Environment Canada Environnement Canada

Bird Conservation Strategy for Bird Conservation Region 13 in Quebec Region – Lower Great Lakes/St. Lawrence Plain

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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

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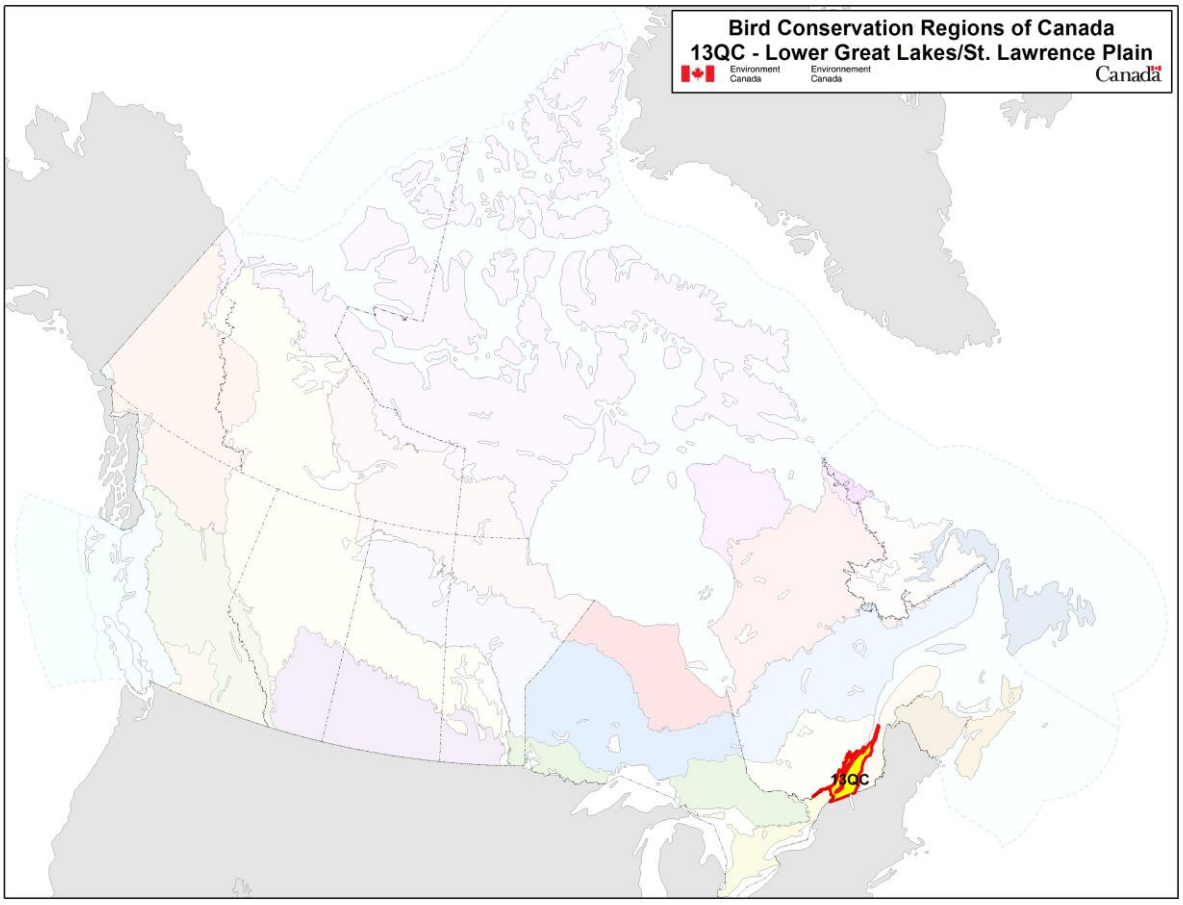

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Executive Summary

In Quebec, the Lower Great Lakes and St. Lawrence Plain Bird Conservation Region (BCR 13-QC) corresponds approximately with the St. Lawrence Lowlands. Although it is the smallest BCR in the province, it is the most densely populated with close to 75% of Quebec's population. The mild climate and fertile soil that characterize this area have been major drivers of agricultural development, so much so that farmland now accounts for nearly half of the land cover in BCR 13-QC. Forest cover, composed mainly of deciduous and mixed vegetation, has been reduced considerably as a result of agricultural and urban development and is therefore quite fragmented. Despite the significant change in natural cover this region has experienced, this BCR boasts the highest biodiversity in Quebec. In terms of avifauna, BCR 13-QC is notable in that it includes the St. Lawrence corridor, a major migration route.

Following an assessment of the 240 bird species found in BCR 13-QC, 68 species were identified as priorities in this BCR. The priority list includes species from 4 bird groups: landbirds (65%), waterfowl (13%), waterbirds (12%) and shorebirds (10%). These priority species include 22 federal and/or provincial species at risk, 8 stewardship species and 2 overabundant species. The priority species found in BCR 13-QC use 12 different habitat classes. The most commonly used are wetlands (46% of priority species), cultivated and managed areas (38%), deciduous forests (26%), and herbaceous habitats (22%).

Each priority species was assigned a population objective based on its population trend. Maintaining populations at current levels was the objective assigned to 37% of priority species; however, better population trend data is required for more than half of these. A recovery objective was assigned to 21% of the species (all are species at risk), and population increase objectives were assigned to 39% of the priority species. Overall, 60% of the priority species identified in BCR-13 QC were assigned a population increase objective, reflecting the magnitude of the threats to bird populations in this BCR.

A threat assessment identified a number of conservation issues facing priority species in the various habitats of BCR 13-QC, as well as the major impacts such threats have in many habitat classes. Major threats include habitat loss and degradation due to the conversion from perennial to annual crops, the drainage and filling of wetlands for agricultural, residential and commercial development, and the overuse of pesticides. Although conservation issues in BCR 13-QC are particularly pervasive in managed and cultivated areas as well as wetlands, neither forested environments nor aquatic ecosystems are immune. The lack of biological or demographic data on priority species and the presence of species at risk without a completed recovery strategy or management plan were also considered to be significant conservation issues in BCR 13-QC, as a total of 65% of priority species are affected.

Conservation objectives have been established to address threats and information gaps relating to priority species. In BCR 13-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. Objectives seeking to improve understanding of population status as well as management of specific species are also among the objectives most frequently mentioned in BCR 13-QC. These objectives are meant to address the lack of information on the ecology and demographics of many priority species and to continue to establish recovery strategies and management plans for species at risk.

Conservation actions have been proposed for priority species in BCR 13-QC to achieve the proposed conservation objectives. A large proportion of the recommended actions involve the protection of sites or areas that are important for priority species, which is indicative of the pressure on habitats and the species they support in this highly populated and exploited region. Population monitoring is also suggested in many of the actions proposed and includes the development and implementation of specific monitoring measures for certain groups of species, such as nocturnal birds, as well as maintaining or updating existing activities, such as waterfowl survey programs and migration monitoring. Lastly, the development and adoption of beneficial management practices, especially in the agriculture and forestry sectors, is a frequently recommended conservation action.

Migratory birds found in BCR 13-QC also face threats that are difficult to analyze with the standardized methodology used in this strategy. These threats include widespread issues that may 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 associated 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 13-QC

The Lower Great Lakes and St. Lawrence Plain Bird Conservation Region (BCR 13) straddles the Canada–U.S. border and extends from the south of Lake Erie to the St. Lawrence Estuary. In Quebec, BCR 13 is bordered to the west by Ontario and to the south by the U.S., and stretches along the shores of the St. Lawrence to Cap Tourmente on the north bank; it then continues on the south bank all the way to Saint-Simon (Fig. 1). All the islands of the St. Lawrence River from the Ontario border to Île-aux-Oies are part of this BCR. They include Île d'Orléans and the archipelagos of Varennes, Contrecoeur, Lake St. Pierre and Isle-aux-Grues. BCR 13-QC covers an area of 33 434 km^2 (31 201 km^2 over land and 2 233 km^2 over water), making this the smallest of the BCRs in the province. The term BCR 13-QC will be used in the rest of this document to refer to the Quebec portion of this BCR.

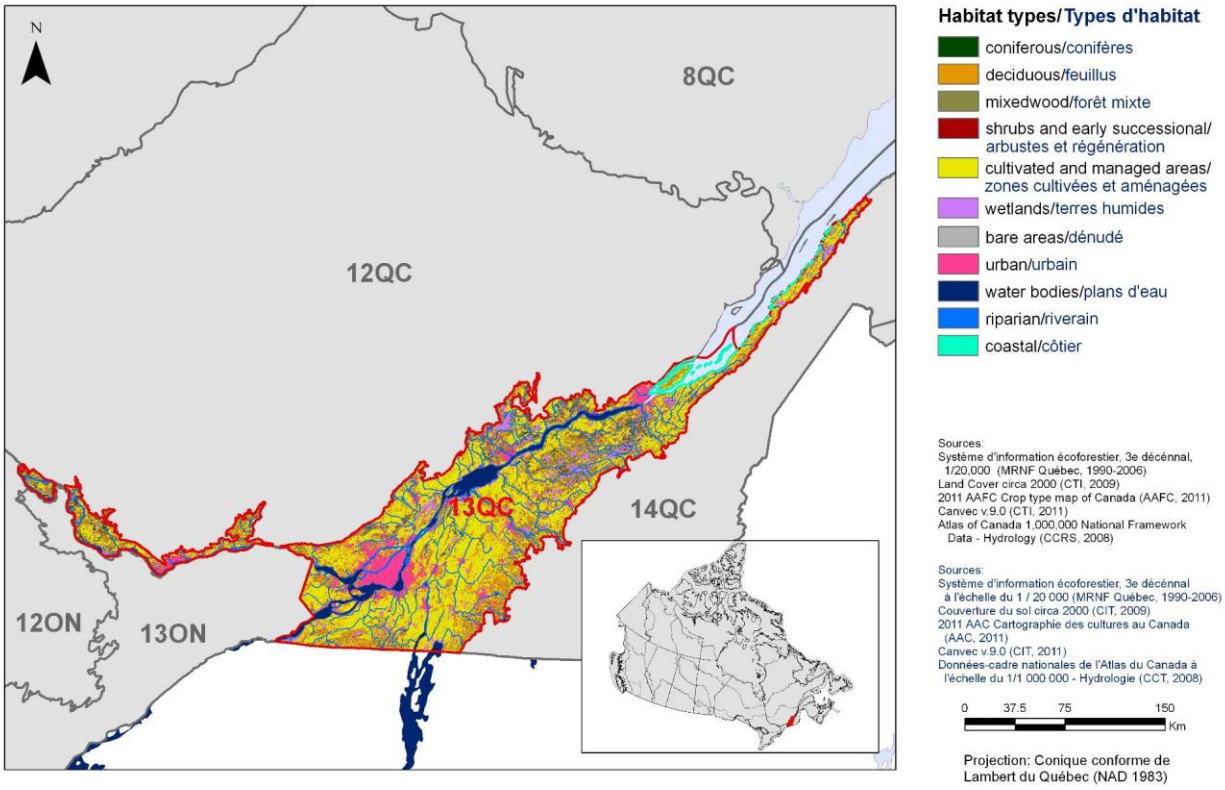

Figure 1. Landcover in BCR 13 in Quebec Region: Lower Great Lakes/St. Lawrence Plain.

Physical environment

Topography

The topography of BCR 13-QC is generally flat, with the exception of seven of the nine Monteregian Hills, namely Mount Royal (233 m), Saint-Bruno (218 m), Saint-Hilaire (403 m), Rougemont (390 m), Yamaska (416 m), Shefford (525 m) and Saint-Grégoire (265 m) (Commission de toponymie Quebec 2012). The rest of the St. Lawrence Plain, which makes up most of BCR 13-QC, has an elevation of less than 100 m (Li and Ducruc 1999).

Hydrography and hydrology

The hydrography of BCR 13-QC is dominated by the St. Lawrence River and the downstream portion of its tributaries, the largest of which are the Richelieu, Yamaska, Nicolet and Bécancour rivers on the south bank, and the Ottawa, Assomption, Saint-Maurice and Jacques-Cartier rivers on the north bank. This BCR also includes four major fluvial lakes: Lake Saint-François (239 km^2), Lake of Two Mountains (149 km^2), Lake Saint-Louis (147 km^2) and Lake Saint-Pierre (362 km^2; Government of Quebec 2002).

Climate

BCR 13-QC's climate is the warmest in Quebec and is characterized by relatively hot summers and cool winters. The average annual temperature is about 5°C, while the average summer temperature is 16.5°C and the average winter temperature is -7°C. The average annual precipitation ranges from 800 to 1000 mm (Ecological Stratification Working Group 1996).

Land cover and land use

The mild climate and fertile soil that characterize the land in BCR 13-QC provide conditions suitable for agricultural, and thus nearly half of the land cover is cultivated and managed areas (Fig. 1), mostly annual crops (e.g., grain corn and soybean; Statistics Canada 2010a). Since BCR 13-QC is the most populated BCR in Quebec, agricultural and urban development has been a major contributing factor to the loss and fragmentation of forest cover (Bélanger and Grenier 2002). Forest cover currently accounts for 28% of BCR 13-QC's area and consists primarily of a mixed, deciduous-dominated forest that is very fragmented (Li et Ducruc, 1999). A little over 5% of the area is wetlands, which consists mainly of bogs, swamps and freshwater marshes. Most of the land in BCR 13-QC is privately owned (Government of Quebec 2012).

Biological environment

Vegetation

BCR 13-QC is located in the northern temperate vegetation zone dominated by deciduous and mixed forest stands (Ministère des Ressources naturelles 2013). The western portion of BCR 13-QC is represented almost entirely by the sugar maple-bitternut hickory bioclimatic domain, while the eastern portion is represented mainly by the sugar maple-basswood domain and, to a minor degree, by the balsam fir-yellow birch domain along the riparian strip from Kamouraska to Saint-Simon.

The sugar maple-bitternut hickory domain has the most diverse flora in Quebec and includes certain species that are at the northern limit of their range. This domain is characterized by the dominance of sugar maple; its main species include basswood, white ash and American beech, in addition to bitternut and shagbark hickory (Gratton 2010). The sugar maple-basswood domain contains sugar maple, basswood, white ash, American beech and ironwood as well as more boreal species such as yellow birch. The balsam fir-yellow birch domain has a larger proportion of conifers compared to the two other bioclimatic domains in the BCR and includes balsam fir, white spruce, Eastern white cedar and yellow birch.

Wildlife

The area covered by BCR 13-QC is home to a wide variety of animal species despite significant human disturbances in the region (Gratton 2010). Abundant or representative mammals include the White-tailed Deer, Coyote, Racoon, Grey Squirrel, Eastern Cottontail and Muskrat. Four mammal species likely to be designated threatened or vulnerable in Quebec live in a number of the region's remaining forests and include the Eastern Red Bat, Silver-Haired Bat, Hoary Bat and Southern Flying Squirrel (Ministère du Développement durable, de l'Environnement, de la Faune et des Parcs 2013).

BCR 13-QC has the widest diversity of amphibians and reptiles in Quebec (Jobin and DesGranges 2012). Representative species are the American Toad, Northern Spring Peeper, Leopard Frog, Garter Snake, Painted Turtle and Common Snapping Turtle. Many are designated species at risk in Canada or Quebec, namely the Mountain Dusky Salamander, Western Chorus Frog, Common Musk Turtle, Spiny Softshell Turtle and Map Turtle (Ministère du Développement durable, de l'Environnement, de la Faune et des Parcs 2013; Species at Risk Public Registry 2012).

The presence of the St. Lawrence River and other major rivers in BCR 13-QC means that fish fauna is also diverse in the region (Gratton 2010). This BCR contains the only fish species endemic to Quebec, the Copper Redhorse, whose only two known spawning grounds are in the Richelieu River. Other representative species include the Yellow Perch, Brown Bullhead, American Shad, Lake Sturgeon and American Eel.

BCR 13-QC supports a large avian diversity, with many of Quebec's bird species attaining their maximum abundance there (Falardeau et al. 2010). Waterfowl is also well represented in this BCR. The Canada Goose as well as diving and dabbling ducks use the wetlands and agricultural fields while nesting, and hundreds of thousands of birds (particularly snow geese and dabbling ducks) use the region as a staging area during spring and fall migration. BCR 13-QC has the largest diversity of rural species in Quebec, including the Bobolink, Eastern Meadowlark, Horned Lark, Savannah Sparrow and Vesper Sparrow. Species characteristic of urban areas in the BCR include the House Sparrow, European Starling and Rock Pigeon—three introduced species—as well as the Ring-billed Gull. The Northern Cardinal and House Finch, both fairly rare 30 years ago, are now common in the urban areas of BCR 13-QC (Falardeau et al. 2010). Forest birds representative of this BCR include the Cooper's Hawk, Red-shouldered Hawk, Eastern Screech-Owl, Eastern Whip-poor-will, White-breasted Nuthatch and Wood Thrush (Drolet et al.

2010). The Herring Gull, Great Blue Heron, Black-crowned Night-Heron, Common Tern and Double-crested Cormorant are some of the waterbirds representative of BCR 13-QC (Chapdelaine and Rail 2004). The Killdeer, Wilson's Snipe and American Woodcock are species of shorebirds known to breed in this BCR (Aubry and Cotter 2007).

Human environment

BCR 13-QC is the most populated area in Quebec with close to 5.5 million people, nearly 75% of the entire population of that province (adapted from Statistics Canada 2010a; 2010b). Major population centres include Montréal (1 649 519 inhabitants), Quebec (516 622), Laval (401 553) and Trois-Rivières (131 338; Statistics Canada 2012). BCR 13-QC comprises 7 Aboriginal communities with a little over 17 000 inhabitants, 85% of whom live in the western part of the BCR in the Mohawk communities of Kahnawake, Akwesasne and Kanesatake (Aboriginal Affairs and Northern Development Canada 2010; Ministère des Affaires municipales des Régions et de l'Occupation du territoire 2010).

Protected and designated areas

Protected areas account for close to 5% of the land in BCR 13-QC (Fig. 2). Five Quebec national parks (responsibility of Quebec's Ministère du Développement durable, de l'Environnement, de la Faune et des Parcs) are located within this BCR and cover a total area of 78 km^2. They are Plaisance, Oka, Îles-de-Boucherville, Mont-Saint-Bruno and Yamaska national parks. This BCR also includes the southeast tip of Gatineau Park (responsibility of the National Capital Commission) and 5 of Quebec's 8 national wildlife areas (NWAs) (responsibility of Environment Canada): Lac Saint-François, Îles de la Paix, Îles de Contrecoeur, Cap Tourmente (partly in BCR 12-QC) and Baie de l'Isle-Verte (partly in BCR 14-QC). Together, these NWAs cover an area of approximately 30 km^2 in BCR 13-QC. Thirteen migratory bird sanctuaries (MBSs) (responsibility of Environment Canada) are located in BCR 13-QC and cover a total area of 77 km^2. An area of 1225 km^2 is occupied by no less than 190 waterbird staging areas (responsibility of Quebec's Ministère du Développement durable, de l'Environnement, de la Faune et des Parcs), most of which are located along the St. Lawrence and Ottawa rivers.

Lastly, BCR 13-QC also includes designated areas that do not have legal protection status. It has 25 Important Bird Areas (IBAs) and four sites designated under the Convention on Wetlands of International Importance (Ramsar). The 25 IBAs have a total area of slightly more than 700 km^2 and generally encompass NWAs and MBSs. The Ramsar sites of BCR 13-QC correspond approximately to Lake St. Pierre and the NWAs of Lac Saint-François, Cap Tourmente and Baie de l'Isle-Verte (Fig. 2).

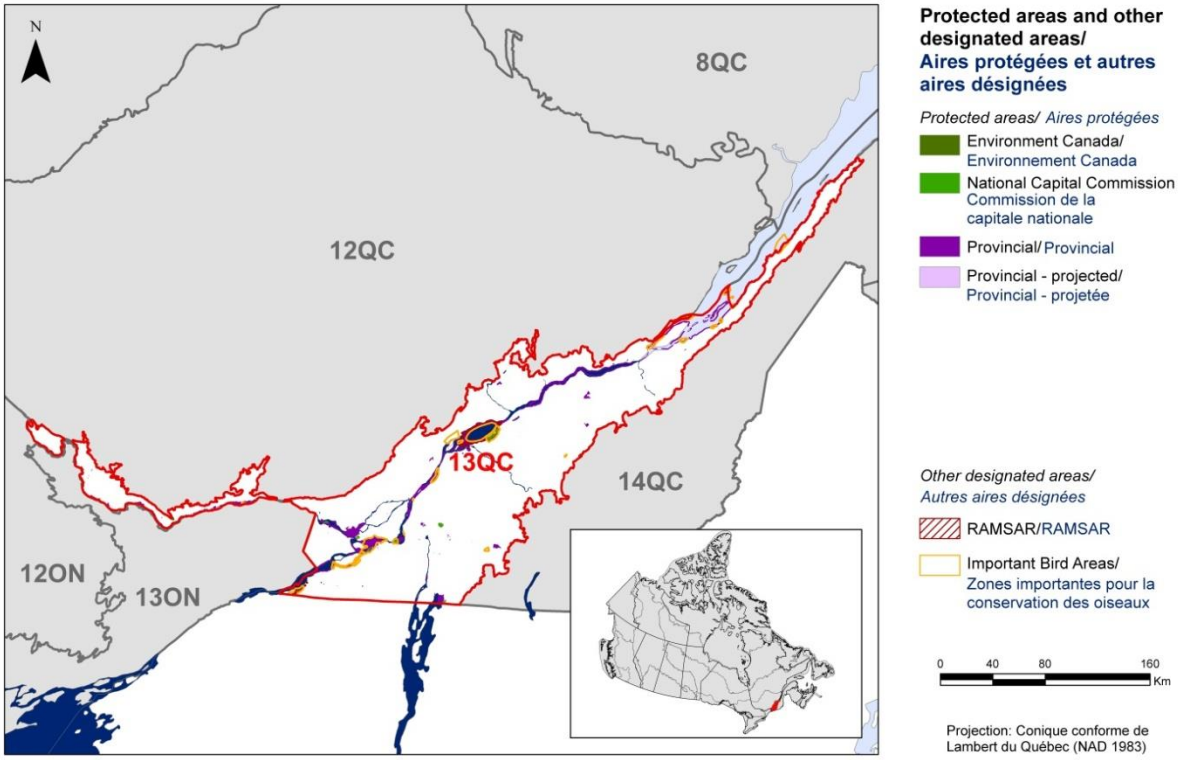

Figure 2. Map of protected and designated areas in BCR 13 in Quebec Region: Lower Great Lakes/ St. Lawrence Plain.

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 13-QC by bird group and by the reason for priority status.

The standard method for selecting priority species identified, on a preliminary basis, 81 priority species, subspecies or populations (called “species” hereinafter) from the 240 bird species in BCR 13-QC (Appendix 1). Regional experts reviewed the preliminary list and excluded 28 previously selected species and added 15 others, making the final count of priority species 68 (Table 1). The reasons for these decisions are presented in Appendix 3.

The 68 priority species identified are not distributed equally among the 4 bird groups. Landbirds are the most represented group with 44 species or 65% of all priority species in BCR 13-QC (Table 2). This is representative of the importance of landbirds in the region, as they account for 63% of all species (Appendix 1). The 8 priority species of waterbirds account for 40% of all species in this group in BCR 13-QC, which is indicative, to a certain degree, of the group's precariousness in the sub-region. Waterfowl and shorebirds have 9 and 7 priority species, respectively.

The vast majority of priority species (58 of 68) were identified for conservation reasons (Table 1, shaded cells). They include 22 species at risk, which are listed provincially under the *Loi sur les espèces menacées ou vulnérables* [Act respecting threatened or vulnerable species], nationally under the *Species at Risk Act* (SARA), or have been assessed by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC; Table 3). Thirteen species are considered at risk both federally and provincially, 4 bird species are considered at risk only at the provincial level (Nelson's Sharp-tailed Sparrow, Grasshopper Sparrow, Bald Eagle and Sedge Wren). The Bobolink, Wood Thrush, Barn Swallow, Eastern Wood-Pewee and Eastern Meadowlark have been assessed as “at risk” by COSEWIC but are not currently listed on Schedule 1 of SARA. Apart from the conservation species, 8 have been identified as priority species for stewardship reasons (Table 1; unshaded cells), while the Canada Goose (resident Atlantic population) and Snow Goose were deemed to require special management due to overabundant populations (Table 1; black cells).

Table 1. Priority species in BCR 13 Quebec, 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 priority level[7] (waterbirds)	NAWMP rank[8] (waterfowl	Expert review[9] (additions to priority list)
American Kestrel	Landbird	Increase 50%					Yes						
Bald Eagle	Landbird	Recovery objective			V			Yes					
Baltimore Oriole	Landbird	Increase 50%					Yes		Yes				
Bank Swallow	Landbird	Increase											Yes
Barn Swallow	Landbird	Increase 50%	T										
Barred Owl	Landbird	Assess/Maintain											Yes
Belted Kingfisher	Landbird	Increase 50%					Yes						
Black-billed Cuckoo	Landbird	Assess/Maintain					Yes		Yes				
Bobolink	Landbird	Increase 50%	T			Yes	Yes		Yes				
Brown Creeper	Landbird	Assess/Maintain											Yes
Brown Thrasher	Landbird	Increase 100%					Yes	Yes					

[1] Conservation species are in shaded cells, stewardship species are in unshaded cells, and species selected for management are in black cells.
[2] Assessed by COSEWIC (Committee on the Status of Endangered Wildlife in Canada) as: E, Endangered; T, Threatened; SC, Special Concern
[3] Species listed on Schedule 1 of the *Species at Risk Act* (SARA) as E, Endangered; T, Threatened; SC, Special Concern (Species at Risk Public Registry).
[4] Status under the *Loi sur les espèces menacées ou vulnérables*[Law on threatened or vulnerable species] (Quebec): T, Threatened; V , Vulnerable; L, Likely to be designated threatened or vulnerable.
[5] Taken from the database downloaded from www.partnersinflight.org. Consult Panjabi et al. (2005) for the analytical method.
[6] 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.
[7] National priority level as identified in *Canada's Waterbird Conservation Plan* (Milko et al. 2003). Tier 1 is the highest priority.
[8] NAWMP: North American Waterfowl Management Plan (NAWMP, Plan Committee, 2004).
[9] Expert review indicates that a species was added to the priority list as a result of expert opinion (reasons for the addition are presented in Appendix 3). Species that have been removed from the priority list, as well as their conservation characteristics and the reasons for their removal are also presented in Appendix 3.

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 priority level[7] (waterbirds)	NAWMP rank[8] (waterfowl	Expert review[9] (additions to priority list)
Canada Warbler	Landbird	Recovery objective[10]	T	T	L	Yes	Yes						
Cerulean Warbler	Landbird	Recovery objective	E	SC	T	Yes	Yes						
Chimney Swift	Landbird	Recovery objective[10]	T	T	L	Yes							
Common Nighthawk	Landbird	Recovery objective[10]	T	T	L	Yes							
Eastern Kingbird	Landbird	Increase 50%					Yes						
Eastern Meadowlark	Landbird	Increase 100%	T				Yes						
Eastern Screech-Owl	Landbird	Assess/Maintain											Yes
Eastern Whip-poor-will	Landbird	Recovery objective[10]	T	T	L	Yes	Yes						
Eastern Wood-Pewee	Landbird	Increase 50%	SC				Yes						
Field Sparrow	Landbird	Increase 100%					Yes						
Golden-winged Warbler	Landbird	Recovery objective[10]	T	T	L	Yes	Yes						
Grasshopper Sparrow	Landbird	Increase			L	Yes		Yes					
Horned Lark	Landbird	Maintain current											Yes
Loggerhead Shrike	Landbird	Recovery objective	E	E	T								
Long-eared Owl	Landbird	Assess/Maintain											Yes
Nelson's Sharp-tailed Sparrow	Landbird	Increase			L	Yes							
Northern Flicker	Landbird	Increase 50%					Yes						
Northern Harrier	Landbird	Maintain current					Yes						

[10] The species is listed under SARA, but the 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 priority level[7] (waterbirds)	NAWMP rank[8] (waterfowl	Expert review[9] (additions to priority list)
Northern Rough-winged Swallow	Landbird	Assess/Maintain											Yes
Northern Saw-whet Owl	Landbird	Assess/Maintain											Yes
Olive-sided Flycatcher	Landbird	Recovery objective[10]	T	T	L	Yes							
Palm Warbler	Landbird	Assess/Maintain				Yes		Yes					
Peregrine Falcon (*anatum/tundrius*)	Landbird	Recovery objective[10]	SC	SC	V[11]	Yes							
Purple Martin	Landbird	Assess/Maintain											Yes
Red-headed Woodpecker	Landbird	Recovery objective	T	T	T	Yes	Yes						
Rose-breasted Grosbeak	Landbird	Maintain current							Yes				
Rufous-sided Towhee	Landbird	Increase 100%				Yes	Yes	Yes					
Savannah Sparrow	Landbird	Increase 50%					Yes						
Sedge Wren	Landbird	Increase			L								
Short-eared Owl	Landbird	Recovery objective[10]	SC	SC	L	Yes							
Vesper Sparrow	Landbird	Increase 100%											Yes
Wood Thrush	Landbird	Increase 100%	T			Yes	Yes						
Yellow-throated Vireo	Landbird	Assess/Maintain						Yes					
American Woodcock	Shorebird	Increase 50%								4a			

[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 priority level[7] (waterbirds)	NAWMP rank[8] (waterfowl	Expert review[9] (additions to priority list)
Killdeer	Shorebird	Increase 50%								3a			
Semipalmated Sandpiper	Shorebird	Increase 100%								3a			
Short-billed Dowitcher (*griseus*)	Shorebird	Maintain current								3a			
Upland Sandpiper	Shorebird	Assess/Maintain								2b			Yes
Wilson's Phalarope	Shorebird	Assess/Maintain								4a			
Wilson's Snipe	Shorebird	Increase 50%								3e			Yes
American Bittern	Waterbird	Increase 50%									Tier 1		
Black Tern	Waterbird	Increase 50%									Tier 1		
Common Loon	Waterbird	Maintain current									Tier 1		
Common Tern	Waterbird	Maintain current									Tier 2		
Least Bittern	Waterbird	Recovery objective	T	T	V						Tier 2		
Sora	Waterbird	Assess/Maintain									Tier 2		
Virginia Rail	Waterbird	Assess/Maintain									Tier 2		
Yellow Rail	Waterbird	Recovery objective	SC	SC	T						Tier 1		
American Black Duck	Waterfowl	Increase										High	
Blue-winged Teal	Waterfowl	Maintain current										Moderately low	Yes
Brant	Waterfowl	Maintain current										Moderately low	Yes
Canada Goose (Atlantic population)	Waterfowl	Maintain current										Very high	
Canada Goose (resident population)	Waterfowl	Decrease										High	

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 priority level[7] (waterbirds)	NAWMP rank[8] (waterfowl	Expert review[9] (additions to priority list)
Greater Scaup	Waterfowl	Maintain current										Moderately high	
Lesser Scaup	Waterfowl	Maintain current										Very high	
Snow Goose	Waterfowl	Decrease										High	
Wood Duck	Waterfowl	Increase										Moderately low	Yes

Table 2. Summary of priority species, by bird group, in BCR13-QC.

