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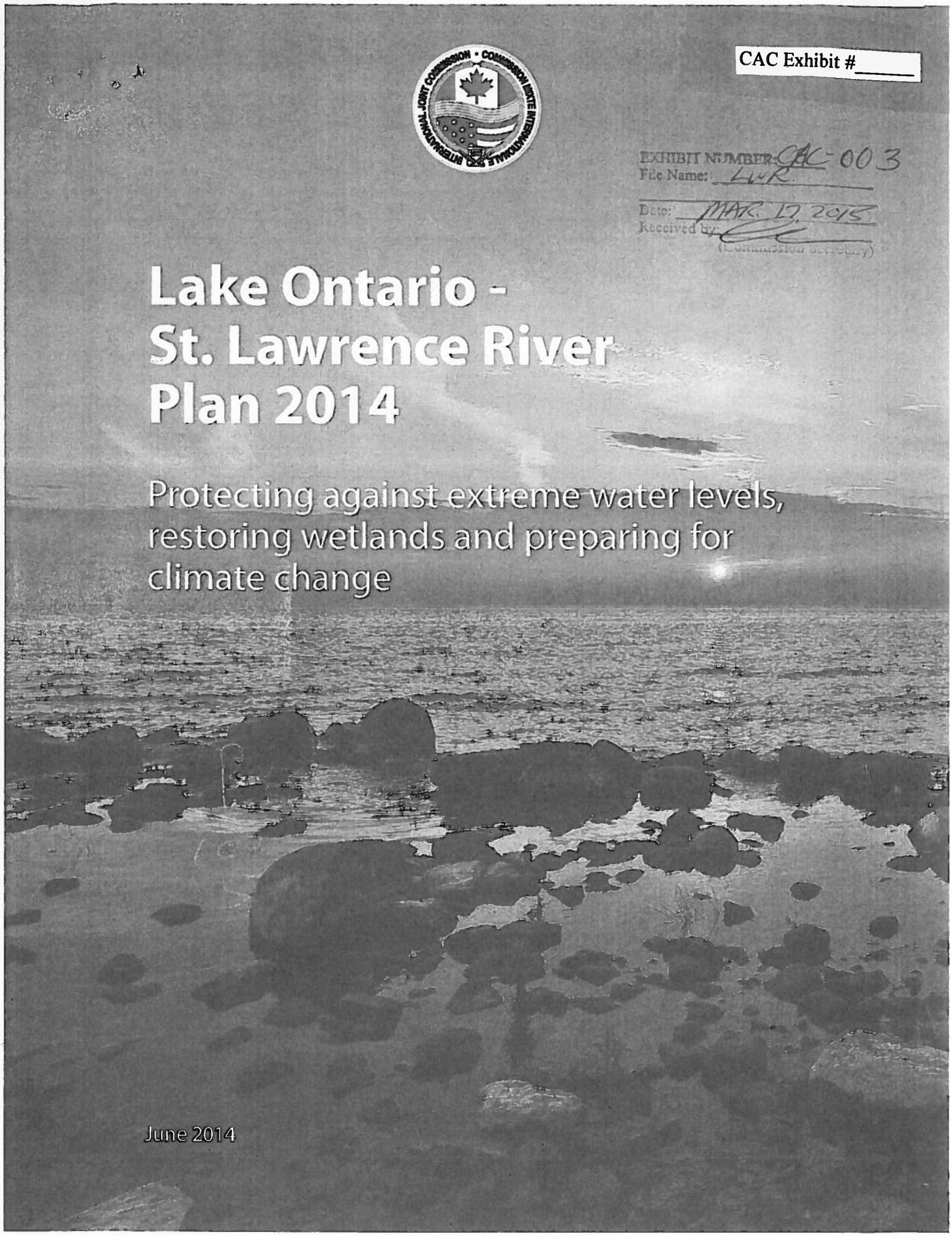
Lake Ontario - St. Lawrence River Plan 2014

