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Analysis of the Richelieu River's Ecological Value and Potential Recognition Statuses



Developed for the **Mouvement écologique du Haut-Richelieu**



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1. Introduction

In 2011, the Upper Richelieu Ecological Movement launched a series of actions in order to obtain a perennial protected area status for the Richelieu River between the Gouin Bridge and Sainte-Thérèse Island, because of its significant ecological value, especially for the migratory bird populations it supports. This project sought to present a portrait of the Richelieu River using existing data banks as well as reports published by various non-profit organizations. The targeted area has been extended starting from the *Rivière du Sud's* mouth up to Sainte-Thérèse Island.

This report will first offer topographic and ecological description of the Richelieu River, and second present a review of potential recognition statuses.

2. Topographic Description of the Richelieu River

The Richelieu River has its source in Lake Champlain and flows north for 124 km to join the St. Lawrence River at the Sorel Islands. It drains a massive 23,828 km² watershed, from which only 16 % (3,781 km²) lies within Quebec's territory (SFPQ, 2002). Three main river sections can be distinguished. First, the Upper Richelieu section, between Lake Champlain and St-Jean-sur-Richelieu, shows a very gentle slope of 0.3 m/km for a distance of 35 km, as the river's width drops from 1.5 km to less than 300 m. The Chambly Canal section, from St-Jean-sur-Richelieu to Chambly, has a steeper slope of about 2 m/km for a distance of 12 km, which make up the Chambly rapids. For the last section, from Chambly to the river mouth, the slope is generally gentle, except for a small portion at the Saint-Ours rapids (COVABAR, 2015). Close to the St. Lawrence River's mouth, the river has a width of only 150 m. The Richelieu River has an average slope of 0.3 m/km for a total gradient of 33 m. Its depth varies from four to eight meters, with extreme values of one meter in Chambly's rapids and nine meters near the Sorel-Tracy port (COVABAR, 2015).

The Richelieu River's banks, within St-Jean-sur-Richelieu's territory, have been the subject of two studies. The first one by COVABAR (the Richelieu River's Watershed Advocacy and Management Committee¹) in 2011 (St-Jean, 2011) covered from the Marchand Bridge to the southern boundaries of the city. The second study was led by Nature Conservancy Canada in 2008 (CNC, 2008) and the study area was between Sainte-Thérèse Island and the Marchand Bridge. Maps showing the state of vegetation and that of the riverbanks from both studies are included in Appendix 1.

¹ Nonofficial translation

COVABAR’s study shows the riparian quality index (RQI) (Appendix 2), which quantifies the presence and nature of riverbanks’ vegetation within the first 10 meters from the high-water line, from an aerial view (forest, agriculture and trees on turf). Each element shown obtains a value according to its capacity to fulfill its natural ecological functions. The higher the RQI, the more the riparian zone is considered suitable to fulfill its required functions (Table 1). Appendix 2 suggests that close to 40 % of the Richelieu riverbanks’ quality is considered either good or very good and more than 50 % are considered of moderate quality, despite the presence of turfed areas supported by retaining walls. Such ratings could be explained by the fact that trees have been preserved.

Table 1. RQI Ratings and Descriptions

Class	Class definition for RQI
8-10	Excellent quality- Riparian zone has trees and shrubs, it covers more than 7.5 meters.
6-8	Good quality- Riparian zone contains many trees and shrubs, natural vegetation on more than 5 meters.
4-6	Moderate quality- Riparian zone contains shrubs, natural vegetation between 3 and 5 meters from the high-water line. Legal riparian zone width in farming areas usually followed.
2-4	Poor quality- Riparian zone contains trees and shrubs mostly on the bank’s slope. Vegetation covers between 1 and 3 meters from high-water line. Legal riparian zone width in farming areas occasionally followed.
0-2	Bad quality- Riparian zone contains herbaceous plants on less than 1 meter wide. Legal riparian zone width in farming areas almost nonexistent.

Excerpt: *St-Jean et al. 2011*

The study by Nature Conservancy Canada, where the riparian quality ratings are not available, mentions that vegetation quality is poor on 59 % of riverbanks, especially along the Chambly Canal, medium on 27 % and excellent on only 14 %. The study also indicates that rip-rap has been used on 29 % of riverbanks and 47 % have retaining walls. More than 75 % of riparian land parcels were covered by turf on more than 20 % of their surface.

To sum up, the territory covered by the two studies, which includes the Richelieu River’s banks within St-Jean-sur-Richelieu boundaries, is mostly developed, equipped with rip-rap, gabions, retaining or low walls, etc. However, southern areas of the city still show sizeable sections of pristine riverbanks including many swamps and marshes.

3. Ecological Description of the Richelieu River

This section contains a compilation of ecological data made available by various organizations. Data from the *Centre de données sur le patrimoine naturel du Québec* (Quebec's Natural Heritage Data Center²) and from eBird's website were collected. Data access requests were also sent to Environment Canada to obtain information on waterfowl management in Quebec. Information on fish populations was also obtained through the monitoring division of Quebec's Department of the Environment (MDDELCC). St-Jean-sur-Richelieu's college (CÉGEP) staffs, as well as Mr. Réal Boulet, from the Upper Richelieu Ornithology Club, have been contacted.

1.1 Species at Risk

In Canada, it is the Committee on the Status of Endangered Wildlife in Canada (COSEWIC), made up of environmental experts (Government of Canada_1, 2016), which examines wild species' statuses and rates them: extirpated, endangered, threatened, special concern, not at risk or data deficient. (Government of Canada_2, 2016). Afterwards, a committee composed of various federal and provincial ministers approves or disapproves a species' addition to the Species at Risk Registry. Once species are officially registered, they can benefit from protective measures under Canada's Species at Risk Act (SARA). A species may therefore have non-identical COSEWIC and SARA statuses.

In Quebec, the Advisory Committee on Threatened or Vulnerable Plants³ is responsible for identifying floral species under Quebec's Act Respecting Threatened or Vulnerable Species (ARTVS). A species is considered threatened when its extirpation is dreaded. It is considered vulnerable when its survival is uncertain, even if its extirpation is not dreaded. Species are likely to be identified as such when available data suggest they are at risk and require special attention. In Quebec, 57 floral species are currently identified as threatened, 21 as vulnerable and 314 are likely to be identified as such (MDDELCC, 2016).

In order to address the current situation of floral species supported by the Richelieu River, data obtained from the *Centre de données sur le patrimoine naturel du Québec* (CDPNQ) and from inventories carried out by CIME between 2010 and 2014 have been compiled. According to these data, 14 species are at risk in the targeted area (Table 2, Figure 1), including 13 species likely to be identified as threatened or vulnerable in Quebec. Among these species, the following three have had unreviewed statuses since 2000: the golden hedgehyssop (*Gratiola aurea*), the palegreen orchid (*Platanthera flava* var. *herbiola*) and the branched bur-reed (*Sparganium androcladum*). The 14th species with registered status, the false hop sedge (*Carex*

²Nonofficial translation

³Nonofficial translation

lupuliformis), is extremely rare and has a threatened status designation under ARTVS and an endangered status designation under SARA. Its essential habitat is also known at numerous spots along the Richelieu River. SARA's original text states that:

"58(1) Subject to this section, no person shall destroy any part of the critical habitat of any listed endangered species or of any listed threatened species — or of any listed extirpated species if a recovery strategy has recommended the reintroduction of the species into the wild in Canada ..."⁴

Yet, the Recovery Strategy for the False Hop Sedge (Environment Canada, 2014) identifies alteration of the water regime as a major threat for this species' survival. Dam construction may therefore directly affect false hop sedge populations, and even cause its disappearance, as it has been recorded for the Carillon and Two Mountains lake populations.

As for faunal species, data from CDPNQ are shown in table 3. However, the latest observation date of the least bittern (*Ixobrychus exilis*) has been updated to include the latest trackings carried out by CIME in the targeted area. Please note that, in order to avoid superimposition on Figure 1, only the centroid of species distribution is indicated. eBird data were also examined to determine if species at risk were listed. Apparently, many ornithologists do not report their observations to CDPNQ, since 17 new status species are listed (Table 4). These observations are however not included on the map of ecologically significant areas (Figure 1).

⁴Excerpt : Chapter 29; Species at Risk Act (S.C. 2002), Paragraph 58(1)

Table 2. Floral Species at Risk

Common Name	Nomenclature	Latest Tracking	ARTVS Status	COSEWIC Status	SARA Status
False hop sedge	<i>Carex lupuliformis</i>	2017	Threatened	Endangered	Endangered
Cattail sedge	<i>Carex typhina</i>	2013	likely to be so designated		
Shagbark hickory	<i>Carya ovata</i>	2013	likely to be so designated		
Swamp white oak	<i>Quercus bicolor</i>	2013	likely to be so designated		
Golden hedgehyssop	<i>Gratiola aurea</i>	1974	likely to be so designated		
Virginia water horehound	<i>Lycopus virginicus</i>	2014	likely to be so designated		
Lowland yellow loosestrife	<i>Lysimachia hybrida</i>	2012	likely to be so designated		
Palegreen orchid	<i>Platanthera flava var herbiola</i>	1942	likely to be so designated		
Yellow water buttercup	<i>Ranunculus flabellaris</i>	2013	likely to be so designated		
Halberdleaf tearthumb	<i>Persicaria arifolia</i>	2013	likely to be so designated		
Branched bur-reed	<i>Sparganium androcladum</i>	1956	likely to be so designated		
Slender bulrush	<i>Schoenoplectus heterochaetus</i>	2001	likely to be so designated		
Sand violet	<i>Viola sororia var affinis</i>	2001	likely to be so designated		
Annual wildrice	<i>Zizania aquatica var aquatica</i>	2013	likely to be so designated		

Table 3. Wildlife Species at Risk

Common Name	Nomenclature	Latest Tracking	ARTVS Status	COSEWIC Status	SARA Status
Cutlip minnow	<i>Exoglossum maxillingua</i>	2012		Special concern	
River redhorse	<i>Moxostoma carinatum</i>	1968	Vulnerable	Special concern	Special concern
Bridle shiner	<i>Notropis bifrenatus</i>	1987	Vulnerable	Special concern	Special concern
Cerulean warbler	<i>Setophaga cerulea</i>	2000	Threatened	Endangered	Special concern
Least bittern	<i>Ixobrychus exilis</i>	2017	Vulnerable	Threatened	Threatened
Northern map turtle	<i>Graptemys geographica</i>	2009	Vulnerable	Special concern	Special concern
Spiny softshell	<i>Apalone spinifera</i>	2008	Threatened	Threatened	Threatened

Table 4. Bird Species at Risk

Common Name	Nomenclature	Latest Tracking	ARTVS Status	COSEWIC Status	SARA Status
Golden eagle	<i>Aquila chrysaetos</i>	2015	Vulnerable		
Harlequin duck	<i>Histrionicus histrionicus</i>	2015	Vulnerable	Special concern	Special concern
Nelson's sharp-tailed sparrow	<i>Ammodramus nelsoni</i>	2007	likely to be so designated		
Barrow's goldeneye	<i>Bucephala islandica</i>	2015	Vulnerable	Special concern	Special concern
Bobolink	<i>Dolichonyx oryzivorus</i>	2014		Threatened	
Horned grebe	<i>Podiceps auritus</i>	2016	Threatened		
Bank swallow	<i>Riparia riparia</i>	2015		Threatened	
Barn swallow	<i>Hirundo rustica</i>	2016		Threatened	
Chimney swift	<i>Chaetura pelagica</i>	2016	likely to be so designated	Threatened	Threatened
Olive-sided flycatcher	<i>Contopus cooperi</i>	2011	likely to be so designated		
Canada warbler	<i>Cardellina canadensis</i>	2016	likely to be so designated	Threatened	Threatened
Least bittern	<i>Ixobrychus exilis</i>	2015	Vulnerable	Threatened	Threatened
Red-necked phalarope	<i>Phalaropus lobatus</i>	1996		Special concern	
Eastern wood-pewee	<i>Contopus virens</i>	2016		Special concern	

Bald eagle	<i>Haliaeetus leucocephalus</i>	2016	Vulnerable	
Rusty blackbird	<i>Euphagus carolinus</i>	2007	likely to be so designated	
Caspian tern	<i>Hydroprogne caspia</i>	2016	Threatened	
Eastern meadowlark	<i>Sturnella magna</i>	1999		Threatened

Éléments d'intérêt écologique le long de la rivière Richelieu

Légende

Sites d'intérêt faunique

- La rivière du Sud et les habitats humides de la Richelieu
- L'Île-aux-Noix et la pointe à l'Esturgeon

Espèces à statut précaire

- Flore
- Faune

Topographie

- Limites municipales
- Routes
- Cours d'eau



Décembre 2016

Sources de données:
RRN, CRHQ, MRC Haut-Richelieu,
CIME Haut-Richelieu
Système de coordonnées de référence:
NAD 83 / MTM zone 8

