



Environment
Canada

Environnement
Canada



The Changing Nature of a River: Aspects of the Biological Integrity of the St. Lawrence

Martin Jean

St. Lawrence Centre, Environment Canada, Quebec Region

Overview

- Is the St. Lawrence River healthy?
- Historical changes:
 - in wetlands
 - in species composition
- Other changes
- The next step: A Monitoring Program

The St. Lawrence River: A Few Facts

- One of the largest rivers in the world
- 70% or 5 million Quebecers live along its shores



Is the St. Lawrence River Healthy?

- Little baseline data are available to determine the characteristics of a healthy St. Lawrence River
- There is no question that the physical pressures on the St. Lawrence River have undermined the biological integrity of the system



St. Lawrence Centre, 2000

Times Have Changed...



Source: La Presse, Oct. 7, 2000, B2



HEIGHT OF WATER
DURING FLOOD
APRIL 18TH 1886

St. Lawrence Centre, 2002



St. Lawrence Centre, 2002

A photograph of a wetland pond. The water is dark blue and filled with numerous lily pads of various shades of green and yellow. Some lily pads are in the foreground, while others are scattered throughout the pond. In the background, there is a dense line of trees and a grassy bank. The sky is clear and blue. The text "Changes in Wetlands" is overlaid in the center of the image in a yellow, sans-serif font.

