Environment Canada Environnement Canada

Bird Conservation Strategy for Bird Conservation Region 3 in Quebec
Region: Arctic Plains and Mountains

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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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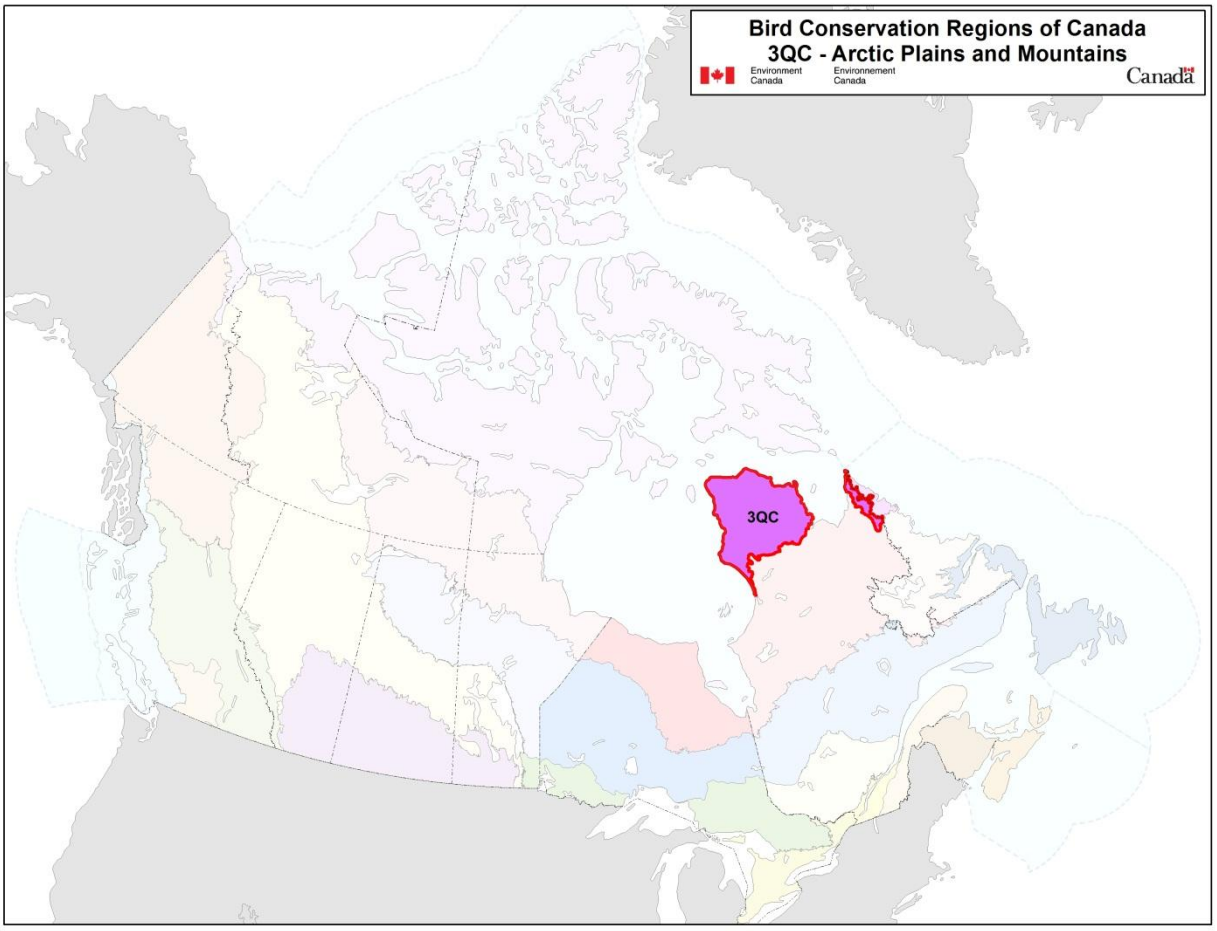
Bird Conservation Strategy for Bird Conservation Region 3 in Quebec Region: Arctic Plains and Mountains



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Executive Summary

The Quebec portion of the Arctic Plains and Mountains Bird Conservation Region (BCR 3-QC) extends across the Ungava Peninsula and the mountainous region on the border of Labrador, covering an area of 206 924 km^2. The climate is extremely harsh and dry with continuous permafrost. BCR 3-QC is mainly covered by arctic tundra, which includes herbaceous plants, mosses, lichens and dwarf shrubs. The region is also characterized by frequent rocky outcrops and a high density of small and medium-sized lakes. BCR 3-QC is the least populated of Quebec's BCRs, and its population is predominantly Aboriginal persons. The main human activities are subsistence hunting, trapping and mining. The avifauna of this BCR includes a limited number of species, but some of them do not nest anywhere else in Quebec.

After evaluating 65 bird species found in BCR 3-QC, 25 species were identified as priorities in this BCR. The priority list includes species from the 4 bird groups: landbirds (40%), waterfowl (28%), shorebirds (20%), waterbirds (12%). These priority species include 4 species considered at risk either provincially or federally. Priority species use 7 habitat types in BCR 3-QC. The habitats that attract the most species are shrubs and early successional habitats (36% of priority species), bare areas (32%), riparian areas (28%), wetlands (28%) and coastal areas (24%).

Each priority species was assigned a population objective based on its population trend. Assessing/maintaining populations at current levels was the objective most often assigned to priority species in BCR 3-QC (48% of priority species), while maintaining the population was the objective assigned to 16% of species. Better population trend data are required for all species that have been assigned one of these two objectives. A recovery objective was assigned to 16% of species (all are species at risk), and population increase objectives were also assigned to 20% of priority species. Overall, 36% of priority species identified in BCR 3-QC were assigned a population increase objective.

A threat assessment identified the main conservation issues facing priority species in the various habitats they use within this BCR. Climate change and mining are the main threats reported in BCR 3-QC. The habitats most severely affected, or potentially affected, by these threats are wetlands, coastal areas and riparian areas. The lack of biological or demographic data on the priority species and the presence of species at risk without a finalized recovery strategy or management plan were also considered to be significant conservation issues since they affect all priority species in this BCR.

Conservation objectives have been established to counter threats and fill gaps in our understanding of priority species. The majority of conservation objectives for BCR 3-QC aim to improve bird population monitoring in order to gather the ecological and demographic information that is lacking about all priority species in this BCR.

In order to achieve the established conservation objectives, conservation actions have been recommended for priority species in BCR 3-QC. More than half of the recommended actions

relate to population monitoring and include activities such as developing and implementing a long-term program to monitor breeding birds in the Arctic, updating the Waterfowl Survey of Northern Quebec (WNOR) and implementing the Program for Regional and International Shorebird Monitoring (PRISM).

Migratory birds found in BCR 3-QC also face threats that are difficult to analyze with the standardized methodology used in this strategy. These threats include generalized problems that may sometimes not apply to a particular habitat (e.g. collisions with human-made structures, air pollution and climate change), research and population monitoring needs, as well as threats to migratory birds when they are outside Canada. An overview of these issues, the species affected and the recommended conservation actions is also presented.

Introduction: Bird Conservation Strategies

Context

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

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

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

[1] NAWMP Plan Committee 2004.
[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 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 3

The Arctic Plains and Mountains Bird Conservation Region (BCR 3) stretches across northeastern Alaska, the northern edge of the Yukon, the northern part of the Northwest Territories, almost all of Nunavut, the northern tip of Quebec and the portion of Newfoundland and Labrador that is east of Ungava Bay. The Quebec portion of BCR 3 (BCR 3-QC) covers the Ungava Peninsula and the mountainous region bordering Labrador (Fig. 1), totalling an area of 206 924 km^2.

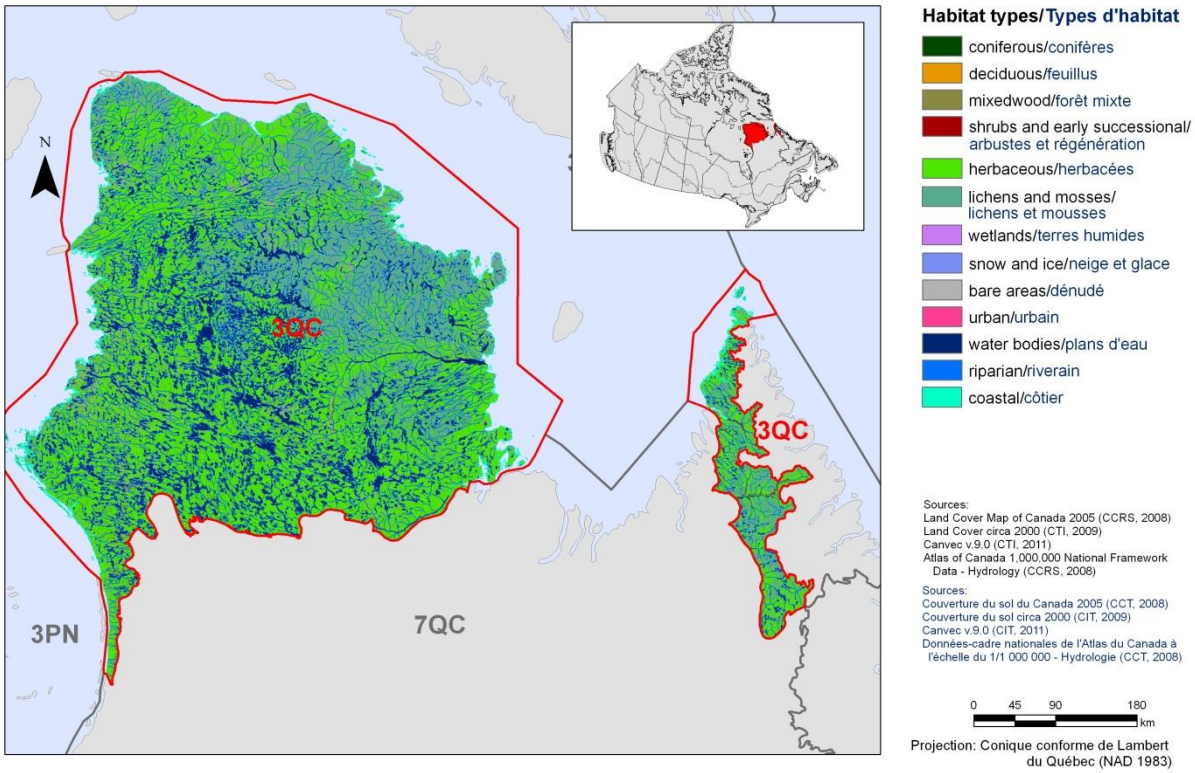

Figure 1. Landcover in BCR 3-QC: Arctic Plains and Mountains.

Physical environment

Topography

In the portion of BCR 3-QC to the west of Ungava Bay (the Arctic Plain), the terrain is hilly and the altitude gradually increases from west to east, varying for the most part between 0 and 300 m (Li and Ducruc, 1999). This area includes the Puvirnituq mountains, which reach an altitude of 693 m. The eastern portion of the BCR (the Arctic Cordillera) has a more rugged terrain and includes the Torngat Mountains on the border of Labrador. This mountain range includes Mont D'Iberville (the highest peak in Quebec with an altitude of 1652 m), Mont Jacques-Rousseau (1261 m) and Korok Mountain (1204 m; Institut de la Statistique du Québec, 2010). Frequent rocky outcrops and continuous permafrost characterize all of BCR 3-QC.

Hydrography and Hydrology

The water system of the western portion of BCR 3-QC includes several major rivers such as the Leaf, Arnaud, Puvirnituq, Kogaluc and Kovik Rivers. There are also countless small and medium-sized lakes and several large lakes including Payne Lake (513 km^2), Lake Nantais (266 km^2), Lac Faribault (248 km^2) and Lac Tasiat (206 km^2; Government of Quebec, 2002). The water system of the eastern part of the BCR is not extensive, and the lakes there are few and small (Li and Ducruc, 1999).

Climate

The climate of BCR 3-QC is extremely harsh and dry with an average annual temperature of -8.5 to -6°C. The average summer temperature varies between 3 and 4°C, while the average winter temperature varies between -20 and -16.5°C. In the northern part of the BCR, coastal ice remains long into the summer and the coldest winter temperatures can reach -50°C. The average annual precipitation is 200 to 300 mm in the northern part of the BCR, 400 to 500 mm further south and 400 to 700 mm in the eastern part of the region (Ecological Stratification Working Group, 1996). BCR 3-QC runs a high risk of being affected by climate change in the decades to come. It is expected that by 2050, northern Quebec will see an increase in average annual temperature of 2 to 4.5°C and an increase in precipitation of up to 32% (adapted from Bourque and Simonet, 2008).

Land Use

BCR 3-QC is mostly covered by arctic tundra and is dominated by herbaceous plants as well as lichens and mosses, which cover 56% and 23% of the region's area respectively (Fig. 1). The countless waterbodies located in the BCR cover 14% of the area. Most of the land in the BCR is public land (Drolet et al. 2010), while the main human activities are subsistence hunting, trapping and mining (Ecological Stratification Working Group, 1996). BCR 3-QC is part of the area covered by the Government of Quebec's Northern Initiative, which aims to sustainably develop the economic potential of Northern Quebec. The economic sectors targeted by this initiative in BCR 3-QC include mining, energy and tourism (Gouvernement du Québec 2013). The Government of Quebec is committed to allocating 50% of the northern development area to protect the environment, preserve biodiversity, and evaluate natural heritage. The implementation of this initiative could possibly change the face of BCR 3-QC.

Biological environment

Vegetation

BCR 3-QC is covered by two vegetation sub-zones: forested tundra in the southern part of the BCR (representing < 1% of the area) and the Low Arctic in the rest of the region (Ministère des Ressources naturelles, 2013). The forested tundra, which coincides with the tree line, separates the boreal zone from the Arctic zone. The landscape here is dominated by shrubby heathland dotted with groves of stunted black spruce.

Plant growth in the Low Arctic is restricted by harsh weather conditions and continuous permafrost. Two types of vegetation represent this sub-zone in BCR 3-QC: shrub tundra in most of the BCR and herbaceous tundra at the northernmost part of the region. The shrub tundra is

characterized by vegetation cover that generally does not exceed two metres in height, consisting of shrubs (e.g. swamp birch and various species of willow), herbaceous plants (mostly grasses), and mosses and lichens. In the herbaceous tundra, rock and mineral soil are often bare and shrubs are scarce, with vegetation dominated by sedges and grasses among the mosses and lichens.

Wildlife

Severe weather conditions in BCR 3-QC limit the number of animal species that breed and feed there. Mammals found in this area include Woodland Caribou (tundra ecotype), Arctic Hare, Ungava Collared Lemming, Arctic Fox and Gray Wolf. The Wolverine, listed as Threatened in Quebec and Endangered in Canada, and the Polar Bear, listed as Vulnerable in Quebec and Special Concern in Canada, are other mammals characteristic of BCR 3-QC (Ministère du Développement durable, de l'Environnement, de la Faune et des Parcs, 2013; Species at Risk Public Registry, 2012). Fish species found in this area include the Arctic Char, the Lake Whitefish, the Lake Trout and the Atlantic Salmon (Li and Ducruc, 1999). BCR 3-QC is not home to any amphibians or reptiles.

The avifauna of BCR 3-QC numbers only 65 species, but some of them do not nest anywhere else in Quebec or only in low abundance just south of the BCR. These include the Snowy Owl, the Northern Wheatear, the Snow Bunting, the Lapland Longspur, the King Eider, the Common Eider, the Tundra Swan and the American Golden Plover (Aubry and Cotter, 2007; Drolet et al. 2010; Lepage et al. in preparation). Other species characteristic of BCR 3-QC include the Snow Goose, the Long-tailed Duck, the Gyrfalcon, the Rough-legged Hawk, the Semipalmated Plover, the Dunlin and the Thick-billed Murre.

Human environment

BCR 3-QC is the least populated of Quebec's BCRs. It has about 7500 inhabitants (adapted from Statistics Canada, 2012), who are predominantly Aboriginal (Inuit) and spread across nine communities. The largest communities are Puvirnituq (1700 inhabitants), Inukjuak (1600) and Salluit (1350).

Protected and designated areas

Approximately 12% of the land in BCR 3-QC has protected area status (Fig. 2). It contains two of Quebec's national parks (operated by the Ministère du Développement durable, de l'Environnement, de la Faune et des Parcs), the Parc national des Pingualuit and the Parc national Kuururjuaq, which together cover a total area of 5594 km^2. BCR 3-QC also includes all of Quebec's Monts-de-Puvirnituq and Cap-Wolstenholme national park reserves and 51% of the Baie-aux-Feuilles national park reserve. These reserves together cover an area of 6408 km^2. Other protected areas included in this BCR are five proposed biodiversity reserves (operated by the Ministère du Développement durable, de l'Environnement, de la Faune et des Parcs), which together cover an area of 7406 km^2.

Finally, BCR 3-QC also includes designated areas that do not have legal protection status. There are eight Important Bird Areas (IBA) that together cover an area of 4345 km^2, some of which partly include the proposed biodiversity reserves.

