Environment Canada Environnement Canada

Bird Conservation Strategy for Bird Conservation Region 14 in Quebec Region – Atlantic Northern Forest

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Preface

Environment Canada led the development of all-bird conservation strategies in each of Canada's Bird Conservation Regions (BCRs) by drafting new strategies and integrating new and existing strategies into an all-bird framework. These integrated all-bird conservation strategies will serve as a basis for implementing bird conservation across Canada, and will also guide Canadian support for conservation work in other countries important to Canada's migrant birds. Input to the strategies from Environment Canada's conservation partners is as essential as their collaboration in implementing their recommendations.

Environment Canada has developed national standards for strategies to ensure consistency of approach across BCRs. Bird Conservation Strategies will provide the context from which specific implementation plans can be developed for each BCR, building on the programs currently in place through Joint Ventures or other partnerships. Landowners including Aboriginal peoples will be consulted prior to implementation.

Conservation objectives and recommended actions from the conservation strategies will be used as the biological basis to develop guidelines and beneficial management practices that support compliance with regulations under the *Migratory Birds Convention Act, 1994*.

Acknowledgements

Véronique Connolly, Stéphane Légaré, Benoît Audet et François Fournier were the main authors of this document which follows templates developed by Alaine Camfield, Judith Kennedy and Elsie Krebs with the help of the BCR planners in each of the Canadian Wildlife Service regions throughout Canada. However, work of this scope cannot be accomplished without the contribution of other colleagues who provided or validated technical information, commented on earlier draft versions of the strategy, and supported the planning process. We would like to thank the following people: Matthieu Allard, Yves Aubry, Luc Bélanger, Martine Benoît, Daniel Bordage, Pierre Brousseau, Vincent Carignan, Richard Cotter, Marie-France Dalcourt, Emmanuel Dalpé-Charron, Bruno Drolet, Gilles Falardeau, Patricia Houle, Benoît Jobin, Sandra Labrecque, Claudie Latendresse, Josée Lefebvre, Christine Lepage, Jean-François Rail and François Shaffer.

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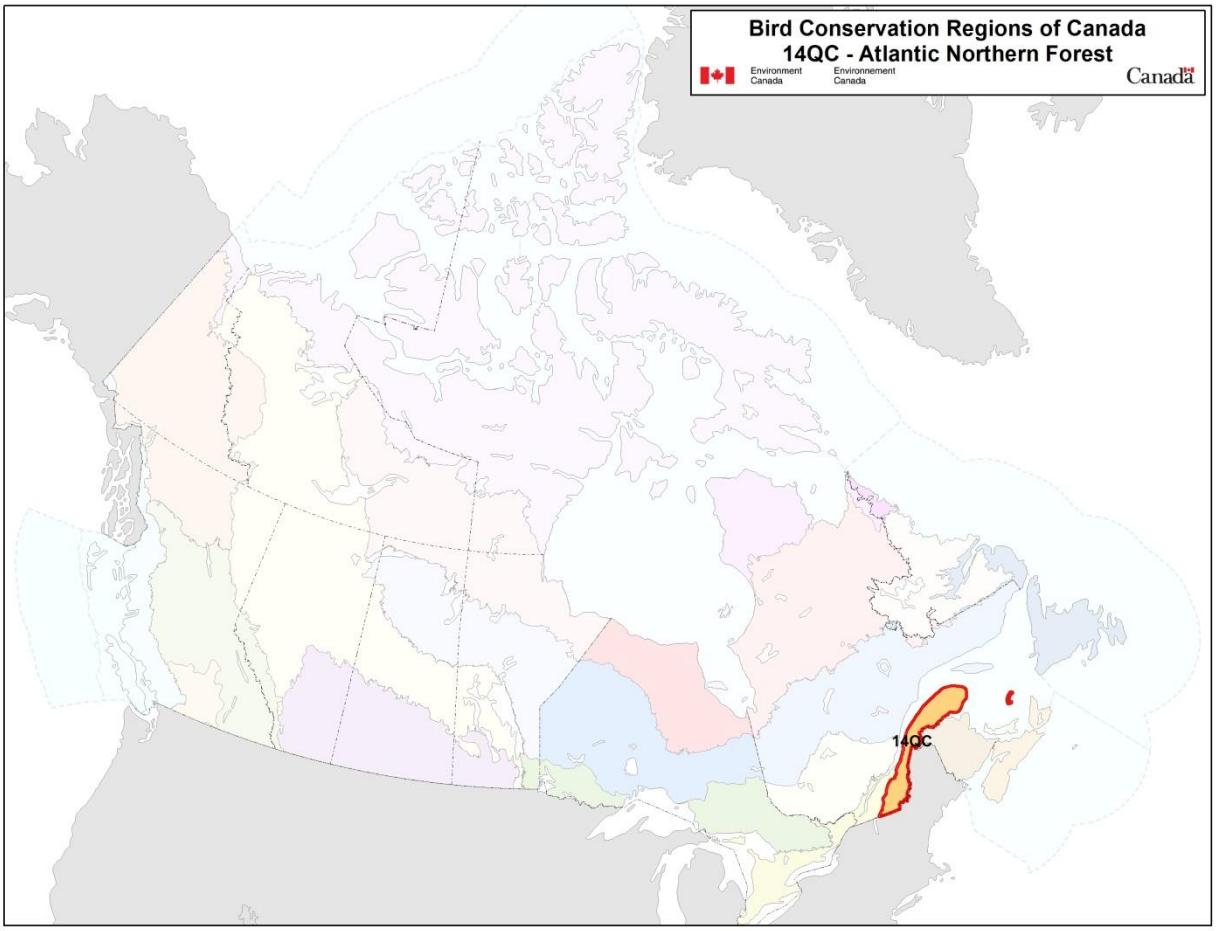

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Executive Summary

The Quebec portion of the Atlantic Northern Forest Bird Conservation Region (BCR 14-QC) largely equates to the Appalachian ecoregion and covers 129 186 km^2. The region's rugged terrain consists of hills and mountains interspersed with plateaus and large valleys. The terrestrial portion of BCR 14-QC is mainly covered by forests, which are mostly mixed wood and, to a lesser extent, coniferous. Agricultural areas are somewhat prevalent in the southern portion of the region and in the less rugged areas of the rest of the BCR. The marine portion of BCR 14-QC is dominated by the St. Lawrence Estuary and Gulf of St. Lawrence and includes a number of rivers and some large lakes. The coastal habitats in this BCR offer nesting sites for certain waterbird species as well as stopover areas for numerous shorebird species during migration. The BCR 14-QC marine environment also includes islands with steep cliffs where a variety of seabird species nest.

Following an assessment of the 256 bird species in BCR 14-QC, 100 species were identified as priorities in this BCR. The priority list includes species from all 4 bird groups: landbirds (52%), shorebirds (15%), waterbirds (22%) and waterfowl (11%). These priority species include 28 species considered at risk, either provincially or federally. Priority species use 11 habitat types in BCR 14-QC, most frequently coastal areas (37% of priority species), wetlands (34%), mixed wood forests (23%), coniferous forests (22%), deciduous forests (14%) and cultivated and managed areas (14%).

Each priority species was assigned a population objective based on its population trend. Maintaining populations at current levels was the objective assigned to the greatest number of priority species in BCR 14-QC (35%), while 19% were assigned an objective to assess/maintain their populations. Better population trend data are required for the vast majority of the species that have been assigned one of these two objectives. A recovery objective was assigned to 20% of the priority species (all are species at risk), and another 26% of the priority species also require population increases. Overall, 46% of priority species identified in BCR-14 QC were assigned a population increase objective. This reflects the magnitude of the threats affecting bird populations in this BCR.

A threat assessment identified a number of conservation issues facing priority species in the various habitats of BCR 14-QC. Major threats include habitat loss and degradation caused by forestry and agriculture, the presence of native and non-native invasive species, climate change and severe weather. The lack of biological or demographic data on the priority species and the ongoing need for the finalization of recovery strategies and management plans for federally listed species at risk were also considered to be significant conservation issues, as a total of 76% of priority species are affected. The habitats most severely affected by the threats in BCR 14-QC include wetlands, coastal areas, and cultivated and managed areas.

Conservation objectives have been established to counter threats and provide the missing information on priority species. In BCR 14-QC, conservation objectives chiefly involve providing

suitable habitat for priority species by ensuring, for example, that resource and land use policies and practices maintain or improve bird habitat. Another major conservation objective is to improve bird population monitoring to gather the missing ecological and demographic information on many of the priority species in the BCR.

Conservation actions have been recommended for priority species in BCR 14-QC in order to achieve the established conservation objectives. The recommended actions largely relate to population monitoring and include on-the-ground activities such as increasing the coverage of the Breeding Bird Survey, conducting species-specific surveys, improving the current migration monitoring program, updating waterfowl banding and survey programs, developing a shorebird monitoring program for the fall migration, and optimizing the seabird monitoring programs. A significant percentage of the recommended actions involve protecting sites and, more particularly, wetlands. These actions include protecting a wide variety of wetlands through stewardship or the legal designation as conservation areas, the adoption of municipal urban plans that protect wetlands, and the protection of shorebird staging areas.

Migratory birds found in BCR 14-QC also face threats that are difficult to analyze with the standardized methodology used in this strategy. These threats include widespread issues that may sometimes not apply to a particular habitat (e.g., collisions with human-made structures, air pollution and climate change), research needs and population monitoring, as well as threats to migratory birds when they are outside Canada. An overview of these issues, the affected species and the recommended conservation actions is also presented.

Introduction: Bird Conservation Strategies

Context

This document is one of a suite of Bird Conservation Region strategies (BCR strategies) that have been drafted by Environment Canada for all regions of Canada. These strategies respond to Environment Canada's need for integrated and clearly articulated bird conservation priorities to support the implementation of Canada's migratory birds program, both domestically and internationally. This suite of strategies builds on existing conservation plans for the four "bird groups" (waterfowl,[1] waterbirds,[2] shorebirds[3] and landbirds[4]) in most regions of Canada, as well as on national and continental plans, and includes birds under provincial/territorial jurisdiction. These new strategies also establish standard conservation planning methods across Canada and fill gaps, as previous regional plans do not cover all areas of Canada or all bird groups.

These strategies present a compendium of required actions based on the general philosophy of achieving scientifically based desired population levels as promoted by the four pillar initiatives of bird conservation. Desired population levels are not necessarily the same as minimum viable or sustainable populations, but represent the state of the habitat/landscape at a time prior to recent dramatic population declines in many species from threats known and unknown. The threats identified in these strategies were compiled using currently available scientific information and expert opinion. The corresponding conservation objectives and actions will contribute to stabilizing populations at desired levels.

The BCR strategies are not highly prescriptive. In most cases, practitioners will need to consult additional information sources at local scales to provide sufficient detail to implement the recommendations of the strategies. Tools such as beneficial management practices will also be helpful in guiding implementation. Partners interested in participating in the implementation of these strategies, such as those involved in the habitat Joint Ventures established under the North American Waterfowl Management Plan (NAWMP), are familiar with the type of detailed implementation planning required to coordinate and undertake on-the-ground activities.

[1] NAWMP Plan Committee 2004; Lepage et al. (in prep).
[2] Milko et al. 2003; Chapdelaine and Rail 2004.
[3] Donaldson et al. 2000; Aubry and Cotter 2007.
[4] Rich et al. 2004; Drolet et al. 2010; Falardeau et al. 2010.

Strategy Structure

Section 1 of this strategy presents general information about the BCR and the subregion, with an overview of the six elements[5] that provide a summary of the state of bird conservation at the sub-regional level. Section 2 provides more detail on the threats, objectives and actions for priority species grouped by each of the broad habitat types in the subregion. Section 3 presents additional widespread conservation issues that are not specific to a particular habitat or were not captured by the threat assessment for individual species, as well as research and monitoring needs, and threats to migratory birds while they are outside of Canada. The approach and methodology are summarized in the appendices, but details are available in a separate document (Kennedy et al. 2012). A national database houses all the underlying information summarized in this strategy and is available from Environment Canada.

[5] The six elements are: Element 1– priority species assessment; Element 2 – habitats important to priority species; Element 3 – population objectives; Element 4 – threat assessment; Element 5 – conservation objectives; Element 6 – recommended actions.

Characteristics of Bird Conservation Region 14-QC

The Atlantic Northern Forest Bird Conservation Region (BCR 14) is bordered by the Adirondack region of New York State to the southwest, includes New England, and covers part of eastern Quebec and all of New Brunswick, Prince Edward Island and Nova Scotia. The Quebec portion of BCR 14 (BCR 14-QC) equates largely to the Appalachian ecoregion (Ecological Stratification Working Group 1996) and occupies a strip south of the St. Lawrence that covers 129 186 km^2 from the Gaspé Peninsula to the American border, just east of Lake Champlain (Fig. 1).
BCR 14-QC includes most of the upper estuary of the St. Lawrence River, the southern portion of the lower St. Lawrence estuary and part of the Gulf of St. Lawrence, as well as the Magdalen Islands.

Physical environment

Topography

BCR 14-QC's rugged terrain consists of hills and mountains interspersed with plateaus and large valleys (Li and Ducruc 1999). Elevations in this region range from sea level to just over 1 200 m. The highest peaks include Mount Megantic (1 105 m), Mount Albert (1 181 m), Mount Gosford (1 192 m) and Mount Jacques-Cartier (1 268 m; Natural Resources Canada 2013), which is the highest in southern Quebec.

Hydrography and hydrology

The St. Lawrence Estuary and Gulf of St. Lawrence, as well as the Saint-François, Chaudière and Matapédia rivers, make up BCR 14-QC's main water system. Other major rivers include the Etchemin, Kamouraska, Rimouski and Bonaventure. BCR 14-QC contains few lakes, but some are relatively large, such as the Memphremagog (95.3 km^2), Saint-François (47. 1 km^2), Aylmer (31.1 km^2), Temiscouata (66.8 km^2) and Matapedia (38 km^2) lakes (Quebec's Ministère du Développement durable, de l'Environnement et des Parcs 2002).

Climate

BCR 14-QC's climate varies with latitude and altitude, ranging from moderate in the southwest to harsh in the higher elevations of its eastern portion. The average annual temperature is approximately 3.5°C, with a summer average of 14.5°C and a winter average of -8 °C. The average annual rainfall ranges from 900 mm to 1 300 mm. In the Chic-Choc Mountains, home to the highest peaks in the BCR subregion, precipitation can exceed 1 300 mm and temperatures are cooler (Ecological Stratification Working Group 1996).

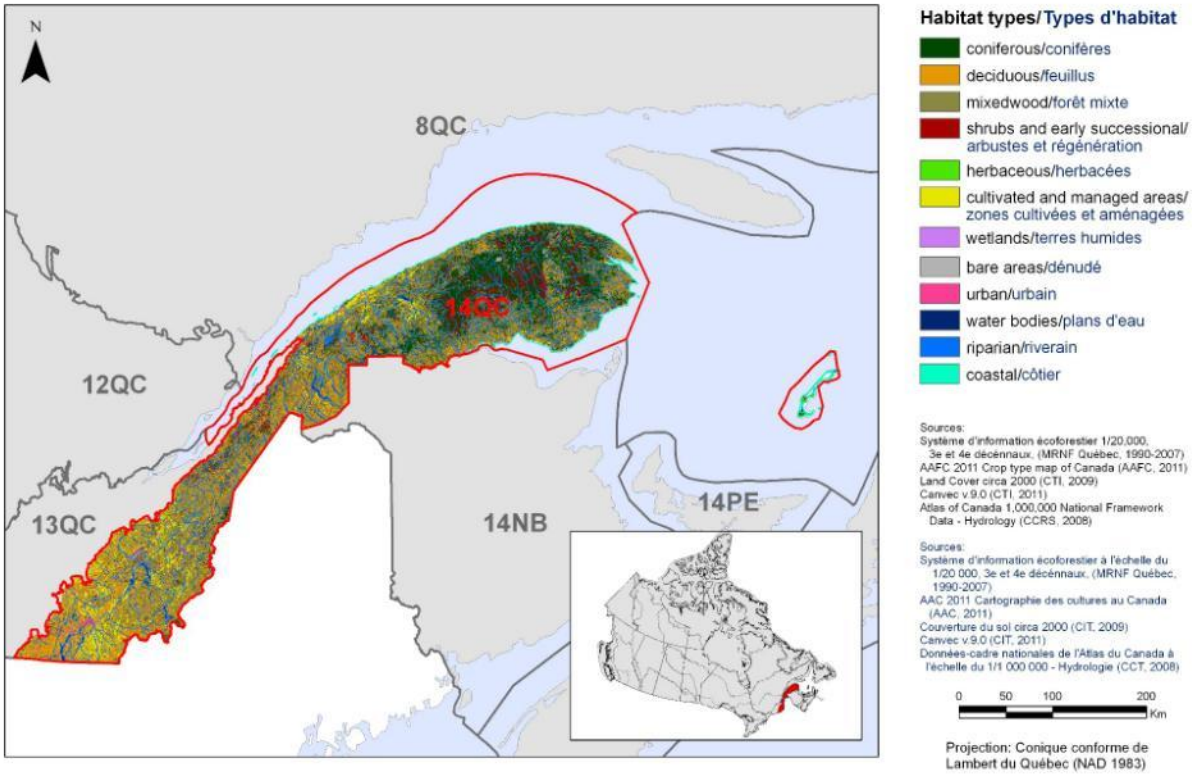

Figure 1. Landcover in BCR 14-QC: Atlantic Northern Forest.

Land cover and land use

Most of the land in BCR 14-QC is covered by forest, which is predominantly mixed wood (Fig. 1; Li and Ducruc 1999). The BCR's rugged terrain and relatively poor soil have limited agricultural activities to the southern portion of the region, as well as in the lowlands, plateaus and valley floors in the rest of the BCR. Therefore, only approximately 10% of the land in BCR 14-QC consists of cultivated and managed areas. Urban areas account for close to 2% of the land area while wetlands account for only 1%. Nearly all of the land in the southwestern portion of the sub-BCR is privately owned while most of the land in the northeastern portion is publicly owned (Drolet et al. 2010). The main activities in this BCR are forestry, agriculture and tourism (Groupe de travail sur la stratification écologique 1996).

Biological environment

Vegetation

BCR 14-QC contains three subzones of vegetation that transition from the southwestern part of the region to the northeastern part as follows: deciduous forest, mixed wood forest and continuous boreal forest (Quebec's Ministère des Ressources naturelles 2013).

The deciduous forest subzone hosts the sugar maple-basswood bioclimatic domain, which is characterized by diverse flora, including many species at the northern limit of their range. Sugar

maple is the dominant species but others such as basswood, American white ash, ironwood and butternut are also found. The deciduous forest subzone also includes the sugar maple-yellow birch bioclimatic domain. The flora here is less diverse but includes several boreal species. Companion species to the sugar maple include the yellow birch, American beech, red oak and hemlock. Windfall is a key element of the forest dynamics in this subzone.

In the eastern portion of BCR 14-QC, the mixed wood forest subzone consists of the balsam fir-yellow birch domain, which is a transition area between the deciduous and boreal forest. This domain is characterized by mixed stands of yellow birch and conifers such as balsam fir, white spruce and cedar. The main drivers of forest dynamics in this sub-area are outbreaks of spruce budworm and fires.

The continuous boreal forest subzone covers much of the easternmost part of BCR 14-QC and is represented by the balsam fir-white birch bioclimatic domain. This bioclimatic domain is characterized by fir and white spruce mixed with white birch mesic sites, while less favourable sites include black spruce, Jack pine and larch, accompanied by white birch or trembling aspen. The main drivers of forest dynamics in this domain are also outbreaks of spruce budworm and fires.

Wildlife

BCR 14-QC features a wide diversity of animal species. Mammal species that are abundant or representative of the region include the white-tailed deer, moose, black bear, Canada lynx, fisher and raccoon (Li and Ducruc 1999). In the eastern portion of the sub-region, on the Gaspé Peninsula, there is an isolated population of Woodland Caribou (mountain ecotype), a species designated as threatened in Quebec and endangered in Canada (Quebec's Ministère du Développement durable, de l'Environnement, de la Faune et des Parcs 2013; Species at Risk Public Registry 2012). The marine portion of BCR 14-QC is used by marine mammals that are at risk in Canada: the Right Whale and Blue Whale, both endangered species; the Beluga, a species threatened in both Quebec and Canada; and the Fin Whale, a species of special concern. BCR 14-QC contains mammal species that are likely to be designated as threatened or vulnerable in Quebec, such as the Gaspé Shrew, Eastern Pipistrelle and Hoary Bat.

BCR 14-QC has numerous amphibian and reptile species, including the Wood Turtle, Leatherback Turtle and the Spring Salamander, which are species at risk in both Canada and Quebec, as well as the Pickerel Frog and Northern Dusky Salamander, two species likely to be designated as threatened or vulnerable in Quebec.

BCR 14-QC is home to a highly diverse fish fauna. Typical fish species include the Atlantic Salmon, Brook Trout, Atlantic Cod, Atlantic Herring, Deepwater Redfish and Atlantic Mackerel (Li and Ducruc 1999; Fisheries and Oceans Canada 2013). The Channel Darter, Rainbow Smelt and American Shad, three vulnerable species in Quebec, are also present in BCR 14-QC.

BCR 14-QC includes a variety of aquatic and terrestrial habitats that are used by a wide range of breeding migratory birds. Species representative of the deciduous forest include the Ruffed

Grouse, Yellow-bellied Sapsucker, Wood Thrush, Veery, American Redstart, Black-throated Blue Warbler and Rose-breasted Grosbeak. The mixed wood forest contains species that are common to deciduous and boreal forests, as well as species that are specially adapted to mixed wood stands, such as the Canada Warbler, Black-throated Green Warbler and Blackburnian Warbler. Species characteristic of the boreal forest include the Spruce Grouse, Black-backed Woodpecker, Boreal Chickadee, Bicknell's Thrush, Cape May Warbler, Blackpoll Warbler and Pine Grosbeak. The agricultural areas are inhabited by farmland species, such as the Bobolink, Eastern Meadowlark, Savannah Sparrow and Vesper Sparrow. Species associated with the wetlands include the Common Loon, American Black Duck, Common Goldeneye, Ring-necked Duck, Green-winged Teal and Common Merganser. The coastal habitats offer nesting sites for species such as the Common Tern and Piping Plover, as well as stopover areas for numerous shorebird species (e.g., the Black-bellied Plover, Semipalmated Plover, Ruddy Turnstone and White-rumped Sandpiper) during migration. BCR 14-QC's marine environment also features a number of islands with steep cliffs that are used for nesting by seabirds, such as the Northern Gannet, Black-legged Kittiwake, Razorbill, Common Murre and Black Guillemot. One of these islands, Île Bonaventure, is home to North America's largest Northern Gannet colony, boasting nearly 50 000 breeding pairs (J.-F. Rail, pers. comm.). During migration and wintering periods, the waters of the St. Lawrence Estuary and Gulf of St. Lawrence within BCR 14-QC are used by a number of waterfowl species, such as the Common Eider, Long-tailed Duck, American Scoter, Surf Scoter, Barrow's Goldeneye (Eastern population) and Red-breasted Merganser. Lastly, BCR 14-QC contains species with highly restricted ranges in Quebec, including the Golden-winged Warbler, Nelson’s Sparrow, American Pipit and the eastern population of Harlequin Duck.

Human environment

Approximately 780 000 people live in BCR 14-QC, accounting for 10% of Quebec's population (adapted from Statistics Canada 2012). The major cities are Sherbrooke (154 601 inhabitants), Rimouski (46 860), Saint-Georges (31 173), Thetford Mines (25 709) and Gaspé (15 163). BCR 14-QC has an Aboriginal population of approximately 2 900 inhabitants spread out over three Mi'kmaq communities in the eastern part of the region: Listuguj, Gesgapegiag and Gespeg (Aboriginal Affairs and Northern Development Canada 2010; Statistics Canada 2010).

Protected and designated areas

Approximately 4% of the land in BCR 14-QC is officially protected (Fig. 2). Seven Quebec national parks (responsibility of Quebec's Ministère du Développement durable, de l'Environnement, de la Faune et des Parcs) and one Canadian national park (operated by Parks Canada) are entirely located within the sub-BCR. These parks, occupying a total area of 1323 km^2, are the Quebec national parks Mont-Orford, Mont-Mégantic, Frontenac, Bic, Gaspésie, Miguasha and Île Bonaventure-et-du-Rocher-Percé, and the Forillon National Park of Canada. In addition, the sub-region includes 28% (343 km^2) of the Saguenay-St. Lawrence Marine Park (joint responsibility of Parks Canada and Quebec's Ministère du Développement durable, de l'Environnement, de la Faune et des Parcs).

BCR 14-QC includes four of Quebec's eight national wildlife areas (Environment Canada's responsibility; Fig. 2). They are the Îles de l'Estuaire, Pointe de l'Est, Pointe-au-Père and Baie de l'Isle-Verte national wildlife areas (the Baie de l'Isle-Verte National Wildlife Area is part of the Ramsar Baie de l'Isle-Verte site and overlaps with BCR 13). Together, they cover an area of 22 km^2. There are also five migratory bird sanctuaries (under Environment Canada's mandate), which cover a total area of 32 km^2: the Île aux Basques, Bonaventure Island and Percé Rock, Bird Rocks, Saint-Omer and Trois-Saumons migratory bird sanctuaries. An area of 862 km^2 is occupied by no less than 165 waterbird staging areas (responsibility of Quebec's Ministère du Développement durable, de l'Environnement, de la Faune et des Parcs).

Finally, BCR 14-QC includes 41 Important Bird Areas (IBAs) totalling 2417 km^2 that are designated as important for birds, but which do not receive legal protection.

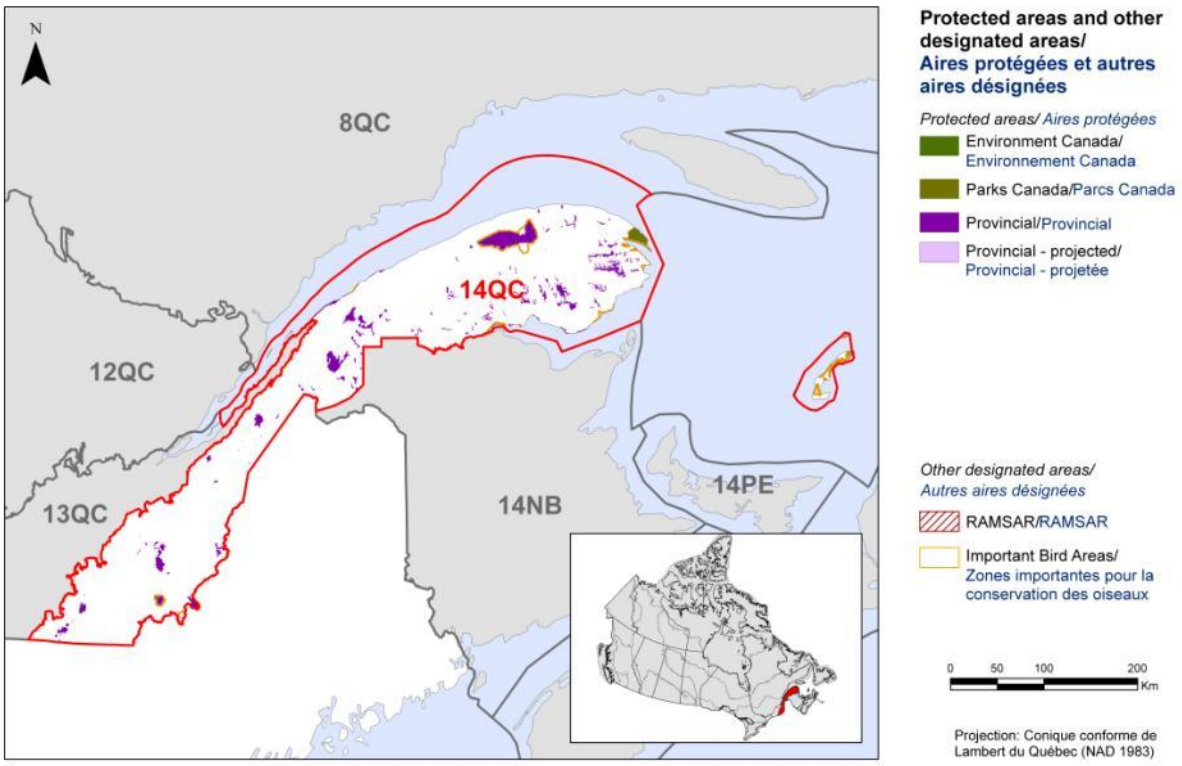

Figure 2. Map of protected and designated areas in BCR 14-QC: Atlantic Northern Forest.

Section 1: Summary of Results – All Birds, All Habitats

Element 1: Priority Species Assessment

These Bird Conservation Strategies identify "priority species" from all regularly occurring bird species in each BCR subregion (see Appendix 1). Species that are vulnerable due to population size, distribution, population trend, abundance and threats are included because of their "conservation concern". Some widely distributed and abundant "stewardship" species are also included. Stewardship species are included because they typify the national or regional avifauna and/or because they have a large proportion of their range and/or continental population in the subregion; many of these species have some conservation concern, while others may not require specific conservation effort at this time. Species of management concern are also included as priority species when they are at (or above) their desired population objectives but require ongoing management because of their socio-economic importance as game species or because of their impacts on other species or habitats (see Appendix 2).

The purpose of the prioritization exercise is to focus implementation efforts on the issues of greatest significance for Canadian avifauna. Table 1 provides a full list of all priority species and their reason for inclusion. Tables 2 and 3 summarize the number of priority species in BCR 14-QC by bird group and by the reason for priority status.

The standard method for selecting priority species was used to identify, on a preliminary basis, 94 priority species, sub-species or populations (called "species" hereinafter) from the 256 species occurring in BCR 14-QC (Appendix 1). Regional experts reviewed the preliminary list and excluded 16 pre-selected species while adding 22 others, for a final list of 100 priority species (Table 1). The reasons for these expert decisions are presented in Appendix 3.

The 100 priority species identified are not distributed equally among the 4 bird groups. Landbirds are the most represented group with 52 species or 52% of all priority species in BCR 14-QC (Table 2). This is an indication of the prevalence of landbirds in the subregion, as they account for 60% of all bird species present (Appendix 1). Forty-four percent of shorebird species (15 species) and 69% of waterbird species (22 species) found in the BCR 14-QC have been identified as priority species, an indication of the precarious status of these 2 groups of birds in the sub-BCR. Among the priority species are also 11 waterfowl species (31% of the waterfowl species found in BCR 14-QC [Table 2]).

The vast majority of priority species (71%) were selected because they are of conservation concern (Table 1; shaded cells). They include 28 species at risk, which are listed provincially under the *Loi sur les espèces menacées ou vulnerable* [Act respecting threatened or vulnerable species] (Quebec), nationally under the *Species at Risk Act* (SARA), or have received a Committee on the Status of Endangered Wildlife in Canada (COSEWIC) designation. Eighteen species are considered at risk both provincially and nationally, 5 species are considered at risk

only by the province of Quebec (Golden Eagle, Nelson's Sparrow, Leach's Storm-Petrel, Bald Eagle and Sedge Wren), and another 5 species are considered at risk nationally. The latter species are the Bobolink, Wood Thrush, Barn Swallow, Eastern Wood-Pewee and Eastern Meadowlark, which were assessed by COSEWIC but are not currently listed on Schedule 1 of SARA. In addition to the species of conservation concern, 29 species have been identified as priority species for stewardship reasons (Table 1; unshaded cells).

Table 1. Priority species in BCR 14-QC, population objective and the reason for priority status.

Priority species[1]	Bird group	Population objective	COSEWIC[2]	SARA[3]	Provincial listing[4]	National/continental concern[5] (landbirds)	Regional concern[5] (landbirds)	Continental stewardship[5] (landbirds)	Regional stewardship[5] (landbirds)	Conservation category and rule[6] (shorebirds)	National conservation level[7] (waterbirds)	NAWMP rank[8] (waterfowl)	Expert review[9] (changes to priority list)
American Redstart	Landbird	Maintain							Y				
American Three-toed Woodpecker	Landbird	Assess/Maintain											Y
Bald Eagle	Landbird	Recovery objective			V			Y					
Bank Swallow	Landbird	Increase 50%											Y
Barn Swallow	Landbird	Increase 100%	T										
Bay-breasted Warbler	Landbird	Maintain				Y			Y				
Belted Kingfisher	Landbird	Increase 50%					Y						
Bicknell's Thrush	Landbird	Recovery objective[10]	T	T	V	Y	Y		Y				
Black-and-white Warbler	Landbird	Maintain							Y				
Black-backed Woodpecker	Landbird	Assess/Maintain						Y					

[1] Species of conservation concern are in shaded cells. Stewardship species are in unshaded cells.
[2] COSEWIC (Committee on the Status of Endangered Wildlife in Canada) assessment: E = Endangered; T = Threatened; SC = Special Concern.
[3] Species listed on Schedule 1 of the *Species at Risk Act* (SARA): E = Endangered; T = Threatened; SC = Special Concern (Species at Risk Public Registry, 2012).
[4] Status under the *Loi sur les espèces menacées ou vulnérables* (Quebec)*:* T = Threatened, V = Vulnerable, L = Likely to be designated threatened or vulnerable.
[5] Taken from the online database from www.partnersinflight.org. Consult Panjabi et al. (2005) for the analytical method.
[6] Conservation concern at the level of the U.S. and Canada as identified in the Canadian Shorebird Conservation Plan (Donaldson et al. 2000). Score 5 is "Highly imperilled" and a score of 1 is "Not at risk". Refer to Donaldson et al. (2000) for the complete description of each category of conservation concern.
[7] Priority tiers at the national level as identified in "Wings Over Water", Canada's waterbird conservation plan (Milko et al. 2003). Tier 1 is highest priority.
[8] NAWMP: North American Waterfowl Management Plan (North American Waterfowl Management Plan; Plan Committee, 2004).
[9] Expert review indicates species that were added to the priority list by expert opinion; justifications for addition are presented in Appendix 3. The species that were removed, along with their conservation features and the justification for removal, are also presented in Appendix 3.
[10] The species is listed under SARA, but its recovery documents are not yet finalized.

Table 1 continued

Priority species[1]	Bird group	Population objective	COSEWIC[2]	SARA[3]	Provincial listing[4]	National/continental concern[5] (landbirds)	Regional concern[5] (landbirds)	Continental stewardship[5] (landbirds)	Regional stewardship[5] (landbirds)	Conservation category and rule[6] (shorebirds)	National conservation level[7] (waterbirds)	NAWMP rank[8] (waterfowl)	Expert review[9] (changes to priority list)
Black-billed Cuckoo	Landbird	Assess/Maintain					Y						
Blackburnian Warbler	Landbird	Maintain				Y		Y	Y				
Blackpoll Warbler	Landbird	Increase 50%					Y						
Black-throated Blue Warbler	Landbird	Maintain							Y				
Black-throated Green Warbler	Landbird	Maintain				Y		Y	Y				
Blue-headed Vireo	Landbird	Maintain						Y					
Bobolink	Landbird	Increase 50%	T			Y	Y						
Boreal Chickadee	Landbird	Maintain					Y	Y					
Boreal Owl	Landbird	Assess/Maintain											Y
Brown Creeper	Landbird	Assess/Maintain											Y
Brown Thrasher	Landbird	Increase 100%						Y					
Canada Warbler	Landbird	Recovery objective[10]	T	T	L	Y	Y		Y				
Chimney Swift	Landbird	Recovery objective[10]	T	T	L	Y							
Common Nighthawk	Landbird	Recovery objective[10]	T	T	L	Y							
Eastern Meadowlark	Landbird	Increase 100%	T										
Eastern Whip-poor-will	Landbird	Recovery objective[10]	T	T	L	Y							
Eastern Wood-Pewee	Landbird	Increase 50%	SC										
Evening Grosbeak	Landbird	Maintain							Y				
Field Sparrow	Landbird	Increase 100%											Y
Golden Eagle	Landbird	Recovery objective			V								
Golden-winged Warbler	Landbird	Recovery objective[10]	T	T	L	Y							

Table 1 continued

Priority species[1]	Bird group	Population objective	COSEWIC[2]	SARA[3]	Provincial listing[4]	National/continental concern[5] (landbirds)	Regional concern[5] (landbirds)	Continental stewardship[5] (landbirds)	Regional stewardship[5] (landbirds)	Conservation category and rule[6] (shorebirds)	National conservation level[7] (waterbirds)	NAWMP rank[8] (waterfowl)	Expert review[9] (changes to priority list)
Magnolia Warbler	Landbird	Maintain				Y		Y					
Nelson's Sparrow	Landbird	Increase			L	Y							
Northern Flicker	Landbird	Increase 50%											Y
Northern Parula	Landbird	Maintain							Y				
Northern Saw-whet Owl (*acadicus*)	Landbird	Assess/Maintain							Y				
Olive-sided Flycatcher	Landbird	Recovery objective[10]	T	T	L	Y	Y						
Ovenbird	Landbird	Maintain											Y
Palm Warbler	Landbird	Assess/Maintain				Y		Y					
Peregrine Falcon (*anatum/tundrius*)	Landbird	Recovery objective[10]	SC	SC	V[11]	Y							
Pine Grosbeak	Landbird	Assess/Maintain				Y		Y					
Purple Finch	Landbird	Maintain							Y				
Rufous-sided Towhee	Landbird	Increase 100%				Y	Y	Y					
Rusty Blackbird	Landbird	Recovery objective[10]	SC	SC	L	Y							
Sedge Wren	Landbird	Increase			L								
Short-eared Owl	Landbird	Recovery objective[10]	SC	SC	L	Y							
Tree Swallow	Landbird	Maintain							Y				
Veery	Landbird	Increase 50%							Y				
White-throated Sparrow	Landbird	Maintain				Y		Y	Y				
Wood Thrush	Landbird	Increase 50%	T			Y	Y						

[11] Under the *Loi sur les espèces menacées ou vulnérables* (Quebec), the subspecies *anatum* is designated "Vulnerable" whereas the subspecies *tundrius* is listed as "Likely to be designated as threatened or vulnerable."

Table 1 continued

Priority species[1]	Bird group	Population objective	COSEWIC[2]	SARA[3]	Provincial listing[4]	National/continental concern[5] (landbirds)	Regional concern[5] (landbirds)	Continental stewardship[5] (landbirds)	Regional stewardship[5] (landbirds)	Conservation category and rule[6] (shorebirds)	National conservation level[7] (waterbirds)	NAWMP rank[8] (waterfowl)	Expert review[9] (changes to priority list)
Yellow-bellied Sapsucker	Landbird	Maintain						Y	Y				
Yellow-throated Vireo	Landbird	Assess/Maintain					Y	Y					
Black-bellied Plover	Shorebird	Assess/Maintain								3a			
Dunlin	Shorebird	Assess/Maintain								3a			
Hudsonian Godwit	Shorebird	Assess/Maintain								4b			
Killdeer	Shorebird	Increase 50%								3a			
Piping Plover (*melodus*)	Shorebird	Recovery objective	E	E	T					5a			
Purple Sandpiper	Shorebird	Increase 50%								2b			Y
Red Knot (*rufa*)	Shorebird	Recovery objective[10]	E	E	L					4a			
Red Phalarope	Shorebird	Assess/Maintain								3a			
Red-necked Phalarope	Shorebird	Assess/Maintain								3a			
Ruddy Turnstone	Shorebird	Increase 50%								4a, b			
Sanderling	Shorebird	Increase 50%								4a			
Semipalmated Sandpiper	Shorebird	Increase 100%								3a			
Short-billed Dowitcher (*griseus*)	Shorebird	Maintain								3a			
Upland Sandpiper	Shorebird	Assess/Maintain								2b			Y
Whimbrel	Shorebird	Assess/Maintain								4a			
American Bittern	Waterbird	Increase 50%									Tier 1		
Atlantic Puffin	Waterbird	Maintain									Tier 3		Y
Black Guillemot	Waterbird	Maintain									Tier 3		Y
Black-legged Kittiwake	Waterbird	Maintain									Tier 3		Y
Bonaparte's Gull	Waterbird	Assess/Maintain									Tier 1		

Table 1 continued

Priority species[1]	Bird group	Population objective	COSEWIC[2]	SARA[3]	Provincial listing[4]	National/continental concern[5] (landbirds)	Regional concern[5] (landbirds)	Continental stewardship[5] (landbirds)	Regional stewardship[5] (landbirds)	Conservation category and rule[6] (shorebirds)	National conservation level[7] (waterbirds)	NAWMP rank[8] (waterfowl)	Expert review[9] (changes to priority list)
Common Loon	Waterbird	Maintain									Tier 1		
Common Murre	Waterbird	Maintain									Tier 3		Y
Common Tern	Waterbird	Maintain									Tier 2		
Double-crested Cormorant	Waterbird	Maintain									Tier 3		Y
Great Black-backed Gull	Waterbird	Maintain									Tier 3		Y
Great Cormorant	Waterbird	Maintain									Tier 3		Y
Herring Gull	Waterbird	Increase 100%									Tier 2		
Horned Grebe (Magdalen Islands population)	Waterbird	Recovery objective[10]	E	E	T						Tier 2		
Leach's Storm-Petrel	Waterbird	Increase 50%			L						Tier 1		
Least Bittern	Waterbird	Recovery objective	T	T	V						Tier 2		
Northern Gannet	Waterbird	Maintain									Tier 3		Y
Razorbill	Waterbird	Maintain									Tier 3		Y
Roseate Tern	Waterbird	Recovery objective	E	E	T						Tier 2		
Sora	Waterbird	Assess/Maintain									Tier 2		
Thick-billed Murre	Waterbird	Increase 50%									Tier 2		
Virginia Rail	Waterbird	Assess/Maintain									Tier 2		
Yellow Rail	Waterbird	Recovery objective	SC	SC	T						Tier 1		
American Black Duck	Waterfowl	Increase										Very high	
American Scoter	Waterfowl	Maintain										Moderately low	Y
Barrow's Goldeneye (Eastern population)	Waterfowl	Recovery objective	SC	SC	V							Moderately high	
Brant	Waterfowl	Maintain										Moderate	Y

Table 1 continued

Priority species[1]	Bird group	Population objective	COSEWIC[2]	SARA[3]	Provincial listing[4]	National/continental concern[5] (landbirds)	Regional concern[5] (landbirds)	Continental stewardship[5] (landbirds)	Regional stewardship[5] (landbirds)	Conservation category and rule[6] (shorebirds)	National conservation level[7] (waterbirds)	NAWMP rank[8] (waterfowl)	Expert review[9] (changes to priority list)
Canada Goose (Atlantic population)	Waterfowl	Maintain										N/A	Y
Canada Goose (North Atlantic population)	Waterfowl	Maintain										High	
Common Eider (*dresseri*)	Waterfowl	Increase										Very high	
Harlequin Duck (Eastern population)	Waterfowl	Recovery objective	SC	SC	V							Moderately high	
Long-tailed Duck	Waterfowl	Maintain										High	
Red-breasted Merganser	Waterfowl	Maintain										Moderate	Y
Surf Scoter	Waterfowl	Maintain										High	

Table 2. Summary of priority species, by bird group, in BCR 14-QC.

Bird Group	Total Species	Total Priority Species	Percent Listed as Priority	Percent of Priority List
Landbird	154	52	34%	52%
Shorebird	34	15	44%	15%
Waterbird	32	22	69%	22%
Waterfowl	36	11	31%	11%
Total	**256**	**100**	**39%**	**100%**

Table 3. Number of priority species in BCR 14-QC by reason for priority status.

