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Quebec Waterfowl Conservation Plan, 2011 – Summary

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1. Introduction

1.1 Context

Birds are certainly one of the most visible components of North American biodiversity. Avian biodiversity—as an essential link in the food chain and due to the key role it plays in biological control, pollination, seed dispersal and other activities—actively contributes to the proper functioning of ecosystems. Consequently, owing to their visibility, vital ecological role, and the sheer extent and diversity of the habitats they use, birds are excellent indicators of ecosystem health. Lastly, birds also perform important social, economic and cultural functions (sport hunting, birdwatching and bird feeding, among others).

The North American Bird Conservation Initiative (NABCI) was signed in 1999 by Canada, the United States and Mexico. The objective of this initiative is to preserve the diversity and abundance of all North American birds by strengthening the effectiveness of current and future conservation initiatives, improving the coordination of efforts at different geographical and political scales, and using sound science and effective management programs as the basis of conservation efforts. NABCI integrates and coordinates conservation initiatives for the four bird groups (waterfowl, shorebirds, waterbirds and landbirds) by using bird conservation regions (BCRs) as a geographic framework and as conservation planning units.

Because of its legal mandate to conserve migratory birds, Environment Canada (EC) plays a vital role within NABCI. Consequently, in 2003, the Quebec Region of the EC's Canadian Wildlife Service (CWS) formulated a five-year action plan (2003–2008) to establish a solid foundation for implementing NABCI in the province (Bélanger et al. 2003). According to the action plan, the first major step in this process is acquiring a sound biological basis; “the achievement of NABCI goals relies largely on the preparation of international, national and regional conservation plans for the four bird groups”. Furthermore, “these plans will identify the biological priorities (priority species and geographic zones), the common threats and the conservation strategies”. The description of the biological basis ends with the statement that knowledge acquisition and population monitoring requirements will be determined (Bélanger et al. 2003). This is the context and basis of the *Quebec Waterfowl Conservation Plan, 2011*.

The *Quebec Waterfowl Conservation Plan, 2011* is addressed to all those concerned with waterfowl conservation, including:

- government officials responsible for wildlife conservation, and land and resource planning and development authorities
- project proponents, biological consultants and participants in the environmental assessment process
- stakeholders from environmental non-governmental organizations (ENGOS)
- scientists and volunteers (citizen scientists) involved in waterfowl research, management and monitoring projects

- sport hunters, Aboriginal people and members of the public who want to learn more about waterfowl conservation and would like to take concrete action to support waterfowl conservation in their communities

1.2 Objectives of the *Quebec Waterfowl Conservation Plan, 2011*

The *Quebec Waterfowl Conservation Plan, 2011* has the following objectives:

- to determine priority species in each BCR
- to establish population objectives for priority species
- to assess the issues affecting, and the needs of, priority species
- to set measurable conservation objectives to help conserve priority species or groups of species
- to recommend actions to be taken to conserve priority species
- to identify types of habitat where conservation measures will be the most useful

The information provided in the Plan is intended to help guide waterfowl conservation initiatives in Quebec. The goal is to create a genuine synergy between all conservation actions, particularly those undertaken:

- under conservation plans for other bird groups—landbirds, waterbirds (i.e., other than waterfowl) and shorebirds
- by the Quebec government, ENGOs, private enterprise and private citizens
- continental programs, including the North American Waterfowl Management Plan (NAWMP) and NABCI

It should be emphasized, however, that the Plan is not an end in itself but instead part of an ongoing process. The Plan will evolve along with advances in our knowledge, the state of the environment and the status of bird populations, in accordance with the principles of adaptive management, which must be “used right from the start of the biological planning in order to rapidly detect the unforeseen contingencies and regard them as learning opportunities” (Bélanger et al. 2003). We suggest reassessing on a regular basis the status of populations of priority species in relation to the objectives set out in this document.

Lastly, it should be noted that the authors of the Plan have recommended actions in response to conservation issues raised concerning waterfowl, regardless of the areas of authority and capacities of the stakeholders involved. It is up to the individual stakeholders to adapt these measures or use them to inspire their own actions, in accordance with their capacities and as they see fit. Under no circumstances do the authors wish to cast aspersions on the actions, roles or responsibilities of the stakeholders involved in managing and protecting waterfowl and their habitats, but rather to simply provide the information required by all so that they can contribute to the conservation of this group of birds.

2. Methodology

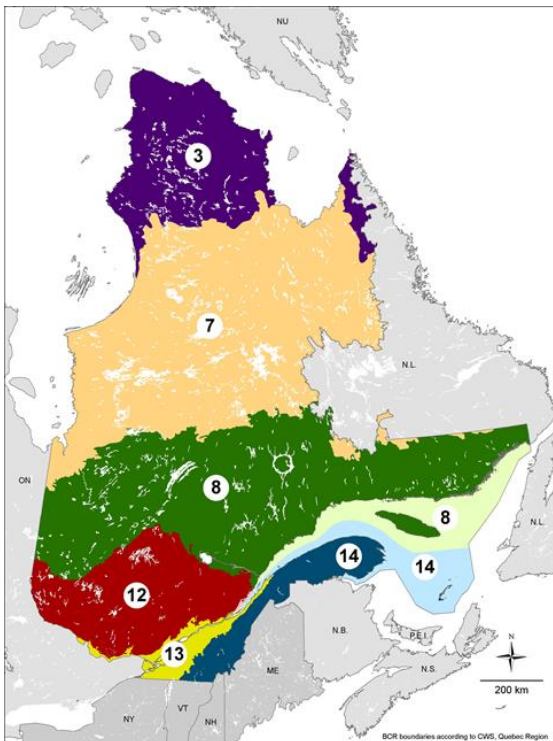
2.1 Bird conservation regions

NABCI uses bird conservation regions (BCR) as a geographical framework for facilitating the planning of bird conservation efforts.

