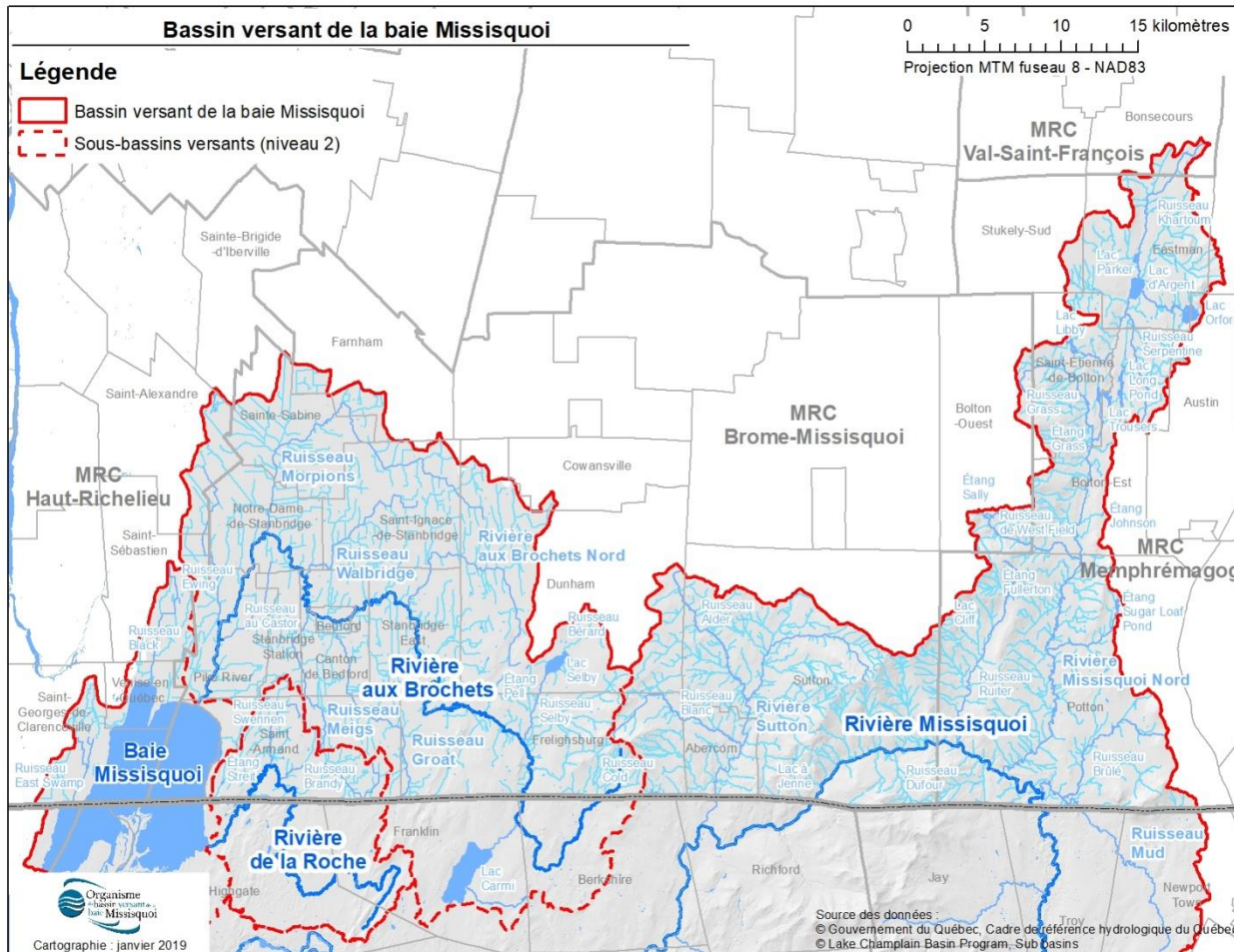




IJC WQ Science/Policy Workshop Research and Policy in the Missisquoi Bay Basin - Québec