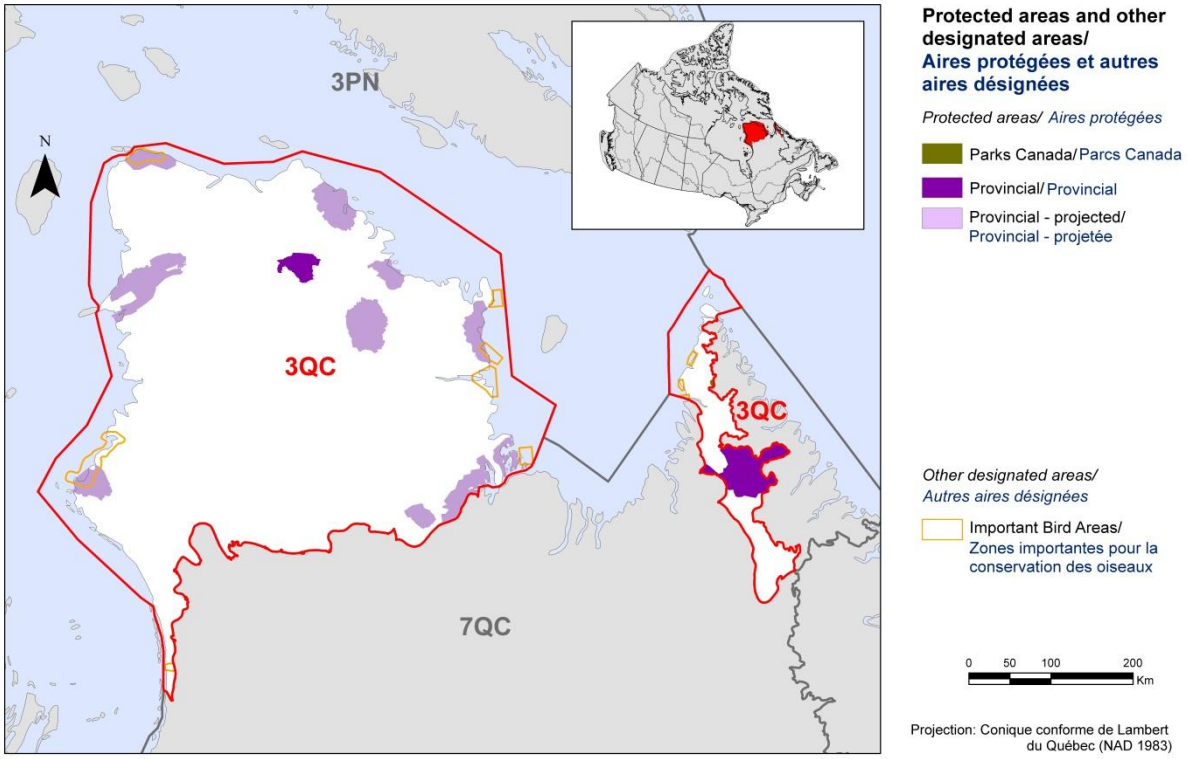

Figure 2. Map of protected areas in BCR 3-QC: Arctic Plains and Mountains.

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

The standard method for selecting priority species was used to identify 29 priority species, sub-species or populations (hereinafter referred to as “species”) on a preliminary basis, among the 65 species found in BCR 3-QC (Appendix 1). Regional experts reviewed the preliminary list and excluded 7 pre-selected species while adding 3 others, so that 25 priority species were included on the final list (Table 1). The reasons for these decisions are presented in Appendix 3.

The 25 priority species identified are not distributed equally among the 4 bird groups. Landbirds are the most highly represented group with 10 species or 40% of all priority species in BCR 3-QC (Table 2). This is a representative picture of the importance of landbirds in the region, as they account for 34% of all bird species (Appendix 1). Fifty percent of shorebirds (5 species), 21% of waterbirds (3 species) and 37% of waterfowl (7 species) found in BCR 3-QC were designated as priority species.

Nearly half of the priority species (48%) were identified for conservation reasons (Table 1, shaded cells). They include 4 species at risk, either provincially under Quebec’s *Loi sur les espèces menacées ou vulnérables* [Act respecting threatened or vulnerable species] or nationally under the *Species at Risk Act* (SARA). Three are species at risk at the provincial and national levels (the Red Knot (*rufa*), the Peregrine Falcon (*anatum/tundrius*) and the Short-eared Owl), while a fourth is considered endangered only at the provincial level (the Golden Eagle). Apart from the conservation concern species, 13 have been identified as priority species for stewardship reasons (Table 1; unshaded cells).

Table 1. Priority species in BCR 3–QC, population objective and the reason for priority status.

Priority species[1]	Bird group	Population objective	COSEWIC[2]	SARA[3]	Provincial listing[4]	National/continental concern[5] (landbirds	Regional concern[5] (landbirds)	Continental stewardship[5] (landbirds)	Regional stewardship[5] (landbirds)	Conservation category and rule[6] (shorebirds)	National priority level[7] (waterbirds)	NAWMP rank[8] (waterfowl)	Expert review[9] (changes to priority list)
Golden Eagle	Landbird	Recovery objective			V				Yes				
Gyrfalcon	Landbird	Assess/Maintain						Yes	Yes				
Hoary Redpoll	Landbird	Assess/Maintain				Yes		Yes					
Lapland Longspur	Landbird	Assess/Maintain				Yes		Yes					
Peregrine Falcon (*anatum/tundrius*)[10]	Landbird	Recovery objective	SC	SC	V[11]	Yes			Yes				
Rock Ptarmigan	Landbird	Assess/Maintain						Yes					
Rough-legged Hawk	Landbird	Assess/Maintain						Yes	Yes				
Short-eared Owl[10]	Landbird	Recovery objective	SC	SC	L	Yes							

[1] Conservation species are in shaded cells. Stewardship species are in unshaded 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): E = Endangered; T = Threatened; SC = Special Concern (Species at Risk Public Registry, 2012).
[4] Status under the *Loi sur les espèces menacées ou vulnérables* (Quebec)*:* T = Threatened, V = Vulnerable, L = Likely to be designated threatened or vulnerable.
[5] Taken from the online database from www.partnersinflight.org. Consult Panjabi et al. (2002) for the analytical method.
[6] Conservation concern at the level of the U.S. and Canada as identified in the Canadian Shorebird Conservation Plan (Donaldson et al. 2000). Score 5 is "Highly imperilled" and a score of 1 is "Not at risk". Refer to Donaldson et al. (2000) for the complete description of each category of conservation concern.
[7] Priority tiers at the country level as identified in "Wings Over Water", Canada's waterbird conservation plan (Milko et al. 2003). Tier 1 is highest priority.
[8] NAWMP: North American Waterfowl Management Plan (North American Waterfowl Management Plan, Plan Committee, 2004).
[9] Expert review indicates species that were added to the priority list as a result of expert opinion; justifications for addition are presented in Appendix 3 of the full strategy. The species that were removed, along with their conservation features and the justification for removal, are also presented in the same Appendix.
[10] The species is listed under SARA, but its recovery documents have not yet been finalized.
[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] (changes to priority list)
Snow Bunting	Landbird	Assess/Maintain				Yes		Yes					
Snowy Owl	Landbird	Assess/Maintain						Yes	Yes				
American Golden Plover	Shorebird	Assess/Maintain								4a,b			
Dunlin	Shorebird	Assess/Maintain								3a			
Red Knot (*rufa*)[10]	Shorebird	Recovery objective	E	E	L					4a			
Red-necked Phalarope	Shorebird	Increase 50%								3a			
Semipalmated Sandpiper	Shorebird	Increase 100%								3a			
Arctic Tern	Waterbird	Assess/Maintain									Tier 2		
Common Loon	Waterbird	Assess/Maintain									Tier 1		
Thick-billed Murre	Waterbird	Assess/Maintain									Tier 2		
American Scoter	Waterfowl	Maintain										Mod. Low	Yes
Canada Goose (Atlantic population)	Waterfowl	Increase										Very high	
Common Eider (*borealis*)	Waterfowl	Maintain										Very high	
Common Eider (*sedentaria*)	Waterfowl	Maintain										Very high	
Greater Scaup	Waterfowl	Increase										N/A	Yes
Long-tailed Duck	Waterfowl	Increase										High	
Red-breasted Merganser	Waterfowl	Maintain										N/A	Yes

Table 2. Summary of priority species, by bird group, in BCR 3-QC.

Bird Group	Total Species	Total Priority Species	Percent Listed as Priority	Percent of Priority List
Landbird	22	10	45 %	40 %
Shorebird	10	5	50 %	20 %
Waterbird	14	3	21 %	12 %
Waterfowl	19	7	37 %	28 %
Total	**65**	**25**	**38 %**	**100 %**

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

Reason for Priority Listing[1]	Landbirds	Shorebirds	Waterbirds	Waterfowl
COSEWIC[2]	2	1	0	0
Federal SARA listed[3]	2	1	0	0
Provincially listed[4]	3	1	0	0
National/Continental Concern[5]	5	-	-	-
Regional Concern[5]	0	-	-	-
National/Continental Stewardship[5]	7	-	-	-
Regional Stewardship[5]	5	-	-	-
Conservation category[6]	-	5	-	-
Priority level[7]	-	-	3	-
NAWMP[8]	-	-	-	4
Expert review[9]	0	0	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 as Threatened, Vulnerable or Likely to be designated as threatened or vulnerable under the *Loi sur les espèces menacées ou vulnérables* (Quebec).
[5] See Table 1.
[6] Conservation category indicates a species ranked in Canada's Shorebird Conservation Plan (Donaldson et al., 2000) as having a 5, 4a, 4b or 3a conservation category in the United States of America and Canada.
[7] Priority level indicate a species ranked in Canada's Waterbird Conservation Plan (Milko et al., 2003) as belonging to Tier 1 or Tier 2.
[8] NAWMP indicates a species ranked in the North American Waterfowl Management Plan (Plan Committee, 2004) as having Moderately High, High or Highest breeding or non-breeding conservation and/or monitoring needs in the BCR.
[9] Species that did not meet the standard criteria but that were added by experts.

Element 2: Habitats Important to Priority Species

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

Priority species use seven habitat types in BCR 3-QC (Fig. 3). Although it only represents 0.2% of the BCR land area, the shrub and early successional habitat class is used by the largest number of priority species (nine species, all landbirds), representing 36% of all priority species. The bare areas habitat class is also marginal in terms of the area it covers in the BCR (less than 0.01%), but is still used by eight priority species (32%), all landbirds.

The riparian and wetlands habitat classes both rank as the third most-used habitat class by priority species (each used by seven species, or 28% of priority species). These two habitat types are mostly used by shorebirds and waterfowl.

The other habitat types used by priority species are coastal areas (used by 24% of priority species), waterbodies (16%) and herbaceous areas (4%). Coastal areas are used by all bird groups with the exception of landbirds, while waterbodies are used by waterbirds and one waterfowl species. The herbaceous habitat category is used by a single priority species, the American Golden Plover, despite being the largest habitat in this BCR, occupying 56% of the area.

See Section 2 for more details on priority species, threats and conservation actions for each habitat type in BCR 3-QC.

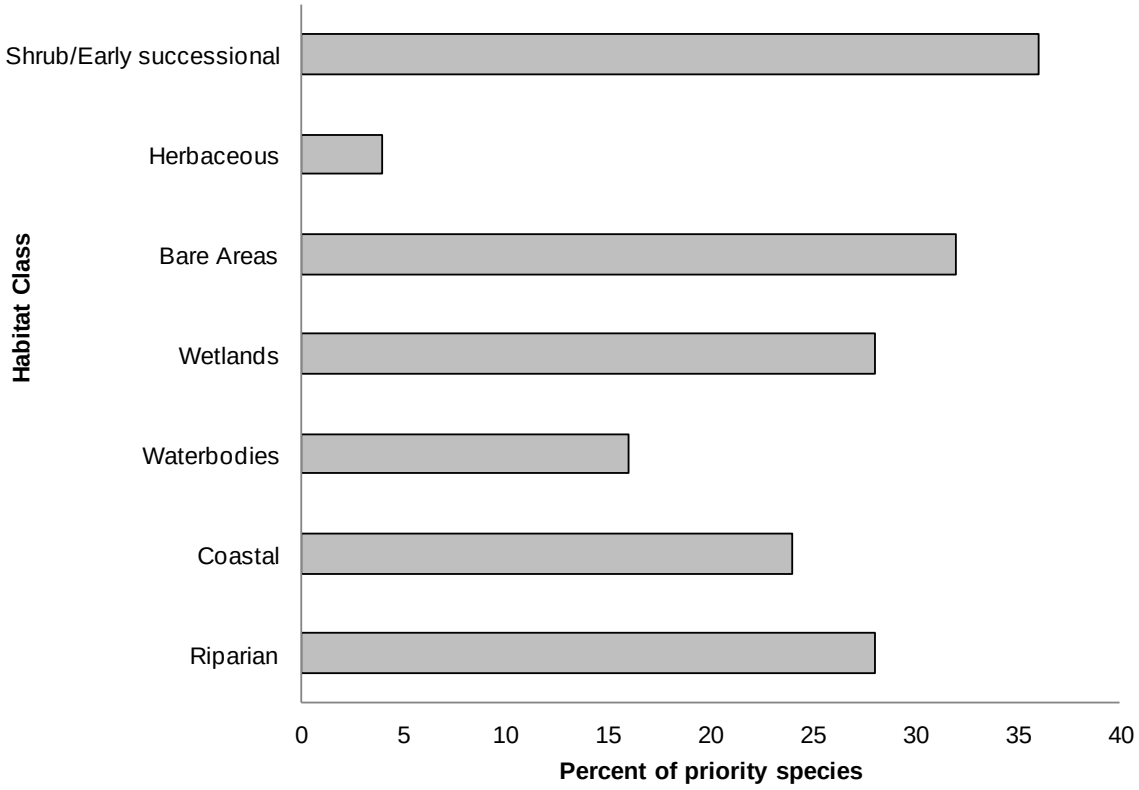

Figure 3. Percent of priority species that are associated with each habitat type in BCR 3-QC.
Note: The total exceeds 100% because each species may be assigned to more than one habitat.

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 Species at Risk Act (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.

"Assess/Maintain" was the objective assigned to the greatest number of priority species in BCR 3-QC (48% of priority species; Fig. 4). For all species with this objective, there is a lack of the biological or demographic information required for proper population management. This is also the case for species that have been assigned the objective of maintaining populations at their current level (16% of priority species).

A recovery objective was assigned to 16% of priority species, reflecting the proportion of priority species in BCR 3-QC that are listed in Appendix 1 of SARA or that have a status of Threatened or Vulnerable according to Quebec's *Act respecting threatened or vulnerable species*. In addition to these recovery objectives, which all seek to increase populations at risk, population increase objectives were also assigned to 20% of priority species under the categories "Increase," "Increase 50%" and "Increase 100%." Overall, 36% of priority species identified in BCR 3-QC were assigned a population increase objective.

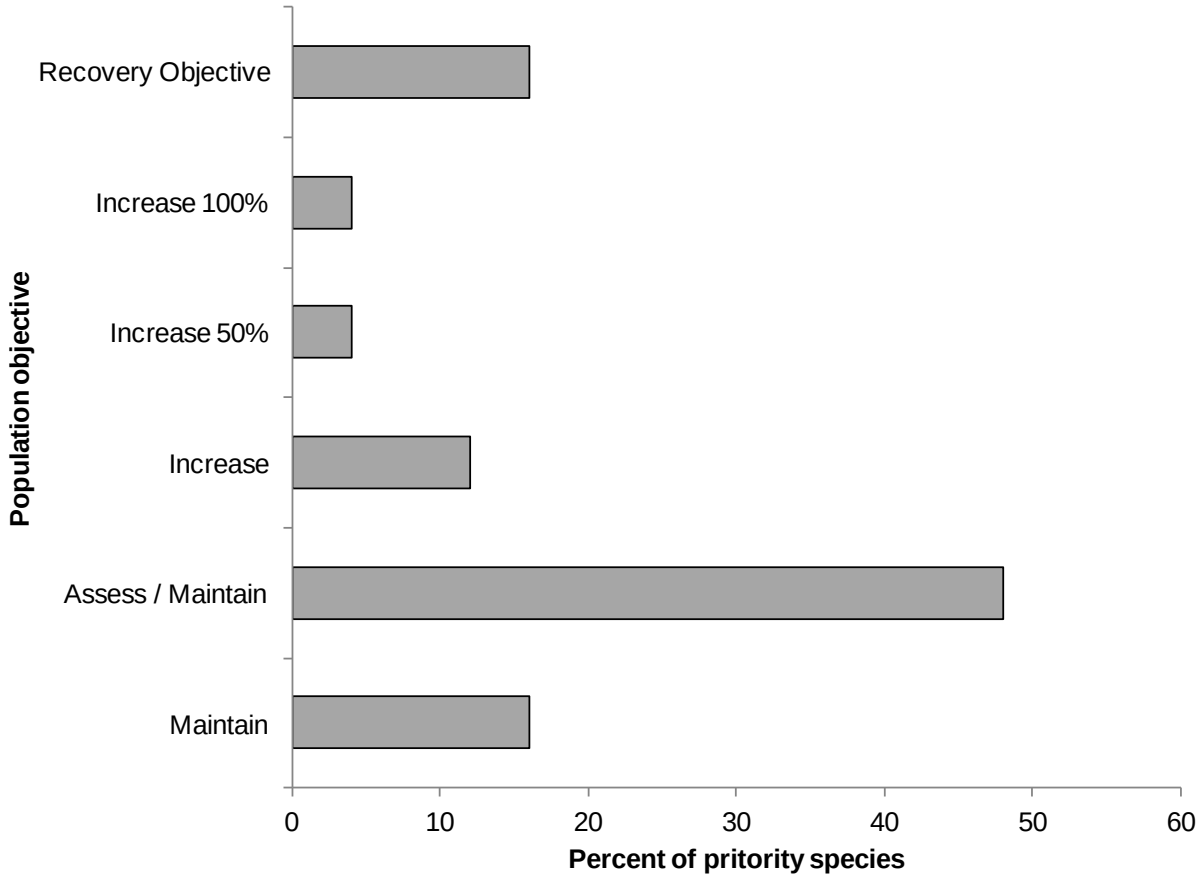

Figure 4. Percent of priority species that are associated with each population objective category in BCR 3-QC.