From south to north, the BCRs found in Quebec comprise (Figure 2):

- Lower Great Lakes/St. Lawrence Plain (BCR 13, covered in Chapter 4 of this document)
- Atlantic Northern Forest (BCR 14; Chapter 5)
- Boreal Hardwood Transition (BCR 12; Chapter 6)
- Boreal Softwood Shield (BCR 8; Chapter 7)
- Taiga Shield and Hudson Plains (BCR 7; Chapter 8)
- Arctic Plains and Mountains (BCR 3; Chapter 9)

Figure 2. Bird conservation regions in Quebec



The *Quebec Waterfowl Conservation Plan, 2011* provides an analysis of the waterfowl species in each of the province's six BCRs. Chapters 4 to 9 contain a description of the individual BCRs, including an overview of the landscape, the waterfowl species present and their use of the BCR, issues affecting waterfowl, priority waterfowl species and, lastly, proposed conservation objectives and actions for the priority species present.

2.2 and 2.3 Data sources and calculation of objectives and abundance

These two sections present the list of databases used and the methods chosen to calculate the numbers of each species present by season and by BCR.

2.4 Use of Bird Conservation Regions (BCRs) by waterfowl

In the sections on the use of each BCR by waterfowl, only species that occur regularly in the BCR are listed. A regular species is defined as one that occurs every year in the BCR during the period in question (migration, breeding, moulting or wintering). For example, although according to *Études des populations d'oiseaux du Québec* (Study of Bird Populations in Quebec; ÉPOQ), the Greater Scaup has bred occasionally in BCR 13 (in 1994, 2000 and 2003), the species does not appear on the list of regular breeders for this BCR because it did not breed there every year (see section 4.3.2).

In order to compile as much information as possible at the BCR scale, the BCR tables show not only regular species but also those considered to be occasional (observed every two to five years), exceptional (species that may go unobserved for a number of years) or probable (indicated breeding pairs observed during the breeding season). In the tables, species are listed in descending order according to population size during the breeding season in the case of regular breeders, followed by other breeding species (“yes”, occasional, exceptional or probable breeding status), which, because they do not have a population size, are listed in taxonomic order, and then by non-breeding species (“no” breeding status), also listed in taxonomic order.

2.5 Determination of priority species

One of the main objectives of this conservation plan was to designate priority waterfowl species in each BCR in Quebec, in order to focus conservation efforts on the species needing the most attention. Various attempts have been made at prioritizing species since NABCI was founded. Prioritization was tried at the BCR (regional) scale at international meetings (Canada and the U.S.) held in 2001 and 2002 to begin planning conservation actions in BCR 13 and 14 (Bélanger et al. 2003). However, most of the data required had not yet been compiled and the resulting prioritization was based mainly on expert opinion. Subsequently, NAWMP carried out its own species prioritization effort (on the continental scale) in its 2004 strategic plan (North American Waterfowl Management Plan 2004a) and the Eastern Habitat Joint Venture (EHJV) has also prioritized species (at the “subregional” scale of Quebec; Eastern Habitat Joint Venture 2007).

Although presenting a new prioritization of waterfowl species in the Quebec BCRs may be a little awkward in this context, we stand behind our list. Our prioritization is founded on a rigorous analysis of CWS data, allowing us to obtain a list of priority species based on the interpretation, involving largely objective criteria, of scientific data that are comparable across BCRs. Above all, we believe that it is crucial to take account of the distinctive characteristics (abundance, population trends, threats faced and others) of waterfowl species at the Quebec scale, to ensure an accurate result. Prioritization was a two-step process, involving an initial objective interpretation (based on nine criteria), followed by a subjective review of the results by waterfowl experts (expert opinion).

2.6 Determination of conservation actions and objectives

Once the priority species were determined, we determined a conservation objective for each species or, in the case of species with the same requirements and concerns, each group of

species. In general, the objective is related to the period when the species occurs in the BCR. For example, the conservation objective may be a breeding population objective to be achieved (e.g., Hooded Merganser in BCR 12), a winter population objective to be achieved (e.g., *borealis* subspecies of the Common Eider in BCR 8), maintaining the ecological integrity of a species' staging grounds (e.g., eelgrass beds for Brant in BCR 14) or protecting foraging areas used by the species during migration (e.g., Greater and Lesser scaup in BCR 13). For some priority species, the objective is to institute a survey of the breeding population (e.g., Harlequin Duck in BCR 7), since the size of the population in the BCR is basically unknown.

Conservation actions were determined based on information and recommendations from a number of CWS and Environment Canada's Science and Technology Branch (EC-S&T) biologists. In addition, many management plans (e.g., Harlequin Duck and Barrow's Goldeneye), action plans (e.g., Greater Snow Goose) and strategic plans (e.g., Black Duck Joint Venture [BDJV], Sea Duck Joint Venture [SDJV] and Arctic Goose Joint Venture [AGJV]) were consulted. It is important to note that the list of actions under each objective is not exhaustive but concentrates on actions with the highest priority that can be realistically achieved.

3. Main issues related to waterfowl conservation

Chapter 3 describes the main conservation issues affecting waterfowl and their associated environmental impacts, as well as recommended mitigation measures. This list is far from exhaustive and we have limited our discussion to the issues that we believe are the most important. Some of these issues will be brought up again in the texts on the individual BCRs, to provide additional information at the regional level, including descriptions and statistics for the BCR in question.

4. Lower Great Lakes/St. Lawrence Plain (BCR 13)

4.3 Use of BCR 13 by waterfowl

4.3.1 Migration

As many as 2,300,000 geese, swans and ducks are estimated to pass through BCR 13 during migration (Table 2).

