Environment Canada Environnement Canada

Bird Conservation Strategy for Bird Conservation Region 8 in Prairie and Northern Region: Boreal Softwood Shield

- Abridged Version -

July 2014



Canada

Preface

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

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

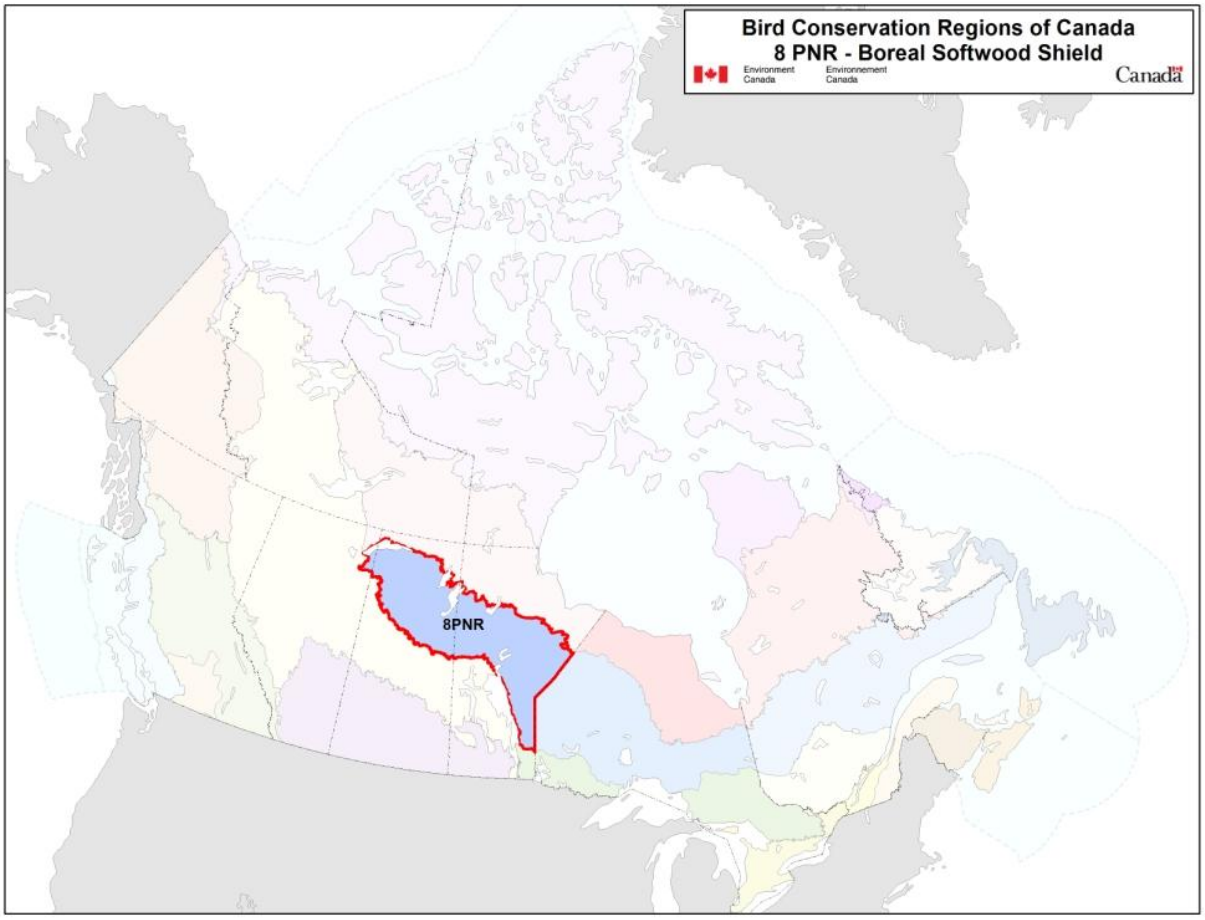
Conservation objectives and recommended actions from the conservation strategies will be used as the biological basis to develop guidelines and beneficial management practices that support compliance with regulations under the *Migratory Birds Convention Act, 1994*.

Acknowledgements

Jean-Michel DeVink was the main author of this document that follows templates developed by Alaine Camfield, Judith Kennedy and Elsie Krebs with the help of the BCR planners in each of the Canadian Wildlife Service regions throughout Canada. K. Calon, W. Fleming, T.J. Habib, K.C. Hannah, E. Kuczynski, C.L. Mahon, and K. St. Laurent conducted all of the initial work to refine species priority lists, assess objectives and threats and research habitat associations as well as producing the first draft of the plan and populating the database. However, work of this scope cannot be accomplished without the contribution of other colleagues who provided or validated technical information, commented on earlier draft versions of the strategy, and supported the planning process, and our thanks are extended to everyone who helped with the completion of this strategy.

To obtain a copy of the complete version of this strategy, please contact us at migratorybirds_oiseauxmigrateurs@ec.gc.ca.

Bird Conservation Strategy for Bird Conservation Region 8 in Prairie and Northern Region: Boreal Softwood Shield



Executive Summary

The Prairie and Northern Region (PNR) portion of Bird Conservation Region 8 (BCR 8) comprises the western portion of the Boreal Shield, which is the largest ecozone in Canada. The Boreal Shield covers 18.2% of Canada's land surface. It extends from the northeast corner of Alberta to Labrador; however, BCR 8 PNR includes the portion of the Boreal Shield in Manitoba, Saskatchewan and Alberta. It is bordered by the Boreal Taiga Plains Ecozone to the south and west and the Taiga Shield and Hudson Plains Ecozones to the north.

Rusty Blackbird Photo: © Dick Daniels

The topography of the PNR portion of the Boreal Shield is characterized by rolling hills, and glacial till is the predominant parent material. Topographic depressions lack permeability, and lakes, ponds, bogs and fens commonly occupy these areas. Forest is the predominant land cover (88.2%). Latitudes range from 49°N in the southeast to almost 60°N in the northwest, which results in a wide range in temperatures and species composition. Boreal forest comprises the majority of the BCR, which is characterized by coniferous trees including white (*Picea glauca*) and black spruce (*Picea mariana*), tamarack (*Larix laricina*), balsam fir (*Abies balsamea*), and jack pine (*Pinus banksiana*). Balsam poplar (*Populus balsamifera*), trembling aspen (*Populus tremuloides*) and white birch (*Betula paryrifera*) are the primary deciduous trees, which become increasingly common in the southern portion of the ecozone. Temperate forests are present in the southern portion of the Boreal Shield from Manitoba to the east, where there are a greater number of trees intolerant to extreme cold, including birch, maple, poplar and some pine species.