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.

A total of 78 threats classified into 6 categories and 7 sub-categories have been identified and are summarized in Fig. 5. Category "12. Other direct threats," represented by sub-category "12.1 Information lacking", is the category most frequently associated with priority species in BRC 3-QC, with 60% of all identified threats and a "Low" overall relative magnitude (Table 4). This category is composed of elements relating to the lack of biological or demographic information required for appropriate population management. Its magnitude is also attributable to the presence of species at risk for which there are no finalized recovery strategies or management plans. Only 1 of the 4 species at risk in BCR 3-QC had a finalized recovery strategy when this document was written. The need for more information was raised for all 25 priority species in BCR 3-QC.

The category "11. Climate change and severe weather" ranks second for the percentage of threats affecting priority species in BCR 3-QC, with 14% of all threats. This category, with a "High" overall relative magnitude (Table 4), is essentially represented by the sub-category "11.5 Other impacts," which includes the higher frequency of adverse weather events as a threat that may affect migration, reproductive success, nesting phenology and prey availability (Fig. 5).

The category "3. Energy production and mining" includes 12% of all identified threats and has a "Medium" overall relative magnitude (Table 4). This category is represented by the sub-category "3.2 Mining and quarrying", whose only threat is habitat loss and degradation due to mining projects.

The sub-category "5.1 Hunting and collecting terrestrial animals" includes 10% of all identified threats and is the only one in category "5. Biological resource use" whose overall relative magnitude is "Low" (Table 4). The only threat included in this sub-category is the lack of knowledge about the extent of subsistence hunting and its impact on bird populations.

The sub-category “8.2 Problematic native species” represents only 3% of the threats in BCR 3-QC (Fig. 5). The only threat associated with this sub-category and, in turn, with category “8. Invasive & other problematic species and genes” as a whole, is related to outbreaks of avian cholera. Category 8 has a “Low” overall relative magnitude for BCR 3-QC (Table 4).

Finally, category “9. Pollution” includes only 1% of identified threats and has a “Low” overall relative magnitude (Table 4). The only sub-category present in this category is “9.2 Industrial & military effluents” and includes the threat of oil spills (Fig. 5).

Of the seven major habitat classes in BCR 3-QC, three are affected by an overall relative threat magnitude of “Medium”: wetlands, coastal areas and riparian areas (Table 4). Coastal areas are affected by the six threat categories in this BCR and face threats with a relative magnitude of “High” due to climate change and severe weather (category 11). This threat category also affects wetlands (“High” relative magnitude) and riparian areas (“Medium” relative magnitude). These three habitat classes are also affected by energy production and mining (category 3), with a relative magnitude of “Medium”. The threats to other habitat classes in BCR 3-QC are assigned a “Low” overall relative magnitude.

Section 2 presents more detailed information on threats by habitat category. Threats to priority species while they are outside Canada during the non-breeding season were also assessed and are presented in the section entitled Threats Outside Canada.

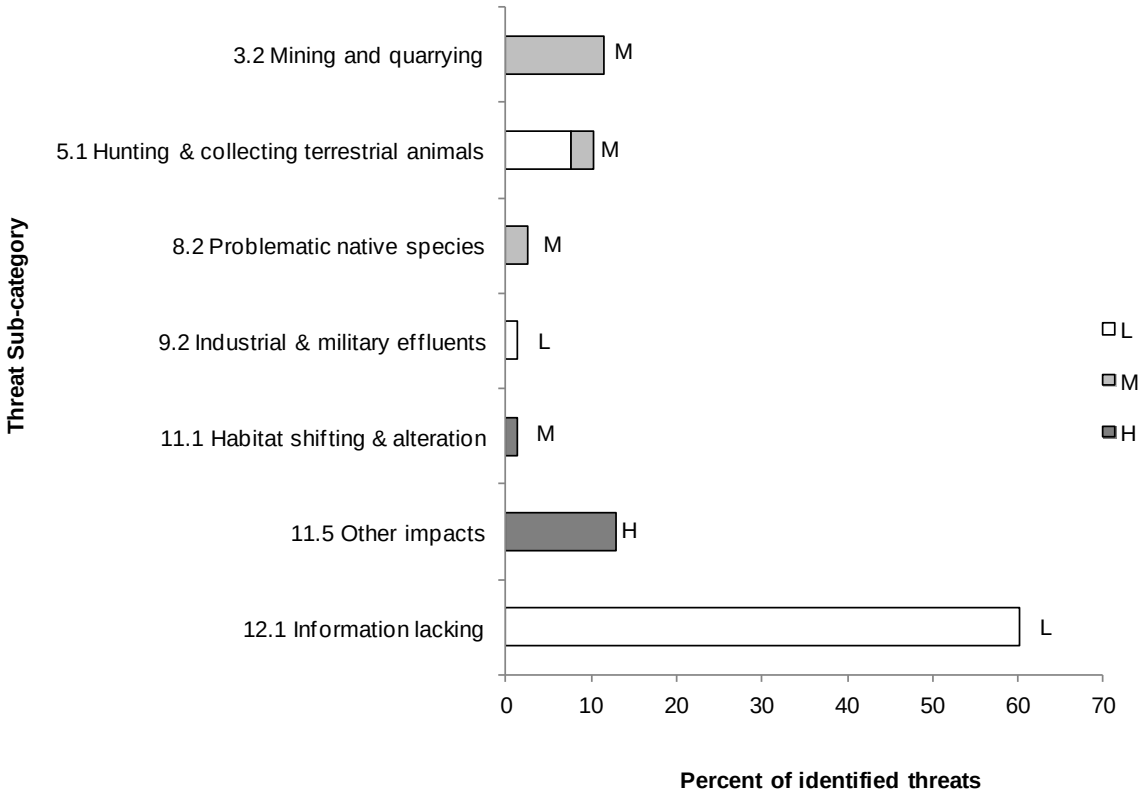

Figure 5. Percent of identified threats to priority species within BCR 3-QC by threat sub-category. Each bar represents the percent of the total number of threats identified in each threat sub-category in BCR 3-QC (for example, if 100 threats were identified in total for all priority species in BCR 3-QC, and 10 of those threats were in the category 1.1 Housing & urban areas, the bar on the graph would represent this as 10%). Shading in the bars (VH = very high, H = high, M = medium and L = low) represents the rolled-up magnitude of all threats in each threat sub-category in the BCR. (See Element 4: Threat Assessment for Priority Species for details on how magnitude was assessed).

Table 4. Relative magnitude of identified threats to priority species within BCR 3-QC by threat category and broad habitat class.

Overall ranks were generated through a roll-up procedure described in Kennedy et al. (2012). L represents Low Magnitude threats; M = Medium; H = High; VH = Very High. Blank cells indicate that no priority species had threats identified in the threat category/habitat combination.

Threat category	Habitat class							
	Shrub/Early successional	Herbaceous	Bare areas	Wetlands	Waterbodies	Coastal	Riparian	Overall
Overall	**L**	**L**	**L**	**M**	**L**	**M**	**M**	
3. Energy production & mining		L		M		M	M	**M**
5. Biological resource use				L		M		**L**
8. Invasive & other problematic species & genes						M		**L**
9. Pollution						L		**L**
11. Climate change & severe weather		M		H		H	M	**H**
12. Other direct threats	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 Fig. 6. In BCR 3-QC, 58% of suggested conservation objectives are in the category "7. Improve understanding" (of population status, limiting factors and mitigation). Most of the objectives in this category are from sub-category "7.1 Improve population/demographic monitoring", while the other objectives are associated with the sub-category "7.2 Improve harvest monitoring." This demonstrates a need for increased monitoring of priority species in this BCR.

Objective "6. Manage for climate change" ranks second with 14% of all suggested conservation objectives and has only one sub-category, "6.2 Manage for habitat resilience as climate changes."

For 11% of the objectives, the goal is to ensure adequate habitat (category 1). This objective category contains only one sub-category, "1.1 Ensure land and resource-use policies and practices maintain or improve bird habitat," and concerns herbaceous areas, wetlands, coastal areas and riparian areas.

The objective "3. Manage individual species" accounts for 10% of all objectives raised for BCR 3-QC. All objectives in this category come from the sub-category "3.4 Implement recovery strategies for species at risk."

Finally, objective "2. Reduce mortality/increase productivity" represents 7% of the suggested conservation objectives and consists of sub-categories "2.3 Reduce mortality and/or sub-lethal effects of oil pollution" and "2.6 Reduce the spread of disease." No objectives have been assigned to categories "4. Reduce disturbance" and "5. Ensure adequate food supplies" in BCR 3-QC.

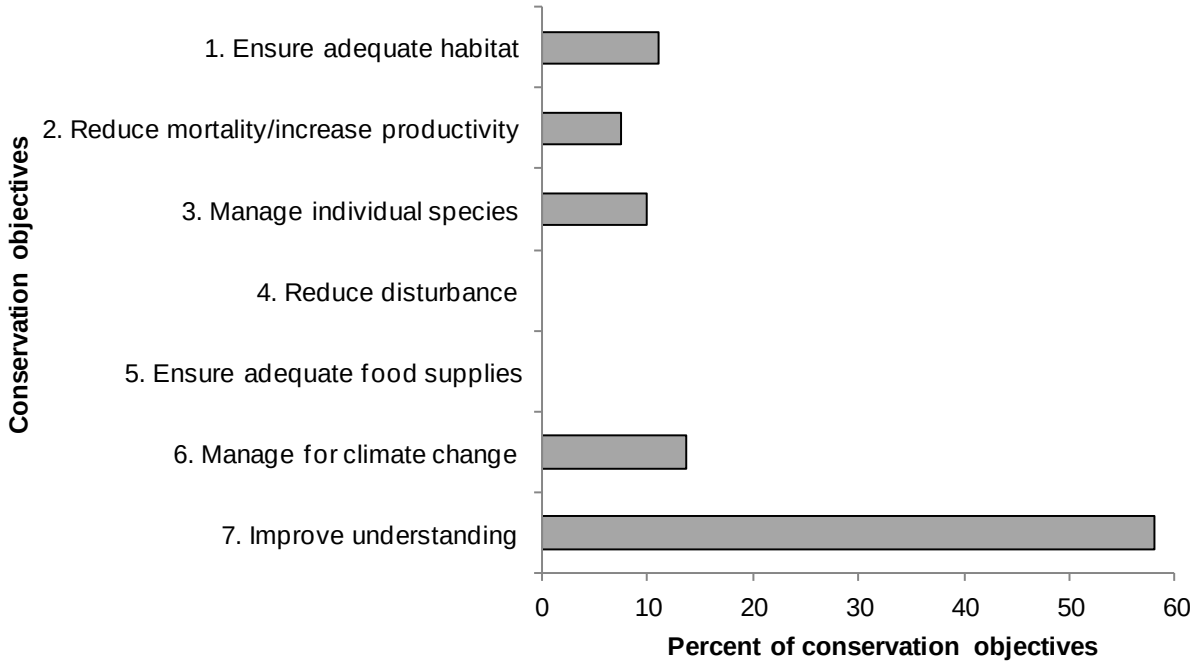

Figure 6. Percent of all conservation objectives assigned to each conservation objective category in BCR 3-QC.

Note: Objective "7. Improve understanding" in this case indicates 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 51% of the actions recommended in BCR 3-QC are in sub-category "8.2 Monitoring." The high frequency of this recommendation is primarily due to the lack of biological or demographic information on all priority species in the BCR. The actions suggested in this category include developing and implementing a long-term program to monitor breeding birds in the Arctic, maintaining the current Canada Geese (Atlantic population) banding program and expanding it to include other priority species of waterfowl in the BCR, updating the Waterfowl Survey of Northern Quebec, implementing the protocol for the Program for Regional and International Shorebird Monitoring (PRISM), and including landbirds. For more details, please refer to Section 3.

Sub-category "8.1 Research" is the second largest, with 13% of all recommended actions. This sub-category is also linked to the lack of information on priority species in BCR 3-QC and includes an action designed to develop research projects to fill gaps in knowledge about the impacts of climate change on Low Arctic birds. Another recommended action in this sub-category is to develop research projects to fill gaps in knowledge about the relationships among duck breeding, moulting and wintering sites, in order to distinguish among the various populations.

Sub-category "5.3 Private sector standards and codes" concerns the mining sector and includes 11% of all suggested conservation actions. The actions recommended consist of encouraging the adoption of more environmentally friendly practices and implementing the mitigation and prevention actions identified in project environmental assessments.

Sub-categories "2.3 Habitat and natural process restoration" and "6.2 Substitution" each represent 7% of the recommended actions. Sub-category 2.3 particularly affects wetlands and coastal areas and mainly concerns habitat restoration after site operations have ceased. The only action recommended in sub-category 6.2 is to promote the reduction of greenhouse gas emissions.

Species recovery (3.2) includes 6% of the recommended actions and mainly concerns the development and implementation of recovery strategies or management plans for species at risk.

Site/area protection (1.1) includes 4% of suggested conservation actions and concerns wetlands, coastal areas and riparian areas. The actions recommended in this sub-category aim

to protect habitat (e.g. important nesting and roosting sites) by granting legal conservation or stewardship status to minimize the impact of threats from the mining sector.

Finally, sub-category "5.4 Compliance and enforcement" represents only 1% of the recommended actions and consists of preventing the discharge of oily ship waste into the ocean by promoting compliance with federal legislation.

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

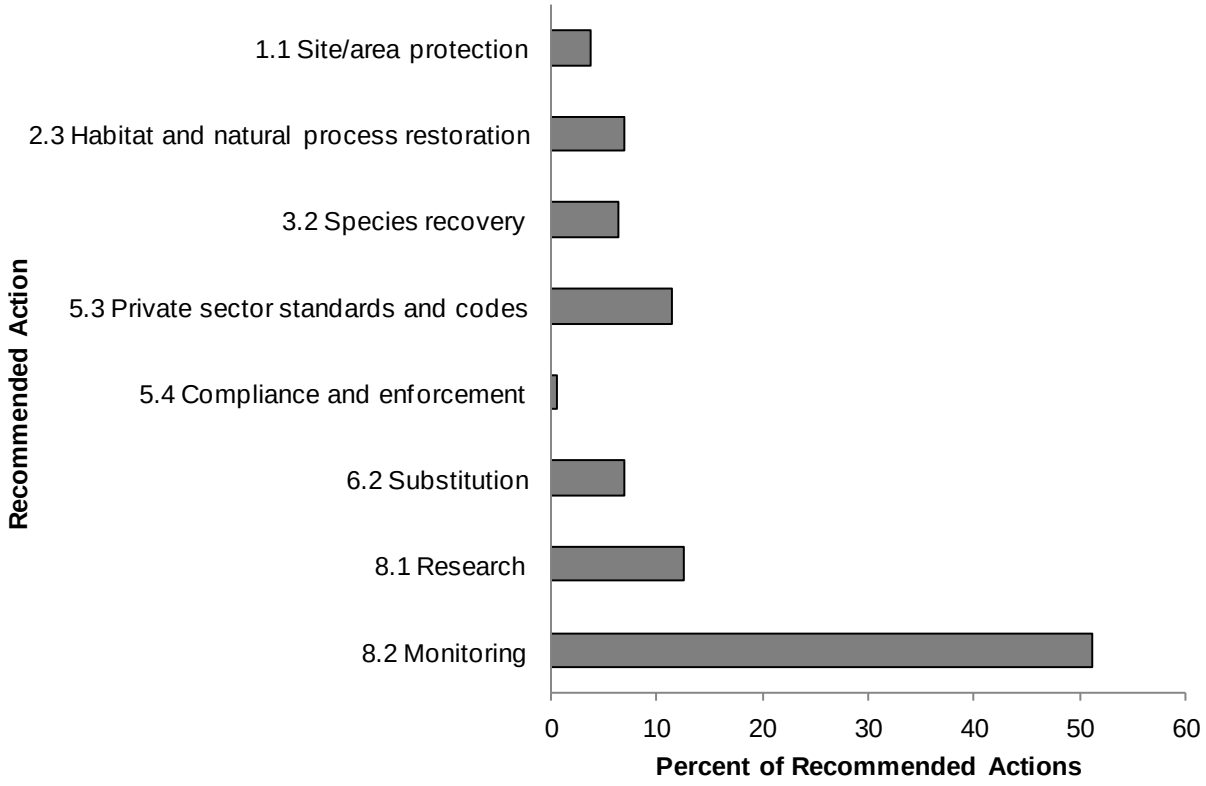

Figure 7. Percent of recommended actions assigned to each sub-category in BCR 3-QC.
Sub-categories "8.1 Research" and "8.2 Monitoring" refer to specific species where more information is required before conservation actions can be formulated. For a discussion of broad-scale research and monitoring requirements, see the section entitled Research and Population Monitoring Needs.