4.3.2 Breeding

BCR 13 probably supports close to 43,500 breeding pairs (Table 2).

4.3.3 Moulting

Our information on the use of BCR 13 by moulting waterfowl is fragmentary.

4.3.4 Wintering

BCR 13 probably supports close to 9,000 overwintering individuals (Table 2).

4.4 Priority species in BCR 13

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

Seventy-five (75) actions, grouped into five components (monitoring and surveys; knowledge acquisition; active surveillance; environmentally sustainable practices; habitat measures) are suggested for waterfowl priority species in BCR 13. To see the list, please consult the complete document.

5. Atlantic Northern Forest (BCR 14)

5.3 Use of BCR 14 by waterfowl

5.3.1 Migration

As many as 1,800 000 geese and ducks are estimated to pass through BCR 14 during migration (Table 3).

5.3.2 Breeding

BCR 14 probably supports close to 70,000 breeding pairs (Table 3).

5.3.3 Moulting

Although the information presented here is limited, we would like to emphasize the importance of BCR 14 to certain species during this important, even crucial, period in their annual life cycle.

5.3.4 Wintering

BCR 14 probably supports close to 77,000 overwintering individuals (Table 3).

5.4 Priority species in BCR 14

High priority	Medium priority
Common Eider (<i>dresseri</i>): Objective 2	Barrow's Goldeneye: Objective 5
American Black Duck: Objective 3	Brant: Objective 6
Harlequin Duck: Objective 4	Canada Goose (North Atlantic Pop.): Objective 7
	Canada Goose (Atlantic Pop.): Objective 7
	Red-breasted Merganser: Objective 8
	Black Scoter: Objective 9
	Surf Scoter: Objective 9
	Long-tailed Duck: Objective 8

5.5 Conservation objectives and actions recommended for priority species in BCR 14

Sixty (60) actions, grouped into five components (monitoring and surveys; knowledge acquisition; active surveillance; environmentally sustainable practices; habitat measures) are suggested for waterfowl priority species in BCR 14. To see the list, please consult the complete document.

6. Boreal Hardwood Transition (BCR 12)

6.3 Use of BCR 12 by waterfowl

6.3.1 Migration

More than 900,000 individuals are estimated to pass through BCR 12 during migration (Table 4).

6.3.2 Breeding

BCR 12 supports close to 180,000 breeding pairs (Table 4).

6.3.3 Moulting

There is very little information about moulting waterfowl in BCR 12. However, since this BCR contains several large lakes and reservoirs, as well as part of the upper estuary, there is reason to believe that geese and some species of ducks moult in the BCR.

6.3.4 Wintering

BCR 12 probably supports close to 2,000 overwintering individuals (Table 4).

6.4 Priority species in BCR 12

High priority	Medium priority
American Black Duck: Objective 2 Barrow's Goldeneye: Objective 3 Hooded Merganser: Objective 4	Common Goldeneye: Objective 4 Wood Duck: Objective 4

6.5 Conservation objectives and actions recommended for priority species in BCR 12

Twenty-six (26) actions, grouped into five components (monitoring and surveys; knowledge acquisition; active surveillance; environmentally sustainable practices; habitat measures) are suggested for waterfowl priority species in BCR 12. To see the list, please consult the complete document.

7. Boreal Softwood Shield (BCR 8)

7.3 Use of BCR 8 by waterfowl

7.3.1 Migration

As many as 3,000,000 geese and ducks are estimated to pass through BCR 8 during migration (Table 5).

7.3.2 Breeding

BCR 8 probably supports close to 390,000 breeding pairs (Table 5).

7.3.3 Moulting

Although there is a paucity of knowledge on moulting waterfowl in general, some information on species that regularly frequent BCR 8 to moult are presented.

7.3.4 Wintering

BCR 8 probably supports close to 93,000 overwintering individuals (Table 5).

7.4 Priority species in BCR 8

High priority	Medium priority
Barrow's Goldeneye: Objective 2	Harlequin Duck: Objective 6
American Black Duck: Objective 3	Surf Scoter: Objective 7
Common Eider (<i>dresseri</i>): Objective 4	Canada Goose (North Atlantic Pop.): Objective 8
Hooded Merganser: Objective 5	Canada Goose (Atlantic Pop.): Objective 8
	Common Goldeneye: Objective 5
	Blue-winged Teal: Objective 9
	Common Eider (<i>borealis</i>): Objective 10
	Long-tailed Duck: Objective 11
	Red-breasted Merganser: Objective 11

7.5 Conservation objectives and actions recommended for priority species in BCR 8

Sixty-seven (67) actions, grouped into five components (monitoring and surveys; knowledge acquisition; active surveillance; environmentally sustainable practices; habitat measures) are suggested for waterfowl priority species in BCR 8. To see the list, please consult the complete document.

8. Taiga Shield and Hudson Plains (BCR 7)

8.3 Use of BCR 7 by waterfowl

8.3.1 Migration

More than 3,100,000 geese, swans and ducks are estimated to migrate through BCR 7 in spring (Table 6).

8.3.2 Breeding

BCR 7 probably supports close to 320,000 breeding pairs of waterfowl (Table 6).

8.3.3 Moulting

Although the information presented is incomplete since it is based on only a few studies, BCR 7 most certainly has a strong potential for supporting moulting waterfowl.

8.3.4 Wintering

According to the information currently available, no waterfowl species overwinter regularly in BCR 7.