Within BCR 8 PNR, 215 species of birds are known to occur, and of these 67 have been identified as priority species based on their distribution and abundance, their threats, their federal and provincial status, their inclusion in regional and continental conservation/ stewardship plans or based on expert opinion. Of the 4 bird groups (landbirds, shorebirds, waterbirds and waterfowl), landbirds are most represented with 152 of the 215 species in the region. Quantitative population trends for landbirds were based on Breeding Bird Survey (BBS) data wherever possible, but not all species are surveyed adequately, and geographic extent is limited due to survey design and the remoteness of BCR 8 PNR.

Wetlands are some of the most important habitat for birds in this region. More priority species (39, or 60%) are found in wetlands than any other habitat type, and one third of the priority species that are considered at risk in BCR 8 PNR use this cover type. Forests (deciduous,

coniferous and mixed) as well as shrubs/early successional habitats and waterbodies are also widely used by priority species in BCR 8 PNR.

The predominant natural disturbance in the western Boreal Shield is wildfire, but disturbances from windthrow and insect outbreaks become more common in the southern portions of this region. Anthropogenic disturbance is still limited in the western Boreal Shield compared with other BCRs in Canada but is increasing. Mining operations, forest harvesting, dams and reservoirs, and their associated infrastructure (e.g., roads) comprise some of the low-level threats to ecological integrity of the area. Mining is the primary industry in northern Saskatchewan, mostly for uranium and gold. Long-range transport of pollutants and ecosystem acidification, including impacts on food availability, are possible consequences of oil sands development upwind of the region and may pose a threat in future. While agriculture has been limited as a result of the cool climate and shallow soils of the Boreal Shield, logging contributes to the economic history of the region. Conversely, recreation and tourism industries, which exist due to the abundance of fish and wildlife resources in the region, have very localized impacts and instead may promote habitat retention by placing direct economic value on functional ecosystems.

Climate change is also predicted to have broad impacts across BCR 8 PNR in future. Climate change has potentially affected forest disturbance and succession patterns, and may pose greater threats to habitat and food availability in the future. Wetland habitats may be particularly at risk, as climate change modelling predicts that wetlands in BCR 8 PNR will be subject to considerable drying. Projections over the coming century predict exacerbated population declines for waterfowl such as scoters and Lesser Scaup, and landbirds such as Olive-sided Flycatcher and Rusty Blackbird. Overall, however, predictions are wide-ranging, with some species increasing and others decreasing at varying rates, suggesting a greater role for individual species management in future. Identification and protection of refugia that will remain relatively stable through a dynamic, shifting climate may facilitate population adaptation.

Inadequate monitoring information is a pervasive issue in BCR 8 PNR: for 57% of priority species it was not possible to assign a quantitative population objective. Landbirds and waterbirds appear to have the largest information gaps in BCR 8 PNR, with many priority species in these groups assigned the population objective of “Assess/Maintain” (18 of 28 landbird species; 9 of 14 waterbird species). While there is more information available for the assessment of population objectives for shorebirds and waterfowl species, significant information gaps remain. However, some population information is available. For 29% of priority species, the evidence of population decline was sufficient to suggest a target for population increase of either 50 or 100%.

Overall, the majority of recommended conservation actions in BCR 8 PNR, an area of primarily Crown lands, fall under the category of Law and Policy, with particular emphasis on the development and implementation of beneficial management practices to avoid, minimize and mitigate the impact of human activities on habitats commonly used by priority bird species. Land management, such as the reintroduction of natural fire regimes to forests and protection

of key habitats, is also recommended. Increasing public awareness of priority species and their needs is also recommended, as is research to address important gaps in knowledge.

Lesser Scaup Photo: © Davefoc

Overall, BCR 8 PNR remains relatively intact when compared with many other regions more affected by anthropogenic disturbances, and the magnitude of most threats throughout this region is currently low. This presents an opportunity to assess this BCR for protection and preservation of ecological features and processes that are unique and/or important to this region, currently and in future. Achieving conservation successes in this region, through the implementation of recommended conservation actions contained within this strategy and others, will require broad collaboration among provincial and federal governments, industry, Aboriginal peoples and other interested parties.

Introduction: Bird Conservation Strategies

Context

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

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

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

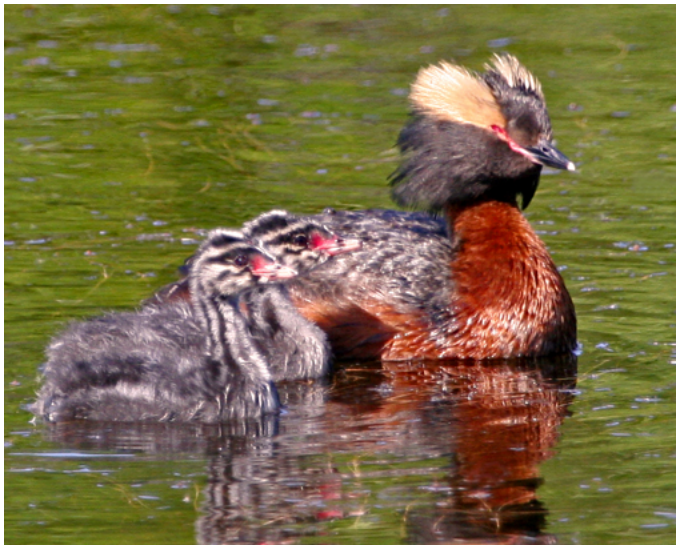
[1] NAWMP Plan Committee 2004.
[2] Milko et al. 2003.
[3] Donaldson et al. 2000.
[4] Rich et al. 2004.