**St-Michaels College, Colchester
Vermont, May 8, 2019**

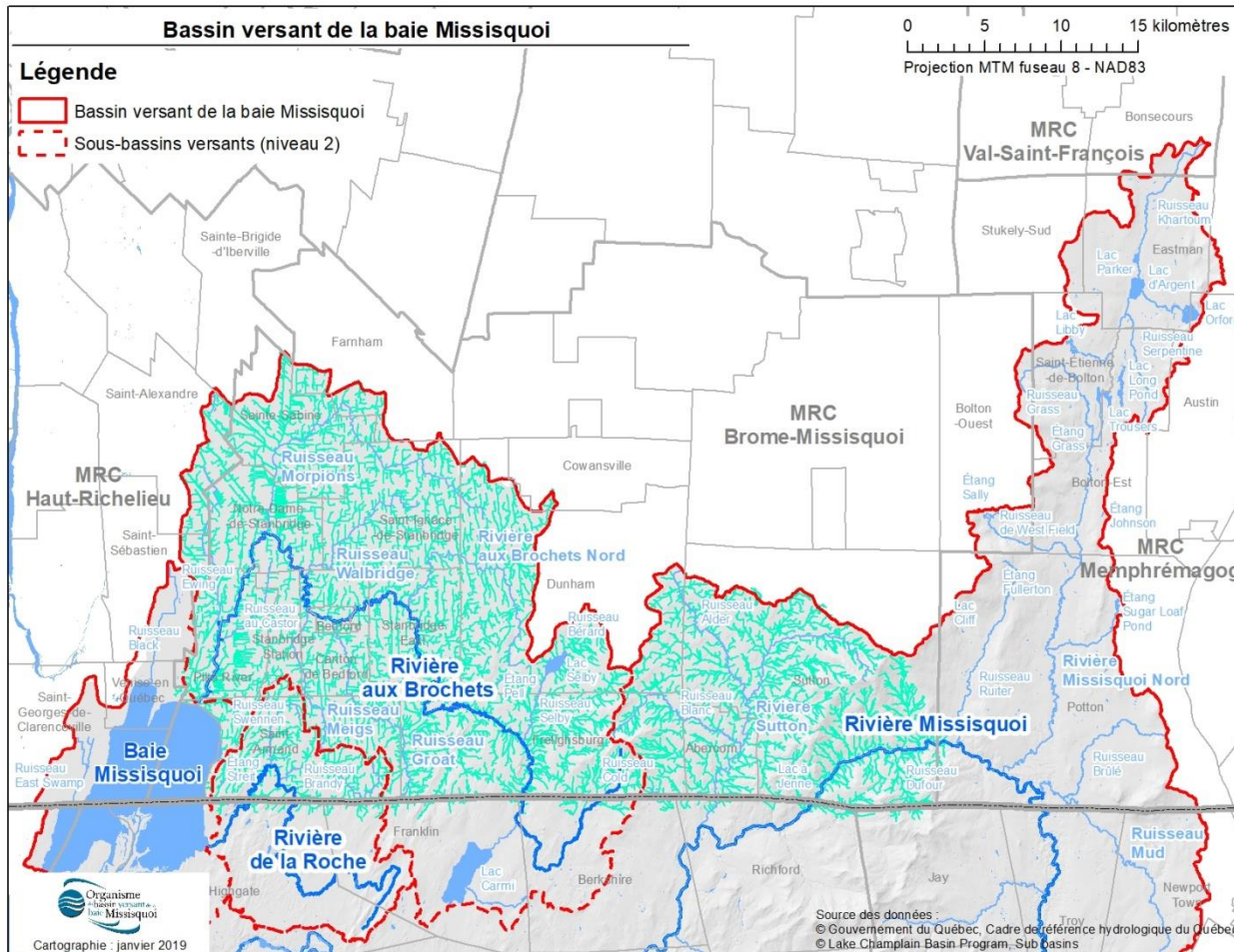
Research and Data in Missisquoi Bay Basin - Québec