8.4 Priority species in BCR 7

High priority	Medium priority
Harlequin Duck: Objective 2 American Black Duck: Objective 3	Barrow's Goldeneye: Objective 4 Brant: Objective 5 Canada Goose (Atlantic Pop.): Objective 6 Canada Goose (North Atlantic Pop.): Objective 6 Black Scoter: Objective 7 Surf Scoter: Objective 7 Red-breasted Merganser: Objective 8

8.5 Conservation objectives and actions recommended for priority species in BCR 7

Twenty-six (26) actions, grouped into five components (monitoring and surveys; knowledge acquisition; active surveillance; environmentally sustainable practices; habitat measures) are suggested for waterfowl priority species in BCR 7. To see the list, please consult the complete document.

9. Arctic Plains and Mountains (BCR 3)

9.3 Use of BCR 3 by waterfowl

9.3.1 Migration

More than 2,200,000 geese, swans and ducks are estimated to migrate through BCR 3 (Table 7).

9.3.2 Breeding

BCR 3 probably supports over 470,000 breeding pairs (Table 7).

9.3.3 Moulting

Given our lack of knowledge on waterfowl at these northern latitudes, the information on moulting birds is incomplete.

9.3.4 Wintering

The Quebec portion of BCR 3, including polynia in Hudson Bay which are not very far from the coast of Quebec, probably hosts close to 200,000 individuals during the winter period (Table 7).

9.4 Priority species in BCR 3

High priority	Medium priority
Canada Goose (Atlantic Pop.): Objective 2 Common Eider (<i>borealis</i>): Objective 3	Common Eider (<i>sedentaria</i>): Objective 3 Red-breasted Merganser: Objective 4 Long-tailed Duck: Objective 5 Greater Scaup: Objective 5 Black Scoter: Objective 5

9.5 Conservation objectives and actions recommended for priority species in BCR 3

Twenty-four (24) actions, grouped into five components (monitoring and surveys; knowledge acquisition; active surveillance; environmentally sustainable practices; habitat measures) are suggested for waterfowl priority species in BCR 3. To see the list, please consult the complete document.

10. Social and economic importance of waterfowl

Chapter 10 outlines the social and economic importance of waterfowl, information that we believe is crucial to the *Quebec Waterfowl Conservation Plan, 2011*. Whether we are referring to the economic spinoffs or social aspects of birdwatching or the Aboriginal and sport harvests, all these activities depend, to various degrees, on the health and long-term survival of Quebec's waterfowl populations.

11. Other conservation plans and initiatives

A review of waterfowl conservation plans formulated to date allows the conservation issues raised and actions undertaken to be viewed in a broader perspective. This chapter will therefore contain a brief summary of the 1978 and 1986 plans produced by CWS experts.

12. Laws, regulations and policies

The objective of this chapter is to present the primary regulatory tools (legal or ministerial) with a major impact on waterfowl populations and their conservation in Quebec. Therefore, a summary of the most important laws, regulations and policies is provided, rather than an exhaustive review of all legislation and policies.

13. Main organizations involved in waterfowl conservation

Shortly after the Eastern Habitat Joint Venture was established in 1989, its Quebec partners agreed to work together and pool their efforts. Some of these partners are engaged directly in waterfowl conservation, while others are involved in general conservation efforts indirectly affecting waterfowl. In addition to the current EHJV partners (see Section 1.4.1), a number of other organizations work to conserve waterfowl species. This section describes the major organizations involved in waterfowl conservation in the province.

14. Implementation of the *Quebec Waterfowl Conservation Plan, 2011*

The aim of the *Quebec Waterfowl Conservation Plan, 2011* and *Status of Quebec Waterfowl Populations, 2009* (Lepage and Bordage 2013), both produced by CWS–Quebec, was to review the current state of knowledge on waterfowl, waterfowl habitats and the threats faced by this group of birds. These two documents illustrate the importance of Quebec for waterfowl at the North American scale, during the nesting and other periods of the year (see species accounts and Table 2 in Lepage and Bordage 2013, and also Appendix 16.1 in this document). This importance is particularly true for the Canada Goose (Atlantic Population [100% of breeding pairs are found in Quebec] and North Atlantic Population [64%]), the American Black Duck (57%), the Common Eider (subspecies *dresseri* [32%] and *borealis* [23%]), the Harlequin Duck (Eastern Population [79%]), the Black Scoter (28%), the Barrow's Goldeneye (Eastern Population [100%]), the Hooded Merganser (28%), the Common Merganser (30%) and the Red-breasted Merganser (56%), that all have more than 20% of their population nesting in habitat in Quebec (Appendix 16.1). Furthermore, for each BCR, this Plan was also intended to determine priority species in each BCR, establish population objectives for priority species, assess the issues affecting, and the needs of, priority species, set measurable conservation objectives to help conserve priority species or groups of species, and recommend actions to be taken or maintained to fully conserve priority species.

It is now important that the listed conservation objectives and actions recommended for priority species in each of the BCR present in Quebec (chapters 4 to 9) be taken into account and utilized not only by CWS but by all stakeholders with a role to play in waterfowl conservation. Partnership and cooperation, a basic principle of NABCI, will be crucial in implementing the *Quebec Waterfowl Conservation Plan, 2011*. Coordinating conservation activities allows gains to be realized over a broader area, while avoiding duplication of effort. We believe that the BCR-based geographic framework will help us bring together all regional partners to plan and carry out bird conservation actions, but any other collaboration approach, even local, can be interesting if proposed actions are relevant. Appendix 16.1 presents a compilation of abundance and densities of waterfowl in each BCR as well as the importance of the BCRs amongst themselves concerning their contribution to waterfowl; the relative importance of the BCRs helps prioritize conservation measures at the time of their implementation.

Various partners and stakeholders can join in this effort, depending on the component and type of actions involved and their areas of expertise (see Table 8 below for a compilation of all suggested actions). CWS will take an active part in the implementation of suggested actions, as long as these actions are related to its mandate and according to available resources, budget and personnel. The recommendations issued in this document will be regularly analyzed by

CWS and considered in a continuous process for improving migratory bird survey and monitoring activities.

