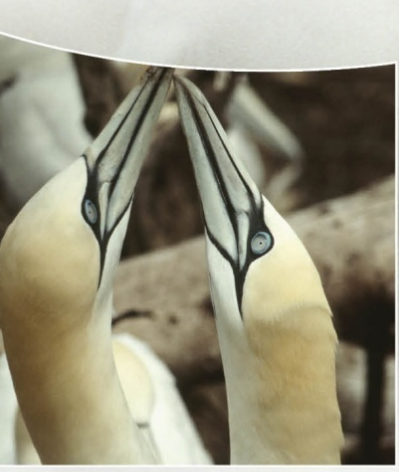
Environment Canada Environnement Canada

Bird Conservation Strategy for Bird Conservation Region 13 in Ontario Region: Lower Great Lakes/St. Lawrence Plain
- 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 migratory 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 BCR. BCR 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.

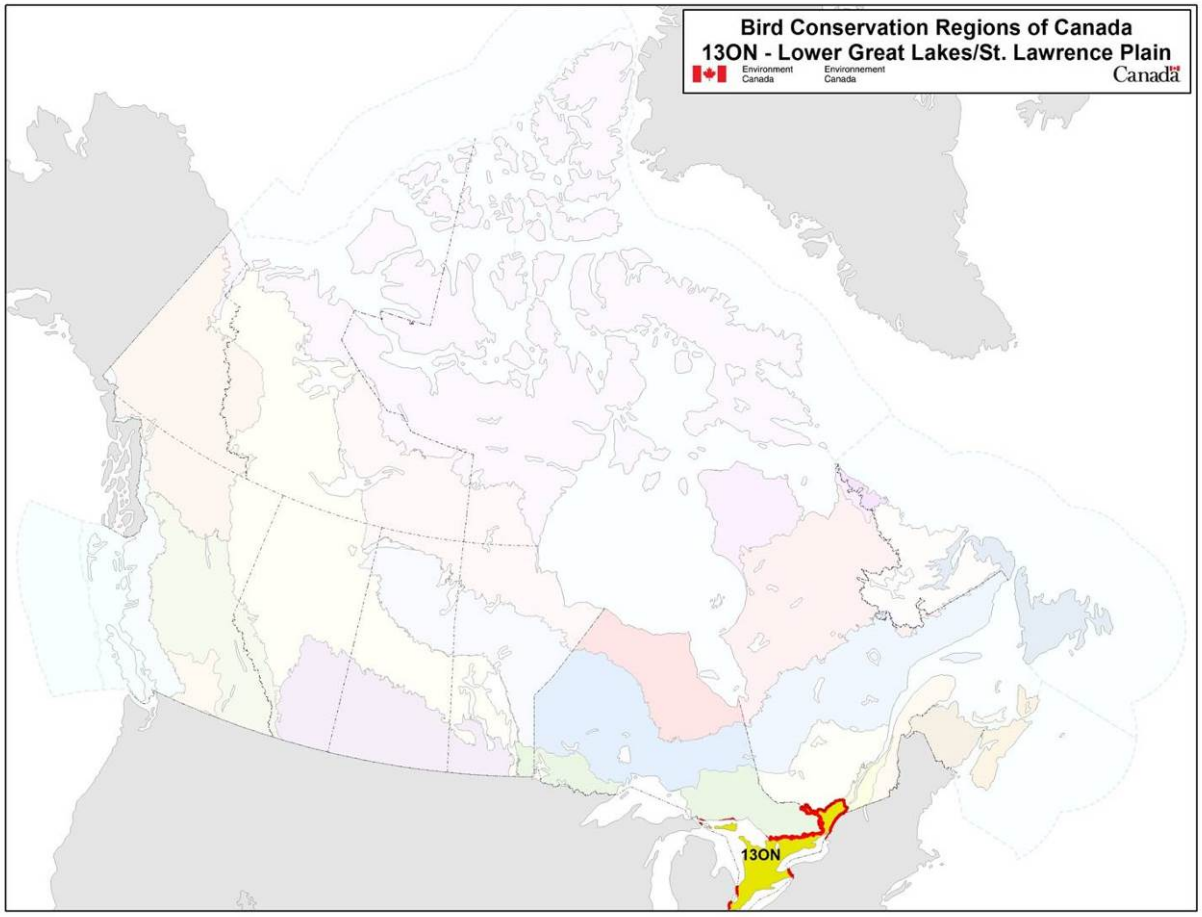
Conservation objectives and recommended actions from the conservation strategies will be used as the biological basis to develop guidelines and Beneficial Management Practices that support compliance with regulations under the *Migratory Birds Convention Act, 1994*. Furthermore, these strategies will guide conservation action in support of *The State of Canada's Birds 2012* (North American Bird Conservation Initiative 2012), which points to the strong influence of human activity on bird populations, both positive and negative, and presents solutions towards keeping common birds common and restoring populations that are in decline.

Acknowledgements

Brigitte Collins and Paul Smith were the main authors 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. However, work of this scope cannot be accomplished without the contribution of others who provided or validated technical information, commented on draft versions of the strategy, produced maps and supported the overall planning process. We would like to thank the following for their contributions to this strategy: Gregor Beck, Graham Bryan, Mike Cadman, Alaine Camfield, Lesley Carpenter, Britt Dupuis, Christian Friis, Krista Holmes, Jack Hughes, Judith Kennedy, Sarah Mainguy, Shawn Meyer, Dave Moore, Jocelyn Neysmith, Marie-France Noel, Michele Rodrick, Daniel Rokitnicki-Wojcik, Paul Watton, Chris Wedeles and D.V. Weseloh.

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 13 in Ontario Region: Lower Great Lakes/St. Lawrence Plain



Executive Summary

The Lower Great Lakes/St. Lawrence Plain Bird Conservation Region 13 (BCR 13) covers an area of 201,300 km^2 across Ontario, Quebec and the United States (Ontario Partners in Flight 2008). In Ontario, the region includes those areas lying between the Canadian Shield and the shores of the Great Lakes. This conservation strategy for Ontario's portion of BCR 13 (BCR 13 ON) builds on existing bird conservation plans and complements those created for the other BCRs across Canada. These strategies serve as a framework for implementing bird conservation nationally and also identify international conservation issues for Canada's priority bird species. This strategy is not intended to be highly prescriptive, but rather is intended to guide future implementation efforts undertaken by various partners and stakeholders.

Southern Ontario is the most populous region of Canada. Approximately one in three Canadians lives here, and population growth continues to outpace that of the rest of the country. Humans have had a profound and irreversible effect on the landscape in this region. Dense, old-growth deciduous and mixed forests once covered 90% of the landscape but were reduced to only 10% by 1920 as lands were cleared for agriculture. Wetlands and natural grasslands also suffered substantial losses. Although agricultural lands still dominate BCR 13 ON, a trend towards reforestation has benefitted some species, and efforts to restore and protect wetlands and other habitat types are ongoing. Moreover, a number of unique natural habitats remain, including Carolinian forests, alvars and the Frontenac Arch. Each of these habitats supports an atypically high proportion of birds as well as species at risk. The coastal wetlands of the Great Lakes also support a rich diversity of birds and offer critical staging habitat for shorebirds and waterfowl en route to breeding and non-breeding areas scattered widely across the western hemisphere.

Within BCR 13 ON, 280 species of birds regularly breed, overwinter, reside year-round or routinely migrate through the region.[1] Of these, 97 were identified as priority species in this BCR. All bird groups are represented on the priority species list, although the list is dominated by landbirds (47%). This list also includes waterbirds (25%), waterfowl (17%) and shorebirds (11%). More than two thirds of the waterbirds (77%) and almost half of the waterfowl (48%) occurring in BCR 13 ON are identified as priority species, compared to 34% of the shorebirds and only 25% of landbirds. Among the 97 priority species, 33 are assessed by the Committee on the Status of Endangered Wildlife in Canada as "at risk," 25 of which are listed under the federal *Species at Risk Act* and 30 under Ontario's *Endangered Species Act 2007* at the time of writing this strategy. In addition, 2 species are identified as being of management interest: the Eastern Temperate-breeding population of Canada Goose and the Mute Swan.

Identifying the broad habitat requirements for each priority species within the BCR allows species to be grouped by shared habitat-based conservation issues and actions. Priority species

[1] Species occurrence was determined using Ontario's Breeding Bird Atlas (Cadman et al. 2007), Birds of North America online (Cornell Lab of Ornithology 2013) and expert opinion.

are associated with 10 habitat types in BCR 13 ON. Wetlands are used by the greatest number of priority species (40%), while forest (deciduous 12% and mixed 13%) and urban areas (6%) are preferred habitat types for a smaller proportion of priority species. Herbaceous habitats (e.g., tallgrass prairie, savannah, alvar) are used by 23% of species, despite accounting for less than 1% of the region's land cover and, by contrast, cultivated and managed areas are used by a similar fraction of species (32%), though these habitat types dominate the landscape. The large number of priority species using cultivated and managed habitats reflects the adaptation to these human-influenced habitats and subsequent population increases by species that were restricted to native herbaceous habitats prior to European settlement. The Great Lakes are a prominent feature of the region, and the beaches, mudflats and other coastal "bare areas" are used by 18% of priority species, while 21% use the waterbodies themselves.

The population objectives in this strategy are categorical and are based on a quantitative or qualitative assessment of species' population trends. Much of BCR 13 ON is well covered by large-scale bird surveys, and in comparison to some other BCRs in Canada, the status of birds in southern Ontario is relatively well known. For 24% of priority species, monitoring data suggest declines with sufficient certainty to support an objective of increasing population size. In contrast, populations are sufficiently elevated to warrant a reduction in population size for two priority species: the Canada Goose, Eastern Temperate-breeding population and the Mute Swan. Maintaining populations at current levels is the objective for 23% of the priority species in BCR 13 ON (including most migrant waterfowl). Only 12% of priority species are assigned a population objective of Assess/Maintain because monitoring data are insufficient to propose an objective. A recovery objective is assigned to 30% of priority species, which are all species at risk whose breeding range occurs within this BCR. Nine percent (9 %) of priority species are identified as migrating through BCR 13 ON, including the federally and provincially endangered Red Knot (*rufa*), and are not assigned an objective, as those are set in other BCR strategies covering the breeding range of these species.

