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**Bird Conservation Strategy for Bird Conservation Region 14 and  
Marine Biogeographic Units 11 and 12 in New Brunswick:  
Atlantic Northern Forest, Bay of Fundy and Gulf of St. Lawrence**

November 2013



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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*.

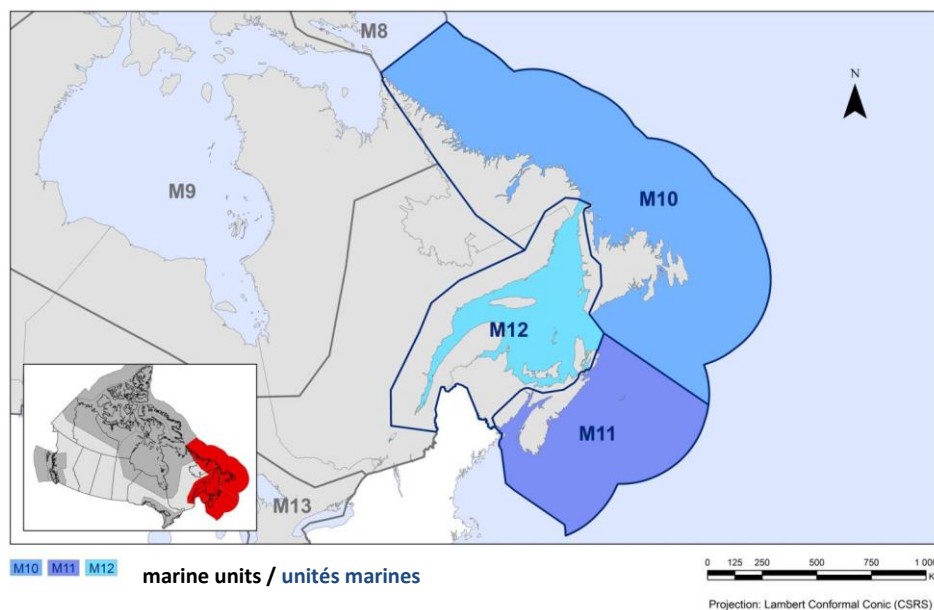
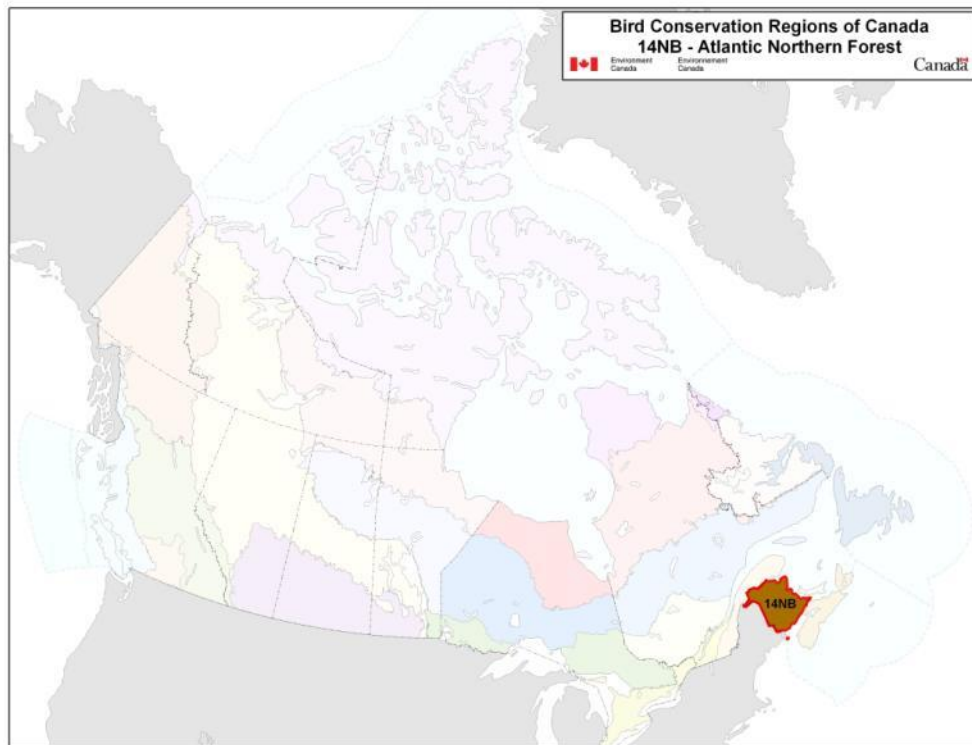
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# **Bird Conservation Strategy for Bird Conservation Region 14 and Marine Biogeographic Units 11 and 12 in New Brunswick: Atlantic Northern Forest, Bay of Fundy, and Gulf of St. Lawrence**



## Table of Contents

<b>Preface</b> .....	<b>i</b>
<b>Acknowledgements</b> .....	<b>i</b>
<b>Executive Summary</b> .....	<b>1</b>
<b>Introduction: Bird Conservation Strategies</b> .....	<b>3</b>
Context.....	3
Strategy Structure.....	4
Characteristics of Bird Conservation Region 14: Atlantic Northern Forest in New Brunswick ..	5
Characteristics of Marine Biogeographic Unit 11: Bay of Fundy of New Brunswick .....	9
Characteristics of Marine Biogeographic Unit 12: Gulf of St. Lawrence of New Brunswick ....	11
<b>Section 1: Summary of Results – All Birds, All Habitats</b> .....	<b>13</b>
Element 1: Priority Species Assessment .....	13
Element 2: Habitats Important to Priority Species .....	23
Element 3: Population Objectives.....	25
Element 4: Threat Assessment for Priority Species .....	28
Element 5: Conservation Objectives.....	34
Element 6: Recommended Actions.....	36
<b>Section 2: Conservation Needs by Habitat</b> .....	<b>40</b>
Coniferous.....	40
Deciduous .....	47
Mixed Wood.....	54
Shrub/Early Successional .....	63
Herbaceous .....	67
Cultivated and Managed Areas.....	72
Urban (Artificial Surfaces and Bare Areas) .....	79
Wetlands .....	85
Riparian .....	93
Inland Waterbodies .....	101
Marine Waters – Bay of Fundy .....	108
Marine Waters – Gulf of St. Lawrence.....	116
Coastal – Above High Tide .....	122
Coastal – Intertidal – Bay of Fundy .....	131
Coastal – Intertidal – Gulf of St. Lawrence .....	139
<b>Section 3: Additional Issues</b> .....	<b>146</b>
Widespread Issues .....	146
<i>Collisions</i> .....	146
<i>Predation by Domestic Cats</i> .....	149
<i>Pollution</i> .....	149
<i>Climate Change</i> .....	158
Research and Population Monitoring Needs.....	163
<i>Population Monitoring</i> .....	163
<i>Research</i> .....	165
Threats Outside Canada.....	167

<b>Next Steps .....</b>	<b>171</b>
<b>References .....</b>	<b>172</b>
<b>Appendix 1 .....</b>	<b>178</b>
List of All Bird Species in BCR 14 NB, MBU 11 NB and MBU 12 NB .....	178
List of All Priority Bird Species and Their Habitat Associations for BCR 14 NB, MBU 11 NB and MBU 12 NB.....	191
List of All Regional Threats in BCR 14 NB, MBU 11 NB and MBU 12 NB .....	196
<b>Appendix 2 .....</b>	<b>202</b>
General Methodology for Compiling the Six Standard Elements .....	202
<i>Element 1: Species Assessment to Identify Priority Species.....</i>	<i>202</i>
<i>Element 2: Habitats Important to Priority Species .....</i>	<i>204</i>
<i>Element 3: Population Objectives for Priority Species .....</i>	<i>204</i>
<i>Element 4: Threat Assessment for Priority Species .....</i>	<i>206</i>
<i>Element 5: Conservation Objectives .....</i>	<i>207</i>
<i>Element 6: Recommended Actions .....</i>	<i>208</i>
<b>Appendix 3 .....</b>	<b>209</b>
IUCN Threat Categories .....	209
IUCN Conservation Action Categories .....	212

## Executive Summary

The landscape of New Brunswick is typical of the Atlantic Northern Forest with mountainous terrain, lowland plains and coastal landforms. Northern temperate forests dominate New Brunswick; the dominant forest types are spruce-fir coniferous and to a lesser extent mixed deciduous-coniferous. The principal land use since European settlement has been forest resource harvesting. As of 2006, only 3% of New Brunswick's forest area remained untouched by humans. Of the four Atlantic provinces, New Brunswick does not have the largest proportion of agricultural land; however, its agricultural sector is the largest. The traditional fishery in New Brunswick is relatively small and has largely been replaced by aquaculture, making the province a leader in finfish and shellfish culture.

There are 71 priority bird species within the terrestrial and freshwater portions of Bird Conservation Region 14 in New Brunswick (BCR 14 NB) and 29 priority bird species in the marine water-dominated habitats of the Marine Biogeographic Units 11 and 12 around New Brunswick (MBU 11 NB and MBU 12 NB). Wetlands are used by the greatest number of priority bird species (49%), while 44% use forests and 30% use cultivated and managed areas. There are a variety of existing and potential threats to the region's avifauna. Many of these threats relate to land use, particularly forestry, and include loss or fragmentation of all forest types as a result of logging; habitat loss or fragmentation due to conversion of forest into managed coniferous forests or farmland; and decreases in diet quality, bird health or prey availability due to contamination of food sources related to biocide use in forestry or agriculture. Other threats relate to urban or recreational housing expansion along the coastline, such as habitat loss, disturbance by humans and shoreline modifications for the protection of coastal infrastructure (e.g., roads and houses).

The most frequently identified conservation objective is to ensure adequate habitat availability for priority bird species. As a result, 41% of recommended actions are related to the management or protection of sites or the protection or restoration of habitats.

New Brunswick has 5 500 km of coastline along two main marine waterbodies: the Gulf of St. Lawrence and the Bay of Fundy. There are 47 priority bird species in the coastal habitats of the 3 planning units. Of these, 17 use coastline above the high-tide line (BCR 14 NB), 32 use the intertidal coast of the Bay of Fundy (MBU 11 NB) and 24 use the intertidal coast of the Gulf of St. Lawrence (MBU 12 NB).

Common threats for priority bird species in all three coastal habitats include disturbances due to ATV traffic, dogs walking off-leash and human uses of beaches, and loss of specific habitat features due to changes in sedimentation patterns caused by the installation of riprap which hardens the shoreline. Priority birds in coastal habitats are also threatened by ocean oil spills and oil discharges from shipping activities. Recommended conservation actions to address the threats include managing coastal recreational and commercial activities to minimize disturbance to priority species; raising public awareness of priority birds and their habitat needs and the impacts of disturbance in coastal areas; and developing beneficial management

practices and avoidance guidelines to manage shipping activities and minimize accidental oil discharges.

The Bay of Fundy is one of the largest semi-enclosed coastal seas in North America and is recognized as one of the world's richest marine ecosystems with various marine and estuarine habitats. The MBU 11 NB includes the northern half of the Bay of Fundy, Passamaquoddy Bay and waters around the Grand Manan archipelago for a total area of 8 000 km<sup>2</sup>. The Bay of Fundy is renowned for extreme tidal variation and associated currents, and includes some of the most extensive intertidal mudflats, saltmarshes and saltmarsh estuaries in North America.

The Gulf of St. Lawrence is part of one of the largest and most productive estuaries in Canada. It is highly influenced by humans, as it is downstream from some of the largest urban, industrial, and agricultural areas and emitters of industrial and agricultural contaminants. The New Brunswick portion of MBU 12 is significantly warmer and shallower than the rest of the Gulf of St. Lawrence, although in winter this portion is predominantly ice-covered.

There are 29 priority bird species found in the marine waters of MBU 11 NB and 14 priority bird species in the marine waters of MBU 12 NB.

There are a variety of common threats to avifauna assemblages in these marine regions. Current threats include oil pollution from boat traffic, competition for resources or disturbances associated with the fishing industry and aquaculture operations. A combination of beneficial management practices, public education, changes in legislation and clean-up programs could help alleviate many of these threats.

This conservation strategy builds on existing bird conservation strategies and complements those created for the other BCRs across Canada. Collectively, the strategies will serve as a framework for implementing bird conservation nationally and also identify international conservation issues for Canada's priority birds. Strategies are not highly prescriptive, but rather are intended to guide future implementation efforts undertaken by various partners and stakeholders. More specifically, information presented in this document is based on an extensive and systematic literature review that, in turn, was reviewed by key regional experts on bird conservation. Planning and implementing conservation actions for priority birds in New Brunswick will necessitate further discussion and work in order to prioritize the recommended actions with key partners.



## 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,<sup>1</sup> waterbirds,<sup>2</sup> shorebirds<sup>3</sup> and landbirds<sup>4</sup>) 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.

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<sup>1</sup> NAWMP Plan Committee 2004.

<sup>2</sup> Milko et al. 2003.

<sup>3</sup> Donaldson et al. 2000.

<sup>4</sup> Rich et al. 2004.

## ***Strategy Structure***

This strategy includes three distinct planning units, the terrestrial portion of Bird Conservation Region 14 in New Brunswick (BCR 14 NB) and Marine Biogeographic Units 11 and 12 around New Brunswick (MBU 11 NB and MBU 12 NB). All three units have distinctive lists of priority bird species. Both MBUs have only two habitat classes: the waterbodies, snow and ice habitat class, and the coastal habitat class. To distinguish these habitat classes in the three planning units, they are renamed “marine waters” and “coastal (intertidal)” for MBU 11 and 12 NB, and “inland waterbodies” and “coastal (above high tide)” for BCR 14 NB.

Section 1 of this strategy presents general information about the BCR and MBUs and the subregion, with an overview of the six elements<sup>5</sup> 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](#).

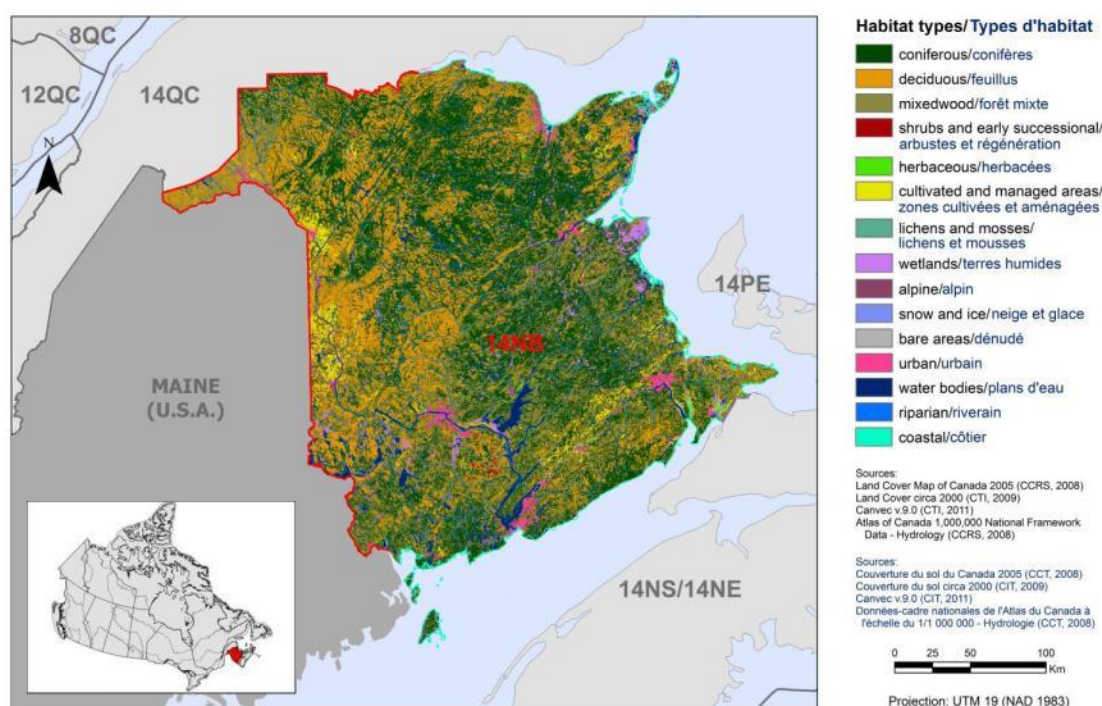
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<sup>5</sup> The six elements are: Element 1 – priority species assessment; Element 2 – habitats important to priority species; Element 3 – population objectives; Element 4 – threat assessment; Element 5 – conservation objectives; Element 6 – recommended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

## ***Characteristics of Bird Conservation Region 14: Atlantic Northern Forest in New Brunswick***

Bird Conservation Region 14 (Atlantic Northern Forest) encompasses an area greater than 35.6 million ha and includes the Maritime provinces, the Gaspé Peninsula and the Eastern Townships in Canada, and most of the states of Maine, New Hampshire and Vermont, and parts of New York, Massachusetts and Connecticut in the United States (Dettmers 2006). Most of this BCR is low-mountainous or open hilly country interspersed with valleys and plains; nearly 85% of the BCR is classified as some type of forest (including regenerating forest; Dettmers 2006).

The portion of BCR 14 in the province of New Brunswick extends over 73 000 km<sup>2</sup> and reflects the combination of mountainous, lowland plain and coastal landforms encompassed within the Atlantic Northern Forest (also known as the Acadian Forest; Fig. 1). The maps in this document are drawn at scales and resolutions that differ from the land cover percentages provided; however, Dettmers (2006) has estimated that there are 15 different land cover types in all of BCR 14 and within each province and state. The estimates may not be current, but they do provide a relative idea of the importance (in terms of size) of particular habitat types within BCR 14 NB.



**Figure 1. Land cover in BCR 14 in New Brunswick, Atlantic Northern Forest.**

Northern temperate forests dominate a large portion of BCR 14 NB, and the most predominant forest types include coniferous forests (called evergreen forest in Dettmers (2006); 27 000 km<sup>2</sup>), mixed deciduous-coniferous forests (14 000 km<sup>2</sup>) and deciduous forests (13 000 km<sup>2</sup>). Early successional/shrubland habitat including regenerating forests (5 300 km<sup>2</sup>) and natural

shrublands (650 km<sup>2</sup>) is another major habitat type in BCR 14 NB. New Brunswick also contains considerable amounts of wetland habitat, including 1 500 km of coastal habitats (e.g., emergent saltmarsh, mud flats, and open water areas associated with estuaries and bays), emergent herbaceous wetlands (2 500 km<sup>2</sup>), freshwater forested wetlands (2 700 km<sup>2</sup>), and open freshwater lakes, streams and rivers (1 800 km<sup>2</sup>; Dettmers (2006)). Agricultural and cultivated areas cover 3 000 km<sup>2</sup> (Dettmers 2006). Urban areas include residential areas (1 060 km<sup>2</sup>), commercial and industrial areas (1 160 km<sup>2</sup>), and mines and quarries (164 km<sup>2</sup>; Dettmers 2006).

New Brunswick experiences large seasonal temperature differences, cold winters and warm (and often humid) summers. Unlike the other Maritime provinces, New Brunswick is somewhat sheltered from the Atlantic Ocean and has a large interior that is removed from the ocean's moderating effects.

The principal land use since European settlement has been harvesting of the extensive forest resources. New Brunswick has the third-largest land area of forest in Atlantic Canada, but it is the leading province in the forestry and logging sector, accounting for 60% of the gross domestic product (GDP) in this sector for the region (Vasarhelyi and Kirk 2007). New Brunswick has only 3% of its forest ecozone area intact, and as of 2006, only fragments of intact forest remain, none of which were larger than 300 km<sup>2</sup> (Conservation Council of NB 2010).

While it does not have the largest proportion of land area in agriculture, New Brunswick is the leading province in the agricultural sector, accounting for 55% of the GDP for Atlantic Canada (Vasarhelyi and Kirk 2007). In 1996, 35% of agricultural land was in crops (Statistics Canada 2008) mainly potatoes, greenhouse production and ornamental crops, fruit and berries, vegetables, and grains (New Brunswick Department of Agriculture, Aquaculture and Fisheries, n.d.).

Only a relatively small share of the traditional fishery industry in Atlantic Canada occurs in New Brunswick. However, New Brunswick has the largest aquaculture fishery including both finfish (100 farms) and shellfish (500 sites; Vasarhelyi and Kirk 2007).

Recreational activities are the other significant land uses of this planning unit. In 2010, New Brunswick welcomed an estimated 2.96 million visits of one or more nights from New Brunswick residents on out-of-town trips, and from visitors from other parts of Canada, the United States and overseas (New Brunswick Department of Culture, Tourism and Healthy Living 2012). The tourism industry is worth an estimated \$738 million (or 3.5% of the provincial GDP; New Brunswick Department of Culture, Tourism and Healthy Living 2012).

Vasarhelyi and Kirk (2007) ranked industries according to their relative impacts on migratory birds based on their areal extent, importance of GDP or number of people employed. For New Brunswick, forestry is the highest ranked industry, followed by agriculture, electrical generation and commercial fishing (Vasarhelyi and Kirk 2007).

There are 15 First Nation reserves in New Brunswick, identified as either Wolastoqiyik (people of the Saint John River Valley, formerly known as Maliseets) or Mi'kmaq (Aboriginal Affairs and Northern Development Canada 2012). While the Mi'kmaq were semi-nomadic and harvested wildlife available to them (seafood, big and small mammals, fish, seabirds, and eggs), the Wolastoqiyik were primarily sedentary people who supplemented their diets by hunting, fishing, and gathering fruits, berries, nuts and natural produce. The current traditions of the Mi'kmaq and Wolastoqiyik have changed and evolved over time, much of it through French and British colonization of what is now Canada (McMillan 1995); both value all wildlife and life forms within and beyond their territory (Berneshawi 1997). The Maritimes Aboriginal harvest for waterfowl has decreased dramatically and is now a peripheral activity (Benoît 2007).

There are a variety of current and potential threats to the region's avifauna. Many of the threats are related to anthropogenic land use, particularly forestry activities. Threats include loss or fragmentation of all forest types as a result of logging activities; decreases in diet quality, in the health of birds, or in prey availability due to contamination of food sources from biocides such as pesticides, herbicides or fungicides used by forestry; and loss and fragmentation of forest types due to the construction and maintenance of roads (including service and logging roads).

Three percent (3%) of New Brunswick's biome is protected either as provincially or federally administered protected areas (Canadian Council on Ecological Areas 2011; Fig. 2). Environment Canada manages 5 National Wildlife Areas and 3 Migratory Bird Sanctuaries for a total area of 70 km<sup>2</sup>, while Parks Canada Agency manages 2 National Parks for a total area of 445 km<sup>2</sup>. However, the majority (in both numbers and total surface area) of the protected areas are provincially managed: 64 areas totalling 1 763 km<sup>2</sup>. The ability of governments to establish protected areas is limited by the amount and location of Crown land. In New Brunswick, half of the land base is privately owned. In addition to protected areas, there are a number of environmental non-governmental organizations engaged in securing and managing lands for conservation. The major organizations engaged in these activities in New Brunswick are:

- Ducks Unlimited Canada (212 km<sup>2</sup> of waterfowl habitat, either owned or with restrictive covenants);
- New Brunswick Nature Trust (20 km<sup>2</sup>); and
- Nature Conservancy Canada (owns or has easements on 38 km<sup>2</sup>).

In addition, designations that recognize ecological uniqueness (but do not formally protect habitat) have elevated public awareness and promoted the conservation of ecologically significant habitats. These include:

- the Bay of Fundy Biosphere Reserve (4 300 km<sup>2</sup>);
- The Bay of Fundy Western Hemisphere Shorebird Reserve Network site (620 km<sup>2</sup>);
- 3 wetlands recognized under the Ramsar Convention on Wetlands of International Importance (184 km<sup>2</sup>); and
- 11 Important Bird Areas (2 620 km<sup>2</sup>).

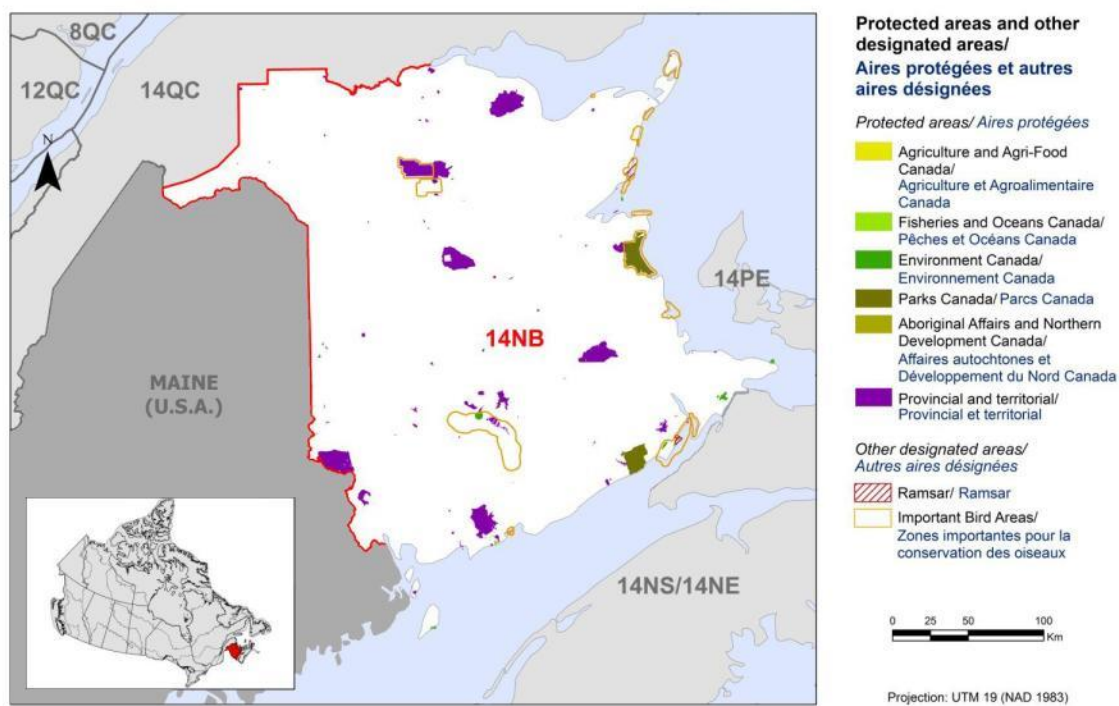
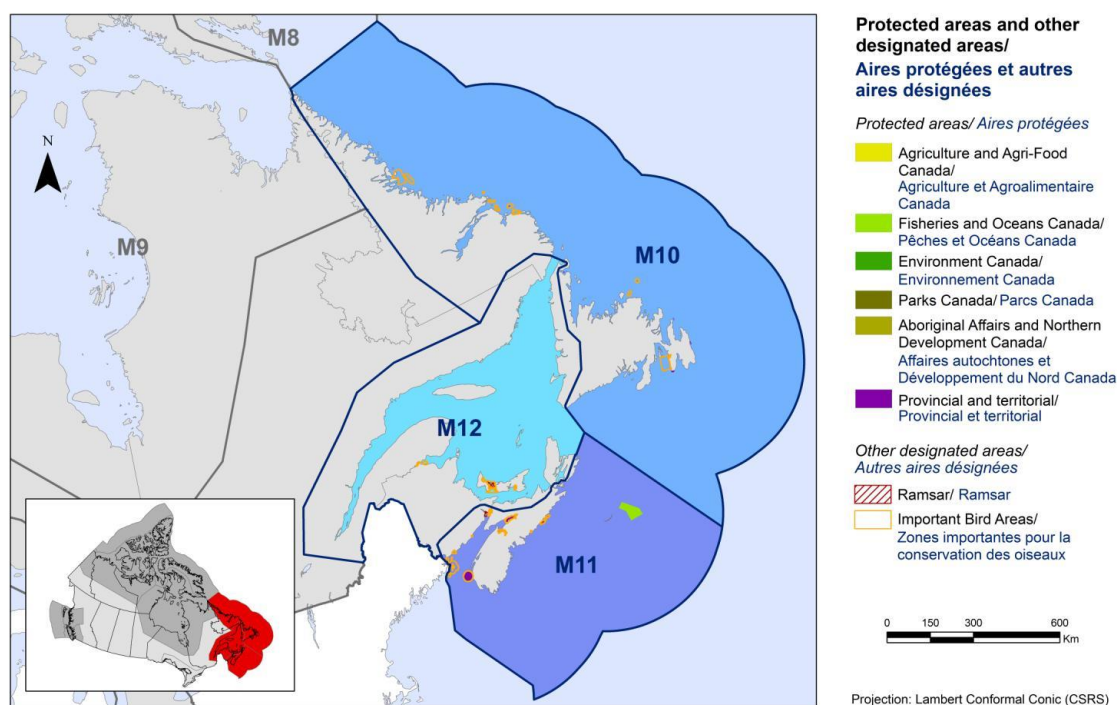


Figure 2. Map of protected and designated areas in BCR 14 NB, Atlantic Northern Forest.

### **Characteristics of Marine Biogeographic Unit 11: Bay of Fundy of New Brunswick**

The Gulf of Maine and Scotian Shelf Ecozone (corresponding to Marine Biogeographic Unit 11 (MBU 11); Fig. 3) is bounded by the Hague Line to the southwest (defining the international border with the United States) and by the southern edge of the Laurentian Channel to the northeast (Fisheries and Oceans Canada 2010). It includes coastal portions of Nova Scotia and New Brunswick, and extends beyond the edge of the continental shelf to the 200 nautical mile limit of the Canadian Exclusive Economic Zone (total area 417 000 km<sup>2</sup>).



**Figure 3. Map of protected and designated areas in MBU 11 (M11) and MBU 12 (M12).**

MBU 11 NB encompasses the Bay of Fundy and part of the Gulf of Maine (which is one of the largest semi-enclosed coastal seas in North America). The area is recognized as one of the world's richest marine ecosystems with various marine and estuarine habitats (Gulf of Maine Council on the Marine Environment, n.d.). Some extensive saltmarsh estuaries associated with outflow from important river systems are located on both the New Brunswick and the Nova Scotia coasts.

MBU 11 NB includes the northern half of the Bay of Fundy, Passamaquoddy Bay and waters around the Grand Manan archipelago for a total area of 8 000 km<sup>2</sup> (Fig. 3). It is renowned for extreme tidal variation and associated currents, and includes some of the most extensive intertidal mudflats, saltmarshes and saltmarsh estuaries in North America.

There are a variety of current and potential threats to the region's avifauna. Current threats include pollution from shipping and other boat traffic, oil and gas exploration and exploitation, mineral mining, fishing and aquaculture operations activities (e.g., competition for resources,

fisheries by-catch mortality, increased boat traffic and disturbance to specific areas important for birds). Climate change is expected to result in a general warming of atmospheric temperatures at these latitudes, with consequences that could include changes in ocean temperatures, ocean currents, ice regimes, frequency of severe weather events, and abundance and distribution of prey and predators. Other poorly understood factors with the potential to severely affect survival of birds in MBU 11 NB include the arrival or changes in occurrence patterns of alien invasive species (such as tunicates and green crab), ecto- and endo-parasites, and diseases. A combination of beneficial management practices, public education, changes in legislation and clean-up programs could help alleviate many of these threats.

There is currently only one marine protected area in MBU 11 NB, Musquash Estuary, located just west of Saint John (administered by the Department of Fisheries and Oceans), which includes one of the largest salt marshes in the Maritimes. The Bay of Fundy is recognized both as a Biosphere Reserve (4300 km<sup>2</sup>) and as Western Hemisphere Shorebird Reserve (620 km<sup>2</sup>).



## ***Characteristics of Marine Biogeographic Unit 12: Gulf of St. Lawrence of New Brunswick***

The Estuary and Gulf of Saint Lawrence (corresponding to Marine Biogeographic Unit 12 (MBU 12); Fig. 3) represents one of the largest and most productive estuarine marine ecosystems in Canada, and in the world (total area of approximately 247 000 km<sup>2</sup>; Therriault 1991). With a drainage basin that includes the Great Lakes, the St. Lawrence marine ecosystem receives more than half of the freshwater inputs from the Atlantic Coast of North America. This ecosystem is also strongly influenced by ocean and climate variability in the North Atlantic, of both Arctic (Labrador Current) and tropical (Gulf Stream) origins. As a result, the area exhibits large spatial and temporal variations in environmental conditions and oceanographic processes (Benoît et al. 2012). This unique setting provides the conditions for a highly diverse and productive biological community and trophic structure (Benoît et al. 2012).

MBU 12 is situated downstream of some of the largest urban and industrial centres, areas of pronounced development on the continent and emitters of industrial and agricultural-based contaminants (Benoît et al. 2012). The massive influx of fresh water, especially during springtime and summer wet seasons, lowers salinity levels in the Gulf and Estuary. Increasing commercial, ecotourism and recreational navigation are vectors for the propagation of aquatic invasive species (Benoît et al. 2012). Shoreline development and associated nutrient and sediment loading as well as a large and expanding shellfish aquaculture industry have transformed large portions of the coast, the estuarine and lagoon waters into aquaculture farms (Benoît et al. 2012). Benoît et al. (2012) reviewed evidence that suggested important aspects of the food-web in MBU 12 changed in the early 1990s. Also, increasing average sea surface temperature and hypoxia, partly as a result of climate change and coastal zone deterioration related to anthropogenic pressures (e.g., coastal eutrophication), may be causing physiological stress in marine organisms (Benoît et al. 2012).

MBU 12 NB encompasses an area approximately 14 000 km<sup>2</sup> (Fig. 3). The system is strongly influenced by ocean and climate variability. While colder, low saline Arctic waters (Labrador Current) enter the Gulf from the north and east, prevailing west and southwest winds moderate the influence of ocean on climate. This moderated influence in conjunction with shallower waters within the Northumberland Strait can lead to significantly warmer ocean temperatures in that area. In winter, this portion of the Gulf is predominantly ice-covered. MBU 12 NB has complex coastlines that are the result of glacial processes. The coastlines include extensive sand beaches and some exposed bedrock, but are largely lacking in cliffs. These features are interspersed with large estuaries hosting salt marshes and wetlands of varying size and influence. Spatial and temporal variation in environmental conditions and oceanographic processes result in a diverse and productive biological community and trophic structure.

There are a variety of current and potential threats to the region's avifauna. Current threats include oil pollution from shipping and other boat traffic; fishing and aquaculture operation activities (e.g., competition for resources, mortality from fisheries by-catch, increased boat traffic and disturbance to areas important for birds). Coastal development affects the shoreline

by transforming coastal habitat for housing and infrastructure development (e.g., in-filling of coastal wetlands, irrigation and erosion control). Measures to prevent the erosion of the coast line will be further exacerbated by sea-level rise due to changing climate. Climate change is expected to result in a general warming of atmospheric temperatures at these latitudes, with consequences that could include changes in ocean temperatures, ocean currents, ice regimes, frequency of severe weather events, and abundance and distribution of prey and predators. Other poorly understood factors with the potential to severely affect avian survival include the arrival or changes in occurrence patterns of alien invasive species (such as tunicates and green crab), ecto- and endo-parasites, and diseases. A combination of beneficial management practices, public education, changes in legislation and clean-up programs could help alleviate many of these threats.

## 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 in BCR 14 NB, MBU 11 NB or MBU 12 NB. Tables 2 and 3 summarize the number of priority species in BCR 14 NB, MBU 11 NB or MBU 12 NB by bird group and by the reason for priority status.

There are 71 priority bird species in BCR 14 NB. The list of priority birds is dominated by landbirds (42 species) but also includes 9 species of shorebirds, 10 species of waterbirds and 10 species of waterfowl (Table 1). Although the total number of priority landbirds is higher than the other bird groups, only 26% of all BCR 14 NB landbirds are included as priority species (Table 2), compared to 32% of all shorebirds, 34% of all waterbirds and 36% of all waterfowl species in BCR 14 NB (Table 2).

There are 44 priority bird species in MBU 11 NB. The list of priority birds is dominated by waterbirds (18 species) but also includes 15 species of shorebirds and 11 species of waterfowl (Table 1). In MBU 11 NB, the proportion of shorebirds that are priority species (48%) is much higher than the proportion of total bird species they represent (27%) in MBU 11 NB (Table 2).

There are 28 priority bird species in MBU 12 NB. The list is dominated by shorebirds (12 species) and waterfowl (11 species), and also includes 5 species of waterbirds (Table 1). In MBU 12 NB, the proportion of shorebirds that are priority species (43%) is much higher than the proportion of total bird species they represent (27%) in MBU 12 NB (Table 2). Waterbird species, on the other hand, represent 11% of the priority species MBU 12 NB, but account for 42% of the total bird species (Table 2).

There are 18 species at risk in BCR 14 NB, 6 in MBU 11 NB and 5 in MBU 12 NB that are either protected by federal and/or provincial legislation (Table 1). In BCR 14 NB, 9 landbird species,

1 shorebird species, 2 waterbird species and 2 waterfowl species are protected by federal legislation whereas only 2 landbird species, 1 shorebird species and 1 waterfowl species are protected by provincial legislation (Table 3). In MBU 11 NB, 2 shorebird species, 2 waterbird species and 2 waterfowl species are protected by federal legislation whereas only 1 shorebird species and 1 waterfowl species are protected by provincial legislation (Table 3). In MBU 12 NB, 2 shorebird species, 1 waterbird species and 2 waterfowl species are protected by federal legislation whereas only 1 shorebird species and 1 waterfowl species are protected by provincial legislation (Table 3).

Table 1. Priority bird species in BCR 14 NB, MBU 11 NB, and MBU 12 NB, population objective, and the reason for priority status.

BCR 14 NB	MBU 11 NB	MBU 12 NB	Priority Species	Bird Group	Population Objective <sup>1</sup>	SARA <sup>2</sup>	COSEWIC <sup>3</sup>	Provincial Listing <sup>4</sup>	National/Continental Concern	National/Continental Stewardship	Regional/Sub-regional Concern	Regional/Sub-regional Stewardship	Waterfowl <sup>5</sup>	Expert Review <sup>6</sup>
Y			American Redstart	Landbird	Maintain current							Y		
Y			American Three-toed Woodpecker	Landbird	Assess/Maintain									Added
Y			Bald Eagle	Landbird	Maintain current			EN						Added
Y			Bank Swallow	Landbird	Increase 100%									Added
Y			Barn Swallow	Landbird	Increase 100%		TH							
Y			Bay-breasted Warbler	Landbird	Maintain current					Y		Y		
Y			Belted Kingfisher	Landbird	Assess/Maintain						Y	Y		
Y			Bicknell's Thrush	Landbird	Increase 50%	TH	TH		Y		Y	Y		
Y			Black-backed Woodpecker	Landbird	Increase 50%						Y			
Y			Black-billed Cuckoo	Landbird	Increase 100%				Y		Y			
Y			Blackburnian Warbler	Landbird	Maintain current					Y				
Y			Black-throated Blue Warbler	Landbird	Maintain current							Y		
Y			Black-throated Green Warbler	Landbird	Maintain current					Y		Y		

<sup>1</sup> Population objectives apply in all units where the species is priority (BCR 14 NB, MBU 11 NB and/or MBU 12 NB) unless otherwise indicated.

<sup>2</sup> Species listed on Schedule 1 of the *Species At Risk Act* as Endangered (EN), Threatened (TH) or Special Concern (SC) (Species at Risk Public Registry 2012).

<sup>3</sup> Species assessed by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC 2012) as Endangered (EN), Threatened (TH) or Special Concern (SC).

<sup>4</sup> Species listed under New Brunswick's *Endangered Species Act* as Endangered (EN) (New Brunswick 2004).

<sup>5</sup> Waterfowl identified as "key species" in the New Brunswick Eastern Habitat Joint Venture (EHJV) 5-year Implementation Plan (2008), or ranked as "High" or "Highest" in either the breeding or non-breeding conservation/monitoring needs category for Waterfowl Conservation Region 14 (analogous to BCR 14) in the North American Waterfowl Management Plan (NAWMP Plan Committee 2004).

<sup>6</sup> Species added to the priority list following review by the NB Technical Working Group.

Table 1 continued

BCR 14 NB	MBU 11 NB	MBU 12 NB	Priority Species	Bird Group	Population Objective <sup>1</sup>	SARA <sup>2</sup>	COSEWIC <sup>3</sup>	Provincial Listing <sup>4</sup>	National/Continental Concern	National/Continental Stewardship	Regional/Sub-regional Concern	Regional/Sub-regional Stewardship	Waterfowl <sup>5</sup>	Expert Review <sup>6</sup>
Y			Blue-headed Vireo	Landbird	Maintain current					Y				
Y			Bobolink	Landbird	Increase 100%		TH		Y		Y			
Y			Boreal Chickadee	Landbird	Increase 100%						Y			
Y			Canada Warbler	Landbird	Increase 100%	TH	TH		Y	Y	Y	Y		
Y			Cape May Warbler	Landbird	Increase 100%						Y	Y		
Y			Chimney Swift	Landbird	Increase 100%	TH	TH		Y					
Y			Common Nighthawk	Landbird	Increase 100%	TH	TH							
Y			Eastern Kingbird	Landbird	Increase 50%						Y			
Y			Eastern Meadowlark	Landbird	Increase 50%		TH							
Y			Eastern Whip-poor-will	Landbird	Assess/Maintain	TH	TH		Y					
Y			Eastern Wood-Pewee	Landbird	Increase 100%						Y			
Y			Evening Grosbeak	Landbird	Increase 100%						Y	Y		
Y			Magnolia Warbler	Landbird	Maintain current					Y		Y		
Y			Nelson's Sparrow	Landbird	Assess/Maintain				Y		Y	Y		
Y			Northern Goshawk	Landbird	Increase 50%						Y	Y		
Y			Olive-sided Flycatcher	Landbird	Increase 100%	TH	TH		Y		Y			
Y			Peregrine Falcon (anatum/tundrius)	Landbird	Assess/Maintain	SC	SC	EN						
Y			Purple Finch	Landbird	Maintain current							Y		
Y			Red-shouldered Hawk	Landbird	Assess/Maintain									Added
Y			Rose-breasted Grosbeak	Landbird	Maintain current							Y		
Y			Ruffed Grouse	Landbird	Assess/Maintain						Y			
Y			Rusty Blackbird	Landbird	Increase 100%	SC	SC				Y			
Y			Short-eared Owl	Landbird	Assess/Maintain	SC	SC							
Y			Tree Swallow	Landbird	Maintain current							Y		

Table 1 continued

BCR 14 NB	MBU 11 NB	MBU 12 NB	Priority Species	Bird Group	Population Objective <sup>1</sup>	SARA <sup>2</sup>	COSEWIC <sup>3</sup>	Provincial Listing <sup>4</sup>	National/Continental Concern	National/Continental Stewardship	Regional/Sub-regional Concern	Regional/Sub-regional Stewardship	Waterfowl <sup>5</sup>	Expert Review <sup>6</sup>
Y			Veery	Landbird	Increase 100%						Y	Y		
Y			White-breasted Nuthatch	Landbird	Maintain current									Added
Y			White-throated Sparrow	Landbird	Maintain current					Y		Y		
Y			Wood Thrush	Landbird	Increase 100%				Y		Y			
Y			Yellow-bellied Sapsucker	Landbird	Maintain current					Y		Y		
Y			American Golden-Plover	Shorebird	Assess/Maintain				Y					
Y			American Woodcock	Shorebird	Increase 50%				Y					
	Y	Y	Black-bellied Plover	Shorebird	Assess/Maintain				Y					
	Y	Y	Dunlin <sup>7</sup>	Shorebird	Assess/Maintain				Y					
	Y	Y	Hudsonian Godwit	Shorebird	Assess/Maintain				Y					
Y			Killdeer	Shorebird	Increase 100%				Y					
	Y	Y	Least Sandpiper <sup>7</sup>	Shorebird	Assess/Maintain				Y					
Y	Y	Y	Lesser Yellowlegs	Shorebird	Assess/Maintain				Y					
Y	Y	Y	Piping Plover (melodus)	Shorebird	Recovery objective	EN	EN	EN	Y					
	Y		Purple Sandpiper	Shorebird	Assess/Maintain				Y					
	Y	Y	Red Knot (rufa)	Shorebird	Assess/Maintain <sup>7</sup>	EN	EN		Y					
	Y		Red Phalarope	Shorebird	Assess/Maintain				Y					
	Y		Red-necked Phalarope	Shorebird	Assess/Maintain				Y					
	Y	Y	Sanderling	Shorebird	Assess/Maintain				Y					

<sup>7</sup> A recent assessment (Andres et al. 2012) now suggests that some of these shorebird species are stable (e.g. Dunlin, Least Sandpiper and Solitary Sandpiper) while others are declining (Ruddy Turnstone). These shorebird priority species were selected in 2009 (based on Andres (2009). Subsequent database versions will be modified to account for this information.

Table 1 continued

BCR 14 NB	MBU 11 NB	MBU 12 NB	Priority Species	Bird Group	Population Objective <sup>1</sup>	SARA <sup>2</sup>	COSEWIC <sup>3</sup>	Provincial Listing <sup>4</sup>	National/Continental Concern	National/Continental Stewardship	Regional/Sub-regional Concern	Regional/Sub-regional Stewardship	Waterfowl <sup>5</sup>	Expert Review <sup>6</sup>
	Y	Y	Semipalmated Sandpiper	Shorebird	Increase 100% (MBU 11) Assess/Maintain (MBU 12)				Y					
Y	Y	Y	Solitary Sandpiper <sup>7</sup>	Shorebird	Assess/Maintain				Y					
Y			Spotted Sandpiper	Shorebird	Increase 50%				Y					
Y	Y	Y	Whimbrel	Shorebird	Assess/Maintain				Y					
	Y	Y	Willet	Shorebird	Increase 50%				Y					
Y			Wilson's Snipe	Shorebird	Increase 100%				Y					
Y			American Bittern	Waterbird	Increase 100%				Y		Y			
	Y		Arctic Tern	Waterbird	Assess/Maintain									Added
Y			Black Tern	Waterbird	Assess/Maintain									Added
	Y		Black-legged Kittiwake	Waterbird	Maintain current					Y				Added
	Y		Bonaparte's Gull	Waterbird	Assess/Maintain				Y					
Y	Y	Y	Common Loon	Waterbird	Maintain current (BCR 14) Assess/Maintain (MBU 11, 12)				Y		Y			
	Y		Common Murre	Waterbird	Assess/Maintain				Y					
Y	Y	Y	Common Tern	Waterbird	Assess/Maintain						Y			
	Y		Dovekie	Waterbird	Assess/Maintain				Y					Removed in MBU 12 NB
	Y		Great Cormorant	Waterbird	Assess/Maintain				Y					
	Y		Great Shearwater	Waterbird	Assess/Maintain				Y	Y		Y		Removed in MBU 12 NB
Y			Green Heron	Waterbird	Assess/Maintain						Y			



Table 1 continued

BCR 14 NB	MBU 11 NB	MBU 12 NB	Priority Species	Bird Group	Population Objective <sup>1</sup>	SARA <sup>2</sup>	COSEWIC <sup>3</sup>	Provincial Listing <sup>4</sup>	National/Continental Concern	National/Continental Stewardship	Regional/Sub-regional Concern	Regional/Sub-regional Stewardship	Waterfowl <sup>5</sup>	Expert Review <sup>6</sup>
	Y	Y	Horned Grebe	Waterbird	Assess/Maintain	EN <sup>8</sup>	EN <sup>8</sup> SC <sup>9</sup>							
	Y		Leach's Storm-Petrel	Waterbird	Assess/Maintain				Y	Y	Y	Y		Removed in MBU 12 NB
Y			Least Bittern	Waterbird	Recovery objective	TH	TH		Y		Y			
	Y		Manx Shearwater	Waterbird	Assess/Maintain				Y		Y			
Y			Pied-billed Grebe	Waterbird	Assess/Maintain				Y					
	Y		Razorbill	Waterbird	Assess/Maintain				Y					
	Y	Y	Red-necked Grebe	Waterbird	Assess/Maintain				Y		Y			
	Y	Y	Red-throated Loon	Waterbird	Assess/Maintain				Y					
	Y		Roseate Tern	Waterbird	Recovery objective	EN	EN							
	Y		Sooty Shearwater	Waterbird	Assess/Maintain				Y					
Y			Sora	Waterbird	Assess/Maintain				Y					
	Y		Thick-billed Murre	Waterbird	Assess/Maintain				Y		Y			
Y			Virginia Rail	Waterbird	Assess/Maintain				Y					
Y			Yellow Rail	Waterbird	Assess/Maintain	SC	SC		Y					
Y	Y	Y	American Black Duck	Waterfowl	Maintain current								EHJV, NAWMP	
Y	Y	Y	Barrow's Goldeneye (Eastern)	Waterfowl	Assess/Maintain	SC	SC						EHJV	
	Y	Y	Black Scoter	Waterfowl	Assess/Maintain								EHJV	
Y	Y	Y	Canada Goose (North Atlantic)	Waterfowl	Maintain current								EHJV, NAWMP	

<sup>8</sup> Status applies to the Magdalen Islands Population of Horned Grebe.<sup>9</sup> Status applies to the Western Population of Horned Grebe.

Table 1 continued

BCR 14 NB	MBU 11 NB	MBU 12 NB	Priority Species	Bird Group	Population Objective <sup>1</sup>	SARA <sup>2</sup>	COSEWIC <sup>3</sup>	Provincial Listing <sup>4</sup>	National/Continental Concern	National/Continental Stewardship	Regional/Sub-regional Concern	Regional/Sub-regional Stewardship	Waterfowl <sup>5</sup>	Expert Review <sup>6</sup>
Y	Y	Y	Canada Goose (Temperate-breeding in Eastern Canada)	Waterfowl	Decrease								Management concern <sup>10</sup>	
	Y	Y	Common Eider	Waterfowl	Increase 50%								EHJV, NAWMP	
Y	Y	Y	Common Goldeneye	Waterfowl	Increase 50% (BCR 14) Assess/Maintain (MBU 11, 12)								EHJV	
Y	Y	Y	Green-winged Teal	Waterfowl	Increase 50%								EHJV	
Y	Y	Y	Harlequin Duck (Eastern)	Waterfowl	Assess/Maintain	SC	SC	EN					EHJV	
	Y	Y	Long-tailed Duck	Waterfowl	Assess/Maintain								NAWMP	
Y			Mallard	Waterfowl	Increase 100%								EHJV	
Y			Ring-necked Duck	Waterfowl	Increase 50%								EHJV	
	Y	Y	Surf Scoter	Waterfowl	Assess/Maintain								NAWMP	
Y			Wood Duck	Waterfowl	Increase 50%								EHJV	

<sup>10</sup> Canada Goose (Temperate-breeding in Eastern Canada) was added as a priority species due to management concerns (e.g. overabundance and problem geese).

**Table 2. Summary of priority bird species, by bird group, in BCR 14 NB, MBU 11 NB and MBU 12 NB.**

Bird Group	Total Species (% of avifauna)	Total Priority Species	Percent Listed as Priority	Percent of Priority List
<b>BCR 14 NB</b>				
Landbird	164 (67%)	42	26%	59%
Shorebird	28 (11%)	9	32%	13%
Waterbird	28 (11%)	10	36%	14%
Waterfowl	26 (10%)	10	38%	14%
<b>Total BCR 14 NB</b>	<b>246</b>	<b>71</b>	<b>29%</b>	<b>100%</b>
<b>MBU 11 NB</b>				
Landbird	4 (3%)	0	0%	0%
Shorebird	31 (27%)	15	48%	34%
Waterbird	51 (44%)	18	35%	41%
Waterfowl	29 (25%)	11	38%	25%
<b>Total MBU 11 NB</b>	<b>115</b>	<b>44</b>	<b>38%</b>	<b>100%</b>
<b>MBU 12 NB</b>				
Landbird	4 (4%)	0	0%	0%
Shorebird	28 (27%)	12	43%	43%
Waterbird	44 (42%)	5	11%	18%
Waterfowl	28 (27%)	11	39%	39%
<b>Total MBU 12 NB</b>	<b>104</b>	<b>28</b>	<b>27%</b>	<b>100%</b>

**Table 3. Number of priority bird species in BCR 14 NB, MBU 11 NB and MBU 12 NB by reason for priority status.**

Reasons for Priority Listing <sup>1</sup>	Landbirds	Shorebirds	Waterbirds	Waterfowl
<b>BCR 14 NB total</b>	<b>42</b>	<b>9</b>	<b>10</b>	<b>10</b>
COSEWIC <sup>2</sup>	12	1	2	2
Federal SARA listed <sup>3</sup>	9	1	2	2
Provincially listed <sup>4</sup>	2	1		1
NAWMP <sup>5</sup>	-	-	-	9
National/Continental Concern	9	9	7	-
Regional/ Sub-regional Concern	18	0	5	-
National/Continental Stewardship	8	0	0	-
Regional/ Sub-regional Stewardship	18	0	0	-

<sup>1</sup> 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 "-").

<sup>2</sup> COSEWIC indicates species assessed by the Committee on the Status of Endangered Wildlife in Canada as Endangered, Threatened, or Special Concern (COSEWIC 2012).

<sup>3</sup> Species listed on Schedule 1 of SARA as Endangered, Threatened or Special Concern (Species at Risk Public Registry 2012).

<sup>4</sup> Species listed under New Brunswick's *Endangered Species Act* as Endangered (EN) (New Brunswick 2004)

<sup>5</sup> NAWMP indicates "key species" in the New Brunswick Eastern Habitat Joint Venture Five-year Implementation Plan (NB-EHJV 2008), or ranked under NAWMP (NAWMP Plan Committee 2004) as having "High" or "Highest" breeding or non-breeding conservation/monitoring needs in the BCR.

Table 3 continued

Reasons for Priority Listing <sup>1</sup>	Landbirds	Shorebirds	Waterbirds	Waterfowl
Management Concern	0	0	0	1
Expert review	5	0	1	0
<b>MBU 11 NB total</b>	<b>0</b>	<b>15</b>	<b>18</b>	<b>11</b>
COSEWIC <sup>2</sup>	0	2	2	2
Federal SARA listed <sup>3</sup>	0	2	2	2
Provincially listed <sup>4</sup>	0	1	0	1
NAWMP <sup>5</sup>	-	-	-	10
National/Continental Concern	0	15	12	-
Regional/ Sub-regional Concern	0	0	6	-
National/Continental Stewardship	0	0	3	-
Regional/ Sub-regional Stewardship	0	0	2	-
Management Concern	0	0	0	1
Expert review	0	0	1	0
<b>MBU 12 NB total</b>	<b>0</b>	<b>12</b>	<b>5</b>	<b>11</b>
COSEWIC <sup>2</sup>	0	2	1	2
Federal SARA listed <sup>3</sup>	0	2	1	2
Provincially listed <sup>4</sup>	0	1		1
NAWMP <sup>5</sup>	-	-	-	10
National/Continental Concern	0	12	3	-
Regional/ Sub-regional Concern	0	0	3	-
National/Continental Stewardship	0	0	0	-
Regional/ Sub-regional Stewardship	0	0	0	-
Management Concern	0	0	0	1
Expert review	0	0	0	0

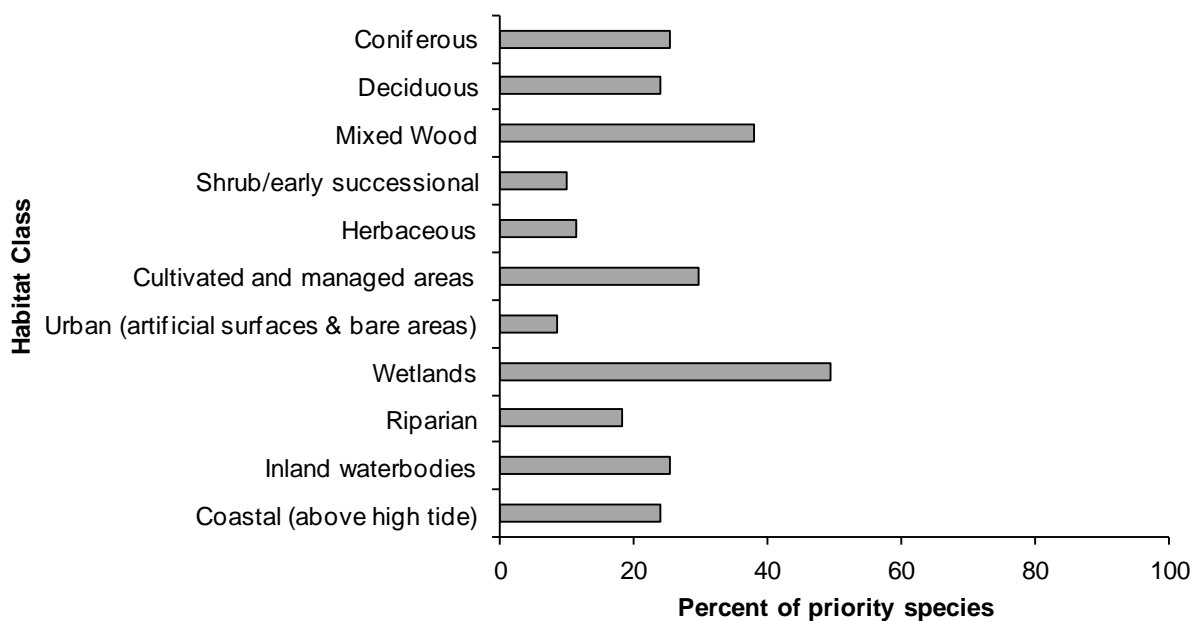
## ***Element 2: Habitats Important to Priority Species***

Identifying the broad habitat requirements for each priority species within the BCR and the MBUs 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 (FAO 2000) to categorize habitats, and species were often assigned to more than one habitat class.

The assignment of habitat associations for priority bird species was primarily done through literature review and expert consultation. For each priority species in BCR 14 NB, MBU 11 NB and MBU 12 NB, all of their known habitat associations were considered, not just the primary habitat associations (Table A-2). Because of the variability and the availability of information related to species-habitat associations, quantifying the relative importance of any given habitat was not possible. In this document, statements regarding the importance of habitat types for priority bird species are related to the number of priority birds associated with each habitat and may not reflect the overall importance of the habitat to all bird species in the planning unit. For more quantitative and qualitative field-based information on habitat associations of all breeding birds species in New Brunswick, please consult the Second Maritimes Breeding Bird Atlas (Stewart et al. in prep.).

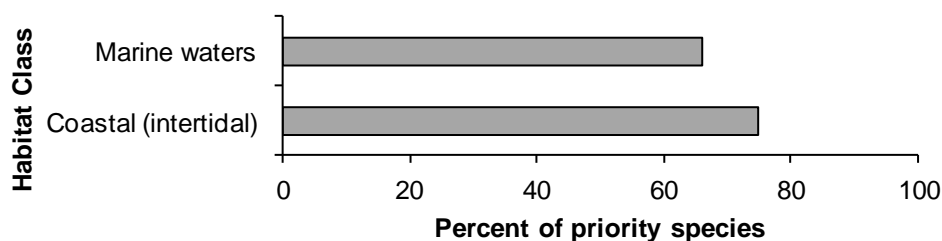
In BCR 14 NB, wetlands are used by the greatest number of priority bird species. There are 35 priority bird species (or 49%) found in wetlands in BCR 14 NB (Fig. 4). Forested habitats are also important habitat types for priority bird species in BCR 14 NB. The 3 forest types combined include 31 species (44%), with more priority bird species using mixed forest (27 species or 38%) than coniferous (18 species or 25%) or deciduous forests (17 species or 24%; Fig. 4). Cultivated and managed areas are also used by many priority birds (21 species or 30%).

In MBU 11 NB, there are 33 priority bird species (or 75%) found in coastal (intertidal) habitats and 29 priority bird species (or 66%) found in marine waters (Fig. 5). In MBU12 NB, there are 24 priority bird species (or 86%) found in intertidal habitats and 14 priority bird species (or 50%) found in marine waters (Fig. 6).



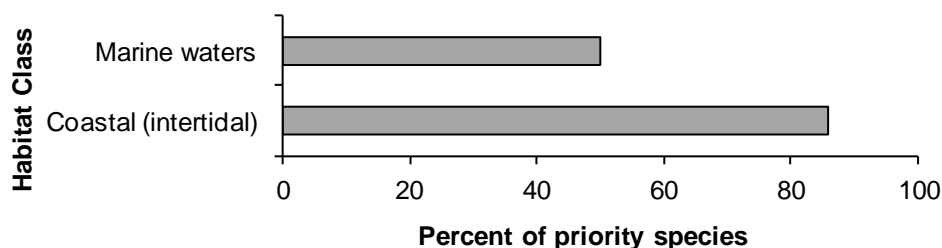
**Figure 4. Percent of priority bird species that are associated with each habitat type in BCR 14 NB.**

**Note:** The total exceeds 100% because species may be assigned to more than one habitat.



**Figure 5. Percent of priority bird species that are associated with each habitat type in MBU 11 NB.**

**Note:** The total exceeds 100% because species may be assigned to more than one habitat.



**Figure 6. Percent of priority bird species that are associated with each habitat type in MBU 12 NB.**

**Note:** The total exceeds 100% because 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.

In BCR 14 NB, there are 21 priority bird species (or 30%) for which the population trend is unknown, and the population objective has been set as assess/maintain (Fig. 7). However, there are 32 priority bird species (or 45%) that have population objectives to increase current levels either by 100%, 50% or to a specific population target from the species' recovery documents (Fig. 7). In both MBU 11 NB and MBU 12 NB, the majority of priority bird species (34 and 23 species, respectively) have unknown population trends and were therefore given a population objective of assess and maintain (Figures 8 and 9). There are 6 priority bird species in MBU 11 NB and 4 in MBU 12 NB that have population objectives to increase current levels either by 100%, 50% or to a particular target from the species' recovery document (Figures 8 and 9). The temperate breeding Canada Goose was the only priority species in all 3 planning units where the population objective is to decrease the population size (Table 1). Because the temperate breeding Canada Goose is considered a priority species based on management concern, there are no threats, conservation objectives or conservation actions listed for this population.