Considering that several actions suggested under the **monitoring and surveys** component are regular recurring CWS activities, some actions go beyond, however, and CWS clearly cannot carry out all the needs listed under this component on its own (see component 1 in Table 8). Consequently, other organizations could play an important role in this area. CWS will take advantage of situations where increased collaboration is possible, for example with Aboriginal communities for northern BCRs. Aboriginal communities and organizations could, for instance, participate in the monitoring of populations of northern species by carrying out surveys and bird banding programs. Other collaborations could be established with the Ministère des Ressources naturelles et de la Faune (MRNF), which conducts aerial surveys to document the use of Waterfowl Gathering Areas (WGAs) even though obtaining accurate counts by species is not its objective.

Although monitoring waterfowl species is a crucial part of the **monitoring and surveys** component, habitat monitoring is equally important. In the mid-1990s, Environment Canada's St. Lawrence Centre instituted a survey of wetland vegetation in the fluvial section and part of the St. Lawrence estuary. The *Conservation Atlas of Wetlands in the St. Lawrence Valley* (Service canadien de la faune 2006) could serve to inspire a project to cover all of Quebec, including Nunavik. In addition, the Quebec section of Ducks Unlimited Canada has made a very significant contribution to habitat mapping with its highly accurate maps of the habitats in 15 of the 17 MRCs (Canards Illimités Canada 2007f), including making its efforts accessible to the public. This type of mapping project is a positive step in the long-term monitoring of habitats, including wetlands. For its part, CWS has been developing over the past few years a "landscape approach" in order to better identify the needs for habitat conservation of migratory birds. Pilot projects will provide development ideas for the future. Among other things, the establishment of collaborations, or the strengthening of existing ones, for mapping tools would be valuable. Such habitat data can be valuable in the understanding of potential changes that could affect waterfowl populations, either their distribution or abundance.

The actions recommended under the **knowledge acquisition** component for each BCR focus mainly on the ecology and population dynamics of priority species (see component 2 in Table 8); this component corresponds to the need for a "solid biological basis" as stipulated in the *Five-year Action Plan for the Implementation of the North American Bird Conservation Initiative in Québec* (Orientation 1) (Bélanger et al. 2003). One strategy to facilitate this would be to create a group of researchers from the Quebec university community and specialists from governmental and non-governmental organizations interested in waterfowl conservation and specializing in fields such as animal and plant physiology and ecology, animal health, ecotoxicology, sustainable development and ecosystem-based management. CWS could, among other things, ensure that this group is kept up to date on the various recommendations emerging from the strategic plans of the species joint ventures (BDJV, AGJV, SDJV) related to knowledge acquisition. These recommendations could provide opportunities for research projects since the joint ventures fund research. In addition, Environment Canada's Science and Technology Branch could play a role in this component since it is responsible for conducting research to better understand wildlife, biodiversity, water, air, soil, climate, environmental prediction and environmental technologies.

The **active surveillance** component mainly involves activities by CWS and Environment Canada related to the various emergency response plans (Oil Spill Emergency Response Plan [OSERP], Avian Mortality Events Emergency Response Plan [AMEERP]), harvest surveys (e.g.,

National Harvest Survey) and law enforcement (see component 3 in Table 8). Law and regulation enforcement is the responsibility of official agents, and Environment Canada plays an active role in this. However, many other forms of surveillance exist, and other organizations can also play a role. For example, local organizations have in the past taken on the task of breeding colony surveillance, and some still occur. CWS has even observed benefits of simple human presence on some islands to prevent poaching, if this presence respects the birds' needs for tranquility (J.-F. Rail, CWS, pers. comm.). CWS could advise organizations interested in taking action in colony surveillance. Another area where contributions from experts could be particularly influential is in the evaluation of the environmental impacts of projects submitted under the *Canadian Environmental Assessment Act, 2012* and its regulations. It is desirable that CWS experts are consulted during the environmental assessment process so that they can make recommendations on species' requirements to ensure that projects do not cause any significant adverse environmental impacts. Environmental assessment is a key process in waterfowl conservation due to its preventive nature. Lastly, several actions in this component will require increased surveillance either during the breeding season in certain Migratory Bird Sanctuaries (MBSs) and National Wildlife Areas (NWAs) or during the hunting season.

Measures in the **environmentally sustainable practices** component almost always involve natural resource exploitation (and therefore logging, mining, oil and gas, and energy generation activities) or land use (including agriculture and industrial and urban development) (see component 4 in Table 8). If these actions are given serious consideration and are actually implemented, they will be among the measures with the greatest impact on the health of waterfowl populations and therefore on their long-term conservation. The very broad scope of these actions means that they will have a positive impact on all bird species and on biodiversity in general. The purpose of the proposed actions of this component is, in particular, to encourage the various stakeholders concerned to ensure that their practices for using and exploiting natural resources are sustainable and environmentally sound.

Federally, we should mention the Fisheries and Oceans Canada's (DFO) Sustainable Development Strategy (Fisheries and Oceans Canada 2006), which aims to meet the needs of an evolving industry while recognizing the principles of sustainable development, as well as the precautionary approach and ecosystem-based management. Since fisheries and aquaculture can have an impact on marine ecosystems, DFO takes into account the effects of these activities on the other parts of the ecosystem, including other species caught incidentally and impacts on bottom habitat (management of environmental impacts). The measures proposed could certainly benefit waterfowl, particularly sea ducks, which can be affected either by overfishing of their prey or by incidental catches.