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 3-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.

Shrub/Early Successional

According to the United Nations Food and Agriculture Organization's (UN-FAO) Land Cover Classification System, "shrub and early successional" habitats are defined as woody vegetation less than five metres in height. Shrub and early successional habitats occupy only 0.2% of the land in BCR 3-QC and are mostly situated in the southern part of this conservation region (Fig. 8).

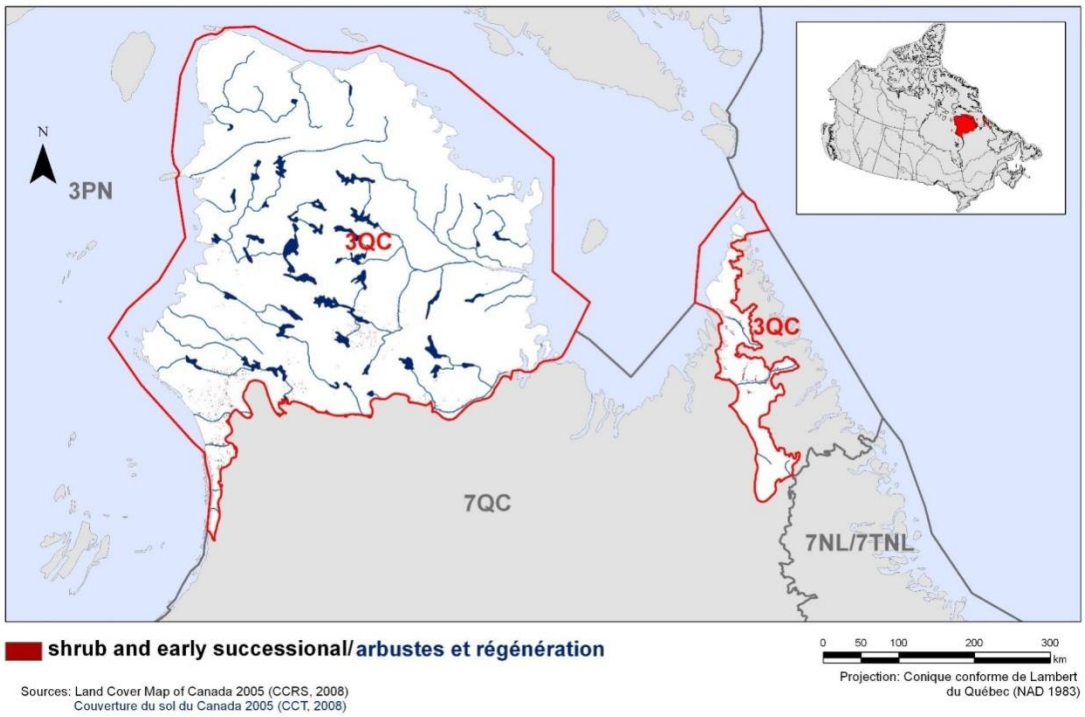

Figure 8. Map of shrub and early successional habitat in BCR 3-QC: Arctic Plains and Mountains.

Although it only covers a small part of BCR 3-QC, the shrub/early successional habitat class is the one used most by priority species (Fig. 3). Nine priority species are found here, all landbirds (Table 5). Two of these species were selected for conservation reasons, while seven were chosen for stewardship purposes. Two species at risk are found in this habitat: the Golden Eagle

(designated as Vulnerable at the provincial level) and the Short-Eared Owl, which is listed on Schedule 1 of SARA (as Special Concern).

The threats to priority species of the shrub/early successional habitat are all part of category "12.1 Information lacking." This conservation issue is addressed in the section entitled Research and Population Monitoring Needs because it is not a habitat-related problem. Therefore, no conservation objectives or recommended actions are presented in this section, Shrubs/Early successional.

Table 5. 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]
Golden Eagle	Tundra	Provincial recovery objective[4]	X	X	
Gyrfalcon	Tundra	Assess/Maintain			X
Hoary Redpoll	Nests in small shrubs (willow, alder, swamp birch)	Assess/Maintain			X
Lapland Longspur	Tundra	Assess/Maintain			X
Rock Ptarmigan	Sparse dwarf shrubs	Assess/Maintain			X
Rough-legged Hawk	Tundra	Assess/Maintain			X
Short-eared Owl[5]	Sparse dwarf shrubs	Recovery objective	X	X	
Snow Bunting	Tundra	Assess/Maintain			X
Snowy Owl	Tundra	Assess/Maintain			X

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

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

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

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

[5] Species listed on Schedule 1 of SARA, but for which there are no finalized recovery documents. Official documents related to SARA will prevail as soon as they are published; however, the interim population objective for this species is Assess/Maintain.

Herbaceous

According to the United Nations Food and Agriculture Organization's (UN-FAO) Land Cover Classification System, the "herbaceous" habitat category consists of non-woody vegetation less than three meters in height that does not originate from a specific crop or development. In BCR 3-QC, herbaceous habitats occupy 56% of the land, making this habitat class the largest in this conservation region (Fig. 9).

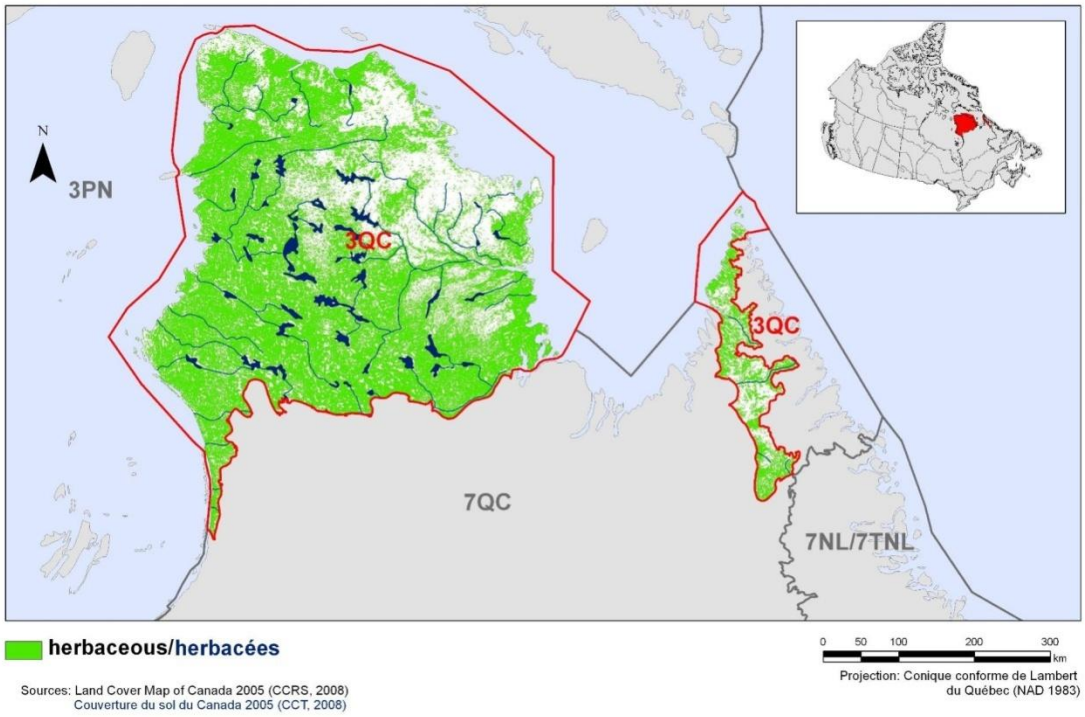

Figure 9. Map of herbaceous habitat in BCR 3 3-QC: Arctic Plains and Mountains.

The herbaceous habitat of BCR 3-QC is used by a single priority species, the American Golden Plover, which was selected for conservation reasons (Table 6). Only two threats were identified (Table 7); the first is habitat loss and degradation caused by mining, in sub-category "3.2 Mining and quarrying." This threat has a relative magnitude of "Medium" (Figure 10). However, when a sub-category has only a single threat, the overall relative magnitude of that sub-category must be lowered to the level immediately below the threat (Kennedy et al. 2012). Therefore, sub-category 3.2 has a "low" overall relative magnitude.

The other threat to the American Golden Plover in herbaceous habitat is the higher frequency of adverse weather events due to climate change that may affect migration, reproductive success, availability of prey or nesting phenology. This threat, of "High" relative magnitude, is part of sub-category "11.5 Other impacts." As explained, the overall relative magnitude of this sub-category must be lowered to "Medium" because there is only one threat.

The conservation objectives for the American Golden Plover aim to conserve and restore the quantity and quality of herbaceous habitats on the landscape and to reduce the potential impact of climate change on open habitats. Suggested conservation measures include restoring habitats after site operations have ceased, encouraging the adoption of more environmentally friendly practices and promoting the reduction of greenhouse gas emissions.

Table 6. Priority species that use herbaceous habitat, a description of the 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 Golden Plover	Low and sparse vegetation on top of well-drained rocky slopes.	Assess/Maintain		X	

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

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

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

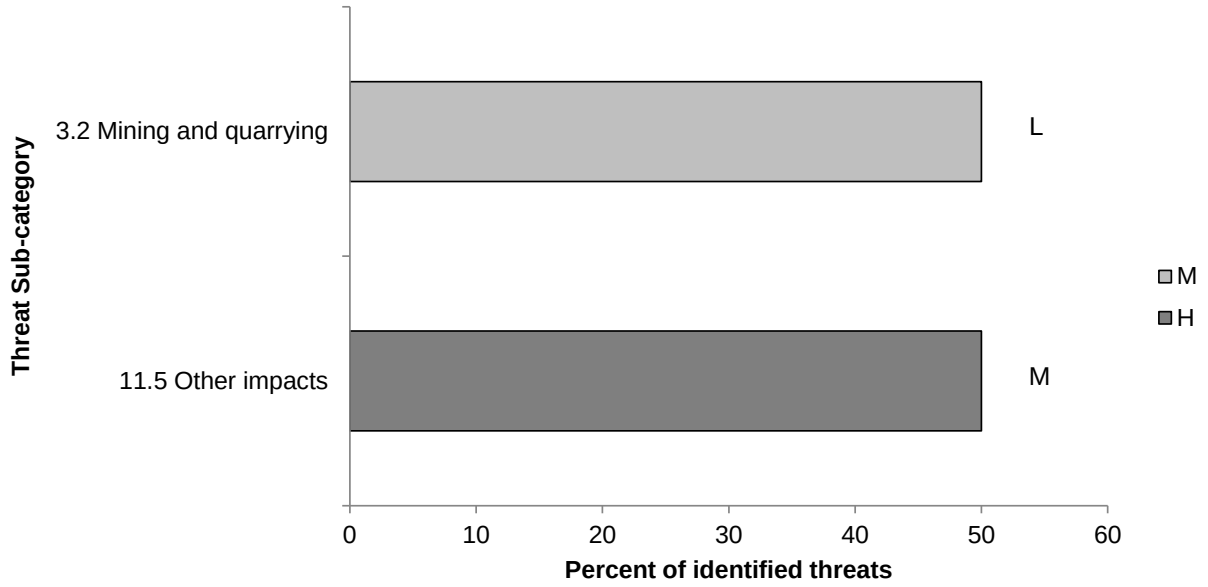

Figure 10. Percent of identified threats to priority species in herbaceous habitat in each threat sub-category.

Each bar represents the percent of the total number of threats identified in each threat sub-category in herbaceous habitats (for example, if 100 threats were identified in total for all priority species in herbaceous habitats, and 10 of those threats were in the category 1.1 Housing & urban areas, the bar on the graph would represent this as 10%). The bars are divided to show the distribution of Low (L), Medium (M), High (H) and Very High (VH) rankings of individual threats within each threat sub-category. For example, the same threat may have been ranked H for one species and L for another. The shading illustrates the proportion of rankings in the sub-category (L, M, H and VH). The overall magnitude of the sub-threat in herbaceous habitat is shown at the end of each bar. See Element 4 in Appendix 2 for more details.

Table 7. Threats addressed, conservation objectives, recommended actions and priority species affected for herbaceous habitat in BCR 3-QC.

Threats addressed	Threat sub-category	Objectives	Objective sub-category	Recommended actions	Action sub-category	Priority species affected
Habitat loss and degradation (mining).	3.2 Mining and quarrying	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	Restore habitats after site operations have ceased. Encourage the adoption of more environmentally friendly practices. Implement the mitigation and prevention actions identified in project environmental assessments. Ensure that mining sites are restored to their original habitat quality (using wildlife monitoring programs before and after mining operations).	2.3 Habitat and natural process restoration 5.3 Private sector standards and codes 8.2 Monitoring	American Golden Plover
Higher frequency of adverse weather events due to climate change that may affect migration, reproductive success, availability of prey or nesting phenology.	11.5 Other impacts	Reduce potential impact of climate change on open habitats.	6.2. Manage for habitat resilience as climate changes	Promote the reduction of greenhouse gas emissions.	6.2 Substitution	American Golden Plover

Bare Areas

According to the United Nations Food and Agriculture Organization's (UN-FAO) Land Cover Classification System adapted for developing BCR strategies, bare areas are habitats with less than 4% plant cover whose cover is not artificial and the result of anthropogenic activities. This type of habitat accounts for only 0.1% of the land in BCR 3-QC and is mainly covered by rocky outcrops and cliffs (Fig. 11).

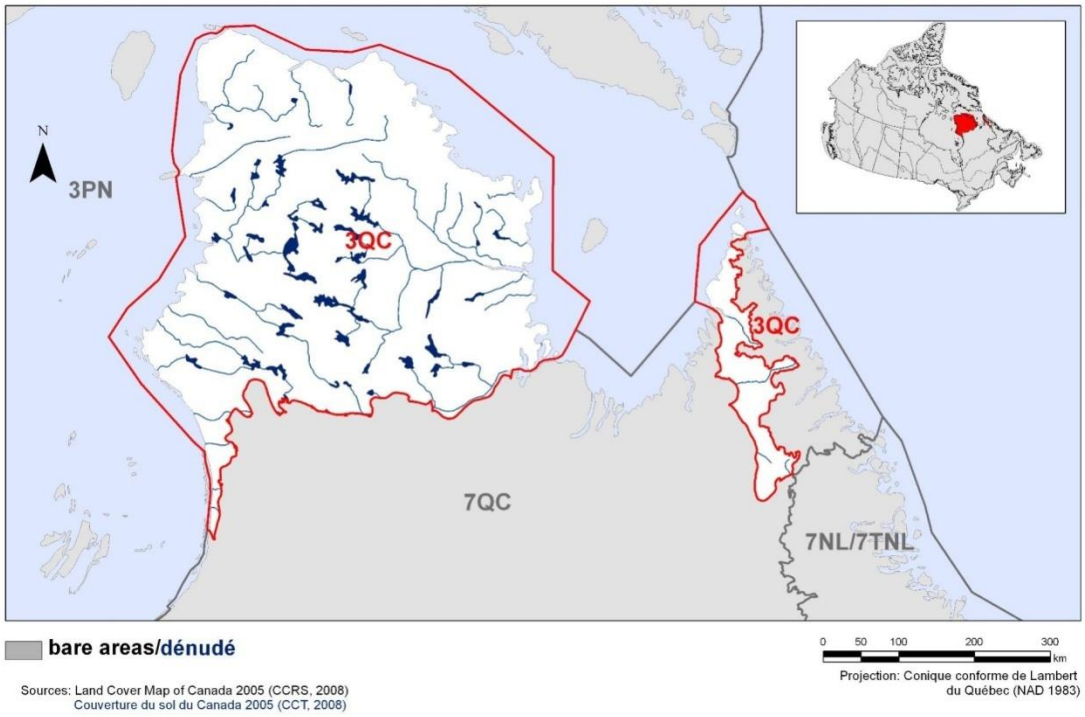

Figure 11. Map of bare habitat in BCR 3-QC: Arctic Plains and Mountains.

Although they only cover a small part of BCR 3-QC, bare areas are the second most-used habitat class by priority species (Fig. 3). Eight priority species are found here, all landbirds (Table 8). Two of these species were selected for conservation reasons, while six were chosen for stewardship purposes. Two species at risk are found in this habitat: the Golden Eagle (designated as Vulnerable at the provincial level) and the Peregrine Falcon (*anatum*/*tundrius*), which is listed on Schedule 1 of SARA (Special Concern).

The threats to priority species in the bare areas habitat are all part of category "12.1 Information lacking." This conservation issue is addressed in the section entitled Research and Population Monitoring Needs because it is not a habitat-related problem. Therefore, no conservation objectives or recommended actions are presented in this section, Bare areas.

Table 8. Priority species that use bare areas, a description of the 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]
Golden Eagle	Cliff	Provincial recovery objective[4]	X	X	
Gyrfalcon	Cliff	Assess/Maintain			X
Hoary Redpoll	Bare areas	Assess/Maintain			X
Peregrine Falcon (*anatum/tundrius*)[5]	Cliff	Recovery objective	X	X	
Rock Ptarmigan	Alpine regions often dotted with rocky outcrops	Assess/Maintain			X
Rough-legged Hawk	Cliff	Assess/Maintain			X
Snow Bunting	Rocky hillsides	Assess/Maintain			X
Snowy Owl	Frequents rocky habitats in arctic tundra	Assess/Maintain			X

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

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

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

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

[5] Species listed on Schedule 1 of SARA, but for which there are no finalized recovery documents. Official documents related to SARA will prevail as soon as they are published; however, the interim population objective for this species is: Assess/Maintain.