Bird Group	Total Species	Total Priority Species	Percent Listed as Priority	Percent of Priority List
Landbird	152	44	29 %	65 %
Shorebird	34	7	21 %	10 %
Waterbird	20	8	40 %	12 %
Waterfowl	34	9	26 %	13 %
Total	**240**	**68**	**28 %**	**100 %**

Table 3. Number of priority species in BCR 13-QC by reason for priority status.

Reason for Priority Listing[1]	Landbirds	Shorebirds	Waterbirds	Waterfowl
COSEWIC[2]	16	0	2	0
Federal SARA listed[3]	11	0	2	0
Provincially listed[4]	15	0	2	0
National/Continental Concern[5]	16	-	-	-
Regional Concern[5]	20	-	-	-
National/Continental Stewardship[5]	6	-	-	-
Regional Stewardship[5]	4	-	-	-
Conservation category[6]	-	5	-	-
Priority level[7]	-	-	8	-
NAWMP[8]	-	-	-	6
Expert review[9]	10	2	0	3

[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 the *Species at Risk Act* as Endangered, Threatened, or Special Concern.

[4] *Provincially Listed* indicates species listed by the *Loi sur les espèces menacées ou vulnérables* (Quebec) as Threatened, Vulnerable or likely to become 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* indicates 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 High or Moderately High breeding or non-breeding conservation and/or monitoring needs in the BCR.

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

Priority species in BCR 13-QC use 12 habitat classes (Fig. 3). Although they account for only 5% of the BCR land area, wetlands are the type of habitat most used by priority species (31 species or 46% of all priority species). Priority species in wetlands fall within 4 groups of birds, the largest of which is landbirds with 15 species.

Cultivated and managed areas (38% of priority species), deciduous forests (26%) and herbaceous environments (22%) are the second, third and fourth most-used habitats, respectively, by priority species in BCR 13-QC. These three types of habitats are mostly used by landbirds. In addition to wetlands, shorebirds, waterbirds and waterfowl primarily use riparian areas and waterbodies.

See Section 2 for additional details on priority species, threats and conservation actions for each habitat type in BCR 13-QC.

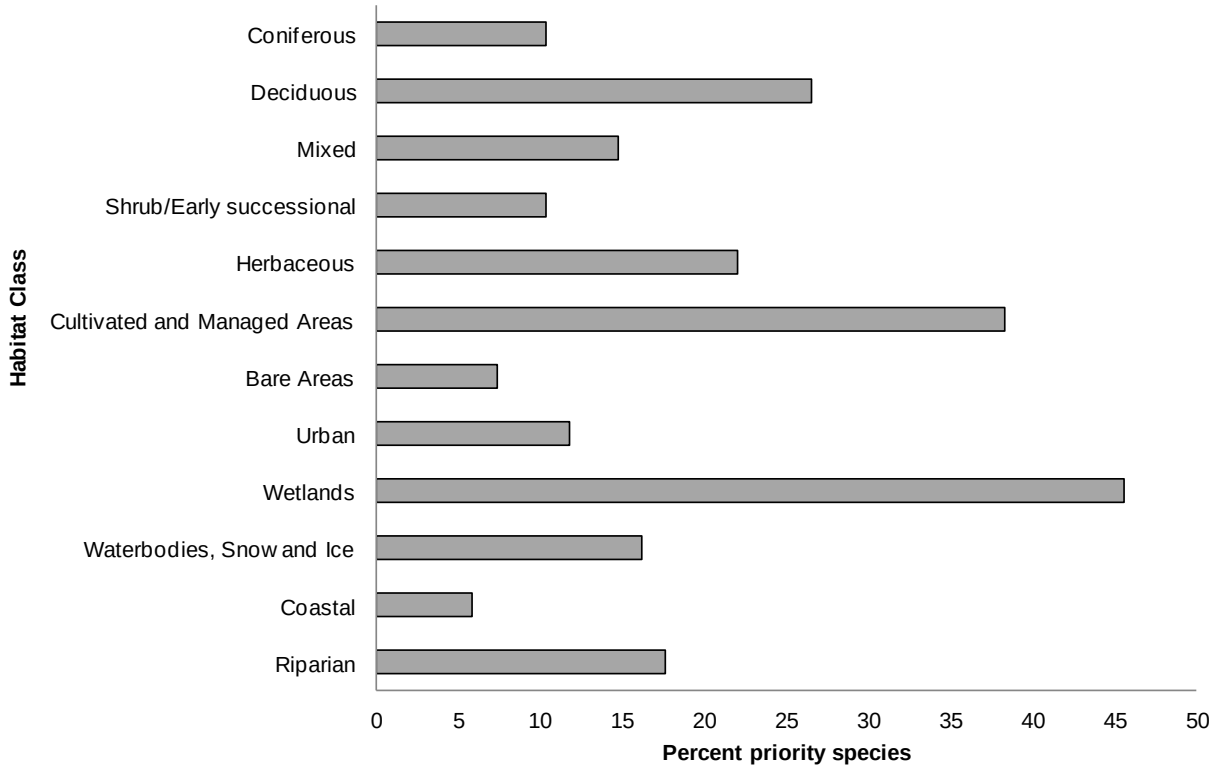

Figure 3. Percent of priority species that are associated with each habitat type in BCR 13-QC.
Note: The total exceeds 100% because each species may be assigned to more than one habitat.

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 the 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.

Due to the significant presence of species at risk in BCR 13-QC, population objectives relating to species recovery rank first at 21% of all objectives for the region, tying with the "Increase 50%" and "Assess/Maintain" objectives (Fig. 4). The "Maintain current" objective ranks close behind with 16%, while "Increase 100%" is the targeted objective for 12% of the priority species in this BCR. By combining the occurrences of the three categories with population increase objectives or recovery objectives, it is noted that 60% of the priority species identified in BCR 13-QC have been assigned an objective that involves increasing their populations. This reflects the magnitude of the threats affecting bird populations in this BCR.

Overall, 37% of priority species were assigned the objective to maintain populations at current levels; however, for more than half of these species, better population trend data is also necessary for decision-making. Lastly, the objective for the Snow Goose and Canada Goose resident population is to decrease the number of birds present.

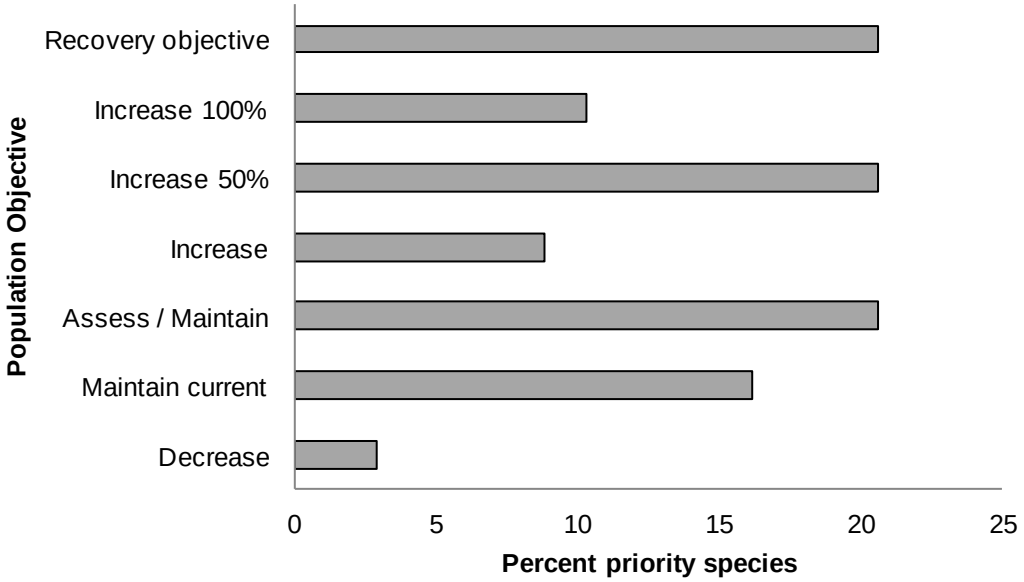

Figure 4. Percent of priority species that are associated with each population objective category in BCR 13-QC.

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 on Widespread Issues, but, unlike other threats, they are not ranked.

Bird populations found in BCR 13-QC face many threats from different sources. No fewer than 548 threats classified into 10 categories and 21 sub-categories have been addressed and are summarized in Figure 5. Category "2. Agriculture & aquaculture" is the category most frequently associated with priority species in BCR 13-QC because it includes 28% of all threats and has a "Very High" overall relative magnitude (Table 4). Sub-category "2.1 Annual & perennial non-timber crops" alone accounts for 23% of threats; it 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, the intensification of agriculture, and the drainage and filling of wetlands for agricultural purposes. More than three-quarters of the threats in this sub-category have a relative magnitude of "High" or "Very High," hence its "Very High" overall relative magnitude. Although the conservation issues associated with category 2 have a particular effect on landbirds, they still impact the three other bird groups.

Sub-category "12.1 Information lacking" is the only one identified in category "12. Other direct threats," and ranks second in terms of the percentage of threats affecting priority species in BCR 13-QC, with 21%. The relative magnitude of all the elements of this conservation issue, as well as the overall relative magnitude of the category, are considered "Low" (Fig. 5; Table 4). This sub-category relates 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 or management plans. Only 5 of the 22 species at risk in BCR 13-QC had a finalized recovery strategy or management plan when this strategy was written. The need for more information was raised for 44 of the 68 priority species (65%) in BCR 13-QC.

Sub-categories “1.1 Housing & urban areas” and “1.2 Commercial & industrial areas” under category “1. Residential & commercial development” are the next most-common threats at 12% and 8%, respectively (Fig. 5). These sub-categories, which have an overall magnitude of “High,” include threats such as habitat loss and/or degradation due to the 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. Overall, category 1 has a “Very High” relative magnitude (Table 4).

Sub-category “9.3 Agricultural & forestry effluents” accounts for 6% of all threats in BCR 13-QC. The only threat associated with this sub-category, and thus with category “9. Pollution”, is the overuse of pesticides, which can cause poisoning, eggshell thinning, and a reduction in prey insect and fish populations. Both sub-category 9.3 and category 9 have a “High” overall relative magnitude for BCR 13-QC (Fig. 5; Table 4).

Category “7. Natural system modifications” is represented by sub-categories “7.2 Dams & water management/use” and “7.3 Other ecosystem modifications” in BCR 13-QC. Although it describes only 5% of all existing threats, this category's overall relative magnitude remains “High” (Table 4). The only threat in sub-category 7.2 is the danger of nest flooding from fluctuations in water levels in the St. Lawrence River as a result of management of the Cornwall Dam. This threat has a relative magnitude of “Medium” and affects mainly waterbirds in wetlands. Sub-category 7.3 results from the abandonment of agricultural land, which then becomes unsuitable for some species of farmland birds, shoreline erosion in riparian areas and the transition from shrub habitats to forest habitats. This sub-category has a “Very High” overall relative magnitude.

Accounting for a little over 5% of threats, category “11. Climate change & severe weather” consists of sub-categories “11.1 Habitat shifting & alterations,” “11.4 Storms & flooding” and “11.5 Other impacts.” The main issues are a higher frequency of adverse weather events that may affect migration, reproductive success, nesting phenology and prey availability as well as changes in the number, size and location of wetlands. These effects are associated with global climate changes, and aerial insectivores such as various species of swallows, the Chimney Swift and the Olive-sided Flycatcher, are particularly affected. Category 11 has a “High” relative magnitude for BCR 13-QC (Table 4), while its sub-categories have relative magnitudes of “Medium” and “High” (Fig. 5).

Other threats, including the colonization of herbaceous and wetland habitats by invasive plant and animal species (sub-category 8.1), and the presence of problematic native species such as the Brown-headed Cowbird (sub-category 8.2), account for 4% and 2% of the conservation issues in BCR 13-QC, respectively. The impacts of logging and wood harvesting (sub-category 5.3), which include forest habitat fragmentation and reduced numbers of snags, large-diameter trees and stands of dead trees, account for approximately 3% of the identified threats. Each of the other sub-categories in Figure 5 represent about 1% of reported threats.

Of the 12 major habitat classes in BCR 13-QC, 9 have been assigned an overall threat magnitude of “High” or “Very High” (Table 4). Cultivated and managed areas as well as wetlands are 2 of the habitat classes most affected by the threats identified in this BCR, with a “Very High” overall relative magnitude. Priority species found in habitats listed under these 2 classes are particularly affected by threats of a “Very High” relative magnitude from agricultural sources (category 2). Birds in cultivated and managed areas are also affected by threats of a “Very High” overall relative magnitude arising from pollution (category 9), while species in wetlands are subjected to impacts of the same magnitude due to residential and commercial development (category 1).

The deciduous, mixed wood, shrub and early successional, herbaceous, urban and riparian habitat classes as well as waterbodies have all been assigned a “High” relative magnitude. For all these habitats, threat categories “1. Residential & commercial development” and “2. Agriculture & aquaculture” have a “High” or “Very High” relative magnitude.

Threat category “4. Transportation & service corridors” particularly affects deciduous as well as shrub and early successional habitats, while category “5. Biological resource use” has a “High” relative magnitude in deciduous and wetland habitats. Lastly, category “7. Natural system modifications” is of a “Very High” relative threat to shrub and early successional habitat, while climate change and severe weather (category 11) have a “High” relative magnitude threatening herbaceous, riparian, urban and wetland habitats as well as in cultivated and managed areas.

Section 2 provides additional 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 Threats Outside Canada section.

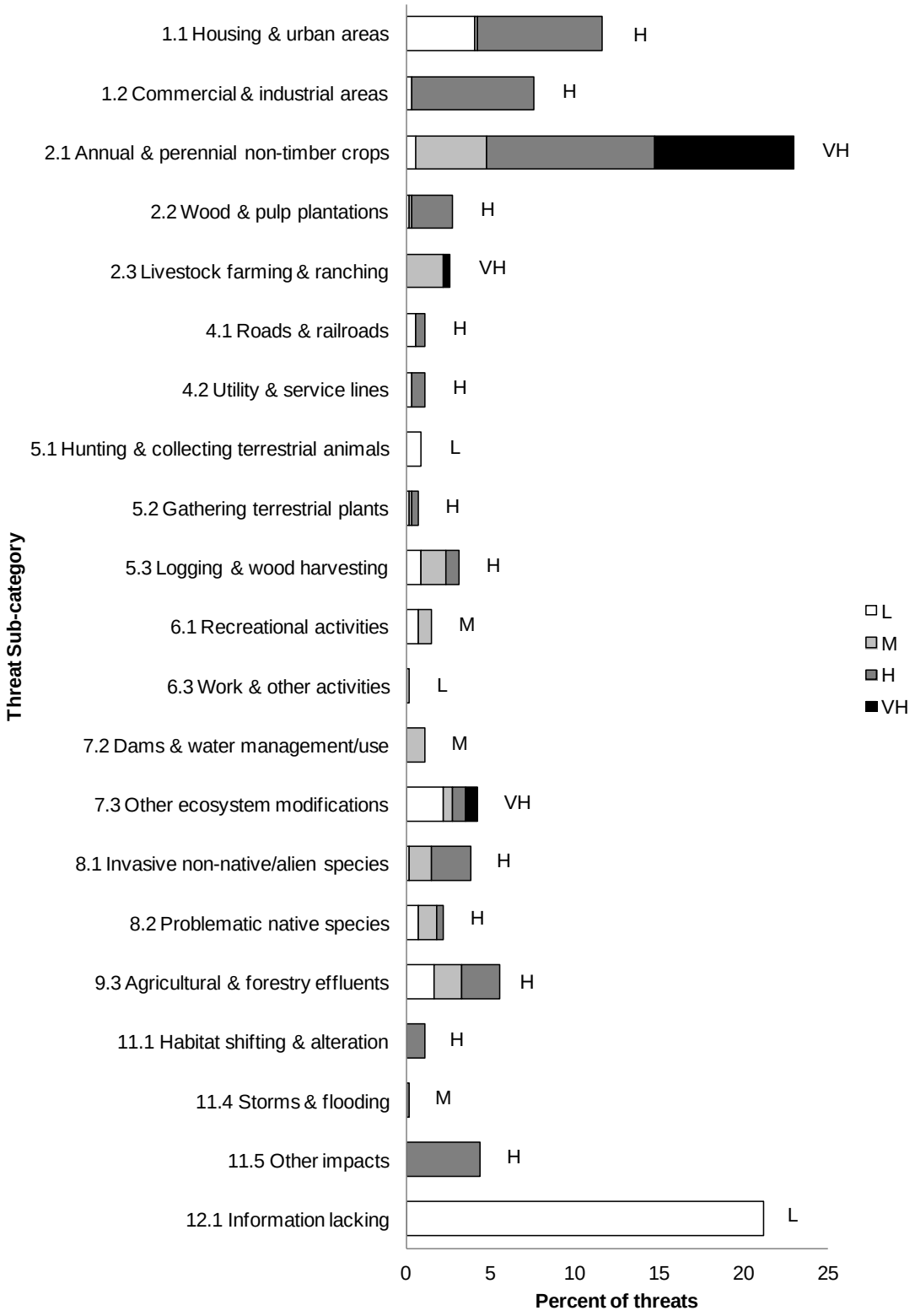

Figure 5. Percent of identified threats to priority species within BCR 13-QC by threat sub-category. Each bar represents the percent of the total number of threats identified in each threat sub-category in BCR 13-QC (for example, if 100 threats were identified in total for all priority species in BCR 13-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 subcategory 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 13-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.

	Habitat class												
Threat category	**Coniferous**	**Deciduous**	**Mixed**	**Shrub/Early Successional**	**Herbaceous**	**Cultivated and Managed Areas**	**Bare Areas**	**Urban**	**Wetlands**	**Waterbodies**	**Coastal**	**Riparian**	**Overall**
Overall	**M**	**H**	**H**	**H**	**H**	**VH**	**M**	**H**	**VH**	**H**	**L**	**H**	
1 Residential & commercial development	H	H	H	H	L	L		H	VH	H		H	**VH**
2 Agriculture & aquaculture	M	H	H	H	H	VH		VH	VH	H		VH	**VH**
4 Transportation & service corridors		H		H		M		M					**H**
5 Biological resource use	L	H	L				L	L	H	L		M	**H**
6 Human intrusions & disturbance							L	M	L	L	L		**L**
7 Natural system modifications				VH		M	H	L	M		L	M	**H**
8 Invasive & other problematic species & genes	M	M	M	H	M	M		M	H		M		**H**
9 Pollution	L	L	L	L		VH			M	L			**H**
11 Climate change & severe weather		M			H	H		H	H			H	**H**
12 Other direct threats	L	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-13 QC, a little over half of the suggested conservation objectives are in category "1. Ensure adequate habitat" and affect nearly all habitats in BCR 13-QC, with the exception of bare areas. This objective category includes three sub-categories for BCR 13-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 habitat features on the landscape."

Objective "7. Improve understanding (of population status, limiting factors and mitigation)" ranks second with 16% of all suggested conservation objectives. The vast majority of objectives in this category are from sub-category "7.1 Improve population/demographic monitoring" and demonstrate a need for increased monitoring in this BCR for many priority species in all four bird groups.

About 15% of the objectives involve managing individual species (category 3). For 22 species at risk in BCR 13-QC, two-thirds of the objectives in this category come from sub-category "3.4 Implement recovery strategies for species at risk." Sub-categories "3.2 Reduce competition with problematic native species," "3.3 Reduce parasitism/predation," "3.5 Prevent and control the spread of invasive and exotic species" and "3.6 Reduce overabundant species" complete this category's objectives.

Objective "2. Reduce mortality/increase productivity" accounts for 10% of the conservation objectives in BCR 13-QC. Half of this category's objectives are associated with the overuse of pesticides in agricultural environments and fall under sub-category "2.1 Reduce mortality and/or sub-lethal effects from pesticide use." A quarter of this category's objectives relate to incidental mortality from farm operations and fall under sub-category "2.4 Reduce incidental mortality." The other objectives deal with reducing parasitism and predation (sub-category 2.5), reducing incidental mortality from collisions (sub-category 2.7), and reducing mortality from legal or illegal hunting and persecution (sub-category 2.8).

Categories “6. Manage for climate change” and “4. Reduce disturbance” account for 5% and 2%, respectively, of all the objectives identified for BCR 13-QC. Sub-category “6.2 Manage for habitat resilience as climate changes,” which primarily affects aerial insectivores, is the only sub-category included in category 6. All category 4 threats fall under sub-category “4.1 Reduce disturbance from human recreation” and mostly relate to priority species that are nesting or gathering near waterbodies. No objectives have been assigned to category “5. Ensure adequate food supplies” in BCR 13-QC.

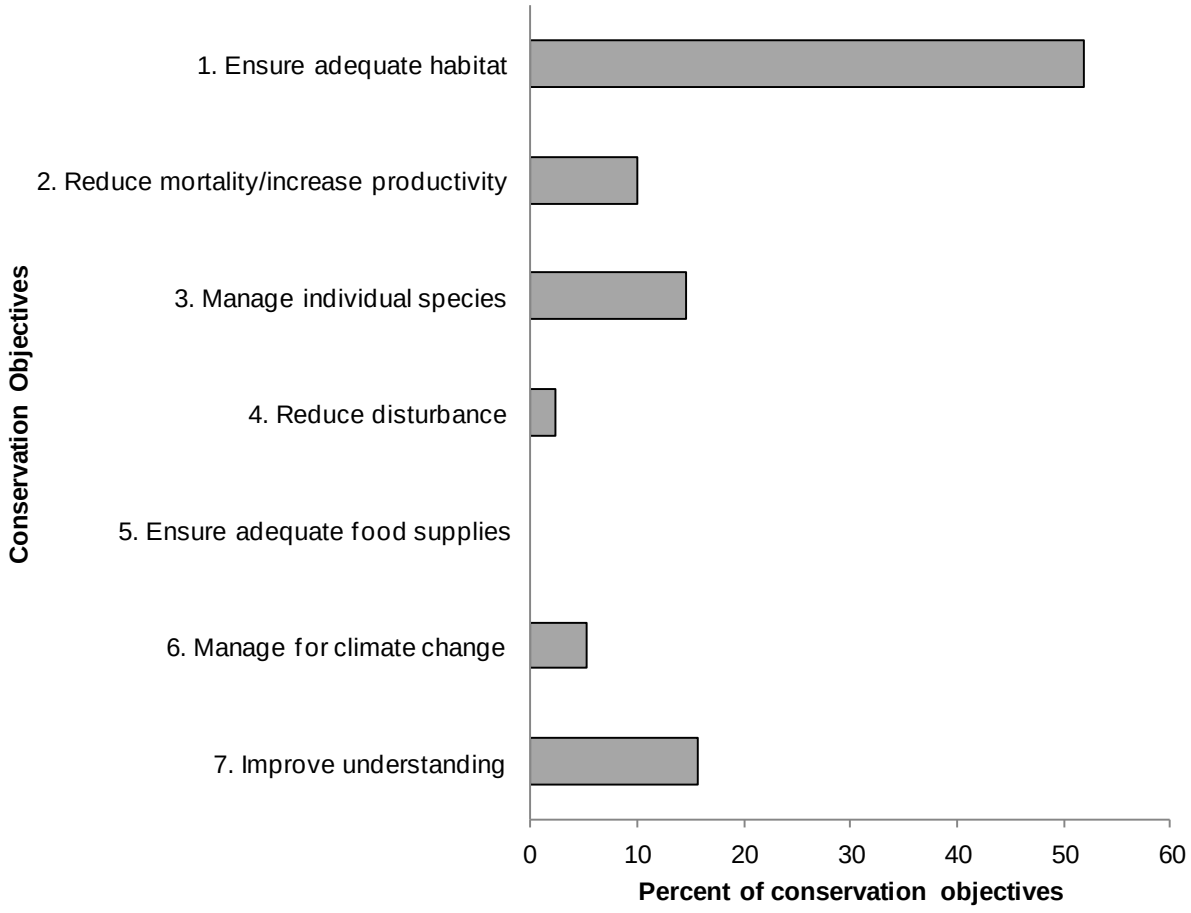

Figure 6: Percent of all conservation objectives assigned to each conservation objective category in BCR 13-QC.

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 30% of the actions recommended in BCR 13-QC are in sub-category "1.1 Site/area protection." The high frequency of this recommendation is due to the considerable anthropogenic pressure on bird habitats and populations in a densely populated area, characterized by a wide variety of human activities. The conservation actions most frequently suggested in this category include the protection of major nesting sites, wetlands and large expanses of mature trees through stewardship, by legally designating them as conservation areas and by adopting municipal land use plans that protect wetlands and woodlands. These actions are designed to minimize the impact of threats associated with residential, commercial and agricultural development.

Conservation actions related to additional monitoring needs (sub-category 8.2) rank second and account for 15% of all actions. These actions include specific monitoring measures for certain groups of species, such as nocturnal birds and shorebirds, updating waterfowl banding and survey programs, and improving the migration monitoring program at the McGill Bird Observatory. See "Research and Population Monitoring Needs" in Section 3 for further details.

The adoption of beneficial management practices, mainly in the agriculture and forestry sectors (sub-category 5.3), is the third most-frequently mentioned action sub-category with 12%. More specifically, developing beneficial management practices to reduce incidental bird mortality, implementing silvicultural treatments that maintain natural habitat structure, and supporting sustainable agriculture are some actions suggested for overcoming a number of threats relating to annual and perennial crops, and logging and wood harvesting.

Sub-category "5.2 Policies and regulations" accounts for 9% of the suggested conservation actions and refers primarily to improving the legal protection of wetlands and enforcing legislation. Lastly, implementing conservation payments (sub-category 6.4) accounts for 7% of actions and aims to compensate landowners and farmers for keeping their land uncultivated, preserving farm woodlots and safeguarding pastureland.

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

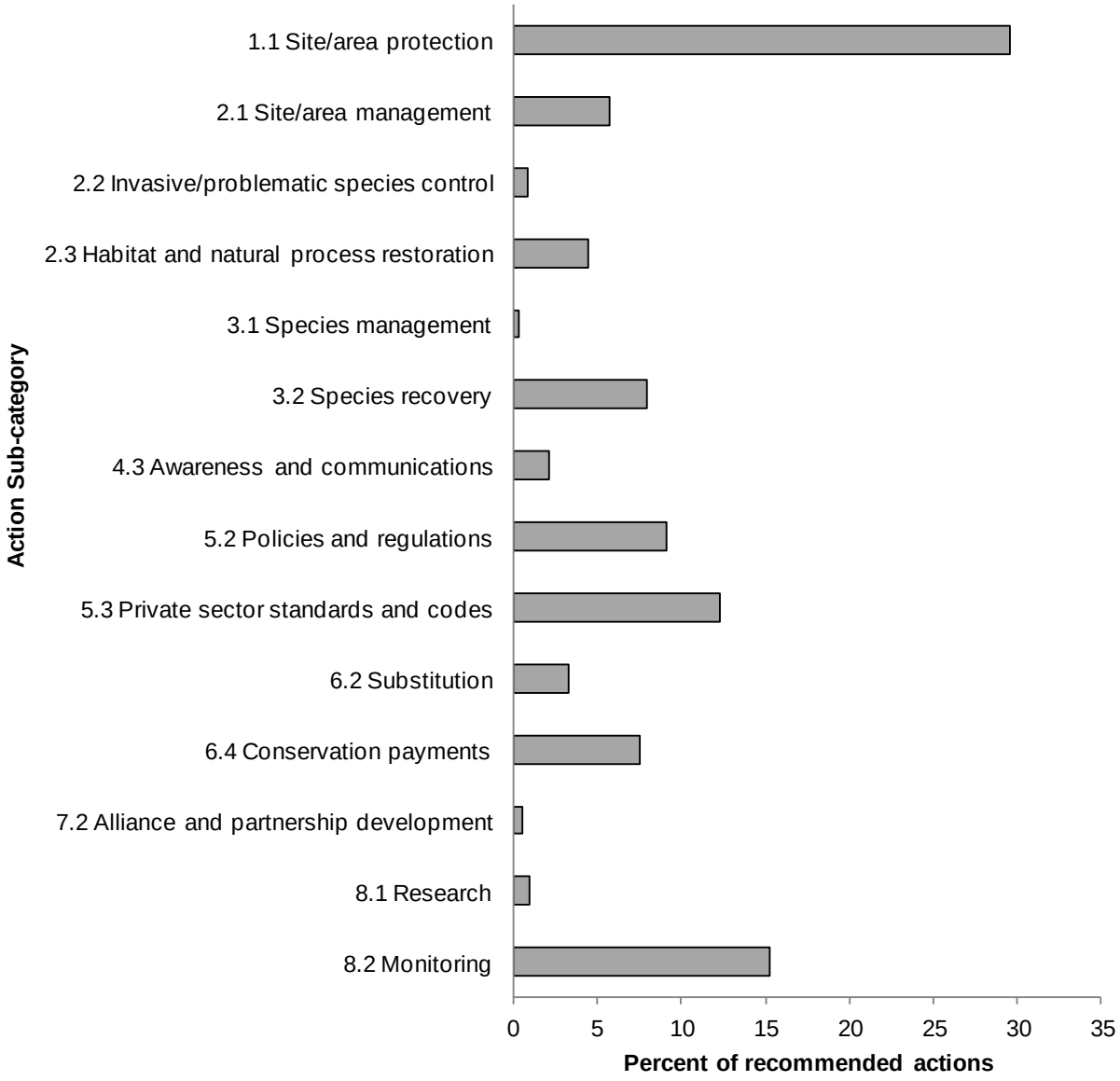

Figure 7. Percent of recommended actions assigned to each sub-category in BCR 13-QC.
"Research" and "monitoring" refers to specific species where additional information is required. For a discussion of broad-scale research and monitoring requirements, see the Research and Population Monitoring Needs 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 13-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. Due to the temperate climate and low-lying landscape of BCR 13-QC, coniferous habitats are minimal in this region and only cover 2.2% of the land (Fig. 8). They are mainly represented by the balsam fir-yellow birch bioclimatic domain and include species such as balsam fir, white spruce, Eastern white cedar and yellow birch.