Strategy Structure

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

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

Characteristics of Bird Conservation Region 8 Prairie and Northern Region



Horned Grebe Photo: © Donna Dewhurst

The Prairie and Northern Region (PNR) portion of BCR 8 comprises the western portion of the Boreal Shield, which is the largest ecozone in Canada. The Boreal Shield covers 18.2% of Canada's land surface (Conservation Areas Reporting and Tracking System 2009). It extends from the northeast corner of Alberta to Labrador, with the PNR portion of BCR 8 including the portion of the Boreal Shield west of the Manitoba/Ontario border. It is bordered by the Boreal Taiga Plains Ecozone to the south and west and the Taiga Shield and Hudson Plains Ecozones to the north (Fig. 1).

Topography is characterized by rolling hills, and glacial till is the predominant parent material (Geological Survey of Canada 1995). Topographic depressions lack permeability, and lakes, ponds, bogs and fens commonly occupy these areas. Forest is the predominant land cover (88.2%).

Latitudes range from 49°N in the southeast to almost 60°N in the northwest, which results in a wide range in temperatures and species composition. Boreal forest comprises the majority of the BCR (Fig. 1), which is characterized by coniferous trees including white (*Picea glauca*) and black spruce (*Picea mariana*), balsam fir (*Abies balsamea*), and jack pine (*Pinus banksiana*). Balsam poplar (*Populus balsamifera*), trembling aspen (*Populus tremuloides*) and white birch (*Betula paryrifera*) are the primary deciduous trees, which become increasingly common in the southern portion of the ecozone. Temperate forests are present in the southern portion of the Boreal Shield from Manitoba to the east, where there are a greater number of trees intolerant to extreme cold, including birch, maple, poplar and pine species (Ecological Stratification Working Group 1995).

The predominant natural disturbance in the western Boreal Shield is wildfire, while windthrow and insect outbreaks are more common in the southern portions. Anthropogenic disturbance is still limited in the western Boreal Shield but is increasing. Climate change has potentially affected forest disturbance and succession patterns, and may pose a greater threat to habitats in the future.

Mining operations, forest harvesting, dams and reservoirs, and their associated infrastructure (e.g., roads) have potential to affect the ecological integrity of the area. Mining is the primary industry in northern Saskatchewan, mostly for uranium and gold. Oil sands developments are located to the west of the Boreal Shield in BCR 6. However, concern about air pollution

contributing to ecosystem acidification is growing with the development of oil sands projects upwind of the region.

Logging occurs in parts of the region, while agriculture has been limited as a result of the cool climate and shallow soils of the Boreal Shield. Recreation and tourism industries exist due to the abundance of fish and wildlife resources in the region, but have very localized impacts.

There are currently a small number of protected areas within BCR 8 PNR (Fig. 2), which provide limited habitat protection for priority species conservation. Just prior to publishing this strategy, the creation of a large new ecological reserve was announced in Saskatchewan. The Pink Lake Representative Area Ecological Reserve, located 160 km north of LaRonge, will add an additional 3660 square kilometres of protected area to this region.

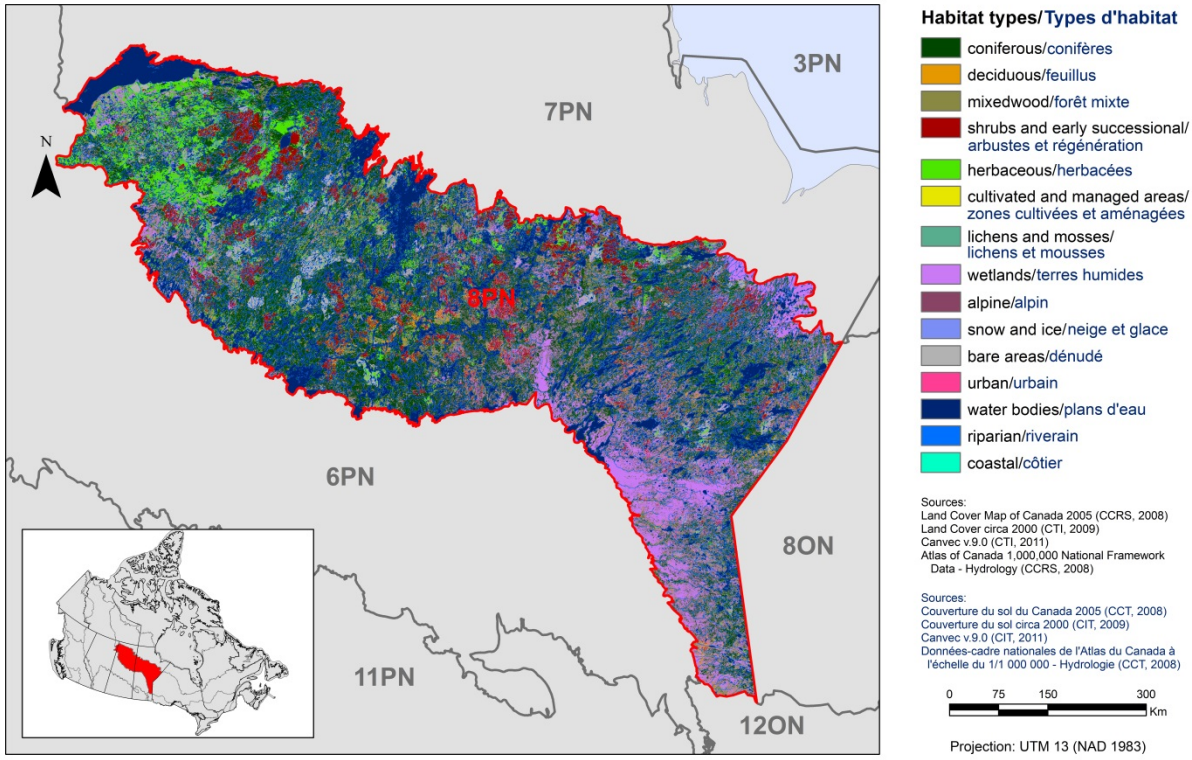


Figure 1. Landcover in BCR 8 PNR.