Changes in Wetlands

Montreal's Wetlands and Watercourses: 1542 - 1642



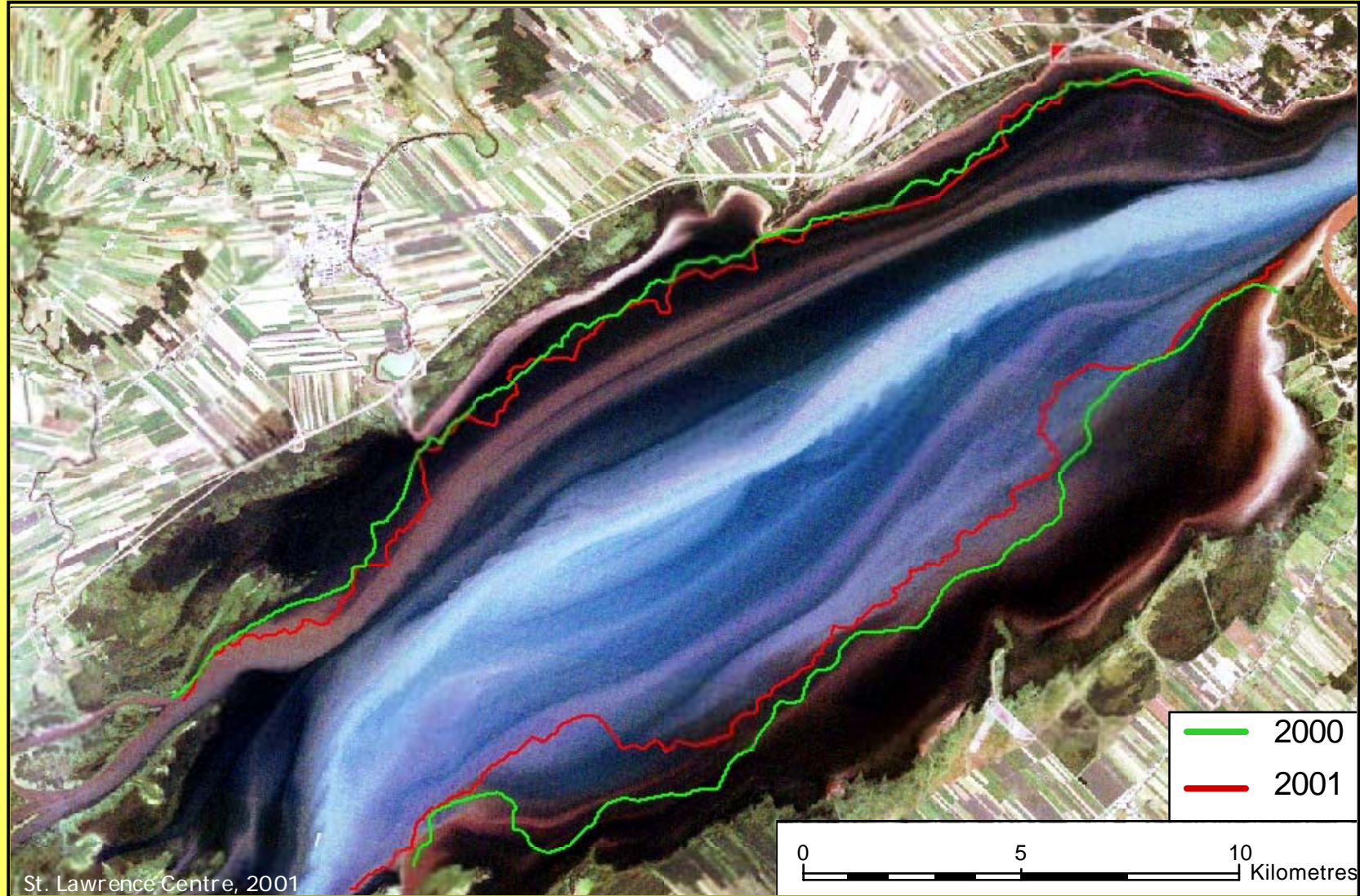
Adapted from Beaugrand-Champagne, 1942

Wetland Losses



- 80% of wetlands have been lost since French settlement
- 50% of the shoreline between Cornwall and Quebec City has been altered by agriculture and urban development