An assessment of threats identified a large number and diversity of conservation issues facing priority species in the various habitats of BCR 13 ON. Major threats to priority species relate to habitat loss and degradation from a variety of sources including urban development, biological resource use, pollution and human disturbance. Given the presence of many species at risk in this BCR, threats are both more numerous and of a greater magnitude than for other BCRs in the province. Wide-ranging conservation issues such as climate change were considered separately as widespread threats, given their effects on multiple species and habitats. The lack of biological or demographic data for some priority species is also considered an important conservation issue in this strategy.

Conservation objectives have been designed to address threats and information gaps facing priority birds in the region. For BCR 13 ON, the majority of conservation objectives identified relate to ensuring an adequate quantity and quality of habitat, such as ensuring that resource and land use policies and practices maintain or improve bird habitat. Objectives seeking to improve understanding of population declines as well as management of specific species are also among those most frequently identified in BCR 13 ON. These objectives address the lack of

information on the ecology and demographics of some priority species and the continued effort to establish recovery strategies and management plans for species at risk.

Recommended actions identify activities that will help to achieve the conservation objectives and thus mitigate threats to priority species. Actions are strategic rather than highly detailed and prescriptive. Whenever possible, recommended actions benefit multiple species and/or respond to more than one threat. Recognizing that a large majority of lands in the region are privately owned, only a small proportion of the actions relate to the direct protection of land. Instead, a majority of actions focus on habitat restoration and management for priority species by engaging land owners and other stakeholders in conservation. Developing and implementing effective policies and regulations, the development, use and promotion of Beneficial Management Practices (BMPs), increasing awareness about conservation issues, developing partnerships, determining factors causing population declines, and improving the scientific knowledge that underlies management decisions all figure prominently in the suite of conservation actions proposed for this region. Engaging stakeholders in actions that restore the function and resilience of ecosystems in this highly impacted region ensures that conservation successes can be maintained over the long term.

Introduction: Bird Conservation Strategies

Context

This document is one of a suite of Bird Conservation Region (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 for birds in Canada 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,[2] waterbirds,[3] shorebirds[4] and landbirds[5]) 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 (BMPs) 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.

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

Strategy Structure

Section 1 of this strategy presents general information about the BCR and the sub-region (i.e., Ontario's portion of the BCR), with an overview of the six elements[6] 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 sub-region. Section 3 presents additional widespread conservation issues that are not specific to a particular habitat or were not captured by the threat assessment for individual species, as well as research and monitoring needs, and threats to migratory birds while they are outside of Canada. The approach and methodology are summarized in the appendices, but details are available in a separate document (Kennedy et al. 2012). A national database houses all the underlying information summarized in this strategy and is available from Environment Canada.

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

Characteristics of Bird Conservation Region 13: Lower Great Lakes/St. Lawrence Plain

The Lower Great Lakes/St. Lawrence Plain Bird Conservation Region, BCR 13, extends across southern Ontario and southwestern Quebec, as well as the northern United States from Ohio to Vermont. The region encompasses a total area of 201,300 km^2, with the largest portion in Ontario (84,500 km^2 or 42%; Ontario Partners In Flight 2008; Fig. 1). Located in the southernmost portion of the province, and of Canada, BCR 13 Ontario (BCR 13 ON) is unique both in terms of physiography and biodiversity. The habitats along the northern boundary of the BCR reflect the transition between the sedimentary rocks and glacial till in the south of the province and the igneous bedrock of the Canadian Shield to the north (Fig. 2). Mixed forest dominates the transitional landscape, and agriculture is limited in comparison to elsewhere in the region. Farther south, glacial till and plains of limestone, clay or sand predominate. Glacial features such as drumlins and moraines occur throughout the region, and because they have poorer soils or challenging topography, they are often less intensively farmed and support more natural habitats. However, much of BCR 13 ON has deep, fertile soil, and intensive farming is a dominant feature of the landscape. Indeed, nearly 60% of the region is classified as cultivated or managed land (Table 1). Still, despite this heavily altered state, BCR 13 ON continues to offer a variety of unique natural habitats.

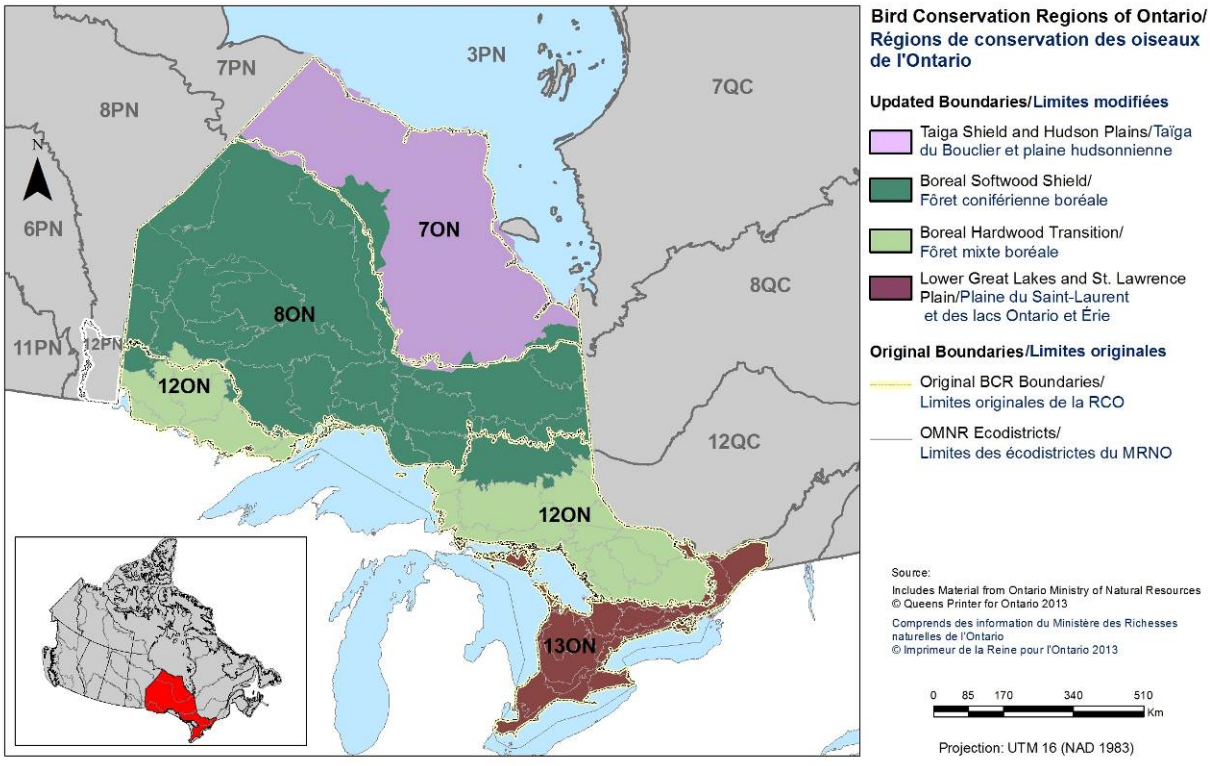


Figure 1. Map of Boundary Changes to BCR 13 ON: Lower Great Lakes/St. Lawrence Plain.

For conservation planning purposes, the original Ontario BCR boundaries (as defined by the North American Bird Conservation Initiative) have been slightly modified to align with the Ontario Ministry of Natural Resources Ecodistrict boundaries[7].

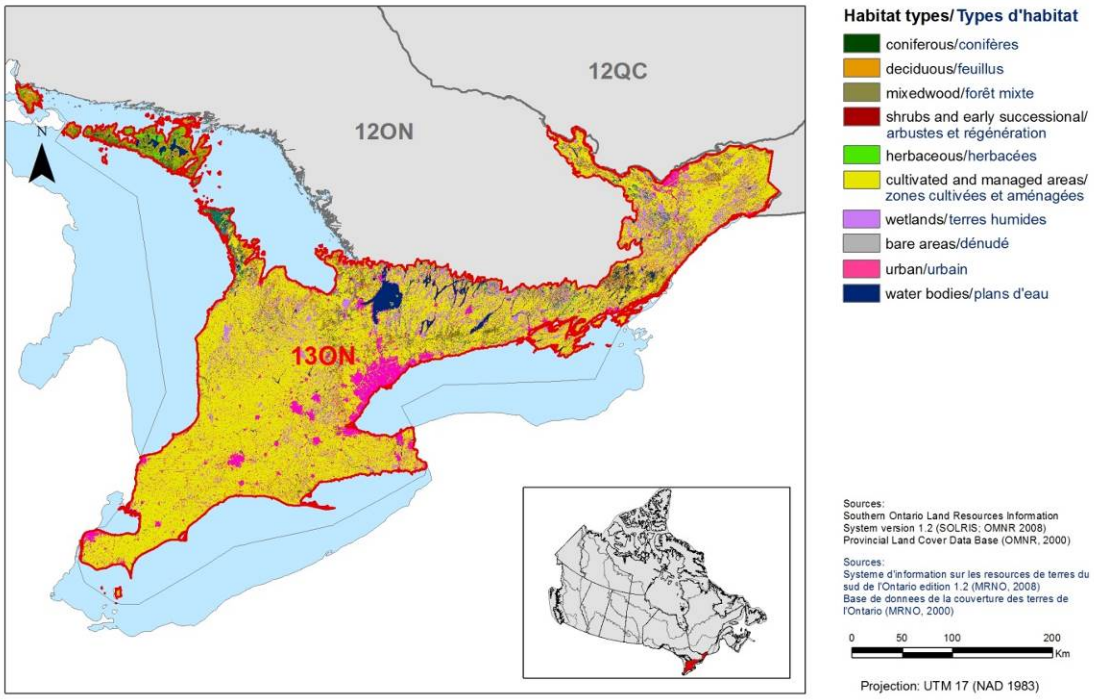


Figure 2. Map of habitat types in BCR 13 ON.