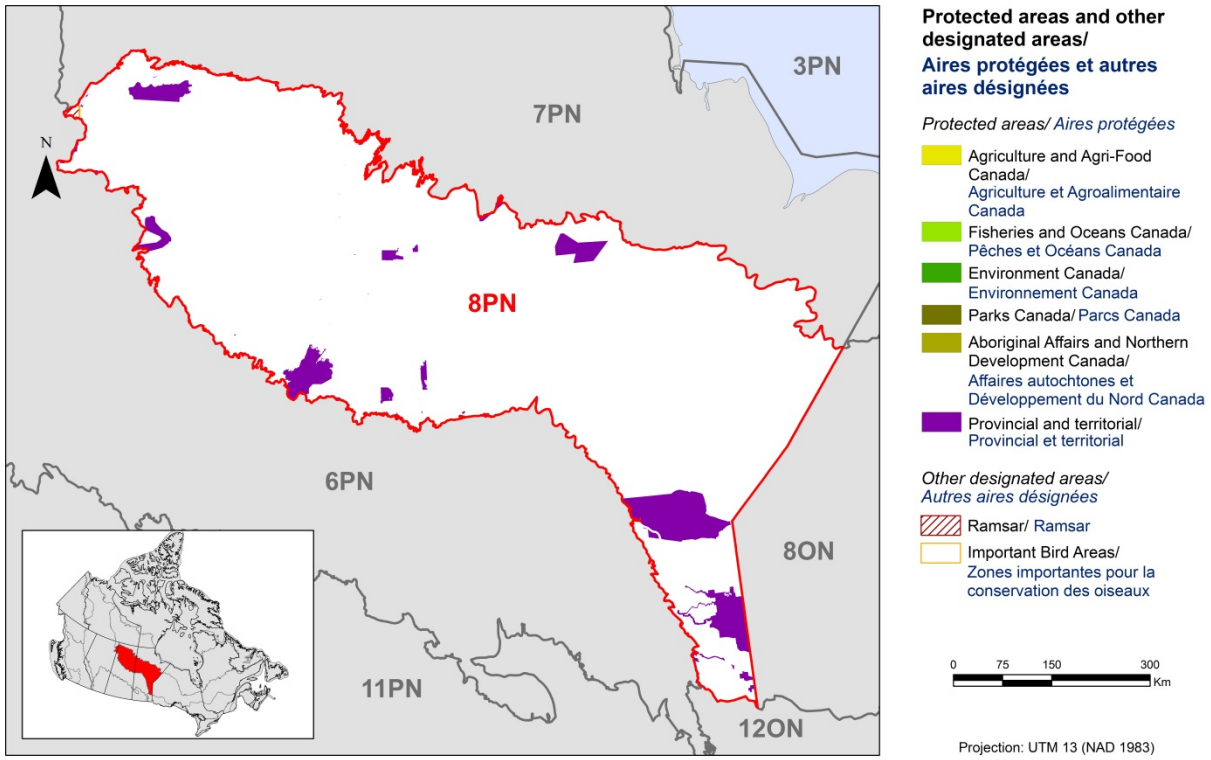


Figure 2. Map of protected and designated areas in BCR 8 PNR.

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. 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.

The purpose of the prioritization exercise is to focus implementation efforts on the issues of greatest significance for Canadian avifauna. Table 1 provides a full list of all priority species and their reason for inclusion. Tables 2 and 3 summarize the number of priority species in BCR 8 PNR Boreal Softwood Shield by bird group and by the reason for priority status.

Within BCR 8 PNR, 215 species of birds are known to occur, and of these, 67 have been identified as priority species based on their distribution and abundance, their threats, their federal and provincial status, their inclusion in regional and continental conservation/ stewardship plans or based on expert opinion (Table 1). Of the 4 bird groups (landbirds, shorebirds, waterbirds and waterfowl), landbirds comprise 152 of the 215 species in the region. While they represent 57% of all priority species, only 25% of the landbirds present were identified as priority species (Table 2). Both shorebirds and waterbirds had half or more of their species listed as priority (Table 2), but the lower number of species means that they represent a much smaller proportion of the total list. Priority landbirds were identified primarily as Stewardship species using continental methods with regional data or because of General Status (GS) ranks, while priority shorebirds, waterbirds and waterfowl were identified largely through continental or regional bird group plans (Table 3).

Table 1. Priority species in BCR 8 PNR, population objective and the reason for priority status.

Species	Bird Group	Population Trend Score[1]	Population Objective	Reason for Priority Status							
				SARA[2]	COSEWIC[3]	Provincial Status[4]	Cont./Reg. Concern[5]	Stewardship[6]	NAWMP[7]	GS[8]	Expert Opinion[9]
Alder Flycatcher	Landbirds	4	Increase 50%					Y			
American Three-toed Woodpecker	Landbirds	3	Assess/Maintain							Y	
Barn Swallow	Landbirds	4	Increase 50%		T						
Barred Owl	Landbirds	3	Assess/Maintain			SC (AB)				Y	
Bay-breasted Warbler	Landbirds	4	Assess/Maintain							Y	
Black-and-white Warbler	Landbirds	3	Assess/Maintain					Y			
Black-backed Woodpecker	Landbirds	3	Assess/Maintain					Y		Y	
Brown Creeper	Landbirds	3	Assess/Maintain							Y	
Canada Warbler	Landbirds	4	Recovery Objective[10]	T	T						
Cape May Warbler	Landbirds	3	Assess/Maintain					Y		Y	
Chestnut-sided Warbler	Landbirds	4	Increase 50%					Y			

[1] Where multiple population trend scores were available (e.g. continental, regional, etc.), we report the highest.
[2] Species listed on Schedule 1 of the *Species at Risk Act* (SARA) as E, Endangered; T, Threatened; SC, Special Concern (Species at Risk Public Registry).
[3] Assessed by COSEWIC (Committee on the Status of Endangered Wildlife in Canada) as: E, Endangered; T, Threatened; SC, Special Concern.
[4] Provincial Status = species legally protected under provincial/territorial legislation as E, Endangered; T, Threatened; SC, Special Concern:
Alberta's *Wildlife Act* www.srd.alberta.ca/fishwildlife/speciesatrisk/SpeciesSummaries/SpeciesAtRiskFactSheets.aspx;
Saskatchewan's *The Wildlife Act* www.environment.gov.sk.ca/wildspeciesatrisk;
Manitoba's *The Endangered Species Act* www.gov.mb.ca/conservation/wildlife/sar/sarlist.html.
[5] Cont./Reg. Concern = Continental or Regional Conservation Concern; species of concern identified by bird group protocols using continental (shorebirds and waterbirds) or BCR-specific (landbirds) data.
[6] Stewardship = landbirds identified as stewardship species using BCR-specific data.
[7] NAWMP = North American Waterfowl Management Plan (2004); the regional breeding or non-breeding need in Waterfowl Conservation Region 8.1 (where both values were available, we report the highest; waterfowl only).
[8] GS = species with a provincial/territorial General Status rank ≤3 (At Risk, May Be At Risk or Sensitive).
[9] Expert Opinion = species added based on expert knowledge.
[10] The species is listed under SARA, but its recovery documents have not yet been finalized.