Wetlands in Transition

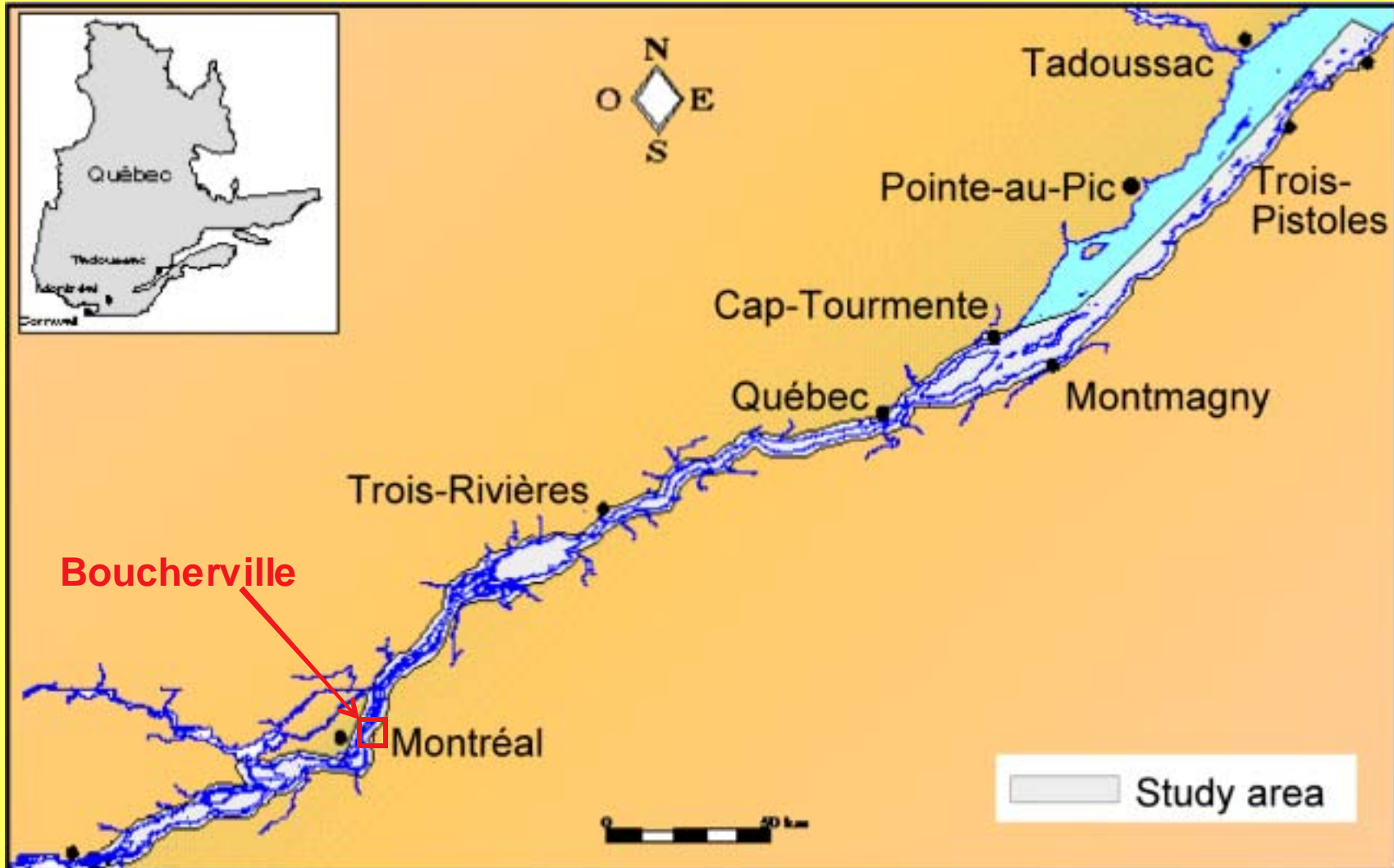


Wetlands *Can* Look Like This!



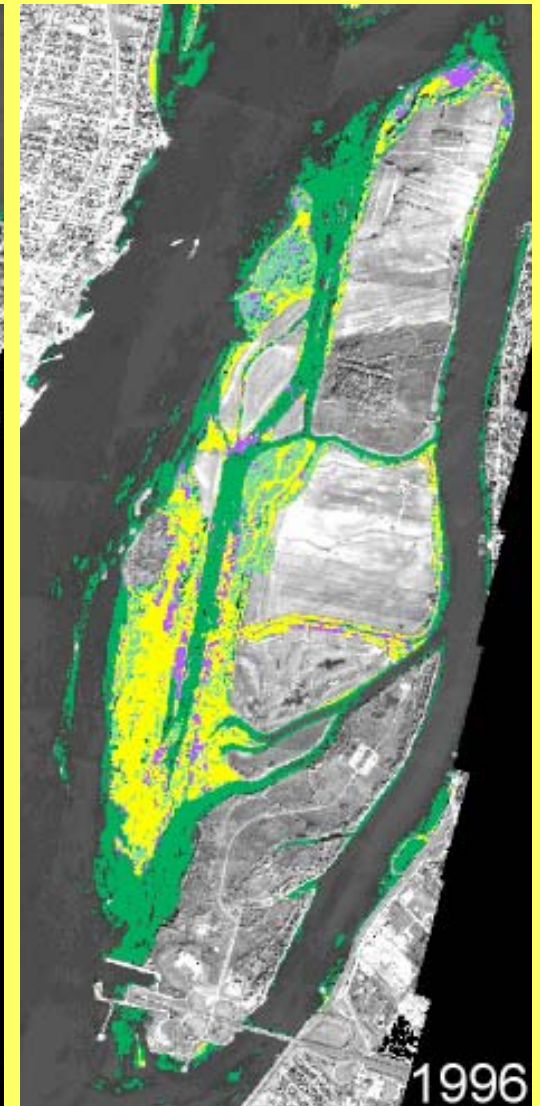