Note: Riparian habitat areas are not depicted on this map because they represent a "zone" and are not a true land cover/land use class. A map depicting the extent of derived riparian areas for illustration purposes can be found in the Riparian section of the complete strategy.

[7] Ecodistrict 6E-17 has been moved from BCR 12 and included in BCR 13, which results in Cockburn and St. Joseph Islands being included in BCR 13.

Table 1. Major categories of land cover in BCR 13 ON and their proportions on the landscape.

BCR Habitat Class[1]	Provincial Land Cover (PLC 27) Class(es)	SOLRIS v1.2 Land Cover/Land Use Class(es)	Area (ha)	Percent of Total Area
Coniferous Forest	Forest – Dense Coniferous	Coniferous Forest Plantations – Tree Cultivation	322,782	3.79%
Deciduous Forest	Forest – Dense Deciduous Forest – Sparse	Deciduous Forest Forest	730,085	8.59%
Mixed Wood Forest	Forest – Dense Mixed	Mixed Forest	378,203	4.45%
Shrub/Early Successional	Forest Depletion – Cuts Forest Depletion – Burns Forest – Regenerating Depletion	Tallgrass Woodland, Treed Sand Barren and Dune, > 25% vegetated Shoreline	1,839	0.02%
Herbaceous	Agriculture – Pasture/Abandoned fields	Open Tallgrass Prairie, Tallgrass Savannah Alvar	58,271	0.68%
Cultivated/Managed Areas	Agriculture - Cropland	Hedge Rows, Undifferentiated	4,974,029	58.53%
Bare Areas	Sand/Gravel/Mine Tailings, Bedrock	Open Shoreline, Open Sand Barren and Dune, Extraction, Open Cliff and Talus	45,528	0.54%
Urban	Settlement/Infrastructure	Transportation, Built-up area pervious, Built-up area impervious	668,898	7.87%
Wetlands[2]	Marsh – Inland, Swamp – Deciduous, Swamp – Coniferous, Fen – Open, Fen – Treed, Bog – Open, Bog – Treed	Swamp, Fen, Bog, Marsh	1,069,538	12.59%
Waterbodies[3]	Water – Deep clear, Water – Shallow/Sedimented	Open Water	246,932	2.91%
Riparian[4]	30 m inland from shoreline		77,614	N/A

[1] BCR Habitat Classes are based on the United Nations international Land Cover Classification System (LCCS).
[2] Coastal wetlands are not differentiated at the resolution of Provincial Land Cover data.
[3] The area of waterbodies does not include the open waters of the Great Lakes. The area includes inland waterbodies only.
[4] Riparian areas are not included in the total area, as they are "zones" and do not represent a true provincial land cover class.

Table 1 continued

BCR Habitat Class[1]	Provincial Land Cover (PLC 27) Class(es)	SOLRIS v1.2 Land Cover/Land Use Class(es)	Area (ha)	Percent of Total Area
Unknown	Unknown, Cloud/shadow		2,175	0.03%
		Total Area	**8,498,280**	**100%**

Data Source: Lower Great Lakes/St. Lawrence Plain – SOLRIS v1.2 (2000–2002 image data)
Manitoulin and North Channel Islands – Provincial Land Cover 27 (Spectranalysis Inc. 2004)

In several areas of the BCR, including Napanee, Manitoulin Island and the Carden Plain, thin soils over limestone support a sparsely vegetated habitat known as alvar, a globally rare ecosystem (Brownell and Riley 2000). In the southern extent of the region, Canada's most southerly area, unique Carolinian forests support a high diversity of bird species including an atypically high proportion of species at risk (Ontario Partners in Flight 2008). The eastern portion of BCR 13 ON holds a unique landscape that is recognized as 1 of only 13 UNESCO World Biosphere Reserves in Canada: the Frontenac Axis (or Frontenac Arch) is a ridge of Precambrian rock that connects the Canadian Shield of the Algonquin Highlands to the Adirondack Mountains of New York. This 50 km long ridge is home to a unique assemblage of species, including highly diverse herpetofauna and uncommon birds such as the Least Bittern and Cerulean Warbler.

However, high species richness is not limited to these unique habitats. BCR 13 ON as a whole supports among the greatest diversity of breeding landbirds of any region in Canada (Rich et al. 2004) and offers important breeding habitat for a wide diversity of waterfowl, shorebirds and waterbirds. Species richness is greatest where there is a mixture of forest, wetlands and grasslands, found near the edge of the Canadian Shield in this region (Mike Cadman, pers. comm. 2012). The region is also of critical importance to birds during migration. The coastal wetlands, beaches and near-shore waters of the Great Lakes are key migratory stopovers for many waterfowl, shorebirds and waterbirds, and many landbirds congregate at locations such as Presqu'ile, Long Point and Point Pelee before continuing over the Great Lakes on their way south to complete their migration. There is also an atypically high proportion of species at risk, due in part to BCR 13 ON's position at Canada's most southerly latitudes, thus at the northern edge of some species' ranges. However, it also reflects the profound influence that humans have had, and continue to have, on the landscape in this region.

The land cover of BCR 13 ON prior to European settlement bears little resemblance to that which we see today. In the early 19th century, as much as 90% of southern Ontario was covered with deciduous forest and mixed woodlands, perhaps 5% was open habitats such as natural tallgrass prairie, alvar, marsh and savannah (Larson et al. 1999), and perhaps 25% of the region was wetlands (including forested swamps; Snell 1987). Clearing of land and drainage of wetlands for agriculture was widespread and intensive, and estimates suggest a maximum loss of 94% of the region's original upland forest (Larson et al. 1999), 97% of the native prairie and savannah habitats (Rodger 1998), and 68% of wetlands (Snell 1987) at various points in the 20th

century. Although still radically different from the historic land cover, current conditions reflect a recent trend towards reforestation. In 2000, 17% of the land cover was forested, wetlands comprised 13% of the region's area and less than 1% of the region supports natural open habitats (Fig. 2, Table 1). At that time, more than half of the region's land cover supported agriculture, and a majority of the other habitats were either human-made or managed for a variety of uses.

Not surprisingly, these massive changes in habitats in BCR 13 ON have had drastic impacts on the region's avifauna. Grassland birds benefitted significantly from the widespread clearing of forest in the 19th century, but many have since declined due to changing land management practices, reforestation and a variety of other threats discussed in this strategy. In contrast, forest bird population show increasing population trends in the region, as evidenced by a 31% increase in counts of many but not all forest birds in the Breeding Bird Survey, 1968–1977 vs. 2001–2003, presumably in response to increases in forest cover in parts of the BCR sub-region (Ontario Partners In Flight 2008). Other trends in bird abundance, such as a decline of up to 75% in counts of migrant shorebirds at stopover sites throughout southern Ontario (Ross et al. 2012), may have little to do with habitat change in BCR 13 ON (many of the key stopovers are protected areas) and instead could relate to changing conditions on the breeding grounds or elsewhere in the non-breeding range. Still other trends in bird abundance in the region, such as a general decline in aerial insectivores, remain poorly understood (Ontario Partners In Flight 2008).

BCR 13 ON features a number of areas that are protected, including 9 National Wildlife Areas and 6 Migratory Bird Sanctuaries totalling 9,985 hectares (Protected Areas Network 2013) that are maintained by Environment Canada's Canadian Wildlife Service (Fig. 3). A network of national and provincial parks, provincial wildlife areas, conservation reserves, and locally managed working forests (e.g., Conservation Authority and county forests) also contributes to the conservation of birds and wildlife in the BCR. As of 2013, 48 Important Bird Areas (IBA Canada 2013) have been identified in BCR 13 ON, as well as 6 Wetlands of International Importance under the 1981 Ramsar Convention.

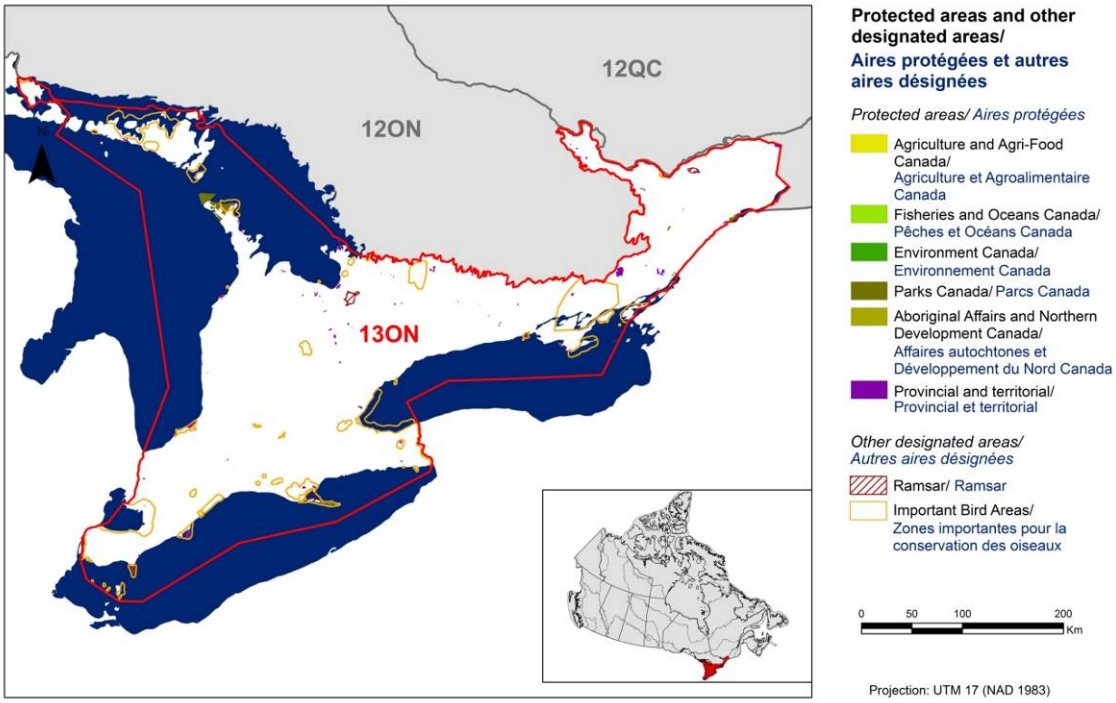


Figure 3. Map of protected areas BCR 13 ON.

