Prairie Pothole Bird Conservation
Region 11 in Canada

Landbird Conservation Plan

prairie habitat
joint venture

A product of the Canadian Prairie Partners in Flight Working Group:

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Cover photo: Baird's Sparrow / Greg W. Lasley, Cornell Laboratory of Ornithology

This publication is printed on recycled paper certified by the Environmental Choices Program. This program brings consumers, industry and government together to improve the quality of Canada's Envrionment.

ACKNOWLEDGEMENTS

This Prairie Partners in Flight plan was commissioned in part for the Prairie Habitat Joint Venture to provide direction as the partners move towards all-bird conservation. We would like to extend appreciation and thanks to all the people who contributed time and expertise to the development of the plan. Their hard work and dedication have made this endeavour possible. Brenda Dale and Judith Kennedy, with input from Steve Wendt, Peter Blancher, and Loney Dickson, originally assembled the Prairie Partners in Flight Working Group. Elizabeth Anderson and Troy Wellicome were the primary organizers and drafters of this document, and deserve much of the credit for this product. In addition to the Working Group and Technical Committee, over 30 people reviewed portions of the plan text or species accounts: C. Aldridge, H. Armbruster, U. Banasch, R. Baydack, P. Boxall, K. Clayton, G. Court, A. Didiuk, J. Duncan, P. Duncan, S. Eros, K. Hannah, D. Hill, S. Houston, J. Kennedy, N. Koper, G. MacMaster, D. Manzur, K. Mazur, M. Norton, P. Rowell, B. Nero, A. Schoepf, S. Sealy, R. Sissons, K. Steenhof, D. Stepnisky, G. Trottier, M. Watmough, and T. Weins. Several people also participated in at least one Prairie PIF meeting: T. Weins, Agriculture and Agri-Food Canada; I. Dyson, Alberta Prairie Conservation Action Plan; R. Gutsell and T. Kosinski, Alberta Sustainable Resource Development; P. Erikson, S. Eros, J. Kennedy, and G. McKeating, Canadian Wildlife Service; A. Martell, Ducks Unlimited Canada; K. Mazur, Manitoba Conservation; T. Sopuck, Manitoba Habitat Heritage Corporation; M. Green and L. Strauss, Nature Conservancy Canada; R. Espie, Saskatchewan Environment; and K. Scalise, Saskatchewan Prairie Conservation Action Plan. Financial support was provided by Alberta NAWMP Biodiversity Fund, Canadian Wildlife Service, Nature Conservancy of Canada, and Partners In Flight-Canada National Working Group agencies. Martin Schmoll with the Canadian Wildlife Service provided GIS support and prepared many of the figures.

Recommended Citation:
Canadian Prairie Partners in Flight. 2004. Landbird Conservation Plan for Prairie Pothole Bird Conservation Region 11 in Canada. Canadian Wildlife Service, Edmonton, AB.

EXECUTIVE SUMMARY

Justification

Many landbird populations in North America have experienced long-term declines, both locally and globally. The primary cause of these declines is thought to be habitat loss and degradation, although brood parasitism, nest predation, introduced species, and anthropogenic mortality have also been implicated. Partners in Flight-Canada emerged from the development of the Canadian Landbird Conservation Plan in 1994, with the goal of ensuring the long-term viability of native landbirds across their range of habitats. Representatives from government agencies, conservation groups, industry, academic institutions, and other key stakeholder groups joined together to address threats to landbirds and habitats through coordinated, cooperative conservation planning.

Purpose and Scope

Prairie Partners in Flight has prepared this plan to: 1) raise awareness about priority landbirds and their habitats in the Canadian prairies and aspen parkland (Bird Conservation Region 11), and 2) synthesize information that decision-makers and land or conservation program managers can use when implementing programs that may affect landbirds. Specifically, this document:

- identifies priority landbird species;
- summarizes their distributions, microhabitat- and landscape-level habitat requirements, responses to management activities, and threats faced;
- identifies priority habitats;
- sets ecologically-based population objectives; and
- outlines knowledge or monitoring gaps and related research questions.