Reason for Priority Listing[1]	Landbirds	Shorebirds	Waterbirds	Waterfowl
COSEWIC[2]	15	2	4	2
Federal SARA listed[3]	10	2	4	2
Provincially listed[4]	14	2	5	2
National/Continental Concern[5]	21	-	-	-
Regional Concern[5]	11	-	-	-
Continental Stewardship[5]	14	-	-	-
Regional Stewardship[5]	16	-	-	-
Conservation category[6]	-	13	-	-
Priority level[7]		-	13	-
NAWMP[8]	-	-	-	7
Expert review[9]	7	2	9	4

[1] A single species can be on the priority list for more than one reason. Note that not all reasons for inclusion apply to every bird group (indicated by "-").

[2] *COSEWIC* indicates species assessed by the Committee on the Status of Endangered Wildlife in Canada as Endangered, Threatened, or Special Concern.

[3] Species listed on Schedule 1 of SARA as Endangered, Threatened, or Special Concern.

[4] *Provincially Listed* indicates species listed under the *Loi sur les espèces menacées ou vulnérables* (Quebec) *as* Threatened, Vulnerable, or Likely to be designated threatened or vulnerable.

[5] See Table 1.

[6] Conservation category indicates a species ranked in Canada's Shorebird Conservation Plan (Donaldson et al., 2000) as having a 5, 4a, 4b or 3a conservation category in the United States of America and Canada.

[7] Priority level indicate a species ranked in Canada's Waterbird Conservation Plan (Milko et al., 2003) as belonging to Tier 1 or Tier 2.

[8] NAWMP indicates species ranked in the North American Waterfowl Management Plan (Plan Committee 2004) as having Highest, High or Moderately High breeding or non-breeding conservation and/or monitoring need in the BCR.

[9] Species that did not meet the standard criteria but that were added by experts.

Element 2: Habitats Important to Priority Species

Identifying the broad habitat requirements for each priority species within the BCR allowed species to be grouped by shared habitat-based conservation issues and actions (see Appendix 2 for details on how species were assigned to standard habitat categories). If many priority species associated with the same habitat face similar conservation issues, then conservation action in that habitat may support populations of several priority species. BCR strategies use a modified version of the standard land cover classes developed by the United Nations (Food and Agriculture Organization 2000) to categorize habitats, and species were often assigned to more than one habitat class.

Eleven habitat classes are used by priority species in BCR-14 QC (Fig. 3). Coastal areas are the habitat class used by the greatest number of priority species (37). This habitat class is used by most of the priority waterbird, shorebird and waterfowl species found in the subregion.

Although they constitute only 1% of the BCR 14-QC land area, wetlands are the second habitat class most used by priority species (34% of priority species). This habitat class is used by all 4 bird groups, with landbirds dominating (14 species).

Mixed wood forest (23% of priority species), coniferous forest (22%), deciduous forest (14%), and cultivated and managed areas (14%) are among the other habitats most used by priority species. The various forest types are used exclusively by priority terrestrial species, while the cultivated and managed areas are used mostly by landbird species but are also inhabited by priority waterfowl and shorebird species.

See Section 2 for additional details on priority species, threats and conservation actions for each habitat class in BCR 14-QC.

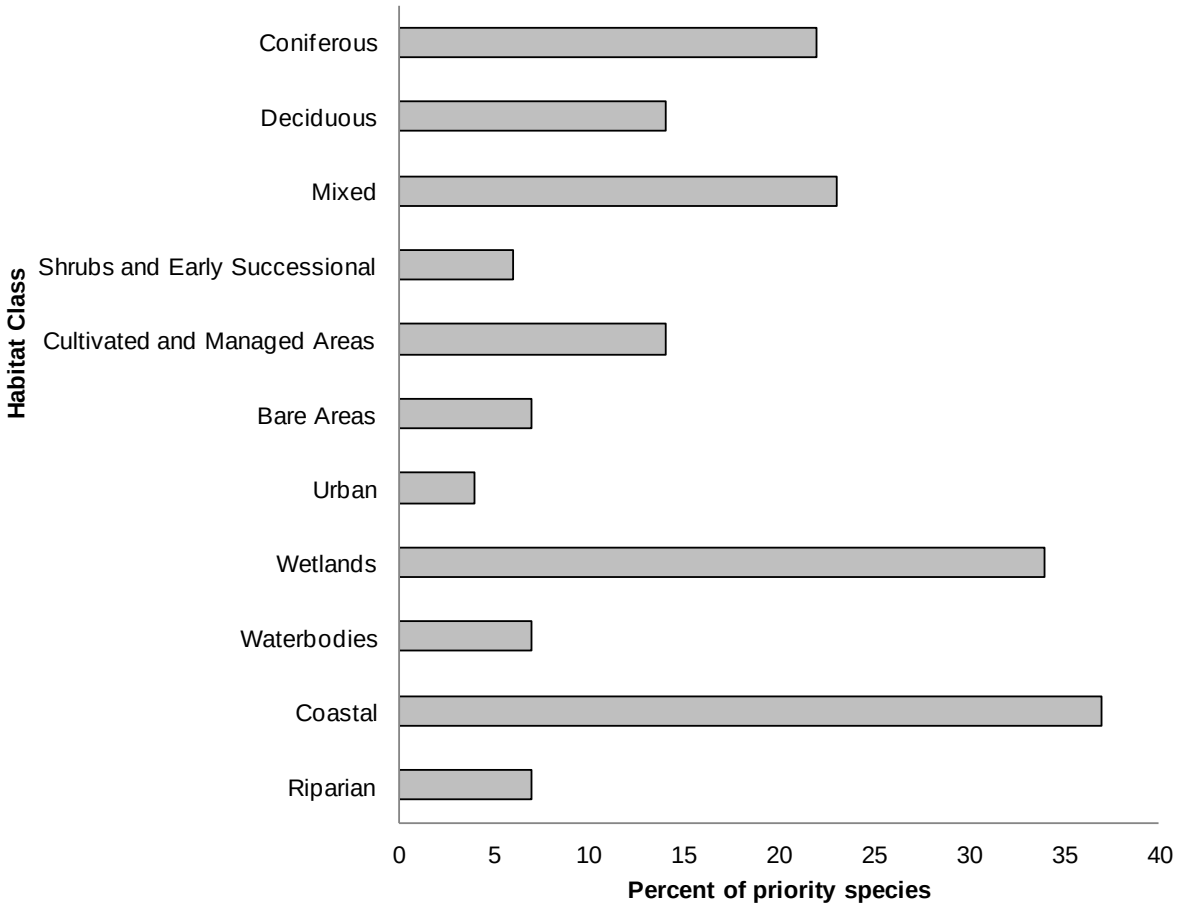

Figure 3. Percent of priority species that are associated with each habitat type in BCR 14-QC.
Note: The total exceeds 100% because each species may be assigned to more than one habitat.

Element 3: Population Objectives

Population objectives allow us to measure and evaluate conservation success. The objectives in this strategy are assigned to categories and are based on a quantitative or qualitative assessment of species' population trends. If the population trend of a species is unknown, the objective is set as “assess and maintain”, and a monitoring objective is given (see Appendix 2). For any species listed under SARA or under provincial/territorial endangered species legislation, Bird Conservation Strategies defer to population objectives in available Recovery Strategies and Management Plans. The ultimate measure of conservation success will be the extent to which population objectives have been reached over the next 40 years. Population objectives do not currently factor in feasibility of achievement, but are held as a standard against which to measure progress.

Maintaining populations at current levels was the objective assigned to the greatest number of priority species in BCR 14-QC (35% of priority species; Fig. 4). For 33 of the 35 species that have been assigned this objective, better population trend data must be acquired for decision making. This also applies to all but one of the species whose population objective is “Assess/Maintain” (19% of priority species).

As a result of the significant presence of species at risk in BCR 14-QC, recovery population objectives relating to species at risk represents 20% of all objectives for the region. In addition to these recovery objectives, which all seek to increase populations of species at risk, population increase objectives were also assigned to 26% of priority species under the categories “Increase,” “Increase 50%” and “Increase 100%.” Overall, 46% of priority species identified in BCR-14 QC were assigned a population increase objective. This reflects the magnitude of the threats affecting bird populations in this BCR.

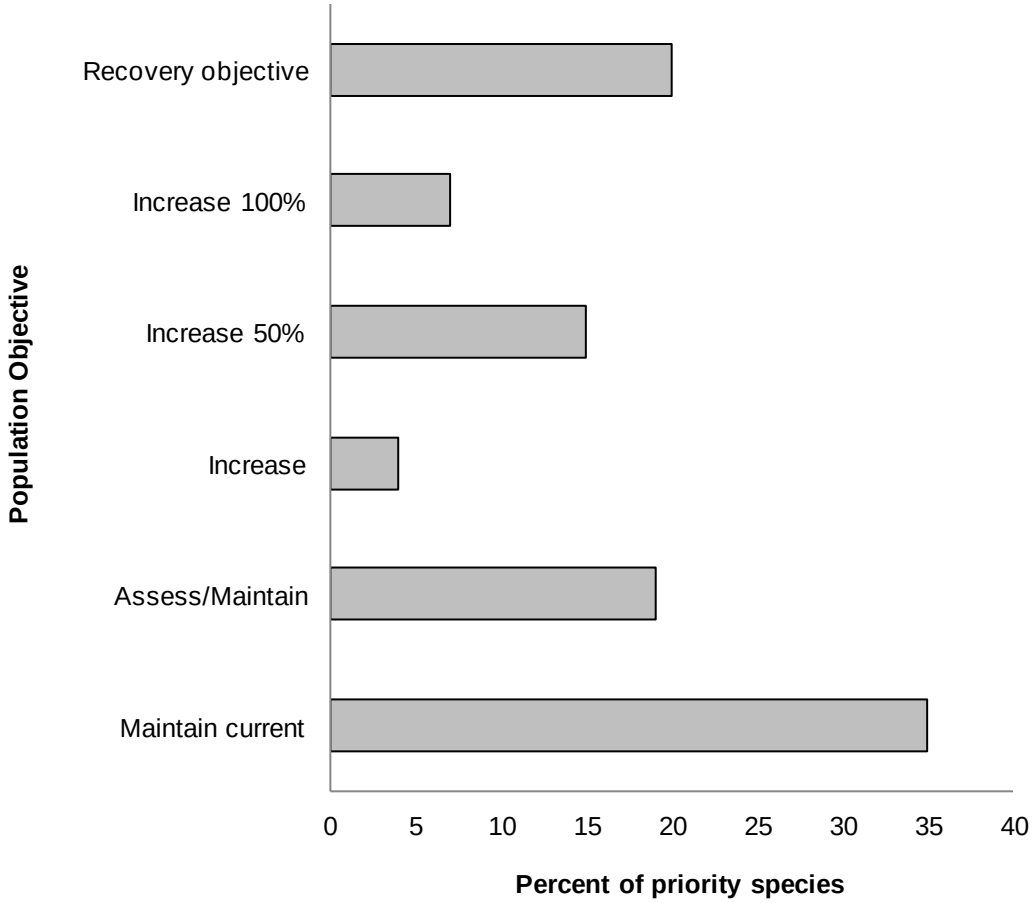

Figure 4. Percent of priority species that are associated with each population objective category in BCR 14-QC.

Element 4: Threat Assessment for Priority Species

The threats assessment process (see Appendix 2) identifies threats believed to have a population-level effect on individual priority species. These threats are assigned a relative magnitude (Low, Medium, High, Very High), based on their scope (the proportion of the species' range within the subregion that is impacted) and severity (the relative impact on the priority species' population). This allows us to target conservation actions towards threats with the greatest effects on suites of species or in broad habitat classes. Some well-known conservation issues (such as predation by domestic cats or climate change) may not be identified in the literature as significant threats to populations of an individual priority species and therefore may not be captured in the threat assessment. However, they merit attention in conservation strategies because of the large numbers of individual birds affected in many regions of Canada. We have incorporated them in a separate section, Widespread Issues, but, unlike other threats, they are not ranked.

Bird populations found in BCR 14-QC face many threats from different sources. No less than 509 threats classified into 11 categories and 26 sub-categories have been identified and are summarized in Figure 5. Category 12 “Other direct threats,” represented by sub-category “12.1 Information lacking,” is the category most frequently associated with priority species in BRC 14-QC because it includes 34% of all identified threats. This category, with a “Low” overall relative magnitude, consists of elements relating to the lack of biological or demographic information required for appropriate population management. Its magnitude is also attributable to the presence of species at risk for which there are no finalized recovery strategies, management plans or action plans (Table 4). Only 9 of the 28 species at risk in BCR 14-QC had a completed recovery strategy, action plan or management plan when this strategy was written. Overall, the need for more information was identified for 83 of the 100 priority species in BCR 14-Qc.

Category 1”Residential & commercial development” ranks second in the percentage of threats affecting priority species in BCR 14-QC, with just over 14% of all threats. This category of “Medium” overall relative magnitude is represented by sub-categories “1.1 Housing & urban areas” and “1.2 Commercial & industrial areas,” which account for 6% and 8% of identified threats, respectively (Fig. 5). These sub-categories include threats such as habitat loss and/or degradation due to drainage and filling of wetlands for residential, commercial or industrial development, loss of woodlands for development, and a decrease in the abundance of prey insects caused by the destruction of wetlands.

Category “2. Agriculture & aquaculture” has a “High” overall relative magnitude and is mainly represented by sub-category “2.1 Annual & perennial non-timber crops,” which accounts for 10% of all identified threats. This sub-category includes elements such as the conversion of forested farmland to arable land, habitat loss and degradation due to the transition from perennial to annual crops, intensification of agriculture, and drainage and filling of wetlands for agriculture.

Category “5. Biological resource use,” which has a “High” overall relative magnitude, is also a major threat. It is mainly represented by sub-category “5.3 Logging & wood harvesting,” which alone is responsible for 7% of the threats identified in BCR 14-QC, and includes forest habitat fragmentation, loss of mature forest, and the decrease in the number of snags with cavities, stands of dead trees and large-diameter trees.

Category “9. Pollution” includes 8% of identified threats and has a “Medium” overall relative magnitude. This category is represented by sub-categories “9.2 Industrial & military effluents” and “9.3 Agricultural & forestry effluents.” The threats relating to sub-category 9.2 are oil spills and sediment contamination, while the only threat in sub-category 9.3 is the overuse of pesticides, which can cause bird poisoning, eggshell thinning, and a reduction in insect populations and prey fish.

Category “8. Invasive & other problematic species & genes” is represented by sub-categories “8.1 Invasive non-native/alien species” and “8.2 Problematic native species” in BCR 14-QC. Although it describes just over 5% of all existing threats, this category has a “Very High” overall relative magnitude. The only threat in sub-category 8.1 is wetland loss and degradation caused by invasive non-native plants. The threats associated with sub-category 8.2 include nest predation by the Brown-headed Cowbird, predation of waterbird nests by the Red Fox and gulls, and predation of shorebirds in staging areas.

Category “7. Natural system modifications” includes approximately 5% of identified threats, but its overall relative magnitude is “High.” The only sub-category included in this category is “7.3 Other ecosystem modifications,” and it involves the abandonment of agricultural land, which becomes unsuitable for some species of farmland birds; closure or disturbance of pits used for nesting; transition of shrub habitats to forest habitats; and alteration of the Havre-aux-Basques habitat (Magdalen Islands), which could affect numerous shorebird species.

Category “11. Climate change & severe weather” is another category that includes only a small percentage of identified threats (close to 4%) but has a “High” overall relative magnitude. This category includes three sub-categories in BCR 14-QC: “11.1 Habitat shifting & alterations,” “11.4 Storms & flooding” and “11.5 Other impacts.” The only threat in sub-category 11.1 is wetland loss and degradation, while sub-category 11.4 involves more frequent flooding affecting the wetlands and cultivated and managed areas. The threats in sub-category 11.5 mainly relate to the increased frequency of adverse weather events that could affect migration, reproductive success, nesting phenology and prey availability. This threat affects aerial insectivores such as the Common Nighthawk, Barn Swallow, Chimney Swift and Olive-sided Flycatcher.

Each of the “3. Energy production & mining”, “4. Transportation & service corridors” and “6. Human intrusions & disturbance” threat categories includes less than 5% of all identified threats and has a “Medium” overall relative magnitude.

The overall relative magnitude of threats to priority species is “High” in 5 of the 11 habitat classes in BCR 14-QC: shrub/early successional, cultivated and managed areas, urban, wetlands and coastal. Also noted is the “Very High” relative impact of three threat categories on priority species in specific habitats, that is, “2. Agriculture & aquaculture” on cultivated and managed areas, “7. Natural system modifications” on shrub/early successional habitat and “8. Invasive & other problematic species & genes” on wetlands and coastal areas.

Section 2 provides more details on the threats associated with the various habitat classes. Threats to priority species while they are outside Canada during the non-breeding season were also assessed and are presented in the section entitled Threats Outside Canada.

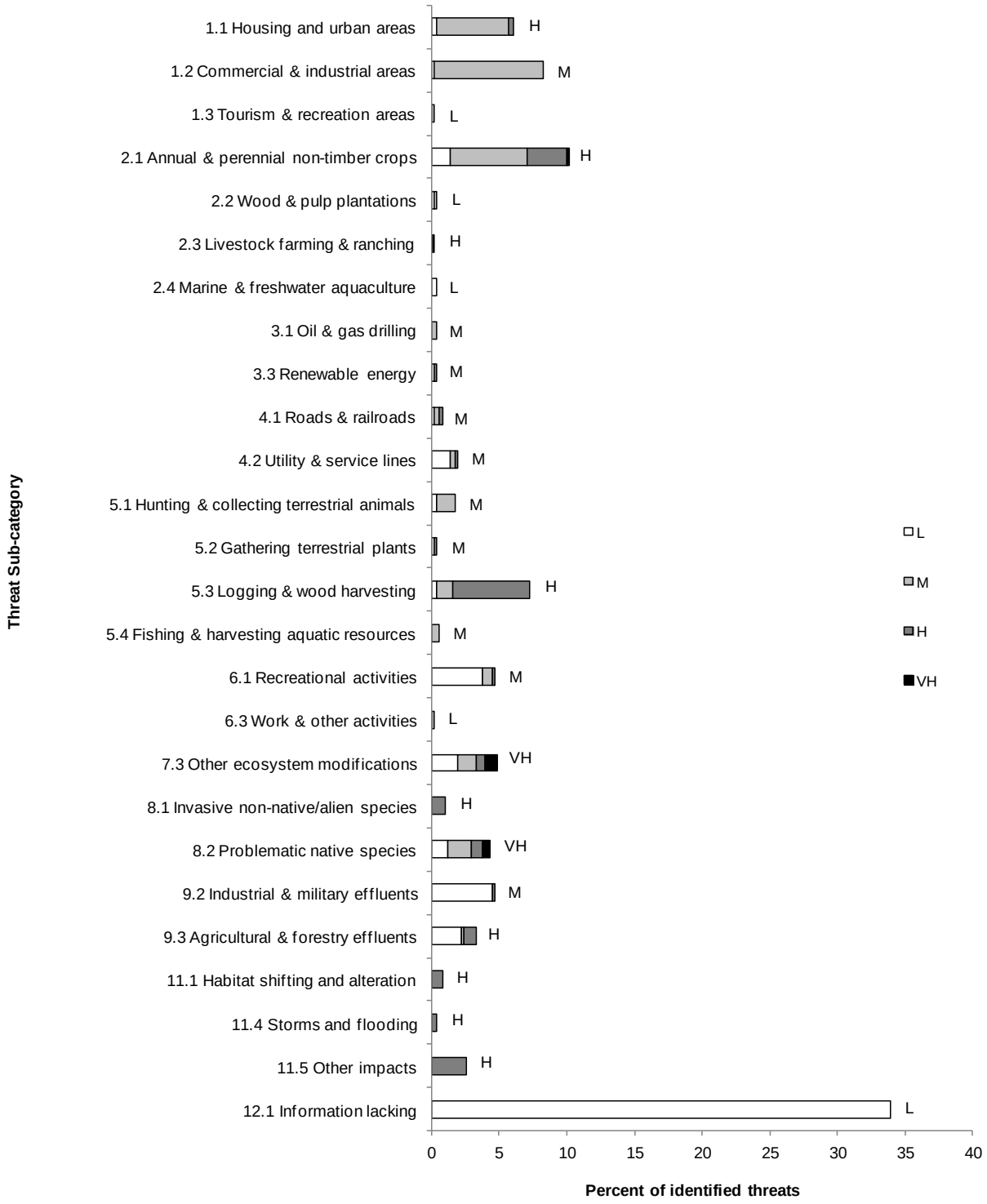

Figure 5. Percent of identified threats to priority species within BCR 14-QC by threat sub-category.
Each bar represents the percent of the total number of threats identified in each threat sub-category in BCR 14-QC (for example, if 100 threats were identified in total for all priority species in BCR 14-QC, and 10 of those threats were in the category 1.1 Housing & urban areas, the bar on the graph would represent this as 10%). Shading in the bars (VH = very high, H = high, M = medium and L = low) represents the rolled-up magnitude of all threats in each threat sub-category in the BCR. (See Appendix 2 for details on how magnitude was assessed).

Table 4. Relative magnitude of identified threats to priority species within BCR 14-QC by threat category and broad habitat class.
Overall ranks were generated through a roll-up procedure described in Kennedy et al. (2012). L represents Low Magnitude threats; M = Medium; H = High; VH = Very High. Blank cells indicate that no priority species had threats identified in the threat category/habitat combination.

Threat category	Habitat class											
	Coniferous	Deciduous	Mixed	Shrub/Early Successional	Cultivated and managed areas	Bare areas	Urban	Wetlands	Waterbodies	Coastal	Riparian	Overall
Overall	**M**	**M**	**M**	**H**	**H**	**M**	**H**	**H**	**L**	**H**	**M**	
1 Residential & commercial development	M	M	M	.	L	.	H	M	.	M	.	**M**
2 Agriculture & aquaculture	L	M	L	H	VH	L	.	H	.	L	.	**H**
3 Energy production & mining	M	.	.	.	.	.	.	.	.	M	.	**M**
4 Transportation & service corridors	L	M	.	M	L	L	L	L	.	.	L	**M**
5 Biological resource use	H	H	H	L	.	L	.	M	L	M	H	**H**
6 Human intrusions & disturbance	.	.	.	.	.	M	L	L	.	M	L	**M**
7 Natural system modifications	.	.	.	VH	M	H	.	H	.	H	M	**H**
8 Invasive & other problematic species & genes	.	.	.	H	.	.	.	VH	.	VH	.	**VH**
9 Pollution	.	L	L	L	H	L	.	L	L	M	L	**M**
11 Climate change & severe weather	.	.	.	.	H	.	H	H	.	M	M	**H**
12. Other direct threats	L	L	L	L	L	L	L	L	L	L	L	**L**

Element 5: Conservation Objectives

Conservation objectives were designed to address threats and information gaps that were identified for priority species. They describe the environmental conditions and research and monitoring that are thought to be necessary for progress towards population objectives and to understand underlying conservation issues for priority bird species. As conservation objectives are reached, they will collectively contribute to achieving population objectives. Whenever possible, conservation objectives were developed to benefit multiple species and/or respond to more than one threat (see Appendix 2).

Conservation objectives have been divided into the seven categories presented in Figure 6. In BCR-14 QC, 36% of suggested conservation objectives are in category "1. Ensure adequate habitat" and involve nearly all the habitats in BCR 14-QC, with the exception of waterbodies. This objective category includes three sub-categories affecting BCR 14-QC: "1.1 Ensure land and resource-use policies and practices maintain or improve bird habitat," "1.2 Maintain the size, shape and configuration of habitat within the natural range of variation" and "1.4 Maintain important bird features on the landscape."

Objective "7. Improve understanding (of population status, limiting factors and mitigation)" ranks second with 25% of all suggested conservation objectives. The vast majority of objectives in this category are from sub-category "7.1 Improve population/demographic monitoring," while the other objectives are associated with sub-category "7.4 Improve understanding of causes of population declines." This indicates a need for increased monitoring in the BCR for numerous priority species in the four bird groups.

Sixteen percent of the objectives involve managing individual species (category 3). Close to 90% of this category's objectives are from sub-category "3.4 Implement recovery plans for species at risk", as there are 28 species at risk in BCR 14-QC. Sub-categories "3.3 Reduce parasitism/predation" and "3.5 Prevent and control the spread of invasive and exotic species" complete this category's objectives.

Objective "2. Reduce mortality/increase productivity" represents 15% of the conservation objectives in BCR 14-QC. Nearly half of this category's objectives are in sub-category "2.1 Reduce mortality and/or sub-lethal effects from pesticide use," while slightly over 20% are from sub-category "2.7. Reduce incidental mortality from collisions." The other objectives in this category are part of sub-categories "2.2. Reduce mortality and/or sub-lethal effects from exposure to contaminants," "2.4 Reduce incidental mortality" and "2.8. Reduce mortality from legal or illegal hunting, and persecution."

Categories "4. Reduce disturbance" and "6. Manage for climate change" account for 5% and 3% of all the objectives raised for BCR 14-QC, respectively. Sub-category "4.1 Reduce disturbance from human recreation," which primarily involves birds in wetlands and coastal areas, is the only sub-category included in category 4. All category 6 objectives are from sub-category "6.2 Manage for habitat resilience as climate changes" and are mainly associated with aerial

insectivores and certain waterbirds. No objectives have been assigned to sub-category "5. Ensure adequate food supplies" in BCR 14-QC.

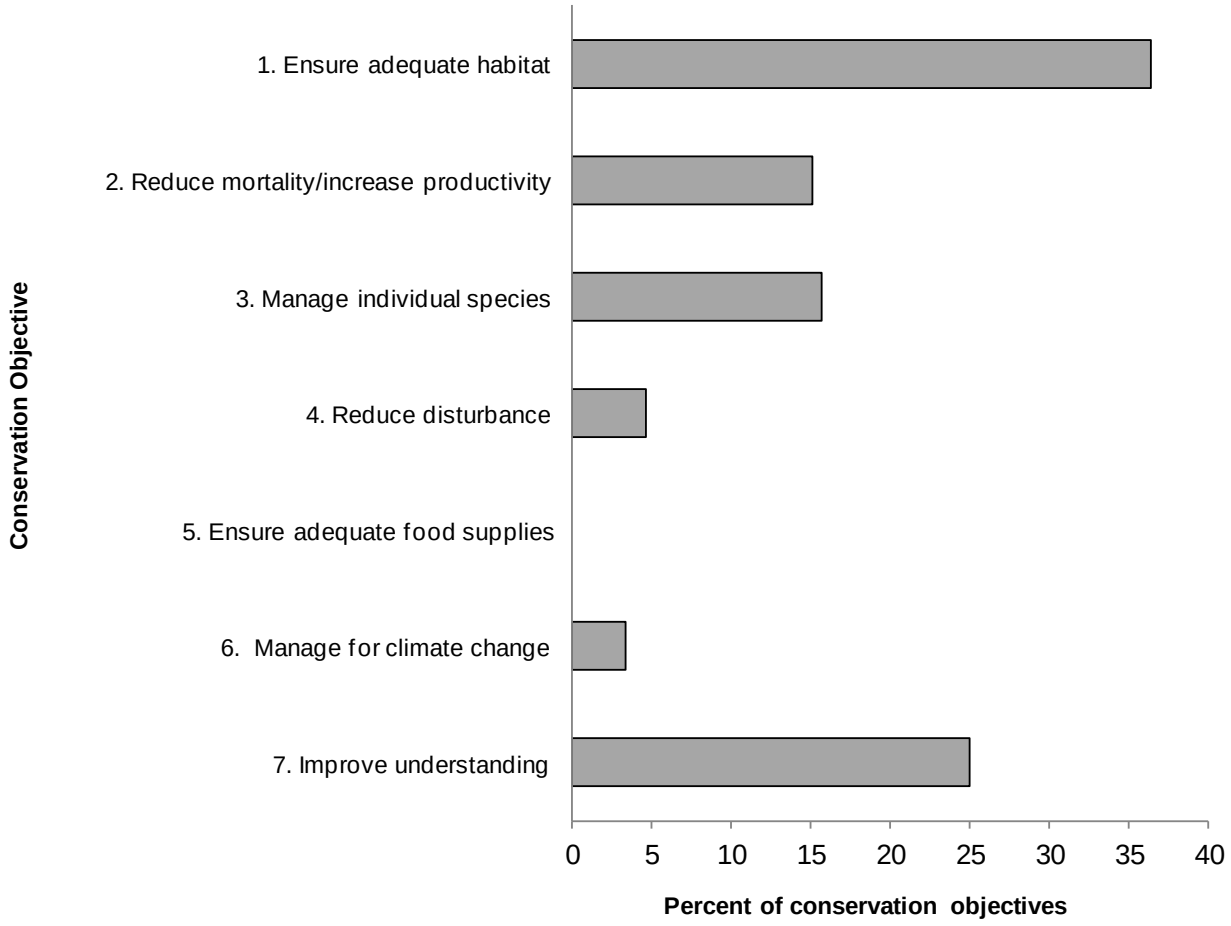

Figure 6. Percent of all conservation objectives assigned to each conservation objective category in BCR 14-QC. **Note:** Objective "7. Improve understanding" means improving our understanding of population status, limiting factors and mitigation.

Element 6: Recommended Actions

Recommended actions indicate on-the-ground activities that will help to achieve the conservation objectives (Fig. 7). Actions are strategic rather than highly detailed and prescriptive (see Appendix 2). Whenever possible, recommended actions benefit multiple species and/or respond to more than one threat. Recommended actions defer to or support those provided in recovery documents for species at risk at the federal, provincial or territorial level, but will usually be more general than those developed for individual species.

Figure 7 shows that close to 29% of the actions recommended in BCR 14-QC are in sub-category "8.2 Monitoring." The high frequency of this recommendation is primarily due to the lack of biological or demographic information on the priority species in the BCR. The actions suggested in this category include increasing the coverage of the Breeding Bird Survey, conducting specific surveys (e.g., surveys of high-altitude birds, breeding birds in boreal forests or nocturnal birds), improving the current migration monitoring program, updating waterfowl banding and survey programs, developing a shorebird monitoring program for the fall migration and optimizing seabirds monitoring. For more information, see the section Research and Population Monitoring Needs.

Sub-category "1.1 Site/area protection" is the second largest, with nearly 24% of all recommended actions. The actions recommended in this category mainly target wetlands and include protecting a variety of wetlands through stewardship or the legal designation of wetlands as conservation areas, the adoption of municipal urban plans that protect wetlands and the protection of shorebird staging areas. These actions are specifically aimed at minimizing the impact of the threats relating to residential and commercial development, as well as agriculture.

Sub-category "3.2 Species recovery" is the third most-frequently mentioned action sub-category (8%) and mainly involves continuing to develop and implement species at risk recovery documents and associated activities.

The adoption of standards and beneficial practices (5.3), mainly in agriculture and forestry, represents 8% of recommended actions. More specifically, developing sustainable agriculture, implementing silvicultural treatments that maintain key habitat features and the landscape structure, and establishing beneficial management practices are some of the actions suggested for overcoming a number of threats relating to annual and perennial crops, and logging and wood harvesting.

Habitat and natural process restoration (2.3) represents 7% of the recommended actions and primarily concerns coastal areas and wetlands. The actions suggested in this category involve maintaining the efficiency of Environment Canada's emergency response programs, as well as reducing pesticide use by promoting integrated pest management.

Sub-category “5.2 Policies and regulations” includes slightly more than 6% of the recommended actions and refers primarily to improving the protection of wetlands through available policies, regulations and stewardship tools. Each of the other sub-categories represents less than 5% of the recommended actions (Fig. 7).

More details on recommended actions for the various habitat classes are presented in Section 2.

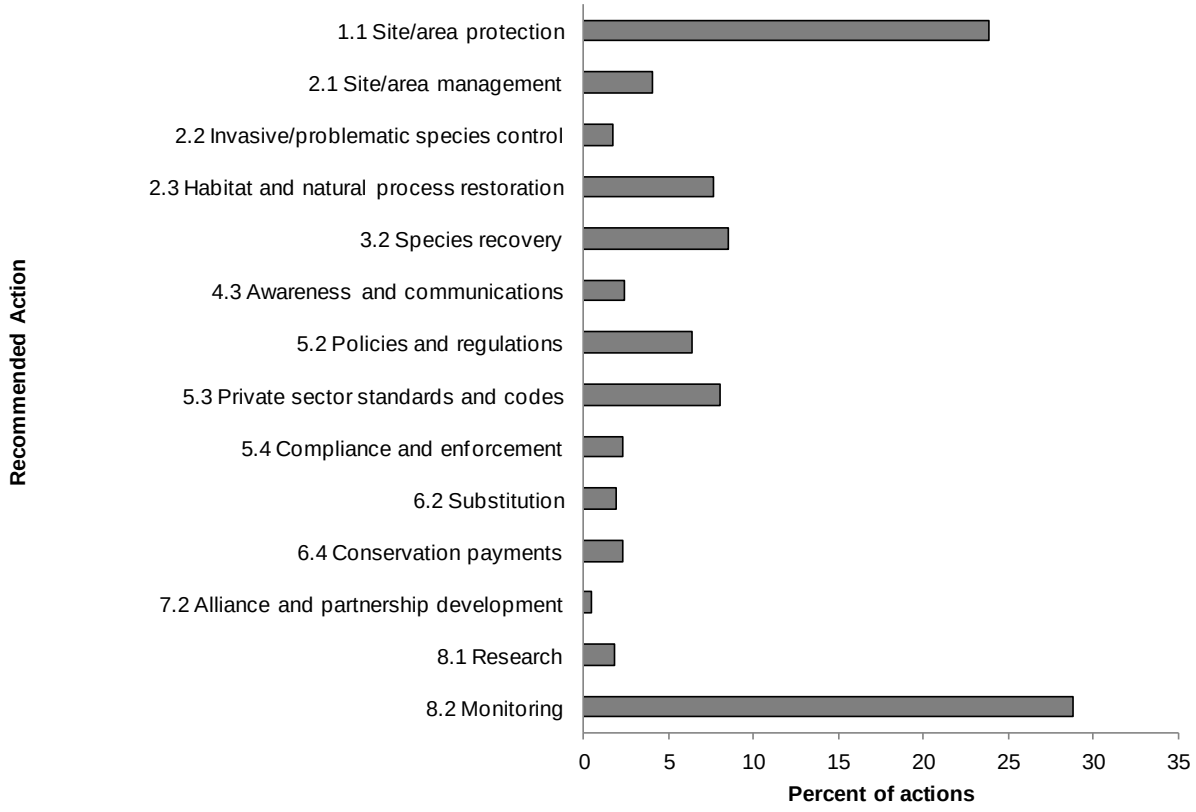

Figure 7. Percent of recommended actions assigned to each sub-category in BCR 14-QC.
“Research” and “monitoring” refers to specific species where additional information is required. For a discussion of broad-scale research and monitoring requirements, see the Research and Population Monitoring Needs section.

Section 2: Conservation Needs by Habitat

The following sections provide more detailed information on priority species, their threats and objectives within each of the broad habitat classes that occur in BCR 14-QC. Where appropriate, habitat information is provided at a finer scale than the broad habitat categories in order to coincide with other land management exercises in the region. Some species do not appear in the threats table because their low-level threats have not been assigned objectives or actions and/or identified threats are addressed in the Widespread Issues section of the strategy.

Coniferous

According to the United Nations Food and Agriculture Organization's (UN-FAO) Land Cover Classification System, coniferous habitats are defined as forest or woodland dominated by evergreen trees whose foliage is typically needle-shaped. In BCR 14-QC, coniferous habitats cover 22% of the land, making this habitat class the second largest in the BCR in terms of area (Fig. 8). Coniferous habitats are mainly represented by the balsam fir-white birch bioclimatic domain and include species such as balsam fir, white spruce, black spruce, Jack pine, larch, white birch and trembling aspen.

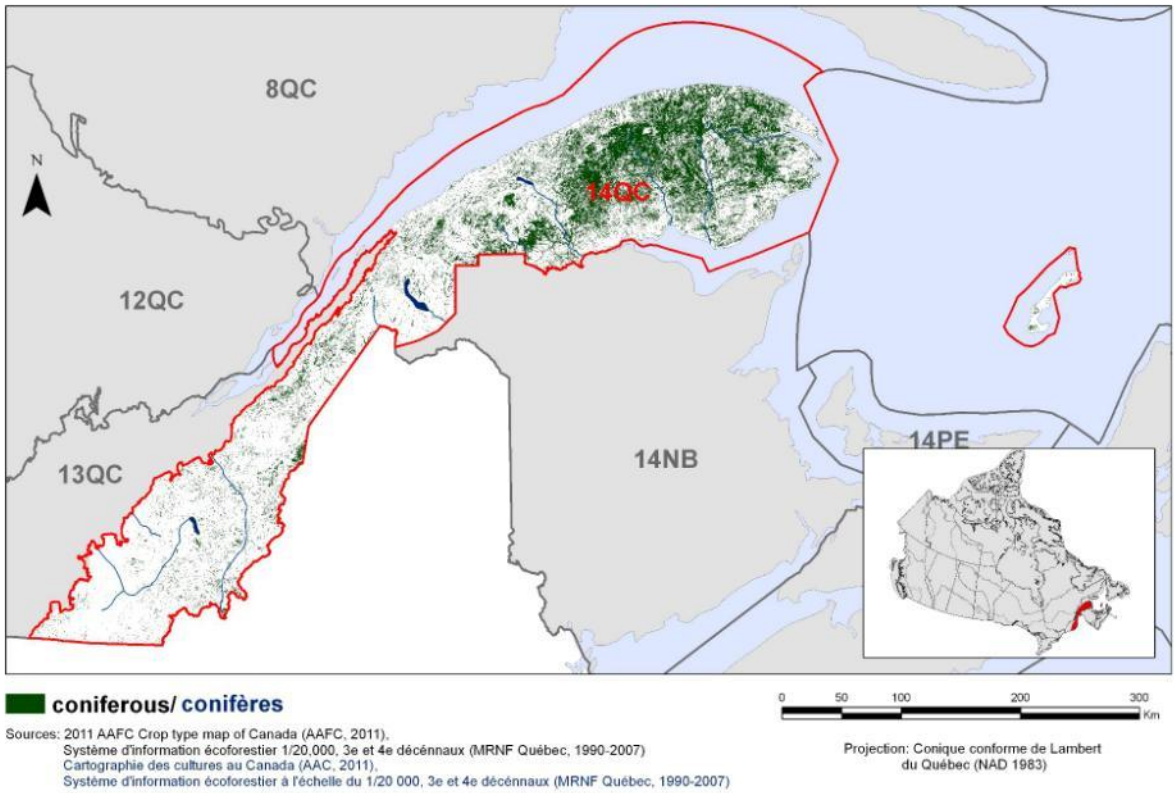

Figure 8. Map of coniferous habitat in BCR 14-QC: Atlantic Northern Forest.

Twenty-two priority species, all landbirds, use the coniferous habitats in BCR 14-QC (Table 5). Thirteen of these species were selected for conservation reasons, while nine were chosen for

stewardship purposes. Four priority species found in this habitat class are listed on Schedule 1 as “Threatened”: the Eastern Whip-poor-will, Bicknell's Thrush, Olive-sided Flycatcher and Canada Warbler. At this time, the recovery strategies for these four species at risk have not yet been finalized.

The threats most frequently identified in the coniferous habitat involve logging and wood harvesting (Fig. 9). This threat category has a “Very High” overall relative magnitude and accounts for 62% of the conservation issues for this habitat. The main threats reported include habitat loss and fragmentation, loss of mature forest, and the growing scarcity of stands of dead trees, large-diameter trees and snags with cavities, as well as loss of naturally disturbed habitat.

The full list of threats in BCR 14-QC's coniferous habitat, as well as the objectives, conservation actions and species that could benefit are presented in Table 6. Conservation objectives are mainly aimed at conserving, protecting and restoring coniferous habitats and the features that make them important for birds. Conservation actions primarily seek to have forestry stakeholders establish standards and beneficial practices to preserve the characteristics of coniferous habitats that are important for priority birds.

Table 5. Priority species that use coniferous habitat, details on habitat used, population objectives and reason for priority status.

Priority species	Details on habitat used	Population objective	Reason for priority status		
			At risk[1]	CC[2]	S[3]
American Three-toed Woodpecker	Disturbed forests (burnt out areas / windfall)	Assess/Maintain	-	X	-
Bay-breasted Warbler	Mature coniferous forest	Maintain	-	X	-
Bicknell's Thrush[4]	Dense coniferous forest, scrubland, arboreal succession, stunted trees	Recovery objective	X	X	-
Black-backed Woodpecker	Disturbed forests (burnt out areas / windfall); dense mature coniferous forest	Assess/Maintain	-	X	-
Blackburnian Warbler	Stands of mature conifers	Maintain	-	-	X
Blackpoll Warbler	Open spruce forests, early successional stands of conifers and stands of stunted black spruce	Increase 50%	-	X	-
Black-throated Green Warbler	Stands of conifers with a closed canopy and complex vertical layers	Maintain	-	-	X
Blue-headed Vireo	Conifer stands with clearings and a dense shrub layer	Maintain	-	-	X
Boreal Chickadee	Dense mature coniferous forest	Maintain	-	X	-
Boreal Owl	Dense mature coniferous forest	Assess/Maintain	-	X	-
Brown Creeper	Mature coniferous forest	Assess/Maintain	-	X	-
Canada Warbler[4]	Relatively open stands of conifers	Recovery objective	X	X	-
Eastern Whip-poor-will[4]	Many types of dry forest habitats with clearings and	Recovery objective	X	X	-

[1] "At risk" includes species considered Endangered, Threatened or Special Concern pursuant to an assessment by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC); listed on Schedule 1 of SARA as Endangered, Threatened or Special Concern, and listed as Endangered, Vulnerable or Likely to be designated threatened or vulnerable under the *Loi sur les espèces menacées ou vulnérables* (Quebec).

[2] "Conservation concern" includes species considered of concern in the Partners in Flight database downloaded from www.partnersinflight.org, the Canadian Shorebird Conservation Plan (Donaldson et al., 2000), Canadian Shorebird Conservation Plan (Milko et al., 2003), the North American Waterfowl Management Plan (Plan Committee, 2004) or by regional experts.

[3] "Stewardship" includes abundant species with a wide range with a large percentage of their range or their continental population located in the conservation unit or sub-unit. These species include landbirds considered by Partners in Flight but also species from other bird groups added by experts.

[4] Species listed on Schedule 1 of SARA, but for which there are no recovery documents finalized at this time. Official documents related to SARA will prevail as soon as they are published; however, the interim population objectives for these species are Eastern whip-poor-will: Increase 100%; Bicknell's Thrush: Increase 100%; Olive-sided Flycatcher: Increase 100%; Canada Warbler: Increase 100%.

