Environment Canada Environnement Canada

Bird Conservation Strategy for Bird Conservation Region 4 in Canada: Northwestern Interior Forest

- ***Abridged Version*** -

March 2013



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 essential, as is their collaboration in implementing their recommendations.

Environment Canada has developed national standards for these strategies to ensure consistency of approach across BCRs. Bird Conservation Strategies will provide the context from which specific implementation plans can be developed within 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.

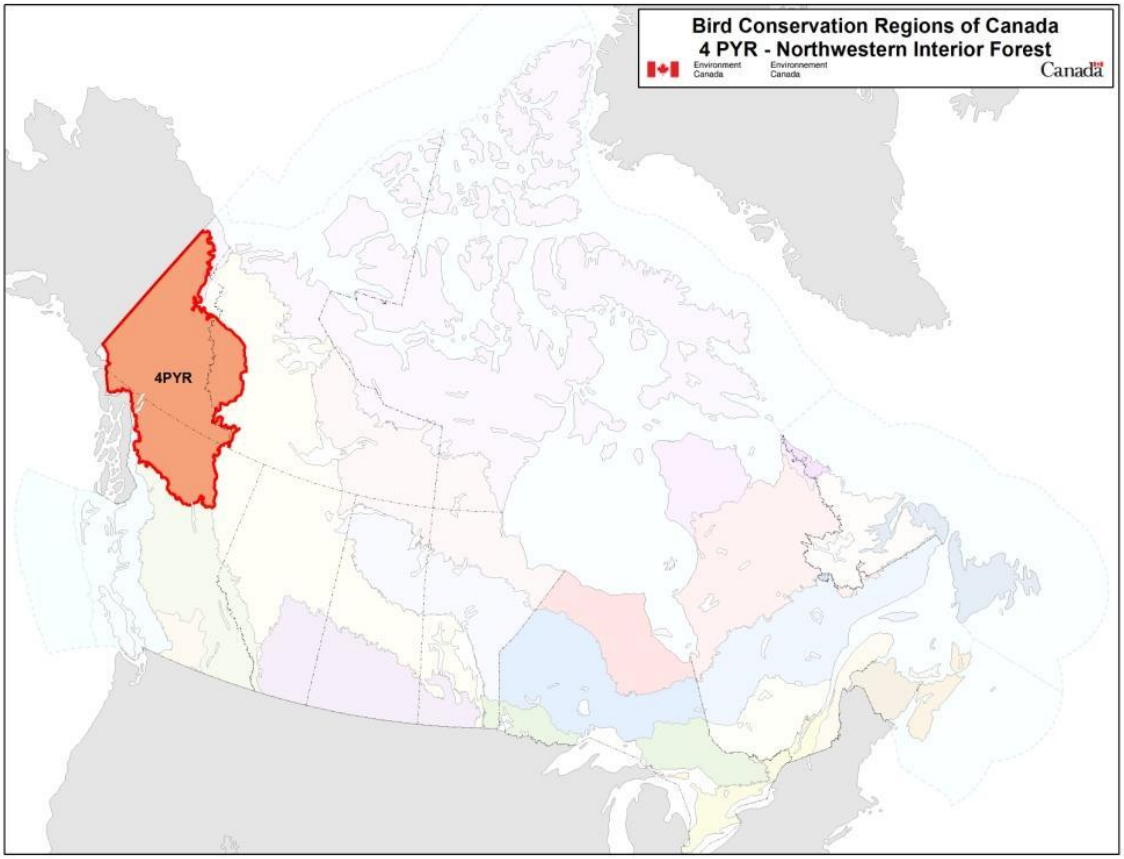
Conservation objectives and recommended actions from the conservation strategies will be used as the biological basis for developing guidelines and beneficial management practices that support compliance with regulations under the *Migratory Birds Convention Act, 1994*.

Acknowledgements

Pam Sinclair was the main author of this document, which follows templates developed by Alaine Camfield, Judith Kennedy and Elsie Krebs with the help of the BCR planners in each of the Canadian Wildlife Service regions throughout Canada. However, work of this scope cannot be accomplished without the contribution of other colleagues who provided or validated technical information, commented on earlier draft versions of the strategy, and supported the planning process. We would like to thank the following people for their contributions to and comments on this document: Katie Aitken, André Breault, Syd Cannings, Véronique Connolly, Mark Connor, Hilary Cooke, Frank Doyle, Mike Dunn, Cameron Eckert, Jim Hawkings, Scott Herron, Nancy Hughes, James Kenyon, Piia Kukka, Maria Leung, Jen Line, Val Loewen, Ian McDonald, Dave Mossop, Marty Mossop, Wendy Nixon, Richard Popko, Janet Scott, Sam Skinner, Doug Tate, Amy Thompson, Debbie van de Wetering, Alasdair Veitch, Richard Vladars and Ivy Whitehorne.

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 4 in Canada: Northwestern Interior Forest



Executive Summary

The Northwestern Interior Forest, Bird Conservation Region 4 (BCR 4), is North America's westernmost boreal bird conservation region, encompassing interior Alaska and Yukon, and reaching into western Northwest Territories and northern British Columbia. Within Canada, BCR 4 overlaps with the traditional territories of 23 First Nations. This strategy is a first attempt to identify, prioritize and begin to address conservation issues for all birds of Canada's portion of this remote region.

The Northwestern Interior Forest region is a mosaic of boreal forest, taiga and alpine tundra, with wetlands and waterbodies sparsely distributed but of high importance to birds. The human population is very small, and many parts of the region are remote and difficult to access; as a result, information on the ecology and population status of birds in this region is limited. The Canadian portion of BCR 4 features 211 regularly occurring bird species, including 201 that breed in the region and 10 that occur only as migrants; only 37 species are resident all year, while 174 depart during the winter. Species assessment identified 77 priority species for bird conservation in BCR 4.

Regional population trends for most priority species in BCR 4 are unknown, and as a result, the population objective for most species is to "assess and maintain" populations. However, even in this relatively undisturbed region, there are seven priority species with evidence of regional declines within BCR 4, and the population objective for these is to increase regional populations.

An assessment of threats to birds in BCR 4 showed that eight priority species face threats of high magnitude. These include seven alpine species threatened by reduction in alpine tundra due to climate change; and Black Tern (*Chlidonias niger),* which breeds at only one small lake in BCR 4. In general, the greatest known threats in BCR4 are climate-related habitat changes and increased frequency of severe weather, affecting alpine species in particular. Forest harvest, including salvage logging and firewood harvest, is affecting birds in certain coniferous forest habitats. Encroachment, disturbance and water-level changes are affecting birds in wetlands and riparian areas.

Conservation objectives focus on ensuring adequate habitat, managing the effects of climate change, and in certain areas, reducing human disturbance. Recommended actions to address threats to birds in BCR 4 include: ensuring that protected areas systems are well-designed, with protected areas including important habitats and large enough to buffer against habitat losses, mortality and nest failure from climate change effects, and linked by movement corridors; site management to reduce disturbance of birds; site management to retain important features of old-growth and burned forest; increasing public awareness of bird conservation issues; and supporting policies to

reduce greenhouse gas emissions. Threats to BCR 4 birds while they are outside of the region, as well as research and monitoring needs, are also discussed.

