

# **Wetlands Status and Trends – for Coastal Wetlands**

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## **Background**

Coastal wetlands are important habitats for a number of plants and animals, and are unique within the Great Lakes for their high productivity and biodiversity. They are ecotones, occurring between land and water, making them essential habitat for Great Lakes fishes, migratory birds, reptiles and amphibians. They are operationally defined as wetlands that occur within 2 km of the 1:100 year floodline of the Great Lake/channel shoreline, and include all four wetland types identified in the Ontario Wetland Evaluation System.

An estimate of current coastal wetlands along the shores of the southern Great Lakes (Ontario and Erie) and their connecting channels (St. Clair, Niagara, Detroit, St. Lawrence) is over 70,000 ha (Ingram et al. 2005). However, coastal wetland losses have been severe since European settlement. About 35% of the wetlands along the Canadian shorelines of Lakes St. Clair, Erie and Ontario have been lost (McCullough, 1985). Between 1789 and 1979, 43% (1,920 ha) of the original coastal marsh along the Canadian shore west of the Bay of Quinte has been lost – with the greatest loss being in the area from Toronto to the Niagara River where 73% to 100% of original coastal marshes were lost (Whillans 1982).

## **Status**

In addition to historic losses, portions of coastal wetlands throughout the Great Lakes continue to be lost due to human encroachment. The Great Lakes Coastal Wetland Consortium (GLCWC) initiated a binational inventory to map and classify all coastal wetlands on both the U.S. and Canadian shorelines (Ingram et al. 2004). The inventory was based on available information at the time of writing, and included comprehensive coverage of U.S. wetlands, as well as Canadian wetlands in the two lower lakes and connecting channels. There were data gaps, however, for Georgian Bay and the North Channel, because the shoreline was too extensive to be surveyed by aerial photography, especially the Township of the Archipelago north of Parry Sound. McMaster University researchers are leading a new mapping initiative using IKONOS satellite imagery and ground-truth information. The GLCWC inventory has been updated with the McMaster information for Georgian Bay to produce a more comprehensive inventory for the entire Great Lakes basin (see Figure 1).

Coastal wetlands of Lake Huron and Georgian Bay together account for 64,641 ha, which is almost 30% of the total wetland area for all five Great Lakes. This is a conservative estimate because the McMaster measurement does not yet include the upper marsh and inland wetlands. Wetlands of Lake Michigan account for 20%, while those in Lake Superior and the St. Marys River together account for another 17%. The remaining 33% are distributed among Lakes Erie, Ontario and the connecting channels.

## **Stressors / Pressures**

Recent publications have discovered a significant link between anthropogenic stressors (i.e. urbanization and agricultural development) and degradation of coastal wetlands on a lake-basin scale (Chow-Fraser 2006; Danz et al. 2007; Morrice et al. 2007; Trebitz et al. 2007). Factors such as percentage of altered land (Chow-Fraser 2006), human population density (Danz et al. 2007, Morrice et al. 2007), and road density

(Danz et al. 2007) are all established indicators of cultural degradation that tend to increase concentrations of nutrients and suspended solids in natural ecosystems. In response to the growing concern over eutrophication, the past 15 years has seen much research devoted to the development of ecological indices, in an effort to track and monitor the habitat quality of Great Lakes coastal waters (e.g. Minns et al. 1994; Lougheed and Chow-Fraser 2002; Wilcox et al. 2002; McNair and Chow-Fraser 2003; Uzarski et al. 2005; Seilheimer and Chow-Fraser 2006; Niemi et al. 2007).

Water Quality Index scores (Chow-Fraser 2006) have been calculated for over 200 wetlands that had been surveyed between 1998 and 2008 (Figure 2 and 3). This snapshot of wetland conditions across the basin shows that most of the degraded sites are located in the lower lakes, especially in the western end of Lakes Ontario and Erie, where wetlands have been negatively impacted by urbanization and agricultural activities, respectively. Few of the sites in Georgian Bay, Lake Huron and Superior were in degraded condition. Sites deemed to be in excellent or reference condition were only found in Lake Huron, Superior and Georgian Bay.