Table 5 continued

Priority species	Details on habitat used	Population objective	Reason for priority status		
			At risk[1]	CC[2]	S[3]
	stands of young pine				
Evening Grosbeak	Stands of mature conifers	Maintain	-	-	X
Magnolia Warbler	Early successional stands of conifers	Maintain	-	-	X
Northern Flicker	Open stands of conifers	Increase 50%	-	X	-
Northern Parula	Stands of mature or overmature conifers	Maintain	-	-	X
Olive-sided Flycatcher[4]	Stands of conifers	Recovery objective	X	X	-
Ovenbird	Dense mature coniferous forest	Maintain	-	-	X
Pine Grosbeak	Conifers	Assess/Maintain	-	X	-
Purple Finch	Stands of conifers (open)	Maintain	-	-	X
White-throated Sparrow	Stands of conifers	Maintain	-	-	X

Figure 9. Percent of identified threats to priority species in coniferous habitat in each threat sub-category
Each bar represents the percent of the total number of threats identified in each threat sub-category in coniferous habitat (for example, if 100 threats were identified in total for all priority species in coniferous habitat, and 10 of those threats were in the category 1.1 Housing & urban areas, the bar on the graph would represent this as 10%). The bars are divided to show the distribution of Low (L), Medium (M), High (H) and Very High (VH) rankings of individual threats within each threat sub-category. For example, the same threat may have been ranked H for one species and L for another; the shading illustrates the proportion of L, M, H and VH rankings in the sub-category). The overall magnitude of the sub-threat in coniferous habitat is shown at the end of each bar (also presented in Table 4, Relative magnitude of identified threats to priority species within BCR 14-QC by threat category and broad habitat class).

Table 6. Threats addressed, conservation objectives, recommended actions and priority species affected for coniferous habitat in BCR 14-QC.

Threats addressed	Threat sub-category	Objectives	Objective category	Recommended actions	Action category	Priority species affected[1]
Loss of mature forest (conversion of woodlands to residential, commercial or industrial land).	1.1 Housing & urban areas 1.2 Commercial & industrial areas	Conserve mature coniferous forests and the features that make them important for birds.	1.1. Ensure land and resource-use policies and practices maintain or improve bird habitat.	In municipalities, adopt urban plans that protect important woodlands. Protect large tracts of mature forest through stewardship or by legally designating them conservation areas.	1.1 Site/area protection	Pine Grosbeak, Brown Creeper
Habitat loss from development of tourism and recreational activities (ski resorts and hiking), renewable energy (wind turbines and transmission lines) and communications towers.	1.3 Tourism & recreation areas 3.3 Renewable energy 4.2 Utilities & service lines	Conserve and restore the quality and quantity of coniferous habitats on the landscape.	1.1. Ensure land and resource-use policies and practices maintain or improve bird habitat.	Implement the mitigation and prevention actions identified in project environmental assessments.	5.3 Private sector standards and codes	Bicknell's Thrush
Loss of mature forest (conversion of forested farmland into arable land).	2.1 Annual & perennial non-timber crops	Conserve and restore the quality and quantity of coniferous forests on the landscape.	1.1. Ensure land and resource-use policies and practices maintain or improve bird habitat.	Develop incentives to maintain woodlands in agricultural areas.	6.4 Conservation incentives	Pine Grosbeak, Brown Creeper

[1] Priority species whose only identified threat is in category "12.1 Information lacking" are not mentioned in this table.

Table 6 continued

Threats addressed	Threat sub-category	Objectives	Objective category	Recommended actions	Action category	Priority species affected[1]
Gradual disappearance of mature forests due to shorter turnaround time in forestry.	5.3 Logging & wood harvesting	Increase the quantity of mature coniferous forest on the landscape	1.1. Ensure land and resource-use policies and practices maintain or improve bird habitat.	Extend the period between logging operations. Promote forest management that maintains the landscape structure (stand composition and age) within the natural range of variation.	2.3 Habitat and natural process restoration 5.3 Private sector standards and codes	Pine Grosbeak, Brown Creeper, Bay-breasted Warbler, Black-backed Woodpecker, American Three-toed Woodpecker
Habitat loss and fragmentation due to the reduced average size of forest habitats and their increasing isolation.	5.3 Logging & wood harvesting	Maintain connectivity between coniferous forests.	1.1. Ensure land and resource-use policies and practices maintain or improve bird habitat.	Adopt practices that maximize habitat connectivity (better spatial configuration).	5.3 Private sector standards and codes	Bicknell's Thrush
Simplification of forest structure from the regeneration of forest cover or use of intermediate silvicultural treatments (precommercial thinning).	5.3 Logging & wood harvesting	Conserve the diversity of types of coniferous forest on the landscape.	1.1. Ensure land and resource-use policies and practices maintain or improve bird habitat.	Reduce use of intermediate silvicultural treatments (precommercial thinning). Promote forest management that maintains the landscape structure (stand composition and age) within the natural range of variation.	5.3 Private sector standards and codes	Bicknell's Thrush
Habitat loss (scarcity of snags for cavity-nesting birds).	5.3 Logging & wood harvesting	Restore features in coniferous forests that are important for birds.	1.4. Maintain important bird habitat features on the landscape	Install nest boxes. Promote silvicultural treatments that maintain key habitat features (large diameter trees, snags with cavities, dead trees and irregular structure).	3.2 Species recovery 5.3 Private sector standards and codes	Boreal Owl, Boreal Chickadee
Loss of naturally disturbed habitat (due to fire suppression, control of insect infestations and increased salvage harvesting).	5.3 Logging & wood harvesting	Conserve an appropriate percentage of dead trees in recently disturbed	1.4. Maintain important bird habitat features on the landscape	Limit salvage harvesting.	5.3 Private sector standards and codes	Black-backed Woodpecker, American Three-toed Woodpecker

Table 6 continued

Threats addressed	Threat sub-category	Objectives	Objective category	Recommended actions	Action category	Priority species affected[1]
		forests.				
Habitat loss (scarcity of stands of dead trees).	5.3 Logging & wood harvesting	Restore features in coniferous forests that are important for birds.	1.4. Maintain important bird habitat features on the landscape	Promote silvicultural treatments that maintain key habitat features (large diameter trees, snags with cavities, dead trees and irregular structure).	5.3 Private sector standards and codes	Black-backed Woodpecker, American Three-toed Woodpecker
Habitat loss (scarcity of large-diameter trees).	5.3 Logging & wood harvesting	Restore features in coniferous forests that are important for birds.	1.4. Maintain important bird habitat features on the landscape	Promote silvicultural treatments that maintain key habitat features (large diameter trees, snags with cavities, dead trees and irregular structure).	5.3 Private sector standards and codes	Brown Creeper, Northern Flicker

Deciduous

According to the United Nations Food and Agriculture Organization's (UN-FAO) Land Cover Classification System, deciduous habitats are defined as forest or woodlands dominated by trees that lose their leaves for part of the year. In BCR 14-QC, deciduous habitats cover 15% of the land, making this habitat class the third largest in the BCR in terms of area (Fig. 10). They are chiefly represented by the sugar maple-basswood and sugar maple-yellow birch bioclimatic domains and include these representative species: sugar maple, basswood, yellow birch, American white ash and American beech.

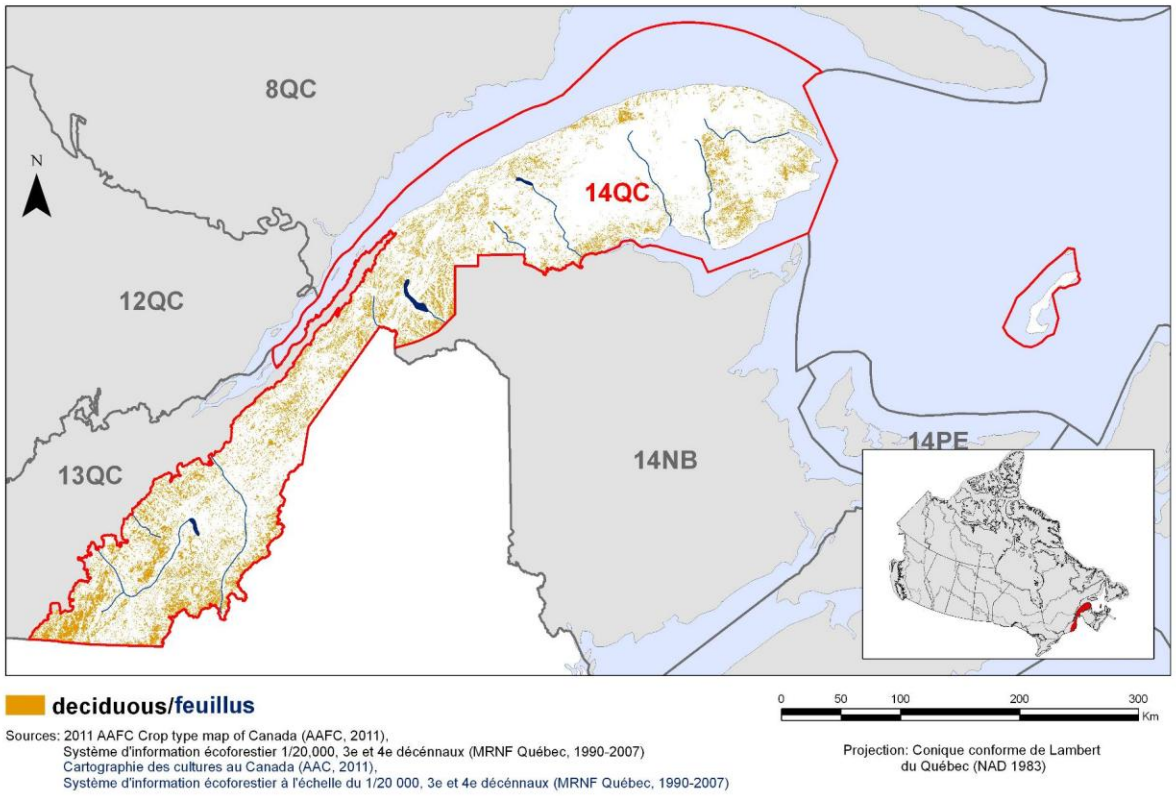

Figure 10. Map of deciduous habitat in BCR 14-QC: Atlantic Northern Forest.

Fourteen priority species, all landbirds, utilize the deciduous habitats in BCR 14-QC (Table 7). Ten of these species are of conservation concern, while four were chosen for stewardship purposes. This habitat class supports only one species at risk listed on Schedule 1 of SARA, namely, the Eastern Whip-poor-will (Threatened). Two other species had been assessed by COSEWIC at the time of writing this strategy, that is, the Wood Thrush (Threatened) and the Eastern Wood-Pewee (Special Concern).

The threats most frequently identified as affecting priority species in the deciduous habitat involve logging and wood harvesting (threat sub-category 5.3; Fig. 11). This threat sub-category has a “High” overall relative magnitude and accounts for 43% of this habitat's conservation

issues. The main threats relating to the forest sector are largely the same as those in coniferous habitats. They include forest habitat fragmentation and loss, loss of mature forest, and the growing scarcity of large-diameter trees and snags with cavities.

Threat sub-categories “1.1 Housing & urban areas,” “1.2 Commercial & industrial areas” and “2.1 Annual & perennial non-timber crops” each account for 13% of the threats reported in deciduous habitat, and all have a “Medium” overall relative magnitude. The conservation issue associated with these three threat sub-categories is the conversion of woodlands to residential, commercial or agricultural land.

The full list of threats to priority species in the deciduous habitat of BCR 14-QC, as well as the objectives, conservation actions and species that could benefit are presented in Table 8. Conservation objectives are mainly aimed at conserving, protecting and restoring deciduous habitats and the features that make them important for birds. Conservation actions include various suggestions such as the use of silvicultural treatments that preserve some habitat characteristics that are important for birds, the preservation of woodlands in agricultural and suburban areas, and avoidance of large tracts of mature forest during construction of new roads and transportation corridors by using alternatives such as bypasses whenever possible.

Table 7. Priority species that use deciduous habitat, details on habitat used, population objectives and reason for priority status.

Priority species	Details on habitat used	Population objective	Reason for priority status		
			At risk[1]	CC[2]	S[3]
American Redstart	Early successional deciduous stands	Maintain	-	-	X
Black-and-white Warbler	Deciduous stands	Maintain	-	-	X
Black-billed Cuckoo	Deciduous stands of intermediate age	Assess/Maintain	-	X	-
Black-throated Blue Warbler	Deciduous stands with a layered structure	Maintain	-	-	X
Brown Creeper	Mature deciduous forest	Assess/Maintain	-	X	-
Eastern Whip-poor-will[4]	Many types of dry forest habitats with clearings, and edges of cultivated fields interspersed with bushes and especially young stands of oak and beech.	Recovery objective	X	X	-
Eastern Wood-Pewee	Deciduous stands of any age, clearings or strips	Increase 50%	X	X	-
Northern Flicker	Open deciduous stands	Increase 50%	-	X	-
Northern Saw-whet Owl	Dense mature deciduous forest	Assess/Maintain	-	X	-
Ovenbird	Dense mature forest	Maintain	-	-	X
Veery	Deciduous stands of intermediate age	Increase 50%	-	X	-
Wood Thrush	Dense mature deciduous forest	Increase 50%	X	X	-
Yellow-bellied Sapsucker	Mature deciduous stands	Maintain	-	X	-
Yellow-throated Vireo	Dense mature deciduous forest	Assess/Maintain	-	X	-

[1] "At risk" includes species considered Endangered, Threatened or Special Concern pursuant to an assessment by the Committee on the Status of Endangered Wildlife in Canada; listed on Schedule 1 of SARA as Endangered, Threatened or Special Concern, and listed as Endangered, Vulnerable or Likely to be designated threatened or vulnerable under the *Loi sur les espèces menacées ou vulnérables* (Quebec).

[2] "Conservation concern" includes species considered to be of concern in the Partners in Flight database (downloaded from www.partnersinflight.org), Canadian Shorebird Conservation Plan (Donaldson et al. 2000), Canada's Waterbird Conservation Plan (Milko et al. 2003) and North American Waterfowl Management Plan (Plan Committee 2004), or by regional experts.

[3] "Stewardship" includes abundant species with a wide range with a large percentage of their range or their continental population located in the conservation unit or sub-unit. These species include landbirds considered by Partners in Flight but also species from other bird groups added by experts.

[4] Species listed on Schedule 1 of SARA but for which there are no recovery documents finalized at this time. Official documents related to SARA will prevail as soon as they are published; however, the interim population objective for this species is: Increase 100%.

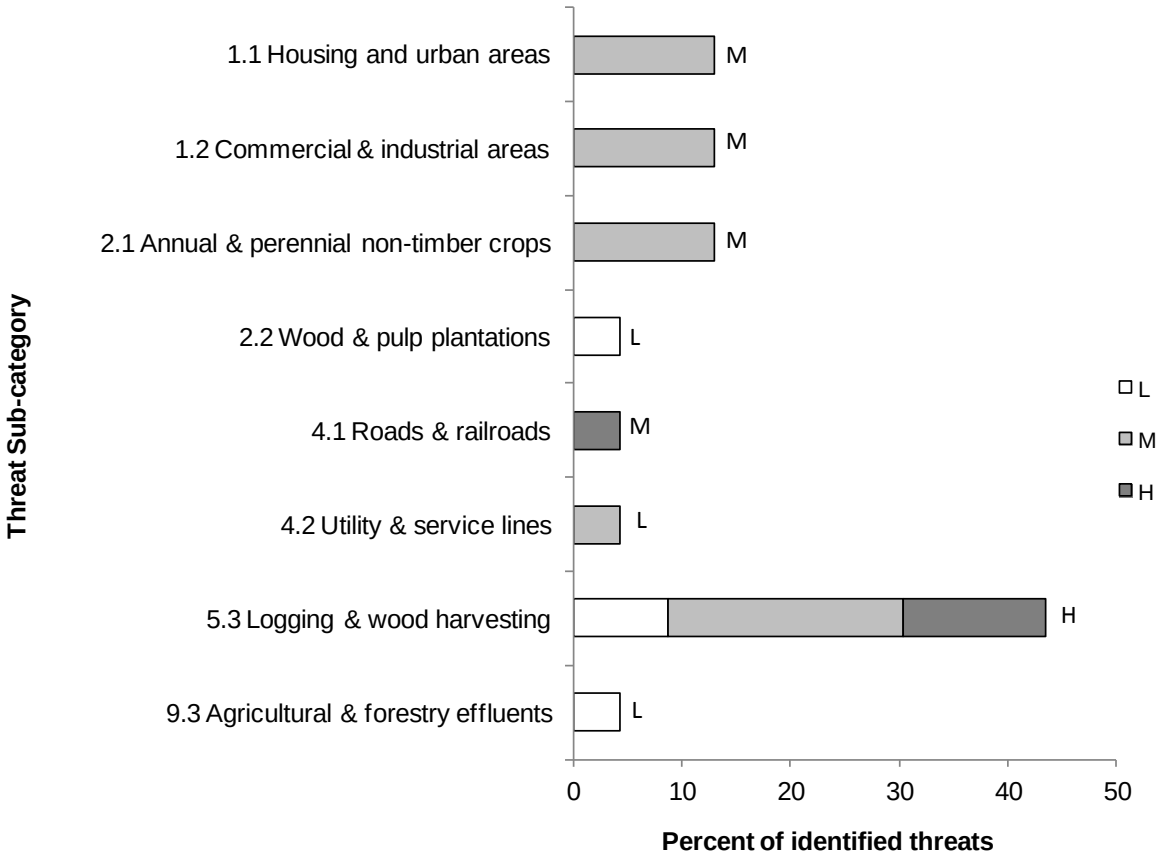

Figure 11. Percentage of identified threats to priority species in deciduous habitat in each threat sub-category. Each bar represents the percent of the total number of threats identified in each threat sub-category in deciduous habitat (for example, if 100 threats were identified in total for all priority species in deciduous habitat, and 10 of those threats were in the category "1.1 Housing & urban areas," the bar on the graph would represent this as 10%). The bars are divided to show the distribution of Low (L), Medium (M), High (H) and Very High (VH) rankings of individual threats within each threat sub-category. For example, the same threat may have been ranked H for one species and L for another; the shading illustrates the proportion of L, M, H and VH rankings in the sub-category. The overall magnitude of the sub-threat in deciduous habitat is shown at the end of each bar (also presented in Table 4, Relative magnitude of identified threats to priority species within BCR 14-QC by threat category and broad habitat class).

Table 8. Threats addressed, conservation objectives, recommended actions and priority species affected in the deciduous habitat of BCR 14-QC.

Threats addressed	Threat sub-category	Objectives	Objective sub-category	Recommended actions	Action sub-category	Priority species affected[1]
Loss of mature forest (conversion of woodlands into residential, commercial or industrial land).	1.1 Housing & urban areas 1.2 Commercial & industrial areas	Conserve mature deciduous forests and the features that make them important for birds.	1.1. Ensure land and resource-use policies and practices maintain or improve bird habitat.	In municipalities, adopt urban plans that protect important woodlands. Protect large tracts of mature forest through stewardship or by legally designating them conservation areas.	1.1 Site/area protection	Brown Creeper, Wood Thrush, Yellow-throated Vireo
Loss of mature forest (conversion of forested farmland into arable land).	2.1 Annual & perennial non-timber crops	Conserve and restore the quality and quantity of deciduous forests on the landscape.	1.1. Ensure land and resource-use policies and practices maintain or improve bird habitat.	Develop incentives to maintain woodlands in agricultural areas.	6.4 Conservation incentives	Brown Creeper, Wood Thrush, Yellow-throated Vireo
Sugarbush management.	2.2 Wood & pulp plantations	Restore features in deciduous forests that are important for birds.	1.4. Maintain important bird habitat features on the landscape	Promote silvicultural treatments in sugarbushes that maintain key habitat features (snags, irregular structure, etc.).	5.3 Private sector standards and codes	Eastern Wood-Pewee
Habitat loss and fragmentation due to expansion of energy transportation corridors and the highway system.	4.1 Roads & railroads 4.2 Utilities & service lines	Maintain connectivity between dense mature deciduous forests.	1.1. Ensure land and resource-use policies and practices maintain or improve bird habitat.	Avoid building new roads and transportation corridors in large tracts of mature forest.	2.1 Site/area management	Wood Thrush

[1] Priority species whose only identified threat is in category "12.1 Information lacking" are not mentioned in this table.

Table 8 continued

Threats addressed	Threat sub-category	Objectives	Objective sub-category	Recommended actions	Action sub-category	Priority species affected[1]
Disappearance of mature forests due to shorter turnaround time in forestry.	5.3 Logging & wood harvesting	Increase the quantity of mature deciduous forest on the landscape.	1.1. Ensure land and resource-use policies and practices maintain or improve bird habitat.	Lengthen the intervals between harvests. Promote forest management that maintains the landscape structure (stand composition and age) within the natural range of variation.	2.3 Habitat and natural process restoration 5.3 Private sector standards and codes	Brown Creeper, Wood Thrush, Yellow-throated Vireo
Habitat loss and fragmentation due to the reduced average size of forest habitats and their increasing isolation.	5.3 Logging & wood harvesting	Maintain connectivity between deciduous forests.	1.1. Ensure land and resource-use policies and practices maintain or improve bird habitat.	Adopt practices that maximize habitat connectivity (better spatial configuration).	5.3 Private sector standards and codes	Wood Thrush
Simplification of forest structure from the regeneration of forest cover or use of intermediate silvicultural treatments (precommercial thinning).	5.3 Logging & wood harvesting	Conserve the diversity of types of deciduous forest on the landscape.	1.2. Maintain the size, shape and configuration of habitat within the natural range of variation.	Promote forest management that maintains the landscape structure (stand composition and age) within the natural range of variation.	5.3 Private sector standards and codes	Veery
Conversion of deciduous forests into coniferous forests.	5.3 Logging & wood harvesting	Restore the original type of habitat on the landscape.	1.2. Maintain the size, shape and configuration of habitat within the natural range of variation.	Plant tree species that are representative of the original stand composition.	2.3 Habitat and natural process restoration	Yellow-throated Vireo

Table 8 continued

Threats addressed	Threat sub-category	Objectives	Objective sub-category	Recommended actions	Action sub-category	Priority species affected[1]
Habitat loss (scarcity of large-diameter trees).	5.3 Logging & wood harvesting	Restore features in deciduous forests that are important for birds.	1.4. Maintain important bird habitat features on the landscape	Promote silvicultural treatments that maintain key habitat features (large diameter trees, snags with cavities, dead trees and irregular structure).	5.3 Private sector standards and codes	Brown Creeper, Northern Flicker, Yellow-bellied Sapsucker
Habitat loss (scarcity of snags for cavity-nesting birds).	5.3 Logging & wood harvesting	Restore features in deciduous forests that are important for birds.	1.4. Maintain important bird habitat features on the landscape	Install nest boxes. Promote silvicultural treatments that maintain key habitat features (large diameter trees, snags with cavities, dead trees and irregular structure).	3.2 Species recovery 5.3 Private sector standards and codes	Northern Saw-whet Owl
Overutilization of pesticides (bird poisoning, eggshell thinning, reduced prey insects, leaching to adjacent habitats, reduced prey fish).	9.3 Agricultural & forestry effluents	Reduce impact of human contaminants on deciduous forests.	2.1. Reduce mortality and/or sub-lethal effects from pesticide use	Reduce pesticide use and promote an integrated pest management system.	2.3 Habitat and natural process restoration	Black-billed Cuckoo

Mixed Wood

Mixed wood forests are defined as forests or woodlands characterized by a mixture of coniferous and deciduous species. In BCR 14-QC, mixed wood forests occupy 40% of the land, making it the dominant habitat class in the BCR (Fig. 12). Mixed wood forests are composed of a blend of various tree species found in deciduous and coniferous forests, such as yellow birch, balsam fir, white spruce and cedar.

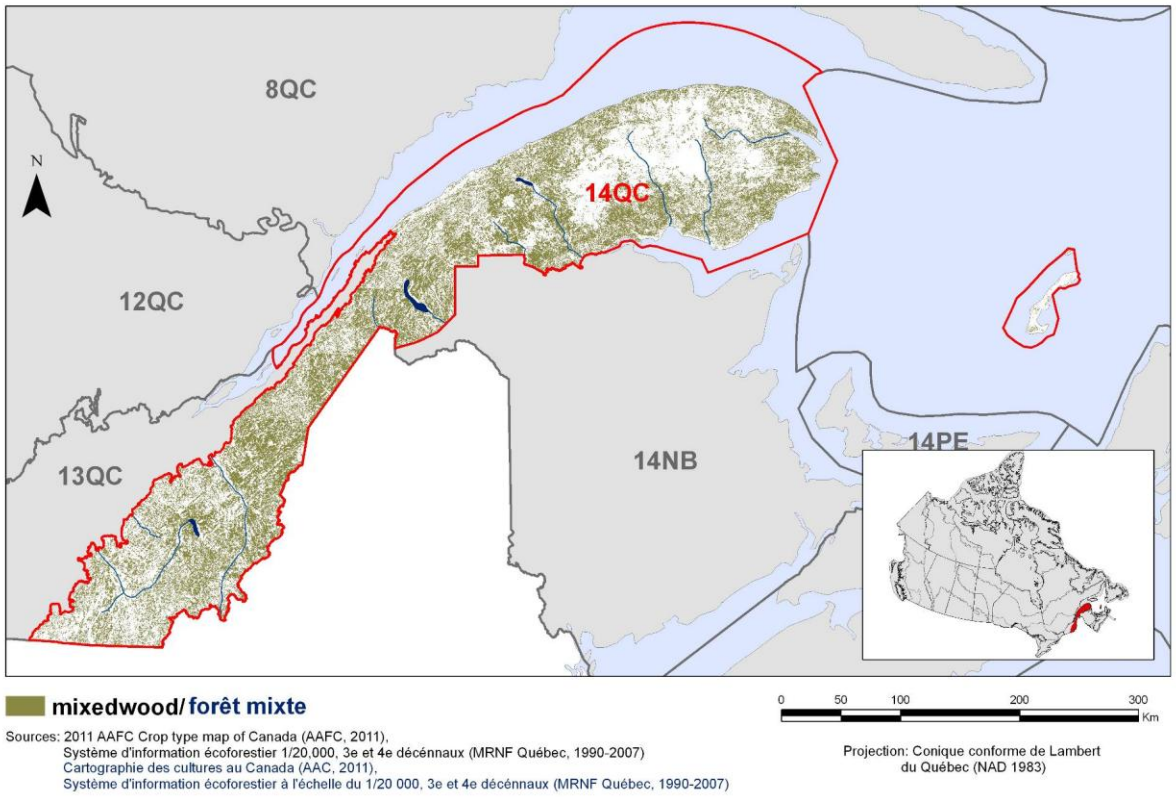

Figure 12. Map of mixed wood forest habitat in BCR 14-QC: Atlantic Northern Forest.

The mixed wood forests in BCR 14-QC are utilized by 23 priority species (all landbirds; Table 9). Eleven of these species were selected for conservation reasons, while 12 were chosen for stewardship purposes. Three species found in this habitat type are species at risk listed on Schedule 1 of SARA as "Threatened": the Whip-poor-will, Olive-sided Flycatcher and Canada Warbler. The recovery strategies for these 3 species are not yet finalized. COSEWIC has assessed the Eastern Wood-Pewee as a species of Special Concern.

As with coniferous and deciduous forests, the threats most frequently identified for priority species in mixed wood forests involve logging and wood harvesting (threat sub-category 5.3, Fig. 13). This threat sub-category has a "High" overall relative magnitude and accounts for 69% of conservation issues for this habitat. The main threats relating to the sub-category are essentially the same as those in coniferous and deciduous forests. They include loss of mature

forest, the growing scarcity of stands of dead trees, large-diameter trees and snags with cavities, and loss of naturally disturbed habitat.

The full list of threats in the mixed wood forest of BCR 14-QC, as well as the objectives, conservation actions and species that could benefit, is presented in Table 10. Conservation objectives are mainly aimed at conserving, protecting and restoring mixed wood forests and the features that make them important for birds. Conservation actions primarily seek to have forestry stakeholders establish standards and best practices to preserve the characteristics of mixed wood forest that are important for priority birds.

Table 9 Priority species that use mixed wood forests, details on habitat used, population objectives and reason for priority status.

Priority species	Details on habitat used	Population objective	Reason for priority status		
			At risk[1]	CC[2]	S[3]
American Redstart	Early successional mixed wood stands	Maintain	-	-	X
American Three-toed Woodpecker	Disturbed forests (burnt out areas / windfall)	Assess/Maintain	-	X	-
Bay-breasted Warbler	Mature mixed wood forests	Maintain	-	X	-
Black-and-white Warbler	Mixed wood stands	Maintain	-	-	X
Black-billed Cuckoo	Mixed wood stands of intermediate age	Assess/Maintain	-	X	-
Blackburnian Warbler	Mature mixed wood stands	Maintain	-	-	X
Black-throated Blue Warbler	Mixed wood stands with a layered structure	Maintain	-	-	X
Black-throated Green Warbler	Mixed wood stands with a closed canopy and complex vertical layers	Maintain	-	-	X
Blue-headed Vireo	Mixed wood stands with clearings and a dense shrub layer	Maintain	-	-	X
Brown Creeper	Mature mixed wood forest	Assess/Maintain	-	X	-
Canada Warbler[4]	Relatively open mixed wood stands	Recovery objective	X	X	-

[1] "At risk" includes species considered Endangered, Threatened or Special Concern pursuant to an assessment by the Committee on the Status of Endangered Wildlife in Canada; listed on Schedule 1 of SARA as Endangered, Threatened or Special Concern, and listed as Endangered, Vulnerable or Likely to be designated threatened or vulnerable under the *Loi sur les espèces menacées ou vulnérables* (Quebec).

[2] "Conservation concern" includes species considered to be of concern in the Partners in Flight database (downloaded from www.partnersinflight.org), Canadian Shorebird Conservation Plan (Donaldson et al. 2000), Canada's Waterbird Conservation Plan (Milko et al. 2003) and North American Waterfowl Management Plan (Plan Committee 2004), or by regional experts.

[3] "Stewardship" includes abundant species with a wide range with a large percentage of their range or their continental population located in the conservation unit or sub-unit. These species include landbirds considered by Partners in Flight but also species from other bird groups added by experts.

[4] Species listed on Schedule 1 of SARA but for which there are no recovery documents finalized at this time. Official documents related to SARA will prevail as soon as they are published; however, the interim population objectives for these species are Eastern Whip-poor-will: Increase 100%; Olive-sided Flycatcher: Increase 100%; and Canada Warbler: Increase 100%.

Table 9 continued

Priority species	Details on habitat used	Population objective	Reason for priority status		
			At risk[1]	CC[2]	S[3]
Eastern Whip-poor-will[4]	Many types of dry forest habitats with clearings, as well as edges of cultivated fields interspersed with shrubs and especially young stands of pine, oak and beech	Recovery objective	X	X	-
Eastern Wood-Pewee	Deciduous stands of any age; presence of clearings or strips	Increase 50%	X	X	-
Evening Grosbeak	Mixed wood stands	Maintain	-	-	X
Magnolia Warbler	Early successional mixed wood stands	Maintain	-	-	X
Northern Parula	Mature or overmature mixed wood stands	Maintain	-	-	X
Northern Saw-whet Owl	Dense mature mixed wood forests	Assess/Maintain	-	X	-
Olive-sided Flycatcher[4]	Mixed wood stands	Recovery objective	X	X	-
Ovenbird	Mature dense forest	Maintain	-	-	X
Purple Finch	Open mixed wood stands	Maintain	-	-	X
Veery	Mixed wood stands of intermediate age	Increase 50%	-	X	-
White-throated Sparrow	Mixed wood stands	Maintain	-	-	X
Yellow-bellied Sapsucker	Mature mixed wood stands	Maintain	-	X	-

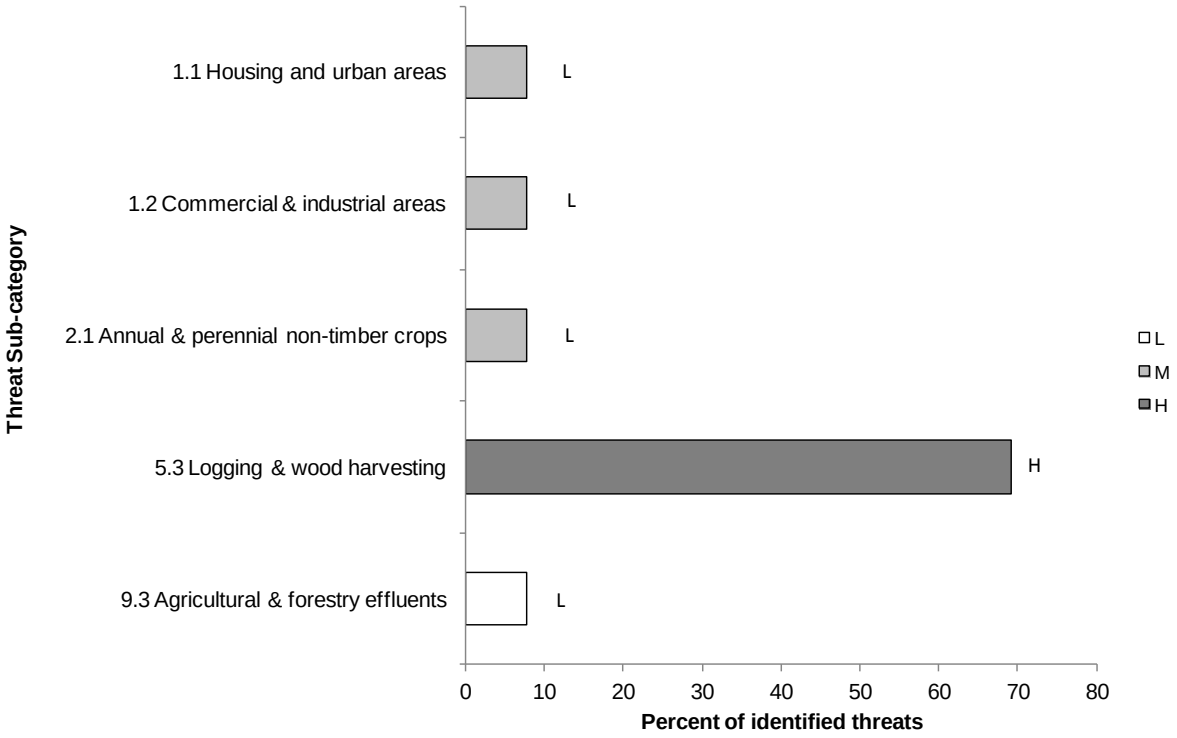

Figure 13. Percentage of identified threats to priority species in mixed wood forest habitat in each threat sub-category.

Each bar represents the percent of the total number of threats identified in each threat sub-category in mixed wood habitat (for example, if 100 threats were identified in total for all priority species in the mixed wood habitat, and 10 of those threats were in category "1.1 Housing & urban areas," the bar would indicate 10%). The bars are divided to show the distribution of Low (L), Medium (M), High (H) and Very High (VH) rankings of individual threats within each threat sub-category. For example, the same threat may have been ranked H for one species but L for another; the shading illustrates the proportion of L, M, H and VH rankings in the sub-category. The overall magnitude of the sub-threat in mixed wood habitat is shown at the end of each bar (also presented in Table 4, Relative magnitude of identified threats to priority species within BCR 14-QC by threat category and broad habitat class).

Table 10. Threats addressed, conservation objectives, recommended actions and priority species affected in the mixed wood forest of BCR 14-QC.

Threats addressed	Threat sub-category	Objectives	Objective sub-category	Recommended actions	Action sub-category	Priority species affected[1]
Loss of mature forest (conversion of woodlands into residential, commercial or industrial land).	1.1 Housing & urban areas 1.2 Commercial & industrial areas	Conserve mature mixed wood forests and the features that make them important for birds.	1.1. Ensure land and resource-use policies and practices maintain or improve bird habitat.	In municipalities, adopt urban plans that protect important woodlands. Protect large tracts of mature forest through stewardship or by legally designating them conservation areas.	1.1 Site/area protection	Brown Creeper
Loss of mature forest (conversion of forested farmland into arable land).	2.1 Annual & perennial non-timber crops	Conserve and restore the quality and quantity of mixed wood forests on the landscape.	1.1. Ensure land and resource-use policies and practices maintain or improve bird habitat.	Develop incentives to maintain woodlands in agricultural areas.	6.4 Conservation incentives	Brown Creeper
Gradual disappearance of mature forests due to shorter turnaround time in forestry.	5.3 Logging & wood harvesting	Increase the quantity of mature mixed wood forest on the landscape	1.1. Ensure land and resource-use policies and practices maintain or improve bird habitat.	Lengthen the intervals between harvests. Promote forest management that maintains the landscape structure (stand composition and age) within the natural range of variation.	2.3 Habitat and natural process restoration 5.3 Private sector standards and codes	Brown Creeper, Bay-breasted Warbler, American Three-toed Woodpecker

[1] Priority species whose only identified threat is in category "12.1 Information lacking" are not mentioned in this table.

Table 10 continued

Threats addressed	Threat sub-category	Objectives	Objective sub-category	Recommended actions	Action sub-category	Priority species affected[1]
Simplification of forest structure from the regeneration of forest cover or use of intermediate silvicultural treatments (precommercial thinning).	5.3 Logging & wood harvesting	Conserve and restore the quality and quantity of mixed wood forests on the landscape.	1.1. Ensure land and resource-use policies and practices maintain or improve bird habitat.	Promote forest management that maintains the landscape structure (stand composition and age) within the natural range of variation.	5.3 Private sector standards and codes	Veery
Habitat loss (scarcity of stands of dead trees).	5.3 Logging & wood harvesting	Restore features in mixed wood forests that are important for birds.	1.4. Maintain important bird habitat features on the landscape	Promote silvicultural treatments that maintain key habitat features (large diameter trees, snags with cavities, dead trees and irregular structure).	5.3 Private sector standards and codes	American Three-toed Woodpecker
Loss of naturally disturbed habitat (due to fire suppression, control of insect infestations and increased salvage harvesting).	5.3 Logging & wood harvesting	Conserve an appropriate percentage of dead trees in recently disturbed forests.	1.4. Maintain important bird habitat features on the landscape	Limit salvage harvesting.	5.3 Private sector standards and codes	American Three-toed Woodpecker
Habitat loss (scarcity of large-diameter trees).	5.3 Logging & wood harvesting	Restore features in mixed wood forests that are important for birds.	1.4. Maintain important bird habitat features on the landscape	Promote silvicultural treatments that maintain key habitat features (large diameter trees, snags with cavities, dead trees and irregular structure).	5.3 Private sector standards and codes	Brown Creeper, Yellow-bellied Sapsucker

Table 10 continued

Threats addressed	Threat sub-category	Objectives	Objective sub-category	Recommended actions	Action sub-category	Priority species affected[1]
Habitat loss (scarcity of snags for cavity-nesting birds).	5.3 Logging & wood harvesting	Restore features in mixed wood forests that are important for birds.	1.4. Maintain important bird habitat features on the landscape	Install nest boxes. Promote silvicultural treatments that maintain key habitat features (large diameter trees, snags with cavities, dead trees and irregular structure).	3.2 Species recovery 5.3 Private sector standards and codes	Northern Saw-whet Owl
Overutilization of pesticides (bird poisoning, eggshell thinning, reduced prey insects, leaching to adjacent habitats, reduced prey fish).	9.3 Agricultural & forestry effluents	Reduce impact of human contaminants on mixed wood forests.	2.1. Reduce mortality and/or sub-lethal effects from pesticide use	Reduce pesticide use and promote an integrated pest management system.	2.3 Habitat and natural process restoration	Black-billed Cuckoo

Shrub/Early Successional

According to the United Nations Food and Agriculture Organization's (UN-FAO) Land Cover Classification System, “shrub and early successional” habitats are defined as woody vegetation less than five metres in height. Shrub and early successional habitats occupy just over 7% of BCR 14-QC and are scattered across the entire region, with higher concentrations in the northern portion (Fig. 14).

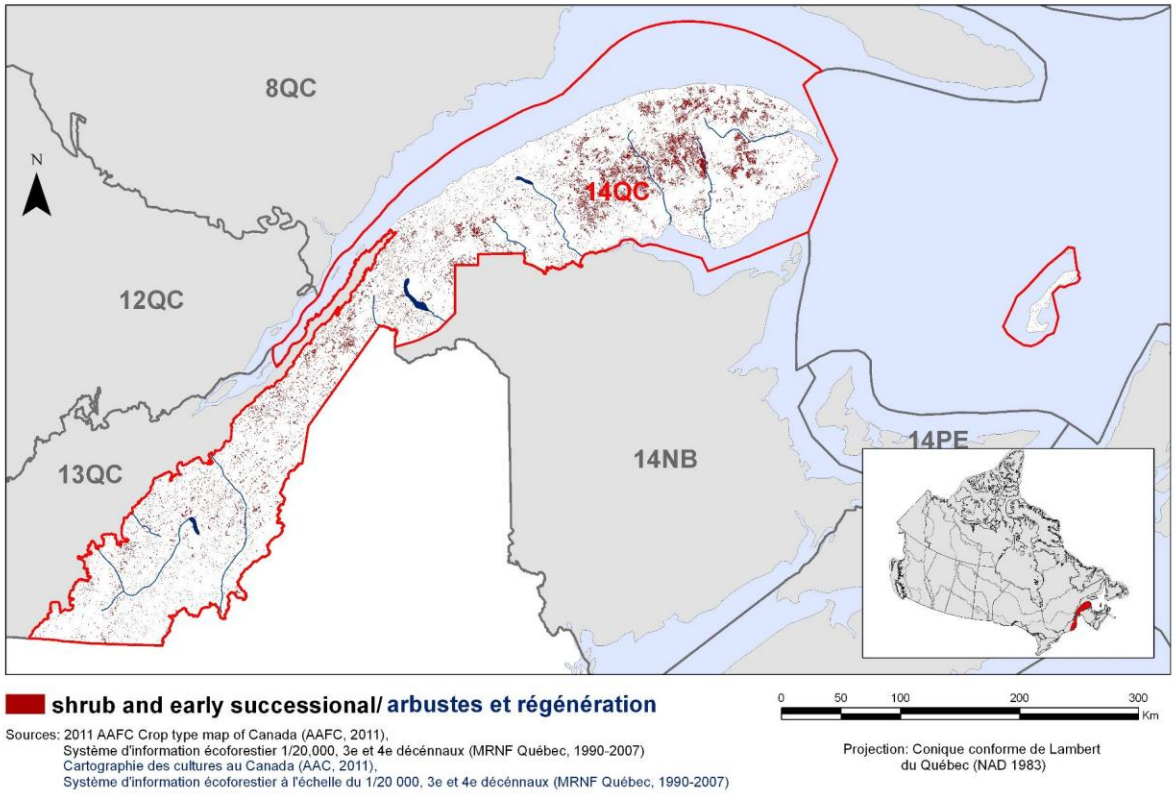

Figure 14. Map of shrub and early successional habitat in BCR 14-QC: Atlantic Northern Forest.

In BCR 14-QC, shrub and early successional habitats are utilized by six priority species, all of which are landbirds that have been selected for conservation reasons (Table 11). There are two species at risk that are listed as Threatened on Schedule 1 of SARA but do not yet have finalized recovery strategies, namely the Olive-sided Flycatcher and Golden-winged Warbler. The Golden Eagle, another species at risk, is designated as “Vulnerable” provincially.

The most frequently identified threat sub-category in the shrub and early successional habitats is “8.2 Problematic native species,” which accounts for 27% of threats and has a “High” overall relative magnitude (Fig. 15). The specific threats associated with this sub-category are nest predation by the Brown-headed Cowbird and the Golden-winged Warbler's hybridization with the Blue-winged Warbler.

Sub-categories “2.1 Annual & perennial non-timber crops” and “7.3 Other ecosystem modifications” each include 20% of all reported threats to priority species in shrub and early successional habitat and have “High” and “Very High” overall relative magnitudes, respectively. Conservation issues related to annual and perennial non-timber crops primarily involve shrub habitat loss and degradation due to intensification of agriculture. The only threat associated with ecosystem changes is the natural evolution of shrub and old field habitats into forest habitats by the lack of renewal of early successional habitats.