Priorities

Of the 259 species that have been observed within the Canadian portion of BCR11, 25 are identified as priority species which merit conservation concern due to high overall global vulnerability or moderate overall global vulnerability with regional importance due to severe declines, high threats, or large or important populations within our BCR. Although these priority species use grassland, woodland/shrubland, and wetland habitats in BCR11, almost all use some component of grasslands, placing highest priority on this habitat type. The priority species are:

Greater Sage-Grouse	Burrowing Owl	Grasshopper Sparrow
Sharp-tailed Grouse	Long-eared Owl	Baird's Sparrow
Northern Harrier	Short-eared Owl	Le Conte's Sparrow
Swainson's Hawk	Loggerhead Shrike	Nelson's Sharp-tailed Sparrow
Ferruginous Hawk	Sedge Wren	McCown's Longspur
Golden Eagle	Sprague's Pipit	Chestnut-collared Longspur
Prairie Falcon	Bohemian Waxwing	Bobolink
Black-billed Cuckoo	Clay-colored Sparrow	
Snowy Owl	Lark Bunting	

Biological Objectives and Knowledge Gaps

Population objectives are established for each priority species based on the degree of population change they had experienced over the past 30 years. These objectives range from aggressive conservation objectives for species experiencing severe declines to the maintenance of current populations for species with stable trends. Such objectives provide a target for planning and implementation and a benchmark against which to measure progress.

Information needs for priority landbirds are numerous and are summarized into the following categories: inventory and monitoring of populations, species demographics and habitat requirements, inventory and monitoring of habitats, management practices and associated species responses, land-use policy, and socio-economic influences.

Implementation

Six broad strategies for implementation are presented. Three recommendations pertain to habitat and land management, specifically maintenance of native habitats, restoration of degraded habitats, and development of Good Management Practices. The other three recommendations deal with research and monitoring opportunities, policy, legislation, and program reviews, and communication of this landbird conservation plan. Specific implementation actions will unfold as existing partners review and use this plan, as new partners envision opportunities to contribute, and as initiatives are integrated with conservation efforts in other jurisdictions and in other bird groups.

TABLE OF CONTENTS

1.0 INTRODUCTION

Landbirds are a diverse group of birds that rely primarily on terrestrial habitats for breeding and wintering. Within the Prairie Pothole Region, landbirds span 10 orders, 29 families, and over 200 species, including grouse, raptors, doves, cuckoos, owls, nighthawks, swifts, hummingbirds, kingfishers, woodpeckers, and passerines. Additional species may occur in the region as vagrants or during migration. A broad array of habitats ranging from cliffs to wet meadows to sagebrush shrublands are utilized by landbirds within the region.

1.1 Partners in Flight and the North American Bird Conservation Initiative

Many landbird populations in North America have experienced long-term declines, both locally and globally. The primary cause of these declines is thought to be habitat loss and degradation, although brood parasitism, nest predation, introduced species, and anthropogenic mortality have also been implicated. Given the degree of environmental degradation that has occurred over the past century, independent local and regional conservation programs have been unable to prevent many bird population declines. In 1990, Partners in Flight (PIF) began its challenging mission to coordinate landbird conservation throughout North and Central America. PIF recognizes that threats to landbird populations must be addressed at various geographic scales, conservation efforts must be based on the strongest scientific foundation possible, and available knowledge and financial resources can be maximized through partnerships.

The same challenges that face breeding, migrating, and wintering landbirds also exist for other bird groups – shorebirds, waterbirds, and waterfowl. Population declines in these groups, coupled with growing interest in nature-based recreation, led government representatives, bird experts, and conservationists from Canada, the United States, and Mexico to launch the North American Bird Conservation Initiative (NABCI) in 1998. The goal of this coordinated, multinational initiative is *to deliver the full spectrum of bird conservation through regionally-based, biologically-driven, landscape-oriented partnerships*. While ensuring that each bird initiative maintains its autonomy, NABCI will help

- integrate bird conservation planning, objectives, and implementation within ecosystems;
- increase the effectiveness of existing and new initiatives by coordinating and broadening current partnerships;
- increase political support and funding for bird conservation; and
- foster greater cooperation among nations and peoples of the continent.

Examples of programs that contribute to NABCI include the Mexican Bird Conservation Strategy, North American Waterfowl Management Plan (NAWMP), National Colonial Waterbird/Seabird Conservation Plans, Western Hemisphere Shorebird Reserve Network, Important Bird Areas Program, and Partners in Flight Regional Landbird Conservation Plans.