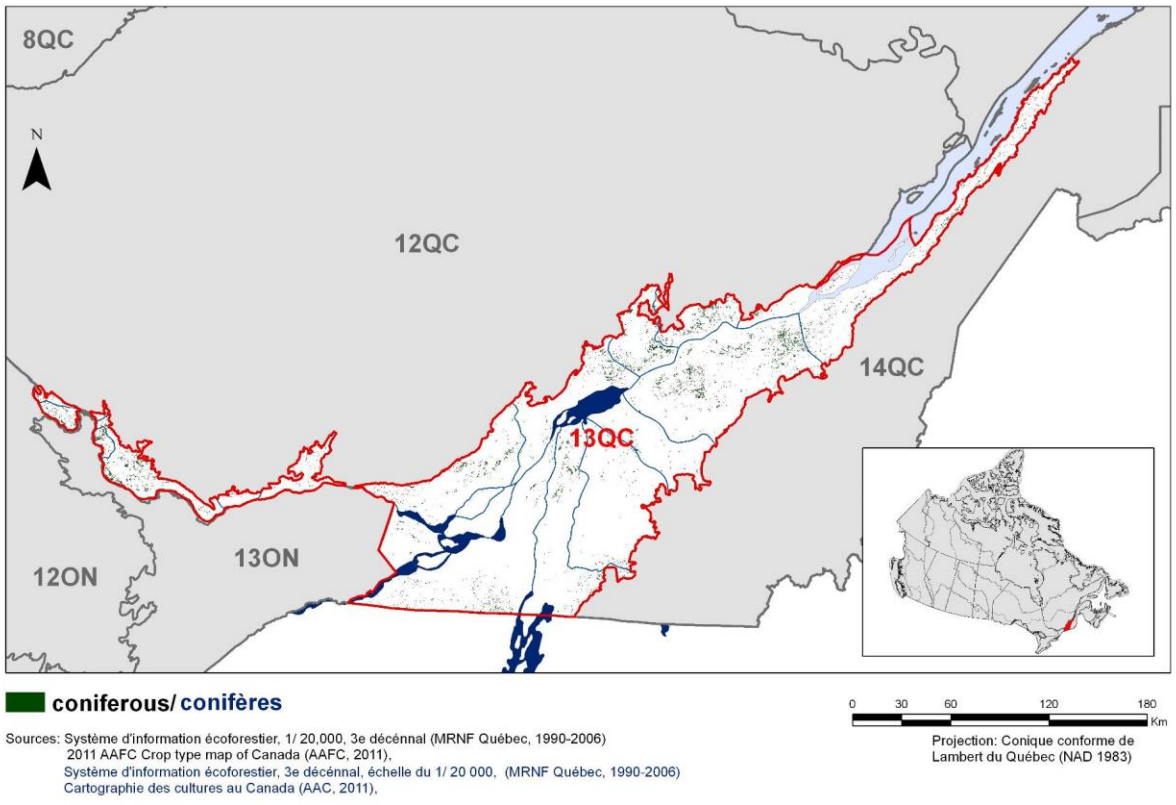

Figure 8. Map of coniferous habitats in BCR 13-QC: St. Lawrence Plain and Lower Great Lakes.

Seven priority species use coniferous habitats in BCR 13-QC (Table 5). All these species are landbirds and have been selected for conservation reasons. Three of the seven priority species found in coniferous habitat are species at risk that have been listed as Threatened: the Eastern Whip-poor-will, Olive-sided Flycatcher and Canada Warbler. There are no finalized recovery strategies for any of these three species, all of which are listed on Schedule 1 of SARA.

The threats to priority species that were the most frequently identified in coniferous habitat stem from logging and wood harvesting as well as annual and perennial non-timber crops (Fig. 9). Each of these threat categories accounts for 25% of this habitat's conservation issues. However, a “High” overall relative magnitude is assigned to threats associated with housing and urban areas, and commercial and industrial areas. The key elements reported are the conversion of woodlands into residential, commercial, industrial or agricultural developments and the growing scarcity of large-diameter trees and snags due to forestry operations.

The full list of threats in the coniferous habitat of BCR 13-QC, 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. Recommended conservation actions include selecting silvicultural treatments that maintain key habitat features such as large-diameter trees, snags with cavities, stands of dead trees and irregular structures. Implementing incentives for preserving habitats or features that are important for priority species are also among the preferred conservation actions.

Table 5. Priority species that use coniferous 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]
American Kestrel	Forest edge	Increase 50%	-	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]	Several types of dry forest habitats with clearings and stands of young pine	Recovery objective	X	X	-
Northern Flicker	Sparse stands of conifers	Increase 50%	-	X	-
Northern Saw-whet Owl	Dense mature coniferous forest	Assess/Maintain	-	X	-
Olive-sided Flycatcher[4]	Stands of conifers	Recovery objective	X	X	-

[1] "At risk" includes species considered Endangered, Threatened or of 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 of Special Concern; and listed as Threatened, 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), the *Canadian Shorebird Conservation Plan* (Milko et al. 2003), the *North American Waterfowl Management Plan* (NAWMP Plan Committee 2004) or by regional experts.

[3] "Stewardship" includes abundant species with a wide range, with a significant percentage of this range or continental population located in the conservation unit or sub-unit. These species include not only 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 Eastern Whip-poor-will: Increase 100%, Olive-sided Flycatcher: Increase 100%, Canada Warbler: Increase 100%.

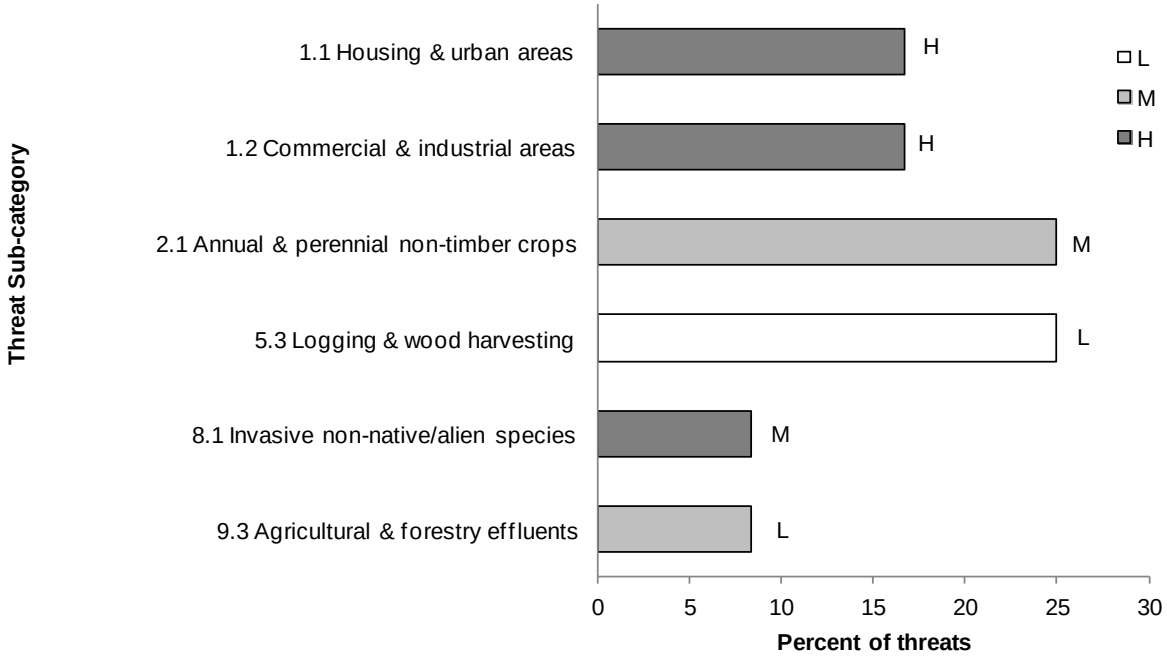

Figure 9. Percent of threats to priority species addressed in coniferous habitat in each threat sub-category.

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 addressed in total for all priority species in the coniferous 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 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 13-QC, by threat category and broad habitat class).

Table 6. Threats addressed, conservation objectives, recommended actions and priority species affected in the coniferous habitat of BCR 13-QC.

Threats addressed	Threat category	Objectives	Objective category	Recommended actions	Action category	Priority species affected[1]
Competition for nesting sites with other species.	8.1 Invasive non-native/alien species	Restore features in coniferous forests that are important for birds.	1.4. Maintain important bird habitat features on the landscape.	Install artificial nesting structures.	3.2 Species recovery	American Kestrel
Decline in snags in open areas.	2.1 Annual & perennial non-timber crops	Conserve and restore the quality and quantity of coniferous habitats on the landscape.	1.4. Maintain important bird habitat features on the landscape.	Develop incentives to maintain snags in open areas.	6.4 Conservation payments 5.3 Private sector standards and codes	American Kestrel
Loss of habitat (conversion of forested farmland into arable land).	2.1 Annual & perennial non-timber crops	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.	Develop incentives to maintain woodlands in agricultural areas.	6.4 Conservation payments	Eastern Whip-poor-will, Brown Creeper
Loss of habitat (conversion of woodlands into 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	Eastern Whip-poor-will, Brown Creeper

[1] Priority species for which the only identified threat is in category "12.1 Information lacking" are not included in this table.

Table 6 continued

Threats addressed	Threat category	Objectives	Objective category	Recommended actions	Action category	Priority species affected[1]
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, stands of dead trees and irregular structure).	5.3 Private sector standards and codes	Northern Flicker, Brown Creeper
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 artificial nesting structures. Promote silvicultural treatments that maintain key habitat features (large-diameter trees, snags with cavities, stands of dead trees and irregular structure).	3.2 Species recovery 5.3 Private sector standards and codes	Northern Saw-whet Owl
Overuse of pesticides (bird poisoning, eggshell thinning, reduction in prey insects and prey fish, leaching to adjacent habitats).	9.3 Agricultural & forestry effluents	Reduce impact of human contaminants on coniferous 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	Eastern Whip-poor-will

Deciduous

According to the 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. Deciduous habitats cover 13% of land in BCR 13-QC and are the most common forest habitat in this BCR (Fig. 10). This habitat is represented by the sugar maple-bitternut hickory bioclimatic domain in the western portion, the sugar maple-basswood domain in the centre and the sugar maple-yellow birch domain in the eastern portion of BCR 13-QC. Representative species include sugar maple, basswood, white ash and American beech.

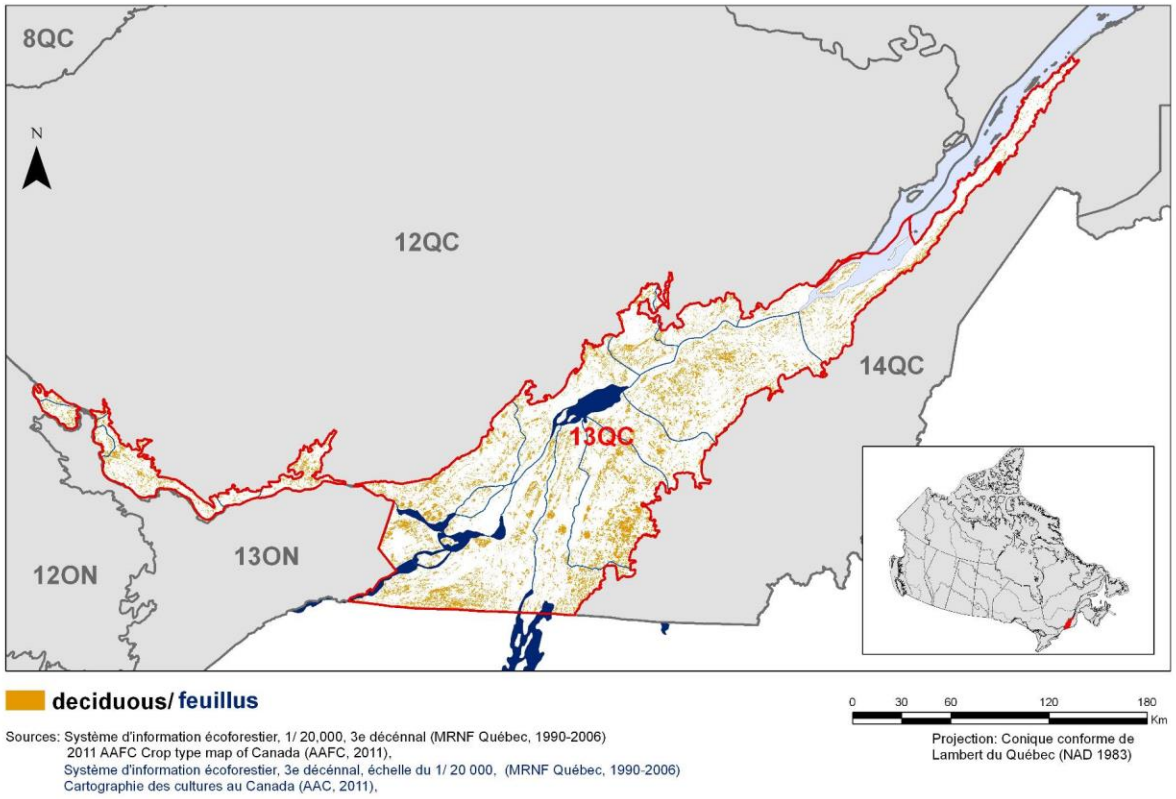

Figure 10. Map of deciduous habitats in BCR 13-QC: St. Lawrence Plain and Lower Great Lakes.

Eighteen priority species, 17 of them landbirds, use the deciduous habitats in BCR 13-QC (Table 7). Only 1 species, the Rose-breasted Grosbeak, was selected for stewardship reasons; 3 others—the Eastern Whip-poor-will (Threatened), Cerulean Warbler (Special Concern) and Red-headed Woodpecker (Threatened)—are species at risk listed on Schedule 1 of SARA. COSEWIC has assessed the Wood Thrush as Threatened and the Eastern Wood-Pewee as a species of Special Concern.

The threats to priority species that were the most frequently identified in deciduous habitat involve annual and perennial non-timber crops (sub-category 2.1) and logging and wood harvesting (sub-category 5.3) (Fig. 11). These two threat sub-categories are considered to have a “High” overall relative magnitude and account for 24% and 20%, respectively, of the threats identified in the deciduous habitat of BCR 13-QC. The main threats associated with sub-category 2.1 are the loss of habitat due to the conversion of forested farmland into arable land and the disappearance of hedges, riparian vegetation and isolated trees on the agricultural landscape. Sub-category 5.3 includes threats such as habitat loss due to the increasing scarcity of large-diameter trees and snags with cavities; it also includes the greatest fragmentation of forest habitats.

Threat sub-categories “1.1 Housing & urban areas” and “1.2 Commercial & industrial areas” each account for 16% of all deciduous habitat conservation issues, and both have a “High” relative magnitude. As for coniferous habitat, the conversion of woodlands into residential, agricultural or commercial land is the most frequently reported issue in these sub-categories.

The full list of threats in the deciduous habitat of BCR 13-QC as well as the objectives, conservation actions and species that could benefit are presented in Table 8. Conservation objectives are mainly to conserve, protect and restore deciduous habitats and the features that make them important for birds. Conservation actions are diverse and include the use of silvicultural treatments that preserve some features important for birds, the adoption of practices that maximize habitat connectivity, and the preservation of woodlands in agricultural and suburban areas.

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 Kestrel	Forest edge	Increase 50%	-	X	-
American Woodcock	Early successional deciduous trees	Increase 50%	-	X	-
Baltimore Oriole	Tree hedgerows	Increase 50%	-	X	-
Barred Owl	Dense mature deciduous forest	Assess/Maintain	-	X	-
Black-billed Cuckoo	Deciduous stands of intermediate age	Assess/Maintain	-	X	-
Brown Creeper	Mature deciduous forest	Assess/Maintain	-	X	-
Cerulean Warbler	Dense mature deciduous forest	Recovery objective[4]	X	X	-
Eastern Kingbird	Tree hedgerows	Increase 50%	-	X	-
Eastern Screech-Owl	Dense mature deciduous forest	Assess/Maintain	-	X	-
Eastern Whip-poor-will[5]	Many types of dry forest habitats with clearings, and edges of cultivated fields interspersed with shrubs and	Recovery objective	X	X	-

[1] "At risk" includes species considered Endangered, Threatened or of 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 of Special Concern; and listed as Threatened, 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), the *Canadian Shorebird Conservation Plan* (Milko et al. 2003), the *North American Waterfowl Management Plan* (NAWMP Plan Committee 2004) or by regional experts.

[3] "Stewardship" includes abundant species with a wide range, with a significant percentage of this range or continental population located in the conservation unit or sub-unit. These species include not only landbirds considered by Partners in Flight but also species from other bird groups that were added by experts.

[4] See Environment Canada (2011a).

[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 Eastern Whip-poor-will: Increase 100%; Red-headed Woodpecker: Increase.

Table 7 continued

Priority species	Details on habitat used	Population objective	Reason for priority status		
			At risk[1]	CC[2]	S[3]
	specifically young stands of oak and beech.				
Eastern Wood-Pewee	Deciduous stands of any age, clearings or strips	Increase 50%	X	X	-
Long-eared Owl	Dense mature deciduous forest	Assess/Maintain	-	X	-
Northern Flicker	Sparse deciduous stands	Increase 50%	-	X	-
Northern Saw-whet Owl	Dense mature deciduous forest	Assess/Maintain	-	X	-
Red-headed Woodpecker[5]	Open deciduous stands	Recovery objective	X	X	-
Rose-breasted Grosbeak	Open stands of early successional deciduous trees	Maintain current	-	-	X
Wood Thrush	Dense mature deciduous forest	Increase 100%	X	X	-
Yellow-throated Vireo	Dense mature deciduous forest	Assess/Maintain	-	X	-

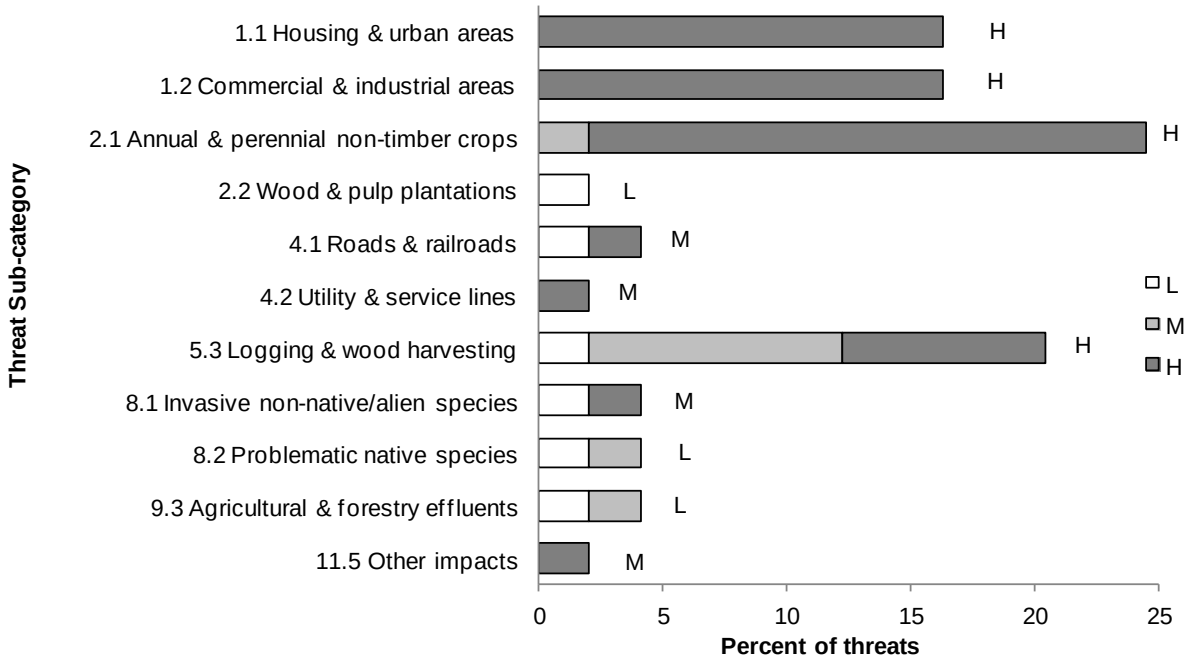

Figure 11. Percent of identified threats to priority species in deciduous habitat in each threat sub-category.

Each bar represents the percent of the total number of threats in each threat sub-category addressed in deciduous habitat (for example, if 100 threats were addressed in total for all priority species in the deciduous 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 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 13-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 13-QC.

Threats addressed	Threat category	Objectives	Objective category	Recommended actions	Action category	Priority species affected[1]
Competition for nesting sites with introduced species.	8.1 Invasive non-native/alien species	Restore features in deciduous forests that are important for birds.	1.4 Maintain important bird habitat features on the landscape	Install artificial nesting structures.	3.2 Species recovery	American Kestrel
Loss of natural vegetation (hedges, riparian strips, isolated trees, shrub layer) on the agricultural landscape.	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.	Promote the maintenance and recovery of hedges and shrub habitats.	2.3 Habitat and natural process restoration	Eastern Kingbird, Baltimore Oriole
Loss of snags in open habitats.	2.1 Annual & perennial non-timber crops	Conserve and restore the quality and quantity of deciduous forests on the landscape.	1.4 Maintain important bird habitat features on the landscape	Develop incentives to conserve snags in open areas.	6.4 Conservation payments	American Kestrel
Loss of habitat (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. Recovery of species at risk.	1.1 Ensure land and resource-use policies and practices maintain or improve bird habitat. 3.4. Implement recovery strategies for species at risk	Develop incentives to maintain woodlands in agricultural areas. Continue to implement the Management Plan for the Cerulean Warbler (Environment Canada 2011a).	6.4 Conservation payments 3.2 Species recovery	American Woodcock, Barred Owl, Eastern Whip-poor-will, Brown Creeper, Wood Thrush, Long-eared Owl, Cerulean Warbler, Eastern Screech-Owl, Yellow-throated Vireo

[1] Priority species for which the only identified threat is in category "12.1 Information lacking" are not included in this table.

Table 8 continued

Threats addressed	Threat category	Objectives	Objective category	Recommended actions	Action category	Priority species affected[1]
Loss of habitat (conversion of woodlands into residential, commercial or industrial land).	1.1 Housing & urban areas 1.2 Commercial & industrial areas	Conserve and restore deciduous forests and the features that make them important for birds. Recovery of species at risk.	1.1 Ensure land and resource-use policies and practices maintain or improve bird habitat. 3.4. Implement recovery strategies for species at risk	Create protected and managed areas for the specific needs of certain species. In municipalities, adopt urban plans that protect important woodlands. Protect large tracts of mature forest through stewardship or by legally designating them conservation areas. Continue to implement the Management Plan for the Cerulean Warbler (Environment Canada 2011a).	1.1 Site/area protection 2.1 Site/area management 3.2 Species recovery	American Woodcock, Barred Owl, Eastern Whip-poor-will, Brown Creeper, Wood Thrush, Cerulean Warbler, Eastern Screech-Owl, Yellow-throated Vireo
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, stands of dead trees and irregular structure).	5.3 Private sector standards and codes	Brown Creeper, Red-headed Woodpecker, Northern Flicker
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 artificial nesting structures. Promote silvicultural treatments that maintain key habitat features (large-diameter trees, snags with cavities, stands of dead trees and irregular structure).	3.2 Species recovery 5.3 Private sector standards and codes	Barred Owl, Eastern Screech-Owl, Northern Saw-whet Owl

Table 8 continued

Threats addressed	Threat category	Objectives	Objective category	Recommended actions	Action category	Priority species affected[1]
Habitat loss and degradation (loss of important tree species due to disease or infestation).	8.1 Invasive non-native/alien species 8.2 Problematic native species	Recovery of species at risk.	3.4. Implement recovery strategies for species at risk	Continue to implement the Management Plan for the Cerulean Warbler (Environment Canada 2011a).	3.2 Species recovery	Cerulean Warbler
Habitat loss and fragmentation due to the expansion of energy transportation corridors and the road system.	4.1 Roads & railroads 4.2 Utility & 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
Habitat loss and fragmentation due to a reduction in the average size of forest habitats and their increasing isolation.	5.3 Logging & wood harvesting	Maintain connectivity between deciduous forests. Recovery of species at risk.	1.1 Ensure land and resource-use policies and practices maintain or improve bird habitat. 3.4. Implement recovery strategies for species at risk	Adopt practices that maximize habitat connectivity (better spatial configuration). Continue to implement the Management Plan for the Cerulean Warbler (Environment Canada 2011a).	5.3 Private sector standards and codes 3.2 Species recovery	Wood Thrush, Cerulean Warbler

Table 8 continued

Threats addressed	Threat category	Objectives	Objective category	Recommended actions	Action category	Priority species affected[1]
Higher frequency of adverse weather events due to climate change that may affect migration, reproductive success, prey availability or nesting phenology.	11.5 Other impacts	Reduce potential impact of climate change on deciduous forests.	6.2 Manage for habitat resilience as climate changes	Promote the reduction of greenhouse gas emissions.	6.2 Substitution	Baltimore Oriole
Disappearance of mature forests due to a shorter felling cycle in forestry.	5.3 Logging & wood harvesting	Recovery of species at risk.	3.4. Implement recovery strategies for species at risk	Continue to implement the Management Plan for the Cerulean Warbler (Environment Canada 2011a).	3.2 Species recovery	Cerulean Warbler
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
Nest parasitism by the Brown-headed Cowbird	8.2 Problematic native species	Recovery of species at risk.	3.4. Implement recovery strategies for species at risk	Continue to implement the Management Plan for the Cerulean Warbler (Environment Canada 2011a).	3.2 Species recovery	Cerulean Warbler
Conversion of deciduous forests into coniferous forests.	5.3 Logging & wood harvesting	Restore managed habitats to their original appearance.	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 composition of the stand.	2.3 Habitat and natural process restoration	Yellow-throated Vireo
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 to limit nesting.	2.1 Site/area management	Baltimore Oriole

Table 8 continued

Threats addressed	Threat category	Objectives	Objective category	Recommended actions	Action category	Priority species affected[1]
Overuse of pesticides (bird poisoning, eggshell thinning, reduction in prey insects and prey fish, leaching to adjacent habitats).	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, Eastern Whip-poor-will

Mixed Wood

Mixed wood forest habitats are defined as forests or woodlands characterized by a mixture of coniferous and deciduous species. Mixed wood forests cover a little less than 13% of BCR 13-QC's geographic area and are found in almost every part of this region, particularly in the eastern portion (Fig. 12). Mixed wood habitats are composed of a blend of various tree species found in deciduous and coniferous habitats, such as yellow birch, balsam fir, white spruce and cedar.

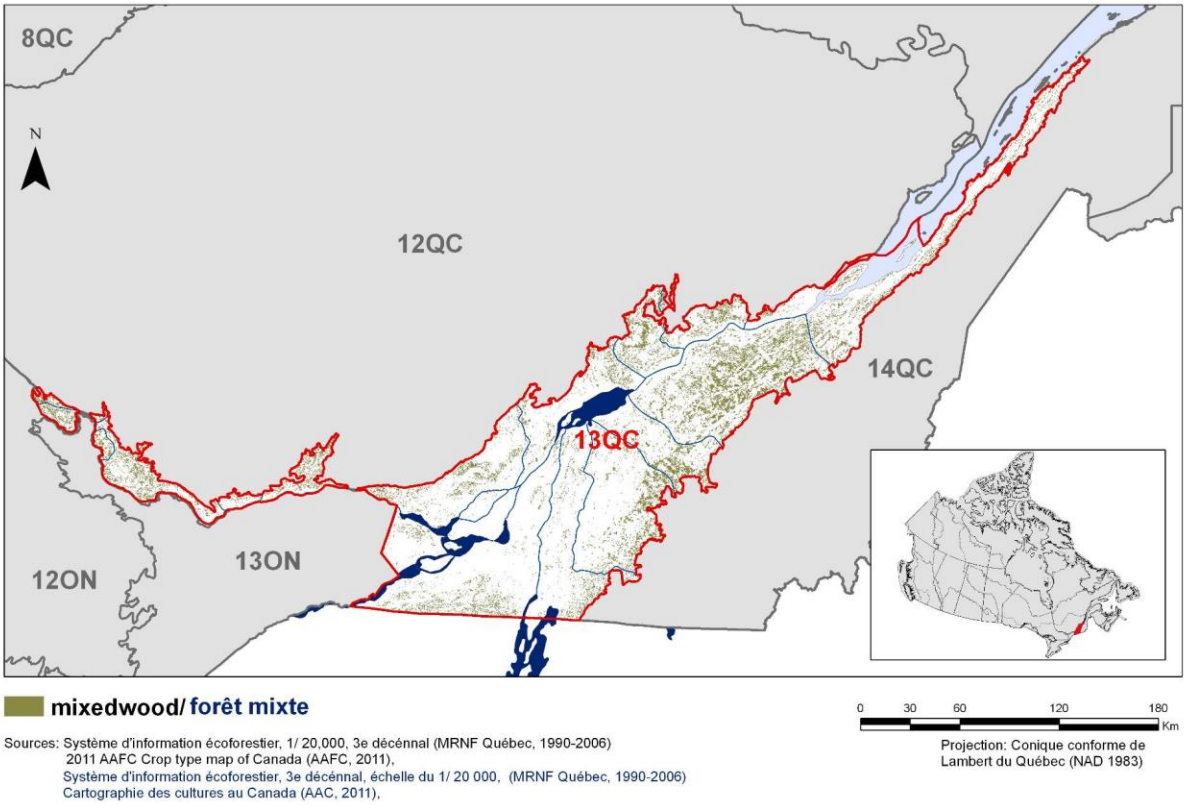

Figure 12. Map of mixed wood forest habitats in BCR 13-QC: St. Lawrence Plain and Lower Great Lakes.

In BCR 13-QC, mixed wood forests are used by 10 priority species, all of which are landbirds (Table 9). Four of these species are at risk. The Eastern Wood-Pewee has been assessed as a species of Special Concern by COSEWIC, while the Eastern Whip-poor-will, Olive-sided Flycatcher and Canada Warbler are listed on Schedule 1 of SARA and are listed as Threatened. There are currently no finalized recovery strategies for these 3 species. Only 1 priority species, the Rose-breasted Grosbeak, has been selected for stewardship purposes.

The most frequently identified threat sub-category in the mixed wood forest is “2.1 Annual & perennial non-timber crops,” which accounts for 31% of all threats to priority species in this

habitat (Fig. 13). The main conservation issues are loss of habitat due to the conversion of forested farmland into arable land and the disappearance of natural vegetation such as hedges and riparian strips on the agricultural landscape. The relative magnitude of this threat is “High” for mixed wood habitat.

Four other sub-categories rank second, each accounting for 15% of threats affecting the priority species that use this habitat. Sub-categories “1.1 Housing & urban areas” and “1.2 Commercial & industrial areas” both have a “High” overall magnitude and are realted to habitat loss due to the conversion of woodlands into residential, commercial or industrial land. Sub-category “5.3 Logging & wood harvesting” has a “Medium” relative magnitude and includes loss of habitat due to the disappearance of large-diameter trees and snags as a result of forestry operations. Lastly, the overuse of pesticides makes up sub-category “9.3 Agricultural & forestry effluents” and is considered a relatively “Low” threat to this habitat.

The full list of threats to priority species in the mixed wood habitats of BCR 13-QC as well as the objectives, conservation actions and species that could benefit are 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 include the use of silvicultural treatments that preserve some features important for birds and the adoption of land use plans that protect woodlands in agricultural and suburban areas.

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 Kestrel	Forest edge	Increase 50%	-	X	-
Black-billed Cuckoo	Mixed wood stands of intermediate age	Assess/Maintain	-	X	-
Brown Creeper	Mature mixed wood forests	Assess/Maintain	-	X	-
Canada Warbler[4]	Relatively open mixed wood stands	Recovery objective	X	X	-
Eastern Kingbird	Tree hedgerows	Increase 50%	-	X	-
Eastern Whip-poor-will[4]	Many types of dry forest habitats with clearings, and edges of cultivated fields interspersed with shrubs and specifically 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 Saw-whet Owl	Mature dense mixed wood forests	Assess/Maintain	-	X	-
Olive-sided Flycatcher[4]	Mixed wood stands	Recovery objective	X	X	-
Rose-breasted Grosbeak	Open, early successional mixed wood forest	Maintain current	-	-	X

[1] "At risk" includes species considered Endangered, Threatened or of 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 of Special Concern; and listed as Threatened, 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), the *Canadian Shorebird Conservation Plan* (Milko et al. 2003), the *North American Waterfowl Management Plan* (NAWMP Plan Committee 2004) or by regional experts.

[3] "Stewardship" includes abundant species with a wide range, with a significant percentage of this range or continental population located in the conservation unit or sub-unit. These species include not only 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 Eastern Whip-poor-will: Increase 100%; Olive-sided Flycatcher: Increase 100%; Canada Warbler: Increase 100%.