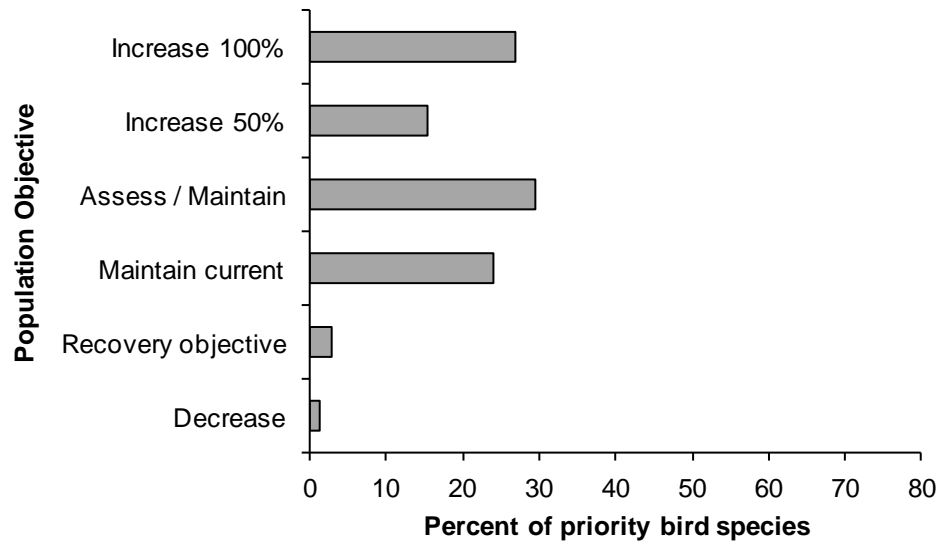


Figure 7. Percent of priority bird species that are associated with each population objective category in BCR 14 NB.

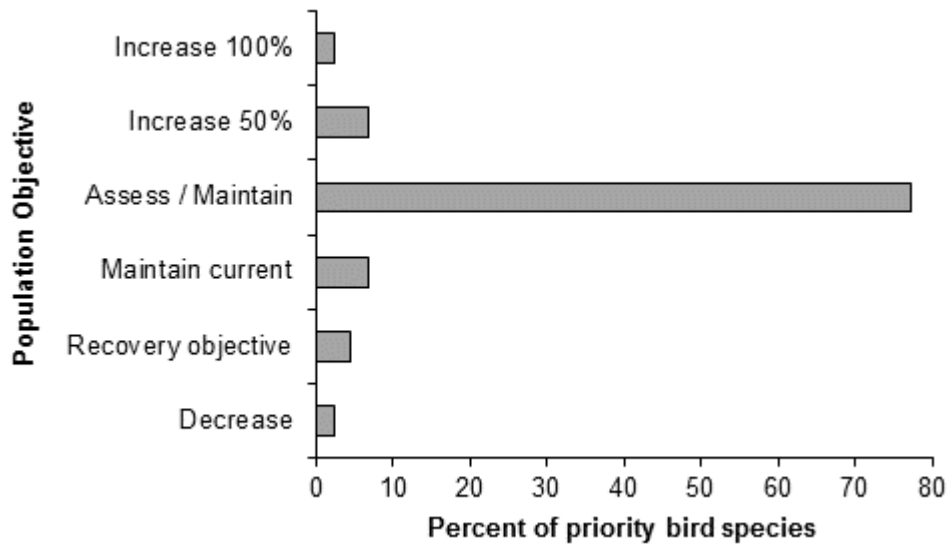
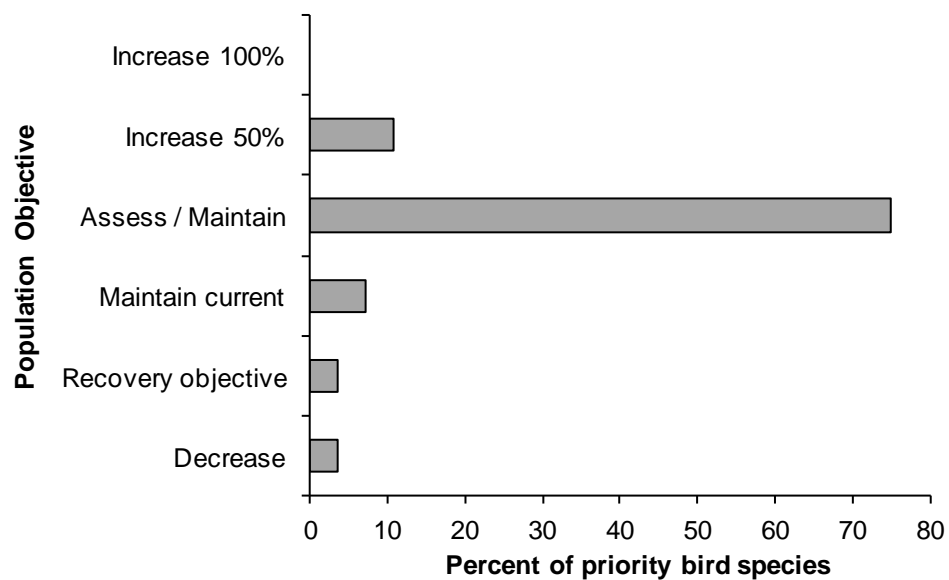


Figure 8. Percent of priority bird species that are associated with each population objective category in MBU 11 NB.





**Figure 9. Percent of priority bird species that are associated with each population objective category in MBU 12 NB.**

#### ***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 or 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.

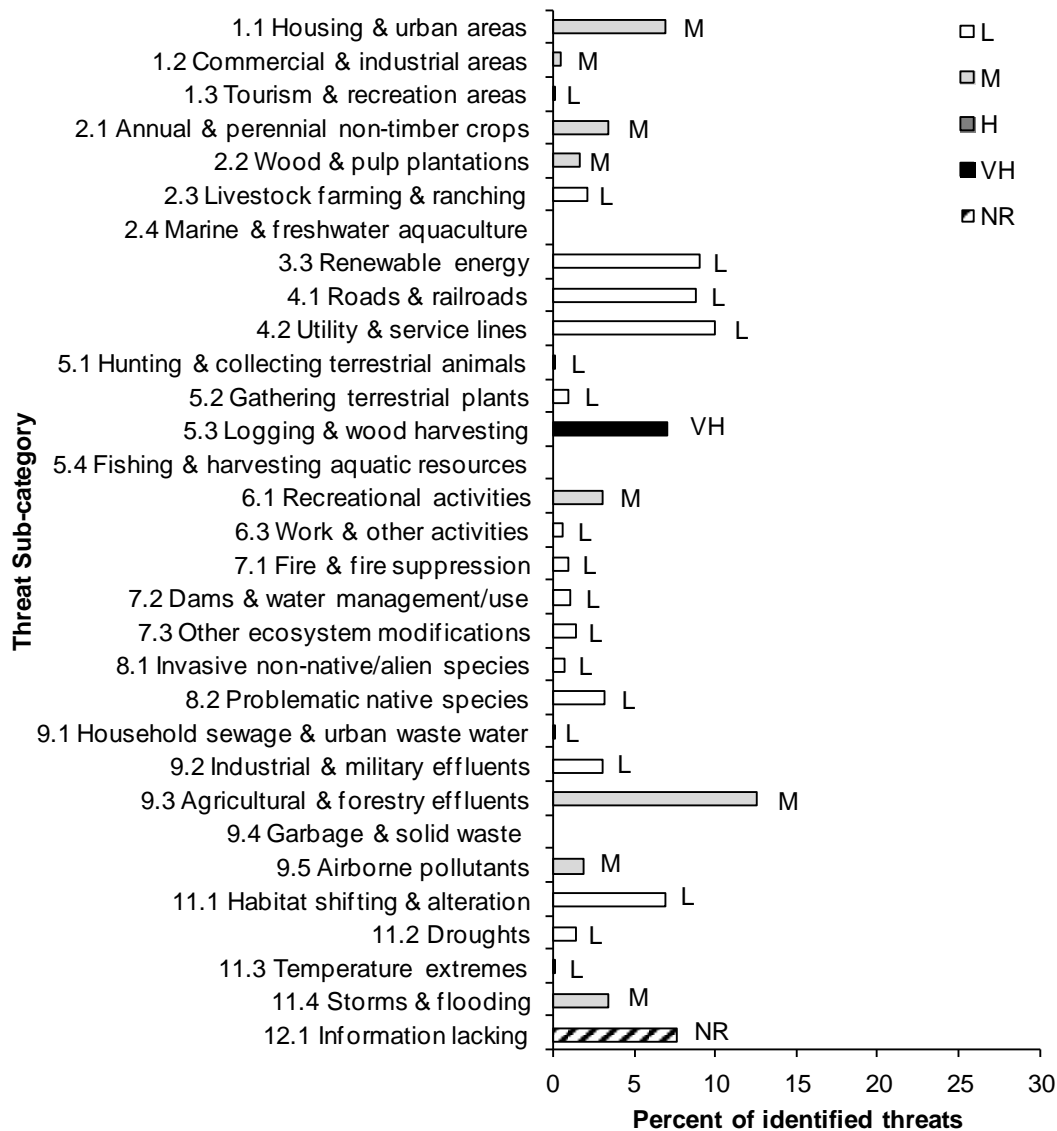
In BCR 14 NB, MBU 11 NB and MBU 12 NB, a threat category was added to the threat classification scheme to allow for the inclusion of inadequate monitoring or research information (category 12 "other direct threats" and sub-category 12.1 "information lacking"). However, this threat category was not ranked since the lack of information could not be given a score for scope or severity.

A list of all threats to priority species in each planning unit is included in Appendix 1 (Table A3). Some of the threats identified are not unique to a particular habitat. For instance, urban development occurs in many habitat types in New Brunswick. There are, however, other threats that are more specific to a particular habitat, such as the loss of rooftops for nesting, which is a specific threat in urban habitats. Threats are categorized as per Salafsky et al. (2008), and when their rankings are rolled-up for each habitat class (Table 4), the overall threat magnitude is highest in the coniferous forests of BCR 14 NB and the coastal (intertidal) habitats of MBU 11 NB. Most other habitat classes have an overall threat magnitude of medium except for the shrub and early successional and the herbaceous habitats of BCR 14 NB, which have a threat magnitude of low (Table 4).

In BCR 14 NB, the only threats given a very high rank were threats due to the loss or fragmentation of coniferous and deciduous forests as a result of logging activities (5.3 Logging & wood harvesting). These threats were ranked high in mixed wood forests, riparian forests and forested wetlands (Fig. 10). For instance, the loss or fragmentation of cedar swamps because of logging activities ranked as a high threat to Canada Warbler (Table 19). The most frequently identified threats were decreases in diet quality, in the health of birds, or in prey availability due to the contamination of food sources from biocides such as pesticides, herbicides or fungicides used by the forestry or agricultural industries (9.3 Agricultural & forestry effluents; Fig. 10). These threats were widespread across all habitat classes (except urban habitat) in BCR 14 NB.

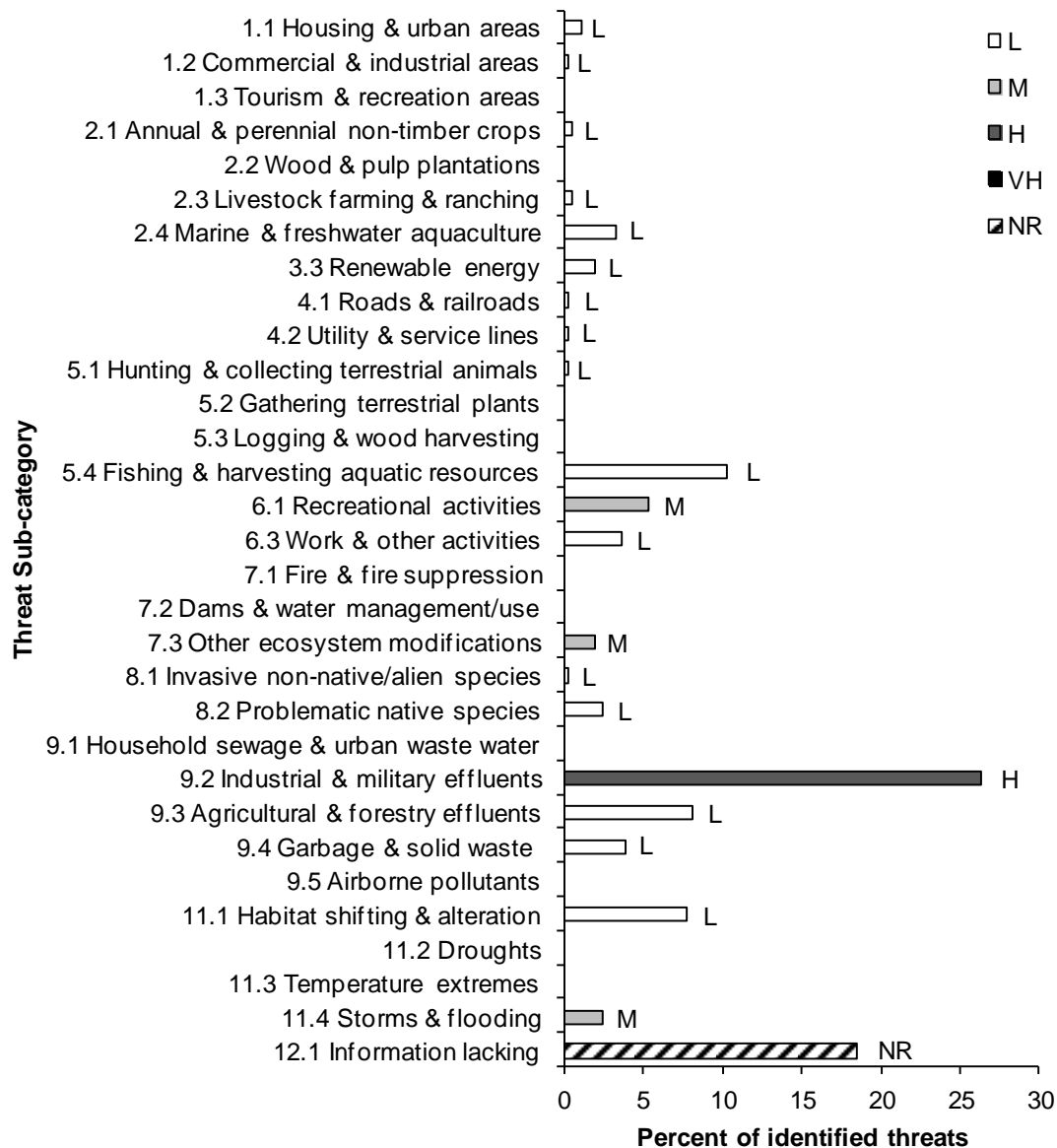
In MBU 11 NB and MBU 12 NB, decreased prey availability due to chemical or heavy metal contamination, from oil spills and discharges or hypothermia caused by oil on plumage (9.2 Industrial & military effluents) were the most frequently identified and highest ranked threats. These were ranked high in MBU 11 NB (Fig. 11) and medium in MBU 12 NB (Fig. 12). There are over 20 different threats identified for priority birds in 17 different threat sub-categories in MBU 11 NB and MBU 12 NB; however, they were all ranked as low (Figures 11 and 12). Low-ranked threats are not discussed further in this strategy.

Threats to priority species while they are outside Canada during the non-breeding season were also assessed and are presented in the section Threats Outside Canada.



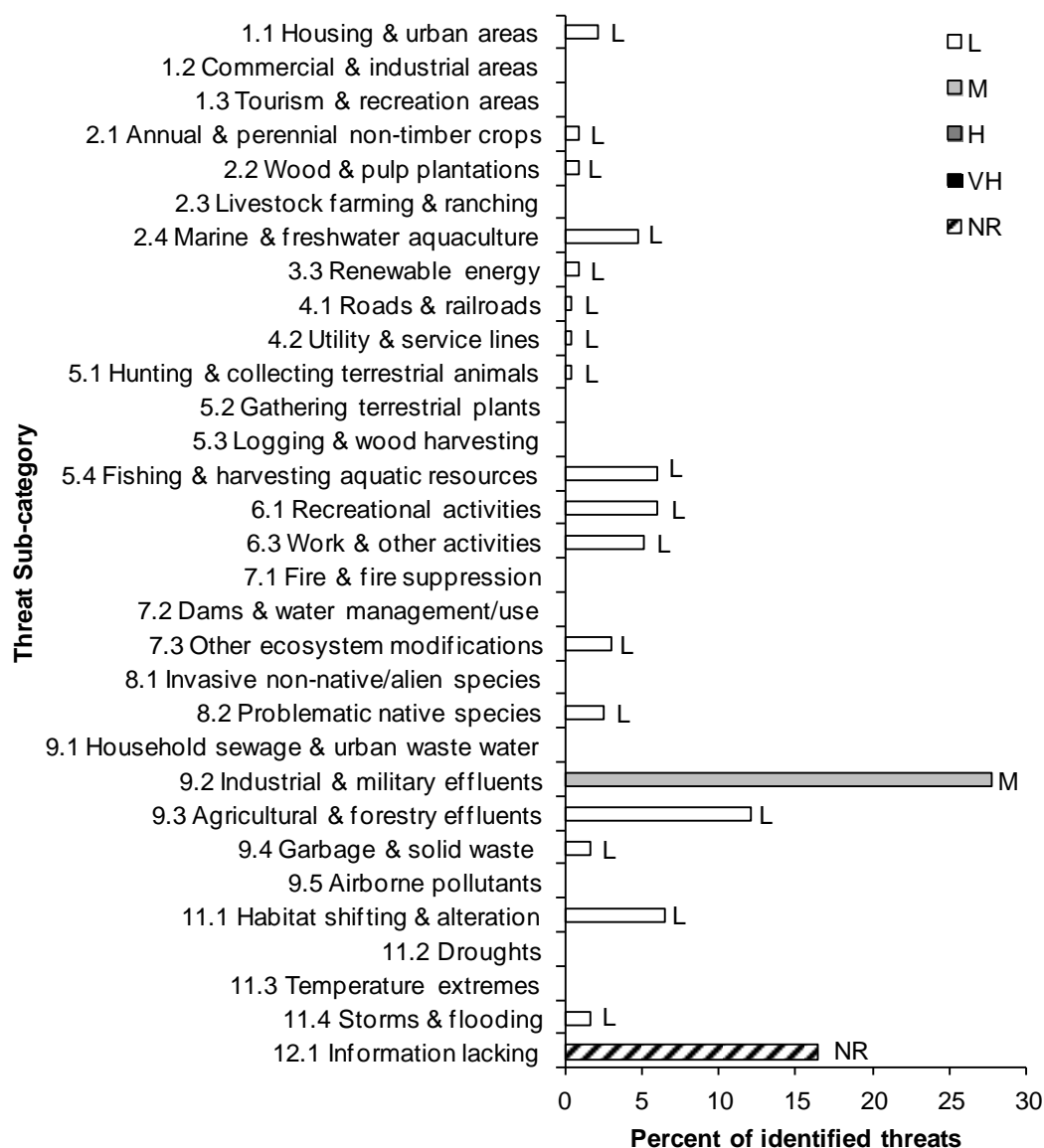
**Figure 10. Percent of identified threats to priority bird species within BCR 14 NB by threat sub-category.**

Each bar represents the percent of the total number of threats identified in each threat sub-category in BCR 14 NB (for example, if 100 threats were identified in total for all priority species in BCR 14 NB, 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 letter at the end of the bars (from L: low, M: medium, H: high, to VH: very high) represents the rolled-up magnitude of all threats in each threat subcategory in the BCR. (See Appendix 2 for details on how magnitude was assessed.) Threats that are unranked due to lack of information are indicated with "NR".



**Figure 11. Percent of identified threats to priority bird species within MBU 11 NB by threat sub-category.**

Each bar represents the percent of the total number of threats identified in each threat sub-category in MBU 11 NB (for example, if 100 threats were identified in total for all priority species in MBU 11 NB, 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 letter at the end of the bars (from L: low, M: medium, to H: high) represents the rolled-up magnitude of all threats in each threat subcategory in the BCR. (See Appendix 2 for details on how magnitude was assessed.) Threats that are unranked due to lack of information are indicated with "NR".



**Figure 12. Percent of identified threats to priority bird species within MBU 12 NB by threat sub-category.**

Each bar represents the percent of the total number of threats identified in each threat sub-category in MBU 12 NB (for example, if 100 threats were identified in total for all priority species in MBU 12 NB, 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 letter at the end of the bars (from L: low to M: medium) represents the rolled-up magnitude of all threats in each threat subcategory in the BCR. (See Appendix 2 for details on how magnitude was assessed). Threats that are unranked due to lack of information are indicated with “NR”.

**Table 4. Relative magnitude of identified threats to priority species within BCR 14 NB, MBU 11 NB and MBU 12 NB by threat category and broad habitat class.**

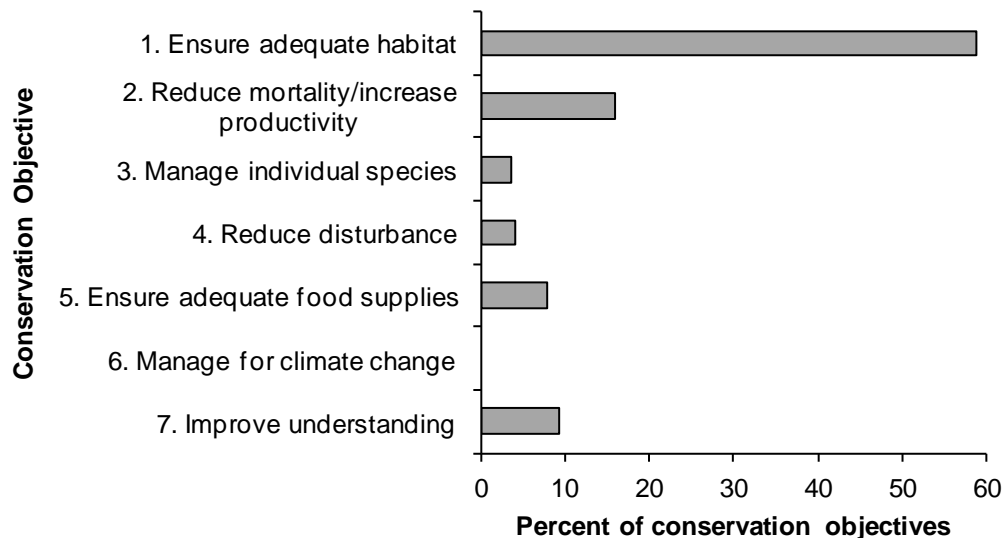
Overall ranks were generated through a roll-up procedure described in (Kennedy et al. 2012). L represents Low magnitude threats; M = Medium; H = High; VH = Very High. Blank cells indicate that no priority bird species had threats identified in the threat category / habitat combination.

	BCR 14 NB												MBU 11 NB				MBU 12 NB				
Threat Category	Habitat Class												Habitat Class				Habitat Class				
	Coniferous	Deciduous	Mixed	Shrub/Early Successional	Herbaceous	Cultivated and Managed Areas	Urban	Wetlands	Inland Waterbodies	Coastal – Above High Tide	Riparian	Widespread	Overall	Marine Waters	Coastal – Intertidal	Widespread	Overall	Marine Waters	Coastal – Intertidal	Widespread	Overall
Overall	H	M	M	L	L	M	M	M	M	M	M	M		M	H	L		M	M	L	
1. Residential & commercial development	L	L	L	L	L	M	H	M	L	M	M	L	M	L	L		L		L		L
2. Agriculture & aquaculture	L	M	M			H		M		L	L		M	M	L		L	M	L		L
3. Energy production & mining	L	L	L		L							L	L		L	L	L		L	L	L
4. Transportation & service corridors	M	L	L		L			L		L	L	L	L		L		L		L		L
5. Biological resource use	VH	VH	H					H	L	L	H		VH	M	L		L	L	L		L
6. Human intrusions & disturbance					L		L	L	M	M	L		M	L	H		M		M		L
7. Natural system modifications	L	L	L	L		L		L	L	M	L		L		M		L		M		L
8. Invasive & other problematic species & genes	L	L	L	L	L	L		L	L	M	L		L	L	M		L	L	L		L
9. Pollution	H	M	M	L	L	M	L	M	M	M	M		M	H	H		H	M	H		M
11. Climate change & severe weather												H	H			M	M			M	M

### ***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).

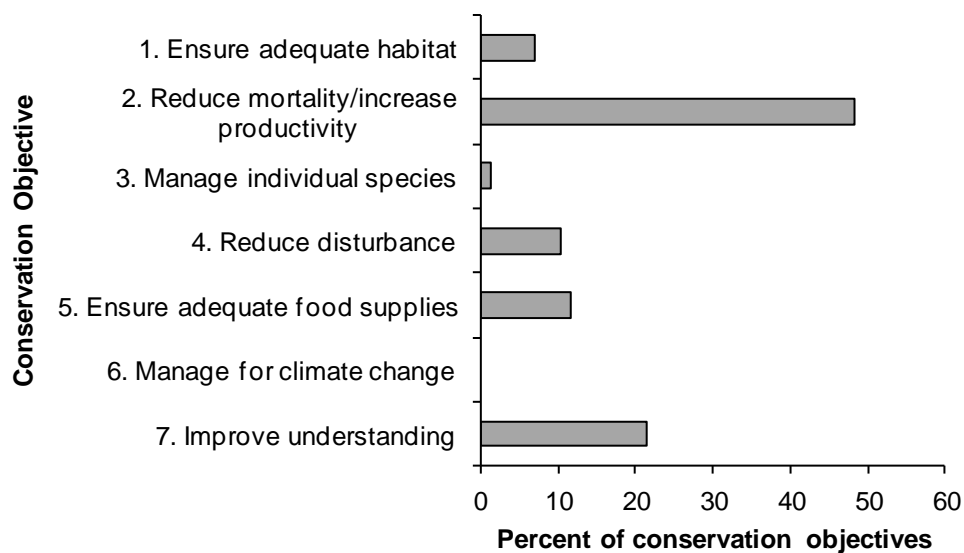
Ensuring adequate habitat availability for priority bird species is the most frequently identified conservation objective in the terrestrial habitats of BCR 14 NB (Fig. 13), while in MBU 11 NB and in MBU 12 NB, the most frequently identified conservation objective is to reduce mortality (Figs. 14, 15). Although conservation objective category 2 in Figures 13–15 includes “increase productivity,” given that most priority bird species do not breed within the MBUs, the bulk of the conservation objectives in this strategy refer only to reducing mortality. Due to our general lack of understanding of factors affecting priority bird species in the marine environment, another frequently identified conservation objective for both MBUs is to improve our understanding of these factors (Figures 14, 15).



**Figure 13. Percent of all conservation objectives assigned to each conservation objective category in BCR 14 NB.**

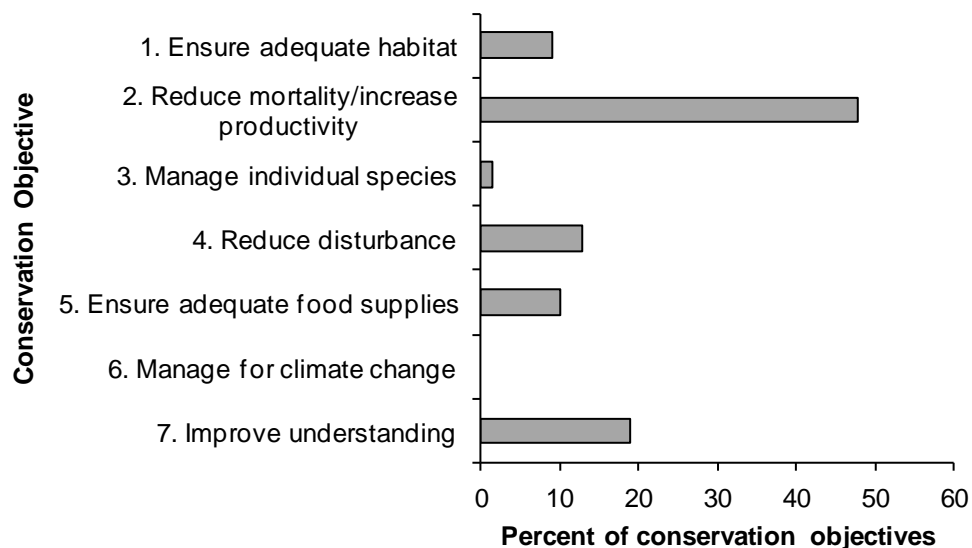
**Note:** Widespread issues (including climate change) were excluded from this calculation as these are detailed in Section 3.





**Figure 14. Percent of all conservation objectives assigned to each conservation objective category in MBU 11 NB.**

**Note:** Widespread issues (including climate change) were excluded from this calculation as these are detailed in Section 3.



**Figure 15. Percent of all conservation objectives assigned to each conservation objective category in MBU 12 NB.**

**Note:** Widespread issues (including climate change) were excluded from this calculation as these are detailed in Section 3.

## ***Element 6: Recommended Actions***

Recommended actions indicate on-the-ground activities that will help to achieve the conservation objectives (listed in Figs. 13, 14 and 15). 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.

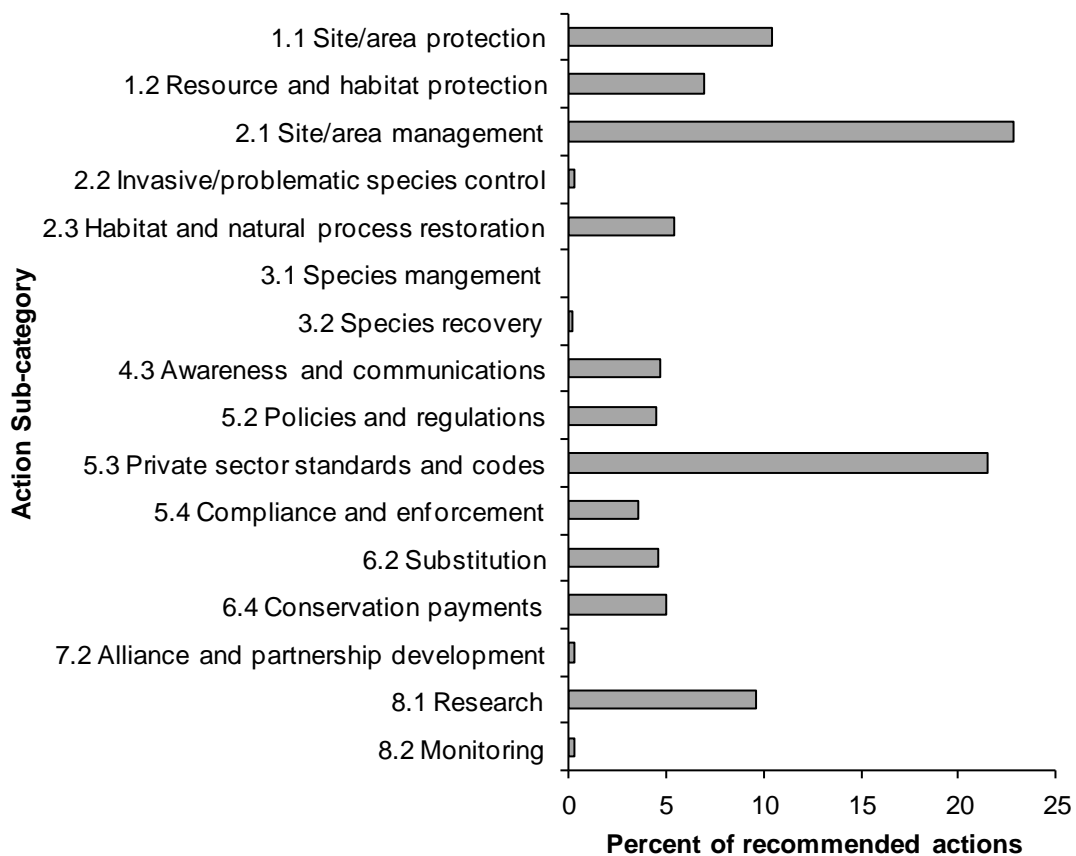
The recommended conservation actions are categorized as per the International Union for Conservation of Nature – Conservation Measures Partnership with the addition of categories for research and monitoring (see Table A-4 in Appendix 3 for a complete list of conservation action categories). In BCR 14 NB, the most frequently recommended conservation actions fall under the sub-categories of: 2.1 Site/area management and 5.3 Private sector standards and codes (Fig. 16). Examples of recommended conservation actions in sub-category 2.1 Site/area management include specific recommendations to maintain patch sizes, configuration and connectivity of different types of forests; to reduce fragmentation of habitats within wetlands to reduce the extent of edges; to maintain large trees; and to define and provide a minimum number, size and condition of residual snags and living trees for priority bird species in forested habitats. Examples of recommended conservation actions in sub-category 5.3 Private sector standards and codes include the development and implementation of guidelines for the protection of priority bird species; and the development of beneficial management practices for peat harvesting, renewable energy development, forestry and agriculture (See Section 2: Conservation Needs by Habitat for more examples).

In New Brunswick, the Department of Natural Resources (DNR) manages roughly 50% of the province's forested land. The DNR provides objectives, planning requirements, habitat descriptions and planning guidelines to guide Crown forest management. The objectives, set every five years, are based on very specific habitat requirements of vertebrates associated with particular forest types (New Brunswick Department of Natural Resources 2005b). The habitat requirements for the management of Crown forests have been incorporated into this document as recommended conservation actions wherever possible and appropriate.

In MBU 11 NB and in MBU 12 NB, the most frequently recommended conservation actions fall in the conservation action sub-categories 5.3 Private sector standards and codes and 5.4 Compliance and enforcement (Figures 17 and 18). Examples of recommended conservation actions in sub-category 5.3 Private sector standards and codes specific to MBUs include the implementation of beneficial management practices for aquaculture, fisheries and other coastal resource harvesting industries; and the development of beneficial management practices and avoidance guidelines to manage renewable energy developments and minimize habitat degradation. Examples of recommended conservation actions under action sub-category 5.4 Compliance and enforcement include continuing to monitor and enforce compliance with laws, policies and regulations to minimize seabird bycatch; and those related to the release of oil and

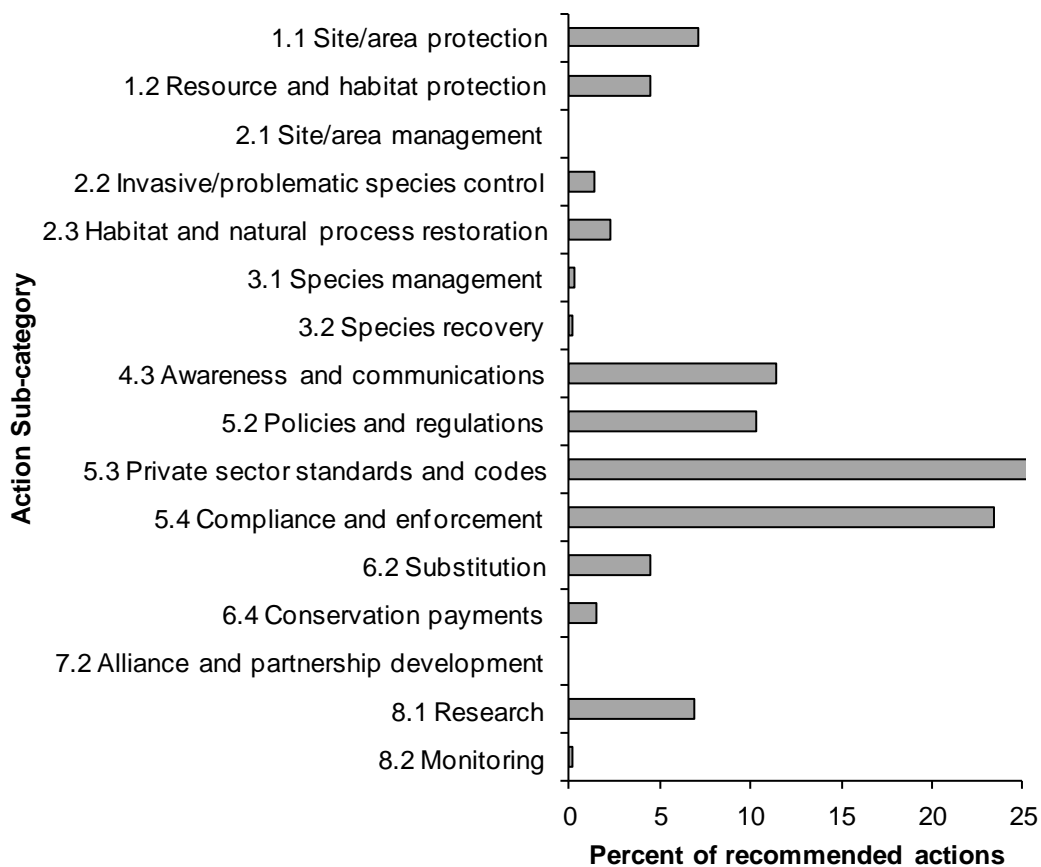
other wastes into marine waters (See Section 2: Conservation Needs by Habitat for more examples).

Recommended conservation actions related to increasing awareness and communications (sub-category 4.3 Awareness and communications) are frequently recommended for both MBU 11 NB and MBU 12 NB (Figures 17 and 18). Examples of recommended conservation actions related to awareness and communications include raising public awareness of shorebird habitat needs and the impacts of disturbance from recreational activities in coastal habitats; about issues surrounding human disturbance at seabird colonies or in other nesting areas; and about the impacts on shorebirds and seabirds when the shoreline is modified to protect infrastructure in coastal areas (see Section 2 for more examples).



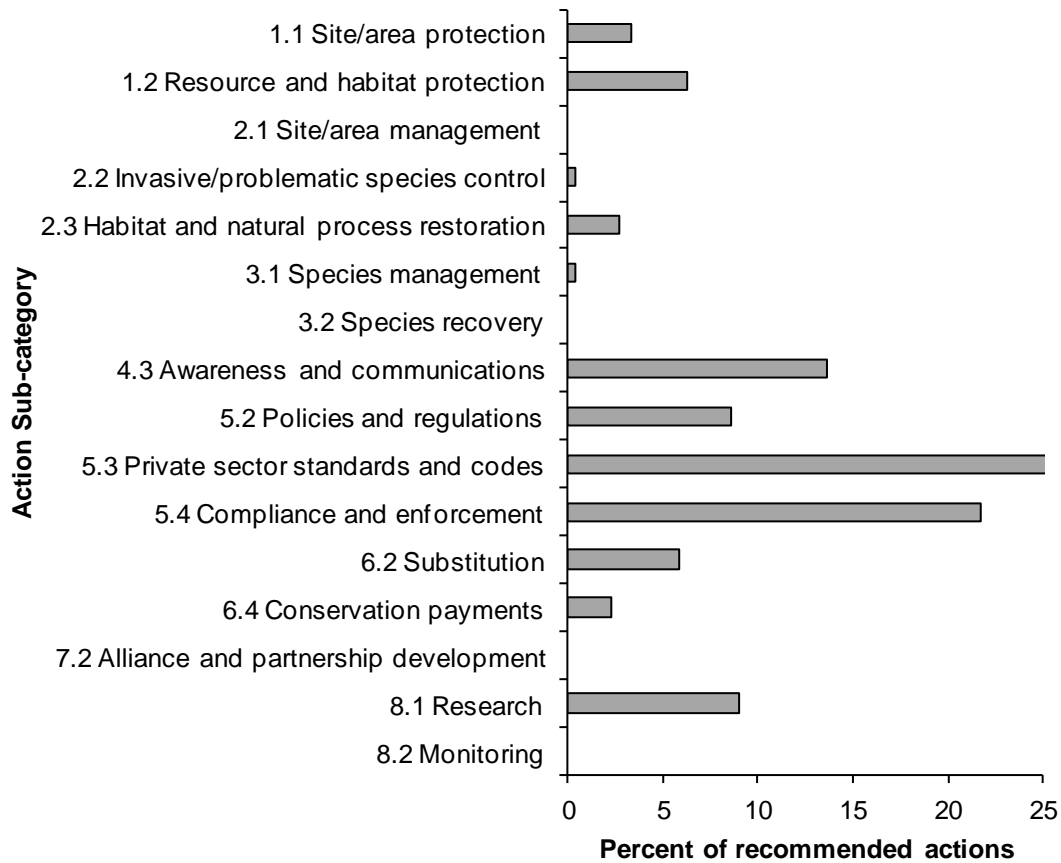
**Figure 16. Percent of recommended actions assigned to each sub-category in BCR 14 NB.**

“Research” and “monitoring” refer to specific species where additional information is required. For a discussion of broad-scale research and monitoring requirements, see Research and Population Monitoring Needs in Section 3.



**Figure 17. Percent of recommended actions assigned to each sub-category in MBU 11 NB.**

“Research” and “monitoring” refers to specific species where additional information is required. For a discussion of broad-scale research and monitoring requirements, see Research and Population Monitoring Needs in Section 3.



**Figure 18. Percent of recommended actions assigned to each sub-category in MBU 12 NB.**

“Research” and “monitoring” refers to specific species where additional information is required. For a discussion of broad-scale research and monitoring requirements, see Research and Population Monitoring Needs in Section 3.

## Section 2: Conservation Needs by Habitat

The following sections provide more detailed information on priority species, their threats and objectives within each of the broad habitat classes that occur in BCR 14 NB, MBU 11 NB and MBU 12 NB. 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 tables because their low-level threats that were ranked low have not been assigned objectives or actions and/or identified threats are addressed in the Widespread Issues section of the strategy.

### Coniferous

Coniferous forest is defined as forest stands where over 75% of total tree basal area is coniferous trees. BCR 14 NB is dominated by coniferous forests; N.B.'s forest is 68% softwood (Erdle and Ward (2008); Fig. 19). Spruce (*Picea rubens*, *P. mariana* and *P. glauca*) and fir (*Abies balsamea*) make up more than half of the timber volume (Erdle and Ward 2008). Lesser but still significant contributors to timber volume include white and jack pine (*Pinus strobus* and *P. banksiana*) and cedar (*Thuja occidentalis*; Erdle and Ward 2008). Furthermore, the age structure of the forest reflects the pattern of past human and natural disturbances: 25% of the forest is less than 20 years old as a result of recent harvesting, while roughly 45% is greater than 60 years old (Erdle and Ward 2008).

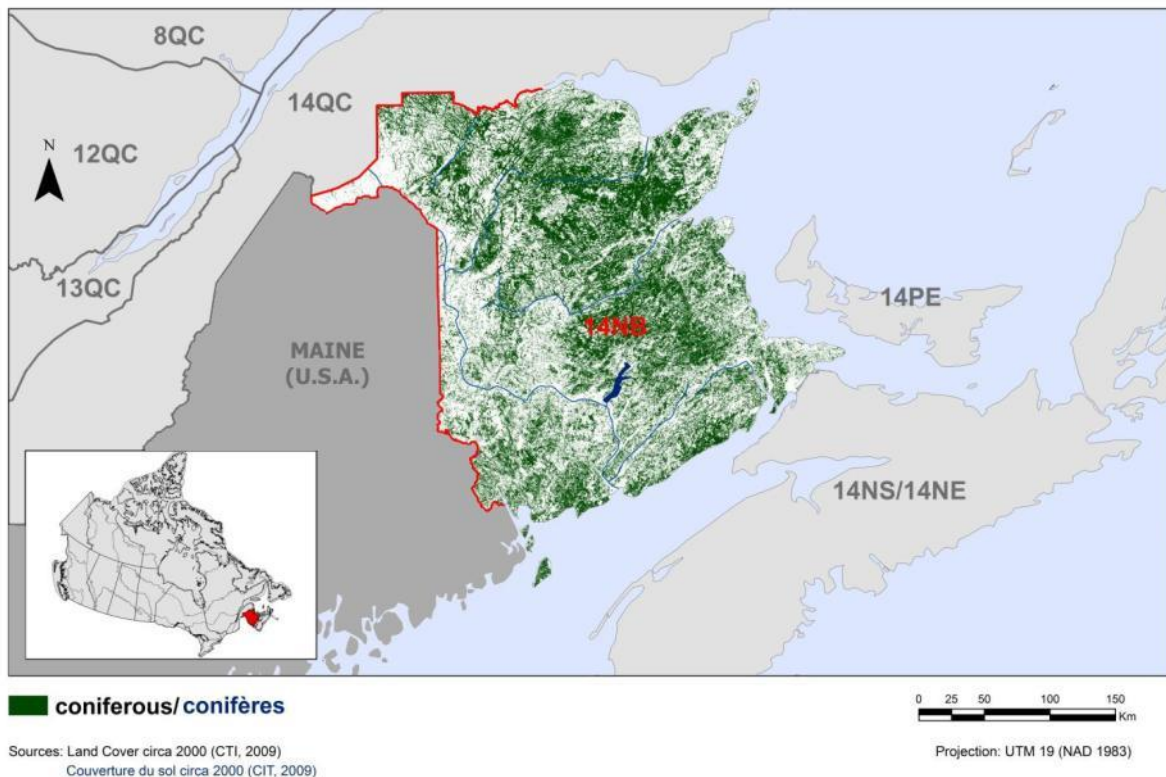


Figure 19. Map of coniferous forest habitat in BCR 14 NB.

There are 18 priority bird species in the broad coniferous habitat category in BCR 14 NB; all are landbirds, and 6 are species at risk (Table 5). Four priority bird species (Bicknell's Thrush, Black-backed Woodpecker, Boreal Chickadee and Cape May Warbler) are found only in coniferous forest and are not also associated with either mixed wood or deciduous forests. The 14 other priority species are also associated with mixed wood forests (see Tables 5 and 9), and 5 also use deciduous forests (see Tables 5, 7 and 9).

Within coniferous forest habitat, 11 of the priority bird species are found in mature or old-growth forests. Additional sub-habitats where priority bird species are found include open forest, spruce-fir forest, dense forest, second-growth forest and moist forest (Table 5).

The highest ranked threat identified for priority species in the coniferous forests of BCR 14 NB is the alteration of forest composition and structure through timber harvest (5.3 Logging & wood harvesting; Fig. 20). Another high-ranked threat to priority bird species using coniferous forest habitats is contamination from pesticides and herbicides from the forestry or agriculture sectors (9.3 Agricultural & forestry effluents; Fig. 20). Forests are additionally being fragmented as a result of road and right-of-way construction (4.1 Roads & railroads and 4.2 Utility & service lines) and the development of wind farms (3.3 Renewable energy), though these threats are ranked low (Fig. 20).

Many bird species will benefit from the conservation objectives and actions presented in Table 6. Recommended conservation actions to address medium- or high-ranked threats to priority birds associated with coniferous forests include identifying, establishing or expanding protected areas of existing old-growth or late-successional coniferous forest habitats, and maintaining sufficient patch sizes, configuration and connectivity of coniferous forest habitats. Developing beneficial management practices to manage developments and minimize habitat degradation is equally important. Pesticides and other biocides should be used only as part of an integrated pest management system to minimize exposure of birds to potentially toxic chemicals.

**Table 5. Priority bird species that use coniferous forest habitat in BCR 14 NB, regional habitat sub-class, important habitat features, population objectives and reason for priority status.**

Priority Bird Species	Habitat Sub-class	Important Habitat Features	Population Objective	Reason for Priority Status						
				SAR <sup>1</sup>	N/CC <sup>2</sup>	N/CS <sup>3</sup>	R/SC <sup>4</sup>	R/SS <sup>5</sup>	NAWMP/EHJV <sup>6</sup>	Review <sup>7</sup>
American Redstart	Second-growth Forest	abundant shrubs and saplings, near water and/or forest edge	Maintain current					Y		
American Three-toed Woodpecker	Mature to Old-growth Forest	mature montane/boreal forest, with dead/dying snags, moist/swampy areas, disturbed areas (fire, insects, windthrow), black spruce	Assess/Maintain							Y
Bay-breasted Warbler	Mature to Old-growth Forest	mature forest and older; old Spruce-Fir <sup>8</sup>	Maintain current			Y		Y		
Bicknell's Thrush	Dense Forest	close-growing conifers at higher elevations	Increase 50%	Y	Y		Y	Y		
Black-backed Woodpecker	Mature to Old-growth Forest	mature to senescent forest, abundant wood boring beetles; old Spruce-Fir <sup>8</sup>	Increase 50%				Y			
Blackburnian Warbler	Mature to Old-growth Forest	mature; old Mixed wood <sup>8</sup>	Maintain current			Y				
Black-throated Green Warbler	Middle-aged to Mature Forest	interior, middle/mature forest; old Forest <sup>8</sup>	Maintain current			Y		Y		
Blue-headed Vireo	Middle-aged to Mature Forest	mid/mature coniferous/mixed forest with >75% closed canopy; some understory (not dense) of shrubs and saplings; old Mixed wood <sup>8</sup>	Maintain current			Y				

<sup>1</sup> SAR, species listed under SARA (Species at Risk Public Registry 2012), assessed by COSEWIC (COSEWIC 2012) or listed under New Brunswick's *Endangered Species Act* (New Brunswick 2004) as Endangered, Threatened or Special Concern (SARA/COSEWIC only).

<sup>2</sup> N/CC, National/Continental Concern.

<sup>3</sup> N/CS, National/Continental Stewardship.

<sup>4</sup> R/SC, Regional/Sub-regional Concern.

<sup>5</sup> R/SS, Regional/Sub-regional Stewardship.

<sup>6</sup> NAWMP/EHJV, waterfowl that are priority under the regional EHJV implementation plan (NB-EHJV 2008) or scored High or Highest in WCR 14 in the NAWMP (NAWMP Plan Committee 2004).

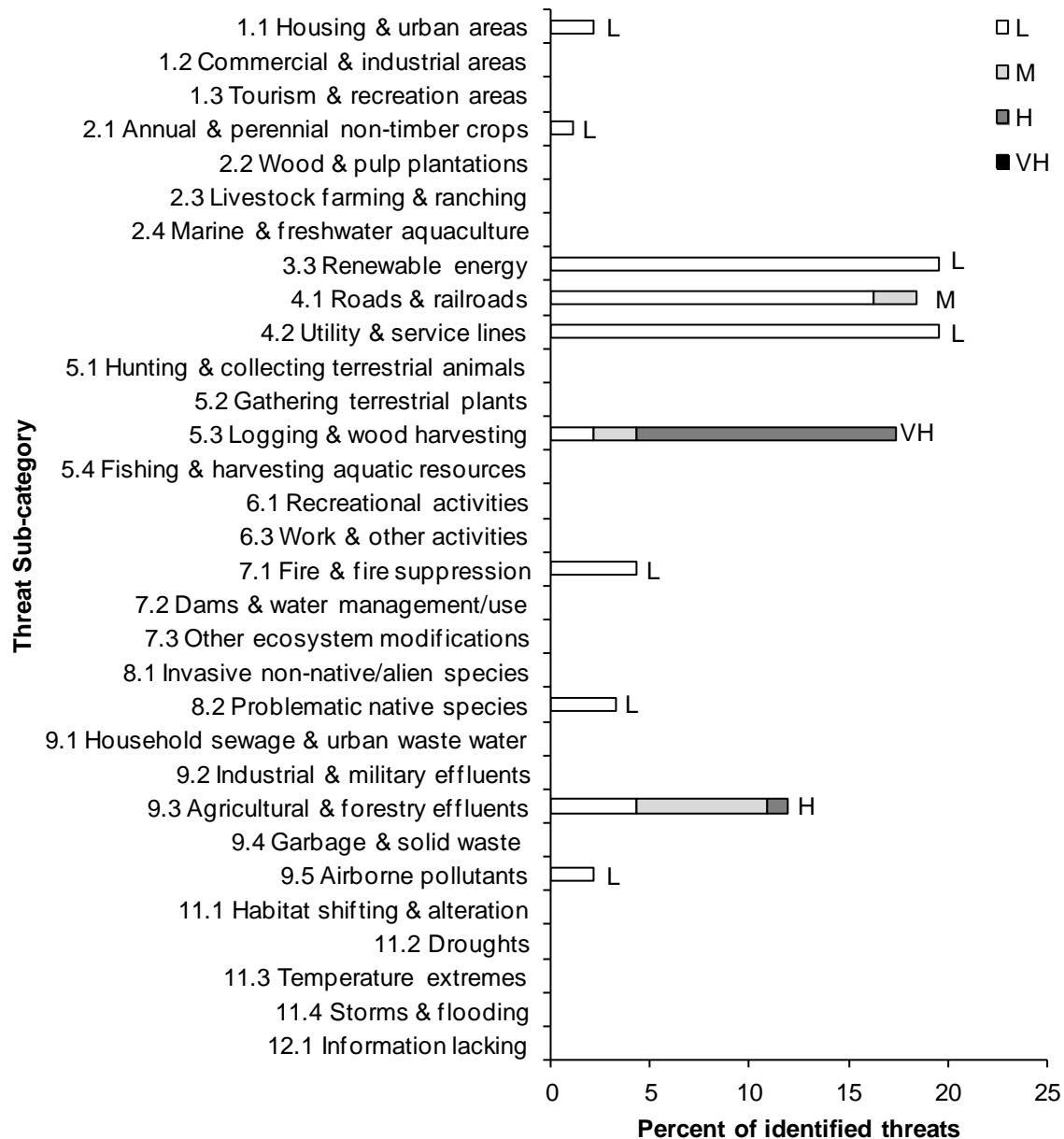
<sup>7</sup> Review, species added by the Regional Technical Working Group or upon expert review. For further details on reasons for priority status and the species prioritization process, see Table 1 and Appendix 2.

<sup>8</sup> Standard habitat categories identified as being used by these species by the NB DNR (New Brunswick Department of Natural Resources 2005a).



Table 5 continued

Priority Bird Species	Habitat Sub-class	Important Habitat Features	Population Objective	Reason for Priority Status						
				SAR <sup>1</sup>	N/CC <sup>2</sup>	N/CS <sup>3</sup>	R/SC <sup>4</sup>	R/SS <sup>5</sup>	NAWMP/ EHJV <sup>6</sup>	Review <sup>7</sup>
Boreal Chickadee	Spruce-Fir Forest	snags/cavities; old Spruce-Fir <sup>8</sup>	Increase 100%				Y			
Canada Warbler	Moist Forest	dense understory, ground moss, moist	Increase 100%	Y	Y	Y	Y	Y		
Cape May Warbler	Mature to Old-growth Forest	mature; old Spruce-Fir <sup>8</sup>	Increase 100%				Y	Y		
Chimney Swift	Mature to Old-growth Forest	large white pines	Increase 100%	Y	Y					
Common Nighthawk	Open Forest	mature forest and older	Increase 100%	Y						
Evening Grosbeak	Second-Growth and Mature Forest	mid/mature open canopy, nesting in bigger trees; old Spruce-Fir <sup>8</sup>	Increase 100%				Y	Y		
Magnolia Warbler	Second-Growth Forest	close-growing conifers	Maintain current			Y		Y		
Olive-sided Flycatcher	Second-Growth and Mature Forest	edges, open areas with perches; old Spruce-Fir <sup>8</sup>	Increase 100%	Y	Y		Y			
Purple Finch	Moist Forest		Maintain current					Y		
Rusty Blackbird	Moist Forest		Increase 100%	Y			Y			



**Figure 20. Percent of identified threats to priority bird species in coniferous forest habitat in each threat sub-category.**

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

**Note:** Threats of all magnitudes are included, although low-ranked threats affecting only a single species were not assigned conservation objectives or recommended actions.

**Table 6. Threats addressed (medium and high rank only), conservation objectives, recommended actions and priority species affected for coniferous habitat in BCR 14 NB.**

Threat Addressed	Threat Category	Conservation Objective	Objective Category	Conservation Action	Action Category	Threat Rank and Priority Species Affected†
Fragmentation or loss of coniferous forest due to the construction of roads	4.1 Roads & railroads	Reduce/eliminate habitat fragmentation from the construction of roads	1.1 Ensure land and resource-use policies and practices maintain or improve bird habitat	Identify, establish or expand protected areas of existing old-growth/late-successional forest habitats.	1.1 Site/area protection	Medium: Black-throated Green Warbler, Boreal Chickadee
				Maintain sufficient patch sizes, configuration and connectivity of coniferous forest habitats to support and, where necessary, enhance populations of priority species.	2.1 Site/area management	
				Define and provide the minimum number, size and condition of residual snags and living trees needed for priority species.	2.1 Site/area management	
				Develop and implement beneficial management practices to limit habitat fragmentation from development (e.g., power lines, road construction).	5.3 Private sector standards and codes	
				Undertake further analysis to achieve a more complete understanding of the impacts of fragmentation on species composition.	8.1 Research	
Fragmentation or loss of coniferous forest due to logging activities	5.3 Logging & wood harvesting	Maintain/restore coniferous forest habitat	1.1 Ensure land and resource-use policies and practices maintain or improve bird habitat	Identify and set aside from logging important breeding habitat.	1.1 Site/area protection	High: Bicknell's Thrush, American Three-toed Woodpecker, Black-backed Woodpecker, Cape May Warbler, Bay-breasted Warbler, Chimney Swift, Blackburnian Warbler, Black-throated Green Warbler, Blue-headed Vireo, Canada Warbler, Magnolia Warbler, Boreal Chickadee Medium: Purple Finch, Evening Grosbeak
				Manage forest to retain and create adequate habitat.	2.1 Site/area management	
				Manage forest to maximize connectedness and connectivity and minimize habitat fragmentation.	2.1 Site/area management	
				Define and provide the minimum number, size and condition of residual snags and living trees needed for priority species.	2.1 Site/area management	
				Improve linkages between bird conservation needs and forest management guidelines.	5.2 Policies and regulations	
				Develop and implement reforestation beneficial management practices for retaining the natural range of forest composition.	5.3 Private sector standards and codes	

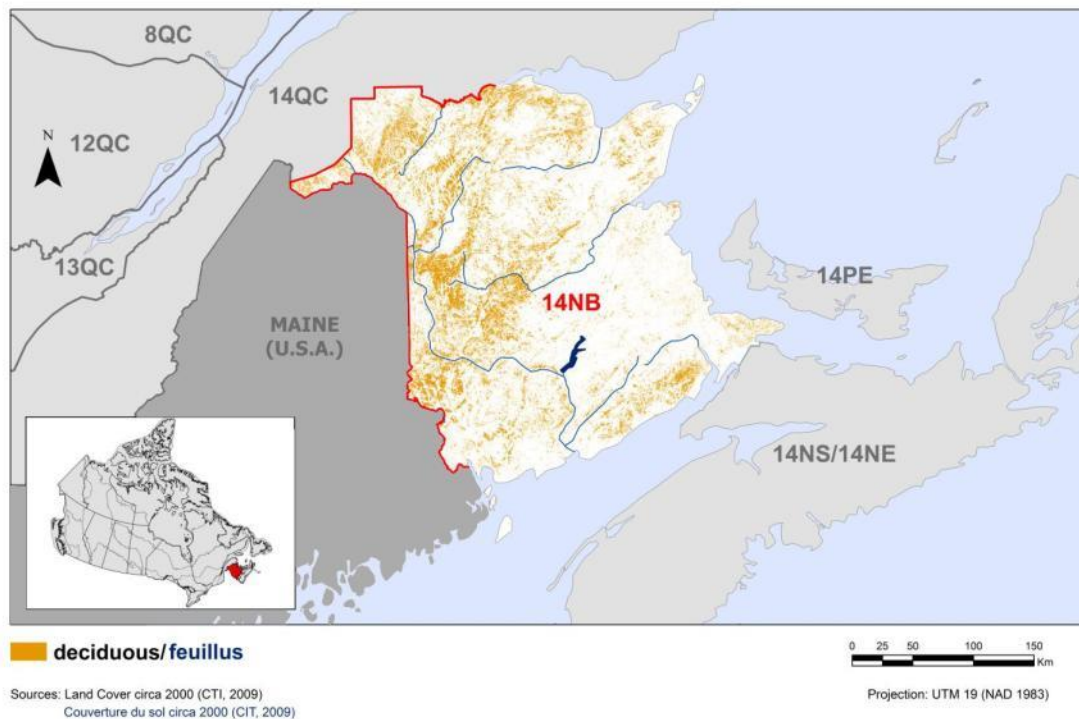
† Priority species not mentioned in this table are absent for one of the following reasons: 1) no identified threats in this habitat; 2) identified threats are discussed in the Widespread Issues section; 3) identified threats in this habitat are of low magnitude.

Table 6 continued

Threat Addressed	Threat Category	Conservation Objective	Objective Category	Conservation Action	Action Category	Threat Rank and Priority Species Affected <sup>†</sup>
Decrease of prey availability to birds due to chemical contamination from biocides such as pesticide, herbicide, or fungicide	9.3 Agricultural & forestry effluents	Reduce the loss of prey/food source from exposure to pesticides and other biocides used by the agriculture industry	5.2 Manage decreases in prey due to contaminants	Use pesticides and other biocides only where necessary and only as part of an integrated pest management system to minimize exposure of birds to potentially toxic chemicals. Promote pesticide free products.	5.3 Private sector standards and codes 6.2 Substitution	High: Bay-breasted Warbler Medium: Blackburnian Warbler, Black-throated Green Warbler, Cape May Warbler, Chimney Swift, Olive-sided Flycatcher, Common Nighthawk

## Deciduous

Deciduous forest habitats (where over 75% of total tree basal area is deciduous trees) occur throughout BCR 14 NB (Fig. 21), representing 32% of New Brunswick's tree volume (Erdle and Ward 2008). The top hardwood species contributing to timber volume in New Brunswick are red and sugar maple (*Acer rubrum* and *A. saccharum*) followed by several birch species (*Betula alleghaniensis*, *B. papyrifera* and *B. populifolia*; Erdle and Ward 2008).