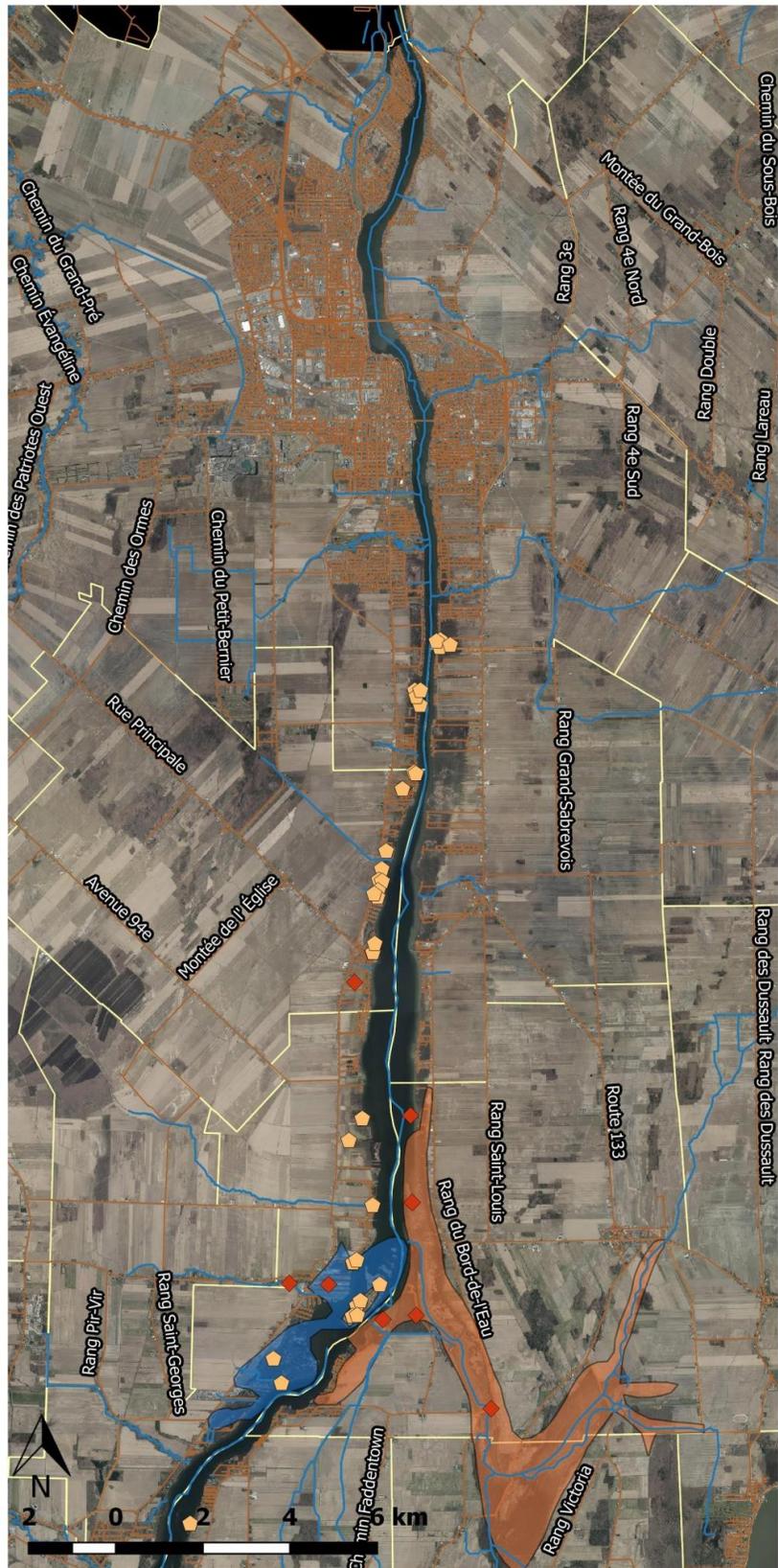


Figure 1. Ecologically Significant Areas along the Richelieu River

1.2 Sites of Wildlife Interest

Sites of Wildlife Interest (SWI) are of major importance for wildlife, although they do not benefit from legal protection as designated wildlife habitats do. Regional directions of Quebec's Department of Forests, Wildlife and Parks (DFWP) are responsible for identifying such sites. The information they gathered is then transferred to regional county municipalities and municipalities for consideration when developing their territories. These data are also taken into account by the Department of Forests, Wildlife and Parks before issuing certificates of authorization (Mr. Étienne Drouin, DFWP – Wildlife management for the Eastern Townships, Montreal and Laval, pers. comm.) However, the protection of such sites is not enforceable against citizens' will because their recognition is not statutory. They are defined as follows:

"Defined area comprising one or many biological and topographic elements contributing to the development and support of a wildlife population. Its biological or social value makes it significant to local or regional communities and its sensitivity requires additional protection measures beyond existing legal provisions."

"SWIs' objectives are the following:

- 1° Protecting habitats of species considered threatened or vulnerable or likely to be so designated for which no recovery strategy is in place;
- 2° Protecting biodiversity on a regional scale;
- 3° Preserving sites of wildlife interest with a high socioeconomic value;
- 4° Preserving previous investments in habitat development."⁵

Two SWIs are located in the study area (Figure 1): the Rivière du Sud and the Richelieu River's marshes, as well as l'Île-aux-Noix and the Pointe à l'Esturgeon.

⁵ Excerpt: DFWP, *Terms and conditions of Sites of Wildlife Interest protection*, 2010 (Nonofficial translation)

1.3 Wildlife Habitats

A wildlife habitat is an area where one or many species can fulfill their basic needs (shelter, food, and reproduction) whether it is residing or migrating. The Wildlife Habitat Regulation identifies eleven different types of wildlife habitats: the waterfowl gathering area, the white-tailed deer yard, the caribou mating areas north of the 52nd parallel, the caribou calving areas north of the 52nd parallel, a cliff inhabited by a colony of birds, the habitat of a threatened or vulnerable wildlife species, a fish habitat, a muskrat habitat, an heronry, an island or a peninsula inhabited by a bird colony, and a salt lick.

According to the Wildlife Habitat Regulation:

“No person may, in a wildlife habitat, carry on an activity that may alter any biological, physical or chemical component peculiar to the habitat of the animal or fish concerned.”⁶

The study area accounts for six waterfowl gathering areas, eight muskrat habitats and one heronry. (Figure 2)

⁶Excerpt: Chapter C-61.1; Act respecting the conservation and development of wildlife; Paragraph 128.6.

1.4 Fishes

Data on fishes originate from two sources. The first one is a 1998 study led by the Aquatic Ecosystem Division of Quebec's Department of Environment and Fauna on ichthyologic populations and environmental biotic integrity (Saint-Jacques, 1998). The second is made up from the Department of Forests, Wildlife and Parks' gross fishing data from 2012 to 2015 (unpublished data, DFWP). According to the first study, the Richelieu River supports 48 fish species, from its source to its water mouth, from which 30 species were also sampled in the study area. The most plentiful ones are: the pumpkinseed (*Lepomis gibbosus*), the American yellow perch (*Perca flavescens*), the rock bass (*Ambloplites rupestris*), the white sucker (*Catostomus commersoni*), the golden shiner (*Netomigonus crysoleucas*), the banded killifish (*Fundulus diaphanus*), the largemouth black bass (*Micropterus salmoides*), the bluntnose minnow (*Pimephales notatus*) and the eastern silvery minnow (*Hybognatus regius*) (Appendix 3).

Among these species, five are pollution tolerant (56 %), three show medium tolerance (33 %) and a single one is pollution intolerant (11 %) (Table 5). In three of the four stations in the study area, the proportion of individuals exhibiting DELTs (deformities, disease, parasites, fin erosion, lesions or tumours) reaches more than 12 %. A fish population's health is considered poor when its DELTs proportion exceeds 5 %. As for the fourth station, DELTs proportion slightly exceeds 3 %, which is sufficient to consider a population's health as degraded. Generally, the Richelieu River's Index of Biotic Integrity (IBI), from its source up to Chambly, is average, despite it being poor at a station located in Saint-Jean-sur-Richelieu.

Table 5. Study Area Main Fish and Their Pollution Tolerance Level in 1998

Common Name	Nomenclature	Pollution Tolerance	Trophic Level
Largemouth black bass	<i>Micropterus salmoides</i>	Tolerant	Piscivorous
Golden shiner	<i>Netomigonus crysoleucas</i>	Tolerant	Omnivorous
Rock bass	<i>Ambloplites rupestris</i>	Medium	Piscivorous
Pumpkinseed	<i>Lepomis gibbosus</i>	Medium	Insectivorous
Banded killifish	<i>Fundulus diaphanus</i>	Intolerant	Insectivorous
Eastern silvery minnow	<i>Hybognatus regius</i>	Tolerant	Herbivorous
White sucker	<i>Catostomus commersoni</i>	Tolerant	Omnivorous
American yellow perch	<i>Perca flavescens</i>	Medium	Piscivorous
Bluntnose minnow	<i>Pimephales notatus</i>	Tolerant	Omnivorous

The Department of Forests, Wildlife and Parks' 2012 samplings have enabled the identification of 22 fish species in the Richelieu River, among which 16 are located in the study area (11 stations). Samplings carried out in 2015 have enabled the identification of 46 species among which two are located in the study area (1 station) (DFWP, unpublished data) (Figure 3). The following data on species' pollution tolerance were gathered from a study led by Plafkin *et al.* in 1989. Among the identified species, four are tolerant (27 %), ten show a medium tolerance (66 %) and one is pollution intolerant (7 %). However these results are subject to caution since the sampling was small (less than 400 individuals), a single sample per station was collected.

Table 6. Study Area's Main Fishes and Their Pollution Tolerance Level in 2012 and 2015

Common Name	Nomenclature	Sampling Years	Pollution Tolerance*	Trophic Level*
Alewife	<i>Alosa pseudoharengus</i>	2012	Medium	Filter feeder
Bowfin	<i>Amia calva</i>	2012	Medium	Piscivorous
Brown bullhead	<i>Ameiurus nebulosus</i>	2012	Tolerant	Insectivorous
Rock bass	<i>Ambloplites rupestris</i>	2012, 2015	Medium	Piscivorous
White sucker	<i>Catostomus commersoni</i>	2012	Tolerant	Omnivorous
Northern pike	<i>Esox lucius</i>	2012	Medium	Piscivorous
Cutlips minnow	<i>Exoglossum maxillingua</i>	2012	Intolerant	Insectivorous
Pumpkinseed	<i>Lepomis gibbosus</i>	2012, 2015	Medium	Insectivorous
Bluegill	<i>Lepomis macrochirus</i>	2012	Medium	Insectivorous
Smallmouth bass	<i>Micropterus dolomieu</i>	2012	Medium	Piscivorous
White perch	<i>Morone americana</i>	2012	Medium	Piscivorous
Golden shiner	<i>Notemigonus crysoleucas</i>	2012	Tolerant	Omnivorous
American yellow Perch	<i>Perca flavens</i>	2012	Medium	Insectivorous
Walleye	<i>Sander vitreus</i>	2012	Medium	Piscivorous
Rudd	<i>Scardinius erythrophthalmus</i>	2012	Tolerant	Omnivorous
Tench	<i>Tinca tinca</i>	2012	NA	NA

*Excerpt: Plafkin *et al.*, 1989

Between 1975 and 1984, nine fish spawning areas were identified by CIME and are still listed with the Departement of Forests, Wildlife and Parks as fish mating areas (Figure 3). The northern pike (*Esox lucius*) is present in every single spawning area. Other identified species include the perch (*Perca flavens*), the brown bullhead (*Ameiurus nebulosus*) and the common carp (*Cyprinus carpio*).

1.5 Waterfowl

Environment Canada's Quebec Waterfowl Conservation Plan (Lepage *et al.*, 2015) has been consulted to develop this section. The plan's objectives are:

- 1) To determine priority species in each Bird Conservation Region (BCR);
- 2) To establish population objectives for priority species;
- 3) To assess the issues affecting, and the needs of, priority species;
- 4) To set measurable conservation objectives to help conserve priority species or groups of species;
- 5) To recommend actions to be taken to conserve priority species;
- 6) To identify types of habitat where conservation measures will be the most useful.

The Richelieu River is located in the BCR 13, which comprises the Lower Great Lakes (Lake Ontario and Lake Erie) and the St. Lawrence Plain. Among waterfowl species identified in this area, 34 were migrating species, 19 were breeding species, 12 were moulting species and 7 were wintering species (Table 7). Since the study area is very large, the Richelieu River is barely mentioned. The Île-aux-Noix area is however identified as a breeding ground for dabbling ducks and Upper Richelieu's surroundings are also mentioned as areas supporting many wintering species. Environment Canada's species' list has been compared with known data on the Richelieu River, originating from the Quebec's Breeding Bird Atlas (Quebec's Breeding Bird Atlas, 2016) and eBird's website. This comparative analysis will be further detailed in the next section of this report. Among the 34 species that travel across the BCR, 32 are reported at many stations along the Richelieu River. Indeed, only the common eider (*Somateria mollissima*) and the canvasback (*Aythya valisineria*) have not been reported. It should be noted that these data do not separate the snow goose (*Chen caerulescens atlantica*) and the lesser snow goose (*Chen caerulescens caerulescens*). Among the 19 breeding species, eight are confirmed to be nesting along the Richelieu River, two are likely to be nesting and two others might possibly be nesting, which tends to demonstrate that the Richelieu River is an important section of the BCR. Ms. Lepage, waterfowl biologist at the Canadian Wildlife Service, explains that: "the Richelieu River is a strategic area for many waterfowl species as a migratory corridor between Lake Champlain and the St. Lawrence River." (pers. comm, 2016)

The Conservation Plan identifies two high priority species (HP): the American black duck (*Anas rubripes*) and the blue-winged teal (*Anas discors*), six medium priority species (MP): the brant (*Branta bernicla*), the Canadian goose (*Branta canadensis*) (Atlantic population), the wood duck (*Aix sponsa*), the greater scaup (*Aythya marila*), the lesser scaup (*Aythya affinis*) and the lesser snow goose. Two species are also subject to special management measures (SMM): the Canadian goose (residing population) and the snow goose. The plan's objectives are shown in Appendix 4.

Table 7. Comparative Table of Species Identified in Environment Canada's Waterfowl Conservation Plan and Species Identified in Known Data for the Richelieu River

Species Priority	Name of Species	Migration	Observed in Richelieu*	Breeding	Nesting in Richelieu**	Moulting	Wintering
	Greater white-fronted goose	x	4				
MP/SMM	Lesser snow goose	x	8				
	Snow goose	x		x	Non observed		
	Ross's goose	x	4				
MP	Brant	x	2				
	Cackling goose	x	6				
MP/SMM	Canadian goose	x	9	x	Confirmed	x	x
	Mute swan	x	1				
MP	Wood duck	x	7	x	Confirmed	x	
	Gadwall	x	4	x	Likely	x	
	Eurasian wigeon	x	3				
	American wigeon	x	6	x	Confirmed	x	
HP	Black duck	x	8	x	Confirmed	x	x
	Mallard	x	9	x	Confirmed	x	x
HP	Blue-winged teal	x	1	x	Confirmed	x	
	Northern shoveler	x	2	x	Possible		
	Northern pintail	x	6	x	Possible	x	x
	Eurasian teal	x	6	x	Likely	x	
	Canvasback	x					
	Redhead	x	4	x	Non observed	x	
	Ring-necked duck	x	7	x	Non observed	x	
MP	Greater scaup	x	5				
MP	Lesser scaup	x	7	x	Non observed		
	Common eider	x		x	Non observed		
	Surf scoter	x	4				
	Velvet scoter	x	3				
	Black scoter	x	3				
	Long-tailed duck	x	4				
	Bufflehead	x	8				
	Common goldeneye	x	8	x	Confirmed		x
	Barrow's goldeneye	x	3				
	Hooded merganser	x	9	x	Confirmed		x
	Common merganser	x	9	x	Non observed		x
	Red-breasted merganser	x	5				
	Ruddy duck	x	3	x	Non observed	x	

*Number of eBird stations where the species was reported

**Breeding Bird Atlas data– excerpt 18 XR 30-31-32 and 18 XQ39

1.6 eBird Data

Launched in 2002, eBird is a citizen science program which invites its users, professionals as well as amateurs, to enter and share their data. eBird data comprises a large amount of information on various species of birds, their distribution and abundance, and its database gets more accurate every year. Inaccurate or arguable data are verified by a committee of experts who will validate it before adding it to the public database available to all. While these data cannot replace scientific research, they offer a fair overview of bird species in Quebec.