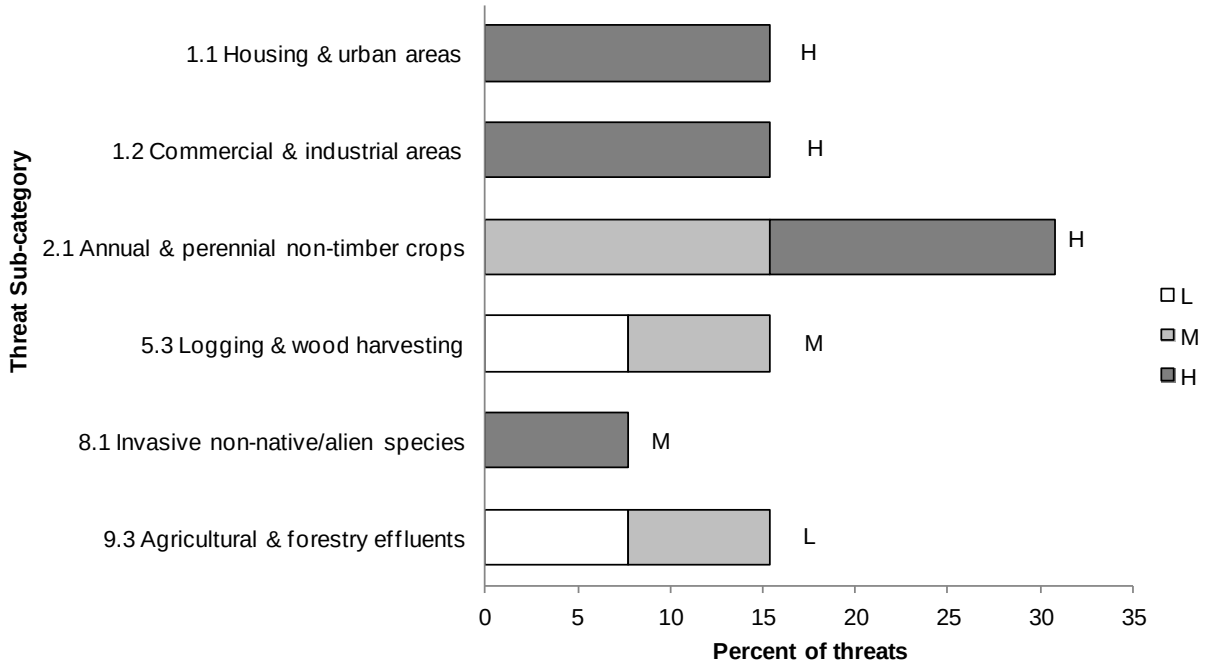

Figure 13. Percent of identified threats to priority species in mixed wood habitat in each threat sub-category.

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 addressed in total for all priority species in 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 forest is shown at the end of each bar (also presented in Table 4, Relative magnitude of identified threats to priority species within BCR 13-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 13-QC.

Threats addressed	Threat category	Objectives	Objective category	Recommended actions	Action category	Priority species affected[1]
Competition for nesting sites with introduced species.	8.1 Invasive non-native/alien species	Restore features in mixed wood forests that are important for birds.	1.4 Maintain important bird habitat features on the landscape	Install artificial nesting structures.	3.2 Species recovery	American Kestrel
Loss of natural vegetation (hedges, riparian strips, isolated trees, shrub layer) on the agricultural landscape.	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	Promote the maintenance and recovery of hedges and shrub habitats.	2.3 Habitat and natural process restoration	Eastern Kingbird
Loss of snags in open habitats.	2.1 Annual & perennial non-timber crops	Conserve and restore the quality and quantity of mixed wood forests on the landscape.	1.4 Maintain important bird habitat features on the landscape	Develop incentives to conserve snags in open areas.	6.4 Conservation payments	American Kestrel
Loss of habitat (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 payments	Eastern Whip-poor-will, Brown Creeper
Loss of habitat (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	Eastern Whip-poor-will, Brown Creeper

[1] Priority species for which the only identified threat is in category "12.1 Information lacking" are not included in this table.

Table 10 continued

Threats addressed	Threat category	Objectives	Objective category	Recommended actions	Action category	Priority species affected[1]
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, stands of dead trees and irregular structure).	5.3 Private sector standards and codes	Brown Creeper
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 artificial nesting structures. Promote silvicultural treatments that maintain key habitat features (large-diameter trees, snags with cavities, stands of dead trees and irregular structure).	3.2 Species recovery 5.3 Private sector standards and codes	Northern Saw-whet Owl
Overuse of pesticides (bird poisoning, eggshell thinning, reduction in prey insects and prey fish, leaching to adjacent habitats).	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, Eastern Whip-poor-will

Shrub/Early Successional

According to the UN-FAO Land Cover Classification System, "shrub and early successional" habitats are defined as being composed of woody vegetation less than five metres in height. Shrub and early successional habitats cover only 2.5% of BCR 13-QC and are scattered across the entire region (Fig. 14).

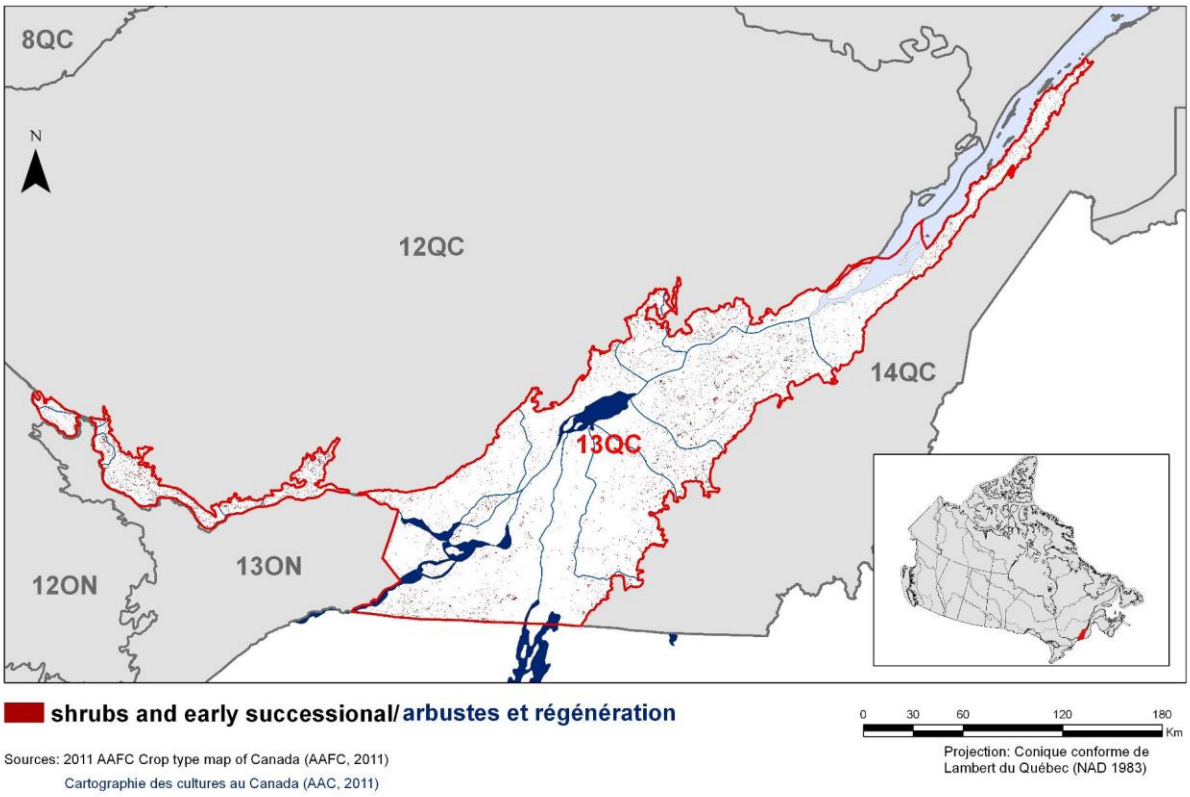

Figure 14. Map of shrub and early successional habitat in BCR 13-QC: St. Lawrence Plain and Lower Great Lakes.

In BCR 13-QC, shrub and early successional habitats are used by seven priority species, five of which are landbirds (Table 11). Two of the species are listed on Schedule 1 of SARA, namely the Loggerhead Shrike (Endangered) and Golden-winged Warbler (Threatened). All priority species that use this habitat were selected for conservation reasons.

The most frequently identified threat sub-category in shrub and early successional habitat is "2.1 Annual & perennial non-timber crops," which accounts for 27% of all threats in this habitat (Fig. 15). Conservation issues primarily involve the loss and degradation of shrub and early successional habitat due to the intensification of agriculture. The relative magnitude of this threat is "High" for this habitat class.

Sub-category “7.3 Other ecosystem modifications” includes 23% of the identified threats and has a “Very High” overall relative magnitude. It mainly involves the natural evolution of shrub habitats and old fields into forest habitats, and the lack of renewal of early successional habitats.

Threat sub-category “8.2 Problematic native species” is associated with the Brown-headed Cowbird's parasitism and the Golden-winged Warbler's hybridization with the Blue-winged Warbler. This threat sub-category has a “High” overall relative magnitude and accounts for 18% of the conservation issues in the shrub and early successional habitat in BCR 13-QC.

Maintenance of energy transportation corridors, where considerable densities of the Rufous-sided Towhee, Golden-winged Warbler and Field Sparrow are found, has a “High” overall relative magnitude under sub-category “4.2 Utility & service lines.” This threat accounts for 14% of the conservation issues for shrub and early successional habitat. Lastly, four other sub-categories account for less than 5% of threats to this habitat in BCR 13-QC.

The full list of threats in the shrub and early successional habitat in BCR 13-QC, as well as the objectives, conservation actions and species that could benefit, are presented in Table 12. Conservation objectives chiefly involve conserving, protecting and restoring shrub and early successional habitats and the features that make them important for birds, as well as limiting the impacts of certain native species. Conservation actions include developing approaches and incentives to maintain shrub and early successional habitats.

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]
American Woodcock	Fallow land	Increase 50%	-	X	-
Blue-winged Teal	Fallow land	Maintain current	-	X	-
Brown Thrasher	Shrublands	Increase 100%	-	X	-
Field Sparrow	Shrublands	Increase 100%	-	X	-
Golden-winged Warbler[4]	Shrublands	Recovery objective	X	X	-
Loggerhead Shrike	Naturalized abandoned fields	Recovery objective[5]	X	X	-
Rufous-sided Towhee	Shrub beds	Increase 100%	-	X	-

[1] "At risk" includes species considered Endangered, Threatened or of 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 of Special Concern; and listed as Threatened, 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), the *Canadian Shorebird Conservation Plan* (Milko et al. 2003), the *North American Waterfowl Management Plan* (NAWMP Plan Committee 2004) or by regional experts.
[3] "Stewardship" includes abundant species with a wide range, with a significant percentage of this range or continental population located in the conservation unit or sub-unit. These species include not only 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 objective for this species is Increase 50%.
[5] See Environment Canada (2010).

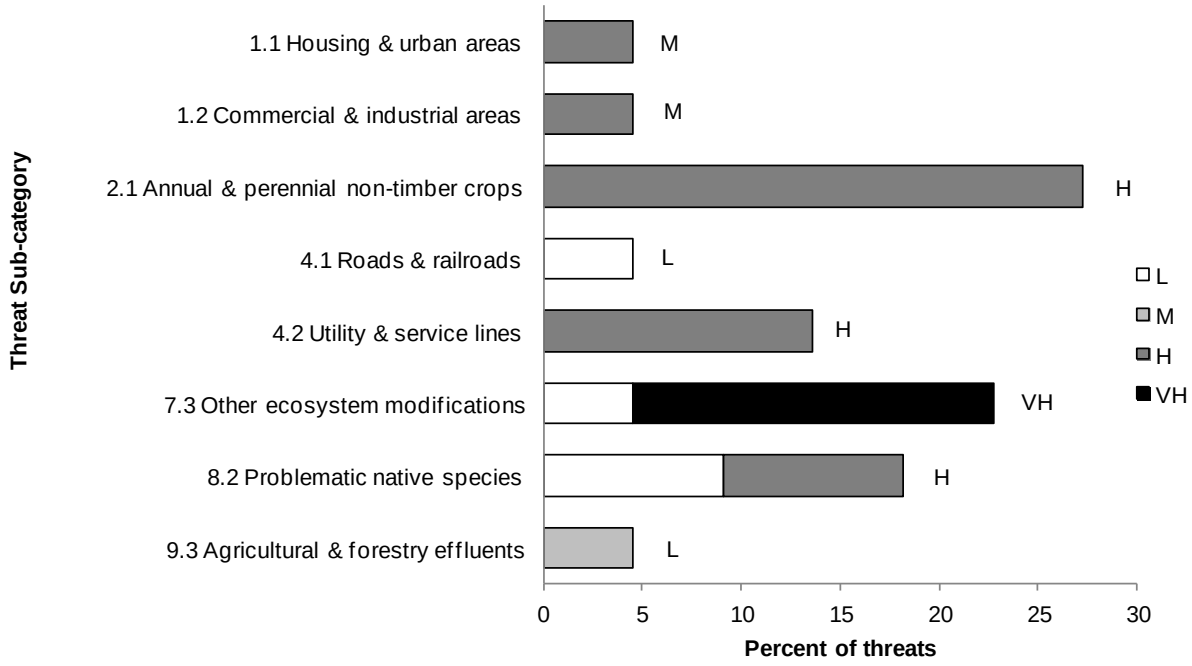

Figure 15. Percent of identified threats to priority species in shrub and early successional habitat in each threat sub-category.

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 addressed 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 13-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 habitats of BCR 13-QC.

Threats addressed	Threat category	Objectives	Objective category	Recommended actions	Action category	Priority species affected
Abandonment of farmland.	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 incentives to maintain uncultivated farmland.	6.4 Conservation payments	Blue-winged Teal
Loss of natural vegetation (hedges, riparian strips, isolated trees, shrub 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 shrub habitats.	2.3 Habitat and natural process restoration	Brown Thrasher
Natural evolution of shrubland 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 Recovery of species at risk.	1.1 Ensure land and resource-use policies and practices maintain or improve bird habitat 3.4. Implement recovery strategies for species at risk	Develop land management approaches for maintaining fallow fields. Continue to implement the Recovery Strategy for the Loggerhead Shrike, *migrans* subspecies (Environment Canada 2010).	2.1 Site/area management 3.2 Species recovery	Field Sparrow, Golden-winged Warbler, Loggerhead Shrike, Rufous-sided Towhee

Table 12 continued

Threats addressed	Threat category	Objectives	Objective category	Recommended actions	Action category	Priority species affected
Loss of habitat (conversion of woodlands into residential, commercial or industrial land).	1.1 Housing & urban areas 1.2 Commercial & industrial areas	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	Preserve and develop sectors with habitat suitable for this species.	2.1 Site/area management	American Woodcock
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 for maintaining fallow fields. Develop incentives to maintain large tracts of scrub pasture and forage land.	2.1 Site/area management 6.4 Conservation payments	Field Sparrow, Brown Thrasher, Golden-winged Warbler, Rufous-sided Towhee
Habitat loss and degradation from maintenance of power line corridors.	4.2 Utility & 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	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 that are 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.	2.2 Invasive/problematic species control	Field Sparrow, Golden-winged Warbler, Rufous-sided Towhee
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

Table 12 continued

Threats addressed	Threat category	Objectives	Objective category	Recommended actions	Action category	Priority species affected
Overuse of pesticides (bird poisoning, eggshell thinning, reduction in prey insects and prey fish, leaching to adjacent habitats).	9.3 Agricultural & forestry effluents	Reduce the 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

Herbaceous

According to the UN-FAO Land Cover Classification System, herbaceous habitats are composed of non-woody vegetation less than three meters in height that does not originate from a specific crop or development. The remote sensing processing used to map habitats for this strategy does not distinguish the herbaceous category from cultivated and managed habitats, which makes determining the spatial coverage of this habitat impossible. However, natural herbaceous habitats are believed to have been originally scarce, and still are, in BCR 13-QC (Vickery et al. 1999). They consist primarily of wet meadows located along the islands of the St. Lawrence.

Herbaceous habitat in BCR 13-QC is used by 15 priority species, 14 of which are landbirds (Table 13). Seven species are at risk including 2 “Threatened” species (Common Nighthawk and Chimney Swift) and 1 of “Special Concern” (Short-eared Owl) listed on Schedule 1 of SARA, 3 assessed as “Threatened” by COSEWIC (Bobolink, Barn Swallow and Eastern Meadowlark), and 1 “Likely to be designated threatened or vulnerable” under provincial legislation (Grasshopper Sparrow). There are currently no finalized recovery strategies or management plans for these species at risk. All species that use this habitat were considered a priority for conservation reasons.

The most frequently reported sub-category for priority species in herbaceous habitat is “2.2 Wood & pulp plantations.” Accounting for 29% of all identified threats in this habitat (Fig. 16), this category has a “High” overall relative magnitude. The only conservation issue identified for this sub-category is the conversion of marginally productive land to coniferous plantations.

With 22% of threats, sub-category “2.3 Livestock farming & ranching” ranks second in frequency and has a “Medium” overall relative magnitude. It mainly involves overly intensive grazing and trampling by livestock on some islands of the St. Lawrence, resulting in the loss and degradation of herbaceous habitat.

Sub-category “8.1 Invasive non-native/alien species” relates primarily to the degradation of the ecological integrity of habitats due to colonization by some invasive plant species such as the common reed (*Phragmites australis*). This threat sub-category has a “Medium” overall relative magnitude and accounts for 16% of the conservation issues in the herbaceous habitat of BCR 13-QC.

The increased frequency of adverse weather events associated with climate change accounts for 11% of threats to herbaceous habitat. This threat has a “High” relative magnitude and is particularly significant to aerial insectivores, as it is associated with the decline observed in their food sources. The increased frequency of extreme weather events during the migration period could also be a significant issue for many bird species.

The full list of threats in the herbaceous habitat in BCR 13-QC as well as the objectives, conservation actions and species that could benefit are presented in Table 14. Conservation objectives chiefly involve conserving, protecting and restoring herbaceous habitats and the features that make them important for birds, as well as limiting the impacts of certain invasive plants and climate change. Conservation actions include discouraging conifer planting on certain abandoned land to preserve the few existing herbaceous habitats (it may be more appropriate to plant conifers in existing forest fragments) and developing incentives and beneficial management practices for conserving herbaceous habitats in agricultural environments.

Table 13. Priority species that use herbaceous 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 Kestrel	Prairies	Increase 50%	-	X	-
Bank Swallow	Prairies	Increase	-	X	-
Barn Swallow	Prairies	Increase 50%	X	X	-
Bobolink	Prairies	Increase 50%	X	X	-
Chimney Swift[4]	Prairies	Recovery objective	X	X	-
Common Nighthawk[4]	Prairies	Recovery objective	X	X	-
Eastern Meadowlark	Prairies	Increase 100%	X	X	-
Grasshopper Sparrow	Shortgrass prairies	Increase	X	X	-
Horned Lark	Shortgrass prairies	Maintain current	-	X	-
Northern Harrier	Prairies	Maintain current	-	X	-
Northern Rough-winged Swallow	Prairies	Assess/Maintain	-	X	-
Savannah Sparrow	Prairies	Increase 50%	-	X	-
Short-eared Owl[4]	Prairies	Recovery objective	X	X	-
Upland Sandpiper	Prairies	Assess/Maintain	-	X	-
Vesper Sparrow	Shortgrass prairies	Increase 100%	-	X	-

[1] "At risk" includes species considered Endangered, Threatened or of 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 of Special Concern; and listed as Threatened, 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), the *Canadian Shorebird Conservation Plan* (Milko et al. 2003), the *North American Waterfowl Management Plan* (NAWMP Plan Committee 2004) or by regional experts.

[3] "Stewardship" includes abundant species with a wide range, with a significant percentage of this range or continental population located in the conservation unit or sub-unit. These species include not only 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; Chimney Swift: Increase; Short-eared Owl: Increase 100 %.

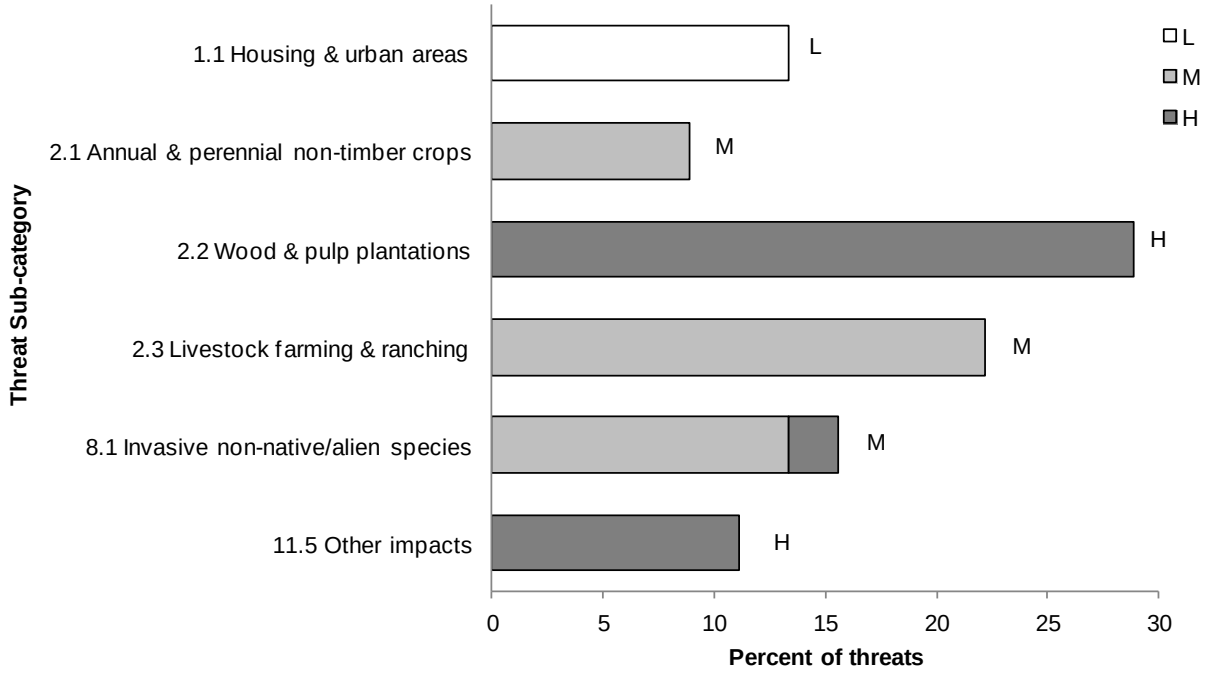

Figure 16. Percent of identified threats to priority species in herbaceous habitat in each threat sub-category.

Each bar represents the percent of the total number of threats identified in each threat sub-category in herbaceous habitat (for example, if 100 threats were addressed in total for all priority species in the herbaceous 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 herbaceous habitat is shown at the end of each bar (also presented in Table 4, Relative magnitude of identified threats to priority species within BCR 13-QC, by threat category and broad habitat class).

Table 14. Threats addressed, conservation objectives, recommended actions and priority species affected in the herbaceous habitat of BCR 13-QC.

Threats addressed	Threat category	Objectives	Objective category	Recommended actions	Action category	Priority species affected
Competition for nesting sites with introduced species.	8.1 Invasive non-native/alien species	Restore features in herbaceous habitats that are important for birds.	1.4 Maintain important bird habitat features on the landscape	Install artificial nesting structures.	3.2 Species recovery	American Kestrel
Conversion of marginally productive land to coniferous plantations.	2.2 Wood & pulp plantations	Conserve and restore the quality and quantity of herbaceous habitats on the landscape.	1.1 Ensure land and resource-use policies and practices maintain or improve bird habitat	Protect important nesting sites through stewardship or by legally designating them as conservation areas. Discourage conifer planting on abandoned land.	1.1 Site/area protection 2.1 Site/area management	Horned Lark, Savannah Sparrow, Grasshopper Sparrow, Vesper Sparrow, Northern Harrier, Common Nighthawk, Bobolink, Short-eared Owl, Northern Rough-winged Swallow, Bank Swallow, Barn Swallow, Upland Sandpiper, Eastern Meadowlark.
Loss of snags in open habitats.	2.1 Annual & perennial non-timber crops	Conserve and restore the quality and quantity of herbaceous habitats on the landscape.	1.4 Maintain important bird habitat features on the landscape	Develop incentives to conserve snags in open areas.	6.4 Conservation payments	American Kestrel
Habitat loss and degradation (due to invasive plant species).	8.1 Invasive non-native/alien species	Limit the impact of invasive plant species on landscape structure and composition.	3.5 Prevent and control the spread of invasive and exotic species	Track the spread of invasive plant species and explore the possibility of developing a control program.	8.2 Monitoring	Savannah Sparrow, Grasshopper Sparrow, Common Nighthawk, Bobolink, Short-eared Owl, Northern Rough-winged Swallow.

Table 14 continued

Threats addressed	Threat category	Objectives	Objective category	Recommended actions	Action category	Priority species affected
Habitat loss and degradation (overgrazing on some islands of the St. Lawrence used for livestock).	2.3. Livestock farming & ranching	Conserve and restore the quality and quantity of herbaceous habitats on the landscape.	1.1 Ensure land and resource-use policies and practices maintain or improve bird habitat.	Work with producers to develop beneficial management practices for livestock farming on the islands of the St. Lawrence.	5.3 Private sector standards and codes	Horned Lark, Savannah Sparrow, Grasshopper Sparrow, Vesper Sparrow, American Kestrel, Bobolink, Short-eared Owl, Northern Rough-winged Swallow, Upland Sandpiper, Eastern Meadowlark.
Habitat loss and degradation (residential development).	1.1 Housing & urban areas	Conserve and restore the quality and quantity of herbaceous 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 payments	Savannah Sparrow, Grasshopper Sparrow, Common Nighthawk, Bobolink, Short-eared Owl, Northern Rough-winged Swallow.
Higher frequency of adverse weather events due to climate change that may affect migration, reproductive success, prey availability or nesting phenology.	11.5 Other impacts	Reduce the potential impact of climate change on herbaceous habitats.	6.2 Manage for habitat resilience as climate changes	Promote the reduction of greenhouse gas emissions.	6.2 Substitution	Common Nighthawk, Northern Rough-winged Swallow, Bank Swallow, Barn Swallow, Chimney Swift.
Incidental bird mortality during Prairie Cord Grass harvest.	2.1 Annual & perennial non-timber crops	Reduce bird mortality at harvest.	2.4 Reduce incidental mortality	Develop beneficial management practices for harvesting when incidental bird mortality occurs (delay harvest, raise blade height, etc.).	5.3 Private sector standards and codes	Savannah Sparrow, Bobolink, Short-eared Owl.

Cultivated and Managed Areas

According to the UN-FAO Land Cover Classification System, cultivated and managed habitats are composed of vegetation from a specific crop or development. They include tree plantations, orchards, grass crops as well as urban vegetation such as urban parks, golf courses and lawns. This type of habitat is by far the most abundant in BCR 13-QC, representing 43% of this conservation region's total land area, and it is found almost everywhere, including on the Island of Montréal (though it is not well represented in Figure 17), in the form of numerous parks and other managed areas.

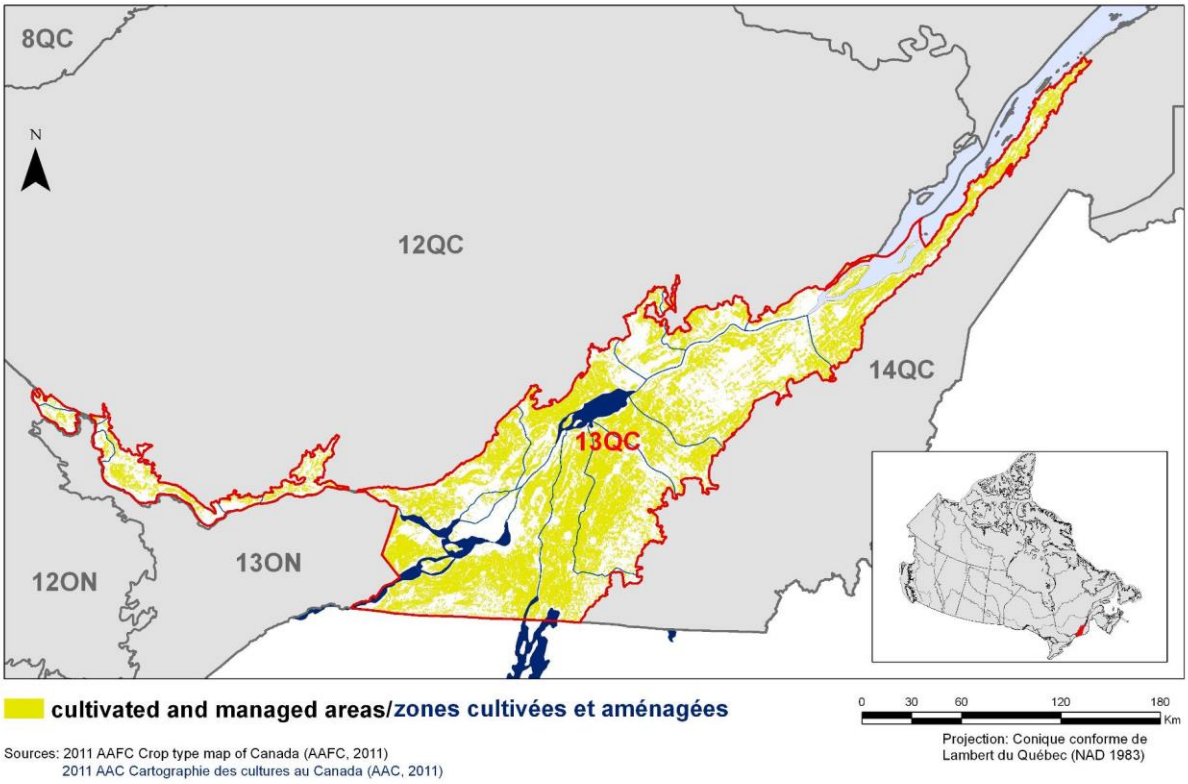

Figure 17. Map of cultivated and managed habitats in BCR 13-QC: St. Lawrence Plain and Lower Great Lakes.

Cultivated and managed areas in BCR 13-QC are used by 26 priority species from 3 of the 4 bird groups (Table 15). Twenty priority landbird species, 4 waterfowl species and 2 shorebird species use this habitat. Of the 26 priority species found in this habitat, more than a third (9) are species at risk and 4 are listed on Schedule 1 of SARA (Common Nighthawk, Short-eared Owl, Chimney Swift and Loggerhead Shrike). COSEWIC has assessed the Bobolink, Barn Swallow and Eastern Meadowlark as “Threatened,” while the Nelson's Sharp-tailed Sparrow and Grasshopper Sparrow are species “Likely to be designated threatened or vulnerable” under provincial legislation. Twenty-four species were selected for conservation reasons, whereas the

Snow Goose and the resident Canada Goose population are listed as priorities for the management and control of their overabundant numbers.

The most frequently identified threat sub-category in cultivated and managed habitat is “2.1 Annual & perennial non-timber crops,” which accounts for 49% of all reported threats to priority species in this habitat (Fig. 18). The main conservation issues in this category, whose relative magnitude is considered “Very High,” are the transition from annual crops to perennial crops, the intensification of agriculture and incidental bird mortality at harvest.