Conservation efforts in BCR 13 ON must recognize that a landscape dominated by humans is the reality for this region. Despite its small size, roughly a third of the Canadian population inhabits the region, and population growth here continues to outpace that elsewhere in the province (Ontario Ministry of Finance 2010). Growth has been, and continues to be, accommodated through urban development, which has often resulted in loss of habitats and ecological functions. The ecological functions found in intact or restored migratory bird habitats, such as forests and wetlands, provide ecological goods and services to the growing human population. The economic value of these ecosystem services, from natural purification of water to control of erosion or insect pests, is increasingly recognized by both governments and the public. The concept of maintaining ecosystem services through sustainable development is widely promoted, and this increased awareness may offer new opportunities for conservation of birds and their habitats.

Approximately 90 % of all lands in Southern Ontario are privately owned (Ontario Partners In Flight 2008). Thus, implementation of conservation actions depends heavily on the involvement of private landowners. Conservation of birds on private lands, and in particular lands that are in most cases managed for a variety of human uses, is a substantial challenge involving numerous stakeholders. Yet, significant progress has been made through stewardship programs, adoption of BMPs, municipal and provincial land use plans, strategic protection of lands by environmental non-governmental organizations, the contribution of conservation authorities working with local communities, and the efforts of partnerships such as the Eastern Habitat Joint Venture. Accordingly, implementation of the actions suggested in this strategy could only

be accomplished through a broad partnership of governments and stakeholders pursuing a common goal of biodiversity conservation in BCR 13 ON.

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 sub-region. Species that are vulnerable due to population size, distribution, population trend, abundance and threats are included as priorities 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 sub-region; 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 and require ongoing management because of their socio-economic importance as game species or because of their impacts on other species or habitats.

In Ontario, significant efforts to define priority species have already been undertaken for shorebirds, waterbirds, waterfowl and landbirds. The results of these bird group-specific planning efforts form the foundation of this integrated bird priority species list for BCR 13 ON. Birds identified as priority species in previous BCR 13 conservation plans were in general included as priority species. These priority species lists were drawn from Ontario Partners in Flight (2008) for landbirds, the North American Waterfowl Management Plan (NAWMP Plan Committee 2004) and the Ontario Eastern Habitat Joint Venture Implementation Plan (2007) for waterfowl, the Ontario Waterbird Conservation Plan (Zeran et al. unpubl.) for waterbirds and from the Ontario Shorebird Conservation Plan (Ross et al. 2003) for shorebirds. In addition, species that occur regularly within the BCR and have been assessed by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC), listed on Schedule 1 of the federal *Species at Risk Act* (SARA) or included on the Species at Risk in Ontario list (SARO; Ontario Ministry of Natural Resources 2013a) in the categories of Endangered, Threatened or Special Concern were added, current to November 2013. Further details on priority species assessment are found in Appendix 2.

The purpose of the prioritization exercise is to focus implementation efforts on the species and issues of greatest significance to Ontario's avifauna. As with any priority-setting exercise, some important species may be excluded; however, the issues of importance to any excluded species are usually captured by addressing the threats identified for species that are included on the priority list. With this in mind, species present in the region only as migrants were included as priority species only when their inclusion introduced new regional conservation issues, such as for the protection of migratory staging sites. Otherwise, the BCR 13 ON strategy relies on conservation actions arising from threats to other priority species to address more general conservation concerns for migrants.

In all, 280 species of birds occur regularly in BCR 13 ON, 97 of which were assessed as priority species (Table 2) with representatives from all four bird groups. Landbirds show the greatest diversity in BCR 13 ON, representing nearly 66% of the candidate species list (Table 3). Many landbird species are uncommon or non-breeders in the region, and only 25% of them were assigned priority status. Still, landbirds contributed the greatest number of species to the priority list (46 species or 47%; Table 3). In contrast, more than two-thirds of the waterbirds present within the region were assigned priority status, contributing 24 species (25%) to the priority list. The diversity of breeding shorebirds and waterfowl in the region is low in comparison to landbirds. These groups contribute 11 and 16 species, respectively, to the priority species list, including a number present only as migrants (Table 2). Among the 97 priority species, 33 are assessed as "at risk" by COSEWIC; 25 are listed on Schedule 1 of the federal SARA, and 30 are included on the SARO list (Table 4).

Table 2. Priority species in BCR 13 ON, population objective and reasons for priority status.
Note: All assessments, listings and designations are current to November 2013. A species can be on the priority list for more than one reason.

Priority Species	Population Objective	COSEWIC[7]	SARA[8]	SARO[9]	Regional/Sub-regional Concern[10]	Regional/Sub-regional Stewardship[11]	National/Continental Concern	National/Continental Stewardship
Landbirds								
Acadian Flycatcher	Recovery objective	E	E	E	Y		Y	Y
American Kestrel	Maintain current				Y			
Bald Eagle	Recovery objective[12]			SC	Y			Y
Baltimore Oriole	Maintain current				Y			
Bank Swallow	Increase	T				Y		
Barn Owl	Recovery objective	E	E	E	Y		Y	
Barn Swallow	Recovery objective	T		T	Y			
Belted Kingfisher	Increase				Y			

[7] Assessed by COSEWIC as E, Endangered; T, Threatened; SC, Special Concern.
[8] Species listed on Schedule 1 of SARA as E, Endangered; T, Threatened; SC, Special Concern (Species at Risk Public Registry 2013).
[9] Species listed as E, Endangered; T, Threatened; SC, Special Concern on the SARO List.
[10] Regional refers to BCR-wide (i.e., all jurisdictional data were used for the entire BCR) while sub-regional refers to the Ontario portion of the BCR only (i.e., Ontario BCR data were used).
[11] Only the landbird group distinguishes stewardship species from other priority species (see Panjabi et al. 2005)
[12] This species is listed under the federal SARA and/or the provincial *Endangered Species Act 2007*, but its federal and/or provincial recovery documents have not yet been finalized.

Table 2 continued

Priority Species	Population Objective	COSEWIC[7]	SARA[8]	SARO[9]	Regional/Sub-regional Concern[10]	Regional/Sub-regional Stewardship[11]	National/Continental Concern	National/Continental Stewardship
Black-billed Cuckoo	Increase				Y	Y		
Blue-winged Warbler	Maintain current				Y		Y	
Bobolink	Recovery objective	T		T	Y	Y	Y	
Brown Thrasher	Increase				Y			Y
Canada Warbler	Recovery objective[6]	T	T	SC	Y		Y	
Cerulean Warbler	Recovery objective	E	SC	T	Y		Y	
Chimney Swift	Recovery objective[6]	T	T	T	Y		Y	
Common Nighthawk	Recovery objective[6]	T	T	SC	Y		Y	
Eastern Kingbird	Increase				Y			
Eastern Meadowlark	Recovery objective	T		T	Y			
Eastern Towhee	Increase				Y		Y	Y
Eastern Whip-poor-will	Recovery objective[6]	T	T	T	Y		Y	
Eastern Wood-Pewee	Increase	SC			Y			
Field Sparrow	Increase				Y			
Golden-winged Warbler	Recovery objective[6]	T	T	SC	Y		Y	
Grasshopper Sparrow	Increase	SC			Y		Y	Y
Henslow's Sparrow	Recovery objective	E	E	E	Y		Y	
Hooded Warbler	Recovery objective		T		Y		Y	Y
Kirtland's Warbler	Recovery objective	E	E	E	Y		Y	
Loggerhead Shrike *(migrans)*	Recovery objective	E	E	E	Y		Y	
Louisiana Waterthrush	Recovery objective	SC	SC	SC	Y		Y	Y
Northern Bobwhite	Recovery objective[6]	E	E	E	Y		Y	
Northern Flicker	Increase				Y			
Northern Harrier	Maintain current				Y			

Table 2 continued

Priority Species	Population Objective	COSEWIC[7]	SARA[8]	SARO[9]	Regional/Sub-regional Concern[10]	Regional/Sub-regional Stewardship[11]	National/Continental Concern	National/Continental Stewardship
Northern Rough-winged Swallow	Increase				Y			
Olive-sided Flycatcher	Recovery objective [6]	T	T	SC	Y		Y	
Peregrine Falcon (*anatum/tundrius*)	Recovery objective	SC	SC	SC	Y		Y	
Prairie Warbler	Assess/Maintain				Y		Y	
Prothonotary Warbler	Recovery objective	E	E	E	Y		Y	
Purple Martin	Increase				Y			
Red-headed Woodpecker	Recovery objective[6]	T	T	SC	Y		Y	
Red-shouldered Hawk	Assess/Maintain				Y			Y
Rose-breasted Grosbeak	Maintain current					Y		
Savannah Sparrow	Increase				Y			
Short-eared Owl	Recovery objective[6]	SC	SC	SC	Y		Y	
Vesper Sparrow	Increase				Y			
Wood Thrush	Maintain current	T			Y		Y	
Yellow-breasted Chat (*virens*)	Recovery objective	E	SC	E	Y		Y	
Shorebirds								
American Golden-Plover	Migrant (no BCR 13-ON population objective)				Y		Y	
American Woodcock	Increase				Y		Y	
Black-bellied Plover	Migrant (no BCR 13-ON population objective)				Y		Y	
Buff-breasted Sandpiper	Migrant (no BCR 13-ON population objective)	SC			Y		Y	
Killdeer	Increase				Y		Y	
Piping Plover (*circumcinctus)*	Recovery objective	E	E	E	Y		Y	
Red Knot (*rufa*)	Migrant (no BCR 13-ON population objective)	E	E	E	Y		Y	
Semipalmated Sandpiper	Migrant (no BCR 13-ON population objective)				Y		Y	