Sub-category “4.2 Utility & service lines” includes 13% of identified threats and has a “Medium” rolled-up overall magnitude. The threats relating to this sub-category involve habitat loss and degradation from the maintenance of power line corridors and collisions with power lines.

The full list of threats in the shrub and early successional habitat in BCR 14-QC as well as the objectives, conservation actions and species that could benefit are presented in Table 12. Conservation objectives are mainly aimed at conserving, protecting and restoring shrub and early successional habitats and the habitat features that make them important for birds, as well as limiting the impacts of certain native species. Conservation actions include various suggestions such as developing incentives and management approaches for the conservation of shrub and early successional habitat.

Table 11. Priority species that use shrub and early successional habitat, details on habitat used, population objectives, and reason for priority status.

Priority species	Details on habitat used	Population objective	Reason for priority status		
			At risk[1]	CC[2]	S[3]
Brown Thrasher	Scrublands	Increase 100%	-	X	-
Field Sparrow	Shrublands, shrubby pastures	Increase 100%	-	X	-
Golden Eagle	Logging and burnt out areas	Provincial recovery objective[4]	X	X	-
Golden-winged Warbler[5]	Scrublands	Recovery objective	X	X	-
Olive-sided Flycatcher[5]	Logging and burnt out areas	Recovery objective	X	X	-
Rufous-sided Towhee	Shrub beds	Increase 100%	-	X	-

[1] "At risk" includes species considered Endangered, Threatened or Special Concern pursuant to an assessment by the Committee on the Status of Endangered Wildlife in Canada; listed on Schedule 1 of SARA as Endangered, Threatened or Special Concern, and listed as Endangered, Vulnerable or Likely to be designated threatened or vulnerable under the *Loi sur les espèces menacées ou vulnérables* (Quebec).
[2] "Conservation concern" includes species considered of concern in the Partners in Flight database downloaded from www.partnersinflight.org, the Canadian Shorebird Conservation Plan (Donaldson et al. 2000), Canadian Shorebird Conservation Plan (Milko et al. 2003), the North American Waterfowl Management Plan (Plan Committee, 2004) or by regional experts.
[3] "Stewardship" includes abundant species with a wide range with a large percentage of their range or their continental population located in the conservation unit or sub-unit. These species include landbirds considered by Partners in Flight but also species from other bird groups that were added by experts.
[4] Refer to Équipe de rétablissement de l'aigle royal au Québec (2005).
[5] Species listed on Schedule 1 of SARA, but for which there are no recovery documents finalized at this time. Official documents related to SARA will prevail as soon as they are published; however, the interim population objectives for these species are Olive-sided Flycatcher: Increase 100%; Golden-winged Warbler: Increase 100%.

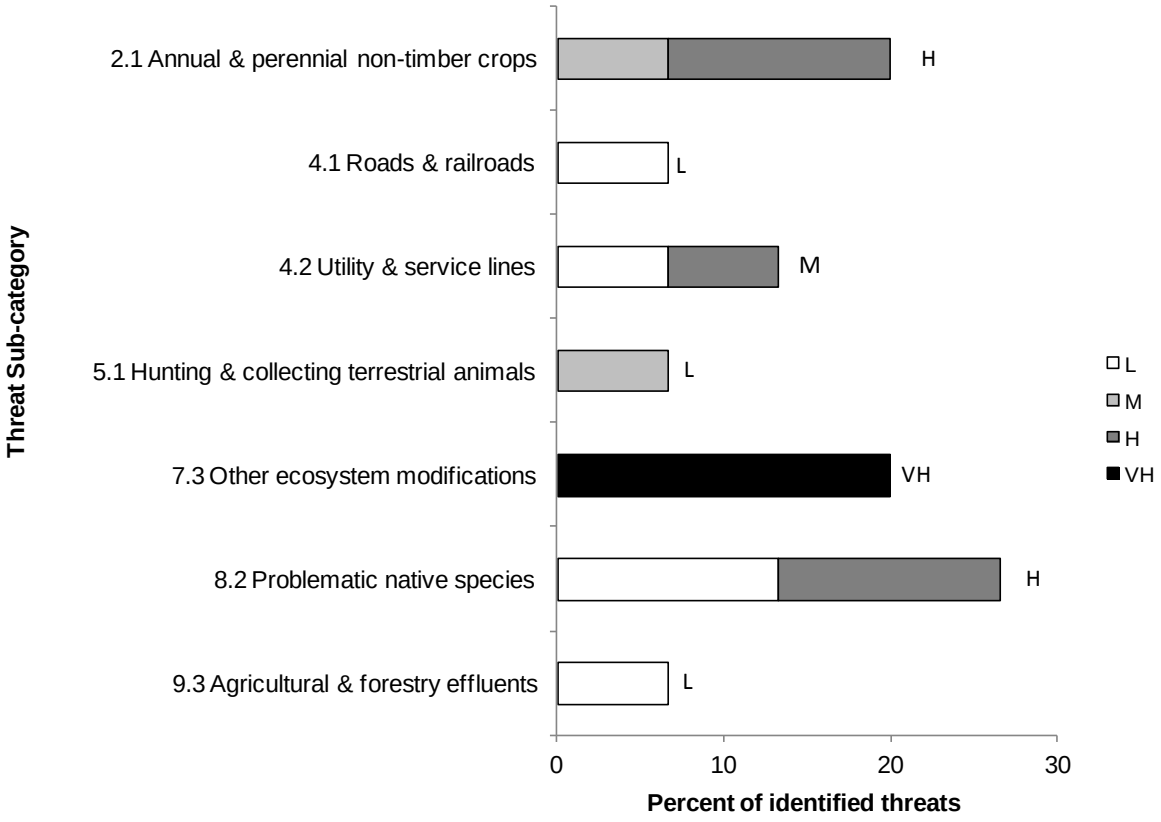

Figure 15. Percentage of identified threats to priority species in shrub and early successional habitat in each threat sub-category.

Each bar represents the percent of the total number of threats identified in each threat sub-category in shrub and early successional habitat (for example, if 100 threats were identified in total for all priority species in shrub and early successional habitat, and 10 of those threats were in category "1.1 Housing & urban areas," the bar would indicate 10%). The bars are divided to show the distribution of Low (L), Medium (M), High (H) and Very High (VH) rankings of individual threats within each threat sub-category. For example, the same threat may have been ranked H for one species but L for another; the shading illustrates the proportion of L, M, H and VH rankings in the sub-category. The overall magnitude of the sub-threat in shrub and early successional habitat is shown at the end of each bar (also presented in Table 4, Relative magnitude of identified threats to priority species within BCR 14-QC by threat category and broad habitat class).

Table 12. Threats addressed, conservation objectives, recommended actions and priority species affected in the shrub and early successional habitat of BCR 14-QC.

Threats addressed	Threat sub-category	Objectives	Objective sub-category	Recommended actions	Action sub-category	Priority species affected[1]
Habitat loss and degradation (intensification of agriculture).	2.1 Annual & perennial non-timber crops	Conserve and restore the quality and quantity of shrub and early successional habitats on the landscape.	1.1. Ensure land and resource-use policies and practices maintain or improve bird habitat.	Develop land management approaches that include fallow fields. Develop incentives to maintain large tracts of pasture and forage land.	2.1 Site/area management 6.4 Conservation incentives	Golden-winged Warbler, Rufous-sided Towhee
Loss of natural vegetation (hedges, riparian strips, isolated trees, bush layer) on the agricultural landscape.	2.1 Annual & perennial non-timber crops	Conserve and restore the quality and quantity of shrub and early successional habitats on the landscape.	1.1. Ensure land and resource-use policies and practices maintain or improve bird habitat.	Promote the maintenance and recovery of hedges and bush habitats.	2.3 Habitat and natural process restoration	Brown Thrasher
Collisions with vehicles when birds nest along roads.	4.1 Roads & railroads	Reduce bird mortality along roads.	2.7 Reduce incidental mortality from collisions.	Construct road shoulders in such a way as to limit nesting.	2.1 Site/area management	Brown Thrasher
Habitat loss and degradation from maintenance of power line corridors.	4.2 Utilities & service lines	Conserve and restore the quality and quantity of shrub and early successional habitats on the landscape.	1.1. Ensure land and resource-use policies and practices maintain or improve bird habitat.	Develop land management approaches that maintain shrub and early successional habitats.	2.1 Site/area management	Golden-winged Warbler
Collisions with power lines and other human-made structures	4.2 Utilities & service lines	Recovery of species at risk.	3.4. Implement recovery strategies for species at risk	Continue to implement the Golden Eagle provincial recovery plan (Équipe de rétablissement de l'aigle royal au Québec 2005).	3.2 Species recovery	Golden Eagle

[1] Priority species whose only identified threat is in category "12.1 Information lacking" are not mentioned in this table.

Table 12 continued

Threats addressed	Threat sub-category	Objectives	Objective sub-category	Recommended actions	Action sub-category	Priority species affected[1]
Deliberate hunting or accidental trapping.	5.1 Hunting & collecting terrestrial animals	Recovery of species at risk.	3.4. Implement recovery strategies for species at risk	Continue to implement the Golden Eagle provincial recovery plan (Équipe de rétablissement de l'aigle royal au Québec 2005).	3.2 Species recovery	Golden Eagle
Natural evolution of scrubland and abandoned fields into forests, and lack of renewal of this type of habitat.	7.3 Other ecosystem modifications	Conserve and restore the quality and quantity of shrub and early successional habitats on the landscape.	1.1. Ensure land and resource-use policies and practices maintain or improve bird habitat.	Develop land management approaches that include fallow fields.	2.1 Site/area management	Field Sparrow, Golden-winged Warbler, Rufous-sided Towhee
Hybridization with the Blue-winged Warbler.	8.2 Problematic native species	Limit the potential for interspecific hybridization.	3.2 Reduce competition with problematic native species	Develop specific habitats to make them better suited to the Golden-winged Warbler than the Blue-winged Warbler.	2.1 Site/area management	Golden-winged Warbler
Nest parasitism by the Brown-headed Cowbird.	8.2 Problematic native species	Reduce the Brown-headed Cowbird's impact on priority species.	3.3. Reduce parasitism/predation	Reduce habitat fragmentation to limit the strip effect. Continue to monitor the Brown-headed Cowbird to track changes in their abundance.	2.2 Invasive/ problematic species control 8.2 Monitoring	Field Sparrow, Golden-winged Warbler, Rufous-sided Towhee

Table 12 continued

Threats addressed	Threat sub-category	Objectives	Objective sub-category	Recommended actions	Action sub-category	Priority species affected[1]
Overutilization of pesticides (bird poisoning, eggshell thinning, reduced prey insects, leaching to adjacent habitats, reduced prey fish).	9.3 Agricultural & forestry effluents	Reduce impact of human contaminants on shrubs and early successional habitats.	2.1. Reduce mortality and/or sub-lethal effects from pesticide use	Reduce pesticide use and promote an integrated pest management system.	2.3 Habitat and natural process restoration	Brown Thrasher

Cultivated and Managed Areas

According to the United Nations Food and Agriculture Organization's (UN-FAO) Land Cover Classification System, cultivated and managed habitats are composed of crops or other managed vegetation. They include tree plantations, orchards, herbaceous crops as well as urban vegetation such as urban parks, golf courses and lawns. This type of habitat covers close to 10% of the land in BCR 14-QC and is mainly found in the southern portion of the BCR, as well as along the St. Lawrence River and Chaleur Bay (Fig. 16).

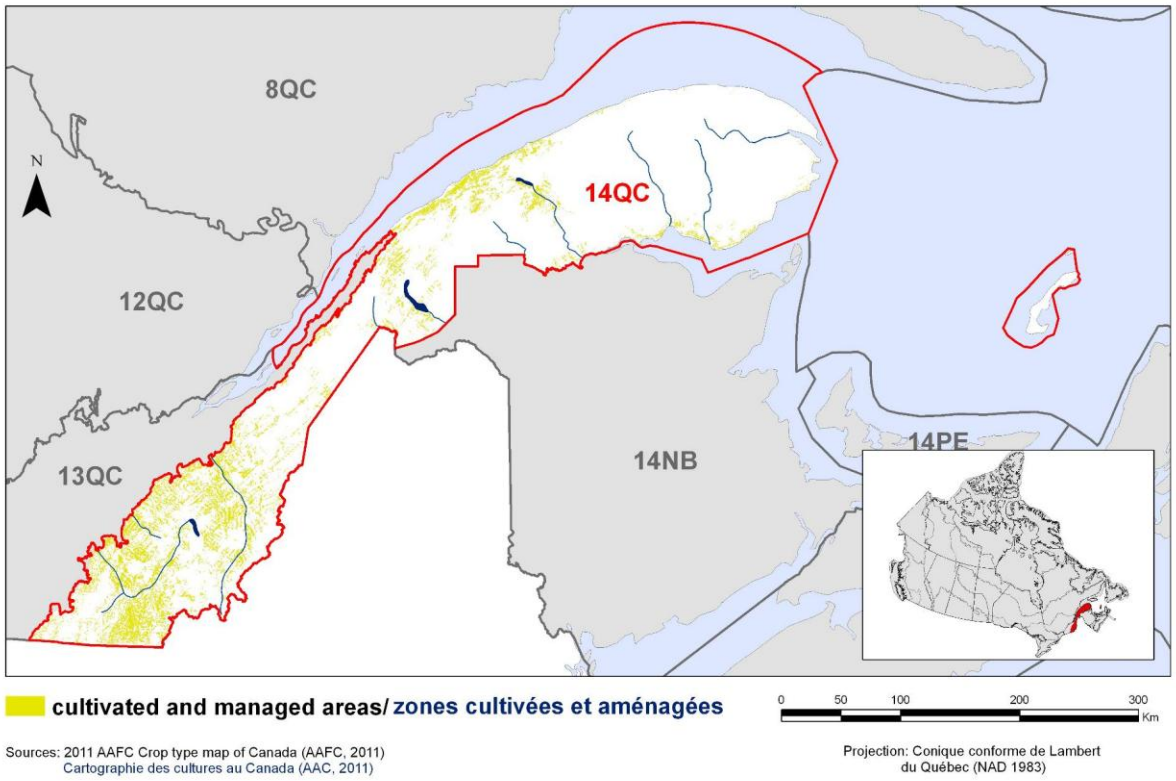

Figure 16. Map of cultivated and managed habitat in BCR 14-QC: Atlantic Northern Forest.

The cultivated and managed areas in BCR 14-QC are utilized by 14 priority species, most of which are landbirds (Table 13). Eleven species were selected for conservation reasons, while 3 were chosen for stewardship purposes. Half of the priority species found in this habitat class are species at risk, and three are listed on Schedule 1 of SARA (Common Nighthawk [Threatened], Short-eared Owl [Special Concern] and Chimney Swift [Threatened]). COSEWIC has assessed the Bobolink, Barn Swallow and Eastern Meadowlark as Threatened, while the Nelson's Sparrow is a species likely to be designated threatened or vulnerable under the *Loi sur les espèces menacées ou vulnérables* (Quebec).

The most frequently identified threat sub-category is "2.1 Annual & perennial non-timber crops," which accounts for 48% of all reported threats to priority species in this habitat (Fig. 17).

The main conservation issues in this category, whose overall relative magnitude is considered "Very High," are the conversion of perennial crops to annual crops, intensification of agriculture and incidental bird mortality at harvest.

With 18% of threats, sub-category "9.3 Agricultural & forestry effluents" ranks second in frequency and has a "High" overall relative magnitude. The only threat relating to this sub-category in the cultivated and managed habitat is the overuse of pesticides, which can cause bird poisoning, eggshell thinning and a reduction in insect prey.

Sub-category "7.3 Other ecosystem modifications" includes 15% of identified threats and has a "Medium" overall relative magnitude. The issues for this sub-category include the abandonment of agricultural land, which becomes unsuitable for some species of farmland birds, as well as the disturbance or closure of pits, which are used as nesting sites by the Bank Swallow.

Sub-category "11.5 Other impacts" accounts for 10% of reported threats in the cultivated and managed habitat and has a "High" overall relative magnitude. The increased frequency of adverse weather events relating to climate change is the only threat in this sub-category and is implicitly associated with aerial insectivores and the decline of their food sources. The increased frequency of extreme weather events during the migration period could also be a major issue for many bird species.

Threat sub-category "2.3 Livestock farming & ranching" also has a "High" overall relative magnitude. The conservation issue associated with this category is the increasing scarcity of nesting sites for the Barn Swallow due to the reduction in the number of farm buildings. The modern construction standards for these buildings make them less attractive for building nests.

The full list of threats in the cultivated and managed habitat of BCR 14-QC, as well as the objectives, conservation actions and species that could benefit, are presented in Table 14. Conservation objectives are mainly aimed at conserving, protecting and restoring open habitats and the features that make them important for birds, reducing the impacts of pesticide contamination and climate change, and reducing incidental bird mortality at harvest.

Conservation actions include various suggestions such as adopting beneficial agricultural management practices to reduce incidental bird mortality, supporting sustainable agriculture through approaches such as maintaining large tracts of shrubland, pasture and forage, and reducing pesticide use by promoting integrated pest management.

Table 13. Priority species that use cultivated and managed areas, details on habitat used, population objectives and reason for priority status.

Priority species	Details on habitat used	Population objective	Reason for priority status		
			At risk[1]	CC[2]	S[3]
Bank Swallow	Hayfields, pasture	Increase 50%	-	X	-
Barn Swallow	Hayfields, pasture	Increase 100%	X	X	-
Bobolink	Hayfields, pasture	Increase 50%	X	X	-
Canada Goose (Atlantic population)	Flooded fields	Maintain	-	-	X
Canada Goose (North Atlantic population)	Flooded fields	Maintain	-	-	X
Chimney Swift[4]	Hayfields, pasture	Recovery objective	X	X	-
Common Nighthawk[4]	Hayfields, pasture	Recovery objective	X	X	-
Eastern Meadowlark	Hayfields, pasture	Increase 100%	X	X	-
Field Sparrow	Pasture	Increase 100%	-	X	-
Killdeer	Cultivated fields	Increase 50%	-	X	-
Nelson's Sparrow	Hayfields	Increase	X	X	-
Short-eared Owl[4]	Hayfields	Recovery objective	X	X	-
Tree Swallow	Hayfields, pasture	Maintain	-	-	X
Upland Sandpiper	Grassy uplands	Assess/Maintain	-	X	-

[1] "At risk" includes species considered Endangered, Threatened or Special Concern pursuant to an assessment by the Committee on the Status of Endangered Wildlife in Canada; listed on Schedule 1 of SARA as Endangered, Threatened or Special Concern, and listed as Endangered, Vulnerable or Likely to be designated threatened or vulnerable under the *Loi sur les espèces menacées ou vulnérables* (Quebec).

[2] "Conservation concern" includes species considered to be of concern in the Partners in Flight database (downloaded from www.partnersinflight.org), Canadian Shorebird Conservation Plan (Donaldson et al. 2000), Canada's Waterbird Conservation Plan (Milko et al. 2003) and North American Waterfowl Management Plan (Plan Committee 2004), or by regional experts.

[3] "Stewardship" includes abundant species with a wide range with a large percentage of their range or their continental population located in the conservation unit or sub-unit. These species include landbirds considered by Partners in Flight but also species from other bird groups added by experts.

[4] Species listed on Schedule 1 of SARA but for which there are no recovery documents finalized at this time. Official documents related to SARA- will prevail as soon as they are published; however, the interim population objectives for these species are Common Nighthawk: Increase 50%; Short-eared Owl: Increase 100%; and Chimney Swift: Increase 100%.

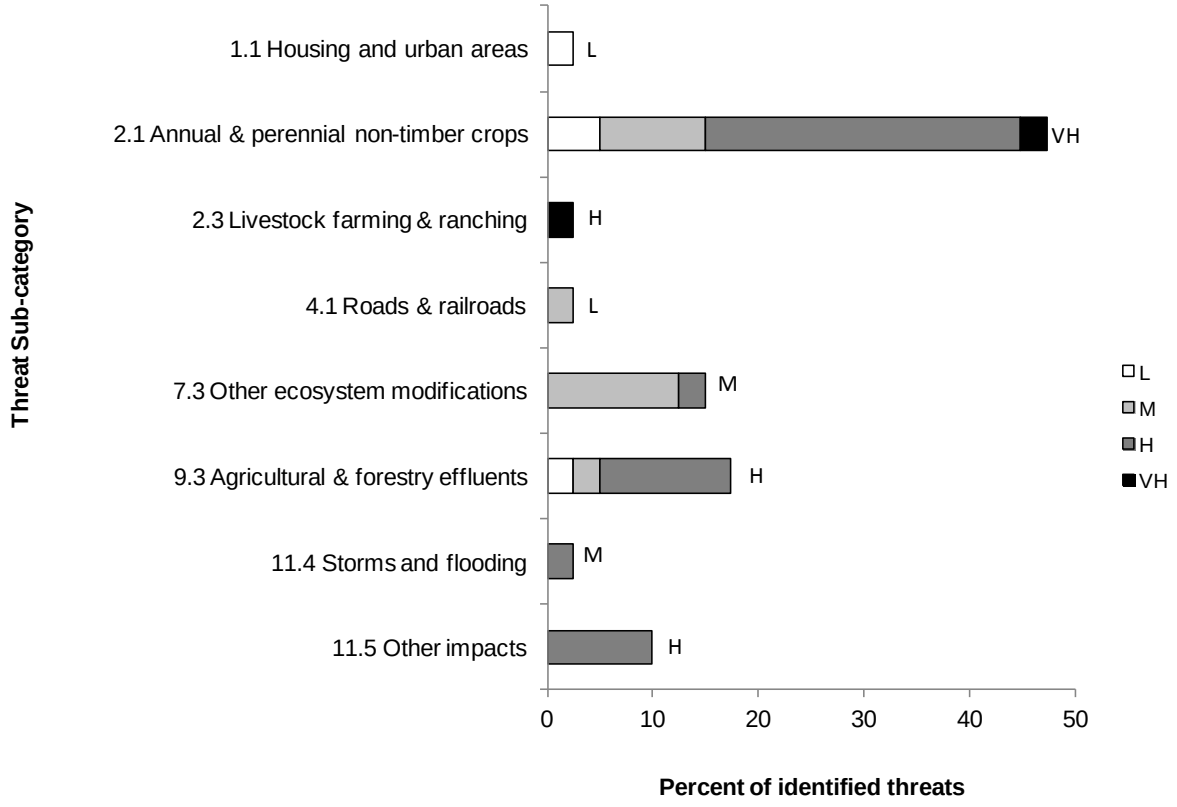

Figure 17. Percentage of identified threats to priority species in cultivated and managed areas in each threat sub-category.

Each bar represents the percent of the total number of threats identified in each threat sub-category in cultivated and managed areas (for example, if 100 threats were identified in total for all priority species in cultivated and managed areas, and 10 of those threats were in the category "1.1 Housing & urban areas," the bar on the graph would represent this as 10%). The bars are divided to show the distribution of Low (L), Medium (M), High (H) and Very High (VH) rankings of individual threats within each threat sub-category. For example, the same threat may have been ranked H for one species and L for another; the shading illustrates the proportion of L, M, H and VH rankings in the sub-category. The overall magnitude of the sub-threat in cultivated and managed areas is shown at the end of each bar (also presented in Table 4, Relative magnitude of identified threats to priority species within BCR 14-QC by threat category and broad habitat class).

Table 14. Threats addressed, conservation objectives, recommended actions and priority species affected in the cultivated and managed areas of BCR 14-QC.

Threats addressed	Threat sub-category	Objectives	Objective sub-category	Recommended actions	Action sub-category	Priority species affected[1]
Habitat loss and degradation (residential development).	1.1 Housing & urban areas	Conserve and restore the diversity and quality of open habitats on the landscape.	1.1. Ensure land and resource-use policies and practices maintain or improve bird habitat.	Develop incentives to maintain abandoned uncultivated farmland.	6.4 Conservation incentives	Eastern Meadowlark
Habitat loss and degradation (intensification of agriculture).	2.1 Annual & perennial non-timber crops	Conserve and restore the diversity and quality of open habitats on the landscape.	1.1. Ensure land and resource-use policies and practices maintain or improve bird habitat.	Support sustainable agricultural development.	5.3 Private sector standards and codes	Bank Swallow, Barn Swallow, Upland Sandpiper, Killdeer, Eastern Meadowlark
Habitat loss and degradation (use of upper marshlands for agricultural activities).	2.1 Annual & perennial non-timber crops	Conserve and restore the quality and quantity of upper marshlands on the landscape.	1.1. Ensure land and resource-use policies and practices maintain or improve bird habitat.	Work with farmers to promote beneficial management practices for the use of upper marshlands.	5.3 Private sector standards and codes	Nelson's Sparrow

[1] Priority species whose only identified threat is in category "12.1 Information lacking" are not mentioned in this table.

Table 14 continued

Threats addressed	Threat sub-category	Objectives	Objective sub-category	Recommended actions	Action sub-category	Priority species affected[1]
Habitat loss and degradation (conversion of perennial crops to annual crops).	2.1 Annual & perennial non-timber crops	Conserve and restore the diversity and quality of open habitats on the landscape.	1.1. Ensure land and resource-use policies and practices maintain or improve bird habitat.	Develop incentives to maintain large tracts of pasture and forage land.	6.4 Conservation incentives	Common Nighthawk, Bobolink, Short-eared Owl, Bank Swallow, Barn Swallow, Chimney Swift, Upland Sandpiper, Eastern Meadowlark
Incidental mortality at harvest.	2.1 Annual & perennial non-timber crops	Reduce bird mortality at harvest.	2.4 Reduce accidental mortality	Develop beneficial management practices for harvesting when accidental bird mortality may occur (delay harvest, raise blade height, etc.).	5.3 Private sector standards and codes	Nelson's Sparrow, Bobolink, Short-eared Owl, Eastern Meadowlark
Reduction in the number of artificial nesting sites.	2.1 Annual & perennial non-timber crops 2.3. Livestock farming & ranching	Conserve and restore the diversity and quality of open habitats on the landscape.	1.4. Maintain important bird habitat features on the landscape	Install nest boxes.	3.2 Species recovery	Barn Swallow
Collisions with vehicles when birds nest along roads.	4.1 Roads & railroads	Reduce bird mortality along roads.	2.7 Reduce incidental mortality from collisions.	Construct road shoulders in such a way as to limit nesting.	2.1 Site/area management	Killdeer
Abandonment of farmland.	7.3 Other ecosystem modifications	Conserve and restore the diversity and quality of open habitats on the landscape.	1.1. Ensure land and resource-use policies and practices maintain or improve bird habitat.	Develop incentives to maintain abandoned uncultivated farmland.	6.4 Conservation incentives	Bobolink, Short-eared Owl, Bank Swallow, Barn Swallow, Eastern Meadowlark

Table 14 continued

Threats addressed	Threat sub-category	Objectives	Objective sub-category	Recommended actions	Action sub-category	Priority species affected[1]
Closure or disturbance of pits used for nesting.	7.3 Other ecosystem modifications	Minimize disturbance during nesting period.	4.1. Reduce disturbance from human recreation	Limit activities in pits during breeding period.	2.1 Site/area management	Bank Swallow
Overutilization of pesticides (bird poisoning, eggshell thinning, reduced prey insects, leaching to adjacent habitats, reduced prey fish).	9.3 Agricultural & forestry effluents	Reduce impact of human contaminants on cultivated and managed habitats.	2.1. Reduce mortality and/or sub-lethal effects from pesticide use	Reduce pesticide use and promote an integrated pest management system.	2.3 Habitat and natural process restoration	Common Nighthawk, Bobolink, Bank Swallow, Barn Swallow, Chimney Swift, Killdeer, Eastern Meadowlark
Habitat loss and degradation (more frequent flooding of sites due to climate change)	11.4 Storms & flooding	Reduce potential impact of climate change on wetlands.	6.2. Manage for habitat resilience as climate changes	Promote the reduction of greenhouse gas emissions.	6.2 Substitution	Nelson's Sparrow

Table 14 continued

Threats addressed	Threat sub-category	Objectives	Objective sub-category	Recommended actions	Action sub-category	Priority species affected[1]
Higher frequency of adverse weather events due to climate change that may affect migration, reproductive success, availability of prey or nesting phenology.	11.5 Other impacts	Reduce potential impact of climate change on cultivated and managed habitats.	6.2. Manage for habitat resilience as climate changes	Promote the reduction of greenhouse gas emissions.	6.2 Substitution	Common Nighthawk, Bank Swallow, Barn Swallow, Chimney Swift

Bare Areas

According to the United Nations Food and Agriculture Organization's (UN-FAO) Land Cover Classification System adapted for developing BCR strategies, bare areas are habitats with less than 4% vegetation cover whose cover is neither artificial nor the result of human activity. They include bare rocks, sandy areas and cliffs. However, they do not include coastal habitats, which will be addressed separately. This type of habitat is rather marginal in BCR 14-QC, accounting for only 0.6% of the total land area of this conservation subregion (Fig. 18).

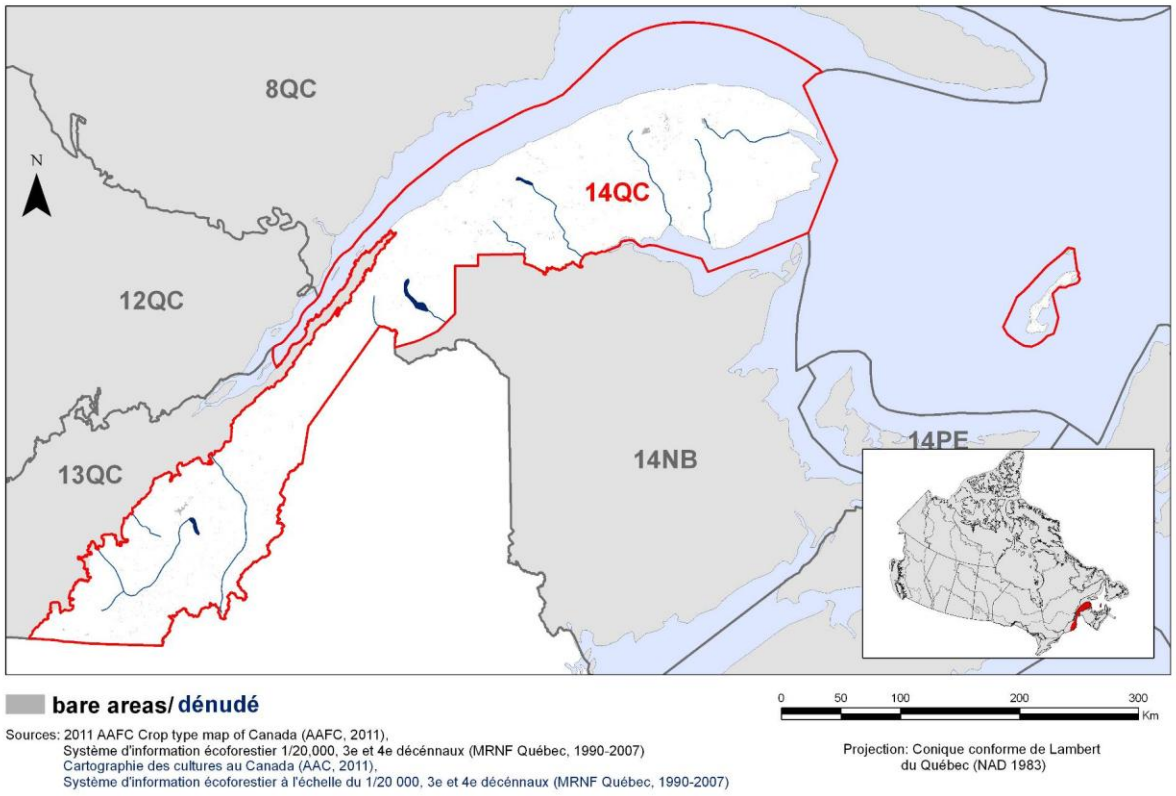

Figure 18. Map of bare areas in BCR 14-QC: Atlantic Northern Forest.

The bare areas of BCR 14-QC are used by seven priority species, including five landbirds, one waterbird (Double-crested Cormorant) and one shorebird (Whimbrel; Table 15). There are three species at risk: the Common Nighthawk, Peregrine Falcon (both listed on Schedule 1 of SARA) and the Golden Eagle (vulnerable at the provincial level). Only one species, the Double-crested Cormorant, has been selected for stewardship purposes.

Threat sub-category “6.1 Recreational activities,” which has a “Medium” overall relative magnitude, is the threat sub-category most frequently associated with bare areas, accounting for 30% of threats to priority species (Fig. 19). The conservation issues associated with this sub-category involve disturbance of Golden Eagle and Peregrine Falcon nesting sites by hikers, as well as staging area disturbances, a threat that affects the Whimbrel.

Both threat sub-categories “4.2 Utility & Service lines” and “7.3 Other ecosystem modifications” account for 20% of identified threats to priority species in this habitat. Sub-category 4.2 has a “Low” overall relative magnitude, and the only related threat is collisions with power lines and other human-made structures. With an overall relative magnitude of “High”, the sole threat in sub-category 7.3 is the disturbance or closure of pits used as nesting sites by the Bank Swallow and Belted Kingfisher.

The full list of threats in the bare areas of BCR 14-QC as well as the objectives, conservation actions and species that could benefit are presented in Table 16. Among other things, conservation objectives and recommended actions seek to minimize disturbance around nesting sites and staging areas.

Table 15. Priority species that use bare areas, details on habitat used, population objectives, and reason for priority status.

Priority species	Details on habitat used	Population objective	Reason for priority status		
			At risk[1]	CC[2]	S[3]
Bank Swallow	Riverbanks, sand, gravel or clay cliffs	Increase 50%	-	X	-
Belted Kingfisher	Riverbanks, pits, rocky escarpments	Increase 50%	-	X	-
Common Nighthawk[5]	Outcrops, gravel or sand beaches, burnt out areas	Recovery objective	X	X	-
Double-crested Cormorant	Cliff ledges	Maintain	-	-	X
Golden Eagle	Cliff	Provincial recovery objective[4]	X	X	-
Peregrine Falcon (*anatum/tundrius*)[5]	Cliff	Recovery objective	X	X	-
Whimbrel	Flats	Assess/Maintain	-	X	-

[1] "At risk" includes species considered Endangered, Threatened or Special Concern pursuant to an assessment by the Committee on the Status of Endangered Wildlife in Canada; listed on Schedule 1 of SARA as Endangered, Threatened or Special Concern, and listed as Endangered, Vulnerable or Likely to be designated threatened or vulnerable under the *Loi sur les espèces menacées ou vulnérables* (Quebec).

[2] "Conservation concern" includes species considered of concern in the Partners in Flight database downloaded from www.partnersinflight.org, the Canadian Shorebird Conservation Plan (Donaldson et al., 2000), Canadian Shorebird Conservation Plan (Milko et al., 2003), the North American Waterfowl Management Plan (Plan Committee, 2004) or by regional experts.

[3] "Stewardship" includes abundant species with a wide range with a large percentage of their range or their continental population located in the conservation unit or sub-unit. These species include landbirds considered by Partners in Flight but also species from other bird groups that were added by experts.

[4] Refer to Équipe de rétablissement de l'aigle royal au Québec (2005).

[5] Species listed on Schedule 1 of SARA but for which there are no recovery documents finalized at this time. Official documents related to SARA will prevail as soon as they are published; however, the interim population objectives for these species are Common Nighthawk: Increase 50%; Peregrine Falcon (*anatum/tundrius)*: Maintain.

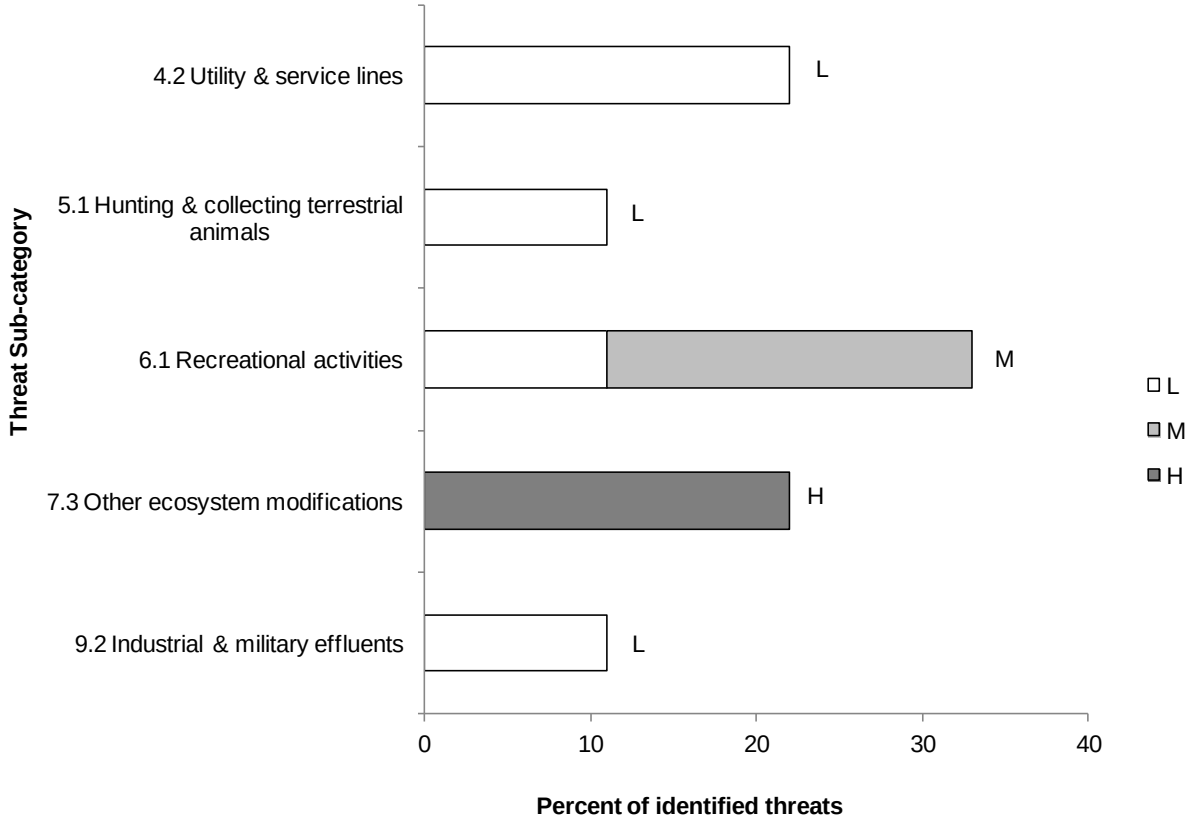

Figure 19. Percentage of identified threats to priority species in bare areas in each threat sub-category.
Each bar represents the percent of the total number of threats identified in each threat sub-category in bare areas (for example, if 100 threats were identified in total for all priority species in bare areas, and 10 of those threats were in the category "1.1 Housing & urban areas," the bar on the graph would represent this as 10%). The bars are divided to show the distribution of Low (L), Medium (M), High (H) and Very High (VH) rankings of individual threats within each threat sub-category. For example, the same threat may have been ranked H for one species and L for another; the shading illustrates the proportion of L, M, H and VH rankings in the sub-category. The overall magnitude of the sub-threat in bare areas is shown at the end of each bar (also presented in Table 4, Relative magnitude of identified threats to priority species within BCR 14-QC by threat category and broad habitat class).

Table 16. Threats addressed, conservation objectives, recommended actions and priority species affected in bare areas of BCR 14-QC.

Threats addressed	Threat sub-category	Objectives	Objective sub-category	Recommended actions	Action sub-category	Priority species affected[1]
Collisions with power lines and other human-made structures	4.2 Utilities & service lines	Reduce mortality from collisions with human-made structures.	2.7 Reduce incidental mortality from collisions.	Promote actions to reduce collisions with human-made structures.	2.1 Site/area management	Golden Eagle, Peregrine Falcon (*anatum/tundrius*)
Deliberate hunting or accidental trapping.	5.1 Hunting & collecting terrestrial animals	Recovery of species at risk.	3.4. Implement recovery strategies for species at risk	Continue to implement the Golden Eagle provincial recovery plan (Équipe de rétablissement de l'aigle royal au Québec 2005).	3.2 Species recovery	Golden Eagle
Disturbance of nesting sites.	6.1 Recreational activities	Minimize disturbance near nesting sites.	4.1. Reduce disturbance from human recreation	Limit activities near nesting sites during the breeding season. Establish buffer zones around known nesting sites. Increase public awareness through outreach campaigns on the vulnerability of certain species to disturbance.	2.1 Site/area management 4.3 Awareness and communications	Golden Eagle, Peregrine Falcon (*anatum/tundrius*)
Disturbance of staging areas.	6.1 Recreational activities	Minimize disturbance near staging areas.	4.1. Reduce disturbance from human recreation	Increase public awareness through outreach campaigns on the species' sensitivity to disturbance.	4.3 Awareness and communications	Whimbrel
Closure or disturbance of pits used for nesting.	7.3 Other ecosystem modifications	Minimize disturbance during nesting period.	4.1. Reduce disturbance from human recreation	Limit activities in pits during breeding period.	2.1 Site/area management	Bank Swallow, Belted Kingfisher

[1] Priority species whose only identified threat is in category "12.1 Information lacking" are not mentioned in this table.

Table 16 continued

Threats addressed	Threat sub-category	Objectives	Objective sub-category	Recommended actions	Action sub-category	Priority species affected[1]
Oil spills.	9.2 Industrial & military effluents	Maintain and improve emergency response programs. Reduce deliberate discharges of oily ship waste into the ocean.	2.3 Reduce mortality and/or sub-lethal effects of oil pollution	Maintain the effectiveness of emergency response programs. Prevent ships from discharging oily waste into the ocean by ensuring compliance with federal legislation.	2.3 Habitat and natural process restoration 5.4 Compliance and enforcement	Whimbrel

Urban

The habitat defined as “urban” primarily consists of human-made surfaces and artificial structures, including structures associated with cities, towns and transport routes, as well as landfill sites. This type of habitat accounts for only 2% of BCR 14-QC's geographic area (Fig. 20).