With 17% of threats, sub-category “9.3 Agricultural & forestry effluents” ranks second in terms of frequency and has a “Very High” overall relative magnitude. The only threat in this sub-category in cultivated and managed habitat is the overuse of pesticides, which can cause bird poisoning, eggshell thinning and a reduction in prey insects.

The increased frequency of adverse weather events associated with climate change accounts for 7% of threats to cultivated and managed habitat. This threat has a “High” relative magnitude and is particularly significant to aerial insectivores, as it is associated with the decline observed in their food sources. The increased frequency of extreme weather events during the migration period could also be a significant 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 in agricultural areas due to the reduction in the number of farm buildings. The modern construction standards for these buildings also make them less suitable for building nests.

The full list of threats affecting priority species in the cultivated and managed habitat of BCR 13-QC as well as the objectives, conservation actions and species that could benefit are presented in Table 16. 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 adopting beneficial agricultural management practices, supporting sustainable agriculture through approaches such as maintaining large tracts of wildland, pasture and forage, and reducing pesticide use by promoting integrated pest management.

Table 15. Priority species that use cultivated and managed 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]	Mng[3]
American Kestrel	Hayfields, pasture	Increase 50%	-	X	-
Baltimore Oriole	Orchards	Increase 50%	-	X	-
Bank Swallow	Hayfields, pasture	Increase	-	X	-
Barn Swallow	Hayfields, pasture	Increase 50%	X	X	-
Blue-winged Teal	Hayfields, pasture	Maintain current	-	X	-
Bobolink	Prairies	Increase 50%	X	X	-
Canada Goose (Atlantic population)	Flooded fields	Maintain current	-	X	-
Canada Goose (resident population)	Open land with well-kept turf near waterbodies (golf courses, city parks)	Decrease	-	-	X
Chimney Swift[4]	Hayfields, pasture	Recovery objective	X	X	-
Common Nighthawk[4]	Hayfields, pasture	Recovery objective	X	X	-
Eastern Kingbird	Fields, orchards	Increase 50%	-	X	-
Eastern Meadowlark	Hayfields, pasture	Increase 100%	X	X	-
Grasshopper Sparrow	Hayfields, pasture	Increase	X	X	-
Horned Lark	Pasture	Maintain current	-	X	-

[1] "At risk" includes species considered Endangered, Threatened or of 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 of Special Concern; and listed as Threatened, 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), the *Canadian Shorebird Conservation Plan* (Milko et al. 2003), the *North American Waterfowl Management Plan* (NAWMP Plan Committee 2004) or by regional experts.

[3] "Management" includes species whose targeted population objective has been met or surpassed, but which require ongoing management due to their socio-economic importance as game species, or because of their effects on other species or habitats.

[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; Chimney Swift: Increase; Short-eared Owl: Increase 100 %.

Table 15 continued

Priority species	Details on habitat used	Population objective	Reason for priority status		
			At risk[1]	CC[2]	Mng[3]
Killdeer	Cultivated fields	Increase 50%	-	X	-
Loggerhead Shrike	Pasture	Recovery objective[5]	X	X	-
Nelson's Sharp-tailed Sparrow	Hayfields	Increase	X	X	-
Northern Harrier	Hayfields, pasture	Maintain current	-	X	-
Northern Rough-winged Swallow	Hayfields, pasture	Assess/Maintain	-	X	-
Purple Martin	Hayfields, pasture	Assess/Maintain	-	X	-
Rufous-sided Towhee	Pasture	Increase 100%	-	X	-
Savannah Sparrow	Hayfields, pasture	Increase 50%	-	X	-
Short-eared Owl[4]	Prairies	Recovery objective	X	X	-
Snow Goose	Hayfields, flooded fields, annual crops	Decrease	-	-	X
Upland Sandpiper	Prairies	Assess/Maintain	-	X	-
Vesper Sparrow	Hayfields, pasture	Increase 100%	-	X	-

[5] See Environment Canada (2010).

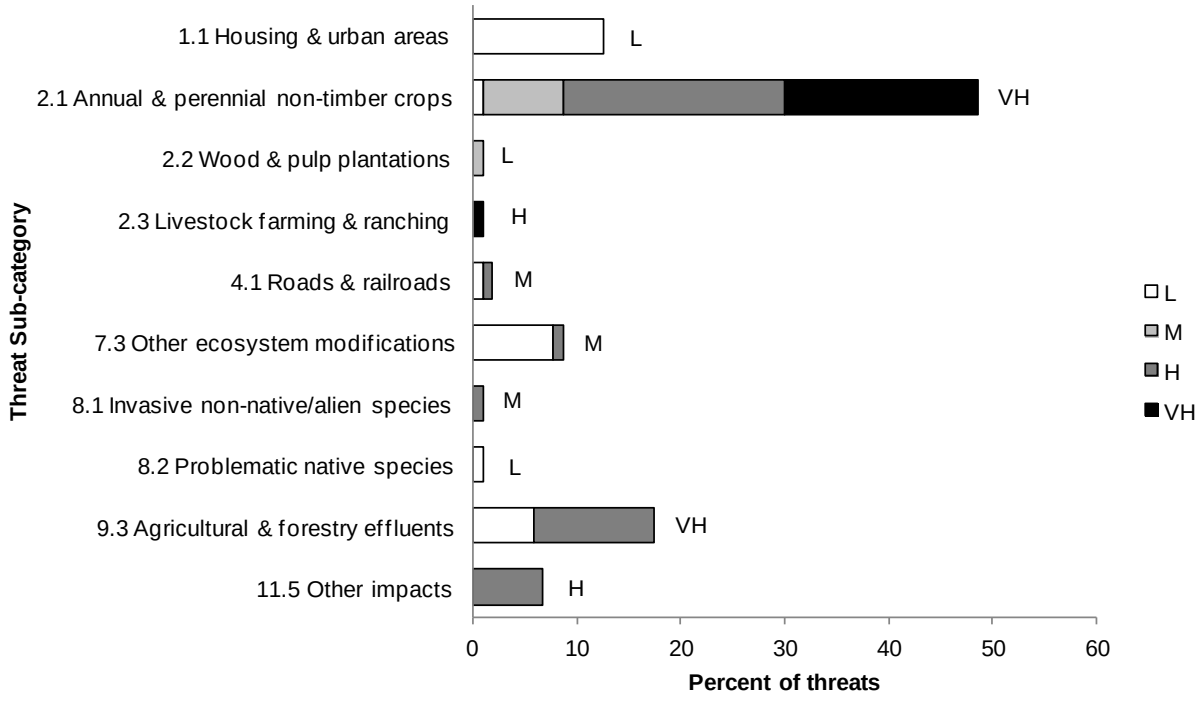

Figure 18. Percent of identified threats to priority species in cultivated and managed areas in each threat sub-category.

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 addressed 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 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 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 13-QC, by threat category and broad habitat class).

Table 16. Threats addressed, conservation objectives, recommended actions and priority species affected in the cultivated and managed areas of BCR 13-QC.

Threats addressed	Threat category	Objectives	Objective category	Recommended actions	Action category	Priority species affected[1]
Abandonment of farmland.	7.3 Other ecosystem modifications	Conserve and restore the quality and quantity of open habitats on the landscape.	1.1 Ensure land and resource-use policies and practices maintain or improve bird habitat	Develop incentives for maintaining farmland as perennial and annual crops or pasture.	6.4 Conservation payments	Horned Lark, Savannah Sparrow, Vesper Sparrow, Northern Harrier, Bobolink, Bank Swallow, Blue-winged Teal, Eastern Meadowlark, Rufous-sided Towhee.
Abandonment of farmland and conversion to coniferous plantations.	2.2 Wood & pulp plantations	Conserve and restore the quality and quantity of open habitats on the landscape.	1.1 Ensure land and resource-use policies and practices maintain or improve bird habitat	Develop incentives for maintaining farmland as perennial and annual crops or pasture.	6.4 Conservation payments	Grasshopper Sparrow
Competition for nesting sites with introduced species.	8.1 Invasive non-native/alien species	Restore features in open habitats that are important for birds.	1.4 Maintain important bird habitat features on the landscape	Install artificial nesting structures.	3.2 Species recovery	American Kestrel
Loss of snags in open habitats.	2.1 Annual & perennial non-timber crops	Conserve and restore the quality and quantity of open habitats on the landscape.	1.4 Maintain important bird habitat features on the landscape	Develop incentives to conserve snags in open areas.	6.4 Conservation payments	American Kestrel

[1] Priority species identified for management purposes and/or for which the only identified threat is in category "12.1 Information lacking" are not included in this table.

Table 16 continued

Threats addressed	Threat category	Objectives	Objective category	Recommended actions	Action 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 quality and quantity of open habitats on the landscape. Recovery of species at risk.	1.1 Ensure land and resource-use policies and practices maintain or improve bird habitat 3.4. Implement recovery strategies for species at risk	Develop incentives to maintain large tracts of pasture and forage land. Continue to implement the Recovery Strategy for the Loggerhead Shrike, *migrans* subspecies (Environment Canada 2010).	6.4 Conservation payments 3.2 Species recovery	Horned Lark, Nelson's Sharp-Tailed Sparrow, Savannah Sparrow, Vesper Sparrow, Northern Harrier, American Kestrel, Common Nighthawk, Bobolink, Short-eared Owl, Northern Rough-winged Swallow, Bank Swallow, Purple Martin, Barn Swallow, Chimney Swift, Upland Sandpiper, Loggerhead Shrike, Blue-winged Teal, Eastern Meadowlark.
Habitat loss and degradation (intensification of agriculture).	2.1 Annual & perennial non-timber crops	Conserve and restore the quality and quantity 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. Develop land management approaches to maintain perennial and annual crops or pasture. Protect important nesting sites through stewardship or by legally designating them as conservation areas.	5.3 Private sector standards and codes 2.1 Site/area management 1.1 Site/area protection	Horned Lark, Nelson's Sharp-Tailed Sparrow, Savannah Sparrow, Grasshopper Sparrow, Vesper Sparrow, Northern Harrier, American Kestrel, Bobolink, Short-eared Owl, Northern Rough-winged Swallow, Bank Swallow, Purple Martin, Barn Swallow, Upland Sandpiper, Killdeer, Blue-winged Teal, Eastern Meadowlark, Rufous-sided Towhee.

Table 16 continued

Threats addressed	Threat category	Objectives	Objective category	Recommended actions	Action category	Priority species affected[1]
Habitat loss and degradation (residential development).	1.1 Housing & urban areas	Conserve and restore the quality and quantity of open habitats on the landscape.	1.1 Ensure land and resource-use policies and practices maintain or improve bird habitat	Develop incentives for maintaining farmland as perennial and annual crops or pasture.	6.4 Conservation payments	Horned Lark, Savannah Sparrow, Vesper Sparrow, Northern Harrier, American Kestrel, Common Nighthawk, Bobolink, Northern Rough-winged Swallow, Bank Swallow, Purple Martin, Barn Swallow, Chimney Swift, Eastern Meadowlark.
Higher frequency of adverse weather events due to climate change that may affect migration, reproductive success, prey availability or nesting phenology.	11.5 Other impacts	Reduce potential impact of climate change on agricultural and open habitats.	6.2 Manage for habitat resilience as climate changes	Promote the reduction of greenhouse gas emissions.	6.2 Substitution	Common Nighthawk, Northern Rough-winged Swallow, Purple Martin, Bank Swallow, Barn Swallow, Chimney Swift, Baltimore Oriole.
Incidental bird mortality at harvest.	2.1 Annual & perennial non-timber crops	Reduce bird mortality at harvest.	2.4 Reduce incidental mortality	Develop beneficial management practices for harvesting when incidental bird mortality occurs (delay harvest, raise blade height, etc.).	5.3 Private sector standards and codes	Horned Lark, Nelson's Sharp-Tailed Sparrow, Savannah Sparrow, Grasshopper Sparrow, Vesper Sparrow, Northern Harrier, Bobolink, Short-eared Owl, Blue-winged Teal, Eastern Meadowlark.

Table 16 continued

Threats addressed	Threat category	Objectives	Objective category	Recommended actions	Action category	Priority species affected[1]
Reduction in the number of artificial nesting sites.	2.1 Annual & perennial non-timber crops 2.3. Livestock farming & ranching	Conserve and restore the quality and quantity of open habitats on the landscape.	1.4 Maintain important bird habitat features on the landscape	Install artificial nesting structures.	3.2 Species recovery	Barn Swallow
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	Continue to monitor the abundance of the Brown-headed Cowbird.	8.2 Monitoring	Rufous-sided Towhee
Overuse of pesticides (bird poisoning, eggshell thinning, reduction in prey insects and prey fish, leaching to adjacent habitats).	9.3 Agricultural & forestry effluents	Reduce impact of human contaminants on cultivated and managed habitats. Recovery of species at risk.	2.1 Reduce mortality and/or sub-lethal effects from pesticide use 3.4. Implement recovery strategies for species at risk	Reduce pesticide use and promote an integrated pest management system. Continue to implement the Recovery Strategy for the Loggerhead Shrike, *migrans* subspecies (Environment Canada 2010).	2.3 Habitat and natural process restoration 3.2 Species recovery	Horned Lark, Savannah Sparrow, Vesper Sparrow, Northern Harrier, American Kestrel, Common Nighthawk, Bobolink, Short-eared Owl, Northern Rough-winged Swallow, Bank Swallow, Purple Martin, Barn Swallow, Chimney Swift, Baltimore Oriole, Loggerhead Shrike, Killdeer, Eastern Meadowlark, Eastern Kingbird.
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	Baltimore Oriole, Killdeer.

Bare Areas

According to the UN-FAO Land Cover Classification System adapted for developing BCR strategies, bare areas are habitats with less than 4% plant cover whose cover is not artificial or the result of human activity. They include bare rocks, sandy areas and cliffs. However, they do not include coastal habitats, which are addressed separately. This type of habitat is rather marginal in BCR 13-QC, representing a little less than 0.5% of this conservation region's total land cover (Fig. 19).

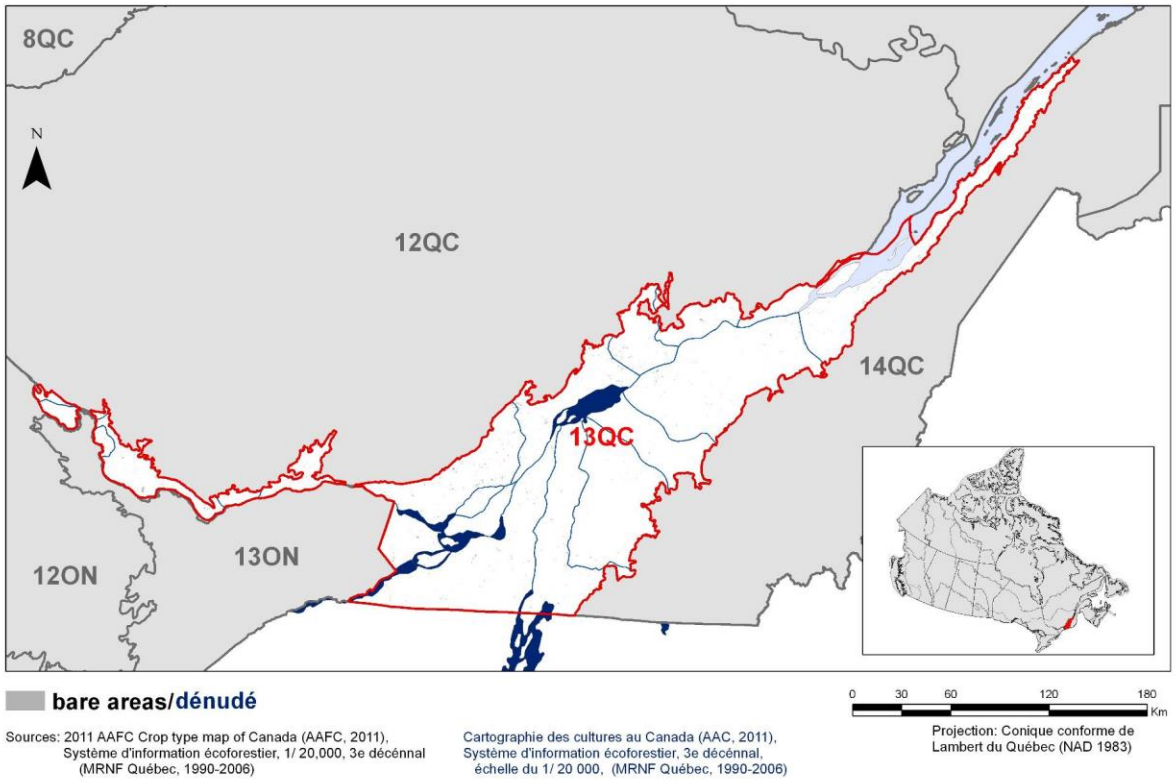

Figure 19. Map of bare areas in BCR 13-QC: St. Lawrence Plain and Lower Great Lakes.

Five priority landbird species are found in the bare areas of BCR 13-QC (Table 17). Two of these are species at risk and listed on Schedule 1 of SARA (Common Nighthawk and Peregrine Falcon, *anatum*/*tundrius*). All species that use this habitat were selected for conservation reasons.

A small number of threats have been identified for priority species found in bare areas. The most frequently observed sub-category is “7.3 Other ecosystem modifications,” which accounts for 60% of all threats reported for this habitat (Fig. 20). The conservation issue in this category, considered to have a “High” relative magnitude, is the disturbance or closure of sandpits used as nesting sites by two species of swallows and the Belted Kingfisher.

With 20% of threats each, sub-categories “5.1 Hunting & collecting terrestrial animals” and “6.1 Recreational activities” have “Low” relative magnitudes. The threats associated with these sub-categories affect the Peregrine Falcon (*anatum/tundrius*) and involve accidental trapping or killing and disturbance of nesting sites by hikers or rock climbers.

The full list of threats to priority species in bare areas in BCR 13-QC, as well as the objectives, conservation actions and species that could benefit are presented in Table 18. Conservation objectives seek to minimize disturbance around nesting sites during the breeding season as well as the killing and trapping of birds. The proposed actions include raising awareness among trappers, hunters and the general public through outreach campaigns and limiting human activity around nesting sites during the breeding season.

Table 17. 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	-	X	-
Belted Kingfisher	Riverbanks, pits, escarpments with superficial deposits	Increase 50%	-	X	-
Common Nighthawk[4]	Outcrops, gravel or sand beaches, burnt out areas	Recovery objective	X	X	-
Northern Rough-winged Swallow	Riverbanks, sand, gravel or clay embankments	Assess/Maintain	-	X	-
Peregrine Falcon (*anatum/tundrius*)[4]	Rock walls, cliffs	Recovery objective	X	X	-

[1] "At risk" includes species considered Endangered, Threatened or of 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 of Special Concern; and listed as Threatened, 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), the *Canadian Shorebird Conservation Plan* (Milko et al. 2003), the *North American Waterfowl Management Plan* (NAWMP Plan Committee 2004) or by regional experts.
[3] "Stewardship" includes abundant species with a wide range, with a significant percentage of this range or continental population located in the conservation unit or sub-unit. These species include not only 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; Peregrine Falcon (*anatum/tundrius*): Maintain current.

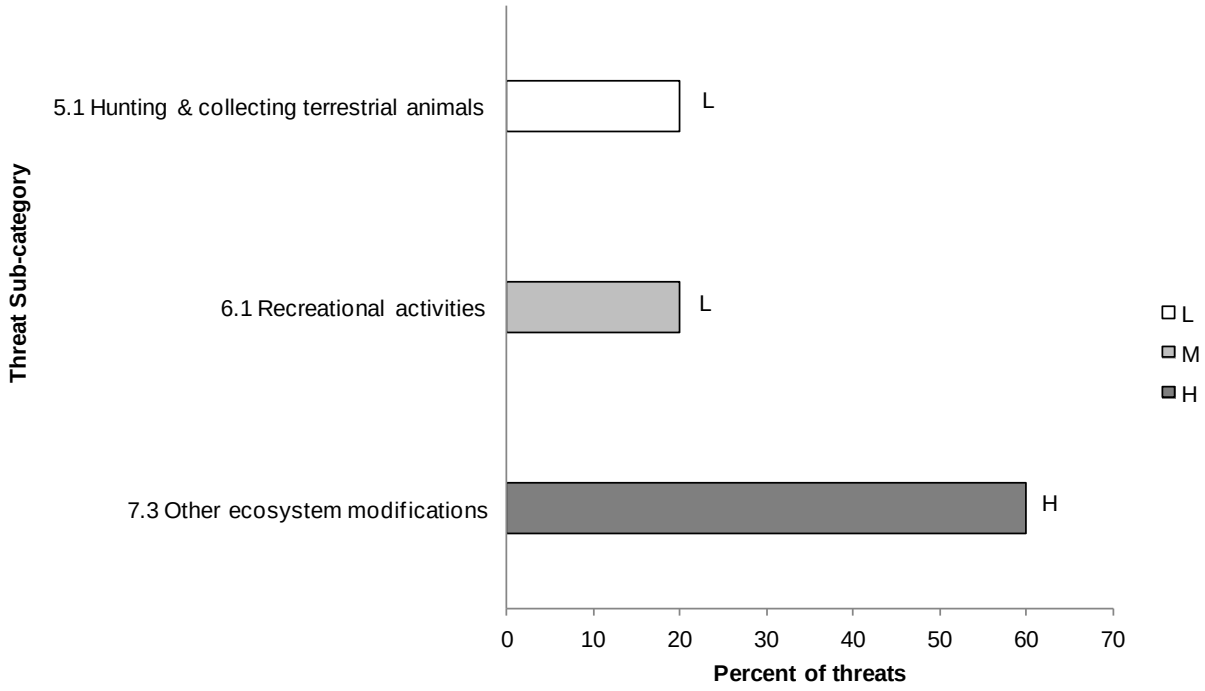

Figure 20. Percent of identified threats to priority species in bare areas in each threat sub-category. Each bar represents the percent of the total number of threats identified in each threat sub-category in bare areas (for example, if 100 threats were addressed in total for all priority species in 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 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 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 13-QC, by threat category and broad habitat class).

Table 18. Threats addressed, conservation objectives, recommended actions and priority species affected in the bare areas of BCR 13-QC.

Threats addressed	Threat category	Objectives	Objective category	Recommended actions	Action 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	Northern Rough-winged Swallow, Bank Swallow, Belted Kingfisher.
Deliberate hunting or accidental trapping.	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 trappers and the public through outreach campaigns.	4.3 Awareness and communications	Peregrine Falcon (*anatum/tundrius*)
Disturbance of nesting sites.	6.1 Recreational activities 6.3 Work & other 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. 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*)

[1] Priority species for which the only identified threat is in category "12.1 Information lacking" are not included in this table.

Urban

Urban habitat consists primarily of human-made structures and artificial surfaces. These include structures associated with cities, towns and transport routes as well as landfill sites. This type of habitat covers 11% of the BCR 13-QC land area and is closely associated with urban areas such as Montréal, Laval, Québec and Trois-Rivières (Fig. 21).

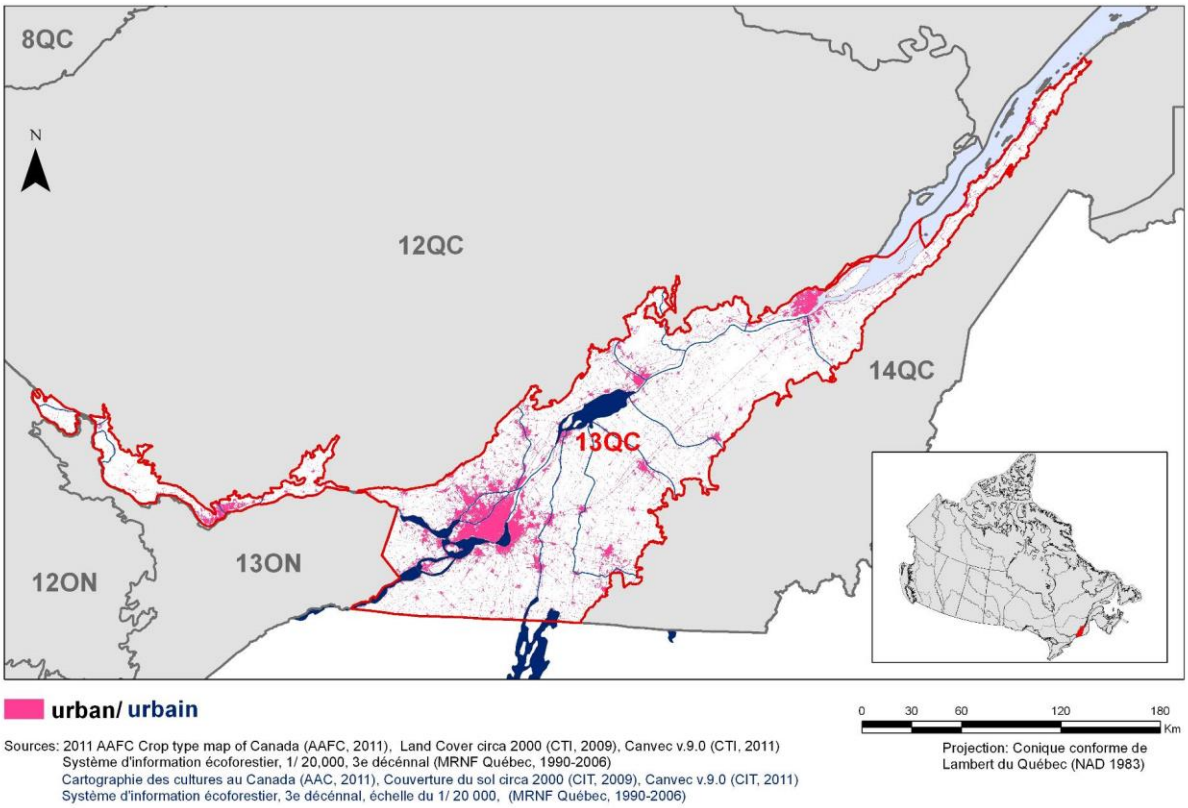

Figure 21. Map of urban areas in BCR 13-QC: St. Lawrence Plain and Lower Great Lakes.

Nine priority species from all four bird groups are found in the urban habitats of BCR 13-QC (Table 19). Six landbird species and one species each of waterfowl, shorebirds and waterbirds are found in this habitat. Of the nine priority species in this habitat, more than half (five) are species at risk, and three are listed on Schedule 1 of SARA (Common Nighthawk, Peregrine Falcon (*anatum/tundrius*) and Chimney Swift). The Barn Swallow has been assessed as "Threatened" by COSEWIC, whereas the Bald Eagle has "Vulnerable" status under the *Loi sur les espèces menacées ou vulnérables* (Quebec). Eight species were selected for conservation reasons, whereas the resident Canada Goose population is listed as a priority for the management and control of its overabundance.

Urban areas rank second among all habitats in BCR 13-QC in terms of the diversity of threats identified for priority bird populations. There are no fewer than 12 different sub-categories of threats (Fig. 22), which ranks this habitat just behind wetlands (14) in this respect.

Four sub-categories each represent 12.5% of threats reported in urban habitat. Sub-categories “1.1 Housing & urban areas” and “11.5 Other impacts” have a “High” relative magnitude. The conservation issues associated with these sub-categories are, respectively, the decrease in artificial nesting sites for the Chimney Swift and Common Nighthawk, and the increased frequency of violent weather events. Sub-categories “4.2 Utility & Service lines” and “7.3 Other ecosystem modifications” both have a “Low” relative magnitude. Threats under these sub-categories involve the risk of collision with power transmission structures for birds of prey in particular, and the limited availability of nesting sites for the Common Tern and Purple Martin.

Threat sub-categories “2.1 Annual and perennial non-timber crops” and “2.3 Livestock farming & ranching” also have “High” relative magnitudes. The conservation issue associated with these categories 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 also make them less suitable for building nests.

The full list of threats to priority species in the urban habitat of BCR 13-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 urban habitats and the features that make them important for birds, and reducing the impacts of human activity and incidental mortality. Suggested conservation actions include installing artificial nesting structures, establishing buffer zones around known nesting sites, and adopting measures that encourage the reduction of greenhouse gas emissions.

Table 19. Priority species that use the 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]	Mng[3]
Bald Eagle	Artificial urban structures (bridges, buildings, etc.)	Provincial recovery objective[4]	X	X	-
Barn Swallow	Human-made surfaces (bridges, barns, tunnels)	Increase 50%	X	X	-
Canada Goose (resident population)	Open land with well-kept turf near waterbodies (golf courses, city parks)	Decrease	-	-	X
Chimney Swift[5]	Chimneys suitable for nesting.	Recovery objective	X	X	-
Common Nighthawk[5]	Gravel roofs	Recovery objective	X	X	-
Common Tern	Human-made structures along the St. Lawrence	Maintain current	-	X	-
Killdeer	Roadbed shoulders, gravel or broken asphalt parking lots	Increase 50%	-	X	-
Peregrine Falcon (*anatum/tundrius*)[5]	Artificial urban structures (bridges, buildings, etc.)	Recovery objective	X	X	-
Purple Martin	Artificial nesting structures	Assess/Maintain	-	X	-

[1] "At risk" includes species considered Endangered, Threatened or of 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 of Special Concern; and listed as Threatened, 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), the *Canadian Shorebird Conservation Plan* (Milko et al. 2003), the *North American Waterfowl Management Plan* (NAWMP Plan Committee 2004) or by regional experts.
[3] "Management" includes species whose targeted population objective has been met or surpassed, but which require ongoing management due to their socio-economic importance as game species, or because of their effects on other species or habitats.
[4] See the Comité de rétablissement du Pygargue à tête blanche au Québec (2002).
[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: Chimney Swift: Increase; Common Nighthawk: Increase; Peregrine Falcon (*anatum/tundrius*): Maintain current.

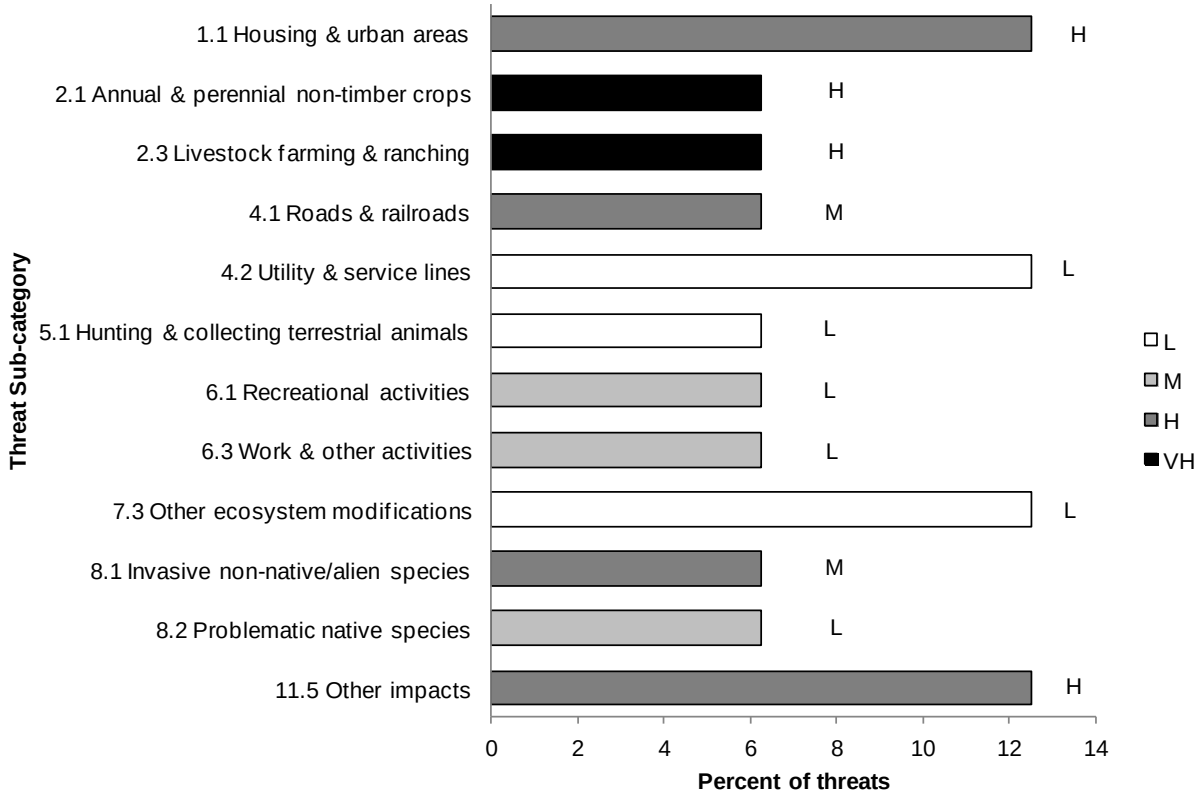

Figure 22. Percent of identified threats to priority species in the urban habitat in each threat sub-category.