Table 2 continued

Priority Species	Population Objective	COSEWIC[7]	SARA[8]	SARO[9]	Regional/Sub-regional Concern[10]	Regional/Sub-regional Stewardship[11]	National/Continental Concern	National/Continental Stewardship
Spotted Sandpiper	Increase				Y		Y	
Upland Sandpiper	Increase				Y			
Wilson's Snipe	Assess/Maintain				Y			
Waterbirds								
American Bittern	Assess/Maintain				Y		Y	
American Coot	Increase				Y			
Black Tern	Recovery objective			SC	Y		Y	
Black-crowned Night-Heron	Assess/Maintain				Y			
Bonaparte's Gull	Migrant (no BCR 13-ON population objective)				Y		Y	
Caspian Tern	Maintain current				Y			
Common Gallinule	Assess/Maintain				Y			
Common Loon	Maintain current				Y		Y	
Common Tern	Increase				Y		Y	
Forster's Tern	Assess/Maintain				Y		Y	
Great Black-backed Gull	Maintain current				Y			
Great Blue Heron	Maintain current				Y			
Great Egret	Maintain current				Y			
Green Heron	Increase				Y			
Horned Grebe (western population)	Migrant (no BCR 13-ON population objective)	SC		SC	Y		Y	
King Rail	Recovery objective	E	E	E	Y		Y	
Least Bittern	Recovery objective	T	T	T	Y		Y	
Little Gull	Migrant (no BCR 13-ON population objective)				Y		Y	
Pied-billed Grebe	Maintain current				Y			
Red-necked Grebe	Assess/Maintain				Y			
Sandhill Crane	Assess/Maintain				Y			

Table 2 continued

Priority Species	Population Objective	COSEWIC[7]	SARA[8]	SARO[9]	Regional/Sub-regional Concern[10]	Regional/Sub-regional Stewardship[11]	National/Continental Concern	National/Continental Stewardship
Sora	Assess/Maintain				Y		Y	
Virginia Rail	Maintain current				Y		Y	
Yellow Rail	Recovery objective	SC	SC	SC	Y		Y	
Waterfowl								
American Black Duck	Maintain current				Y		Y	
Blue-winged Teal	Increase				Y		Y	
Canada Goose (Southern James Bay)	Migrant[7] (no BCR 13-ON population objective)				Y		Y	
Canada Goose (Temperate-breeding in Eastern Canada)	Decrease[8]				Y			
Canvasback	Maintain current				Y		Y	
Common Goldeneye	Maintain current				Y		Y	
Common Merganser	Maintain current				Y			
Green-winged Teal	Maintain current				Y			
Lesser Scaup	Assess/Maintain				Y		Y	
Long-tailed Duck	Assess/Maintain				Y		Y	
Mallard	Maintain current				Y		Y	
Mute Swan	Decrease[8]				Y			
Redhead	Maintain current				Y		Y	
Ring-necked Duck	Maintain current				Y			
Tundra Swan	Maintain current				Y			
Wood Duck	Increase				Y			

[7] Population objectives for migrant waterfowl are based on spring and fall staging surveys of the Great Lakes with the exception of the Southern James Bay Population of Canada Geese.
[8] A species of management interest due to its high abundance.

Table 3. Summary of priority species, by bird group, in BCR 13 ON.

Bird Group	Number of Species	Percent of Total Number of Species	Number of Priority Species	Percent Listed as Priority by Bird Group	Percent of Total Number of Priority Species
Landbird	184	66%	46	25%	47%
Shorebird	32	11%	11	34%	11%
Waterbird	31	11%	24	77%	25%
Waterfowl	33	12%	16	48%	17%
Total	**280**	**100%**	**97**	**-**	**100%**

Table 4. Number of priority species in BCR 13 ON by reason for priority status.
Note: All assessments, listings and designations are current to November 2013.

Priority Listing[1]	Landbird	Shorebird	Waterbird	Waterfowl
COSEWIC[2]	26	3	4	0
SARA[3]	20	2	3	0
SARO[4]	23	2	5	0
National/Continental Concern	26	9	13	9
National/Continental Stewardship[5]	8	N/A	N/A	N/A
Regional/Sub-regional Concern[6]	44	11	24	16
Regional/Sub-regional Stewardship	4	N/A	N/A	N/A
Management Interest[7]	0	0	0	2

[1] A single species can be on the priority list for more than one reason.
[2] Assessed by COSEWIC as Endangered, Threatened or Special Concern.
[3] Species listed on Schedule 1 of SARA as Endangered, Threatened or Special Concern.
[4] Species listed as Endangered, Threatened or Special Concern on the SARO List.
[5] Only the landbird group distinguishes stewardship species from other priority species (see Panjabi et al. 2005).
[6] Regional refers to BCR-wide (i.e., all jurisdictional data were used for the entire BCR) while sub-regional refers to the Ontario portion of the BCR only (i.e., Ontario BCR data were used).
[7] A species of management interest due to its high abundance.

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 13 ON, two data sets were used to derive the extent of available BCR habitats. The Southern Ontario Land Resource Information System (SOLRIS) version 1.2 released April 2008 provides a comprehensive land cover/land use inventory of southern Ontario's natural, rural and urban areas (Ontario Ministry of Natural Resources 2008). SOLRIS follows a standardized approach for ecosystem description, inventory and interpretation known as Ecological Land Classification (Lee et al. 1998) and covers the majority of the BCR. Provincial land cover (PLC) data were used to fill the information gaps for Manitoulin and North Channel Islands. PLC 27 is an Ontario land cover classification system produced wholly from satellite remote sensing data by the Ontario Ministry of Natural Resources. It provides a classification of 27 broad land cover types for the province of Ontario north of the southern border of the Canadian Shield and reflects the nature of the land surface rather than the land use (Spectranalysis Inc., 2004).

Priority species used many different habitats, with wetlands most heavily used (40% of species; Fig. 4). Although wetlands represent only 13% of land cover, prior to European settlement wetlands (greater than 10 ha) covered perhaps 25% or more of the region (Ducks Unlimited Canada 2010). The high number of wetland-associated priority species reflects the ongoing pressure on this important habitat. Similarly, herbaceous habitats (e.g., tallgrass prairie, savannah, alvar) were used by 23% of species, despite accounting for less than 1% of the region's land cover, whereas cultivated and managed areas used by a similar fraction of species (32%) dominate the landscape. The populations of many priority species that had been restricted to native herbaceous habitats prior to European settlement flourished as they adapted to the cultivated and managed land that became available. The large number of priority species using these two habitat classes is due to alarming population declines as high-quality open country such as native and managed grasslands is lost or degraded.

The Great Lakes are a prominent feature of the region, and the beaches, mudflats and other coastal "bare areas" were used by 18% of species, while 21% used the waterbodies themselves (Great Lakes and inland waterbodies) (Fig. 4). The two forested habitats were used by 12% (deciduous) and 13% (mixed wood) of priority species. Although the diversity of landbirds can be high in the forests of BCR 13 ON, many of these species were not identified as priorities. Forest cover has actually increased in BCR 13 ON over the last 70 years (Riley and Mohr 1994; Ontario Partners in Flight 2008) and populations of many but not all forest bird species show stable or increasing trends over the last 40 years (Environment Canada 2014). It may be that some of these species have stabilized at lower post-European settlement population levels. However, it remains important to keep common species common, and current habitat trends

must be monitored as new studies are showing a decline in forest cover in the north-eastern United States following decades of increase (Foster et al. 2008).

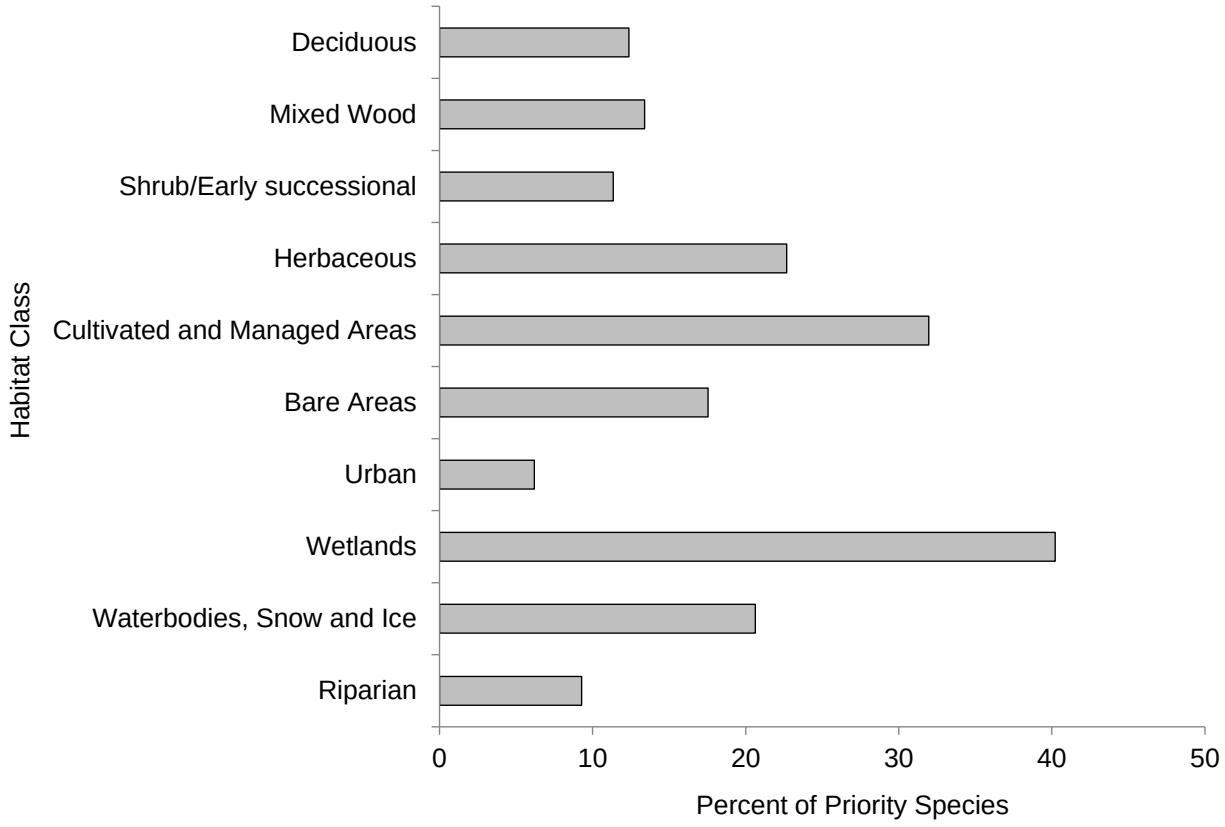


Figure 4. Percent of priority species that are associated with each habitat type in BCR 8 ON.
Note: The total exceeds 100% because each species may use more than one habitat.