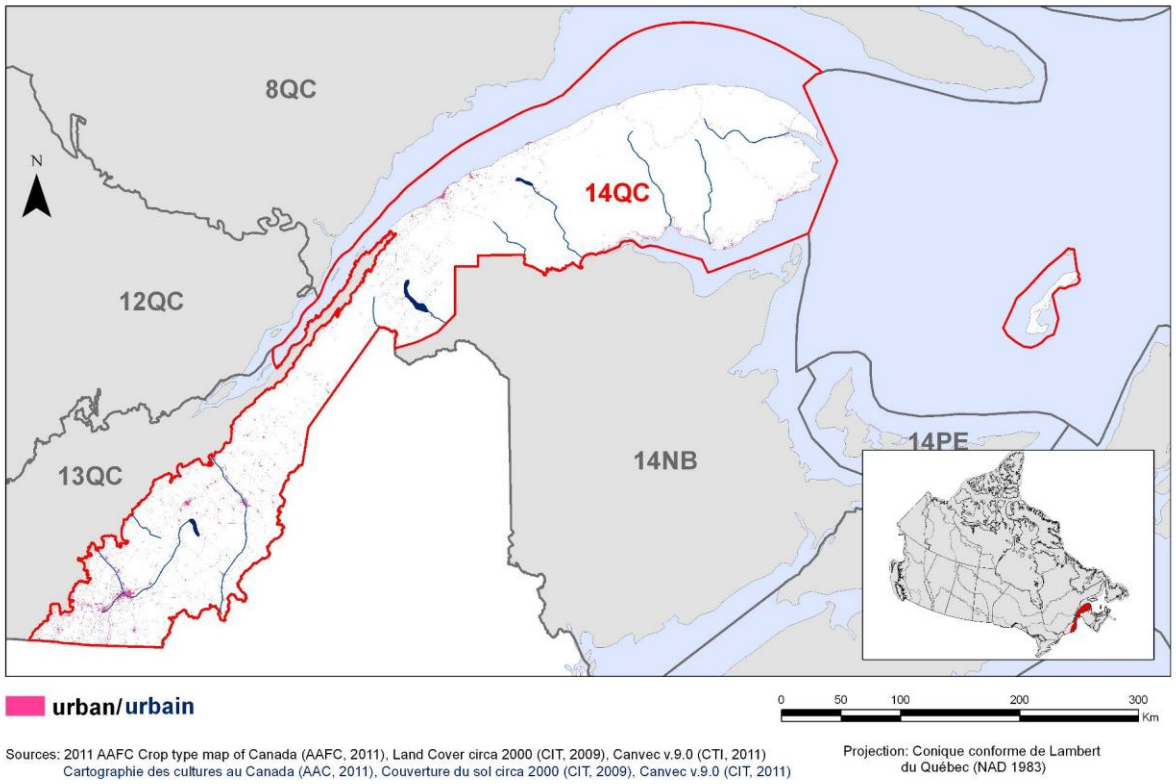

Figure 20. Map of urban areas in BCR 14-QC: Atlantic Northern Forest.

Four priority species (three landbirds and one shorebird), selected for conservation reasons, are found in the urban areas of BCR 14-QC. Three are species at risk listed on Schedule 1 of SARA, namely Common Nighthawk, Peregrine Falcon (*anatum/tundrius*) and Chimney Swift (Table 17).

Sub-categories “1.1 Housing & urban areas” and “11.5 Other impacts” each include 29% of reported threats in urban areas, and both have a “High” overall relative magnitude (Fig. 21). The conservation issues associated with these sub-categories are, respectively, the decrease in artificial nesting sites and the increased frequency of violent weather events, two threats that affect the Chimney Swift and Common Nighthawk.

Three other reported sub-categories in urban areas are “4.1 Roads & railroads,” “4.2 Utility & service lines” and “6.3 Work & other activities.” Each accounts for 14% of identified threats and has a “Low” overall relative magnitude. The first sub-category concerns the Killdeer, which is susceptible to collisions with vehicles when it nests along roads, while the second involves the

risk of the Peregrine Falcon (*anatum/tundrius*) colliding with power transmission structures. Sub-category 6.3 stems from the disturbance of Peregrine Falcon (*anatum/tundrius*) nesting sites (buildings and bridges).

The full list of threats in the urban habitat of BCR 14-QC as well as the objectives, conservation actions and species that could benefit are presented in Table 18. Conservation objectives are mainly aimed at conserving, protecting and restoring open habitats and the features that make them important for birds, reducing the impacts of climate change and reducing incidental bird mortality. Conservation actions include various suggestions such as installing artificial nesting structures, reducing greenhouse gas emissions, and reducing collisions with power transmission structures and vehicles.

Table 17. Priority species that use urban habitat, details on habitat used, population objectives and reasons for priority status.

Priority species	Details on habitat used	Population objective	Reason for priority status		
			At risk[1]	CC[2]	S[3]
Chimney Swift[4]	Chimneys suitable for nesting.	Recovery objective	X	X	-
Common Nighthawk[4]	Gravel roofs	Recovery objective	X	X	-
Killdeer	Roadbed shoulders, gravel or broken asphalt parking lots	Increase 50%	-	X	-
Peregrine Falcon (*anatum/tundrius*)[4]	Artificial urban structures (bridges, buildings, etc.)	Recovery objective	X	X	-

[1] "At risk" includes species considered Endangered, Threatened or Special Concern pursuant to an assessment by the Committee on the Status of Endangered Wildlife in Canada; listed on Schedule 1 of SARA as Endangered, Threatened or Special Concern, and listed as Endangered, Vulnerable or Likely to be designated threatened or vulnerable under the *Loi sur les espèces menacées ou vulnérables* (Quebec).

[2] "Conservation concern" includes species considered of concern in the Partners in Flight database downloaded from www.partnersinflight.org, the Canadian Shorebird Conservation Plan (Donaldson et al., 2000), Canadian Shorebird Conservation Plan (Milko et al., 2003), the North American Waterfowl Management Plan (Plan Committee, 2004) or by regional experts.

[3] "Stewardship" includes abundant species with a wide range with a large percentage of their range or their continental population located in the conservation unit or sub-unit. These species include landbirds considered by Partners in Flight but also species from other bird groups that were added by experts.

[4] Species listed on Schedule 1 of SARA, but for which there are no recovery documents finalized at this time. Official documents related to SARA will prevail as soon as they are published; however, the interim population objectives for these species are Common Nighthawk: Increase 50%; Peregrine Falcon (*anatum/tundrius)*: Maintain; Chimney Swift: Increase 100%.

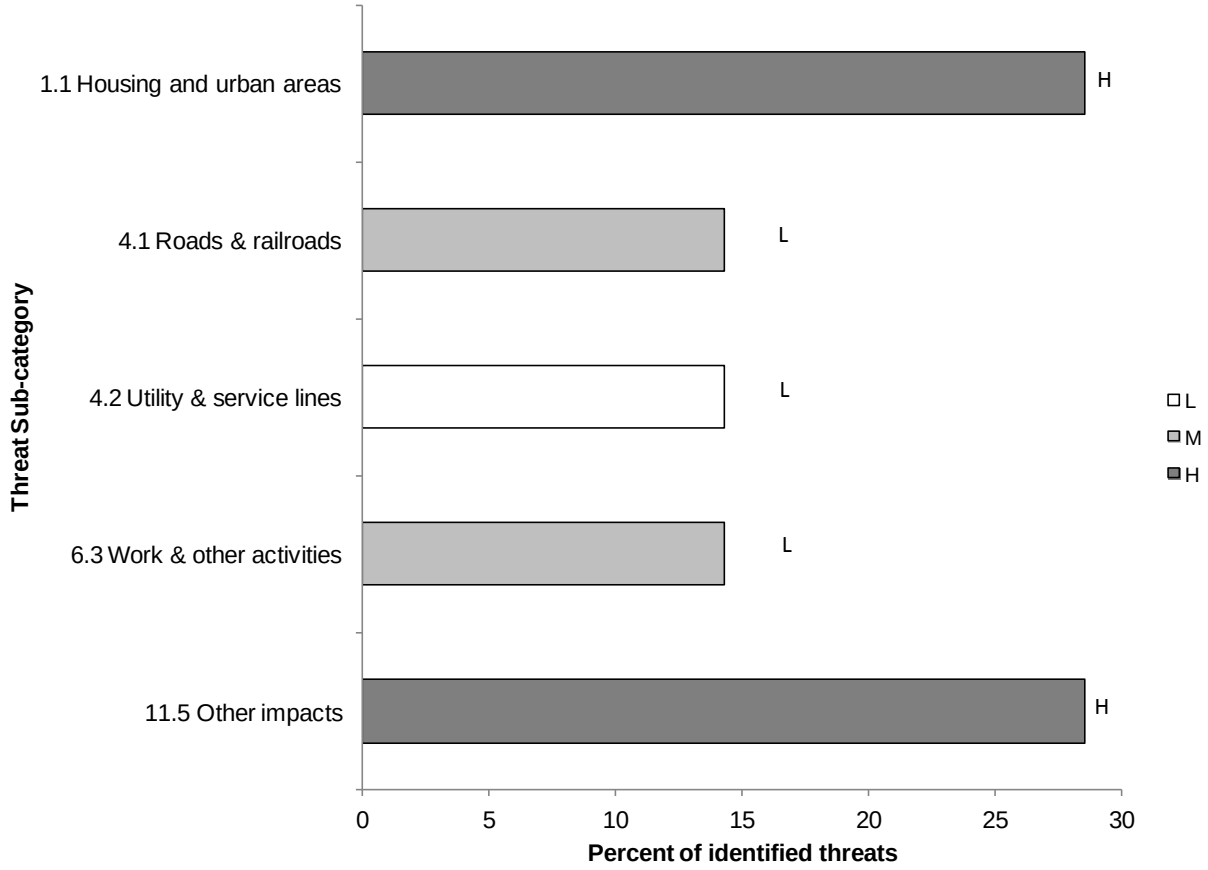

Figure 21. Percentage of identified threats to priority species in the urban habitat in each threat sub-category. Each bar represents the percent of the total number of threats identified in each threat sub-category in urban habitat (for example, if 100 threats were identified in total for all priority species in urban habitat, and 10 of those threats were in the category "1.1 Housing & urban areas," the bar on the graph would represent this as 10%). The bars are divided to show the distribution of Low (L), Medium (M), High (H) and Very High (VH) rankings of individual threats within each threat sub-category. For example, the same threat may have been ranked H for one species but L for another; the shading illustrates the proportion of L, M, H and VH rankings in the sub-category. The overall magnitude of the sub-threat in urban habitat is shown at the end of each bar (also presented in Table 4, Relative magnitude of identified threats to priority species within BCR 14-QC by threat category and broad habitat class).

Table 18. Threats addressed, conservation objectives, recommended actions and priority species affected in the urban habitat of BCR 14-QC.

Threats addressed	Threat sub-category	Objectives	Objective sub-category	Recommended actions	Action sub-category	Priority species affected
Reduction in number of artificial nesting sites.	1.1 Housing & urban areas	Restore features in open habitats that are important for birds.	1.4. Maintain important bird habitat features on the landscape	Install nesting boxes.	3.2 Species recovery	Common Nighthawk, Chimney Swift
Collisions with vehicles when birds nest along roads.	4.1 Roads & railroads	Reduce bird mortality along roads.	2.7 Reduce incidental mortality from collisions.	Construct roadbed shoulders so as to limit nesting.	2.1 Site/area management	Killdeer
Collisions with power lines and other human-made structures	4.2 Utilities & service lines	Reduce mortality from collisions with human-made structures.	2.7 Reduce incidental mortality from collisions.	Promote actions to reduce collisions with human-made structures.	2.1 Site/area management	Peregrine Falcon (*anatum/tundrius*)
Disturbance of nesting sites (buildings and bridges).	6.3 Work & other activities	Minimize human disturbance near nesting sites.	4.1. Reduce disturbance from human recreation	Establish buffer zones around known nesting sites. Limit activities near nesting sites during the breeding season. Raise public awareness through outreach campaigns on the sensitivity of certain species to disturbance.	2.1 Site/area management 4.3 Awareness and communications	Peregrine Falcon (*anatum/tundrius*)

Table 18 continued

Threats addressed	Threat sub-category	Objectives	Objective sub-category	Recommended actions	Action sub-category	Priority species affected
Higher frequency of adverse weather events due to climate change that may affect migration, reproductive success, availability of prey or nesting phenology.	11.5 Other impacts	Reduce potential impact of climate change on urban habitats.	6.2. Manage for habitat resilience as climate changes	Promote the reduction of greenhouse gas emissions.	6.2 Substitution	Common Nighthawk, Chimney Swift

Wetlands

In the context of the BCR strategies, the habitat class defined as “wetlands” is any terrestrial habitat that is either temporarily saturated with water or permanently flooded. A wetland can be a bog, a swamp or a freshwater, brackish or saltwater marsh. Wetlands cover only 1% of BCR 14-QC and are scattered throughout the region (Fig. 22).

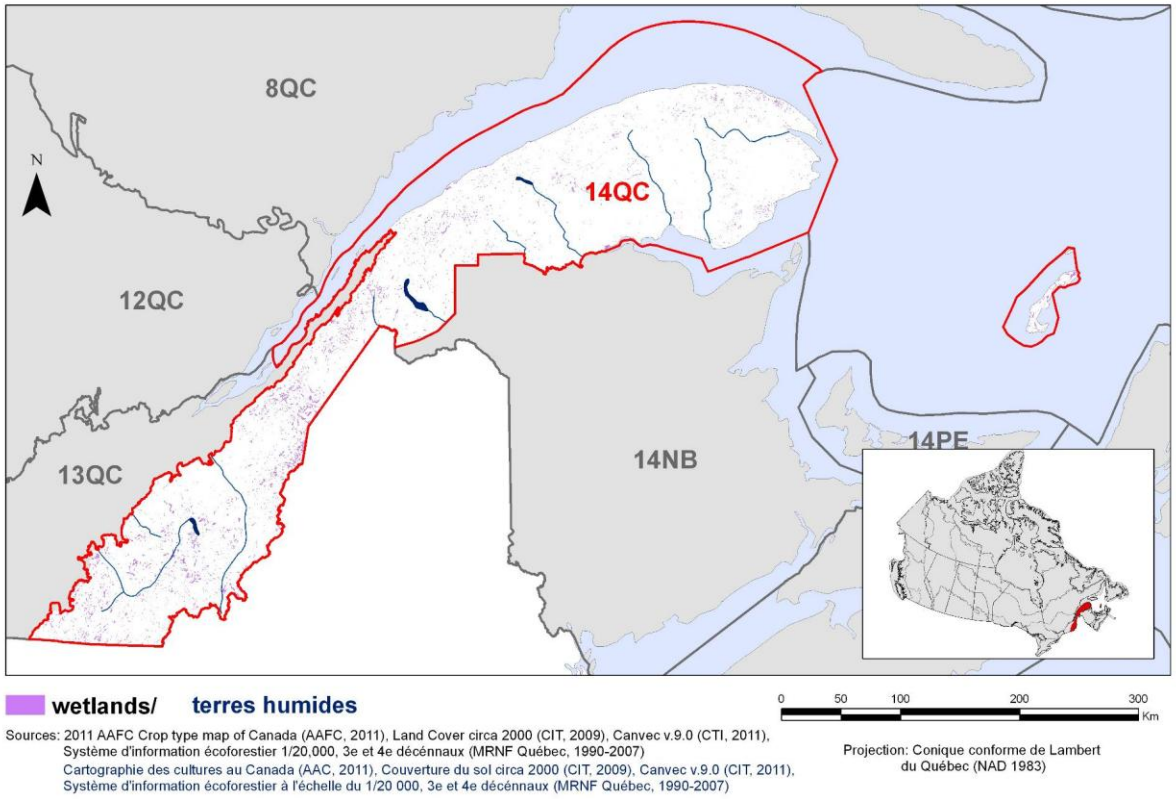

Figure 22. Map of wetland habitat in BCR 14-QC: Atlantic Northern Forest.

Although they only cover a small portion of BCR 14-QC, wetlands are the second habitat class most used by priority species. There are 34 priority species from the 4 bird groups, including 14 landbirds, 6 shorebirds, 10 waterbirds and 4 waterfowl species (Table 19). Nearly half of the priority species found in this habitat are species at risk, of which 11 are listed on Schedule 1 of SARA. Twenty-nine species were selected for conservation reasons, while 5 were chosen for stewardship purposes.

Sixteen threat sub-categories affect priority species in wetlands, which makes wetlands the BCR 14-QC habitat class with the greatest variety of threats (Fig. 23). The most frequently reported sub-category is “1.2 Commercial & industrial areas,” which accounts for 22% of identified threats in this habitat. With a “Medium” overall relative magnitude, this sub-category affects just over half of the priority species found in the wetlands. The threats associated with this sub-category are habitat loss from the drainage and filling of wetlands for commercial

development, alteration of coastal wetlands caused by industrial development and a decrease in the number of insect prey subsequent to the loss of wetlands, which specifically affects aerial insectivores.

Accounting for 20% of threats identified for priority species in this habitat, sub-category “2.1 Annual & perennial non-timber crops” ranks second in frequency and has a “High” overall relative magnitude. This sub-category affects nearly half of the priority species found in the wetlands, and the main conservation issues associated with it are the drainage and filling of wetlands for agricultural purposes, the resulting decline in insect prey, and the use of upper marshlands for agriculture.

Sub-category “1.1 Housing & urban areas” is the third most-reported threat (18%) and has a “Medium” overall relative magnitude. The main threat linked to this sub-category is habitat loss and degradation caused by the drainage and filling of wetlands for residential development, which affects just over half of the priority species found in this type of habitat. The decrease in the number of insect prey subsequent to the loss of wetlands is another threat, which specifically affects aerial insectivores.

Although they individually account for less than 5% of reported threats, five threat sub-categories have a “High” overall relative magnitude: “7.3 Other ecosystem modifications,” “8.1 Invasive non-native/alien species,” “8.2 Problematic native species,” “11.1 habitat shifting & alteration” and “11.5 Other impacts.” An important issue associated with sub-category 7.3 is the limited number of nesting sites available to the Roseate Tern due to the loss of Common Tern colonies. The sole threat in sub-category 8.1, habitat loss and degradation caused by invasive plants, affects various waterbird species. Nest predation (mainly by foxes and gulls; sub-category 8.2) affects certain colonial waterbirds. Sub-category 11.1 involves habitat loss and degradation resulting from climate change, while sub-category 11.5 concerns the increased frequency of adverse weather events.

The full list of threats in the wetlands of BCR 14-QC as well as the objectives, conservation actions and species that could benefit are presented in Table 20. Conservation objectives are mainly aimed at conserving, protecting and restoring wetlands on the landscape. Conservation actions include various suggestions such as protecting sites that are important for priority species through stewardship or by legally designating them conservation areas, adopting municipal urban plans that protect wetlands and developing beneficial agricultural management practices.

Table 19. Priority species that use wetlands, details on habitat used, population objectives and reason for priority status.

Priority species	Details on habitat used	Population objective	Reason for priority status		
			At risk[1]	CC[2]	S[3]
American Bittern	Freshwater marshes, salt marshes, swamps	Increase 50%	-	X	-
American Black Duck	Freshwater marshes, salt marshes, swamps, bogs	Increase	-	-	X
Bank Swallow	Marshes, bogs	Increase 50%	-	X	-
Barn Swallow	Marshes	Increase 100%	X	X	-
Brant	Salt marshes	Maintain	-	X	-
Canada Goose (North Atlantic population)	Bogs	Maintain	-	-	X
Canada Goose (Atlantic population)	Bogs	Maintain	-	-	X
Canada Warbler[4]	Shrub swamps, bogs	Recovery objective	X	X	-
Chimney Swift[4]	Marshes	Recovery objective	X	X	-
Common Nighthawk[4]	Marshes	Recovery objective	X	X	-
Common Tern	Salt marshes	Maintain	-	X	-
Dunlin	Salt marshes	Assess/Maintain	-	X	-
Golden Eagle	Marshes, bogs	Provincial recovery objective[5]	X	X	-

[1] "At risk" includes species considered Endangered, Threatened or Special Concern pursuant to an assessment by the Committee on the Status of Endangered Wildlife in Canada; listed on Schedule 1 of SARA as Endangered, Threatened or Special Concern, and listed as Endangered, Vulnerable or Likely to be designated threatened or vulnerable under the *Loi sur les espèces menacées ou vulnérables* (Quebec).

[2] "Conservation concern" includes species considered of concern in the Partners in Flight database downloaded from www.partnersinflight.org, the Canadian Shorebird Conservation Plan (Donaldson et al., 2000), Canadian Shorebird Conservation Plan (Milko et al., 2003), the North American Waterfowl Management Plan (Plan Committee, 2004) or by regional experts.

[3] "Stewardship" includes abundant species with a wide range with a large percentage of their range or their continental population located in the conservation unit or sub-unit. These species include landbirds considered by Partners in Flight but also species from other bird groups that were added by experts.

[4] Species listed on Schedule 1 of SARA but for which there are no recovery documents finalized at this time. Official documents related to SARA shall prevail as soon as they are published; however, the interim population objectives for these species are Red Knot (*rufa*): Increase 100%; Common Nighthawk: Increase 50%; Peregrine Falcon (*anatum/tundrius)*: Maintain; Short-eared Owl: Increase 100%; Chimney Swift: Increase 100%; Olive-sided Flycatcher: Increase 100%; Canada Warbler: Increase 100%; Rusty Blackbird: Increase 100%.

[5] Refer to Équipe de rétablissement de l'aigle royal au Québec (2005).

Table 19 continued

Priority species	Details on habitat used	Population objective	Reason for priority status		
			At risk[1]	CC[2]	S[3]
Great Black-backed Gull	Coastal marshes	Maintain	-	-	X
Herring Gull	Coastal marshes	Increase 100%	-	X	-
Horned Grebe (Magdalen Islands population)	Freshwater marshes	Recovery objective[6]	X	X	-
Least Bittern	Freshwater marshes, shrub swamps	Recovery objective[7]	X	X	-
Nelson's Sparrow	Salt marshes	Increase	X	X	-
Olive-sided Flycatcher[4]	Treed swamps	Recovery objective	X	X	-
Palm Warbler	Bogs	Assess/Maintain	-	X	-
Peregrine Falcon (*anatum/tundrius*)[4]	Freshwater marshes, salt marshes	Recovery objective	X	X	-
Red Knot (*rufa*) [4]	Salt marshes	Recovery objective	X	X	-
Red-necked Phalarope	Coastal marshes	Assess/Maintain	-	X	-
Roseate Tern	Coastal marshes. The species nests in Common Tern colonies.	Recovery objective[8]	X	X	-
Rusty Blackbird[4]	Swamps, bogs	Recovery objective	X	X	-
Sedge Wren	Freshwater marshes	Increase	X	X	-
Semipalmated Sandpiper	Coastal marshes	Increase 100%	-	X	-
Short-eared Owl[4]	Freshwater marshes, salt marshes, bogs	Recovery objective	X	X	-
Sora	Freshwater marshes, salt marshes	Assess/Maintain	-	X	-
Tree Swallow	Marshes	Maintain	-	-	X
Upland Sandpiper	Bogs	Assess/Maintain	-	X	-
Virginia Rail	Freshwater marshes, salt marshes	Assess/Maintain	-	X	-
Whimbrel	Coastal marshes	Assess/Maintain	-	X	-
Yellow Rail	Marshes (wet meadow), salt marshes, bogs (grassy part)	Recovery objective[9]	X	X	-

[6] Refer to Environment Canada (2012a).
[7] Refer to Environment Canada (2011).
[8] Refer to Environment Canada (2010).
[9] Refer to Environment Canada (2012b).

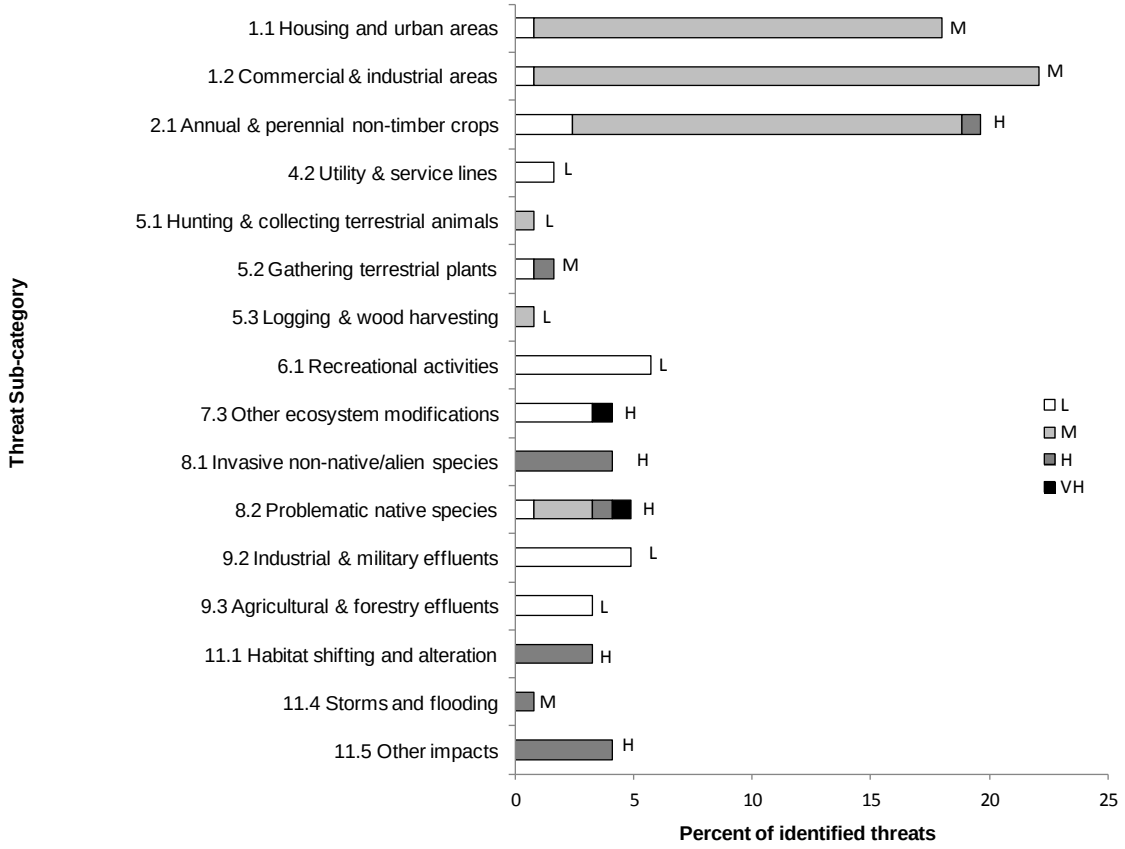

Figure 23. Percentage of identified threats to priority species in wetlands in each threat sub-category.
Each bar represents the percent of the total number of threats identified in each threat sub-category in wetlands (for example, if 100 threats were identified in total for all priority species in wetlands, and 10 of those threats were in the category "1.1 Housing & urban areas," the bar on the graph would represent this as 10%). The bars are divided to show the distribution of Low (L), Medium (M), High (H) and Very High (VH) rankings of individual threats within each threat sub-category. For example, the same threat may have been ranked H for one species and L for another; the shading illustrates the proportion of L, M, H and VH rankings in the sub-category. The overall magnitude of the sub-threat in wetlands is shown at the end of each bar (also presented in Table 4, Relative magnitude of identified threats to priority species within BCR 14-QC by threat category and broad habitat class).

Table 20. Threats addressed, conservation objectives, recommended actions and priority species affected in the wetlands of BCR 14-QC.

Threats addressed	Threat sub-category	Objectives	Objective sub-category	Recommended actions	Action sub-category	Priority species affected[1]
Habitat loss (drainage and filling of wetlands for residential or commercial development).	1.1 Housing & urban areas 1.2 Commercial & industrial areas	Conserve and restore the diversity and quality of wetlands on the landscape. Protect at least 75% of suitable nesting sites on the Magdalen Islands (applies to the Horned Grebe). Protect at least 65% of suitable nesting sites along the St. Lawrence and Saguenay rivers (applies to the Yellow Rail).	1.1. Ensure land and resource-use policies and practices maintain or improve bird habitat.	Protect wetlands for priority species through stewardship or by legally designating them conservation areas. Protect wetlands of various sizes, configurations and habitat conditions to ensure the diversity of habitats and species on the landscape. Protect important nesting sites through stewardship or by legally designating them conservation areas. In municipalities, adopt urban plans that protect wetlands. Preserve eelgrass beds that are important for the Brant. Improve the protection of wetlands through available policies, regulations and stewardship tools.	1.1 Site/area protection 5.2 Policies and regulations	Brant, American Bittern, Common Nighthawk, Peregrine Falcon (*anatum/tundrius*), Horned Grebe (Magdalen Islands population), Short-eared Owl, Sora, Chimney Swift, Upland Sandpiper, Olive-sided Flycatcher, Palm Warbler, Canada Warbler, Least Bittern, Rusty Blackbird, Virginia Rail, Yellow Rail, Common Tern, Sedge Wren

[1] Priority species whose only identified threat is in category "12.1 Information lacking" are not mentioned in this table.

Table 20 continued

Threats addressed	Threat sub-category	Objectives	Objective sub-category	Recommended actions	Action sub-category	Priority species affected[1]
Decrease in the number of prey insects due to the loss of wetlands.	1.1 Housing & urban areas 1.2 Commercial & industrial areas 2.1 Annual & perennial non-timber crops	Conserve and restore the diversity and quality of wetlands on the landscape.	1.1. Ensure land and resource-use policies and practices maintain or improve bird habitat.	Protect wetlands for priority species through stewardship or by legally designating them conservation areas. Protect wetlands of various sizes, configurations and habitat conditions to ensure the diversity of habitats and species on the landscape. In municipalities, adopt urban plans that protect wetlands. Improve the protection of wetlands through available policies, regulations and stewardship tools. Support sustainable agricultural development.	1.1 Site/area protection 5.2 Policies and regulations 5.3 Private sector standards and codes	Common Nighthawk, Bank Swallow, Barn Swallow, Chimney Swift
Habitat alteration (industrial projects on coastal lands).	1.2 Commercial & industrial areas	Conserve and restore the quantity and quality of coastal wetlands on the landscape.	1.1. Ensure land and resource-use policies and practices maintain or improve bird habitat.	Identify, characterize and protect critical staging areas through stewardship or by legally designating them conservation areas.	1.1 Site/area protection	Red Knot(*rufa*), Semipalmated Sandpiper, Dunlin , Whimbrel, Red-necked Phalarope

Table 20 continued

Threats addressed	Threat sub-category	Objectives	Objective sub-category	Recommended actions	Action sub-category	Priority species affected[1]
Habitat loss (drainage and filling of wetlands for agricultural development).	2.1 Annual & perennial non-timber crops	Conserve and restore the diversity and quality of wetlands on the landscape. Protect at least 65% of suitable nesting sites along the St. Lawrence and Saguenay rivers (Yellow Rail).	1.1. Ensure land and resource-use policies and practices maintain or improve bird habitat.	Protect wetlands for priority species through stewardship or by legally designating them conservation areas. Protect wetlands of various sizes, configurations and habitat conditions to ensure the diversity of habitats and species on the landscape. Protect important nesting sites through stewardship or by legally designating them conservation areas. Improve the protection of wetlands through available policies, regulations and stewardship tools. Support sustainable agricultural development.	1.1 Site/area protection 5.2 Policies and regulations 5.3 Private sector standards and codes	Nelson's Sparrow, American Bittern, Common Nighthawk, Peregrine Falcon (*anatum/tundrius*), Short-eared Owl, Sora, Upland Sandpiper, Olive-sided Flycatcher, Palm Warbler, Canada Warbler, Least Bittern, Rusty Blackbird, Virginia Rail, Yellow Rail, Common Tern, Sedge Wren
Habitat loss and degradation (bog drainage for cranberry cultivation)	2.1 Annual & perennial non-timber crops	Conserve and restore the diversity and quality of wetlands on the landscape.	1.1. Ensure land and resource-use policies and practices maintain or improve bird habitat.	Implement the mitigation and prevention actions identified in project environmental assessments. Manage water levels to avoid flooding nests during the nesting period.	5.3 Private sector standards and codes	Upland Sandpiper, Palm Warbler

Table 20 continued

Threats addressed	Threat sub-category	Objectives	Objective sub-category	Recommended actions	Action sub-category	Priority species affected[1]
Habitat loss and degradation (use of upper marshlands for agricultural activities).	2.1 Annual & perennial non-timber crops	Conserve and restore the quality and quantity of upper marshlands on the landscape.	1.1. Ensure land and resource-use policies and practices maintain or improve bird habitat.	Work with farmers to promote beneficial management practices for the use of upper marshlands.	5.3 Private sector standards and codes	Nelson's Sparrow, Yellow Rail
Collisions with power lines and other human-made structures	4.2 Utilities & service lines	Reduce mortality from collisions with human-made structures.	2.7 Reduce incidental mortality from collisions.	Promote actions to reduce collisions with human-made structures.	2.1 Site/area management	Golden Eagle, Peregrine Falcon (*anatum/tundrius*)
Deliberate hunting or accidental trapping.	5.1 Hunting & harvesting terrestrial animals	Recovery of species at risk.	3.4. Implement recovery strategies for species at risk	Continue to implement the Golden Eagle provincial recovery plan (Équipe de rétablissement de l'aigle royal au Québec 2005).	3.2 Species recovery	Golden Eagle
Habitat loss and degradation (bog drainage for peat mining).	5.2 Gathering terrestrial plants	Conserve and restore the diversity and quality of wetlands on the landscape.	1.1. Ensure land and resource-use policies and practices maintain or improve bird habitat.	Restore habitat once site operations have been concluded. Encourage the adoption of more environmentally friendly operating methods. Implement the mitigation and prevention actions identified in project environmental assessments. Make sure that habitats in mining sites are restored to their original state (through wildlife monitoring programs before and after mining operations).	2.3 Habitat and natural process restoration 5.3 Private sector standards and codes 8.2 Monitoring	Upland Sandpiper, Palm Warbler

Table 20 continued

Threats addressed	Threat sub-category	Objectives	Objective sub-category	Recommended actions	Action sub-category	Priority species affected[1]
Habitat loss and degradation (logging in forest wetlands).	5.3 Logging & wood harvesting	Conserve and restore the diversity and quality of wetlands on the landscape.	1.1. Ensure land and resource-use policies and practices maintain or improve bird habitat.	Promote compliance with provincial legislation relating to logging in forest wetlands.	5.4 Compliance and enforcement	Olive-sided Flycatcher
Disturbance of nesting sites.	6.1 Recreational activities	Conserve important nesting habitats in the BCR. Protect at least 75% of suitable nesting sites on the Magdalen Islands (applies to the Horned Grebe). Minimize disturbance near nesting sites.	1.4. Maintain important bird habitat features on the landscape 4.1. Reduce disturbance from human recreation	Protect important nesting sites through stewardship or by legally designating them conservation areas. Limit activities near nesting sites during the breeding season. Establish buffer zones around known nesting sites. Increase public awareness through outreach campaigns on the vulnerability of certain species to disturbance.	1.1 Site/area protection 2.1 Site/area management 4.3 Awareness and communications	Horned Grebe (Magdalen Islands population), Common Tern
Disturbance of nesting sites (this species' nest is vulnerable to waves from fishing and recreational vessels).	6.1 Recreational activities	Minimize disturbance near nesting sites.	4.1. Reduce disturbance from human recreation	Limit activities near nesting sites during the breeding season. Establish buffer zones around known nesting sites. Increase public awareness through outreach campaigns on the vulnerability of certain species to disturbance.	2.1 Site/area management 4.3 Awareness and communications	American Bittern

Table 20 continued

Threats addressed	Threat sub-category	Objectives	Objective sub-category	Recommended actions	Action sub-category	Priority species affected[1]
Disturbance of staging areas.	6.1 Recreational activities	Minimize disturbance near staging areas.	4.1. Reduce disturbance from human recreation	Increase public awareness through outreach campaigns on the sensitivity of certain species to human disturbance.	4.3 Awareness and communications	Red Knot (*rufa*), Semipalmated Sandpiper, Dunlin, Whimbrel
Habitat alteration at Havre-aux-Basques in the Magdalen Islands.	7.3 Other ecosystem modifications	Conserve and restore the quantity and quality of wetlands on the landscape.	1.1. Ensure land and resource-use policies and practices maintain or improve bird habitat.	Identify, characterize and protect critical staging areas through stewardship or by legally designating them conservation areas.	1.1 Site/area protection	Red Knot (*rufa*), Semipalmated Sandpiper, Dunlin
Habitat loss and degradation (range loss/decline in abundance of eelgrass beds).	7.3 Other ecosystem modifications	Conserve and restore the quality and quantity of eelgrass beds on the landscape.	1.2. Maintain the size, shape and configuration of habitat within the natural range of variation.	Restore important eelgrass beds (by replanting root stock). Assess the conditions that increase the epidemiological virulence of the *Labyrinthula zosterae* pathogen.	2.3 Habitat and natural process restoration 8.1 Research	Brant
Limited number of nesting sites (loss of Common Stern colonies will reduce the number of suitable nesting sites).	7.3 Other ecosystem modifications	Recovery of species at risk.	3.4. Implement recovery strategies for species at risk	Continue to implement the amended recovery strategy for the Roseate Tern (Environment Canada 2010).	3.2 Species recovery	Roseate Tern
Habitat loss and degradation (invasive species).	8.1 Invasive non-native/alien species	Limit the impact of invasive plants on landscape structure and composition.	3.5 Prevent and control the spread of invasive and exotic species	Track invasive species and assess the possibility of developing a control program.	8.2 Monitoring	American Bittern, Sora, Least Bittern, Virginia Rail, Yellow Rail
Nest predation (primarily by foxes and gulls).	8.2 Problematic native species	Increase the survival rate and productivity at nesting sites.	2.5. Reduce parasitism/ predation	Maintain existing predator control programs and explore the possibility of introducing new ones.	2.2 Invasive/ problematic species control	Herring Gull, Roseate Tern, Common Tern

Table 20 continued

Threats addressed	Threat sub-category	Objectives	Objective sub-category	Recommended actions	Action sub-category	Priority species affected[1]
Predation in staging areas	8.2 Problematic native species	Reduce mortality and disturbance in staging areas.	2.5. Reduce parasitism/ predation	Maintain existing predator control programs and explore the possibility of introducing new ones.	2.2 Invasive/ problematic species control	Red Knot (*rufa*), Semipalmated Sandpiper
Potential competition with the Pied-billed Grebe, which has recently established itself in the Magdalen Islands.	8.2 Problematic native species	Study the Pied-billed Grebe's impact on the Horned Grebe.	7.4. Improve understanding of causes of population declines	Compare habitats used by the Pied-billed Grebe in the Magdalen Islands with those used by the Horned Grebe, in order to better focus efforts on habitats that do not encourage the Pied-billed Grebe.	8.1 Research	Horned Grebe (Magdalen Islands population)
Oil spills.	9.2 Industrial & military effluents	Maintain and improve emergency response programs. Reduce deliberate discharges of oily ship waste into the ocean.	2.3 Reduce mortality and/or sub-lethal effects of oil pollution	Maintain the effectiveness of emergency response programs.. Prevent ships from discharging oily waste into the ocean by ensuring compliance with federal legislation.	2.3 Habitat and natural process restoration 5.4 Compliance and enforcement	Brant, Red Knot (*rufa*), Semipalmated Sandpiper, Dunlin, Whimbrel, Red-necked Phalarope
Overutilization of pesticides (bird poisoning, eggshell thinning, reduction in prey insects and prey fish, leaching to adjacent habitats).	9.3 Agricultural & forestry effluents	Improve water quality in the wetlands.	2.1. Reduce mortality and/or sub-lethal effects from pesticide use	Reduce the use of pollutants that could contaminate the environment.	2.3 Habitat and natural process restoration	American Bittern, Sora, Least Bittern, Virginia Rail
Habitat loss and degradation (climate change could alter the number, size and location of wetlands).	11.1 Habitat shifting & alteration	Reduce potential impact of climate change on wetlands.	6.2. Manage for habitat resilience as climate changes	Promote the reduction of greenhouse gas emissions.	6.2 Substitution	Sora, Least Bittern, Virginia Rail, Yellow Rail

Table 20 continued

Threats addressed	Threat sub-category	Objectives	Objective sub-category	Recommended actions	Action sub-category	Priority species affected[1]
Habitat loss and degradation (more frequent flooding of sites due to climate change)	11.4 Storms & flooding	Reduce potential impact of climate change on wetlands.	6.2. Manage for habitat resilience as climate changes	Promote the reduction of greenhouse gas emissions.	6.2 Substitution	Nelson's Sparrow
Higher frequency of adverse weather events due to climate change that may affect migration, reproductive success, availability of prey or nesting phenology.	11.5 Other impacts	Reduce potential impact of climate change on wetlands.	6.2. Manage for habitat resilience as climate changes	Promote the reduction of greenhouse gas emissions.	6.2 Substitution	Common Nighthawk, Bank Swallow, Barn Swallow, Chimney Swift, Olive-sided Flycatcher

Waterbodies, Snow and Ice

According to the United Nations Food and Agriculture Organization's (UN-FAO) Land Cover Classification System adapted for developing BCR strategies, "waterbodies, snow and ice" are primarily areas covered with water such as lakes, reservoirs, rivers and ponds. Expanses of snow and ice (permanent, seasonal, moving or stable) are also included in this class but are not used by priority species in BCR 14-QC. Waterbodies (excluding the St. Lawrence River and Gulf) account for approximately 2% of the BCR 14-QC land area and include numerous rivers and some large lakes (Fig. 24).

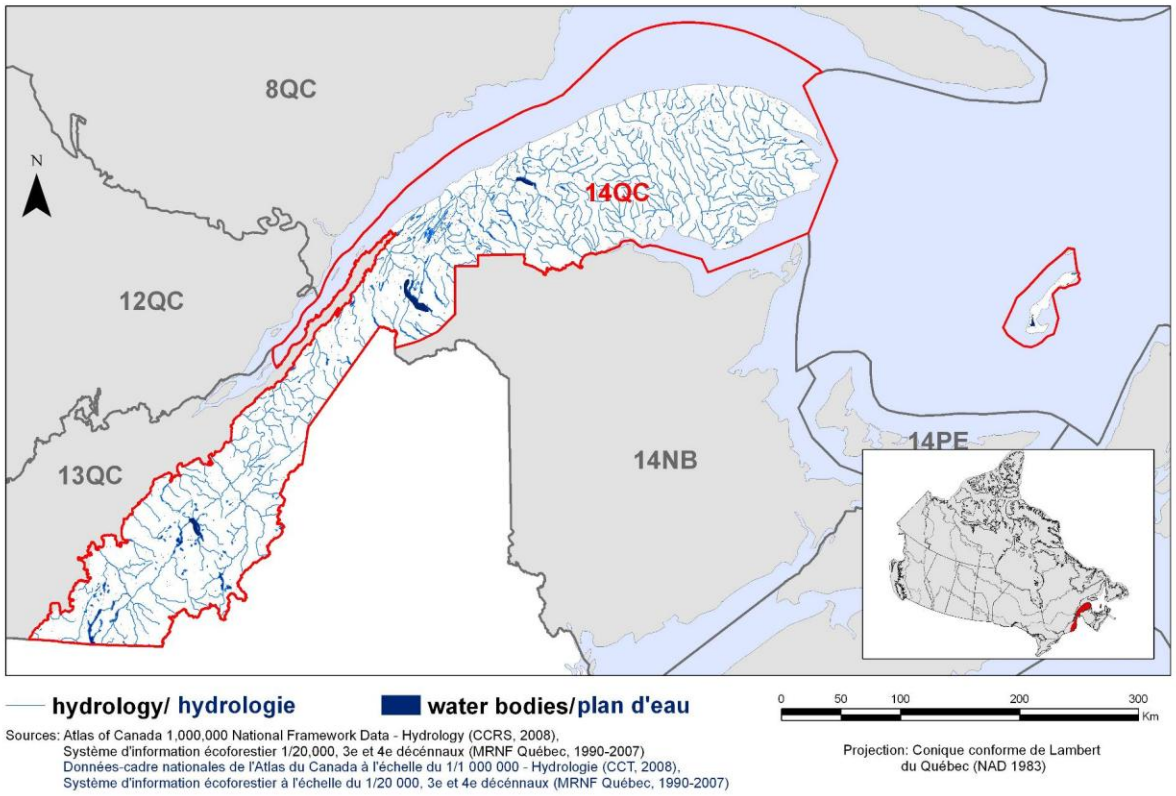

Figure 24. Hydrology map for BCR 14-QC: Atlantic Northern Forest.