This is a working document that will be periodically revised and updated. Currently in BCR 4, industrial development is limited, and most threats to birds are of low magnitude. In the Northwestern Interior Forest, we still have many opportunities for proactive conservation, keeping common species common, protecting large areas of intact roadless habitat, and avoiding the path of habitat destruction and degradation followed by expensive species recovery programs. New threats to BCR 4 birds will undoubtedly develop, and emerging threats such as those from climate change will be better understood; some existing threats will increase in magnitude; and new actions will be recommended in future versions of the strategy. The goal of this first version is to present a framework, using the best information currently available, for effective conservation of all native bird species of the Northwestern Interior Forest in Canada.

Introduction: Bird Conservation Strategies

Context

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

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

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

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

Strategy Structure

Section 1 of this strategy, published here, 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 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 of Canada. The approach and methodology are summarized in the appendices of the full strategy, 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 4

The BCR 4 Environment

Bird Conservation Region (BCR) 4, the Northwestern Interior Forest, is an inland mountainous area of forest, taiga, shrub flats and tundra that corresponds roughly with the Taiga Cordillera and Boreal Cordillera ecozones. BCR 4 is divided approximately in half by the U.S./Canada (i.e., Alaska/Yukon) border. The subregion that this strategy addresses is the Canadian portion of BCR 4, which encompasses most of the Yukon Territory, the Northern Boreal Mountains ecoprovince of British Columbia, and the mountainous western region of the Northwest Territories (Fig. 1). Throughout this document, reference to BCR 4 means this Canadian subregion.

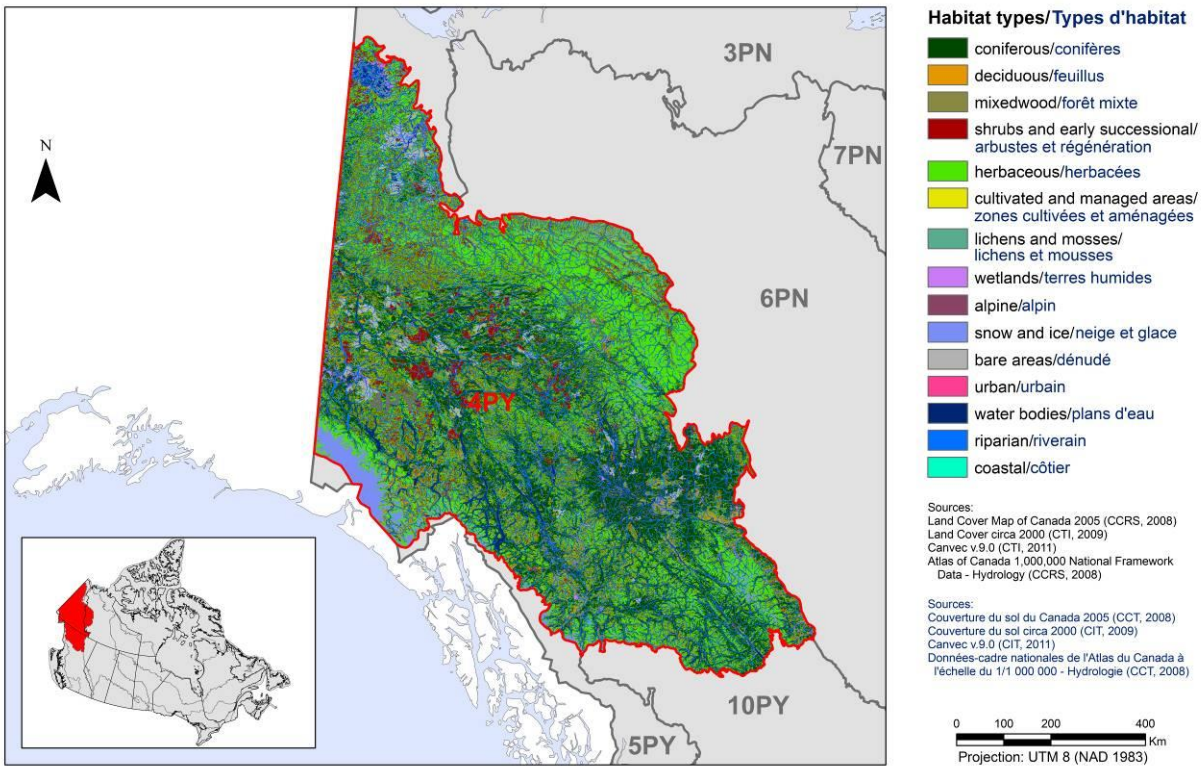


Figure 1. Land cover in BCR 4 in Canada: Northwestern Interior Forest.

The range of elevation and latitude in BCR 4 creates a diversity of habitat types, from dense lowland white spruce forest in the larger river valleys, to drier fire-driven coniferous forests and sparsely treed taiga, to open shrub flats and alpine tundra; the relatively limited wetland and riparian areas form rich pockets of biological diversity and productivity.

Winters in BCR 4 are long, dark and cold. In the Taiga Cordillera, January mean temperatures range between -25^{o} and -30^{o} C. Snow cover lasts a minimum of six months per year, and may persist up to eight months. In the Boreal Cordillera, January mean temperatures range between -15^{o} C and -27^{o} C. Throughout the BCR summers are short and cool, with July mean temperatures between 12^{o} C and 15^{o} C (Wahl 2004).

The Taiga Cordillera is the most sparsely populated ecozone in Canada, with only a few hundred human inhabitants. The largest community in the Boreal Cordillera ecozone, which forms the southern part of the BCR, is Whitehorse, Yukon. Within the entire Canadian portion of BCR 4, the human population is approximately 36,500. This includes all nine Yukon communities, plus seven small northern British Columbia communities. There are no settlements in the Northwest Territories portion of BCR 4.

The region encompasses all or part of the traditional territories of 23 First Nations, including Acho Dene Koe First Nation, Carcross/Tagish First Nation, Champagne and Aishihik First Nation, Daylu Dena Council, Dease River First Nation, Dehcho First Nations, Gwich'in Tribal Council, Iskut First Nation, Kluane First Nation, Kwanlin Dün First Nation, Liard First Nation, Little Salmon/Carmacks First Nation, Na-Cho Nyak Dun First Nation, Ross River Dena Council, Sahtu Dene Council, Selkirk First Nation, Ta'an Kwäch'än Council, Tahltan Band, Taku River Tlingit, Teslin Tlingit Council, Tr'ondëk Hwëch'in, Vuntut Gwitchin First Nation, and White River First Nation.

BCR 4 has relatively low levels of human development. There are large areas within this BCR subregion that remain free of roads, making many areas difficult to access. Agricultural activities are limited and clustered around communities, mostly around Whitehorse and Dawson. Forest harvest, placer and hard-rock mining, and oil and gas exploration and development are currently limited but expanding in the region.