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. 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 yet available, interim breeding population objectives are provided by species, by habitat in Section 2 of the complete strategy. When recovery objectives are available, they will replace the interim objectives. The ultimate measure of conservation success will be the extent to which population objectives have been reached within the timeframes set by national and continental bird conservation plans.

The lands, habitats and ecosystems within BCR 13 ON have changed fundamentally and irreversibly over the last 200 years (Environment Canada 2013; Ontario Partners in Flight 2008). How they will contribute to restoring North America's bird populations at natural abundances can be seen by referring to historic conditions, present-day conditions and new opportunities. Different bird species and guilds have flourished and declined with past changes to the ecosystems of BCR 13 ON. For example, forest birds were at peak abundance when BCR 13 ON was a forest biome prior to European land clearance. Subsequently, when forests in this region were converted to open country habitats for agriculture (peaking in extent in the early 20th century), populations of open country birds increased greatly (Ontario Partners In Flight 2008). Today, high-quality open country habitats are in decline and with each successive ecosystem state, the population abundance of few, if any, bird guilds have remained the same. Furthermore, new species colonized BCR 13 ON when ecosystem changes favoured them. Therefore, the BCR 13 ON priority species represent different ecological reference points. Setting population and habitat targets that contribute to North American population goals must be done in the context of the relationship of a species' status relative to these previous ecosystem states. There are, therefore, multiple reference points for setting objectives for sustainable populations and habitat that reflect population levels prior to various widespread declines associated with the different bird species and guilds.

Unlike many BCRs in Canada, much of BCR 13 ON is well covered by large-scale bird surveys such as the Breeding Bird Survey, the Christmas Bird Count, the Ontario Breeding Bird Atlas, the Ontario Shorebird Survey, the Southern Ontario Breeding Waterfowl Plot Survey, the Great Lakes Marsh Monitoring Program, the Great Lakes Colonial Waterbird Monitoring Surveys and decadal migrant waterfowl surveys of the major shorelines in southern Ontario. Consequently, the status of birds in Southern Ontario is relatively well known, which facilitates the setting of population objectives for priority species. For 24% of priority species, monitoring data suggested declines with sufficient certainty to support an objective of increasing population size (Fig. 5). In contrast, populations were sufficiently elevated to warrant a reduction in population size for two priority species: the Eastern Temperate-breeding Canada Goose and non-native invasive Mute Swan. Both are species of management interest for Environment Canada's

Canadian Wildlife Service in Ontario Region. Maintaining populations at current levels (including most migrant waterfowl) was the objective for 23% of the priority species in BCR 13 ON, while only 12% of priority species were assigned a population objective of Assess/Maintain because monitoring data were insufficient to propose an objective. Six of these species were waterbirds. Among breeding birds, waterbirds and especially marsh birds are perhaps the most difficult group to monitor in BCR 13 ON, and population size and status remain poorly known for a number of species. A recovery objective was assigned to 30% of priority species, which are all species at risk whose breeding range occurs within this BCR, though their recovery documents may not yet be finalized. Nine percent (9 %) of priority species were identified as migrating through BCR 13 ON, including the federally and provincially endangered Red Knot (*rufa*), and were not assigned an objective as those were set in other BCR strategies covering the breeding range of these species. However, population goals were established for migrant waterfowl, recognizing both the importance of migratory staging habitat to waterfowl and the importance of migrant waterfowl to society. One exception is the Southern James Bay population of Canada Geese, which is impossible to differentiate from temperate breeders during routine aerial surveys.

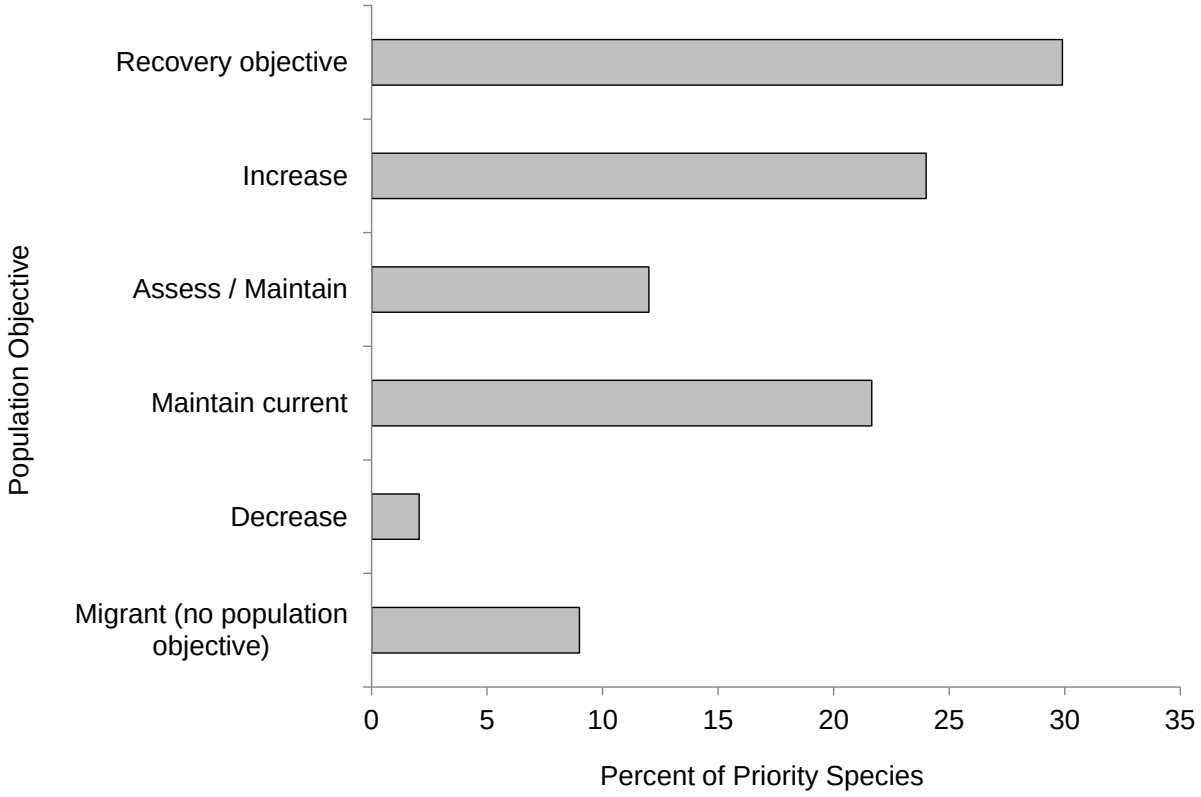


Figure 5. Percent of priority species that are associated with each population objective category in BCR 13 ON.

Element 4: Threat Assessment for Priority Species

Bird population trends may be driven by factors that negatively affect either their reproduction or survival during any point in their annual life cycle. Threats that can reduce survival include reduced food availability at migratory stopovers or exposure to toxic compounds. Examples of threats that can reduce reproductive success are high levels of nest predation or reduced quality or quantity of breeding habitat. The threats assessment process (which is based on the methods described in Salafsky et al. 2008) 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 sub-region 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 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. Usually these issues transcend habitat types and are considered "widespread," and these issues are addressed in a separate section of the complete strategy, but unlike other threats, they are not ranked (e.g., climate change and severe weather; threat category 11).

In BCR 13 ON, threat category 12 "other direct threats" and sub-category 12.1 "Information lacking" was used to identify priority species that lack adequate biological or demographic information required for population conservation and management. Using this category in this manner facilitated the development of targeted research and monitoring conservation actions to address knowledge gaps for these species, but unlike the other threats, they were not ranked (Fig. 6).

Because of the highly human-altered landscape, priority birds in BCR 13 ON face a significant number of anthropogenic threats, greater in both number and intensity than for birds in Ontario's more northerly BCRs (Fig. 6 and Table 5). The dominant threats relate to habitat loss and degradation from a variety of sources including residential and commercial development (threat category 1), agriculture (category 2), transportation and service corridors (category 4), biological resource use (category 5), invasive and other problematic species (category 8), pollution (category 9), natural system modifications (category 7) such as succession in grasslands in the absence of natural fire regimes, or unnatural regulation of water levels in wetlands, and also human intrusion and disturbance of breeding or foraging birds (category 6). These threats are discussed in more detail in subsequent sections of the complete strategy, but the diversity and magnitude of threats are noteworthy (Fig. 6). Within BCR 13 ON, threats related to climate change and severe weather (category 11), collisions with vehicles (category 4), and collisions with buildings (category 1) were considered to be widespread and as such are discussed in the Widespread Issues section of the complete strategy.

Cumulative Effects of Threats to Priority Species

For several of the threats identified in this strategy, the long-term combined or cumulative effect may be greater than the sum of the effects of the individual threat. There is no standardized method for assessing these "cumulative effects." The threat ranking and roll-up procedures (Appendix 2) demonstrate the sum of effects for threats within and among threat categories and are useful for identifying the most important threats within a habitat class or the relative importance of individual threats across the BCR sub-region (Table 5). These procedures also identify whether a large number of low-level threats may be affecting a species. However, it is important to consider that threats might interact in unanticipated ways or that, in aggregate, threats might exceed some ecological threshold to produce cumulative effects of an unanticipated magnitude. Cumulative impact studies assessing population responses to multiple stressors are an important tool to better understand the long-term consequences of some of the threats described in this strategy.