General data on MBB Québec

- Waterways data
 - Latest = GRHQ, 2018; Excluding ditches, many small waterways missing
 - LIDAR coverage: Montérégie 2013, Estrie to come; high resolution LIDAR waterways and ditches for MRCBM only
 - « Verbalized » waterways: MRCBM, MRCHR. For Ag drainage and maintenance.
- Hydrology
 - 4 river stations (Direction expertise hydrique)
 - 1 Missisquoi Bay station (Environnement Canada)

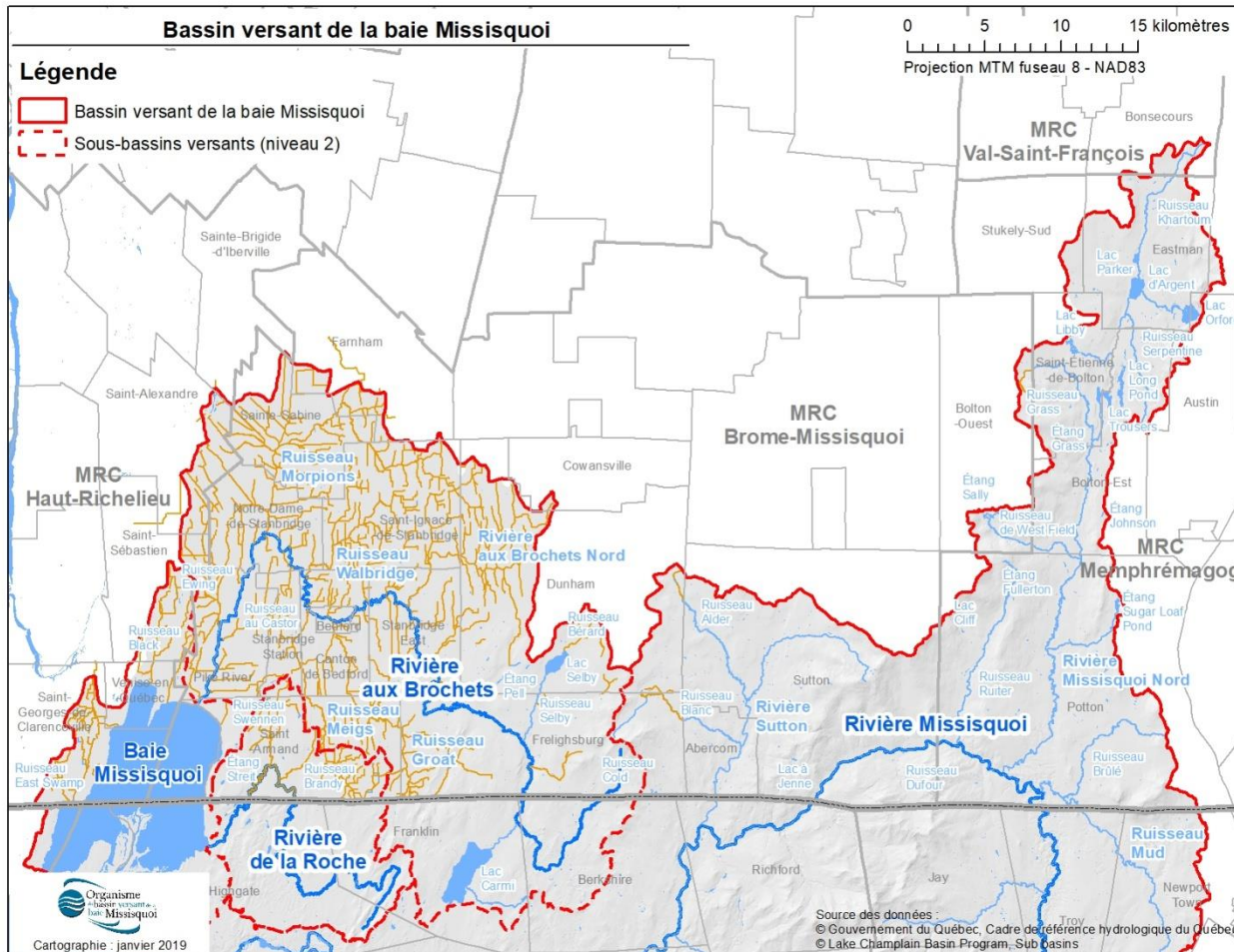
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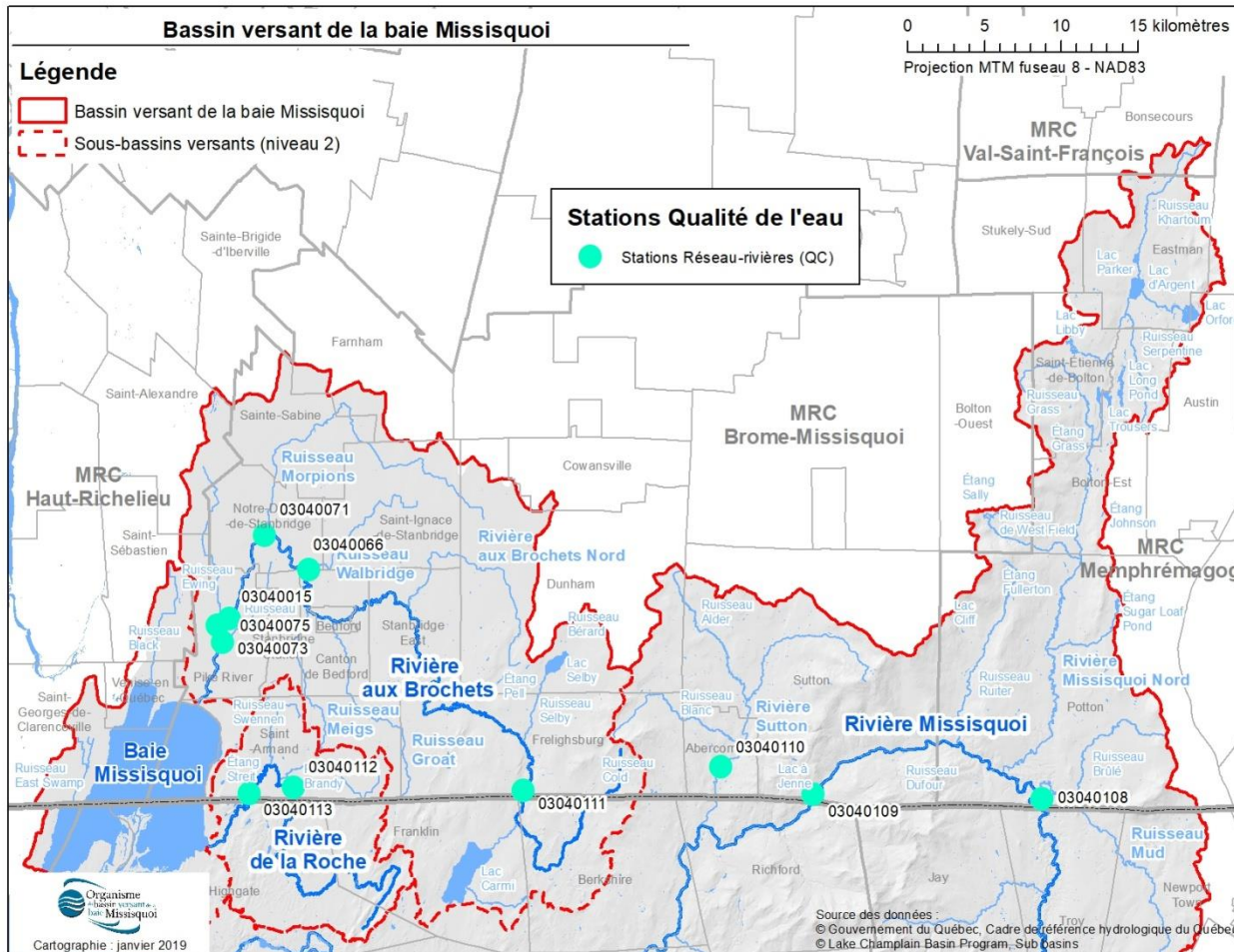
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Research and Data in Missisquoi Bay Basin - Québec