Protecting against extreme water levels, restoring wetlands and preparing for climate change



June 2014

Public Concern	IJC Response
4. Past Siting and Design Decisions	IJC heard testimony that many designs are not based on the current plan; some shore protection structures are being designed to accommodate only a 1.2 m (4 ft) range of water levels, even though the range of levels under Plan 1958DD has been about 1.8 m (6 ft) More than 90% of the impact to coastal property involves existing or new protection structures; as a result, some communities along the south shore will suffer coastal damages to existing development, no matter the regulation plan Plan 2014 is not expected to change the floodplain delineation that has guided home design along the Lake Ontario's shoreline
5. Mitigation of Damages	Future high Lake Ontario water levels under any regulation plan can be expected to damage or threaten existing shore protection, water and wastewater systems, and even some homes Meaningful reductions in the level of risk can only be realized through the design of homes, structures and infrastructure systems; while these are addressed by domestic regulations, the IJC can inform those considerations with evidence from its own investigations
6. Assessment of Damage to Wetlands	The IJC reviewed the findings of the Lake Ontario-St. Lawrence River Study, the peer review of that Study, and subsequent evidence and arguments on the subject of the integrity of the environmental science before concluding that the evidence is overwhelming that current regulation rules damage the environment

4.5 Ecosystems

4.5.1 Overview of the Interest[24]

The ecosystems interest includes the biological components of the natural environment of Lake Ontario and the St. Lawrence River, together with the ecological services that the natural environment provides to people who live and work in the region.

The biological communities of Lake Ontario and the St. Lawrence River have, by necessity, evolved to adapt to the natural range of water levels and water level changes that occur on time scales ranging from wind-driven seiches that can occur several times daily, to the seasonal cycle, to changes that occur over decades and longer.

The biological effects of water level fluctuations are greatest in shallow water, where even small changes in water levels can result in conversion of a standing water environment to an environment in which sediments are exposed to the air, or *vice versa*. The localized effects of this change in the environment are evident in the relatively immobile plant communities that occur in wetlands. In fact, the patterns of water level change are the driving force that determines the overall diversity and condition of wetland plant communities and the habitats they

[24] Based on Lake Ontario-St. Lawrence River Study Environmental Technical Work Group Report (IJC, 2006f).

provide for a multitude of invertebrates, amphibians, reptiles, fish, birds and mammals.

There are more than 80 species of plants and animals in the Lake Ontario-St. Lawrence coastal zone that are sensitive to water level fluctuations and that are being tracked as species of concern by the Natural Heritage Program in New York and the Natural Heritage Information Centre in Ontario. Of these species, 30 are officially designated by state, provincial or federal authorities as threatened or endangered. In the Quebec section of the lower St. Lawrence River, there are 13 special concern, vulnerable, threatened and/or endangered species affected by water levels.

The coastal wetland area within Lake Ontario and the St. Lawrence River is about 26,000 ha (64,000 acres) in size. These wetlands are made up of four basic types: submerged aquatic vegetation; emergent marsh; meadow marsh; and upland vegetation (trees/shrubs) (Wilcox, et al., 2005). More than 80% of the wetland area occurs in the eastern half of the Lake Ontario basin and Thousand Islands region.

Further down the river, the ecological value of Lake St. Pierre marshes has been recognized by their designation as a Ramsar wetland by an international compact. The lake is a UNESCO Biosphere Reserve and is included as a protected site under the Eastern Habitat Joint Venture. With more than 12,000 ha (30,000 acres) of swamps and marshes, Lake St. Pierre accounts for 80% of lower St. Lawrence River wetlands. The lake also supports a large population of nesting blue heron, a major staging area for migratory wildfowl and 167 species of nesting birds. Permanently submerged areas, wetlands and the spring floodplain are home to 13 amphibian and 79 fish species, many of which are sought by sport and commercial fisheries.