Wetlands

As part of the BCR strategies, the habitat class defined as "Wetlands" is any terrestrial habitat that is either temporarily saturated with water or permanently flooded. A wetland can be a bog, a swamp or a freshwater, brackish or saltwater marsh. Wetlands cover 4% of BCR 3-QC and are scattered across the entire region, with the exception of the part east of Ungava Bay (Fig. 12).

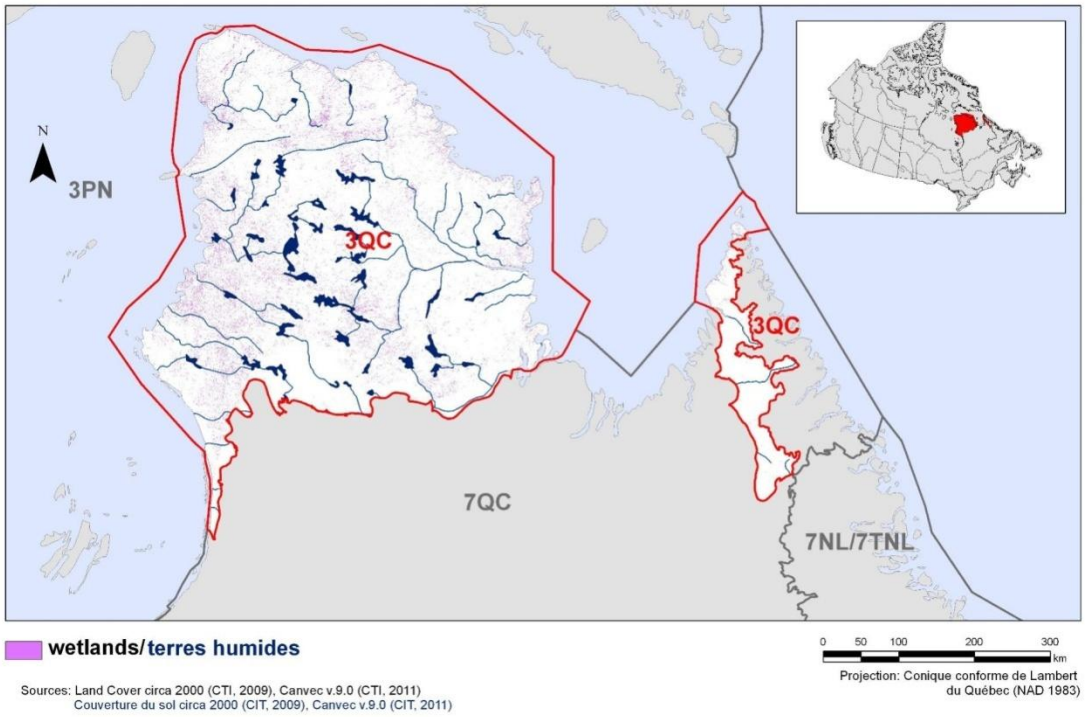

Figure 12. Map of wetland habitat in BCR 3-QC: Arctic Plains and Mountains.

The wetlands in BCR 3-QC are used by seven priority species: four shorebirds, two landbirds and one waterfowl (Table 9). Three species are listed on Schedule 1 of SARA: the Red Knot (*rufa*; Endangered), the Peregrine Falcon (*anatum*/*tundrius*; Special Concern) and the Short-eared Owl (Special Concern). Only one priority species, the Canada Goose (Atlantic population), was selected for stewardship reasons.

The most frequently reported threat sub-category in the wetlands of BCR 3-QC is "3.2 Mining and quarrying," which accounts for 36% of all threats in this habitat (Fig. 13). The only threat included in this sub-category, which has a "Medium" overall relative magnitude, is habitat loss and degradation caused by mining projects.

Each comprising 27% of the threats reported in this habitat, sub-categories "5.1 Hunting & collecting terrestrial animals" and "11.5 Other impacts" both ranked second in frequency with "Low" and "High" overall relative magnitudes, respectively. The conservation issue associated

with sub-category 5.1 is the lack of knowledge about the extent of subsistence hunting and its impact on bird populations. The only threat in sub-category 11.5 is the higher frequency of adverse weather events due to climate change that may affect migration, reproductive success, availability of prey or nesting phenology.

Finally, sub-category “11.1 Habitat shifting & alteration” accounts for 9% of threats reported in wetlands and has a “Medium” overall relative magnitude. The only threat associated with this sub-category is the habitat loss and degradation caused by climate change, which could result in a loss of productivity at roosting sites.

The full list of threats in the wetlands of BCR 3-QC, as well as the objectives, conservation actions and the species they could benefit, are presented in Table 10. Conservation objectives aim mainly to conserve and restore the diversity and quality of wetlands on the landscape, to ensure appropriate levels of subsistence harvest, and to limit the potential impacts of climate change on the wetlands. The conservation actions recommended include protecting a variety of wetlands, encouraging the adoption of more environmentally friendly practices, documenting the migratory bird harvest and the collection of eggs by Aboriginal communities, and promoting the reduction of greenhouse gas emissions.

Table 9. Priority species that use wetland 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]
Canada Goose (Atlantic population)	Wet sedge meadows	Increase			X
Dunlin	Wet tundra, string bogs and ponds	Assess/Maintain		X	
Peregrine Falcon (*anatum/tundrius*)[4]	Freshwater marshes, saltmarshes	Recovery objective	X	X	
Red Knot (*rufa*)[4]	Saltmarsh	Recovery objective	X	X	
Red-necked Phalarope	Tundra vegetation near lakes, ponds, bogs, marshes and in the middle of or near small streams	Increase 50%		X	
Semipalmated Sandpiper	Mainly coastal wetlands (including bogs) on lowlands (< 50 m altitude) or uplands (> 50 m altitude)	Increase 100%		X	
Short-eared Owl[4]	Freshwater marshes, saltmarshes	Recovery objective	X	X	

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

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

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

[4] Species listed on Schedule 1 of SARA, but for which there are no finalized recovery documents. Official documents related to SARA will prevail as soon as they are published; however, the interim population objectives for these species are Peregrine Falcon (*anatum/tundrius)*: Assess/Maintain; Red Knot (*rufa*): Increase 100%; Short-eared Owl: Assess/Maintain.

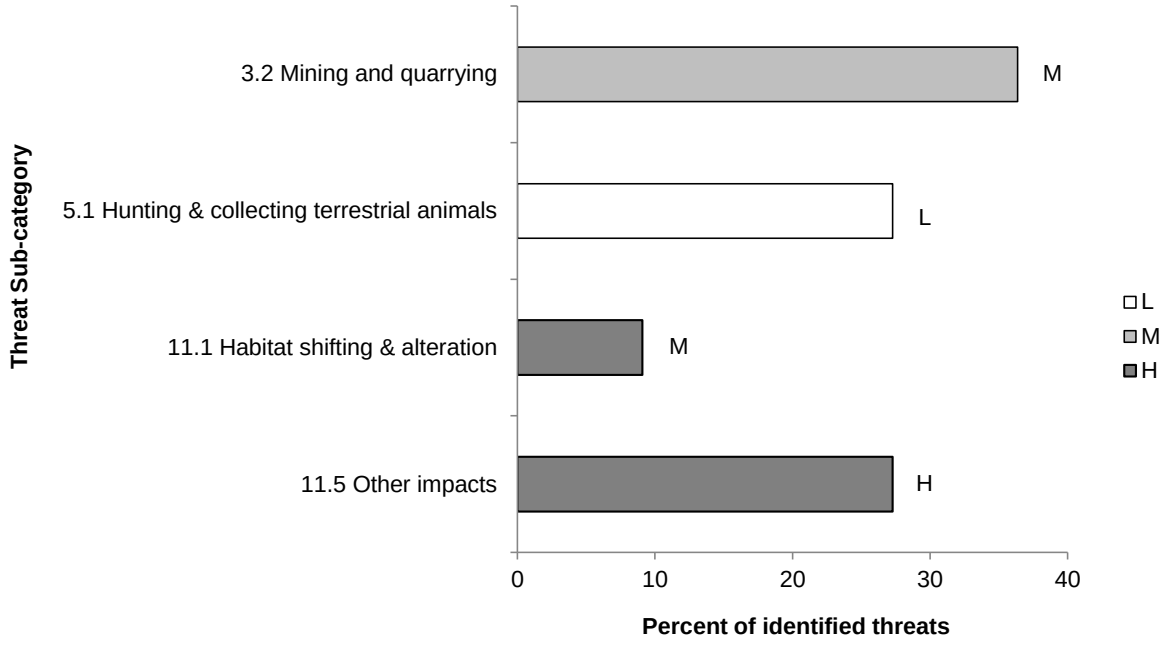

Figure 13. Percent of identified threats to priority species in wetland habitat in each threat sub-category.

Each bar represents the percent of the total number of threats identified in each threat sub-category in herbaceous habitats (for example, if 100 threats were identified in total for all priority species in herbaceous habitats, and 10 of those threats were in the category 1.1 Housing & urban areas, the bar on the graph would represent this as 10%). The bars are divided to show the distribution of Low (L), Medium (M), High (H) and Very High (VH) rankings of individual threats within each threat sub-category. For example, the same threat may have been ranked H for one species and L for another. The shading illustrates the proportion of rankings in the sub-category (L, M, H and VH). The overall magnitude of the sub-threat in herbaceous habitat is shown at the end of each bar. See Element 4 in Appendix 2 for more details.

Table 10. Threats addressed, conservation objectives, recommended actions and priority species affected for wetland habitat in BCR 3-QC.

Threats addressed	Threat sub-category	Objectives	Objective sub-category	Recommended actions	Action sub-category	Priority species affected[1]
Habitat loss and degradation (mining).	3.2 Mining and quarrying	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 of various sizes, configurations and habitat conditions to ensure the diversity of habitat types and species on the landscape. Restore habitats after site operations have ceased. Encourage the adoption of more environmentally friendly practices. Implement the mitigation and prevention actions identified in project environmental assessments. Ensure that mining sites are restored to their original habitat quality (through wildlife monitoring programs before and after mining operations).	1.1 Site/area protection 2.3 Habitat and natural process restoration 5.3 Private sector standards and codes 8.2 Monitoring	Red Knot (*rufa*), Semipalmated Sandpiper, Dunlin, Red-necked Phalarope
Lack of knowledge about the extent of subsistence hunting and its impact on bird populations.	5.1 Hunting & collecting terrestrial animals	Ensure appropriate levels of subsistence harvest	7.2. Improve harvest monitoring	Document the migratory bird harvest and the collection of eggs by Aboriginal communities in order to assess the impact on the species concerned.	8.2 Monitoring	Red Knot (*rufa*), Semipalmated Sandpiper, Dunlin
Habitat loss and degradation (climate change could cause a loss of productivity at roosting sites).	11.1 Habitat shifting & alteration	Reduce potential impact of climate change on wetlands.	6.2. Manage for habitat resilience as climate changes	Promote the reduction of greenhouse gas emissions.	6.2 Substitution	Semipalmated Sandpiper
Higher frequency of adverse weather events due to climate change	11.5 Other impacts	Reduce potential impact of climate change on	6.2. Manage for habitat resilience as climate changes	Promote the reduction of greenhouse gas emissions.	6.2 Substitution	Red Knot (*rufa*), Dunlin, Red-necked

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

Table 10 continued

Threats addressed	Threat sub-category	Objectives	Objective sub-category	Recommended actions	Action sub-category	Priority species affected[1]
that may affect migration, reproductive success, availability of prey or nesting phenology.		wetlands.				Phalarope

Waterbodies, Snow and Ice

According to the United Nations Food and Agriculture Organization's (UN-FAO) Land Cover Classification System adapted for developing BCR strategies, "waterbodies, snow and ice" are primarily areas covered with water such as lakes, reservoirs, rivers and ponds. Theoretically, this habitat class includes marine and freshwater habitats, as well as ice (permanent, seasonal, in motion or stable). However, marine habitats adjacent to BCR 3-QC fall under jurisdiction of Nunavut. As a result, those marine waters are not taken into account in this Quebec strategy but are instead included in the Prairie and Northern region's BCR 3 strategy: Arctic Plains and Mountains. In addition, no priority species use snow or ice as a habitat in BCR 3-QC; therefore, inland fresh waterbodies are the only sub-habitats used by priority species within this habitat category. The "waterbodies, snow and ice" habitat class covers 14% of the land in BCR 3-QC and includes numerous rivers, countless small and medium-sized lakes, and several large lakes (Fig. 14).

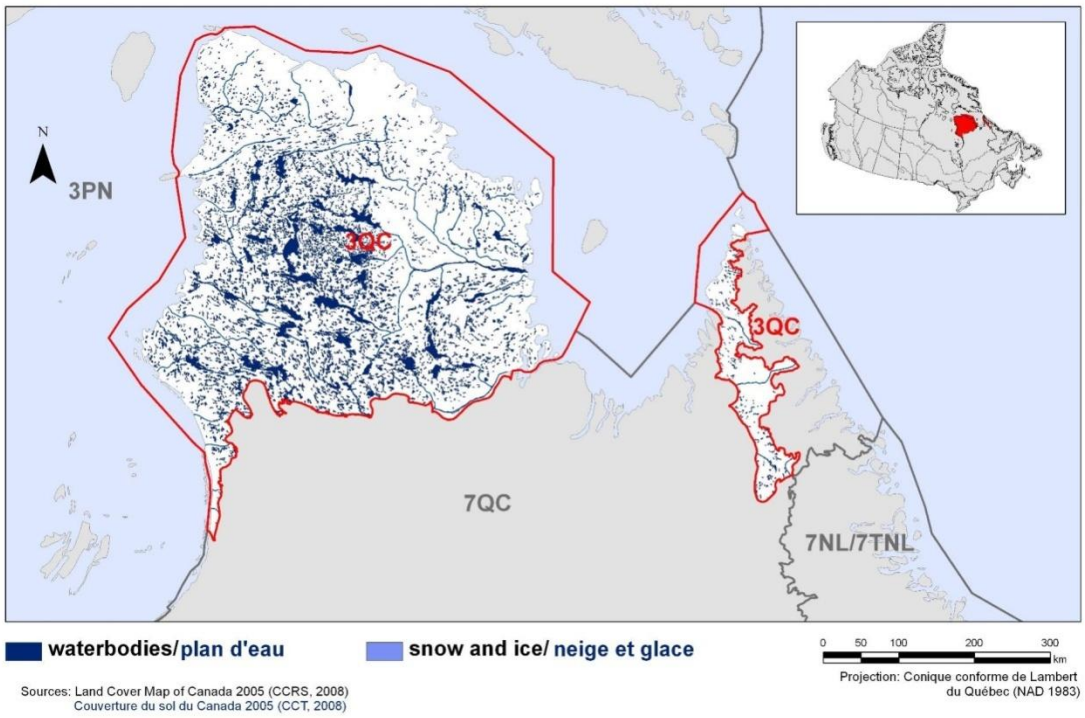

Figure 14. Map of waterbodies, snow and ice habitat in BCR 3-QC: Arctic Plains and Mountains.

Four priority species, including three species of waterfowl and one species of waterbird, are found in the waterbodies of BCR 3-QC, and all were selected for stewardship purposes (Table 11). The threats to priority species in the waterbodies of this BCR are all part of category "12.1 Information lacking." This conservation issue is addressed in the section entitled Research and Population Monitoring Needs because it is not a habitat-related problem. Therefore, no conservation objectives or recommended actions are presented in this section, Waterbodies, snow and ice.

Table 11. Priority species that use waterbodies, snow and ice 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 Scoter	Small or medium-sized lakes	Maintain			X
Canada Goose (Atlantic population)	Islands and islets found in ponds, lakes and rivers	Increase			X
Common Loon	Lakes containing fish, at least five ha in area with a preference for large alkaline lakes (> 50 ha) at low elevations	Assess/Maintain			X
Red-breasted Merganser	Edge of lakes (small or medium-sized) and rivers, edge of bays on large lakes; lagoon and estuary shorelines	Maintain			X

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

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

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

Coastal Areas

Coastal areas consist of terrestrial and aquatic habitats along the marine coasts. They consist mainly of estuary areas, mudflats, sandbars, rocky shores and islands. The area of this habitat type is difficult to calculate, but it is estimated that the BCR 3-QC marine coast stretches 6686 km along Hudson Bay, Hudson Strait and Ungava Bay (Fig. 15).