Table 1 continued

Species	Bird Group	Population Trend Score[1]	Population Objective	Reason for Priority Status							
				SARA[2]	COSEWIC[3]	Provincial Status[4]	Cont./Reg. Concern[5]	Stewardship[6]	NAWMP[7]	GS[8]	Expert Opinion[9]
Chimney Swift	Landbirds	4	Recovery Objective[10]	T	T					Y	
Common Nighthawk	Landbirds	4	Recovery Objective[10]	T	T					Y	
Common Yellowthroat	Landbirds	4	Increase 50%							Y	
Connecticut Warbler	Landbirds	4	Increase 50%				Y				
Eastern Phoebe	Landbirds	3	Assess/Maintain							Y	
Eastern Whip-poor-will	Landbirds	4	Recovery Objective[10]	T	T						
Evening Grosbeak	Landbirds	4	Assess/Maintain					Y			
Great Gray Owl	Landbirds	3	Assess/Maintain							Y	
Least Flycatcher	Landbirds	4	Assess/Maintain							Y	
Mourning Warbler	Landbirds	4	Assess/Maintain					Y			
Nashville Warbler	Landbirds	3	Assess/Maintain					Y			
Northern Flicker	Landbirds	4	Increase 50%					Y			
Northern Hawk Owl	Landbirds	3	Assess/Maintain							Y	
Olive-sided Flycatcher	Landbirds	5	Recovery Objective[10]	T	T						
Ovenbird	Landbirds	3	Assess/Maintain					Y			
Peregrine Falcon (*anatum/tundrius*)	Landbirds	3	Assess/Maintain	SC	SC	T (AB), E (MB)				Y	
Pileated Woodpecker	Landbirds	3	Assess/Maintain							Y	
Pine Grosbeak	Landbirds	3	Assess/Maintain							Y	
Purple Finch	Landbirds	4	Increase 50%				Y				
Ruffed Grouse	Landbirds	4	Assess/Maintain					Y			
Rusty Blackbird	Landbirds	5	Assess/Maintain	SC	SC					Y	
Sedge Wren	Landbirds	3	Assess/Maintain								Y
Short-eared Owl	Landbirds	5	Assess/Maintain	SC	SC					Y	
Swamp Sparrow	Landbirds	3	Assess/Maintain					Y			
White-winged Crossbill	Landbirds	3	Assess/Maintain							Y	
Yellow-bellied Flycatcher	Landbirds	3	Assess/Maintain					Y			

Table 1 continued

Species	Bird Group	Population Trend Score[1]	Population Objective	Reason for Priority Status							
				SARA[2]	COSEWIC[3]	Provincial Status[4]	Cont./Reg. Concern[5]	Stewardship[6]	NAWMP[7]	GS[8]	Expert Opinion[9]
Yellow-bellied Sapsucker	Landbirds	4	Increase 50%					Y			
Killdeer	Shorebirds	5	Increase 50%				Y				
Lesser Yellowlegs	Shorebirds	5	Increase 100%				Y				
Red-necked Phalarope	Shorebirds	4	Migrant (No pop. objective)				Y				
Short-billed Dowitcher	Shorebirds	5	Increase 100%				Y			Y	
Solitary Sandpiper	Shorebirds	3	Increase 50%				Y				
Wilson's Snipe	Shorebirds	5	Increase 100%				Y				
American Bittern	Waterbirds	4	Increase 50%				Y			Y	
American White Pelican	Waterbirds	3	Assess/Maintain				Y			Y	
Black Tern	Waterbirds	5	Increase 100%				Y				
Bonaparte's Gull	Waterbirds	3	Assess/Maintain				Y				
California Gull	Waterbirds	3	Assess/Maintain				Y				
Caspian Tern	Waterbirds	2	Assess/Maintain							Y	Y
Common Loon	Waterbirds	3	Assess/Maintain				Y				
Common Tern	Waterbirds	3	Assess/Maintain				Y				
Herring Gull	Waterbirds	4	Increase 50%				Y				
Horned Grebe (western population)	Waterbirds	4	Increase 100%		SC		Y			Y	
Pied-billed Grebe	Waterbirds	3	Assess/Maintain							Y	
Sora	Waterbirds	3	Assess/Maintain				Y			Y	
Virginia Rail	Waterbirds	3	Assess/Maintain				Y				
Yellow Rail	Waterbirds	3	Assess/Maintain	SC	SC		Y			Y	
American Wigeon	Waterfowl	4	Increase 50%				Y		Mod. High		
Bufflehead	Waterfowl	1	Assess/Maintain				Y		Mod. High		
Common Goldeneye	Waterfowl	2	Assess/Maintain				Y		High		
Green-winged Teal	Waterfowl	2	Assess/Maintain				Y		Mod. High	Y	
Lesser Scaup	Waterfowl	4	Increase 50%				Y		High	Y	
Mallard	Waterfowl	3	Assess/Maintain				Y		High		
Ring-necked Duck	Waterfowl	1	Assess/Maintain				Y		High		
Surf Scoter	Waterfowl	3	Increase 50%				Y		Mod. High		

Table 1 continued

Species	Bird Group	Population Trend Score[1]	Population Objective	Reason for Priority Status							
				SARA[2]	COSEWIC[3]	Provincial Status[4]	Cont./Reg. Concern[5]	Stewardship[6]	NAWMP[7]	GS[8]	Expert Opinion[9]
White-winged Scoter	Waterfowl	3	Increase 50%				Y		Mod. High	Y	

Table 2. Summary of priority species, by bird group, in BCR 8 PNR.

Bird Group	Total Species	Total Priority Species	Percent Listed as Priority	Percent of Priority List
Landbird	152	38	25%	57%
Shorebird	12	6	50%	9%
Waterbird	24	14	58%	21%
Waterfowl	27	9	33%	13%
Total	215	67	31%	100%

Table 3. Number of priority species in BCR 8 PNR by reason for priority status.