**Figure 21. Map of deciduous habitat in BCR 14 NB.**

There are 17 priority bird species in the broad deciduous habitat category in BCR 14 NB; all are landbirds, and 3 are species at risk (Table 7). All 17 priority bird species in deciduous forests are also associated with mixed wood forests; 5 species also use coniferous forests. No priority species in BCR 14 NB are found exclusively in deciduous forests.

Within deciduous forest habitat, 65% of the priority bird species are found in mature or old-growth forest habitat. Additional sub-habitats where priority bird species are found include open forests, second-growth forests and moist forests (Table 7).

The highest ranked threat identified for priority species in the deciduous forests of BCR 14 NB is the alteration of forest composition and structure through timber harvest (5.3 Logging & wood harvesting; Fig. 22). Selectively cutting hardwood forest within short time intervals changes their structure, resulting in fewer and more scattered mature closed-canopy stands (Villard 2000). In addition, deciduous forests are being fragmented as a result of road and right-of-way construction (4.1 Roads & railroads and 4.2 Utility & service lines) and the development of wind

farms (3.3 Renewable energy; Fig. 22). Medium-ranked threats to priority bird species in deciduous forest include conversion of deciduous forest to a managed coniferous forest (2.2 Wood & pulp plantations) and contamination from pesticides and herbicides from the forestry or agriculture sectors (9.3 Agricultural & forestry effluents; Fig. 22).

Many bird species will benefit from the conservation objectives and actions presented in Table 8. Recommended conservation actions to address medium- and high-ranked threats to priority bird species associated with deciduous habitat include identifying, establishing or expanding protected areas of existing old-growth or late-successional deciduous forest habitats, and maintaining sufficient patch sizes, configuration and connectivity of deciduous forest habitats to help populations of priority bird species. It is equally important to develop beneficial management practices to manage developments and minimize habitat degradation. Managing post-logging sites and permitting or encouraging deciduous regeneration is also recommended. Pesticides and other biocides should be used only as part of an integrated pest management system to minimize exposure of birds to potentially toxic chemicals.

**Table 7. Priority bird species that use deciduous habitat in BCR 14 NB, regional habitat sub-class, important habitat features, population objectives and reason for priority status.**

Priority Bird Species	Habitat Sub-class	Important Habitat Features	Population Objective	Reason for Priority Status						
				SAR <sup>1</sup>	N/CC <sup>2</sup>	N/CS <sup>3</sup>	R/SC <sup>4</sup>	R/SS <sup>5</sup>	NAWMP/ EHJV <sup>6</sup>	Review <sup>7</sup>
American Redstart	Second-growth Forest	abundant shrubs and saplings, near water and/or forest edge	Maintain current					Y		
Black-billed Cuckoo	Second-growth Forest	shrubs	Increase 100%		Y		Y			
Blackburnian Warbler	Mature to Old-growth Forest	mature; old Mixed wood <sup>8</sup>	Maintain current			Y				
Black-throated Blue Warbler	Mature to Old-growth Forest	undisturbed mature forest, relatively open canopy or gaps, deciduous sapling understory; old Tolerant Hardwood <sup>8</sup>	Maintain current					Y		
Canada Warbler	Moist Forest	dense understory, ground moss, moist	Increase 100%	Y	Y	Y	Y	Y		
Chimney Swift	Mature to Old-growth Forest	old poplar stands, sugar maple	Increase 100%	Y	Y					
Eastern Whip-poor-will	Open Forest	proximity to open areas; well-developed leaf litter without a lot of herbaceous cover	Assess/Maintain	Y	Y					
Eastern Wood-Pewee	Middle-aged to Mature Forest	mature, well-developed canopy with big trees, open understory; old Tolerant Hardwood <sup>8</sup>	Increase 100%				Y			

<sup>1</sup> SAR, species listed under SARA (Species at Risk Public Registry 2012), assessed by COSEWIC (COSEWIC 2012) or listed under New Brunswick's *Endangered Species Act* (New Brunswick 2004) as Endangered, Threatened or Special Concern (SARA/COSEWIC only).

<sup>2</sup> N/CC, National/Continental Concern.

<sup>3</sup> N/CS, National/Continental Stewardship.

<sup>4</sup> R/SC, Regional/Sub-regional Concern.

<sup>5</sup> R/SS, Regional/Sub-regional Stewardship.

<sup>6</sup> NAWMP/EHJV, waterfowl that are priority under the regional EHJV implementation plan (NB-EHJV 2008) or scored High or Highest in WCR 14 in the NAWMP (NAWMP Plan Committee 2004).

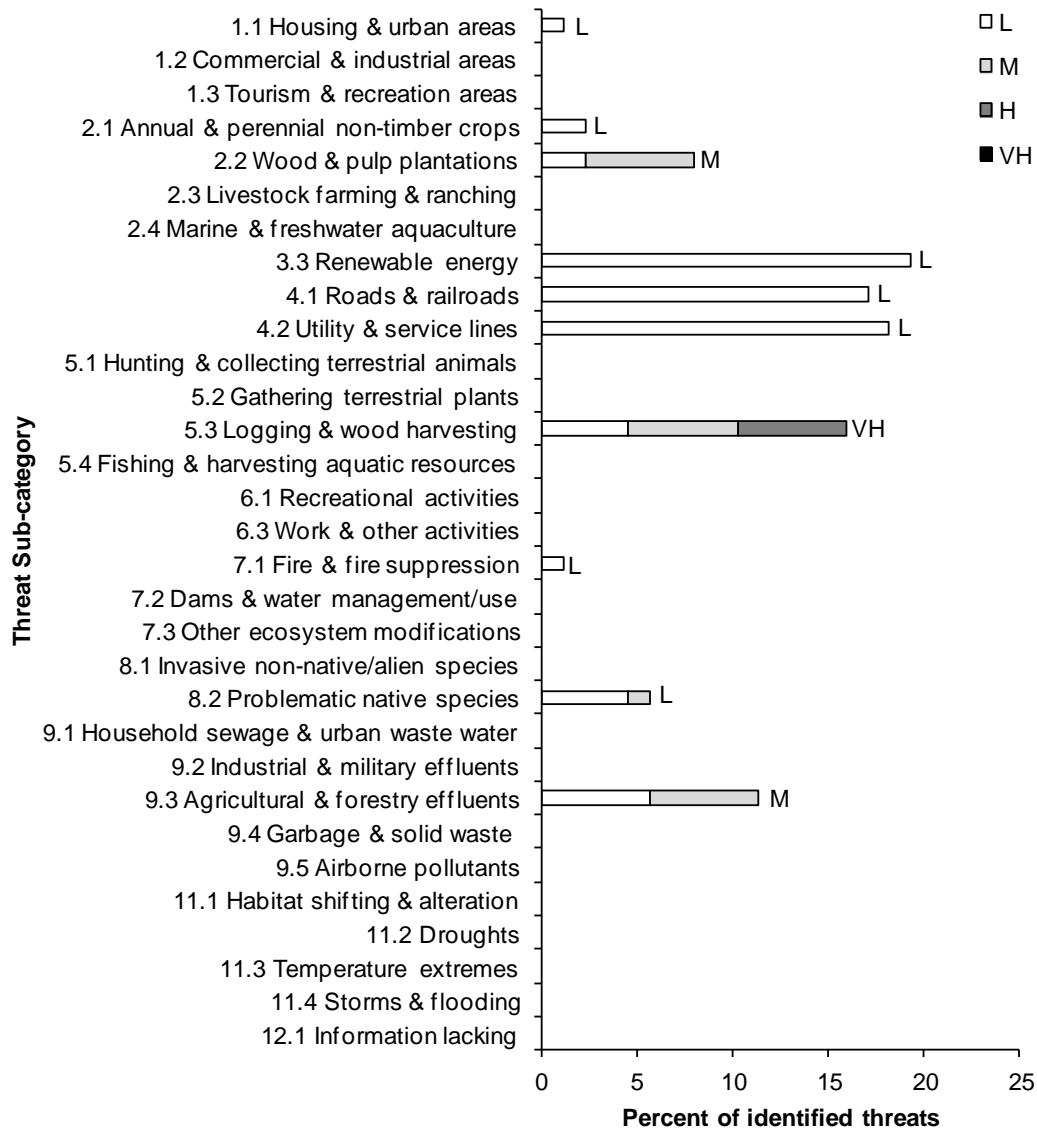
<sup>7</sup> Review, species added by the Regional Technical Working Group or upon expert review. For further details on reasons for priority status and the species prioritization process, see Table 1 and Appendix 2.

<sup>8</sup> Standard habitat categories identified as being used by these species by the NB DNR (New Brunswick Department of Natural Resources 2005a).

Table 7 continued

Priority Bird Species	Habitat Sub-class	Important Habitat Features	Population Objective	Reason for Priority Status						
				SAR <sup>1</sup>	N/CC <sup>2</sup>	N/CS <sup>3</sup>	R/SC <sup>4</sup>	R/SS <sup>5</sup>	NAWMP/ EHJV <sup>6</sup>	Review <sup>7</sup>
Northern Goshawk	Mature to Old-growth Forest	mature forest with high canopy closure, open understory, and moderate slopes; old Hardwood <sup>8</sup>	Increase 50%				Y	Y		
Purple Finch	Moist Forest		Maintain current					Y		
Red-shouldered Hawk	Mature to Old-growth Forest	mature forest and older	Assess/Maintain							Y
Rose-breasted Grosbeak	Second-Growth and Mature Forest	dense sapling layer, open canopy	Maintain current					Y		
Ruffed Grouse	Second-Growth and Mature Forest	coarse woody debris	Assess/Maintain				Y			
Veery	Second-Growth Forest	dense understory, moist	Increase 100%				Y	Y		
White-breasted Nuthatch	Mature to Old-growth Forest	mature forest and older, with big trees/cavities; old Tolerant Hardwood <sup>8</sup>	Maintain current							Y
Wood Thrush	Middle-aged to Mature Forest	open floor, dense saplings	Increase 100%		Y		Y			
Yellow-bellied Sapsucker	Mature to Old-growth Forest	mature birch/poplar, presence of rot, presence of sap; old Hardwood <sup>8</sup>	Maintain current			Y		Y		





**Figure 22. Percent of identified threats to priority bird species in deciduous forest habitat in each threat sub-category.**

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

**Note:** Threats of all magnitudes are included, although low-ranked threats affecting only a single species were not assigned conservation objectives or recommended actions.

**Table 8. Threats addressed (medium and high rank only), conservation objectives, recommended actions and priority species affected for deciduous habitat in BCR 14 NB.**

Threat Addressed	Threat Category	Conservation Objective	Objective Category	Conservation Action	Action Category	Threat Rank and Priority Species Affected <sup>†</sup>
Fragmentation or loss of deciduous forest due to its conversion to managed coniferous forests	2.2 Wood & pulp plantations	Maintain/restore deciduous forests	1.1 Ensure land and resource-use policies and practices maintain or improve bird habitat	Identify, establish or expand protected areas of existing old-growth/late-successional forest habitats.	1.1 Site/area protection	Medium: Black-throated Blue Warbler, Yellow-bellied Sapsucker, Wood Thrush, Black-billed Cuckoo, Ruffed Grouse
				Maintain sufficient patch sizes, configuration and connectivity of deciduous forest habitats to support and, where necessary, enhance populations of priority species.	2.1 Site/area management	
				Define and provide the minimum number, size and condition of residual snags and living trees needed for priority species.	2.1 Site/area management	
				Manage post-logging sites for tree species, age and structural diversity.	2.3 Habitat and natural process restoration	
				Manage post-logging sites to permit/encourage deciduous regeneration.	2.3 Habitat and natural process restoration	
				Develop and implement reforestation beneficial management practices for retaining the natural range of forest composition.	5.3 Private sector standards and codes	
				Improve linkages between bird conservation needs and forest management guidelines.	5.2 Policies and regulations	
Fragmentation or loss of deciduous forest due to logging activities	5.3 Logging & wood harvesting	Maintain/restore deciduous forests	1.1 Ensure land and resource-use policies and practices maintain or improve bird habitat	Identify, establish or expand protected areas of existing old-growth/late-successional forest habitats.	1.1 Site/area protection	High: Northern Goshawk, Chimney Swift, Blackburnian Warbler, White-breasted Nuthatch, Canada Warbler Medium: Black-throated Blue
				Maintain sufficient patch sizes, configuration and connectivity of deciduous forest habitats to support and, where necessary, enhance populations of priority species.	2.1 Site/area management	
				Define and provide the minimum number, size and condition of residual snags and living trees needed for priority species.	2.1 Site/area management	
				Manage post-logging sites for tree species, age and structural	2.3 Habitat and	

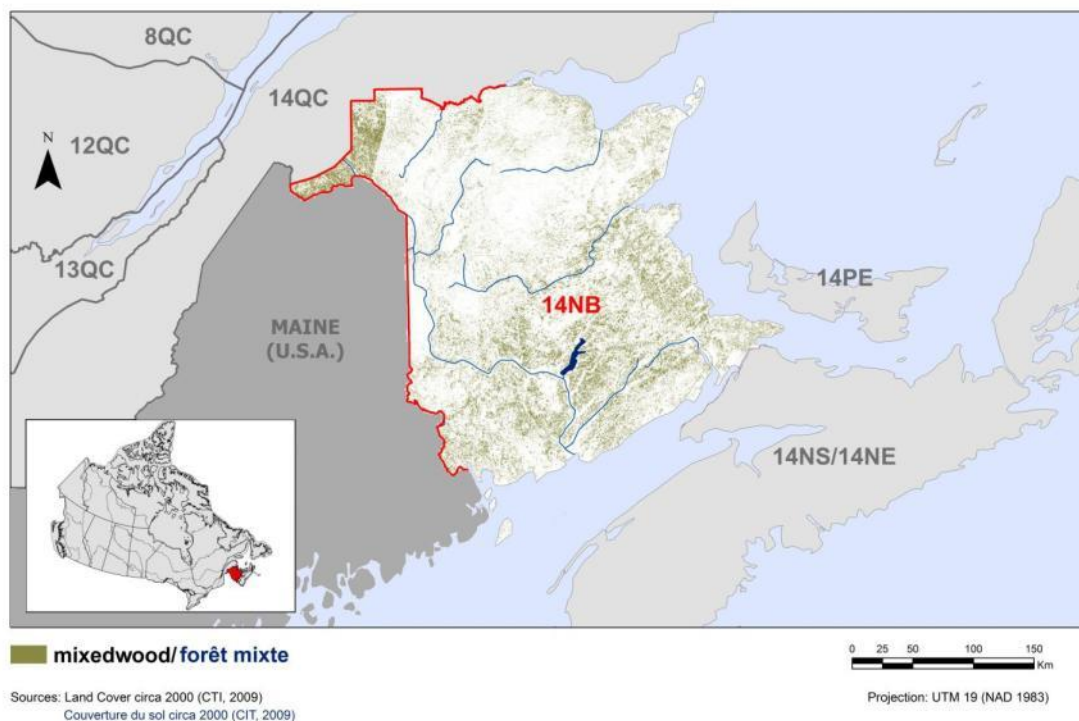
<sup>†</sup> Priority species not mentioned in this table are absent for one of the following reasons: 1) no identified threats in this habitat; 2) identified threats are discussed in the Widespread Issues section; 3) identified threats in this habitat are of low magnitude.

Table 8 continued

Threat Addressed	Threat Category	Conservation Objective	Objective Category	Conservation Action	Action Category	Threat Rank and Priority Species Affected <sup>†</sup>
				diversity.	natural process restoration	Warbler, Red-shouldered Hawk, Yellow-bellied Sapsucker, Wood Thrush, Purple Finch
				Manage post-logging sites to permit/encourage deciduous regeneration.	2.3 Habitat and natural process restoration	
				Develop and implement reforestation beneficial management practices for retaining the natural range of forest composition.	5.3 Private sector standards and codes	
				Improve linkages between bird conservation needs and forest management guidelines.	5.2 Policies and regulations	
Increased predation due to an increase of raccoon populations as a result of land use practices	8.2 Problematic native species	Reduce predation by foxes and raccoons	2.5 Reduce parasitism/ predation	Improve waste management (household and industrial waste, landfills and waste processing facilities) to minimize availability of food to scavengers and reduce artificially sustained predator populations (e.g. raccoons, foxes, gulls).	2.2 Invasive/ problematic species control	Medium: Eastern Whip-poor-will
Decrease of prey availability to birds due to chemical contamination from biocides such as pesticide, herbicide, or fungicide	9.3 Agricultural & forestry effluents	Reduce the loss of prey/food source from exposure to pesticides and other biocides used by the agriculture industry	5.2 Manage decreases in prey due to contaminants	Use pesticides and other biocides only where necessary and only as part of an integrated pest management system to minimize exposure of birds to potentially toxic chemicals.	5.3 Private sector standards and codes	Medium: Black-billed Cuckoo, Blackburnian
				Promote pesticide free products.	6.2 Substitution	Warbler, Eastern Whip-poor-will, Chimney Swift, Eastern Wood-Pewee

## Mixed Wood

Mixed wood forests, defined as a mixture of deciduous and coniferous trees where neither tree type is dominant (i.e. neither type makes up >75% of the total tree basal area (Frisk 2011), occur commonly throughout BCR 14 NB (Fig. 23). Natural forest types in BCR 14 NB include rich tolerant hardwood (or deciduous forests), spruce-fir forest (or coniferous forests), and an array of coniferous, deciduous and mixed intermediate forest types (Loo and Ives 2003). Red spruce (*Picea rubens*), yellow birch (*Betula alleghaniensis*), sugar maple (*Acer saccharum*) and balsam fir (*Abies balsamea*) are considered characteristic trees of BCR 14 NB (Loo and Ives 2003).



**Figure 23. Map of mixed wood forest habitat in BCR 14 NB.**

There are 27 priority bird species in the broad mixed wood habitat category in BCR 14 NB; all are landbirds and 6 are species at risk (Table 9). The American Woodcock is the only species found in mixed wood habitat that is not found in either the coniferous or deciduous forests (though it is found in shrub habitat). All other priority species in mixed wood habitat were also linked to either deciduous forests (12 species), coniferous forests (9 species) or all 3 forest types (5 species; see Tables 5, 7 and 9).

Within the broad mixed-wood habitat category, 17 priority bird species are found in mature or old-growth forests. Additional sub-habitats where priority bird species are found include open forest, second-growth forest and moist forest (Table 9).

The highest ranked threat identified for priority species in mixed wood forests of BCR 14 NB was the alteration of forest composition and structure through timber harvest (5.3 Logging &

wood harvesting; Fig. 24). As in the deciduous forest, priority birds in the mixed wood forest are also threatened by conversion of deciduous forests to managed coniferous forests (2.2 Wood & pulp plantations); this threat was ranked medium overall (Fig. 24). In addition, priority bird species in mixed wood forests are exposed to contamination by pesticides and herbicides from the forestry or agriculture sectors (9.3 Agricultural & forestry effluents; ranked medium; Fig. 24). In addition, mixed wood forests are being fragmented as a result of road and right-of-way construction (4.1 Roads & railroads and 4.2 Utility & service lines) and the development of wind farms (3.3 Renewable energy). These three threat categories were the most frequently identified, though all were ranked low (Fig. 24).

Many bird species will benefit from the conservation objectives and actions presented in Table 10. Conservation actions to address medium- and high-ranked threats to priority bird species associated with mixed wood habitat include identifying, establishing, or expanding protected areas of existing old-growth or late-successional mixed wood forest habitats and maintaining sufficient patch sizes, configuration and connectivity of mixed wood forest habitats to help populations of priority bird species. Developing beneficial management practices to manage developments and minimize habitat degradation is equally important. Pesticides and other biocides should be used only as part of an integrated pest management system to minimize exposure of birds to potentially toxic chemicals.

**Table 9. Priority bird species that use mixed wood forest habitat in BCR 14 NB, regional habitat sub-class, important habitat features, population objectives and reason for priority status.**

Priority Bird Species	Habitat Sub-class	Important Habitat Features	Population Objective	Reason for Priority Status						
				SAR <sup>1</sup>	N/CC <sup>2</sup>	N/CS <sup>3</sup>	R/SC <sup>4</sup>	R/SS <sup>5</sup>	NAWMP/ EHJV <sup>6</sup>	Review <sup>7</sup>
American Redstart	Second-growth Forest	abundant shrubs and saplings, near water and/or forest edge	Maintain current					Y		
American Three-toed Woodpecker	Mature to Old-growth Forest	mature montane/boreal forest, with dead/dying snags, moist/swampy areas, disturbed areas (fire, insects, windthrow), black spruce	Assess/Maintain							Y
American Woodcock	Second-growth Forest	young, moist forest with openings	Increase 50%		Y					
Bay-breasted Warbler	Mature to Old-growth Forest	mature forest and older; old Spruce-Fir <sup>8</sup>	Maintain current			Y		Y		
Black-billed Cuckoo	Second-growth Forest	shrubs	Increase 100%		Y		Y			
Blackburnian Warbler	Mature to Old-growth Forest	mature; old Mixed wood <sup>8</sup>	Maintain current			Y				
Black-throated Blue Warbler	Mature to Old-growth Forest	undisturbed mature forest, relatively open canopy or gaps, deciduous sapling understory; old Tolerant Hardwood <sup>8</sup>	Maintain current					Y		
Black-throated Green Warbler	Middle-aged to Mature Forest	interior, middle/mature forest; old Forest <sup>8</sup>	Maintain current			Y		Y		

<sup>1</sup> SAR, species listed under SARA (Species at Risk Public Registry 2012), assessed by COSEWIC (COSEWIC 2012), or listed under New Brunswick's *Endangered Species Act* (New Brunswick 2004) as Endangered, Threatened or Special Concern (SARA/COSEWIC only).

<sup>2</sup> N/CC, National/Continental Concern.

<sup>3</sup> N/CS, National/Continental Stewardship.

<sup>4</sup> R/SC, Regional/Sub-regional Concern.

<sup>5</sup> R/SS, Regional/Sub-regional Stewardship.

<sup>6</sup> NAWMP/EHJV, waterfowl that are priority under the regional EHJV implementation plan (NB-EHJV 2008) or scored High or Highest in WCR 14 in the NAWMP (NAWMP Plan Committee 2004)

<sup>7</sup> Review, species added by the Regional Technical Working Group or upon expert review. For further details on reasons for priority status and the species prioritization process, see Table 1 and Appendix 2.

<sup>8</sup> Standard habitat categories identified as being used by these species by the NB DNR (New Brunswick Department of Natural Resources 2005a).

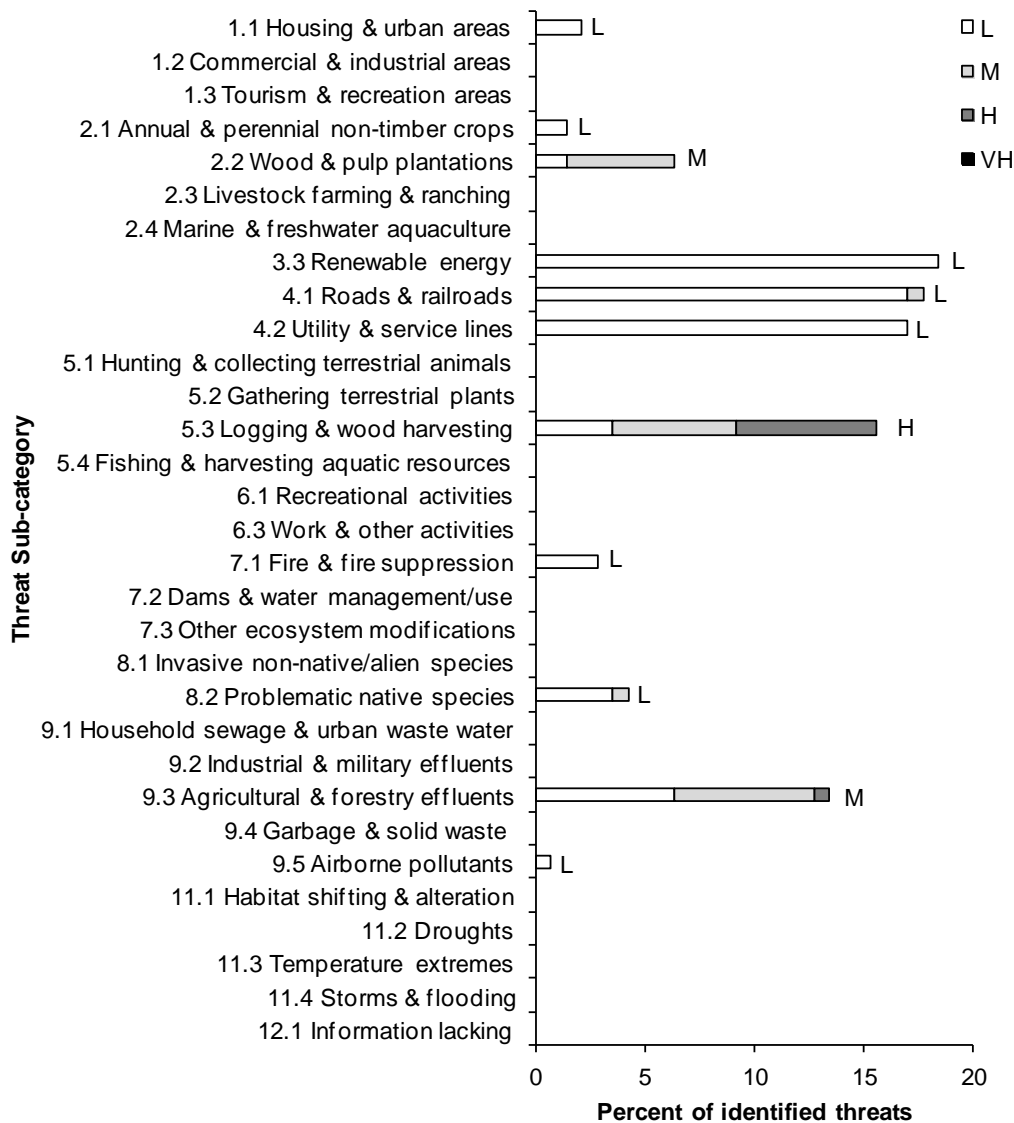
Table 9 continued

Priority Bird Species	Habitat Sub-class	Important Habitat Features	Population Objective	Reason for Priority Status						
				SAR <sup>1</sup>	N/CC <sup>2</sup>	N/CS <sup>3</sup>	R/SC <sup>4</sup>	R/SS <sup>5</sup>	NAWMP/ EHJV <sup>6</sup>	Review <sup>7</sup>
Blue-headed Vireo	Middle-aged to Mature Forest	mid/mature coniferous/mixed forest with >75% closed canopy; some understory (not dense) of shrubs and saplings; old Mixed wood <sup>8</sup>	Maintain current			Y				
Canada Warbler	Moist Forest	dense understory, ground moss, moist	Increase 100%	Y	Y	Y	Y	Y		
Chimney Swift	Mature to Old-growth Forest	snags/hollow trees	Increase 100%	Y	Y					
Common Nighthawk	Open Forest	mature forest and older	Increase 100%	Y						
Eastern Whip-poor-will	Open Forest	proximity to open areas; well-developed leaf litter without a lot of herbaceous cover	Assess/Maintain	Y	Y					
Eastern Wood-Pewee	Middle-aged to Mature Forest	mature, well-developed canopy with big trees, open understory; old Tolerant Hardwood <sup>8</sup>	Increase 100%				Y			
Evening Grosbeak	Second-growth and Mature Forest	mid/mature open canopy, nesting in bigger trees; old Spruce-Fir <sup>8</sup>	Increase 100%				Y	Y		
Magnolia Warbler	Second-growth Forest	close-growing conifers	Maintain current			Y		Y		
Northern Goshawk	Mature to Old-growth Forest	mature forest with high canopy closure, open understory, and moderate slopes; old Hardwood <sup>8</sup>	Increase 50%				Y	Y		
Olive-sided Flycatcher	Second-growth and Mature Forest	edges, open areas with perches; old Spruce-Fir <sup>8</sup>	Increase 100%	Y	Y		Y			
Purple Finch	Moist Forest		Maintain current					Y		
Red-shouldered Hawk	Mature to Old-growth Forest	mature forest and older	Assess/Maintain							Y
Rose-breasted Grosbeak	Second-growth and Mature Forest	dense sapling layer, open canopy	Maintain current					Y		
Ruffed Grouse	Second-growth and Mature Forest	coarse woody debris	Assess/Maintain				Y			
Rusty Blackbird	Moist Forest		Increase 100%	Y			Y			
Veery	Second-growth Forest	dense understory, moist	Increase 100%				Y	Y		
White-breasted Nuthatch	Mature to Old-growth Forest	mature forest and older, with big trees/cavities; old Tolerant Hardwood <sup>8</sup>	Maintain current							Y
Wood Thrush	Middle-aged to Mature Forest	open floor, dense saplings	Increase 100%		Y		Y			

Table 9 continued

Priority Bird Species	Habitat Sub-class	Important Habitat Features	Population Objective	Reason for Priority Status						
				SAR <sup>1</sup>	N/CC <sup>2</sup>	N/CS <sup>3</sup>	R/SC <sup>4</sup>	R/SS <sup>5</sup>	NAWMP/ EHJV <sup>6</sup>	Review <sup>7</sup>
Yellow-bellied Sapsucker	Mature to Old-growth Forest	mature birch/poplar, presence of rot, presence of sap; old Hardwood <sup>8</sup>	Maintain current			Y		Y		





**Figure 24. Percent of identified threats to priority bird species in mixed wood forest habitat in each threat sub-category.**

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

**Note:** Threats of all magnitudes are included, although low-ranked threats affecting only a single species were not assigned conservation objectives or recommended actions.

**Table 10. Threats addressed (medium and high rank only), conservation objectives, recommended action, and priority species affected for mixed wood habitat in BCR 14 NB.**

Threat Addressed	Threat Category	Conservation Objective	Objective Category	Conservation Action	Action Category	Threat Rank and Priority Species Affected <sup>†</sup>
Fragmentation or loss of mixed forest due to its conversion to managed coniferous forest	2.2 Wood & pulp plantations	Maintain/restore mixed forests	1.1 Ensure land and resource-use policies and practices maintain or improve bird habitat	Identify, establish or expand protected areas of existing old-growth/late-successional forest habitats.	1.1 Site/area protection	Medium: American Three-toed Woodpecker, Bay-breasted Warbler, Black-throated Blue Warbler, Yellow-bellied Sapsucker, Wood Thrush, Ruffed Grouse, Black-billed Cuckoo
				Maintain sufficient patch sizes, configuration and connectivity of mixed forest habitats to support and, where necessary, enhance populations of priority species.	2.1 Site/area management	
				Define and provide the minimum number, size and condition of residual snags and living trees needed for priority species.	2.1 Site/area management	
				Manage post-logging sites for tree species, age and structural diversity.	2.3 Habitat and natural process restoration	
				Manage post-logging sites to permit/encourage deciduous regeneration.	2.3 Habitat and natural process restoration	
				Develop and implement reforestation beneficial management practices for retaining the natural range of forest composition.	5.3 Private sector standards and codes	
				Improve linkages between bird conservation needs and forest management guidelines.	5.2 Policies and regulations	
Fragmentation or loss of mixed forest due to the construction of roads	4.1 Roads & railroads	Reduce/eliminate habitat fragmentation from the construction of roads	1.1 Ensure land and resource-use policies and practices maintain or improve bird habitat	Identify, establish or expand protected areas of existing old-growth/late-successional forest habitats.	1.1 Site/area protection	Medium: Black-throated Green Warbler
				Maintain sufficient patch sizes, configuration and connectivity of mixed forest habitats to support and, where necessary, enhance populations of priority species.	2.1 Site/area management	
				Define and provide the minimum number, size and condition of residual snags and living trees needed for	2.1 Site/area management	

<sup>†</sup> Priority species not mentioned in this table are absent for one of the following reasons: 1) no identified threats in this habitat; 2) identified threats are discussed in the Widespread Issues section; 3) identified threats in this habitat are of low magnitude.

Table 10 continued

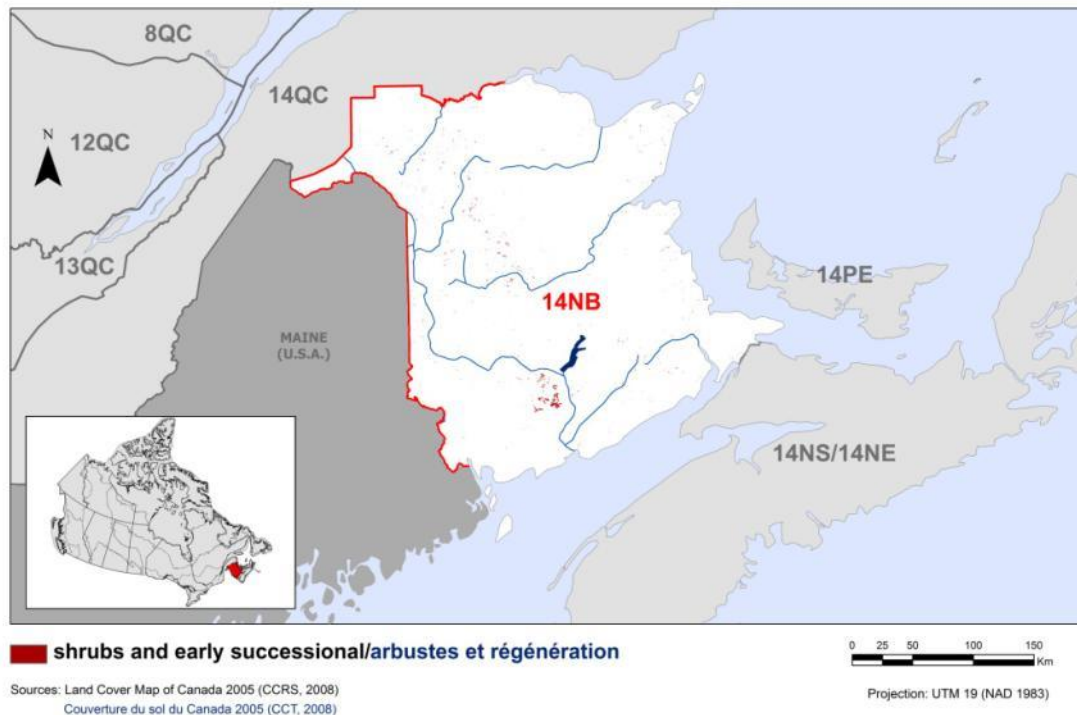
Threat Addressed	Threat Category	Conservation Objective	Objective Category	Conservation Action	Action Category	Threat Rank and Priority Species Affected <sup>†</sup>
				priority species.		
				Develop and implement beneficial management practices to limit habitat fragmentation from development (e.g. power lines, road construction).	5.3 Private sector standards and codes	
				Undertake further analysis to achieve a more complete understanding of the impacts of fragmentation on species composition.	8.1 Research	
Fragmentation or loss of mixed forest due to logging activities	5.3 Logging & wood harvesting	Maintain/restore mixed forests	1.1 Ensure land and resource-use policies and practices maintain or improve bird habitat	Identify, establish or expand protected areas of existing old-growth/late-successional forest habitats.	1.1 Site/area protection	High: Bay-breasted Warbler, Chimney Swift, Northern Goshawk, American Three-toed Woodpecker, Blackburnian Warbler, Black-throated Green Warbler, Blue-headed Vireo, Canada Warbler, Magnolia Warbler Medium: Yellow-bellied Sapsucker, Black-throated Blue Warbler, Red-shouldered Hawk, White-breasted Nuthatch, Wood Thrush, Purple Finch, Evening Grosbeak, Black-billed Cuckoo
				Maintain sufficient patch sizes, configuration and connectivity of mixed forest habitats to support and, where necessary, enhance populations of priority species.	2.1 Site/area management	
				Define and provide the minimum number, size and condition of residual snags and living trees needed for priority species.	2.1 Site/area management	
				Manage post-logging sites for tree species, age and structural diversity.	2.3 Habitat and natural process restoration	
				Develop and implement reforestation beneficial management practices for retaining the natural range of forest composition.	5.3 Private sector standards and codes	
				Improve linkages between bird conservation needs and forest management guidelines.	5.2 Policies and regulations	
Increased predation due to an increase of raccoon populations as a result of land use practices	8.2 Problematic native species	Reduce predation by foxes and raccoons	2.5 Reduce parasitism/predation	Improve waste management (household and industrial waste, landfills and waste processing facilities) to minimize availability of food to scavengers and reduce artificially sustained predator populations (e.g. raccoons, foxes, gulls).	2.2 Invasive/problematic species control	Medium: Eastern Whip-poor-will

Table 10 continued

Threat Addressed	Threat Category	Conservation Objective	Objective Category	Conservation Action	Action Category	Threat Rank and Priority Species Affected <sup>†</sup>
Decrease of prey availability to birds due to chemical contamination from biocides such as pesticide, herbicide, or fungicide	9.3 Agricultural & forestry effluents	Reduce the loss of prey/food source from exposure to pesticides and other biocides used by the agriculture industry	5.2 Manage decreases in prey due to contaminants	Use pesticides and other biocides only where necessary and only as part of an integrated pest management system to minimize exposure of birds to potentially toxic chemicals.	5.3 Private sector standards and codes	High: Bay-breasted Warbler Medium: Black-billed Cuckoo, Blackburnian Warbler, Black-throated Blue Warbler, Black-throated Green Warbler, Eastern Whip-poor-will, Chimney Swift, Common Nighthawk, Eastern Wood-Pewee, Olive-sided Flycatcher
				Promote pesticide free products.	6.2 Substitution	

### ***Shrub/Early Successional***

Early successional habitat is fairly common and widespread, occurring whenever windthrow, spruce budworm, timber harvest or other disturbances have created successional openings within forests (Fig. 25). Typical shrub and early successional species in New Brunswick include pin cherry, raspberry, white and grey birch, poplar, white spruce, and tamarack.



**Figure 25. Map of shrubs and early successional habitat in BCR 14 NB.**

Seven priority species, six landbirds and one shorebird, are found in early successional habitat in BCR 14 NB. Only the Short-eared Owl is a species at risk (Table 11), assessed by COSEWIC and listed as special concern under SARA. Shrub and early successional habitats have limited habitat sub-types, and many priority birds in this habitat do not demonstrate a particular preference for one habitat sub-type. Exceptions are American Redstarts and Veerys that tend to use dense shrubs and Eastern Kingbirds and Short-eared Owls that tend to use scattered shrubs (Table 11).

Shrub and early successional habitat is lost as succession progresses and young forests mature. While new patches of early successional habitat are created by timber harvesting, they are typically managed for accelerated conifer regrowth, which may reduce the suitability of habitat patches (Betts et al. 2010). The most frequently identified threats to priority birds using shrub and early successional habitats were the

succession of old fields to forest (7.3 Other ecosystem modifications) and direct lethal and sub-lethal effects of chemical contamination on birds or their food from agricultural pesticides, fungicides and other biocides (9.3 Agricultural & forestry effluents; Fig. 26). All identified threats to priority bird species in shrub and early successional habitat were ranked low; therefore, specific conservation actions are not presented in this document.

**Table 11. Priority bird species that use shrub and/or early successional habitats in BCR 14 NB, regional habitat sub-class, important habitat features, population objectives and reason for priority status.**

Priority Bird Species	Habitat Sub-class	Important Habitat Features	Population Objective	Reason for Priority Status						
				SAR <sup>1</sup>	N/CC <sup>2</sup>	N/CS <sup>3</sup>	R/SC <sup>4</sup>	R/SS <sup>5</sup>	NAWMP/ EHJV <sup>6</sup>	Review <sup>7</sup>
American Redstart	Dense Shrub	high shrubs	Maintain current				Y			
American Woodcock	Non-specific Early Successional	high shrubs	Increase 50%							
Eastern Kingbird	Scattered Shrub		Increase 50%			Y				
Rose-breasted Grosbeak	Non-specific Shrub		Maintain current				Y			
Short-eared Owl	Scattered Shrub	abundant prey	Assess/Maintain	Y						
Veery	Dense Shrub		Increase 100%			Y	Y			
White-throated Sparrow	Non-specific Shrub	any forest type with slash or shrubs	Maintain current		Y		Y			

<sup>1</sup> SAR, species listed under SARA (Species at Risk Public Registry 2012), assessed by COSEWIC (COSEWIC 2012) or listed under New Brunswick's *Endangered Species Act* (New Brunswick 2004) as Endangered, Threatened or Special Concern (SARA/COSEWIC only).

<sup>2</sup> N/CC, National/Continental Concern.

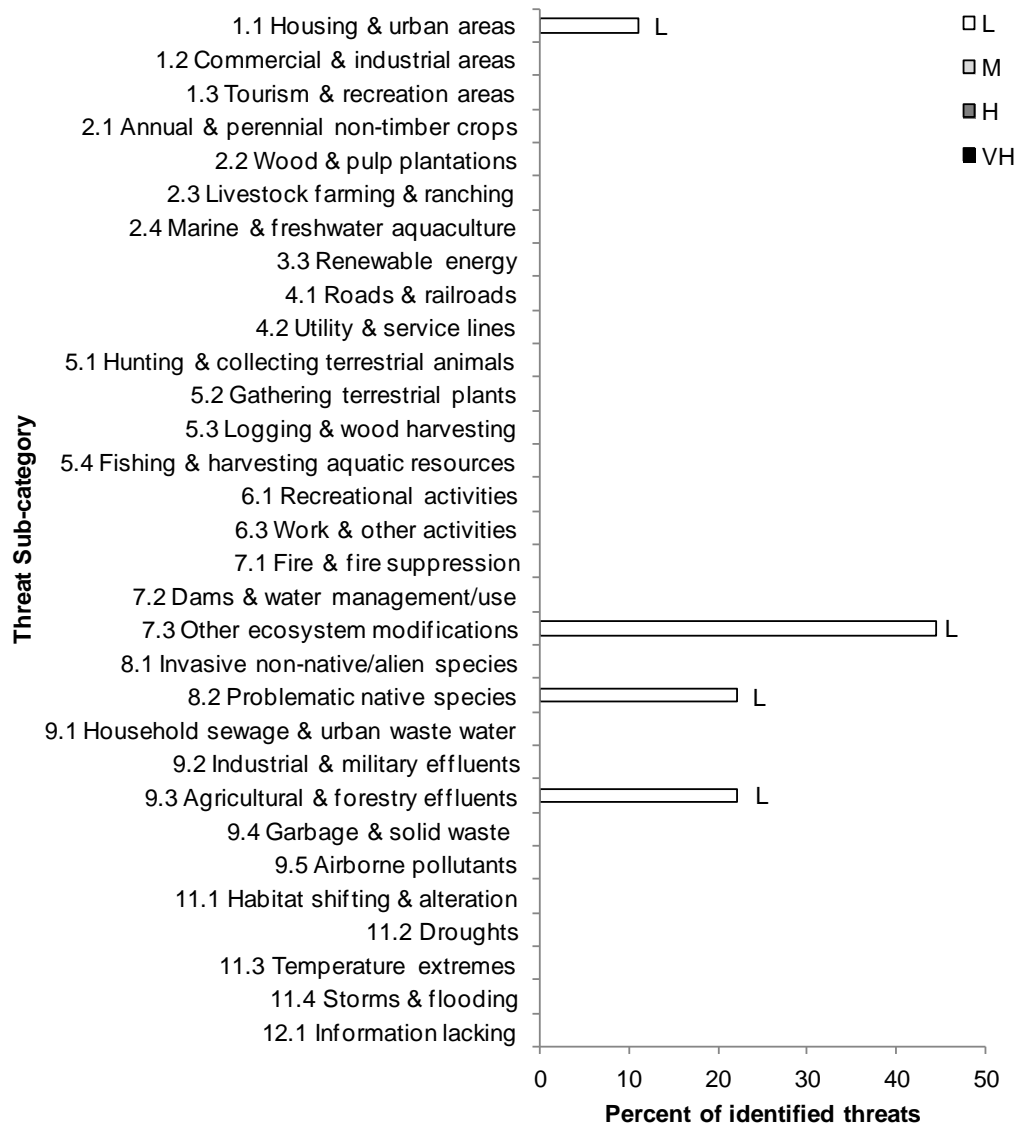
<sup>3</sup> N/CS, National/Continental Stewardship.

<sup>4</sup> R/SC, Regional/Sub-regional Concern.

<sup>5</sup> R/SS, Regional/Sub-regional Stewardship.

<sup>6</sup> NAWMP/EHJV, waterfowl that are priority under the regional EHJV implementation plan (NB-EHJV 2008) or scored High or Highest in WCR 14 in the NAWMP (NAWMP Plan Committee 2004)

<sup>7</sup> Review, species added by the Regional Technical Working Group or upon expert review. For further details on reasons for priority status and the species prioritization process, see Table 1 and Appendix 2.



**Figure 26. Percent of identified threats to priority bird species in shrub and/or early successional habitat in each threat sub-category.**

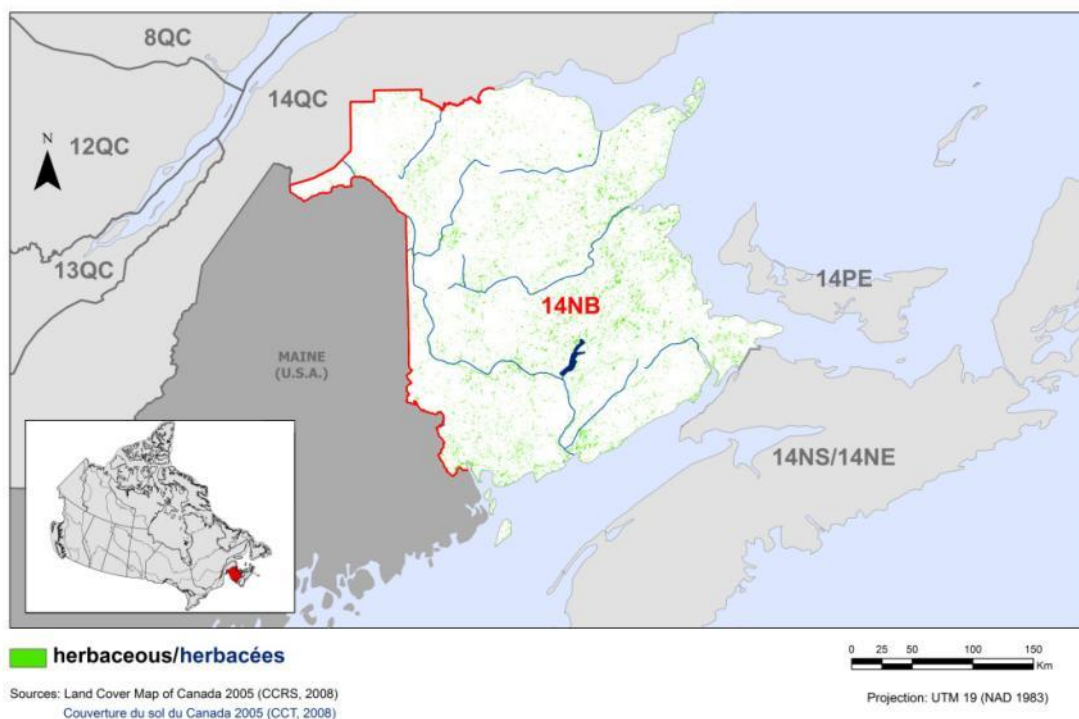
Each bar represents the percent of the total number of threats identified in each threat sub-category in shrub and/or early successional habitat (for example, if 100 threats were identified in total for all priority species in shrub and/or early successional habitat, and 10 of those threats were in the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

**Note:** Threats of all magnitudes are included, although low-ranked threats affecting only a single species were not assigned conservation objectives or recommended actions.



## Herbaceous

Herbaceous areas are natural assemblages of forbs and graminoids that are often associated with “open” areas. They include natural areas and pasture lands but do not include cultivated and managed areas such as hayfields (these are discussed in the next section: Cultivated and Managed Areas). In New Brunswick, herbaceous areas can be found near cliff edges and other exposed areas, along beaches and bog margins, in riverside seeps, river beaches, shoreline outcrops and tall meadows along river valleys such as the Saint John River Valley. Herbaceous plant communities can also be found in disturbed areas as early successional or pioneer species or in traditional pasturelands. Overall, herbaceous habitats form only a small portion of BCR 14 NB, but they are an important part of the overall landscape (Fig. 27).



**Figure 27. Map of herbaceous habitat in BCR 14 NB.**

Grassland-associated birds are exhibiting major continent-wide declines and are one of the most rapidly declining bird groups (North American Bird Conservation Initiative Canada; NABCI 2012, NABCI U.S. Committee 2009). Of the eight priority species that have been identified as using herbaceous habitats in BCR 14 NB, four are species at risk (Table 12).

The only medium-ranked threat to priority bird species in natural herbaceous habitats in BCR 14 NB is habitat loss or fragmentation due to conversion to urban development (1.1 Housing & urban areas; Fig. 28). Also, because these habitat types are often present in exposed environments with high wind velocities (e.g. the coast), herbaceous areas are threatened by wind power developments (3.3 Renewable energy; Fig. 28). While this was the most frequently identified threat, the footprint of wind farms is generally relatively small and

their impacts most profound on relatively scarce or rare habitat types (see section on Wind Turbines for more details). Threats resulting from wind power developments were therefore ranked low (Fig. 28).

Many bird species will benefit from conservation actions to address the loss of herbaceous habitat to urban development (Table 13). The main recommendations are securing and managing grassland habitat through a variety of methods, including the re-creation of grassland-like habitats, and providing incentives to landowners to maintain grasslands.

**Table 12. Priority bird species that use herbaceous habitat in BCR 14 NB, regional habitat sub-class, important habitat features, population objectives and reason for priority status.**

Priority Bird Species	Habitat Sub-class	Important Habitat Features	Population Objective	Reason for Priority Status						
				SAR <sup>1</sup>	N/CC <sup>2</sup>	N/CS <sup>3</sup>	R/SC <sup>4</sup>	R/SS <sup>5</sup>	NAWMP/ EHJV <sup>6</sup>	Review <sup>7</sup>
American Bittern	Natural Herbaceous		Increase 100%		Y		Y			
American Golden-Plover	Natural Herbaceous		Assess/Maintain		Y					
Bobolink	Natural Herbaceous	large fields, high grasses	Increase 100%	Y	Y		Y			
Common Nighthawk	Natural Herbaceous		Increase 100%	Y						
Eastern Kingbird	Natural Herbaceous		Increase 50%				Y			
Eastern Meadowlark	Natural Herbaceous	high grasses, litter	Increase 50%	Y						
Short-eared Owl	Natural Herbaceous	abundant prey	Assess/Maintain	Y						
Tree Swallow	Natural Herbaceous	cavities within 1.5 km of water or open areas for foraging	Maintain current					Y		

<sup>1</sup> SAR, species listed under SARA (Species at Risk Public Registry 2012), assessed by COSEWIC (COSEWIC 2012) or listed under New Brunswick's *Endangered Species Act* (New Brunswick 2004) as Endangered, Threatened or Special Concern (SARA/COSEWIC only).

<sup>2</sup> N/CC, National/Continental Concern.

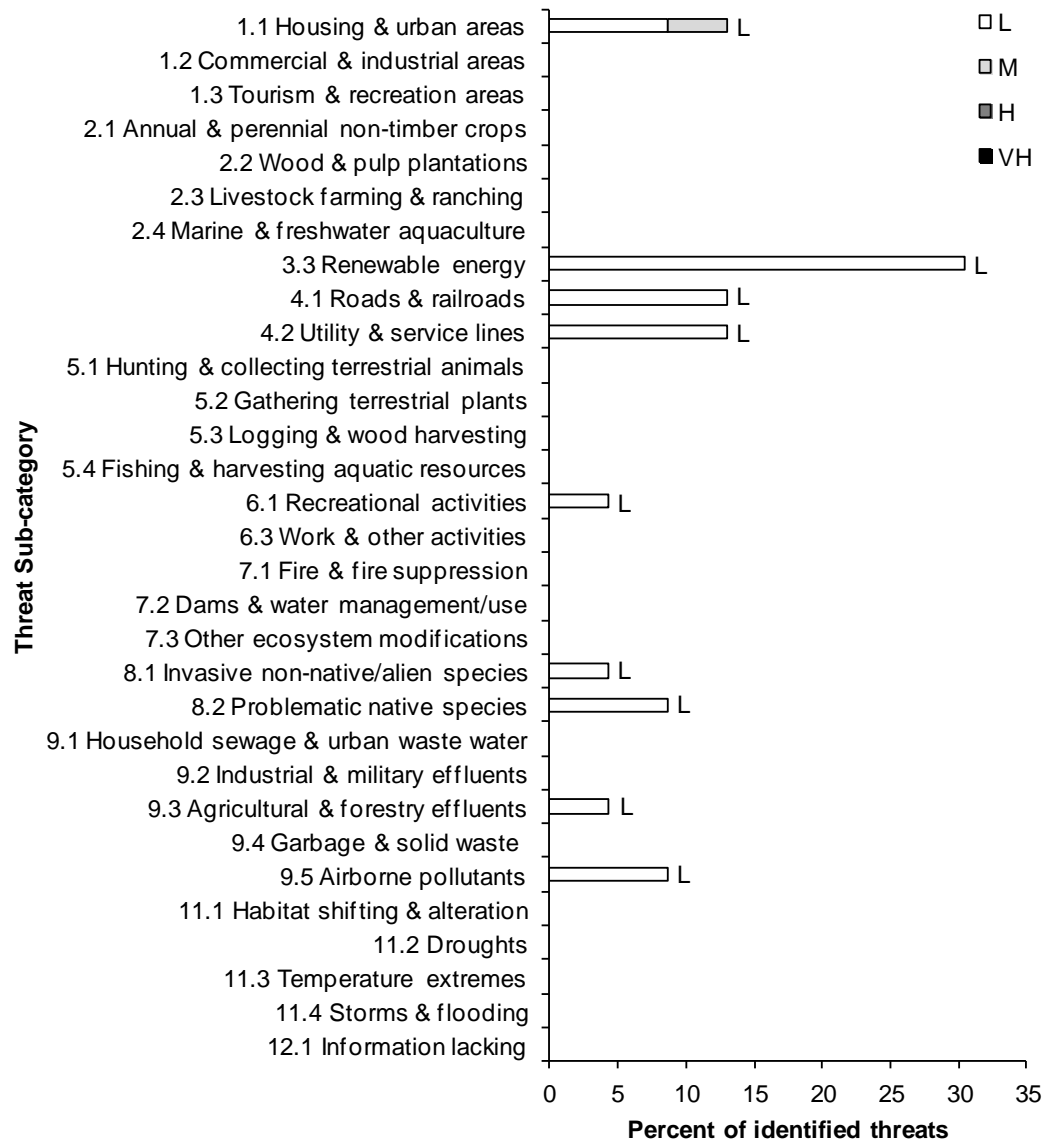
<sup>3</sup> N/CS, National/Continental Stewardship.

<sup>4</sup> R/SC, Regional/Sub-regional Concern.

<sup>5</sup> R/SS, Regional/Sub-regional Stewardship.

<sup>6</sup> NAWMP/EHJV, waterfowl that are priority under the regional EHJV implementation plan (NB-EHJV 2008) or scored High or Highest in WCR 14 in the NAWMP (NAWMP Plan Committee 2004).

<sup>7</sup> Review, species added by the Regional Technical Working Group or upon expert review. For further details on reasons for priority status and the species prioritization process, see Table 1 and Appendix 2.



**Figure 28. Percent of identified threats to priority bird species in herbaceous habitat in each threat sub-category.**

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

**Note:** Threats of all magnitudes are included, although low-ranked threats affecting only a single species were not assigned conservation objectives or recommended actions.

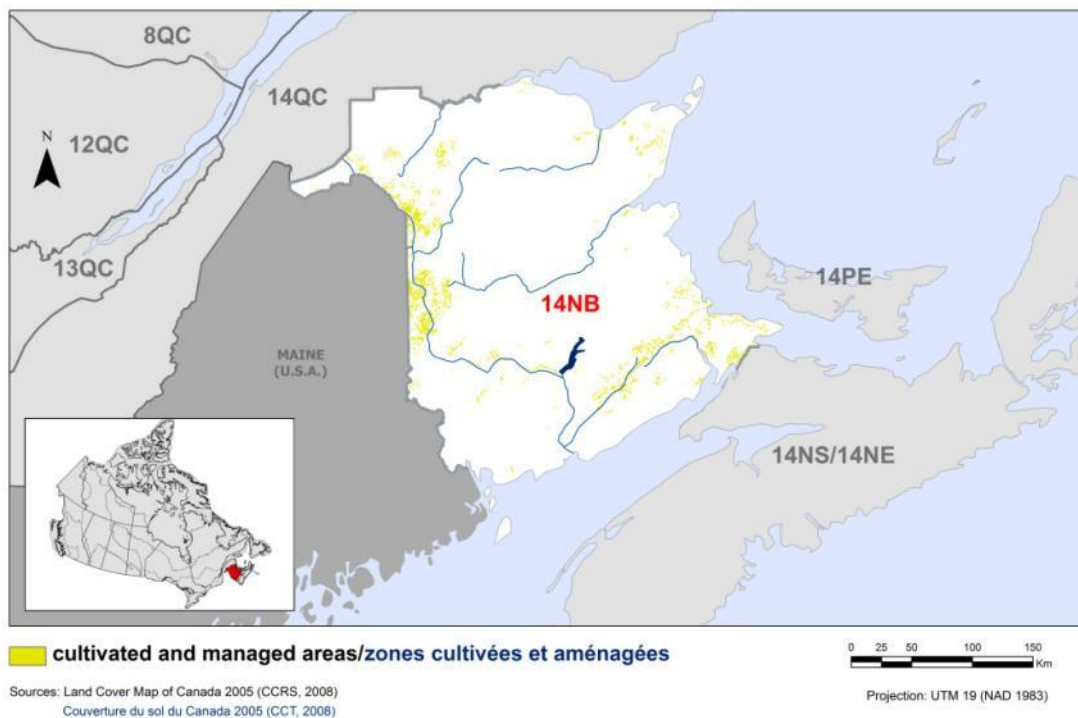
**Table 13. Threats addressed (medium and high rank only), conservation objectives, recommended actions and priority species affected for herbaceous in BCR 14 NB.**

Threat Addressed	Threat Category	Conservation Objective	Objective Category	Conservation Action	Action Category	Threat Rank and Priority Species Affected <sup>†</sup>
Fragmentation or loss of natural grasslands due to urban development	1.1 Housing & urban areas	Maintain/restore natural grasslands	1.1 Ensure land and resource-use policies and practices maintain or improve bird habitat	Recreate grassland-like habitats through specific site management.	2.3 Habitat and natural process restoration	Medium: American Bittern
				Secure and manage grassland habitat for priority species through various methods such as creation of protected areas, private land acquisitions, conservation easements, community conservation plans and stewardship agreements.	1.2 Resource and habitat protection	
				Provide incentives for landowners to protect grassland habitat.	6.4 Conservation payments	

<sup>†</sup> Priority species not mentioned in this table are absent for one of the following reasons: 1) no identified threats in this habitat; 2) identified threats are discussed in the Widespread Issues section; 3) identified threats in this habitat are of low magnitude.

### ***Cultivated and Managed Areas***

Cultivated and managed areas include agricultural areas and urban vegetation (or parklands). There were 3880 km<sup>2</sup> farmed in New Brunswick in 2001, of which 38% was devoted to crops (Statistics Canada 2001a) making up close to 2% of New Brunswick's total geographic area (New Brunswick Department of Agriculture, Aquaculture and Fisheries, n.d.). Cattle and dairy farms accounted for 26% and 11% of farms in New Brunswick in 2001. Fruit operations, 90% of which are managed "wild" blueberry acreage, accounted for 13% (Statistics Canada 2001b). Land suitable for agricultural production is concentrated in the Saint John River Valley, along the Petitcodiac River and in the Acadian Peninsula (Fig. 29).



**Figure 29. Map of cultivated and managed areas in BCR 14 NB.**

Cultivated and managed areas, particularly those near water, are important in terms of biodiversity and are used by a broad diversity of species. Of the 21 priority bird species that have been identified as using cultivated and managed areas in BCR 14 NB, 6 are species at risk (Table 14). The temperate breeding population of Canada Goose was determined to be an overabundant priority species of management concern in BCR 14 NB (Table 14).

The most frequently identified threats to priority bird species in Cultivated and managed areas in BCR 14 NB are the contamination of food sources by, or the direct mortality of priority birds as a result of, chemicals used by the agriculture industry (9.3 Agricultural & forestry effluents; Fig. 30). These threats are ranked medium for Short-eared Owl, Tree and Barn Swallows, Eastern Kingbird, and Common Nighthawk (Table 15); three of these are species at risk

(Table 14). In addition, agricultural practices such as mowing hayfields during the breeding season (2.1 Annual & perennial non-timber crops; Fig. 30 and Table 15) is a high-ranked threat for Bobolink, Nelson's Sparrow and Eastern Meadowlark, and a medium-ranked threat to Short-eared Owl. Agricultural lands in BCR 14 NB are also threatened by urban development (1.1 Housing & urban areas; Fig. 30), a medium-ranked threat for Nelson's Sparrow (Table 15).

Many bird species will benefit from the conservation objectives and actions presented in Table 15. Conservation actions to address medium- and high-ranked threats in cultivated and managed areas in BCR 14 NB include protecting grassland habitat, and increasing awareness of farmers about the effects of their practices on grassland birds and providing information on mitigation. In addition, bird-friendly agricultural practices should be encouraged through economic and other incentives. Pesticides and other biocides should be used only as part of an integrated pest management system to minimize exposure of birds to potentially toxic chemicals.

