter Waterfowl Survey (MWS) (Environment and Climate Change Canada/Canadian Wildlife Service, Ontario) and the Lower Great Lakes Migrant Waterfowl Survey (LGLMWS) (Environment and Climate Change Canada/Canadian Wildlife Service, Ontario). Observed counts were adjusted by species-specific or species group detection rates estimated for aerial fixed-wing surveys by Hodges et al. (2008) for coastal surveys in Alaska. (2) Ground-based estimates made during Christmas bird counts (CBC) (National Audubon Society 2015) from 1997 to 2015. Observed counts (not adjusted for incomplete detection) were derived from summing annual data from CBC circles included within the key site boundaries.

**Biological Value:** This site is important to several species of sea ducks during spring and fall, but particularly during winter. Long-tailed Duck



(*Clangula hyemalis*), White-winged Scoter (*Melanitta deglandi*), Surf Scoter (*Melanitta perspicillata*), Hooded Merganser (*Lophodytes cucullatus*), Common Merganser (*Mergus merganser*), Red-breasted Merganser (*Mergus serrator*), Common Goldeneye (*Bucephala clangula*), and Bufflehead (*Bucephala albeola*) have been observed in varying abundances since the 1990s at this site (Appendix 1). Sea duck numbers at this site and others across the lower Great Lakes have increased substantially since the mid-1980s and the early 1990s (Petrie and Schummer 2002). The establishment of dreissenid (zebra) mussels at Lake Erie in the mid-1980s and at Lake Ontario in the early 1990s provided an abundant food source for sea ducks and other diving duck species (Custer and Custer 1996, Schummer et al. 2008a, b). Dreissenid mussels also may provide favorable microhabitats for other important aquatic invertebrate prey items, such as amphipods and chironomids, and they may have improved water quality and clarity that benefits merganser forage fish species, such as gizzard shad (*Dorosoma cepedianum*), emerald shiner (*Notropis antherinoides*), and round goby

(*Neogobius melanostomus*) and improved the foraging efficiency of many sea ducks (Wisden and Bailey 1995, Ross et al. 2005, Bur et al. 2008, Schummer et al. 2008b).

**Spring:** During aerial surveys of the lower Great Lakes shorelines of Ontario during 1999 and 2000, the maximum peak abundance of sea ducks at this site has been estimated at 12,200 birds (Environment and Climate Change Canada/Canadian Wildlife Service unpublished data [LGLMWS]). Common Goldeneye, Common Merganser, and Bufflehead were the most common species at this site; the estimated maximum peak number of each species, respectively, was 5700, 3600, and 2800 individuals. Other sea duck species observed in lower maximum peak estimated abundances at this site during spring included Red-breasted Merganser, Long-tailed Duck, Hooded Merganser, and White-winged Scoter.

**Fall:** During aerial surveys of the lower Great Lakes shorelines of Ontario during 1999 and 2000, sea duck estimated maximum peak abundance at this site was 9000 birds (Environment and Climate Change Canada/Canadian Wildlife Service unpublished data [LGLMWS]). Common Goldeneye and Common Merganser were the most common and abundant species at this site during fall, with estimated maximum peak numbers of about 4800 goldeneyes and 2100 mergansers. Other species commonly observed at lower abundances at this site during fall surveys included Bufflehead, Red-breasted Merganser, Long-tailed Duck, and Hooded Merganser.

**Winter:** During annual aerial waterfowl surveys of the Ontario shorelines of the lower Great Lakes conducted during January 2002 through 2018, the maximum peak sea duck abundance at this site was estimated at 43,000 birds (Environment and Climate Change Canada/Canadian Wildlife Service unpublished data [MWS]). CBC circles surveyed annually within this site reported a maximum count of about 18,100 sea ducks between 1997 and 2015 (National Audubon Society and Bird Studies Canada unpublished data [CBC]). The largest concentrations of sea ducks, particularly in years when much of the river is frozen, typically occur closest to Lake Ontario where the river originates. Common Merganser, Common Goldeneye, Bufflehead, and Red-breasted Merganser are among the most common species during this season; maximum peak abundances of those species, respec-

tively, have been estimated at 40,300 (MWS), 4900 (MWS), 2600 (MWS), and 8500 (National Audubon Society and Bird Studies Canada unpublished data [CBC]). Other species observed less regularly on an annual basis and typically at lower maximum peak abundances during winter included Long-tailed Duck (12,200 [MWS]), Hooded Merganser (250 [CBC]), White-winged Scoter (75 [CBC]), Surf Scoter (15 [CBC]), and Black Scoter (26 [MWS]).