Seven priority species, including four waterfowl species, two landbirds and one waterbird, are found in the waterbodies of BCR 14-QC (Table 21). These priority species include two species at risk, namely the Harlequin Duck (Eastern population), which is listed on Schedule 1 of SARA (Special Concern), and the Bald Eagle (provincially Vulnerable). Three species are listed as priorities for conservation reasons while four were chosen for stewardship purposes.

The number of threats identified in BCR 14-QC waterbodies is low, partly due to the fact the stewardship species were assigned only monitoring actions. The only two threat sub-categories affecting conservation species are "5.1 Hunting & harvesting terrestrial animals" and "9.3 Agricultural & forestry effluents," both of which have a "Low" overall relative magnitude

and include half of the threats reported in this habitat (Fig. 25). The former involves the deliberate killing of the Belted Kingfisher near aquaculture facilities and poaching of the Harlequin Duck (Eastern population; Table 22). The latter, which affects the Belted Kingfisher and Bald Eagle, relates to the degradation of aquatic environments in agricultural areas and focuses more specifically on the overuse of pesticides that seep into the water system, causing adverse effects on the food chain.

The conservation objectives for priority species using the waterbodies of BCR 14-QC are to reduce mortality from hunting and persecution, as well as pesticide pollution. The recommended actions for achieving these objectives involve increasing awareness among aquaculturists through outreach campaigns, continuing to implement the Management Plan for the Harlequin Duck (Histrionicus histrionicus) Eastern Population, in Atlantic Canada and Québec (Environment Canada 2007) and reducing the use of pollutants that could contaminate the environment (Table 22).

Table 21. Priority species that use waterbodies, details on habitat used, population objectives and reason for priority status.

Priority species	Details on habitat used	Population objective	Reason for priority status		
			At risk[1]	CC[2]	S[3]
American Black Duck	Lakes, beaver ponds	Increase	-	-	X
Bald Eagle	Rivers	Provincial recovery objective[4]	X	X	-
Belted Kingfisher	Lakes, rivers	Increase 50%	-	X	-
Canada Goose (North Atlantic population)	Waterbodies	Maintain	-	-	X
Canada Goose (Atlantic population)	Waterbodies	Maintain	-	-	X
Common Loon	Fish lakes at least five ha in area with a preference for large alkaline lakes (> 50 ha) at low elevations	Maintain	-	-	X
Harlequin Duck (Eastern population)[5]	Fast-flowing rivers in the Gaspé Peninsula	Recovery objective	X	X	-

[1] "At risk" includes species considered Endangered, Threatened or Special Concern pursuant to an assessment by the Committee on the Status of Endangered Wildlife in Canada; listed on Schedule 1 of SARA as Endangered, Threatened or Special Concern, and listed as Endangered, Vulnerable or Likely to be designated threatened or vulnerable under the *Loi sur les espèces menacées ou vulnérables* (Quebec).
[2] "Conservation concern" includes species considered of concern in the Partners in Flight database downloaded from www.partnersinflight.org, the Canadian Shorebird Conservation Plan (Donaldson et al., 2000), Canadian Shorebird Conservation Plan (Milko et al., 2003), the North American Waterfowl Management Plan (Plan Committee, 2004) or by regional experts.
[3] "Stewardship" includes abundant species with a wide range with a large percentage of their range or their continental population located in the conservation unit or sub-unit. These species include landbirds considered by Partners in Flight but also species from other bird groups that were added by experts.
[4] Refer to Comité de rétablissement du pygargue à tête blanche au Québec (2002).
[5] Refer to Environment Canada (2007).

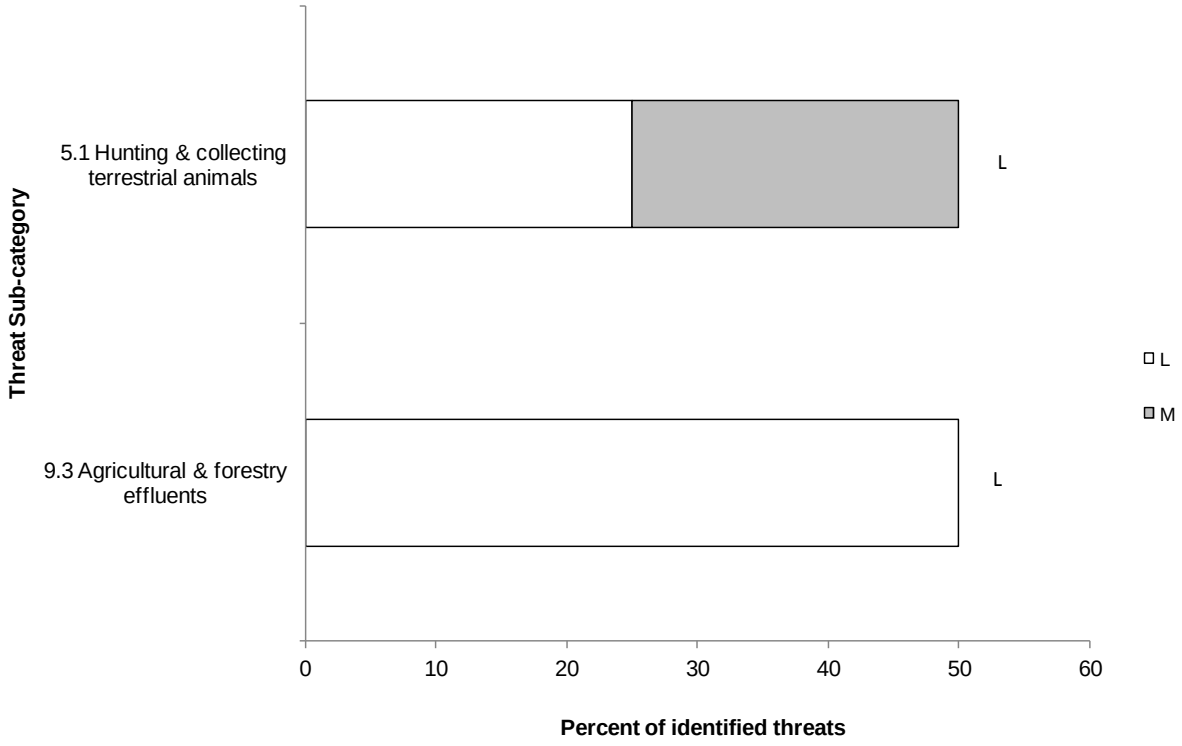

Figure 25. Percentage of identified threats to priority species in waterbodies in each threat sub-category. Each bar represents the percent of the total number of threats identified in each threat sub-category in waterbodies (for example, if 100 threats were identified in total for all priority species in waterbodies, and 10 of those threats were in the category "1.1 Housing & urban areas," the bar on the graph would represent this as 10%). The bars are divided to show the distribution of Low (L), Medium (M), High (H) and Very High (VH) rankings of individual threats within each threat sub-category. For example, the same threat may have been ranked H for one species and L for another; the shading illustrates the proportion of L, M, H and VH rankings in the sub-category. The overall magnitude of the sub-threat in waterbodies is shown at the end of each bar (also presented in Table 4, Relative magnitude of identified threats to priority species within BCR 14-QC by threat category and broad habitat class).

Table 22. Threats addressed, conservation objectives, recommended actions and priority species affected in the waterbodies of BCR 14-QC.

Threats addressed	Threat sub-category	Objectives	Objective sub-category	Recommended actions	Action sub-category	Priority species affected[1]
Deliberate killings near aquaculture facilities.	5.1 Hunting & harvesting terrestrial animals	Reduce bird mortality caused by killing and trapping.	2.8 Reduce mortality from legal or illegal hunting, and persecution	Increase awareness among aquaculturists through outreach campaigns.	4.3 Awareness and communications	Belted Kingfisher
Poaching.	5.1 Hunting & harvesting terrestrial animals	Recovery of species at risk.	3.4. Implement recovery strategies for species at risk	Continue to implement the Harlequin Duck (Eastern population) management plan (Environment Canada 2007).	3.2 Species recovery	Harlequin Duck (Eastern population)
Overutilization of pesticides (bird poisoning, eggshell thinning, reduction in prey insects and prey fish, leaching to adjacent habitats).	9.3 Agricultural & forestry effluents	Improve water quality.	2.1. Reduce mortality and/or sub-lethal effects from pesticide use	Reduce the use of pollutants that could contaminate the environment.	2.3 Habitat and natural process restoration	Belted Kingfisher, Bald Eagle

[1] Priority species whose only identified threat is in category "12.1 Information lacking" are not mentioned in this table.

Coastal Areas

Coastal areas consist of terrestrial and aquatic habitats along the marine coasts. They consist mainly of estuary areas, mudflats, sandbars, rocky shores and islands. The geographic size of this habitat type is difficult to calculate, but it is estimated that the BCR 14-QC marine coast stretches 1427 km along the St. Lawrence River, Gulf of St. Lawrence and Chaleur Bay (Fig. 26).

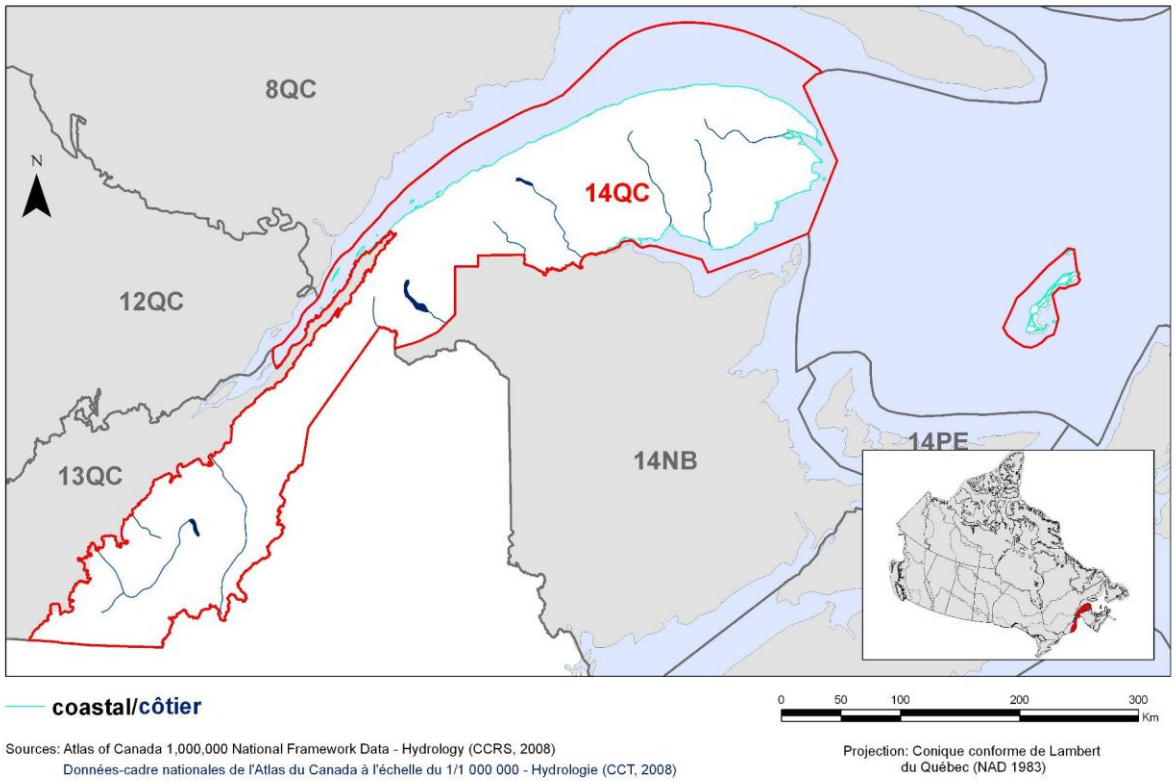

Figure 26. Map of coastal areas in BCR 14-QC: Atlantic Northern Forest.

Coastal areas are the habitat class most used by priority species in BCR 14-QC; 37 priority species occur in these areas at some point or other during the year (Table 23). Fifteen priority waterbird species, 13 shorebird species and 9 waterfowl species have been counted there, which is the majority of priority species from these 3 groups in BCR 14-QC. Twenty-three species were selected for conservation reasons, while 14 were chosen for stewardship purposes.

Five priority species found in this habitat class are species at risk listed on Schedule 1 of SARA: the Harlequin Duck (Eastern population; Special Concern), Barrow's Goldeneye (Eastern population; Special Concern), Red Knot (*rufa*; Endangered), Piping Plover (*melodus*; Endangered) and Roseate Tern (Endangered). The last three are also considered at risk provincially. A sixth species at risk, the Leach's Storm-Petrel, is likely to be designated threatened or vulnerable under provincial legislation.

Eleven threat sub-categories affect priority species in coastal areas, making them the BCR 14-QC habitat with the second highest diversity of threats (Fig. 27). The most frequently reported sub-category is "9.2 Industrial & military effluents," accounting for 25% of all threats in this habitat. With a "Medium" overall relative magnitude, this sub-category involves oil spills (which affect nearly half of the priority species in this habitat) and sediment contamination.

Accounting for 19% of threats, sub-category "6.1 Recreational activities" ranks second in frequency and has a "Medium" overall relative magnitude. The main threats that make up this sub-category are the disturbance of nesting sites (affects certain colonial waterbird species) and disturbance of staging areas (affects shorebirds especially).

Another significant threat sub-category is "8.2 Problematic native species," which has a "Very High" overall relative magnitude and includes 17% of threats to priority species reported for coastal areas. The major threats included in this sub-category are nest predation (mainly by foxes and gulls), which is experienced by a number of waterbird species, as well as predation of Piping Plover (*melodus*) adults, chicks and eggs.

With a "Medium" overall relative magnitude, habitat alteration resulting from industrial development on coastal lands (threat sub-category 1.2) accounts for 13% of conservation issues in the coastal areas. This habitat is also affected by other ecosystem modifications (sub-category 7.3), which have a "High" relative magnitude and account for 10% of reported threats. One of these modifications is the loss of Common Tern colonies, a threat to the Roseate Tern, which nests in these colonies. Another sub-category 7.3 threat is habitat alteration at Havre-aux-Basques in the Magdalen Islands, where numerous shorebird species can be found during migration.

The other threat sub-categories affecting priority species in coastal areas individually account for less than 5% of threats and have a "Low" or "Medium" overall relative magnitude.

The full list of threats in the coastal areas of BCR 14-QC, as well as the objectives, conservation actions and the species that could benefit, are presented in Table 24. The conservation objectives include reducing oil pollution, minimizing the disturbance of nesting sites and staging areas, reducing predation, and conserving and restoring coastal areas on the landscape. Some of the recommended conservation actions are to ensure compliance with federal legislation on oil spills, protect important nesting sites and staging areas, implement outreach campaigns on the effects of human disturbance, and continue and initiate predator control programs on the main coastal sites used by priority species.

Table 23. Priority species that use coastal habitats, details on habitat used, population objectives and reason for priority status.

Priority species	Details on habitat used	Population objective	Reason for priority status		
			At risk[1]	CC[2]	S[3]
American Scoter	Up to 250 m from the shoreline, mainly in Chaleur Bay	Maintain	-	-	X
Atlantic Puffin	Coastal islands without mammalian predators; the species nests in burrows dug in the grassy slopes of the shores or uses boulders, crevices or cliff ledges	Maintain	-	X	-
Barrow's Goldeneye (Eastern population)	Up to 50 m from the Gaspé Peninsula shoreline (Chaleur Bay)	Recovery objective[4]	X	X	-
Black Guillemot	Rocky habitat of coastal islands (crevices, boulders, cracks in rocks), crevices in the high cliffs of the mainland coast	Maintain	-	-	X
Black-bellied Plover	Flats	Assess/Maintain	-	X	-
Black-legged Kittiwake	Coastal or island cliff ledges	Maintain	-	X	-
Bonaparte's Gull	Flats	Assess/Maintain	-	X	-
Canada Goose (North Atlantic population)	Banks of the St. Lawrence River	Maintain	-	-	X
Canada Goose (Atlantic population)	Banks of the St. Lawrence River	Maintain	-	-	X
Common Eider (*dresseri*)	Edges of coniferous forest, dwarf trees and tallgrass prairies on the islands of the St. Lawrence Estuary; shoreline of the upper	Increase	-	X	-

[1] "At risk" includes species considered Endangered, Threatened or Special Concern pursuant to an assessment by the Committee on the Status of Endangered Wildlife in Canada; listed on Schedule 1 of SARA as Endangered, Threatened or Special Concern, and listed as Endangered, Vulnerable or Likely to be designated threatened or vulnerable under the *Loi sur les espèces menacées ou vulnérables* (Quebec).
[2] "Conservation concern" includes species considered of concern in the Partners in Flight database downloaded from www.partnersinflight.org, the Canadian Shorebird Conservation Plan (Donaldson et al., 2000), Canadian Shorebird Conservation Plan (Milko et al., 2003), the North American Waterfowl Management Plan (Plan Committee, 2004) or by regional experts.
[3] "Stewardship" includes abundant species with a wide range with a large percentage of their range or their continental population located in the conservation unit or sub-unit. These species include landbirds considered by Partners in Flight but also species from other bird groups that were added by experts.
[4] Refer to Environment Canada (2013).

Table 23 continued

Priority species	Details on habitat used	Population objective	Reason for priority status		
			At risk[1]	CC[2]	S[3]
	and lower St. Lawrence estuaries between Cape Marteau and Mitis Point				
Common Murre	Rocky habitat of coastal islands (crevices, boulders, cracks in rocks)	Maintain	-	X	-
Common Tern	Low islands, barrier beaches, sandbars (on rocky or sandy substrate) with low vegetation	Maintain	-	X	-
Double-crested Cormorant	Rocky or forest habitats on islands without mammalian predators	Maintain	-	-	X
Dunlin	Intertidal shorelines	Assess/Maintain	-	X	-
Great Black-backed Gull	Rocky or sandy islands, islands with low vegetation, barrier beaches or barrier islands, coastal or island cliff ledges, islands formed of dredged spoils	Maintain	-	-	X
Great Cormorant	Cliffs and plateaus of rocky islands (without predators); rocky shorelines	Maintain	-	-	X
Harlequin Duck (Eastern population)[5]	Up to 50 m from the shoreline; between Newport and Port-Daniel, to Forillon and to Île Bonaventure	Recovery objective	X	X	-
Herring Gull	Mainly islands (rocky, sandy and barrier islands, and islands formed of dredged spoils), as well as coastal and island cliff ledges, beaches and sand dunes	Increase 100%	-	X	-
Hudsonian Godwit	Intertidal shorelines	Assess/Maintain	-	X	-
Leach's Storm-Petrel	Slopes or plateau of coastal islands (without mammalian predators)	Increase 50%	X	X	-
Long-tailed Duck	St. Lawrence River, mainly offshore	Maintain	-	-	X
Northern Gannet	High cliffs with wide ledges and adjacent plateau of offshore islands	Maintain	-	-	X
Piping Plover (*melodus*)	Sandy beaches	Recovery objective[6]	X	X	-

[5] Refer to Environment Canada (2007).
[6] Refer to Environment Canada (2012c).

Table 23 continued

Priority species	Details on habitat used	Population objective	Reason for priority status		
			At risk[1]	CC[2]	S[3]
Purple Sandpiper	Rocky shores and beaches	Increase 50%	-	-	X
Razorbill	Rocky island habitats: cliff ledges, boulders, crevices, cracks in rocks	Maintain	-	-	X
Red Knot (*rufa*)[7]	Intertidal shorelines	Recovery objective	X	X	-
Red Phalarope	Coastal waters	Assess/Maintain	-	X	-
Red-breasted Merganser	Up to 250 m from the shoreline	Maintain	-	-	X
Red-necked Phalarope	Coastal waters	Assess/Maintain	-	X	-
Roseate Tern	Rocky coastal islands, barrier beaches. The species nests in Common Tern colonies.	Recovery objective[8]	X	X	-
Ruddy Turnstone	Intertidal shorelines	Increase 50%	-	X	-
Sanderling	Intertidal shorelines	Increase 50%	-	X	-
Semipalmated Sandpiper	Intertidal shorelines (migration)	Increase 100%	-	X	-
Short-billed Dowitcher (*griseus*)	Intertidal shorelines	Maintain	-	-	X
Surf Scoter	Up to 250 m from the shoreline	Maintain	-	-	X
Thick-billed Murre	Cliff ledges of rocky coastal islands	Increase 50%	-	X	-
Whimbrel	Coast and uplands	Assess/Maintain	-	X	-

[7] Species at risk listed on Schedule 1 of SARA, but for which there are no recovery documents finalized at this time. Official documents related to SARA will prevail as soon as they are published; however, the interim population objective for this species is Increase 100%.
[8] Refer to Environment Canada (2010).

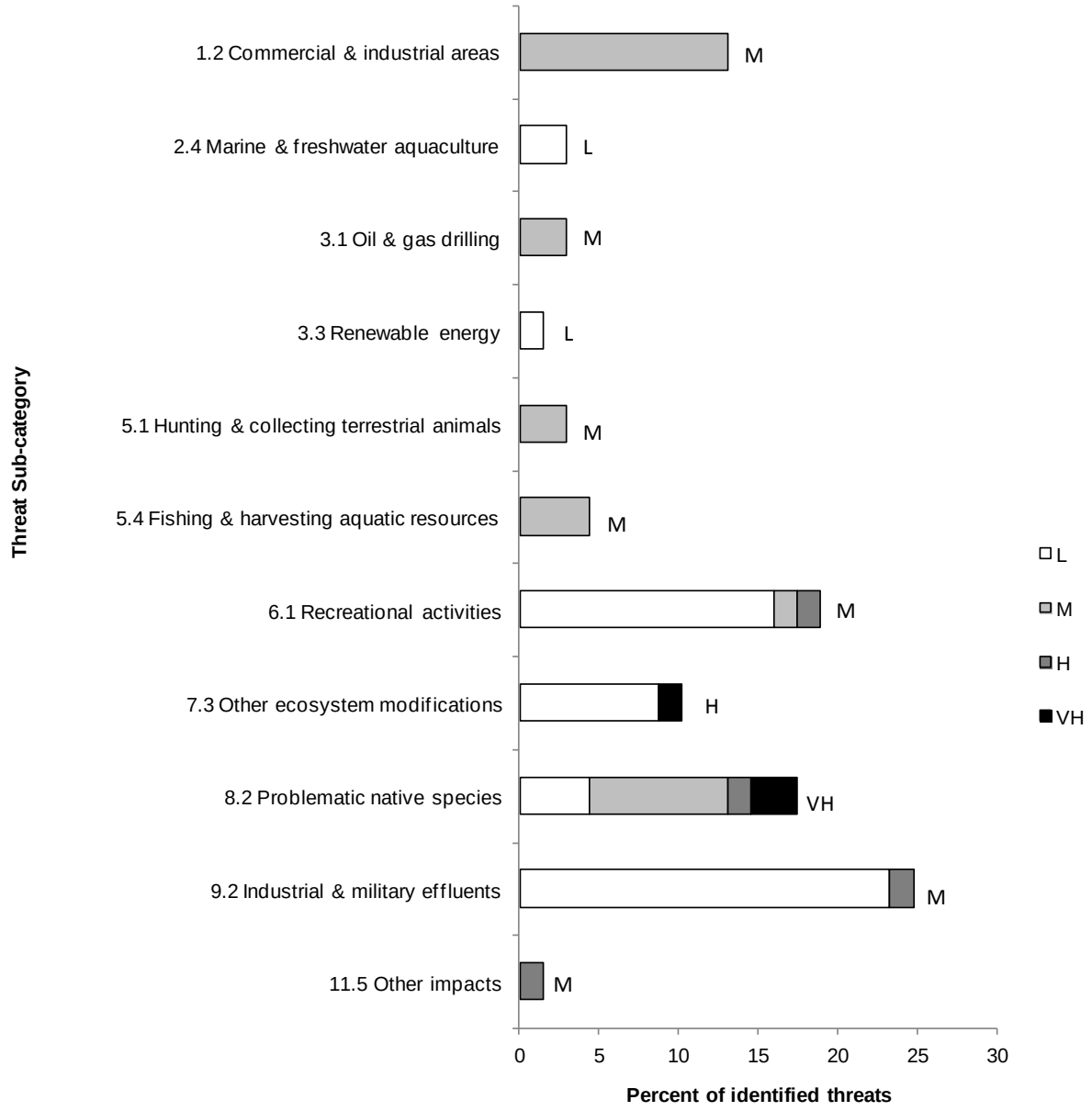

Figure 27. Percentage of identified threats to priority species in coastal habitats in each threat sub-category. Each bar represents the percent of the total number of threats identified in each threat sub-category in coastal habitats (for example, if 100 threats were identified in total for all priority species in coastal habitats, and 10 of those threats were in the category "1.1 Housing & urban areas," the bar on the graph would represent this as 10%). The bars are divided to show the distribution of Low (L), Medium (M), High (H) and Very High (VH) rankings of individual threats within each threat sub-category. For example, the same threat may have been ranked H for one species and L for another; the shading illustrates the proportion of L, M, H and VH rankings in the sub-category. The overall magnitude of the sub-threat in coastal habitats is shown at the end of each bar (also presented in Table 4, Relative magnitude of identified threats to priority species within BCR 14-QC by threat category and broad habitat class).

Table 24. Threats addressed, conservation objectives, recommended actions and priority species affected in the coastal habitats of BCR 14-QC.

Threats addressed	Threat sub-category	Objectives	Objective sub-category	Recommended actions	Action sub-category	Priority species affected[1]
Habitat alteration (industrial projects in coastal areas).	1.2 Commercial & industrial areas	Conserve and restore the quantity and quality of coastal wetlands on the landscape.	1.1. Ensure land and resource-use policies and practices maintain or improve bird habitat.	Identify, characterize and protect critical staging areas through stewardship or by legally designating them conservation areas.	1.1 Site/area protection	Hudsonian Godwit, Red Knot (*rufa*), Sanderling, Semipalmated Sandpiper, Dunlin, Whimbrel, Red-necked Phalarope, Red Phalarope, Ruddy Turnstone
Habitat loss due to current and potential aquaculture.	2.4 Marine & freshwater aquaculture	Conserve and restore the quality and quantity of coastal habitats on the landscape.	1.1. Ensure land and resource-use policies and practices maintain or improve bird habitat.	Implement the mitigation and prevention actions identified in project environmental assessments. Quantify the potential overlap between mussel harvesting/aquaculture and the use of these resources by priority species, and assess the impact of these activities.	5.3 Private sector standards and codes 8.1 Research	Harlequin Duck (Eastern population), Common Eider (*dresseri*)
Potential offshore oil exploration and development.	3.1 Oil & gas drilling	Recovery of species at risk.	3.4. Implement recovery strategies for species at risk	Continue to implement the Harlequin Duck (Eastern population) management plan (Environment Canada 2007). Continue to implement the Barrow's Goldeneye (Eastern population) management plan (Environment Canada 2013).	3.2 Species recovery	Harlequin Duck (Eastern population), Barrow's Goldeneye (Eastern population)

[1] Priority species whose only identified threat is in category "12.1 Information lacking" are not mentioned in this table.

Table 24 continued

Threats addressed	Threat sub-category	Objectives	Objective sub-category	Recommended actions	Action sub-category	Priority species affected[1]
Potential offshore wind farms.	3.3 Renewable energy	Recovery of species at risk.	3.4. Implement recovery strategies for species at risk	Continue to implement the Harlequin Duck (Eastern population) management plan (Environment Canada 2007).	3.2 Species recovery	Harlequin Duck (Eastern population)
Hunting (being confused with the Common Goldeneye).	5.1 Hunting & harvesting terrestrial animals	Recovery of species at risk.	3.4. Implement recovery strategies for species at risk	Continue to implement the Barrow's Goldeneye (Eastern population) management plan (Environment Canada 2013).	3.2 Species recovery	Barrow's Goldeneye (Eastern population)
Poaching	5.1 Hunting & harvesting terrestrial animals	Recovery of species at risk.	3.4. Implement recovery strategies for species at risk	Continue to implement the Harlequin Duck (Eastern population) management plan (Environment Canada 2007).	3.2 Species recovery	Harlequin Duck (Eastern population)
Seaweed harvesting along the shoreline.	5.4 Fishing & harvesting aquatic resources	Promote research on the possible effects of seaweed harvesting on the reproductive success of sea ducks.	7.4. Improve understanding of causes of population declines	Quantify the potential overlap between seaweed harvesting and the use of these resources by the Eider during brood rearing, and assess the impact of this activity on duckling survival.	8.1 Research	Common Eider (*dresseri*)
Bycatch in fishing nets.	5.4 Fishing & harvesting aquatic resources	Reduce bycatch mortality in fishing gear.	2.4 Reduce accidental mortality	Implement beneficial management practices.	5.3 Private sector standards and codes	Harlequin Duck (Eastern population), Common Eider (*dresseri*)
Disturbance of staging areas.	6.1 Recreational activities	Minimize disturbance near staging areas.	4.1. Reduce disturbance from human recreation	Increase public awareness through outreach campaigns on the sensitivity of certain species to human disturbance.	4.3 Awareness and communications	Hudsonian Godwit, Red Knot (*rufa*), Sanderling, Semipalmated Sandpiper, Dunlin, Black-bellied Plover, Ruddy Turnstone

Table 24 continued

Threats addressed	Threat sub-category	Objectives	Objective sub-category	Recommended actions	Action sub-category	Priority species affected[1]
Disturbance of nesting sites.	6.1 Recreational activities	Conserve important nesting habitats in the BCR. Protect at least 75% of suitable nesting sites on the Magdalen Islands (applies to the Piping Plover). Minimize disturbance near nesting sites.	1.4. Maintain important bird habitat features on the landscape 4.1. Reduce disturbance from human recreation	Protect important nesting sites through stewardship or by legally designating them conservation areas. Limit activities near nesting sites during the breeding season. Establish buffer zones around known nesting sites. Increase public awareness through outreach campaigns on the vulnerability of certain species to disturbance.	1.1 Site/area protection 2.1 Site/area management 4.3 Awareness and communications	Common Eider (*dresseri*), Thick-billed Murre, Common Murre, Piping Plover (*melodus*), Common Tern
Recreational use of coastal areas (e.g., for boating activities).	6.1 Recreational activities	Recovery of species at risk.	3.4. Implement recovery strategies for species at risk	Continue to implement the Harlequin Duck (Eastern population) management plan (Environment Canada 2007).	3.2 Species recovery	Harlequin Duck (Eastern population)
Habitat alteration at Havre-aux-Basques in the Magdalen Islands.	7.3 Other ecosystem modifications	Conserve and restore the quantity and quality of wetlands on the landscape.	1.1. Ensure land and resource-use policies and practices maintain or improve bird habitat.	Identify, characterize and protect critical staging areas through stewardship or by legally designating them conservation areas.	1.1 Site/area protection	Hudsonian Godwit, Red Knot (*rufa*), Sanderling, Semipalmated Sandpiper, Dunlin, Black-bellied Plover

Table 24 continued

Threats addressed	Threat sub-category	Objectives	Objective sub-category	Recommended actions	Action sub-category	Priority species affected[1]
Limited number of nesting sites (loss of Common Tern colonies reduces the number of suitable nesting sites).	7.3 Other ecosystem modifications	Recovery of species at risk.	3.4. Implement recovery strategies for species at risk	Continue to implement the amended recovery strategy for the Roseate Tern (Environment Canada 2010).	3.2 Species recovery	Roseate Tern
Nest predation (primarily by foxes and gulls).	8.2 Problematic native species	Increase the survival rate and productivity at nesting sites. Develop research projects to fill knowledge gaps (applies to the Common Eider).	2.5. Reduce parasitism/predation 7.4. Improve understanding of causes of population declines	Maintain existing predator control programs and assess the possibility of introducing new ones. Assess the impact of gull predation on the survival of Common Eider ducklings.	2.2 Invasive/problematic species control 8.1 Research	Common Eider (*dresseri*), Herring Gull, Atlantic Puffin, Black-legged Kittiwake, Leach's Storm-Petrel, Roseate Tern, Common Tern
Outbreaks	8.2 Problematic native species	Maintain and improve emergency response programs. Reduce the impact of wildlife diseases in coastal habitats.	2.6. Reduce the spread of disease.	Maintain the effectiveness of emergency response programs to prevent and reduce disease-related mortality. Study the dynamics of avian cholera and the factors that contribute to outbreaks.	3.2 Species recovery 8.1 Research	Common Eider (*dresseri*)
Predation of adults, chicks or eggs.	8.2 Problematic native species	Recovery of species at risk.	3.4. Implement recovery strategies for species at risk	Continue to implement the recovery strategy for the Piping Plover (Environment Canada 2012d).	3.2 Species recovery	Piping Plover (*melodus*)
Predation in staging areas.	8.2 Problematic native species	Reduce mortality and disturbance in staging areas.	2.5. Reduce parasitism/predation	Maintain existing predator control programs and explore the possibility of introducing new ones.	2.2 Invasive/problematic species control	Red Knot (*rufa*), Semipalmated Sandpiper

Table 24 continued

Threats addressed	Threat sub-category	Objectives	Objective sub-category	Recommended actions	Action sub-category	Priority species affected[1]
Nesting site competition with the Common Murre and Razorbill.	8.2 Problematic native species	Maintain and increase monitoring of seabird colonies.	7.1 Improve population/demographic monitoring	Continue to monitor seabirds in the Magdalen Islands	8.2 Monitoring	Thick-billed Murre
Oil Spills	9.2 Industrial & military effluents	Maintain and improve emergency response programs. Reduce deliberate discharges of oily ship waste into the ocean.	2.3 Reduce mortality and/or sub-lethal effects of oil pollution	Maintain the effectiveness of emergency response programs. Prevent ships from discharging oily waste into the ocean by ensuring compliance with federal legislation.	2.3 Habitat and natural process restoration 5.4 Compliance and enforcement	Harlequin Duck (Eastern population), Hudsonian Godwit, Red Knot (*rufa*), Sanderling, Semipalmated Sandpiper, Dunlin, Common Eider (*dresseri*), Barrow's Goldeneye (Eastern population), Thick-billed Murre, Common Murre, Atlantic Puffin, Bonaparte's Gull, Red Phalarope, Black-bellied Plover, Piping Plover (*melodus*), Ruddy Turnstone
Sediment contamination (polychlorinated biphenyls, polycyclic aromatic hydrocarbons, lead and mercury).	9.2 Industrial & military effluents	Recovery of species at risk.	3.4. Implement recovery strategies for species at risk	Continue to implement the Barrow's Goldeneye (Eastern population) management plan (Environment Canada 2013).	3.2 Species recovery	Barrow's Goldeneye (Eastern population)

Table 24 continued

Threats addressed	Threat sub-category	Objectives	Objective sub-category	Recommended actions	Action sub-category	Priority species affected[1]
Prey distribution changes caused by climate change.	11.5 Other impacts	Reduce potential impact of climate change on coastal habitats.	6.2. Manage for habitat resilience as climate changes	Promote the reduction of greenhouse gas emissions.	6.2 Substitution	Thick-billed Murre

Riparian

A riparian area is defined as the 15 m interface between land and a river or stream. Based on BCR 14-QC's hydrographic system (see Fig. 24), it is estimated that this habitat accounts for only 0.5% of the land, but it occurs commonly on the landscape.

The riparian areas of BCR 14-QC are home to seven priority species, including five landbirds and two waterfowl species (Table 25). The only species selected for stewardship purposes is the American Black Duck. Within the riparian areas are three priority species at risk that are listed on Schedule 1 of SARA (the Harlequin Duck [Eastern population], Olive-sided Flycatcher and Rusty Blackbird) and one species that is at risk provincially (Bald Eagle).

The three threat sub-categories affecting priority species in this habitat are “5.1 Hunting & harvesting terrestrial animals,” “5.3 Logging & wood harvesting” and “7.3 Other ecosystem modifications,” each accounting for 20% of reported threats (Fig. 28). While logging has a “High” overall relative magnitude, hunting and other ecosystem modifications are of “Medium” magnitude. The threats linked to sub-category 5.1 involve the deliberate killing or accidental trapping of the Bald Eagle, and poaching of the Harlequin Duck. The conservation issues relating to logging and wood harvesting are the loss of wooded riparian strips and important bird habitat features (large-diameter trees). Lastly, the only threat in sub-category 7.3 is the erosion of banks used by the Bank Swallow and Belted Kingfisher for nesting.

Four other sub-categories each account for 10% of conservation issues and have a “Low” or “Medium” overall relative magnitude. Threats associated with these sub-categories are collisions with power lines and other structures (sub-category 4.2), disturbance of nesting sites from recreational activities (6.1), overuse of pesticides (9.3), and increased frequency of adverse weather events (11.5).

The full list of threats in the riparian areas of BCR 14-QC, as well as the objectives, conservation actions and species that could benefit, are presented in Table 26. Conservation objectives are aimed at conserving and restoring the quality and quantity of riparian habitats on the landscape and recovering species at risk. Conservation actions include expanding the wooded riparian strips to be conserved as part of forest management.

Table 25. Priority species that use riparian habitats, details on habitat used, population objectives and reasons for priority status.

Priority species	Details on habitat used	Population objective	Reason for priority status		
			At risk[1]	CC[2]	S[3]
American Black Duck	Lakeshore, banks of rivers and streams	Increase	-	-	X
Bald Eagle	Forest areas near or beside the edges of major watercourses	Provincial recovery objective[4]	X	X	-
Bank Swallow	Riparian slopes	Increase 50%	-	X	-
Belted Kingfisher	Lakes, rivers	Increase 50%	-	X	-
Harlequin Duck (Eastern population)	Fast-flowing rivers in the Gaspé Peninsula	Recovery objective[5]	X	X	-
Olive-sided Flycatcher[6]	Riparian stands of mixed wood or conifers	Recovery objective	X	X	-
Rusty Blackbird[6]	Riparian forests	Recovery objective	X	X	-

[1] "At risk" includes species considered Endangered, Threatened or Special Concern pursuant to an assessment by the Committee on the Status of Endangered Wildlife in Canada; listed on Schedule 1 of SARA as Endangered, Threatened or Special Concern, and listed as Endangered, Vulnerable or Likely to be designated threatened or vulnerable under the *Loi sur les espèces menacées ou vulnérables* (Quebec).
[2] "Conservation concern" includes species considered of concern in the Partners in Flight database downloaded from www.partnersinflight.org, the Canadian Shorebird Conservation Plan (Donaldson et al., 2000), Canadian Shorebird Conservation Plan (Milko et al., 2003), the North American Waterfowl Management Plan (Plan Committee, 2004) or by regional experts.
[3] "Stewardship" includes abundant species with a wide range with a large percentage of their range or their continental population located in the conservation unit or sub-unit. These species include landbirds considered by Partners in Flight but also species from other bird groups that were added by experts.
[4] Refer to Comité de rétablissement du pygargue à tête blanche au Québec (2002).
[5] Refer to Environment Canada (2007).
[6] Species listed on Schedule 1 of SARA but for which there are no recovery documents finalized at this time. Official documents related to SARA will prevail as soon as they are published; however, the interim population objectives for these species are Olive-sided Flycatcher: Increase 100%; Rusty Blackbird: Increase 100%.

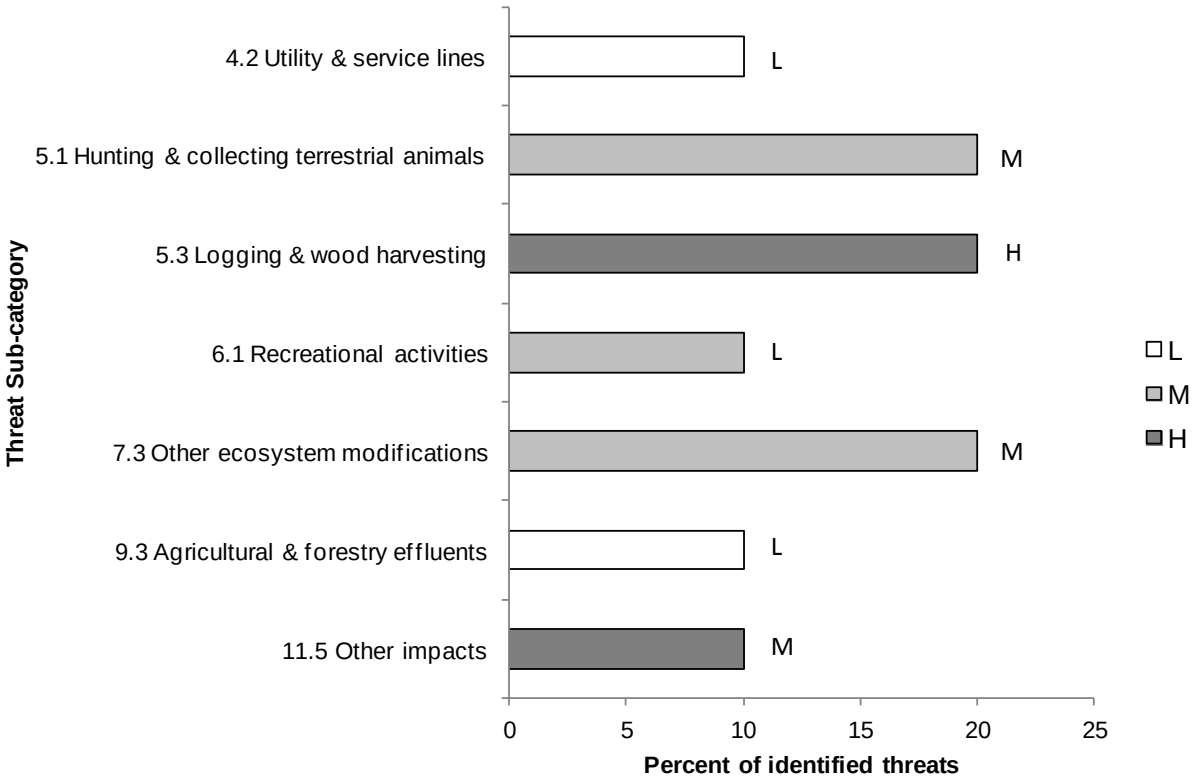

Figure 28. Percent of identified threats to priority species in riparian habitats in each threat sub-category. Each bar represents the percent of the total number of threats identified in each threat sub-category in riparian habitat (for example, if 100 threats were identified in total for all priority species in riparian habitat, and 10 of those threats were in the category "1.1 Housing & urban areas," the bar on the graph would represent this as 10%). The bars are divided to show the distribution of Low (L), Medium (M), High (H) and Very High (VH) rankings of individual threats within each threat sub-category. For example, the same threat may have been ranked H for one species but L for another; the shading illustrates the proportion of L, M, H and VH rankings in the sub-category. The overall magnitude of the sub-threat in riparian habitat is shown at the end of each bar (also presented in Table 4, Relative magnitude of identified threats to priority species within BCR 14-QC by threat category and broad habitat class).

Table 26. Threats addressed, conservation objectives, recommended actions and priority species affected in riparian habitats of BCR 14-QC.