BCR 4 includes within its boundaries four national parks (Ivvavik National Park, Vuntut National Park, Kluane National Park, and part of Nahanni National Park Reserve), one National Wildlife Area (Nisutlin River Delta NWA), and a number of Provincial and Territorial parks. Overall, 13% of BCR 4 is in protected areas (Fig. 2); however, this varies by jurisdiction (12% in Yukon, 22% in British Columbia) and land cover (from 42% of snow and ice to 7.4% of forest in protected areas within BCR 4, using Earth Observation for Sustainable Development (EOSD) land cover data). Additional protected areas are planned in British Columbia under the Taku Atlin Land Use Plan, and proposed in Northwest Territories.

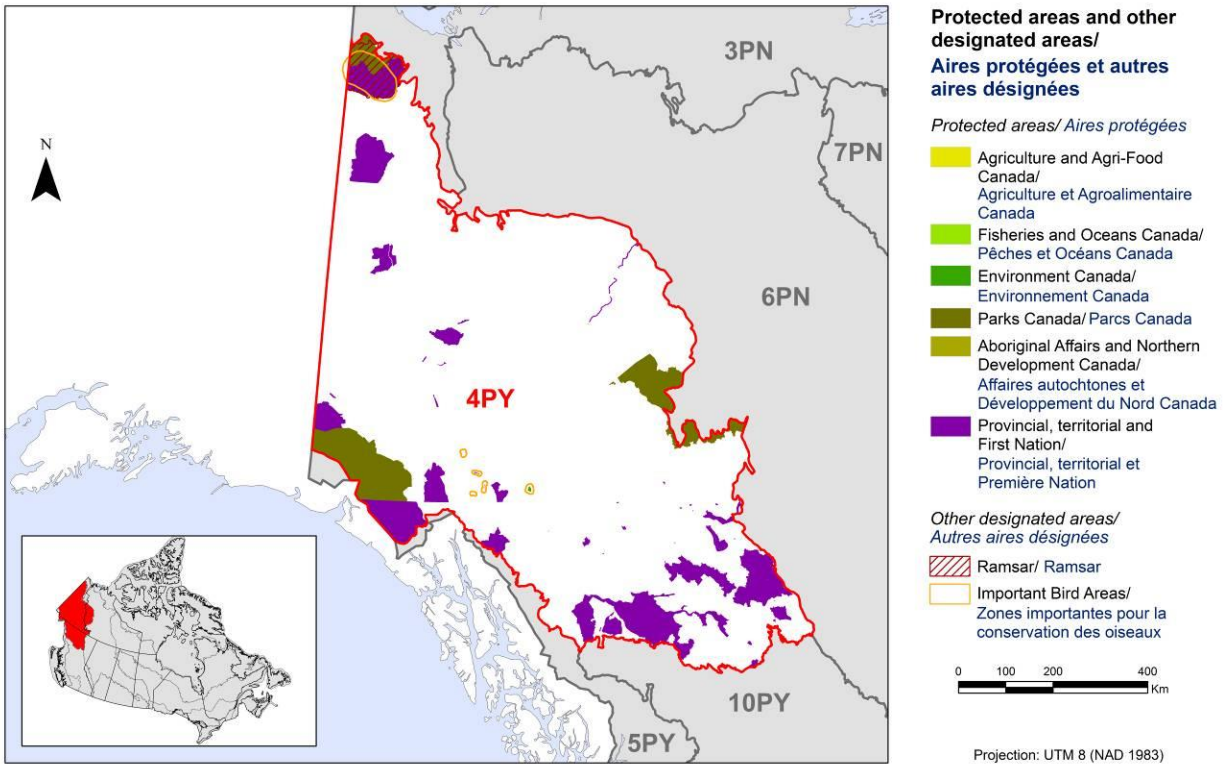


Figure 2. Protected and other designated areas in BCR 4 in Canada: Northwestern Interior Forest.

BCR 4 Birds

The Canadian portion of BCR 4 is home to 211 regularly-occurring bird species including 31 species of waterfowl, 19 species of waterbirds, 23 species of shorebirds, and 138 species of landbirds. Of these, 201 species breed in BCR 4 and 10 species occur as migrants only; 37 species are present year-round, while 174 species depart for the winter.

Five bird species which occur regularly in BCR 4 are listed under Canada's *Species at Risk Act* (SARA): Common Nighthawk and Olive-sided Flycatcher are listed as Threatened, and Peregrine Falcon (*anatum/tundrius*), Short-eared Owl and Rusty Blackbird are listed as Special Concern (Species at Risk Public Registry 2012). In addition, Barn Swallow has been recommended as Threatened, and Horned Grebe (western population) has been recommended as Special Concern by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC 2012), but they have not yet been listed under SARA.

Of the 211 regularly occurring bird species in the Canadian portion of BCR 4, 170 are protected under Canada's *Migratory Birds Convention Act, 1994*. Three are introduced non-native species that occur regularly in small numbers in BCR 4: Rock Pigeon,

European Starling and House Sparrow. The remaining 38 species are under territorial/provincial jurisdiction.

BCR 4 birds include a mixture of species typical of the Boreal and Arctic regions, as well as eastern and western Canada. Many BCR 4 birds are widespread species such as Gray Jay and Rusty Blackbird that nest across the boreal region in North America, while others such as Long-tailed Jaeger and Lapland Longspur are typically Arctic species that reach their southern limits in alpine tundra habitats within this subregion. Still others are “west coast” species such as Varied Thrush and Townsend’s Warbler that reach the eastern limit of their distribution in the subregion, sharing habitat with “eastern” birds such as “Myrtle” Yellow-rumped Warbler and White-throated Sparrow that reach their western limits here.

BCR 4 features significant numbers of nesting Trumpeter Swans, Golden Eagles, Gyrfalcons, and Peregrine Falcons; large concentrations of staging waterbirds at very limited open water areas in spring; high proportions of the world breeding populations of species such as Barrow’s Goldeneye, Surfbird and Wandering Tattler; almost the entire breeding population of Harlan’s Hawk; large concentrations of waterfowl moulting at Old Crow Flats, and also moving across the region from the Pacific coast to moulting areas in Northwest Territories; and high numbers of Sandhill Cranes and many other species migrating through the Tintina Trench between Alaskan breeding grounds and southern wintering areas.

The small human population and inaccessibility of much of the region has ensured that large areas of bird habitat are still relatively undisturbed, but also means that available information on birds and habitats in BCR 4 is very limited.

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 (i.e. BCR 4 in Canada); 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 4 in Canada by bird group and by the reason for priority status.

For the Canadian portion of BCR 4, of the 211 species that occur regularly, 77 priority species were identified, including 74 breeding species and 3 species that are priorities as migrants (listed in Table 1, summarized in Table 2). Many species (43) are of conservation concern on a continental or national scale, and have sufficient numbers within BCR 4 to warrant being conservation needs within the region (Table 3). Many species (48) are regional stewardship priorities due to the large proportion of their continental and/or world population that occurs in BCR 4; in fact, 33 species are priorities for stewardship reasons alone (i.e., no strong conservation concern). Only six species are of regional conservation concern in BCR 4, mostly due to evidence of population declines within the region; these are American Wigeon, Lesser Scaup, American Kestrel, Lesser Yellowlegs, Olive-sided Flycatcher and Rusty Blackbird. With improved monitoring of birds within BCR 4, we may see further species of regional concern added to this list.