**Sensitivities:** Sea ducks are sensitive to human disturbance, mostly related to small vessel and/or shipping traffic, during migration and winter periods. Food resource availability and quality could be influenced by industrial, urban or cottage development, agricultural pollution, and invasive and/or other problematic species. Type E botulism (*Clostridium botulinum*) outbreaks that can kill large numbers of sea ducks and/or waterbirds occur periodically at the lower Great Lakes (Canadian Cooperative Wildlife Health Centre 2003, 2005), particularly during fall migration. Other epizootic disease outbreaks may be possible where large numbers of waterfowl congregate.

**Potential Conflicts:** Disturbance associated with small vessel and ship traffic is a potential conflict during spring and fall at this site. Chemical and oil spills and water contamination are possible from several sources, including shipping, urban, industry, and agriculture. Hydroelectric generating capacity/technologies could also be a future potential conflict at this site.

**Status:** Two areas with conservation designation are located within this site, the Frontenac Arch Biosphere Reserve (part of the UNESCO World Biosphere Reserve program) and St. Lawrence Islands National Park.

#### Literature Cited

- Bur, M. T., M. A. Stepanian, G. Bernhardt, and M. W. Turner. 2008. Fall diets of Red-breasted Merganser (*Mergus serrator*) and Walleye (*Sander vitreus*) in Sandusky Bay and adjacent waters of western Lake Erie. *American Midland Naturalist* 159:147–161.
- Canadian Cooperative Wildlife Health Centre. 2003. Wildlife Health Centre Newsletter fall 2003, volume 9, number 2. <http://www.cwhc-rscf.ca/docs/newsletters/newsletter9-2en.pdf>.

- Canadian Cooperative Wildlife Health Centre. 2005. Wildlife Health Centre Newsletter fall 2005, volume 11, number 1. <http://www.cwhc-rscf.ca/docs/newsletters/newsletter11-1en.pdf>.
- Custer, C. M., and T. W. Custer. 1996. Food habits of diving ducks in the Great Lakes after the zebra mussel (*Dreissena polymorpha*) invasion. *Journal of Field Ornithology* 67:86–99.
- Farrell, J. M., K. T. Holeck, E. L. Mills, C. E. Hoffman, and V. J. Patil. 2010. Recent ecological trends in lower trophic levels of the international section of the St. Lawrence River: A comparison of the 1970s to the 2000s. *Hydrobiologia* 647:21–33.
- Hodges, J. I., D. J. Groves, and B. P. Conant. 2008. Distribution and abundance of waterbirds near shore in Southeast Alaska. *Northwestern Naturalist* 89:85–96.
- Lean, D. R. S. 2000. Some secrets of a great river: An overview of the St. Lawrence River supplement. *Canadian Journal of Fisheries and Aquatic Sciences* 57(Suppl. 1):1–6.
- Marty, J., M. R. Twiss, J. J. Ridal, Y. de La Fontaine, and J. M. Farrell. 2010. From the Great Lakes flows a great river: Overview of the St. Lawrence River ecology supplement. *Hydrobiologia* 647:1–5.
- National Audubon Society. 2015. Annual Summaries of the Christmas Bird Count, 1901–Present. <https://netapp.audubon.org/cbcobservation/>.
- Petrie, S., and M. Schummer. 2002. Waterfowl response to zebra mussels on the lower Great Lakes. *Birding* 34:346–351.
- Prince, H. H., P. I. Padding, and R. W. Knapton. 1992. Waterfowl use of the Laurentian Great Lakes. *Journal of Great Lakes Research* 18:673–699.
- Ross, R. K., S. A. Petrie, S. S. Badzinski, and A. Mullie. 2005. Autumn diet of greater scaup, lesser scaup, and long-tailed ducks on eastern Lake Ontario prior to zebra mussel invasion. *Wildlife Society Bulletin* 33:81–91.
- Schummer, M. L., S. A. Petrie, and R. C. Bailey. 2008a. Dietary overlap sympatric diving ducks during winter on northeastern Lake Ontario. *Auk* 125:425–433.
- Schummer, M. L., S. A. Petrie, and R. C. Bailey. 2008b. Interaction between macroinvertebrate abundance and habitat use by diving ducks during winter on northeastern Lake Ontario. *Journal of Great Lakes Research* 34:54–71.
- Twiss, M. R. 2007. Whither the St. Lawrence River? *Journal of Great Lakes Research* 33:693–698.
- Wisden, P. A., and R. C. Bailey. 1995. Development of a macroinvertebrate community structure associated with zebra mussel (*Dreissena polymorpha*) colonization of artificial substrates. *Canadian Journal of Zoology* 73:1438–1443.