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 addressed in total for all priority species in the urban 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 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 13-QC, by threat category and broad habitat class).

Table 20. Threats addressed, conservation objectives, recommended actions and priority species affected in the urban habitat of BCR 13-QC.

Threats addressed	Threat category	Objectives	Objective category	Recommended actions	Action category	Priority species affected[1]
Collisions with power lines and other human-made structures	4.2 Utility & service lines	Reduce mortality from collisions with human-made structures. Recovery of species at risk.	2.7 Reduce incidental mortality from collisions 3.4. Implement recovery strategies for species at risk	Promote actions to reduce collisions with human-made structures. Continue to implement the Bald Eagle provincial recovery strategy (Comité de rétablissement du pygargue à tête blanche au Quebec 2002).	2.1 Site/area management 3.2 Species recovery	Peregrine Falcon (*anatum/tundrius*), Bald Eagle
Competition for nesting sites with introduced species.	8.1 Invasive non-native/alien species	Restore features in open habitats that are important for birds.	1.4 Maintain important bird habitat features on the landscape	Install artificial nesting structures.	3.2 Species recovery	Purple Martin
Limited number of nesting sites.	7.3 Other ecosystem modifications	Restore nesting habitats and other features important for birds in the BCR.	1.4 Maintain important bird habitat features on the landscape	Explore the possibility of developing some islands to restore breeding populations there. Install artificial nesting structures.	2.1 Site/area management 3.2 Species recovery	Common Tern, Purple Martin
Deliberate hunting or accidental trapping.	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 trappers and the public through outreach campaigns.	4.3 Awareness and communications	Peregrine Falcon (*anatum/tundrius*)

[1] Priority species identified for management purposes and/or for which the only identified threat is in category "12.1 Information lacking" are not included in this table.

Table 20 continued

Threats addressed	Threat category	Objectives	Objective category	Recommended actions	Action category	Priority species affected[1]
Disturbance of nesting sites.	6.1 Recreational activities 6.3 Work & other activities	Minimize human 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. 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*), Common Tern
Higher frequency of adverse weather events due to climate change that may affect migration, reproductive success, prey availability 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
Reduction in the number of artificial nesting sites.	1.1 Housing & urban areas 2.1 Annual & perennial non-timber crops 2.3. Livestock farming & ranching	Restore features in open habitats that are important for birds.	1.4 Maintain important bird habitat features on the landscape	Install artificial nesting structures.	3.2 Species recovery	Common Nighthawk, Barn Swallow, Chimney Swift

Table 20 continued

Threats addressed	Threat category	Objectives	Objective category	Recommended actions	Action category	Priority species affected[1]
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	Common Tern
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 to limit nesting.	2.1 Site/area management	Killdeer

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. This type of habitat covers a little more than 5% of BCR 13-QC and is found throughout the region. However, greater concentrations of wetlands are found along the St. Lawrence River, particularly around Lake St. Pierre, and on a strip along the eastern boundary of the BCR (Fig. 23).

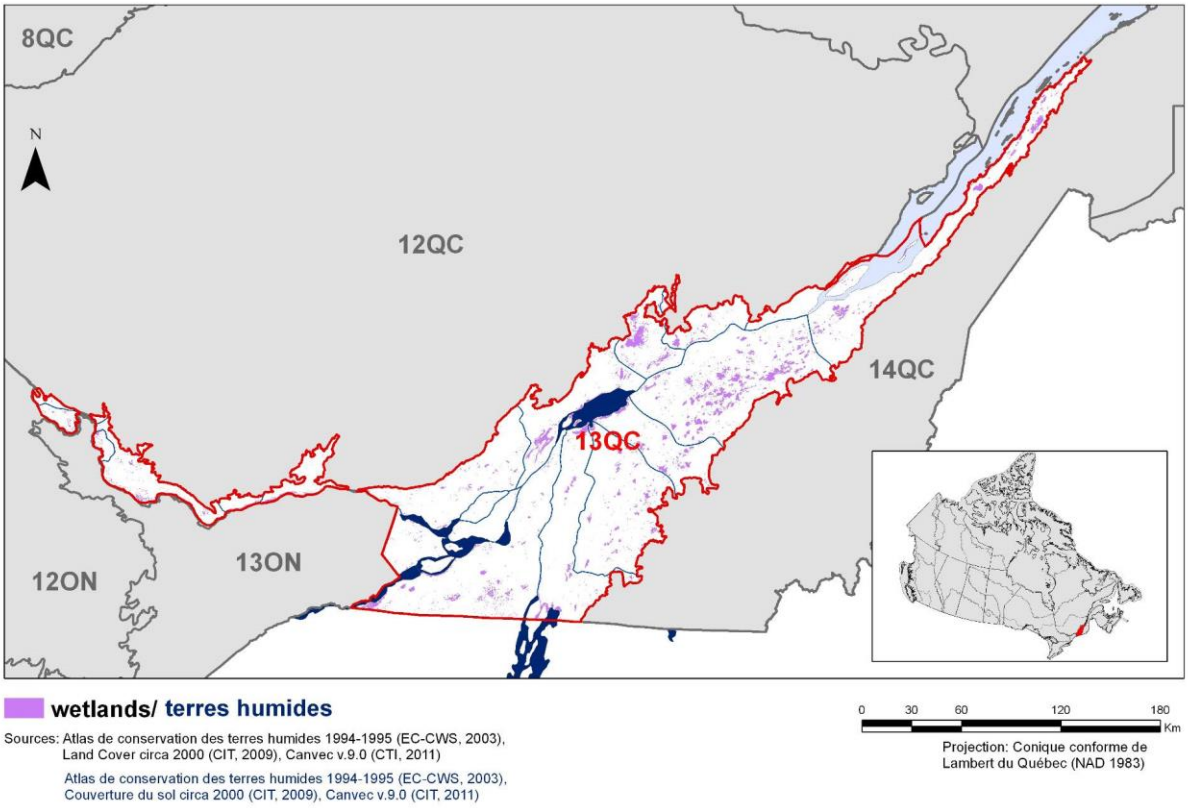

Figure 23. Map of wetland habitat in BCR 13-QC: St. Lawrence Plain and Lower Great Lakes.

The wetlands of BCR 13-QC are used by 31 priority species from all 4 bird groups (Table 21), which makes this the most frequently used habitat class by priority species in this BCR. Fifteen landbird species, 4 shorebird species and 6 species each of waterfowl and waterbirds are found in this habitat. Of the 31 priority species in this habitat, nearly a third (10) are species at risk, and 8 are listed on Schedule 1 of SARA. The Barn Swallow has been assessed as “Threatened” by COSEWIC, whereas the Nelson's Sharp-tailed Sparrow is “Likely to be designated threatened or vulnerable” by provincial legislation. Twenty-seven species were selected for conservation reasons, while the Brant, Canada Goose (Atlantic population) and Wood Duck were chosen for stewardship reasons. The Snow Goose is the only species in this habitat selected for management purposes.

Fourteen threat sub-categories affect priority species in wetlands, which makes this the habitat class with the widest variety of threats in BCR 13-QC (Fig. 24). The most frequently reported sub-category is “2.1 Annual & perennial non-timber crops,” which accounts for 26% of all identified threats in this habitat. The main conservation issues in this “Very High” magnitude sub-category include the drainage and filling of wetlands for agricultural purposes, the resulting decline in prey insects, and the use of upper marshes for agriculture.

Sub-categories “1.1 Housing & urban areas” and “1.2 Commercial & industrial areas” are also threats of a “Very High” relative magnitude in wetlands, and each represents 20% of threats to priority species in this habitat. Habitat loss and degradation caused by the drainage and filling of wetlands for residential and commercial development is the main conservation issue under these categories. The decrease in the number of insect prey due to the loss of wetlands is another threat, which affects aerial insectivores specifically.

Four other threat sub-categories have “High” relative magnitudes: the presence of invasive plants (8.1), a higher frequency of adverse weather events (11.5), changes in the number, area and location of wetlands due to climate change (11.1), and peat mining (5.2). Overall, these threats account for a combined 16% of wetland conservation issues in BCR 13-QC.

The full list of threats to priority species in the wetlands of BCR 13-QC, as well as the objectives, conservation actions and species that could benefit, are presented in Table 22. Conservation objectives are mainly aimed at conserving, protecting and restoring wetlands on the landscape, as well as limiting the impacts of climate change and colonization by certain invasive plant species. Conservation actions include protecting sites that are important for priority species through stewardship or by legally designating them as conservation areas, adopting municipal land use plans that protect wetlands, developing beneficial agricultural management practices and controlling invasive alien species.

Table 21. 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]	Mng[4]
American Bittern	Freshwater marshes, saltmarshes, swamps	Increase 50%	-	X	-	-
American Black Duck	Freshwater marshes, harvested peatlands, swamps, saltmarshes	Increase	-	X	-	-
Bank Swallow	Marshes, bogs	Increase	-	X	-	-
Barn Swallow	Marshes	Increase 50%	X	X	-	-
Black Tern	Marshes, swamps	Increase 50%	-	X	-	-
Blue-winged Teal	Freshwater marshes, brackish marshes, saltmarshes, swamps	Maintain current	-	X	-	-
Brant	Eelgrass beds, spartina marshes and other saltmarshes	Maintain current	-	-	X	-
Canada Goose (Atlantic population)	Bogs	Maintain current	-	-	X	-
Canada Warbler[5]	Shrub swamps, bogs	Recovery objective	X	X	-	-
Chimney Swift[5]	Marshes	Recovery objective	X	X	-	-
Common Nighthawk[5]	Marshes	Recovery objective	X	X	-	-

[1] "At risk" includes species considered Endangered, Threatened or of 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 of Special Concern; and listed as Threatened, 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), the *Canadian Shorebird Conservation Plan* (Milko et al. 2003), the *North American Waterfowl Management Plan* (NAWMP Plan Committee 2004) or by regional experts.
[3] "Stewardship" includes abundant species with a wide range, with a significant percentage of this range or continental population located in the conservation unit or sub-unit. These species include not only landbirds considered by Partners in Flight but also species from other bird groups that were added by experts.
[4] "Management" includes species whose targeted population objective has been met or surpassed, but which require ongoing management due to their socio-economic importance as game species, or because of their effects on other species or habitats.
[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; Peregrine Falcon (*anatum/*tundrius): Maintain current; Short-eared Owl: Increase 100%; Chimney Swift: Increase; Olive-sided Flycatcher: Increase 100%; Canada Warbler: Increase 100%.

Table 21 continued

Priority species	Details on habitat used	Population objective	Reason for priority status			
			At risk[1]	CC[2]	S[3]	Mng[4]
Least Bittern	Freshwater marshes with emergent plants, shrub swamps	Recovery objective[6]	X	X	-	-
Nelson's Sharp-tailed Sparrow	Freshwater marshes, saltmarshes	Increase	X	X	-	-
Northern Harrier	Freshwater marshes, saltmarshes	Maintain current	-	X	-	-
Northern Rough-winged Swallow	Marshes	Assess/Maintain	-	X	-	-
Olive-sided Flycatcher[5]	Treed swamps	Recovery objective	X	X	-	-
Palm Warbler	Marshes	Assess/Maintain	-	X	-	-
Peregrine Falcon (*anatum/tundrius*)[5]	Freshwater marshes, saltmarshes	Recovery objective	X	X	-	-
Purple Martin	Marshes	Assess/Maintain	-	X	-	-
Savannah Sparrow	Bogs, saltmarshes	Increase 50%	-	X	-	-
Sedge Wren	Freshwater marshes, bogs, swamps	Increase	X	X	-	-
Semipalmated Sandpiper	Coastal marshes	Increase 100%	-	X	-	-
Short-eared Owl[5]	Freshwater marshes, bogs, saltmarshes	Recovery objective	X	X	-	-
Snow Goose	Bulrush marshes	Decrease	-	-	-	X
Sora	Marshes	Assess/Maintain	-	X	-	-
Upland Sandpiper	Bogs	Assess/Maintain	-	X	-	-
Virginia Rail	Marshes	Assess/Maintain	-	X	-	-
Wilson's Phalarope	Freshwater marshes, brackish marshes, herbaceous wetlands	Assess/Maintain	-	X	-	-
Wilson's Snipe	Brackish marshes, freshwater marshes	Increase 50%	-	X	-	-
Wood Duck	Treed swamps	Increase	-	-	X	-
Yellow Rail	Marshes (wet meadow), bogs (herbaceous part), saltmarshes	Recovery objective[7]	X	X	-	-

[6] See Environment Canada (2011a).
[7] See Environment Canada (2012).

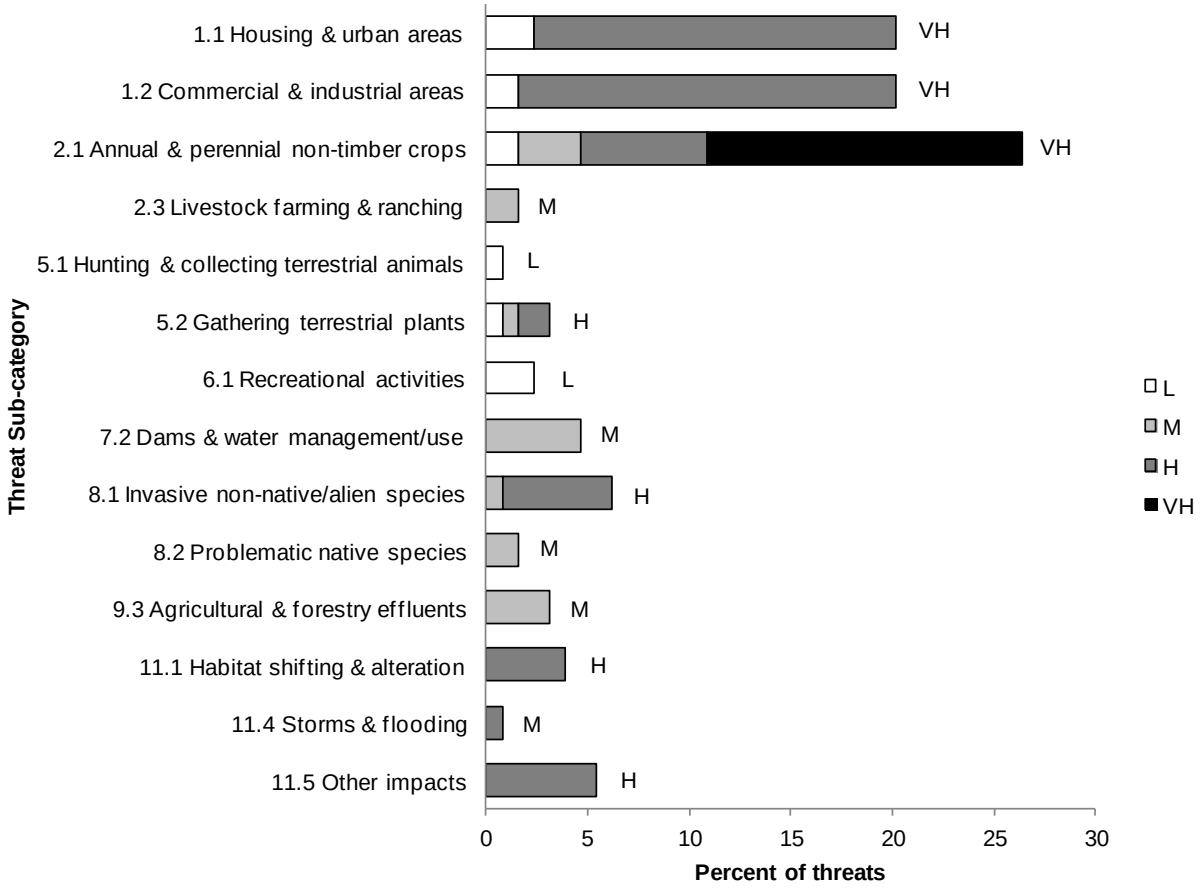

Figure 24. Percent of identified threats to priority species in wetlands in each threat sub-category. Each bar represents the percent of the total number of threats identified in each threat sub-category in wetlands (for example, if 100 threats were addressed in total for all priority species in wetlands, 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 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 wetlands is shown at the end of each bar (also presented in Table 4, Relative magnitude of identified threats to priority species within BCR 13-QC, by threat category and broad habitat class).

Table 22. Threats addressed, conservation objectives, recommended actions and priority species affected in the wetlands of BCR 13-QC.

Threats addressed	Threat category	Objectives	Objective category	Recommended actions	Action category	Priority species affected[1]
Deliberate hunting or accidental trapping.	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 trappers and the public through outreach campaigns.	4.3 Awareness and communications	Peregrine Falcon (*anatum/tundrius*)
Disturbance of nesting sites and staging areas.	6.1 Recreational activities	Minimize disturbance near nesting sites and staging areas.	4.1 Reduce disturbance from human recreation	Limit activities near nesting sites during the breeding season. Establish buffer zones around known nesting sites. Raise public awareness through outreach campaigns on the sensitivity of certain species to disturbance.	2.1 Site/area management 4.3 Awareness and communications	Semipalmated Sandpiper, American Bittern, Black Tern.
Habitat loss and degradation (invasion of alder in the sedge meadows of the Lac Saint-François National Wildlife Area).	8.2 Problematic native 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 explore the possibility of developing a control program.	8.2 Monitoring	Sedge Wren

[1] Priority species identified for management purposes and/or for which the only identified threat is in category "12.1 Information lacking" are not included in this table.

Table 22 continued

Threats addressed	Threat category	Objectives	Objective category	Recommended actions	Action 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 quantity and quality of wetlands on the landscape. Protect an adequate proportion of breeding sites in the BCR. Recovery of species at risk.	1.1 Ensure land and resource-use policies and practices maintain or improve bird habitat 3.4. Implement recovery strategies for species at risk	Protect wetlands (including important nesting sites) for priority species through stewardship or by legally designating them as conservation areas. Protect wetlands of various sizes, configurations and habitat conditions to ensure the diversity of habitats and species on the landscape. Improve the protection of wetlands by enforcing existing policies and regulations. Raise awareness among farmers of the rush marsh drainage problem between Kamouraska and Îsle-Verte. Support sustainable agricultural development. Continue to implement the Recovery Strategy for the Least Bittern (Environment Canada 2011b).	1.1 Site/area protection 5.2 Policies and regulations 4.3 Awareness and communications 5.3 Private sector standards and codes 3.2 Species recovery	Wilson's Snipe, Nelson's Sharp-tailed Sparrow, Savannah Sparrow, American Bittern, American Black Duck, Black Tern, Northern Harrier, Peregrine Falcon (*anatum/tundrius*), Short-eared Owl, Sora, Upland Sandpiper, Olive-sided Flycatcher, Palm Warbler, Canada Warbler, Least Bittern, Wilson's Phalarope, Virginia Rail, Yellow Rail, Blue-winged Teal, Sedge Wren.
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 quantity and quality of wetlands on the landscape. Protect an adequate proportion of breeding sites in the BCR.	1.1 Ensure land and resource-use policies and practices maintain or improve bird habitat	Protect wetlands (including important nesting sites) for priority species through stewardship or by legally designating them as 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	1.1 Site/area protection	Wilson's Snipe, Nelson's Sharp-tailed Sparrow, Savannah Sparrow, Northern Harrier, American Bittern, American Black Duck, Black Tern, Peregrine Falcon (*anatum/tundrius*), Short-eared Owl, Sora, Upland Sandpiper, Olive-sided Flycatcher,

Table 22 continued

Threats addressed	Threat category	Objectives	Objective category	Recommended actions	Action category	Priority species affected[1]
				that protect wetlands. Improve the protection of wetlands by enforcing existing policies and regulations. Continue to implement the Recovery Strategy for the Least Bittern (Environment Canada 2011b). Continue to implement the Management Plan for the Yellow Rail (Environment Canada 2012).	5.2 Policies and regulations 3.2 Species recovery	Palm Warbler, Canada Warbler, Least Bittern, Wilson's Phalarope, Virginia Rail, Yellow Rail, Blue-winged Teal, Sedge Wren.
		Recovery of species at risk.	3.4. Implement recovery strategies for species at risk			
Habitat loss and degradation (bog drainage for cranberry cultivation).	2.1 Annual & perennial non-timber crops	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	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	Savannah Sparrow, American Black Duck, Upland Sandpiper, Palm Warbler.
Habitat loss and degradation (draining bogs for peat mining).	5.2 Gathering terrestrial plants	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	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. Raise awareness among bog operators of the importance of leaving in place at least 5-metre-wide strips of vegetation for nesting.	5.2 Policies and regulations 5.3 Private sector standards and codes 4.3 Awareness and communications	Savannah Sparrow, American Black Duck, Upland Sandpiper, Palm Warbler.

Table 22 continued

Threats addressed	Threat category	Objectives	Objective category	Recommended actions	Action category	Priority species affected[1]
Habitat loss and degradation (nest flooding during major fluctuations in water levels as a result of dam management in Cornwall).	7.2 Dams & water management/use	Conserve and restore the quantity and quality of wetlands on the landscape. Recovery of species at risk.	1.1 Ensure land and resource-use policies and practices maintain or improve bird habitat 3.4. Implement recovery strategies for species at risk	Consult Canadian Wildlife Service about managing the waters of the St. Lawrence (International Joint Commission) during the decision-making process so that they can comment on species requirements and needs. Continue to implement the Recovery Strategy for the Least Bittern (Environment Canada 2011b).	5.3 Private sector standards and codes 3.2 Species recovery	American Bittern, Black Tern, Sora, Virginia Rail, Least Bittern, Sedge Wren.
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 Sharp-tailed Sparrow
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. Recovery of species at risk.	6.2 Manage for habitat resilience as climate changes 3.4. Implement recovery strategies for species at risk	Promote the reduction of greenhouse gas emissions. Continue to implement the Recovery Strategy for the Least Bittern (Environment Canada 2011b). Continue to implement the Management Plan for the Yellow Rail (Environment Canada 2012).	6.2 Substitution 3.2 Species recovery	Sora, Least Bittern, Wilson's Phalarope, Yellow Rail, Virginia Rail.
Habitat loss and degradation (invasive plant species).	8.1 Invasive non-native/alien species	Limit the impact of invasive plants on landscape structure and composition. Recovery of	3.5 Prevent and control the spread of invasive and exotic species 3.4. Implement recovery	Track invasive plant species and explore the possibility of developing a control program. Continue to implement the Recovery	8.2 Monitoring 3.2 Species	Nelson's Sharp-tailed Sparrow, Northern Harrier, American Bittern, Short-eared Owl, Sora, Least Bittern, Yellow Rail, Virginia Rail.

Table 22 continued

Threats addressed	Threat category	Objectives	Objective category	Recommended actions	Action category	Priority species affected[1]
		species at risk.	strategies for species at risk	Strategy for the Least Bittern (Environment Canada 2011b). Continue to implement the Management Plan for the Yellow Rail (Environment Canada 2012).	recovery	
Habitat loss and degradation (use of some islands of the St. Lawrence for livestock grazing and other agricultural activities).	2.1 Annual & perennial non-timber crops 2.3. Livestock farming & ranching	Conserve and restore the quality and quantity of upper marshlands on the landscape. Recovery of species at risk.	1.1 Ensure land and resource-use policies and practices maintain or improve bird habitat 3.4. Implement recovery strategies for species at risk	Work with producers to develop beneficial management practices on ranching and agricultural operations in upper marshlands. Continue to implement the Management Plan for the Yellow Rail (Environment Canada 2012).	5.3 Private sector standards and codes 3.2 Species recovery	Nelson's Sharp-tailed Sparrow, Short-eared Owl, Wilson's Phalarope, Yellow Rail, Sedge Wren.
Higher frequency of adverse weather events due to climate change that may affect migration, reproductive success, prey availability 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, Northern Rough-winged Swallow, Purple Martin, Bank Swallow, Barn Swallow, Chimney Swift, Olive-sided Flycatcher.
Overuse 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. Recovery of species at risk.	2.1 Reduce mortality and/or sub-lethal effects from pesticide use 3.4. Implement recovery strategies for species at risk	Reduce pesticide use and promote an integrated pest management system. Continue to implement the Recovery Strategy for the Least Bittern (Environment Canada 2011b).	2.3 Habitat and natural process restoration 3.2 Species recovery	American Bittern, Sora, Least Bittern, Virginia Rail.

Table 22 continued

Threats addressed	Threat category	Objectives	Objective category	Recommended actions	Action 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	Semipalmated Sandpiper
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 quantity 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 by enforcing existing policies and regulations. Support sustainable agricultural development.	1.1 Site/area protection 5.2 Policies and regulations 5.3 Private sector standards and codes	Common Nighthawk, Northern Rough-winged Swallow, Bank Swallow, Purple Martin, Barn Swallow, Chimney Swift.

Waterbodies, Snow and Ice

According to the 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 no priority species use this habitat type in BCR 13-QC. Waterbodies account for a little less than 9% of the land in the BCR 13-QC and mainly include the St. Lawrence River and its major lakes, namely Lake Saint-François, Lake of Two Mountains, Lake Saint-Louis and Lake Saint-Pierre (Fig. 25).

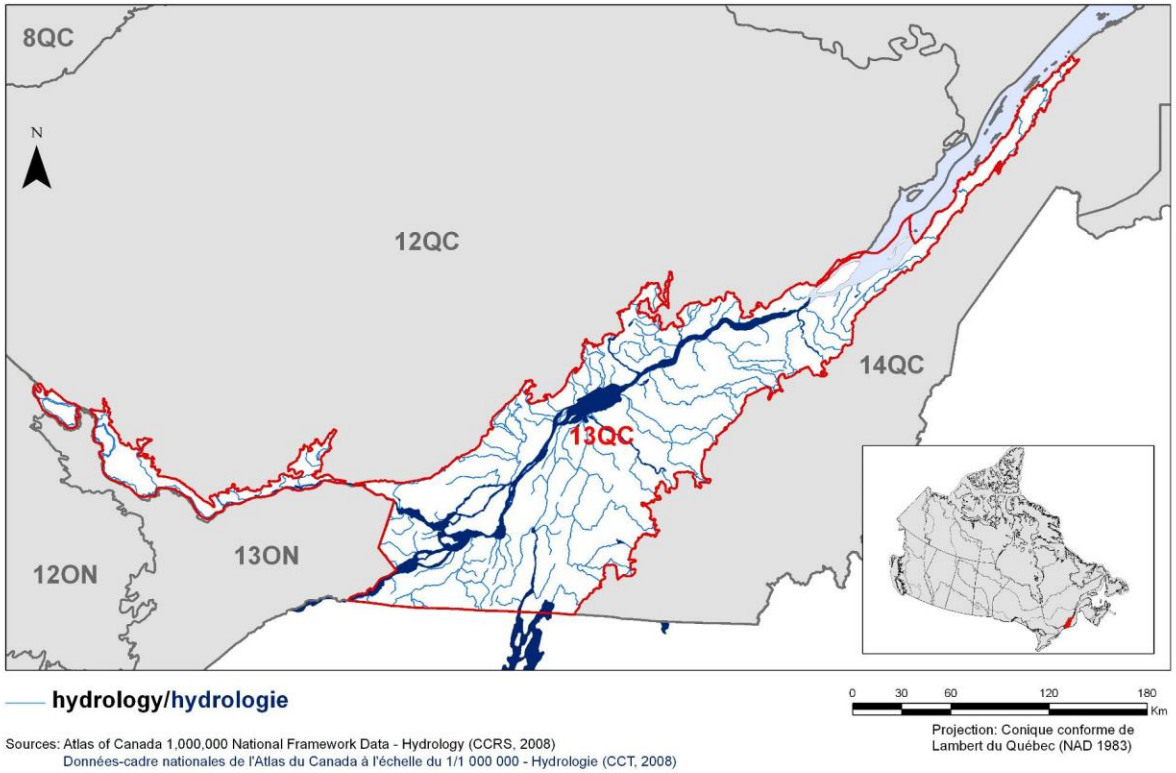

Figure 25. Hydrology map of BCR 13-QC: St. Lawrence Plain and Lower Great Lakes.

Eleven priority species, seven of which are waterfowl, are found in the waterbodies of BCR 13-QC (Table 23). There are also two species of waterbirds and two species of landbirds that use this habitat for hunting. Of all the priority species that use waterbodies, only the Bald Eagle is a species at risk (Vulnerable under provincial legislation). Five species are listed as priority for conservation reasons, while five others were selected for stewardship purposes. The Snow Goose is the only species in this habitat selected for management purposes.

The most frequently identified threat sub-category for priority species found around waterbodies is "2.1 Annual & perennial non-timber crops," which accounts for 33% of all reported threats in this habitat (Fig. 26). The main conservation issues in this category, which

has a “High” relative magnitude, include the drainage and filling of wetlands adjacent to waterbodies for agricultural purposes and the adverse effects of the intensification of agriculture on river water quality. Wetlands near lakes and rivers are essential components of habitat quality in waterbody habitats. For this reason, some threats affecting wetlands in these areas are also affiliated with waterbodies.

Sub-category “9.3 Agricultural & forestry effluents,” which ranks second with 22% of threats, is also related to the problem of 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 full list of threats to priority species found in the waterbodies of BCR 13-QC, as well as the objectives, conservation actions and species that could benefit, are presented in Table 24. Conservation objectives mainly focus on conserving and restoring the quality and quantity of freshwater habitats on the landscape. Conservation actions include protecting wetlands adjacent to waterbodies and adopting agricultural practices designed to reduce the amount of pollutants that can contaminate the environment.