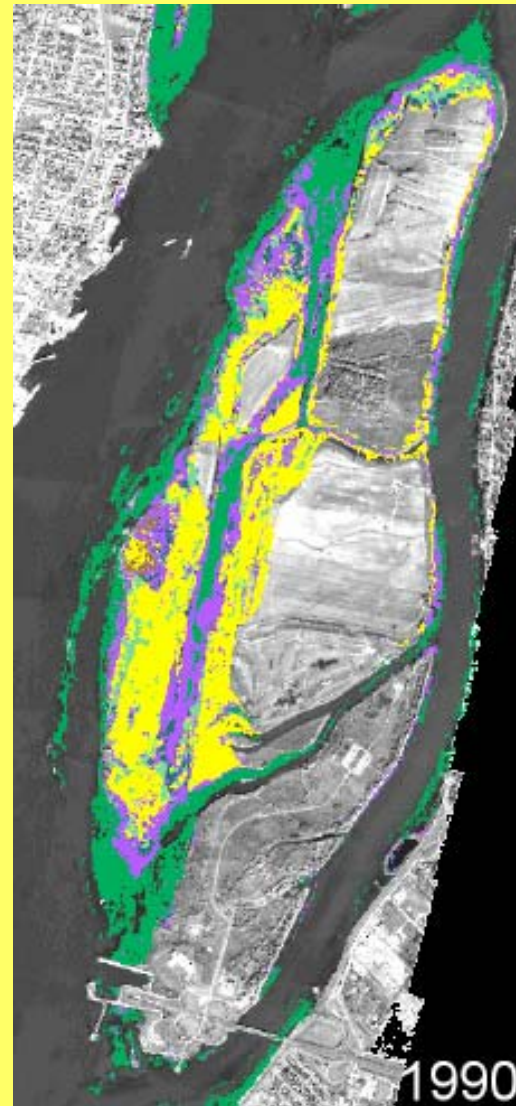
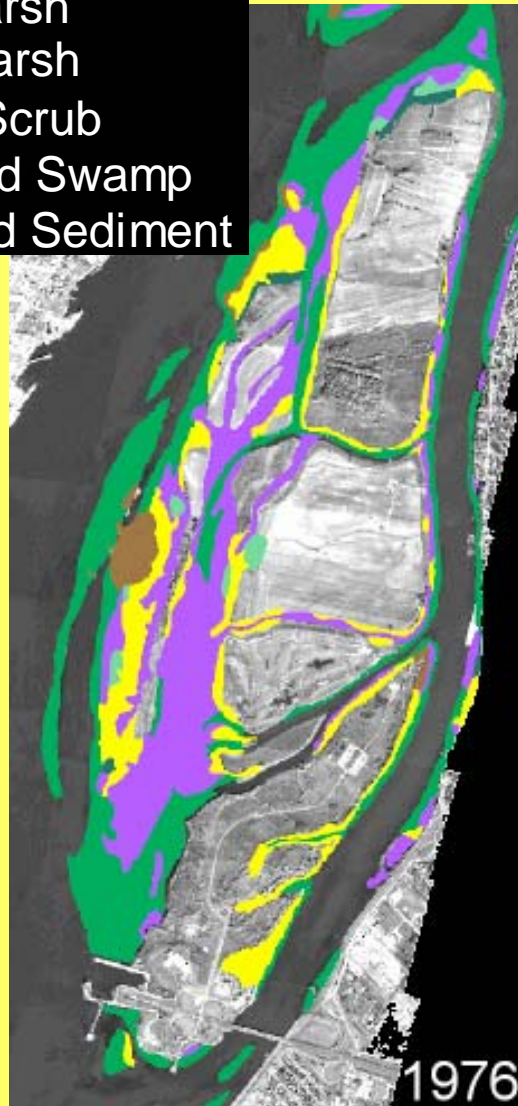
St. Lawrence Centre, 2001