### **Management Implications**

Georgian Bay is one of the world's largest freshwater archipelagos, and wetland habitat is prevalent along the highly complex shoreline, especially throughout the eastern coast. This region is host to a disproportionately large number of pristine wetlands, with high biodiversity of plants and animals (Chow-Fraser 2006; Croft and Chow-Fraser 2007; Seilheimer and Chow-Fraser 2007; see Figure 2 and 3). Although most of these habitats are still un-impacted, the highway system serving this region has been recently expanded, and cottage and residential development along the shoreline are expected to rapidly increase.

Georgian Bay is prone to the same anthropogenic stressors as the lower lakes, which have been affected by human growth for a much longer time and to a greater degree. Research at McMaster University shows that incremental cottage development along with an expanded road network has resulted in eutrophication and ecological damage to wetlands of southeastern Georgian Bay, even without the conventional stressors related to large-scale land-use alterations (e.g. industrial, agricultural or urban activities). Pollutants such as primary nutrients and total suspended solids tends to increase with road density, as does the number of exotic fish and plant species. Even though most of the Georgian Bay sites are currently in very good to excellent condition, a few wetlands with heavy cottage development are showing signs of water-quality impairment similar to those in settled areas of the lower Great Lakes. Steps should be taken now to identify the high-quality wetlands and to protect them from human encroachment.

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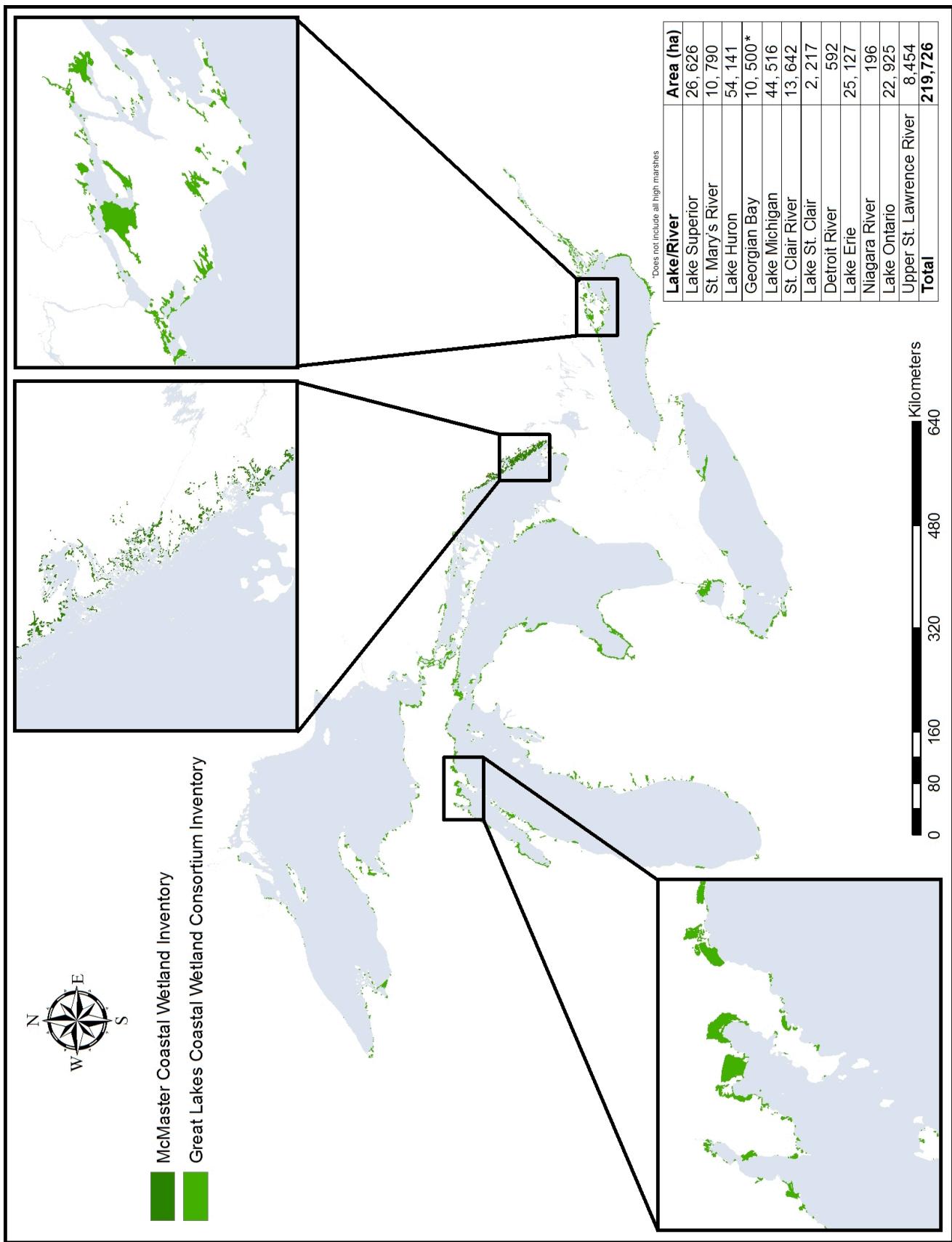