**Table 14. Priority bird species that use cultivated and managed areas in BCR 14 NB, regional habitat sub-class, important habitat features, population objectives and reason for priority status.**

Priority Bird Species	Habitat Sub-class	Important Habitat Features	Population Objective	Reason for Priority Status						
				SAR <sup>1</sup>	N/CC <sup>2</sup>	N/CS <sup>3</sup>	R/SC <sup>4</sup>	R/SS <sup>5</sup>	NAWMP/ EHJV <sup>6</sup>	Review <sup>7</sup>
American Black Duck	Agriculture	proximity to water	Maintain current						Y	
American Golden-Plover	Agriculture; Urban Vegetation	open areas such as golf courses, airports	Assess/Maintain		Y					
Barn Swallow	Agriculture; Urban Vegetation	structure with horizontal surface and shelter for nesting, nearby source of mud for nest construction	Increase 100%	Y						
Bobolink	Agriculture	large fields, high grasses	Increase 100%	Y	Y		Y			
Canada Goose (North Atlantic)	Agriculture		Maintain current						Y	
Canada Goose (Temperate-breeding in Eastern Canada)	Agriculture; Urban Vegetation	parks, lawns, golf courses	Decrease						Y <sup>8</sup>	
Common Nighthawk	Agriculture		Increase 100%	Y						
Eastern Kingbird	Agriculture		Increase 50%				Y			
Eastern Meadowlark	Agriculture	high grasses, litter	Increase 50%	Y						
Green-winged Teal	Agriculture	proximity to water	Increase 50%						Y	
Killdeer	Agriculture		Increase 100%		Y					

<sup>1</sup> SAR, species listed under SARA (Species at Risk Public Registry 2012), assessed by COSEWIC (COSEWIC 2012) or listed under New Brunswick's *Endangered Species Act* (New Brunswick 2004) as Endangered, Threatened or Special Concern (SARA/COSEWIC only).

<sup>2</sup> N/CC, National/Continental Concern.

<sup>3</sup> N/CS, National/Continental Stewardship.

<sup>4</sup> R/SC, Regional/Sub-regional Concern.

<sup>5</sup> R/SS, Regional/Sub-regional Stewardship.

<sup>6</sup> NAWMP/EHJV, waterfowl that are priority under the regional EHJV implementation plan (NB-EHJV 2008) or scored High or Highest in WCR 14 in the NAWMP (NAWMP Plan Committee 2004).

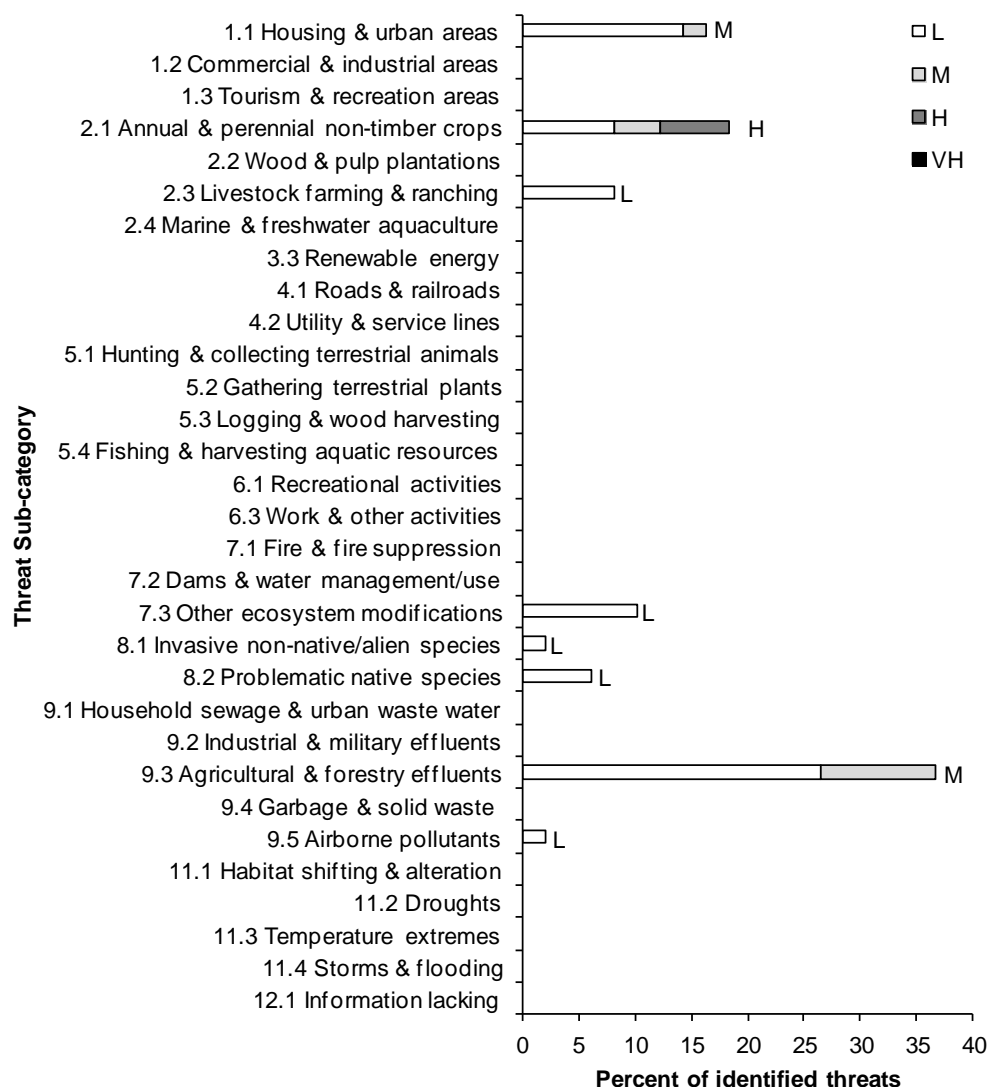
<sup>7</sup> Review, species added by the Regional Technical Working Group or upon expert review. For further details on reasons for priority status and the species prioritization process, see Table 1 and Appendix 2.

<sup>8</sup> Canada Goose (Temperate-breeding in Eastern Canada) was added as a priority species due to management concerns (e.g. overabundance and problem geese).



Table 14 continued

Priority Bird Species	Habitat Sub-class	Important Habitat Features	Population Objective	Reason for Priority Status						
				SAR <sup>1</sup>	N/CC <sup>2</sup>	N/CS <sup>3</sup>	R/SC <sup>4</sup>	R/SS <sup>5</sup>	NAWMP/ EHJV <sup>6</sup>	Review <sup>7</sup>
Mallard	Agriculture	proximity to water	Increase 100%						Y	
Nelson's Sparrow	Agriculture		Assess/Maintain		Y		Y	Y		
Short-eared Owl	Agriculture	abundant prey	Assess/Maintain	Y						
Sora	Agriculture	uplands near marshes, pastures	Assess/Maintain		Y					
Spotted Sandpiper	Agriculture	near open shoreline for foraging, displaying, etc., and denser habitat for brood cover	Increase 50%		Y					
Tree Swallow	Agriculture	cavities within 1.5 km of water or open areas for foraging	Maintain current					Y		
Whimbrel	Agriculture		Assess/Maintain		Y					
White-throated Sparrow	Urban Vegetation		Maintain current			Y		Y		
Wilson's Snipe	Agriculture	organic soil, wet, open water nearby	Increase 100%		Y					
Yellow Rail	Agriculture	prefers richer types of herbaceous vegetation, and elsewhere Carex	Assess/Maintain	Y	Y					



**Figure 30. Percent of identified threats to priority bird species in cultivated and managed areas in each threat sub-category.**

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

**Note:** Threats of all magnitudes are included, although low-ranked threats affecting only a single species were not assigned conservation objectives or recommended actions.

**Table 15. Threats addressed (medium and high rank only), conservation objectives, recommended actions, and priority species affected for cultivated and managed areas in BCR 14 NB.**

Threat Addressed	Threat Category	Conservation Objective	Objective Category	Conservation Action	Action Category	Threat Rank and Priority Species Affected <sup>†</sup>
Fragmentation or loss of managed grasslands due to their conversion to urban development	1.1 Housing & urban areas	Maintain/restore managed grassland habitat	1.1 Ensure land and resource-use policies and practices maintain or improve bird habitat	Secure and manage grassland habitat for priority species through various methods such as creation of protected areas, private land acquisitions, conservation easements, community conservation plans and stewardship agreements.	1.2 Resource and habitat protection	Medium: Nelson's Sparrow
				Provide incentives for landowners to protect grassland habitat.	6.4 Conservation payments	
				Include guidelines for the protection of priority species in beneficial management practices for municipalities and industry.	5.3 Private sector standards and codes	
Fragmentation or loss of managed grasslands due to their conversion to cropland	2.1 Annual & perennial non-timber crops	Maintain/restore managed grassland habitat	1.1 Ensure land and resource-use policies and practices maintain or improve bird habitat	Encourage bird-friendly agricultural practices through economic and other incentives.	6.4 Conservation payments	Medium: Short-eared Owl
				Increase awareness of and provide information to farmers on how to mitigate effects of their practices on grassland birds.	4.3 Awareness and communications	
				Provide incentives for landowners to protect grassland habitat.	6.4 Conservation payments	
Destruction of nests due to early haying (during the breeding and brooding periods)	2.1 Annual & perennial non-timber crops	Reduce/eliminate adult and nestling mortality as a result of early haying	2.4 Reduce incidental mortality	Increase awareness of and provide information to farmers on how to mitigate effects of their practices on grassland birds.	4.3 Awareness and communications	High: Bobolink, Nelson's Sparrow, Eastern Meadowlark Medium: Short-eared Owl
				Encourage bird-friendly agricultural practices through economic and other incentives.	6.4 Conservation payments	
				Wherever possible, avoid activity in fields supporting grassland species during the breeding season.	5.3 Private sector standards and codes	
Decrease of diet quality and of health of birds	9.3 Agricultural & forestry	Reduce mortality from exposure to	2.1 Reduce mortality and/or sub-lethal	Use pesticides and other biocides only where necessary and only as part of an integrated pest management system to minimize exposure of birds to	5.3 Private sector standards and codes	Medium: Short-eared Owl, Tree Swallow

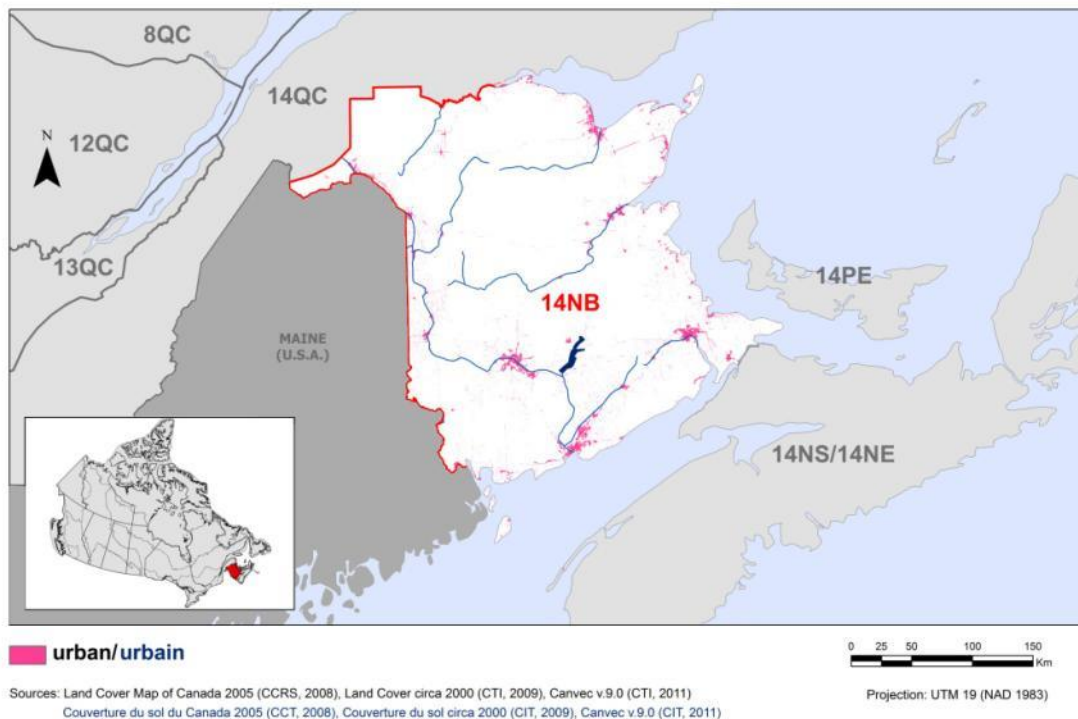
<sup>†</sup> Priority species not mentioned in this table are absent for one of the following reasons: 1) no identified threats in this habitat; 2) identified threats are discussed in the Widespread Issues section; 3) identified threats in this habitat are of low magnitude.

Table 15 continued

Threat Addressed	Threat Category	Conservation Objective	Objective Category	Conservation Action	Action Category	Threat Rank and Priority Species Affected <sup>†</sup>
due to the consumption of contaminated food by biocides such as pesticide, herbicide, or fungicide	effluents	pesticides and other biocides used by the agriculture industry	effects from pesticide use	potentially toxic chemicals.		
				Promote pesticide-free products.	6.2 Substitution	
				Continue to monitor and enforce compliance with laws, policies and regulations at all levels.	5.4 Compliance and enforcement	
Decrease of prey availability to birds due to chemical contamination from biocides such as pesticide, herbicide, or fungicide	9.3 Agricultural & forestry effluents	Reduce the loss of prey/food source from exposure to pesticides and other biocides used by the agriculture industry	5.2 Manage decreases in prey due to contaminants	Use pesticides and other biocides only where necessary and only as part of an integrated pest management system to minimize exposure of birds to potentially toxic chemicals.	5.3 Private sector standards and codes	Medium: Barn Swallow, Eastern Kingbird, Common Nighthawk
				Promote pesticide-free products.	6.2 Substitution	

### ***Urban (Artificial Surfaces and Bare Areas)***

The urban habitat class consists of areas where developments such as buildings, roads, parking lots and other impervious surfaces dominate (FAO 2000). The 2011 Census reported population growth in New Brunswick, which was a reversal from a decade of population decline (Statistics Canada 2012). The three major urban centres in New Brunswick (Fig. 31) include the provincial capital of Fredericton, (population of 56 000), Saint John (population of 70 000) and Moncton (population of 69 000), which, when combined with surrounding communities, are among the fastest-growing places in the province (Statistics Canada 2012).



**Figure 31. Map of urban areas in BCR 14 NB.**

Six priority bird species are found in urban habitat in BCR 14 NB, four of which are species at risk (Table 16). All of these species use either urban infrastructure such as bridges, rooftops, chimneys, or banks and cliffs created from mines and quarries (Table 16).

Within urban habitats, the most frequently identified and highest ranked threats are loss of nesting sites on commercial or industrial structures and, to a lesser extent, loss of nesting sites on private dwellings (old chimneys, gravel roofs, old wooden buildings, etc.; 1.2 Commercial & industrial areas and 1.1 Housing & urban areas, respectively). Disturbance at nest sites due to building and bridge maintenance activities (6.3 Work & other activities) was also a frequently identified threat, though it ranked low overall (Fig. 32).

Many bird species will benefit from the conservation objectives and actions presented in Table 17. The conservation actions recommended to address high- or medium-ranked threats

include raising awareness of the importance of old chimneys as nesting habitat for Chimney Swift and encouraging stewardship organizations to promote the use of appropriate habitat management guidelines by private landowners and developers. It is also important to develop and implement beneficial management practices for bridge maintenance and building renovations and to maintain or restore gravel rooftops to benefit priority bird species such as Common Nighthawk.

**Table 16. Priority bird species in urban habitats in BCR 14 NB, regional habitat sub-class, important habitat features, population objectives and reason for priority status.**

Priority Bird Species	Habitat Sub-class	Important Habitat Features	Population Objective	Reason for Priority Status						
				SAR <sup>1</sup>	N/CC <sup>2</sup>	N/CS <sup>3</sup>	R/SC <sup>4</sup>	R/SS <sup>5</sup>	NAWMP/ EHJV <sup>6</sup>	Review <sup>7</sup>
Bank Swallow	Mines and Quarries	cut banks/cliffs with soft sandy soil	Increase 100%							Y
Barn Swallow	Buildings and Bridges	open habitats for foraging, nearby source of mud for nest construction	Increase 100%	Y						
Chimney Swift	Chimneys	chimneys or other vertical structures	Increase 100%	Y	Y					
Common Nighthawk	Gravel	gravel rooftops or other urban parklands, low artificial light	Increase 100%	Y						
Killdeer	Gravel	flat gravel rooftops, gravel pits, quarries	Increase 100%		Y					
Peregrine Falcon (anatum/tundrius)	Buildings and Bridges		Assess/Maintain	Y						

<sup>1</sup> SAR, species listed under SARA (Species at Risk Public Registry 2012), assessed by COSEWIC (COSEWIC 2012) or listed under New Brunswick's *Endangered Species Act* (New Brunswick 2004) as Endangered, Threatened or Special Concern (SARA/COSEWIC only).

<sup>2</sup> N/CC, National/Continental Concern.

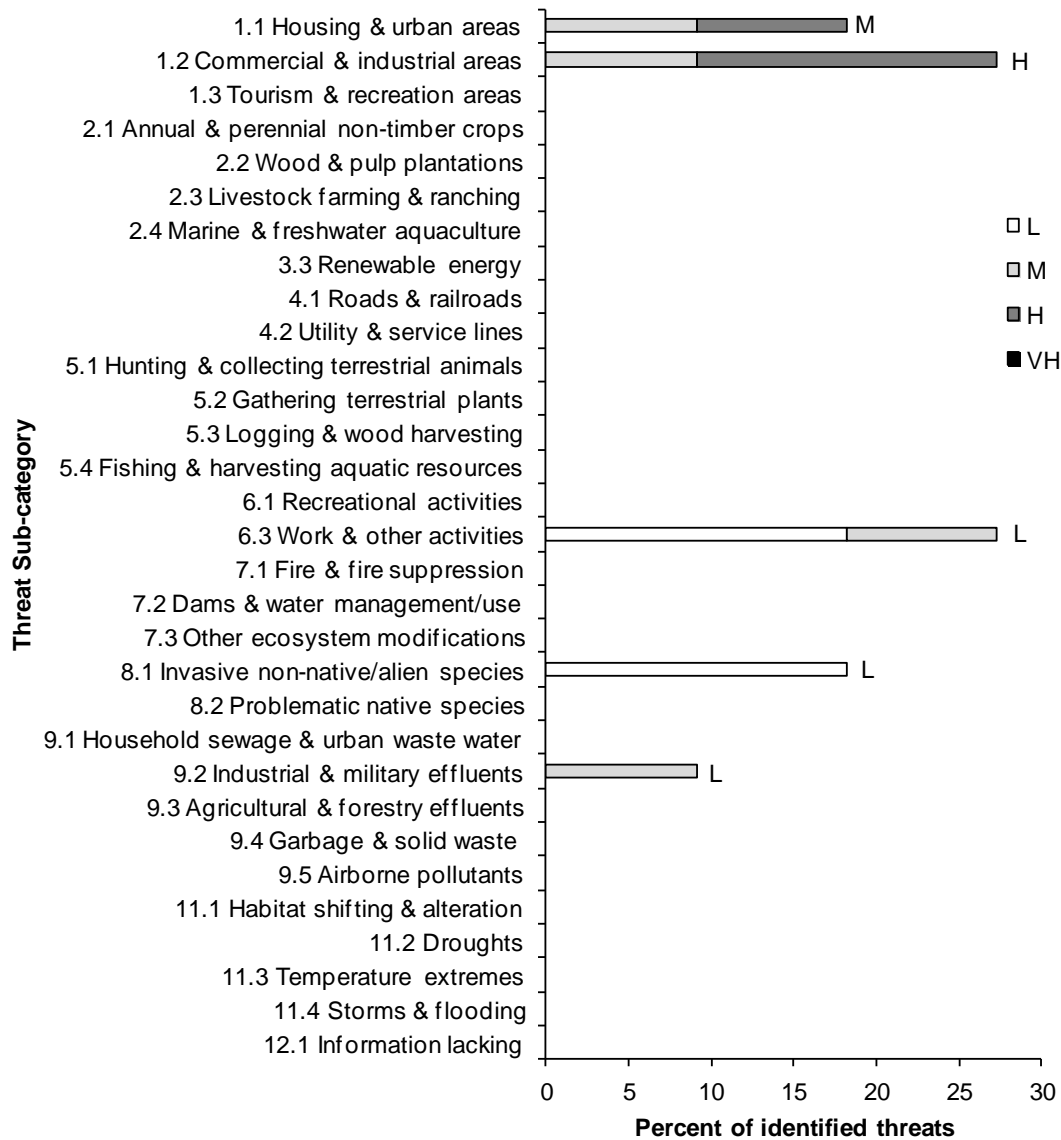
<sup>3</sup> N/CS, National/Continental Stewardship.

<sup>4</sup> R/SC, Regional/Sub-regional Concern.

<sup>5</sup> R/SS, Regional/Sub-regional Stewardship.

<sup>6</sup> NAWMP/EHJV, waterfowl that are priority under the regional EHJV implementation plan (NB-EHJV 2008) or scored High or Highest in WCR 14 in the NAWMP (NAWMP Plan Committee 2004).

<sup>7</sup> Review, species added by the Regional Technical Working Group or upon expert review. For further details on reasons for priority status and the species prioritization process, see Table 1 and Appendix 2.



**Figure 32. Percent of identified threats to priority bird species in urban habitat in each threat sub-category.**

Each bar represents the percent of the total number of threats identified in each threat sub-category in urban habitat (for example, if 100 threats were identified in total for all priority species in urban habitat, and 10 of those threats were in the category 1.1 Housing & urban areas, the bar on the graph would represent this as 10%). The bars are divided to show the distribution of L: Low, M: Medium, H: High and VH: Very High 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. The overall magnitude of the sub-threat in urban is shown in Table 4, Relative magnitude of identified threats to priority species within BCR 14 NB by threat category and broad habitat class.

**Note:** Threats of all magnitudes are included, although low-ranked threats affecting only a single species were not assigned conservation objectives or recommended actions.



**Table 17. Threats addressed (medium and high rank only), conservation objectives, recommended actions and priority species affected for urban habitat in BCR 14 NB.**

Threat Addressed	Threat Category	Conservation Objective	Objective Category	Conservation Action	Action Category	Threat Rank and Priority Species Affected <sup>†</sup>
Loss of nesting habitat on gravel roofs due to their renovation or replacement, particularly of older buildings	1.1 Housing & urban areas	Maintain/restore availability of gravel rooftops	1.4 Maintain important bird features on the landscape	Develop beneficial management practices and avoidance guidelines to manage building renovation and maintenance activities and maintain/restore gravel rooftops.	5.3 Private sector standards and codes	Medium: Common Nighthawk
	1.2 Commercial & industrial areas			Educate groups working on urban revitalization and urban wildlife about the issue of the nighthawk decline, and encourage changes in roof construction where feasible.	4.3 Awareness and communications	
Loss of old chimneys as nesting sites	1.1 Housing & urban areas	Maintain/restore old chimneys	1.4 Maintain important bird features on the landscape	Encourage stewardship organizations to promote the use of appropriate habitat management guidelines by private landowners and developers.	7.2 Alliance and partnership development	High: Chimney Swift
	1.2 Commercial & industrial areas			Raise awareness of the importance of old chimneys as nesting habitat for Chimney Swift.	4.3 Awareness and communications	
Loss of nesting habitat in old wooden barns and covered bridges due to their renovation or replacement	1.2 Commercial & industrial areas	Maintain/restore old buildings	1.4 Maintain important bird features on the landscape	Develop beneficial management practices and avoidance guidelines to manage developments and minimize priority species habitat degradation.	5.3 Private sector standards and codes	High: Barn Swallow
				Develop and implement mitigation measures (such as enhancements to new or existing buildings, or creation of alternative nesting structures) when loss of nesting structures cannot be avoided.	3.2 Species recovery	
				Raise awareness of the importance of old buildings to Barn Swallows and the value of Barn Swallows in the ecosystem.	4.3 Awareness and communications	

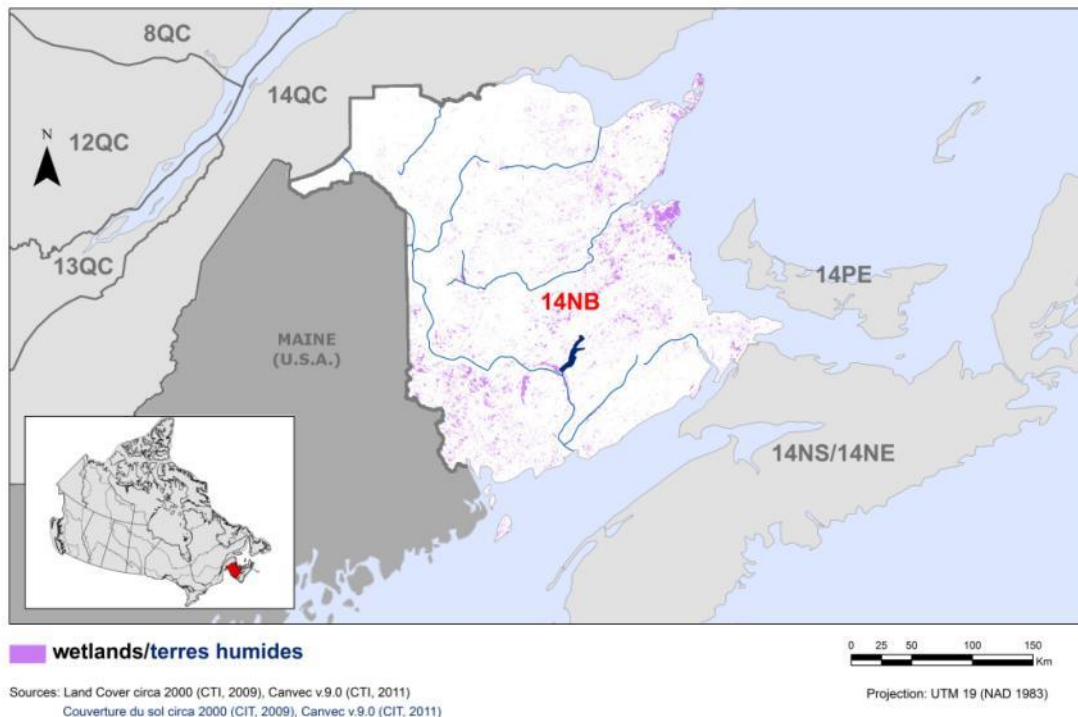
<sup>†</sup> Priority species not mentioned in this table are absent for one of the following reasons: 1) no identified threats in this habitat; 2) identified threats are discussed in the Widespread Issues section; 3) identified threats in this habitat are of low magnitude.

Table 17 continued

Threat Addressed	Threat Category	Conservation Objective	Objective Category	Conservation Action	Action Category	Threat Rank and Priority Species Affected <sup>†</sup>
Disturbance at nest sites due to maintenance activities of buildings and bridges	6.3 Work & other activities	Reduce/eliminate disturbance by building and bridge maintenance activities	4.2 Reduce disturbance from industrial or work activity	Develop and implement beneficial management practices for bridge maintenance crews, to benefit priority species.	5.3 Private sector standards and codes	Medium: Barn Swallow
Decrease of prey availability to birds due to the chemical or heavy metal contamination	9.2 Industrial & military effluents	Reduce the loss of prey/food source from exposure to chemical/heavy metal contaminants	5.2 Manage decreases in prey due to contaminants	Develop beneficial management practices to manage the discharge of chemical/heavy metal contaminants into the environment.	5.3 Private sector standards and codes	Medium: Bank Swallow
				Continue to monitor and enforce compliance with laws, policies and regulations at all levels.	5.4 Compliance and enforcement	

## Wetlands

The wetland habitat class includes bogs, swamps, marshes (fresh and saltwater), fens and shallow open water (largely unvegetated surface, but <2 m deep; Kennedy et al. 2012). As of 2002, only 4% of New Brunswick's land base was classed as wetland habitat. Of all New Brunswick's wetlands, 3% are coastal marsh, 7% are part of the Saint John River Floodplain wetlands, 41% are freshwater inland wetlands and 49% are inland bogs (New Brunswick Department of Environment and Local Government 2002; Fig. 33).



**Figure 33. Map of wetland habitat in BCR 14 NB.**

Of the 71 priority bird species in BCR 14 NB, 35 species (49%) use wetland habitats (Table 18). Ten of these are species at risk, either assessed by COSEWIC, or listed and protected under federal or provincial legislations. While some (9) of these species use non-specific freshwater wetlands, others use marshes (11), swamps (6), or bogs (2), or a combination of different wetland types (8; Table 18).

Species found in wetland habitats face a wide variety of threats (Fig. 34). Since 1800, an estimated 20 million ha, almost 15% of Canada's total wetland base, have been drained or lost to other functions and in New Brunswick, 65% of coastal salt marshes have been converted to agriculture (North American Wetlands Conservation Council; New Brunswick Department of Environment and Local Government 2002). In addition to net habitat loss from conversion to agriculture (2.1 Annual & perennial non-timber crops) or to commercial and residential developments (1.1 Housing & urban areas), priority bird species in wetlands are threatened by decreases in diet quality or prey availability due to chemical contamination from biocides such

as pesticides, fungicides or herbicides (9.3 Agricultural & forestry effluents; Fig. 34); all of these threats were ranked medium. The highest ranked threat to priority bird species in BCR 14 NB was the loss or fragmentation of wetlands due to logging activities (5.3 Logging & wood harvesting; Fig. 34). Two threats were identified in (9.5) Airborne pollutants and were ranked either as medium or low for six priority species (Fig. 34). The threats are further discussed in the Pollution portion of Section 3, where specific conservation actions are presented.

Many bird species will benefit from the conservation objectives and actions presented in Table 19. Conservation actions to address medium- and high-ranked threats include developing beneficial management practices that encourage bird-friendly agricultural practices and provide incentives for landowners to protect wetlands. Securing and managing wetlands for priority bird species through various methods such as creating protected areas, acquiring private land, conservation easements, community conservation plans and stewardship agreements, and improving linkages between bird habitat needs and forestry practices are also recommended. Pesticides and other biocides should be used only as part of an integrated pest management system to minimize exposure of birds to potentially toxic chemicals.

**Table 18. Priority bird species in wetland habitats in BCR 14 NB, regional habitat sub-class, important habitat features, population objectives and reason for priority status.**

Priority Bird Species	Habitat Sub-class	Important Habitat Features	Population Objective	Reason for Priority Status						
				SAR <sup>1</sup>	N/CC <sup>2</sup>	N/CS <sup>3</sup>	R/SC <sup>4</sup>	R/SS <sup>5</sup>	NAWMP/EHJV <sup>6</sup>	Review <sup>7</sup>
American Bittern	Non-specific Freshwater Wetlands	peat bogs, shrub swamps, marsh and fens with tall emergent vegetation	Increase 100%		Y		Y			
American Black Duck	Non-specific Freshwater Wetlands	freshwater wetlands with a mix of emergent and submergent vegetation	Maintain current						Y	
American Three-toed Woodpecker	Swamp	mature montane/boreal forest, with dead/dying snags, moist/swampy areas, disturbed areas (fire, insects, windthrow), black spruce	Assess/Maintain							Y
Barn Swallow	Non-specific Freshwater Wetlands	structure with horizontal surface and shelter for nesting, nearby source of mud for nest construction	Increase 100%	Y						
Black Tern	Marsh; Non-specific Freshwater Wetlands	high-density wetland landscape, marsh complexes of >20 hectares; short dense or tall sparse vegetation structure	Assess/Maintain							Y
Black-backed Woodpecker	Swamp	mature to senescent forest, abundant wood boring beetles; old Spruce-Fir <sup>8</sup>	Increase 50%				Y			
Bobolink	Marsh	emergent vegetation	Increase 100%	Y	Y		Y			
Canada Goose (North Atlantic)	Marsh	adjacent, accessible upland areas with grasses and forbs	Maintain current						Y	

<sup>1</sup> SAR, species listed under SARA (Species at Risk Public Registry 2012), assessed by COSEWIC (COSEWIC 2012) or listed under New Brunswick's *Endangered Species Act* (New Brunswick 2004) as Endangered, Threatened or Special Concern (SARA/COSEWIC only).

<sup>2</sup> N/CC, National/Continental Concern.

<sup>3</sup> N/CS, National/Continental Stewardship.

<sup>4</sup> R/SC, Regional/Sub-regional Concern.

<sup>5</sup> R/SS, Regional/Sub-regional Stewardship.

<sup>6</sup> NAWMP/EHJV, waterfowl that are priority under the regional EHJV implementation plan (NB-EHJV 2008) or scored High or Highest in WCR 14 in the NAWMP (NAWMP Plan Committee 2004).

<sup>7</sup> Review, species added by the Regional Technical Working Group or upon expert review. For further details on reasons for priority status and the species prioritization process, see Table 1 and Appendix 2.

<sup>8</sup> Standard habitat categories identified as being used by these species by the NB DNR (New Brunswick Department of Natural Resources 2005a).

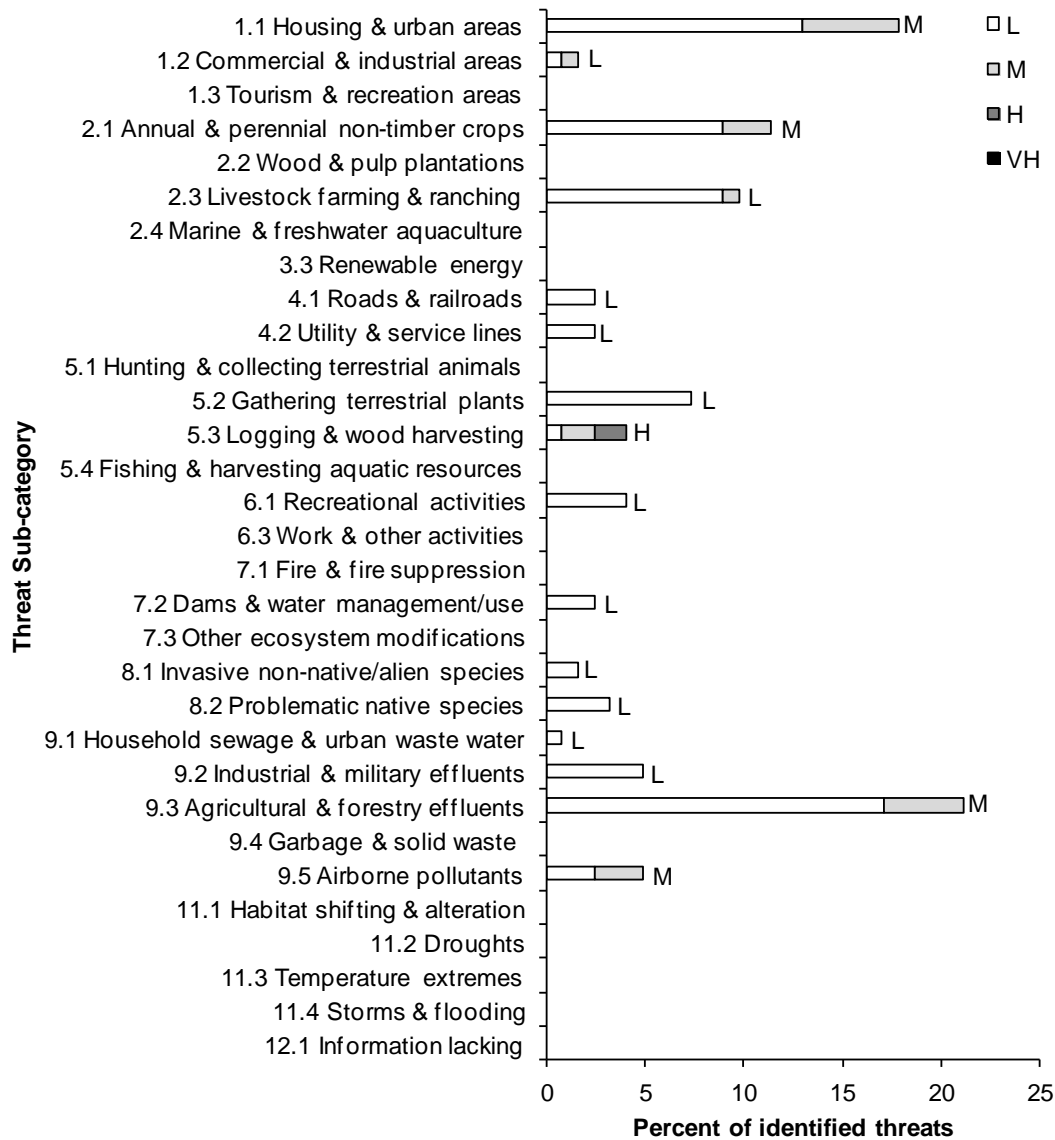
Table 18 continued

Priority Bird Species	Habitat Sub-class	Important Habitat Features	Population Objective	Reason for Priority Status						
				SAR <sup>1</sup>	N/CC <sup>2</sup>	N/CS <sup>3</sup>	R/SC <sup>4</sup>	R/SS <sup>5</sup>	NAWMP/ EHJV <sup>6</sup>	Review <sup>7</sup>
Canada Goose (Temperate-breeding in Eastern Canada)	Marsh		Decrease						Y <sup>9</sup>	
Canada Warbler	Swamp	cedar swamp, dense understory, ground moss, moist	Increase 100%	Y	Y	Y	Y	Y		
Chimney Swift	Non-specific Freshwater Wetlands	watersheds with man made flowages, dead trees with cavities for nesting	Increase 100%	Y	Y					
Common Goldeneye	Non-specific Freshwater Wetlands	mature forests near water, trees with cavities	Increase 50%						Y	
Common Nighthawk	Bog; Marsh	peat bogs	Increase 100%	Y						
Eastern Kingbird	Swamp		Increase 50%				Y			
Green Heron	Marsh; Swamp	thick vegetation	Assess/Maintain				Y			
Green-winged Teal	Marsh	freshwater wetlands with a mix of emergent and submergent vegetation	Increase 50%						Y	
Killdeer	Marsh		Increase 100%		Y					
Least Bittern	Marsh	tall emergent vegetation/cattails	Recovery objective	Y	Y		Y			
Lesser Yellowlegs	Bog; Marsh	shallow water (0–10 cm)	Assess/Maintain		Y					
Magnolia Warbler	Bog	peat bogs	Maintain current			Y		Y		
Mallard	Non-specific Freshwater Wetlands	freshwater wetlands with a mix of emergent and submergent vegetation	Increase 100%						Y	
Nelson's Sparrow	Marsh		Assess/Maintain		Y		Y	Y		
Olive-sided Flycatcher	Bog	open areas with perches; old Spruce-Fir <sup>8</sup>	Increase 100%	Y	Y		Y			
Pied-billed Grebe	Marsh	dense emergent vegetation with open water	Assess/Maintain		Y					
Red-shouldered Hawk	Swamp	deciduous swamp	Assess/Maintain							Y
Ring-necked Duck	Marsh	open water (1.5 m depth) with abundant emergent and submergent vegetation	Increase 50%						Y	
Rusty Blackbird	Bog; Swamp	bog edges	Increase 100%	Y			Y			
Short-eared Owl	Bog; Marsh	abundant prey	Assess/Maintain	Y						

<sup>9</sup> Canada Goose (Temperate-breeding in Eastern Canada) was added as a priority species due to management concerns (e.g. overabundance and problem geese).

Table 18 continued

Priority Bird Species	Habitat Sub-class	Important Habitat Features	Population Objective	Reason for Priority Status						
				SAR <sup>1</sup>	N/CC <sup>2</sup>	N/CS <sup>3</sup>	R/SC <sup>4</sup>	R/SS <sup>5</sup>	NAWMP/ EHJV <sup>6</sup>	Review <sup>7</sup>
Solitary Sandpiper	Swamp	wooded wetlands, shallow water (0–10 cm)	Assess/Maintain		Y					
Sora	Marsh	shallow water (0–15 cm) dominated by emergent vegetation	Assess/Maintain		Y					
Tree Swallow	Non-specific Freshwater Wetlands	cavities within 1.5 km of water or open areas for foraging	Maintain current					Y		
Virginia Rail	Marsh	shallow water (0–15 cm), emergent cover and substrate	Assess/Maintain		Y					
Wilson's Snipe	non-specific Freshwater Wetlands	organic soil, wet	Increase 100%		Y					
Wood Duck	Marsh; Swamp	near mature forest with suitable nesting cavities	Increase 50%						Y	
Yellow Rail	Bog; Fen; Marsh	prefers richer types of herbaceous vegetation, and elsewhere Carex	Assess/Maintain	Y	Y					



**Figure 34. Percent of identified threats to priority bird 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 wetland habitat (for example, if 100 threats were identified in total for all priority species in wetland habitat, and 10 of those threats were in the category 1.1 Housing & urban areas, the bar on the graph would represent this as 10%). The bars are divided to show the distribution of L: Low, M: Medium, H: High and VH: Very High 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 the various rankings in the sub-category). The overall magnitude of the sub-threat in wetland is shown in Table 4, Relative magnitude of identified threats to priority species within BCR 14 NB by threat category and broad habitat class.

**Note:** Threats of all magnitudes are included, although low-ranked threats affecting only a single species were not assigned conservation objectives or recommended actions.



**Table 19. Threats addressed (medium and high rank only), conservation objectives, recommended actions and priority species affected for wetland habitats in BCR 14 NB.**

Threat Addressed	Threat Category	Conservation Objective	Objective Category	Conservation Action	Action Category	Threat Rank and Priority Species Affected <sup>†</sup>
Fragmentation or loss of freshwater wetlands due to urban development	1.1 Housing & urban areas	Maintain/restore freshwater wetlands	1.1 Ensure land and resource-use policies and practices maintain or improve bird habitat	Secure and manage freshwater wetlands for priority species through various methods such as creation of protected areas, private land acquisitions, conservation easements, community conservation plans and stewardship agreements.	1.2 Resource and habitat protection	Medium: American Bittern, Black Tern, Nelson's Sparrow, Green Heron, Least Bittern, Pied-billed Grebe
	1.2 Commercial & industrial areas			Include guidelines for the protection of priority species in beneficial management practices for municipalities and industry.	5.3 Private sector standards and codes	
				Provide incentives for landowners to protect freshwater wetlands.	6.4 Conservation payments	
Fragmentation or loss of freshwater wetlands due to their conversion to cropland	2.1 Annual & perennial non-timber crops	Maintain/restore freshwater wetlands	1.1 Ensure land and resource-use policies and practices maintain or improve bird habitat	Develop beneficial management practices that encourage bird-friendly agricultural practices.	5.3 Private sector standards and codes	Medium: Least Bittern, Pied-billed Grebe, Solitary Sandpiper
				Increase awareness of and provide information to farmers on how to mitigate effects of their practices on priority birds.	4.3 Awareness and communications	
				Provide incentives for landowners to protect freshwater wetlands.	6.4 Conservation payments	
				Secure and manage freshwater wetlands for priority species through various methods such as creation of protected areas, private land acquisitions, conservation easements, community conservation plans and stewardship agreements.	1.2 Resource and habitat protection	
Fragmentation or loss of freshwater wetlands due to cattle grazing	2.3 Livestock farming & ranching	Maintain/restore freshwater wetlands	1.1 Ensure land and resource-use policies and practices maintain or improve bird	Develop beneficial management practices that encourage bird-friendly agricultural practices.	5.3 Private sector standards and codes	Medium: Pied-billed Grebe
				Increase awareness of and provide information to farmers on how to mitigate effects of their practices on priority birds.	4.3 Awareness and communications	

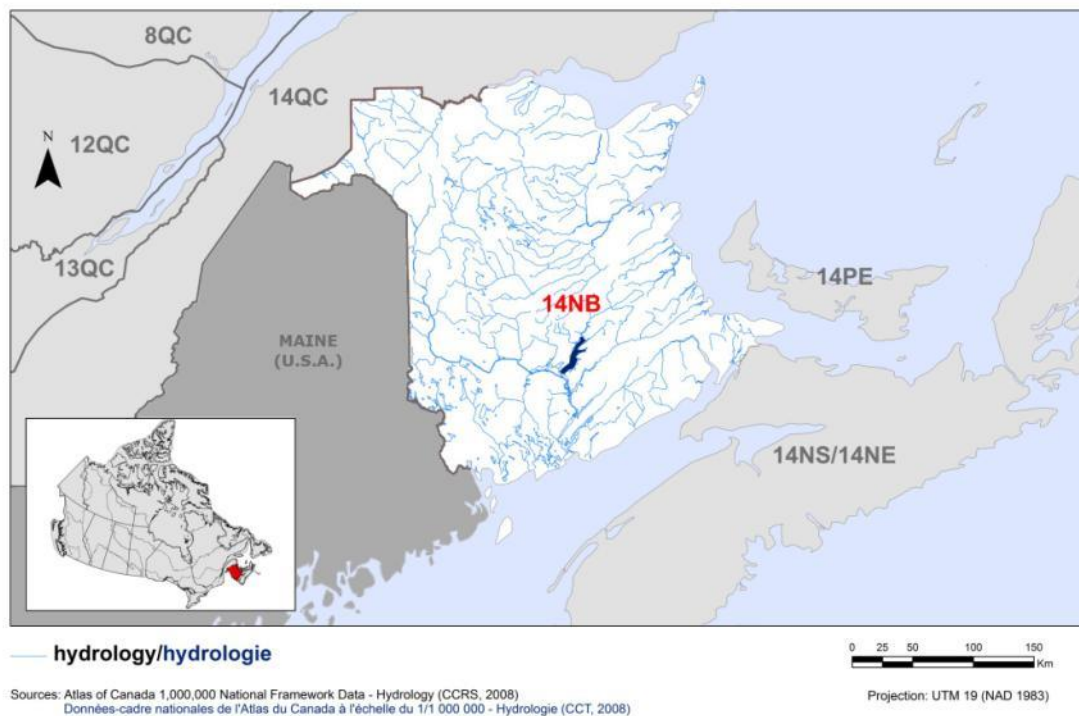
<sup>†</sup> Priority species not mentioned in this table are absent for one of the following reasons: 1) no identified threats in this habitat; 2) identified threats are discussed in the Widespread Issues section; 3) identified threats in this habitat are of low magnitude.

Table 19 continued

Threat Addressed	Threat Category	Conservation Objective	Objective Category	Conservation Action	Action Category	Threat Rank and Priority Species Affected <sup>†</sup>
			habitat	Provide incentives for landowners to protect freshwater wetlands.	6.4 Conservation payments	
				Secure and manage freshwater wetlands for priority species through various methods such as creation of protected areas, private land acquisitions, conservation easements, community conservation plans and stewardship agreements.	1.2 Resource and habitat protection	
Fragmentation or loss of swamps due to logging activities	5.3 Logging & wood harvesting	Maintain/restore swamps	1.1 Ensure land and resource-use policies and practices maintain or improve bird habitat	Secure and manage swamps for priority species through various methods such as creation of protected areas, private land acquisitions, conservation easements, community conservation plans and stewardship agreements.	1.2 Resource and habitat protection	High: Black-backed Woodpecker, Canada Warbler Medium: Red-shouldered Hawk, Wood Duck
				Define and provide the minimum number, size and condition of residual snags and living trees needed for priority species.	2.1 Site/area management	
				Improve linkages between bird conservation needs and forest management guidelines.	5.2 Policies and regulations	
Decrease of diet quality and of health of birds due to the consumption of contaminated food by biocides such as pesticide, herbicide, or fungicide	9.3 Agricultural & forestry effluents	Reduce mortality from exposure to pesticides and other biocides used by the agriculture industry	2.1 Reduce mortality and/or sub-lethal effects from pesticide use	Use pesticides and other biocides only where necessary and only as part of an integrated pest management system to minimize exposure of birds to potentially toxic chemicals.	5.3 Private sector standards and codes	Medium: Short-eared Owl, Tree Swallow
				Promote pesticide-free products.	6.2 Substitution	
				Continue to monitor and enforce compliance with laws, policies and regulations at all levels.	5.4 Compliance and enforcement	
Decrease of prey availability to birds due to chemical contamination from biocides such as pesticide, herbicide, or fungicide	9.3 Agricultural & forestry effluents	Reduce the loss of prey/food source from exposure to pesticides and other biocides used by the agriculture industry	5.2 Manage decreases in prey due to contaminants	Use pesticides and other biocides only where necessary and only as part of an integrated pest management system to minimize exposure of birds to potentially toxic chemicals.	5.3 Private sector standards and codes	Medium: Barn Swallow, Chimney Swift, Common Nighthawk
				Promote pesticide-free products.	6.2 Substitution	

## Riparian

Riparian areas occur adjacent to standing or flowing water (such as wetlands, lakes and rivers) where the vegetation is influenced by the presence of water and is distinct from adjacent uplands. Riparian areas are the transition zone where land meets water along rivers, streams, lakes, ponds and estuaries and may be treed, shrubby or herbaceous, depending on site conditions. There are over 60 000 kilometres of rivers, brooks and streams in New Brunswick (New Brunswick Department of Natural Resources 2012). The major river systems in New Brunswick include the St. John River (the second-longest river on the North American eastern seaboard), Petitcodiac River, Miramichi River, St. Croix River and the Restigouche River (Fig. 35).



**Figure 35. Map of riparian habitat (approximated by hydrology) in BCR 14 NB.**

Of the 13 priority species that use riparian habitats in BCR 14 NB, 4 are species at risk (Table 20). Ten of the priority bird species in BCR 14 NB use riparian forests that are mature, deciduous, coniferous or unspecified forest types. Three priority bird species use either bare areas or banks and cliffs within riparian areas (Table 20).

Riparian areas, and consequently the birds that use them, face a wide variety of threats (Fig. 36). The highest ranked threat to priority bird species in BCR 14 NB was the fragmentation or loss of riparian habitat due to logging activities (5.3 Logging & wood harvesting; Fig. 36). Because of their proximity to water, riparian areas are threatened by urban development (a medium-ranked threat; 1.1 Housing & urban areas; Fig. 36). However, the most frequently identified were direct contamination of food or decreases in prey availability due to biocides such as fungicide, pesticide and herbicide (9.3 Agricultural & forestry effluents).

Many bird species will benefit from the conservation objectives and actions presented in Table 21. Conservation actions to address medium- and high-ranked threats for priority bird species found in riparian habitat include managing recreational activities in waterbodies and waterways to minimize disturbance to priority bird species, and improving linkages between bird conservation needs and forest management guidelines. Pesticides and other biocides should be used only as part of an integrated pest management system to minimize exposure of birds to potentially toxic chemicals. It is also important to secure and manage riparian forest habitat through various methods such as creation of protected areas, private land acquisitions, conservation easements, community conservation plans and stewardship agreements.

**Table 20. Priority bird species that use riparian habitats in BCR 14 NB, regional habitat sub-class, important habitat features, population objectives and reason for priority status.**

Priority Bird Species	Habitat Sub-class	Important Habitat Features	Population Objective	Reason for Priority Status						
				SAR <sup>1</sup>	N/CC <sup>2</sup>	N/CS <sup>3</sup>	R/SC <sup>4</sup>	R/SS <sup>5</sup>	NAWMP/ EHJV <sup>6</sup>	Review <sup>7</sup>
Bald Eagle	Mature Forest	relatively unpopulated, deciduous or coniferous forest near water with large nest/perching trees	Maintain current	Y						Y
Bank Swallow	Banks and Bluffs	cut banks/cliffs with soft sandy soil	Increase 100%							Y
Bay-breasted Warbler	Mature Forest	mature forest and older; old Spruce-Fir <sup>8</sup>	Maintain current			Y		Y		
Belted Kingfisher	Bare Areas	vertical earth exposure for nest burrow; overhanging perches beneficial	Assess/Maintain				Y	Y		
Common Goldeneye	Non-specific Forest	mature forests near water, trees with cavities	Increase 50%						Y	
Eastern Kingbird	Non-specific Forest		Increase 50%				Y			
Green Heron	Non-specific Forest; Non-specific Shrub	shoreline vegetation	Assess/Maintain				Y			
Peregrine Falcon (anatum/tundrius)	Bare Areas	cliffs/crevices for nesting	Assess/Maintain	Y						
Rusty Blackbird	Coniferous Forest		Increase 100%	Y			Y			
Spotted Sandpiper	Non-specific Forest	near open shoreline for foraging, displaying, etc., and semi-open habitat for nesting	Increase 50%		Y					
Tree Swallow	Non-specific Forest; Non-specific Shrub	cavities within 1.5 km of water or open areas for foraging	Maintain current					Y		

<sup>1</sup> SAR, species listed under SARA (Species at Risk Public Registry 2012), assessed by COSEWIC (COSEWIC 2012) or listed under New Brunswick's *Endangered Species Act* (New Brunswick 2004) as Endangered, Threatened or Special Concern (SARA/COSEWIC only).

<sup>2</sup> N/CC, National/Continental Concern.

<sup>3</sup> N/CS, National/Continental Stewardship.

<sup>4</sup> R/SC, Regional/Sub-regional Concern.

<sup>5</sup> R/SS, Regional/Sub-regional Stewardship.

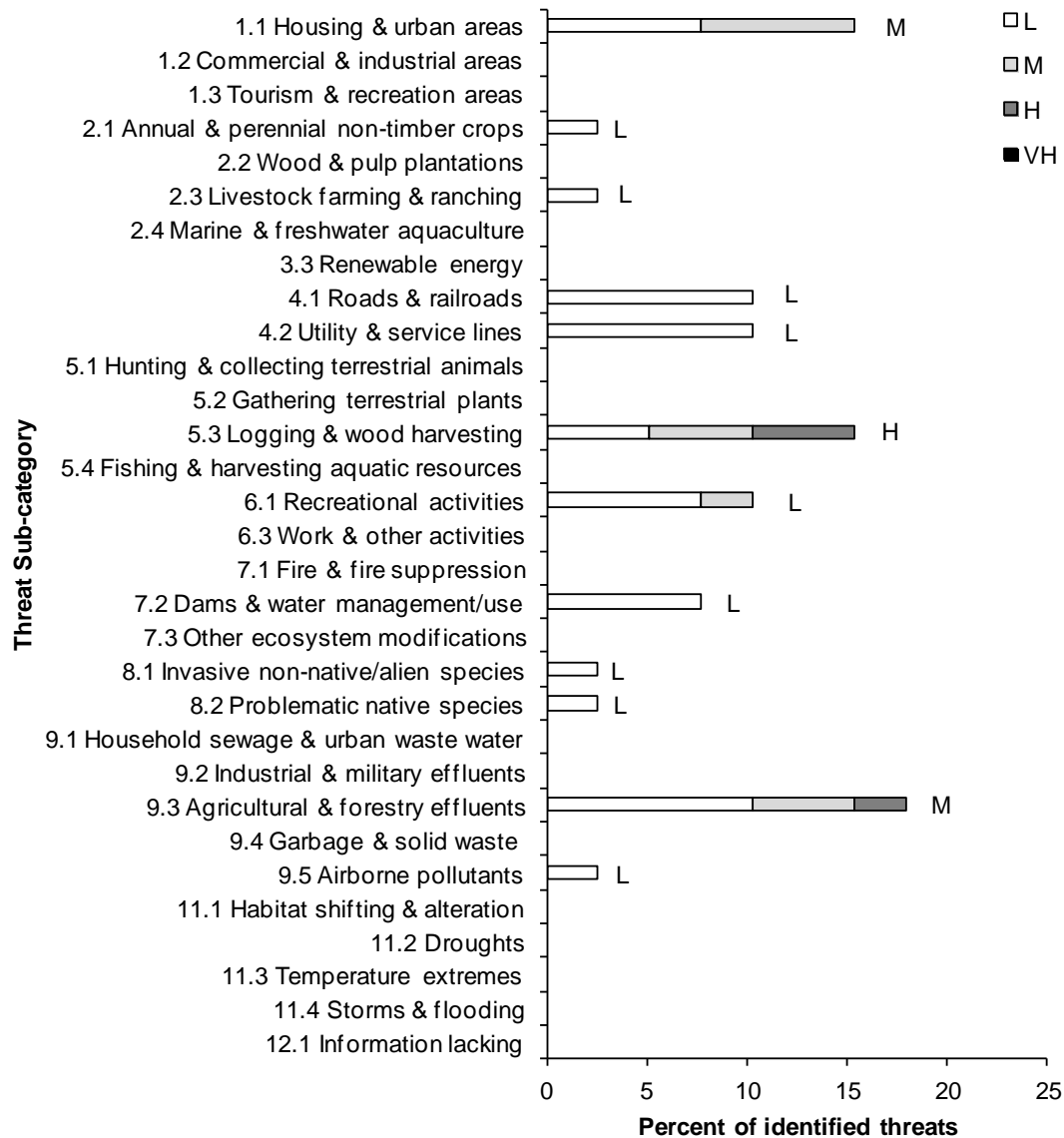
<sup>6</sup> NAWMP/EHJV, waterfowl that are priority under the regional EHJV implementation plan (NB-EHJV 2008) or scored High or Highest in WCR 14 in the NAWMP (NAWMP Plan Committee 2004).

<sup>7</sup> Review, species added by the Regional Technical Working Group or upon expert review. For further details on reasons for priority status and the species prioritization process, see Table 1 and Appendix 2.

<sup>8</sup> Standard habitat categories identified as being used by these species by the NB DNR (New Brunswick Department of Natural Resources 2005a).

Table 20 continued

Priority Bird Species	Habitat Sub-class	Important Habitat Features	Population Objective	Reason for Priority Status						
				SAR <sup>1</sup>	N/CC <sup>2</sup>	N/CS <sup>3</sup>	R/SC <sup>4</sup>	R/SS <sup>5</sup>	NAWMP/ EHJV <sup>6</sup>	Review <sup>7</sup>
Wood Duck	Non-specific Forest	mature forest with suitable nesting cavities near water	Increase 50%						Y	
Yellow Rail	Deciduous Forest	prefers richer types of herbaceous vegetation, and elsewhere Carex	Assess/Maintain	Y	Y					



**Figure 36. Percent of identified threats to priority bird species in riparian habitat in each threat sub-category.**

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

**Note:** Threats of all magnitudes are included, although low-ranked threats affecting only a single species were not assigned conservation objectives or recommended actions.

**Table 21. Threats addressed (medium and high rank only), conservation objectives, recommended actions and priority species affected for riparian habitat in BCR 14 NB.**

Threat Addressed	Threat Category	Conservation Objective	Objective Category	Conservation Action	Action Category	Threat Rank and Priority Species Affected <sup>†</sup>
Fragmentation or loss of riparian forest due to urban development	1.1 Housing & urban areas	Maintain/restore riparian forests	1.1 Ensure land and resource-use policies and practices maintain or improve bird habitat	Secure and manage riparian forest habitat for priority species through various methods such as creation of protected areas, private land acquisitions, conservation easements, community conservation plans and stewardship agreements.	1.2 Resource and habitat protection	Medium: Bald Eagle, Bay-breasted Warbler, Green Heron
				Maintain sufficient patch sizes, configuration and connectivity of riparian forest habitats to support and, where necessary, enhance populations of priority species.	2.1 Site/area management	
				Maintain/restore riparian buffers of suitable width depending on riparian sub-habitat type and species.	2.3 Habitat and natural process restoration	
				Include guidelines for the protection of priority species in riparian habitats in beneficial management practices for municipalities and industry.	5.3 Private sector standards and codes	
				Develop beneficial management practices and avoidance guidelines to manage developments and minimize priority species habitat degradation.	5.3 Private sector standards and codes	
				Provide incentives for landowners to protect riparian forest habitat.	6.4 Conservation payments	
Fragmentation or loss of riparian forest and nesting sites due to logging activities	5.3 Logging & wood harvesting	Maintain/restore riparian forests	1.1 Ensure land and resource-use policies and practices maintain or improve bird habitat	Identify, establish or expand protected areas of existing riparian forest habitats.	1.1 Site/area protection	High: Bay-breasted Warbler, Wood Duck Medium: Bald Eagle, Tree Swallow
				Maintain sufficient patch sizes, configuration and connectivity of riparian forest habitats to support and, where necessary, enhance populations of priority species.	2.1 Site/area management	
				Define and provide the minimum number, size and condition of residual snags and living trees needed for priority species.	2.1 Site/area management	
				Develop and implement reforestation beneficial management practices for retaining the natural range of forest composition.	5.3 Private sector standards and codes	

<sup>†</sup> Priority species not mentioned in this table are absent for one of the following reasons: 1) no identified threats in this habitat; 2) identified threats are discussed in the Widespread Issues section; 3) identified threats in this habitat are of low magnitude.