To start with, data from eight public stations located within the study area have been gathered without the report year. These stations are, from north to south: Sainte-Thérèse Island, Chambly Canal, Richelieu Rest Area (Cayer), Harris Inn, Notre-Dame Gateway, Hazen stream, Sainte-Anne de Sabrevois Marina, flooded fields located from the 46th to the 53rd avenue in St-Blaise-sur-Richelieu and the Little Blue Heron Monitoring Site, also in St-Blaise. (Figure 4, Appendix 5)

Data obtained was first compared to *QuébecOiseaux's* rare birds' list. Among its seven types of rare birds, three are reported in the study area:

*Singular species: species which are least often reported in Quebec or any species reported for the first time.

*Unusual species: species commonly reported over the years, yet unobserved during some years.

*Rare species: species which are reported every year but very few times.

Therefore, 16 of these species have been reported over the years in 7 stations out of 9 (Table 8).

Informations sur l'avifaune le long de la rivière Richelieu

Légende

Stations d'observation

- ▲ eBird
- ▲ CIME

Topographie

- ▭ Limites municipales
- Routes
- Cours d'eau



Décembre 2016

Sources de données:
 RRRN, CRHQ, MRC Haut-Richelieu,
 CIME Haut-Richelieu
 Système de coordonnées de référence:
 NAD 83 / MTM zone 8

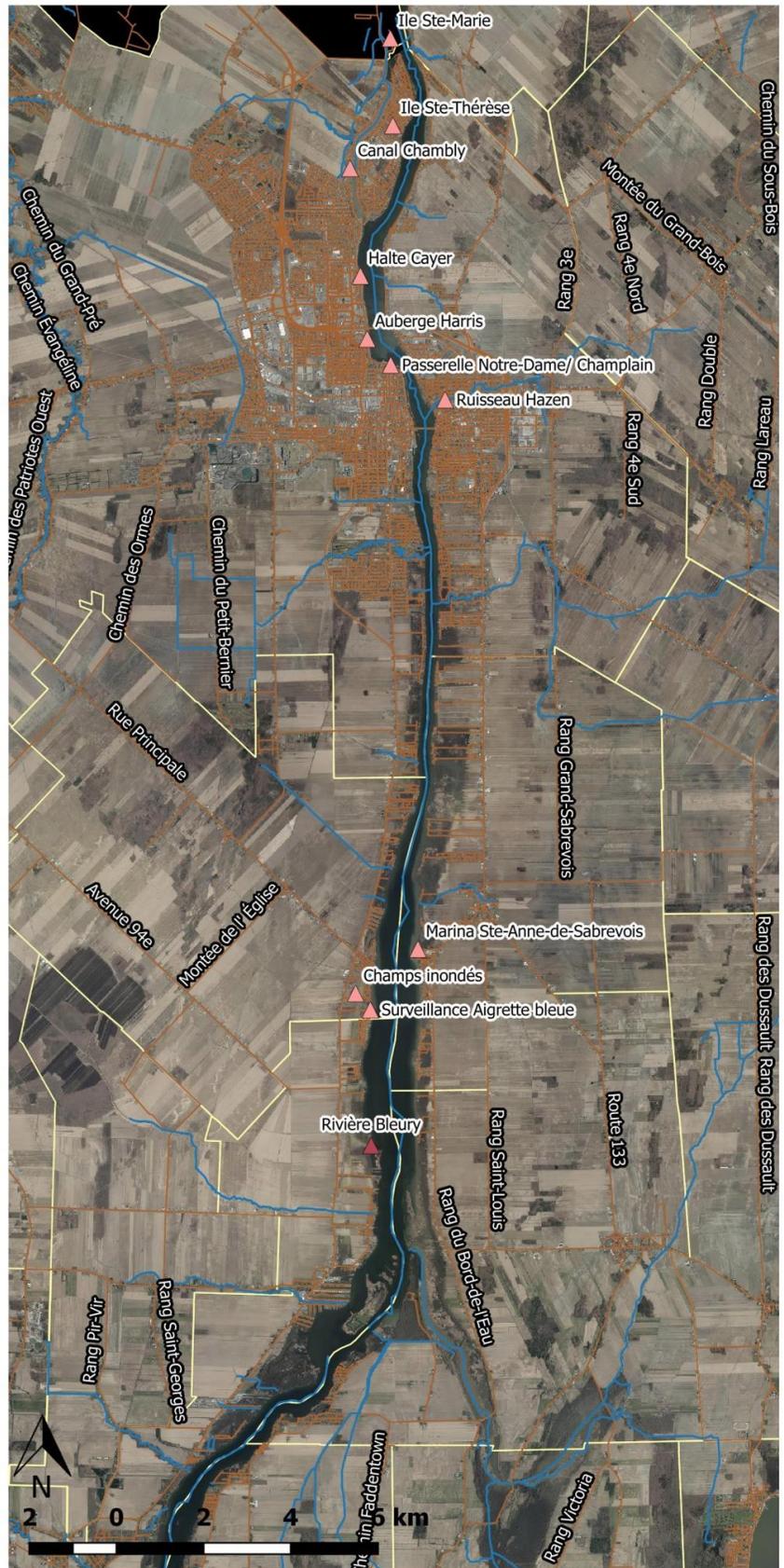


Figure 4. Localization of eBird Stations along the Richelieu River

Table 8. Rare Species Reported in the Study Area According to *QuébecOiseaux's* List

Common Name	Observation types	Stations									
		Sainte-Thérèse Island	Chambly Canal	Richelieu Rest Area (Cayer)	Harris Inn	Notre-Dame Gateway	Hazen Stream	Sabrevois Marina	Flooded Fields	Little Blue Heron	Monitoring Site
Marbled godwit	Rare										2008
Barnacle goose	Unusual	2016		2012	2012	2012					2016
Ruff	Rare										2010
Yellow-billed cuckoo	Rare						2010				
Trumpeter swan	Singular			2015	2013						
Mute swan	Rare										2008
Lesser black-backed gull	Rare			2015							
Cattle egret	Rare										2010
Glossy ibis	Rare										2014
Franklin's gull	Rare			2015							
Greater white-fronted goose	Rare	2016	2016	2015	2015	2015					
Red-necked phalarope	Rare										1996
Red phalarope	Rare										2006
Wilson's phalarope	Rare										2014
Eurasian collared-dove	Singular						2011				
Carolina wren	Rare						2016			2003	

The second half of eBird data analysis is credited to Mr. Réal Boulet, director of the Upper Richelieu ornithology club, who has studied more than 2,500 forms on snow geese between January 1st 2010 and May 31st 2016 (Boulet, 2016). Mr. Boulet's analysis emphasizes that the Richelieu River is the second most popular spring staging site among snow geese in Quebec, ahead of both the Cap Tourmente National Wildlife Area and the Montmagny area, with between 25,000 and 125,000 snow geese being observed along the Richelieu River. The Baie-du-Febvre sector takes first place with more than 200,000 snow geese during springtime. It seems that staging site preferences are more variable during the fall migrations, as many sites support a rather similar number of snow geese. The Upper Richelieu snow geese population peaked in 2015 with a maximum of 200,000 individuals reported. Table 9 shows snow goose maximum density for each migratory season.

Table 9. The Richelieu River's Snow Goose Density per Migratory Season

	2010	2011	2012	2013	2014	2015	2016
Spring	200	25,000	400	100,000	12,000	125,000	50,000
Fall	1,500	60,000	30,000	5,000	20,000	200,000	NA
CBC*	37	8,361	22,913	5,350	3	1,655	NA

*Christmas Bird Census between December 15th and 20th

This analysis also highlights a migratory calendar (Tables 10 and 11) according to which snow geese would be observed on the Richelieu River between March 8th and April 7th during springtime and between November 15th and the arrival of colder weather at the end of December.

Table 10. Spring Migratory Calendar According to eBird

	March				April				May			
	1 st to 7 th	8 th to 14 th	15 th to 21 st	22 nd to 31 st	1 st to 7 th	8 th to 14 th	15 th to 21 st	22 nd to 30 th	1 st to 7 th	8 th to 14 th	15 th to 21 st	22 nd to 31 st
St-Jean-sur-Richelieu		*	*	*	*							
Baie-du-Febvre			*	*	*	*	*	*	*	*		
Beudet Reservoir					*	*	*	*				
Cap Tourmente						*	*	*	*	*	*	*
Montmagny						*	*	*	*	*	*	*
Burbank Pond	NA											

Table 11. Fall Migratory Calendar According to eBird

	September		October				November				December			
	15 th to 21 st	22 nd to 31 st	1 st to 7 th	8 th to 14 th	15 th to 21 st	22 nd to 30 th	1 st to 7 th	8 th to 14 th	15 th to 21 st	22 nd to 31 st	1 st to 7 th	8 th to 14 th	15 th to 21 st	22 nd to 31 st
Cap Tourmente		*	*	*	*	*	*	*	*	*				
Montmagny				*	*	*	*	*		*				
Burbank Pond				*	*	*	*	*	*	*				
Beudet Reservoir				*	*	*	*	*	*	*	*	*		
St-Jean-sur-Richelieu									*	*	*	*	*	*
Baie-du-Febvre	NA													

1.7 Protected Areas

Many protected areas are located within the study area or its vicinity (Figure 5). To begin with, the Marcel-Raymond ecological reserve was established in 1987 under provincial jurisdiction; it is located in Henryville, near the *Rivière du Sud* mouth. With its 64.21 ha area, this reserve supports a swamp white oak population and other vegetation groups commonly found on Richelieu riverbanks (MDDELCC _2, 2016). Since 1998, this area has a designated status for a plant habitat to protect the false hop sedge, which is statutorily endangered in Canada and threatened in Quebec (MDDELCC _3, 2016). Moreover, in 2009, the Quebec government has granted protected status to some Richelieu riverbanks between the American border and Sabrevois as a proposed Samuel-de-Champlain biodiversity reserve. The proposed reserve comprises 18 delimited areas covering 487 ha. The end of its temporary protection has been pushed back to June 2021. Its conservation goals are the following (MDDELCC_4, 2016):

- * Protecting rare wetlands in the natural area of the St. Lawrence Lowlands;
- * Maintaining wetlands' biodiversity;
- * Reinforcing protection of wildlife and floral habitats;
- * Gaining additional knowledge on natural heritage.

Three conservation organizations are currently holding property on this territory. Nature Conservancy Canada holds 624 ha in the Sainte-Thérèse Island area, Ducks Unlimited Canada holds 268 ha in the *Rivière du Sud* area and CIME holds 17 ha in Saint-Paul-de-l'Île-aux-Noix; this last holding was officially recognized as the Rivière-Bleury natural reserve in 2013.

4. Recognition Statuses

4.1 Biodiversity Reserve and Aquatic Reserve

Biodiversity and aquatic reserves can be distinguished by the nature of the territory they protect; the first one seeks to protect land-based ecosystems and the second one water-based ecosystems. The main goal of both types is to maintain biodiversity. Both comprise a set of protection measures classified as five compatibility groups depending on their probability to obtain authorization from Quebec's Department of the Environment (MDDELCC) under the Natural Heritage Conservation Act or under the reserve's conservation plan (DFWP, 2011; Appendix 6).

In practical terms, the MDDELCC seeks to restrain any type of commercial or industrial activity, or personal use, within the boundaries of these reserves. However, touristic or recreational activities may be allowed as long as they are compatible with conservation goals stated in every reserve's plan. Ecological, educational or community-based activities are prioritized.

Recognition Criteria:

MDDELCC civil servants are responsible for identifying sites worthy of being granted a biodiversity or aquatic reserve status by evaluating their rare assets. The Department is however open to suggestions from the public. The required procedure to assign such statuses is described in the Natural Heritage Conservation Act. It is mentioned that the Department of Forests, Wildlife and Parks must be part in the process, that it must be subject to public consultation, that it must follow the Act Respecting Land Use Planning and Development and finally be approved by the *Commission de protection du territoire agricole du Québec* (Agriculture Land Protection Commission) ⁷.

13. The Minister may designate certain settings that are remarkable because of the rarity or exceptional interest of one of their biophysical features by establishing their boundaries on a plan.

14. Before designating a setting under section 13, the Minister shall consult the ministers concerned, in particular the ministers responsible for agriculture, wildlife, energy and natural resources in cases involving wetlands and bodies of water.

39. Before a proposal is made to the Government on permanent protection status for land set aside as a proposed aquatic reserve, biodiversity reserve or man-made landscape, the Minister

⁷Nonofficial translation

shall entrust the *Bureau d'audiences publiques sur l'environnement* (the public hearings office) or one or more persons the Minister designates as commissioners with the mandate to hold a public consultation.

44. In addition to the public consultation provided for in Division I, the establishment of an aquatic reserve, a biodiversity reserve, an ecological reserve or a man-made landscape, a change in their limits, or their abolishment, is effected by order of the Government, on a proposal by the Minister, subject to:

- (1)** Compliance with the prescriptions of Chapter VI of Title I of the Act respecting land use planning and development (chapter A-19.1) where they apply within the area;
- (2)** The opinion of the *Commission de protection du territoire agricole du Québec* if all or part of the land is situated in a reserved area or in an agricultural zone established under the Act respecting the preservation of agricultural land and agricultural activities (chapter P-41.1); and
- (3)** Publication of a notice of the decision of the Government in the *Gazette officielle du Québec* with the plan of the area and the applicable conservation plan or protection agreement in the case of a man-made landscape.”⁸

4.2 Waterfowl Gathering Areas

Waterfowl gathering areas are wildlife habitats recognized in Quebec under the Act Respecting the Conservation and Development of Wildlife, according to which:

“No person may, in a wildlife habitat, carry on an activity that may alter any biological, physical or chemical component peculiar to the habitat of the animal or fish concerned.”⁹

Recognition Criteria:

1. “The area must be the site of a swamp, floodplain delimited by the mean high-water level for a 2-year period, intertidal zone, water plant community or band of water measuring no more than 1 km wide as measured from the low-water mark.
2. The area must be occupying no less than 25 ha.
3. The area must be frequented by geese or ducks during nesting or migration seasons. This can be established as follows:

⁸Excerpt: Chapter C-61.01; Natural Heritage Conservation Act.