Figure 1. Distribution of coastal wetlands in the Great Lakes.

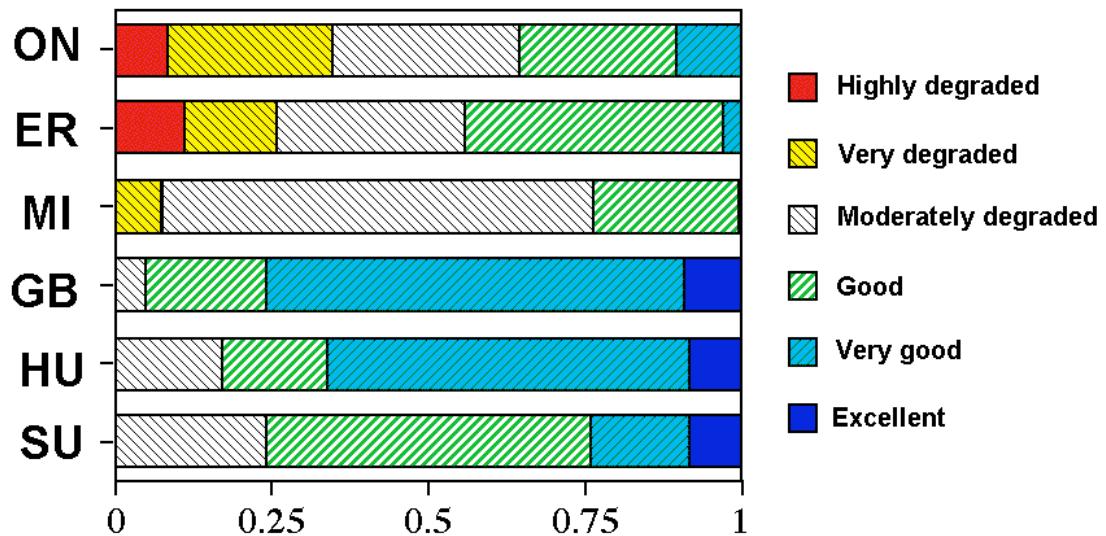


Figure 2. Differences among lakes with respect to percent total wetlands in each category of wetland quality according to WQI scores (see Chow-Fraser 2006). ON=Ontario, Niagara River and St. Lawrence River; ER=Erie and Lake St. Clair and connecting channels; MI=Michigan; GB=Georgian Bay and the North Channel; HU=Huron (without GB and the North Channel), SU=Superior.