Table 21 continued

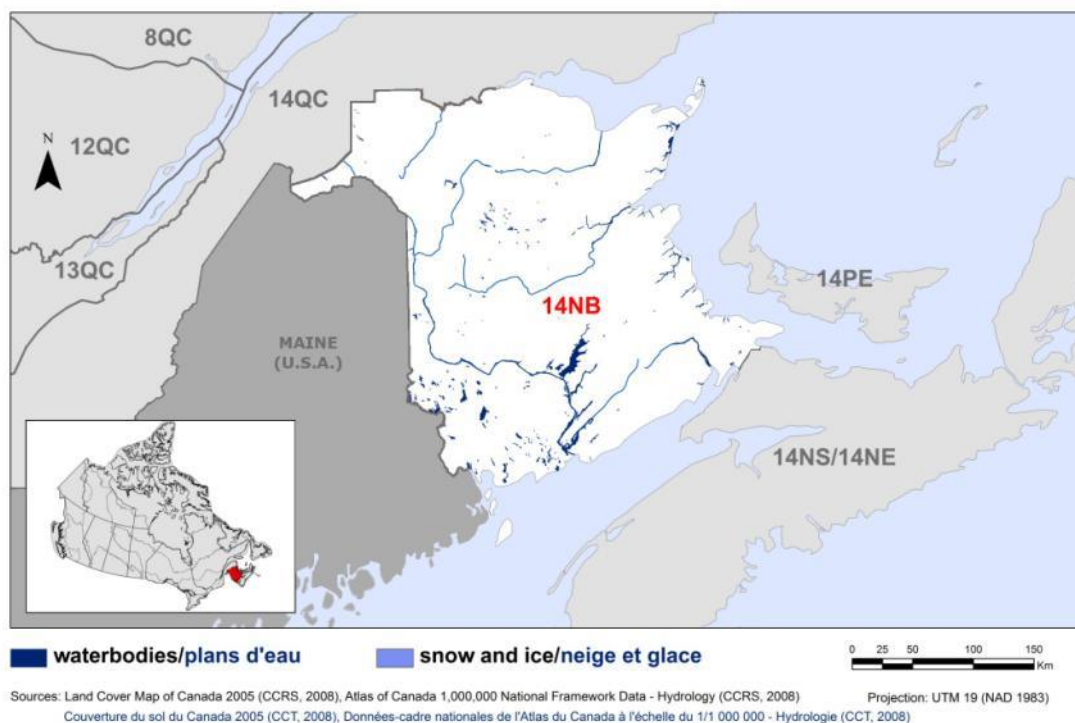
Threat Addressed	Threat Category	Conservation Objective	Objective Category	Conservation Action	Action Category	Threat Rank and Priority Species Affected <sup>†</sup>
				Manage post-logging sites for tree species, age and structural diversity.	2.3 Habitat and natural process restoration	
				Improve linkages between bird conservation needs and forest management guidelines.	5.2 Policies and regulations	
				Promote the installation of nest boxes (Wood Duck, Tree Swallow).	3.2 Species recovery	
Disturbance at roosting sites due to recreational activities in waterbodies and waterways	6.1 Recreational activities	Reduce/eliminate disturbance from recreational activities in riparian habitats	4.1 Reduce disturbance from human recreation	Secure and manage key riparian habitat for priority species through various methods such as creation of protected areas, private land acquisitions, conservation easements, community conservation plans and stewardship agreements.	1.2 Resource and habitat protection	Medium: Bald Eagle
				Raise public awareness of priority species and their habitat needs, and the impacts of disturbance from recreational activities.	4.3 Awareness and communications	
				Manage recreational activities in waterbodies and waterways to minimize disturbance to priority species.	5.2 Policies and regulations	
				Assess the impacts of recreational activities in waterbodies and waterways on priority species.	8.1 Research	
Decrease of diet quality and of health of birds due to the consumption of contaminated food by biocides such as pesticide, herbicide, or fungicide	9.3 Agricultural & forestry effluents	Reduce mortality from exposure to pesticides and other biocides used by the agriculture industry	2.1 Reduce mortality and/or sub-lethal effects from pesticide use	Use pesticides and other biocides only where necessary and only as part of an integrated pest management system to minimize exposure of birds to potentially toxic chemicals.	5.3 Private sector standards and codes	Medium: Tree Swallow
				Promote pesticide-free products.	6.2 Substitution	
				Continue to monitor and enforce compliance with laws, policies and regulations at all levels.	5.4 Compliance and enforcement	
Decrease of prey availability to birds due to chemical contamination from biocides such as pesticide, herbicide, or	9.3 Agricultural & forestry effluents	Reduce the loss of prey/food source from exposure to pesticides and other biocides used by the	5.2 Manage decreases in prey due to contaminants	Use pesticides and other biocides only where necessary and only as part of an integrated pest management system to minimize exposure of birds to potentially toxic chemicals.	5.3 Private sector standards and codes	High: Bay-breasted Warbler Medium: Bank Swallow
				Promote pesticide-free products.	6.2 Substitution	

Table 21 continued

Threat Addressed	Threat Category	Conservation Objective	Objective Category	Conservation Action	Action Category	Threat Rank and Priority Species Affected <sup>†</sup>
fungicide		agriculture industry				

## Inland Waterbodies

The inland waterbodies habitat class is a sub-set of the waterbodies, snow and ice habitat category (FAO 2000). There are no areas within BCR 14 NB where snow or ice covers the ground for the majority of the year. To differentiate between waterbodies within the marine biogeographic units (MBU 11 NB and MBU 12 NB) surrounding New Brunswick, the following section focuses on reservoirs, lakes, ponds, streams and rivers (Fig. 37). There are more than 2 500 lakes in BCR 14 NB (New Brunswick Department of Natural Resources 2012).



**Figure 37. Map of inland waterbodies in BCR 14 NB; there is no area covered by snow or ice for the majority of the year.**

Of the 18 priority bird species that use this habitat, only 2 are species at risk (Table 22). Lakes or ponds are used by 8 priority bird species, while 3 use rivers and streams, and 9 use all 4 types of inland waterbodies (Table 22).

The highest ranked threats to priority bird species in BCR 14 NB are disturbance from recreational activities (6.1) and airborne pollutants (9.5), both ranked medium (Fig. 38). Threats from airborne pollutants are further discussed in the Pollution section, where specific conservation actions for widespread threats are presented. The most frequently identified threats to priority bird species in inland waterbodies are decreases in diet quality or prey availability due to contamination of water from biocides such as pesticides, herbicides and fungicides (9.3 Agricultural & forestry effluents, ranked low), or chemical or heavy metal contamination (9.2 Industrial & military effluents, ranked low; Fig. 38).

Many bird species will benefit from the conservation objectives and actions presented in Table 23. Conservation actions to address medium-ranked threats to priority birds in BCR 14 NB include securement and management of key inland waterbodies and waterways (such as the Common Loon) through various methods such as creation of protected areas, private land acquisitions, conservation easements, community conservation plans and stewardship agreements. It is also important to raise public awareness about waterbirds and their habitat needs and about the impacts of disturbance from recreational activities in lakes and ponds. Common Terns are threatened by increased competition and displacement by gulls. Discouraging gulls from occupying managed tern colonies and on islands selected for restoration and monitoring gull population and distributions are two proposed conservation actions to address the threat.

**Table 22. Priority bird species that use inland waterbodies in BCR 14 NB, regional habitat sub-class, important habitat features, population objectives and reason for priority status.**

Priority Bird Species	Habitat Sub-class	Important Habitat Features	Population Objective	Reason for Priority Status						
				SAR <sup>1</sup>	N/CC <sup>2</sup>	N/CS <sup>3</sup>	R/SC <sup>4</sup>	R/SS <sup>5</sup>	NAWMP/ EHJV <sup>6</sup>	Review <sup>7</sup>
American Black Duck	Lakes/Ponds; Rivers/Streams	lake and pond margins, slow moving rivers and streams, wooded ponds, riparian areas, beaver ponds	Maintain current						Y	
Barrow's Goldeneye (Eastern)	Rivers/Streams	flow constrictions that provide open water areas during winter	Assess/Maintain	Y					Y	
Belted Kingfisher	Lakes/Ponds; Rivers/Streams	clear water near vertical earth exposure for digging nest burrow (or next boxes); overhanging perches beneficial	Assess/Maintain				Y	Y		
Black Tern	Non-specific Freshwater		Assess/Maintain							Y
Canada Goose (North Atlantic)	Lakes/Ponds	lake and pond margins, slow moving rivers and streams	Maintain current						Y	
Canada Goose (Temperate-breeding in Eastern Canada)	Lakes/Ponds		Decrease						Y <sup>8</sup>	
Common Goldeneye	Lakes/Ponds; Rivers/Streams	clear water preferred; near suitable nesting habitat (i.e. mature forest having large trees with cavities)	Increase 50%						Y	
Common Loon	Lakes/Ponds; Rivers/Streams	with small island and sheltered coves	Maintain current		Y		Y			

<sup>1</sup> SAR, species listed under SARA (Species at Risk Public Registry 2012), assessed by COSEWIC (COSEWIC 2012) or listed under New Brunswick's *Endangered Species Act* (New Brunswick 2004) as Endangered, Threatened or Special Concern (SARA/COSEWIC only).

<sup>2</sup> N/CC, National/Continental Concern.

<sup>3</sup> N/CS, National/Continental Stewardship.

<sup>4</sup> R/SC, Regional/Sub-regional Concern.

<sup>5</sup> R/SS, Regional/Sub-regional Stewardship.

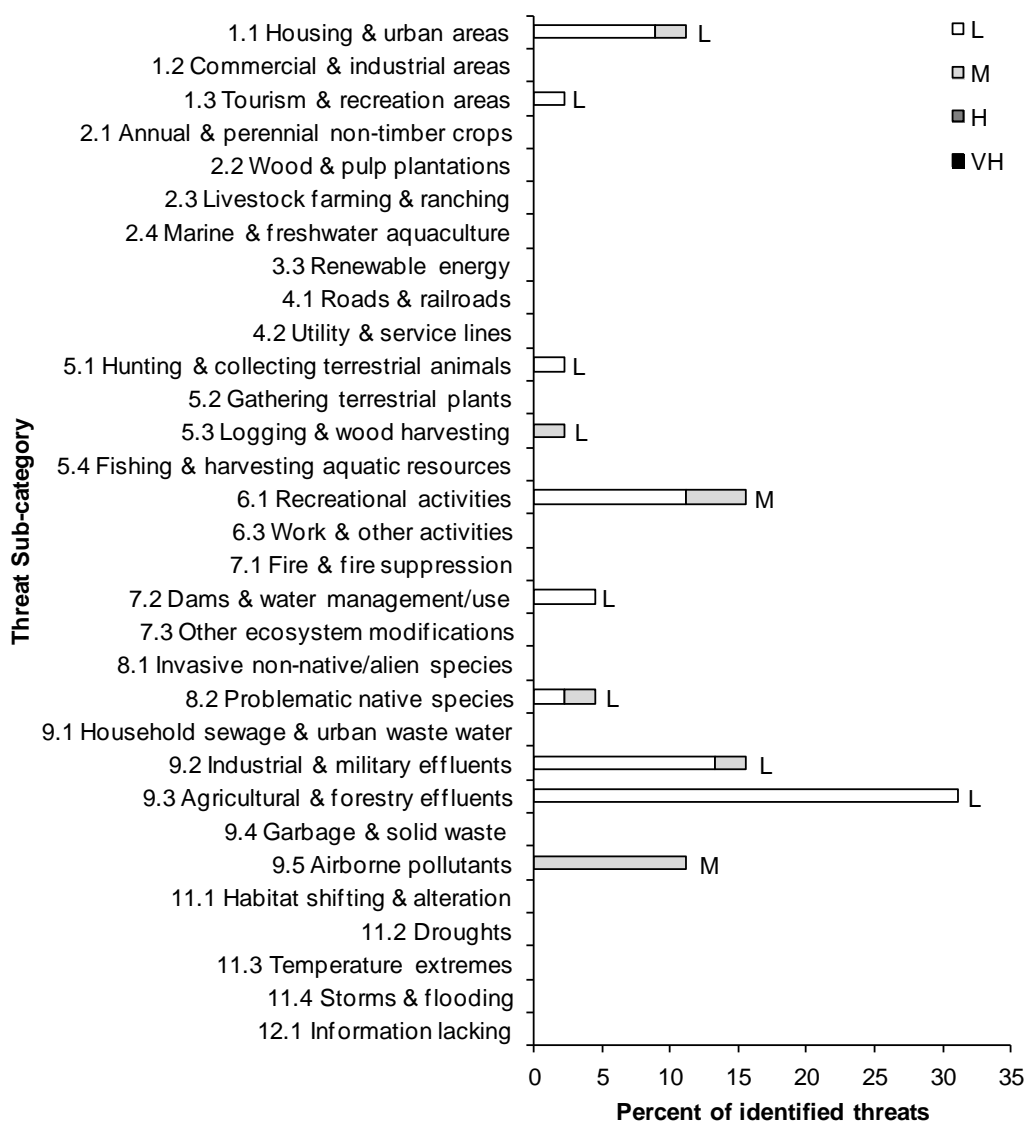
<sup>6</sup> NAWMP/EHJV, waterfowl that are priority under the regional EHJV implementation plan (NB-EHJV 2008) or scored High or Highest in WCR 14 in the NAWMP (NAWMP Plan Committee 2004).

<sup>7</sup> Review, species added by the Regional Technical Working Group or upon expert review. For further details on reasons for priority status and the species prioritization process, see Table 1 and Appendix 2.

<sup>8</sup> Canada Goose (Temperate-breeding in Eastern Canada) was added as a priority species due to management concerns (e.g. overabundance and problem geese).

Table 22 continued

Priority Bird Species	Habitat Sub-class	Important Habitat Features	Population Objective	Reason for Priority Status						
				SAR <sup>1</sup>	N/CC <sup>2</sup>	N/CS <sup>3</sup>	R/SC <sup>4</sup>	R/SS <sup>5</sup>	NAWMP/ EHJV <sup>6</sup>	Review <sup>7</sup>
Common Tern	Lakes/Ponds	shallow areas, clear water for foraging, rocky islands	Assess/Maintain				Y			
Green Heron	Rivers/Streams	shoreline vegetation	Assess/Maintain				Y			
Green-winged Teal	Lakes/Ponds	wooded ponds, riparian areas	Increase 50%						Y	
Harlequin Duck (Eastern)	Rivers/Streams	clear, fast flowing rivers and streams, preferably with small islands	Assess/Maintain	Y					Y	
Mallard	Lakes/Ponds; Rivers/Streams	lake and pond margins, slow moving rivers and streams, wooded ponds, riparian areas, beaver ponds	Increase 100%						Y	
Pied-billed Grebe	Lakes/Ponds	dense emergent vegetation with open water	Assess/Maintain		Y					
Ring-necked Duck	Lakes/Ponds	open water (1.5 m depth) with abundant emergent and submergent vegetation	Increase 50%						Y	
Solitary Sandpiper	Lakes/Ponds; Rivers/Streams	lake and stream margins, shallow water (0-10 cm)	Assess/Maintain		Y					
Wilson's Snipe	Lakes/Ponds; Rivers/Streams	organic soil, wet	Increase 100%		Y					
Wood Duck	Lakes/Ponds; Rivers/Streams	near mature forest with suitable nesting cavities	Increase 50%						Y	



**Figure 38. Percent of identified threats to priority bird species in inland waterbodies in each threat sub-category.**

Each bar represents the percent of the total number of threats identified in each threat sub-category in inland waterbodies (for example, if 100 threats were identified in total for all priority species in inland waterbodies, and 10 of those threats were in the category 1.1 Housing & urban areas, the bar on the graph would represent this as 10%). The bars are divided to show the distribution of L: Low, M: Medium, H: High and VH: Very High 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 these rankings in the sub-category. The overall magnitude of the sub-threat in inland waterbodies is shown in Table 4, Relative magnitude of identified threats to priority species within BCR 14 NB by threat category and broad habitat class.

**Note:** Threats of all magnitudes are included, although low-ranked threats affecting only a single species were not assigned conservation objectives or recommended actions.

**Table 23. Threats addressed (medium and high rank only), conservation objectives, recommended action, and priority species affected for inland waterbodies in BCR 14 NB.**

Threat Addressed	Threat Category	Conservation Objective	Objective Category	Conservation Action	Action Category	Threat Rank and Priority Species Affected <sup>†</sup>
Fragmentation or loss of riparian habitat to urban development	1.1 Housing & urban areas	Maintain/restore rivers and streams	1.1 Ensure land and resource-use policies and practices maintain or improve bird habitat	Secure and manage riparian habitat for priority species through various methods such as creation of protected areas, private land acquisitions, conservation easements, community conservation plans and stewardship agreements.	1.2 Resource and habitat protection	Medium: Green Heron
				Provide incentives for landowners to protect riparian habitat.	6.4 Conservation payments	
Fragmentation or loss of riparian forest due to logging activities	5.3 Logging & wood harvesting	Maintain/restore rivers and streams	1.1 Ensure land and resource-use policies and practices maintain or improve bird habitat	Manage forest to retain and create adequate habitat.	2.1 Site/area management	Medium: Harlequin Duck (Eastern)
Disturbance at nest sites due to recreational activities in waterbodies and waterways	6.1 Recreational activities	Reduce/eliminate disturbance from recreational activities in lakes and ponds	4.1 Reduce disturbance from human recreation	Establish/maintain protected areas to restrict access/activity at breeding sites.	1.1 Site/area protection	Medium: Common Loon
				Manage recreational activities to minimize disturbance during the breeding season.	5.2 Policies and regulations	
				Raise public awareness of waterbirds and their habitat needs, and the impacts of disturbance from recreational activities in lakes and ponds.	4.3 Awareness and communications	
				Assess the impacts of recreational activities in waterbodies and waterways on priority species.	8.1 Research	
Disturbance at nest sites due to recreational activities in waterbodies and waterways	6.1 Recreational activities	Reduce/eliminate disturbance from recreational activities in rivers and streams	4.1 Reduce disturbance from human recreation	Raise awareness of issues surrounding human disturbance in nesting areas.	4.3 Awareness and communications	Medium: Harlequin Duck (Eastern)
				Manage recreational activities to minimize disturbance during the breeding season.	5.2 Policies and regulations	
				Assess the impacts of recreational activities in waterbodies and waterways on priority species.	8.1 Research	

<sup>†</sup> Priority species not mentioned in this table are absent for one of the following reasons: 1) no identified threats in this habitat; 2) identified threats are discussed in the Widespread Issues section; 3) identified threats in this habitat are of low magnitude.

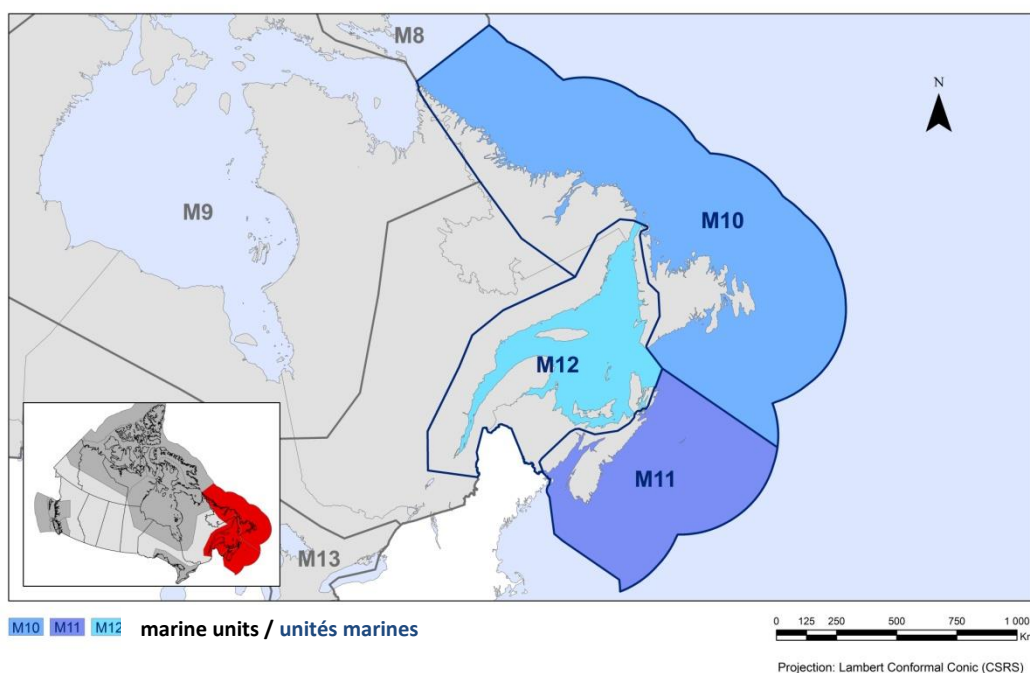


Table 23 continued

Threat Addressed	Threat Category	Conservation Objective	Objective Category	Conservation Action	Action Category	Threat Rank and Priority Species Affected <sup>†</sup>
Competition and displacement by gulls	8.2 Problematic native species	Reduce/eliminate displacement by gulls	3.2 Reduce competition with problematic native species	Discourage gulls at managed colonies and on islands selected for restoration	2.2 Invasive /problematic species control	Medium: Common Tern
				Decrease gull populations near tern colonies by encouraging: closure of landfills, control of refuse at fish plants and on fishing boats and discouraging people from feeding gulls.	2.2 Invasive/ problematic species control	
				Monitor gull population and distribution.	2.2 Invasive/ problematic species control	
Decrease of diet quality and of health of birds due to the chemical or heavy metal contamination of food source	9.2 Industrial & military effluents	Reduce mortality from exposure to chemical/heavy metal contaminants from industry	2.2 Reduce mortality and/or sub-lethal effects from exposure to contaminants	Develop beneficial management practices to manage the discharge of chemical/heavy metal contaminants into the environment.	5.3 Private sector standards and codes	Medium: Common Loon
				Continue to monitor and enforce compliance with laws, policies and regulations at all levels.	5.4 Compliance and enforcement	

### **Marine Waters – Bay of Fundy**

This marine waters habitat class is a sub-set of the waterbodies, snow and ice habitat category (FAO 2000). There is no area within MBU 11 NB where snow or ice covers the ocean for the majority of the year. To differentiate between inland waterbodies within BCR 14 NB, the following section focuses on the marine waters of the northern half of the Bay of Fundy, along the province of New Brunswick, up to the international boundary with the U.S.A. in the south and to the southern edge of the Laurentian Channel on the northeast, encompassing a total area of approximately 8 000 km<sup>2</sup> (Fig. 39).



**Figure 39. Map of the marine waters of the Bay of Fundy (MBU 11 NB).**

**Note:** Includes marine waters along the south shore of New Brunswick but not those off the shores of the province of Nova Scotia.

Of the 29 priority species that are found in the marine waters of MBU 11 NB, 4 are species at risk (Table 24). Sixteen priority species of MBU 11 NB are found most often in the nearshore waters but are also known to use the continental shelf (Table 24).

The most frequently identified and highest ranked threats to priority bird species in MBU 11 NB are related to oil spills and discharges from shipping activities (9.2 Industrial & military effluents), fisheries bycatch and competition for resources with the fisheries industry (5.4 Fishing & harvesting aquatic resources; Fig. 40). Competition with aquaculture facilities for prey, nesting, brooding or foraging areas was an important threat to Surf Scoters and Common Eiders (2.4 Freshwater and marine aquaculture ranked medium; Table 25). Mortality due to the consumption of garbage was a highly ranked threat for the Manx Shearwater (9.4 Garbage and solid waste; Table 25).

Many bird species will benefit from the conservation objectives and actions presented in Table 25. Recommended conservation actions to address medium- or high-ranked threats to priority bird species in MBU 11 NB include managing the aquaculture industry to minimize habitat degradation, continuing to promote and monitor compliance with laws, policies and regulations regarding the release of oil, oily waste and garbage into the ocean, and developing beneficial management practices and avoidance guidelines to manage shipping activities and minimize accidental oil discharges.

**Table 24. Priority bird species that use the marine waters in MBU 11 NB, regional habitat sub-class, important habitat features, population objectives and reason for priority status.**

Priority Bird Species	Habitat Sub-class	Important Habitat Features	Population Objective	Reason for Priority Status						
				SAR <sup>1</sup>	N/CC <sup>2</sup>	N/CS <sup>3</sup>	R/SC <sup>4</sup>	R/SS <sup>5</sup>	NAWMP/ EHJV <sup>6</sup>	Review <sup>7</sup>
American Black Duck	Nearshore Waters	shallow sheltered areas	Maintain current						Y	
Arctic Tern	Nearshore Waters	open waters where prey is available within 50 cm of the surface	Assess/Maintain							Y
Barrow's Goldeneye (Eastern)	Nearshore Waters	rocky coasts, rockweed, sheltered bays	Assess/Maintain	Y					Y	
Black Scoter	Nearshore Waters	sandy, cobble, or boulder substrate, 5–6 m depth, mollusc beds	Assess/Maintain						Y	
Black-legged Kittiwake	Continental Shelf; Nearshore Waters	upwellings/fronts	Maintain current		Y					
Bonaparte's Gull	Nearshore Waters		Assess/Maintain		Y					
Common Eider	Nearshore Waters		Increase 50%						Y	
Common Goldeneye	Nearshore Waters	sandy, cobble, rocky, or boulder substrate with abundant prey	Assess/Maintain						Y	
Common Loon	Nearshore Waters	bays and nearshore coastal areas	Assess/Maintain		Y		Y			
Common Murre	Continental Shelf; Nearshore Waters	upwellings/fronts	Assess/Maintain		Y					
Common Tern	Nearshore Waters	shallow areas, clear water for foraging	Assess/Maintain				Y			
Dovekie	Continental Shelf; Nearshore Waters	upwellings/fronts, continental shelf edge, offshore pack ice, cold water	Assess/Maintain		Y					

<sup>1</sup> SAR, species listed under SARA (Species at Risk Public Registry 2012), assessed by COSEWIC (COSEWIC 2012) or listed under New Brunswick's *Endangered Species Act* (New Brunswick 2004) as Endangered, Threatened or Special Concern (SARA/COSEWIC only).

<sup>2</sup> N/CC, National/Continental Concern.

<sup>3</sup> N/CS, National/Continental Stewardship.

<sup>4</sup> R/SC, Regional/Sub-regional Concern.

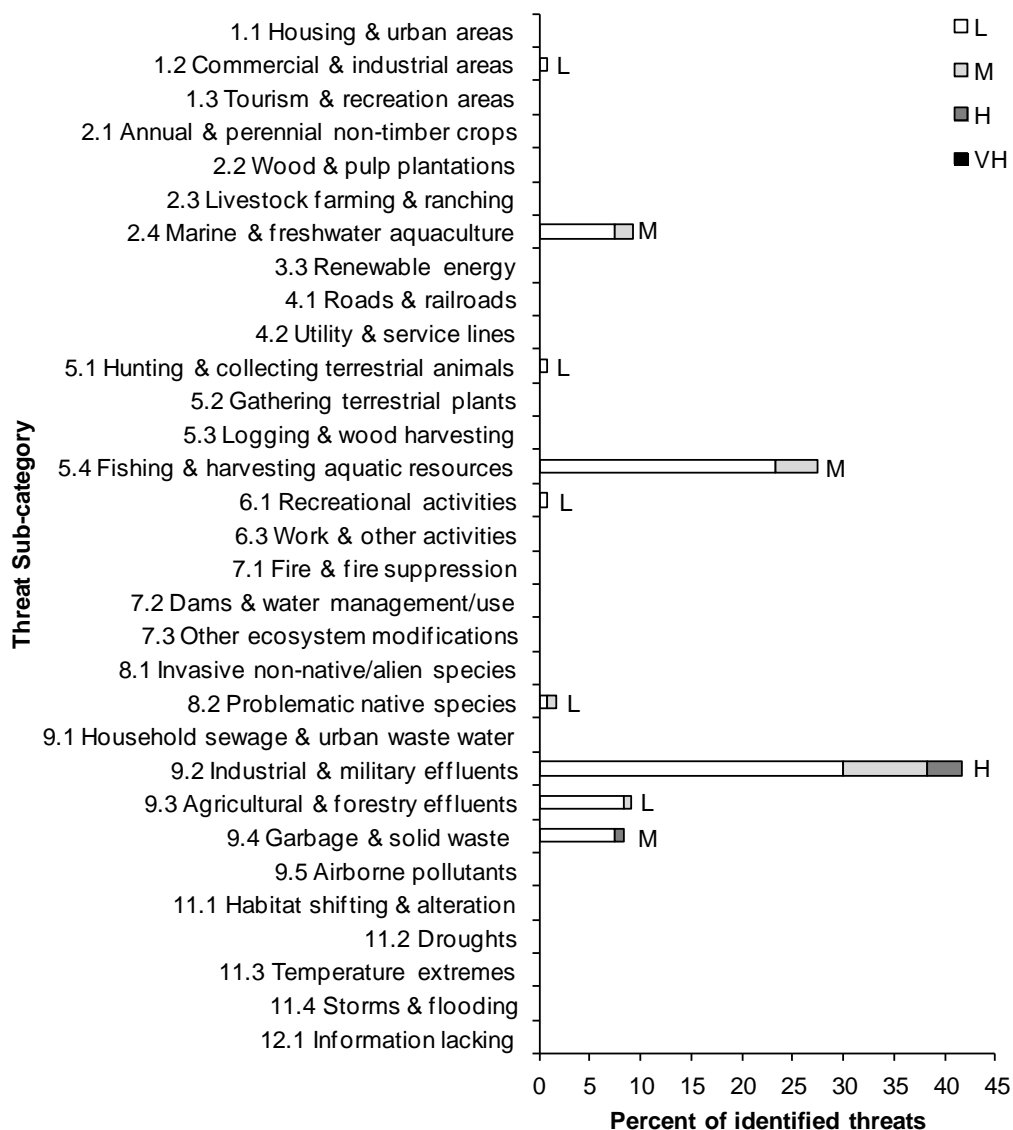
<sup>5</sup> R/SS, Regional/Sub-regional Stewardship.

<sup>6</sup> NAWMP/EHJV, waterfowl that are priority under the regional EHJV implementation plan (NB-EHJV 2008) or scored High or Highest in WCR 14 in the NAWMP (NAWMP Plan Committee 2004).

<sup>7</sup> Review, species added by the Regional Technical Working Group or upon expert review. For further details on reasons for priority status and the species prioritization process, see Table 1 and Appendix 2.

Table 24 continued

Priority Bird Species	Habitat Sub-class	Important Habitat Features	Population Objective	Reason for Priority Status						
				SAR <sup>1</sup>	N/CC <sup>2</sup>	N/CS <sup>3</sup>	R/SC <sup>4</sup>	R/SS <sup>5</sup>	NAWMP/ EHJV <sup>6</sup>	Review <sup>7</sup>
Great Cormorant	Nearshore Waters	sheltered bays with nearby perching sites	Assess/Maintain		Y					
Great Shearwater	Continental Shelf; Nearshore Waters	upwellings/fronts	Assess/Maintain		Y	Y	Y			
Green-winged Teal	Nearshore Waters	sheltered bays	Increase 50%						Y	
Harlequin Duck (Eastern)	Nearshore Waters	rocky coastline, exposed headlands, and subtidal ledges; often associated with offshore islands	Assess/Maintain	Y					Y	
Horned Grebe	Nearshore Waters	sheltered areas between islands far from land (10–20 m depth)	Assess/Maintain	Y						
Leach's Storm-Petrel	Continental Shelf	upwellings/fronts	Assess/Maintain			Y	Y	Y		
Long-tailed Duck	Continental Shelf; Nearshore Waters	protected bays with steep slopes and shorelines with gradual shelves	Assess/Maintain						Y	
Manx Shearwater	Continental Shelf; Nearshore Waters	fronts/upwellings	Assess/Maintain		Y		Y			
Razorbill	Continental Shelf; Nearshore Waters		Assess/Maintain		Y					
Red Phalarope	Continental Shelf; Nearshore Waters	near upwellings, where Euphausiids are present	Assess/Maintain		Y					
Red-necked Grebe	Nearshore Waters		Assess/Maintain		Y		Y			
Red-necked Phalarope	Continental Shelf; Nearshore Waters	shelfbreaks, upwellings, fronts	Assess/Maintain		Y					
Red-throated Loon	Continental Shelf; Nearshore Waters	sheltered, shallow, sandy substrates	Assess/Maintain		Y					
Roseate Tern	Nearshore Waters	shallow water, sandy substrate	Recovery objective	Y						
Sooty Shearwater	Continental Shelf; Nearshore Waters	upwellings/fronts	Assess/Maintain		Y					
Surf Scoter	Nearshore Waters	sandy, cobble or rocky substrate (<10 m depth)	Assess/Maintain						Y	
Thick-billed Murre	Continental Shelf; Nearshore Waters	ice, upwellings/fronts	Assess/Maintain		Y		Y			



**Figure 40. Percent of identified threats to priority bird species in the marine waters of MBU 11 NB in each threat sub-category.**

Each bar represents the percent of the total number of threats identified in each threat sub-category in the marine waters of MBU 11 NB (for example, if 100 threats were identified in total for all priority species in the marine waters, 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 L: Low, M: Medium, H: High and VH: Very High 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 the rankings in the sub-category. The overall magnitude of the sub-threat in the marine waters of MBU 11 NB is shown in Table 4, Relative magnitude of identified threats to priority species within MBU 11 NB by threat category and broad habitat class.

**Note:** Threats of all magnitudes are included, although low-ranked threats affecting only a single species were not assigned conservation objectives or recommended actions.

**Table 25. Threats addressed (medium and high rank only), conservation objectives, recommended actions and priority species affected for the marine waters of MBU 11 NB.**

Threat Addressed	Threat Category	Conservation Objective	Objective Category	Conservation Action	Action Category	Threat Rank and Priority Species Affected <sup>†</sup>
Competition for foraging areas with aquaculture farms	2.4 Marine & freshwater aquaculture	Reduce/eliminate competition for foraging areas with the aquaculture industry in nearshore waters	5.3 Reduce human competition for food sources or foraging sites	Manage the aquaculture industry to minimize competition with priority species.	5.3 Private sector standards and codes	Medium: Surf Scoter
				Raise public awareness of waterbirds and waterfowl and their habitat needs, and the impacts of aquaculture.	4.3 Awareness and communications	
				Assess the impact of aquaculture on priority species.	8.1 Research	
Competition for nesting or brood rearing areas with aquaculture farms	2.4 Marine & freshwater aquaculture	Reduce/eliminate competition for brooding/chick rearing areas with the aquaculture industry in nearshore waters	5.3 Reduce human competition for food sources or foraging sites	Manage the aquaculture industry to minimize competition with priority species.	5.3 Private sector standards and codes	Medium: Common Eider
				Raise awareness in the industry about the impacts of activities on waterfowl.	4.3 Awareness and communications	
				Assess the impact of aquaculture on priority species.	8.1 Research	
Competition for prey or resources with industrial or commercial fisheries operations	5.4 Fishing & harvesting aquatic resources	Reduce/eliminate competition for resources (food) with the fishing industry	5.3 Reduce human competition for food sources or foraging sites	Establish/maintain protected areas to restrict access/activity at key foraging sites.	1.1 Site/area protection	Medium: Black-legged Kittiwake
				Provide input into laws, regulations, and beneficial management practices for fishing activities that directly impact the quality of seabird foraging habitat.	5.2 Policies and regulations	
Fisheries bycatch or drowning as a result of entanglement in	5.4 Fishing & harvesting aquatic	Reduce mortality from fisheries bycatch	2.4 Reduce incidental mortality	Develop policies, regulations and beneficial management practices that minimize waterbird, waterfowl and seabird bycatch, such as the	5.2 Policies and regulations	Medium: Common Murre, Manx Shearwater,

<sup>†</sup> Priority species not mentioned in this table are absent for one of the following reasons: 1) no identified threats in this habitat; 2) identified threats are discussed in the Widespread Issues section; 3) identified threats in this habitat are of low magnitude.

Table 25 continued

Threat Addressed	Threat Category	Conservation Objective	Objective Category	Conservation Action	Action Category	Threat Rank and Priority Species Affected <sup>†</sup>
fishing gear	resources			modification of fishing gear.		Razorbill, Thick-billed Murre
				Continue to monitor and enforce compliance with laws, policies and regulations to minimize seabird bycatch.	5.4 Compliance and enforcement	
				Establish/maintain protected areas to restrict fishing activity at key foraging sites.	1.1 Site/area protection	
Decrease of diet quality and of health of birds due to the chemical or heavy metal contamination of food source	9.2 Industrial & military effluents	Reduce mortality from exposure to chemical/heavy metal contaminants from industry	2.2 Reduce mortality and/or sub-lethal effects from exposure to contaminants	Develop beneficial management practices to manage the discharge of chemical/heavy metal contaminants into the environment.	5.3 Private sector standards and codes	Medium: Leach's Storm-Petrel
				Continue to monitor and enforce compliance with laws, policies and regulations at all levels.	5.4 Compliance and enforcement	
Hypothermia caused by oil on plumage from oil spills and oil discharges	9.2 Industrial & military effluents	Reduce mortality from oiling	2.3 Reduce mortality and/or sub-lethal effects from oil pollution	Develop beneficial management practices and avoidance guidelines to manage shipping activities and minimize accidental oil discharges.	5.3 Private sector standards and codes	High: Great Cormorant, Razorbill, Red Phalarope, Red-necked Phalarope Medium: Arctic Tern, Common Loon, Common Murre, Dovekie, Harlequin Duck (Eastern), Horned Grebe, Thick-billed Murre, Sooty Shearwater
				Continue to monitor and enforce compliance with laws, policies and regulations regarding the release of oil and oily waste into marine waters.	5.4 Compliance and enforcement	
Decrease of diet quality and of health of birds due to the contamination from pesticide, herbicide, or fungicide	9.3 Agricultural & forestry effluents	Reduce mortality from exposure to pesticides and other biocides used by the agriculture industry	2.1 Reduce mortality and/or sub-lethal effects from pesticide use	Use pesticides and other biocides only where necessary and only as part of an integrated pest management system to minimize exposure of birds to potentially toxic chemicals.	5.3 Private sector standards and codes	Medium: Leach's Storm-Petrel
				Promote pesticide-free products.	6.2 Substitution	
				Continue to monitor and enforce compliance with laws, policies and regulations at all levels.	5.4 Compliance and enforcement	

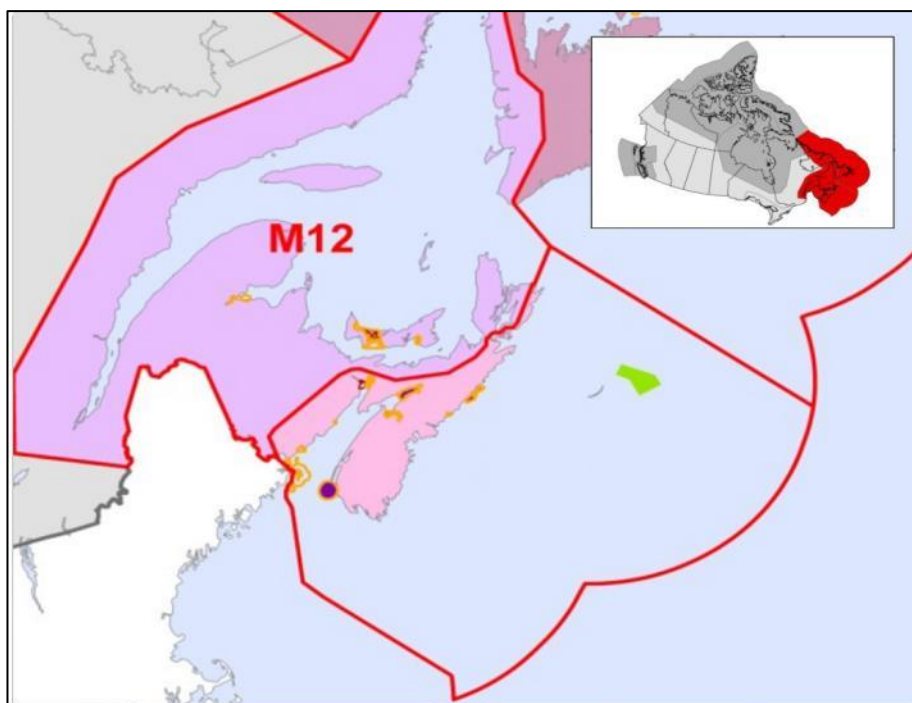


Table 25 continued

Threat Addressed	Threat Category	Conservation Objective	Objective Category	Conservation Action	Action Category	Threat Rank and Priority Species Affected <sup>†</sup>
Mortality resulting from consumption of plastics or garbage	9.4 Garbage & solid waste	Reduce mortality from ingestion and entanglement in garbage and other solid wastes	2.4 Reduce incidental mortality	Develop beneficial management practices to manage garbage and other solid wastes, and eliminate dumping into the marine environment.	5.3 Private sector standards and codes	High: Manx Shearwater
				Continue to monitor and enforce compliance with laws, policies and regulations that reduce garbage and other waste disposal into the marine environment.	5.4 Compliance and enforcement	

### ***Marine Waters – Gulf of St. Lawrence***

The marine waters habitat class is a sub-set of the waterbodies, snow and ice habitat category (FAO 2000). There is no area within MBU 12 NB where snow or ice covers the ocean for the majority of the year. To differentiate between the inland waterbodies of BCR 14 NB, the following section focuses on marine water, from nearshore waters to the Northumberland Strait (Fig. 41). The total area of MBU 12 NB is approximately 14 000 km<sup>2</sup>.



**Figure 41. Map of the marine waters of the Gulf of St. Lawrence (MBU 12 NB).**

**Note:** The boundary of MBU 12 NB follows the contours of the New Brunswick coast from the Gaspé Peninsula in the north, through the middle of the Northumberland Strait, south to the Nova Scotia border. It does not include the marine waters off Prince Edward Island or Quebec.

Of the 14 priority species found in the marine waters of MBU 12 NB, 3 are species at risk (Table 26). All priority bird species use nearshore waters, and 2 also use the continental shelf (Table 26).

The most frequently identified and highest ranked threats (ranked medium) are related to oil spills and discharges from shipping activities (9.2 Industrial & military effluents; Fig. 42). Competition for resources with aquaculture industries (2.4 Marine & freshwater aquaculture) and fisheries (5.4 Fishing & harvesting aquatic resources) were also frequently identified, though they were ranked medium and low, respectively (Fig. 42).

Many bird species will benefit from the conservation objectives and actions presented in Table 27. Recommended conservation actions to address medium-ranked threats in MBU 12 NB include managing the aquaculture industry to minimize habitat degradation; continuing to

promote and monitor compliance with laws, policies and regulations regarding the release of oil and oily waste into the ocean; and developing beneficial management practices to manage shipping activities and minimize accidental oil discharges.

**Table 26. Priority bird species that use the marine waters of MBU 12 NB, regional habitat sub-class, important habitat features, population objectives and reason for priority status.**

Priority Bird Species	Habitat Sub-class	Important Habitat Features	Population Objective	Reason for Priority Status						
				SAR <sup>1</sup>	N/CC <sup>2</sup>	N/CS <sup>3</sup>	R/SC <sup>4</sup>	R/SS <sup>5</sup>	NAWMP/ EHJV <sup>6</sup>	Review <sup>7</sup>
American Black Duck	Nearshore Waters	shallow sheltered areas	Maintain current						Y	
Barrow's Goldeneye (Eastern)	Nearshore Waters	rocky coasts, rockweed, sheltered bays	Assess/Maintain	Y					Y	
Black Scoter	Nearshore Waters	sandy, cobble or boulder substrate, 5–6 m depth, mollusc beds	Assess/Maintain						Y	
Common Eider	Nearshore Waters		Increase 50%						Y	
Common Goldeneye	Nearshore Waters	sandy, cobble, rocky or boulder substrate with abundant prey	Assess/Maintain						Y	
Common Loon	Nearshore Waters	bays and nearshore coastal areas	Assess/Maintain		Y		Y			
Common Tern	Nearshore Waters	shallow areas, clear water for foraging	Assess/Maintain				Y			
Green-winged Teal	Nearshore Waters	sheltered bays	Increase 50%						Y	
Harlequin Duck (Eastern)	Nearshore Waters	rocky coastline, exposed headlands and subtidal ledges; often associated with offshore islands	Assess/Maintain	Y					Y	
Horned Grebe	Nearshore Waters	sheltered areas between islands far from land (10–20 m depth)	Assess/Maintain	Y						
Long-tailed Duck	Continental Shelf; Nearshore Waters	protected bays with steep slopes and shorelines with gradual shelves	Assess/Maintain						Y	
Red-necked Grebe	Nearshore Waters		Assess/Maintain		Y		Y			

<sup>1</sup> SAR, species listed under SARA (Species at Risk Public Registry 2012), assessed by COSEWIC (COSEWIC 2012) or listed under New Brunswick's *Endangered Species Act* (New Brunswick 2004) as Endangered, Threatened or Special Concern (SARA/COSEWIC only).

<sup>2</sup> N/CC, National/Continental Concern.

<sup>3</sup> N/CS, National/Continental Stewardship.

<sup>4</sup> R/SC, Regional/Sub-regional Concern.

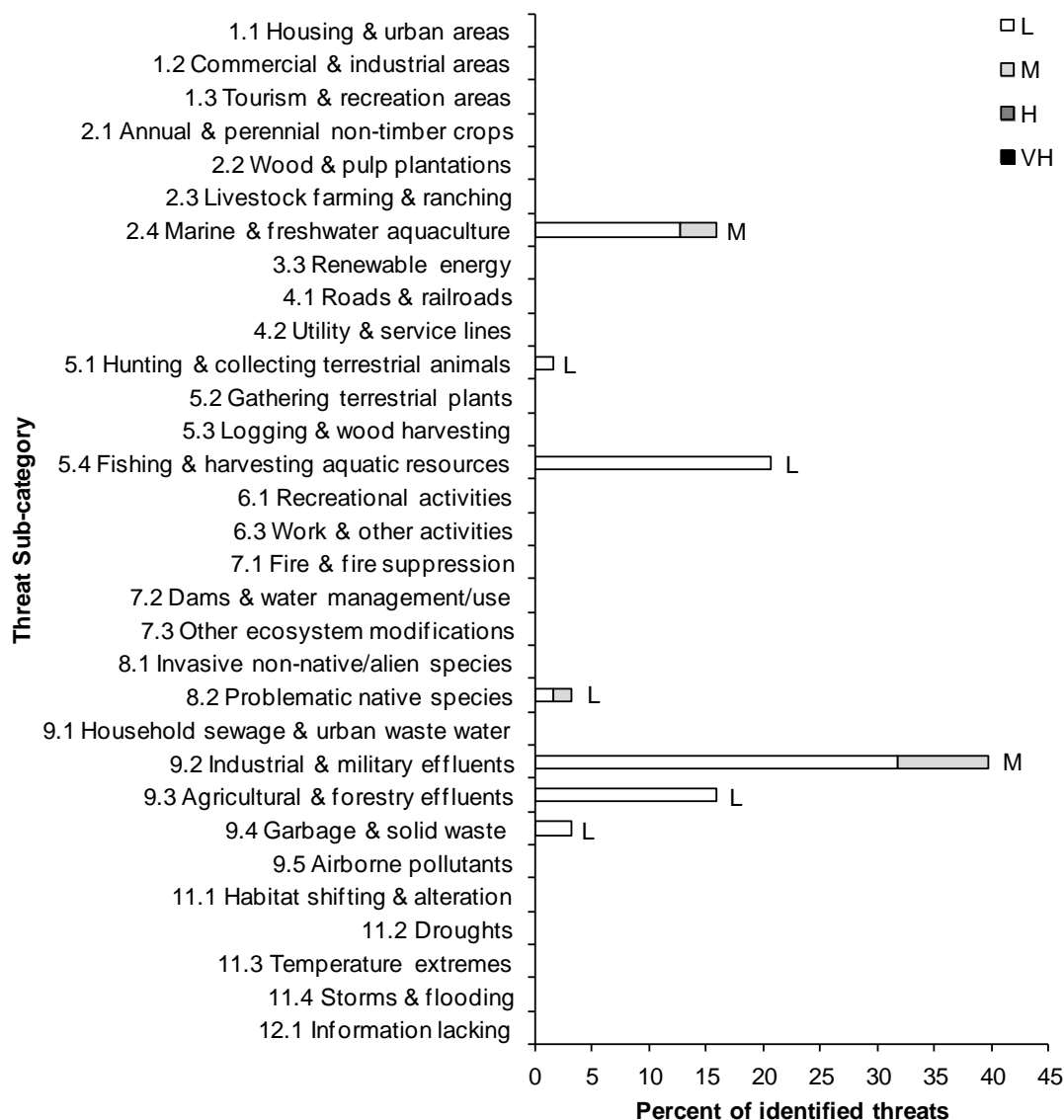
<sup>5</sup> R/SS, Regional/Sub-regional Stewardship.

<sup>6</sup> NAWMP/EHJV, waterfowl that are priority under the regional EHJV implementation plan (NB-EHJV 2008) or scored High or Highest in WCR 14 in the NAWMP (NAWMP Plan Committee 2004).

<sup>7</sup> Review, species added by the Regional Technical Working Group or upon expert review. For further details on reasons for priority status and the species prioritization process, see Table 1 and Appendix 2.

Table 26 continued

Priority Bird Species	Habitat Sub-class	Important Habitat Features	Population Objective	Reason for Priority Status						
				SAR <sup>1</sup>	N/CC <sup>2</sup>	N/CS <sup>3</sup>	R/SC <sup>4</sup>	R/SS <sup>5</sup>	NAWMP/ EHJV <sup>6</sup>	Review <sup>7</sup>
Red-throated Loon	Continental Shelf; Nearshore Waters	sheltered, shallow, sandy substrate	Assess/Maintain		Y					
Surf Scoter	Nearshore Waters	sandy, cobble or rocky substrate (<10 m depth)	Assess/Maintain						Y	



**Figure 42. Percent of identified threats to priority bird species in the marine waters of MBU 12 NB in each threat sub-category.**

Each bar represents the percent of the total number of threats identified in each threat sub-category in the marine waters of MBU 12 NB (for example, if 100 threats were identified in total for all priority species in the marine waters of MBU 12 NB, 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 L: Low, M: Medium, H: High and VH: Very High 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 the rankings in the sub-category. The overall magnitude of the sub-threat in the marine waters of MBU 12 NB is shown in Table 4, Relative magnitude of identified threats to priority species within MBU 12 NB by threat category and broad habitat class.

**Note:** Threats of all magnitudes are included, although low-ranked threats affecting only a single species were not assigned conservation objectives or recommended actions.

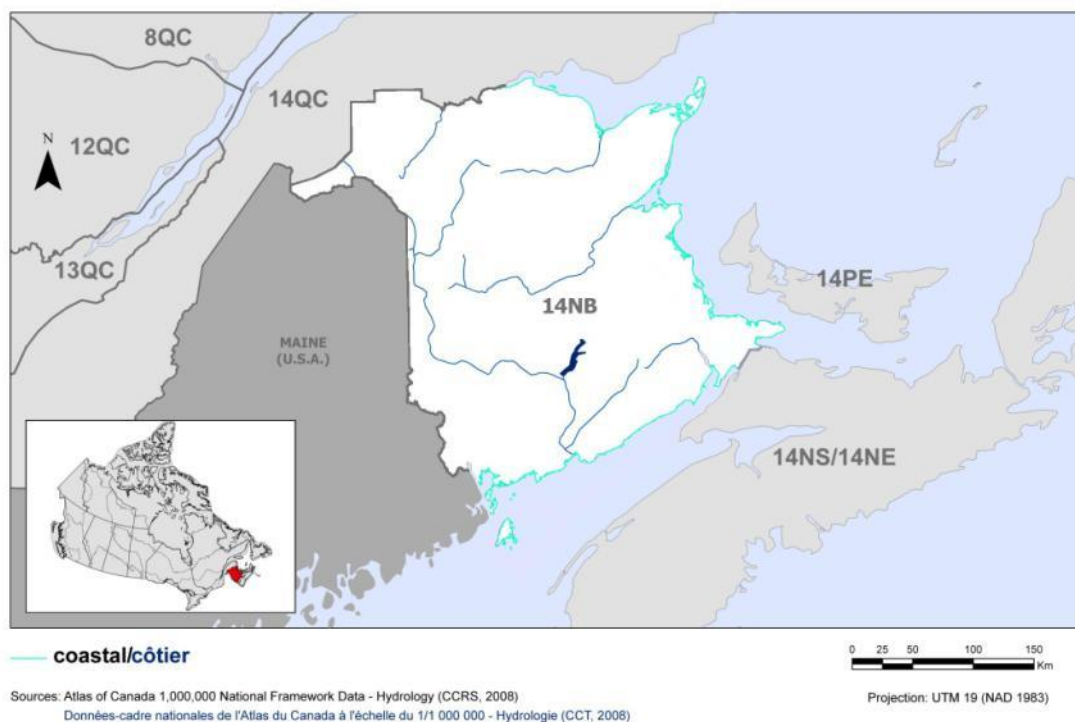
**Table 27. Threats addressed (medium and high rank only), conservation objectives, recommended actions and priority species affected for the marine waters of MBU 12 NB.**

Threat Addressed	Threat Category	Conservation Objective	Objective Category	Conservation Action	Action Category	Threat Rank and Priority Species Affected <sup>†</sup>
Competition for foraging areas with aquaculture farms	2.4 Marine & freshwater aquaculture	Reduce/eliminate competition for foraging areas with the aquaculture industry in nearshore waters	5.3 Reduce human competition for food sources or foraging sites	Manage the aquaculture industry to minimize competition with priority species.	5.3 Private sector standards and codes	Medium: Surf Scoter, Common Eider, Black Scoter
				Raise public awareness of waterbirds and waterfowl and their habitat needs, and the impacts of aquaculture.	4.3 Awareness and communications	
				Assess the impact of aquaculture on priority species.	8.1 Research	
Competition for nesting or brood rearing areas with aquaculture farms	2.4 Marine & freshwater aquaculture	Reduce/eliminate competition for brooding/chick rearing areas with the aquaculture industry in nearshore waters	5.3 Reduce human competition for food sources or foraging sites	Manage the aquaculture industry to minimize competition with priority species.	5.3 Private sector standards and codes	Medium: Common Eider
				Raise awareness in the industry about the impacts of activities on waterfowl.	4.3 Awareness and communications	
				Assess the impact of aquaculture on priority species.	8.1 Research	
Hypothermia caused by oil on plumage from oil spills and oil discharges	9.2 Industrial & military effluents	Reduce mortality from oiling	2.3 Reduce mortality and/or sub-lethal effects from oil pollution	Develop beneficial management practices and avoidance guidelines to manage shipping activities and minimize accidental oil discharges.	5.3 Private sector standards and codes	Medium: Barrow's Goldeneye (Eastern), Common Loon, Harlequin Duck (Eastern), Horned Grebe, Surf Scoter, Black Scoter
				Continue to monitor and enforce compliance with laws, policies and regulations regarding the release of oil and oily waste into marine waters.	5.4 Compliance and enforcement	

<sup>†</sup> Priority species not mentioned in this table are absent for one of the following reasons: 1) no identified threats in this habitat; 2) identified threats are discussed in the Widespread Issues section; 3) identified threats in this habitat are of low magnitude.

### ***Coastal – Above High Tide***

The coastal habitat category includes all habitat types along ocean shorelines (FAO 2000). More specifically, this section focuses on coastal habitats that are above the high-tide mark, including barrier islands, beaches, rocky shorelines, high marsh saltmarshes, heath lands, and banks and bluffs. BCR 14 NB has 5 500 km of coastline along two main marine waterbodies: the Gulf of St. Lawrence (including the Bay of Chaleur and Northumberland Strait) and the Bay of Fundy (Fig. 43). Priority bird species using marine coastal habitats (intertidal areas) in the province of New Brunswick are included in the next two sections: Coastal (intertidal) – Bay of Fundy and Coastal (intertidal) – Gulf of St. Lawrence.



**Figure 43. Map of coastal (above high tide) habitat in BCR 14 NB.**

Of the 17 priority species that are found in coastal habitat (above high tide) in BCR 14 NB, 6 are species at risk (Table 28). Eight species are found on beaches and 7 in coastal marshes (Table 28).

The most frequently identified and highest ranked threats for priority bird species in coastal habitats (above high tide) are decreases in food availability for birds or mortality from hypothermia due to oil spills and discharges (9.2 Industrial & military effluents) and disturbance due to recreational activities such as all-terrain-vehicle use and dogs off-leash (6.1 Recreational activities; Fig. 44). Coastal urban development (1.1 Housing & urban areas) and contamination of food sources from agricultural runoff (9.3 Agricultural & forestry effluents) were also frequently identified threats (ranked medium; Fig. 44). Competition and displacement by gulls and increased predation from high predator populations due to land use practices (8.2



Problematic native species) were also medium threats but only for two priority species (Common Tern and Piping Plover (*melodus*); Table 29).

Many bird species will benefit from the conservation objectives and actions presented in Table 29. Conservation actions to address medium- and high-ranked threats to priority bird species in coastal habitat (above high tide) include managing coastal recreational activities to minimize disturbance to priority species, and securing and managing key coastal habitat for priority species through various methods such as creation of protected areas, private land acquisitions, conservation easements, community conservation plans and stewardship agreements. To address threats related to oil spills and discharges, conservation actions include continuing to promote and monitor compliance with laws, policies and regulations regarding the release of oil and oily waste into the ocean, and developing beneficial management practices to manage shipping activities and minimize accidental oil discharges. Pesticides and other biocides should be used only as part of an integrated pest management system to minimize exposure of birds to potentially toxic chemicals. It is also important to raise public awareness of shorebirds and their habitat needs and of the impacts of disturbance in coastal areas. Managing coastal off-bottom oyster aquaculture activities to minimize disturbance to priority bird species is also recommended.

**Table 28. Priority bird species that use coastal habitats (above high tide) in BCR 14 NB, regional habitat sub-class, important habitat features, population objectives and reason for priority status.**

Priority Bird Species	Habitat Sub-class	Important Habitat Features	Population Objective	Reason for Priority Status						
				SAR <sup>1</sup>	N/CC <sup>2</sup>	N/CS <sup>3</sup>	R/SC <sup>4</sup>	R/SS <sup>5</sup>	NAWMP/ EHJV <sup>6</sup>	Review <sup>7</sup>
American Bittern	Saltmarsh	tall emergent vegetation with aquatic bed vegetation	Increase 100%		Y		Y			
American Golden-Plover	Beaches	beaches and barrier beaches	Assess/Maintain		Y					
Bald Eagle	Beaches; Estuaries; Saltmarsh; Mature Forest	shoreline, relatively unpopulated, deciduous or coniferous forest near water with large nest/perching trees	Maintain current	Y						Y
Bank Swallow	Banks and Bluffs	cut banks/cliffs with soft sandy soil	Increase 100%							Y
Belted Kingfisher	Estuaries	clear water near vertical earth exposure for digging nest burrow (or next boxes); overhanging perches beneficial	Assess/Maintain				Y	Y		
Common Nighthawk	Beaches		Increase 100%	Y						
Common Tern	Beaches	sand and gravel, scattered vegetation (cover for chicks)	Assess/Maintain				Y			
Killdeer	Beaches		Increase 100%		Y					
Mallard	Estuaries; Saltmarsh		Increase 100%						Y	
Nelson's Sparrow	Saltmarsh		Assess/Maintain		Y		Y	Y		
Peregrine Falcon (anatum/tundrius)	Beaches	shorebirds	Assess/Maintain	Y						

<sup>1</sup> SAR, species listed under SARA (Species at Risk Public Registry 2012), assessed by COSEWIC (COSEWIC 2012) or listed under New Brunswick's *Endangered Species Act* (New Brunswick 2004) as Endangered, Threatened or Special Concern (SARA/COSEWIC only).

<sup>2</sup> N/CC, National/Continental Concern.

<sup>3</sup> N/CS, National/Continental Stewardship.

<sup>4</sup> R/SC, Regional/Sub-regional Concern.

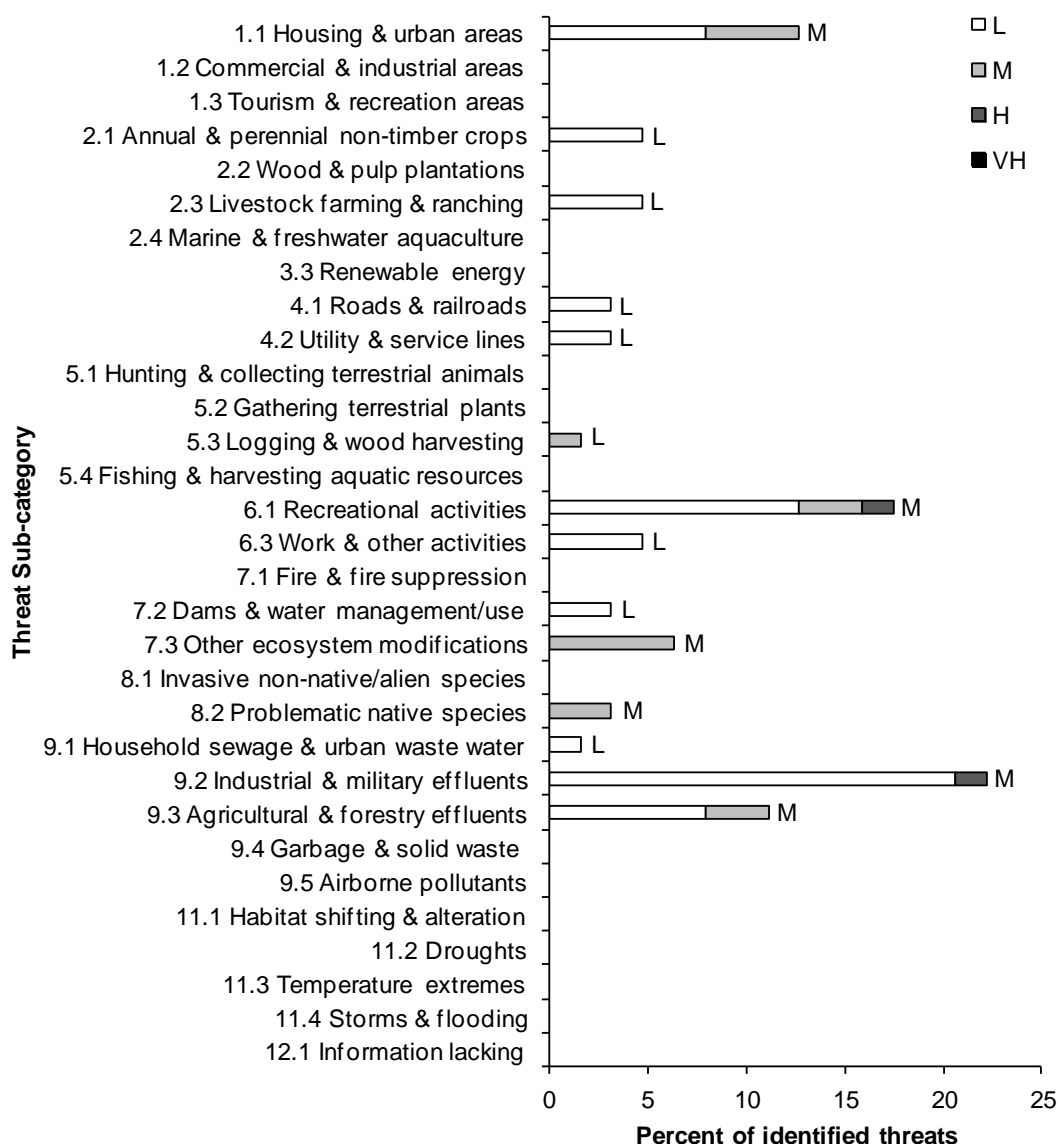
<sup>5</sup> R/SS, Regional/Sub-regional Stewardship.