⁹Excerpt: Chapter C-61.1; Act Respecting the Conservation and Development of Wildlife; Paragraph 128.6.

A) An area where there are at least 50 birds of those species per kilometer of shoreline measured along a straight line drawn between the two most distant points on the shoreline;

B) An area comprising 1.5 birds per hectare. If the limits of a floodplain cannot be established as indicated, they shall correspond to the natural high-water mark.”¹⁰

4.3 Migratory Bird Sanctuary

Migratory bird sanctuaries are under federal jurisdiction. They protect critical migratory bird habitats. They may also be breeding sites or staging sites.

“(2) No person shall, in a migratory bird sanctuary,

(a) hunt migratory birds,

(b) disturb, destroy or take the nests of migratory birds, or

(c) have in his possession a live migratory bird, or a carcass, skin, nest or egg of a migratory bird.

5 (1) No person who owns a dog or cat shall permit the dog or cat to run at large in a migratory bird sanctuary.”¹¹

Recognition Criteria:

“Sanctuaries should be reviewed every five years to determine if they continue to meet the described criteria.

An area will be considered suitable for the establishment or maintenance of a Migratory Bird Sanctuary if it meets one or more of the criteria that follow:

1. It supports populations which are concentrated, for any part of the year, in order to meet one or several essential needs, and which are vulnerable to site-specific threats. As a significant portion of the populations could be affected, threats may include intensive hunting, exploration or development, etc. Such key habitat sites could include nesting colonies, moulting areas, wintering areas or staging areas.
2. It supports populations that occupy habitats of restricted geographical area and are vulnerable to human disturbance. Areas that support threatened, endangered or rare species are examples.

¹⁰Modified excerpt : Chapter C-61.1, R.18; Regulation Respecting Wildlife Habitats-Act Respecting the Conservation and Development of Wildlife (Chapter C-61.1, ss. 128.1, 128.6 and 128.18); Paragraph 1.

¹¹Excerpt: Migratory Bird Sanctuary Regulations (C.R.C., c. 1036)

3. It regularly supports at least 1 % of a population of one species or subspecies.
4. The site figures prominently in the requirement for the management of regional populations of migratory birds and/or has high capabilities for educational or interpretative purposes.”¹²

4.4 Important Bird Areas (IBA)

An IBA status is an international recognition granted to sites considered essential to bird populations' well-being and worldwide biodiversity. Until now, 218 countries and territories have joined in this large-scale program launched by BirdLife International. In Quebec, Nature Quebec is responsible for this program. The IBA status does not however offer any legal protection, which means protection measures must be locally established. IBA may be combined with another type of protection status (Nature Quebec, 2016).

Recognition Criteria

In order to be recognized as an IBA, a site must meet at least one of four standardized criteria, which are the subject of an international consensus:

- * Supporting a species at risk (federal status);
- * Supporting a species that is either endemic or restricted by distribution range;
- * Supporting a representative biome-restricted bird population;
- * Supporting, on a regular basis, 1 % or more of a global, continental or regional population of a bird species.

Additional information on IBA criteria and a BirdLife table can be found in Appendix 7.

¹² Excerpt: Migratory Bird Sanctuary Policy, Criteria and Procedures.

5. Analysis and recommendations

According to the ecological data examined in this report and the various protection statuses available, the waterfowl gathering area status seems to be the most appropriate option since it meets all three recognition criteria. This status could be granted to the river section between the Gouin Bridge and Sainte-Thérèse Island.

International recognition through the Important Bird Area program could also be sought for the area between the *Rivière du Sud*'s water mouth and Sainte-Thérèse Island's southern tip. Indeed, data analysis tends to show that the river receives, with many peaks higher than 60,000 birds, more than 1 % of snow geese world population, estimated at 4,290,000 individuals (Lepage and Bordage, 2013), to wit 42,900 individuals. Further scientific study should be undertaken to validate this. Moreover, Bleury River, in Sabrevois, and the *Rivière du Sud* are both recognized nesting areas of the least bittern, a threatened species under SARA. The study area therefore meets two criteria to be recognized as an IBA.

The study area also meets the requirements to be recognized as a migratory bird sanctuary, since it supports a significant gathering of birds and provides them nourishment when migrating. This gathering regularly reaches at least 1 % of world snow goose population and the strip of land along the Chambly Canal facilitates related educational activities. Potential threats to bird gatherings in this sector like a dam would no doubt have an impact on migratory bird populations. This protection status would probably not be socially acceptable since the Chambly Canal' strip of land is widely used by dog owners. Moreover, wetlands in Saint-Paul-de-l'Île-aux-Noix, Saint-Blaise-sur-le-Richelieu and, potentially, Sabrevois, are waterfowl-hunting territories. Common usage rights would therefore be limited by such status because it prohibits hunting and dogs on riverbanks.

The aquatic reserve status would be more difficult to obtain since many designation restrictions would apply. Indeed, the Richelieu River is under shared jurisdiction: the riverbed is under provincial jurisdiction while the water column is under federal jurisdiction. Recreational and cruising boat traffic as well as any biodiversity-damaging activity or spill are therefore under federal jurisdiction.

According to data obtained from an MDDELCC representative, among all activities identified in the Natural Heritage Conservation Act, only those concerning gas, oil or mining development could be regulated with an aquatic reserve status. Moreover, activities likely to damage the riverbed, riverbanks and shoreline or alter watercourses' integrity are already regulated by the Policy for Protection of Riverbanks, Littoral Zones and Floodplains and would not therefore justify the establishment of a reserve. Other river modifications such as: water level alterations, river obstruction or diversion fall under federal jurisdiction. However, should a dam be built, its base would lie on the riverbed. Such a case was not foreseen when setting up the conditions of an aquatic reserve status and therefore would require further analysis by MDDELCC staff. In the

Summary of the General Compatibility of Activities (Appendix 6), such actions are incompatible but may be allowed under exceptional circumstances.

Dam construction would also require an authorization from the International Joint Commission (IJC), created in 1912, to ensure cooperation between Canada and the United States for shared water management. In its first report published in 1972, the Commission concluded that it is technically possible to build anti-flooding structures on the Richelieu River, but was unable to determine its legitimacy, leaving the debate open to governments. It did however mention in 1973 the need to evaluate environmental impacts of flood control structures (IJC, 2017). After the great floods of 2011, the Commission readdressed the issue of flood in areas surrounding Lake Champlain and the Richelieu River. In a study published in 2015, many details on topographic elements of the river (depth, ground) and its aquatic flora profile were added. A flood modelling system was also developed. In the preliminary version of the Identification of Measures to Mitigate Flooding and the Impacts of Flooding of the Lake Champlain and the Richelieu River, published in May 2017 (IJC_2, 2017), one of the objectives aims at assessing the potential impacts of a flood controlling structure, among others elements, on wetlands and wildlife over a period of five years.

6. Conclusion

This analysis shows that the section from the American border to Sainte-Thérèse Island's southern tip in Saint-Jean-sur-Richelieu offers a wide biological diversity. Despite the constant threat of urbanization and agricultural expansion, this area still offers quality habitats to a large number of species, whether waterfowl or fish. It is therefore of prime importance that the proposed status for this sector should preserve its biological integrity while maintaining the community's shared uses. Over and above these considerations, the greatest benefits a provincial, or even an international, recognition would bring to this territory would rest with the site's natural wealth through improved knowledge and appreciation, as well as in strengthening regional pride.

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Appendices

Appendix 1. Maps of St-Jean-sur-Richelieu's Riparian Zones (Excerpt : NCC, 2008; St-Jean *et al.*, 2011)

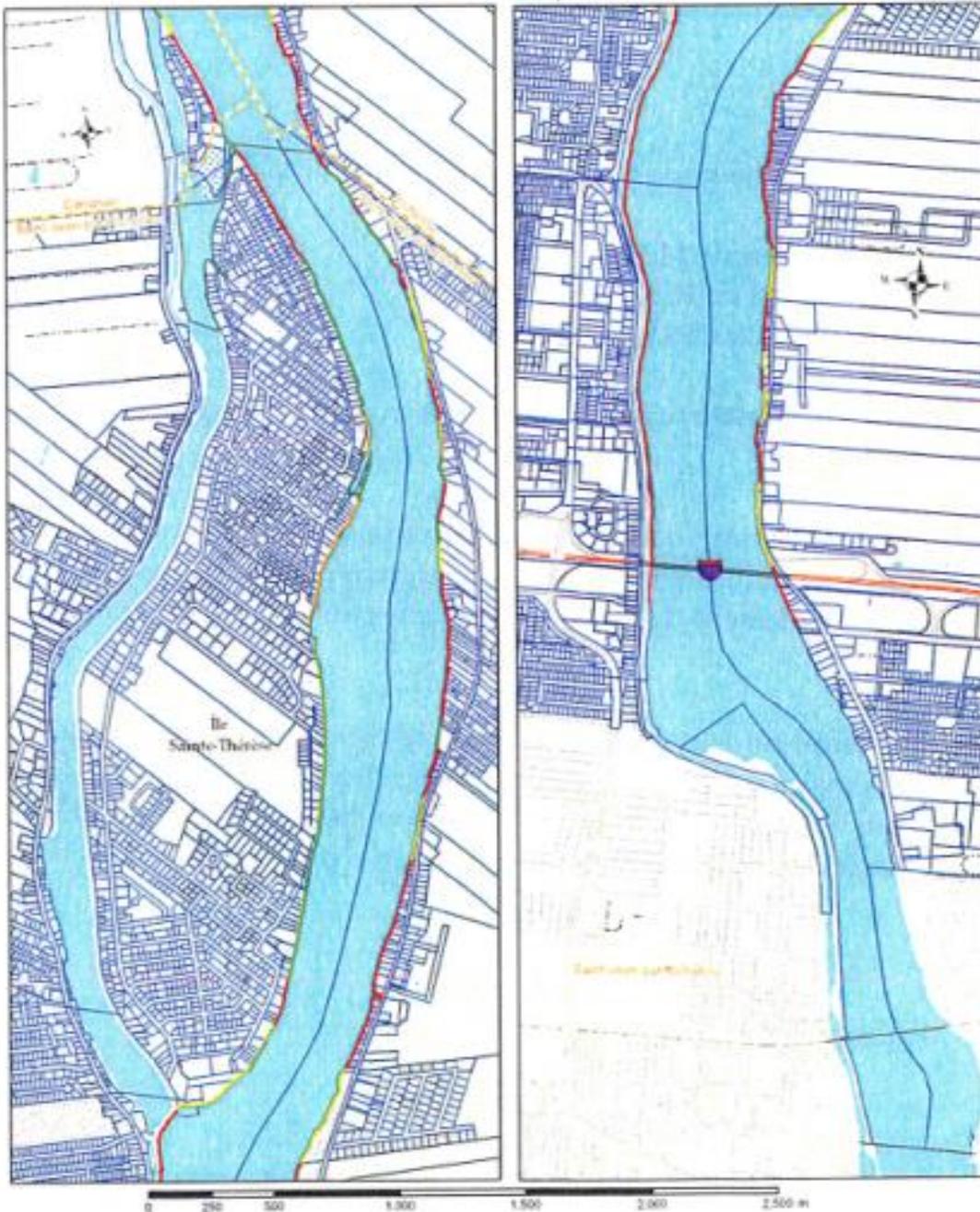
Carte 2 : Qualité de la végétation



Bandes riveraines Saint-Jean-sur-Richelieu

-  Propriétés de Conservation de la Nature
-  Limites de propriété
-  Limites municipales

- Qualité de la végétation
-  Mauvaise
 -  Moyenne
 -  Moyenne
 -  Excellente
 -  Excellente