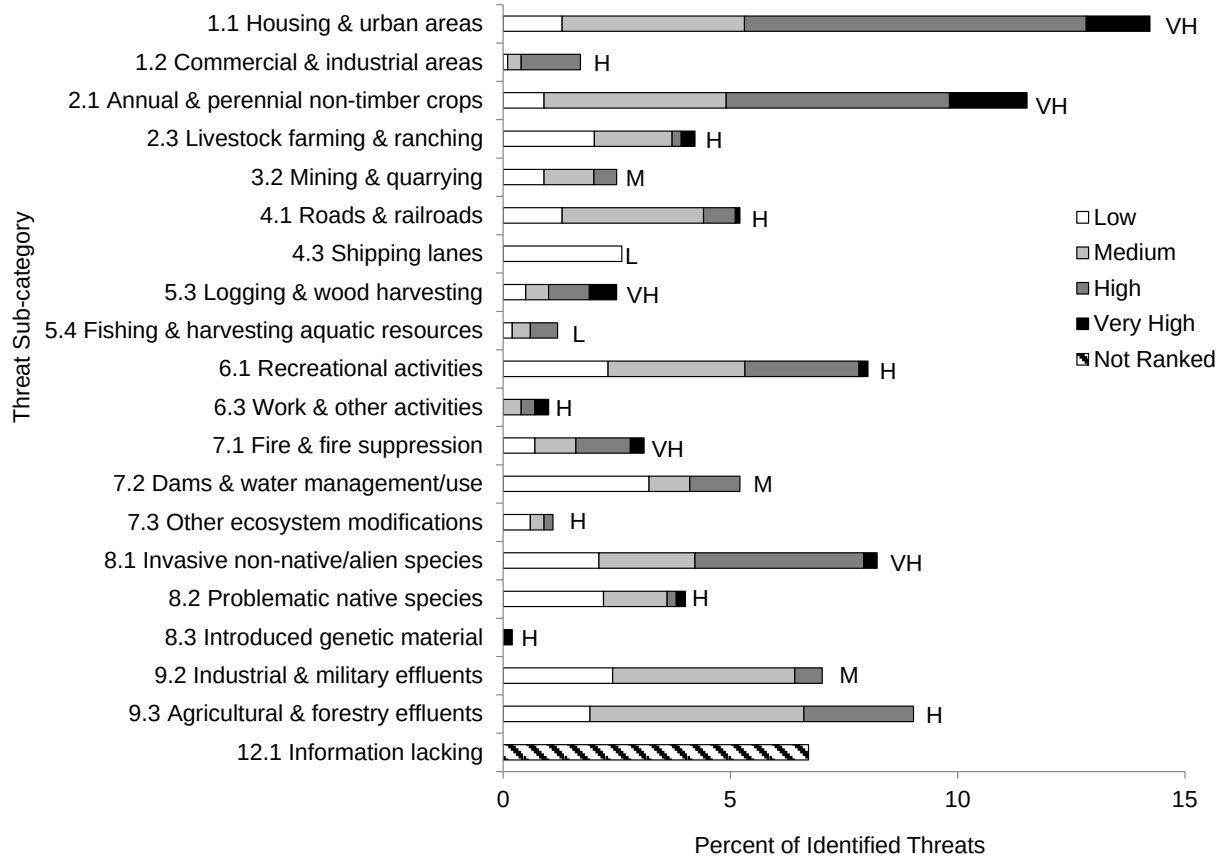


Figure 6. Percent of identified threats to priority species within BCR 13 ON by threat sub-category.
Each bar represents the percent of the total number of threats identified in each threat sub-category in BCR 13 ON (for example, if 100 threats were identified in total for all priority species in BCR 13 ON, and 10 of those threats were in the category 6.1 Recreational activities, 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 magnitude of the threats in each threat sub-category in the BCR. 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 overall rolled-up magnitude of the threat sub-category is

shown at the end of each bar (also presented in Table 5). Threat sub-category 12.1 Information lacking was not ranked.

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 of the complete version of the strategy.

Table 5. Relative magnitude of identified threats to priority species within BCR 13 ON by threat category and broad habitat class.

Only threats with a population-level effect were considered, and 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. Cells with hyphens indicate that no priority species had threats identified in the threat category/habitat combination.

Threat Category	Habitat Class										
	Deciduous	Mixed	Shrub/Early successional	Herbaceous	Cultivated and Managed Areas	Bare Areas	Urban	Wetlands	Waterbodies	Riparian	Overall Rank
Overall Rank	**VH**	**VH**	**H**	**VH**	**VH**	**H**	**H**	**VH**	**VH**	**H**	
1. Residential & Commercial Development	VH	VH	H	H	H	VH	H	VH	H	H	**VH**
2. Agriculture & Aquaculture	VH	VH	H	VH	VH	-	-	VH	-	H	**VH**
3. Energy Production & Mining	-	-	-	M	-	H	-	L	L	L	**M**
4. Transportation & Service Corridors	M	M	-	H	H	L	M	M	-	M	**H**
5. Biological Resource Use	VH	VH	-	-	-	-	-	H	M	M	**VH**
6. Human Intrusions & Disturbance	L	L	L	M	VH	H	H	H	VH	H	**VH**
7. Natural System Modifications	L	L	VH	VH	VH	M	-	H	L	-	**VH**
8. Invasive & Other Problematic Species & Genes	VH	H	H	H	H	H	L	VH	VH	L	**VH**
9. Pollution	M	H	L	-	VH	M	M	H	H	H	**H**

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.

For BCR 13 ON, the majority of conservation objectives identified relate to ensuring an adequate supply and quality of habitat (conservation objective category 1; Fig. 7). Included in these objectives are the maintenance and/or restoration of the full range and diversity of habitat types, maintaining the quality of existing habitats, and retaining important features on the landscape (e.g., standing dead snags for cavity-nesting birds). Also important is the need to manage individual species (category 3). Most of the objectives in this category relate to the prevention and control of invasive and exotic species as well as the development and/or implementation of recovery strategies and management plans for the numerous species at risk in BCR 13 ON. The third-most identified conservation objective category reflects the need to improve understanding of factors causing population declines of priority species as well as enhancing population/demographic and habitat monitoring across the BCR (category 7). Other objectives address the need to reduce human disturbance of priority species (category 4), ensure adequate food supply through the maintenance of natural food webs and prey sources (category 5), and reduce mortality (and/or sub-lethal effects) through reductions in pesticide use across the BCR (category 2).

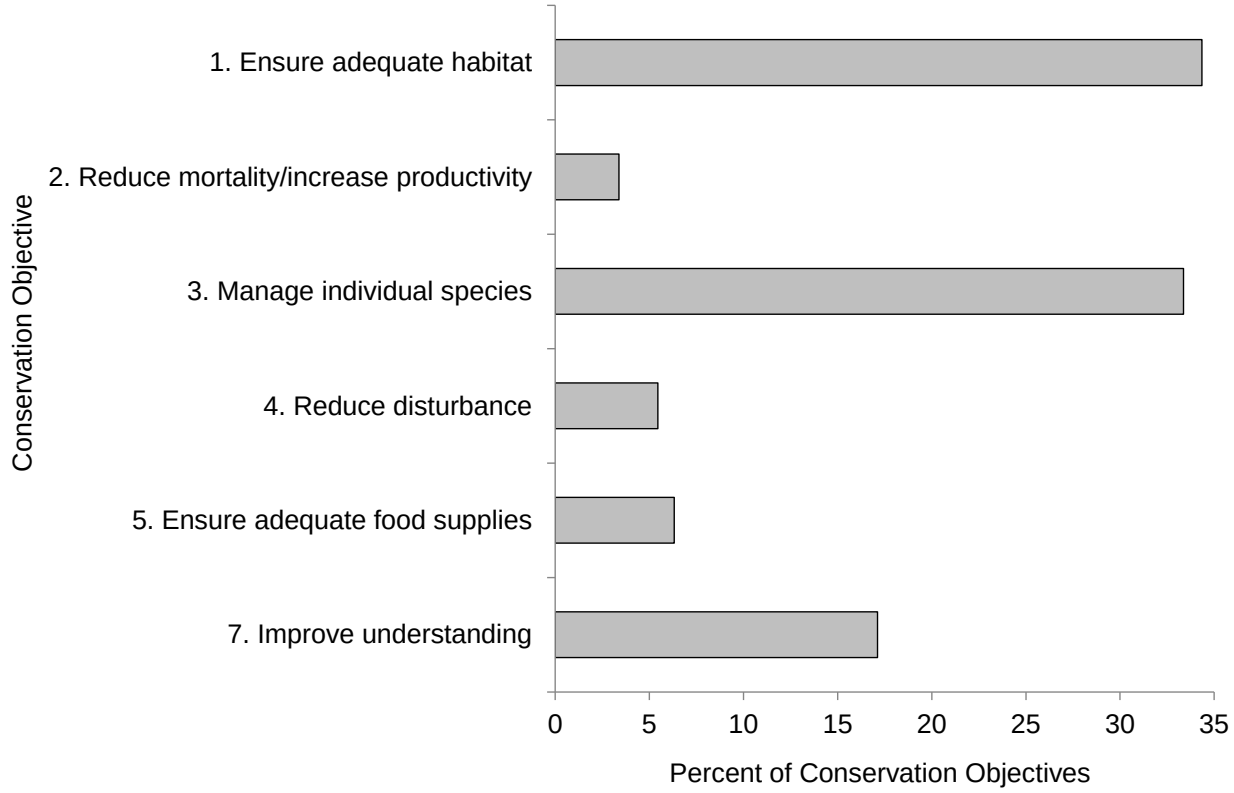


Figure 7. Percent of all conservation objectives assigned to each conservation objective category in BCR 13 ON.

Element 6: Recommended Actions

Recommended actions indicate on-the-ground activities that will help to achieve the conservation objectives (Fig. 8). 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 and will usually be more general than those developed for individual species. However, for detailed recommendations for species at risk, readers should consult published federal recovery documents (Species at Risk Public Registry 2013) or provincial recovery documents (Ontario Ministry of Natural Resources 2013b). Similarly, a number of landbird species included in this strategy are stewardship species as defined by Partners in Flight (Rich et al. 2004). These are species with stable populations or for which no specific conservation issues have been identified, but which depend on BCR 13 ON to such an extent that the region has a high responsibility for their protection. These species may not appear prominently in the threats, objectives and actions described herein, but should benefit from the implementation of actions that target multiple species.