Table 1. Priority species in BCR 4 in Canada: Northwestern Interior Forest, population objective, and reasons for priority status.

Priority species	Bird group	Population trend	Population objective	COSEWIC[1]	SARA[2]	Regional concern	National/continental concern	Regional stewardship	Continental stewardship (waterbirds, landbirds only)	Other reason[3]
Alder Flycatcher	Landbird	3	Assess/Maintain						Yes	
American Kestrel	Landbird	3	Assess/Maintain			Yes				expert opinion
American Three-toed Woodpecker	Landbird	2*	Maintain Current					Yes		score change
Barn Swallow	Landbird	3	Assess/Maintain	T			Yes			
Blackpoll Warbler	Landbird	4*	Increase 50%					Yes		
Bohemian Waxwing	Landbird	3	Assess/Maintain					Yes	Yes	
Boreal Chickadee	Landbird	3	Assess/Maintain					Yes	Yes	
Boreal Owl	Landbird	3	Assess/Maintain					Yes		
Brewer's Sparrow	Landbird	3	Assess/Maintain				Yes			
Common Nighthawk	Landbird	3	Assess/Maintain	T	T		Yes			
Dusky Grouse	Landbird	3	Assess/Maintain				Yes			
Golden Eagle	Landbird	3	Assess/Maintain					Yes		score change
Golden-crowned Sparrow	Landbird	3	Assess/Maintain					Yes		score change
Gray Jay	Landbird	2	Maintain Current						Yes	
Gray-crowned Rosy-Finch	Landbird	3	Assess/Maintain					Yes		
Gray-headed Chickadee	Landbird	3	Assess/Maintain					Yes		expert opinion
Great Gray Owl	Landbird	3	Assess/Maintain					Yes		
Northern Goshawk	Landbird	3	Assess/Maintain					Yes		

[1] Assessed by COSEWIC (Committee on the Status of Endangered Wildlife in Canada) as: E, Endangered; T, Threatened; SC, Special Concern

[2] Species listed on Schedule 1 of the *Species at Risk Act* as E, Endangered; T, Threatened; SC, Special Concern (Species at Risk Public Registry).

[3] "expert opinion" indicates that a species was added or removed from the priority list as a result of expert opinion; "score change" and "score correction" indicate the Partners in Flight species assessment scores were modified or corrected by regional experts; "applied PIF methods" indicates species assessment designed for landbirds was applied to other groups

* Regional population trend scores that have been modified from the PIF 2007 database, based on current regional data, are marked with an asterisk

Table 1 continued

Priority species	Bird group	Population trend	Population objective	COSEWIC[1]	SARA[2]	Regional concern	National/continental concern	Regional stewardship	Continental stewardship (waterbirds, landbirds only)	Other reason[3]
Northern Hawk Owl	Landbird	3	Assess/Maintain					Yes		
Northern Shrike	Landbird	3	Assess/Maintain					Yes		score correction
Olive-sided Flycatcher	Landbird	4	Increase 50%	T	T	Yes	Yes	Yes		
Peregrine Falcon (*anatum/tundrius)*	Landbird	3	Assess/Maintain	SC	SC		Yes	Yes		
Pine Grosbeak	Landbird	3*	Assess/Maintain					Yes	Yes	
Rufous Hummingbird	Landbird	3	Assess/Maintain				Yes			score change
Rusty Blackbird	Landbird	4	Increase 50%	SC	SC	Yes	Yes	Yes		
Short-eared Owl	Landbird	3	Assess/Maintain	SC	SC		Yes			
Smith's Longspur	Landbird	3	Assess/Maintain				Yes			
Swainson's Hawk	Landbird	3	Assess/Maintain				Yes			expert opinion
Townsend's Warbler	Landbird	3	Assess/Maintain					Yes		expert opinion
Varied Thrush	Landbird	3	Assess/Maintain					Yes		
White-crowned Sparrow	Landbird	4*	Increase 50%					Yes		
White-tailed Ptarmigan	Landbird	3	Assess/Maintain					Yes		
White-winged Crossbill	Landbird	3	Assess/Maintain						Yes	
Wilson's Warbler	Landbird	3*	Assess/Maintain					Yes		
American Golden-Plover	Shorebird	3	Assess/Maintain				Yes			
Killdeer	Shorebird	3	Assess/Maintain				Yes			
Lesser Yellowlegs	Shorebird	4*	Increase 50%			Yes	Yes	Yes		
Red-necked Phalarope	Shorebird	3	Assess/Maintain				Yes			
Semipalmated Sandpiper	Shorebird		Migrant (no pop. obj.)				Yes			
Short-billed Dowitcher	Shorebird	3	Assess/Maintain				Yes			
Solitary Sandpiper	Shorebird	3	Assess/Maintain				Yes	Yes		
Spotted Sandpiper	Shorebird	3	Assess/Maintain					Yes		applied PIF methods
Surfbird	Shorebird	3	Assess/Maintain				Yes	Yes		

Table 1 continued

Priority species	Bird group	Population trend	Population objective	COSEWIC[1]	SARA[2]	Regional concern	National/continental concern	Regional stewardship	Continental stewardship (waterbirds, landbirds only)	Other reason[3]
Upland Sandpiper	Shorebird	3	Assess/Maintain				Yes			
Wandering Tattler	Shorebird	3	Assess/Maintain					Yes		
Whimbrel	Shorebird	3	Assess/Maintain				Yes			
Wilson's Snipe	Shorebird	2	Maintain Current				Yes			
Arctic Tern	Waterbird	3	Assess/Maintain				Yes			
Black Tern	Waterbird	3	Assess/Maintain				Yes			
Bonaparte's Gull	Waterbird	3	Assess/Maintain				Yes	Yes	Yes	
Common Loon	Waterbird	3	Assess/Maintain				Yes		Yes	
Herring Gull	Waterbird	3	Assess/Maintain				Yes			
Horned Grebe (western population)	Waterbird	3	Assess/Maintain	SC			Yes	Yes		
Mew Gull	Waterbird	3	Assess/Maintain					Yes		score change, applied PIF methods
Pacific Loon	Waterbird	3	Assess/Maintain				Yes	Yes		
Red-necked Grebe	Waterbird	3	Assess/Maintain					Yes		applied PIF methods
Sora	Waterbird	2	Maintain Current				Yes		Yes	
Thayer's Gull	Waterbird		Migrant (no pop. obj.)				Yes		Yes	
American Wigeon	Waterfowl	4*	Increase 50%			Yes	Yes	Yes		
Barrow's Goldeneye	Waterfowl	3	Assess/Maintain					Yes		
Blue-winged Teal	Waterfowl	3	Assess/Maintain				Yes			
Bufflehead	Waterfowl	3	Assess/Maintain					Yes		
Canada Goose, Lesser	Waterfowl	3	Assess/Maintain				Yes	Yes		
Canvasback	Waterfowl	3	Assess/Maintain				Yes	Yes		
Common Goldeneye	Waterfowl	3	Assess/Maintain				Yes			
Greater White-fronted Goose, Mid-continent	Waterfowl	3	Assess/Maintain					Yes		