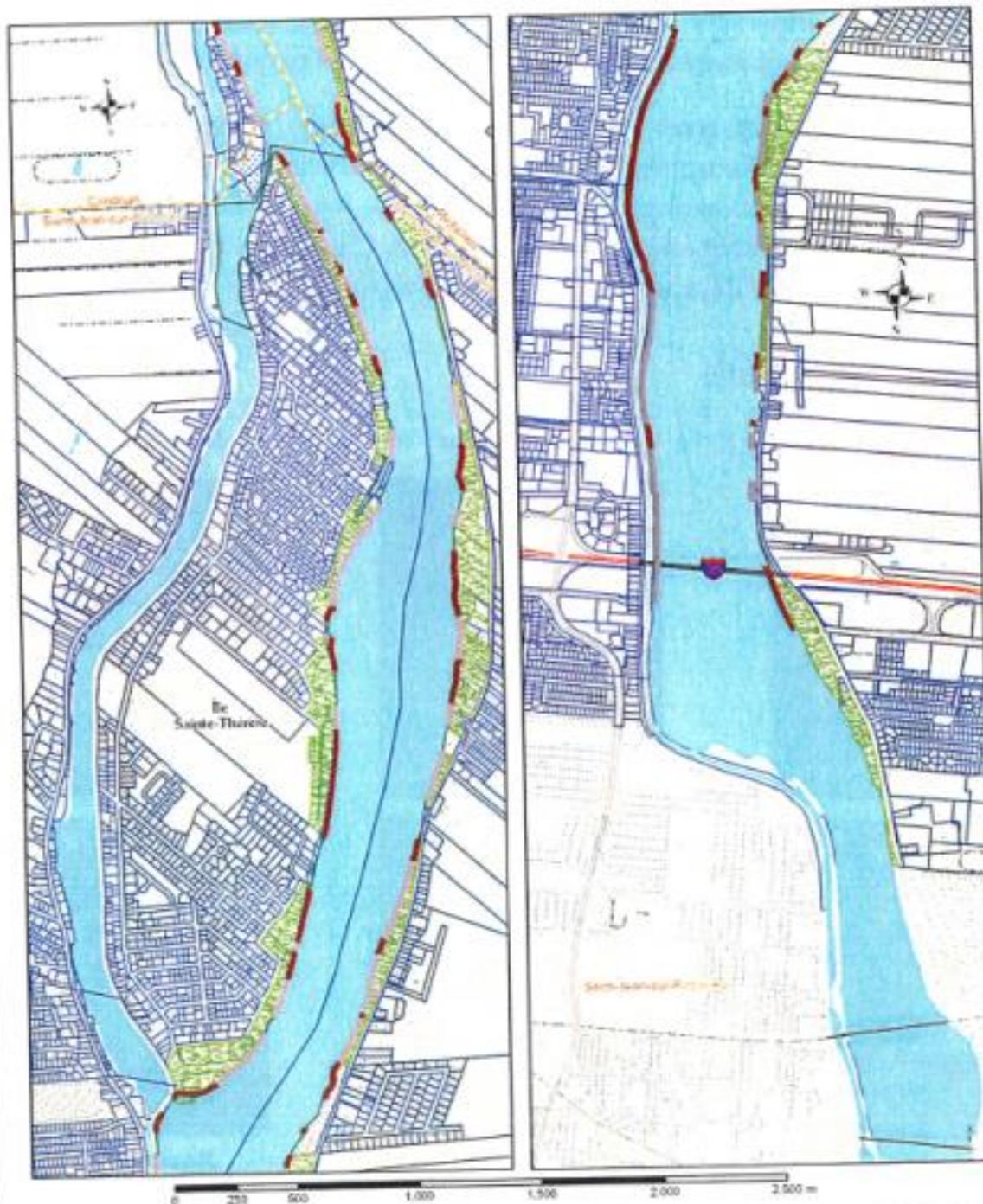


Carte 3 : État des rives

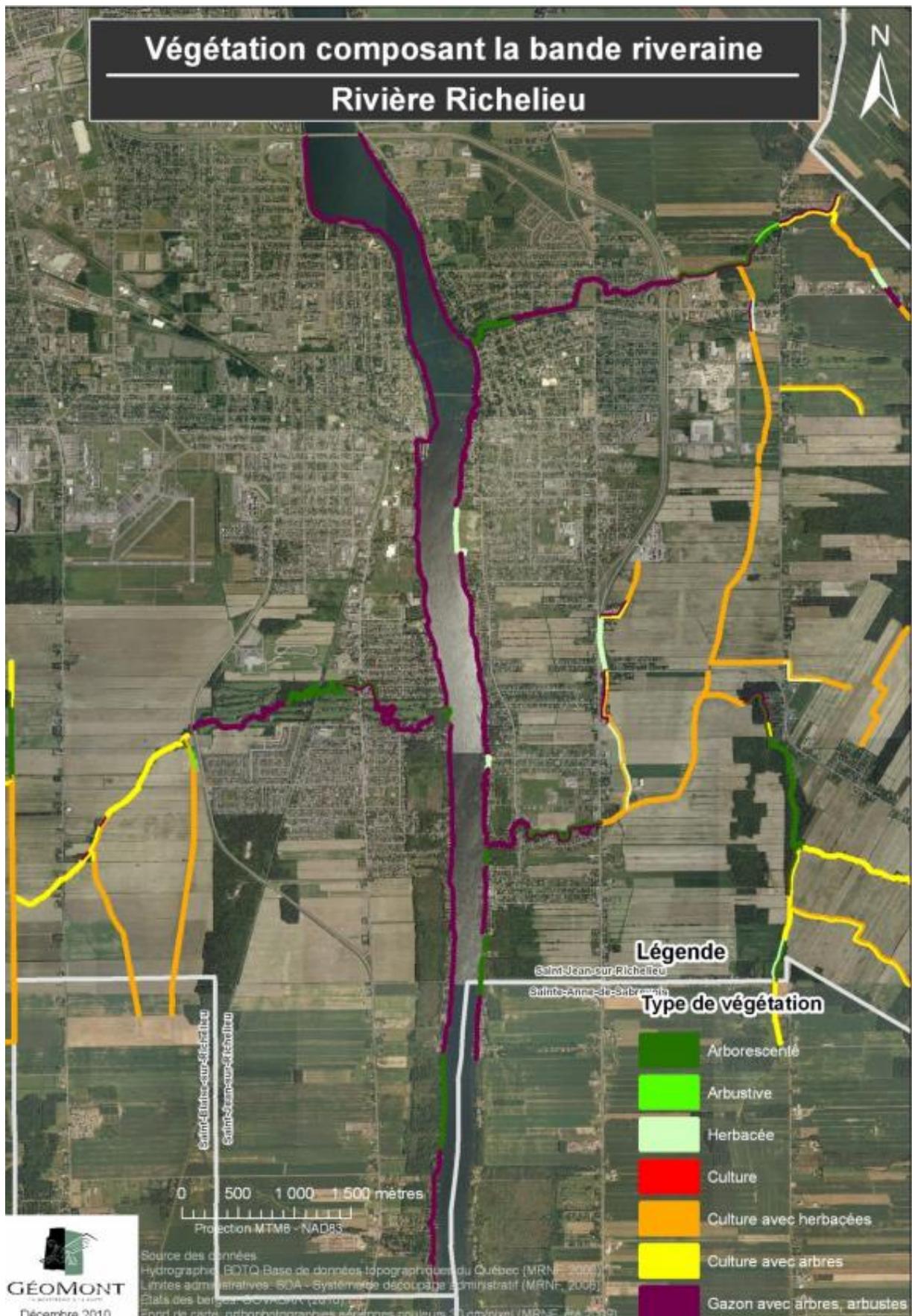
Secteur Saint-Jean-sur-Richelieu

- Propriété de Conservation de la Nature
- Limites municipales
- Limites de propriété

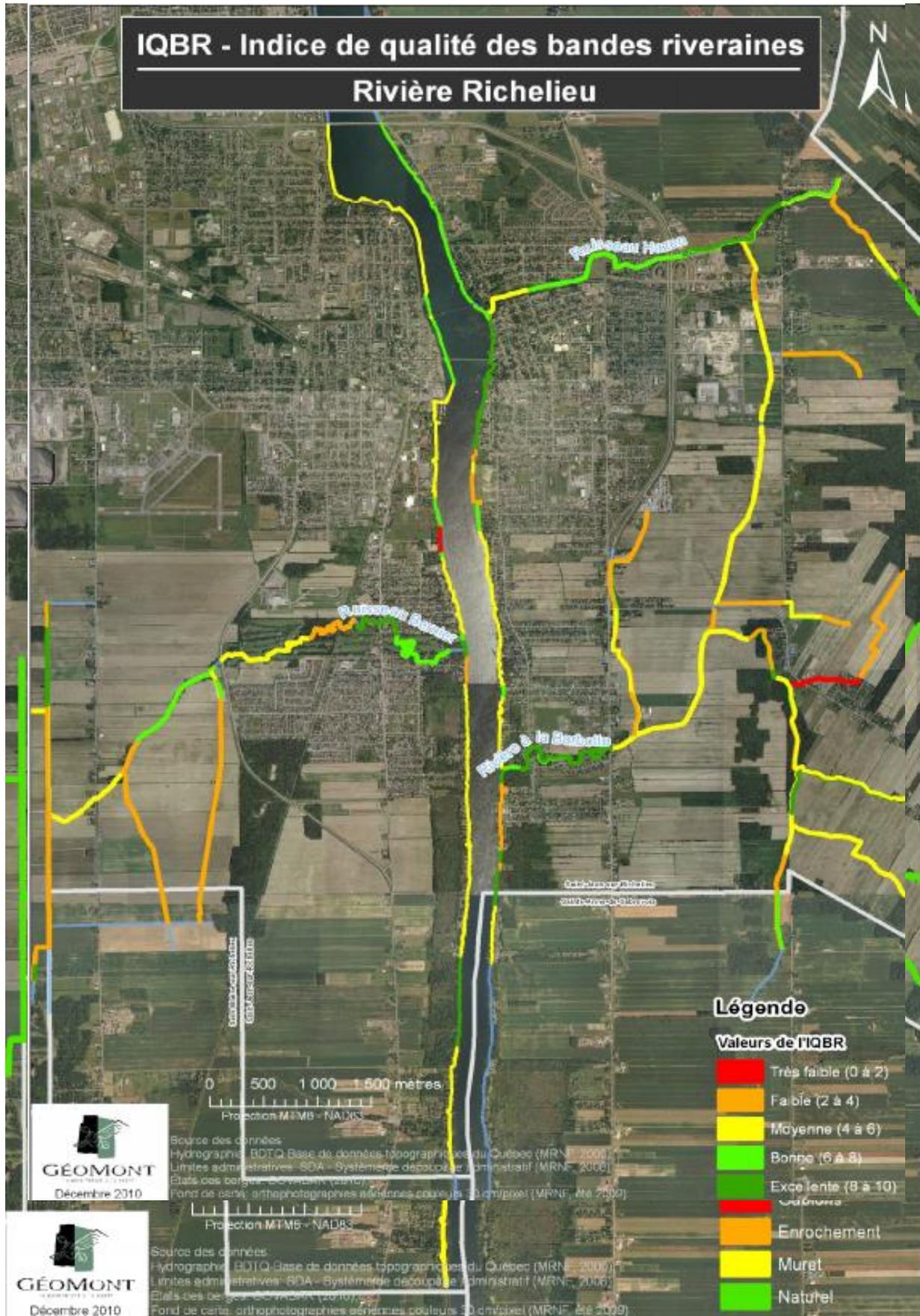
- ### Empiètements en rive
- Gazon
 - Entochement
 - Mur de soutènement



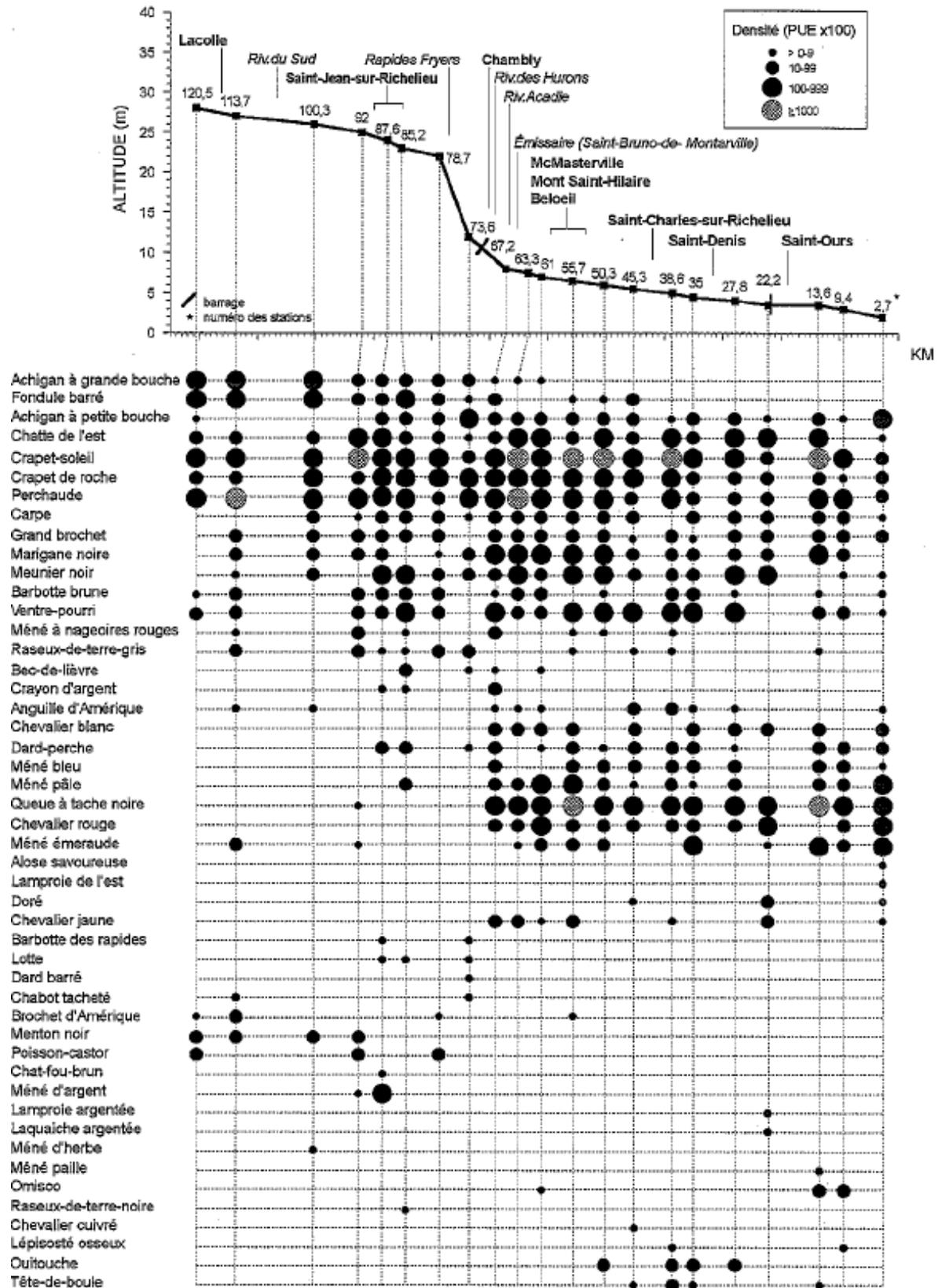
Végétation composant la bande riveraine Rivière Richelieu



Appendix 2. The Richelieu River's Riparian Quality Index (RQI) between the Marchand Bridge and the City's Limits (Excerpt: St-Jean *et al.* 2011)



Appendix 3. Fish Species Density Distribution in the Richelieu River (Excerpt: Saint-Jacques, 1998)



Appendix 4. Quebec Waterfowl Conservation Plan Objectives, 2011

Excerpt: Lepage et al., 2015, *Quebec Waterfowl Conservation Plan, 2011*

4.4 Priority species in BCR 13

Priority species in BCR 13 were selected using *objective* prioritization methods (see section 2.5 and Appendix 16.2), combined with the *subjective* experience of CWS specialists. A conservation objective has been set for each priority species (see section 4.5).

High priority	Medium priority
American Black Duck: Objective 2 Blue-winged Teal: Objective 3	Brant: Objective 4 Canada Goose (Atlantic Pop.): Objective 5 Wood Duck: Objective 6 Greater Scaup: Objective 7 Lesser Scaup: Objective 7 Snow Goose: Objective 8

Special management measures
Canada Goose (Resident Pop.): Objective 9 Snow Goose: Objective 8

4.5 Conservation objectives and actions recommended for priority species in BCR 13

Objective 1 comprises actions that apply to a number of the priority species. Objectives 2 to 9 comprise actions targeting a specific priority species or group of species.

Objective 1 Ensure the conservation of high-priority and medium-priority species.