4.5.2 Effects of Plan 2014

The Lake Ontario-St. Lawrence River Study Board concluded that the:

> "...current regulation plan has reduced the range and occurrences of extreme Lake Ontario levels as intended under the existing Order of Approval. From an environmental perspective, this has resulted in a smaller transition zone within wetlands from submerged to upland plants, thus reducing the diversity of plant life along the shore and negatively impacting birds, fish and mammals that depend on those plants. Regulation has also caused dewatering drawdowns in the fall through early spring, to the detriment of some habitat." (IJC, 2006)

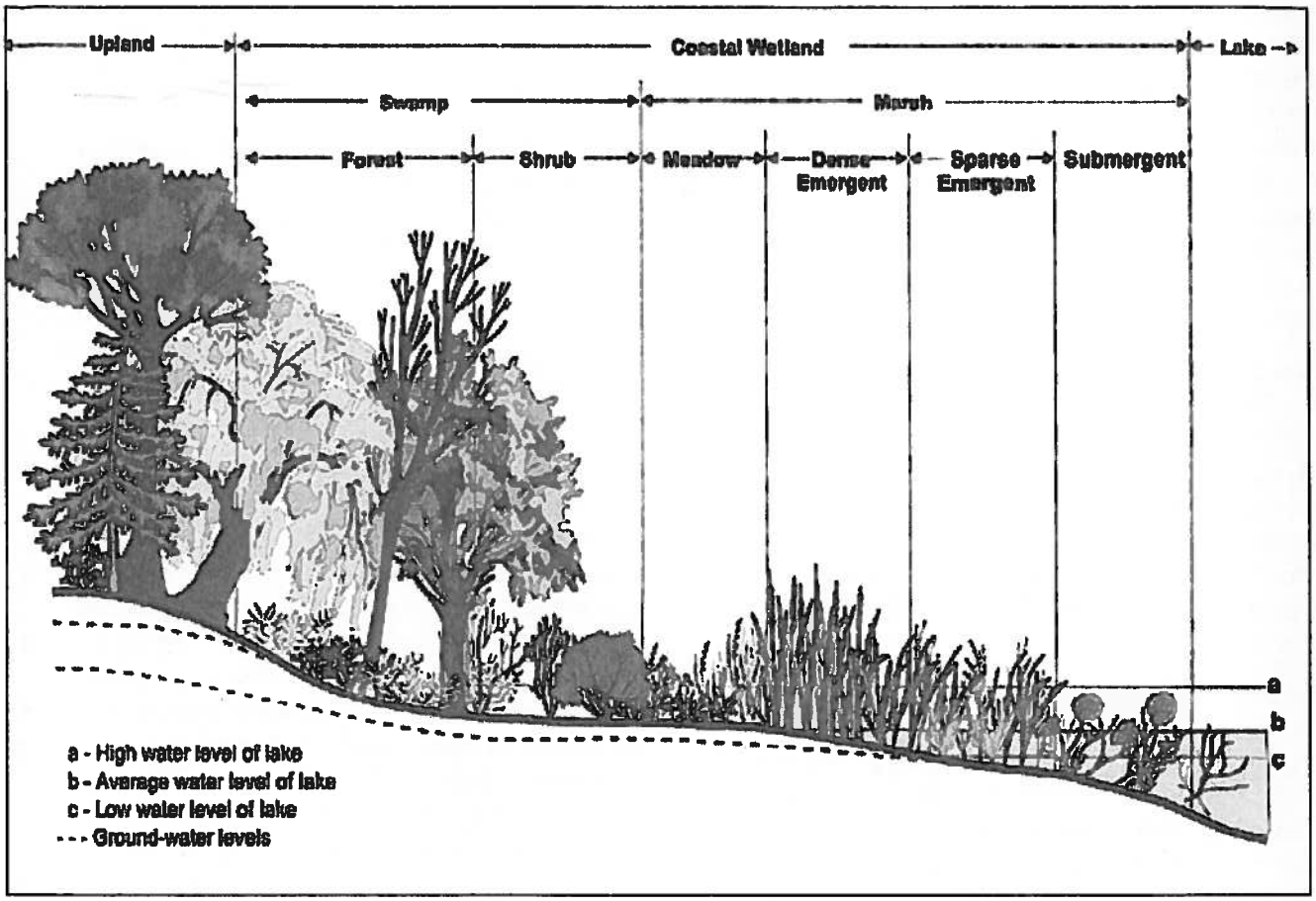
Comparing the variability of the 101 years of Lake Ontario water levels resulting with no regulation and with regulation under Plan 1958DD (shown in Figures Ex-1 and Ex-3 in the Executive Summary) demonstrates that regulation of Lake Ontario has restricted the natural fluctuations of its water levels, both in terms of reducing its extremes and year-to-year variability. These figures also show that Plan 1958DD typically has reduced the lake levels significantly in the winter compared to the natural levels.