Reason for Priority Listing[1]	Landbirds	Shorebirds	Waterbirds	Waterfowl
Federal SARA listed[2]	7	0	1	0
COSEWIC[3]	9	0	2	0
Provincially listed[4]	2	0	0	0
Continental/Regional Concern[5]	2	6	12	9
Stewardship[6]	14	0	0	0
NAWMP[7]	0	0	0	9
GS[8]	19	1	7	3
Expert Opinion[9]	1	0	1	0

[1] A single species can be on the priority list for more than one reason. Note that not all reasons for inclusion apply to every bird group (indicated by "-").
[2] Species listed on Schedule 1 of the *Species at Risk Act* (SARA) as Endangered, Threatened or Special Concern.
[3] COSEWIC indicates species assessed by the Committee on the Status of Endangered Wildlife in Canada as Endangered, Threatened or Special Concern.
[4] Provincial Status = species legally protected under provincial/territorial legislation: Alberta's *Wildlife Act* www.srd.alberta.ca/fishwildlife/speciesatrisk/SpeciesSummaries/SpeciesAtRiskFactSheets.aspx; Saskatchewan's *The Wildlife Act* www.environment.gov.sk.ca/wildspeciesatrisk; Manitoba's *The Endangered Species Act* www.gov.mb.ca/conservation/wildlife/sar/sarlist.html.
[5] Cont./Reg. Concern = Continental or Regional Conservation Concern; species of concern identified by bird group protocols using continental (shorebirds and waterbirds) or BCR-specific (landbirds) data.
[6] Stewardship = landbirds identified as stewardship species using BCR-specific data.
[7] NAWMP = North American Waterfowl Management Plan (2004); the regional breeding or non-breeding need in Waterfowl Conservation Region 8.1 (where both values were available, we report the highest; waterfowl only).
[8] GS = species with a provincial/territorial General Status rank ≤3 (At Risk, May Be At Risk or Sensitive).
[9] Expert Opinion = species added based on expert knowledge.

Element 2: Habitats Important to Priority Species

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

Within BCR 8 PNR, the most important habitat type for priority species are wetlands, followed by the various woody habitat types (mixed wood, deciduous, coniferous, shrub/early successional; Fig. 3). These habitat types are also of particular importance for targeted conservation actions, as they will have the greatest potential benefit for priority species.

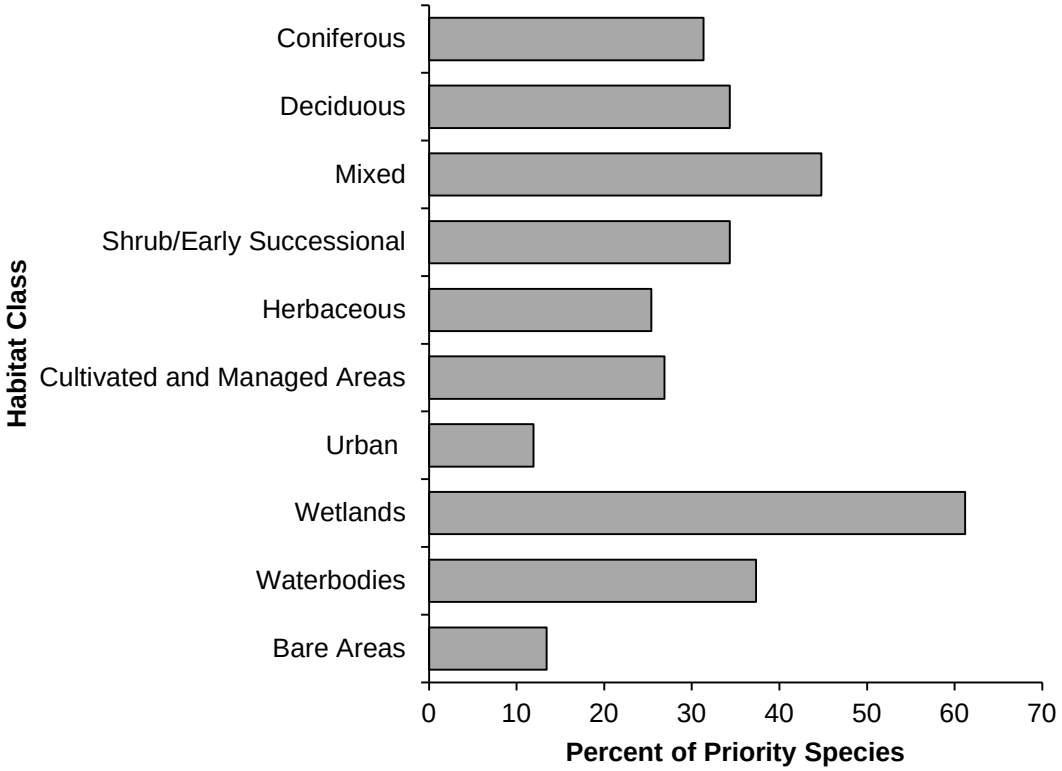


Figure 3. Percent of priority species that are associated with each habitat class in BCR 8 PNR.

Element 3: Population Objectives

Canada Warbler Photo: © William H. Majoros

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. 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.

The majority of species within BCR 8 PNR had a population objective of "assess/maintain," reflecting both the general lack of information about many species within this BCR, and that many populations within the region are currently at desired population levels because of a relatively pristine landscape with few threats and impacts (Fig. 4). There are 11 species (mostly landbirds) that have been assessed by COSEWIC as at risk, 9 of which are listed on Schedule 1 of SARA. Recovery planning initiatives are ongoing for these listed species. Roughly one-third of the species had population objectives to increase by 50% or 100%, which were proportionally distributed amongst the 4 bird groups. Most species with objectives to increase populations were migratory in nature and are likely limited by factors found outside BCR 8 PNR. Conservation actions should be prioritized according to potential benefits for species whose population objectives are to increase their abundance.