Water Quality and Nutrient loading

- Water quality monitoring
 - Réseau-rivières MELCC: 11 stations, Frequency: 1/month + 8/high flow = 20/year
 - Missisquoi North River watershed: MRC Memphrémagog, various, yearly
 - Missisquoi Bay area (direct drainage): only data = 2009
- Internal loading
 - Sediment accumulation: OBVBM, 2003. 97 sites, 200 samples.
- Support capacity (P, N, SS)
 - Pike River watershed: Gangbazo et Lepage, 2005. Maximum capacity of annual crops exceeded to obtain 0,03 mgP/l...

Research and Data in Missisquoi Bay Basin - Québec

Water Quality and Nutrient loading

- Point sources (Municipal, Industrial) = 2% total P from MBB Qc
- Nonpoint sources = 98% total P from MBB Qc
 - Runoff and nutrient export models: IRDA, MRCBM, OBVBM, etc.
 - Pike River watershed SWAT 2006: Ag surfaces = 88% P loading
 - MRCBM GeoDEP 2016
 - Rock River watershed GeoDEP 2019
 - Field data, mostly agricultural: IRDA, CSBVVB, McGill, etc.
 - Castor, Ewing, Walbridge, Morpions subwatersheds
 - Surface dynamics (5-10 high rain events, soil and manure management) and Subsurface dynamics (tile drainage = approx 40% P exports; 90% N exports)....
 - Soil health: latest data = 1990; 2017 (ongoing study) including MBB Qc
 - Social science : Implementation of Ag BMPs, Incentives and Compensations

Research and Data in Missisquoi Bay Basin - Québec

Cyanobacteria

- Data collection and HABs dynamics
 - Ministry on Environment (MELCC) 2000-2014: Blais 2001-2008; Blais 2014
 - Canadian National Research Council: regular sampling since 2006 for studies
 - Specific studies: Bird (UQAM); FQRNT; etc.
 - Hotspots, species, concentrations, general risk assessment (recreation and drinking)
 - N impact on toxins concentrations, but maintain focus on P for mitigation; Pesticides (herbicides, TFM, etc.) impacts considered
- Health risks
 - Lévesque et al., 2014: Missisquoi Bay epidemiological study
 - Increased risk of gastrointestinal symptoms observed for exposed populations
 - MSSS, 2014: Meta-analysis and public health approach
 - Little or no official human (or animal) « health » events reported in Québec

Research and Data in Missisquoi Bay Basin - Québec

Cyanobacteria

- Drinking water
 - Polytechnique: Barbeau, Prévost, Dorner, etc.
 - Bedford waterplant efficiency monitoring
 - In lake realtime monitoring
 - Filter processes and cyanotoxins control
 - *Algal Blooms, Treatment, Risk Assessment, Prediction and Prevention through Genomics (ATRAPP) 2016 (ongoing study): UdeM, Genomics Canada, etc.*
 - Better prediction and management
- Ecologic impacts
 - Bird, 2004; Dorner, 2014; etc.
 - Fish die offs; Mussels 2017 ?
 - Ouranos-UQAM, 2018-2020 (ongoing study)
 - Impacts on fauna and food chain in Missisquoi Bay and Pike River delta

Research and Data in Missisquoi Bay Basin - Québec

In lake restoration

- BAPE, 1990: dredging of Pike River mouth sediment accumulation; project refused
- EXXEP, 2004: 14 methods evaluated, none with reasonable cost-benefits
- IJC, 2005: impact of causeway, conclusion: proceed to complete removal and equivalent investment in basin mitigation