NABCI Bird Conservation Regions, or BCRs (Figure 1), provide a common spatial framework and a fundamental geographic unit on which to plan and deliver integrated all-bird conservation initiatives across North America. These BCRs are ecoregions that define areas of similar biotic (vegetation and fauna) and abiotic (soils, drainage patterns, temperature, annual precipitation) characteristics, and thus potentially similar management issues. The BCR approach also

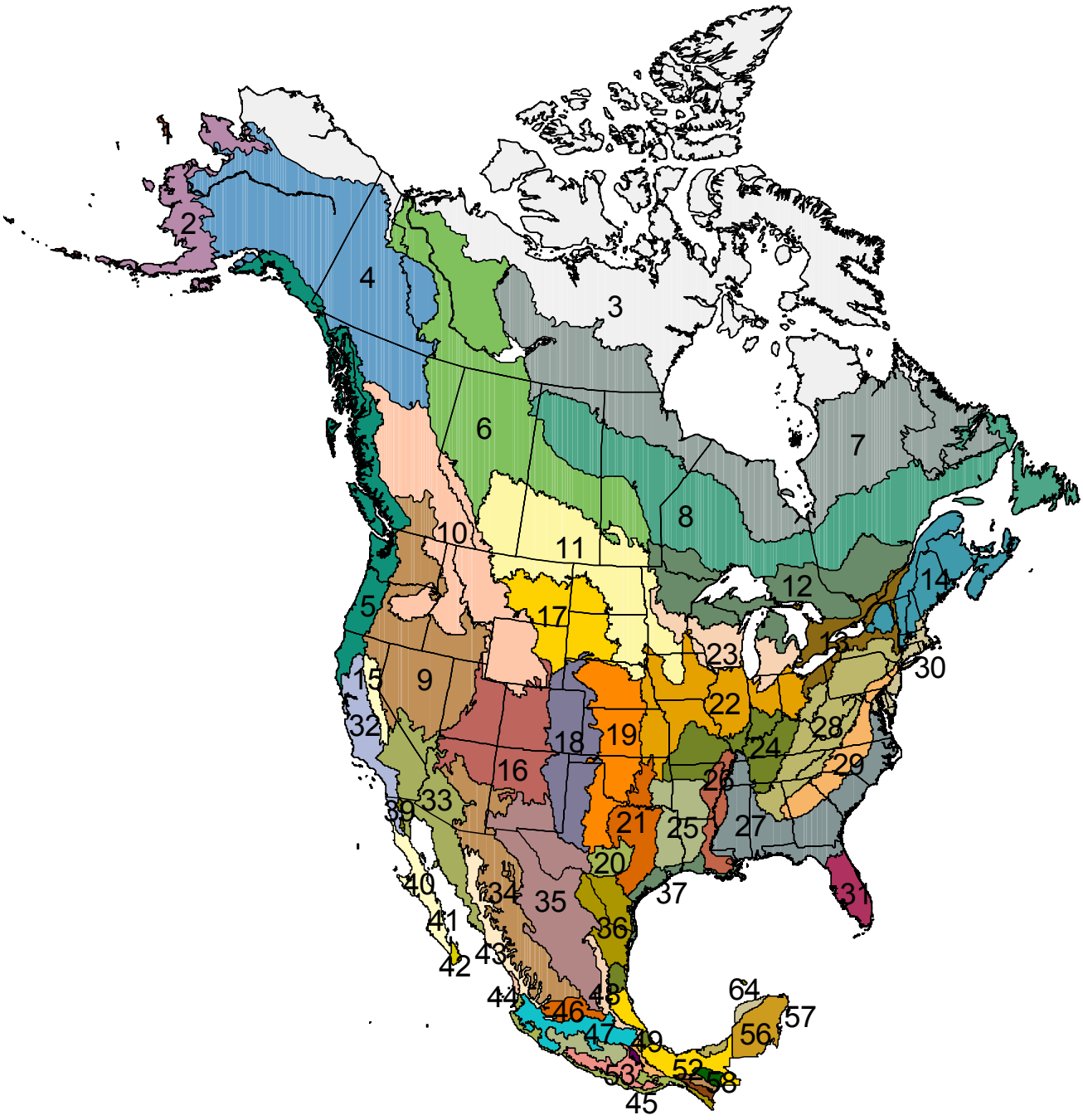


Figure 1. Bird Conservation Regions (BCR) in Canada, the United States, and Mexico as identified by the North American Bird Conservation Initiative. BCR11 is Prairie Pothole and surrounding BCRs are as follows: BCR6 – Boreal Taiga Plains, BCR10 – Northern Rockies, BCR12 – Boreal Hardwood Transition, BCR17 – Badlands and Prairies, BCR22 – Eastern Tallgrass Prairie, and BCR23 – Prairie Hardwood Transition.

facilitates communication and coordination among stakeholders that work at different spatial scales or in different geographic regions.