Incidental take is an issue for Environment Canada in accordance with the *Migratory Birds Regulations*. While these regulations, which arise under the *Migratory Birds Convention Act, 1994*, prohibit the harming of migratory birds and the disturbance or destruction of their nests and eggs, significant numbers of birds, nests and eggs are inadvertently destroyed by activities such as forestry, mining, agriculture, power generation, electricity transmission, fishing, infrastructure management and urban development. This type of inadvertent destruction is called incidental take and is illegal. Environment Canada is promoting compliance with the regulations by recommending, among other things, the avoidance of potentially destructive activities during key periods to reduce the risk of nest destruction (Environnement Canada 2011a). The guidelines for avoiding incidental take proposed by Environment Canada will help landowners, activity managers and industry representatives conducting activities and projects on lands and seascapes across Canada to comply with the *Migratory Birds Regulations*.

At the provincial level, the Quebec government enacted the *Sustainable Development Act* in April 2006. This law establishes a management framework for all Quebec government departments, agencies and enterprises by identifying 16 principles to be taken into account by government authorities when framing their actions. They include the following three principles, which have an impact on the environment: biodiversity preservation (species, ecosystems and natural processes that support life must be maintained in order to ensure the quality of human life); respect for ecosystem support capacity (human activities must be respectful of the support capacity of ecosystems and ensure the long-term survival of ecosystems); and responsible production and consumption (production and consumption patterns must be changed in order to make production and consumption more viable and more socially and environmentally responsible) (Ministère du Développement durable de l'Environnement et des Parcs du Québec 2006). To administer the *Sustainable Development Act*, the Quebec government formulated the *Government Sustainable Development Strategy* (Gouvernement du Québec 2007), which reaches over 150 government departments, agencies and government enterprises. To work towards achieving sustainable development, this strategy is asking each government department and agency to prepare and then implement an action plan establishing the means to be used to contribute to the objectives. The Ministère du Développement durable, de l'Environnement et des Parcs (MDDEP) is responsible for coordinating all government action in the area of sustainable development and for promoting sustainable development within the government and Quebec society as a whole.

MDDEP's 2009–2014 strategic plan (Ministère du Développement durable de l'Environnement et des Parcs du Québec 2009b) presents general directions for the Department, some of which concern waterfowl conservation. The direction entitled “combat climate change and reduce air pollution” is accompanied by the *2006–2012 Action Plan – Québec and Climate Change – A Challenge for the Future*, the goal of which is to reduce greenhouse gas emissions and put in place adaptive measures to climate change targeting the environment, natural resources and the territory (Ministère du Développement durable de l'Environnement et des Parcs du Québec 2008). The biodiversity strategy (*Stratégie sur la diversité biologique*) of the Quebec government and the measures proposed (Ministère du Développement durable de l'Environnement et des Parcs du Québec 2005b) could have beneficial effects on waterfowl conservation in the decades to come, since they target a substantial number of action areas (energy, wildlife, forests, agriculture, industry, mines, tourism and municipalities).

Among other governmental measures that could be beneficial to waterfowl is a new forest management model proposed by the Ministère des Ressources naturelles et de la Faune du Québec, which incorporates innovative forest management approaches (including ecosystem-based forest management) and the impact of climate change on forests (Ministère des Ressources naturelles et de la Faune du Québec 2009a). The *Sustainable Forest Development Act* (2010) introduces changes to help strengthen this new forest management model. In the area of oil and gas exploration and development activities in the marine environment, the Quebec government has begun developing a strategic environmental assessment program aimed at providing a framework for future offshore oil and gas exploration and development (Gouvernement du Québec 2009b). The publication of the final synthesis report, which will include recommendations to protect the marine environment from the effects of future offshore oil and gas development, was expected in 2012. In the area of wind power, MRNF has implemented measures to ensure that wind farms respond to environmental concerns. To obtain project authorization, wind farm developers are now required to establish a monitoring program for birds and bats—to be carried out for three years after the wind farm is commissioned—to assess mortality in birds and their use of the wind farm. Lastly, one of the three directions of Quebec's mineral strategy, adopted in 2009 and coordinated by the MRNF, is to ensure

environmentally sustainable mineral development (Ministère des Ressources naturelles et de la Faune du Québec 2009c).

In the field of agriculture, the report by the Pronovost commission on the future of agriculture and agri-foods in Quebec (Commission sur l'avenir de l'agriculture et de l'agroalimentaire québécois), which was published in 2008, has inspired a new vision of agriculture at Ministère de l'Agriculture, des Pêcheries et de l'Alimentation du Québec (MAPAQ). One of the action priorities established in light of the report is environmental protection (Ministère de l'Agriculture des Pêcheries et de l'Alimentation du Québec 2009a). Actions taken in the following areas will have an unquestionable impact on wildlife habitat in agricultural environments: improving water quality, reviewing the phytosanitary (pest control) strategy to favour alternatives to pesticides and the wise use of pesticides, and implementation and expansion of the Prime-Vert program. The Prime-Vert funding program, which runs until 2013, was set up by MAPAQ to help farm producers meet the challenges of environmentally sound land stewardship, successful integrated land management, water quality and the reduction or prevention of greenhouse gas emissions (Ministère de l'Agriculture des Pêcheries et de l'Alimentation du Québec 2009b). MAPAQ also intends to help aquaculture operations reduce phosphorus discharges through its freshwater aquaculture sustainable development strategy (Stratégie de développement durable de l'aquaculture en eau douce), one of the aims of which is to protect the aquatic environment (Table filière de l'aquaculture en eau douce au Québec 2003).

The 2009–2013 action plan adopted by the Ministère des Affaires municipales, des Régions et de l'Occupation du territoire^a (MAMROT) recommends that sustainable development concerns be integral to the review of *An Act Respecting Land Use Planning and Development* and how it is administered, and that the capacity of local municipalities, municipalités régionales de comté (regional county municipalities; MRCs) and metropolitan communities to integrate sustainable development principles into urban and land-use planning be improved (Ministère des Affaires municipales des Régions et de l'Occupation du territoire 2009). These measures could have repercussions on waterfowl conservation in urban and peri-urban environments. In addition, MAMROT publishes a collection of best practices guides on land-use planning and sustainable development.