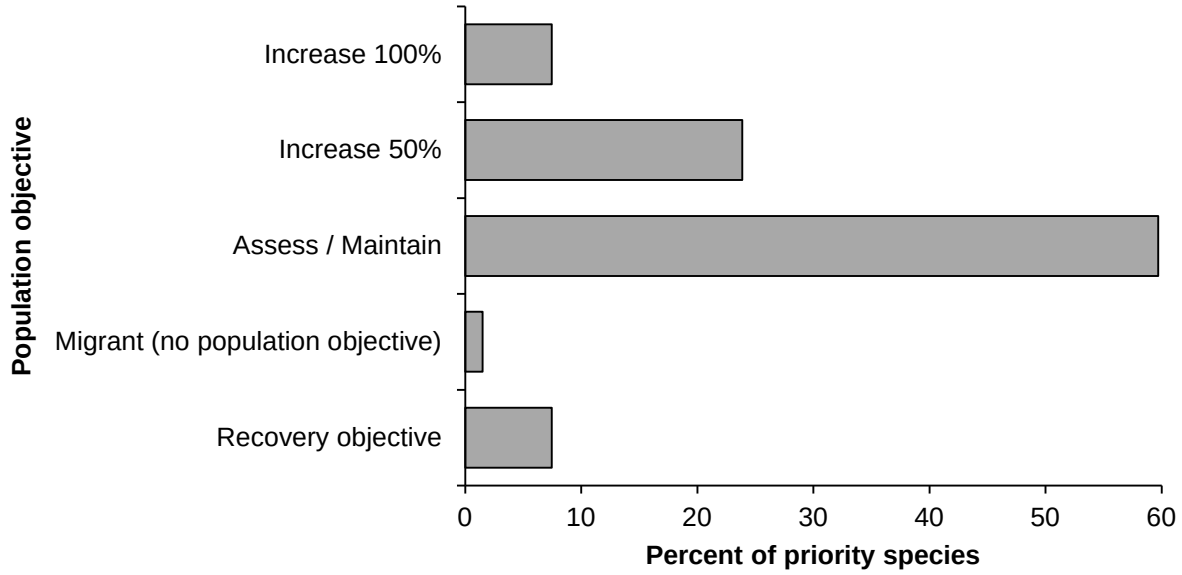


Figure 4. Percent of priority species that are associated with each population objective category in BCR 8 PNR.

Element 4: Threat Assessment for Priority Species

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

Overall, the threats identified for priority species in this BCR were of low magnitude at both the threat category and threat sub-category levels (Fig. 5; Table 4). This reflects the relatively pristine state of this region due to its remoteness and lack of human habitation and disturbance. Logging and wood harvesting activities (threat sub-category 5.3) represented the most frequently identified threat to priority species, due to the extent of forests and the large scale of forestry activities in BCR 8 PNR; however, none of the threats in this sub-category had sufficient impacts to priority species to be given a threat magnitude above low. While control of superabundant food sources associated with these forests, such as spruce budworm outbreaks, can represent an issue for some bird populations, there are no extensive spray programs within BCR 8 PNR.

Numerous industrial developments within and outside BCR 8 PNR release environmental contaminants, including effluents and airborne pollutants, but these do not currently constitute a threat to bird populations here. Early signs of increasing ecosystem acidification of PNR BCR 8 have been documented in the western extent due to long-range transport of pollutants from oil sands development upwind of the region (Jeffries et al. 2010, Government of Saskatchewan 2013, Turcotte et al. in prep.). Acidification can alter the structure and function of aquatic and terrestrial ecosystems and has been previously linked to decreases in calcium availability and invertebrate abundance, both of which can impact on bird populations and communities (Hames et al. 2002, Pabian and Brittingham 2011, Pabian and Brittingham 2012), and thus pollution as a threat (sub-category 9.5 Airborne Pollutants) merits reassessment in future updates.