Monitoring and surveys

- Action 1 Continue WLOW, which serves as a baseline for determining breeding population objectives.
 - ▶ American Black Duck, Blue-winged Teal, Wood Duck, Canada Goose
- Action 2 Institute a spring survey of migrants of priority species that do not breed in the BCR.
 - ▶ Brant, Greater Scaup, Lesser Scaup
- Action 3 Continue the pre-season banding program to monitor harvest rates, document birds' movements, quantify survival and obtain indices of reproductive success of priority species.
 - ▶ American Black Duck, Blue-winged Teal, Wood Duck

- Action 4 Institute a survey to monitor the productivity of priority species.
 - ▶ American Black Duck, Blue-winged Teal
- Action 5 Continue the St. Lawrence freshwater wetland monitoring program (Jean et al. 2005; State of the St. Lawrence Monitoring Committee 2008) to better understand wetland vegetation dynamics and determine the extent of losses of different types of wetlands.
 - ▶ American Black Duck, Blue-winged Teal, Wood Duck, Brant
- Action 6 Institute a survey of a series of key wetlands used by certain priority species (along the St. Lawrence and farther inland); determine the extent and nature of losses and modifications to wetlands.
 - ▶ American Black Duck, Blue-winged Teal, Wood Duck, Brant

Knowledge acquisition

- Action 7 Determine the most important parameters (e.g., adult survival by season, productivity) in the annual cycle of priority species in order to guide monitoring and conservation efforts.
 - ▶ American Black Duck, Blue-winged Teal, Wood Duck, Brant, Greater Scaup, Lesser Scaup
- Action 8 Determine local factors (e.g., habitat characteristics, food resources) that have an impact on the breeding of priority species.
 - ▶ American Black Duck, Blue-winged Teal, Wood Duck
- Action 9 Determine the abundance and distribution of priority species according to wetland type and wetland location in the BCR; locate priority habitats that face threats and develop strategies to curb these threats.
 - ▶ American Black Duck, Blue-winged Teal, Wood Duck
- Action 10 Determine links between breeding grounds, moulting areas and wintering grounds (delineation of populations).
 - ▶ Brant, Greater Scaup, Lesser Scaup
- Action 11 Locate the best habitats to be protected for certain priority species.
 - ▶ Blue-winged Teal (marshes), Brant (eelgrass beds)

Active surveillance

- Action 12 Encourage consultation with CWS specialists during environmental assessment processes in order to obtain recommendations related to priority species.
 - ▶ American Black Duck, Blue-winged Teal, Wood Duck, Brant, Canada Goose, Greater Scaup, Lesser Scaup, Snow Goose
- Action 13 Continue the Harvest Questionnaire Survey and the Species Composition Survey (Wingbee) to monitor harvest rates of priority species.
 - ▶ American Black Duck, Blue-winged Teal, Wood Duck, Canada Goose, Brant, Greater Scaup, Lesser Scaup, Snow Goose
- Action 14 Ensure the efficacy of the CWS Oil Spill Emergency Response Plan in order to prevent and limit mortality in priority species in the event of an oil spill.
 - ▶ American Black Duck, Blue-winged Teal, Wood Duck, Brant, Canada Goose, Greater Scaup, Lesser Scaup, Snow Goose

- Action 15 Ensure the efficacy of the CWS Avian Mortality Events Emergency Response Plan, and make improvements if necessary, to prevent and limit mortality in priority species in the event of an outbreak of avian disease (e.g., avian cholera, botulism).
 ► American Black Duck, Blue-winged Teal, Wood Duck, Brant, Canada Goose, Greater Scaup, Lesser Scaup, Snow Goose
- Action 16 Ensure the adequate surveillance of NWAs in the fluvial section, particularly during the nesting period.
 ► American Black Duck, Blue-winged Teal, Wood Duck
- Action 17 Provide advice to the IJC when needed and inform it on the requirements of priority species (Lehoux et al. 2003).
 ► American Black Duck, Blue-winged Teal

Environmentally sustainable practices

- Action 18 Raise awareness among farmers of the environmental issues associated with large-scale monocultures (grains, soybeans, corn) in the St. Lawrence lowlands to counter the loss of breeding habitats in this region (forest patches, forested and shrubby riparian strips, agricultural wildland or abandoned fields, etc.).
 ► American Black Duck, Blue-winged Teal, Wood Duck
- Action 19 Promote sustainable, ecological agriculture which ensures the presence of suitable waterfowl habitat (riparian strips, healthy aquatic habitats, etc.) during both the nesting and brood-rearing periods; for instance, encourage private programs such as the program by Fondation de la faune du Québec and the Union des producteurs agricoles to enhance watercourse biodiversity in agricultural environments (*Programme de mise en valeur de la biodiversité des cours d'eau en milieu agricole*) and Nature Québec's zero-carbon farm initiative (*Agriculture et climat: Vers des fermes 0 carbone*).
 ► American Black Duck, Blue-winged Teal, Wood Duck
- Action 20 Raise awareness among island landowners and farmers in the fluvial section of the need to preserve crucial breeding habitats (particularly tallgrass meadows) on islands and to keep livestock away from the shoreline to prevent trampling, which exacerbates the erosion problem.
 ► American Black Duck, Blue-winged Teal
- Action 21 Raise awareness among the authorities responsible for land-use planning and development (residential and industrial development) of the importance of conserving wetlands.
 ► American Black Duck, Blue-winged Teal, Wood Duck
- Action 22 Raise awareness among pleasure boaters and kayakers of the importance of avoiding all disturbance to waterfowl on islands in the fluvial section in summer (not coming ashore on islands during the nesting and brood-rearing periods, and not approaching birds during the moulting period).
 ► American Black Duck, Blue-winged Teal, Wood Duck
- Action 23 Raise awareness among pleasure boaters of the importance of reducing their speed in channels and when navigating close to the shoreline in order to lessen the impact of waves on shore erosion (Environnement Canada 2006a).
 ► American Black Duck, Blue-winged Teal, Wood Duck
- Action 24 Raise awareness among the public of the issue of invasive species and practices to prevent their spread (e.g., washing boat hulls).
 ► American Black Duck, Blue-winged Teal, Wood Duck, Brant, Canada Goose, Greater Scaup, Lesser Scaup

Habitat measures

- Action 25 Acquire, restore or protect emergent marshes in the Lake Saint-Louis–Lake Saint-Pierre section whenever possible (particularly the Lake Saint-Pierre archipelago; Lehoux et al. 2003); specifically, restore marshes that are choked with vegetation by creating openings so that they can be used again by duck broods (see *Atlas de restauration des rives du Saint-Laurent* [Environnement Canada 2006a] to identify sites where this type of restoration can be undertaken).
▶ American Black Duck, Blue-winged Teal
- Action 26 Stabilize banks to combat erosion and the loss of island habitat, particularly in the Îles de la Paix, Varennes and Contrecoeur islands and the Lake Saint-Pierre archipelago (Dauphin and Lehoux 2004; Environnement Canada 2006a); portions of the shoreline where bank stabilization is a priority have already been identified (see *Bilan de la sévérité de l'érosion dans le Saint-Laurent dulcicole* [Dauphin and Lehoux 2004]), particularly the barrier islands in the Îles de Contrecoeur NWA where priority wetlands are seriously threatened.
▶ American Black Duck, Blue-winged Teal
- Action 27 Encourage the establishment of an invasive plant monitoring network made up of local communities, conservation organizations and governments; when possible (see *Atlas de restauration des rives du Saint-Laurent* [Environnement Canada 2006a]), use direct control (e.g., manual weeding) or measures to prevent propagation (e.g., control of runners).
▶ American Black Duck, Blue-winged Teal

Objective 2

Ensure the conservation of the American Black Duck; increase the breeding population to 11,000 indicated breeding pairs and maintain this population (Table 2).

- ▶ **Key habitats (breeding):** marshes, peatlands, agricultural watercourses, swamps, beaver ponds, lakes
- ▶ **Primary conservation issues:** habitat loss (shift to intensive farming practices, drainage of farmland, peatland exploitation, deforestation, cottage and resort development [shoreline encroachment]), harvest rates, climate change (possible effect on wintering)

In addition, consult the Population Monitoring Implementation Plan (Black Duck Joint Venture 2008b) and the Research Program Implementation Plan (Black Duck Joint Venture 2008c) for a list of BDJV recommendations for the American Black Duck.

Other actions specifically targeting the American Black Duck in BCR 13:

Monitoring and surveys

- Action 28 Institute a monitoring program of wintering American Black Duck to document changes and assess if they are related to climate change (this survey and the effects of global warming are identified in the BDJV 2010 Research Program Implementation Plan).

Knowledge acquisition

- Action 29 Compare the use of natural and exploited peatlands in the St. Lawrence Valley by the American Black Duck; determine if peatland exploitation (peat mining and cranberry production) has an impact on breeding in the species.
- Action 30 To preserve local breeding populations as well as migrant and wintering populations identified as vulnerable, determine the natal region of birds bagged in the sport and Aboriginal harvests.
- Action 31 Locate moulting areas used by the American Black Duck; determine if they are threatened and, if so, develop strategies to combat these threats.

Environmentally sustainable practices

- Action 32 Educate farmers about the issues arising from drainage practices that are degrading cordgrass marshes along the upper estuary between Kamouraska and L'Isle-Verte (Argus inc. 1998; Environnement Canada 2006a).
- Action 33 Raise awareness among commercial peatland users of the importance of leaving strips of residual vegetation at least five metres wide for nesting American Black Ducks (Bélanger et al. 1994).
- Action 34 Raise hunters' awareness of the importance of respecting regulations on daily bag and possession limits for American Black Ducks.

Habitat measures

- Action 35 Acquire, restore or protect cordgrass marshes in the Lower St. Lawrence region whenever possible (see Argus inc. 1998), since these marshes are the preferred brood-rearing habitat of the American Black Duck.
- Action 36 Restore, whenever possible, salt marshes where the creation of drainage canals has resulted in the drying up of the marsh and pools; using sills to seal off canals can significantly improve the quality of marshes by restoring vegetation and increasing the number of pools (see the *Atlas de restauration des rives du Saint-Laurent* [Environnement Canada 2006a] to find sites where this type of restoration work can be carried out).
- Action 37 Whenever possible, restore aboiteaus that can be restored (see the *Atlas de restauration des rives du Saint-Laurent* [Environnement Canada 2006a] to find sites where this type of restoration work can be done); removing dikes can restore exchanges between diked marshes and the St. Lawrence.
- Action 38 Acquire, restore or protect natural peatlands (e.g., create a corridor of protected natural peatlands in the Arthabasca, Bécancour, de l'Érable, Bellechasse, Lévis and Lotbinière MRCs); investigate the possibility of increasing the links between peatlands in the vicinity of the Baie de L'Isle-Verte NWA (e.g., integrate the Bois-des-Bel bog with the NWA); create a protected buffer zone around the Baie de L'Isle-Verte NWA.
- Action 39 In agricultural and mixed agricultural and forest landscapes, conserve and protect woodlots containing streams, ponds and lakes, since these habitats are particularly sought out by American Black Ducks during the nesting period (Maisonneuve et al. 2006).

Objective 3

Ensure the conservation of the Blue-winged Teal; at a minimum, maintain the breeding population at 110 indicated breeding pairs (Table 2).

- ▶ **Key habitats (breeding):** freshwater and brackish-water marshes, agricultural watercourses and ponds, agricultural wildland (abandoned fields), herbaceous riparian strips, swamps, beaver ponds
- ▶ **Primary conservation issues:** habitat loss (shift to intensive farming practices, drainage of fields, filling-in of small wetlands), harvest rates

Other actions specifically targeting the Blue-winged Teal in BCR 13:

Active surveillance

Action 40 Ensure adequate surveillance along the Ottawa River during the sport hunt.

Environmentally sustainable practices

Action 41 Raise hunters' awareness of the importance of respecting regulations on daily bag and possession limits for Blue-winged Teal.

Objective 4

Ensure the conservation of the Atlantic Population of the Brant; maintain the ecological integrity of staging areas.

- ▶ **Key habitats (migration):** eelgrass beds, cordgrass marshes and other salt marshes
- ▶ **Primary conservation issues:** habitat quality (condition of eelgrass beds), oil spills, harvest rates

Other actions specifically targeting the Brant in BCR 13:

Knowledge acquisition

Action 42 Determine the causes promoting the appearance of the pathogen *Labyrinthula zosterae*, which is responsible for eelgrass wasting disease.

Environmentally sustainable practices

Action 43 Raise awareness among the responsible authorities of the importance of treating wastewater before it is discharged, which is not being done by certain municipalities in the Bas-Saint-Laurent region (State of the St. Lawrence Monitoring Committee 2008). High nutrient and sediment loads in the water promote the growth of phytoplankton and filamentous algae to the detriment of eelgrass.

Habitat measures

Action 44 Acquire, restore or protect eelgrass beds (e.g., Cacouna Bay and the mouth of the Trois-Pistoles River) whenever possible (see *Atlas de restauration des rives du Saint-Laurent* [Environnement Canada 2006a]).

Objective 5

Ensure the conservation of the Atlantic Population of the Canada Goose; maintain the ecological integrity of staging areas.

- ▶ **Key habitats (migration):** agricultural fields (annual crops), flooded fields, floodplains and shoreline along the fluvial section, ponds, peatlands
- ▶ **Primary conservation issues:** harvest rates, oil spills

Note: In addition, see the report *A management plan for the Atlantic Population of Canada Geese* (Canada Goose Committee – Atlantic Flyway Council Game Bird Technical Section 2008) for a complete list of measures proposed for this population.

There are no actions specifically targeting the Atlantic Population of the Canada Goose in BCR 13 other than those listed under Objective 1.

Objective 6

Ensure the conservation of the Wood Duck; increase the breeding population to 2,800 indicated breeding pairs and maintain this population (Table 2).

- ▶ **Key habitats (breeding):** presence of tree cavities (snags and live mature trees) or artificial nesting boxes in mature deciduous or mixed forests near lakes, ponds, streams, rivers, flooded forests, swamps or beaver ponds
- ▶ **Primary conservation issues:** habitat loss (logging, harvesting of farm woodlots, scarcity of mature trees and snags with cavity potential in lowland areas), inter- and intraspecific competition for nesting cavities, harvest rates

Other actions specifically targeting the Wood Duck in BCR 13:

Knowledge acquisition

- Action 45 Compare the productivity of Wood Ducks nesting in natural cavities with conspecifics using artificial nest boxes to determine the importance of nest boxes in the species' productivity.
- Action 46 Determine the importance of cavities excavated by Pileated Woodpeckers for breeding Wood Duck.

Environmentally sustainable practices

- Action 47 Increase awareness among the authorities responsible for forest management and harvesting on the importance of maintaining sufficient numbers of large trees (diameter breast height [DBH] of 30 cm or more) and protecting trees with potential nesting cavities (snags and live mature trees) for nesting Wood Ducks (e.g., maintain one snag per hectare; Bergeron et al. 1997).
- Action 48 Increase awareness among the authorities responsible for forest management and harvesting on preserving riparian strips (e.g., when certain species are present, protect a strip at least 20 m wide and keep a certain percentage of the strips intact).
- Action 49 Raise awareness among farmers and private landowners of the importance of preserving agricultural woodlots and trees with nesting cavities.