The *Sustainable Navigation Strategy for the St. Lawrence* is a St. Lawrence Action Plan initiative arising under the third Canada–Quebec Agreement on the St. Lawrence. The aims of the strategy include harmonizing navigation activities with the protection of river ecosystems and other uses of the St. Lawrence (D'Arcy and Bibeault 2004). Some of the measures proposed in the strategy include a voluntary speed reduction measure for ships in the Montréal-Sorel section (the most sensitive stretch between Cornwall and Montmagny) to counter wake erosion and the documentation of the impact of pleasure boating on shoreline erosion in the narrow channels in Lake Saint-Pierre. The prevention of shoreline erosion of this sector preserves breeding habitat for waterfowl.

Environmental organizations, as well as governments and their departments, can participate in implementing the actions listed under the **environmentally sustainable practices** component. Examples include the pilot project launched by the Fondation de la faune du Québec to enhance

^a At the time of printing, MAMROT has been designated Affaires municipales et Occupation du territoire, MDDEP has been turned into Développement durable, Environnement et Lutte contre les changements climatiques, and MRNF has been renamed Forêts, Faune et Parcs as well as Énergie et Ressources naturelles.

biodiversity in agricultural watercourses, carried out in collaboration with the Union des producteurs agricoles and many other private and government partners (Fondation de la faune 2009). Regroupement QuébecOiseaux has produced a brochure on protecting Barrow's Goldeneye and has conducted a campaign to educate operators of fishing territories (zones d'exploitation contrôlée [controlled harvesting zone; ZECs] and outfitters) about the importance of fishless lakes to this species (Regroupement QuébecOiseaux 2010). Also of interest is the existence of two funding programs dedicated to support community projects: the Community Interaction program—St. Lawrence Action Plan and the EcoAction program. The component environmentally sustainable practices also includes actions to promote awareness in the public; local organizations would be ideal partners in these types of measures, since they can tailor the message to the local audience (e.g., educating pleasure boaters about the importance of not landing on islands in the fluvial section during the nesting and brood-rearing periods).

All these measures, and others not listed, affect waterfowl directly or indirectly and respond to the concerns raised in the actions recommended under the **environmentally sustainable practices** component. To go even further, it would be important that the various networks of participants and decision-makers get inspiration through this document so that the conservation of migratory birds, including waterfowl, will be integrated in the planning of human activities.

Since, under the **habitat measures** component, a number of the objectives and proposed actions involve carrying out conservation measures in the field (see component 5 in Table 8), the Eastern Habitat Joint Venture appears the ideal vehicle for achieving results. The EHJV, with 20 years of experience and expertise in this area, has a long list of conservation achievements behind it, including the protection and restoration of wetlands and adjacent upland habitats along the St. Lawrence, Ottawa and Saguenay rivers, in the Abitibi region and in the boreal forest. The EHJV has incorporated new conservation challenges targeting all bird species and not just waterfowl in its 2007–2012 strategic plan (Eastern Habitat Joint Venture 2007). Noteworthy actions taken by EHJV partners include regional conservation plans and detailed wetland mapping by Ducks Unlimited Canada to build awareness of the importance of wetlands among elected officials, land managers, land-use planning authorities, other local stakeholders and the public.

In addition to the EHJV partners, other organizations, whether government agencies or non-governmental organizations, can participate in habitat conservation actions targeting particular sites or a specific type of measure. To optimize opportunities for protecting the environment, it is important to take advantage of all existing programs—not only species joint ventures but also recovery and management plans for species at risk, the Ecological Gifts Program, Habitat Stewardship Program for Species at Risk, various federal programs (Interdepartmental Recovery Fund, Endangered Species Recovery Fund, Aboriginal Capacity Building Fund and Aboriginal Critical Habitat Measures Fund), Fondation Hydro-Québec pour l'environnement, Partenaires pour la nature and others.

Two government initiatives are particularly noteworthy in the context of waterfowl conservation. First, the Federal Marine Protected Areas Strategy, coordinated by DFO, provides a framework for the establishment of a network of marine protected areas to contribute to the health of Canada's oceans and marine environments (Fisheries and Oceans 2005). The responsibility for the network and for establishing and managing these areas is shared by DFO, Parks Canada and Environment Canada. Among the three types of protected federal areas provided in the strategy are Marine Wildlife Areas, which could be created to protect and conserve habitat for a variety of wildlife including migratory birds and endangered species. The other government initiative is the network of protected areas in Quebec overseen by MDDEP under the *Natural*

Heritage Conservation Act. The objective of the Act is to safeguard the character, diversity and integrity of Quebec's natural heritage through measures to protect its biological diversity and the life-sustaining elements of natural settings (Gouvernement du Québec 2010b). Protected areas recognized by MDDEP cover a broad spectrum ranging from ecological reserves to national parks, wildlife habitats, national wildlife areas and natural habitats on private land set aside for conservation purposes. These protected areas are managed by various levels of government (Environment Canada [NWA and MBS], Parks Canada [national parks and national park reserves of Canada] and DFO [protected marine areas; none exists yet in Quebec]), corporate bodies and individuals. As of November 2009, protected areas covered 8.14% of Quebec's territory (Ministère du Développement durable de l'Environnement et des Parcs du Québec 2009a), but new protected areas are planned since the Quebec government has announced the protection of 12% of the province by 2015 (Ministère du Développement durable de l'Environnement et des Parcs du Québec 2009b).