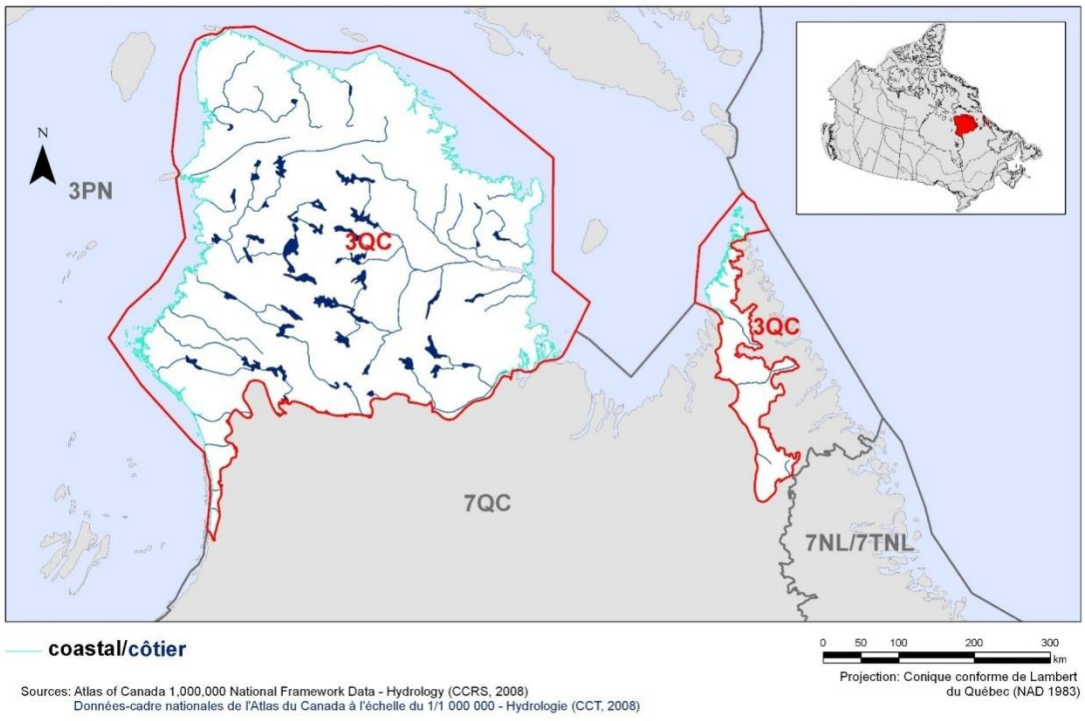

Figure 15. Map of coastal habitat in BCR 3-QC: Arctic Plains and Mountains.

The coastal areas of BCR 3-QC are utilized by six priority species, including two shorebirds, two waterbirds and two species of waterfowl (Table 12). All of these species were selected for conservation reasons and one of them is listed in Schedule 1 of SARA, namely the Red Knot (*rufa*; Endangered).

The most frequently reported threat sub-categories in the coastal areas of BCR 3-QC are "5.1 Hunting and collecting terrestrial animals" and "11.5 Other impacts," which each account for 33% of all reported or potential threats in this habitat (Fig. 16). With a "Medium" overall relative magnitude, the only conservation issue associated with sub-category 5.1 is the lack of knowledge about the extent of subsistence hunting and its impact on bird populations. Sub-category 11.5 has a "High" overall relative magnitude and is associated with the higher frequency of adverse weather events due to climate change that may affect migration, reproductive success, availability of prey or nesting phenology.

Threat sub-categories “3.2 Mining & quarrying” and “8.2 Problematic native species” each account for 13% of reported threats in the coastal areas and both have a “Medium” overall relative magnitude. Sub-category 3.2 is associated with habitat loss and degradation caused by mining, while sub-category 8.2 is associated with outbreaks of avian cholera.

Threat sub-category “9.2 Industrial & military effluents”, which has a “Low” relative magnitude, accounts for the rest of the reported threats in the coastal areas (7%) and is associated with oil spills.

The full list of threats in the coastal areas of BCR 3-QC, as well as the objectives, conservation actions and the species they could benefit, are presented in Table 13. Conservation objectives aim mainly to limit the potential impacts of climate change, ensure appropriate levels of subsistence harvest, and conserve and restore coastal areas on the landscape. Some of the conservation measures recommended include promoting the reduction of greenhouse gas emission, documenting the migratory bird harvest and the collection of eggs by Aboriginal communities in order to assess the impact on the species concerned, and protecting important coastal areas through stewardship or by legally designating them as conservation areas.

Table 12. Priority species that use coastal 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]
Arctic Tern	Islands on the tundra lakes and coastal low-lying islands	Assess/Maintain		X	
Common Eider (*borealis*)	Coastal islands in Ungava Bay and along the Quebec coast of Hudson Strait	Maintain		X	
Common Eider (*sedentaria*)	Islands along the east coast of Hudson Bay	Maintain		X	
Red Knot (*rufa*)[4]	Intertidal shorelines	Recovery objective	X	X	
Semipalmated Sandpiper	Mainly coastal wetlands (including bogs) on lowlands (< 50 m altitude) or uplands (>50 altitude)	Increase 100%		X	
Thick-billed Murre	High cliffs of Cape Wolstenholme	Assess/Maintain		X	

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

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

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

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

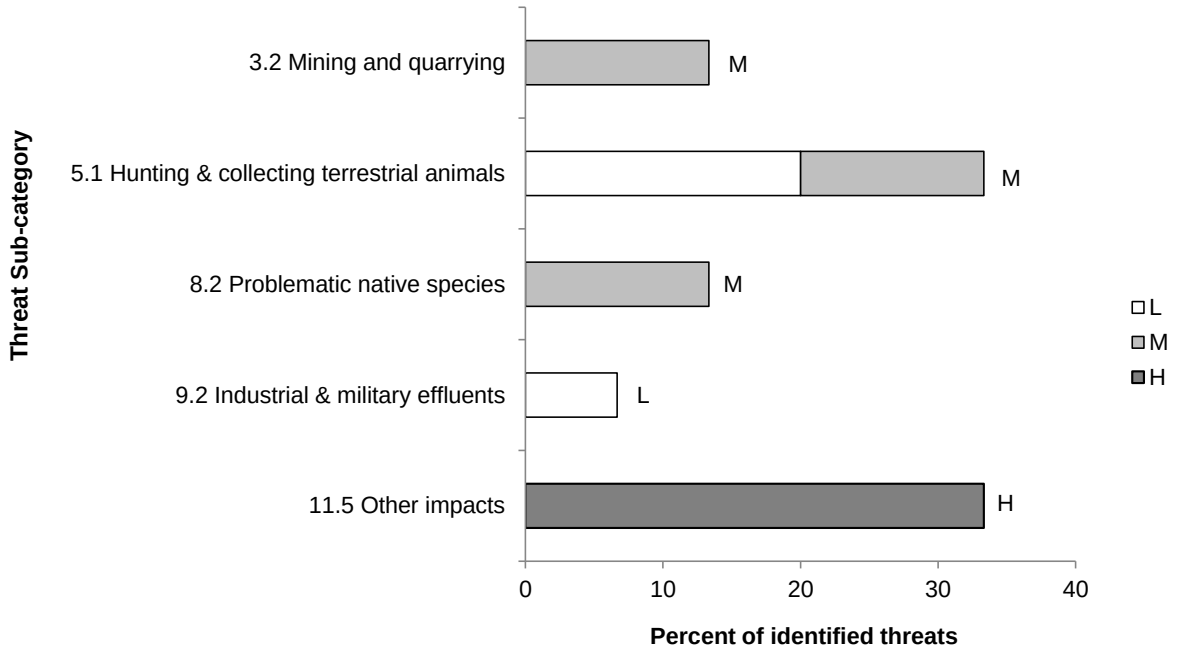

Figure 16. Percent of identified threats to priority species in coastal habitat in each threat sub-category.

Each bar represents the percent of the total number of threats identified in each threat sub-category in herbaceous habitats (for example, if 100 threats were identified in total for all priority species in herbaceous habitats, and 10 of those threats were in the category 1.1 Housing & urban areas, the bar on the graph would represent this as 10%). The bars are divided to show the distribution of Low (L), Medium (M), High (H) and Very High (VH) rankings of individual threats within each threat sub-category. For example, the same threat may have been ranked H for one species and L for another. The shading illustrates the proportion of rankings in the sub-category (L, M, H and VH). The overall magnitude of the sub-threat in herbaceous habitat is shown at the end of each bar. See Element 4 in Appendix 2 for more details.

Table 13: Threats addressed, conservation objectives, recommended actions and priority species affected for coastal habitat in BCR 3-QC.

Threats addressed	Threat sub-category	Objectives	Objective sub-category	Recommended actions	Action sub-category	Priority species affected
Habitat loss and degradation (mining).	3.2 Mining and quarrying	Conserve and restore the quality and quantity of coastal habitats on the landscape.	1.1. Ensure land and resource-use policies and practices maintain or improve bird habitat	Protect important coastal sites through stewardship or by legally designating them as conservation areas. Restore habitats after site operations have ceased. Encourage the adoption of more environmentally friendly practices. Implement the mitigation and prevention actions identified in project environmental assessments. Ensure that mining sites are restored to their original habitat quality (through wildlife monitoring programs before and after mining operations).	1.1 Site/area protection 2.3 Habitat and natural process restoration 5.3 Private sector standards and codes 8.2 Monitoring	Red Knot (*rufa*), Semipalmated Sandpiper
Lack of knowledge about the extent of subsistence hunting and its impact on bird populations.	5.1 Hunting & collecting terrestrial animals	Ensure appropriate levels of subsistence harvest.	7.2. Improve harvest monitoring	Document the migratory bird harvest and the collection of eggs by Aboriginal communities in order to assess the impact on the species concerned.	8.2 Monitoring	Red Knot (*rufa*), Semipalmated Sandpiper, Common Eider (*borealis*), Common Eider (*sedentaria*), Arctic Tern
Outbreaks of avian cholera.	8.2 Problematic native species	Maintain and improve emergency response programs.	2.6. Reduce the spread of disease	Maintain effective emergency response programs	3.2 Species recovery	Common Eider (*borealis*), Common Eider (*sedentaria*)

Table 13 continued

Threats addressed	Threat sub-category	Objectives	Objective sub-category	Recommended actions	Action sub-category	Priority species affected
Oil spills.	9.2 Industrial & military effluents	Reduce the deliberate discharge of oily ship waste into the ocean.	2.3 Reduce mortality and/or sub-lethal effects from oil pollution	Maintain emergency response programs. Prevent the discharge of oily ship waste into the ocean by promoting compliance with federal legislation.	2.3 Habitat and natural process restoration 5.4 Compliance and enforcement	Thick-billed Murre
Higher frequency of adverse weather events due to climate change that may affect migration, reproductive success, availability of prey or nesting phenology.	11.5 Other impacts	Reduce potential impact of climate change on coastal habitats.	6.2. Manage for habitat resilience as climate changes	Promote the reduction of greenhouse gas emissions.	6.2 Substitution	Red Knot (*rufa*), Semipalmated Sandpiper, Common Eider (*borealis*), Common Eider (*sedentaria*), Thick-billed Murre

Riparian Areas

Riparian areas are defined as any habitat located within 15 metres of a body of fresh water. Based on BCR 3-QC's hydrographic system (see Fig. 14), it is estimated that this habitat accounts for only 1% of the land, but it is found almost everywhere in the area.

Seven priority species, including two species of shorebirds and five species of waterfowl, are found in the riparian areas of BCR 3-QC (Table 14). Two of these species were selected for conservation reasons, while five were chosen for stewardship purposes.

The most frequently reported threat sub-category in the riparian areas of BCR 3-QC is "3.2 Mining and quarrying," which accounts for 67% of all threats in this habitat and has a "Medium" overall relative magnitude (Fig. 17). The conservation issue associated with this sub-category is habitat loss and degradation caused by mining projects.

The only other sub-category affecting riparian areas is "11.5 Other impacts," which accounts for 33% of all threats reported. This sub-category has a "Medium" overall relative magnitude and is associated with the higher frequency of adverse weather events due to climate change that may affect migration, reproductive success, availability of prey or nesting phenology.

The full list of threats in the riparian areas of BCR 3-QC, as well as the objectives, conservation actions and the species they could benefit, are presented in Table 15. Conservation objectives aim mainly to conserve and restore the diversity, quantity and quality of riparian areas on the landscape, and to limit the potential impacts of climate change on the riparian areas. Some of the conservation measures recommended include protecting important riparian areas through stewardship or by legally designating them as conservation areas, encouraging the adoption of more environmentally friendly practices, restoring habitats after site operations have ceased and promoting the reduction of greenhouse gas emissions.

Table 14. Priority species that use riparian 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]
American Scoter	Edges of ponds and small lakes	Maintain			X
Canada Goose (Atlantic population)	Edge of waterbodies	Increase			X
Greater Scaup	Edges of ponds and small lakes	Increase			X
Long-tailed Duck	Edges of ponds and small lakes	Increase			X
Red-breasted Merganser	Edge of lakes (small or medium-sized) and rivers; edge of bays on large lakes; lagoon and estuary shorelines	Maintain			X
Red-necked Phalarope	Tundra vegetation near freshwater lakes, ponds, bogs, marshes and in the middle of or near small streams	Increase 50%		X	
Semipalmated Sandpiper	Edges of small lakes, ponds and rivers	Increase 100%		X	

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

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

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

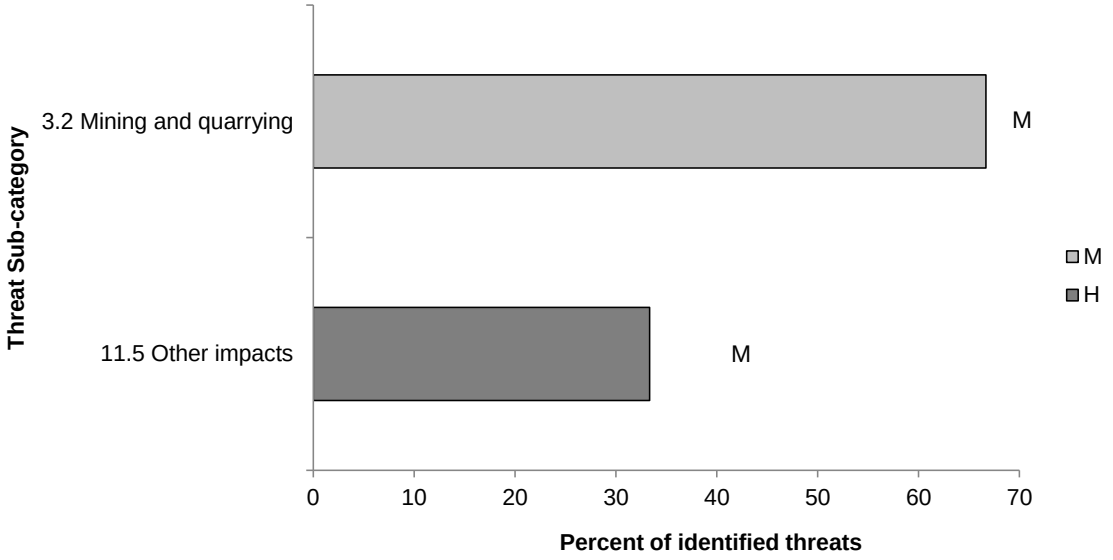

Figure 17. Percent of identified threats to priority species in riparian habitats in each threat sub-category.

Each bar represents the percent of the total number of threats identified in each threat sub-category in herbaceous habitats (for example, if 100 threats were identified in total for all priority species in herbaceous habitats, and 10 of those threats were in the category 1.1 Housing & urban areas, the bar on the graph would represent this as 10%). The bars are divided to show the distribution of Low (L), Medium (M), High (H) and Very High (VH) rankings of individual threats within each threat sub-category. For example, the same threat may have been ranked H for one species and L for another. The shading illustrates the proportion of rankings in the sub-category (L, M, H and VH). The overall magnitude of the sub-threat in herbaceous habitat is shown at the end of each bar. See Element 4 in Appendix 2 for more details.

Table 15. Threats addressed, conservation objectives, recommended actions and priority species affected for riparian habitat in BCR 3-QC.

Threats addressed	Threat sub-category	Objectives	Objective sub-category	Recommended actions	Action sub-category	Priority species affected[1]
Habitat loss and degradation (mining).	3.2 Mining and quarrying	Conserve and restore the diversity, 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 areas (including important nesting and roosting sites) through stewardship or by legally designating them as conservation areas. Restore habitats after site operations have ceased. Encourage the adoption of more environmentally friendly practices. Implement the mitigation and prevention actions identified in project environmental assessments. Ensure that mining sites are restored to their original habitat quality (through wildlife monitoring programs before and after mining operations).	1.1 Site/area protection 2.3 Habitat and natural process restoration 5.3 Private sector standards and codes 8.2 Monitoring	Semipalmated Sandpiper, Red-necked Phalarope
Higher frequency of adverse weather events due to climate change that may affect migration, reproductive success, availability of prey or nesting phenology.	11.5 Other impacts	Reduce potential impact of climate change on riparian habitats.	6.2. Manage for habitat resilience as climate changes	Promote the reduction of greenhouse gas emissions.	6.2 Substitution	Red-necked Phalarope

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

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.)
- 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

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).

BCR 3-QC is part of the territory covered by the Government of Quebec's Northern Initiative, which includes goals such as developing wind power (Gouvernement du Québec 2013). The development of wind farms in BCR 3-QC could potentially affect the priority species of this conservation area. See Table 16 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 16 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 16 for conservation objectives and actions.

Oil Pollution

Oil may enter the environment either accidentally, through deliberate dumping, or in contained tailings ponds. It may be a single large event, as occurred in the Gulf of Mexico in 2010, or numerous smaller events. Annual estimates are that between 217 800 and 458 600 birds are killed by ship-source oil spills annually (Calvert et al. 2013). Typically, diving birds are most at risk of oiling; however, any birds that come into contact with oil are vulnerable. Oil can impact birds through direct effects such as hypothermia (resulting from lost water-proofing of feathers following oil contamination), toxicity (from ingesting oil as they preen or by inhaling volatile organic compounds), and indirect effects, such as reduced prey availability and decreased quality of habitat. While techniques exist to clean and rehabilitate oiled birds, many birds die before, during and after rescue attempts (Brown and Lock 2003). See Table 16 for conservation objectives and actions.