Action 50 For old-growth forests (exceptional forest ecosystems) located on private land, make landowners aware of the importance of protecting them and invite them to sign voluntary conservation agreements.

Action 51 Educate the public about the importance of snags for cavity-nesting ducks.

Habitat measures

Action 52 Support the nest box program run by the Société d'aménagement de la baie Lavallière, to ensure its long-term existence.

Objective 7

Ensure the conservation of Greater and Lesser scaup; maintain the ecological integrity of the foraging areas used during migration by the two species.

- ▶ **Key habitats (migration):** Ottawa River and the fluvial section (particularly the riverine lakes)
- ▶ **Primary conservation issues:** availability and quality of food resources, susceptibility to contamination (selenium), harvest rates, oil spills, loss of amphipod-rich wetlands

Other actions specifically targeting Greater and Lesser scaup in BCR 13:

Monitoring and surveys

Action 53 Continue the monitoring of water quality in the fluvial section of the St. Lawrence and the monitoring of toxic sediment contamination in the St. Lawrence (Rondeau 2005; State of the St. Lawrence Monitoring Committee 2008; Pelletier 2008b).

Knowledge acquisition

Action 54 Determine the food sources used by Greater and Lesser scaup in their major staging areas to determine if these resources are limited or threatened and to guide monitoring and conservation efforts for the two species.

Action 55 Determine regional factors (e.g., food resources) with an impact on migration and individual condition in Greater and Lesser scaup.

Action 56 Compare the current distribution and abundance of Greater and Lesser scaup in their major staging areas with abundance and distribution in the 1970s and 1980s, to identify the reasons for the changes that have occurred.

Action 57 Accurately determine the specific proportion of Greater and Lesser scaup in mixed flocks of migrants to guide monitoring and conservation efforts (the National Harvest Survey provides an indication of this proportion in fall).

Active surveillance

Action 58 Continue to pursue cooperative efforts and actions put forward under the Great Lakes Water Quality Agreement and the Great Lakes Air Quality Agreement, since the issues involved (e.g., potential contamination) are major ones affecting scaup frequenting the St. Lawrence.

Environmentally sustainable practices

Action 59 Since sediments in lakes Saint-François, Saint-Louis and Saint-Pierre are still contaminated, encourage efforts to reduce toxic effluent discharges by upstream industries in the fluvial section (Pelletier 2002; 2005; 2008b).

Action 60 Raise awareness among hunters of the issue of disturbing scaup in their staging areas in fall (e.g., Waterfowl Gathering Area in western part of Lake Saint-Pierre).

Habitat measures

- Action 61 Protect important staging areas used by scaup that currently do not have protected status by having them designated as a Waterfowl Gathering Area or Marine Wildlife Area, for example.

Objective 8

Ensure the conservation of the Snow Goose, while ensuring the sustainable integrated management of the species; maintain the number of migrants at between 500,000 and 750,000 individuals (Table 2).

- ▶ **Key habitats (migration):** bulrush marshes, particularly in the Cap Tourmente NWA, L'Isle-aux-Grues archipelago, and Saint-Vallier, Montmagny, Cap-Saint-Ignace and Trois-Saumons Migratory Bird Sanctuaries.
- ▶ **Primary conservation issues:** availability and quality of food resources, harvest rates, degradation of bulrush marshes, oil spills

Note: Consult the most recent Greater Snow Goose Action Plan for a complete list of strategic actions proposed for this subspecies.

Although the species is considered to be overabundant, it must be kept in mind that this was not always the case—the population only numbered 3,000 individuals in the early 1900s—and a significant cause of mortality, such as an epidemic on the breeding grounds, could result in a dramatic decline in the population. Quebec has always been an important migration route and staging area for Snow Geese.

Other actions specifically targeting the Snow Goose in BCR 13:

Monitoring and surveys

- Action 62 Continue the GSGOS.
- Action 63 Continue fall surveys of the ratio of young to adults to be able to measure annual productivity in the population over the long term.
- Action 64 Continue to locate neck-collared individuals in spring and fall.
- Action 65 Begin the monitoring of bulrush marsh ecological integrity again (Cap Tourmente and Côte-du-Sud).

Knowledge acquisition

- Action 66 Monitor changes in the dispersal of geese in response to changes in agricultural practices and to management measures undertaken.
- Action 67 Improve models for predicting population trends in response to various management scenarios.

Active surveillance

- Action 68 Continue the spring conservation hunt as an exceptional management measure until the objective for the population as a whole has been achieved.
- Action 69 Ensure adequate surveillance during the spring and fall hunts.

Habitat measures

Action 70 Plant lure crops on public land next to bulrush marshes used by Snow Geese to minimize browsing in marshes in fall.

Objective 9

Limit the growth of the Resident Population of the Canada Goose and restrict its expansion.

- ▶ **Key habitats (breeding):** well-maintained, open expanses of grass near bodies of water (e.g., golf courses, urban parks); islands in the fluvial section and fluvial estuary of the St. Lawrence
- ▶ **Primary conservation issues:** invasive species, short-distance migrant, constantly high reproductive success, less exposed to mortality from sport hunting

Note: Consult the handbook *Canada and Cackling Geese: Management and Population Control in Southern Canada* (Environnement Canada 2010c) for a complete list of proposed strategic actions for managing the Resident Population.

Other actions specifically targeting the Resident Population of the Canada Goose in BCR 13:

Monitoring and surveys

Action 71 Continue banding Resident Canada Geese to document their movements, quantify survival rates, obtain indices of reproductive success and determine the growth rate of the population.

Knowledge acquisition

Action 72 Study the impacts of the increase in the population of Resident Canada Geese on duck habitats and productivity.

Active surveillance

Action 73 Follow up on management actions, either long-standing or new, aiming to increase the sport harvest or control the population of Resident Canada Geese.

Action 74 Educate the public about potential issues arising from the cohabitation of Resident Canada Geese and humans.

Habitat measures

Action 75 Raise awareness among municipalities and golf course and urban park managers of landscape modification techniques that can be used to make these green spaces less attractive to Resident Canada Geese.

Appendix 5. List of Species Reported on Public Sites According to eBird's Database

	Sainte-Thérèse Island	Chambly Canal	Richelieu Rest Area (Cayer)	Harris Inn	Notre-Dame Gateway	Hazen Stream	Labrevois Marina	Flooded Fields	Little Blue Heron Monitoring Site	Bleury River*
SWANS, GEESE AND DUCKS										
Greater white-fronted goose	x	x	x	x	x					
Greylag goose			x							
Snow goose (MP/ SMM)	x	x	x	x	x	x	x	x		
Ross's goose		x	x	x				x		
Hybrid: snow goose x Ross's goose								x		
Barnacle goose	x		x	x	x			x		
Brant goose (MP)						x		x		
Cackling goose	x		x	x	x		x	x		
Canada goose (MP/SMM)	x	x	x	x	x	x	x	x	x	x
Hybrid: greater white-fronted goose x Canada goose			x							
Hybrid : snow goose x Canada goose	x		x							
Trumpeter swan			x	x						
Mute swan								x		
Whooper swan				x						
Wood duck (MP)	x	x	x	x		x		x	x	
Gadwall	x		x	x				x		
Eurasian wigeon	x						x	x		
American wigeon	x		x	x	x		x	x		
American black duck (HP)	x	x	x	x	x	x	x	x		
Mallard	x	x	x	x	x	x	x	x	x	x
Hybrid : American black duck x mallard				x		x		x		
Blue-winged teal (HP)								x		
Northern shoveler		x						x		
Northern pintail	x	x	x	x	x			x		
Eurasian teal	x	x	x	x	x			x		
Redhead			x		x	x		x		
Ring-necked duck	x	x	x	x	x		x	x		
Greater scaup (MP)		x	x	x				x	x	
Lesser scaup (MP)	x	x	x	x	x		x	x		
Greater scaup or lesser scaup	x		x	x				x		
Harlequin duck			x	x						
Surf scoter			x	x	x			x		
Velvet scoter			x	x	x					
Black scoter			x	x	x					
Long-tailed duck		x	x	x	x					
Bufflehead	x	x	x	x	x	x	x	x		
Common goldeneye	x	x	x	x	x	x	x	x		
Barrow's goldeneye			x	x	x					
Hybrid : Barrow's Goldeneye /common goldeneye			x							

	Sainte-Thérèse Island	Chambly Canal	Richelieu Rest Area (Cayer)	Harris Inn	Notre-Dame Gateway	Hazen Stream	Labrevois Marina	Flooded Fields	Little Blue Heron Monitoring Site	Bleury River*
Hooded merganser	x	x	x	x	x	x	x	x	x	
Common merganser	x	x	x	x	x	x	x	x	x	
Red-breasted merganser	x		x	x	x			x		
Ruddy duck			x	x	x					
GALLINACEANS										
Wild turkey								x		
LOONS AND GREBES										
Common loon	x		x			x		x		
Pied-billed grebe		x	x					x		x
Horned grebe			x	x	x			x		
Red-necked grebe			x	x	x					
CORMORANTS AND ANHINGAS										
Double-crested cormorant	x	x	x	x	x	x		x	x	
HERONS, IBISES, ETC										
American bittern								x		x
Least bittern										x
Great blue heron	x	x	x	x	x	x	x	x	x	x
Great egret	x	x			x	x		x		x
Snowy egret								x		
Little blue heron								x	x	
Western cattle egret								x		
Green heron		x				x		x		
Black-crowned night heron		x				x				x
Glossy ibis								x		
VULTURES, RAPTORES, ETC										
Turkey vulture		x	x			x	x	x	x	
Western osprey		x	x			x		x	x	x
Golden eagle						x				
Hen harrier			x			x		x		
Sharp-shinned hawk			x							
Cooper's hawk	x	x	x	x		x		x		
Sharp-shinned hawk or Cooper's hawk									x	
Bald eagle	x		x	x		x	x	x	x	
Red-shouldered hawk								x		
Broad-winged hawk						x		x		
Red-tailed hawk		x	x	x	x	x	x	x	x	
Rough-legged buzzard				x				x		
RAILS, GALLINULES, ETC										
American coot	x		x	x	x					
SHOREBIRDS										
Grey plover								x		
American golden plover								x		
Semipalmated plover			x					x	x	
Killdeer	x	x	x			x		x	x	

	Sainte-Thérèse Island	Chambly Canal	Richelieu Rest Area (Cayer)	Harris Inn	Notre-Dame Gateway	Hazen Stream	Labrevois Marina	Flooded Fields	Little Blue Heron Monitoring Site	Bleury River*
Hudsonian godwit			x					x		
Marbled godwit								x		
Ruff								x		
Dunlin			x		x			x		
Least sandpiper	x		x					x	x	
White-rumped sandpiper			x		x			x		
Pectoral sandpiper			x					x	x	
Semipalmated sandpiper								x		
Short-billed dowitcher								x		
Wilson's snipe			x					x	x	
Wilson's phalarope								x		
Red-necked phalarope								x		
Red phalarope								x		
Spotted sandpiper		x	x			x		x	x	
Solitary sandpiper						x		x	x	
Common redshank	x	x	x		x			x	x	
Lesser yellowlegs	x		x					x	x	
LARIDAE										
Bonaparte's gull		x	x	x		x		x		
Franklin's gull			x							
Ring-billed gull	x	x	x	x	x	x	x	x	x	x
European Herring gull	x	x	x	x	x	x	x	x	x	x
Iceland gull	x	x		x						
Lesser Black-backed gull	x	x	x							
Great Black-backed gull	x	x	x	x	x	x	x	x		
Caspian tern			x	x		x	x	x	x	
Black tern								x		
Common tern						x		x	x	x
PIGEONS AND DOVES										
Rock dove (domesticated form)	x	x	x	x	x	x	x	x	x	
Eurasian collared dove						x				
Mourning dove	x	x	x	x	x	x	x	x	x	x
CUCULIDAE										
Yellow-billed cuckoo						x				
Black-billed cuckoo						x				
OWLS										
Eastern screech owl						x				
SWIFTS										
Chimney swift						x		x	x	
HUMMINGBIRDS										
Ruby-throated hummingbird		x				x		x	x	
KINGFISHERS										
Belted kingfisher	x	x	x	x	x	x		x	x	
WOODPECKERS										

	Sainte-Thérèse Island	Chambly Canal	Richelieu Rest Area (Cayer)	Harris Inn	Notre-Dame Gateway	Hazen Stream	Labrevois Marina	Flooded Fields	Little Blue Heron Monitoring Site	Bleury River*
Yellow-bellied sapsucker						x				x
Downy woodpecker	x	x	x		x	x		x	x	x
Hairy woodpecker		x	x			x		x		
Northern flicker		x	x			x		x	x	
Pileated woodpecker	x					x				
FALCONS ET CARACARAS										
American kestrel						x		x	x	
Merlin			x			x		x	x	
Peregrine falcon						x		x		
TYRANNIDAES: PEWEES, FLYCATCHERS, ETC										
Olive-sided flycatcher						x				
Eastern Wood pewee						x		x		
Yellow-bellied flycatcher						x				
Alder flycatcher		x							x	
Willow flycatcher						x				
Least flycatcher		x				x				
Eastern phoebe		x				x		x	x	
Great crested flycatcher		x				x				
Eastern kingbird		x				x		x	x	x
SHRIKES										
Great grey shrike		x								
VIREOS										
Blue-headed vireo						x				
Philadelphia vireo						x				
Warbling vireo		x				x		x	x	
Red-eyed vireo		x				x			x	
CORVIDAES										
Blue jay	x	x	x	x	x	x	x	x	x	x
American crow	x	x	x	x	x	x	x	x	x	x
Northern raven	x	x				x	x	x	x	
LARKS										
Horned lark		x		x			x	x		
SWALLOWS										
Northern rough-winged swallow					x	x				
Purple martin		x			x	x		x	x	
Tree swallow		x	x		x	x	x	x	x	x
Sand martin						x		x	x	
American cliff swallow		x				x		x		
CHICKADEES										
Black-capped chickadee	x	x	x	x	x	x	x	x	x	x
Tufted titmouse		x				x		x		
NUTHATCHES										
Red-breasted nuthatch						x				