Table 1 continued

Priority species	Bird group	Population trend	Population objective	COSEWIC[1]	SARA[2]	Regional concern	National/continental concern	Regional stewardship	Continental stewardship (waterbirds, landbirds only)	Other reason[3]
Green-winged Teal	Waterfowl	2	Maintain Current					Yes		
Harlequin Duck	Waterfowl	3	Assess/Maintain					Yes		
Lesser Scaup	Waterfowl	4*	Increase 50%			Yes	Yes	Yes		
Long-tailed Duck	Waterfowl	3	Assess/Maintain				Yes			
Mallard	Waterfowl	2	Maintain Current				Yes	Yes		
Northern Pintail	Waterfowl	3	Assess/Maintain				Yes	Yes		
Northern Shoveler	Waterfowl	3	Assess/Maintain					Yes		
Surf Scoter	Waterfowl	3	Assess/Maintain				Yes	Yes		
Trumpeter Swan, Pacific Coast[4]	Waterfowl	2*	Maintain Current					Yes		
Trumpeter Swan, Rocky Mountain[4]	Waterfowl	2*	Maintain Current				Yes			
Tundra Swan, Western	Waterfowl		Migrant (no pop. obj.)					Yes		
White-winged Scoter	Waterfowl	3	Assess/Maintain				Yes	Yes		

[4] The Pacific Coast and Rocky Mountain populations of Trumpeter Swan are counted as one species in the total number of priority species.

Table 2. Summary of priority species, by bird group, in BCR 4 in Canada: Northwestern Interior Forest.

Bird Group	Total Species	Total Priority Species	Percent Listed as Priority	Percent of Priority List
Landbird	138	34	25%	44%
Shorebird	23	13	56%	17%
Waterbird	19	11	58%	14%
Waterfowl	31	19	61%	25%
Total/Overall	**211**[1]	**77**	**36%**	**100%**

[1] Table A1 includes 219 species, but 8 occur regularly only in the U.S. portion of the BCR and so are excluded in the total here.

Table 3. Number of priority species in BCR 4 in Canada: Northwestern Interior Forest, by reason for priority status.

Reason for Priority Listing[1]	Landbirds	Shorebirds	Waterbirds	Waterfowl
COSEWIC[2]	6	0	1	0
Federal SARA listed[3]	5	0	0	0
National/Continental Concern	11	11	9	12
Regional Concern	3	1	0	2
National/Continental Stewardship	6	-	4	-
Regional Stewardship	22	5	5	16

[1] A single species can be on the priority list for more than one reason. Note that not all reasons for inclusion apply to every bird group (indicated by "-").
[2] *COSEWIC* indicates species assessed by the Committee on the Status of Endangered Wildlife in Canada as Endangered, Threatened or Special Concern.
[3] Species listed on Schedule 1 of the *Species at Risk Act* as Endangered, Threatened or Special Concern.

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 Agriculture Organization 2000) to categorize habitats, and species were often assigned to more than one habitat class.

In BCR 4, as in other BCRs, land cover classes from the Land Cover Classification System (LCCS) developed by the United Nations (Food and Agriculture Organization 2000) were used as broad habitat categories to assign species to primary (most used) and secondary (also used) habitat types. However, in order to describe the relative abundance of broad habitat categories in BCR 4 in Section 2 below, percent cover of Earth Observation for Sustainable Development (EOSD) land cover classes were used (Wulder and Nelson 2003). Finally, the Land Cover Map of Canada was used to illustrate the distribution of each broad habitat category in maps. As a result of using these three different land cover systems (each of which defines the habitats somewhat differently), the maps, text, and species habitat assignments do not always concur in

their definition of each habitat class; discrepancies are explained in the text. Future versions of this BCR strategy will resolve these discrepancies.

In BCR 4, the LCCS classes used as primary habitat by the most priority species were wetland, shrub/early successional, coniferous and waterbodies (Fig. 3). Primary and secondary habitat associations for each priority species are presented in Appendix 3 of the full strategy.

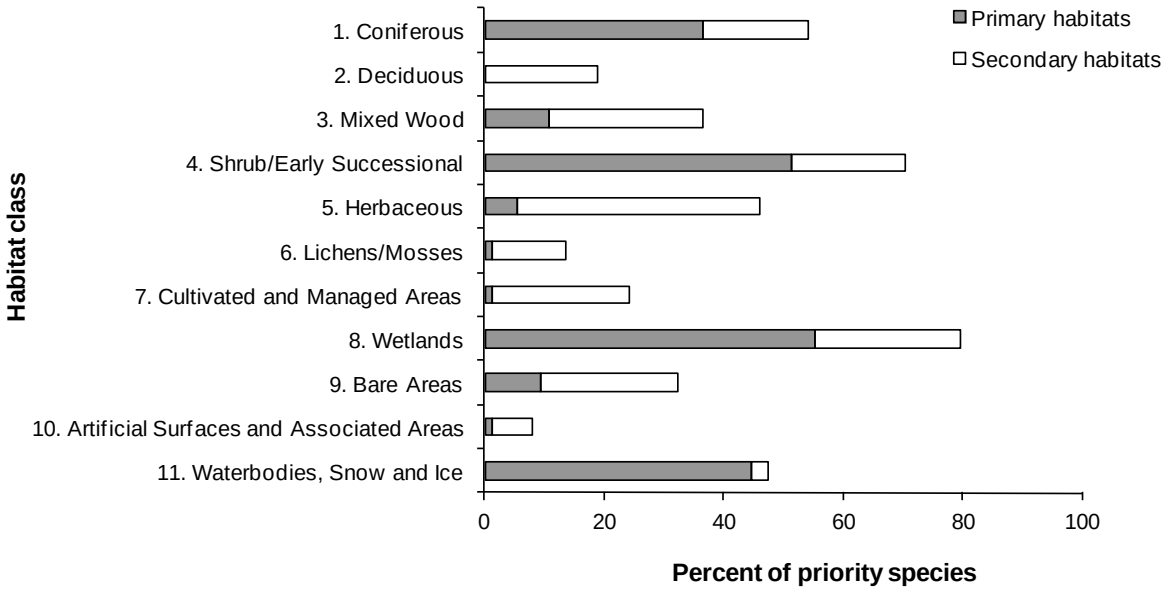


Figure 3. Percent of priority species that are associated with each habitat type in BCR 4 in Canada: Northwestern Interior Forest.
Note: The total exceeds 100% because each species was assigned to more than one habitat class (up to three primary habitat classes, and up to eight habitat classes overall, per species).

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. 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 4, 60 of the 74 priority breeding species have unknown regional population trends; as a result, for these species the population objective is to “assess and maintain” the regional population. Seven species are considered to have stable populations in the region, and have been assigned an objective of “maintain current” population. Within BCR 4, 7 species have documented regional population declines: American Wigeon, Lesser Scaup, Lesser Yellowlegs, Olive-sided Flycatcher, Blackpoll Warbler, White-crowned Sparrow and Rusty Blackbird. Regional declines were detected by the Yukon Cooperative Roadside Waterbird Survey for the 2 waterfowl, and by the North American Breeding Bird Survey for the other 5 species. All 7 of these species have a “possible or moderate population decrease,” with “increase 50%” as population objectives (Fig. 4).