Different plants have different watering requirements. The compression of the range of lake levels has allowed the trees and shrubs to grow closer to the water and cattails and other emergent plants that tolerate persistent flooding to expand their range up the shoreline, squeezing out meadow marsh plants in-between (see Figure 20). The strong correlations between plant types and flooding history were evident in the extensive sampling of wetlands at 32 sites around Lake Ontario during the Lake Ontario-St. Lawrence River Study. Study researchers carefully inventoried the kinds of plants growing at different elevations, and were then able to show strong relationships between the type of plants found on the shore and how recently the shore had been flooded at that elevation (Wilcox *et al.*, 2005). They determined that upland plants dominated above elevations that had not been inundated in the past 30 years. As well, there was little meadow marsh vegetation at elevations that had been kept wet in the growing season for the last five years.

These results were consistent with the published water tolerances for upland and meadow marsh plants. Regulation plans could then be evaluated based on these evident relationships. Plan 2014 would allow both more frequent low and more frequent high Lake Ontario water levels that would

Figure 20

Compressing Natural Water Level Variability Reduces Plant and Animal Diversity
Source: Wilcox, 2012



expand the meadow marsh areas from time to time, creating a dynamic diversity in wetland plants and the animal life associated with them, while still controlling most of the high levels that can damage coastal development.

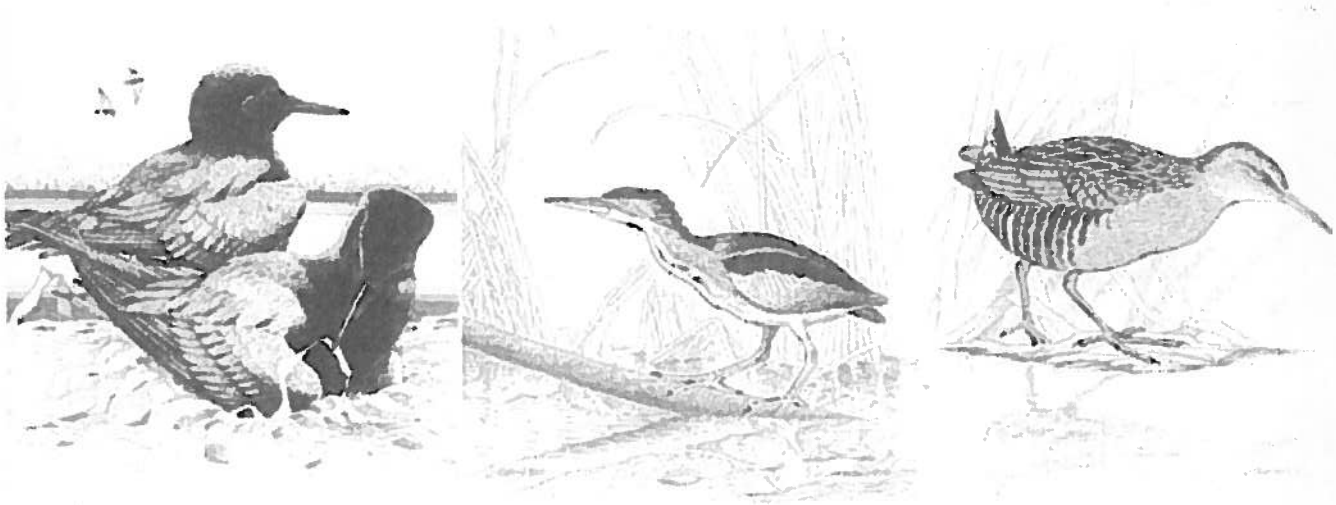
Plan 2014 also would help restore bird species such as the Black Tern, Least Bittern, and King Rail (Figure 21), which are listed as at-risk by either New York State or the Province of Ontario (DesGranges *et al.*, 2005).