Table 23. Priority species that use water bodies, 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]	Mng[4]
American Black Duck	Lakes, beaver ponds, agricultural streams	Increase	-	X	-	-
Bald Eagle	Large lakes and rivers	Provincial recovery objective[5]	X	X	-	-
Belted Kingfisher	Lakes, rivers	Increase 50%	-	X	-	-
Black Tern	Ponds	Increase 50%	-	X	-	-
Blue-winged Teal	Agricultural streams and waterbodies, beaver ponds	Maintain current	-	X	-	-
Canada Goose (Atlantic population)	Waterbodies	Maintain current	-	-	X	-
Common Loon	Fish lakes at least five ha in area with a preference for large alkaline lakes (> 50 ha) at low elevations	Maintain current	-	-	X	-
Greater Scaup	First 150 m strip of water along the St. Lawrence River, mainly fluvial lakes	Maintain current	-	-	X	-
Lesser Scaup	First 150 m strip of water along the St. Lawrence River, mainly fluvial lakes	Maintain current	-	-	X	-
Snow Goose	First 150 m strip of water along the St. Lawrence River	Decrease	-	-	-	X
Wood Duck	First 150 m strip of water along the St. Lawrence River	Increase	-	-	X	-

[1] "At risk" includes species considered Endangered, Threatened or of 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 of Special Concern; and listed as Threatened, 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), the *Canadian Shorebird Conservation Plan* (Milko et al. 2003), the *North American Waterfowl Management Plan* (NAWMP Plan Committee 2004) or by regional experts.
[3] "Stewardship" includes abundant species with a wide range, with a significant percentage of this range or continental population located in the conservation unit or sub-unit. These species include not only landbirds considered by Partners in Flight but also species from other bird groups that were added by experts.
[4] "Management" includes species whose targeted population objective has been met or surpassed, but which require ongoing management due to their socio-economic importance as game species, or because of their effects on other species or habitats.
[5] See the Comité de rétablissement du Pygargue à tête blanche au Québec (2002).

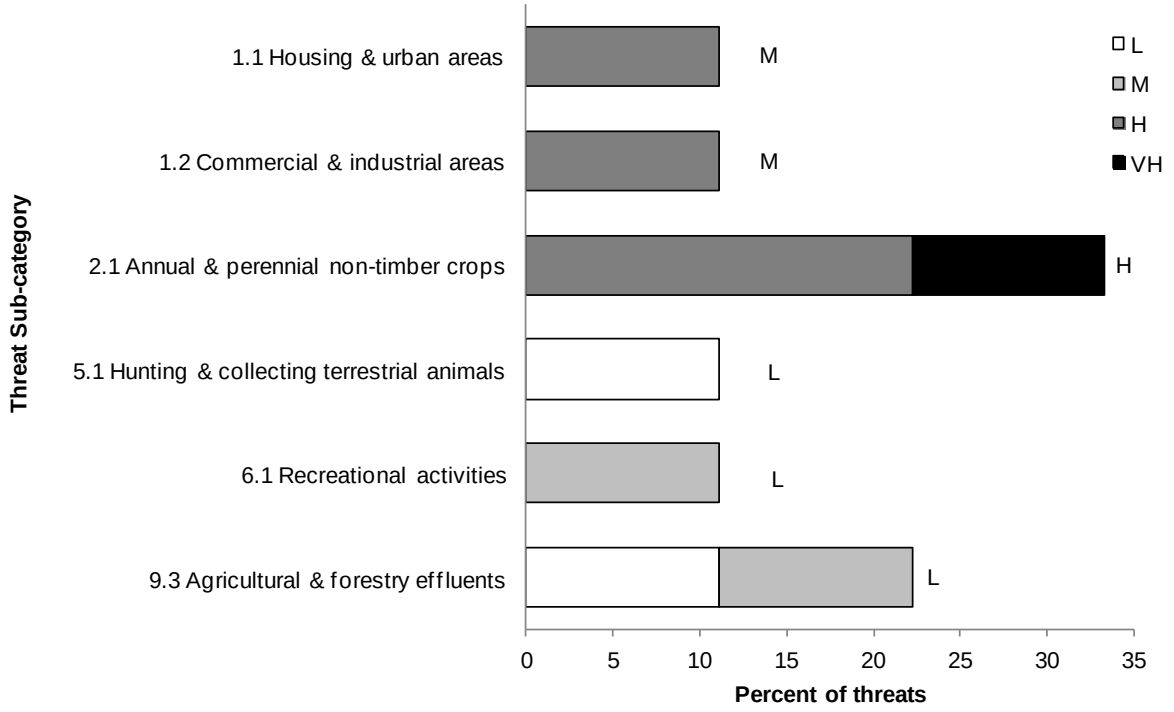

Figure 26. Percent of identified threats to priority species in waterbodies in each threat sub-category. Each bar represents the percent of the total number of threats identified in each threat sub-category in waterbodies (for example, if 100 threats were addressed in total for all priority species in 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 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 waterbodies is shown at the end of each bar (also presented in Table 4, Relative magnitude of identified threats to priority species within BCR 13-QC, by threat category and broad habitat class).

Table 24. Threats addressed, conservation objectives, recommended actions and priority species affected in the waterbodies of BCR 13-QC.

Threats addressed	Threat category	Objectives	Objective category	Recommended actions	Action 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
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. Raise public awareness through outreach campaigns on the sensitivity of certain species to disturbance.	2.1 Site/area management 4.3 Awareness and communications	Black Tern
Habitat loss (drainage and filling of wetlands for agricultural development).	2.1 Annual & perennial non-timber crops	Conserve and restore the quantity and quality of freshwater habitats 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 habitat classes and species on the landscape. Support sustainable agricultural development.	1.1 Site/area protection 5.3 Private sector standards and codes	American Black Duck

[1] Priority species identified for management purposes and/or for which the only identified threat is in category "12.1 Information lacking" are not included in this table.

Table 24 continued

Threats addressed	Threat category	Objectives	Objective category	Recommended actions	Action 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 quantity and quality of freshwater habitats on the landscape. Protect an adequate proportion of breeding sites in the BCR.	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 habitat classes and species on the landscape. In municipalities, adopt urban plans that protect wetlands. Improve the protection of wetlands by enforcing existing policies and regulations.	1.1 Site/area protection 5.2 Policies and regulations	American Black Duck
Habitat loss and degradation (intensification of agriculture).	2.1 Annual & perennial non-timber crops	Conserve and restore the quantity and quality of freshwater 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	American Black Duck, Blue-winged Teal.
Overuse of pesticides (bird poisoning, eggshell thinning, reduction in prey insects and prey fish, leaching to adjacent habitats).	9. Agricultural & forestry effluents	Improve water quality in the wetlands. Recovery of species at risk.	2.1 Reduce mortality and/or sub-lethal effects from pesticide use 3.4. Implement recovery strategies for species at risk	Reduce pesticide use and promote an integrated pest management system. Continue to implement the provincial recovery strategy for the Bald Eagle (Comité de rétablissement du pygargue à tête blanche au Quebec 2002).	2.3 Habitat and natural process restoration 3.2 Species recovery	Belted Kingfisher, Bald Eagle.

Coastal

Coastal habitats are terrestrial and aquatic habitats along the marine coasts. They consist mainly of estuary areas, mudflats, sandbars, rocky shores and islands. The extent of this habitat type is difficult to determine, but it is estimated that the BCR 13-QC marine coast stretches 335 km along the St. Lawrence River (Fig. 27).

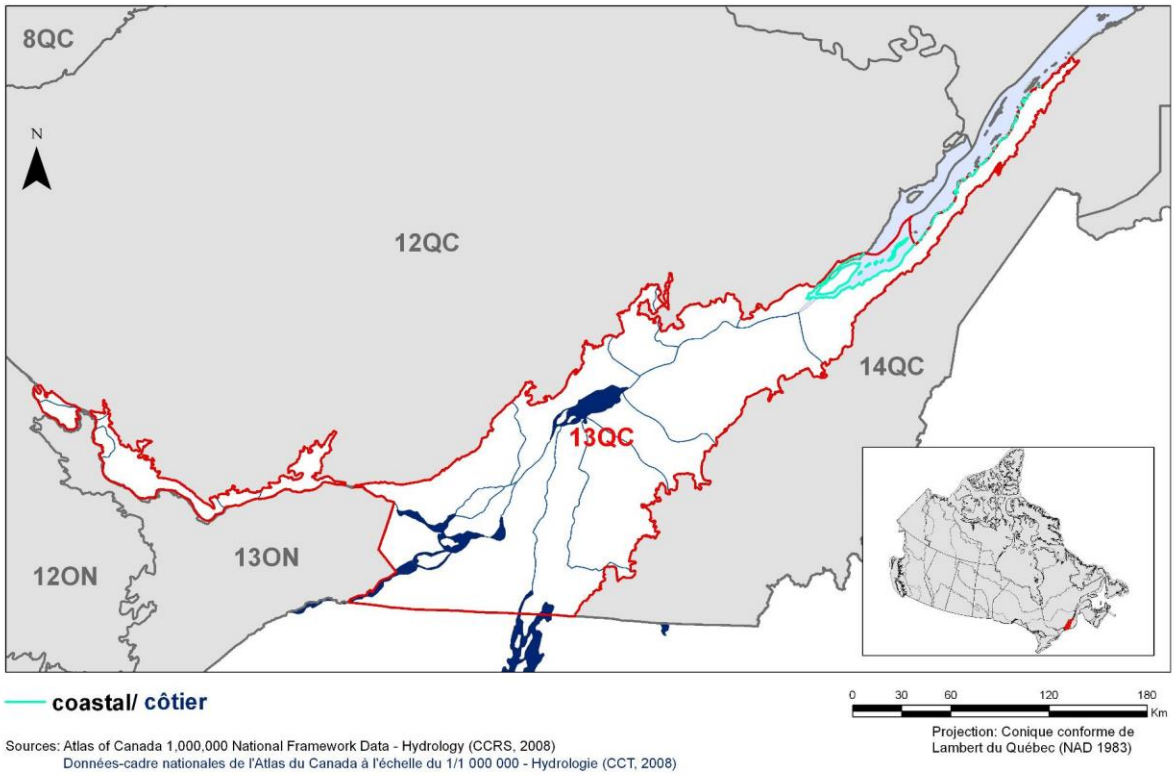

Figure 27. Map of coastal habitat in BCR 13-C: St. Lawrence Plain and Lower Great Lakes.

The coastal habitats of BCR 13-QC are used by four priority species, including two shorebird species, one waterbird species and one waterfowl species (Table 25). None are species at risk, and there is an equal number of conservation and stewardship species.

The number of threats identified in the coastal habitats of BCR 13-QC is low, partly due to the stewardship species only being assigned conservation actions that involve monitoring. The main threat affecting the two conservation species is the presence of predators (sub-category 8.2) at nesting sites or in staging areas, resulting in either mortality or lower productivity (Fig. 28). This threat has a “Medium” relative magnitude and is followed by disturbances caused by recreational activities (sub-category 6.1) and the lack of nesting sites for the Common Tern (sub-category 7.3); both these issues have a “Low” overall magnitude.

The conservation objectives and actions that address the threats affecting priority birds in the coastal areas of BCR 13-QC are presented in Table 26. Conservation objectives are aimed at minimizing disturbances at nesting and roosting sites and restoring nesting habitats. Conservation actions include island management, launching awareness campaigns on the effects of human disturbance, and continuing or even stepping up predator control programs at main coastal sites used by priority species.

Table 25. 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]
Canada Goose (Atlantic population)	Banks of the St. Lawrence River	Maintain current	-	-	X
Common Tern	Low-lying islands of the St. Lawrence partially covered in short vegetation, sandy substrate or gravel	Maintain current	-	X	-
Semipalmated Sandpiper	Intertidal shorelines	Increase 100%	-	X	-
Short-billed Dowitcher (*griseus*)	Intertidal shorelines	Maintain current	-	-	X

[1] "At risk" includes species considered Endangered, Threatened or of 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 of Special Concern; and listed as Threatened, 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), the *Canadian Shorebird Conservation Plan* (Milko et al. 2003), the *North American Waterfowl Management Plan* (NAWMP Plan Committee 2004) or by regional experts.
[3] "Stewardship" includes abundant species with a wide range, with a significant percentage of this range or continental population located in the conservation unit or sub-unit. These species include not only landbirds considered by Partners in Flight but also species from other bird groups that were added by experts.

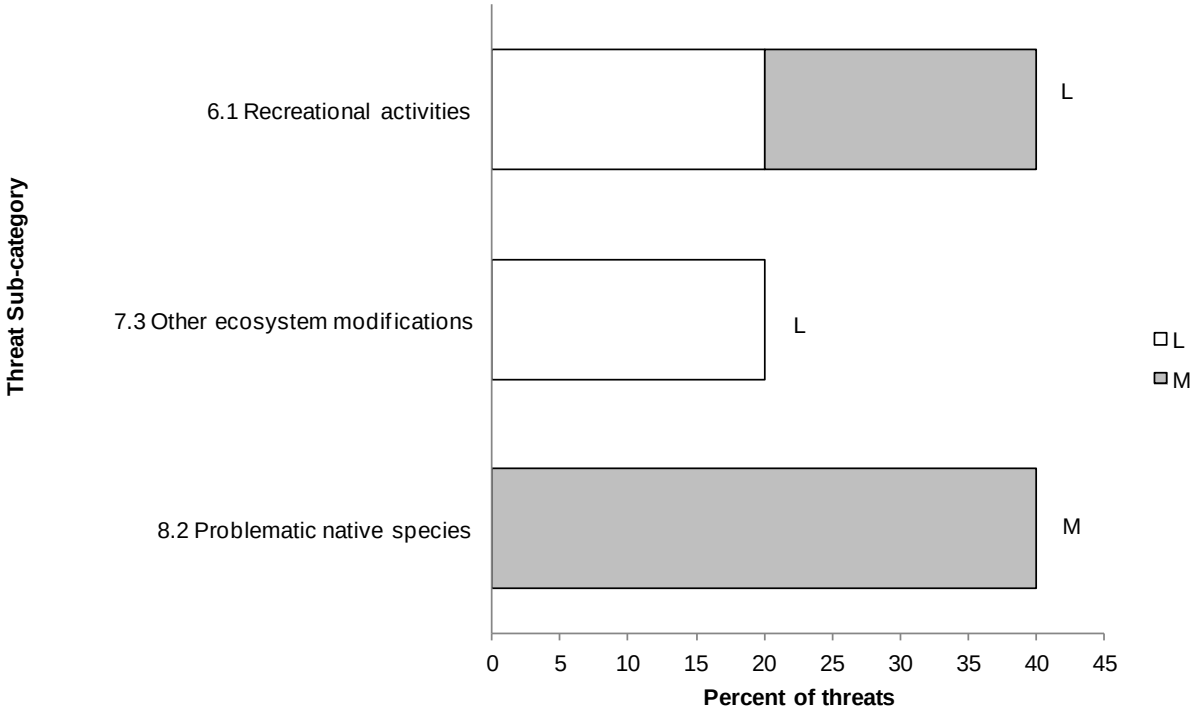

Figure 28. Percent of identified threats to priority species in coastal habitats in each threat sub-category.

Each bar represents the percent of the total number of threats identified in each threat sub-category in the coastal habitats (for example, if 100 threats were addressed in total for all priority species in the 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 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 the 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 13-QC, by threat category and broad habitat class).

Table 26. Threats addressed, conservation objectives, recommended actions and priority species affected in the coastal habitats of BCR 13-QC.

Threats addressed	Threat category	Objectives	Objective category	Recommended actions	Action category	Priority species affected[1]
Limited number of nesting sites.	7.3 Other ecosystem modifications	Restore nesting habitats in the BCR.	1.4 Maintain important bird habitat features on the landscape	Explore the possibility of developing some islands to restore breeding populations there.	2.1 Site/area management	Common Tern
Disturbance of nesting sites and staging areas.	6.1 Recreational activities	Minimize disturbances near nesting sites and 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	Semipalmated Sandpiper, Common Tern
Predation at nesting sites and in staging areas.	8.2 Problematic native species	Reduce mortality and disturbance at nesting sites and 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	Semipalmated Sandpiper, Common Tern

[1] Priority species for which the only identified threat is in category "12.1 Information lacking" are not included in this table.

Riparian

A riparian area is defined as any habitat located within 15 metres of a freshwater body. Based on BCR 13-QC's hydrographic system (see Fig. 25), it is estimated that this habitat accounts for about 0.4% of the land, but it is found almost everywhere in the area.

Thirteen priority species, including 8 landbirds, 4 species of waterfowl and 1 shorebird, are found in the riparian areas of BCR 13-QC (Table 27). Three are species at risk, 2 of which are listed as Threatened on Schedule 1 of SARA and 1 of which is designated as Vulnerable under provincial legislation. In addition to 11 conservation species, the list of priority birds in this habitat includes 1 stewardship species (Wood Duck) and 1 overabundant species included for management purposes (Canada Goose – resident population).

The most frequently identified threat sub-category for species found in the riparian areas of BCR 13-QC is “2.1 Annual & perennial non-timber crops,” which accounts for 40% of all reported threats in this habitat (Fig. 29). This sub-category has a “Very High” relative magnitude, and the conservation issues associated with it are the disappearance of riparian strips, the intensification of agriculture and incidental bird mortality during the harvest.

Accounting for 15% of threats, the erosion of banks used for nesting by the Bank Swallow, Northern Rough-winged Swallow and Belted Kingfisher in sub-category “7.3 Other ecosystem modifications” ranks second, with an overall relative magnitude of “Medium.” Three other sub-categories each account for 10% of conservation issues and have a “Medium” relative magnitude. They include habitat loss due to residential development (sub-category 1.1), loss of habitat features important for birds (snags, large-diameter trees) as a result of forestry operations (sub-category 5.3) and the higher frequency of adverse weather events (sub-category 11.5).

The full list of threats to priority species in the riparian areas of BCR 13-QC, as well as the objectives, conservation actions and species that could benefit, are presented in Table 28. Conservation objectives are mainly focus on conserving, protecting and restoring riparian areas on the landscape, and restoring the features that make them important for birds. Objectives also include limiting the impacts of climate change and minimizing incidental bird mortality and human disturbance.

Recommended conservation actions include protecting, conserving and restoring key bird habitats, namely riparian strips, riparian wetlands and large tracts of riparian forage; adopting beneficial agricultural and forestry management practices; and reducing greenhouse gas emissions.

Table 27. Priority species that use riparian 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]	Mng[4]
American Black Duck	Edges of lakes, rivers and streams	Increase	-	X	-	-
Bald Eagle	Forest areas near or beside the edges of major watercourses	Provincial recovery objective[5]	X	X	-	-
Baltimore Oriole	Sparse forest near waterbodies	Increase 50%	-	X	-	-
Bank Swallow	Streambank slopes	Increase	-	X	-	-
Belted Kingfisher	Lakeshores and riverbanks	Increase 50%	-	X	-	-
Blue-winged Teal	Herbaceous riparian strips	Maintain current	-	X	-	-
Canada Goose (resident population)	Open land with well-kept turf near waterbodies (golf courses, city parks)	Decrease	-	-	-	X
Eastern Kingbird	Sparse forest near waterbodies	Increase 50%	-	X	-	-
Northern Rough-winged Swallow	Riverbanks	Assess/Maintain	-	X	-	-

[1] "At risk" includes species considered Endangered, Threatened or of 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 of Special Concern; and listed as Threatened, 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), the *Canadian Shorebird Conservation Plan* (Milko et al. 2003), the *North American Waterfowl Management Plan* (NAWMP Plan Committee 2004) or by regional experts.
[3] "Stewardship" includes abundant species with a wide range, with a significant percentage of this range or continental population located in the conservation unit or sub-unit. These species include not only landbirds considered by Partners in Flight but also species from other bird groups that were added by experts.
[4] "Management" includes species whose targeted population objective has been met or surpassed, but which require ongoing management due to their socio-economic importance as game species, or because of their effects on other species or habitats.
[5] See the Comité de rétablissement du Pygargue à tête blanche au Québec (2002).

Table 27 continued

Priority species	Details on habitat used	Population objective	Reason for priority status			
			At risk[1]	CC[2]	S[3]	Mng[4]
Olive-sided Flycatcher[6]	Riparian stands of mixed wood or conifers	Increase 100%	X	X	-	-
Red-headed Woodpecker[6]	Marshy edges of lakes and streams	Recovery objective	X	X	-	-
Wilson's Phalarope	Fields near water	Assess/Maintain	-	X	-	-
Wood Duck	Mature deciduous forests near lakes, ponds and streams; mature mixed wood forests near lakes, ponds and streams	Increase	-	-	X	-

[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%; Red-headed Woodpecker: Increase.

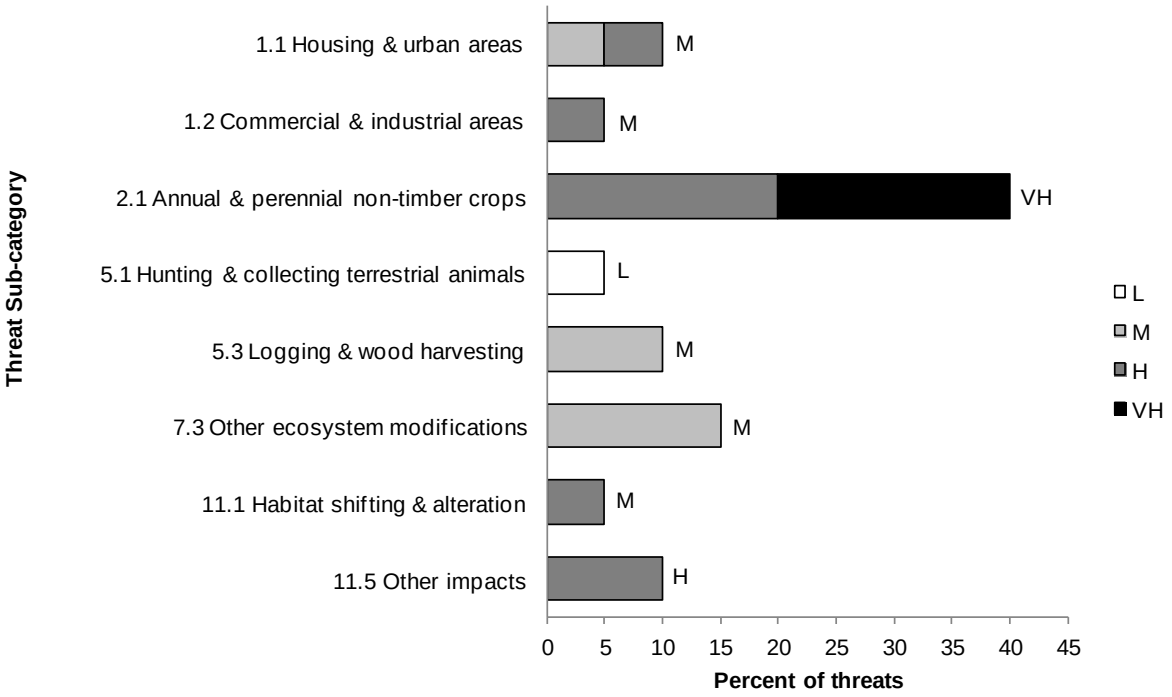

Figure 29. Percent of identified threats to priority species in riparian habitats in each threat sub-category.

Each bar represents the percent of the total number of threats identified in each threat sub-category in the riparian habitats (for example, if 100 threats were addressed in total for all priority species in the riparian 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 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 habitats is shown at the end of each bar (also presented in Table 4, Relative magnitude of identified threats to priority species within BCR 13-QC, by threat category and broad habitat class).

Table 28. Threats addressed, conservation objectives, recommended actions and priority species affected in the riparian habitats of BCR 13-QC.

Threats addressed	Threat category	Objectives	Objective category	Recommended actions	Action category	Priority species affected[1]
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 strategy (Comité de rétablissement du pygargue à tête blanche au Québec 2002).	3.2 Species recovery	Bald Eagle
Loss of natural vegetation (hedges, riparian strips, isolated trees, shrub layer) on the agricultural landscape.	2.1 Annual & perennial non-timber crops	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	Promote the maintenance and recovery of hedges and riparian strips in agricultural areas.	2.3 Habitat and natural process restoration	Eastern Kingbird, Baltimore Oriole
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	Northern Rough-winged Swallow, Bank Swallow, Belted Kingfisher
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 provincial recovery strategy for the Bald Eagle (Comité de rétablissement du pygargue à tête blanche au Québec 2002).	3.2 Species recovery	Bald Eagle
Habitat loss (scarcity of snags for cavity-nesting birds).	5.3 Logging & wood harvesting	Restore features in riparian habitats that are important for birds.	1.4 Maintain important bird habitat features on the landscape	Install artificial nesting structures. Promote silvicultural treatments that maintain key habitat features (large-diameter trees, snags with cavities, stands of dead trees and irregular structure).	3.2 Species recovery 5.3 Private sector standards and codes	Red-headed Woodpecker

[1] Priority species identified for management purposes and/or for which the only identified threat is in category "12.1 Information lacking" are not included in this table.

Table 28 continued

Threats addressed	Threat category	Objectives	Objective category	Recommended actions	Action category	Priority species affected[1]
Habitat loss and degradation (transition from perennial crops to annual crops).	2.1 Annual & perennial non-timber crops	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	Develop incentives to maintain large tracts of pasture and forage in riparian areas.	6.4 Conservation payments	Wilson's Phalarope
Habitat loss and degradation (drainage and filling of wetlands for agricultural, commercial or residential development).	1.1 Housing & urban areas 1.2 Commercial & industrial areas 2.1 Annual & perennial non-timber crops	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	Protect riparian wetlands for priority species through stewardship or by legally designating them as conservation areas. Protect wetlands of various sizes, configurations and habitat conditions to ensure the diversity of habitats and species on the landscape. Improve the protection of wetlands by enforcing existing policies and regulations. Support sustainable agricultural development.	1.1 Site/area protection 5.2 Policies and regulations 5.3 Private sector standards and codes	Red-headed Woodpecker
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 riparian habitats.	6.2 Manage for habitat resilience as climate changes	Promote the reduction of greenhouse gas emissions.	6.2 Substitution	Wilson's Phalarope
Habitat loss and degradation (intensification of agriculture).	2.1 Annual & perennial non-timber crops	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	Support sustainable agricultural development.	5.3 Private sector standards and codes	American Black Duck, Blue-winged Teal

Table 28 continued

Threats addressed	Threat category	Objectives	Objective category	Recommended actions	Action category	Priority species affected[1]
Higher frequency of adverse weather events due to climate change that may affect migration, reproductive success, prey availability or nesting phenology.	11.5 Other impacts	Reduce 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, Baltimore Oriole
Incidental bird mortality at harvest.	2.1 Annual & perennial non-timber crops	Reduce bird mortality at harvest.	2.4 Reduce incidental 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	Wilson's Phalarope, Blue-winged Teal
Increased human presence around lakes resulting in disturbance to birds, loss of wetlands and shoreline hardening.	1.1 Housing & urban areas	Minimize disturbance near nesting and feeding sites in riparian habitats.	4.1 Reduce disturbance from human recreation	Establish buffer zones around nesting and feeding habitats in recreational areas. Raise public awareness through outreach campaigns on the sensitivity of certain species to disturbance.	2.1 Site/area management 4.3 Awareness and communications	American Black Duck

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 29 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 29 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 29 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 29 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 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 29 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 29 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 29 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 29 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 29 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 waterproofing 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 29 for conservation objectives and actions.

Table 29. 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
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	2.1 Site/area management 5.3 Private sector standards and codes	All species

Table 29 continued

Threats addressed	Threat sub-category	Objective	Objective category	Recommended actions	Action category	Example priority species affected
				avoid topographic locations where migrating birds are likely to be found in abundance. Retrofit existing towers to adhere to as many guidelines as possible.		
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, Peregrine Falcon (*anaum/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 plans to avoid unnecessary use of particulate salt (a bird attractant) on roads. Avoid locating roads in valuable bird habitat.	2.1 Site/area management 1.1 Site/area protection	Bald Eagle, Baltimore Oriole, Barn Swallow, Brown Thrasher, Common Nighthawk, Killdeer, Short-eared Owl
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						

Table 29 continued

Threats addressed	Threat sub-category	Objective	Objective category	Recommended actions	Action category	Example priority species affected
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
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.	5.2 Policies and regulations 5.3 Private sector standards and codes	**Direct or indirect poisoning by pesticides:** Horned Lark, Savannah Sparrow, Vesper Sparrow, Northern Harrier, American Kestrel, Black-billed Cuckoo, Eastern Whip-poor-will, Common Nighthawk, Bobolink, Short-eared Owl, Rough-winged Swallow, Bank Swallow, Purple Martin, Barn Swallow, Sora,

Table 29 continued

Threats addressed	Threat sub-category	Objective	Objective category	Recommended actions	Action category	Example priority species affected
						Chimney Swift, Brown Thrasher, Baltimore Oriole, Least Bittern, Loggerhead Shrike, Killdeer, Bald Eagle, Virginia Rail, Eastern Meadowlark, Eastern Kingbird. **Reductions in prey due to pesticide use:** American Kestrel, Bald Eagle, Bank Swallow, Barn Swallow, Black Tern, Bobolink, Brown Thrasher, Chimney Swift, Common Nighthawk, Eastern Meadowlark, Eastern Whip-poor-will, Killdeer, Least Bittern, Loggerhead Shrike, Northern Harrier, Purple Martin, Rough-winged Swallow, Short-eared Owl
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, Blue-winged Teal, Brant, Canada Goose (Atlantic population), Common Loon, Greater Scaup, Lesser Scaup
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:** Common Loon, Northern Harrier **PCBs:**

Table 29 continued

Threats addressed	Threat sub-category	Objective	Objective category	Recommended actions	Action category	Example priority species affected
						Common Tern, Greater Scaup **Other contaminants:** Peregrine Falcon (*anatum/tundrius*)
Mortality of waterbirds from oil pollution.	9.2 Industrial & military effluents	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:** Bald Eagle, Common Loon, Greater Scaup, Lesser Scaup, Short-billed Dowitcher (*griseus*)
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 affects 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 30 and 31 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. In BCR 13-QC, for the 174 species evaluated, the model predicts a gain of 19 species, a loss of 34 species for a total turnover (species gains + species losses) of 31%.

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 30. 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, Greater Scaup, Lesser Scaup
Extended breeding season	Canada Goose
Habitat loss as a result of ecosystem changes (e.g., advances in treeline)	Nelson's Sparrow, Sora, Least Bittern, Wilson's Phalarope, Virginia Rail, Yellow Rail
Increase in severe weather events	Canada Goose, Common Nighthawk, Rough-winged Swallow, Bank Swallow, Purple Martin, Barn Swallow, Chimney Swift, Olive-sided Flycatcher, Baltimore Oriole

Table 31. 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. 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. 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).	5.2 Policies and regulations 1.1 Site/area protection 2.1 Site/area management	All species, but notably: Nelson's Sparrow, Common Nighthawk, Rough-winged Swallow, Bank Swallow, Purple Martin, Barn Swallow, Sora, Chimney Swift, Olive-sided Flycatcher, Baltimore Oriole, Least Bittern, Wilson's Phalarope, Virginia Rail, Yellow Rail
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	8.1 Research	All species

Table 31 continued

Threats addressed	Threat sub-category	Objective	Objective category	Recommended actions	Action category	Priority species affected
				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.	8.2 Monitoring	

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.

The lack of information remains a concern for effective management of a number of priority species in BCR 13-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 many bird conservation issues.

The lack of population status data was considered a significant issue for 38 of the 68 (56%) priority species in BCR 13-QC. Examples of the species in question are listed in Table 32, 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

- 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

- develop strategies to reduce expenditures on the eastern waterfowl breeding surveys, while retaining acceptable precision in population estimates;
- review the information needs and expenditures for duck banding programs;
- realign resources for eider and scoter monitoring to a more efficient suite of surveys.