1.2 Partners in Flight Conservation Planning in Canada and in the Prairies

Partners in Flight-Canada emerged from the development of the Canadian Landbird Conservation Plan in 1994, with the *goal of ensuring the long-term viability of populations of native landbirds across their range of habitats*. To meet this goal, the Framework for Landbird Conservation in Canada identified five main conservation activities: planning, monitoring, research, outreach, and applied conservation (Canadian Landbird Conservation Working Group 1996). This wide variety of activities requires a wide variety of partners, and thus PIF Working Groups are typically comprised of representatives from government agencies, conservation groups, industry, academic institutions, and other key stakeholder groups. Although some overarching bird conservation issues can be addressed at the national or international level, most are best addressed at a smaller scale. Accordingly, conservation plans are prepared at the BCR level by Regional PIF Working Groups, while the National Working Group primarily provides tools that foster a consistent approach among BCRs.

A regional Prairie Partners In Flight Working Group was organized for BCR11 in Canada and included the following member organizations: Agriculture and Agri-Food Canada, Alberta NAWMP Partnership, Alberta Sustainable Resource Development, Canadian Cattleman's Association, Canadian Wildlife Service (CWS), Ducks Unlimited Canada, Manitoba Conservation, Nature Conservancy of Canada (NCC), Nature Saskatchewan, Saskatchewan Environment, and Saskatchewan Watershed Authority (formerly Saskatchewan Wetland Conservation Corporation, SWCC). *The overall goal of the group is to have prairie partners work together to conserve the distribution, diversity, and abundance of native landbirds and their habitats across the grassland and aspen parkland regions of Manitoba, Saskatchewan, and Alberta.* Although the Landbird Conservation Plan prepared by this group draws upon bird data from the entire Prairie Pothole Bird Conservation Region 11, recommendations are specific to the Canadian portion of the BCR. The specific objectives of this plan are to provide guidance and tools for landbird conservation efforts in the Canadian portion of BCR11 by

- identifying priority landbird species based on a standardized process that incorporates population trends, distributions, threats, relative abundance, and local stewardship responsibility within the BCR;
- synthesizing our current knowledge about the ecology of priority landbird species, their distributions, microhabitat- and landscape-level habitat requirements, and response to management activities;
- describing habitats used by suites of priority species, how these priority habitats are affected by management practices, and how they are distributed across the Prairie Provinces;
- identifying measurable, ecologically-based conservation objectives that describe the nature, extent, and distribution of populations of priority species or favourable habitat conditions;
- outlining knowledge gaps and related research questions which should be addressed to increase our ability to successfully monitor and manage landbird species and habitats; and
- suggesting conservation strategies that may be implemented by a range of delivery agencies to achieve these objectives.

The primary target audience for this plan is agencies that deliver conservation programs for

landbirds and landbird habitats within the Canadian portion of BCR11 and may have opportunities to tailor their programs to deliver components of this plan. Such agencies include the partner organizations of the Prairie Habitat Joint Venture (PHJV) formed under NAWMP to implement waterfowl habitat conservation projects, as well as additional groups and associations that are members of the Prairie PIF Working Group. Land management agencies, regional and local naturalist societies, conservation organizations, community or agricultural groups, and municipalities may also find this plan a useful aid when developing their programming. Finally, landowners, land managers, and producers who make the ultimate decisions regarding the management and conservation of habitat and the implementation of conservation measures on their landbase may be interested in this plan.

Although the most up-to-date information on landbirds and habitats within BCR11 was used during the preparation of this conservation plan, Prairie PIF recognizes that significant gaps exist in our knowledge of population trends, habitat requirements, response to management activities, impacts of climate change, etc. Accordingly, this document should be considered as dynamic, with subsequent versions incorporating new information as it becomes available. Although this Prairie PIF conservation plan is limited in focus to landbirds, it is intended to complement similar planning exercises for other bird groups (i.e., waterfowl, shorebirds, and waterbirds) and other portions of the BCR (i.e., landbird conservation plans previously prepared for the Northern Tallgrass Prairie Physiographic Area, the Northern Mixed-grass Prairie Physiographic Area, and the Mixed Grass Prairie and Intermountain Grasslands ecosystems of Montana).