The health of muskrat and northern pike species is an indication of the health of the ecosystem more generally. The more natural fall-winter-spring drawdown of Lake Ontario levels with Plan 2014 would benefit the environment for muskrat overwintering survival and northern pike access to spawning habitat in the spring. Environmental scientists and organizations that responded during the IJC's 2013 public hearings supported these findings, though in some cases they expressed concern that the implementation of a new plan was taking years and that Plan 2014 ceded some of the environmental benefits attributed to Plans B+ and Bv7.

The U.S. Department of Interior, the USEPA, Conservation Ontario, and many environmental non-governmental organizations in New York, Ontario and Quebec that responded during the 2013 hearings supported Plan 2014 because of its environmental benefits. Many of these respondents noted the finding from IJC studies that past regulation of Lake Ontario levels has caused the loss of wetland plant diversity. Even some residents of Lake Ontario's south shore said during the 2013 hearings that they had personally observed this

Figure 21

Plan 2014 Would Help Several Species of At-risk Birds



Black Tern **Least Bittern** **King Rail**

Regulation of Lake Ontario levels since 1960 has greatly reduced the variability of water levels, and for over 50 years, that has affected natural life along the coastal zone of the lake. Plan 2014 would restore enough of the natural variability to make significant improvements to the environment while protecting most of the benefits to riparians along the Lake Ontario shorelines.

Ecosystem performance indicators associated with particular species, such as the three at-risk bird species shown here, often have broader significance because they are applicable to many species with the same habitat requirements.

impact over the decades they had lived there. In addition to confirming the scientific assessment of the relationship between water level patterns and wetland health, several thousand expressions of support for a regulation plan that addressed the environment were received by the IJC, documenting the public interest in ecosystem health.

The restoration of more natural water level regimes in Lake Ontario and the St. Lawrence River is not a traditional wetland restoration project, which typically includes harvesting and planting, physical transformations of the wetlands, or cleanup of pollutants. Nonetheless, as the USEPA noted, "Plan 2014 will increase the diversity and functioning of 64,000 acres of coastal wetlands by allowing hydrologic conditions to support native wetland plant seed germination and growth" (USEPA, 2013).

Focusing on scale alone, there are few wetland restoration projects in the history of such projects in North America that have affected as large an area. By comparison, the Everglades Restoration is much larger, costing billions of dollars and affecting millions of acres, but is considered the largest ecosystem restoration project in the world. Napa Sonoma Marsh Restoration project in California, when completed, is expected to restore as many as 10,000 acres at a cost of $55 million (2004 U.S. dollars) USACE, 2004). The Emiquon Floodplain Restoration on the Illinois River, near Peoria, Illinois, will restore about 5,400 acres at a cost of over $13 million (USACE, 2014).

Ecosystem Effects of Plan 2014 on the Lower St. Lawrence River

As shown in Table 1, there are no significant differences to ecosystems on the lower river among the various regulation plans. The relationship between releases from the Moses-Saunders dam and each lower river ecosystem performance indicator is different. Factors such as mean water depth or levels, mean current velocity and water level decrease over certain parts of the year are important drivers of many of these indicators. However, the changes from the Plan 1958DD release patterns to Plan 2014 patterns were not enough to make a significant difference to the