Wetland Monitoring: Study Area



Boucherville: 1976 - 1996

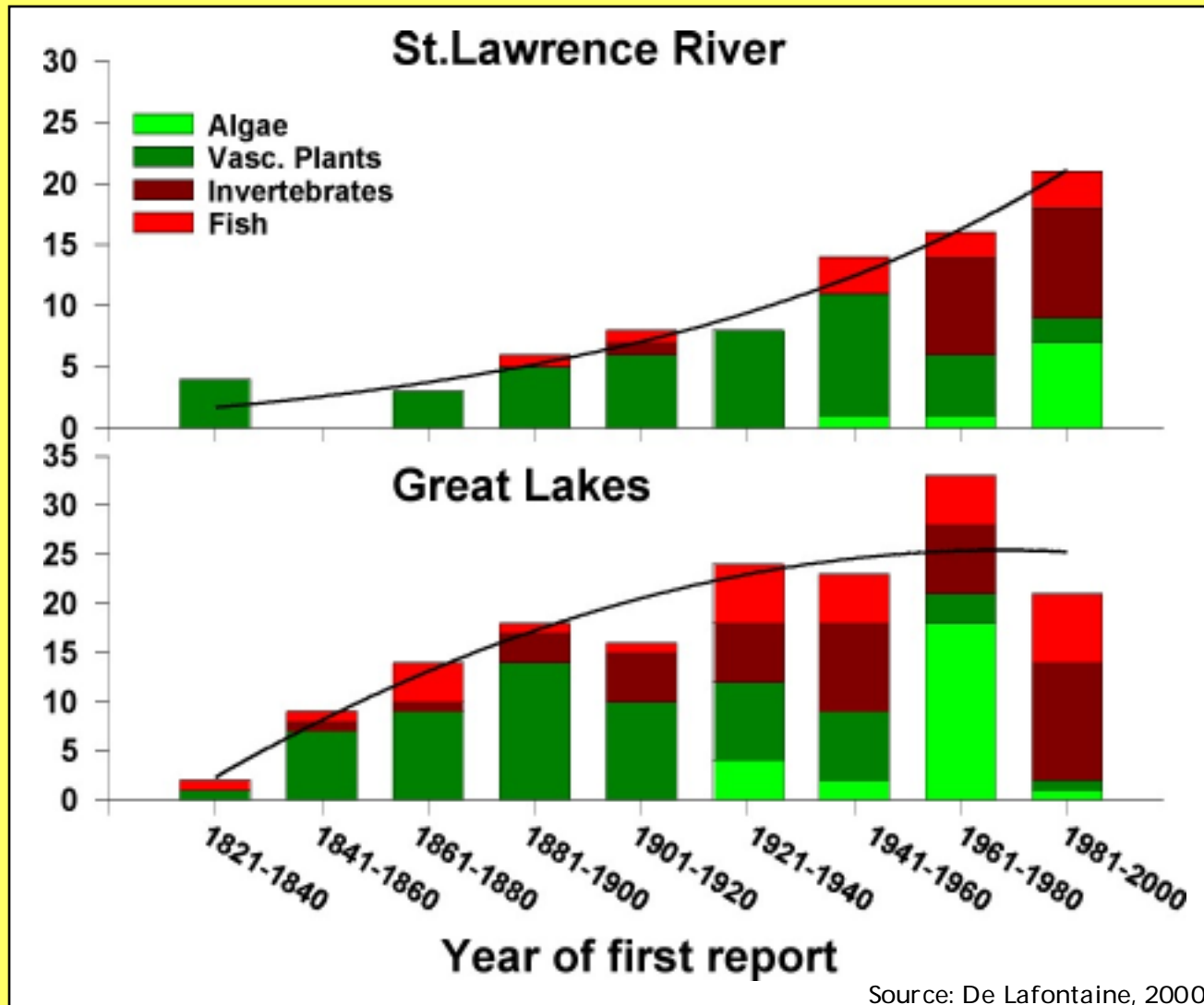
- Aquatic Bed
- Low Marsh
- High Marsh
- Shrub/Scrub
- Forested Swamp
- Exposed Sediment



Changes in Species Composition



Non-Native Species: St. Lawrence River vs. Great Lakes

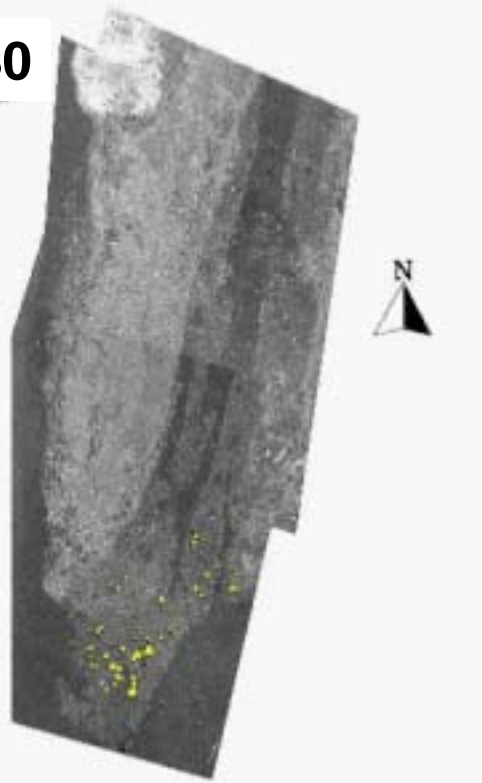


Source: De Lafontaine, 2000

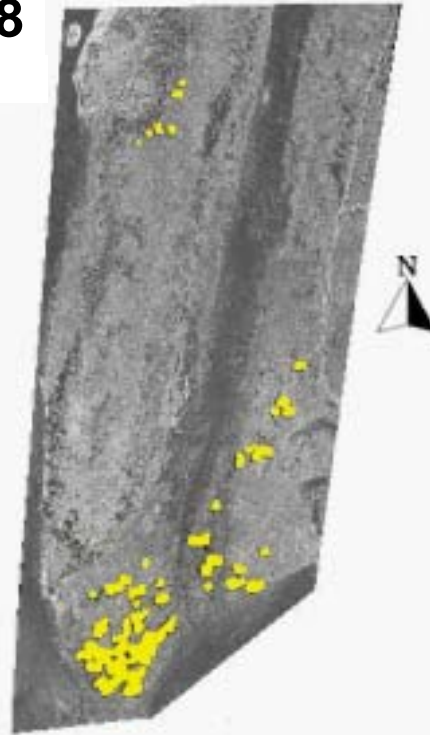
Common Reed (*Phragmites australis*)