Table 16. Conservation objectives and actions associated with bird mortality from collisions and contaminants.

Threats addressed	Threat sub-category	Objective	Objective category	Recommended actions	Action category	Example priority species affected
Collision mortality						
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. Use 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
Environmental Contaminants						
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 **PCBs:** Greater Scaup **Other contaminants:** Peregrine Falcon (*anatum/tundrius*)
Mortality from ingestion of lead shot or tackle.	5.1 Hunting & collecting terrestrial animals 5.4 Fishing &	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	4.3 Awareness and communications 5.4 Compliance and enforcement	Canada Goose (Atlantic population), Greater Scaup, Red-breasted Merganser, Black Scoter, Common Loon

Table 16 continued

Threats addressed	Threat sub-category	Objective	Objective category	Recommended actions	Action category	Example priority species affected
	harvesting aquatic resources			adoption of non-toxic alternatives in target shooting, upland game bird hunting, and fishing.		
Mortality of waterbirds from oil pollution.	9.2 Industrial & military effluents	Reduce mortality from oil pollution	2.3 Reduce mortality and/or sublethal effects from 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 ensure 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 effects of oil exposure:** Red Knot (*rufa*), Semipalmated Sandpiper, Common Eider (borealis), Common Eider (sedentaria), Thick-billed Murre
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 17 and 18 for a summary of impacts of climate change and conservation objectives.

A recent exercise used bioclimatic modeling to predict changes in bird species ranges based on anticipated climate change for different time periods and under different emissions scenarios (Lawler et al. unpublished; Lawler et al. 2009). Bioclimatic models use statistical associations between the current range of a species and a suite of climate variables to predict future ranges under new climate conditions. The study focused on priority bird species currently found within BCRs in Canada. The results suggest that bird species turnover in Canada will be highest in northern BCRs as species ranges continue to shift northward in the coming decades. For the 56 species assessed in BCR 3-QC, the model predicts a gain of 88 species and a loss of 5 species, for a total turnover (species gains + species losses) of 166%.

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 17. 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 and documented.

Potential and realized effects of climate change	Examples of species affected
Mismatch between peak hatch and peak food abundance	Greater Scaup
Extended breeding season	Canada Goose
Habitat loss as a result of ecosystem changes	Semipalmated Sandpiper
Changes in ocean temperature and currents impact marine productivity and food webs	Thick-billed Murre
Increase in severe weather events	Red Knot (*rufa*), Semipalmated Sandpiper, Dunlin, Canada Goose, Common Eider (*borealis*), Common Eider (*sedentaria*), American Golden-Plover, Red-necked Phalarope
Thawing of permafrost and increased evaporation will result in vegetation shifts and loss of wetlands in arctic habitat	Semipalmated Sandpiper, Dunlin, Red-necked Phalarope

Table 18. 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. Minimize anthropogenic stressors (such as development and 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 management 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 2.1 Site/area management 1.1 Site/area protection	All species, but especially Red Knot (*rufa*), Semipalmated Sandpiper, Dunlin, Canada Goose, Common Eider (*borealis*), Common Eider (*sedentario*), Thick-billed Murre, American Golden-Plover, and Red-necked Phalarope

Table 18 continued

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

Research and Population Monitoring Needs

Population Monitoring

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

The lack of information remains a large concern for effective management of all priority species in BCR 3-QC. The remoteness of the BCR, the absence of roadways and its sparse population mean that priority species cannot be monitored using standard monitoring programs such as the Breeding Bird Survey.

The lack of biological or demographic data on all priority species in BCR 3-QC was considered a significant conservation issue. Examples of the species concerned are listed in Table 19, 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

- 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

- complete a first round of Arctic PRISM breeding shorebird surveys to obtain reliable population estimates and baseline distribution information across the Arctic;
- 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

Seabirds:

- develop a monitoring strategy for seabird colonies coordinated at the national level to ensure that priority colonies are regularly monitored through appropriate allocation of resources between regions and colonies;
- assess new techniques for counting seabirds such as the use of digital photography;
- determine to what extent pelagic surveys should emphasize the collection of replicate samples in the same locations to estimate inter-year sampling trends of different regions to expand geographic coverage.

Inland waterbirds/marshbirds:

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

Waterfowl

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

Table 19. Species categories, possible monitoring approaches, and example priority species in BCR 3-QC for which there are currently insufficient data to reliably estimate population trend at the BCR scale.

Category	Possible monitoring approaches	Example priority species
Landbirds	Develop and implement a long-term monitoring program for breeding birds in the Arctic. Develop and implement a long-term monitoring program for cliff-nesting birds (birds of prey).	Rough-legged Hawk, Gyrfalcon, Peregrine Falcon (*anatum/tundrius*), Snowy Owl, Short-eared Owl, Rock Ptarmigan, Snow Bunting, Lapland Longspur, Hoary Redpoll
Shorebirds	Implement the Program for Regional and International Shorebird Monitoring (PRISM) protocol in order to determine the distribution and abundance of shorebirds and, if possible, to identify, characterize and protect critical nesting and roosting sites. Monitor potential roosting sites in the coastal areas of Hudson Bay and Ungava Bay.	Red Knot (*rufa*), Semipalmated Sandpiper, Dunlin, Red-necked Phalarope, American Golden Plover
Waterbirds	Compile an inventory of the breeding colonies of the Thick-billed Murre on Akpatok Island, the Digges Islands and Cape Wolstenholme. Develop a seabird monitoring program for the coastal areas of the BCR.	Thick-billed Murre, Arctic Tern
Waterfowl	Update the Waterfowl Survey of Northern Quebec. Maintain the current Canada Geese (Atlantic population) banding program and expand it to include other priority species of waterfowl in the BCR. Develop a monitoring program to assess the population trends of the *sedentaria* and *borealis* sub-species of the Common Eider.	Canada Goose (Atlantic population), Common Eider (*borealis*), Common Eider (*sedentaria*), Greater Scaup, Long-tailed Duck, Red-breasted Merganser, American Scoter

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 in Table 20 are bigger picture questions, and not necessarily a schedule of studies, that are needed to determine the needs of individual species. 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 20. General research objectives in BCR 3-QC.

Objective	Priority species affected
Study the dynamics of avian cholera and the factors that contribute to outbreaks.	Common Eider (*borealis*), Common Eider (*sedentaria*)
Develop research projects to fill gaps in knowledge about the relationships among duck breeding, moulting and wintering sites in order to distinguish among the various populations.	Long-tailed Duck, Red-breasted Merganser, American Scoter
Identify priority areas for implementation of recommendations in BCR strategies.	All priority species.
Where they do not already exist, conduct research to develop materials setting out sector-specific beneficial management practices (BMPs), 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.
Engage in and support climate change research with respect to: - links among climate, prey species, and priority seabirds; modelling potential responses to changes in climatic conditions - alteration and loss of coastal habitat with predicted sea-level rise, and effects on priority species - range expansion or contraction among priority bird species - identification of vulnerable species	All priority species, but especially Rough-legged Hawk, Gyrfalcon, Snowy Owl, Rock Ptarmigan, Snow Bunting, Lapland Longspur, Hoary Redpoll
Conduct research to determine the effects of disturbance on birds at sea and assess their resilience to disturbance, both during and outside the breeding season. Increase survey efforts to accurately map the seasonal distribution and abundance of seaducks, coastal seabirds and pelagic seabirds to identify those sectors of the economy with which they may come into significant conflict.	All seabirds and seaducks.
Assess the potential effects of coastal and offshore wind developments on birds, including both direct (collision mortality) and indirect (habitat loss due to avoidance of turbine installations) effects. Identify particularly vulnerable species.	All birds found in coastal and offshore areas, including migrating individuals/flocks.

Threats Outside Canada

Many bird species found in Canada spend a large portion of their life-cycle outside the country (Fig. 18). These species face threats while they are outside Canada; in fact, threats to some migratory species may be most severe outside the breeding season (Calvert et al. 2009). Of the 25 priority species in BCR 3-QC, 23 (92%) are migratory and spend part of their annual cycle—up to half the year or more—outside Canada.

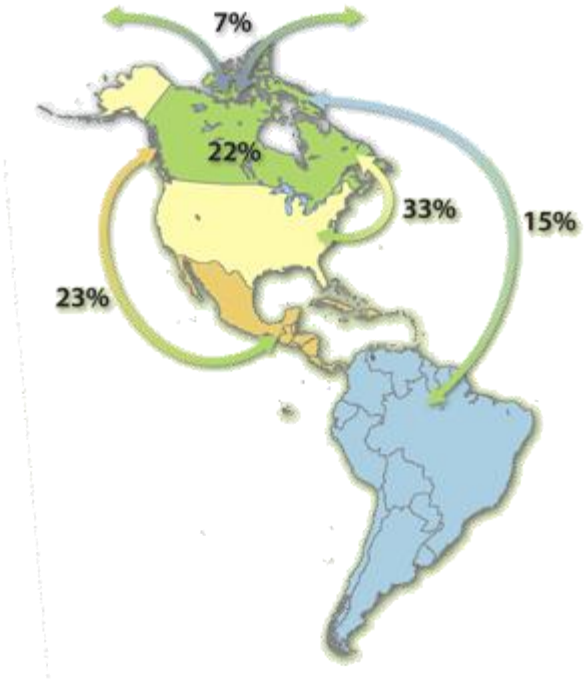

Figure 18. Percent of Canadian breeding birds that migrate to regions outside Canada for part of their life-cycle (North American Bird Conservation Initiative 2012).

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 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 Canada.

Nevertheless, some information is available to guide conservation stakeholders outside Canada. Figure 19 shows that several priority bird species in BCR 3-QC are threatened by the loss or degradation of key migration and wintering habitats. The primary causes of habitat loss or degradation are the conversion of grassland and wetlands for agricultural purposes (IUCN - International Union for Conservation of Nature sub-category 2.1) and residential development (IUCN sub-category 1.1). Loss and degradation of wintering habitat is a greater threat to species with relatively small and concentrated wintering areas. The Red Knot (*rufa*) and the Semipalmated Sandpiper are particularly vulnerable when large numbers of individuals are concentrated in a handful of roosting sites. The loss or degradation of these areas could have devastating effects on such species.

In addition to habitat loss, priority birds in BCR 3-QC suffer increased mortality due to human-induced threats during migration and wintering. Exposure to industrial contaminants such as hydrocarbons and heavy metals (sub-category 9.2) has lethal and sub-lethal effects on priority species. Other significant causes of mortality among priority species outside Canada are hunting and fishing (sub-categories 5.1 and 5.4), in particular lead poisoning (ingestion of hunting pellets), legal or illegal hunting and accidental mortality (e.g. getting caught in fishing nets).

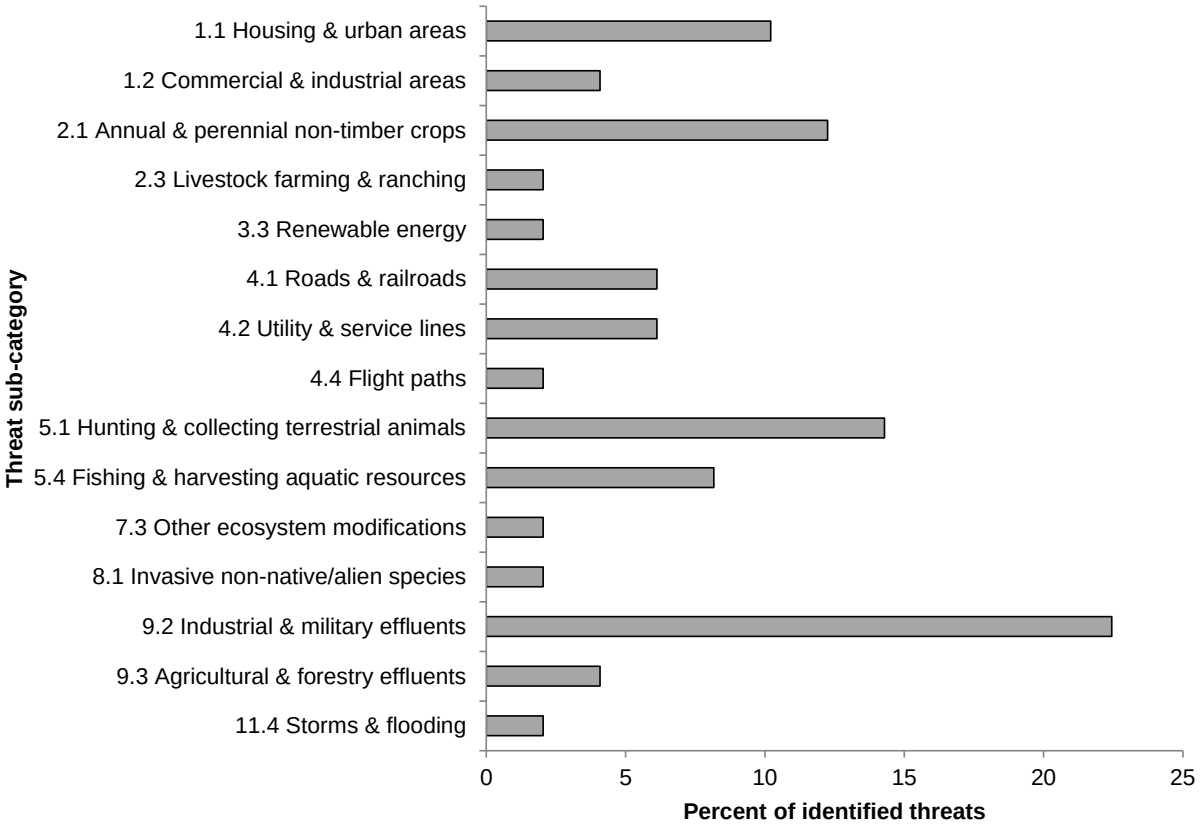

Figure 19. Percent of identified threats to priority species (by threat sub-category) in BCR 3-QC when they are outside Canada.

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.

References

Aubry, Y. and R. Cotter. 2007. *Québec Shorebird Conservation Plan*. Environment Canada, Canadian Wildlife Service, Quebec region, Sainte‑Foy, xvi + 203 p.

Avian Monitoring Review Steering Committee. 2012. Environment Canada Avian Monitoring Review – Final Report. Environment Canada, Ottawa ON, xii + 170 pages + 3 appendices.

Bourque, A. and G. Simonet. 2008. "Quebec", *in* From Impacts to Adaptation: Canada in a Changing Climate 2007, *edited by* D.S. Lemmen, F.J. Warren, J. Lacroix and E. Bush. Government of Canada, Ottawa, ON, pp. 171-226. www.nrcan.gc.ca/sites/www.nrcan.gc.ca.earth-sciences/files/pdf/assess/2007/pdf/ch5_e.pdf.

Brown, R.G. B. Revision: A. R. Lock. 2003. *Oil pollution and birds*. Hinterland Who's Who. Minister of the Environment, Environment Canada. www.hww.ca/en/issues-and-topics/oil-pollution-and-birds.html. Accessed 4 April 2012.

Calvert, A.M., C.A. Bishop, R.D. Elliot, E.A. Krebs, T.M. Kydd, C.S. Machtans and G.J. Robertson. 2013. *A synthesis of human-related avian mortality in Canada.* Avian Conservation and Ecology - Écologie et conservation des oiseaux 8(2):11. www.ace-eco.org/vol8/iss2/art11/.

Calvert, A.M., S.J. Walde and P.D. Taylor. 2009. *Non-breeding drivers of population dynamics in seasonal migrants: Conservation parallels across taxa.* Avian Conservation and Ecology - Écologie et conservation des oiseaux, 4 (2): 5. www.ace-eco.org/vol4/iss2/art5/.

Chapdelaine, G. and J.-F. Rail. 2004. *Québec's Waterbird Conservation Plan*. Migratory Bird Division, Canadian Wildlife Service, Quebec Region, Environment Canada, Sainte-Foy, Quebec. 99 p. http://publications.gc.ca/collections/Collection/CW66-228-2-2004E.pdf.

Donaldson, G. M., C. Hyslop, R. I. G. Morrison, H. L. Dickson, and I. Davidson (editors). 2000. *Canadian Shorebird Conservation Plan*. Canadian Wildlife Service, Environment Canada, Ottawa, Ontario. 27pp. http://publications.gc.ca/site/eng/402194/publication.html.

Drolet, B., V. Carignan, M.-A. Vaillancourt and G. Falardeau. 2010. *Plan de conservation des oiseaux terrestres du Québec : volume 1, oiseaux des milieux forestiers*. Unpublished working document, Environment Canada, Canadian Wildlife Service, Quebec Region.

Ecological Stratification Working Group. 1996. *A National Ecological Framework for Canada.* Agriculture and Agri-Food Canada, Research Branch, Centre for Land and Biological Resources Research and Environment Canada, State of the Environment Directorate, Ecozone Analysis Branch, Ottawa/Hull. Report and national map at 1:7500 000 scale. http://sis.agr.gc.ca/cansis/publications/manuals/1996/index.html.

Eeva, T. and E. Lehikoinen. 2000. *Recovery of breeding success in wild birds*. Nature 403: 851-852.