Threats addressed	Threat sub-category	Objectives	Objective sub-category	Recommended actions	Action sub-category	Priority species affected[1]
Collisions with power lines and other human-made structures	4.2 Utilities & service lines	Recovery of species at risk.	3.4. Implement recovery strategies for species at risk	Continue to implement the Bald Eagle provincial recovery plan (Comité de rétablissement du pygargue à tête blanche au Québec 2002).	3.2 Species recovery	Bald Eagle
Deliberate hunting or accidental trapping.	5.1 Hunting & harvesting terrestrial animals	Recovery of species at risk.	3.4. Implement recovery strategies for species at risk	Continue to implement the Bald Eagle provincial recovery plan (Comité de rétablissement du pygargue à tête blanche au Québec 2002).	3.2 Species recovery	Bald Eagle
Poaching	5.1 Hunting & harvesting terrestrial animals	Recovery of species at risk.	3.4. Implement recovery strategies for species at risk	Continue to implement the Harlequin Duck (Eastern population) management plan (Environment Canada 2007).	3.2 Species recovery	Harlequin Duck (Eastern population)
Habitat loss (scarcity of large-diameter trees).	5.3 Logging & wood harvesting	Recovery of species at risk.	3.4. Implement recovery strategies for species at risk	Continue to implement the Bald Eagle provincial recovery plan (Comité de rétablissement du pygargue à tête blanche au Québec 2002).	3.2 Species recovery	Bald Eagle
Loss of wooded riparian strips.	5.3 Logging & wood harvesting	Conserve and restore the quality and quantity of riparian habitats on the landscape.	1.1. Ensure land and resource-use policies and practices maintain or improve bird habitat.	Expand the wooded riparian strips to be conserved as part of forest management.	5.3 Private sector standards and codes	Rusty Blackbird
Disturbance of nesting sites.	6.1 Recreational activities	Recovery of species at risk.	3.4. Implement recovery strategies for species at risk	Continue to implement the Bald Eagle provincial recovery plan (Comité de rétablissement du pygargue à tête blanche au Québec 2002).	3.2 Species recovery	Bald Eagle

[1] Priority species whose only identified threat is in category "12.1 Information lacking" are not mentioned in this table.

Table 26 continued

Threats addressed	Threat sub-category	Objectives	Objective sub-category	Recommended actions	Action sub-category	Priority species affected[1]
Erosion of riparian strips used for nesting.	7.3 Other ecosystem modifications	Conserve and restore the quality and quantity of riparian habitats on the landscape.	1.1. Ensure land and resource-use policies and practices maintain or improve bird habitat.	Maintain/restore a riparian strip that is sufficiently wide based on the sub-habitat and species present. Maintain and restore riparian habitats.	2.3 Habitat and natural process restoration	Bank Swallow, Belted Kingfisher
Overutilization of pesticides (bird poisoning, eggshell thinning, reduction in prey insects and prey fish, leaching to adjacent habitats).	9.3 Agricultural & forestry effluents	Recovery of species at risk.	3.4. Implement recovery strategies for species at risk	Continue to implement the Bald Eagle provincial recovery plan (Comité de rétablissement du pygargue à tête blanche au Québec 2002).	3.2 Species recovery	Bald Eagle
Higher frequency of adverse weather events due to climate change that may affect migration, reproductive success, availability of prey or nesting phenology.	11.5 Other impacts	Reduce the potential impact of climate change on riparian habitats.	6.2. Manage for habitat resilience as climate changes	Promote the reduction of greenhouse gas emissions.	6.2 Substitution	Olive-sided Flycatcher

Section 3: Additional Issues

Widespread Issues

Some well-known conservation issues may not be identified in the literature as significant threats to populations of an individual priority species and therefore may not be captured in the threat assessment. However, these issues, while they may or may not be limiting factors for any individual species or population, contribute to avian mortality or decreases in fecundity across many species and thus warrant conservation attention. Usually these issues transcend habitat types and are considered "widespread". Examples of these issues include:

- Collisions with human-made structures (buildings, cars, utility/telecommunications towers and lines, etc.)
- Predation by domestic cats
- Pollution/pesticides/oil spills
- Climate change

Because the widespread issues do not fit into the standard presentation format used in the BCR strategies, they are presented separately here. The mortality estimates included here are largely based on draft reports that were available within Environment Canada when this strategy was produced; the numbers may change as the final scientific papers are peer-reviewed and published. Human-related avian mortality across all sectors was standardized and compared in Calvert *et al*. 2013.

Collisions

Buildings

Collisions with glass windows or reflective panels on buildings, are believed to be a significant source of bird mortality in Canada. Estimates of mortality from collisions with houses in Canada (including birds using feeders) range from approximately 15.8–30.5 million birds per year (Machtans et al. 2013). Mortality from collisions with buildings of fewer than 12 storeys is estimated at approximately 0.3–11.4 million birds/year, and for all cities in Canada with tall buildings in an urban core the estimate is 13 000 – 256 000 birds/year (Machtans et al. 2013). The total estimate of mortality from collisions with buildings in Canada is therefore between 16.1 and 42.2 million birds/year (Machtans et al. 2013).

Data from Canada and the northeastern United States reveal that 163 species of birds of 32 families are known to have been killed by buildings. Some families and species of birds are disproportionately affected by collisions with buildings. *Parulidae* (warblers), *Fringillidae* (sparrows and allies) and *Regulidae* (kinglets) account for 70% of all bird deaths; the species most frequently killed are White-throated Sparrows (13.5% of all reported deaths), Golden-crowned Kinglets (10.2%), Dark-eyed Juncos (6.1%), Ovenbirds (5.3%) and Ruby-crowned Kinglets (5.3%). The population-level effects of bird mortality from building strikes are unknown. See Table 27 for conservation objectives and actions.

Wind Turbines

The 2 955 wind turbines in Canada in 2011 have drawn considerable attention for their potential to cause mortality to birds and other species (notably bats). Two sources of mortality are typically associated with wind turbines: collisions with the turbines themselves, and the destruction of nests by turbine construction activities during the breeding season. On average, 5.9 birds are killed per turbine per year. Scaling up to a national level, an estimated 16 700 birds (range 13 300–21 600) die from collisions with wind turbines each year (Zimmerling et al. 2013).

Some species are particularly vulnerable to collisions with wind turbines; for example, raptors flying along a land/water interface. For smaller, more common passerine species (warblers, thrushes, kinglets, etc.), the relatively small number of birds affected does not appear to pose a population level threat. However, the anticipated proliferation of wind turbines means we should continue to ensure that turbines are sited to avoid important bird habitats and migration corridors.

At the 43 wind farms in Canada for which data are available, total habitat loss per turbine is 1.23 ha on average. Based on this average, the predicted total habitat loss for wind farms nationwide is 3 635 ha. Using published estimates of nest densities, the total number of affected nests, not accounting for construction that might occur outside the breeding season, is approximately 5 700 (Zimmerling et al. 2013). See Table 27 for conservation objectives and actions.

Communication Towers

There are currently almost 8 000 communication towers in Canada >60 m high (Longcore et al. 2012), each of which can pose a hazard to birds during migration. Birds are attracted to the lights of communication towers and are killed when they collide with the structures and guy wires. Mortality increases exponentially with tower height, in part because the use of guy wires also increases with tower height. Poor weather also plays a significant role in increasing migrant fatality; foggy and cloudy conditions increase the lit area around towers and block celestial clues used by migrating birds. The result is that birds circle to exhaustion in the halo of artificial light or collide with each other, the tower or its guy wires (American Bird Conservancy 2012).

Avian mortality at towers is unequally distributed among species and regions, but estimates suggest that over 220 000 birds are killed in Canada each year (Longcore et al. 2012).

Neotropical migrants in the families *Parulidae* (wood-warblers) and *Vireonidae* (vireos) are the species most commonly killed by communication towers. These families include threatened species and many that are of conservation concern in Canada and/or the United States. When considered in concert with mortality at towers in the United States (which is 20 times higher due to the larger number and greater height of towers in the United States), and the mortality from other stationary structures, mortality from collisions with communication towers may negatively affect the population trends of some birds. See Table 27 for conservation objectives and actions.

Power Lines

Birds may be killed by colliding with power lines, or they may be electrocuted. Species with high wing-loading and thus low maneuverability, such as waterfowl, appear particularly at risk for collisions (Bevanger 1998). Electrocutions are most likely for large birds such as raptors and herons, whose bodies are large enough to span the distances between wires and create a short circuit. Raptors' habit of using power poles as perches further increases their risk. However, estimates of total mortality due to collisions and electrocutions can vary widely (Manville 2005) and population-level impacts are difficult to determine. Canadian estimates are that 161,000–802 000 birds are killed annually by electrocution and another 5.3–20.6 million birds are killed each year by colliding with electrical transmission lines (Calvert et al. 2013). See Table 27 for conservation objectives and actions.

Vehicles

There are over 1.4 million km of roads and hundreds of airports in Canada (World Bank Indicators 2012) that are often bordered by fences and vegetation that provide convenient places for birds to perch, forage and nest. The paved surfaces can attract birds through the heat they emit, the puddles that form beside roads, and the salt and grit used for de-icing. Current estimates for one- and two-lane paved roads outside of major urban centres in Canada are that between 4.65 and 13.8 million birds are killed annually (Bishop and Brogan 2013).

Bird collisions with cars are influenced by the location of the road, proximity of vegetation, and vehicle speed. Raptors and owls that hunt and forage near roads are particularly vulnerable, but many species that forage for grit and road salt or are otherwise attracted to roads have a high likelihood of being hit by vehicles. The population-level effects of this source of mortality are not known. See Table 27 for conservation objectives and actions.

Predation by Domestic Cats

Based on the number of pet cats in Canada and published kill rates by cats elsewhere, roughly 204 million birds (range 105–348 million) are killed by domestic and feral cats in Canada each year (Blancher 2013). The broad range on this estimate reflects imprecise information on the average number of bird kills per cat, especially for rural and feral cats, and a lack of information on the number of feral cats (versus owned or pet cats) in Canada.

The birds most susceptible to cat predation are those that nest or forage on or near the ground, or spend substantial time in human-dominated landscapes (both rural and urban) where cats are abundant. The proportion of Canada's birds killed by cats would be higher if additional cat predation when migrating through, or wintering in, the U.S. is factored in.

Without detailed study of the individual species affected, it is difficult to assess whether mortality caused by cat predation impacts population trends of birds in Canada. Nevertheless, it is likely that many species of birds are potentially vulnerable to population effects at the local scale in southern Canada. See Table 27 for conservation objectives and actions.

Pollution

Pollution caused by industrial chemicals, pesticides and heavy metals can have both direct and indirect effects on survival and reproduction in birds. Sometimes the effects of exposure to pollutants are unexpected and do not result in immediate, measurable impacts on bird populations (Eeva and Lehikoinen 2000, Franceschini et al. 2008, North American Bird Conservation Initiative, U.S. Committee 2009, Mineau 2010). However, persistent exposure can result in sharp declines in bird populations as happened with Peregrine Falcons in eastern Canada prior to the ban of DDT. See Table 27 for conservation objectives and actions.

Pesticides

The most recent estimate suggests that 0.96–4.4 million birds are killed by pesticides annually in Canada (Mineau 2010). Provinces such as Saskatchewan, which have a large agricultural land base, account for the majority of the estimated kill, and pesticides are thought to be an important contributor to the decline in grassland bird species in Canada (Mineau 2010). Pesticides can kill birds rapidly following contact or may have sub-lethal impacts such as suppressed immune function and reduced stress response. There may also be indirect effects of pesticides such as reduction in prey and changes in vegetation that reduce habitat quality. While the use of the many toxic pesticides has been eliminated in Canada, migratory birds are still exposed while on wintering grounds in countries where their use is still permitted (Mineau 2010). See Table 27 for conservation objectives and actions.

Toxic Chemicals and Heavy Metals

Toxic organic chemicals and heavy metals released into the environment can also negatively impact bird populations. While some industrial chemicals such as PCBs are regulated, there is concern about new chemicals such as flame retardants (PBDE) that are used in computers, car parts and upholstery, and whose effects on wildlife are largely unknown (Environment Canada 2003). Scavengers experience toxic effects when they ingest lead shotgun pellets or bullet fragments embedded in carcasses of game animals, and loons and other waterbirds are exposed to lead from shotgun pellets, sinkers and jigs that they ingest either while collecting grit for their gizzards or by eating bait fish with line and sinker still attached (Scheuhammer and Norris 1996, Scheuhammer et al. 2003). In some areas, lead poisoning from sinkers and jigs can account for approximately half of the mortality of adult Common Loons on their breeding grounds (Scheuhammer and Norris 1996). Birds are also susceptible to bioaccumulation of other toxic metals such as methylmercury, selenium and others when they consume prey that has been exposed to these substances. See Table 27 for conservation objectives and actions.

Oil Pollution

Oil may enter the environment either accidentally, through deliberate dumping or in contained tailings ponds. It may be a single large event, as occurred in the Gulf of Mexico in 2010, or numerous smaller events. Annual estimates are that between 217 800 and 458 600 birds are killed by ship-source oil spills annually (Calvert et al. 2013). Typically, diving birds are most at risk of oiling; however, any birds that come into contact with oil are vulnerable. Oil can impact birds through direct effects such as hypothermia (resulting from lost water proofing of feathers

following oil contamination), toxicity (from ingesting oil as they preen or by inhaling volatile organic compounds) and indirect effects, such as reduced prey availability and decreased quality of habitat. While techniques exist to clean and rehabilitate oiled birds, many birds die before, during and after rescue attempts (Brown and Lock 2003). See Table 27 for conservation objectives and actions.

Table 27. Conservation objectives and actions associated with bird mortality from collisions, cats and contaminants.

Threats addressed	Threat sub-category	Objective	Objective category	Recommended actions	Action category	Example priority species affected
Collision mortality						
Collisions with buildings cause bird mortality.	1.1 Housing and urban areas 1.2 Commercial and industrial areas	Reduce incidental mortality from collisions with windows/buildings	2.7 Reduce incidental mortality from collisions	Follow best management practices for bird-friendly buildings including using bird-friendly glass, reducing reflection from windows, providing visual markers to enable birds to perceive windows, and reducing light pollution.	2.1 Site/area management 5.3 Private sector standards and codes	All species
Collisions with wind turbines cause bird mortality.	3.3 Renewable energy	Reduce incidental mortality from collisions with wind turbines	2.7 Reduce incidental mortality from collisions.	Follow beneficial management practices for reducing bird mortality when designing and locating wind turbines. Ensure that offshore wind energy developments will not present significant migration barriers. Locate offshore wind energy developments away from seabird breeding colonies and important waterbird foraging areas. Utilize techniques such as radar monitoring to determine pre-construction flight paths and assess the degree to which wind farms present migration barriers, and infrared camera systems to quantify strike rates.	2.1 Site/area management 5.3 Private sector standards and codes 1.2 Resource and habitat protection 8.2 Monitoring	All species

Table 27 continued

Threats addressed	Threat sub-category	Objective	Objective category	Recommended actions	Action category	Example priority species affected
Collisions with communications towers cause bird mortality, particularly during migration.	1.2 Commercial and industrial areas	Reduce incidental mortality from collisions with human-made structures	2.7 Reduce incidental mortality from collisions.	Follow beneficial management practices for reducing mortality to birds when constructing new communications towers. Switch off solid lights on existing towers and ensure that remaining lights have a synchronized, complete dark phase. Take steps to ensure that new towers avoid guy wires and minimize height, and avoid topographic locations where migrating birds are likely to be found in abundance. Retrofit existing towers to adhere to as many guidelines as possible.	2.1 Site/area management 5.3 Private sector standards and codes	All species
Collisions with power lines and accidental electrocution cause bird mortality.	4.2 Utility and service lines	Reduce mortality from collisions with utility lines / transmission towers	2.7 Reduce incidental mortality from collisions.	In high-risk areas, retrofit power lines so that the risk of electrocution of raptors is minimized. In new developments, locate transmission lines underground. Use markers or paint to increase visibility of power lines in high-strike areas. Avoid siting lines over or near wetlands.	2.1 Site/area management	Bald Eagle, Golden Eagle, Peregrine Falcon (*anatum/tundrius*)
Collisions with vehicles cause bird mortality.	4.1 Roads and railroads	Reduce mortality from collisions with vehicles	2.7 Reduce incidental mortality from collisions.	Erect road signs or speed bumps to lower vehicle speeds where bird activity is frequent. Remove plants that attract birds from roadsides and medians. Landscape along roads using taller trees and bushes to cause birds to fly higher. Encourage the use of salt management	2.1 Site/area management	Bald Eagle, Barn Swallow, Brown Thrasher, Common Nighthawk, Killdeer, Short-eared Owl

Table 27 continued

Threats addressed	Threat sub-category	Objective	Objective category	Recommended actions	Action category	Example priority species affected
				plans to avoid unnecessary use of particulate salt (a bird attractant) on roads. Avoid locating roads in valuable bird habitat.	1.1 Site/area protection	
Population effects of collisions are unknown.	12.1 Information lacking	Improve understanding of population effects of mortality from collisions	7.4 Improve understanding of causes of population declines.	Assess the biological importance of bird kills from all sources of collisions.	8.1 Research	All species
Predation by domestic cats						
Predation by domestic and feral cats.	8.1 Invasive non-native/ alien species	Reduce mortality from domestic and feral cats	2.4 Reduce incidental mortality.	Implement a "Cats Indoors!" Campaign following the guidelines of the American Bird Conservancy (www.abcbirds.org/abcprograms/policy/cats/index.html). Work to reduce feral cat overpopulation through cat control regulations.	5.3 Private sector standards and codes 5.2 Policies and regulations	Ground nesting or ground foraging species; species attracted to feeders; species inhabiting suburban or urban areas
Population effects of cat predation are unknown.	12.1 Information lacking	Improve understanding of population effects of cat predation	7.4 Improve understanding of causes of population declines.	Evaluate which species are most vulnerable to cat predation. Investigate the population-level effects of cat predation through better monitoring of kill rates and the number of feral cats. Continue to monitor bird populations so changes in numbers and distributions can be identified and management of cats can be altered to reflect these changes. Conduct effectiveness monitoring to evaluate if mitigation activities are achieving the desired results.	8.1 Research 8.2 Monitoring	Ground nesting or ground foraging species; species attracted to feeders; species inhabiting suburban or urban areas

Table 27 continued

Threats addressed	Threat sub-category	Objective	Objective category	Recommended actions	Action category	Example priority species affected
Environmental contaminants						
Mortality, sub-lethal effects, reductions in prey populations and habitat alteration caused by exposure to/use of pesticides.	9.3 Agricultural & forestry effluents	Reduce mortality and sub-lethal effects of pesticides on birds Reduce the effects of pesticides on prey species	2.1 Reduce mortality and/or sub-lethal effects from pesticide use. 5.1 Maintain natural food webs and prey sources.	Substantially reduce the use of pesticides/rodenticides/herbicides in Canada. Where elimination is not possible, they should be used as part of an integrated pest management system. Improve regulation of pesticides/rodenticides/herbicides in Canada to reduce bird mortality.	5.3 Private sector standards and codes 5.2 Policies and regulations	**Direct or indirect poisoning by pesticides:** Bald Eagle, Barn Swallow, Bobolink, Common Nighthawk, Eastern Meadowlark, Killdeer, Least Bittern, Virginia Rail **Reductions in prey due to pesticide use:** Bank Swallow, Barn Swallow, Bobolink, Chimney Swift, Common Nighthawk, Eastern Meadowlark
Mortality from ingestion of lead shot or tackle.	5.1 Hunting & collecting terrestrial animals 5.4 Fishing & harvesting aquatic resources	Reduce mortality and sub-lethal effects of lead shot and fishing tackle on birds	2.2 Reduce mortality and/or sub-lethal effects from exposure to contaminants.	Work with hunters, anglers and industry to eliminate the exposure of birds to shot, sinkers and jigs made of lead. Enforce the use of non-toxic shot in waterfowl hunting, and encourage adoption of non-toxic alternatives in target shooting, upland game bird hunting, and fishing.	4.3 Awareness and communications 5.4 Compliance and enforcement	Bald Eagle, Common Loon
Mortality from heavy metals and other contaminants.	9.2 Industrial & military effluents	Reduce mortality from heavy metals and other contaminants	2.2 Reduce mortality and/or sub-lethal effects from exposure to contaminants.	Work with industry and policy makers to reduce the quantity of heavy metals and other contaminants released into the environment.	5.3 Private sector standards and codes 5.2 Policies and regulations	**Heavy metals:** Barrow's Goldeneye, (Eastern population), Surf Scoter, Common Loon **PCBs:** Barrow's Goldeneye, (Eastern population), Common Tern, Leach's Storm-Petrel **Other contaminants:** Common Murre, Horned Grebe (Magdalen Islands population), Peregrine Falcon (*anatum/tundrius*)

Table 27 continued

Threats addressed	Threat sub-category	Objective	Objective category	Recommended actions	Action category	Example priority species affected
Mortality of waterbirds from oil pollution.	9. Pollution	Reduce mortality from oil pollution	2.3 Reduce mortality and/or sublethal effects of oil pollution. 5.1 Maintain natural food webs and prey sources.	Improve monitoring and enforcement capacity to reduce chronic oil pollution from illegal dumping of bilge waste and cleaning of oil tanks. Improve education/outreach to make sure that the oil industry and its regulators are aware of the potential impacts on birds and take measures to prevent exposure of birds to oil.	5.4 Compliance and enforcement 4.3 Awareness and communications	**Lethal and sublethal effect of oil exposure:** Atlantic Puffin, Barrow's Goldeneye (Eastern population), Black-bellied Plover, Bonaparte's Gull, Brant, Common Eider (*dresseri),* Common Murre, Eastern Harlequin Duck, Hudsonian Godwit, Piping Plover (*melodus*), Purple Sandpiper, Red Knot (*rufa*), Red Phalarope, Red-necked Phalarope, Ruddy Turnstone, Sanderling, Semipalmated Sandpiper, Thick-billed Murre, Whimbrel
Population effects of pollution are unknown.	12.1 information lacking	Improve understanding of population effects of pollution	7.4 Improve understanding of causes of population declines.	Evaluate the effects of PBDEs and other chemicals on vital rates in birds. Evaluate the extent to which pesticides are reducing prey availability for aerial insectivores. Improve the ability to monitor and understand the effects of contaminant concentrations in birds. Continue to acquire information on oiling of waterbirds through programs like Birds Oiled at Sea.	8.1 Research 8.2 Monitoring	All species

Climate Change

The effects of climate change are already measurable in many bird habitats and have resulted in range shifts and changes in the timing of migration and breeding in some species (National Audubon Society 2009, North American Bird Conservation Initiative, U.S. Committee 2009). Birds in all habitats will be affected by climate change. The most vulnerable are predicted to be those that are dependent on oceanic ecosystems and those found in coastal, island, grassland, arctic and alpine habitats (North American Bird Conservation Initiative, U.S. Committee 2010). Changing climate may also facilitate the spread of disease, the introduction of new predators and the invasion of non-native species that alter habitat structure and community composition (North American Bird Conservation Initiative, U.S. Committee 2009, Faaborg et al. 2010). See Tables 28 and 29 for a summary of impacts of climate change and conservation objectives.

A recent exercise used bioclimatic modelling to predict changes in bird species ranges based on anticipated climate change for different time periods and under different emissions scenarios (Lawler et al. unpublished; Lawler et al. 2009). Bioclimatic models use statistical associations between the current range of a species and a suite of climate variables to predict future ranges under new climate conditions. The study focused on priority bird species currently found within BCRs in Canada. The results suggest that bird species turnover in Canada will be highest in northern BCRs as species ranges continue to shift northward in the coming decades. For the 171 species examined in BCR 14-QC, the model predicts a gain of 19 species, a loss of 15 species for a total turnover (species gains + species losses) of 20%.

To maintain healthy bird populations in the face of a changing climate, conservation must be carefully planned and must be implemented so as to buffer birds from the negative impacts of climate change wherever possible (Faaborg et al. 2010).

Table 28. Examples of the current and anticipated effects of climate change on bird populations in Canada and some affected bird species.
Note: The species shown here do not represent an exhaustive list; rather, they provide examples of species for which the effects of climate change have been suggested or documented.

Potential and Realized Effects of Climate Change	Examples of Species Affected
Mismatch between peak hatch and peak food abundance	Olive-sided Flycatcher, Rusty Blackbird
Extended breeding season	Canada Goose
Habitat loss as a result of ecosystem changes	Least Bittern, Nelson's Sparrow, Sora, Virginia Rail, Yellow Rail
Increase in severe weather events	Bank Swallow, Barn Swallow, Chimney Swift, Common Nighthawk, Olive-sided Flycatcher, Thick-billed Murre
Changes in ocean temperature and currents impact marine productivity and food webs	Black Scoter

Table 29. Proposed conservation objectives and actions to address climate change.

Threats addressed	Threat sub-category	Objective	Objective category	Recommended Actions	Action category	Priority species affected
Climate change impacts habitat and negatively affects survival and productivity of birds	11.1 Habitat shifting and alteration 11.4 Storms and flooding 11. 5 Other impacts	Reduce greenhouse gas emissions Mitigate the effects of climate change on bird habitat	6.1 Support efforts to reduce greenhouse gas emissions 6.2 Manage for habitat resilience as climate changes	Support efforts to reduce greenhouse gas emissions. Incorporate predicted shifts in habitat into landscape level plans (e.g., when establishing protected areas ensure the maintenance of north-south corridors to facilitate northward range shifts of bird species). Manage for habitat resilience to allow ecosystems to adapt despite disturbances and changing conditions. Minimize anthropogenic stressors (such as development or pollution) to help maintain resilience. Manage buffer areas and the matrix between protected areas to enhance movement of species across the landscape. Manage ecosystems to maximize carbon storage and sequestration while simultaneously enhancing bird habitat. Minimize anthropogenic stressors (such as development and pollution) to help maintain resilience.	5.2 Policies and regulations 2.1 Site/area management 1.1 Site/area protection	All species but especially: Bank Swallow, Barn Swallow, Chimney Swift, Common Nighthawk, Least Bittern, Nelson's Sparrow, Olive-sided Flycatcher, Sora, Thick-billed Murre, Virginia Rail, Yellow Rail

Table 29 continued

Threats addressed	Threat sub-category	Objective	Objective category	Recommended Actions	Action category	Priority species affected
Population-level effects of climate change are unknown	12.1 Information lacking	Improve understanding of climate change on birds and their habitats	7.5 Improve understanding of potential effects of climate change	Evaluate which species are most vulnerable to climate change. Investigate the cumulative effects of climate change. Investigate behavioural responses to climate change (such as range shifts, changes in demographic rates, and changes in timing of breeding and migration) through long-term studies. Continue to monitor bird populations so changes in numbers and distributions can be identified. Undertake monitoring to evaluate the effectiveness of mitigation activities.	8.1 Research 8.2 Monitoring	All

Research and Population Monitoring Needs

Population Monitoring

An estimate of population trend for each species is necessary for the development of elements 1 and 3 (Species Assessment and Population Objectives). However, there are many species for which we are currently unable to estimate a population trend (PT) score. These species were typically assigned a population objective of “assess/maintain.” The inability to estimate a PT score may be the result of a lack of monitoring data for the BCR as a whole or may be because certain species are not well captured by common monitoring techniques. To be able to effectively evaluate species believed to be of conservation concern, and to track those not yet of concern for future changes in status, we require more comprehensive monitoring that enables us to generate population trends for all species of birds in Canada. However, it is important to note that for some species, population trends are better understood at scales larger or smaller than the BCR unit, and lack of BCR-scale population trend data should not preclude acting to conserve these species. However, we must keep in mind that the demographic trends of some species are easier to determine at larger or smaller scales than the BCR, and the lack of data on trends for these species across the BCR should not stop us from taking take action to conserve them.

The lack of information remains a concern for effective management of numerous priority species in BCR 14-QC. Although there are many standard monitoring programs, they do not provide a complete picture of the status and trends of all species in this region that are contending with a host of bird conservation issues.

The lack of population status data was considered a significant conservation issue for 76 of the 100 priority species in BCR 14-QC. Examples of the species concerned are listed in Table 30, which also contains recommended actions for improving population status monitoring.

A recent Environment Canada review (Avian Monitoring Review Steering Committee 2012) of avian monitoring programs in Canada made the following recommendations for each of the four main species groups:

Landbirds

- develop options for on-the-ground monitoring across boreal Canada;
- evaluate the ability of migration monitoring and checklist surveys to contribute to Environment Canada's monitoring needs; and
- evaluate the feasibility and cost-effectiveness of improving demographic monitoring to help understand causes of population change.

Shorebirds

- develop more reliable sampling methods for counting shorebirds in migration to address concerns about bias; and
- increase Latin American involvement in monitoring shorebirds on the wintering grounds, including Red Knot.

Waterbirds

Sea birds

- develop a nationally coordinated monitoring strategy for seabird colonies to ensure that priority colonies are regularly surveyed by appropriately allocating resources among regions and colonies;
- assess new techniques for counting seabirds such as using digital photography;
- assess the extent to which pelagic surveys could extend their geographic coverage by replacing repeat surveys at the same locations that generate population trends with surveys at different locations in different years.

Inland waterbirds

- evaluate alternative strategies for filling gaps in coverage for both colonial waterbirds and marsh birds;
- consider both costs and potential reduction in risks; and
- carry out any necessary pilot work to evaluate options.

Waterfowl

- review the information needs and expenditures for duck banding programs;
- develop strategies to reduce spending on surveys of Eastern breeding populations of waterfowl species while maintaining an acceptable level of accuracy for population estimates;
- realign resources for eider and scoter monitoring to a more efficient suite of surveys.

Table 30. Categories of poorly monitored species, possible monitoring approaches, and example priority species in BCR 14-QC for which there are currently insufficient data to reliably estimate population trend at the BCR scale.

Category	Possible monitoring approaches	Example priority species
Landbirds	Increase the coverage of the Breeding Bird Survey (BBS) or complete specific surveys of rare, discrete or cryptic birds whose populations are not well known (e.g.: high altitude birds, breeding birds in the boreal forest). Increase coverage of the Christmas Bird Count. Expand the current migration monitoring program (Canadian Migration Monitoring Network) by implementing and supporting stations in BCR.	American Three-toed Woodpecker, Bicknell's Thrush, Black-billed Cuckoo, Blackpoll Warbler, Blue-headed Vireo, Boreal Chickadee, Canada Warbler, Eastern Towhee, Evening Grosbeak, Field Sparrow, Golden-winged Warbler, Nelson's Sparrow, Northern Parula, Pine Grosbeak, Rusty Blackbird, Sedge Wren, Yellow-throated Vireo
Aerial insectivores	Develop and implement specific surveys. If possible, conduct regular colony counts (e.g., Chimney Swift roosts). Initial surveys may be needed to find the breeding areas, colonies or roosts. Implement or extend targeted twilight surveys for the Common Nighthawk and Eastern Whip-poor-will. These surveys could be based on the United States Nightjar Survey Network model (ccb-wm.org/nightjars.htm).	Bank Swallow, Barn Swallow, Chimney Swift, Common Nighthawk, Eastern Whip-poor-will, Eastern Wood-Pewee, Olive-sided Flycatcher, Tree Swallow
Diurnal raptors	Support Christmas Bird Counts and expand their reach to record the presence of wintering raptors, such as the Bald Eagle and Short-eared Owl. Support raptor identification training for monitors. Low-density raptors that are poorly represented by regular surveys such as the Breeding Bird Survey require targeted species surveys, especially along the coast.	Bald Eagle, Golden Eagle, Peregrine Falcon (*anatum/tundrius*), Short-eared Owl
Nocturnal raptors	Support surveys of hawks and owls and expand their reach. Targeted species surveys may be required for rare species and species poorly represented using traditional survey methods.	Boreal Owl, Northern Saw-whet Owl (acadicus)

Table 30 continued

Category	Possible monitoring approaches	Example priority species
Shorebirds	Conduct banding activities and track bands on adults and juveniles in staging areas. Monitor species abundance and distribution of adults and juveniles in staging areas. Develop and conduct specific surveys, e.g., (1) surveys in staging areas between September and late November, a period of the year that is not well covered by regular surveys; (2) aerial surveys of potential and known staging areas in the coastal areas; (3) aerial surveys to identify the Purple Sandpiper's wintering area in the St. Lawrence corridor; and (4) aerial surveys of the Hudsonian Godwit in the Magdalen Islands. Develop and conduct a program similar to the Atlantic Canada Shorebird Survey in order to monitor the abundance and distribution of most coastal birds during fall migration.	Black-bellied Plover, Dunlin, Hudsonian Godwit, Red Knot (*rufa*), Sanderling, Semipalmated Sandpiper, Piping Plover (*melodus*), Purple Sandpiper, Red Phalarope, Red-necked Phalarope, Ruddy Turnstone Short-billed Dowitcher (*griseus*), Upland Sandpiper
Colonial waterbirds	Continue to monitor seabirds along the St. Lawrence Estuary, Gaspé Peninsula and Magdalen Islands. Develop survey techniques for assessing demographic trends of alcids on the islands of the St. Lawrence Estuary and Gulf of St. Lawrence. Maintain the species monitoring program under the St. Lawrence Action Plan in order to assess the bioindicators of the St. Lawrence marine ecosystem. Develop a monitoring program to assess demographic trend of the colonies of Leach's Storm-Petrel.	Black Guillemot, Black-legged Kittiwake, Common Murre, Common Tern, Double-crested Cormorant, Great Black-backed Gull, Herring Gull, Leach's Storm-Petrel, Northern Gannet, Razorbill
Inland waterbirds	Support the Marsh Monitoring Program, expand it for better spatial coverage and consider hiring birders to cover remote sites. Continue to monitor the Horned Grebe in the Magdalen Islands to better assess the species' demographic trend.	American Bittern, Sora, Virginia Rail, Horned Grebe (Magdalen Islands population)

Table 30 continued

Category	Possible monitoring approaches	Example priority species
Waterfowl	Maintain the banding program to monitor the effects of hunting pressure on priority species, document movements and acquire demographic data (survival rate, reproductive success). To maximize reported information from efforts invested, update the three programs: the St. Lawrence shoreline waterfowl monitoring program, southern Quebec lowlands waterfowl monitoring program and southern Quebec highlands waterfowl monitoring program. Maintain and expand the Common Eider banding program and continue to annually monitor colonies in the St. Lawrence Estuary. Set up a long-term monitoring program for sea ducks that winter in ice-free areas of the St. Lawrence.	American Black Duck, Canada Goose (North Atlantic population), Canada Goose (Atlantic population), Common Eider (*dresseri*), Long-tailed Duck, Red-breasted Merganser

Research

The focus of this section is to outline the main areas where a lack of information hindered the ability to understand conservation needs and make conservation recommendations. Research objectives presented here are bigger picture questions, and not necessarily a schedule of studies, that are needed to determine the needs of individual species (Table 31). Undertaking research will allow us to improve future iterations of BCR strategies and to focus future implementation, and will also enable the development of new tools for conservation.

Table 31. General research objectives in BCR 14-QC.

Objective	Priority species affected
Determine primary drivers of population decline (e.g., adult or juvenile survival, productivity, habitat quality) in priority bird species exhibiting declining trends, or that are known to be declining nationally or continentally.	**Species exhibiting declining trends in BCR 14-QC:** American Bittern, Barn Swallow, Black-billed Cuckoo, Canada Warbler, Chimney Swift, Eastern Wood-Pewee, Herring Gull, Leach's Storm-Petrel, Red Knot (*rufa*), Roseate Tern, Semipalmated Sandpiper, Thick-billed Murre, Upland Sandpiper, Wood Thrush
Develop research projects to fill gaps in knowledge about reproductive success and survival rates (to potentially assess the success of conservation actions, etc.).	Common Tern
Develop research projects to study the demography of the breeding colonies on the islands of the St. Lawrence Estuary.	Razorbill
Develop research projects to fill knowledge gaps relating to priority habitat assessments.	American Bittern
Develop research projects to fill gaps in knowledge about survival rates and wintering site fidelity.	Purple Sandpiper
Develop research projects to fill gaps in knowledge about the relationships between breeding, moulting and wintering sites to differentiate between the different duck populations.	American Scoter, Common Eider (*dresseri*), Long-tailed Duck, Red-breasted Merganser, Surf Scoter
Map land cover changes that have occurred across the BCR between the baseline time periods established in BCR strategies and the current day in order to correlate habitat loss with species declines and assess the main types of habitat transitions that have occurred (e.g., wetland to urban development, old growth to managed forest, tidal flats and flood plains to agriculture, etc.).	All species for which habitat-related declines have occurred or are suspected.
Combine up-to-date land cover information, additional data on bird densities, and detailed bird-habitat relationships for all priority species to allow for the calculation of quantitative habitat targets and to directly link conservation and population objectives.	All priority species.
Identify priority areas for implementation of recommendations in BCR strategies.	All priority species.

Table 31 continued

Objective	Priority species affected
Determine specific population connectivity and migration routes between breeding and wintering areas, using techniques such as genetic analysis, stable isotopes and geolocators.	All non-resident species.
Where they do not already exist, conduct research to develop sector-specific beneficial management practices documents, with an emphasis on bird and biodiversity conservation. Increase compliance with these and existing BMPs via policy/legislation, bylaws, and public outreach/awareness. Monitor adherence to these BMPs and assess their effectiveness at preserving and/or increasing priority bird populations.	All priority species.
Determine the population-level significance of bird mortality from collisions with anthropogenic structures of all types and predation by domestic cats. Identify particularly vulnerable species.	All priority species.
Continue to engage in and support climate change research with respect to: - links between climate, forage species, and priority seabirds; and model potential responses to changes in climatic conditions. - alteration and loss of coastal habitat with predicted sea-level rise, particularly estuaries, saltmarsh, beach/dunes and mud/sand flats; and effects on priority species. - alteration and loss of terrestrial habitats, particularly shifting forest types and loss of alpine habitats. - range expansion or contraction of priority bird species. - identification of vulnerable species.	All priority species.
Conduct research to determine the effects of disturbance on birds at sea and assess the resiliency of birds to disturbance, both during and outside the breeding season. Increase survey efforts to accurately map the seasonal distribution and abundance of seaducks, coastal seabirds and pelagic seabirds to identify potential areas of high conflict.	All seabirds and seaducks.
Monitor compliance and assess the effectiveness of current bycatch mitigation measures in commercial longline fisheries. Monitor bycatch in commercial net fisheries, and develop, implement, and assess effectiveness of bycatch mitigation measures for gillnet fisheries. Identify particularly vulnerable species to gillnet and longline bycatch.	All seabirds and seaducks.
Assess and quantify direct and indirect impacts of commercial fisheries on priority seabirds (e.g., commercial harvest of forage fish, fishery-induced changes in marine food webs).	All seabirds.

Table 31 continued

Objective	Priority species affected
Assess the potential effects of coastal and offshore wind developments on birds, including both direct (collision mortality) and indirect (habitat loss due to avoidance of turbine installations) effects. Identify particularly vulnerable species.	All birds found in coastal and offshore areas, including migrating individuals/flocks.
Investigate the potential effects of finfish aquaculture on priority bird species. Quantify and assess the population-level significance of direct mortality (e.g., shooting, net entanglement) and habitat loss/degradation (e.g., installation footprint, algal blooms due to nutrient input).	All waterbirds and seaducks that use nearshore habitats (e.g. Common Eider and Harlequin Duck)
Engage in interdisciplinary research to identify additive and interactive effects of multiple invasive species on ecosystem structure and function, in both terrestrial (e.g., introduced Sitka black-tailed deer, rabbits, raccoons, cats and rats; European Starling, House Sparrow, Scotch broom), freshwater (e.g., purple loosestrife, yellow flag iris) and marine habitats (e.g., *Spartina spp*., green crab). Identify impacts to priority bird species.	All priority species.

Threats Outside Canada

Many bird species found in Canada spend a large portion of their life cycle outside of the country (Fig. 29). These species face threats while they are outside Canada; in fact, threats to some migratory species may be most severe outside of the breeding season (Calvert et al. 2009). Of the 100 priority species in BCR 14-QC, 85 are migratory and spend part of their annual cycle—up to half the year or more—outside Canada.

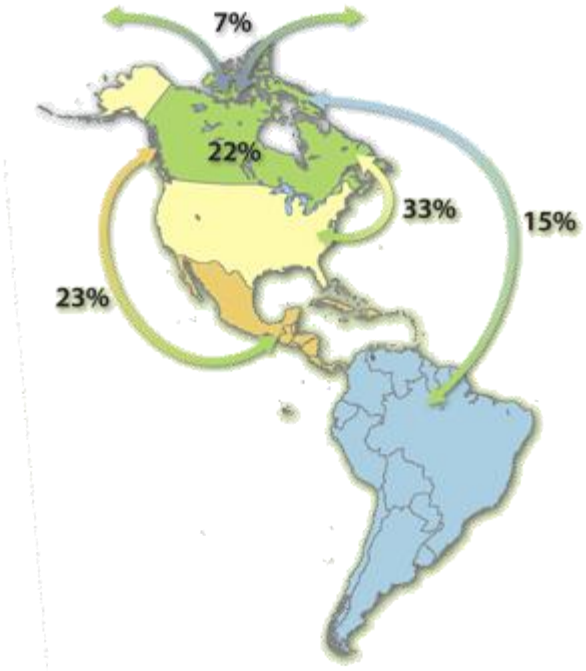

Figure 29. Percent of Canadian breeding birds that migrate to regions outside of Canada for part of their life cycle (North American Bird Conservation Initiative 2012).

Similar to the assessment of threats facing priority species within Canada, we conducted a literature review to identify threats facing priority species while they are outside Canada. A lack of data was a pervasive issue for this exercise. For many species, little is known about threats they face during migration or while on their wintering grounds. Indeed, for some species, their wintering ranges and habitat use are only poorly known, if at all. There is also little information linking specific wintering areas to particular breeding populations, making it difficult to connect declines in breeding populations to potential problems on the wintering grounds. In addition, what data exist on wintering migrant species are heavily biased towards work done in the United States, and little research is available from Mexico, Central and South America. While many of the threats identified in the United States likely affect species throughout their range, unique issues outside of the United States may have been missed. An absence of threats in a region may reflect that the necessary research has not yet been conducted (or may not be published in English). Because information on bird distributions during the non-breeding season is limited, we were unable to assess the scope and severity of threats to priority species while they are outside of Canada.

Nevertheless, some information is available to guide conservation stakeholders outside Canada. Figure 30 indicates that many priority bird species in BCR 14-QC are threatened by the loss or degradation of key migration and wintering habitats. The primary causes of habitat loss or degradation are the conversion of grassland and wetlands for agricultural purposes (threat sub-category 2.1), logging and wood harvesting (threat sub-category 5.3) and residential development (threat sub-category 1.1). Loss and degradation of wintering habitat is a greater threat to species with relatively small and concentrated wintering areas, such as the Bicknell's Thrush. The Semipalmated Sandpiper and Short-billed Dowitcher (*griseus*) are also particularly vulnerable when large numbers of individuals are concentrated in a handful of roosting sites. The loss or degradation of these areas could have devastating effects on such species.

In addition to habitat loss, priority birds in BCR 14-QC suffer increased mortality due to human activity or infrastructure while migrating and wintering. Collisions with human-made structures such as buildings and communication towers pose a significant threat during migration (threat sub-categories 1.1 and 1.2). Exposure to industrial contaminants such as hydrocarbons and heavy metals (threat sub-category 9.2) and to agricultural pesticides (threat sub-category 9.3) has lethal and sub-lethal effects on priority species. Another major cause of direct and indirect mortality among priority species outside Canada is legal and illegal hunting (threat sub-category 5.1), the resulting lead poisoning (ingestion of hunting pellets) and incidental mortality (e.g., non-recovered bird kills).