Lastly, we should say a few words about waterfowl gathering areas, one of the types of protected areas recognized by MDDEP. The *Regulation respecting wildlife habitats* defines a waterfowl gathering areas as an area frequented by geese or ducks (50 birds/km) during the nesting or migration seasons. One of the actions proposed under this Waterfowl Conservation Plan is the protection of sites frequented during the moulting or wintering period. Since several waterfowl gathering areas are also moulting areas (e.g., Jérémie Islets, Mille-Vaches Bay) or wintering areas (e.g., La Malbaie, Pointe aux Ivrognes) supporting large concentrations of ducks, the possibility of including all concentrations of aquatic birds throughout the year, regardless of the period in which birds are present, should be considered.

Along with the laws, regulations and policies described in Chapter 12, most of which are administered by the federal government, other tools can be used to assist in the implementation of the **habitat measures** component. The MDDEP administers the *Politique de protection des rives, du littoral et des plaines inondables* (Protection Policy for Lakeshores, Riverbanks, Littoral Zones and Floodplains), which was amended in 2005 to better protect the high-velocity zones of floodplains (i.e., the part of a floodplain that may be flooded during a 20-year flood event) (Gouvernement du Québec 2005). In addition, MDDEP was in the process of formulating a wetland conservation and sustainable management policy in 2007, which should help to promote, provide a framework for, and improve the sustainable management of wetlands in Quebec, particularly those on private land (Ministère du Développement durable de l'Environnement et des Parcs du Québec 2007).

To close this chapter on implementing the Waterfowl Conservation Plan, we believe it is essential to take full advantage of the potential synergy between the various conservation initiatives. Initiatives and partnerships should look beyond waterfowl and broaden their notion of conservation to include all priority bird species, which will benefit biodiversity in general. For example, the regular updates of NAWMP should be seen as opportunities to consider new ways of doing things, and the review of laws and policies as opportunities to integrate good management practices. It will also be crucial to keep Aboriginal organizations and representatives informed of actions and projects involving waterfowl conservation so that they can participate fully in conservation efforts. To conclude, even though biodiversity was the subject of an international year in 2010, let us hope that it will not get forgotten but instead that it will gather more interest and remain on the program.

16. Appendices

16.1 Relative importance of each BCR in their contribution to waterfowl

Table 9 illustrates the importance of the BCRs, relative to each other, in their **contribution for breeding of each waterfowl species**. Although incomplete, because in some BCRs breeding populations or densities of some species are not known, this table nevertheless allows us to draw some great observations.

BCR 13 provides an important contribution for dabbling ducks, despite the fact that it is the smallest BCR in Quebec, with the highest densities for six species found here (Wood Duck, Gadwall, American Wigeon, Mallard, Northern Shoveler and Green-winged Teal); however, BCR 13 is relatively unimportant with respect to size of breeding populations, with only Gadwall obtaining its largest population in this BCR. The BCR 13 appears a good candidate for developing actions for the conservation of dabbling ducks, though Quebec does not have a large amount of responsibility on a North American scale (see proportion nesting in Quebec in Table 9).

BCR 14 has neither the highest density nor the largest breeding population for any waterfowl species, although we recognize its importance for Common Eider *dresseri* colonies.

In **BCR 12**, the highest densities in Quebec for at least six species (American Black Duck, Ring-necked Duck, Bufflehead, Hooded Merganser, Common Goldeneye and Common Merganser), of which four are cavity nesting species, are found here. BCR 12 is home also to the largest numbers of breeding pairs for the Wood Duck, Bufflehead and Hooded Merganser. BCR 12 is a good candidate for the establishment of conservation actions of ducks nesting in forest areas.

For **BCR 8**, its particular importance is from hosting the largest breeding populations in Quebec for at least 10 species of waterfowl (Canada Goose "resident population" [less interesting considering that it is an "undesirable" species], American Wigeon, American Black Duck, Mallard, Blue-winged Teal, Green-winged Teal, Ring-necked Duck, Common Eider *dresseri*, Common Goldeneye and Barrow's Goldeneye), although this may in part be due to the fact that this BCR is the second largest in terms of area. In addition, the highest densities for Blue-winged Teal and Barrow's Goldeneye are found here. BCR 8 is therefore a good candidate for conservation of a wide variety of waterfowl, from dabbling and diving ducks as well as sea ducks.

BCR 7 provides an important contribution to scaup and sea ducks; six of these species have their largest breeding populations in Quebec here (Greater Scaup, Lesser Scaup, Harlequin Duck, Surf Scoter, Black Scoter and Common Merganser). It also has the highest densities for Lesser Scaup and Surf Scoter. BCR 7 could therefore have actions developed aimed at the conservation of nesting sea ducks, among others.

As for **BCR 3**, although it is the most northerly of the BCRs in Quebec, eight species or populations have their largest breeding populations here (Canada Goose Atlantic Population and North Atlantic Population, Tundra Swan, Northern Pintail, Common Eider *borealis*, Common Eider *sedentaria*, Long-tailed Duck and Red-breasted Merganser), and at least eight species—

mostly the same ones—obtain their highest densities in this BCR (Canada Goose Atlantic Population and North Atlantic Population, Tundra Swan, Northern Pintail, Greater Scaup, Black Scoter, Long-tailed Duck and Red-breasted Merganser). Actions developed for BCR 3 will contribute to the conservation of a great variety of waterfowl.

In summary, the highest densities in Quebec are found in BCR 13 (dabbling ducks), BCR 12 (mostly cavity-nesting ducks) and BCR 3 (several species or populations of waterfowl), whereas the largest breeding populations are in BCR 8 (several species of waterfowl), BCR 7 (mostly sea ducks) and BCR 3 (especially geese and sea ducks), although the large size of these three BCRs partly explains the large populations.

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