Environment Canada. 2003. *Great Lakes Fact Sheet. Fish and wildlife health effects in the Canadian Great Lakes areas of concern*. 2003. http://publications.gc.ca/site/eng/244150/publication.html ISBN 0-662-34076-0.

Équipe de rétablissement de l'aigle royal au Québec. 2005. *Plan de rétablissement de l'aigle royal* (Aquila chrysaetos) *au Québec 2005-2010*. Ministère des Ressources naturelles et de la Faune du Québec, Secteur Faune Québec. 29 p.

Faaborg, J., R.T. Holmes, A.D. Anders, K.L. Bildstein, K.M. Dugger, S.A. Gauthreaux, P. Heglund, K.A. Hobson, A.E. Jahn, D.H. Johnson, S.C. Latta, D.J. Levey, P.P. Marra, C.L. Merkord, E. Nol, S.I. Rothstein, T.W. Sherry, T.S. Sillett, F.R. Thompson and N. Warnock. 2010. *Conserving migratory land birds in the New World: Do we know enough?* Ecological Applications, 20 (2): 398-418.

Falardeau, G., V. Carignan, B. Drolet and M.-A. Vaillancourt. 2010. *Plan de conservation des oiseaux terrestres du Québec, volume 2 : les oiseaux des milieux agricoles, humides, urbains, arctiques, alpins et des falaises.* Unpublished working document, Environment Canada, Canadian Wildlife Service, Quebec Region.

Food and Agriculture Organization (FAO). 2000. *Land cover classification system*. United Nations Food and Agriculture Organization, Rome. www.fao.org/docrep/003/x0596e/x0596e00.htm.

Franceschini, M.D., C.M. Custer, T.W. Custer, J.M. Reed and L.M. Romero. 2008. *Corticosterone stress response in tree swallows nesting near polychlorinated biphenyl- and dioxin-contaminated rivers.* Environmental Toxicology and Chemistry, 27: 2326–2331.

Gouvernement du Québec. 2002. *Portrait général de l'eau*. www.mddep.gouv.qc.ca/eau/regions/ (Accessed 7 August 2012).

Gouvernement du Québec. 2013. *Le Nord pour tous*. www.nord.gouv.qc.ca/ (Accessed 21 October 2013).

Institut de la Statistique du Québec. 2010. Principaux sommets, par région administrative et selon la chaîne de montagnes, Québec. www.stat.gouv.qc.ca/publications/referenc/quebec_stat/ter_ter/ter_ter_4.htm (Accessed 10 June 2013).

Kennedy, J.A., E.A. Krebs and A.F. Camfield. 2012. *A Manual for Completing All-bird Conservation Plans in Canada*, April 2012 version. Canadian Wildlife Service, Environment Canada. Ottawa, Ontario.

Lawler, J.L., J.-F. Gobeil, A. Baril, K. Lindsay, A. Fenech and N. Comer. *Potential Range Shifts of Bird Species in Canadian Bird Conservation Regions Under Climate Change*. Unpublished technical report from the Canadian Wildlife Service.

Lawler, J. J., S. L. Shafer, D. White, P. Kareiva, E. P. Maurer, A. R. Blaustein and P. J. Bartlein. 2009. *Projected climate-induced faunal change in the western hemisphere*. Ecology 90: 588-597.

Lepage, C., D. Bordage, D. Dauphin, F. Bolduc and B. Audet. In preparation. *Quebec Waterfowl Conservation Plan, 2010*. Environment Canada, Canadian Wildlife Service, Quebec region, Quebec City.

Li, T. and J.-P. Ducruc. 1999. *Les provinces naturelles. Niveau I du cadre écologique de référence du Québec*. Ministère de l'Environnement. www.mddep.gouv.qc.ca/biodiversite/aires_protegees/provinces/ (Accessed 10 October 2012).

Milko, R., L. Dickson, R. Elliot, and G. Donaldson. 2003. *Wings Over Water: Canada's Waterbird Conservation Plan*. Canadian Wildlife Service, Environment Canada, Ottawa, Ontario. 28pp.

Mineau, P. 2010. *Avian mortality from pesticides used in agriculture in Canada.* Wildlife and Landscape Science Directorate unpublished report. Environment Canada Science and Technology Branch.

Ministère des Ressources naturelles. 2013. *Zones de végétation et domaines bioclimatiques du Québec*. www.mrn.gouv.qc.ca/forets/inventaire/inventaire-zones.jsp (Accessed 28 February 2013).

Ministère du Développement durable, de l'Environnement, de la Faune et des Parcs. 2013. *Liste des espèces désignées menacées ou vulnérables au Québec*. www.mddefp.gouv.qc.ca/faune/especes/menacees/liste.asp (Accessed 28 February 2013).

National Audubon Society. 2009. *Birds and Climate Change – Ecological Disruption in Motion*. 16 pages.

North American Bird Conservation Initiative (NABCI). 2012. *The State of Canada's Birds, 2012*. Environment Canada, Ottawa, Canada. 36 pp.

North American Bird Conservation Initiative, U.S. Committee, 2009. *The State of the Birds, United States of America, 2009*. U.S. Department of Interior, Washington D.C. 36 pages.

North American Bird Conservation Initiative, U.S. Committee, 2010. *The State of the Birds 2010 Report on Climate Change, United States of America*. U.S. Department of the Interior, Washington D.C.

North American Waterfowl Management Plan, Plan Committee. 2004. North American Waterfowl Management Plan 2004. *Implementation Framework: Strengthening the Biological Foundation*. Canadian Wildlife Service, U.S. Fish and Wildlife Service, Secretaria de Medio Ambiente y Recursos Naturales, 106 pp. www.nawmp.ca/pdf/impfr-en-k.pdf.

Panjabi, A. O., E. H. Dunn, P. J. Blancher, W. C. Hunter, B. Altman, J. Bart, C. J. Beardmore, H. Berlanga, G. S. Butcher, S. K. Davis, D. W. Demarest, R. Dettmers, W. Easton, H. Gomez de Silva Garza, E. E. Iñigo-Elias, D. N. Pashley, C. J. Ralph, T. D. Rich, K. V. Rosenberg, C. M. Rustay, J. M. Ruth, J. S. Wendt, and T. C. Will. 2005. *The Partners in Flight Handbook on Species Assessment. Version 2005*. Partners in Flight Technical Series No. 3. Rocky Mountain Bird Observatory website: www.rmbo.org/pubs/downloads/Handbook2005.pdf.

Rich, T.D., C.J. Beardmore, H. Berlanga, P.J. Blancher, M.S.W. Bradstreet, G.S. Butcher, D.W. Demarest, E.H. Dunn, W.C. Hunter, E.E. Iñigo-Elias, J.A. Kennedy, A.M. Martell, A.O. Panjabi, D.N. Pashley, K.V. Rosenberg, C.M. Rustay, J.S. Wendt and T.C. Will. 2004. *Partners in Flight North American Landbird Conservation Plan.* Cornell Lab of Ornithology. Ithaca, New York.

Salafsky, N., D. Salzer, A.J. Stattersfield, C. Hilton-Taylor, R. Neugarten, S.H.M. Butchart, B. Collen, N. Cox, L.L. Master, S. O'Connor and D. Wilkie. 2008. *A standard lexicon for biodiversity conservation: Unified classifications of threats and actions*. Conservation Biology, 22 (4): 897-911.

Scheuhammer, A.M., and S.L. Norris. 1996. *The ecotoxicology of lead shot and lead fishing weights.* Ecotoxicology, 5: 279-295.

Scheuhammer, A.M., S. L. Money, D. A. Kirk, and G. Donaldson. 2003. *Lead fishing sinkers and jigs in Canada: Review of their use patterns and toxic impacts on wildlife*. Occasional Paper no. 108. Canadian Wildlife Service.

Species at Risk Public Registry. Accessed 13 October 2012. *Schedule 1: List of Wildlife Species at Risk*. www.sararegistry.gc.ca/species/schedules_e.cfm?id=1.

Statistics Canada. 2012. *Population and dwelling counts, for Canada, provinces and territories, and census subdivisions (municipalities), 2011 and 2006 censuses*. http://www12.statcan.gc.ca/census-recensement/2011/dp-pd/hlt-fst/pd-pl/Table-Tableau.cfm?Lang=eng&T=302&PR=24&S=51&O=A&RPP=25 (Accessed 10 Sept. 2012).

Zimmerling, J.R., A. Pomeroy, M.V. d'Entremont et C.M. Francis. 2013. *Canadian Estimate of bird mortality due to collisions and direct habitat loss associated with wind turbine developments*. Avian Conservation and Ecology - Écologie et conservation des oiseaux 8(2):10. www.ace-eco.org/vol8/iss2/art10/.

Appendix 1

List of All Bird Species in BCR 3-QC

Table A1. Complete list of species in BCR 3-QC when they are in the BCR (breeding, migrant, wintering, seasonal) and their priority status.

Scientific Name	Common Name	Bird Group	Breeding	Migrant	Wintering	Seasonal	Priority
Aquila chrysaetos	Golden Eagle	Landbird	X				X
Eremophila alpestris	Horned Lark (*strigata*)	Landbird	X				
Zonotrichia leucophrys	White-crowned Sparrow	Landbird	X				
Passerculus sandwichensis	Savannah Sparrow	Landbird	X				
Spizella arborea	American Tree Sparrow	Landbird	X				
Buteo lagopus	Rough-legged Hawk	Landbird	X				X
Sturnus vulgaris	Common Starling	Landbird	X				
Falco rusticolus	Gyrfalcon	Landbird	X				X
Falco peregrinus anatum/tundrius	Peregrine Falcon (*anatum/tundrius*)	Landbird	X				X
Corvus corax	Common Raven	Landbird	X				
Bubo scandiacus	Snowy Owl	Landbird	X		X		X
Asio flammeus	Short-eared Owl	Landbird	X				X
Lagopus muta	Rock Ptarmigan	Landbird	X		X		X
Lagopus lagopus	Willow Ptarmigan	Landbird	X		X		
Turdus migratorius	American Robin	Landbird	X				
Empidonax alnorum	Alder Flycatcher	Landbird	X				
Anthus rubescens	American Pipit	Landbird	X				
Plectrophenax nivalis	Snow Bunting	Landbird	X				X
Calcarius lapponicus	Lapland Longspur	Landbird	X				X
Acanthis hornemanni	Hoary Redpoll	Landbird	X		X		X
Acanthis flammea	Common Redpoll	Landbird	X				
Oenanthe oenanthe	Northern Wheatear	Landbird	X				
Calidris melanotos	Pectoral Sandpiper	Shorebird	X				

Table A1 continued

Scientific Name	Common Name	Bird Group	Breeding	Migrant	Wintering	Seasonal	Priority
Calidris canutus rufa	Red Knot (*rufa*)	Shorebird		X			X
Calidris minutilla	Least Sandpiper	Shorebird	X				
Calidris pusilla	Semipalmated Sandpiper	Shorebird	X				X
Calidris alpine	Dunlin	Shorebird	X				X
Gallinago delicata	Wilson's Snipe	Shorebird	X				
Actitis macularius	Spotted Sandpiper	Shorebird	X				
Phalaropus lobatus	Red-necked Phalarope	Shorebird	X				X
Pluvialis dominica	American Golden Plover	Shorebird	X				X
Charadrius semipalmatus	Semipalmated Plover	Shorebird	X				
Larus glaucoides	Iceland Gull	Waterbird	X				
Larus argentatus	Herring Gull	Waterbird	X				
Larus hyperboreus	Glaucous Gull	Waterbird	X		X		
Larus marinus	Great Black-backed Gull	Waterbird	X				
Cepphus grille	Black Guillemot	Waterbird	X		X		
Uria lomvia	Thick-billed Murre	Waterbird	X		X		X
Stercorarius longicaudus	Long-tailed Jaeger	Waterbird	X				
Stercorarius parasiticus	Parasitic Jaeger	Waterbird	X				
Stercorarius pomarinus	Pomarine Jaeger	Waterbird	X				
Alca torda	Razorbill	Waterbird	X				
Gavia stellate	Red-throated Loon	Waterbird	X				
Gavia pacifica	Pacific Loon	Waterbird	X				
Gavia immer	Common Loon	Waterbird	X				X
Sterna paradisaea	Arctic Tern	Waterbird	X				X
Branta hutchinsii	Cackling Goose	Waterfowl	X	X			
Branta canadensis	Canada Goose (North Atlantic population)	Waterfowl	X	X			
Branta canadensis	Canada Goose (Atlantic population)	Waterfowl	X	X			X
Branta canadensis	Canada Goose (resident population)	Waterfowl				X	
Anas platyrhynchos	Mallard	Waterfowl	X	X			

Table A1 continued

Scientific Name	Common Name	Bird Group	Breeding	Migrant	Wintering	Seasonal	Priority
Anas rubripes	American Black Duck	Waterfowl	X	X			
Anas acuta	Northern Pintail	Waterfowl	X	X			
Anas clypeata	Northern Shoveler	Waterfowl	X	X			
Cygnus columbianus	Tundra Swan	Waterfowl	X	X			
Somateria mollissima borealis	Common Eider (*borealis*)	Waterfowl	X				X
Somateria mollissima sedentaria	Common Eider (*sedentaria*)	Waterfowl	X		X		X
Somateria spectabilis	King Eider	Waterfowl	X	X	X		
Aythya marila	Greater Scaup	Waterfowl	X	X			X
Bucephala islandica	Barrow's Goldeneye (Eastern population)	Waterfowl				X	
Clangula hyemalis	Long-tailed Duck	Waterfowl	X	X			X
Mergus serrator	Red-breasted Merganser	Waterfowl	X	X			X
Melanitta americana	American Scoter	Waterfowl	X	X			X
Chen caerulescens	Snow Goose	Waterfowl	X	X			
Anas crecca	Green-winged Teal	Waterfowl	X	X			

Appendix 2

General Methodology for Compiling the Six Standard Elements

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

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

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

Element 1: Species Assessment to Identify Priority Species

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

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

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

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

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

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

Element 2: Habitats Important to Priority Species

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

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

Element 3: Population Objectives for Priority Species

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

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

Population objectives for all bird groups are based on a quantitative or qualitative assessment of species' population trends. If the population trend for a species is unknown, the objective is usually "assess and maintain", and a monitoring objective is set. Harvested waterfowl and stewardship species that are already at desired population levels are given an objective of "maintain". For any species listed under the 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 using 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 (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 unified classification of threats (adapted from Salafsky et al. 2008).

Category Number	Threat Category and Sub-category
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
8	Invasive & other problematic species & genes
8.1	Invasive non-native/alien species
8.2	Problematic native species
8.3	Introduced genetic material

Table A2 continued

Category Number	Threat Category and Sub-category
9	Pollution
9.1	Household sewage & urban waste water
9.2	Industrial & military effluents
9.3	Agricultural & forestry effluents
9.4	Garbage & solid waste
9.5	Air-borne pollutants
9.6	Excess energy
10	Geological events
10.1	Volcanoes
10.2	Earthquakes/tsunamis
10.3	Avalanches/landslides
11	Climate change & severe weather
11.1	Habitat shifting & alteration
11.2	Droughts
11.3	Temperature extremes
11.4	Storms & flooding
11.5	Other impacts
12	Other direct threats
12.1	Information lacking

Element 5: Conservation Objectives

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

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

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

Conservation objectives generally fall into one of two broad categories:

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

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

Element 6: Recommended Actions

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

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

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

Appendix 3

Species Added or Removed from the BCR 3-QC Priority List

Table A3. List of species added or removed from the BCR 3-QC priority list and their assessment characteristics.

Species[1]	Presence[2]	Standardized Assessment: Legal Status[3] Fed.	Standardized Assessment: Legal Status[3] Prov.	Standardized Assessment: Bird Group Score[4]	Reason for which regional experts have added or removed a species (after the standardized assessment)
ADDED					
WATERFOWL					
American Scoter	Br/Mi			Moderately low	BCR 3-QC accounts for a large percentage of the observations of the species in Quebec
Greater Scaup	Br/Mi			N/A	BCR 3-QC accounts for a large percentage of the observations of the species in Quebec
Red-breasted Merganser	Br/Mi			N/A	BCR 3-QC accounts for a large percentage of the observations of the species in Quebec
REMOVED					
WATERBIRDS					
Herring Gull	Br			Tier 2	Bird group score lowered by regional experts
Pacific Loon	Br			Tier 2	Number of breeding pairs in BCR 3-QC is too low

[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.
[3] Federal: Schedule 1 of the SARA, SC = Special Concern. Provincial: *Loi sur les espèces menacées ou vulnérables*, V = Vulnérable.
[4] 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). Refer to 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			Reason for which regional experts have added or removed a species (after the standardized assessment)
		Legal Status[3]		Bird Group Score[4]	
		Fed.	Prov.		
WATERFOWL					
Barrow's Goldeneye (Eastern population)	Mo	SC	V	N/A	Number of individuals in BCR 3-QC is too low
King Eider	Br/Wi/Mi/Mo			High	Number of breeding pairs in BCR 3-QC is too low
Northern Pintail	Br/Mi			High	Number of breeding pairs in BCR 3-QC is too low
Snow Goose	Br/Mi			High	Bird group score lowered by regional experts
Tundra Swan	Br/Mi			High	Number of breeding pairs in BCR 3-QC is too low

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