<sup>6</sup> NAWMP/EHJV, waterfowl that are priority under the regional EHJV implementation plan (NB-EHJV 2008) or scored High or Highest in WCR 14 in the NAWMP (NAWMP Plan Committee 2004).

<sup>7</sup> Review, species added by the Regional Technical Working Group or upon expert review. For further details on reasons for priority status and the species prioritization process, see Table 1 and Appendix 2.

Table 28 continued

Priority Bird Species	Habitat Sub-class	Important Habitat Features	Population Objective	Reason for Priority Status						
				SAR <sup>1</sup>	N/CC <sup>2</sup>	N/CS <sup>3</sup>	R/SC <sup>4</sup>	R/SS <sup>5</sup>	NAWMP/ EHJV <sup>6</sup>	Review <sup>7</sup>
Piping Plover (melodus)	Beaches	sparse vegetation and wrack, sand or medium cobble beach but not rocky	Recovery objective	Y	Y					
Short-eared Owl	Saltmarsh	abundant prey	Assess/Maintain	Y						
Sora	Saltmarsh		Assess/Maintain		Y					
Spotted Sandpiper	Beaches	beaches and barrier beaches	Increase 50%		Y					
Whimbrel	Heathlands	coastal heathlands	Assess/Maintain		Y					
Yellow Rail	Saltmarsh	prefers richer types of herbaceous vegetation, and elsewhere Carex	Assess/Maintain	Y	Y					



**Figure 44. Percent of identified threats to priority bird species in coastal (above high tide) habitat in each threat sub-category.**

Each bar represents the percent of the total number of threats identified in each threat sub-category in coastal (above high tide) habitat (for example, if 100 threats were identified in total for all priority species in coastal (above high tide) habitat, and 10 of those threats were in the category 1.1 Housing & urban areas, the bar on the graph would represent this as 10%). The bars are divided to show the distribution of L: Low, M: Medium, H: High and VH: Very High 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 the rankings in the sub-category. The overall magnitude of the sub-threat in coastal (above high tide) is shown in Table 4, Relative magnitude of identified threats to priority species within BCR 14 NB by threat category and broad habitat class.

**Note:** Threats of all magnitudes are included, although low-ranked threats affecting only a single species were not assigned conservation objectives or recommended actions.

**Table 29. Threats addressed (medium and high rank only), conservation objectives, recommended actions and priority species affected in coastal (above high tide) habitats in BCR 14 NB.**

Threat Addressed	Threat Category	Conservation Objective	Objective Category	Conservation Action	Action Category	Threat Rank and Priority Species Affected <sup>†</sup>
Fragmentation or loss of mature coastal forest due to urban development	1.1 Housing & urban areas	Maintain /restore mature and old growth coastal forests	1.1 Ensure land and resource-use policies and practices maintain or improve bird habitat	Identify, establish or expand protected areas of existing old-growth/late-successional coastal forest habitats.	1.1 Site/area protection	Medium: Bald Eagle
				Maintain sufficient patch sizes, configuration and connectivity of coastal mature forest habitats to support and, where necessary, enhance populations of priority species.	2.1 Site/area management	
				Define and provide the minimum number, size and condition of residual snags and living trees needed for priority species.	2.1 Site/area management	
				Develop beneficial management practices and avoidance guidelines to manage developments and minimize priority species habitat degradation.	5.3 Private sector standards and codes	
Fragmentation or loss of saltmarshes due to urban development	1.1 Housing & urban areas	Maintain/restore saltmarshes	1.1 Ensure land and resource-use policies and practices maintain or improve bird habitat	Secure and manage saltmarsh habitat for priority species through various methods such as provincial Integrated Coastal Zone Management plans, creation of protected areas, private land acquisitions, conservation easements or community conservation plans.	1.2 Resource and habitat protection	Medium: American Bittern, Nelson's Sparrow
				Develop beneficial management practices and avoidance guidelines to manage developments and minimize priority species habitat degradation.	5.3 Private sector standards and codes	
				Raise public awareness of the importance of saltmarsh habitat to priority species.	4.3 Awareness and communications	
				Provide incentives for landowners to protect saltmarsh habitat.	6.4 Conservation payments	
				Enhance and restore saltmarshes from abandoned dykelands.	2.3 Habitat and natural process restoration	
				Assess the impacts of coastal development on saltmarshes and priority species.	8.1 Research	

<sup>†</sup> Priority species not mentioned in this table are absent for one of the following reasons: 1) no identified threats in this habitat; 2) identified threats are discussed in the Widespread Issues section; 3) identified threats in this habitat are of low magnitude.

Table 29 continued

Threat Addressed	Threat Category	Conservation Objective	Objective Category	Conservation Action	Action Category	Threat Rank and Priority Species Affected <sup>†</sup>
				Establish long-term monitoring programs for Nelson's Sparrow.	8.2 Monitoring	
Fragmentation or loss of mature coastal forest due to logging activities, in particular loss of nesting, perching trees	5.3 Logging & wood harvesting	Maintain/restore mature and old growth coastal forests	1.1 Ensure land and resource-use policies and practices maintain or improve bird habitat	Identify, establish or expand protected areas of existing old-growth/late-successional coastal forest habitats.	1.1 Site/area protection	Medium: Bald Eagle
				Maintain sufficient patch sizes, configuration and connectivity of coastal mature forest habitats to support and, where necessary, enhance populations of priority species.	2.1 Site/area management	
				Define and provide the minimum number, size and condition of residual snags and living trees needed for priority species.	2.1 Site/area management	
				Improve linkages between bird conservation needs and forest management guidelines.	5.2 Policies and regulations	
Disturbance at foraging sites from recreational activities in coastal areas	6.1 Recreational activities	Reduce/eliminate disturbance from recreational activities in coastal areas	4.1 Reduce disturbance from human recreation	Secure and manage key coastal habitat for priority species through various methods such as creation of protected areas, private land acquisitions, conservation easements, community conservation plans and stewardship agreements.	1.2 Resource and habitat protection	High: Piping Plover (melodus) Medium: American Golden-Plover
				Raise public awareness of priority species and their habitat needs, and the impacts of disturbance from recreational activities in coastal areas.	4.3 Awareness and communications	
				Manage coastal recreational activities to minimize disturbance to priority species.	5.2 Policies and regulations	
				Assess the impacts of recreational activities in coastal areas on priority species.	8.1 Research	
Disturbance at roost sites from recreational activities in coastal areas	6.1 Recreational activities	Reduce/eliminate disturbance from recreational activities in mature coastal forest	4.1 Reduce disturbance from human recreation	Establish/maintain protected areas to restrict access/activity at roost sites.	1.1 Site/area protection	Medium: Bald Eagle
				Raise environmental awareness of issues surrounding human disturbance in coastal habitat.	4.3 Awareness and communications	
				Manage recreational activities to minimize disturbance during key periods for priority species.	5.2 Policies and regulations	
Loss or degradation of habitat due to changes in	7.3 Other ecosystem modifications	Maintain/restore beaches	1.1 Ensure land and resource-use policies and practices	Secure and manage coastal habitat for priority species through various methods such as creation of protected areas, private land acquisitions, conservation easements, community conservation plans and stewardship agreements.	1.2 Resource and habitat protection	Medium: Bank Swallow, Common Tern, Piping Plover

Table 29 continued

Threat Addressed	Threat Category	Conservation Objective	Objective Category	Conservation Action	Action Category	Threat Rank and Priority Species Affected <sup>†</sup>
sedimentation patterns caused by installation of riprap			maintain or improve bird habitat	Manage coastal development activities to minimize habitat degradation.	5.2 Policies and regulations	(melodus), Spotted Sandpiper
				Raise public awareness of shorebirds and seabirds and their habitat needs, and the impacts of hardening shoreline in coastal areas.	4.3 Awareness and communications	
				Enhance/restore degraded habitat	2.3 Habitat and natural process restoration	
Competition and displacement by gulls	8.2 Problematic native species	Reduce/eliminate displacement by gulls	3.2 Reduce competition with problematic native species	Discourage gulls at managed colonies and on islands selected for restoration	2.2 Invasive/problematic species control	Medium: Common Tern
				Decrease gull populations near tern colonies by encouraging: closure of landfills, control of refuse at fish plants and on fishing boats and discouraging people from feeding gulls.	2.2 Invasive/problematic species control	
				Monitor gull population and distribution.	2.2 Invasive/problematic species control	
Increased predation due to an increasing populations of foxes and racoons as a results of land use practices	8.2 Problematic native species	Reduce predation by foxes and racoons	2.5 Reduce parasitism/predation	Improve waste management (household and industrial waste, landfills and waste processing facilities) to minimize availability of food to scavengers and reduce artificially sustained predator populations (e.g. racoons, foxes).	2.2 Invasive/problematic species control	Medium: Piping Plover (melodus)
Hypothermia due to oil on plumage from oil spills and discharges	9.2 Industrial & military effluents	Reduce mortality from oiling	2.3 Reduce mortality and/or sub-lethal effects from oil pollution	Develop beneficial management practices and avoidance guidelines to manage shipping activities and minimize accidental oil discharges.	5.3 Private sector standards and codes	High: Piping Plover (melodus)
				Continue to monitor and enforce compliance with laws, policies and regulations regarding the release of oil and oily waste into waterbodies.	5.4 Compliance and enforcement	
Decrease of diet quality and of health of birds	9.3 Agricultural & forestry	Reduce mortality from exposure to	2.1 Reduce mortality and/or sub-lethal	Use pesticides and other biocides only where necessary and only as part of an integrated pest management system to minimize exposure of birds to potentially toxic chemicals.	5.3 Private sector standards and codes	Medium: Short-eared Owl

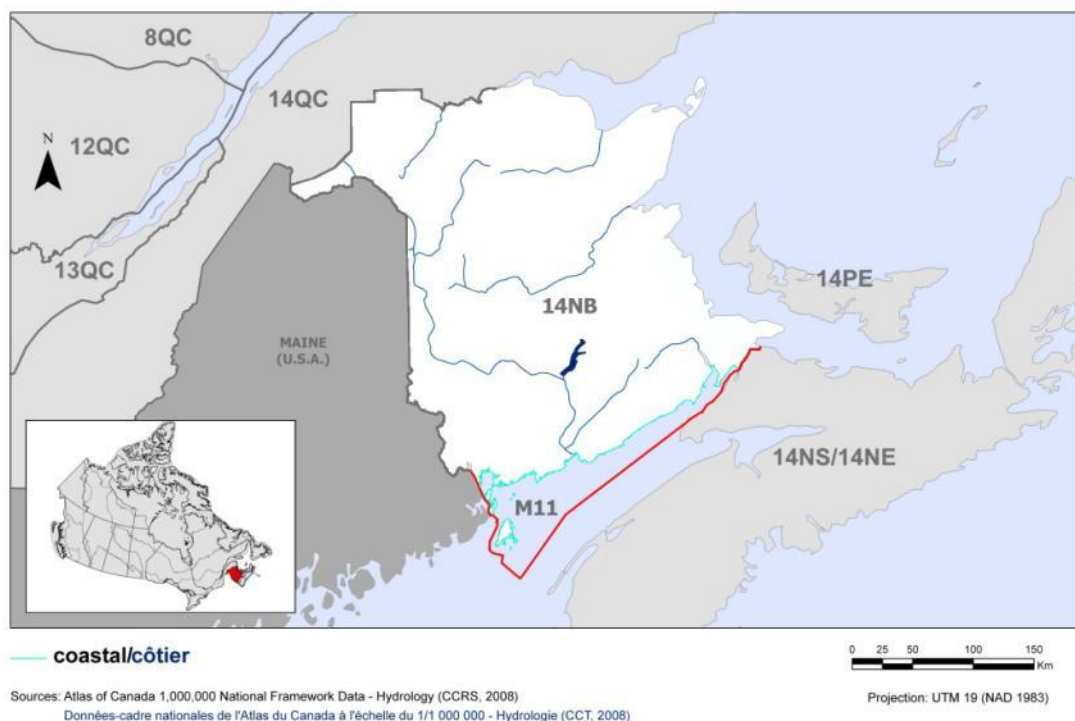
Table 29 continued

Threat Addressed	Threat Category	Conservation Objective	Objective Category	Conservation Action	Action Category	Threat Rank and Priority Species Affected <sup>†</sup>
due to the consumption of contaminated food by biocides such as pesticide, herbicide, or fungicide	effluents	pesticides and other biocides used by the agriculture industry	effects from pesticide use	Promote pesticide-free products.	6.2 Substitution	
				Continue to monitor and enforce compliance with laws, policies and regulations at all levels.	5.4 Compliance and enforcement	
Decrease of prey availability to birds due to chemical contamination from biocides such as pesticide, herbicide, or fungicide	9.3 Agricultural & forestry effluents	Reduce the loss of prey/food source from exposure to pesticides and other biocides used by the agriculture industry	5.2 Manage decreases in prey due to contaminants	Use pesticides and other biocides only where necessary and only as part of an integrated pest management system to minimize exposure of birds to potentially toxic chemicals.	5.3 Private sector standards and codes	Medium: Bank Swallow
				Promote pesticide-free products.	6.2 Substitution	



### ***Coastal – Intertidal – Bay of Fundy***

The coastal habitat category includes all marine habitats along ocean shorelines (FAO 2000) but does not include terrestrial shoreline habitat. More specifically, this section focuses on intertidal coastal habitats of MBU 11 NB, such as estuaries, mudflats, sand flats, rocky shorelines, eelgrass, low marshes, saltmarshes and islands along the Bay of Fundy (Fig. 45). Priority species that primarily use terrestrial coastal habitats (banks and bluffs, beaches, heathlands) in the province of New Brunswick are included in a previous section: Coastal (Above High Tide); while priority bird species using coastal (intertidal) habitats on the Gulf of St. Lawrence (MBU 12 NB) are discussed in the next section: Coastal (Intertidal) - Gulf of St. Lawrence.



**Figure 45. Map of the coastal (intertidal) habitat in MBU 11 NB.**

Of the 33 priority species that use coastal (intertidal) habitat in MBU 11 NB, 5 are species at risk (Table 30). Saltmarshes are used by 12 priority species, 9 species use mudflats, and 8 use islands. However, the most widely used coastal (intertidal) habitat, which is used by 66% of the priority species found in MBU 11 NB, is estuaries (Table 30).

The highest ranked and most frequently identified threats to priority bird species in the intertidal coast of MBU 11 NB are hypothermia and contamination of food sources due to oil spills and discharges from shipping activities (9.2 Industrial & military effluents; Fig. 46). Recreational activities (6.1) on beaches that disturb priority birds at foraging and nesting sites were also a highly ranked threat (Fig. 46). Less frequently identified threats that were ranked overall as medium were those related to problematic native species, for example, competition

with and displacement by gulls, increased predation due to increases in predator populations, and competition for nest sites with or nest predation by gulls and crows (8.2 Problematic native species; Fig. 46). The armouring of shoreline (7.3 Other ecosystem modifications) was also ranked as a medium threat (Fig. 46).

Many bird species will benefit from the conservation objectives and actions presented in Table 31. Recommended conservation actions to address medium- or high-ranked threats to priority bird species in coastal (intertidal) habitats in MBU 11 NB include managing coastal recreational and commercial activities to minimize disturbance to priority species and developing beneficial management practices to manage shipping activities and minimize accidental oil discharges. There are also species specific conservation actions to address threats to Arctic Tern, Common Tern and Roseate Tern. Species-specific recommended actions are to continue nest protection programs on key Roseate Tern colonies; monitor gull population size and distribution; discourage gull populations at colonies where all three species of terns nest by encouraging the closure of landfills, control of refuse at fish plants and on fishing boats, and by discouraging people from feeding gulls.

**Table 30. Priority bird species that use coastal (intertidal) habitats of MBU 11 NB, regional habitat sub-class, important habitat features, population objectives and reason for priority status.**

Priority Bird Species	Habitat Sub-class	Important Habitat Features	Population Objective	Reason for Priority Status						
				SAR <sup>1</sup>	N/CC <sup>2</sup>	N/CS <sup>3</sup>	R/SC <sup>4</sup>	R/SS <sup>5</sup>	NAWMP/ EHJV <sup>6</sup>	Review <sup>7</sup>
American Black Duck	Estuaries; Saltmarsh		Maintain current						Y	
Arctic Tern	Islands	sandy, gravelly or sparsely vegetated shores of small islands	Assess/Maintain							Y
Barrow's Goldeneye (Eastern)	Estuaries		Assess/Maintain	Y					Y	
Black-bellied Plover	Estuaries; Mudflats; Saltmarsh; Sandflats		Assess/Maintain		Y					
Black-legged Kittiwake	Islands	predator-free islands	Maintain current		Y					
Bonaparte's Gull	Estuaries		Assess/Maintain		Y					
Canada Goose (North Atlantic)	Estuaries; Mudflats; Saltmarsh		Maintain current						Y	
Canada Goose (Temperate-breeding in Eastern Canada)	Estuaries; Mudflats; Saltmarsh		Decrease						Y <sup>8</sup>	
Common Eider	Islands; Rocky Shoreline	vegetated or rocky, livestock-free and predator-free islands with abundant seaweed and access to fresh water; abundant prey	Increase 50%						Y	
Common Goldeneye	Estuaries	adequate prey	Assess/Maintain						Y	

<sup>1</sup> SAR, species listed under SARA (Species at Risk Public Registry 2012), assessed by COSEWIC (COSEWIC 2012) or listed under New Brunswick's *Endangered Species Act* (New Brunswick 2004) as Endangered, Threatened or Special Concern (SARA/COSEWIC only).

<sup>2</sup> N/CC, National/Continental Concern.

<sup>3</sup> N/CS, National/Continental Stewardship.

<sup>4</sup> R/SC, Regional/Sub-regional Concern.

<sup>5</sup> R/SS, Regional/Sub-regional Stewardship.

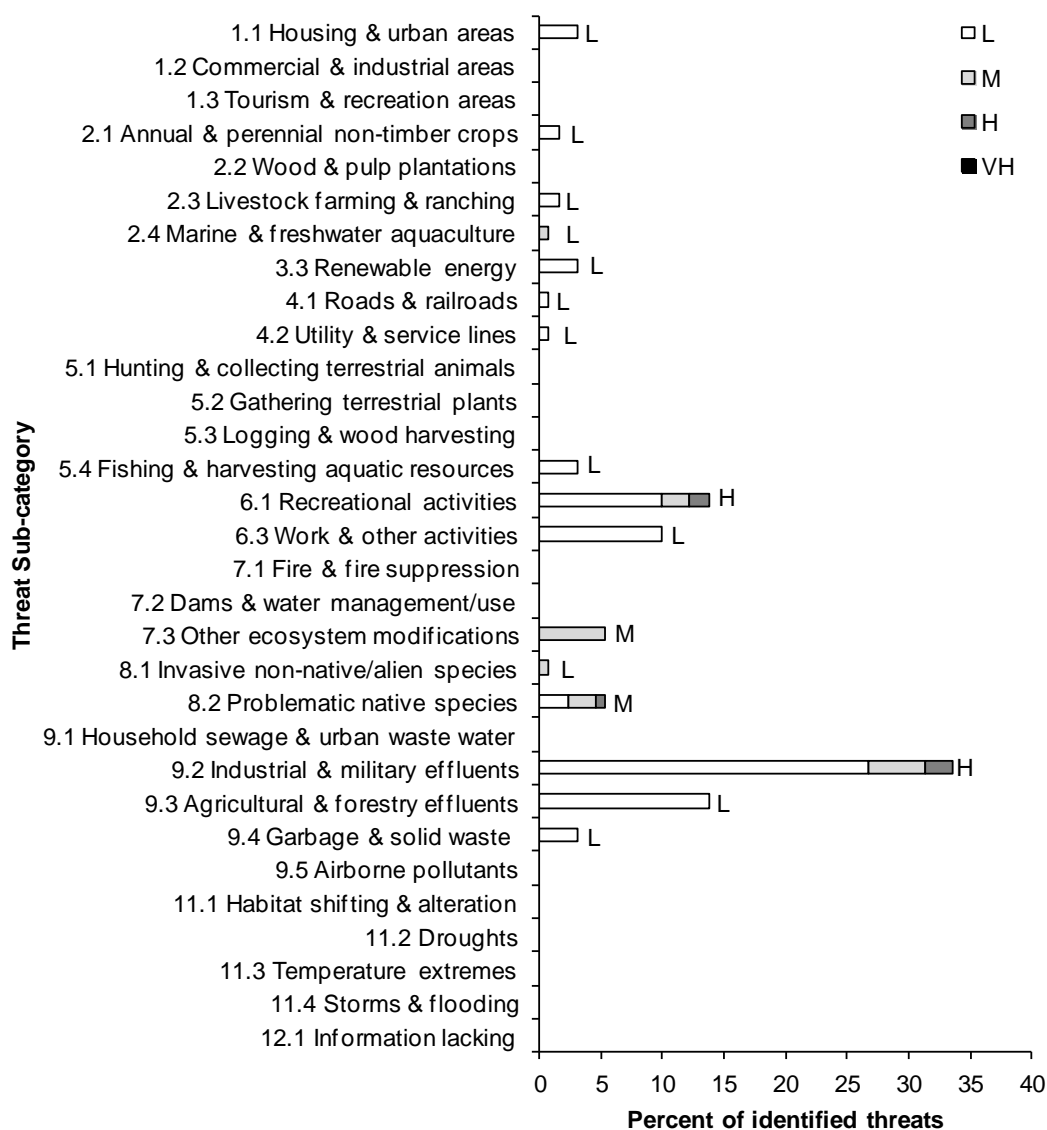
<sup>6</sup> NAWMP/EHJV, waterfowl that are priority under the regional EHJV implementation plan (NB-EHJV 2008) or scored High or Highest in WCR 14 in the NAWMP (NAWMP Plan Committee 2004).

<sup>7</sup> Review, species added by the Regional Technical Working Group or upon expert review. For further details on reasons for priority status and the species prioritization process, see Table 1 and Appendix 2.

<sup>8</sup> Canada Goose (Temperate-breeding in Eastern Canada) was added as a priority species due to management concerns (e.g. overabundance and problem geese).

Table 30 continued

Priority Bird Species	Habitat Sub-class	Important Habitat Features	Population Objective	Reason for Priority Status						
				SAR <sup>1</sup>	N/CC <sup>2</sup>	N/CS <sup>3</sup>	R/SC <sup>4</sup>	R/SS <sup>5</sup>	NAWMP/ EHJV <sup>6</sup>	Review <sup>7</sup>
Common Loon	Estuaries		Assess/Maintain		Y		Y			
Common Murre	Islands	islands or cliffs for nesting	Assess/Maintain		Y					
Common Tern	Estuaries; Saltmarsh; Islands	sand and gravel, scattered vegetation (cover for for chicks)	Assess/Maintain				Y			
Dunlin	Estuaries; Mudflats; Sandflats		Assess/Maintain		Y					
Green-winged Teal	Saltmarsh	coastal marshes with heavy vegetation and muddy bottoms	Increase 50%						Y	
Horned Grebe	Estuaries	sheltered/protected areas	Assess/Maintain	Y						
Hudsonian Godwit	Estuaries; Mudflats; Saltmarsh; Sandflats		Assess/Maintain		Y					
Leach's Storm-Petrel	Islands	vegetated islands with soft soil for digging burrows or rock crevices for nest sites, livestock-free	Assess/Maintain			Y	Y	Y		
Least Sandpiper	Estuaries; Mudflats; Saltmarsh		Assess/Maintain		Y					
Lesser Yellowlegs	Estuaries; Mudflats; Saltmarsh		Assess/Maintain		Y					
Piping Plover (melodus)	Sandflats		Recovery objective	Y	Y					
Purple Sandpiper	Rocky Shoreline	rocky shoreline exposed to wave action	Assess/Maintain		Y					
Razorbill	Islands	islands or cliffs for nesting	Assess/Maintain		Y					
Red Knot (rufa)	Mudflats; Saltmarsh; Sandflats		Assess/Maintain	Y	Y					
Red-necked Grebe	Estuaries		Assess/Maintain		Y		Y			
Red-necked Phalarope	Estuaries		Assess/Maintain		Y					
Red-throated Loon	Estuaries	sheltered, shallow, sandy substrates	Assess/Maintain		Y					
Roseate Tern	Islands	cover for nests and chicks	Recovery objective	Y						
Sanderling	Estuaries; Sandflats		Assess/Maintain		Y					
Semipalmated Sandpiper	Beaches; Estuaries; Mudflats; Sandflats	sand/gravel beaches with sparse vegetation and wrack	Increase 100%		Y					
Solitary Sandpiper	Estuaries		Assess/Maintain		Y					
Whimbrel	Estuaries; Saltmarsh; Sandflats		Assess/Maintain		Y					
Willet	Beaches; Estuaries; Saltmarsh		Increase 50%		Y					



**Figure 46. Percent of identified threats to priority bird species in coastal (intertidal) habitats of MBU 11 NB in each threat sub-category.**

Each bar represents the percent of the total number of threats identified in each threat sub-category in coastal (intertidal) habitats of MBU 11 NB (for example, if 100 threats were identified in total for all priority species in coastal (intertidal) habitats of MBU 11 NB, 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 L: Low, M: Medium, H: High and VH: Very High 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 the rankings in the sub-category. The overall magnitude of the sub-threat in coastal (intertidal) habitats of MBU 11 NB is shown in Table 4, Relative magnitude of identified threats to priority species within MBU 11 NB by threat category and broad habitat class.

**Note:** Threats of all magnitudes are included, although low-ranked threats affecting only a single species were not assigned conservation objectives or recommended actions.

**Table 31. Threats addressed (medium and high rank only), conservation objectives, recommended actions and priority species affected in coastal (intertidal) habitats in MBU 11 NB.**

Threat Addressed	Threat Category	Conservation Objective	Objective Category	Conservation Action	Action Category	Threat Rank and Priority Species Affected <sup>†</sup>
Competition for nesting or brood rearing areas with aquaculture farms	2.4 Marine & freshwater aquaculture	Reduce/eliminate competition for brooding/chick rearing areas with the aquaculture industry	5.3 Reduce human competition for food sources or foraging sites	Manage the aquaculture industry to minimize competition with priority species.	5.3 Private sector standards and codes	Medium: Common Eider
				Raise awareness in the industry about the impacts of activities on waterfowl.	4.3 Awareness and communications	
Disturbance at foraging sites from recreational activities in coastal areas	6.1 Recreational activities	Reduce/eliminate disturbance from recreational activities in coastal areas	4.1 Reduce disturbance from human recreation	Secure and manage key coastal habitat (beaches, intertidal mudflats, saltmarshes, etc.) for priority species through various methods such as creation of protected areas, private land acquisitions, conservation easements or community conservation plans.	1.2 Resource and habitat protection	High: Piping Plover ( <i>melodus</i> ), Semipalmated Sandpiper Medium: Black-bellied Plover, Red Knot ( <i>rufa</i> ), Sanderling
				Raise public awareness of shorebirds and their habitat needs, and the impacts of disturbance from recreational activities in coastal areas.	4.3 Awareness and communications	
				Manage coastal recreational activities to minimize disturbance to priority species.	5.2 Policies and regulations	
				Assess the impacts of recreational activities in coastal areas on priority species.	8.1 Research	
Loss or degradation of habitat due to changes in sedimentation patterns caused by installation of	7.3 Other ecosystem modifications	Maintain/restore beaches	1.1 Ensure land and resource-use policies and practices maintain or improve bird	Secure and manage coastal habitat for priority species through various methods such as creation of protected areas, private land acquisitions, conservation easements, community conservation plans and stewardship agreements.	1.2 Resource and habitat protection	Medium: Black-bellied Plover, Lesser Yellowlegs, Piping Plover ( <i>melodus</i> ), Red Knot ( <i>rufa</i> ),
				Manage coastal development activities to minimize habitat degradation.	5.2 Policies and regulations	

<sup>†</sup> Priority species not mentioned in this table are absent for one of the following reasons: 1) no identified threats in this habitat; 2) identified threats are discussed in the Widespread Issues section; 3) identified threats in this habitat are of low magnitude.

Table 31 continued

Threat Addressed	Threat Category	Conservation Objective	Objective Category	Conservation Action	Action Category	Threat Rank and Priority Species Affected <sup>†</sup>
riprap			habitat	Raise public awareness of shorebirds and seabirds and their habitat needs, and the impacts of hardening shoreline in coastal areas.	4.3 Awareness and communications	Sanderling, Semipalmated Sandpiper, Whimbrel
				Enhance/restore degraded habitat	2.3 Habitat and natural process restoration	
Predation from introduced mammalian predators on coastal islands	8.1 Invasive non-native/alien species	Reduce/eliminate mortality from introduced predators on coastal islands	2.5 Reduce parasitism/predation	Control predator activity at breeding sites.	2.2 Invasive/problematic species control	Medium: Leach's Storm-Petrel
Competition from or displacement by gulls	8.2 Problematic native species	Reduce/eliminate displacement by gulls	3.2 Reduce competition with problematic native species	Discourage gulls at managed colonies and on islands selected for restoration	2.2 Invasive/problematic species control	Medium: Arctic Tern, Common Tern
				Decrease gull populations near tern colonies by encouraging: closure of landfills, control of refuse at fish plants and on fishing boats and discouraging people from feeding gulls.	2.2 Invasive/problematic species control	
				Monitor gull population and distribution.	8.2 Monitoring	
Competition and nest predation from mammalian and avian predators on coastal islands	8.2 Problematic native species	Reduce loss of productivity from nest predation on coastal islands	2.5 Reduce parasitism/predation	Discourage gulls at managed colonies and on islands selected for restoration	2.2 Invasive/problematic species control	High: Roseate Tern
				Decrease gull populations near tern colonies by encouraging: closure of landfills, control of refuse at fish plants and on fishing boats and discouraging people from feeding gulls	2.2 Invasive/problematic species control	
				Establish at least one additional predator-free colony	3.2 Species recovery	
				Near key Roseate Tern colonies, collect information on gull resource use, home range and determinants of reproductive success	8.1 Research	
				Monitor gull population and distribution	8.2 Monitoring	
Contamination of	9.2 Industrial	Reduce oil	2.3 Reduce	Develop beneficial management practices and avoidance	5.3 Private sector	Medium:

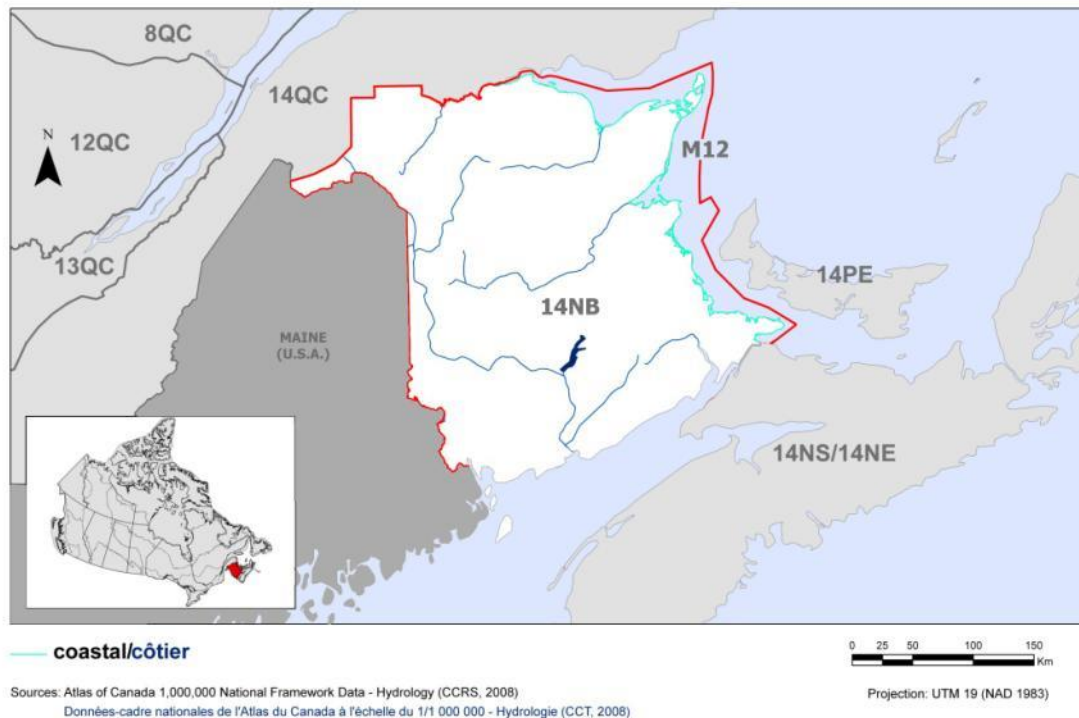
Table 31 continued

Threat Addressed	Threat Category	Conservation Objective	Objective Category	Conservation Action	Action Category	Threat Rank and Priority Species Affected <sup>†</sup>
food source due to oil spills and discharges	& military effluents	contamination in the habitat	mortality and/or sub-lethal effects from oil pollution	guidelines to manage shipping activities and minimize accidental oil discharges.	standards and codes	Semipalmated Sandpiper
				Continue to monitor and enforce compliance with laws, policies and regulations regarding the release of oil and oily waste into marine waters.	5.4 Compliance and enforcement	
Hypothermia due to oil on plumage from oil spills and discharges	9.2 Industrial & military effluents	Reduce mortality from oiling	2.3 Reduce mortality and/or sub-lethal effects from oil pollution	Develop beneficial management practices and avoidance guidelines to manage shipping activities and minimize accidental oil discharges.	5.3 Private sector standards and codes	High: Piping Plover ( <i>melodus</i> ), Red Knot ( <i>rufa</i> ), Semipalmated Sandpiper Medium: Common Loon, Horned Grebe, Purple Sandpiper, Willet
				Continue to monitor and enforce compliance with laws, policies and regulations regarding the release of oil and oily waste into marine waters.	5.4 Compliance and enforcement	



### ***Coastal – Intertidal – Gulf of St. Lawrence***

The coastal areas habitat category includes all marine habitats along ocean shorelines (FAO 2000) but does not include terrestrial shoreline habitat. More specifically, this section focuses on the intertidal coastal habitats of MBU 12 NB, such as estuaries, mudflats, sand flats, rocky shorelines, eelgrass, low marshes, saltmarshes and islands along the Gulf of St. Lawrence (Fig. 47). Priority species using primarily terrestrial coastal habitats (banks and bluffs, beaches, heathlands) in the province of New Brunswick are included in a previous section: Coastal (Above High Tide); while the priority bird species using coastal (intertidal) habitats on the Bay of Fundy (MBU 11 NB) are discussed in the previous section: Coastal (Intertidal) – Bay of Fundy.



**Figure 47. Map of the coastal (intertidal) habitat in MBU 12 NB.**

Of the 24 priority species that use coastal (intertidal) habitat of MBU 12 NB, 4 are species at risk (Table 32). Saltmarshes are used by 12 priority species, 9 species use mudflats and 2 use islands. However, the most widely used coastal habitat, which is used by 83% of the priority bird species in MBU 12 NB, is estuaries (Table 32).

The highest ranked and most frequently identified threats in the intertidal coast of MBU 12 NB are hypothermia (death by cold due to oil on the plumage) and contamination of food sources due to oil spills and discharges from shipping activities (9.2 Industrial & military effluents; Fig. 48). Recreational activities (6.1) on beaches disturb priority birds at foraging and nesting sites, and the armouring of shoreline destroys habitat, changes the sedimentation pattern and displaces birds (7.3 Other ecosystem modifications) (ranked medium; Fig. 48). Low-ranked threats include competition for resources with aquaculture farms (2.4 Marine &

freshwater aquaculture) and decreases in diet quality due to the consumption of food contaminated by biocides such as pesticides, herbicides, or fungicides (9.3 Agricultural & forestry effluents; Fig. 48).

Many bird species will benefit from the conservation objectives and actions presented in Table 33. Recommended conservation actions to address medium- or high-ranked threats to priority bird species in coastal (intertidal) habitat in MBU 12 NB include managing coastal recreational and commercial activities to minimize disturbance to priority species and to minimize habitat degradation; raising public awareness of the impacts on the habitat of shorebirds and seabirds of hardening shoreline in coastal areas; and developing beneficial management practices to manage shipping activities and minimize accidental oil discharges.

**Table 32. Priority bird species that use coastal (intertidal) habitats of MBU 12 NB, regional habitat sub-class, important habitat features, population objectives and reason for priority status.**

Priority Bird Species	Habitat Sub-class	Important Habitat Features	Population Objective	Reason for Priority Status						
				SAR <sup>1</sup>	N/CC <sup>2</sup>	N/CS <sup>3</sup>	R/SC <sup>4</sup>	R/SS <sup>5</sup>	NAWMP/ EHJV <sup>6</sup>	Review <sup>7</sup>
American Black Duck	Estuaries; Saltmarsh		Maintain current						Y	
Barrow's Goldeneye (Eastern)	Estuaries		Assess/Maintain	Y					Y	
Black-bellied Plover	Estuaries; Mudflats; Saltmarsh; Sandflats		Assess/Maintain		Y					
Canada Goose (North Atlantic)	Estuaries; Mudflats; Saltmarsh		Maintain current						Y	
Canada Goose (Temperate-breeding in Eastern Canada)	Estuaries; Mudflats; Saltmarsh		Decrease						Y <sup>8</sup>	
Common Eider	Islands; Rocky Shoreline	vegetated or rocky, livestock-free and predator-free islands with abundant seaweed and access to fresh water; abundant prey	Increase 50%						Y	
Common Goldeneye	Estuaries	adequate prey	Assess/Maintain						Y	
Common Loon	Estuaries		Assess/Maintain		Y		Y			
Common Tern	Estuaries; Saltmarsh; Islands	sand and gravel, scattered vegetation (cover for chicks)	Assess/Maintain				Y			

<sup>1</sup> SAR, species listed under SARA (Species at Risk Public Registry 2012), assessed by COSEWIC (COSEWIC 2012) or listed under New Brunswick's *Endangered Species Act* (New Brunswick 2004) as Endangered, Threatened or Special Concern (SARA/COSEWIC only).

<sup>2</sup> N/CC, National/Continental Concern.

<sup>3</sup> N/CS, National/Continental Stewardship.

<sup>4</sup> R/SC, Regional/Sub-regional Concern.

<sup>5</sup> R/SS, Regional/Sub-regional Stewardship.

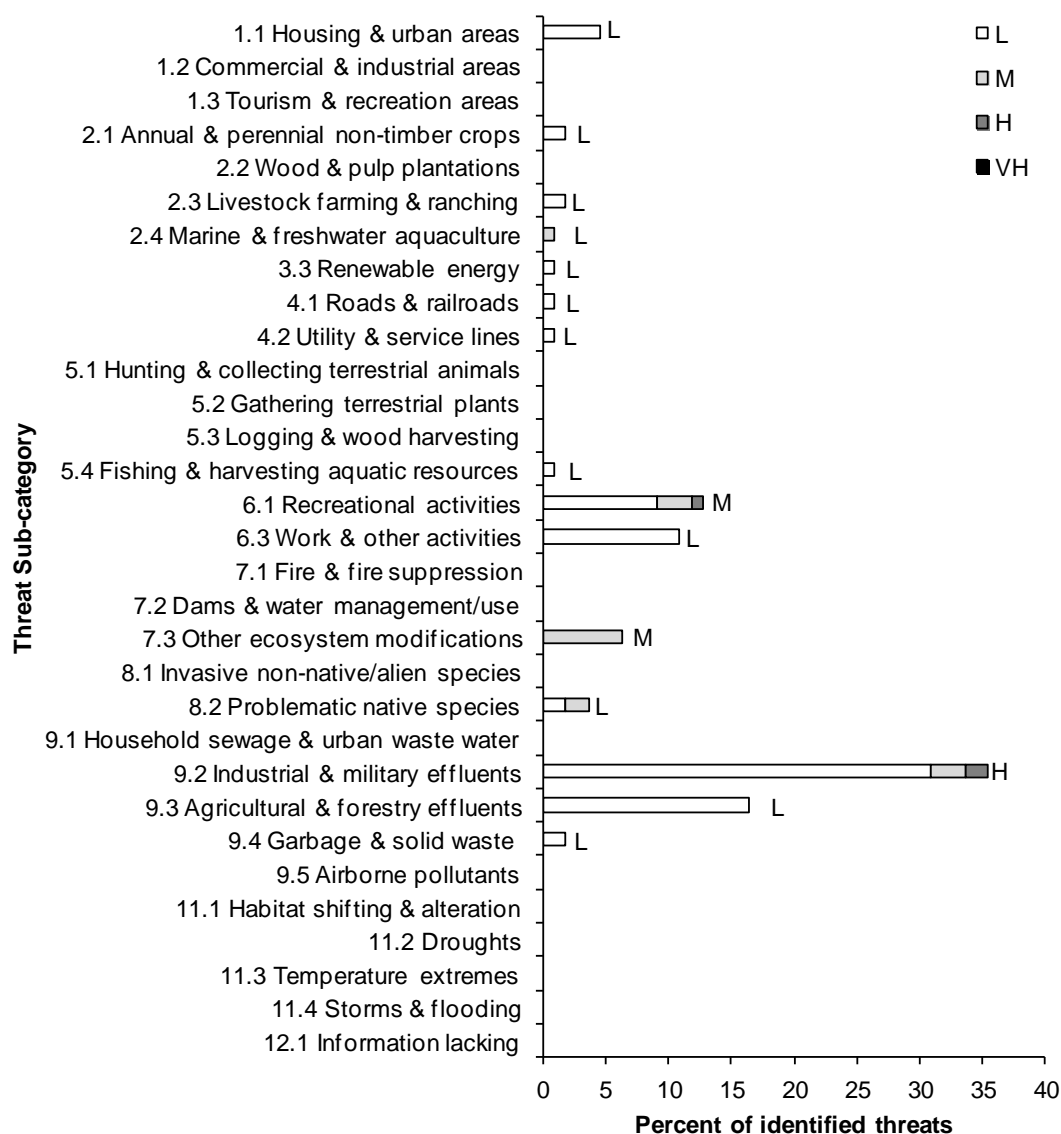
<sup>6</sup> NAWMP/EHJV, waterfowl that are priority under the regional EHJV implementation plan (NB-EHJV 2008) or scored High or Highest in WCR 14 in the NAWMP (NAWMP Plan Committee 2004).

<sup>7</sup> Review, species added by the Regional Technical Working Group or upon expert review. For further details on reasons for priority status and the species prioritization process, see Table 1 and Appendix 2.

<sup>8</sup> Canada Goose (Temperate-breeding in Eastern Canada) was added as a priority species due to management concerns (e.g. overabundance and problem geese).

Table 32 continued

Priority Bird Species	Habitat Sub-class	Important Habitat Features	Population Objective	Reason for Priority Status						
				SAR <sup>1</sup>	N/CC <sup>2</sup>	N/CS <sup>3</sup>	R/SC <sup>4</sup>	R/SS <sup>5</sup>	NAWMP/ EHJV <sup>6</sup>	Review <sup>7</sup>
Dunlin	Estuaries; Mudflats; Sandflats		Assess/Maintain		Y					
Green-winged Teal	Saltmarsh	coastal marshes with heavy vegetation and muddy bottoms	Increase 50%						Y	
Horned Grebe	Estuaries	sheltered/protected areas	Assess/Maintain	Y						
Hudsonian Godwit	Estuaries; Mudflats; Saltmarsh; Sandflats		Assess/Maintain		Y					
Least Sandpiper	Estuaries; Mudflats; Saltmarsh		Assess/Maintain		Y					
Lesser Yellowlegs	Estuaries; Mudflats; Saltmarsh		Assess/Maintain		Y					
Piping Plover (melodus)	Sandflats		Recovery objective	Y	Y					
Red Knot (rufa)	Mudflats; Saltmarsh; Sandflats		Assess/Maintain	Y	Y					
Red-necked Grebe	Estuaries		Assess/Maintain		Y		Y			
Red-throated Loon	Estuaries		Assess/Maintain		Y					
Sanderling	Estuaries; Sandflats		Assess/Maintain		Y					
Semipalmated Sandpiper	Beaches; Estuaries; Mudflats; Sandflats	sand or gravel beaches with sparse vegetation and wrack	Assess/Maintain		Y					
Solitary Sandpiper	Estuaries		Assess/Maintain		Y					
Whimbrel	Estuaries; Saltmarsh; Sandflats		Assess/Maintain		Y					
Willet	Beaches; Estuaries; Saltmarsh		Increase 50%		Y					



**Figure 48. Percent of identified threats to priority bird species in coastal (intertidal) habitats of MBU 12 NB in each threat sub-category.**

Each bar represents the percent of the total number of threats identified in each threat sub-category of the coastal (intertidal) habitats of MBU 12 NB (for example, if 100 threats were identified in total for all priority species in coastal (intertidal) habitats of MBU 12 NB, and 10 of those threats were in the category 1.1 Housing & urban areas, the bar on the graph would represent this as 10%). The bars are divided to show the distribution of Low (L), Medium (M), High (H) and Very High (VH) rankings of individual threats within each threat sub-category. For example, the same threat may have been ranked H for one species and L for another; the shading illustrates the proportion of L, M, H and VH rankings in the sub-category. The overall magnitude of the sub-threat of the coastal (intertidal) habitats of MBU 12 NB is shown in Table 4, Relative magnitude of identified threats to priority species within MBU 12 NB by threat category and broad habitat class.

**Note:** Threats of all magnitudes are included, although low-ranked threats affecting only a single species were not assigned conservation objectives or recommended actions.

**Table 33. Threats addressed (medium and high rank only), conservation objectives, recommended actions and priority species affected for coastal (intertidal) habitats in MBU 12 NB.**

Threat Addressed	Threat Category	Conservation Objective	Objective Category	Conservation Action	Action Category	Threat Rank and Priority Species Affected <sup>†</sup>
Competition for nesting or brood rearing areas with aquaculture farms	2.4 Marine & freshwater aquaculture	Reduce/eliminate competition for brooding/chick rearing areas with the aquaculture industry	5.3 Reduce human competition for food sources or foraging sites	Manage the aquaculture industry to minimize competition with priority species. Raise awareness in the industry about the impacts of activities on waterfowl.	5.3 Private sector standards and codes 4.3 Awareness and communications	Medium: Common Eider
Disturbance at foraging sites from recreational activities in coastal areas	6.1 Recreational activities	Reduce/eliminate disturbance from recreational activities in coastal areas	4.1 Reduce disturbance from human recreation	Secure and manage key coastal habitat (beaches, intertidal mudflats, saltmarshes, etc.) for priority species through various methods such as creation of protected areas, private land acquisitions, conservation easements, or community conservation plans. Raise public awareness of shorebirds and their habitat needs, and the impacts of disturbance from recreational activities in coastal areas. Manage coastal recreational activities to minimize disturbance to priority species. Assess the impacts of recreational activities in coastal areas on priority species.	1.2 Resource and habitat protection 4.3 Awareness and communications 5.2 Policies and regulations 8.1 Research	High: Piping Plover (melodus) Medium: Black-bellied Plover, Red Knot (rufa), Sanderling
Loss or degradation of habitat due to changes in sedimentation patterns caused by installation of riprap	7.3 Other ecosystem modifications	Maintain/restore beaches	1.1 Ensure land and resource-use policies and practices maintain or improve bird habitat	Secure and manage coastal habitat for priority species through various methods such as creation of protected areas, private land acquisitions, conservation easements, community conservation plans and stewardship agreements. Enhance/restore degraded habitat.	1.2 Resource and habitat protection 2.3 Habitat and natural process	Medium: Black-bellied Plover, Lesser Yellowlegs, Piping Plover (melodus), Red Knot (rufa), Sanderling, Semipalmated

<sup>†</sup> Priority species not mentioned in this table are absent for one of the following reasons: 1) no identified threats in this habitat; 2) identified threats are discussed in the Widespread Issues section; 3) identified threats in this habitat are of low magnitude.

Table 33 continued

Threat Addressed	Threat Category	Conservation Objective	Objective Category	Conservation Action	Action Category	Threat Rank and Priority Species Affected <sup>†</sup>
					restoration	Sandpiper, Whimbrel
				Raise public awareness of shorebirds and seabirds and their habitat needs, and the impacts of hardening shoreline in coastal areas.	4.3 Awareness and communications	
				Manage coastal development activities to minimize habitat degradation.	5.2 Policies and regulations	
Competition from or displacement by gulls	8.2 Problematic native species	Reduce/eliminate displacement by gulls	3.2 Reduce competition with problematic native species	Discourage gulls at managed colonies and on islands selected for restoration	2.2 Invasive/problematic species control	Medium: Common Tern
				Decrease gull populations near tern colonies by encouraging closure of landfills and control of refuse at fish plants and on fishing boats, and discouraging people from feeding gulls.	2.2 Invasive/problematic species control	
				Monitor gull population and distribution.	8.2 Monitoring	
Hypothermia due to oil on plumage from oil spills and discharges	9.2 Industrial & military effluents	Reduce mortality from oiling	2.3 Reduce mortality and/or sub-lethal effects from oil pollution	Develop beneficial management practices and avoidance guidelines to manage shipping activities and minimize accidental oil discharges.	5.3 Private sector standards and codes	High: Piping Plover (melodus), Red Knot (rufa)
				Continue to monitor and enforce compliance with laws, policies and regulations regarding the release of oil and oily waste into marine waters.	5.4 Compliance and enforcement	Medium: Common Loon, Horned Grebe, Willet

## 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/telecommunication towers and lines, etc.)
- Predation by domestic cats
- Pollution/pesticides/oil spills
- Climate change

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

These widespread issues are not presented in any particular order as the relative importance of these issues in New Brunswick is not known.

### **Collisions**

#### *Buildings*

Collisions with glass windows or reflective panels on buildings, are believed to be a significant source of bird mortality in Canada. Estimates of mortality from collisions with houses in Canada (including birds using feeders) range from approximately 15.8–30.5 million birds per year (Machtans et al. 2013). Mortality from collisions with buildings of less than 12 storeys is estimated at approximately 0.92–3.0 million birds/year, and for all cities in Canada with tall buildings in an urban core the estimate is 13 000 – 256 000 birds/year (Machtans et al. 2013). The total estimate of mortality from collisions with buildings in Canada is therefore between 16.1 and 42.2 million birds/year (Machtans et al. 2013).

Data from Canada and the northeastern United States reveal that 163 species of birds in 32 families are known to have been killed by buildings. Some families and species of birds are disproportionately affected by collisions with buildings. Parulidae (warblers), Fringillidae (sparrows and allies) and Regulidae (kinglets) account for 70% of all bird deaths; the species most frequently killed are White-throated Sparrows (13.5% of all reported deaths), Golden-crowned Kinglets (10.2%), Dark-eyed Juncos (6.1%), Ovenbirds (5.3%) and



Ruby-crowned Kinglets (5.3%). The population-level effects of bird mortality from building strikes are unknown. See Table 34 for conservation objectives and actions.

### *Wind Turbines*

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

Some species are particularly vulnerable to collisions with wind turbines, for example, raptors flying along a land/water interface. For smaller, more common passerine species (warblers, thrushes, kinglets, etc.), the relatively small number of birds affected does not appear to pose a population-level threat. In fact, wind turbines have a negligible effect on bird populations compared to other infrastructure developments (Environment Canada, unpublished reports). However, the anticipated proliferation of wind turbines means that we should continue to ensure that turbines are sited to avoid important bird habitats and migration corridors whenever possible.

At the 43 wind farms in Canada for which data are available, total habitat loss per turbine is 1.23 ha on average. Based on this average, the predicted total habitat loss for wind farms nationwide is 3 635 ha. Using published estimates of nest densities, the total number of affected nests, not accounting for construction that might occur outside the breeding season, is approximately 5 700 (Zimmerling et al. 2013). See Table 34 for conservation objectives and actions.

The Government of New Brunswick has decided to increase its generation capacity from renewable resources by 10% before 2016 (New Brunswick Department of Energy and Mines, n.d.). There are currently three wind farms in New Brunswick: Kent Hills (and expansion), Caribou Wind Park and Lameque Wind Power Project, each producing nearly 300 MW (Canadian Wind Energy Association 2008). The national wind resource map ([www.windatlas.ca](http://www.windatlas.ca)) highlights the Northern interior, Acadian Peninsula, Cape Jourimain and Bay of Fundy shores as significant wind energy locations in New Brunswick (New Brunswick Government 2007).

### *Communication Towers*

There are currently almost 8 000 communication towers in Canada >60 m high (Longcore et al. 2012), each of which can pose a hazard to birds during migration. Birds are attracted to the lights of communication towers and are killed when they collide with the structures and guy wires. Mortality increases exponentially with tower height, in part because the use of guy wires also increases with tower height. Poor weather also plays a significant role in increasing migrant fatality; foggy and cloudy conditions increase the lit area around towers and block celestial

clues used by migrating birds. The result is that birds circle to exhaustion in the halo of artificial light, or collide with each other, the tower or its guy wires (American Bird Conservancy 2012).

Avian mortality at towers is unequally distributed among species and regions, but estimates suggest that over 220 000 birds are killed in Canada each year (Longcore et al. 2012). In the Canadian portion of BCR 14, more than 18 000 birds are estimated to be killed from collisions with towers every year (Longcore et al. 2012).

Neotropical migrants in the families Parulidae (wood-warblers) and Vireonidae (vireos) are the species most commonly killed by communication towers. These families include threatened species and many that are of conservation concern in Canada and/or the United States. When considered in concert with mortality at towers in the United States (which is 20 times higher due to the larger number and greater height of towers in the United States) and the mortality from other stationary structures, mortality from collisions with communication towers may negatively affect the population trends of some birds. See Table 34 for conservation objectives and actions.

#### *Power Lines*

Birds may be killed by colliding with power lines or they may be electrocuted. Species with high wing-loading and thus low manoeuvrability, such as waterfowl, appear particularly at risk for collisions (Bevanger 1998). For instance, MacKinnon and Kennedy (2011) recently recorded the impact of local power transmission lines and shortwave communication towers on Common Eiders during their migration through southeastern New Brunswick. Electrocutions are most likely for large birds such as raptors and herons, whose bodies are large enough to span the distances between wires and create a short-circuit. Raptors' habit of using power poles as perches further increases their risk. However, estimates of total mortality due to collisions and electrocutions can vary widely (Manville 2005) and population-level impacts are difficult to determine. Canadian estimates are that 161 000 – 802 000 birds are killed annually by electrocution and another 5.3–20.6 million birds are killed each year by colliding with electrical transmission lines (Calvert et al. 2013). The NB Power Group of companies provides electricity to more than 370 000 New Brunswick homes, businesses or facilities by way of 6 700 km of transmission and 20 000 km of distribution lines across the province (Énergie NB Power, n.d.). See Table 34 for conservation objectives and actions.

#### *Vehicles*

There are over 1.4 million km of roads and hundreds of airports in Canada (World Bank Indicators 2012) that are often bordered by fences and vegetation which provide convenient places for birds to perch, forage, and nest. In New Brunswick, the department of transportation manages more than 18 000 km of roads (New Brunswick Department of Transportation 2011). This does not include roads in towns, cities, those owned by municipalities or roads in National Parks. The paved surfaces can attract birds through the heat they emit, the puddles that form beside roads, and the salt and grit used for de-icing. Current estimates for one- and two-lane paved roads outside major urban centres in Canada are that between 4.65 and 13.8 million birds are killed annually (Bishop and Brogan 2013).

Bird collisions with cars are influenced by the location of the road, proximity of vegetation and vehicle speed. Raptors and owls that hunt and forage near roads are particularly vulnerable, but many species that forage for grit and road salt or are otherwise attracted to roads have a high likelihood of being hit by vehicles. The population-level effects of this source of mortality are not known. See Table 34 for conservation objectives and actions.

### **Predation by Domestic Cats**

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

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

Without detailed study of the individual species affected, it is difficult to assess whether mortality caused by cat predation impacts population trends of birds in Canada. Nevertheless, it is likely that many species of birds are potentially vulnerable to population effects at the local scale in southern Canada. In BCR 14 NB, the Common Nighthawk in urban areas has been identified as a priority species affected by cat predation. See Table 34 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 Lehtikoinen 2000; Franceschini et al. 2008; NABCI, 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.

#### *Pesticides*

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

still exposed while on wintering grounds in countries where their use is still permitted (Mineau 2010).

The 2011 Census of Agriculture reported that in New Brunswick, commercial fertilizer was applied on 783 km<sup>2</sup> (however, only 45% of farms reported their commercial fertilizer usage); herbicides were applied on 603 km<sup>2</sup> (30% of farms reported their herbicide usage); insecticides on 270 km<sup>2</sup> (18% of farms reported) and fungicides on 295 km<sup>2</sup> (15% of farms reported; Statistics Canada 2011a). Furthermore, Statistics Canada mentions that there are under-reporting problems with their 2006 questionnaire, which also appear to be present in its 2011 census; therefore, one can assume that the commercial application of fertilizer, herbicide, insecticide and fungicide is much higher than reported. The total value of agricultural production in New Brunswick was near \$61 million in 2000 (Statistics Canada 2001b).

New Brunswick has the largest aquaculture fishery in Atlantic Canada, including both finfish (100 farms) and shellfish (500 sites; Vasarhelyi and Kirk 2007). The New Brunswick aquaculture industry gross outputs for 2010 were over \$266 million (Statistics Canada 2011b). While the finfish aquaculture industry uses pesticides for the control of crustacean parasites such as sea lice, no information could be found on amounts used by the industry.

Contamination of food sources or decreases in prey availability due to pesticides, fungicides or insecticides were identified as threats to priority bird species in all habitats, except for urban areas of BCR 14 NB. These threats were identified for 55 of its 71 priority bird species in BCR 14 NB; for 24 of 44 priority species in the coastal habitats and marine waters of MBU 11 NB; and for 23 of 28 priority species in the coastal habitats and marine waters of MBU 12 NB. See Table 34 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 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.

Decreases in diet quality or decreases in prey availability due to chemical or heavy metal contamination were identified as threats to priority bird species in the following habitats: urban, all waterbodies (inland and marine), wetlands and coastal (above and below high tide).

In BCR 14 NB, 9 of 71 priority species were affected; 19 of 44 priority species in MBU 11 NB were affected; and 12 of 28 priority species in MBU 12 NB were affected. See Table 34 for conservation objectives and actions.

#### *Acid deposition*

Acid rain is a problem in eastern Canada because many of the water and soil systems in the region lack natural alkalinity – such as a lime base – and therefore cannot neutralize acid naturally (Environment Canada 2012). Provinces that are part of the Canadian Precambrian Shield, such as Ontario, Quebec, New Brunswick and Nova Scotia, are hardest hit by acid rain because their water and soil systems cannot fight the damaging consequences of acid rain (Environment Canada 2012).

Habitat degradation due to acid precipitation affecting prey availability or reductions in fecundity due to contamination of food from acid precipitation have been identified as threats in 7 habitats of BCR 14 NB and for 10 of its priority species.

#### *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). Off the south coast of Newfoundland it has been estimated that over 300 000 birds are killed by oil spills annually (Wiese and Robertson 2004), largely as a result of deliberate dumping of oily waste by ships. 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).

The Gulf of St. Lawrence is the gateway for shipping traffic to New Brunswick, Quebec and Ontario. In 2007, 65 million tonnes of domestic shipping and 161 million tonnes of international shipping passed through the Gulf (Statistics Canada 2010). The petroleum industry (crude oil from domestic and international markets) and potash dominate marine shipping (Vasarhelyi and Kirk 2007). Saint John handles heavy traffic cargo (> 25 million tonnes), mostly in the form of crude oil (Vasarhelyi and Kirk 2007). The fishing industry was a cornerstone industrial sector in New Brunswick; however, only a relatively small share of the traditional fishery industry remains following the collapse of the fish stocks (Vasarhelyi and Kirk 2007).

Given the extensive shipping traffic through the MBU 11 NB and MBU 12 NB, these areas are susceptible to oil spills both accidental and intentional. Decreases in food availability or hypothermia caused by oil spills and discharges were identified as threats to priority species in

all coastal habitats and in marine waters in BCR 14 NB, and for all priority species in MBU 11 NB and MBU 12 NB. See Table 34 for conservation objectives and actions.