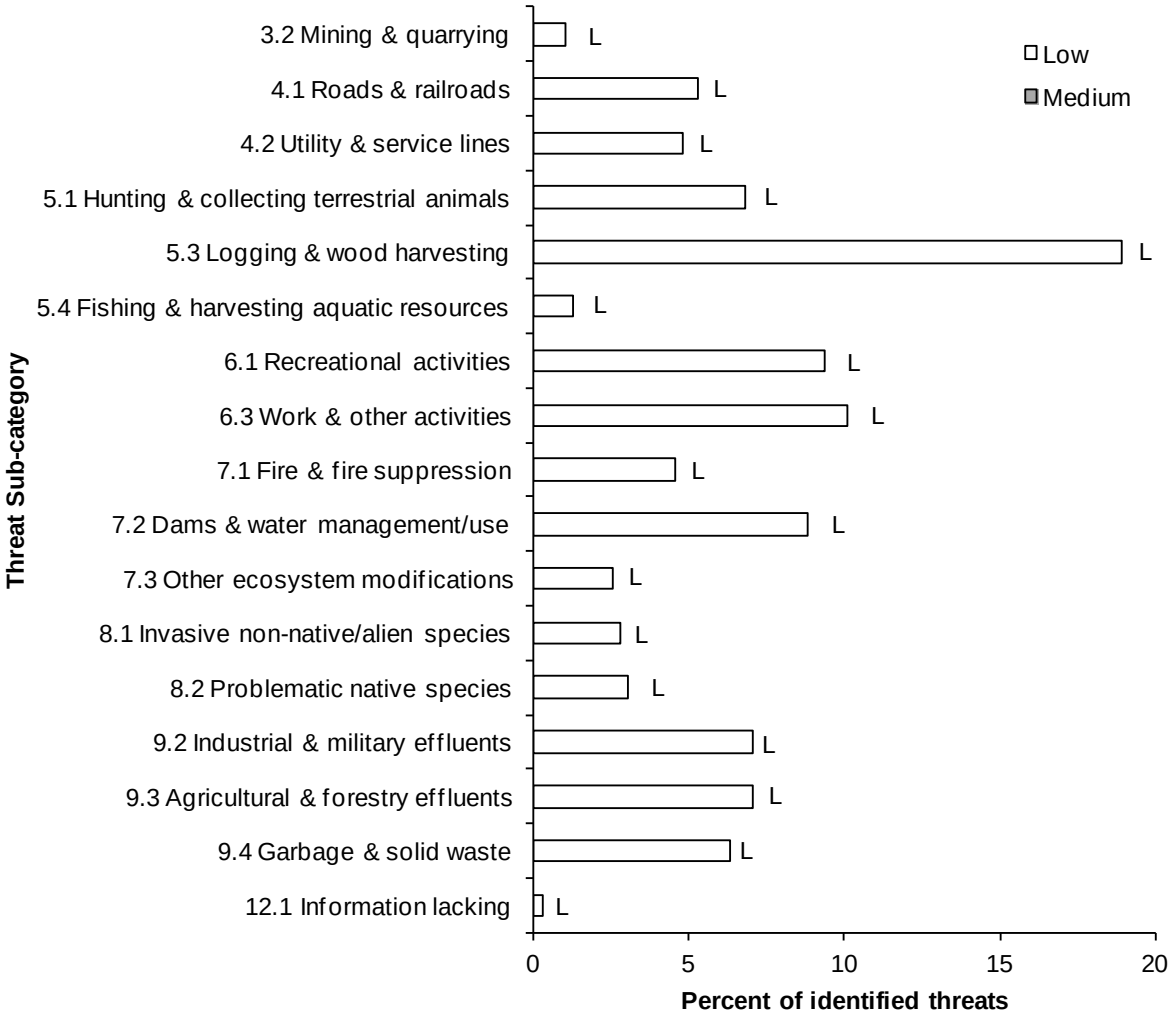


Figure 5. Percent of identified threats to priority species within BCR 8 PNR by threat sub-category.
Each bar represents the percent of the total number of threats identified in each threat sub-category in BCR 8 PNR (for example, if 100 threats were identified in total for all priority species in BCR 8 PNR, and 10 of those threats were in the category 6.3 Work & other activities, the bar on the graph would represent this as 10%). Shading in the bars (M = medium and L = low) represents the rolled-up magnitude of all threats in each threat sub-category in the BCR.

Table 4. Relative magnitude of identified threats to priority species within BCR 8 PNR by threat category and broad habitat class.

Overall ranks were generated through a roll-up procedure described in Kennedy et al. (2012). L and M represent Low and Medium Magnitude threats, respectively. Blank cells indicate that no priority species had threats identified in the threat category/habitat combination.

Threat category	Habitat class										
	Coniferous	Deciduous	Mixed Wood	Shrubs/Early Successional	Herbaceous	Cultivated and Managed Areas	Urban	Wetlands	Waterbodies	Bare Areas	Overall Magnitude
Overall	**L**	**L**	**L**	**L**	**L**	**L**	**L**	**L**	**L**	**L**	
3. Energy Production & Mining	L		L	L		L					**L**
4. Transportation & Service Corridors	L	L	L	L	L	L	L	L	L	L	**L**
5. Biological Resource Use	L	L	L	L	L			L	L	L	**L**
6. Human Intrusions & Disturbance	L	L	L	L	L	L	L	L	L	L	**L**
7. Natural System Modifications	L	L	L	L	L	L	L	L	L	L	**L**
8. Invasive & Other Problematic Species & Genes	L	L	L	L		L		L	L		**L**
9. Pollution	L	L	L	L	L	L	L	L	L	L	**L**
12. Other Direct Threats								L			**L**

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

Element 5: Conservation Objectives

Wilson's Snipe Photo: © Cephas

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.

For BCR 8 PNR, no threats identified for individual species were assessed at a magnitude of "medium" or greater. Therefore no specific conservation objectives or associated actions are presented, as per Kennedy et al. (2012).

Element 6: Recommended Actions

Recommended actions indicate on-the-ground activities that will help to achieve the conservation objectives (Fig. 7). Actions are strategic rather than highly detailed and prescriptive. 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.

California Gull Photo: © Alan Vernon

For BCR 8 PNR no threats identified for individual species were assessed at a magnitude of "medium" or greater. Therefore no specific conservation objectives or associated actions were developed as per Kennedy et al. (2012). Many of the threats facing priority bird species in BCR 8 PNR are not well understood; this may be due to inadequate monitoring for most species, which leads to uncertainty in BCR population trends, or a lack of evidence establishing causative relationships between human activities and population declines.

These knowledge gaps will often be best addressed using an adaptive management approach, which iteratively employs management actions as scientific experiments to test specific hypotheses to inform future management decisions (Walters et al. 1992). As the dominant habitat types within BCR 8 PNR are forests, beneficial management practices for forest ecosystems will help to maintain breeding habitat for many bird species.

References

Conservation Areas Reporting and Tracking System (CARTS). 2009. *Protected areas coverage in Canada, prepared for Ecosystem Status and Trends Report*. Accessed on November 5, 2009 www.CCEA.org

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

Ecological Stratification Working Group. 1995. *A National Ecological Framework for Canada*. Agriculture and Agri-Food Canada, Research Branch, Centre for Land and Biological Resources Research and Environment Canada, State of the Environment Directorate, Ecozone Analysis Branch. Ottawa/Hull.

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

Hames, R.S., K.V. Rosenberg, J.D. Lowe, S.E. Barker and A.A. Dhondt. 2002. *Adverse effects of acid rain on the distribution of the Wood Thrush* Hylocichla mustelinain *North America*. PNAS 99(17): 11235-11240.

Jeffries, D.S., R.G. Semkin, J.J. Gibson and I. Wong. 2010. *Recently surveyed lakes in northern Manitoba and Saskatchewan, Canada: characteristics and critical loads of acidity*. Journal of Limnology 69(Suppl.1): 45-55.

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

Milko, R., L. Dickson, R. Elliot and G. Donaldson. 2003. *Wings Over Water: Canada's Waterbird Conservation*

North American Waterfowl Management Plan (NAWMP), Plan Committee. 2004. North American Waterfowl Management Plan 2004. *Implementation Framework: Strengthening the Biological Foundation*. Canadian Wildlife Service, U.S. Fish and Wildlife Service, Secretaria de Medio Ambiente y Recursos Naturales, 106 pp.

Pabian, S.E. and M.C. Brittingham. 2011. *Soil Calcium Availability Limits Forest Songbird Productivity and Density*. The Auk 128(3): 441-447.

Pabian, S.E. and M.C. Brittingham. 2012. *Soil calcium and forest birds: indirect links between nutrient availability and community composition*. Ecosystems 15: 748-760.

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

Walters, C., G. Gunderson and C. S. Holling. 1992. *Experimental policies for water management in the Everglades*. Ecological Applications 2: 189-202.