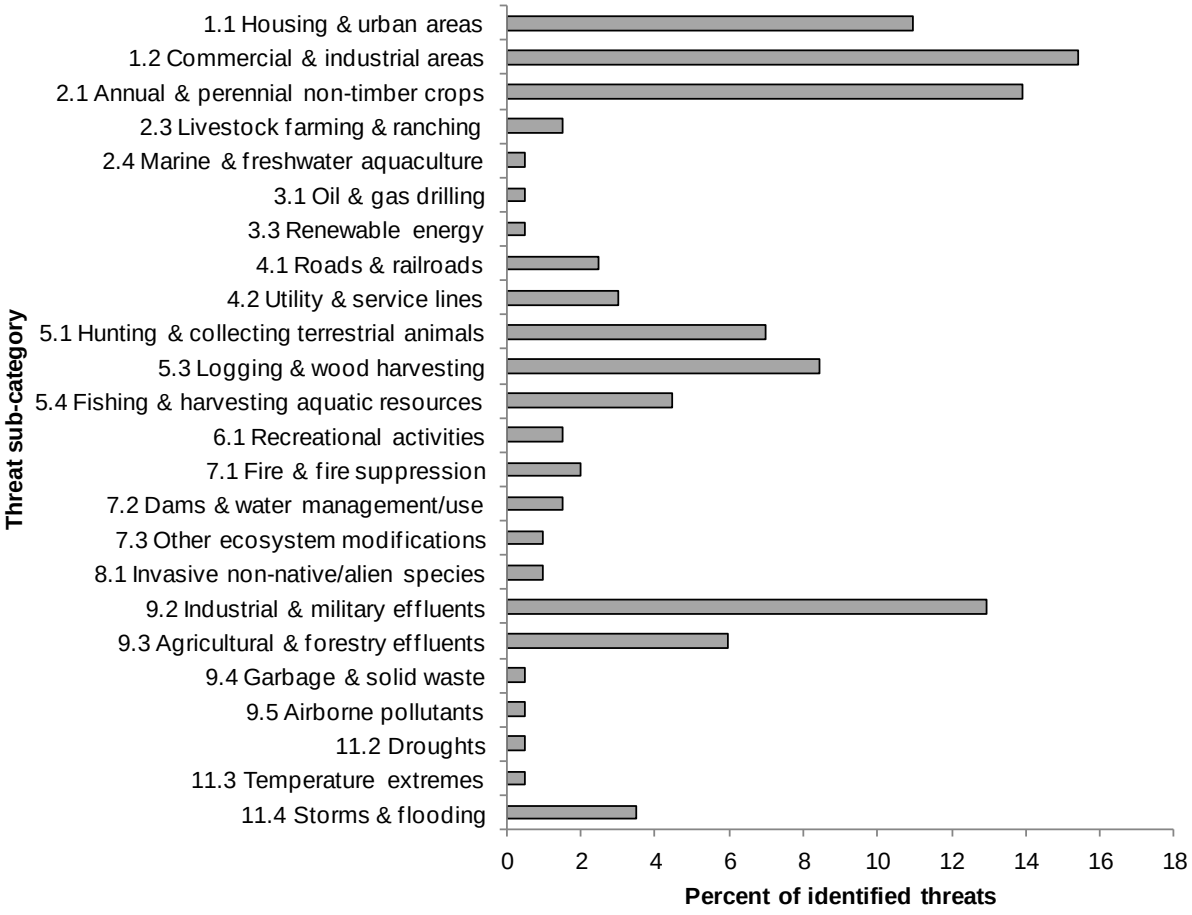

Figure 30: Percent of identified threats to priority species (by threat sub-category) in BCR 14-QC when they are outside Canada.
Note: Magnitudes could not be assigned for threats outside Canada due to lack of information on scope and severity.

Next Steps

The primary aims of BCR strategies are to present Environment Canada's priorities with respect to migratory bird conservation, and to provide a comprehensive overview of the conservation needs of bird populations to practitioners who may then undertake activities that promote bird conservation in Canada and internationally. Users from all levels of government, Aboriginal communities, the private sector, academia, NGOs and citizens will benefit from the information. BCR strategies can be used in many different ways depending on the needs of the user, who may focus on one or more of the elements of the strategy to guide their conservation projects.

BCR strategies will be updated periodically. Errors, omissions, and additional sources of information may be provided to Environment Canada at any time for inclusion in subsequent versions.

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Appendix 1

List of All Bird Species in BCR 14-QC

Table A1. Complete list of species in BCR 14-QC, when they are in the BCR (breeding, migrant, winter) and their priority status.

Scientific Name	Common Name	Bird Group	Breeding	Migrant	Wintering	Seasonal	Priority
Empidonax alnorum	Alder Flycatcher	Landbird	X	-	-	-	-
Corvus brachyrhynchos	American Crow	Landbird	X	-	X	-	-
Spinus tristis	American Goldfinch	Landbird	X	-	X	-	-
Falco sparverius	American Kestrel	Landbird	X	-	-	-	-
Anthus rubescens	American Pipit	Landbird	X	-	-	-	-
Setophaga ruticilla	American Redstart	Landbird	X	-	-	-	X
Turdus migratorius	American Robin	Landbird	X	-	X	-	-
Picoides dorsalis	American Three-toed Woodpecker	Landbird	X	-	X	-	X
Haliaeetus leucocephalus	Bald Eagle	Landbird	X	-	X	-	X
Icterus galbula	Baltimore Oriole	Landbird	X	-	-	-	-
Riparia riparia	Bank Swallow	Landbird	X	-	-	-	X
Hirundo rustica	Barn Swallow	Landbird	X	-	-	-	X
Strix varia	Barred Owl	Landbird	X	-	X	-	-
Setophaga castanea	Bay-breasted Warbler	Landbird	X	-	-	-	X
Megaceryle alcyon	Belted Kingfisher	Landbird	X	-	-	-	X
Catharus bicknelli	Bicknell's Thrush	Landbird	X	-	-	-	X
Mniotilta varia	Black-and-white Warbler	Landbird	X	-	-	-	X
Picoides arcticus	Black-backed Woodpecker	Landbird	X	-	X	-	X
Coccyzus erythropthalmus	Black-billed Cuckoo	Landbird	X	-	-	-	X
Setophaga fusca	Blackburnian Warbler	Landbird	X	-	-	-	X
Poecile atricapillus	Black-capped Chickadee	Landbird	X	-	X	-	-
Setophaga striata	Blackpoll Warbler	Landbird	X	-	-	-	X
Setophaga caerulescens	Black-throated Blue Warbler	Landbird	X	-	-	-	X
Setophaga virens	Black-throated Green Warbler	Landbird	X	-	-	-	X
Cyanocitta cristata	Blue Jay	Landbird	X	-	X	-	-
Polioptila caerulea	Blue-grey Gnatcatcher	Landbird	X	-	-	-	-
Vireo solitarius	Blue-headed Vireo	Landbird	X	-	-	-	X

Table A1 continued

Scientific Name	Common Name	Bird Group	Breeding	Migrant	Wintering	Seasonal	Priority
Vermivora cyanoptera	Blue-winged Warbler	Landbird	X	-	-	-	-
Dolichonyx oryzivorus	Bobolink	Landbird	X	-	-	-	X
Poecile hudsonicus	Boreal Chickadee	Landbird	X	-	X	-	X
Aegolius funereus	Boreal Owl	Landbird	X	-	X	-	X
Buteo platypterus	Broad-winged Hawk	Landbird	X	-	-	-	-
Certhia americana	Brown Creeper	Landbird	X	-	X	-	X
Toxostoma rufum	Brown Thrasher	Landbird	X	-	-	-	X
Molothrus ater	Brown-headed Cowbird	Landbird	X	-	-	-	-
Cardellina canadensis	Canada Warbler	Landbird	X	-	-	-	X
Setophaga tigrina	Cape May Warbler	Landbird	X	-	-	-	-
Bombycilla cedrorum	Cedar Waxwing	Landbird	X	-	X	-	-
Setophaga pensylvanica	Chestnut-sided Warbler	Landbird	X	-	-	-	-
Chaetura pelagica	Chimney Swift	Landbird	X	-	-	-	X
Spizella passerina	Chipping Sparrow	Landbird	X	-	-	-	-
Spizella pallida	Clay-colored Sparrow	Landbird	X	-	-	-	-
Petrochelidon pyrrhonota	Cliff Swallow	Landbird	X	-	-	-	-
Sialia sialis	Common Bluebird	Landbird	X	-	-	-	-
Quiscalus quiscula	Common Grackle	Landbird	X	-	-	-	-
Chordeiles minor	Common Nighthawk	Landbird	X	-	-	-	X
Corvus corax	Common Raven	Landbird	X	-	X	-	-
Acanthis flammea	Common Redpoll	Landbird	X	-	X	-	-
Sturnus vulgaris	Common Starling	Landbird	X	-	X	-	-
Geothlypis trichas	Common Yellowthroat	Landbird	X	-	-	-	-
Accipiter cooperii	Cooper's Hawk	Landbird	X	-	-	-	-
Junco hyemalis	Dark-eyed Junco	Landbird	X	-	X	-	-
Picoides pubescens	Downy Woodpecker	Landbird	X	-	X	-	-
Tyrannus tyrannus	Eastern Kingbird	Landbird	X	-	-	-	-
Sturnella magna	Eastern Meadowlark	Landbird	X	-	-	-	X
Sayornis phoebe	Eastern Phoebe	Landbird	X	-	-	-	-
Megascops asio	Eastern Screech-Owl	Landbird	X	-	X	-	-
Antrostomus vociferus	Eastern Whip-poor-will	Landbird	X	-	-	-	X
Contopus virens	Eastern Wood-Pewee	Landbird	X	-	-	-	X
Coccothraustes vespertinus	Evening Grosbeak	Landbird	X	-	X	-	X
Spizella pusilla	Field Sparrow	Landbird	X	-	-	-	X

Table A1 continued

Scientific Name	Common Name	Bird Group	Breeding	Migrant	Wintering	Seasonal	Priority
Passerella iliaca	Fox Sparrow	Landbird	X	-	-	-	-
Aquila chrysaetos	Golden Eagle	Landbird	X	-	-	-	X
Regulus satrapa	Golden-crowned Kinglet	Landbird	X	-	X	-	-
Vermivora chrysoptera	Golden-winged Warbler	Landbird	X	-	-	-	X
Ammodramus savannarum	Grasshopper Sparrow	Landbird	X	-	-	-	-
Dumetella carolinensis	Gray Catbird	Landbird	X	-	-	-	-
Perisoreus canadensis	Gray Jay	Landbird	X	-	X	-	-
Perdix perdix	Gray Partridge	Landbird	X	-	X	-	-
Myiarchus crinitus	Great Crested Flycatcher	Landbird	X	-	-	-	-
Bubo virginianus	Great Horned Owl	Landbird	X	-	X	-	-
Picoides villosus	Hairy Woodpecker	Landbird	X	-	X	-	-
Catharus guttatus	Hermit Thrush	Landbird	X	-	-	-	-
Eremophila alpestris	Horned Lark	Landbird	X	-	-	-	-
Haemorhous mexicanus	House Finch	Landbird	X	-	X	-	-
Passer domesticus	House Sparrow	Landbird	X	-	X	-	-
Troglodytes aedon	House Wren	Landbird	X	-	-	-	-
Passerina cyanea	Indigo Bunting	Landbird	X	-	-	-	-
Ammodramus leconteii	Le Conte's Sparrow	Landbird	X	-	-	-	-
Empidonax minimus	Least Flycatcher	Landbird	X	-	-	-	-
Melospiza lincolnii	Lincoln's Sparrow	Landbird	X	-	-	-	-
Asio otus	Long-eared Owl	Landbird	X	-	X	-	-
Setophaga magnolia	Magnolia Warbler	Landbird	X	-	-	-	X
Cistothorus palustris	Marsh Wren	Landbird	X	-	-	-	-
Falco columbarius	Merlin	Landbird	X	-	-	-	-
Zenaida macroura	Mourning Dove	Landbird	X	-	X	-	-
Geothlypis philadelphia	Mourning Warbler	Landbird	X	-	-	-	-
Oreothlypis ruficapilla	Nashville Warbler	Landbird	X	-	-	-	-
Ammodramus nelsoni	Nelson’s Sparrow	Landbird	X	-	-	-	X
Cardinalis cardinalis	Northern Cardinal	Landbird	X	-	X	-	-
Colaptes auratus	Northern Flicker	Landbird	X	-	X	-	X
Accipiter gentilis	Northern Goshawk	Landbird	X	-	X	-	-
Circus cyaneus	Northern Harrier	Landbird	X	-	-	-	-
Surnia ulula	Northern Hawk Owl	Landbird	X	-	X	-	-
Mimus polyglottos	Northern Mockingbird	Landbird	X	-	X	-	-

Table A1 continued

Scientific Name	Common Name	Bird Group	Breeding	Migrant	Wintering	Seasonal	Priority
Setophaga americana	Northern Parula	Landbird	X	-	-	-	X
Stelgidopteryx serripennis	Northern Rough-winged Swallow	Landbird	X	-	-	-	-
Aegolius acadicus	Northern Saw-whet Owl	Landbird	X	-	X	-	X
Parkesia noveboracensis	Northern Waterthrush	Landbird	X	-	-	-	-
Contopus cooperi	Olive-sided Flycatcher	Landbird	X	-	-	-	X
Pandion haliaetus	Osprey	Landbird	X	-	-	-	-
Seiurus aurocapilla	Ovenbird	Landbird	X	-	-	-	X
Setophaga palmarum	Palm Warbler	Landbird	X	-	-	-	X
Falco peregrinus anatum/tundrius	Peregrine Falcon (*anatum/tundrius*)	Landbird	X	-	-	-	X
Vireo philadelphicus	Philadelphia Vireo	Landbird	X	-	-	-	-
Dryocopus pileatus	Pileated Woodpecker	Landbird	X	-	X	-	-
Pinicola enucleator	Pine Grosbeak	Landbird	X	-	X	-	X
Spinus pinus	Pine Siskin	Landbird	X	-	X	-	-
Setophaga pinus	Pine Warbler	Landbird	X	-	-	-	-
Haemorhous purpureus	Purple Finch	Landbird	X	-	X	-	X
Progne subis	Purple Martin	Landbird	X	-	-	-	-
Loxia curvirostra	Red Crossbill	Landbird	X	-	X	-	-
Sitta canadensis	Red-breasted Nuthatch	Landbird	X	-	X	-	-
Vireo olivaceus	Red-eyed Vireo	Landbird	X	-	-	-	-
Buteo lineatus	Red-shouldered Hawk	Landbird	X	-	-	-	-
Buteo jamaicensis	Red-tailed Hawk	Landbird	X	-	-	-	-
Agelaius phoeniceus	Red-winged Blackbird	Landbird	X	-	-	-	-
Columba livia	Rock Dove	Landbird	X	-	X	-	-
Pheucticus ludovicianus	Rose-breasted Grosbeak	Landbird	X	-	-	-	-
Regulus calendula	Ruby-crowned Kinglet	Landbird	X	-	-	-	-
Archilochus colubris	Ruby-throated Hummingbird	Landbird	X	-	-	-	-
Bonasa umbellus	Ruffed Grouse	Landbird	X	-	X	-	-
Pipilo erythrophthalmus	Rufous-sided Towhee	Landbird	X	-	-	-	X
Euphagus carolinus	Rusty Blackbird	Landbird	X	-	-	-	X
Passerculus sandwichensis	Savannah Sparrow	Landbird	X	-	-	-	-
Piranga olivacea	Scarlet Tanager	Landbird	X	-	-	-	-
Cistothorus platensis	Sedge Wren	Landbird	X	-	-	-	X

Table A1 continued

Scientific Name	Common Name	Bird Group	Breeding	Migrant	Wintering	Seasonal	Priority
Accipiter striatus	Sharp-shinned Hawk	Landbird	X	-	-	-	-
Asio flammeus	Short-eared Owl	Landbird	X	-	-	-	X
Melospiza melodia	Song Sparrow	Landbird	X	-	-	-	-
Falcipennis canadensis	Spruce Grouse	Landbird	X	-	X	-	-
Catharus ustulatus	Swainson's Thrush	Landbird	X	-	-	-	-
Melospiza georgiana	Swamp Sparrow	Landbird	X	-	-	-	-
Oreothlypis peregrina	Tennessee Warbler	Landbird	X	-	-	-	-
Tachycineta bicolor	Tree Swallow	Landbird	X	-	-	-	X
Baeolophus bicolor	Tufted Titmouse	Landbird	X	-	X	-	-
Cathartes aura	Turkey Vulture	Landbird	X	-	-	-	-
Catharus fuscescens	Veery	Landbird	X	-	-	-	X
Pooecetes gramineus	Vesper Sparrow	Landbird	X	-	-	-	-
Vireo gilvus	Warbling Vireo	Landbird	X	-	-	-	-
Sitta carolinensis	White-breasted Nuthatch	Landbird	X	-	X	-	-
Zonotrichia albicollis	White-throated Sparrow	Landbird	X	-	-	-	X
Loxia leucoptera	White-winged Crossbill	Landbird	X	-	X	-	-
Meleagris gallopavo	Wild Turkey	Landbird	X	-	X	-	-
Empidonax traillii	Willow Flycatcher	Landbird	X	-	-	-	-
Cardellina pusilla	Wilson's Warbler	Landbird	X	-	-	-	-
Troglodytes hiemalis	Winter Wren	Landbird	X	-	-	-	-
Hylocichla mustelina	Wood Thrush	Landbird	X	-	-	-	X
Setophaga petechia	Yellow Warbler	Landbird	X	-	-	-	-
Empidonax flaviventris	Yellow-bellied Flycatcher	Landbird	X	-	-	-	-
Sphyrapicus varius	Yellow-bellied Sapsucker	Landbird	X	-	-	-	X
Coccyzus americanus	Yellow-billed Cuckoo	Landbird	X	-	-	-	-
Setophaga coronata	Yellow-rumped Warbler	Landbird	X	-	-	-	-
Vireo flavifrons	Yellow-throated Vireo	Landbird	X	-	-	-	X
Pluvialis dominica	American Golden-Plover	Shorebird	-	X	-	-	-
Scolopax minor	American Woodcock	Shorebird	X	X	-	-	-
Calidris bairdii	Baird's Sandpiper	Shorebird	-	X	-	-	-
Pluvialis squatarola	Black-bellied Plover	Shorebird	-	X	-	-	X
Tryngites subruficollis	Buff-breasted Sandpiper	Shorebird	-	X	-	-	-
Calidris alpina	Dunlin	Shorebird	-	X	-	-	X
Tringa melanoleuca	Greater Yellowlegs	Shorebird	X	X	-	-	-

Table A1 continued

Scientific Name	Common Name	Bird Group	Breeding	Migrant	Wintering	Seasonal	Priority
Limosa haemastica	Hudsonian Godwit	Shorebird	-	X	-	-	X
Charadrius vociferus	Killdeer	Shorebird	X	X	-	-	X
Calidris minutilla	Least Sandpiper	Shorebird	X	X	-	-	-
Tringa flavipes	Lesser Yellowlegs	Shorebird	-	X	-	-	-
Limnodromus scolopaceus	Long-billed Dowitcher	Shorebird	-	X	-	-	-
Limosa fedoa	Marbled Godwit	Shorebird	-	X	-	-	-
Calidris melanotos	Pectoral Sandpiper	Shorebird	-	X	-	-	-
Charadrius melodus melodus	Piping Plover (*melodus*)	Shorebird	X	X	-	-	X
Calidris maritima	Purple Sandpiper	Shorebird	-	X	X	-	X
Calidris canutus rufa	Red Knot (*rufa*)	Shorebird	-	X	-	-	X
Phalaropus fulicarius	Red Phalarope	Shorebird	-	X	-	-	X
Phalaropus lobatus	Red-necked Phalarope	Shorebird	-	X	-	-	X
Arenaria interpres	Ruddy Turnstone	Shorebird	-	X	-	-	X
Calidris alba	Sanderling	Shorebird	-	X	-	-	X
Charadrius semipalmatus	Semipalmated Plover	Shorebird	X	X	-	-	-
Calidris pusilla	Semipalmated Sandpiper	Shorebird	-	X	-	-	X
Limnodromus griseus griseus	Short-billed Dowitcher (*griseus*)	Shorebird	-	X	-	-	X
Tringa solitaria	Solitary Sandpiper	Shorebird	X	X	-	-	-
Actitis macularius	Spotted Sandpiper	Shorebird	X	X	-	-	-
Calidris himantopus	Stilt Sandpiper	Shorebird	-	X	-	-	-
Bartramia longicauda	Upland Sandpiper	Shorebird	X	X	-	-	X
Calidris mauri	Western Sandpiper	Shorebird	-	X	-	-	-
Numenius phaeopus	Whimbrel	Shorebird	-	X	-	-	X
Calidris fuscicollis	White-rumped Sandpiper	Shorebird	-	X	-	-	-
Tringa semipalmata	Willet	Shorebird	X	X	-	-	-
Phalaropus tricolor	Wilson's Phalarope	Shorebird	X	X	-	-	-
Gallinago delicata	Wilson's Snipe	Shorebird	X	X	-	-	-
Botaurus lentiginosus	American Bittern	Waterbird	X	-	-	-	X
Fulica americana	American Coot	Waterbird	X	-	-	-	-
Sterna paradisaea	Arctic Tern	Waterbird	X	-	-	-	-
Fratercula arctica	Atlantic Puffin	Waterbird	X	-	-	-	X
Cepphus grylle	Black Guillemot	Waterbird	X	-	X	-	X
Chlidonias niger	Black Tern	Waterbird	X	-	-	-	-
Nycticorax nycticorax	Black-crowned Night-Heron	Waterbird	X	-	-	-	-

Table A1 continued

Scientific Name	Common Name	Bird Group	Breeding	Migrant	Wintering	Seasonal	Priority
Chroicocephalus ridibundus	Black-headed Gull	Waterbird	X	-	-	-	-
Rissa tridactyla	Black-legged Kittiwake	Waterbird	X	-	X	-	X
Chroicocephalus philadelphia	Bonaparte's Gull	Waterbird	-	X	-	-	X
Gavia immer	Common Loon	Waterbird	X	-	-	-	X
Gallinula galeata	Common Moorhen	Waterbird	X	-	-	-	-
Uria aalge	Common Murre	Waterbird	X	-	X	-	X
Sterna hirundo	Common Tern	Waterbird	X	-	-	-	X
Phalacrocorax auritus	Double-crested Cormorant	Waterbird	X	-	-	-	X
Larus marinus	Great Black-backed Gull	Waterbird	X	-	X	-	X
Ardea herodias	Great Blue Heron	Waterbird	X	-	-	-	-
Phalacrocorax carbo	Great Cormorant	Waterbird	X	-	X	-	X
Butorides virescens	Green Heron	Waterbird	X	-	-	-	-
Larus argentatus	Herring Gull	Waterbird	X	-	X	-	X
Podiceps auritus	Horned Grebe	Waterbird	X	-	-	-	X
Oceanodroma leucorhoa	Leach's Storm-Petrel	Waterbird	X	-	-	-	X
Ixobrychus exilis	Least Bittern	Waterbird	X	-	-	-	X
Morus bassanus	Northern Gannet	Waterbird	X	-	-	-	X
Podilymbus podiceps	Pied-billed Grebe	Waterbird	X	-	-	-	-
Alca torda	Razorbill	Waterbird	X	-	-	-	X
Larus delawarensis	Ring-billed Gull	Waterbird	X	-	X	-	-
Sterna dougallii	Roseate Tern	Waterbird	X	-	-	-	X
Porzana carolina	Sora	Waterbird	X	-	-	-	X
Uria lomvia	Thick-billed Murre	Waterbird	X	-	X	-	X
Rallus limicola	Virginia Rail	Waterbird	X	-	-	-	X
Coturnicops noveboracensis	Yellow Rail	Waterbird	X	-	-	-	X
Anas rubripes	American Black Duck	Waterfowl	X	X	X	-	X
Melanitta americana	American Scoter	Waterfowl	-	X	-	-	X
Anas americana	American Wigeon	Waterfowl	X	X	-	-	-
Bucephala islandica	Barrow's Goldeneye (Eastern population)	Waterfowl	-	X	X	-	X
Anas discors	Blue-winged Teal	Waterfowl	X	X	-	-	-
Branta bernicla	Brant	Waterfowl	-	X	-	-	X
Bucephala albeola	Bufflehead	Waterfowl	-	X	-	-	-
Branta canadensis	Canada Goose (Atlantic	Waterfowl	-	X	-	-	X

Table A1 continued

Scientific Name	Common Name	Bird Group	Breeding	Migrant	Wintering	Seasonal	Priority
	population)						
Branta canadensis	Canada Goose (North Atlantic population)	Waterfowl	-	X	-	-	X
Branta canadensis	Canada Goose (resident population)	Waterfowl	X	X	-	-	-
Somateria mollissima borealis	Common Eider (*borealis*)	Waterfowl	-	X	X	-	-
Somateria mollissima dresseri	Common Eider (*dresseri*)	Waterfowl	X	X	-	-	X
Bucephala clangula	Common Goldeneye	Waterfowl	X	X	X	-	-
Mergus merganser	Common Merganser	Waterfowl	X	X	X	-	-
Anas penelope	Eurasian Wigeon	Waterfowl	-	X	-	-	-
Anas strepera	Gadwall	Waterfowl	X	X	-	-	-
Aythya marila	Greater Scaup	Waterfowl	X	X	-	-	-
Anser albifrons	Greater White-fronted Goose	Waterfowl	-	X	-	-	-
Anas crecca	Green-winged Teal	Waterfowl	X	X	-	-	-
Histrionicus histrionicus	Harlequin Duck (Eastern)	Waterfowl	X	X	X	-	X
Lophodytes cucullatus	Hooded Merganser	Waterfowl	X	X	X	-	-
Somateria spectabilis	King Eider	Waterfowl	-	X	X	-	-
Aythya affinis	Lesser Scaup	Waterfowl	-	X	-	-	-
Clangula hyemalis	Long-tailed Duck	Waterfowl	-	X	X	-	X
Anas platyrhynchos	Mallard	Waterfowl	X	X	X	-	-
Anas acuta	Northern Pintail	Waterfowl	X	X	-	-	-
Anas clypeata	Northern Shoveler	Waterfowl	X	X	-	-	-
Mergus serrator	Red-breasted Merganser	Waterfowl	X	X	X	-	X
Aythya americana	Redhead	Waterfowl	-	X	-	-	-
Aythya collaris	Ring-necked Duck	Waterfowl	X	X	-	-	-
Chen rossii	Ross's Goose	Waterfowl	-	X	-	-	-
Oxyura jamaicensis	Ruddy Duck	Waterfowl	-	X	-	-	-
Chen caerulescens	Snow Goose	Waterfowl	-	X	-	-	-
Melanitta perspicillata	Surf Scoter	Waterfowl	-	X	-	-	X
Melanitta fusca	White-winged Scoter	Waterfowl	-	X	-	-	-
Aix sponsa	Wood Duck	Waterfowl	X	X	-	-	-

Appendix 2

General Methodology for Compiling the Six Standard Elements

Each strategy includes six required elements to conform to the national standard. An extensive manual (Kennedy et al. 2012) provides methods and other guidance for completing each element. The six elements provide an objective means of moving towards multi-species conservation efforts that are targeted to species and issues of highest priority. The six elements are:

1) identifying priority species – to focus conservation attention on species of conservation concern and those most representative of the region
2) attributing priority species to habitat classes – a tool for identifying habitats of conservation interest and a means of organizing and presenting information
3) setting population objectives for priority species – an assessment of current population status compared to the desired status, and a means of measuring conservation success
4) assessing and ranking threats – identifies the relative importance of issues affecting populations of priority species within the planning area as well as outside Canada (i.e., throughout their life cycle)
5) setting conservation objectives – outlines the overall conservation goals in response to identified threats and information needs; also a means of measuring accomplishments
6) proposing recommended actions – strategies to begin on-the-ground conservation to help achieve conservation objectives

The first four elements apply to individual priority species, and together comprise an assessment of the status of priority species and the threats they face. The last two elements integrate information across species to create a vision for conservation implementation both within Canada and in countries that host priority species during migration and the non-breeding season.

Element 1: Species Assessment to Identify Priority Species

The Bird Conservation Strategies identify "priority species" from all regularly occurring bird species in each subregion. The priority species approach allows management attention and limited resources to focus on those species with particular conservation importance, ecological significance and/or management need. The species assessment processes used are derived from standard assessment protocols developed by the four major bird conservation initiatives[6].

The species assessment process applies quantitative rule sets to biological data for factors such as:

- population size,
- breeding and non-breeding distribution,
- population trend,

[6] Partners in Flight (landbirds), Wings Over Water (waterbirds), Canadian Shorebird Conservation Plan (shorebirds), North American Waterfowl Management Plan (waterfowl).

- breeding and non-breeding threats, and
- regional density and abundance.

The assessment is applied to individual bird species and ranks each species in terms of its biological vulnerability and population status. The assessments can be used to assign sub-regional (i.e., provincial section of a BCR), regional (BCR) and continental conservation priorities among birds.

Element 2: Habitats Important to Priority Species

Identifying the broad habitat requirements for each priority species in the breeding and non-breeding season allows species with shared habitat-based conservation issues or actions to be grouped. If many priority species associated with the same habitat class face similar conservation issues, then conservation action in that habitat class may support populations of several priority species. In most cases, all habitat associations identified in the literature are listed for individual species. Habitat associations do not indicate relative use, suitability ratings or rankings, nor selection or avoidance; this could be a useful exercise to undertake in the future.

In order to link with other national and international land classification schemes and to capture the range of habitat types across Canada, habitat classes for all priority species are based, at the coarsest level, on the hierarchical approach of the international Land Cover Classification System (LCCS) developed by the United Nations Food and Agriculture Organization (Food and Agriculture Organization 2000). Some modifications were made to the LCCS scheme to reflect habitat types that are important to birds that are not included in the classification (e.g., marine habitats). Species often are assigned to more than one of these coarse habitat classes. To retain the link to regional spatial data (e.g., provincial forest inventories, etc.), or to group species into regionally relevant habitat classes, individual BCR strategies may identify finer scale habitat classes. Finer-scale habitat attributes and the surrounding landscape context were also captured when possible to better guide the development of specific conservation objectives and actions.

Element 3: Population Objectives for Priority Species

A central component of effective conservation planning is setting clear objectives that can be measured and evaluated. Bird Conservation Strategies set objectives based upon the conservation philosophies of national and continental bird initiatives, including the North American Bird Conservation Initiative (NABCI), that support conserving the distribution, diversity and abundance of birds throughout their historical ranges. The baselines for population objectives used in this planning exercise (those existing during the late 1960s, 1970s, and 1990s for eastern waterfowl) reflect population levels prior to widespread declines. Most of the four bird conservation initiatives under the umbrella of NABCI have adopted the same baselines at the continental and national scale (waterfowl, shorebirds and landbirds; national and continental waterbird plans have not yet set population objectives). Some regions in the current planning effort have adjusted baselines to reflect the start of systematic monitoring. The ultimate measure of conservation success will be the extent to which

population objectives have been reached. Progress towards population objectives will be regularly assessed as part of an adaptive management approach.

Population objectives for all bird groups are based on a quantitative or qualitative assessment of species' population trends. If the population trend for a species is unknown, the objective is usually “assess and maintain”, and a monitoring objective is set. Harvested waterfowl and stewardship species that are already at desired population levels are given an objective of “maintain”. For any species listed under SARA or under provincial/territorial endangered species legislation, Bird Conservation Strategies defer to population objectives in available Recovery Strategies and Management Plans. If recovery documents are not available, objectives are set using the same approach as for other species within that bird group. Once recovery objectives are available, they will replace interim objectives.

Element 4: Threat Assessment for Priority Species

Bird population trends are driven by factors that affect reproduction and/or survival during any point in the annual cycle. Threats that can reduce survival include, for example, reduced food availability at migratory stopovers or exposure to toxic compounds. Examples of threats that can reduce reproductive success may include high levels of nest predation or reduced quality or quantity of breeding habitat.

The threats assessment exercise included three main steps:

1. Conducting a literature review to Itemize past, current and future threats for each priority species and classifying the threats following a standardized classification scheme (Salafsky et al. 2008).
2. Ranking the magnitude of threats for priority species following a standardized protocol (Kennedy et al. 2012).
3. Preparing a set of threat profiles for the BCR subregion, for broad habitat categories.

Each threat was categorized following the IUCN-CMP threat classification scheme (Salafsky et al. 2008) with the addition of categories to capture species for which we lack information. Only threats stemming from human activity were included in the threats assessment because they can be mitigated; natural processes that prevent populations from expanding beyond a given level were considered and noted, but no actions beyond research and/or monitoring were developed. Threats were ranked by assessing the scope (the proportion of the species' range within the subregion that is affected by the threat) and severity (the relative impact that the threat poses to the viability of the species' populations) of the threat. The scores for scope and severity were combined to determine an overall magnitude of low, medium, high or very high. These magnitudes were then rolled up by threat categories and sub-categories across habitat types (see Kennedy et al. 2012 for details on this process). The threats roll-up allows for comparison of the relative magnitude of the threats among threat categories and habitat types. The scoring and ranking of threats not only helps to determine which threats contribute most to population declines in individual species, but also allows us to focus attention on the threats with the greatest effects on suites of species or in broad habitat classes.

Table A2. IUCN-CMP standard threat classification system (adapted from Salafsky et al, 2008).

Threat number	Threat description
1	**Residential & commercial development**
1.1	Housing & urban areas
1.2	Commercial & industrial areas
1.3	Tourism & recreation areas
2	**Agriculture & aquaculture**
2.1	Annual & perennial non-timber crops
2.2	Wood & pulp plantations
2.3	Livestock farming & ranching
2.4	Marine & freshwater aquaculture
3	**Energy production & mining**
3.1	Oil & gas drilling
3.2	Mining & quarrying
3.3	Renewable energy
4	**Transportation & service corridors**
4.1	Roads & railroads
4.2	Utility & service lines
4.3	Shipping lanes
4.4	Flight paths
5	**Biological resource use**
5.1	Hunting & collecting terrestrial animals
5.2	Gathering terrestrial plants
5.3	Logging & wood harvesting
5.4	Fishing & harvesting aquatic resources
6	**Human intrusions & disturbance**
6.1	Recreational activities
6.2	War, civil unrest & military exercises
6.3	Work & other activities
7	**Natural system modifications**
7.1	Fire & fire suppression
7.2	Dams & water management/use
7.3	Other ecosystem modifications

Table A2 continued

Threat number	Threat description
8	**Invasive & other problematic species & genes**
8.1	Invasive non-native/alien species
8.2	Problematic native species
8.3	Introduced genetic material
9	**Pollution**
9.1	Household sewage & urban waste water
9.2	Industrial & military effluents
9.3	Agricultural & forestry effluents
9.4	Garbage & solid waste
9.5	Air-borne pollutants
9.6	Excess energy
10	**Geological events**
10.1	Volcanoes
10.2	Earthquakes/tsunamis
10.3	Avalanches/landslides
11	**Climate change & severe weather**
11.1	Habitat shifting & alteration
11.2	Droughts
11.3	Temperature extremes
11.4	Storms & flooding
11.5	Other impacts
12	**Other direct threats**
12.1	Information lacking

Element 5: Conservation Objectives

Overall, conservation objectives represent the desired conditions within the subregion that will collectively contribute to achieving population objectives. Objectives may also outline the research or monitoring needed to improve the understanding of species declines and how to best take action.

Currently, most conservation objectives are measurable using qualitative categories (e.g., decrease, maintain, increase) that will allow an evaluation of implementation progress, but they are not linked quantitatively to population objectives. Implementation that incorporates an active adaptive management process is an underlying principle of this conservation effort

and will allow for future evaluation of whether or not reaching conservation objectives contributed to achieving population objectives.

Whenever possible, conservation objectives benefit multiple species and/or respond to more than one threat. However, where necessary, they focus on the specific requirements of a single species.

Conservation objectives generally fall into one of two broad categories:

- habitat objectives within the BCR subregion (the quantity, quality and configuration of priority habitats)
- non-habitat objectives within the BCR subregion (minimizing mortality by reducing predation, conducting education and outreach to reduce human disturbance, etc.)

Ideally, habitat objectives would reflect the type, amount and location of habitat necessary to support population levels of priority species outlined in the population objectives. Currently, there is a lack of data and tools at the BCR scale to develop these specific quantitative objectives. Threats-based objectives present the direction of change required to move toward the population objectives using the best available information and knowledge of ecosystem management strategies within broad habitat types.

Element 6: Recommended Actions

Recommended conservation actions are the strategies required to achieve conservation objectives. Recommended actions are usually made at the strategic level rather than being highly detailed and prescriptive. Actions were classified following the IUCN-CMP classification of conservation actions (Salafsky et al. 2008), with the addition of categories to address research and monitoring needs. When possible, more detailed recommendations can be included, for example if beneficial management practices, ecosystem plans or multiple recovery documents are available for a subregion. However, actions should be detailed enough to provide initial guidance for implementation.

The objectives for research, monitoring and widespread issues may not have actions associated with them. These issues are often so multi-faceted that actions are best designed in consultation with partners and subject-matter experts. Implementation teams will be better positioned to address these complex issues, drawing input from various stakeholders.

Recommended actions defer to or support those provided in recovery documents for species at risk at the federal, provincial or territorial level, but because these strategies are directed at multiple species, actions are usually more general than those developed for individual species. For more detailed recommendations for species at risk, readers should consult recovery documents.

Appendix 3

Species Added or Removed from the BCR 14-QC Priority List

Table A3. List of species added or removed from the BCR 14-QC priority list and their assessment characteristics.

Species[1]	Presence[2]	Standardized Assessment			Reason for which regional experts have added or removed a species (after a standardized assessment)
		Legal Status[3]		Bird Group Score [4]	
		Fed.	Prov.		
ADDED					
-LANDBIRDS-					
American Three-toed Woodpecker	Obr				Precautionary principle (significant habitat loss in BCR 14-QC)
Bank Swallow	Br				Bird group score raised by regional experts
Boreal Owl	Obr				Precautionary principle (significant habitat loss in BCR 14-QC)
Brown Creeper	Br				Precautionary principle (significant habitat loss in BCR 14-QC)
Field Sparrow	Obr				Severe decline of the species in BCR 14-QC
Northern Flicker	Br				Bird group score raised by regional experts
Ovenbird	Br				Bird group score raised by regional experts

[1] Species listed in alphabetical order by bird group. Species names based on the American Ornithologists' Union's list of North American birds, 7th edition and supplements up to the 51st supplement.

[2] Wi = wintering, Mi = migratory, Mo = molting, Br = breeder, Obr = occasional breeder, Rbr = rare breeder

[3] Federal: Schedule 1 of SARA, E = Endangered; T = Threatened; SC = Special Concern. Keep in mind that the species has been assessed by COSEWIC but is not listed on Schedule 1 of SARA. Provincial: *Loi sur les espèces menacées ou vulnérables* (Quebec), T = Threatened, V = Vulnerable, L = Likely to be designated threatened or vulnerable.

[4] **Landbirds**: CC = continental concern, RC = regional concern (all BCR 14), CS = continental stewardship, RS = regional stewardship (all of BCR 14). Information taken from the database downloaded from www.partnersinflight.org (see Panjabi et al. 2005 for the analytical method). **Shorebirds**: Conservation concern in the United States of America and Canada, as identified in the Canadian Shorebird Conservation Plan (Donaldson et al., 2000). A score of 5 means "Highly imperiled" and a score of 1 means "Species not at risk." Consult Donaldson et al. (2000) for the complete description of conservation categories. **Waterbirds**: National priority level as identified in Canada's Waterbird Conservation Plan (Milko et al., 2003). **Waterfowl**: Conservation needs for breeding and nonbreeding birds as identified in the North American Waterfowl Management Plan (2004). Consult Kennedy et al. (2012) for the thresholds used to classify the species of the various groups for the priority list.

Table A3 continued

Species[1]	Presence[2]	Standardized Assessment: Legal Status[3] Fed.	Legal Status[3] Prov.	Bird Group Score[4]	Reason for which regional experts have added or removed a species (after a standardized assessment)
-SHOREBIRDS-					
Purple Sandpiper	Wi/Mi			2b	A large proportion of the species' wintering area is in BCR 14-QC
Upland Sandpiper	Br/Mi			2b	Precautionary principle (modern agricultural practices affect the species in BCR 14-QC)
-WATERBIRDS-					
Atlantic Puffin	Br			Tier 3	Severe decline of the species in BCR 14-QC
Black Guillemot	Br			Tier 3	Bird group score raised by regional experts
Black-legged Kittiwake	Br			Tier 3	Bird group score raised by regional experts
Common Murre	Br			Tier 3	Bird group score raised by regional experts
Double-crested Cormorant	Br			Tier 3	Bird group score raised by regional experts
Great Black-backed Gull	Br			Tier 3	Bird group score raised by regional experts
Great Cormorant	Br			Tier 3	Bird group score raised by regional experts
Northern Gannet	Br			Tier 3	Bird group score raised by regional experts
Razorbill	Br			Tier 3	Bird group score raised by regional experts
-WATERFOWL-					
American Scoter	Mi			Moderately low	BCR 14-QC accounts for a large percentage of the observations of the species in Quebec
Brant	Mi			Moderate	Small population restricted to a specific habitat; high harvest rate
Canada Goose (Atlantic population)	Mi			Non-existent	BCR 14-QC accounts for a large percentage of the observations of the species in Quebec
Red-breasted Merganser	Br/Wi/Mi			Moderate	BCR 14-QC accounts for a large percentage of the observations of the species in Quebec
REMOVED					
-LANDBIRDS-					
Grasshopper Sparrow	Obr		L		Exceptional breeder in BCR 14-QC
Ruffed Grouse	Br			RC	Healthy population according to monitoring by Quebec's Ministère du Développement durable, de l'Environnement, de la Faune et des

Table A3 continued

Species[1]	Presence[2]	Standardized Assessment: Legal Status[3] Fed.	Prov.	Bird Group Score[4]	Reason for which regional experts have added or removed a species (after a standardized assessment)
					Parcs (Lower St. Lawrence)
Blue-winged Warbler	Rbr			CC	Number of breeding pairs in BCR 14-QC is too low
Willow Flycatcher	Obr			CC	No major issues for the species in BCR 14-QC (the population is actually increasing in this BCR)
-SHOREBIRDS-					
American Golden Plover	Mi			4a, b	No known staging sites in BCR 14-QC
American Woodcock	Br/Mi			4a	Logging provides habitat for this species in BCR 14-QC
Buff-breasted Sandpiper	Mi			4a, b	No known staging sites in BCR 14-QC
Marbled Godwit	Mi			4a, b	No known staging sites in BCR 14-QC
Wilson's Phalarope	Br/Mi			4a	Number of breeding pairs in BCR 14-QC is too low
-WATERBIRDS-					
Arctic Tern	Br			Tier 2	Number of breeding pairs in BCR 14-QC is too low
Black Tern	Br			Tier 1	Number of breeding pairs in BCR 14-QC is too low
-WATERFOWL-					
Common Goldeneye	Br/Wi/Mi			Moderately high	Number of breeding pairs in BCR 14-QC is too low
Green-winged Teal	Br/Mi			Moderately high	Number of breeding pairs in BCR 14-QC is too low
Ring-necked Duck	Br/Mi			Moderately high	Number of breeding pairs in BCR 14-QC is too low
White-winged Scoter	Mi			Moderately high	Number of individuals in BCR 14-QC is too low
Wood Duck	Br/Mi			Moderately high	Number of breeding pairs in BCR 14-QC is too low

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Additional information can be obtained at:
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