**Table 34. Conservation objectives and actions associated with bird mortality from collisions, cats and contaminants.**

Threats addressed	Threat sub-category	Objective	Objective category	Recommended actions	Action category	Priority species affected
<b>Collision mortality</b>						
Collisions with buildings cause bird mortality.	1.1 Housing and urban areas 1.2 Commercial and industrial areas	Reduce incidental mortality from collisions with windows/buildings	2.7 Reduce incidental mortality from collisions	Follow beneficial management practices for bird-friendly buildings including using bird-friendly glass, reducing reflection from windows, providing visual markers to enable birds to perceive windows, and reducing light pollution.	2.1 Site/area management 5.3 Private sector standards and codes	All species But specifically noted in the threat assessment process for: Canada Warbler Evening Grosbeak Purple Finch
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.	<p>Follow beneficial management practices for reducing bird mortality when designing and locating wind turbines.</p> <p>Ensure that offshore wind energy developments will not present significant migration barriers.</p> <p>Locate offshore wind energy developments away from seabird breeding colonies and important waterbird foraging areas.</p> <p>Utilize techniques such as radar monitoring to determine pre-construction flight paths and assess the degree to which wind farms present migration barriers, and infrared camera systems to quantify strike rates.</p>	<p>2.1 Site/area management 5.3 Private sector standards and codes</p> <p>1.2 Resource and habitat protection</p> <p>8.2 Monitoring</p>	All species But specifically noted in the threat assessment process for warblers, thrushs, terns and: Blue-headed Vireo Eastern Wood-Pewee Olive-sided Flycatcher American Woodcock Veery White-throated Sparrow Leach's Storm-Petrel

Table 34 continued

Threats addressed	Threat sub-category	Objective	Objective category	Recommended actions	Action category	Priority species affected
Collisions with communication towers cause bird mortality, particularly during migration.	1.2 Commercial and industrial areas	Reduce incidental mortality from collisions with human-made structures	2.7 Reduce incidental mortality from collisions.	<p>Follow beneficial management practices for reducing mortality to birds when constructing new communication towers.</p> <p>Switch off solid lights on existing towers and ensure that remaining lights have a synchronized, complete dark phase.</p> <p>Take steps to ensure that new towers avoid guy wires and minimize height, and avoid topographic locations where migrating birds are likely to be found in abundance.</p> <p>Retrofit existing towers to adhere to as many guidelines as possible.</p>	<p>2.1 Site/area management</p> <p>5.3 Private sector standards and codes</p>	All species
Collisions with power lines and accidental electrocution cause bird mortality.	4.2 Utility and service lines	Reduce mortality from collisions with utility lines and transmission towers	2.7 Reduce incidental mortality from collisions.	<p>In high-risk areas, retrofit power lines so that the risk of electrocution of raptors is minimized. In new developments, locate transmission lines underground.</p> <p>Use markers or paint to increase visibility of power lines in high-strike areas. Avoid siting lines over or near wetlands.</p>	2.1 Site/area management	Waterfowl, herons, raptors And specifically noted in the threat assessment process for 22 species among which 1 waterfowl species, 14 landbird species, 4 waterbird species, and 3 shorebird species
Collisions with vehicles cause bird mortality.	4.1 Roads and railroads	Reduce mortality from collisions with vehicles	2.7 Reduce incidental mortality from collisions.	<p>Erect road signs or speed bumps to lower vehicle speeds where bird activity is frequent.</p> <p>Remove plants that attract birds from roadsides and medians. Landscape along roads using taller trees and bushes to cause birds to fly higher.</p>	2.1 Site/area management	Specifically noted in the threat assessment process for 12 species, among which 3 shorebird species, 4 waterbird species, 4 landbird species and 1 waterfowl species



Table 34 continued

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

Table 34 continued

Threats addressed	Threat sub-category	Objective	Objective category	Recommended actions	Action category	Priority species affected
				achieving the desired results.		
<b>Environmental contaminants</b>						
Mortality, sub-lethal effects, reductions in prey populations and habitat alteration caused by exposure to/use of pesticides.	9.3 Agricultural & forestry effluents	Reduce mortality and sub-lethal effects of pesticides on birds  Reduce the effects of pesticides on prey species	2.1 Reduce mortality and/or sub-lethal effects from pesticide use.  5.1 Maintain natural food webs and prey sources.	Substantially reduce the use of pesticides/rodenticides/herbicides in Canada. Where elimination is not possible, they should be used as part of an integrated pest management system.  Improve regulation of pesticides/rodenticides/herbicides in Canada to reduce bird mortality.	5.2 Policies and regulations  5.3 Private sector standards and codes	<b>BCR 14 NB:</b> 55 species among which 7 waterbird species, 9 waterfowl species, 8 shorebird species and 31 landbird species  <b>MBU 11 NB:</b> 24 species among which 12 shorebird species, 9 waterfowl species and 3 waterbird species  <b>MBU 12 NB:</b> 23 species among which 12 shorebird species, 10 waterfowl species and 1 waterbird species
Mortality from ingestion of lead shot or tackle.	5.1 Hunting & collecting terrestrial animals 5.4 Fishing & harvesting aquatic resources	Reduce mortality and sub-lethal effects of lead shot and fishing tackle on birds	2.2 Reduce mortality and/or sub-lethal effects from exposure to contaminants.	Work with hunters, anglers and industry to eliminate the exposure of birds to shot, sinkers and jigs made of lead.  Enforce the use of non-toxic shot in waterfowl hunting, and encourage adoption of non-toxic alternatives in target shooting, upland game bird hunting, and fishing.	4.3 Awareness and communications  5.4 Compliance and enforcement	Bald Eagle
Mortality from heavy metals and other contaminants. (including acid deposition)	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	<b>BCR 14 NB:</b> 9 species among which 6 waterfowl species, 2 waterbird species and 1 landbird species  <b>MBU 11NB:</b> 19 species among which 11 waterbird species and 8 waterfowl species  <b>MBU 12 NB:</b>

Table 34 continued

Threats addressed	Threat sub-category	Objective	Objective category	Recommended actions	Action category	Priority species affected
						12 species among which 8 waterfowl species and 4 waterbird species
Mortality of waterbirds from oil pollution.	9. Pollution	Reduce mortality from oil pollution	2.3 Reduce mortality and/or sublethal effects of oil pollution. 5.1 Maintain natural food webs and prey sources.	<p>Improve monitoring and enforcement capacity to reduce chronic oil pollution from illegal dumping of bilge waste and cleaning of oil tanks.</p> <p>Improve education/outreach to make sure that the oil industry and its regulators are aware of the potential impacts on birds and take measures to prevent exposure of birds to oil.</p>	<p>5.4 Compliance and enforcement</p> <p>4.3 Awareness and communications</p>	<p><b>BCR 14 NB:</b> American Golden-Plover Bald Eagle Belted Kingfisher Killdeer Mallard Piping Plover (melodus) Spotted Sandpiper</p> <p><b>MBU 11 NB:</b> All species</p> <p><b>MBU 12 NB:</b> All species</p>
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.	<p>Evaluate the affects of PBDEs and other chemicals on vital rates in birds.</p> <p>Evaluate the extent to which pesticides are reducing prey availability for aerial insectivores.</p> <p>Improve the ability to monitor and understand the effects of contaminant concentrations in birds.</p> <p>Continue to acquire information on oiling of waterbirds through programs like Birds Oiled at Sea.</p>	<p>8.1 Research</p> <p>8.2 Monitoring</p>	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; NABCI, 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 (NABCI, 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 (NABCI, U.S. Committee 2009; Faaborg et al. 2010). See Tables 35 and 36 for a summary of impacts of climate change and conservation objectives.

A recent exercise used bioclimatic modelling to predict changes in bird species ranges based on anticipated climate change for different time periods and under different emissions scenarios (Lawler et al. 2010; 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 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.

Given the predominance of its coastlines, some of the impacts of climate change in the 21st century in New Brunswick may include a rise in sea level and more intense coastal storms (Warren et al. 2010); increases in both mean annual temperature (expected to be highest in western areas) and changes in precipitation (specifically, drier inland summers; Lemmen et al. 2008); more frequent winter thaws and an increased risk of ice-jam flooding; larger fluctuations in river runoff; more significant coastal erosion and flooding; more extreme and variable weather patterns; and larger fluctuations in groundwater availability (New Brunswick Government 2012).

In the Gulf of Maine, including the Bay of Fundy (MBU 11), some of the impacts of climate change may include an increase in sea-surface temperature (Fogarty et al. 2007), a decrease in salinity (Greene et al. 2008), acidification, sea-level rise and increased intensity of storm events (Nye 2010).

In the Gulf of St. Lawrence (MBU 12), some of the impacts of climate change are expected to include changes in surface and intermediate waters and ice cover (Galbraith et al. 2010), changes in storm frequency and intensity, and sea-level rise (Shaw et al. 2003), as well as a decrease in freshwater from the St. Lawrence River, which could affect the water circulation and stratification in the Gulf (Saucier et al. 2009). Anticipated changes also include a decrease in salinity due to an increase in Arctic-derived fresher water (Greene et al. 2008). In addition, the naturally low oxygen levels in the mouth of the Gulf of St. Lawrence are expected to become even lower as the water warms, which is a concern along the Gulf's coastal areas and harbours (Gilbert et al. 2005).

In BCR 14 NB, 66 priority species are expected to be affected by climate change through habitat alterations resulting in loss of suitable habitat and reductions in survival or fecundity. For 5 of those priority species, climate change has been given a high threat rank (Bank Swallow, Barn Swallow, Bobolink, Yellow Rail and Common Tern). Bicknell's Thrush is projected to be significantly impacted by climate change in the next 80–100 years due to losses of high-elevation coniferous forest habitat. In MBU 11 NB, 30 priority species, and in MBU 12 NB, 16 priority species are expected to be affected by climate change through habitat loss or reductions in productivity. Climate change has been ranked as a high-level threat for the Common Tern in both MBUs as Common Terns are expected to be highly affected by reductions in fecundity. See Table 35 for a more exhaustive list of priority species affected by climate change and Table 36 for conservation objectives and actions to address the threats due to climate change.

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 35. Examples of the current and anticipated effects of climate change on bird populations in Canada and examples of priority bird species impacted by each climate change effect.**

**Note:** The species shown here do represent an exhaustive list of species for which the effects of climate change have been suggested or documented.

Potential and Realized Effects of Climate Change	Priority Species Affected in BCR 14 NB, MBU 11 NB and MBU 12 NB
Mismatch between peak hatch and peak food abundance	98 priority species: landbird species: 38 shorebird species: 19 waterbird species: 21 waterfowl species: 20
Extended breeding season	Canada Goose, Lincoln's Sparrow
Habitat loss as a result of ecosystem changes (e.g., advances in treeline)	American Bittern, American Black Duck, American Woodcock, Bank Swallow, Bicknell's Thrush, Black Tern, Canada Warbler, Green Heron, Least Bittern, Pied-billed Grebe, Rusty Blackbird, Solitary Sandpiper, Sora, Virginia Rail, Wood Duck, Yellow Rail
Increase in severe weather events	All priority shorebird species and: American Bittern, American Black Duck, Arctic Tern, Barn Swallow, Belted Kingfisher, Black Tern, Black-legged Kittiwake, Bobolink, Canada Warbler, Chimney Swift, Common Eider, Common Loon, Common Nighthawk, Common Tern, Eastern Whip-poor-will, Great Cormorant, Green-winged Teal, Harlequin Duck (Eastern), Leach's Storm-Petrel, Least Bittern, Mallard, Nelson's Sparrow, Pied-billed Grebe, Ring-necked Duck, Roseate Tern, Ruffed Grouse, Short-eared Owl, Sora, Tree Swallow, Veery, Virginia Rail, Yellow Rail
Introduction of new predators and competitors	Red-necked Grebe

Table 35 continued

Potential and Realized Effects of Climate Change	Priority Species Affected in BCR 14 NB, MBU 11 NB and MBU 12 NB
Range shifts to the north and from coastal to inland sites	Tennessee Warbler, Spruce Grouse
Changes in ocean temperature and currents impact marine productivity and food webs	American Black Duck, Arctic Tern, Black-bellied Plover, Black-legged Kittiwake, Common Murre, Common Tern, Dovekie, Dunlin, Great Cormorant, Great Shearwater, Green-winged Teal, Hudsonian Godwit, Leach's Storm-Petrel, Least Sandpiper, Lesser Yellowlegs, Manx Shearwater, Razorbill, Red Knot (rufa), Red Phalarope, Red-necked Phalarope, Roseate Tern, Sanderling, Solitary Sandpiper, Sooty Shearwater, Surf Scoter, Thick-billed Murre, Whimbrel, Willet

Table 36. Proposed conservation objectives and actions to address climate change.

Threats addressed	Threat category	Objective	Objective category	Recommended actions	Action category	Planning unit: Priority species affected (rank of threat)
Climate change impacts habitat and negatively affects survival and productivity of birds	11.1 Habitat shifting and alteration	<p>Reduce greenhouse gas emissions</p> <p>Mitigate the effects of climate change on bird habitat</p>	<p>6.1 Support efforts to reduce greenhouse gas emissions</p> <p>6.2 Manage for habitat resilience as climate changes</p>	<p>Support efforts to reduce greenhouse gas emissions.</p> <p>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.</p> <p>Manage buffer areas and the matrix between protected areas to enhance movement of species across the landscape.</p> <p>Manage ecosystems to maximize carbon storage and sequestration while simultaneously enhancing bird habitat.</p> <p>Incorporate predicted shifts in habitat into landscape level plans (e.g., when establishing protected areas ensure the maintenance of north-south corridors to facilitate northward range shifts of bird species).</p>	<p>5.2 Policies and regulations</p> <p>1.1 Site/area protection</p> <p>2.1 Site/area management</p> <p>5.2 Policies and regulations</p>	<p><b>In BCR 14 NB:</b> Black-throated Blue Warbler (M), Bicknell's Thrush (M) and 62 species (L)</p> <p><b>In MBU 11 NB:</b> 28 species (L)</p> <p><b>In MBU 12 NB:</b> 15 species (L)</p>
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	<p>Evaluate which species are most vulnerable to climate change.</p> <p>Investigate the cumulative effects of climate change.</p> <p>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.</p>	8.1 Research	All

Table 36 continued

Threats addressed	Threat category	Objective	Objective category	Recommended actions	Action category	Planning unit: Priority species affected (rank of threat)
				<p>Continue to monitor bird populations so changes in numbers and distributions can be identified.</p> <p>Undertake monitoring to evaluate the effectiveness of mitigation activities.</p>	8.2 Monitoring	



## ***Research and Population Monitoring Needs***

### **Population Monitoring**

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

A lack of information about population status or underlying causes of population decline were determined to be significant conservation concerns for 43 priority species in BCR 14 NB, 34 priority species in MBU 11 NB and 22 priority species in MBU 12 NB. The list of species and recommendations for improving population monitoring are listed in Table 37.

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**

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

#### **Waterbirds**

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

#### **Waterfowl**

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

With the Avian Monitoring Review recommendations (Avian Monitoring Review Steering Committee 2012), there will be further discussions with other government officials and key bird and habitat conservation players about bird population monitoring needs and priorities not only for BCR 14 NB and its associated marine units but also for all priority birds within Atlantic Region.

**Table 37. Monitoring objectives for priority species in BCR 14 NB, MBU 11 NB and MBU 12 NB for which we do not have good monitoring data.**

Objective	Priority species affected
1. Develop/improve population monitoring techniques for priority birds <b>wintering</b> in BCR 14 NB, NB MBUs 11, 12 (trend direction and magnitude) not effectively monitored using existing techniques.	<b>BCR 14 NB:</b> Ruffed Grouse, Northern Goshawk, Short-eared Owl, American Three-toed Woodpecker, Black-backed Woodpecker, Evening Grosbeak. <b>MBU 11 NB:</b> Purple Sandpiper, Red-throated Loon, Common Loon, Red-necked Grebe, Horned Grebe, Bonaparte's Gull, Long-tailed duck. <b>MBU 12 NB:</b> Red-throated Loon, Common Loon, Red-necked Grebe, Horned Grebe, Long-tailed duck, Surf Scoter, Black Scoter
2. Develop/improve migration monitoring techniques for priority birds <b>migrating</b> through BCR 14 NB, MBU 11 NB, MBU 12 NB (trend direction and magnitude) not effectively monitored using existing techniques.	<b>In BCR 14 NB:</b> American Golden-Plover, Solitary Sandpiper, Whimbrel, Belted Kingfisher <b>In MBU 11 NB, MBU 12 NB:</b> All shorebird priority species
3. Develop/improve monitoring techniques for priority birds <b>breeding</b> in BCR 14 NB (trend direction and magnitude) not effectively monitored using existing techniques.	Pied-billed Grebe, Green Heron, Yellow Rail, Sora, Black Tern, Common Tern, Nelson's Sparrow, Rusty Blackbird, Solitary Sandpiper, Wilson's Snipe, Red-shouldered Hawk, Ruffed Grouse, American Three-toed Woodpecker, Black-backed Woodpecker, Bicknell's Thrush, Boreal Chickadee, Bank Swallow, Belted Kingfisher, Short-eared Owl
4. Develop appropriate habitat monitoring techniques across spatial scales (associations, trend direction and magnitude).	All priority species
5. Develop appropriate monitoring techniques to quantify sources, magnitude and extent of identified threats to priority waterfowl, waterbirds and shorebirds related to practices in adjacent upland habitat (boating, ATV use, tourism, coastal recreation, fishing, wind farms, development, aquaculture).	Priority waterbirds, waterfowl and shorebirds in BCR 14 NB and all priority birds species in MBU 11 NB, MBU 12 NB
6. Develop appropriate monitoring techniques to quantify sources, magnitude and extent of identified threats to priority species related to practices within watersheds (agriculture, forestry, development).	All priority species in BCR 14 NB, MBU 11 NB, MBU 12 NB

## Research

The focus of this section is to outline the main areas where a lack of information hindered our ability to understand conservation needs and make conservation recommendations. Research objectives presented here are bigger picture questions, and not necessarily a schedule of studies, that are needed to determine the needs of individual species (Table 38). 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 38 provides a preliminary list of research needs for BCR 14 NB, MBU 11 NB and MBU 12 NB. This list will be used as a starting point for further discussions with other government officials, key bird and habitat conservation players and scientists about research needs and priorities for BCR 14 NB, MBU 11 NB, and MBU 12 NB along with all priority birds within Atlantic Region.

**Table 38. Proposed preliminary research objectives for BCR 14 NB, MBU 11 NB and MBU 12 NB.**

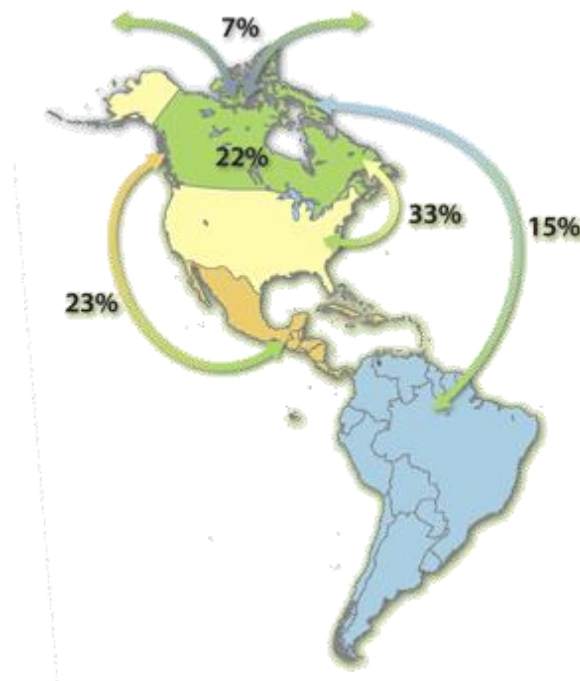
Objective	Examples of Species Affected
1. Determine primary drivers of population decline (e.g. adult or juvenile survival, productivity, habitat quality in Canada or elsewhere on the species' range).	Priority species with declining population trends e.g. aerial insectivores and Bicknell's Thrush (in BCR 14 NB) and shorebirds (in MBU 11 NB, MBU 12 NB)
2. Generate priority species-habitat relationships (during breeding, roosting, foraging, staging, and wintering) using up-to-date habitat (e.g. land cover), bird distribution and abundance data (correcting for species-specific detectability estimates); identify species thresholds, link to conservation objectives and inform determination of quantitative population and habitat targets.	All priority species of BCR 14 NB, MBU 11 NB, MBU 12 NB
3. Develop a spatially explicit habitat/threat framework for identifying spatial priorities for bird conservation.	All priority species of BCR 14 NB, MBU 11 NB, MBU 12 NB
4. Determine the degree of genetic isolation of priority birds at risk and determine effective population size.	Bicknell's Thrush
5. Determine whether physiological stress as determined by H-L ratio can be used as productivity measure in hard-to-study species.	Bicknell's Thrush
6. Continue to engage in interdisciplinary climate change research	All priority species of BCR 14 NB, MBU 11 NB, MBU 12 NB
7. Determine the population-level impact of anthropogenic structures of all types, including direct effects (e.g. attraction, avoidance, collision mortality) and indirect effects (e.g. habitat loss related to redistribution of prey, fragmentation of habitat)	Identify species most vulnerable among all priority species
8. Determine the population-level significance of mortality from predation by domestic and feral cats.	Identify particularly vulnerable priority birds of BCR 14 NB
9. Determine the population-level significance of direct and indirect impacts of development within watersheds on priority birds; conduct research on the direct and indirect effects of sedimentation and chemical contamination (e.g. watershed-based agricultural runoff).	All priority species of BCR 14 NB, MBU 11 NB, MBU 12 NB

Table 38 continued

Objective	Examples of Species Affected
10. Assess impacts of disturbance on priority species behaviour, specifically related to practices in coastal zones (existing and anticipated finfish and shellfish aquaculture, clamming, ATV use, beach recreation, tourism, wind farms), and cumulative effects.	In BCR 14 NB: Pied-billed Grebe, Green Heron, Yellow Rail, Sora, Black Tern, Common Tern, American Golden-Plover, Spotted Sandpiper, Solitary Sandpiper, Whimbrel, Bank Swallow, Nelson's Sparrow In MBU 11 NB, MBU 12 NB: All priority species using the intertidal zone
11. Assess impacts of coastal development on priority bird habitats, specifically related to practices in coastal zones (existing and anticipated finfish and shellfish aquaculture, clamming, ATV use, beach recreation, tourism, wind farms, shoreline hardening), and cumulative effects.	In BCR 14 NB: Pied-billed Grebe, Green Heron, Yellow Rail, Sora, Black Tern, Common Tern, American Golden-Plover, Spotted Sandpiper, Solitary Sandpiper, Whimbrel, Bank Swallow, Belted Kingfisher, Nelson's Sparrow In MBU 12 NB: All priority species using the intertidal zone
12. Participate in national assessment, including cost/benefit analysis, of the possibilities for demographic monitoring of landbirds in Canada to determine value of demographic monitoring.	Priority landbirds of BCR 14 NB
13. Assess impacts of offshore development on priority bird habitats (existing and anticipated resource extraction projects, offshore wind development, etc.), and cumulative effects.	All priority species using offshore habitats of MBU 11 NB, MBU 12 NB

### ***Threats Outside Canada***

Many bird species found in Canada spend a large portion of their life cycle outside the country (Fig. 49). 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 71 priority species in BCR 14 NB, 51 (72%) are migratory and spend part of their annual cycle—up to half the year or more—outside Canada. Of the 44 priority species in MBU 11 NB, 30 (68%) are migratory, and of the 28 priority species in MBU 12 NB, 21 (75%) are migratory.



**Figure 49. Percent of Canadian breeding birds that migrate to regions outside Canada for part of their life cycle (NABCI 2012).**

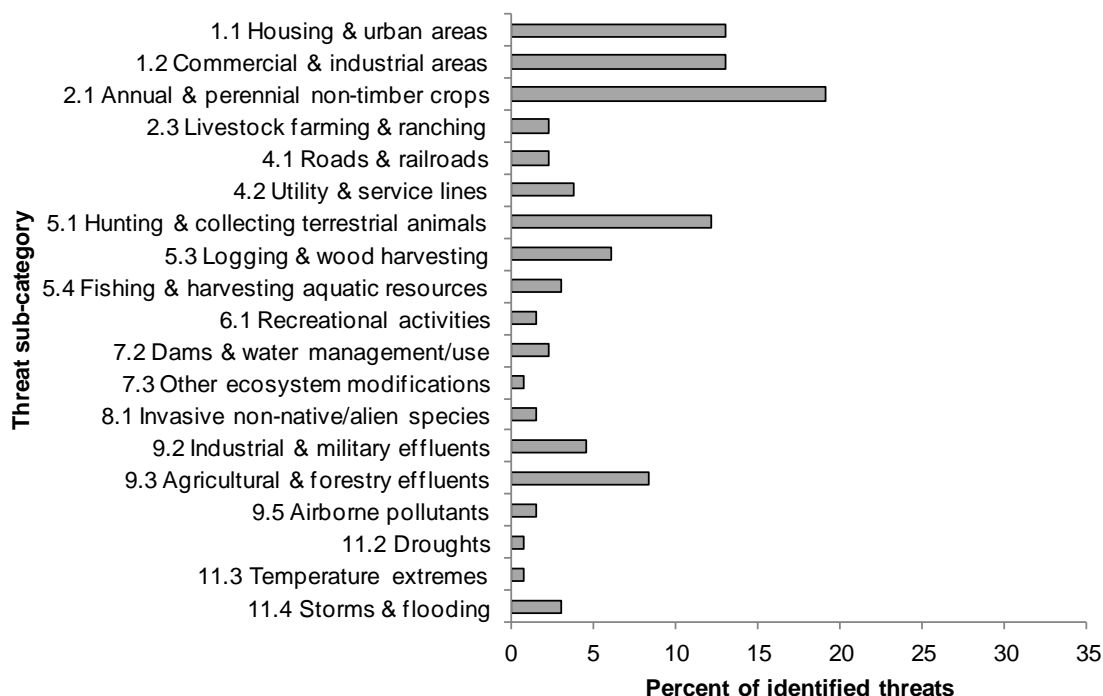
Similar to the assessment of threats facing priority species within Canada, we conducted a literature review to identify threats facing priority species while they are outside Canada. A lack of data was a pervasive issue for this exercise. For many species, little is known about threats they face during 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.

Despite this, some information is available to inform conservation work outside Canada (Figures 50, 51, 52). Priority birds from BCR 14 NB, MBU 11 NB and MBU 12 NB face the loss or degradation of key migration and wintering habitats. The primary sources of habitat loss and degradation include deforestation (5.3 Logging & wood harvesting), residential development (1.1 Housing & urban areas) and the conversion of grasslands, wetlands and forests for agricultural use (2.1 Annual & perennial non-timber crops).

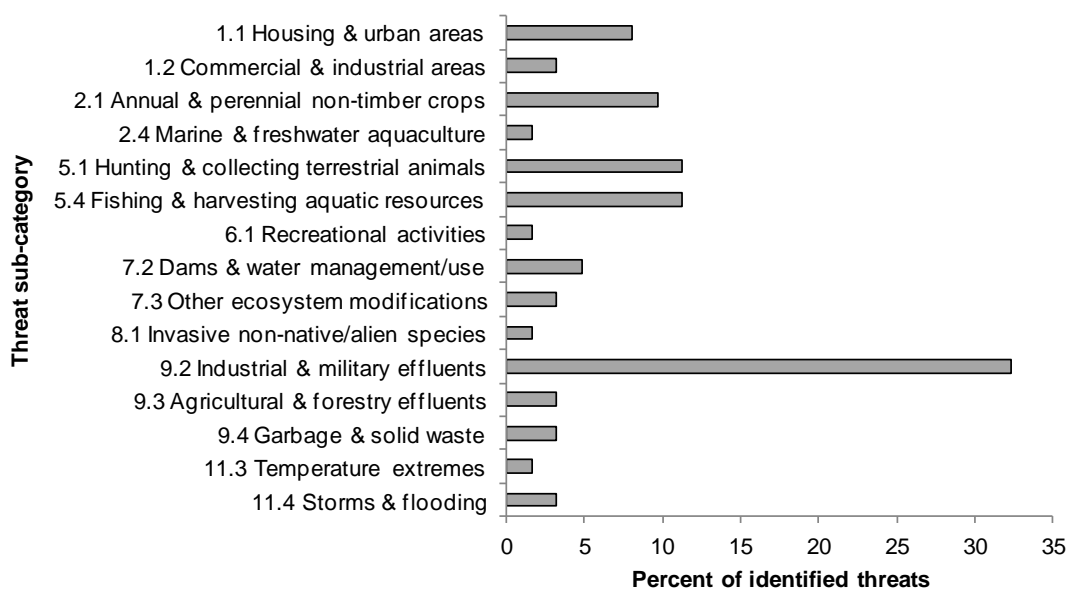
The threat of loss and degradation of stopover or overwinter habitat is greater for species that have relatively small and concentrated wintering ranges. Others are particularly vulnerable, as large numbers of the species concentrate at just a handful of key migratory stopover sites; degradation or loss of these sites could have devastating impacts on the species.

In addition to habitat loss, other significant threats encountered by priority birds from BCR 14 NB, MBU 11 NB and MBU 12 NB are the lethal and sub-lethal impacts of exposure to industrial and agricultural contaminants (9.2 Industrial & military effluents and 9.3 Agricultural & forestry effluents), particularly for species found in the MBUs. Oil pollution, heavy metals and pesticides cause mortality during migration and on the wintering grounds, either directly by poisoning or indirectly through reductions in prey. Other large sources of mortality for priority species outside Canada are related to legal and illegal hunting activities and poisoning from lead shot (5.1 Hunting & collecting terrestrial animals) and collisions with buildings and towers (1.2 Commercial & industrial areas). Priority species from the MBUs are also susceptible to impacts from fishing and harvesting aquatic resources (5.4 Fishing & harvesting aquatic resources); these include incidental bycatch and habitat alteration from rockweed harvesting and aquaculture.



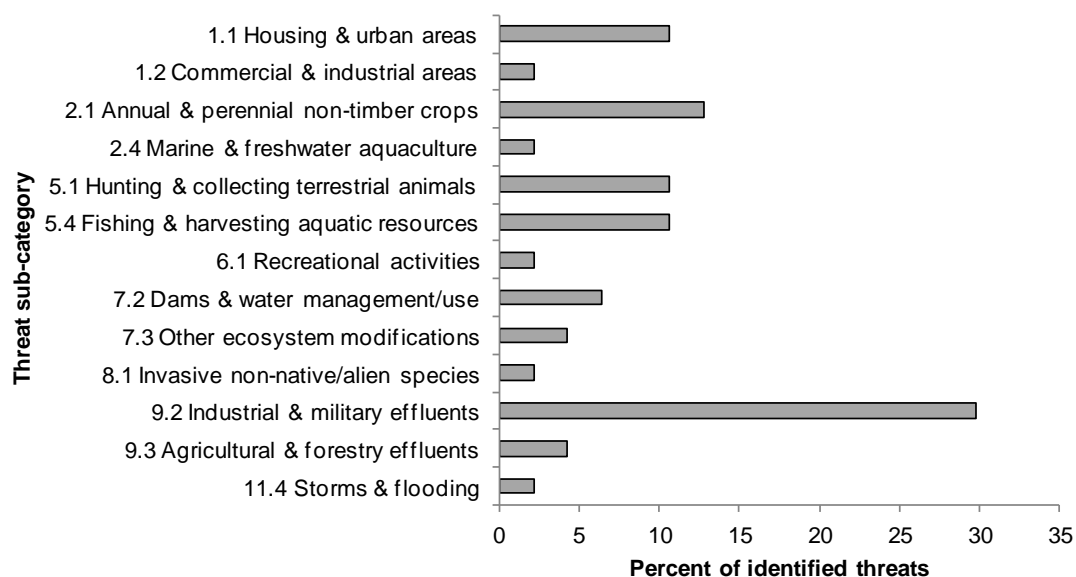
**Figure 50. Percent of identified threats to priority species (by threat sub-category) in BCR 14 NB when they are outside Canada.**

**Note:** Magnitudes could not be assigned for threats outside Canada due to lack of information on scope and severity.



**Figure 51. Percent of identified threats to priority species (by threat sub-category) in MBU 11 NB when they are outside Canada.**

**Note:** Magnitudes could not be assigned for threats outside Canada due to lack of information on scope and severity.



**Figure 52. Percent of identified threats to priority species (by threat sub-category) in MBU 12 NB 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, non-governmental organizations and citizens will benefit from the information. BCR strategies can be used in many different ways depending on the needs of the user, who may focus on one or more of the elements of the strategy to guide their conservation projects.

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

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## Appendix 1

### List of All Bird Species in BCR 14 NB, MBU 11 NB and MBU 12 NB

Table A1. Complete list of species in BCR 14 NB, MBU 11 NB and MBU 12 NB, when they are in the planning unit (breeding, migrant, winter) and their priority status.

Scientific Name	English Name	French Name	Bird Group	Breeding	Migrant	Wintering	Seasonal	Priority
<i>Empidonax alnorum</i>	Alder Flycatcher	Moucherolle des aulnes	Landbird	BCR 14 NB	BCR 14 NB			
<i>Corvus brachyrhynchos</i>	American Crow	Corneille d'Amérique	Landbird	BCR 14 NB	BCR 14 NB	BCR 14 NB		
<i>Spinus tristis</i>	American Goldfinch	Chardonneret jaune	Landbird	BCR 14 NB	BCR 14 NB	BCR 14 NB		
<i>Falco sparverius</i>	American Kestrel	Crécerelle d'Amérique	Landbird	BCR 14 NB	BCR 14 NB			
<i>Anthus rubescens</i>	American Pipit	Pipit d'Amérique	Landbird		BCR 14 NB			
<i>Setophaga ruticilla</i>	American Redstart	Paruline flamboyante	Landbird	BCR 14 NB	BCR 14 NB			BCR 14 NB
<i>Turdus migratorius</i>	American Robin	Merle d'Amérique	Landbird	BCR 14 NB	BCR 14 NB	BCR 14 NB		
<i>Picoides dorsalis</i>	American Three-toed Woodpecker	Pic à dos rayé	Landbird	BCR 14 NB	BCR 14 NB	BCR 14 NB		BCR 14 NB
<i>Spizella arborea</i>	American Tree Sparrow	Bruant hudsonien	Landbird		BCR 14 NB			
<i>Haliaeetus leucocephalus</i>	Bald Eagle	Pygargue à tête blanche	Landbird	BCR 14 NB MBU 11 NB MBU 12 NB	BCR 14 NB	BCR 14 NB MBU 11 NB MBU 12 NB	MBU 11 NB MBU 12 NB	BCR 14 NB
<i>Icterus galbula</i>	Baltimore Oriole	Oriole de Baltimore	Landbird	BCR 14 NB				
<i>Riparia riparia</i>	Bank Swallow	Hirondelle de rivage	Landbird	BCR 14 NB	BCR 14 NB			BCR 14 NB
<i>Hirundo rustica</i>	Barn Swallow	Hirondelle rustique	Landbird	BCR 14 NB	BCR 14 NB			BCR 14 NB
<i>Strix varia</i>	Barred Owl	Chouette rayée	Landbird	BCR 14 NB	BCR 14 NB	BCR 14 NB		
<i>Setophaga castanea</i>	Bay-breasted Warbler	Paruline à poitrine baie	Landbird	BCR 14 NB	BCR 14 NB			BCR 14 NB
<i>Megasceryle alcyon</i>	Belted Kingfisher	Martin-pêcheur d'Amérique	Landbird	BCR 14 NB	BCR 14 NB		MBU 11 NB MBU 12 NB	BCR 14 NB
<i>Catharus bicknelli</i>	Bicknell's Thrush	Grive de Bicknell	Landbird	BCR 14 NB	BCR 14 NB			BCR 14 NB
<i>Mniotilta varia</i>	Black-and-white Warbler	Paruline noir et blanc	Landbird	BCR 14 NB	BCR 14 NB			
<i>Picoides arcticus</i>	Black-backed Woodpecker	Pic à dos noir	Landbird	BCR 14 NB	BCR 14 NB	BCR 14 NB		BCR 14 NB
<i>Coccyzus erythrophthalmus</i>	Black-billed Cuckoo	Coulicou à bec noir	Landbird	BCR 14 NB	BCR 14 NB			BCR 14 NB
<i>Setophaga fusca</i>	Blackburnian Warbler	Paruline à gorge orangée	Landbird	BCR 14 NB	BCR 14 NB			BCR 14 NB
<i>Poecile atricapillus</i>	Black-capped Chickadee	Mésange à tête noire	Landbird	BCR 14 NB	BCR 14 NB	BCR 14 NB		
<i>Setophaga striata</i>	Blackpoll Warbler	Paruline rayée	Landbird	BCR 14 NB	BCR 14 NB			
<i>Setophaga caerulea</i>	Black-throated Blue Warbler	Paruline bleue	Landbird	BCR 14 NB	BCR 14 NB			BCR 14 NB



Table A1 continued

Scientific Name	English Name	French Name	Bird Group	Breeding	Migrant	Wintering	Seasonal	Priority
<i>Setophaga virens</i>	Black-throated Green Warbler	Paruline à gorge noire	Landbird	BCR 14 NB	BCR 14 NB			BCR 14 NB
<i>Passerina caerulea</i>	Blue Grosbeak	Guiraca bleu	Landbird		BCR 14 NB			
<i>Cyanocitta cristata</i>	Blue Jay	Geai bleu	Landbird	BCR 14 NB		BCR 14 NB		
<i>Polioptila caerulea</i>	Blue-gray Gnatcatcher	Gobemoucheron gris-bleu	Landbird		BCR 14 NB			
<i>Vireo solitarius</i>	Blue-headed Vireo	Viréo à tête bleue	Landbird	BCR 14 NB	BCR 14 NB			BCR 14 NB
<i>Vermivora cyanoptera</i>	Blue-winged Warbler	Paruline à ailes bleues	Landbird		BCR 14 NB			
<i>Dolichonyx oryzivorus</i>	Bobolink	Goglu des prés	Landbird	BCR 14 NB	BCR 14 NB			BCR 14 NB
<i>Bombycilla garrulus</i>	Bohemian Waxwing	Jaseur boréal	Landbird		BCR 14 NB			
<i>Poecile hudsonicus</i>	Boreal Chickadee	Mésange à tête brune	Landbird	BCR 14 NB	BCR 14 NB	BCR 14 NB		BCR 14 NB
<i>Aegolius funereus</i>	Boreal Owl	Nyctale de Tengmalm	Landbird		BCR 14 NB			
<i>Buteo platypterus</i>	Broad-winged Hawk	Petite Buse	Landbird	BCR 14 NB	BCR 14 NB			
<i>Certhia americana</i>	Brown Creeper	Grimpereau brun	Landbird	BCR 14 NB	BCR 14 NB	BCR 14 NB		
<i>Toxostoma rufum</i>	Brown Thrasher	Moqueur roux	Landbird	BCR 14 NB	BCR 14 NB			
<i>Molothrus ater</i>	Brown-headed Cowbird	Vacher à tête brune	Landbird	BCR 14 NB	BCR 14 NB			
<i>Cardellina canadensis</i>	Canada Warbler	Paruline du Canada	Landbird	BCR 14 NB	BCR 14 NB			BCR 14 NB
<i>Setophaga tigrina</i>	Cape May Warbler	Paruline tigrée	Landbird	BCR 14 NB	BCR 14 NB			BCR 14 NB
<i>Bombycilla cedrorum</i>	Cedar Waxwing	Jaseur d'Amérique	Landbird	BCR 14 NB	BCR 14 NB	BCR 14 NB		
<i>Setophaga pensylvanica</i>	Chestnut-sided Warbler	Paruline à flancs marron	Landbird	BCR 14 NB	BCR 14 NB			
<i>Chaetura pelagica</i>	Chimney Swift	Martinet ramoneur	Landbird	BCR 14 NB	BCR 14 NB			BCR 14 NB
<i>Spizella passerina</i>	Chipping Sparrow	Bruant familier	Landbird	BCR 14 NB	BCR 14 NB			
<i>Spizella pallida</i>	Clay-colored Sparrow	Bruant des plaines	Landbird		BCR 14 NB			
<i>Petrochelidon pyrrhonota</i>	Cliff Swallow	Hirondelle à front blanc	Landbird	BCR 14 NB	BCR 14 NB			
<i>Quiscalus quiscula</i>	Common Grackle	Quiscale bronzé	Landbird	BCR 14 NB	BCR 14 NB			
<i>Chordeiles minor</i>	Common Nighthawk	Engoulevent d'Amérique	Landbird	BCR 14 NB	BCR 14 NB			BCR 14 NB
<i>Corvus corax</i>	Common Raven	Grand Corbeau	Landbird	BCR 14 NB	BCR 14 NB	BCR 14 NB		
<i>Acanthis flammea</i>	Common Redpoll	Sizerin flammé	Landbird		BCR 14 NB			
<i>Geothlypis trichas</i>	Common Yellowthroat	Paruline masquée	Landbird	BCR 14 NB	BCR 14 NB			
<i>Accipiter cooperii</i>	Cooper's Hawk	Épervier de Cooper	Landbird	BCR 14 NB	BCR 14 NB			
<i>Junco hyemalis</i>	Dark-eyed Junco	Junco ardoisé	Landbird	BCR 14 NB	BCR 14 NB	BCR 14 NB		
<i>Spiza americana</i>	Dickcissel	Dickcissel d'Amérique	Landbird		BCR 14 NB			
<i>Picoides pubescens</i>	Downy Woodpecker	Pic mineur	Landbird	BCR 14 NB	BCR 14 NB	BCR 14 NB		
<i>Sialia sialis</i>	Eastern Bluebird	Merlebleu de l'Est	Landbird	BCR 14 NB	BCR 14 NB			
<i>Tyrannus tyrannus</i>	Eastern Kingbird	Tyran tritri	Landbird	BCR 14 NB	BCR 14 NB			BCR 14 NB
<i>Sturnella magna</i>	Eastern Meadowlark	Sturnelle des prés	Landbird	BCR 14 NB	BCR 14 NB			BCR 14 NB
<i>Sayornis phoebe</i>	Eastern Phoebe	Moucherolle phébi	Landbird	BCR 14 NB	BCR 14 NB			
<i>Pipilo erythrophthalmus</i>	Eastern Towhee	Tohi à flancs roux	Landbird		BCR 14 NB			

Table A1 continued

Scientific Name	English Name	French Name	Bird Group	Breeding	Migrant	Wintering	Seasonal	Priority
<i>Antrostomus vociferus</i>	Eastern Whip-poor-will	Engoulevent bois-pourri	Landbird	BCR 14 NB	BCR 14 NB			BCR 14 NB
<i>Contopus virens</i>	Eastern Wood-Pewee	Pioui de l'Est	Landbird	BCR 14 NB	BCR 14 NB			BCR 14 NB
<i>Coccothraustes vespertinus</i>	Evening Grosbeak	Gros-bec errant	Landbird	BCR 14 NB	BCR 14 NB	BCR 14 NB		BCR 14 NB
<i>Spizella pusilla</i>	Field Sparrow	Bruant des champs	Landbird		BCR 14 NB			
<i>Passerella iliaca</i>	Fox Sparrow	Bruant fauve	Landbird	BCR 14 NB	BCR 14 NB	BCR 14 NB		
<i>Aquila chrysaetos</i>	Golden Eagle	Aigle royal	Landbird		BCR 14 NB			
<i>Regulus satrapa</i>	Golden-crowned Kinglet	Roitelet à couronne dorée	Landbird	BCR 14 NB	BCR 14 NB	BCR 14 NB		
<i>Dumetella carolinensis</i>	Gray Catbird	Moqueur chat	Landbird	BCR 14 NB	BCR 14 NB			
<i>Perisoreus canadensis</i>	Gray Jay	Mésangeai du Canada	Landbird	BCR 14 NB	BCR 14 NB	BCR 14 NB		
<i>Catharus minimus</i>	Gray-cheeked Thrush	Grive à joues grises	Landbird		BCR 14 NB			
<i>Myiarchus crinitus</i>	Great Crested Flycatcher	Tyrann huppé	Landbird	BCR 14 NB	BCR 14 NB			
<i>Bubo virginianus</i>	Great Horned Owl	Grand-duc d'Amérique	Landbird	BCR 14 NB		BCR 14 NB		
<i>Falco rusticolus</i>	Gyr Falcon	Faucon gerfaut	Landbird		BCR 14 NB			
<i>Picoides villosus</i>	Hairy Woodpecker	Pic chevelu	Landbird	BCR 14 NB	BCR 14 NB	BCR 14 NB		
<i>Catharus guttatus</i>	Hermit Thrush	Grive solitaire	Landbird	BCR 14 NB	BCR 14 NB			
<i>Acanthis hornemanni</i>	Hoary Redpoll	Sizerin blanchâtre	Landbird			BCR 14 NB		
<i>Eremophila alpestris</i>	Horned Lark	Alouette hausse-col	Landbird	BCR 14 NB	BCR 14 NB	BCR 14 NB		
<i>Troglodytes aedon</i>	House Wren	Troglodyte familier	Landbird		BCR 14 NB			
<i>Passerina cyanea</i>	Indigo Bunting	Passerin indigo	Landbird	BCR 14 NB	BCR 14 NB			
<i>Calcarius lapponicus</i>	Lapland Longspur	Plectrophane lapon	Landbird		BCR 14 NB			
<i>Empidonax minimus</i>	Least Flycatcher	Moucherolle tchébec	Landbird	BCR 14 NB	BCR 14 NB			
<i>Melospiza lincolni</i>	Lincoln's Sparrow	Bruant de Lincoln	Landbird	BCR 14 NB	BCR 14 NB			
<i>Asio otus</i>	Long-eared Owl	Hibou moyen-duc	Landbird	BCR 14 NB	BCR 14 NB			
<i>Setophaga magnolia</i>	Magnolia Warbler	Paruline à tête cendrée	Landbird	BCR 14 NB	BCR 14 NB			BCR 14 NB
<i>Cistothorus palustris</i>	Marsh Wren	Troglodyte des marais	Landbird	BCR 14 NB	BCR 14 NB			
<i>Falco columbarius</i>	Merlin	Faucon émerillon	Landbird	BCR 14 NB	BCR 14 NB			
<i>Zenaidura macroura</i>	Mourning Dove	Tourterelle triste	Landbird	BCR 14 NB	BCR 14 NB	BCR 14 NB		
<i>Geothlypis philadelphia</i>	Mourning Warbler	Paruline triste	Landbird	BCR 14 NB	BCR 14 NB			
<i>Oreothlypis ruficapilla</i>	Nashville Warbler	Paruline à joues grises	Landbird	BCR 14 NB	BCR 14 NB			
<i>Ammodramus nelsoni</i>	Nelson's Sparrow	Bruant de Nelson	Landbird	BCR 14 NB MBU 11 NB MBU 12 NB	BCR 14 NB			BCR 14 NB
<i>Cardinalis cardinalis</i>	Northern Cardinal	Cardinal rouge	Landbird	BCR 14 NB	BCR 14 NB	BCR 14 NB		
<i>Colaptes auratus</i>	Northern Flicker	Pic flamboyant	Landbird	BCR 14 NB	BCR 14 NB	BCR 14 NB		
<i>Accipiter gentilis</i>	Northern Goshawk	Autour des palombes	Landbird	BCR 14 NB	BCR 14 NB	BCR 14 NB		BCR 14 NB
<i>Circus cyaneus</i>	Northern Harrier	Busard Saint-Martin	Landbird	BCR 14 NB	BCR 14 NB			

Table A1 continued

Scientific Name	English Name	French Name	Bird Group	Breeding	Migrant	Wintering	Seasonal	Priority
<i>Surnia ulula</i>	Northern Hawk Owl	Chouette épervière	Landbird		BCR 14 NB			
<i>Mimus polyglottos</i>	Northern Mockingbird	Moqueur polyglotte	Landbird	BCR 14 NB	BCR 14 NB	BCR 14 NB		
<i>Setophaga americana</i>	Northern Parula	Paruline à collier	Landbird	BCR 14 NB	BCR 14 NB			
<i>Stelgidopteryx serripennis</i>	Northern Rough-winged Swallow	Hirondelle à ailes hérissées	Landbird	BCR 14 NB	BCR 14 NB			
<i>Aegolius acadicus</i>	Northern Saw-whet Owl	Petite Nyctale	Landbird	BCR 14 NB	BCR 14 NB	BCR 14 NB		
<i>Lanius excubitor</i>	Northern Shrike	Pie-grièche grise	Landbird		BCR 14 NB			
<i>Parkesia noveboracensis</i>	Northern Waterthrush	Paruline des ruisseaux	Landbird	BCR 14 NB	BCR 14 NB			
<i>Contopus cooperi</i>	Olive-sided Flycatcher	Moucherolle à côtés olive	Landbird	BCR 14 NB	BCR 14 NB			BCR 14 NB
<i>Oreothlypis celata</i>	Orange-crowned Warbler	Paruline verdâtre	Landbird		BCR 14 NB			
<i>Icterus spurius</i>	Orchard Oriole	Oriole des vergers	Landbird		BCR 14 NB			
<i>Pandion haliaetus</i>	Osprey	Balbusard pêcheur	Landbird	BCR 14 NB	BCR 14 NB		MBU 11 NB MBU 12 NB	
<i>Seiurus aurocapilla</i>	Ovenbird	Paruline couronnée	Landbird	BCR 14 NB	BCR 14 NB			
<i>Setophaga palmarum</i>	Palm Warbler	Paruline à couronne rousse	Landbird	BCR 14 NB	BCR 14 NB			
<i>Falco peregrinus anatum/tundrius</i>	Peregrine Falcon (anatum/tundrius)	Faucon pèlerin (anatum/tundrius)	Landbird	BCR 14 NB	BCR 14 NB			BCR 14 NB
<i>Vireo philadelphicus</i>	Philadelphia Vireo	Viréo de Philadelphie	Landbird	BCR 14 NB	BCR 14 NB			
<i>Dryocopus pileatus</i>	Pileated Woodpecker	Grand Pic	Landbird	BCR 14 NB	BCR 14 NB	BCR 14 NB		
<i>Pinicola enucleator</i>	Pine Grosbeak	Durbec des sapins	Landbird	BCR 14 NB	BCR 14 NB	BCR 14 NB		
<i>Spinus pinus</i>	Pine Siskin	Tarin des pins	Landbird	BCR 14 NB	BCR 14 NB	BCR 14 NB		
<i>Setophaga pinus</i>	Pine Warbler	Paruline des pins	Landbird	BCR 14 NB	BCR 14 NB			
<i>Setophaga discolor</i>	Prairie Warbler	Paruline des prés	Landbird		BCR 14 NB			
<i>Haemorhous purpureus</i>	Purple Finch	Roselin pourpré	Landbird	BCR 14 NB	BCR 14 NB	BCR 14 NB		BCR 14 NB
<i>Progne subis</i>	Purple Martin	Hirondelle noire	Landbird	BCR 14 NB	BCR 14 NB			
<i>Loxia curvirostra</i>	Red Crossbill	Bec-croisé des sapins	Landbird	BCR 14 NB		BCR 14 NB		
<i>Melanerpes carolinus</i>	Red-bellied Woodpecker	Pic à ventre roux	Landbird		BCR 14 NB			
<i>Sitta canadensis</i>	Red-breasted Nuthatch	Sittelle à poitrine rousse	Landbird	BCR 14 NB	BCR 14 NB	BCR 14 NB		
<i>Vireo olivaceus</i>	Red-eyed Vireo	Viréo aux yeux rouges	Landbird	BCR 14 NB	BCR 14 NB			
<i>Melanerpes erythrocephalus</i>	Red-headed Woodpecker	Pic à tête rouge	Landbird		BCR 14 NB			
<i>Buteo lineatus</i>	Red-shouldered Hawk	Buse à épauettes	Landbird	BCR 14 NB	BCR 14 NB			BCR 14 NB
<i>Buteo jamaicensis</i>	Red-tailed Hawk	Buse à queue rousse	Landbird	BCR 14 NB	BCR 14 NB	BCR 14 NB		
<i>Agelaius phoeniceus</i>	Red-winged Blackbird	Carouge à épauettes	Landbird	BCR 14 NB	BCR 14 NB			
<i>Pheucticus ludovicianus</i>	Rose-breasted Grosbeak	Cardinal à poitrine rose	Landbird	BCR 14 NB	BCR 14 NB			BCR 14 NB
<i>Buteo lagopus</i>	Rough-legged Hawk	Buse pattue	Landbird		BCR 14 NB			
<i>Regulus calendula</i>	Ruby-crowned Kinglet	Roitelet à couronne rubis	Landbird	BCR 14 NB	BCR 14 NB			

Table A1 continued

Scientific Name	English Name	French Name	Bird Group	Breeding	Migrant	Wintering	Seasonal	Priority
<i>Archilochus colubris</i>	Ruby-throated Hummingbird	Colibri à gorge rubis	Landbird	BCR 14 NB	BCR 14 NB			
<i>Bonasa umbellus</i>	Ruffed Grouse	Gélinotte huppée	Landbird	BCR 14 NB	BCR 14 NB	BCR 14 NB		BCR 14 NB
<i>Euphagus carolinus</i>	Rusty Blackbird	Quiscale rouilleux	Landbird	BCR 14 NB	BCR 14 NB			BCR 14 NB
<i>Passerculus sandwichensis</i>	Savannah Sparrow	Bruant des prés	Landbird	BCR 14 NB	BCR 14 NB			
<i>Piranga olivacea</i>	Scarlet Tanager	Piranga écarlate	Landbird	BCR 14 NB	BCR 14 NB			
<i>Accipiter striatus</i>	Sharp-shinned Hawk	Épervier brun	Landbird	BCR 14 NB	BCR 14 NB	BCR 14 NB		
<i>Asio flammeus</i>	Short-eared Owl	Hibou des marais	Landbird	BCR 14 NB	BCR 14 NB	BCR 14 NB		BCR 14 NB
<i>Plectrophenax nivalis</i>	Snow Bunting	Plectrophane des neiges	Landbird		BCR 14 NB			
<i>Bubo scandiacus</i>	Snowy Owl	Harfang des neiges	Landbird		BCR 14 NB			
<i>Melospiza melodia</i>	Song Sparrow	Bruant chanteur	Landbird	BCR 14 NB	BCR 14 NB	BCR 14 NB		
<i>Falcipectus canadensis</i>	Spruce Grouse	Tétras du Canada	Landbird	BCR 14 NB	BCR 14 NB	BCR 14 NB		
<i>Piranga rubra</i>	Summer Tanager	Piranga vermillon	Landbird		BCR 14 NB			
<i>Catharus ustulatus</i>	Swainson's Thrush	Grive à dos olive	Landbird	BCR 14 NB	BCR 14 NB			
<i>Melospiza georgiana</i>	Swamp Sparrow	Bruant des marais	Landbird	BCR 14 NB	BCR 14 NB			
<i>Oreothlypis peregrina</i>	Tennessee Warbler	Paruline obscure	Landbird	BCR 14 NB	BCR 14 NB			
<i>Tachycineta bicolor</i>	Tree Swallow	Hirondelle bicolor	Landbird	BCR 14 NB	BCR 14 NB			BCR 14 NB
<i>Baeolophus bicolor</i>	Tufted Titmouse	Mésange bicolor	Landbird	BCR 14 NB	BCR 14 NB	BCR 14 NB		
<i>Cathartes aura</i>	Turkey Vulture	Urubu à tête rouge	Landbird	BCR 14 NB	BCR 14 NB			
<i>Catharus fuscescens</i>	Veery	Grive fauve	Landbird	BCR 14 NB	BCR 14 NB			BCR 14 NB
<i>Pooecetes gramineus</i>	Vesper Sparrow	Bruant vespéral	Landbird	BCR 14 NB	BCR 14 NB			
<i>Vireo gilvus</i>	Warbling Vireo	Viréo mélodieux	Landbird	BCR 14 NB	BCR 14 NB			
<i>Tyrannus verticalis</i>	Western Kingbird	Tyran de l'Ouest	Landbird		BCR 14 NB			
<i>Sitta carolinensis</i>	White-breasted Nuthatch	Sittelle à poitrine blanche	Landbird	BCR 14 NB	BCR 14 NB	BCR 14 NB		BCR 14 NB
<i>Zonotrichia leucophrys</i>	White-crowned Sparrow	Bruant à couronne blanche	Landbird		BCR 14 NB			
<i>Zonotrichia albicollis</i>	White-throated Sparrow	Bruant à gorge blanche	Landbird	BCR 14 NB	BCR 14 NB			BCR 14 NB
<i>Loxia leucoptera</i>	White-winged Crossbill	Bec-croisé bifascié	Landbird	BCR 14 NB	BCR 14 NB	BCR 14 NB		
<i>Empidonax traillii</i>	Willow Flycatcher	Moucherolle des saules	Landbird	BCR 14 NB	BCR 14 NB			
<i>Cardellina pusilla</i>	Wilson's Warbler	Paruline à calotte noire	Landbird	BCR 14 NB	BCR 14 NB			
<i>Troglodytes hiemalis</i>	Winter Wren	Troglodyte des forêts	Landbird	BCR 14 NB	BCR 14 NB			
<i>Hylocichla mustelina</i>	Wood Thrush	Grive des bois	Landbird	BCR 14 NB	BCR 14 NB			BCR 14 NB
<i>Setophaga petechia</i>	Yellow Warbler	Paruline jaune	Landbird	BCR 14 NB	BCR 14 NB			
<i>Empidonax flaviventris</i>	Yellow-bellied Flycatcher	Moucherolle à ventre jaune	Landbird	BCR 14 NB	BCR 14 NB			
<i>Sphyrapicus varius</i>	Yellow-bellied Sapsucker	Pic maculé	Landbird	BCR 14 NB	BCR 14 NB			BCR 14 NB
<i>Coccyzus americanus</i>	Yellow-billed Cuckoo	Coulicou à bec jaune	Landbird		BCR 14 NB			

Table A1 continued

Scientific Name	English Name	French Name	Bird Group	Breeding	Migrant	Wintering	Seasonal	Priority
<i>Icteria virens</i>	Yellow-breasted Chat	Paruline polyglotte	Landbird		BCR 14 NB			
<i>Xanthocephalus xanthocephalus</i>	Yellow-headed Blackbird	Carouge à tête jaune	Landbird		BCR 14 NB			
<i>Setophaga coronata</i>	Yellow-rumped Warbler	Paruline à croupion jaune	Landbird	BCR 14 NB	BCR 14 NB			
<i>Pluvialis dominica</i>	American Golden-Plover	Pluvier bronzé	Shorebird		BCR 14 NB MBU 11 NB MBU 12 NB			BCR 14 NB
<i>Scolopax minor</i>	American Woodcock	Bécasse d'Amérique	Shorebird	BCR 14 NB	BCR 14 NB			BCR 14 NB
<i>Calidris bairdii</i>	Baird's Sandpiper	Bécasseau de Baird	Shorebird		BCR 14 NB MBU 11 NB MBU 12 NB			
<i>Pluvialis squatarola</i>	Black-bellied Plover	Pluvier argenté	Shorebird		BCR 14 NB MBU 11 NB MBU 12 NB			MBU 11 NB MBU 12 NB
<i>Tryngites subruficollis</i>	Buff-breasted Sandpiper	Bécasseau roussâtre	Shorebird		BCR 14 NB MBU 11 NB MBU 12 NB			
<i>Calidris alpina</i>	Dunlin	Bécasseau variable	Shorebird		BCR 14 NB MBU 11 NB MBU 12 NB			MBU 11 NB MBU 12 NB
<i>Tringa melanoleuca</i>	Greater Yellowlegs	Grand Chevalier	Shorebird		BCR 14 NB MBU 11 NB MBU 12 NB			
<i>Limosa haemastica</i>	Hudsonian Godwit	Barge hudsonienne	Shorebird		BCR 14 NB MBU 11 NB MBU 12 NB			MBU 11 NB MBU 12 NB
<i>Charadrius vociferus</i>	Killdeer	Pluvier kildir	Shorebird	BCR 14 NB	BCR 14 NB MBU 11 NB MBU 12 NB			BCR 14 NB
<i>Calidris minutilla</i>	Least Sandpiper	Bécasseau minuscule	Shorebird		BCR 14 NB MBU 11 NB MBU 12 NB			MBU 11 NB MBU 12 NB
<i>Tringa flavipes</i>	Lesser Yellowlegs	Petit Chevalier	Shorebird		BCR 14 NB MBU 11 NB MBU 12 NB			BCR 14 NB MBU 11 NB MBU 12 NB
<i>Limnodromus scolopaceus</i>	Long-billed Dowitcher	Bécassin à long bec	Shorebird		MBU 11 NB MBU 12 NB			