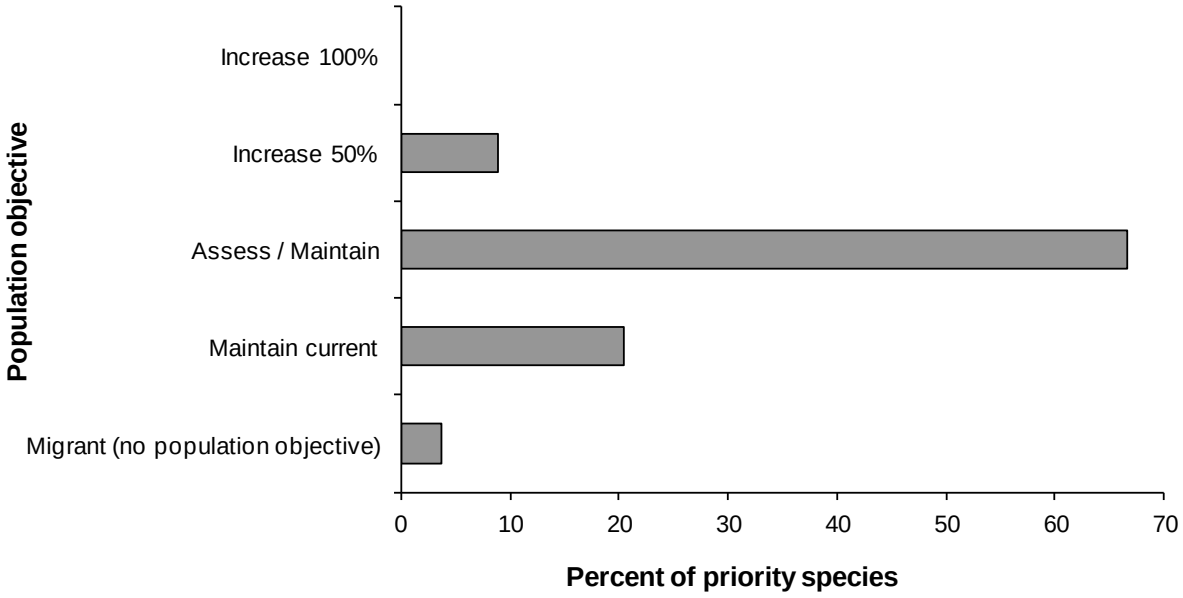


Figure 4. Percent of priority species that are associated with each population objective category in BCR 4 in Canada: Northwestern Interior Forest.

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 in the full strategy, but, unlike other threats, they are not ranked.

We identified a total of 831 specific threats to bird species while they are in BCR 4; these included threats to 72 of the 77 priority species (Fig. 5, Table 4). To clarify, each "specific threat" is one specific threat affecting one priority species (so, for example, if the same threat affects 3 species, or affects one species in 3 habitats, then that is considered to be 3 "specific threats").

In BCR 4, no specific threats were assessed as having "very high" magnitude; but 30 threats to 8 priority species in 6 broad habitat types were assessed as having "high" magnitude. Each of these had a large scope ("throughout"; >50% of the species' range within BCR 4 affected), and medium severity (where the threat exists, 25% of the population is affected). Species with high magnitude threats include 7 alpine species highly threatened by reduction of alpine tundra habitats due to climate change, including White-tailed Ptarmigan, American Golden-Plover, Wandering Tattler, Whimbrel, Surfbird, Smith's Longspur and Gray-crowned Rosy-Finch. The eighth species is Black Tern, which uses the "wetland/lake" regional habitat subclass and breeds at only one site in BCR 4; it has high magnitude threats from habitat change and disturbance from aquaculture operations at its single breeding lake.

A further 23 priority species had threats of medium magnitude, and 41 priority species had low magnitude threats only. Five priority species had no known threats in BCR 4 (Swainson's Hawk, Rufous Hummingbird, Alder Flycatcher, Gray-headed Chickadee, Wilson's Warbler).

Two threat categories rolled up to High magnitude in BCR 4 (Table 4). The Climate Change and Severe Weather threat category included threats such as reduction in alpine tundra due to encroachment of trees and shrubs, loss of wetlands due to melting permafrost, loss of spruce forest (all included in sub-category 11.1 in Fig. 5), and increasing frequency of storms and cold temperatures (sub-categories 11.3 and 11.4). Human Intrusions and Disturbance included disturbance of nesting and staging birds by people, pets, boats, all-terrain vehicles, and aircraft (sub-categories 6.1 and 6.3).

Four threat categories rolled up to Medium magnitude. Residential and Commercial Development included encroachment of residential development on waterbodies and wetlands, particularly at spring staging areas, as well as collisions with windows. Agriculture and Aquaculture included encroachment of rangeland and cropland on wetlands and riparian habitats, and degradation of habitat from aquaculture. Biological Resource Use included loss of old growth riparian white spruce forest, and loss of standing dead trees, through harvest and firewood cutting. Natural System Modifications included water level changes from hydroelectric development, and forest fire suppression.

Four threat categories rolled up to Low magnitude. Energy Production and Mining included habitat loss and degradation from mining and oil and gas exploration and development, including leaking of toxins from tailing ponds. Transportation and Service Corridors included

habitat fragmentation and degradation from roads, as well as collisions with vehicles. Pollution included ingestion of garbage from landfills, ingestion of lead sinkers, and reduction of insect prey from pesticides. Invasive and Other Problematic Species and Genes included increased populations of competing species or predators, and increased frequency/intensity of forest pest outbreaks and diseases. Energy Production and Mining is currently expanding rapidly in the region, and threats in this category may already be significantly greater than is documented here. The same may be true for Transportation and Service Corridors, Pollution, and Invasive and Other Problematic Species and Genes; threats in these categories will likely increase as part of the same expanding development.