Tributary treatments in MBB Qc

- Filter marshes: Walbridge (McGill-OBVBM), efficient for small debits, difficult to generalize
- Scories for ag ditches: considered, partially tried but not conclusive
- Tile drain treatments: considered (controled, filtered, etc.), none tried in MBB Qc

Policy and Governance in Missisquoi Bay Basin - Québec

Lake Champlain Trilateral Approach

- MOU VT-QC-NY
 - LCBP
 - Steering, Executive. TAC, CAC, E&O
 - An Evolving Plan « Opportunities for Action » 1996-2016, 2017-...
 - Agreement P reduction VT-QC 2002, 2019 ?
 - Task Force, Monitoring Program, Reports, Action Plan
- Establishment of a QC Inter-Ministerial Committee (CICBM)
 - Implementation Plan and Annual Reports until 2011
 - Creation of OBVBM in 1999
- Boundary Waters Treaty 1909
 - IJC 2005 Causeway, 2012 CSA, 2015 Flood, 2017 Water Quality

Policy and Governance in Missisquoi Bay Basin - Québec

Québec Water Policy in 2002

After reaffirming that water is an integral part of the Quebecers' collective heritage, the policy introduces measures and government commitments to:

- Implement a watershed-based management to reform water governance;
- protect water quality and aquatic ecosystems;
- continue to clean-up and improve the management of water services

Integrated water management

- OBVBM
- Water Master Plan
- Blue-green Algae Intervention Plan (2007-2017)
- Update Québec Water Strategy 2018-2030

Policy and Governance in Missisquoi Bay Basin - Québec

Québec Water Strategy 2018-2030

The Strategy is guided by seven orientations and an Action Plan 550 M\$

- 7th Orientation: Ensure and strengthen the integrated management of water resources
- Enhance support to watershed organizations and monitoring of integrated water resources management
- Support Québec-Vermont-New York cooperation for management of Lake Champlain, Lake Memphremagog and the Richelieu River
- Better prevent and manage water-related risks, including floods
- Conserve and restore aquatic environments
- Major Ag project to test BMPs (5M\$), project submitted for MBB

Policy and Governance in Missisquoi Bay Basin - Québec

Agricultural Regulatory

- Model and practices supported by the government, economic context and global competitiveness
- REA (MELCC)
 - Livestock, storage and spreading manure (1981)
 - Cultivated surfaces, NMP (PAEF et P Balance) (1997)
 - Pesticide Management Code (permits, certificates, storage)
- Management shared regulation by MELCC and Municipality (Policy)
 - Wetland, riparian Buffer, floodplain

The Wetland and Watershed Conservation Act (2017) a new regime for conserving wetlands and water with the goal of no net loss

Policy and Governance in Missisquoi Bay Basin - Québec

Agricultural programs MAPAQ and Financière Agricole

- Property Tax Support and Crop Insurance (ASRA)
 - Ecoconditionality (P Balance, reduction of compensation)
- Prime-Vert MAPAQ
 - 3 phases, BMPs at the farm, Watershed project, outreach
- Technical support (MAPAQ)
 - Consulting-services, Agroenvironmental Club
- Stream Management (MRC)
 - Agr. drainage

Projects: IRDA, Coop de solidarité du bassin versant de la Rivière-aux-Brochets, Lisière Verte (Federal Program, BMPs, buffer 8-9 m), OBVBM-MRCBM Interventions in degraded agricultural fields

Policy and Governance in Missisquoi Bay Basin - Québec

- Major work done by the different actors (Agencies, Municipalities, MRC, OBV, Lake Associations, etc.)
- Ag Regulations
- Municipalities infrastructures
- Watersheds studies, field works
- Characterizations and inspections, Farm by Farm
- Intense efforts to emphasize in Pike River Watershed, strengths in all sectors
- Notable progress of observed "mentalities"
- **Fertile ground for innovation and project realization**