Table A1 continued

Scientific Name	English Name	French Name	Bird Group	Breeding	Migrant	Wintering	Seasonal	Priority
<i>Calidris melanotos</i>	Pectoral Sandpiper	Bécasseau à poitrine cendrée	Shorebird		BCR 14 NB MBU 11 NB MBU 12 NB			
<i>Charadrius melodus melodus</i>	Piping Plover (melodus)	Pluvier siffleur (melodus)	Shorebird	BCR 14 NB MBU 12 NB	BCR 14 NB MBU 11 NB MBU 12 NB			BCR 14 NB MBU 11 NB MBU 12 NB
<i>Calidris maritima</i>	Purple Sandpiper	Bécasseau violet	Shorebird		MBU 11 NB MBU 12 NB	MBU 11 NB		MBU 11 NB
<i>Calidris canutus rufa</i>	Red Knot (rufa)	Bécasseau maubèche (rufa)	Shorebird		MBU 11 NB MBU 12 NB			MBU 11 NB MBU 12 NB
<i>Phalaropus fulicarius</i>	Red Phalarope	Phalarope à bec large	Shorebird		MBU 11 NB			MBU 11 NB
<i>Phalaropus lobatus</i>	Red-necked Phalarope	Phalarope à bec étroit	Shorebird		BCR 14 NB MBU 11 NB MBU 12 NB			MBU 11 NB
<i>Arenaria interpres</i>	Ruddy Turnstone	Tournepierrre à collier	Shorebird		BCR 14 NB MBU 11 NB MBU 12 NB			
<i>Calidris alba</i>	Sanderling	Bécasseau sanderling	Shorebird		BCR 14 NB MBU 11 NB MBU 12 NB	MBU 11 NB		MBU 11 NB MBU 12 NB
<i>Charadrius semipalmatus</i>	Semipalmated Plover	Pluvier semipalmé	Shorebird		BCR 14 NB MBU 11 NB MBU 12 NB			
<i>Calidris pusilla</i>	Semipalmated Sandpiper	Bécasseau semipalmé	Shorebird		BCR 14 NB MBU 11 NB MBU 12 NB			MBU 11 NB MBU 12 NB
<i>Limnodromus griseus</i>	Short-billed Dowitcher	Bécassin roux	Shorebird		BCR 14 NB MBU 11 NB MBU 12 NB			
<i>Tringa solitaria</i>	Solitary Sandpiper	Chevalier solitaire	Shorebird	BCR 14 NB	BCR 14 NB MBU 11 NB MBU 12 NB			BCR 14 NB MBU 11 NB MBU 12 NB
<i>Actitis macularius</i>	Spotted Sandpiper	Chevalier grivelé	Shorebird	BCR 14 NB	BCR 14 NB MBU 11 NB MBU 12 NB			BCR 14 NB
<i>Calidris himantopus</i>	Stilt Sandpiper	Bécasseau à échasses	Shorebird		BCR 14 NB MBU 11 NB			
<i>Bartramia longicauda</i>	Upland Sandpiper	Maubèche des champs	Shorebird	BCR 14 NB	BCR 14 NB			
<i>Calidris mauri</i>	Western Sandpiper	Bécasseau d'Alaska	Shorebird		MBU 11 NB			

Table A1 continued

Scientific Name	English Name	French Name	Bird Group	Breeding	Migrant	Wintering	Seasonal	Priority
<i>Numenius phaeopus</i>	Whimbrel	Courlis corlieu	Shorebird		BCR 14 NB MBU 11 NB MBU 12 NB			BCR 14 NB MBU 11 NB MBU 12 NB
<i>Calidris fuscicollis</i>	White-rumped Sandpiper	Bécasseau à croupion blanc	Shorebird		BCR 14 NB MBU 11 NB MBU 12 NB			
<i>Tringa semipalmata</i>	Willet	Chevalier semipalmé	Shorebird	MBU 11 NB MBU 12 NB	BCR 14 NB MBU 11 NB MBU 12 NB			MBU 11 NB MBU 12 NB
<i>Phalaropus tricolor</i>	Wilson's Phalarope	Phalarope de Wilson	Shorebird		BCR 14 NB MBU 11 NB MBU 12 NB			
<i>Gallinago delicata</i>	Wilson's Snipe	Bécassine de Wilson	Shorebird	BCR 14 NB	BCR 14 NB MBU 11 NB MBU 12 NB			BCR 14 NB
<i>Botaurus lentiginosus</i>	American Bittern	Butor d'Amérique	Waterbird	BCR 14 NB MBU 11 NB MBU 12 NB	BCR 14 NB MBU 11 NB MBU 12 NB	MBU 11NB MBU 12 NB		BCR 14 NB
<i>Fulica americana</i>	American Coot	Foulque d'Amérique	Waterbird	BCR 14 NB MBU 11 NB	BCR 14 NB MBU 11 NB MBU 12 NB			
<i>Sterna paradisaea</i>	Arctic Tern	Sterne arctique	Waterbird	MBU 11 NB MBU 12 NB	MBU 11 NB MBU 12 NB			MBU 11 NB
<i>Fratercula arctica</i>	Atlantic Puffin	Macareux moine	Waterbird	MBU 11 NB	MBU 11 NB MBU 12 NB	MBU 11 NB		
<i>Cephus grylle</i>	Black Guillemot	Guillemot à miroir	Waterbird	MBU 11 NB MBU 12 NB	MBU 11 NB MBU 12 NB	MBU 11 NB MBU 12 NB		
<i>Chlidonias niger</i>	Black Tern	Guifette noire	Waterbird	BCR 14 NB	BCR 14 NB			BCR 14 NB
<i>Nycticorax nycticorax</i>	Black-crowned Night-Heron	Bihoreau gris	Waterbird	BCR 14 NB MBU 11 NB MBU 12 NB	BCR 14 NB MBU 11 NB MBU 12 NB			
<i>Chroicocephalus ridibundus</i>	Black-headed Gull	Mouette rieuse	Waterbird		MBU 11 NB MBU 12 NB	MBU 11 NB MBU 12 NB		
<i>Rissa tridactyla</i>	Black-legged Kittiwake	Mouette tridactyle	Waterbird	MBU 11 NB MBU 12 NB	MBU 11 NB MBU 12 NB	MBU 11 NB MBU 12 NB		MBU 11 NB
<i>Chroicocephalus philadelphia</i>	Bonaparte's Gull	Mouette de Bonaparte	Waterbird		BCR 14 NB MBU 11 NB MBU 12 NB	BCR 14 NB MBU 11 NB MBU 12 NB		MBU 11 NB
<i>Hydroprogne caspia</i>	Caspian Tern	Sterne caspienne	Waterbird		MBU 12 NB			

Table A1 continued

Scientific Name	English Name	French Name	Bird Group	Breeding	Migrant	Wintering	Seasonal	Priority
<i>Bubulcus ibis</i>	Cattle Egret	Héron garde-boeufs	Waterbird		BCR 14 NB MBU 11 NB			
<i>Gallinula galeata</i>	Common Gallinule	Gallinule d'Amérique	Waterbird	BCR 14 NB	BCR 14 NB			
<i>Gavia immer</i>	Common Loon	Plongeon huard	Waterbird	BCR 14 NB	BCR 14 NB MBU 11 NB MBU 12 NB	MBU 11 NB MBU 12 NB		BCR 14 NB MBU 11 NB MBU 12 NB
<i>Uria aalge</i>	Common Murre	Guillemot marmette	Waterbird	MBU 11 NB	MBU 11 NB MBU 12 NB	MBU 11 NB		MBU 11 NB
<i>Sterna hirundo</i>	Common Tern	Sterne pierregarin	Waterbird	BCR 14 NB MBU 11 NB MBU 12 NB	BCR 14 NB MBU 11 NB MBU 12 NB			BCR 14 NB MBU 11 NB MBU 12 NB
<i>Phalacrocorax auritus</i>	Double-crested Cormorant	Cormoran à aigrettes	Waterbird	BCR 14 NB MBU 11 NB MBU 12 NB	BCR 14 NB MBU 11 NB MBU 12 NB	MBU 11 NB MBU 12 NB		
<i>Alle alle</i>	Dovekie	Mergule nain	Waterbird		MBU 11 NB MBU 12 NB	MBU 11 NB		MBU 11 NB
<i>Larus hyperboreus</i>	Glaucous Gull	Goéland bourgmestre	Waterbird		BCR 14 NB MBU 11 NB MBU 12 NB	BCR 14 NB MBU 11 NB MBU 12 NB		
<i>Plegadis falcinellus</i>	Glossy Ibis	Ibis falcinelle	Waterbird		BCR 14 NB MBU 11 NB			
<i>Larus marinus</i>	Great Black-backed Gull	Goéland marin	Waterbird	BCR 14 NB MBU 11 NB MBU 12 NB	BCR 14 NB MBU 11 NB MBU 12 NB	BCR 14 NB MBU 11 NB MBU 12 NB		
<i>Ardea herodias</i>	Great Blue Heron	Grand Héron	Waterbird	BCR 14 NB MBU 11 NB MBU 12 NB	BCR 14 NB MBU 11 NB MBU 12 NB	MBU 11 NB		
<i>Phalacrocorax carbo</i>	Great Cormorant	Grand Cormoran	Waterbird		MBU 11 NB MBU 12 NB	MBU 11 NB MBU 12 NB		MBU 11 NB
<i>Ardea alba</i>	Great Egret	Grande Aigrette	Waterbird		BCR 14 NB MBU 11 NB MBU 12 NB			
<i>Puffinus gravis</i>	Great Shearwater	Puffin majeur	Waterbird		MBU 11 NB MBU 12 NB		MBU 11 NB MBU 12 NB	MBU 11 NB
<i>Stercorarius skua</i>	Great Skua	Grand Labbe	Waterbird		MBU 11 NB	MBU 11 NB		
<i>Butorides virescens</i>	Green Heron	Héron vert	Waterbird	BCR 14 NB	BCR 14 NB MBU 11 NB			BCR 14 NB



Table A1 continued

Scientific Name	English Name	French Name	Bird Group	Breeding	Migrant	Wintering	Seasonal	Priority
<i>Larus argentatus</i>	Herring Gull	Goéland argenté	Waterbird	BCR 14 NB MBU 11 NB MBU 12 NB	BCR 14 NB MBU 11 NB MBU 12 NB	BCR 14 NB MBU 11 NB MBU 12 NB		
<i>Podiceps auritus</i>	Horned Grebe	Grèbe esclavon	Waterbird		MBU 11 NB MBU 12 NB	MBU 11 NB MBU 12 NB		MBU 11 NB MBU 12 NB
<i>Larus glaucoides</i>	Iceland Gull	Goéland arctique	Waterbird		BCR 14 NB MBU 11 NB MBU 12 NB	BCR 14 NB MBU 11 NB MBU 12 NB		
<i>Leucophaeus atricilla</i>	Laughing Gull	Mouette atricille	Waterbird	MBU 11 NB	MBU 11 NB MBU 12 NB	MBU 11 NB		
<i>Oceanodroma leucorhoa</i>	Leach's Storm-Petrel	Océanite cul-blanc	Waterbird	MBU 11 NB	MBU 11 NB MBU 12 NB	MBU 11 NB MBU 12 NB		MBU 11 NB
<i>Ixobrychus exilis</i>	Least Bittern	Petit Blongios	Waterbird	BCR 14 NB	BCR 14 NB			BCR 14 NB
<i>Larus fuscus</i>	Lesser Black-backed Gull	Goéland brun	Waterbird		BCR 14 NB MBU 11 NB MBU 12 NB	BCR 14 NB MBU 11 NB MBU 12 NB		
<i>Egretta caerulea</i>	Little Blue Heron	Aigrette bleue	Waterbird		BCR 14 NB MBU 11 NB			
<i>Hydrocoloeus minutus</i>	Little Gull	Mouette pygmée	Waterbird		MBU 11 NB MBU 12 NB	MBU 11 NB MBU 12 NB		
<i>Stercorarius longicaudus</i>	Long-tailed Jaeger	Labbe à longue queue	Waterbird		MBU 12 NB	MBU 12 NB		
<i>Puffinus puffinus</i>	Manx Shearwater	Puffin des Anglais	Waterbird		MBU 11 NB MBU 12 NB		MBU 11 NB MBU 12 NB	MBU 11 NB
<i>Fulmarus glacialis</i>	Northern Fulmar	Fulmar boréal	Waterbird		MBU 11 NB MBU 12 NB	MBU 11 NB MBU 12 NB		
<i>Morus bassanus</i>	Northern Gannet	Fou de Bassan	Waterbird	MBU 11 NB	MBU 11 NB MBU 12 NB	MBU 11 NB MBU 12 NB		
<i>Stercorarius parasiticus</i>	Parasitic Jaeger	Labbe parasite	Waterbird		MBU 11 NB MBU 12 NB	MBU 11 NB MBU 12 NB		
<i>Podilymbus podiceps</i>	Pied-billed Grebe	Grèbe à bec bigarré	Waterbird	BCR 14 NB	BCR 14 NB MBU 11 NB MBU 12 NB			BCR 14 NB
<i>Stercorarius pomarinus</i>	Pomarine Jaeger	Labbe pomarin	Waterbird		MBU 11 NB MBU 12 NB	MBU 11 NB MBU 12 NB		
<i>Alca torda</i>	Razorbill	Petit Pingouin	Waterbird	MBU 11 NB	MBU 11 NB MBU 12 NB	MBU 11 NB		MBU 11 NB
<i>Podiceps grisegena</i>	Red-necked Grebe	Grèbe jougris	Waterbird		BCR 14 NB MBU 11 NB MBU 12 NB	MBU 11 NB MBU 12 NB		MBU 11 NB MBU 12 NB

Table A1 continued

Scientific Name	English Name	French Name	Bird Group	Breeding	Migrant	Wintering	Seasonal	Priority
<i>Gavia stellata</i>	Red-throated Loon	Plongeon catmarin	Waterbird		MBU 11 NB MBU 12 NB	MBU 11 NB MBU 12 NB		MBU 11 NB MBU 12 NB
<i>Larus delawarensis</i>	Ring-billed Gull	Goéland à bec cerclé	Waterbird	BCR 14 NB MBU 11 NB MBU 12 NB	BCR 14 NB MBU 11 NB MBU 12 NB	BCR 14 NB MBU 11 NB MBU 12 NB		
<i>Sterna dougallii</i>	Roseate Tern	Sterne de Dougall	Waterbird	MBU 11 NB	MBU 11 NB			MBU 11 NB
<i>Egretta thula</i>	Snowy Egret	Aigrette neigeuse	Waterbird		BCR 14 NB MBU 11 NB			
<i>Puffinus griseus</i>	Sooty Shearwater	Puffin fuligineux	Waterbird		MBU 11 NB MBU 12 NB		MBU 11 NB MBU 12 NB	MBU 11 NB
<i>Porzana carolina</i>	Sora	Marouette de Caroline	Waterbird	BCR 14 NB MBU 11 NB MBU 12 NB	BCR 14 NB MBU 11 NB MBU 12 NB			BCR 14 NB
<i>Stercorarius macormicki</i>	South Polar Skua	Labbe de McCormick	Waterbird		MBU 11 NB		MBU 11 NB	
<i>Uria lomvia</i>	Thick-billed Murre	Guillemot de Brünnich	Waterbird		MBU 11 NB MBU 12 NB	MBU 11 NB		MBU 11 NB
<i>Rallus limicola</i>	Virginia Rail	Râle de Virginie	Waterbird	BCR 14 NB	BCR 14 NB MBU 11 NB MBU 12 NB			BCR 14 NB
<i>Oceanites oceanicus</i>	Wilson's Storm-Petrel	Océanite de Wilson	Waterbird		MBU 11 NB MBU 12 NB		MBU 11 NB MBU 12 NB	
<i>Coturnicops noveboracensis</i>	Yellow Rail	Râle jaune	Waterbird	BCR 14 NB	BCR 14 NB			BCR 14 NB
<i>Nyctanassa violacea</i>	Yellow-crowned Night-Heron	Bihoreau violacé	Waterbird		MBU 11 NB			
<i>Anas rubripes</i>	American Black Duck	Canard noir	Waterfowl	BCR 14 NB MBU 11 NB MBU 12 NB	BCR 14 NB MBU 11 NB MBU 12 NB	BCR 14 NB MBU 11 NB MBU 12 NB		BCR 14 NB MBU 11 NB MBU 12 NB
<i>Anas americana</i>	American Wigeon	Canard d'Amérique	Waterfowl	BCR 14 NB	BCR 14 NB MBU 11 NB MBU 12 NB			
<i>Bucephala islandica</i>	Barrow's Goldeneye (Eastern)	Garrot d'Islande (de l'Est)	Waterfowl		BCR 14 NB	BCR 14 NB MBU 11 NB MBU 12 NB		BCR 14 NB MBU 11 NB MBU 12 NB
<i>Melanitta americana</i>	Black Scoter	Macreuse à bec jaune	Waterfowl		MBU 11 NB MBU 12 NB	MBU 11 NB		MBU 11 NB MBU 12 NB

Table A1 continued

Scientific Name	English Name	French Name	Bird Group	Breeding	Migrant	Wintering	Seasonal	Priority
<i>Anas discors</i>	Blue-winged Teal	Sarcelle à ailes bleues	Waterfowl	BCR 14 NB	BCR 14 NB MBU 11 NB MBU 12 NB			
<i>Branta bernicla</i>	Brant	Bernache cravant	Waterfowl		MBU 11 NB MBU 12 NB	MBU 11 NB		
<i>Bucephala albeola</i>	Bufflehead	Petit Garrot	Waterfowl		BCR 14 NB MBU 11 NB MBU 12 NB	BCR 14 NB MBU 11 NB MBU 12 NB		
<i>Branta canadensis</i>	Canada Goose	Bernache du Canada	Waterfowl	BCR 14 NB MBU 11 NB MBU 12 NB	BCR 14 NB MBU 11 NB MBU 12 NB			
<i>Branta canadensis</i>	Canada Goose (North Atlantic)	Bernache du Canada (Atlantique Nord)	Waterfowl		BCR 14 NB MBU 11 NB MBU 12 NB			BCR 14 NB MBU 11 NB MBU 12 NB
<i>Branta canadensis</i>	Canada Goose (Temperate-breeding in Eastern Canada)	Bernache du Canada (qui se reproduit dans des régions tempérées de l'est du Canada)	Waterfowl	BCR 14 NB MBU 11 NB MBU 12 NB	BCR 14 NB			BCR 14 NB MBU 11 NB MBU 12 NB
<i>Somateria mollissima</i>	Common Eider	Eider à duvet	Waterfowl	MBU 11 NB MBU 12 NB	MBU 11 NB MBU 12 NB	MBU 11 NB		MBU 11 NB MBU 12 NB
<i>Bucephala clangula</i>	Common Goldeneye	Garrot à oeil d'or	Waterfowl	BCR 14 NB	BCR 14 NB MBU 11 NB MBU 12 NB	BCR 14 NB MBU 11 NB MBU 12 NB		BCR 14 NB MBU 11 NB MBU 12 NB
<i>Mergus merganser</i>	Common Merganser	Grand Harle	Waterfowl	BCR 14 NB	BCR 14 NB MBU 11 NB MBU 12 NB	BCR 14 NB MBU 11 NB MBU 12 NB		
<i>Anas penelope</i>	Eurasian Wigeon	Canard siffleur	Waterfowl		BCR 14 NB			
<i>Anas strepera</i>	Gadwall	Canard chipeau	Waterfowl	BCR 14 NB MBU 11 NB	BCR 14 NB			
<i>Aythya marila</i>	Greater Scaup	Fuligule milouinan	Waterfowl	BCR 14 NB	BCR 14 NB	MBU 11 NB MBU 12 NB		
<i>Anas crecca</i>	Green-winged Teal	Sarcelle d'hiver	Waterfowl	BCR 14 NB MBU 11 NB MBU 12 NB	BCR 14 NB MBU 11 NB MBU 12 NB			BCR 14 NB MBU 11 NB MBU 12 NB
<i>Histrionicus histrionicus</i>	Harlequin Duck (Eastern)	Arlequin plongeur (de l'Est)	Waterfowl	BCR 14 NB	BCR 14 NB MBU 12 NB	MBU 11 NB		BCR 14 NB MBU 11 NB MBU 12 NB

Table A1 continued

Scientific Name	English Name	French Name	Bird Group	Breeding	Migrant	Wintering	Seasonal	Priority
<i>Lophodytes cucullatus</i>	Hooded Merganser	Harle couronné	Waterfowl	BCR 14 NB	BCR 14 NB MBU 11 NB MBU 12 NB	BCR 14 NB MBU 11 NB		
<i>Somateria spectabilis</i>	King Eider	Eider à tête grise	Waterfowl		MBU 11 NB MBU 12 NB	MBU 11 NB		
<i>Aythya affinis</i>	Lesser Scaup	Petit Fuligule	Waterfowl		BCR 14 NB MBU 11 NB MBU 12 NB	MBU 11 NB MBU 12 NB		
<i>Clangula hyemalis</i>	Long-tailed Duck	Harelde kakawi	Waterfowl		BCR 14 NB MBU 11 NB MBU 12 NB	BCR 14 NB MBU 11 NB MBU 12 NB		MBU 11 NB MBU 12 NB
<i>Anas platyrhynchos</i>	Mallard	Canard colvert	Waterfowl	BCR 14 NB MBU 11 NB MBU 12 NB	BCR 14 NB MBU 11 NB MBU 12 NB	BCR 14 NB MBU 11 NB MBU 12 NB		BCR 14 NB
<i>Anas acuta</i>	Northern Pintail	Canard pilet	Waterfowl	BCR 14 NB MBU 11 NB MBU 12 NB	BCR 14 NB MBU 11 NB MBU 12 NB			
<i>Anas clypeata</i>	Northern Shoveler	Canard souchet	Waterfowl	BCR 14 NB MBU 11 NB MBU 12 NB	BCR 14 NB MBU 11 NB MBU 12 NB			
<i>Mergus serrator</i>	Red-breasted Merganser	Harle huppé	Waterfowl	BCR 14 NB MBU 11 NB MBU 12 NB	BCR 14 NB MBU 11 NB MBU 12 NB	MBU 11 NB MBU 12 NB		
<i>Aythya collaris</i>	Ring-necked Duck	Fuligule à collier	Waterfowl	BCR 14 NB	BCR 14 NB MBU 11 NB MBU 12 NB			BCR 14 NB
<i>Oxyura jamaicensis</i>	Ruddy Duck	Érismature rousse	Waterfowl		BCR 14 NB			
<i>Chen caerulescens</i>	Snow Goose	Oie des neiges	Waterfowl		BCR 14 NB MBU 11 NB MBU 12 NB			
<i>Melanitta perspicillata</i>	Surf Scoter	Macreuse à front blanc	Waterfowl		MBU 11 NB MBU 12 NB	MBU 11 NB		MBU 11 NB MBU 12 NB
<i>Melanitta fusca</i>	White-winged Scoter	Macreuse brune	Waterfowl		MBU 11 NB MBU 12 NB	MBU 11 NB		
<i>Aix sponsa</i>	Wood Duck	Canard branchu	Waterfowl	BCR 14 NB	BCR 14 NB			BCR 14 NB

**List of All Priority Bird Species and Their Habitat Associations for BCR 14 NB, MBU 11 NB and MBU 12 NB**

Table A2. List of all priority bird species for BCR 14 NB, MBU 11 NB and MBU 12 NB associated in each habitat class. Shaded cells indicate that the species was not a priority within the planning unit.

BCR 14 NB	MBU 11 NB	MBU 12 NB	Priority Species	Bird Group	BCR 14 NB											MBU 11 NB & 12 NB	
					Coniferous	Mixed Wood	Deciduous	Shrub/Early Successional	Herbaceous	Cultivated and Managed Areas	Urban	Riparian	Wetland	Inland Waterbodies	Coastal (above high tide)	Marine Waters	Coastal (intertidal)
Y			American Redstart	Landbird	Y	Y	Y	Y									
Y			American Three-toed Woodpecker	Landbird	Y	Y							Y				
Y			Bald Eagle	Landbird								Y			Y		
Y			Bank Swallow	Landbird							Y	Y			Y		
Y			Barn Swallow	Landbird						Y	Y		Y				
Y			Bay-breasted Warbler	Landbird	Y	Y						Y					
Y			Belted Kingfisher	Landbird								Y		Y	Y		
Y			Bicknell's Thrush	Landbird	Y												
Y			Black-backed Woodpecker	Landbird	Y								Y				
Y			Black-billed Cuckoo	Landbird		Y	Y										
Y			Blackburnian Warbler	Landbird	Y	Y	Y										
Y			Black-throated Blue Warbler	Landbird		Y	Y										
Y			Black-throated Green Warbler	Landbird	Y	Y											
Y			Blue-headed Vireo	Landbird	Y	Y											
Y			Bobolink	Landbird					Y	Y			Y				
Y			Boreal Chickadee	Landbird	Y												
Y			Canada Warbler	Landbird	Y	Y	Y						Y				

Table A2 continued

BCR 14 NB	MBU 11 NB	MBU 12 NB	Priority Species	Bird Group	BCR 14 NB											MBU 11 NB & 12 NB	
					Coniferous	Mixed Wood	Deciduous	Shrub/Early Successional	Herbaceous	Cultivated and Managed Areas	Urban	Riparian	Wetland	Inland Waterbodies	Coastal (above high tide)	Marine Waters	Coastal (intertidal)
Y			Cape May Warbler	Landbird	Y												
Y			Chimney Swift	Landbird	Y	Y	Y				Y		Y				
Y			Common Nighthawk	Landbird	Y	Y			Y	Y	Y		Y		Y		
Y			Eastern Kingbird	Landbird				Y	Y	Y		Y	Y				
Y			Eastern Meadowlark	Landbird					Y	Y							
Y			Eastern Whip-poor-will	Landbird		Y	Y										
Y			Eastern Wood-Pewee	Landbird		Y	Y										
Y			Evening Grosbeak	Landbird	Y	Y											
Y			Magnolia Warbler	Landbird	Y	Y							Y				
Y			Nelson's Sparrow	Landbird						Y			Y		Y		
Y			Northern Goshawk	Landbird		Y	Y										
Y			Olive-sided Flycatcher	Landbird	Y	Y							Y				
Y			Peregrine Falcon (anatum/tundrius)	Landbird							Y	Y			Y		
Y			Purple Finch	Landbird	Y	Y	Y										
Y			Red-shouldered Hawk	Landbird		Y	Y						Y				
Y			Rose-breasted Grosbeak	Landbird		Y	Y	Y									
Y			Ruffed Grouse	Landbird		Y	Y										
Y			Rusty Blackbird	Landbird	Y	Y						Y	Y				
Y			Short-eared Owl	Landbird				Y	Y	Y			Y		Y		
Y			Tree Swallow	Landbird					Y	Y		Y	Y				
Y			Veery	Landbird		Y	Y	Y									

Table A2 continued

BCR 14 NB	MBU 11 NB	MBU 12 NB	Priority Species	Bird Group	BCR 14 NB											MBU 11 NB & 12 NB	
					Coniferous	Mixed Wood	Deciduous	Shrub/Early Successional	Herbaceous	Cultivated and Managed Areas	Urban	Riparian	Wetland	Inalnd Waterbodies	Coastal (above high tide)	Marine Waters	Coastal (intertidal)
Y			White-breasted Nuthatch	Landbird		Y	Y										
Y			White-throated Sparrow	Landbird				Y		Y							
Y			Wood Thrush	Landbird		Y	Y										
Y			Yellow-bellied Sapsucker	Landbird		Y	Y										
Y			American Golden-Plover	Shorebird					Y	Y					Y		
Y			American Woodcock	Shorebird		Y		Y									
	Y	Y	Black-bellied Plover	Shorebird													Y
	Y	Y	Dunlin	Shorebird													Y
	Y	Y	Hudsonian Godwit	Shorebird													Y
Y			Killdeer	Shorebird						Y	Y		Y		Y		
	Y	Y	Least Sandpiper	Shorebird													Y
Y	Y	Y	Lesser Yellowlegs	Shorebird								Y					Y
Y	Y	Y	Piping Plover (melodus)	Shorebird											Y		Y
	Y		Purple Sandpiper	Shorebird													Y
	Y	Y	Red Knot (rufa)	Shorebird													Y
	Y		Red Phalarope	Shorebird												Y	
	Y		Red-necked Phalarope	Shorebird												Y	Y
	Y	Y	Sanderling	Shorebird													Y
	Y	Y	Semipalmated Sandpiper	Shorebird													Y
Y	Y	Y	Solitary Sandpiper	Shorebird								Y	Y				Y
Y			Spotted Sandpiper	Shorebird						Y		Y			Y		
Y	Y	Y	Whimbrel	Shorebird						Y					Y		Y

Table A2 continued

BCR 14 NB	MBU 11 NB	MBU 12 NB	Priority Species	Bird Group	BCR 14 NB											MBU 11 NB & 12 NB	
					Coniferous	Mixed Wood	Deciduous	Shrub/Early Successional	Herbaceous	Cultivated and Managed Areas	Urban	Riparian	Wetland	Inland Waterbodies	Coastal (above high tide)	Marine Waters	Coastal (intertidal)
	Y	Y	Willet	Shorebird													Y
Y			Wilson's Snipe	Shorebird						Y			Y	Y			
Y			American Bittern	Waterbird					Y				Y		Y		
	Y		Arctic Tern	Waterbird												Y	Y
Y			Black Tern	Waterbird									Y	Y			
	Y		Black-legged Kittiwake	Waterbird												Y	Y
	Y		Bonaparte's Gull	Waterbird												Y	Y
Y	Y	Y	Common Loon	Waterbird										Y		Y	Y
	Y		Common Murre	Waterbird												Y	Y
Y	Y	Y	Common Tern	Waterbird										Y	Y	Y	Y
	Y		Dovekie	Waterbird												Y	
	Y		Great Cormorant	Waterbird												Y	
	Y		Great Shearwater	Waterbird												Y	
Y			Green Heron	Waterbird								Y	Y	Y			
	Y	Y	Horned Grebe	Waterbird												Y	Y
	Y		Leach's Storm-Petrel	Waterbird												Y	Y
Y			Least Bittern	Waterbird									Y				
	Y		Manx Shearwater	Waterbird												Y	
Y			Pied-billed Grebe	Waterbird									Y	Y			
	Y		Razorbill	Waterbird												Y	Y
	Y	Y	Red-necked Grebe	Waterbird												Y	Y
	Y	Y	Red-throated Loon	Waterbird												Y	Y



Table A2 continued

BCR 14 NB	MBU 11 NB	MBU 12 NB	Priority Species	Bird Group	BCR 14 NB										MBU 11 NB & 12 NB		
					Coniferous	Mixed Wood	Deciduous	Shrub/Early Successional	Herbaceous	Cultivated and Managed Areas	Urban	Riparian	Wetland	Inalnd Waterbodies	Coastal (above high tide)	Marine Waters	Coastal (intertidal)
	Y		Roseate Tern	Waterbird											Y	Y	
	Y		Sooty Shearwater	Waterbird											Y		
Y			Sora	Waterbird						Y			Y		Y		
	Y		Thick-billed Murre	Waterbird											Y		
Y			Virginia Rail	Waterbird									Y				
Y			Yellow Rail	Waterbird						Y		Y		Y			
Y	Y	Y	American Black Duck	Waterfowl						Y			Y	Y		Y	Y
Y	Y	Y	Barrow's Goldeneye (Eastern)	Waterfowl										Y		Y	Y
	Y	Y	Black Scoter	Waterfowl											Y		
Y	Y	Y	Canada Goose (North Atlantic)	Waterfowl						Y			Y	Y			Y
Y	Y	Y	Canada Goose (Temperate-breeding in Eastern Canada)	Waterfowl						Y			Y	Y			Y
	Y	Y	Common Eider	Waterfowl												Y	Y
Y	Y	Y	Common Goldeneye	Waterfowl								Y	Y	Y		Y	Y
Y	Y	Y	Green-winged Teal	Waterfowl						Y			Y	Y		Y	Y
Y	Y	Y	Harlequin Duck (Eastern)	Waterfowl										Y		Y	
	Y	Y	Long-tailed Duck	Waterfowl												Y	
Y			Mallard	Waterfowl						Y			Y	Y	Y		
Y			Ring-necked Duck	Waterfowl									Y	Y			
	Y	Y	Surf Scoter	Waterfowl												Y	
Y			Wood Duck	Waterfowl								Y	Y	Y			

### List of All Regional Threats in BCR 14 NB, MBU 11 NB and MBU 12 NB

Table A3. List of all the regional threats (with rolled-up rankings at the sub-threat level) sorted by threat sub-category numbered as per Salfsky and colleagues (2008) and habitat class of BCR 14 NB, MBU 11 NB and MBU 12 NB. "Y" means the threat was associated with the habitat class. The rolled-up score for each threat sub-category is also provided by habitat: L: Low, M: Medium, H: High, VH: Very High.

Threat Sub-categories (regional threats)	BCR 14 NB												MBU 11 NB			MBU 12 NB		
	Coniferous	Mixedwood	Deciduous	Shrub/Early Successional	Herbaceous	Cultivated and Managed Areas	Urban	Inland Waterbodies	Wetlands	Riparian	Coastal (above high tide)	Widespread	Coastal (intertidal)	Marine Waters	Widespread	Coastal (intertidal)	Marine Waters	Widespread
1.1 Housing and urban areas	L	L	L	L	L	M	M	L	M	M	M	L	L			L		
Fragmentation or loss of <i>habitat class</i> to urban development	Y	Y	Y	Y	Y	Y		Y	Y	Y	Y							
Loss of saltmarshes by in-filling for recreational and residential development													Y			Y		
Loss of nesting sites on private housing structures (old chimneys, gravel roofs, old wooden buildings, etc).							Y											
Mortality due to collisions with house windows or buildings												Y						
1.2 Commercial & industrial areas							H		L					L				
Fragmentation or loss of <i>habitat class</i> to industrial development									Y									
Loss of nesting sites on commercial or industrial structures (old chimneys, gravel roofs, old wooden buildings, etc).							Y											
Loss of or disturbance at nearshore foraging sites due to urban development														Y				
1.3 Tourism and recreation areas								L										
Fragmentation or loss of <i>habitat class</i> to recreational housing development								Y										
2.1 Annual & perennial non-timber crops	L	L	L			H			M	L	L		L			L		
Fragmentation or loss of moist habitat type within a <i>habitat class</i> due to a conversion of that habitat to cropland	Y	Y	Y			Y			Y	Y	Y							
Loss of saltmarshes by dyking for agricultural lands													Y			Y		
Destruction of nests due to early haying						Y												
2.2 Wood & pulp plantations		M	M															

Table A3 continued

Threat Sub-categories (regional threats)	BCR 14 NB												MBU 11 NB			MBU 12 NB		
	Coniferous	Mixedwood	Deciduous	Shrub/Early Successional	Herbaceous	Cultivated and Managed Areas	Urban	Inland Waterbodies	Wetlands	Riparian	Coastal (above high tide)	Widespread	Coastal (intertidal)	Marine Waters	Widespread	Coastal (intertidal)	Marine Waters	Widespread
Fragmentation or loss of <i>a habitat class</i> due to its conversion to managed coniferous forest		Y	Y															
2.3 Livestock farming & ranching						L			L	L	L		L			L		
Destruction of nests by cattle grazing in nesting habitat						Y												
Fragmentation or loss of <i>habitat class</i> due to a change in land use for cattle grazing habitat									Y	Y	Y		Y			Y		
2.4 Marine & freshwater aquaculture													L	M		L	M	
Competition for prey or foraging areas with industrial or commercial operations (specifically with aquaculture farms)														Y			Y	
Competition for prey or nesting or brooding areas with industrial or commercial operations (specifically with aquaculture farms)													Y	Y		Y	Y	
3.3 Renewable Energy	L	L	L		L							L	L		L	L		L
Fragmentation or loss of <i>habitat class</i> due to construction and operation of wind farms	Y	Y	Y		Y								Y			Y		
Mortality due to collision with wind turbines												Y			Y			Y
4.1 Roads & railroads	M	L	L		L				L	L	L	L	L			L		
Fragmentation or loss of <i>habitat class</i> due to the construction of roads	Y	Y	Y		Y				Y	Y	Y							
Loss of saltmarshes due to in-filling for construction and maintenance of roads													Y			Y		
Mortality due to collisions with vehicles												Y						
4.2 Utility & service lines	L	L	L		L				L	L	L	L	L			L		
Fragmentation or loss of <i>habitat class</i> due to the construction and maintenance of right-of-ways for power lines	Y	Y	Y		Y				Y	Y	Y							
Loss of saltmarshes for in-filling for the construction and maintenance of right-of-ways for power lines													Y			Y		

Table A3 continued

Threat Sub-categories (regional threats)	BCR 14 NB												MBU 11 NB			MBU 12 NB		
	Coniferous	Mixedwood	Deciduous	Shrub/Early Successional	Herbaceous	Cultivated and Managed Areas	Urban	Inland Waterbodies	Wetlands	Riparian	Coastal (above high tide)	Widespread	Coastal (intertidal)	Marine Waters	Widespread	Coastal (intertidal)	Marine Waters	Widespread
Mortality due to collision with service lines and communication towers												Y						
5.1 Hunting & collecting terrestrial animals								L						L			L	
Accidental shooting or mistaken identity								Y						Y			Y	
Illegal shooting or poaching														Y				
5.2 Gathering terrestrial plants									L									
Fragmentation or loss of bogs within <i>wetlands</i> for peat extraction									Y									
5.3 Logging & wood harvesting	VH	H	VH					L	H	H	L							
Fragmentation or loss of forests due to logging activities	Y	Y	Y					Y	Y	Y	Y							
5.4 Fishing & harvesting aquatic resources													L	M		L	L	
Competition for prey or resources with the industrial or commercial harvesting operations of algae													Y	Y		Y	Y	
Competition for prey or resources with industrial or commercial harvesting operations of marine worms													Y					
Competition for prey or resources with industrial or commercial fisheries operations														Y		Y	Y	
Fisheries bycatch or drowning as a result of entanglement in fishing gear														Y			Y	
6.1 Recreational activities					L			M	L	L	M		H	L		M		
Disturbance at foraging sites by recreational activities in <i>habitat class</i>					Y			Y	Y	Y	Y		Y	Y		Y		
Disturbance at roosting sites by recreational activities in <i>habitat class</i>										Y	Y							
Disturbance at nest sites by recreational activities in <i>habitat class</i>								Y	Y		Y		Y			Y		
Habitat loss or degradation due to human activity causing collapse of nesting banks										Y	Y							
6.3 Work & other activities							L				L		L			L		

Table A3 continued

Threat Sub-categories (regional threats)	BCR 14 NB												MBU 11 NB			MBU 12 NB		
	Coniferous	Mixedwood	Deciduous	Shrub/Early Successional	Herbaceous	Cultivated and Managed Areas	Urban	Inland Waterbodies	Wetlands	Riparian	Coastal (above high tide)	Widespread	Coastal (intertidal)	Marine Waters	Widespread	Coastal (intertidal)	Marine Waters	Widespread
Disturbance at nest sites due to building and bridge maintenance activities							Y											
Disturbance at nest sites due to research activities													Y					
Disturbance at foraging sites due to operational activities of oyster and mussel aquaculture leases											Y		Y			Y		
7.1 Fire & fire suppression	L	L	L															
Fire suppression	Y	Y	Y															
7.2 Dams & water management/use								L	L	L	L							
Habitat loss or degradation due to changes to hydrology or stabilization of water regimes within <i>habitat class</i>								Y	Y	Y	Y							
7.3 Other ecosystem modifications				L		L					M		M			M		
Loss of old and abandoned fields returning to forest				Y														
Reforestation of agricultural land (i.e., as a loss of cultivated and managed areas)						Y												
Loss of specific habitat features due to changes in sedimentation patterns which are caused by the installation of riprap											Y		Y			Y		
8.1 Invasive non-native/alien species					L	L	L		L	L			L					
Introduction of mammalian predators leading to increased competition from problematic non-native species													Y					
Competition for nest sites with European Starling, a problematic non-native species					Y	Y	Y		Y	Y								
Degradation of <i>wetlands</i> due to the invasion of purple loosestrife									Y									
8.2 Problematic native species	L	L	L	L	L	L		L	L	L	M		M	L		L	L	
Parasitism by Brown-headed Cowbird	Y	Y	Y	Y	Y	Y			Y									
Competition with Red-winged Blackbirds									Y	Y								
Hybridization and competition with Mallards						Y		Y	Y				Y	Y		Y	Y	

Table A3 continued

Threat Sub-categories (regional threats)	BCR 14 NB												MBU 11 NB			MBU 12 NB		
	Coniferous	Mixedwood	Deciduous	Shrub/Early Successional	Herbaceous	Cultivated and Managed Areas	Urban	Inland Waterbodies	Wetlands	Riparian	Coastal (above high tide)	Widespread	Coastal (intertidal)	Marine Waters	Widespread	Coastal (intertidal)	Marine Waters	Widespread
Competition with and displacement by gulls								Y			Y		Y			Y		
Increased predation due to an increase of predator populations as a result of land use practices		Y	Y								Y		Y					
Competition for nest sites or nest predation from gulls, crows or squirrels	Y												Y			Y		
Finch eye disease	Y	Y	Y															
Mortality from disease outbreaks									Y					Y			Y	
9.1 Household sewage & urban waste water									L		L							
Decrease of diet quality and of health of birds due to the chemical contamination of water and sediments by sewage or urban wastewater operations									Y		Y							
9.2 Industrial & military effluents							L	L	L		M		H	H		H	M	
Decrease of diet quality and of health of birds due to the chemical or heavy metal contamination of food source								Y	Y		Y		Y	Y		Y	Y	
Decrease of prey availability to birds due to chemical or heavy metal contamination							Y	Y					Y	Y		Y	Y	
Decrease of availability of food to birds due to oil spills and oil discharges											Y		Y	Y		Y	Y	
Hypothermia caused by oil on plumage from oil spills and oil discharges											Y		Y	Y		Y	Y	
9.3 Agricultural & forestry effluents	H	M	M	L	L	M		L	M	M	M		L	L		L	L	
Decrease of diet quality and of health of birds due to the consumption of contaminated food by biocides such as pesticide, herbicide, or fungicide	Y	Y	Y	Y		Y		Y	Y	Y	Y		Y	Y		Y	Y	
Decrease of prey availability due to chemical contamination from biocides such as pesticide, herbicide, or fungicide	Y	Y	Y	Y	Y	Y		Y	Y	Y	Y							
Loss of food source due to eutrophication from fertilisers								Y			Y							

Table A3 continued

Threat Sub-categories (regional threats)	BCR 14 NB												MBU 11 NB			MBU 12 NB		
	Coniferous	Mixedwood	Deciduous	Shrub/Early Successional	Herbaceous	Cultivated and Managed Areas	Urban	Inland Waterbodies	Wetlands	Riparian	Coastal (above high tide)	Widespread	Coastal (intertidal)	Marine Waters	Widespread	Coastal (intertidal)	Marine Waters	Widespread
9.4 Garbage & solid waste													L	M		L	L	
Mortality from the consumption of plastics or garbage													Y	Y		Y	Y	
9.5 Airborne pollutants	L	L			L	L		M	M	L								
Habitat degradation due to acid precipitation affecting prey availability	Y	Y			Y			Y	Y	Y								
Reduction in fecundity due to the contamination of food from acid precipitation					Y	Y		Y	Y	Y								
11.1 Habitat shifting and alteration												M			L			L
Habitat degradation due to changes in weather or sea surface temperature affecting food availability												Y			Y			Y
Habitat loss due to changes in fire regimes, increased temperature at high elevations												Y						
11.2 Droughts												M						
Loss of moist habitat types												Y						
11.3 Temperature extremes												L						
Reduction in survival due to spring climate fluctuations												Y						
11.4 Storms and flooding												H			M			M
Reduction in survival of adults or chicks or flooding of nests due to heavy rains												Y			Y			Y
Habitat loss due to increased severity or frequency of storms leading to coastal erosion												Y						

## 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<sup>6</sup>.

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

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

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<sup>6</sup> Partners in Flight (landbirds), Wings Over Water (waterbirds), Canadian Shorebird Conservation Plan (shorebirds), NAWMP (waterfowl).



- population trend,
- 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.

For New Brunswick planning units, a species was considered “regularly occurring” within the unit and assessed for priority status if there were 10 or more records in the past 10 years, occurring every year or almost every year. Records were obtained from Partners in Flight, preliminary data from the Maritimes Breeding Bird Atlas (Stewart et al. in prep.), the Atlantic Canada Shorebird Surveys database (Canadian Wildlife Service–Atlantic Region), the Atlantic Colonial Seabird Bird Database (Canadian Wildlife Service–Atlantic Region), [eBird Canada](#) (eBird Canada 2010), the Atlantic Coastal Blocks database (Canadian Wildlife Service–Atlantic Region) and the [Christmas Bird Count](#) data (National Audubon Society 2010). Federally or provincially listed species were also considered, even if there were fewer than 10 records.

Some aspects of the methodology were different for Atlantic Region than other regions. The priority species were not derived from standard assessment protocols developed by the four major bird conservation initiatives due to issues of scale that were not addressed by all the conservation initiatives. The result is that the sub-BCR species priority list includes priorities identified at any or all of three geographic scales: continental, BCR-wide and within the sub-BCR.

Continental waterfowl priority species were assessed by determining the interaction of importance to harvest and population trend. NAWMP’s latest version adds regional prioritization to its continental assessment (NAWMP Plan Committee 2004) and NAWMP’s Waterfowl Conservation Regions (WCRs) are similar to NABCI’s BCRs. Species have been prioritized in each WCR based on their continental priority level in combination with the region’s relative importance to the species, which is derived from assessments of the percentage and relative density of populations and threats to habitats within the WCR. To translate these strategies to on-the-ground conservation efforts, many states and provinces have developed their own NAWMP Implementation Plans.

The waterfowl species prioritization exercise in this strategy was strongly based on the EHJV Implementation Plan (NB-EHJV 2008). The “key waterfowl species” were selected from the NB-EHJV Implementation Plan in each of the planning units. In addition, some species were added for which the NAWMP conservation and/or monitoring rank was “High” or “Highest” if they had not been included in the NB-EHJV Implementation Plan.

Instead of using the North American Waterbird Conservation Plan’s (Kushlan et al. 2002) species assessment scores and methods, Lock (2009) adopted certain aspects of the Partners in

Flight method (Panjabi et al. 2005) to create his own assessment system. However, he did not assign a cut-off point to his total score, above which species would be considered priority species. We thus used information gathered from Lock's plan and working files, along with Kushlan et al. (2002), to establish a list of priority species for Atlantic Region, following the Partners in Flight approach for regional species assessment (Panjabi et al. 2005).

Similar to waterbirds, shorebirds do not benefit from having an established regional assessment protocol. We tried to take advantage of previous conservation planning efforts, namely by using results of the Canadian Shorebird Conservation Plan (Donaldson et al. 2000) and the Atlantic Canada Shorebird Conservation Plan (Boates et al. 2008), updating trend information with Morrison et al. (2006) and Andres (2009) and data from the Atlantic Canada Shorebird Surveys.

For landbirds, Partners in Flight (PIF) has taken the lead role in preparing standard methodology to assess landbird species throughout North America. To identify species on which to focus conservation attention all landbird species were assessed using the sub-regional adaptation of the PIF regional assessment guidelines (Blancher, personal communication based on Panjabi et al. 2005).

## **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 (FAO 2000). Some modifications were made to the LCCS scheme to reflect habitat types that are important to birds that are not included in the classification (e.g., marine habitats). Species often are assigned to more than one of these coarse habitat classes. To retain the link to regional spatial data (e.g., provincial forest inventories) or to group species into regionally relevant habitat classes, individual BCR strategies may identify finer-scale habitat classes. Finer-scale habitat attributes and the surrounding landscape context were also captured when possible to better guide the development of specific conservation objectives and actions.

## **Element 3: Population Objectives for Priority Species**

A central component of effective conservation planning is setting clear objectives that can be measured and evaluated. Bird Conservation Strategies set objectives based upon the conservation philosophies of national and continental bird initiatives, including the North

American Bird Conservation Initiative (NABCI), that support conserving the distribution, diversity and abundance of birds throughout their historical ranges. The baselines for population objectives used in this planning exercise (those existing during the late 1960s, 1970s and 1990s for eastern waterfowl) reflect population levels prior to widespread declines. Most of the four bird conservation initiatives under the umbrella of NABCI have adopted the same baselines at the continental and national scale (waterfowl, shorebirds and landbirds; national and continental waterbird plans have not yet set population objectives). Some regions in the current planning effort have adjusted baselines to reflect the start of systematic monitoring. The ultimate measure of conservation success will be the extent to which population objectives have been reached. Progress towards population objectives will be regularly assessed as part of an adaptive management approach.

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

For New Brunswick planning units, population objectives for waterfowl were taken from the NB-EHJV Implementation Plan (NB-EHJV 2008) and from the Atlantic Flyway Management Plan objectives in the case of the Canada Goose North Atlantic population (Atlantic Flyway Technical Section 2008). Population objectives for landbirds, inland waterbirds and breeding shorebirds were assigned based on the species population trend (PT) score. For each priority species, the PT score for the entire BCR was provided by Partners in Flight, and the PT score for the province of New Brunswick portion of the BCR was calculated from Breeding Bird Survey (BBS) data and/or Maritimes Breeding Bird Atlas data following PIF protocols (Panjabi et al. 2005). As part of a precautionary approach, the higher of the two PT scores was used to assign a population objective.

Priority species exhibiting declines (PT=4) were given an objective of "increase by 50%", while strongly declining species (PT=5) had an objective identified as "increase by 100%". For species with PT = 3 (uncertain or unknown trend), objectives were set as "maintain and assess." Finally, species with stable or increasing populations (PT = 1 or 2) were given the objective to "maintain current."

For PT scores (which are mostly for landbirds with BBS data), we used the new trinational method (May 2010 trinational document *Saving our Shared Birds*). We also adjusted the 30-year period to cover the whole span of BBS data, which is 42 years (1966-2008).

For landbirds, we updated data from the 2004 species assessment (Rocky Mountain Bird Observatory 2005) with more recent data whenever possible. We used new distribution data and population trend scores from the PIF database (Panjabi et al. 2005), as well as new trend scores from BBS trend analyses (up to 2008). We relied heavily on a preliminary comparison of differences in detection probability between the first and second Maritimes Breeding Bird Atlas (Erskine 1992 and Stewart et al., in prep.). The comparison was preliminary because the last year of the second Atlas had not yet happened. This analysis does not provide a trend but is the closest we have to a systematic comparison that allows all birds with results from this method to be compared similarly. We used the Atlas data analysis for landbirds but also for other birds where necessary and where results were available.

#### **Element 4: Threat Assessment for Priority Species**

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

The threats assessment exercise included three main steps:

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

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

In BCR 14 NB, MBU 11 NB and MBU 12 NB, a category was added to the threats classification scheme to address species with inadequate monitoring or research information (category 12 “other direct threats” and sub-category 12.1 “information lacking”). However, ranking for this threat category were not conducted.

### **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:

1. habitat objectives within the BCR subregion (the quantity, quality and configuration of priority habitats)
2. 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 our knowledge of ecosystem management strategies within broad habitat types.

For New Brunswick, MBU 11 NB and MBU 12 NB, conservation objectives were developed for all threats regardless of magnitude level. Species at risk were given conservation objectives identifying them as species at risk and directing the reader to available recovery documents. However, since many of the recovery documents are not yet available, species at risk were treated like all other priority bird species and conservation objectives were developed to address identified threats. The same methodology was used for waterfowl species covered under the Eastern Habitat Joint Venture’s Implementation of the NAWMP.

## **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 and see IUCN Conservation Action Categories), 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

Tables adapted from Salafsky et al. (2008).

### *IUCN Threat Categories*

**Table A4. International Union for Conservation of Nature–Conservation Measures Partnership (IUCN-CMP) classification of threats to biodiversity as per Salafsky et al. (2008).**

Note that not all threat categories apply to birds or occur in every BCR or MBU.

Threat category/sub-category	Definition
<b>1 Residential and commercial development</b>	Human settlements of other nonagricultural land uses with a substantial footprint
1.1 Housing and urban areas	Human cities, towns and settlements including nonhousing development typically integrated with housing
1.2 Commercial and industrial areas	Factories and other commercial centers
1.3 Tourism and recreation areas	Tourism and recreation sites with a substantial footprint
<b>2 Agriculture and aquaculture</b>	Threats from farming and ranching as a result of agricultural expansion and intensification, including siculture, mariculture and aquaculture
2.1 Annual and perennial non-timber crops	Crops planted for food, fodder, fiber, fuel or other uses
2.2 wood and pulp plantations	Stands of timber planted for timber or fiber outside of natural forests, often with non-native species
2.3 Livestock farming and ranching	Domestic terrestrial animals raised in one location on farmed or nonlocal resources (farming); also domestic or semidomesticated animals allowed to roam in the wild and supported by natural habitats (ranching)
2.4 Marine and freshwater aquaculture	Aquatic animals raised in one location on farmed or nonlocal resources; also hatchery fish allowed to roam in the wild
<b>3 Energy production and mining</b>	Threats from production of nonbiological resources
3.1 Oil and gas drilling	Exploring for, developing, and producing petroleum and other liquid hydrocarbons
3.2 Mining and quarrying	Exploring for, developing, and producing minerals and rocks
3.3 Renewable energy	Exploring, developing and producing renewable energy
<b>4 Transportation and service corridors</b>	Threats from long, narrow transport corridors and the vehicles that use them including associated wildlife mortality
4.1 Roads and railroads	Surface transport on roadways and dedicated tracks
4.2 Utility and service lines	Transport of energy and resources
4.3 Shipping lanes	Transport on and in freshwater and ocean waterways
4.4 Flight paths	Air and space transport
<b>5 Biological resource use</b>	Threats from consumptive use of “wild” biological resources including deliberate and unintentional harvesting effects; also persecution or control of specific species
5.1 Hunting and collecting terrestrial animals	Killing or trapping terrestrial wild animals or animal products for commercial, recreation, subsistence, research or cultural purposes, or for control/persecution reasons; includes accidental mortality/bycatch
5.2 Gathering terrestrial plants	Harvesting plants, fungi, and other nontimber/nonanimal products for commercial, recreation, subsistence, research or cultural purposes, or for control purposes
5.3 Logging and wood harvesting	Harvesting trees and other woody vegetation for timber, fiber, or fuel

Table A4 continued

Threat category/sub-category	Definition
5.4 Fishing and harvesting aquatic resources	Harvesting aquatic wild animals or plants for commercial, recreation, subsistence, research or cultural purposes, or for control/persecution reasons; includes accidental mortality/bycatch
<i>6 Human intrusions and disturbance</i>	Threats from human activities that alter, destroy and disturb habitats and species associated with nonconsumptive uses of biological resources
6.1 Recreational activities	People spending time in nature or travelling in vehicles outside established transport corridors, usually for recreation purposes
6.2 War, civil unrest and military exercises	Actions by formal or paramilitary forces without a permanent footprint
6.3 Work and other activities	People spending time in or travelling in natural environments for reasons other than recreation or military activities
<i>7 Natural system modifications</i>	Threats from actions that convert or degrade habitat in service of “managing” natural or seminatural systems, often to improve human welfare
7.1 Fire and fire suppression	Suppression or increase in fire frequency and/or intensity outside of its natural range of variation
7.2 Dams and water management/use	Changing water flow patterns from their natural range of variation either deliberately or as a result of other activities
7.3 Other ecosystem modifications	Other actions that convert or degrade habitat in the service of “managing” natural systems to improve human welfare.
<i>8 Invasive and other problematic species and genes</i>	Threats from non-native and native plants, animals, pathogens/microbes, or genetic material that have or are predicted to have harmful effects on biodiversity following their introduction, spread, and/or increase in abundance
8.1 Invasive non-native/alien species	Harmful plants, animals, pathogens and other microbes not originally found within the ecosystem(s) in question and directly or indirectly introduced and spread into it by human activities
8.2 Problematic native species	Harmful plants, animals, pathogens and other microbes that are originally found within the ecosystem(s) in question, but have become “out of balance” or “released” directly or indirectly due to human activities
8.3 Introduced genetic material	Human-altered or transported organisms or genes
<i>9 Pollution</i>	Threats from introduction of exotic and/or excess materials or energy from point and nonpoint sources
9.1 Household sewage and urban waste water	Water-borne sewage and nonpoint runoff from housing and urban areas that include nutrients, toxic chemicals and/or sediments
9.2 Industrial and military effluents	Water-borne pollutants from industrial and military sources including mining, energy production, and other resource extraction industries that include nutrients, toxic chemicals and/or sediments
9.3 Agricultural and forestry effluents	Water-borne pollutants from agricultural, sivicultural, and aquaculture systems that include nutrients, toxic chemicals and/or sediments including the effects of these pollutants on the site where they are applied
9.4 Garbage and solid waste	Rubbish and other solid materials including those that entangle wildlife
9.5 Air-borne pollutants	Atmospheric pollutants from point and non-point sources
9.6 Excess energy	Inputs of heat, sound or light that disturb wildlife or ecosystems
<i>10 Geological events</i>	Threats from catastrophic geological events
10.1 Volcanoes	Volcanic events
10.2 Earthquakes/tsunamis	Earthquakes and associated events
10.3 Avalanches/landslides	Avalanches or landslides



Table A4 continued

Threat category/sub-category	Definition
<b>11 Climate change and severe weather</b>	Long-term climatic changes that may be linked to global warming and other severe climatic or weather events outside of the natural range of variation that could wipe out a vulnerable species or habitat
11.1 Habitat shifting and alteration	Major changes in habitat composition and location
11.2 Droughts	Periods in which rainfall falls below the normal range of variation
11.3 Temperature extremes	Periods in which temperatures exceed or go below the normal range of variation
11.4 Storms and flooding	Extreme precipitation and/or wind events or major shifts in seasonality of storms
11.5 Other impacts	
<b>12 Other direct threats*</b>	Other threats
12.1 Information lacking	Lack of clearly documented threats

\* Note that this category is not part of the IUCN classification system and was added as part of the BCR planning process to address species of concern for which threats are not clearly documented and/or are unknown.

## ***IUCN Conservation Action Categories***

**Table A5. International Union for Conservation of Nature–Conservation Measures Partnership (IUCN-CMP) classification of conservation actions.**

Note that not all categories of actions were applicable or were recommended in each BCR or MBU. Encouraging industry compliance with voluntary beneficial management practices was classified under *5.3 Private sector standards and codes*.

<b>Action category/sub-category</b>	<b>Definition</b>
<b>1 Land/water protection</b>	Actions to identify, establish or expand parks and other legally protected areas, and to protect resource rights
1.1 Site/area protection	Establishing or expanding public or private parks, reserves, and other protected areas roughly equivalent to IUCN categories I-VI
1.2 Resource and habitat protection	Establishing protection or easements of some specific aspect of the resource on public or private lands outside of IUCN categories I-VI
<b>2 Land/water management</b>	Actions directed at conserving or restoring sites, habitats and the wider environment
2.1 Site/area management	Management of protected areas and other resource lands for conservation
2.2 Invasive/problematic species control	Eradication, controlling, and/or preventing invasive and/or other problematic plants, animals and pathogens
2.3 Habitat and natural process restoration	Enhancing degraded or restoring missing habitats and ecosystem functions; dealing with pollution
<b>3 Species management</b>	Actions directed at managing or restoring species, focused on the species of concern itself
3.1 Species management	Managing specific plant and animal populations of concern
3.2 Species recovery	Maintaining, enhancing, or restoring specific plant and animal populations, vaccination programs
3.3 Species reintroduction	Reintroducing species to places where the formally occurred or benign introductions
3.4 <i>ex situ</i> conservation	Protecting biodiversity out of its native habitats
<b>4 Education and awareness</b>	Actions directed at people to improve understanding and skills, and influence behavior
4.1 Formal education	Enhancing knowledge and skills of students in a formal degree program
4.2 Training	Enhancing knowledge, skills, and information exchange for practitioners, stakeholders, and other relevant individuals in structured settings outside of degree programs
4.3 Awareness and communications	Raising environmental awareness and providing information through various media or civil disobedience
<b>5 Law and policy</b>	Actions to develop, change, influence, and help implement formal legislation, regulations, and voluntary standards
5.1 Legislation	Making, implementing, changing, influencing, or providing input into formal government sector legislation or policies at all levels: international, national, state/provincial, local, tribal
5.2 Policies and regulations	Making, implementing, changing, influencing, or providing input into policies and regulations affecting the implementation of laws at all levels: international, national, state/provincial, local, tribal
5.3 Private sector standards and codes	Setting, implementing, changing, influencing, or providing input into voluntary standards and professional codes that govern private sector practice
5.4 Compliance and enforcement	Monitoring and enforcing compliance with laws, policies and regulations, and standards and codes at all levels

Table A5 continued

Action category/sub-category	Definition
<i>6 Livelihood, economic and other incentives</i>	Actions to use economic and other incentives to influence behavior
6.1 Linked enterprises and livelihood alternatives	Developing enterprises that directly depend on the maintenance of natural resources or provide substitute livelihoods as a means of changing behaviors and attitudes
6.2 Substitution	Promoting alternative products and services that substitute for environmentally damaging ones
6.3 Market forces	Using market mechanisms to change behaviors and attitudes
6.4 Conservation payments	Using direct or indirect payments to change behavior and attitudes
6.5 Non-monetary values	Using intangible values to change behavior and attitudes
<i>7 External capacity building</i>	Actions to build infrastructure to do better conservation
7.1 Institutional and civil society development	Creating or providing nonfinancial support and capacity building for nonprofits, government agencies, communities, and for-profits
7.2 Alliance and partnership development	Forming and facilitating partnerships, alliances, and networks of organizations
7.3 Conservation finance	Raising and providing funds for conservation work
<i>8 Knowledge acquisition*</i>	Gathering information about species or habitat of concern
8.1 Research	Undertaking new or supporting, continuing and/or expanding existing research relating to specific species or threats
8.2 Monitoring	Establishing new or supporting, continuing, and/or expanding existing monitoring schemes to gather required data about individual or groups of species or habitats

\* Note that this category is not part of the IUCN classification system, and was added as part of the BCR planning process to address certain actions that do not fit elsewhere in the IUCN scheme.

**[www.ec.gc.ca](http://www.ec.gc.ca)**

Additional information can be obtained at:

Environment Canada

Inquiry Centre

10 Wellington Street, 23rd Floor

Gatineau QC K1A 0H3

Telephone: 1-800-668-6767 (in Canada only) or 819-997-2800

Fax: 819-994-1412

TTY: 819-994-0736

Email: [enviroinfo@ec.gc.ca](mailto:enviroinfo@ec.gc.ca)