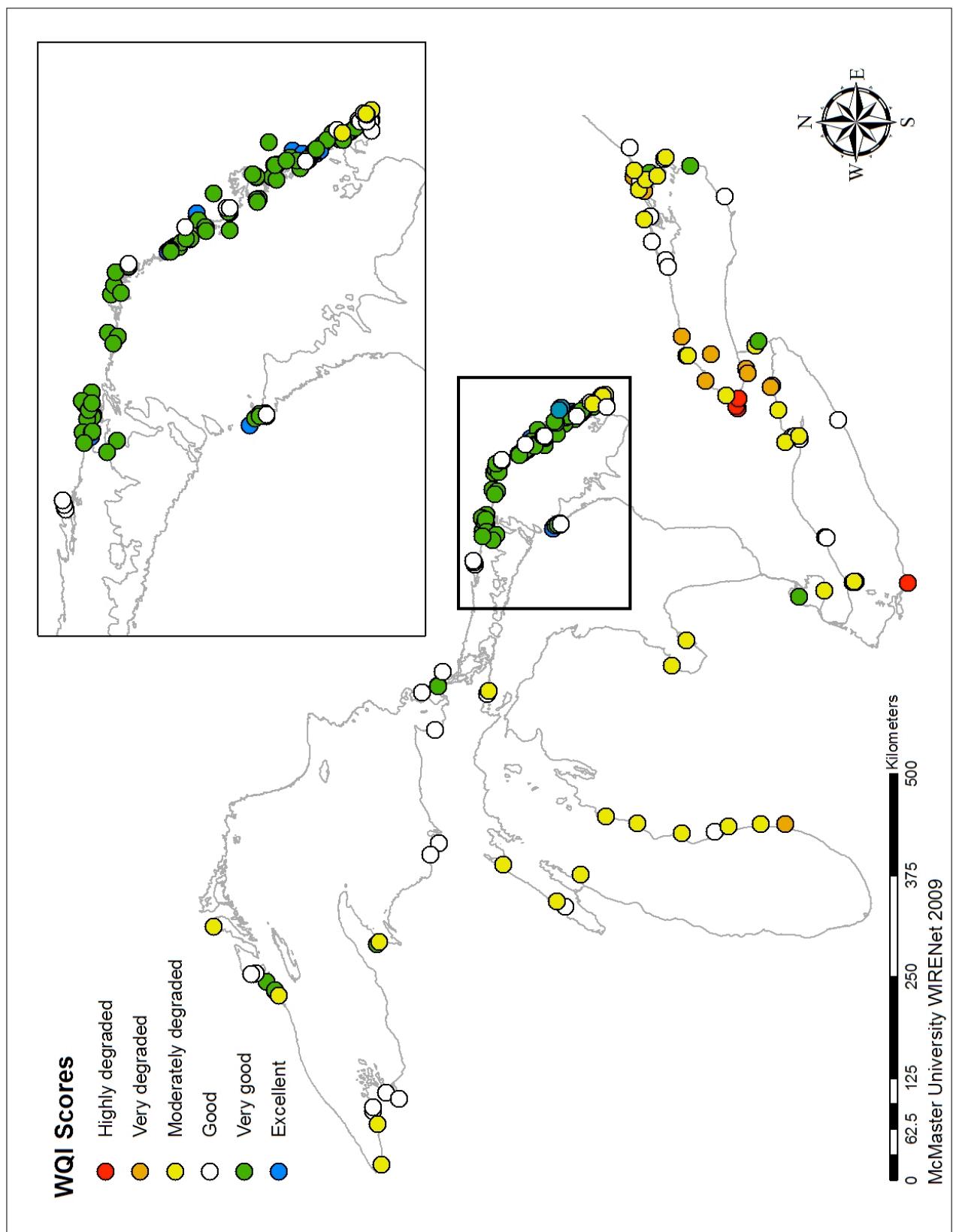


Figure 3. Distribution of wetlands and their associated ecological condition as determined by the Water Quality Index. Inset is the map of Georgian Bay.