The proposed conservation actions for BCR 13 ON are diverse in their approach (Fig. 8), demonstrating the need for a multi-faceted strategy for conservation in this highly developed region. Recognizing that a large majority of lands in the region are privately owned, only a small proportion of the actions relate to the direct protection of land (action sub-category 1.1). Instead, a majority of actions focus on habitat restoration and management (sub-categories 2.1, and 2.3) for priority species by engaging landowners and other stakeholders in conservation. Developing and implementing effective policies and regulations (sub-category 5.2), the development, use and promotion of BMPs (sub-category 5.3), increasing awareness about conservation issues (sub-category 4.3), developing partnerships (sub-category 7.2), determining factors causing population declines and improving the scientific knowledge that underlies management decisions (sub-category 8.1) all figure prominently in the suite of conservation actions proposed for this region. Engaging stakeholders in actions that restore the function and resilience of ecosystems in this highly impacted region ensures that conservation successes can be maintained over the long term.

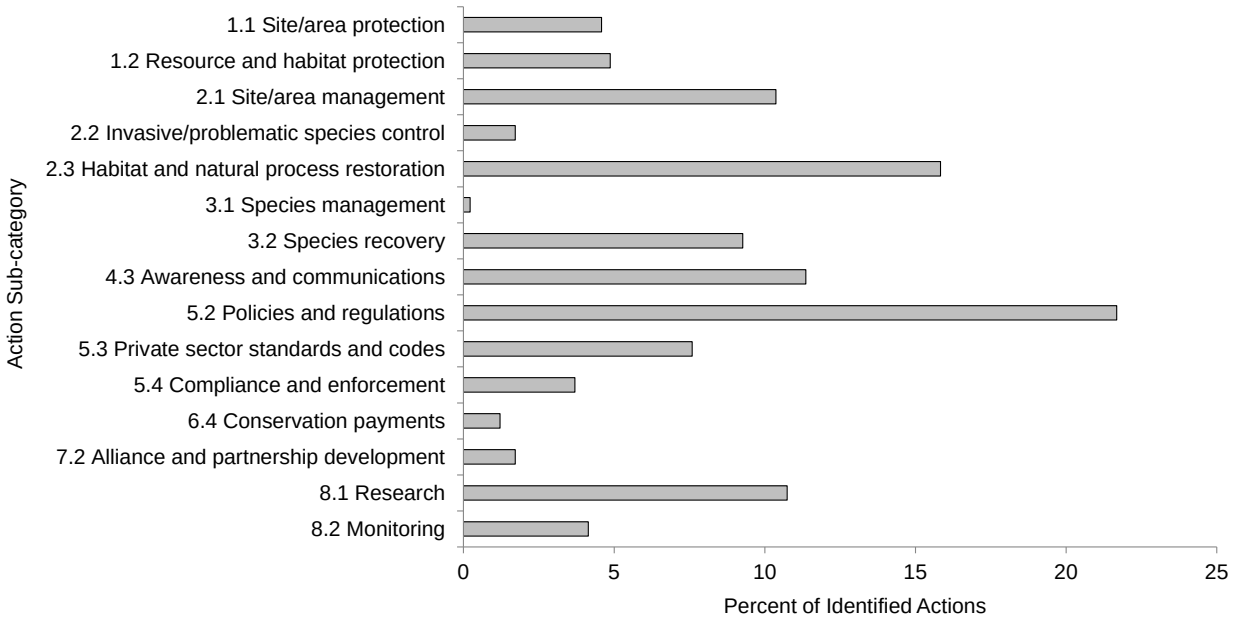


Figure 8. Percent of recommended actions assigned to each sub-category in BCR 13 ON.
”Research and monitoring” actions refer to individual species where information is required to support conservation and management.

References

Brownell, V.R. and J.L. Riley. 2000. *The alvars of Ontario: significant alvar natural areas in the Ontario Great Lakes Region*. Federation of Ontario Naturalists.

Cadman, M.D., D.A. Sutherland, G.G. Beck, D. Lepage, and A.R. Couturier, eds. 2007. *Atlas of the Breeding Birds of Ontario, 2001-2005*. Bird Studies Canada, Environment Canada, Ontario Field Ornithologists, Ontario Ministry of Natural Resources, and Ontario Nature, Toronto, xxii + 706 pp.

Cornell Lab of Ornithology. 2013. *Birds of North America Online*. Available at: http://bna.birds.cornell.edu/bna/.

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

Ducks Unlimited Canada. 2010. Southern Ontario wetland conversion analysis: final report. Ducks Unlimited. Barrie, ON. 23 p

Environment Canada, 2014. *North American Breeding Bird Survey* – Canadian Trends Website, Data-version 2012. Environment Canada, Gatineau, Quebec. K1A 0H3.

Environment Canada, 2013. *How Much Habitat is Enough?* Third Edition. Environment Canada, Toronto, Ontario.

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

Foster, D. R., Donahue, B., Kittredge, D. B., Motzkin, G., Hall, B., Turner, B. L., Chilton, E. 2008. New England's Forest Landscape. Ecological Legacies and Conservation Patterns Shaped by Agrarian History. In: Redman, C. L., Foster, D. R., *Agrarian Landscapes in Transition*, Oxford University Press, Inc., New York, N. Y.

IBA Canada. 2013. *Site Catalogue Query*. www.ibacanada.ca/explore.jsp?lang=EN. Accessed December 2013.

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

Larson, B., J.L. Riley, E.A. Snell and H.G. Godschalk. 1999. *The woodland heritage of Southern Ontario: a study of ecological change, distribution and significance*. Federation of Ontario Naturalists.

Lee, H., Bakowsky, W., Riley, J., Bowles, J., Puddister, M., Uhlig, P. and S. McMurray. 1998. *Ecological Land Classification for Southern Ontario: First Approximation and its Application*. Ontario Ministry of Natural Resources, Southcentral Science Section, Science Development and Transfer Branch. SCSS Field Guide FG-02. 225 p.

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. 28 pp.

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

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, pp. 106.

Ontario Eastern Habitat Joint Venture. 2007. *Ontario Eastern Habitat Joint Venture Five-year Implementation Plan 2006-2010*. Environment Canada, Ducks Unlimited Canada, Nature Conservancy of Canada, Ontario Ministry of Agriculture, Food and Rural Affairs, Ontario Ministry of Natural Resources and Wildlife Habitat Canada. Unpublished. 94pp.

Ontario Ministry of Finance. 2010. *Ontario population projections update, 2009-2036*. Queen's Park Printer for Ontario, Toronto, Ontario.

Ontario Ministry of Natural Resources. 2013a. *Species at Risk in Ontario (SARO) List*. Available at: www.mnr.gov.on.ca/en/Business/Species/2ColumnSubPage/MNR_SAR_CSSR_SARO_LST_EN.html

Ontario Ministry of Natural Resources. 2013b. *Recovery Strategies*. Available at: www.mnr.gov.on.ca/en/Business/Species/2ColumnSubPage/MNR_SAR_SPEC_RCVRY_STRAT_EN.html

Ontario Ministry of Natural Resources. 2008. Science and Information Branch. SOLRIS Technical Team. Accuracy Assessment Report 2: SOLRIS Version 1.2 (April 2008 release). Peterborough, Ontario: 44 pp. Available at: www.mnr.gov.on.ca/en/Business/LIO/index.html

Ontario Partners in Flight. 2008. *Ontario Landbird Conservation Plan: Lower Great Lakes/St. Lawrence Plain, North American Bird Conservation Region 13*. Ontario Ministry of Natural Resources, Bird Studies Canada, Environment Canada. 90 pp + appendices.

Panjabi, A. O., E. H. Dunn, P. J. Blancher, W. C. Hunter, B. Altman, J. Bart, H. Berlanga, G. S. Butcher, S. K. Davis, D. W. Demarest, R. Dettmers, W. Easton, H. G. de Silva Garza, E. E. Inigo-Elias, D. N. Pashley, C. J. Ralph, T. D. Rich, K. V. Rosenberg, C. M. Rustay, J. M. Ruth, J. S. Wendt, and T. C. Will. 2005. *The Partners in Flight Handbook on Species Assessment*. Partners in Flight Science Committee, Technical Series No. 3, 30 pp.

Protected Areas Network. 2013. *Ontario*. www.ec.gc.ca/ap-pa/default.asp?lang=En&n=A0FC17AA-1. Accessed December 2013.

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. Inigo-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. 85 pp + appendices.

Riley, J.L. and P. Mohr. 1994. *The Natural Heritage of Southern Ontario's Settled Landscapes*. Discussion Paper. Ontario Ministry of Natural Resources, Aurora, ON.

Rodger, L. 1998. *Tallgrass communities of Southern Ontario: a recovery plan*. World Wildlife Fund. 68 pp.

Ross, K., K. Abraham, R. Clay, B. Collins, J. Iron, R. James, D. McLachlin, R. Weeber, 2003. *Ontario Shorebird Conservation Plan*. Environment Canada, Downsview, 48 pp.

Ross, R.K., P.A. Smith, C.A. Friis, R.I.G. Morrison, and B. Campbell. 2012. *Population trends of shorebirds in southern Ontario*, 1974-2009. Waterbirds 35:15-24.

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 et D. Wilkie. 2008. « A standard lexicon for biodiversity conservation: Unified classifications of threats and actions », *Conservation Biology*, 22 (4) : 897-911.

Snell, E. 1987. *Wetland distribution and conversion in Southern Ontario*. Working Paper 48, Inland Waters and Lands Directorate, Environment Canada, Ottawa.

Species at Risk Public Registry. 2013. *Recovery Strategies*. Available at: www.sararegistry.gc.ca/sar/recovery/recovery_e.cfm.

Spectranalysis Inc. 2004. *Introduction to the Ontario Land Cover Data Base, Second Edition (2000): Outline of Production Methodology and Description of 27 Land Cover Classes*. Report to Ontario Ministry of Natural Resources. Unpublished.