Table 32. Categories of poorly monitored species, possible monitoring approaches, and example priority species in BCR 13-QC for which there are currently insufficient data to reliably estimate population trend at the BCR scale.

Category	Possible monitoring approaches	Example priority species
Aerial insectivores	Develop and implement specific surveys. Conduct regular colony counts where applicable (e.g. Purple Martin, Chimney Swift roost sites). Initial surveys may be required to locate breeding areas, colonies, and/or communal roosts. Implement or expand focused crepuscular surveys for Common Nighthawk. These surveys could be modeled after the United States Nightjar Survey Network.	Eastern Whip-poor-will, Common Nighthawk, Rough-winged Swallow, Purple Martin, Chimney Swift, Olive-sided Flycatcher
Diurnal raptors	Sparsely distributed raptors that are not well represented by regular survey efforts such as the Breeding Bird Survey require targeted, species-specific inventory efforts.	Bald Eagle, Northern Harrier, Peregrine Falcon (*anatum/tundrius*), Short-eared Owl
Nocturnal raptors	Support and expand Nocturnal Owl Surveys. Species-specific surveys may be required for species that are not well sampled by typical survey methods and rare species.	Barred Owl, Short-eared Owl, Long-eared Owl, Northern Saw-whet Owl Eastern Screech-Owl
Landbirds	Increase BBS coverage or conduct specific surveys of rare, discrete or cryptic birds whose populations are not well-known. Support and improve the migration monitoring program at the McGill Bird Observatory and set up other Canadian Migration Monitoring Network stations in the BCR. Continue, expand and improve monitoring of fallow-land birds in southern Quebec.	Field Sparrow, Black-billed Cuckoo, Rose-breasted Grosbeak, Brown Creeper, Northern Rough-winged Swallow, Brown Thrasher, Golden-winged Warbler, Cerulean Warbler, Canada Warbler, Northern Saw-whet Owl, Red-headed Woodpecker, Eastern Wood-Pewee, Rufous-sided Towhee, Sedge Wren, Yellow-throated Vireo
Colonial waterbirds	Support permanent surveys of the main colonies in the BCR and extend their scope.	Black Tern, Common Tern
Inland waterbirds	Increase surveys of inland waterbirds whose populations are not well-known (e.g., develop and implement a monitoring program for the fluvial portion of the St. Lawrence River).	American Bittern, Black Tern, Sora, Common Loon, Virginia Rail,

Table 32 continued

Category	Possible monitoring approaches	Example priority species
	Support the Marsh Monitoring Program, expand it for better spatial coverage and consider hiring birdwatchers to cover remote sites.	Yellow Rail
Shorebirds	Continue to monitor harvest rates of the Wilson's Snipe and American Woodcock for species management. 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 implement specific surveys. Maintain the North American Woodcock Singing-ground Survey. 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 the fall migration.	American Woodcock, Semipalmated Sandpiper, Short-billed Dowitcher (*griseus*), Wilson's Snipe, Upland Sandpiper, Wilson's Phalarope
Waterfowl	To maximize the information gained from efforts invested, update the three waterfowl monitoring programs, particularly the Waterfowl Survey of Southern Quebec Lowlands. Establish a spring survey of migratory individuals among priority species that do not nest in BCR 13-QC. Continue the banding program to monitor the harvest rate for priority species, document bird movements, quantify their survival and obtain indicators of reproductive success. Monitor the productivity of priority species. Set up a long-term monitoring program for the American Black Duck over the winter to document changes in the species' life cycle, particularly with respect to the effects of global warming. Continue to monitor the St. Lawrence wetlands (Jean et al. 2005; State of the St. Lawrence Monitoring Committee 2008) to understand the dynamics of changes in wetland vegetation and determine the loss of various types of wetlands. Monitor a series of wetlands that are important for certain priority species (along the St. Lawrence and inland) and determine if any losses or changes have occurred.	Brant, Canada Goose (Atlantic population), Canada Goose (resident population), Wood Duck, American Black Duck, Greater Scaup, Lesser Scaup, Blue-winged Teal

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 33). 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 33. General research objectives in BCR 13-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 13-QC:** Wilson's Snipe, American Bittern, Wood Thrush, Black Tern, Barn Swallow, Upland Sandpiper, Olive-sided Flycatcher, Cerulean Warbler, Canada Warbler, Eastern Wood-Pewee
Determine the most significant parameters (e.g., survival of adults depending on season, productivity) in the annual cycle of priority waterfowl species to guide monitoring and conservation actions. Determine what local factors (e.g., habitat features, food sources) affect nesting of priority waterfowl species.	American Black Duck, Blue-winged Teal, Wood Duck, Brant, Greater Scaup, Lesser Scaup
Study trends in Snow Goose dispersal patterns in response to changes in farming practices and species management actions. Improve predictive models for population trends in response to various management scenarios.	Snow Goose
Study population dynamics and annual survival rates of species that use pastures and fields in the early stages of plant succession in order to establish the significance of this type of habitat for the population dynamics of these species.	Upland Sandpiper, Wilson's Phalarope
Identify and characterize key nesting and roosting sites for priority shorebirds.	Semipalmated Sandpiper, Short-billed Dowitcher (*griseus*), Upland Sandpiper, Wilson's Phalarope.

Table 33 continued

Objective	Priority species affected
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).	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.
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.
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, etc.), freshwater (e.g. purple loosestrife, yellow flag iris, etc.) and marine habitats (e.g. *Spartina spp*., green crab, etc.). Identify impacts to priority bird species.	All priority species.

Threats Outside Canada

Many bird species found in Canada (78%) spend a large portion of their life cycle outside of the country (Fig. 30). 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 68 priority species in BCR 13-QC, 65 (96%) are migratory and spend part of their annual cycle—up to half the year or more—outside Canada.

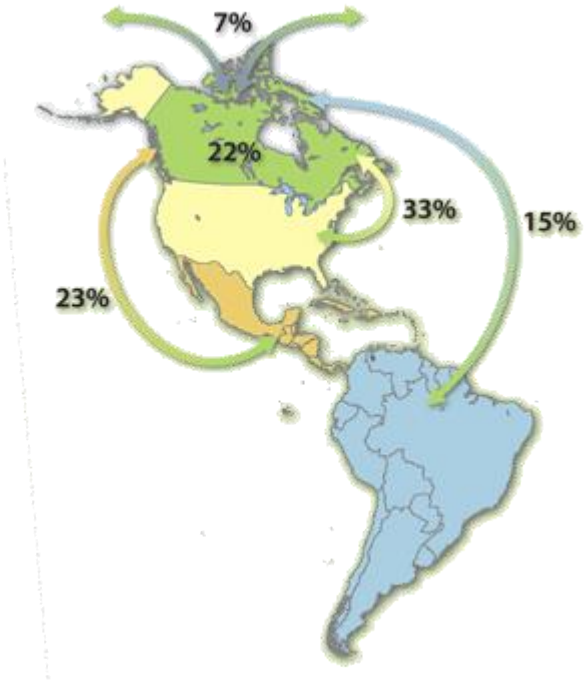

Figure 30. Percent of Canadian breeding birds that migrate to regions outside of Canada for part of their life cycle (North American Bird Conservation Initiative 2012).

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 31 shows that many priority bird species in BCR 13-QC are threatened by the loss or degradation of key migration and wintering habitats. The primary causes of habitat loss are the conversion of grasslands and wetlands into farmland (threat sub-category 2.1) and into residential developments (sub-category 1.1). The loss and degradation of roosts in wintering habitats is a greater threat to species with relatively small and concentrated wintering areas. The Semipalmated Sandpiper and Short-billed Dowitcher (*griseus*) in particular are especially vulnerable when large numbers of individuals are concentrated in a handful of roosting sites. The loss or degradation of these sites could have devastating effects on such species.

In addition to habitat loss, priority birds in BCR 13-QC suffer increased mortality caused by human activity during migration and wintering. Collisions with human-made structures such as buildings and communication towers are a significant threat during migration (sub-categories 1.1 and 1.2). Exposure to lethal or sub-lethal concentrations of agricultural pesticides (sub-category 9.3) can also cause mortality during migration or at wintering sites, either through direct exposure (poisoning) or indirectly (decrease in prey abundance). Mortality can also be caused by exposure to industrial contaminants such as pollution from oil or heavy metals (sub-category 9.2). Another major cause of mortality among priority species outside Canada is hunting (sub-category 5.1), caused notably by lead poisoning (ingestion of hunting pellets), legal or illegal hunting, and incidental mortality.

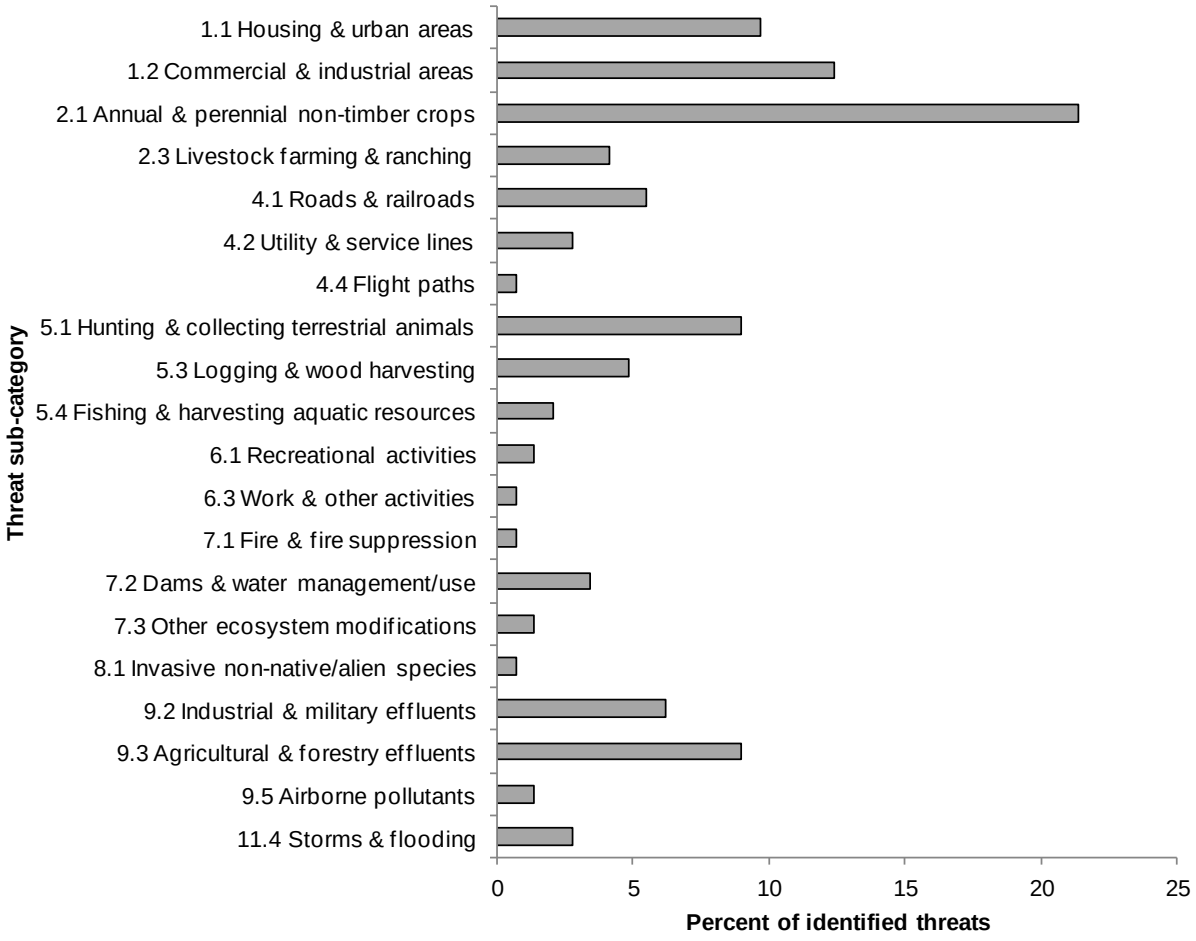

Figure 31. Percent of identified threats to priority species (by threat sub-category) in BCR 13-QC when they are outside Canada.

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 13-QC

Table A1. Complete list of species in BCR 13-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
Botaurus lentiginosus	American Bittern	Waterbird	X				X
Fulica americana	American Coot	Waterbird	X				
Chlidonias niger	Black Tern	Waterbird	X				X
Nycticorax nycticorax	Black-crowned Night-Heron	Waterbird	X				
Gavia immer	Common Loon	Waterbird	X				X
Gallinula chloropus	Common Moorhen	Waterbird	X				
Sterna hirundo	Common Tern	Waterbird	X				X
Phalacrocorax auritus	Double-crested Cormorant	Waterbird	X				
Larus marinus	Great Black-backed Gull	Waterbird	X				
Ardea herodias	Great Blue Heron	Waterbird	X				
Ardea alba	Great Egret	Waterbird	X				
Butorides virescens	Green Heron	Waterbird	X				
Larus argentatus	Herring Gull	Waterbird	X				
Ixobrychus exilis	Least Bittern	Waterbird	X				X
Podilymbus podiceps	Pied-billed Grebe	Waterbird	X				
Larus delawarensis	Ring-billed Gull	Waterbird	X				
Grus canadensis	Sandhill Crane	Waterbird	X				
Porzana carolina	Sora	Waterbird	X				X
Rallus limicola	Virginia Rail	Waterbird	X				X
Coturnicops noveboracensis	Yellow Rail	Waterbird	X				X
Pluvialis dominica	American Golden Plover	Shorebird		X			
Scolopax minor	American Woodcock	Shorebird	X	X			X
Calidris bairdii	Baird's Sandpiper	Shorebird		X			
Pluvialis squatarola	Black-bellied Plover	Shorebird		X			
Tryngites subruficollis	Buff-breasted Sandpiper	Shorebird		X			
Calidris alpina	Dunlin	Shorebird		X			
Tringa melanoleuca	Greater Yellowlegs	Shorebird		X			
Limosa haemastica	Hudsonian Godwit	Shorebird		X			
Charadrius vociferus	Killdeer	Shorebird	X	X			X

Table A1 continued

Scientific Name	Common Name	Bird Group	Breeding	Migrant	Wintering	Seasonal	Priority
Calidris minutilla	Least Sandpiper	Shorebird		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			
Calidris maritima	Purple Sandpiper	Shorebird		X			
Calidris canutus rufa	Red Knot (*rufa*)	Shorebird		X			
Phalaropus fulicarius	Red Phalarope	Shorebird		X			
Phalaropus lobatus	Red-necked Phalarope	Shorebird		X			
Arenaria interpres	Ruddy Turnstone	Shorebird		X			
Calidris alba	Sanderling	Shorebird		X			
Charadrius semipalmatus	Semipalmated Plover	Shorebird		X			
Calidris pusilla	Semipalmated Sandpiper	Shorebird		X			X
Limnodromus griseus griseus	Short-billed Dowitcher (*griseus*)	Shorebird		X			X
Tringa solitaria	Solitary Sandpiper	Shorebird		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			
Calidris fuscicollis	White-rumped Sandpiper	Shorebird		X			
Tringa semipalmata	Willet	Shorebird		X			
Phalaropus tricolor	Wilson's Phalarope	Shorebird	X	X			X
Gallinago delicata	Wilson's Snipe	Shorebird	X	X	X		X
Empidonax alnorum	Alder Flycatcher	Landbird	X				
Corvus brachyrhynchos	American Crow	Landbird	X				
Spinus tristis	American Goldfinch	Landbird	X				
Falco sparverius	American Kestrel	Landbird	X				X
Setophaga ruticilla	American Redstart	Landbird	X				
Turdus migratorius	American Robin	Landbird	X				
Haliaeetus leucocephalus	Bald Eagle	Landbird	X				X
Icterus galbula	Baltimore Oriole	Landbird	X				X
Riparia riparia	Bank Swallow	Landbird	X				X

Table A1 continued

Scientific Name	Common Name	Bird Group	Breeding	Migrant	Wintering	Seasonal	Priority
Tyto alba	Barn Owl	Landbird	X				
Hirundo rustica	Barn Swallow	Landbird	X				X
Strix varia	Barred Owl	Landbird	X				X
Setophaga castanea	Bay-breasted Warbler	Landbird	X				
Megaceryle alcyon	Belted Kingfisher	Landbird	X				X
Mniotilta varia	Black-and-white Warbler	Landbird	X				
Picoides arcticus	Black-backed Woodpecker	Landbird	X				
Coccyzus erythropthalmus	Black-billed Cuckoo	Landbird	X				X
Setophaga fusca	Blackburnian Warbler	Landbird	X				
Poecile atricapillus	Black-capped Chickadee	Landbird	X				
Setophaga caerulescens	Black-throated Blue Warbler	Landbird	X				
Setophaga virens	Black-throated Green Warbler	Landbird	X				
Cyanocitta cristata	Blue Jay	Landbird	X				
Polioptila caerulea	Blue-grey Gnatcatcher	Landbird	X				
Vireo solitarius	Blue-headed Vireo	Landbird	X				
Vermivora cyanoptera	Blue-winged Warbler	Landbird	X				
Dolichonyx oryzivorus	Bobolink	Landbird	X				X
Poecile hudsonicus	Boreal Chickadee	Landbird	X				
Buteo platypterus	Broad-winged Hawk	Landbird	X				
Certhia americana	Brown Creeper	Landbird	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				
Thryothorus ludovicianus	Carolina Wren	Landbird	X				
Bombycilla cedrorum	Cedar Waxwing	Landbird	X				
Setophaga cerulea	Cerulean Warbler	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				
Quiscalus quiscula	Common Grackle	Landbird	X				
Chordeiles minor	Common Nighthawk	Landbird	X				X
Corvus corax	Common Raven	Landbird	X				

Table A1 continued

Scientific Name	Common Name	Bird Group	Breeding	Migrant	Wintering	Seasonal	Priority
Geothlypis trichas	Common Yellowthroat	Landbird	X				
Accipiter cooperii	Cooper's Hawk	Landbird	X				
Junco hyemalis	Dark-eyed Junco	Landbird	X				
Picoides pubescens	Downy Woodpecker	Landbird	X				
Sialia sialis	Eastern Bluebird	Landbird	X				
Tyrannus tyrannus	Eastern Kingbird	Landbird	X				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
Sturnus vulgaris	European Starling	Landbird	X				
Coccothraustes vespertinus	Evening Grosbeak	Landbird	X				
Spizella pusilla	Field Sparrow	Landbird	X				X
Regulus satrapa	Golden-crowned Kinglet	Landbird	X				
Vermivora chrysoptera	Golden-winged Warbler	Landbird	X				X
Ammodramus savannarum	Grasshopper Sparrow	Landbird	X				X
Dumetella carolinensis	Gray Catbird	Landbird	X				
Perisoreus canadensis	Gray Jay	Landbird	X				
Perdix perdix	Gray Partridge	Landbird	X				
Myiarchus crinitus	Great Crested Flycatcher	Landbird	X				
Bubo virginianus	Great Horned Owl	Landbird	X				
Picoides villosus	Hairy Woodpecker	Landbird	X				
Ammodramus henslowii	Henslow's Sparrow	Landbird	X				
Catharus guttatus	Hermit Thrush	Landbird	X				
Eremophila alpestris	Horned Lark	Landbird	X				X
Haemorhous mexicanus	House Finch	Landbird	X				
Passer domesticus	House Sparrow	Landbird	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				
Lanius ludovicianus	Loggerhead Shrike	Landbird					X
Asio otus	Long-eared Owl	Landbird	X				X

Table A1 continued

Scientific Name	Common Name	Bird Group	Breeding	Migrant	Wintering	Seasonal	Priority
Setophaga magnolia	Magnolia Warbler	Landbird	X				
Cistothorus palustris	Marsh Wren	Landbird	X				
Falco columbarius	Merlin	Landbird	X				
Zenaida macroura	Mourning Dove	Landbird	X				
Geothlypis philadelphia	Mourning Warbler	Landbird	X				
Oreothlypis ruficapilla	Nashville Warbler	Landbird	X				
Ammodramus nelsoni	Nelson's Sharp-tailed Sparrow	Landbird	X				X
Cardinalis cardinalis	Northern Cardinal	Landbird	X				
Colaptes auratus	Northern Flicker	Landbird	X				X
Accipiter gentilis	Northern Goshawk	Landbird	X				
Circus cyaneus	Northern Harrier	Landbird	X				X
Mimus polyglottos	Northern Mockingbird	Landbird	X				
Setophaga americana	Northern Parula	Landbird	X				
Stelgidopteryx serripennis	Northern Rough-winged Swallow	Landbird	X				X
Aegolius acadicus	Northern Saw-whet Owl	Landbird	X				X
Parkesia noveboracensis	Northern Waterthrush	Landbird	X				
Contopus cooperi	Olive-sided Flycatcher	Landbird	X				X
Icterus spurius	Orchard Oriole	Landbird	X				
Pandion haliaetus	Osprey	Landbird	X				
Seiurus aurocapilla	Ovenbird	Landbird	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				
Spinus pinus	Pine Siskin	Landbird	X				
Setophaga pinus	Pine Warbler	Landbird	X				
Haemorhous purpureus	Purple Finch	Landbird	X				
Progne subis	Purple Martin	Landbird	X				X
Loxia curvirostra	Red Crossbill	Landbird	X				
Sitta canadensis	Red-breasted Nuthatch	Landbird	X				
Vireo olivaceus	Red-eyed Vireo	Landbird	X				
Melanerpes erythrocephalus	Red-headed Woodpecker	Landbird	X				X
Buteo lineatus	Red-shouldered Hawk	Landbird	X				

Table A1 continued

Scientific Name	Common Name	Bird Group	Breeding	Migrant	Wintering	Seasonal	Priority
Buteo jamaicensis	Red-tailed Hawk	Landbird	X				
Agelaius phoeniceus	Red-winged Blackbird	Landbird	X				
Columba livia	Rock Pigeon	Landbird	X				
Pheucticus ludovicianus	Rose-breasted Grosbeak	Landbird	X				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				
Passerculus sandwichensis	Savannah Sparrow	Landbird	X				X
Piranga olivacea	Scarlet Tanager	Landbird	X				
Cistothorus platensis	Sedge Wren	Landbird	X				X
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				
Troglodytes hiemalis	Troglodyte des forêts	Landbird	X				
Baeolophus bicolor	Tufted Titmouse	Landbird	X				
Cathartes aura	Turkey Vulture	Landbird	X				
Catharus fuscescens	Veery	Landbird	X				
Pooecetes gramineus	Vesper Sparrow	Landbird	X				X
Vireo gilvus	Warbling Vireo	Landbird	X				
Sturnella neglecta	Western Meadowlark	Landbird	X				
Sitta carolinensis	White-breasted Nuthatch	Landbird	X				
Zonotrichia albicollis	White-throated Sparrow	Landbird	X				
Loxia leucoptera	White-winged Crossbill	Landbird	X				
Meleagris gallopavo	Wild Turkey	Landbird	X		X		
Empidonax traillii	Willow Flycatcher	Landbird	X				
Cardellina pusilla	Wilson's Warbler	Landbird	X				
Hylocichla mustelina	Wood Thrush	Landbird	X				X
Setophaga petechia	Yellow Warbler	Landbird	X				

Table A1 continued

Scientific Name	Common Name	Bird Group	Breeding	Migrant	Wintering	Seasonal	Priority
Empidonax flaviventris	Yellow-bellied Flycatcher	Landbird	X				
Sphyrapicus varius	Yellow-bellied Sapsucker	Landbird	X				
Coccyzus americanus	Yellow-billed Cuckoo	Landbird	X				
Setophaga coronata	Yellow-rumped Warbler	Landbird	X				
Vireo flavifrons	Yellow-throated Vireo	Landbird	X				X
Anas rubripes	American Black Duck	Waterfowl	X	X	X		X
Anas americana	American Wigeon	Waterfowl	X	X			
Anas discors	Blue-winged Teal	Waterfowl	X	X			X
Branta bernicla	Brant	Waterfowl		X			X
Bucephala albeola	Bufflehead	Waterfowl		X			
Branta hutchinsii	Cackling Goose	Waterfowl		X			
Branta canadensis	Canada Goose (Atlantic population)	Waterfowl		X			X
Branta canadensis	Canada Goose (resident population)	Waterfowl	X	X	X		X
Aythya valisineria	Canvasback	Waterfowl		X			
Somateria mollissima (dresseri)	Common Eider (*dresseri*)	Waterfowl	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			
Lophodytes cucullatus	Hooded Merganser	Waterfowl	X	X	X		
Aythya affinis	Lesser Scaup	Waterfowl	X	X			X
Clangula hyemalis	Long-tailed Duck	Waterfowl		X			
Melanitta americana	Black Scoter	Waterfowl		X			
Anas platyrhynchos	Mallard	Waterfowl	X	X	X		
Anas acuta	Northern Pintail	Waterfowl	X	X	X		
Anas clypeata	Northern Shoveler	Waterfowl	X	X			
Mergus serrator	Red-breasted Merganser	Waterfowl	X	X			
Aythya americana	Redhead	Waterfowl	X	X			
Aythya collaris	Ring-necked Duck	Waterfowl	X	X			
Chen rossii	Ross's Goose	Waterfowl		X			

Table A1 continued

Scientific Name	Common Name	Bird Group	Breeding	Migrant	Wintering	Seasonal	Priority
Oxyura jamaicensis	Ruddy Duck	Waterfowl	X	X			
Chen caerulescens	Snow Goose	Waterfowl	X	X			X
Melanitta perspicillata	Surf Scoter	Waterfowl		X			
Cygnus columbianus	Tundra Swan	Waterfowl		X			
Melanitta fusca	White-winged Scoter	Waterfowl		X			
Aix sponsa	Wood Duck	Waterfowl	X	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 UN-FAO (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), 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

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 13-QC Priority List

Table A3. List of species added or removed from the BCR 13-QC priority list and their assessment characteristics.

		Standardized Assessment			
		Legal Status[3]			
Species[1]	Presence[2]	Fed.	Prov.	Bird group score[4]	Reason for which regional experts have added or removed a species (after undergoing a standardized assessment)
ADDED					
-LANDBIRDS-					
Horned Lark	Br	-	-	-	Severe decline of species in Quebec
Vesper Sparrow	Br	-	-	-	Bird group score increased by regional experts
Barred Owl	Br	-	-	-	Precautionary principle (significant habitat loss in BCR 13-QC)
Brown Creeper	Br	-	-	-	Precautionary principle (significant habitat loss in BCR 13-QC)
Long-eared Owl	Br	-	-	-	Precautionary principle (significant habitat loss in BCR 13-QC)

[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 supplement 51.

[2] Wi = wintering, Mi = migratory, Mo = moulting, Br = breeding, Obr = occasional breeding (every year), Sbr = seldom breeding (not every year), Ebr = exceptional breeding (only a few times in the BCR).

[3] Federal: Schedule 1 of the *Species at Risk Act* (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* T = Threatened, V = Vulnerable, L = Likely to be designated threatened or vulnerable.

[4] **Landbirds**: CC = continental concern, RC = regional concern (all BCR 12), CS = continental stewardship, RS = regional stewardship (all BCR 12). Information taken from the database downloaded from (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 imperilled" 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 non-breeding 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.	Prov.	Bird group score[4]	Reason for which regional experts have added or removed a species (after undergoing a standardized assessment)
Northern Rough-winged Swallow	Br	-	-	-	Bird group score increased by regional experts
Bank Swallow	Br	-	-	-	Severe decline of species in Quebec
Purple Martin	Br	-	-	-	Severe decline of species in Quebec
Eastern Screech-Owl	Br	-	-	-	Precautionary principle (significant habitat loss in BCR 13-QC)
Northern Saw-whet Owl	Br	-	-	-	Precautionary principle (significant habitat loss in BCR 13-QC)
-SHOREBIRDS-					
Wilson's Snipe	Br/Mi/Wi	-	-	3e	Precautionary principle (significant habitat loss in BCR 13-QC)
Upland Sandpiper	Br/Mi	-	-	2b	Precautionary principle (species affected by modern farming practices)
-WATERFOWL-					
Brant	Mi	-	-	Moderately low	Small population, high harvest rate, restricted to a specific habitat
Wood Duck	Br/Mi	-	-	Moderately low	Precautionary principle (significant habitat loss in BCR 13-QC)
Blue-winged Teal	Br/Mi	-	-	Moderately low	Precautionary principle (species affected by modern farming practices)
REMOVED					
-LANDBIRDS-					
Henslow's Sparrow	Ebr	T	-	CC/RC	Exceptional breeder in BCR 13-QC
Barn Owl	Ebr	E	L	-	Exceptional breeder in BCR 13-QC
Blue-winged Warbler	Sbr	-	-	CC	Number of breeding pairs in BCR 13-QC is too low
Bay-breasted Warbler	Br	-	-	CC	Number of breeding pairs in BCR 13-QC is too low
Rusty Blackbird	Sbr	SC	-	CC	Number of breeding pairs in BCR 13-QC is too low
-SHOREBIRDS-					
Hudsonian Godwit	Mi	-	-	4b	No known staging areas in BCR 13-QC
Marbled Godwit	Mi	-	-	4a, b	No known staging areas in BCR 13-QC

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 undergoing a standardized assessment)
Red Knot (*rufa*)	Mi	E	L	4a	Number of individuals in BCR 13-QC is too low
Buff-breasted Sandpiper	Mi	-	-	4a, b	Number of individuals in BCR 13-QC is too low
Sanderling	Mi	-	-	4a	No known staging areas in BCR 13-QC
Semipalmated Sandpiper	Mi	-	-	3a	No known staging areas in BCR 13-QC
Dunlin	Mi	-	-	3a	No known staging areas in BCR 13-QC
Short-billed Dowitcher (*griseus*)	Mi	-	-	3a	No known staging areas in BCR 13-QC
Whimbrel	Mi	-	-	4a	No known staging areas in BCR 13-QC
Red-necked Phalarope	Mi	-	-	3a	No known staging areas in BCR 13-QC
Red Phalarope	Mi	-	-	3a	No known staging areas in BCR 13-QC
Black-bellied Plover	Mi	-	-	3a	No known staging areas in BCR 13-QC
American Golden Plover	Mi	-	-	4a, b	No known staging areas in BCR 13-QC
Piping Plover (*melodus*)	Mi			5a	Number of individuals in BCR 13-QC is too low
Ruddy Turnstone	Mi	-	-	4a, b	No known staging areas in BCR 13-QC
-WATERBIRDS-					
Herring Gull	Br	-	-	Tier 2	Bird group score lowered by regional experts
-WATERFOWL-					
Mallard	Br/Wi/Mi	-	-	High	Bird group score lowered by regional experts
Canvasback	Mi	-	-	Moderately high	Number of individuals in BCR 13-QC is too low
Common Goldeneye	Br/Wi/Mi	-	-	High	Bird group score lowered by regional experts
Long-tailed Duck	Mi	-	-	High	Number of individuals in BCR 13-QC is too low
American Scoter	Mi	-	-	Moderately high	Number of individuals in BCR 13-QC is too low
Surf Scoter	Mi	-	-	High	Number of individuals in BCR 13-QC is too low
White-winged Scoter	Mi	-	-	Moderately high	Number of individuals in BCR 13-QC is too low

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Additional information can be obtained at:
Environment Canada
Inquiry Centre
10 Wellington Street, 23rd Floor
Gatineau QC K1A 0H3
Telephone: 1-800-668-6767 (in Canada only) or 819-997-2800
Fax: 819-994-1412
TTY: 819-994-0736
Email: enviroinfo@ec.gc.ca