	Sainte-Thérèse Island	Chambly Canal	Richelieu Rest Area (Cayer)	Harris Inn	Notre-Dame Gateway	Hazen Stream	Labrevois Marina	Flooded Fields	Little Blue Heron Monitoring Site	Bleury River*
White-breasted nuthatch	x	x	x			x	x	x	x	
CREEPERS										
Brown creeper		x				x		x		
WRENS										
House wren		x				x				
Winter wren		x								
Marsh wren										x
Carolina wren						x		x		
KINGLETS										
Golden-crowned kinglet			x					x		
Ruby-crowned kinglet						x		x		
ROBINS AND TURDIDAES										
Veery		x				x				
Grey-cheeked thrush						x				
Swainson's thrush						x				
Hermit thrush						x				
American robin	x	x	x		x	x	x	x	x	m
MOCKINGBIRDS										
Grey catbird		x				x			x	
Brown thrasher		x				x				
STARLINGS AND MYNAHS										
Common starling	x	x	x	x	x	x	x	x	x	
Buff-bellied pipit								x		
WAXWINGS										
Cedar waxwing	x	x	x			x		x	x	
WARBLERS										
Ovenbird						x				
Northern waterthrush						x				
Golden-winged warbler						x				
Black-and-white warbler						x				
Tennessee warbler						x				
Orange-crowned warbler						x				
Nashville warbler						x				
Common yellowthroat		x				x				
American redstart		x				x				
Cape May warbler						x				
Northern parula						x				
Magnolia warbler		x				x				
Bay-breasted warbler						x				
Blackburnian warbler						x				
Mangrove warbler		x				x		x		x
Chestnut-sided warbler						x				
Blackpoll warbler						x				
Black-throated Blue warbler						x				

	Sainte-Thérèse Island	Chambly Canal	Richelieu Rest Area (Cayer)	Harris Inn	Notre-Dame Gateway	Hazen Stream	Labrevois Marina	Flooded Fields	Little Blue Heron Monitoring Site	Bleury River*
Palm warbler						x				
Pine warbler						x				
Myrtle warbler		x	x	x		x		x		
Black-throated Green warbler						x				
Canada warbler						x				
Wilson's warbler						x				
TOWHEES ET SPARROWS										
LeConte's sparrow							x			
Nelson's sparrow							x			
American tree sparrow	x	x				x		x		
Chipping sparrow		x			x	x		x	x	
Red Fox sparrow						x				
Dark-eyed junco	x		x			x		x		
White-crowned sparrow						x				
White-throated sparrow			x		x	x				
Vesper sparrow									x	
Savannah sparrow								x		
Song sparrow	x	x	x	x	x	x	x	x	x	
Swamp sparrow								x		
Eastern towhee						x				
CARDINALS, BUNTINGS ET DICKCISSELS										
Scarlet tanager						x				
Northern cardinal	x	x	x		x	x	x	x	x	x
Rose-breasted grosbeak						x				
Indigo bunting								x		
ICTERIDAE										
Bobolink		x						x		
Red-winged blackbird	x	x	x		x	x	x	x	x	x
Eastern meadowlark								x		
Rusty blackbird		x					x	x		
Common grackle	x	x	x		x	x	x	x	x	x
Brown-headed cowbird		x				x		x	x	
Baltimore oriole		x				x		x		x
FINCHES AND EUPHONIAS										
House finch	x	x	x			x		x		
Purple finch		x				x				
Pine siskin						x				
American goldfinch	x	x	x		x	x		x	x	x
SPARROWS										
House sparrow	x	x	x	x	x	x	x	x	x	

Appendix 6. Summary of the General Compatibility of Activities and Interventions Subject to Authorization

Excerpt: DFWP, 2011, Activity Framework for Biodiversity Reserves and Aquatic Reserves

APPENDIX II: SUMMARY OF THE GENERAL COMPATIBILITY OF ACTIVITIES AND INTERVENTIONS SUBJECT TO AUTHORIZATION

Legend

- Prohibited (Pro): Activity or intervention that is incompatible and therefore prohibited under the *Natural Heritage Conservation Act* (NHCA) or the conservation plan, and which cannot be authorized by the MDDELCC.
- Incompatible #1 (I-1): Activity or intervention that is incompatible and therefore prohibited, but for which the MDDELCC retains the possibility of authorization on an exceptional basis. The exceptionality of the situation must be shown and the degree of impact minimized. Very strict performance conditions will be stipulated by the MDDELCC. Such activities and interventions are almost never authorized by the MDDELCC.
- Incompatible #2 (I-2): Activity or intervention that is generally incompatible and that the MDDELCC does not wish to see performed in aquatic and biodiversity reserves; however, a particular territorial context could justify authorization. Strict performance conditions will be stipulated by the MDDELCC to minimize impacts. Such activities and interventions are rarely authorized by the MDDELCC.
- Incompatible #3 (I-3): Activity or intervention that is generally incompatible and that the MDDELCC generally does not wish to see performed; however, in certain contexts they could be better (as a way of protecting biodiversity) than doing nothing. Performance conditions will be stipulated by the MDDELCC to minimize impacts. Whether or not authorization is granted will depend on the particular characteristics of the natural environment and the proposed activity or intervention.
- Compatible #1 (C): Activity or intervention that is generally compatible with the vocation of aquatic and biodiversity reserves, but whose performance could have an impact on biodiversity or the natural environment. Performance conditions may be stipulated by the MDDELCC to minimize impacts. Such activities and interventions are generally authorized by the MDDELCC.
- Permitted (Per): Activity or intervention that is not regulated by either the NHCA or the conservation plan, and is therefore permitted without authorization from the MDDELCC.

Note to the reader

The following table concerns aquatic and biodiversity reserves with permanent status.

Note that the table reflects the general activity framework. In practice, the final conservation plan of each reserve may specify more restrictive or more permissive measures for each activity and intervention. Also, the fragility or sensitivity of the environment, or of some element of biodiversity, could require the MDDELCC to decide differently from what is conveyed in this table.

Activity or Intervention	Degree of Compatibility					
	Pro	I-1	I-2	I-3	C	Per
Incompatible and therefore prohibited						
Mining and gas or oil extraction						
Mineral, gas or oil exploration, including brine or underground reservoir exploration, prospecting, digging and boring						
Forest management (commercial, industrial)						
including the harvesting of wood after a fire, epidemic or windfall						
Exploitation of hydraulic resources and any production of energy on a commercial or industrial basis						
Use of fertilizers						
Stocking a watercourse or water body with fish for the purpose of aquaculture or commercial fishing						
Harvesting of non-timber forest products by mechanical means						
Operation of a sand or gravel pit						
Incompatible, but may be authorized exceptionally	Pro	I-1	I-2	I-3	C	Per
Intervention in a wetland ° Example of an exception: dismantling of a beaver dam						
Dredging, filling, obstruction or diversion of any watercourse or water body ° Example of an exception: shoreline restoration, reconstruction of a dam						
Activity that could degrade the bed or banks of a watercourse or water body, or alter its biochemical characteristics or the quality of aquatic, riparian or wetland environments ° Example of an exception: repair or reconstruction of a riparian infrastructure						
Use of any form of pesticide ° Example of an exception: use of Bacillus thuringiensis (Bt) to combat an invasive species						

Burial, abandonment or disposal of waste, snow or other residual materials, except in waste receptacles, facilities or sites designated by the MDDELCC ◦ Example of an exception: temporary action during authorized development work, on sites for an outfitter or ZEC						
Activity or circulation in a given sector, when signage restricts such access ◦ Example of an exception: monitoring a threatened or vulnerable species; management, conservation or restoration intervention						
Staying on the same site for more than 90 days without a land right ◦ Example of an exception: authorized research or biodiversity monitoring program						
Commercial activities including the sale of goods or services not concerning wildlife, recreation or tourism, particularly using motorized vehicles ◦ Example of an exception: sale of traditional Aboriginal products						
Activity that could severely degrade the soil or a geological formation, or harm the plant cover ◦ Example of an exception: temporary action during authorized development work, with mandatory environmental restoration; archeological research or educational activity						

Activity or Intervention	Degree of Compatibility					
	Pro	I-1	I-2	I-3	C	Per
Incompatible, but may be authorized exceptionally (cont.)						
Activity that could severely degrade the soil or a geological formation, or harm the plant cover ◦ Example of an exception: temporary action during authorized development work, with mandatory environmental restoration; archeological research or educational activity						
Blocking access by a barrier or other means ◦ Example of an exception: if agreement with the Sûreté du Québec for safety reasons						
Certain work related to the improvement of forest roads (e.g. widening the roadway, upgrading the class of road) ◦ Example of an exception: no way to go around the reserve by another road						
Sports competition, tournament or motor vehicle rally, or any large-scale non-motorized event not related to nature, if more than fifteen people are involved ◦ Example of an exception: no way to go around the reserve						

Incompatible, but may be authorized in some contexts	Pro	I-1	I-2	I-3	C	Per
Cutting of firewood for domestic purposes in a sector designated by the MFFP (e.g. for a cottage or outfitter) ◦ Example of a conducive context: cottage accessible only by boat or seaplane						
Harvesting of non-timber forest products for commercial purposes ◦ Example of a conducive context: traditional activity on which a community depends						
Forest management activities to maintain a sugar bush and harvest maple products to meet domestic needs ◦ Example of a conducive context: existing domestic sugar bush with a low tap rate						
Species introduction ◦ Example of a conducive context: reintroduction of a threatened or extirpated species; stocking under MDDELCC-MFFP agreement						
Introduction of a plant species that is not native to the bioclimatic domain of the reserve ◦ Example of a conducive context: reintroduction of a threatened or extirpated species						
Construction or installation of any new infrastructure or facility for activities not related to wildlife, recreation or tourism ◦ Example of a conducive context: infrastructure of public interest that cannot be located outside the reserve						
Land development work, including burial, earthwork, removal or displacement of surface materials or plant cover ◦ Example of a conducive context: if for an authorized compatible infrastructure (e.g. hut, lookout, hiking trail)						
Development of trails and infrastructures for motorized vehicles (e.g. snowmobiles, quad bikes) where forest clearing is required ◦ Example of a conducive context: no way to go around the reserve or use existing roads						

Activity or Intervention	Degree of Compatibility					
Incompatible, but may be authorized if impact is low or positive	Pro	I-1	I-2	I-3	C	Per
Sports competition, tournament or motor vehicle rally, or any large-scale non-motorized event not related to nature, if more than fifteen people are involved ◦ Example of context with low or positive impact: cross-country race or cross-country skiing on existing trails or roads						

Development of trails and infrastructures for motorized vehicles using existing roads <ul style="list-style-type: none"> ◦ Example of context with low or positive impact: a route that will capture all the impact, limiting access to the rest of the reserve 						
Infrastructure development for an outfitter, ZEC or wildlife reserve <ul style="list-style-type: none"> ◦ Example of context with low or positive impact: site characterized and approved under a development plan from the MFFP 						
Cutting wood for the construction of a cottage or camp (including renovation and repair) <ul style="list-style-type: none"> ◦ Example of context with low or positive impact: isolated cottage or camp with no overland access to wood outside the reserve 						
Compatible but authorization required	Pro	I-1	I-2	I-3	C	Per
Nature-related event involving more than fifteen people (e.g. botanical inventory, ornithology)						
Construction of buildings for educational, recreational or tourism purposes (e.g. an interpretive centre)						
Development of a backcountry campsite, semi serviced campground or serviced campground						
Dismantling of a beaver dam (only if it affects or could affect an infrastructure)						
Development of trails related to educational or interpretive activities						
Development of any recreational infrastructure, such as trails, lookouts, huts, interpretive panels, culverts, crossings, picnic tables etc., related to recreational activities with no harvesting (e.g. hiking, horseback riding, dog sledding, cross-country skiing, snowshoeing, bicycling, climbing, canoe-camping, kayaking, etc.)						
Research activities (archeology, botany, wildlife, etc.) requiring small-scale harvesting or ground preparation						
Forest management for the purpose of maintaining biodiversity (e.g. re-establishment of woodland caribou)						
Permitted without authorization	Pro	I-1	I-2	I-3	C	Per
Commercial activities (sale of products or services) related to nature discovery (e.g. ecotourism guides, kayak rental, topographical map sales, GPS rental, canoe transportation, etc.)						
Existing normal activities of an outfitter, ZEC or wildlife reserve (e.g. guides, boat rental, accommodation)						
Installation of a dock, platform or boathouse (when freely permitted under section 2 of the Regulation respecting the water property in the domain of the State)						

Appendix 7. BirdLife Criteria per IBA Class

IBA DESIGNATIONS	Category 1 THREATENED BIRDS ¹	Category 2 RESTRICTED-RANGE SPECIES ⁴	Category 3 BIOME-RESTRICTED SPECIES	Category 4 CONGREGATIONS ^{1,2,3}
A - GLOBAL	A1 IUCN listed species Critically Endangered & Endangered = 1 Vulnerable = 30. Static thresholds.	Bird species with a natural (historical) breeding range of less than 50,000 km ² . <i>No species meet this criterion in Canada.</i>	N/A ⁶ <i>To be determined in cooperation with Continental IBA Partners.</i>	A4i/ii/iv 1%; land/water/air ⁵ . Thresholds set based on species' global abundance.
B - REGIONAL (Continental)	B1 IUCN listed species Near Threatened: non-Passeriformes = 30, Passeriformes = 90. Static thresholds. <i>This category is not fully determined yet. Coordination with Continental IBA Partners pending to identify species considered at risk within the Nearctic.</i>	N/A ⁶	N/A ⁶ <i>To be determined in cooperation with Continental IBA Partners.</i>	B4i/ii/iv 1%; land/water/air ⁵ . Threshold set based on species' Nearctic abundance. B4iii threshold is 20,000 birds (single or mixed species by group; 20,000 seabirds or landbirds or waterbirds); land/water ⁵ . This criterion is used where species specific data is unavailable; otherwise birds are assessed against i/ii criteria and respective thresholds.
C - SUB-REGIONAL (National)	C1 COSEWIC listed species 1% and network approach to capture all listed species (<1% + diversity of birds & habitats/pressures considered). Threshold set based on species abundance within the region of listing (e.g. if a species is listed in ON, the 1% threshold is derived based on its ON population).	N/A ⁶	N/A ⁶	N/A ⁶

¹ Thresholds pertain to individuals. Regular use by birds is implied.

² Subspecies are eligible provided their numbers exceed species level thresholds.

³ All birds are eligible, including species at risk. Birds can trigger IBA designation under more than one IBA criterion.

⁴ Native Canadian bird species do not have restricted breeding ranges. This category is most relevant to southern/tropical areas and geographically isolated islands.

⁵ Land/water/air refers to how birds are using IBAs and is correlated with IBA designations. 4i/ii are IBAs encompassing lands/waters, whereas 4iv are aerial corridor IBAs.

⁶ Not applied.