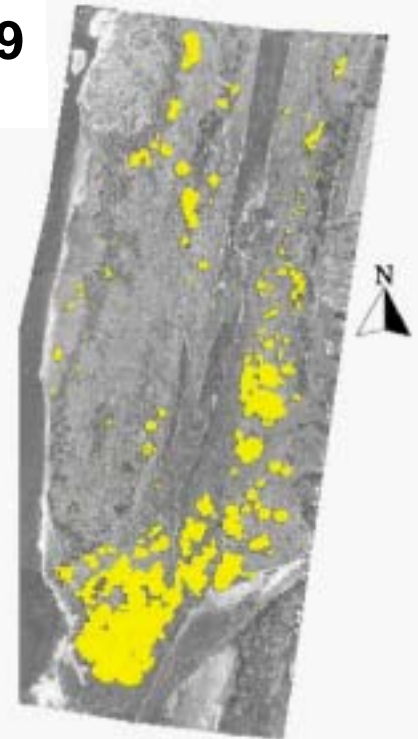
1980



1988



1999

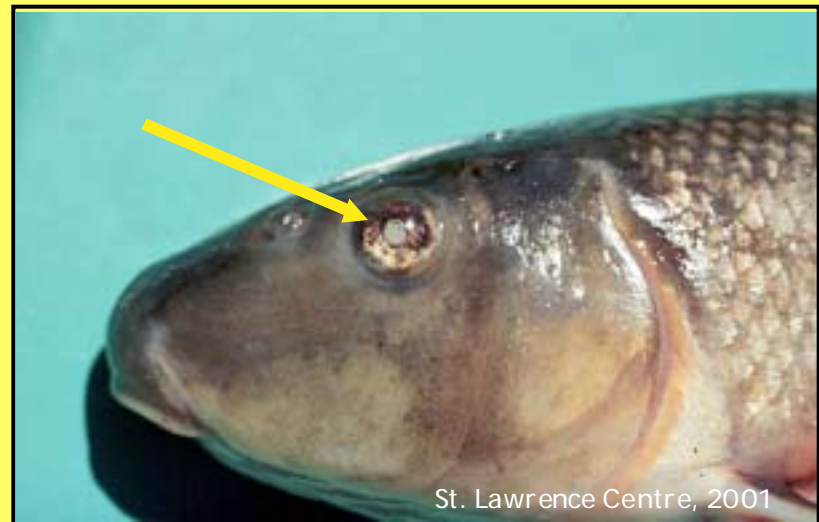


An aerial photograph of a coastal wetland. The foreground is dominated by lush green marsh vegetation, with several small, winding channels of water cutting through it. The marsh extends towards a large body of blue water, likely a bay or estuary, which stretches to the horizon. The sky is a clear, bright blue with a few scattered white clouds. The overall scene depicts a healthy, natural coastal ecosystem.

Other Changes

Other Indicators of Biological Integrity

- Parasites
 - Use parasites to help evaluate food web structure and trophic interactions
 - Use parasite communities as indicators of pollution, other stressors and biodiversity



Other Indicators of Biological Integrity

- Mussels
 - Mussels are used to evaluate the impact of estrogenic chemicals
 - Mussels exposed for one year to a municipal effluent plume have an increased female/male ratio
 - Feminization of mussels apparent 11 km downstream of the plume



What is Monitored Now?

- Water
 - Toxic substances
 - Physical and chemical characteristics
 - Levels and flows
 - Water quality
- River Bed
 - Toxic substances
- Biological Resources
 - Wetlands
 - Marine plankton
 - Toxic algae
 - Fish
 - Seabirds
 - Great Blue Heron
 - Northern Gannet
 - Beluga Whale



Environment
Canada

Environnement
Canada



Acknowledgements

- Serge Villeneuve
- Yves de Lafontaine
- Christiane Hudon
- Jean-Pierre Amyot
- David Marcogliese
- François Gagné
- Christian Blaise
- Patricia Potvin
- François Boudreault
- Colleagues of the State of the St. Lawrence Section