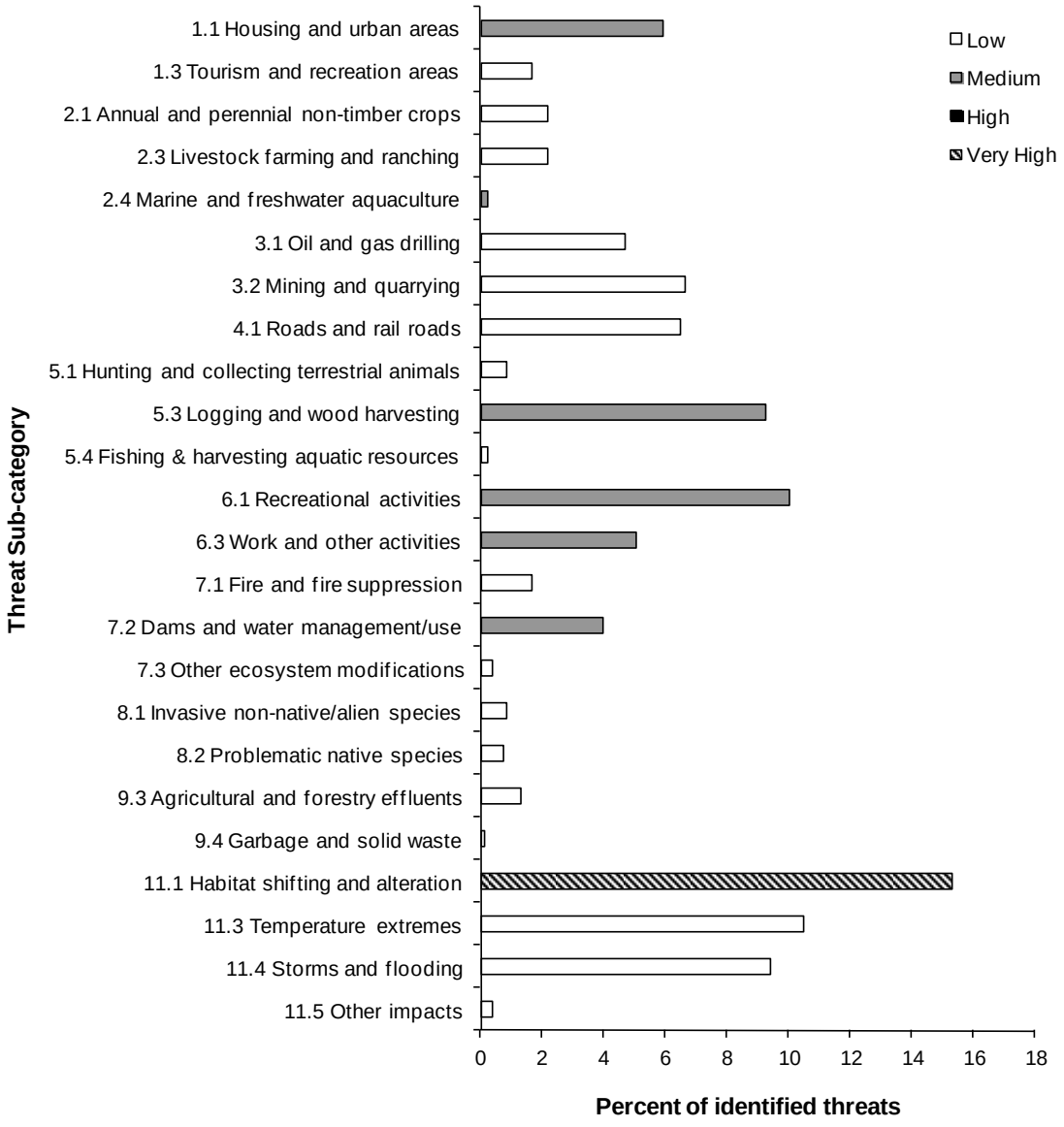


Figure 5. Percent and magnitude of identified threats to priority species in BCR 4 in Canada: Northwestern Interior Forest, by threat sub-category.

Overall, 831 threats to species were identified (each threat is to one species in one habitat; there were 319 species-habitat combinations). Class 10, Geological events, was omitted because there were no threats identified in that category.

Each bar represents the percent of the total number of threats identified in each threat sub-category in BCR X (for example, if 100 threats were identified in total for all priority species in BCR 4 in Canada: Northwestern Interior Forest, and 10 of those threats were in the category 1.1 Housing & urban areas, the bar on the graph would represent this as 10%). Shading in the bars (VH = very high, H = high, M = medium and L = low) represents the rolled up magnitude of all threats in each threat subcategory in the BCR.

Much remains to be learned about conservation issues and threats to birds in boreal regions, including BCR 4. For example, a threat which has been identified for one species may also affect other species which use the same habitats, but in many cases there is no documentation to support this, and so those threats to other species are not included. Further, much remains to be learned about the magnitude of threats to birds in boreal regions. If a particular threat is not listed for a particular species in this strategy, this may be due to a lack of information rather than the absence of the threat. Also, the magnitude of any threat may be underestimated in this first version of the strategy, due to limited knowledge. Future versions of this strategy will incorporate new information on threats to birds, and the magnitude of threats within BCR 4.

Table 4. Relative magnitude of identified threats to priority species within BCR 4 in Canada: Northwestern Interior Forest, by threat category and broad habitat class.

Overall ranks were generated through a roll-up procedure described in Kennedy et al. (2012). L represents Low Magnitude threats; M = Medium; H = High; VH = Very High. Blank cells indicate that no priority species had threats identified in the threat category/habitat combination. Threat categories and habitat classes which rolled up to medium or high threat levels overall are in bold. Threats to species in both their primary and secondary habitat classes were included.

Threat Category	**Habitat Class**											
	Coniferous	Deciduous	Mixed Wood	**Shrub/Early Successional**	**Herbaceous**	Cultivated and Managed Areas	**Lichens/Mosses**	**Bare Areas**	Artificial Surfaces and Associated Areas	**Wetlands**	**Waterbodies, Snow and Ice**	**Overall**
Overall	**M**	**L**	**L**	**M**	**M**	**L**	**M**	**M**	**L**	**H**	**M**	
1. Residential & commercial development	L	L		L	M	L	L	M		M	M	**M**
2. Agriculture & aquaculture	L			L	L					M	M	**M**
3. Energy production & mining	L	L	L	L	L	L	L	L		L	L	**L**
4. Transportation & service corridors	L	L	L	L	L	L	L	L		L	L	**L**
5. Biological resource use	M	L	M	L	L	L	L	L		M	L	**M**
6. Human intrusions & disturbance	L	L	L	M	L	L	L	L	L	H	H	**H**
7. Natural system modifications	L		L	L	L	L	L	L	L	M	M	**M**
8. Invasive & other problematic species & genes	M	L	L	L	L	L				L		**L**
9. Pollution	L		L	L		L		L		L	L	**L**
11. Climate change & severe weather	L	L	L	H	H	L	H	H	L	H	L	**H**

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 of the full strategy.

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.

In BCR 4, most conservation actions fell under the related objectives of ensuring adequate habitat and managing for climate change (Fig. 6). In addition, many actions were recommended under the objective of reducing disturbance. For BCR 4, we did not include research and monitoring ("7 Improve Understanding") as a conservation objective, because the need for improved knowledge encompasses virtually all species in all habitats in this remote region. Knowledge gaps are discussed separately under the "Research and Population Monitoring Needs" section of the full strategy.

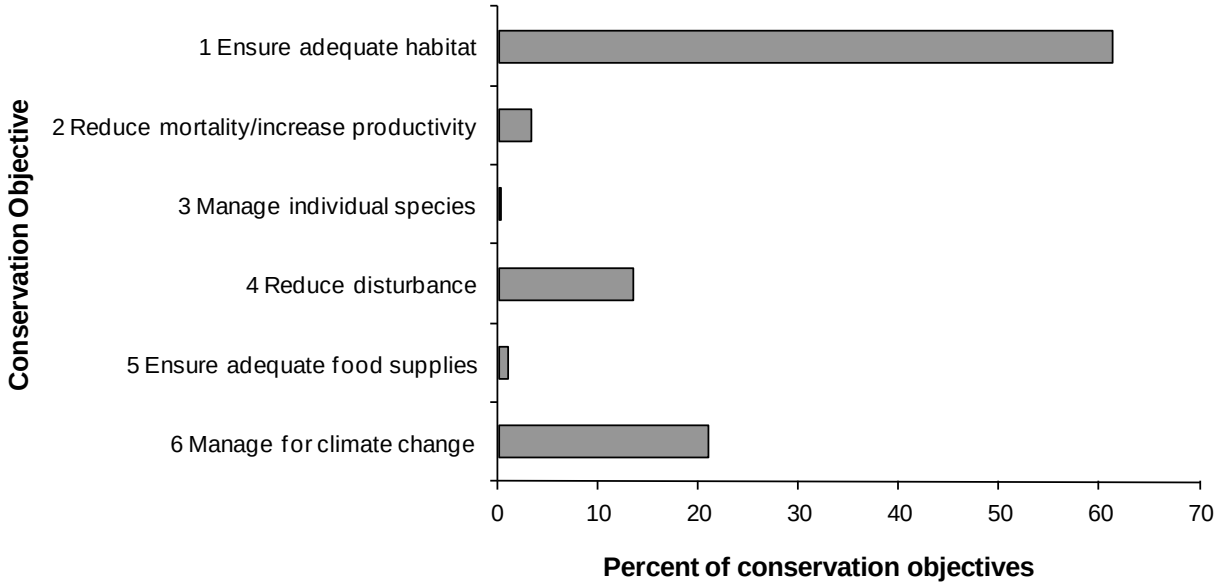


Figure 6. Percent of conservation objectives assigned to each conservation objective category in BCR 4 in Canada: Northwestern Interior Forest.

There were 1575 actions recommended to address the 836 threats to species in their habitats in BCR 4. Each action falls under one of the Conservation Objective categories.

Note: "7 Improve Understanding" is not included here for BCR 4 because virtually all species require research and monitoring for management.

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.

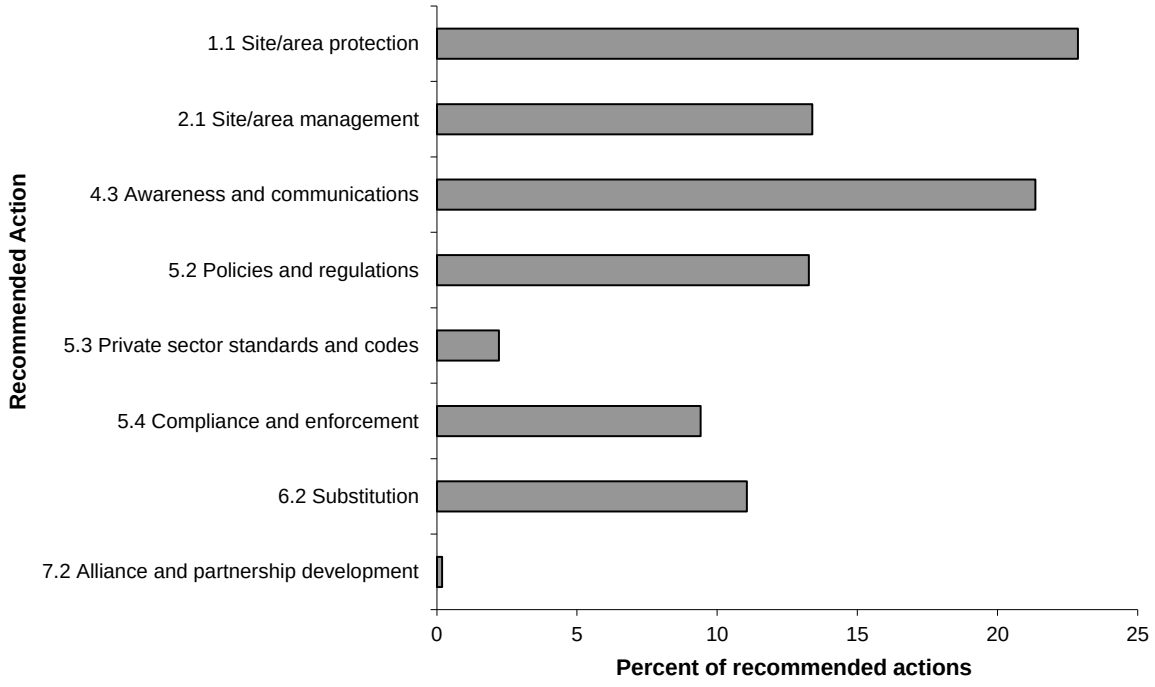


Figure 7. Percent of recommended actions assigned to each sub-category in BCR 4 in Canada: Northwestern Interior Forest.
There were 1575 actions recommended to address the 836 threats to species in their habitats in BCR 4.
Note: "8. Knowledge acquisition" is not included here for BCR 4 because virtually all species require research and monitoring for management.

In BCR 4, the most important sub-category of actions recommended is "Site/area protection," to ensure that the system of protected areas is sufficient to maintain species in the face of climate change, including large protected areas adequately representing all habitats and connected by movement corridors, to buffer against habitat loss, increased mortality, and to allow movement of habitats and species. Recommendations in "Site/area protection" category refer to protected areas that correspond roughly to IUCN categories I–VI (Salafsky et al. 2008).

Many recommended actions fell under the “Awareness and communications” sub-category, reflecting the need to inform land managers and the public of the status and conservation needs of birds in the region. Many actions under ““Policies and regulations” and “Substitution” involve supporting efforts to reduce greenhouse gas emissions.

References

Committee on the Status of Endangered Wildlife in Canada. 2012. www.cosewic.gc.ca/

Donaldson, G. M., C. Hyslop, R. I. G. Morrison, H. L. Dickson, and I. Davidson (editors). 2000. *Canadian Shorebird Conservation Plan*. Canadian Wildlife Service, Environment Canada, Ottawa, Ontario. 27pp. www.cws-scf.ec.gc.ca/publications/AbstractTemplate.cfm?lang=e&id=318

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

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 Plan*. Canadian Wildlife Service, Environment Canada, Ottawa, Ontario. 28pp. www.cws-scf.ec.gc.ca/publications/wow/Wings-EN-2003.pdf

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, 106pp. www.nawmp.ca/pdf/impfr-en-k.pdf

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

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

Species at Risk Public Registry. Accessed 4 April 2012. *Schedule 1: List of Wildlife Species at Risk*. www.sararegistry.gc.ca/species/schedules_e.cfm?id=1.

Wahl, H. 2004. *Climate*. In: "Ecoregions of the Yukon Territory: Biophysical properties of Yukon landscapes." C.A.S. Smith, J.C. Meikle, and C.F. Roots (eds.). Agriculture and Agri-Food Canada, PARC Technical Bulletin No. 04-01, Summerland, British Columbia, p. 19-23.

Wulder, M., and T. Nelson. 2003. EOSD Land cover classification legend report version 2. Natural Resources Canada, Victoria, BC.