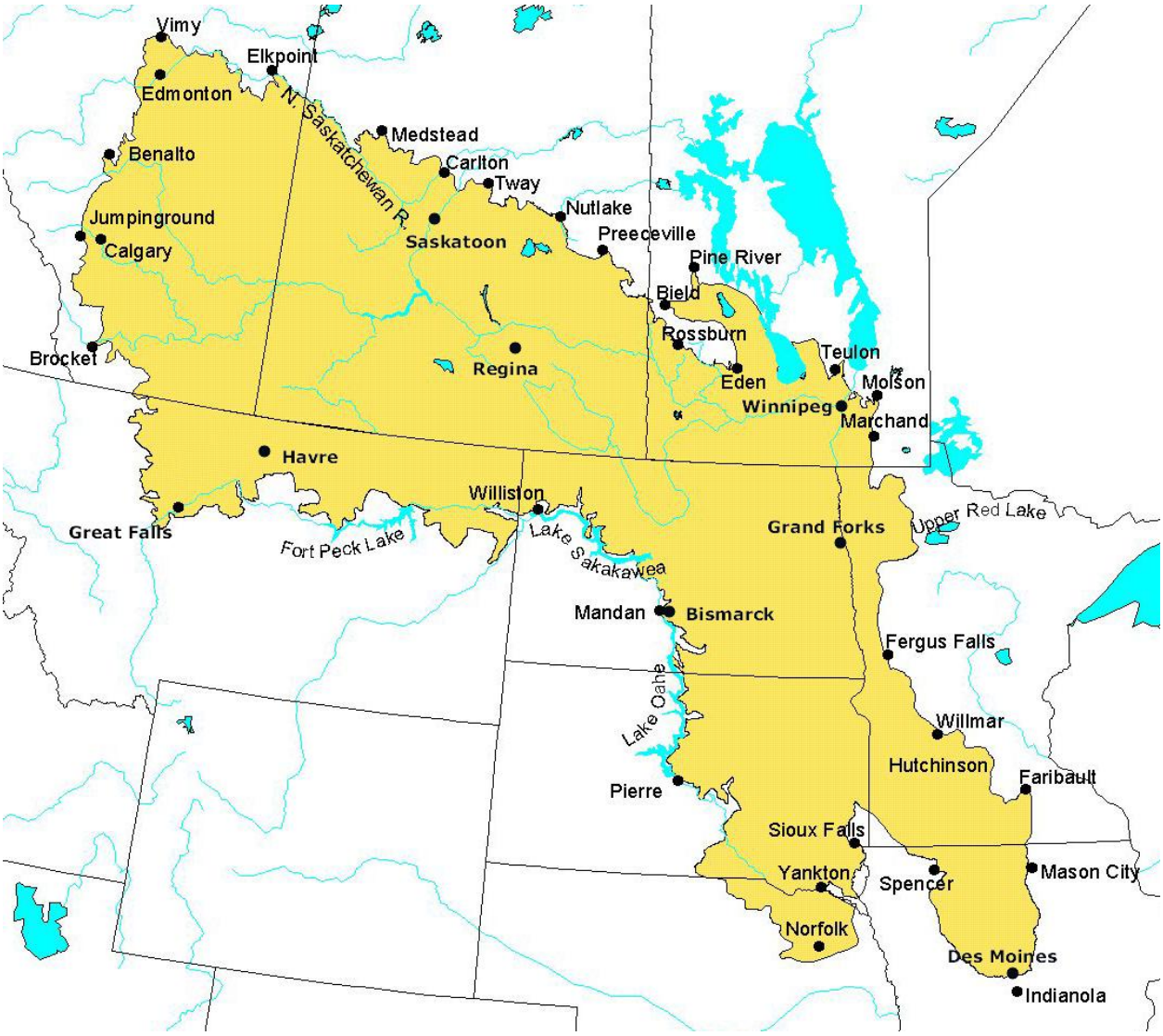
2.0 OVERVIEW OF THE PRAIRIE POTHOLE BIRD CONSERVATION REGION 11

2.1 Geography

The Prairie Pothole BCR11 encompasses parts of three provinces and six states in the northern Great Plains (Figure 2). BCR11 stretches from the southern edge of the boreal forest in the north (BCR6) to the Missouri River in the south in northeastern Nebraska (BCR17), and from the foothills of the Rocky Mountains in the west (BCR10) to the tallgrass prairie-hardwood savanna of central Minnesota and central Iowa in the east (BCR23, BCR22). In total, BCR11 covers approximately 871,000 km^2.

Although the PHJV area also encompasses the Peace Parkland in northwestern Alberta, Prairie PIF decided to restrict this conservation plan to the boundaries of the Prairie Pothole Bird Conservation Region 11. Accordingly, it is recommended that the Peace Parkland be covered by conservation planning exercises for Boreal Taiga Plains Bird Conservation Region 6 (Appendix III identifies priority species found in BCR11 which may be found in the Peace Parkland portion of BCR6).

Figure 2. Prairie Pothole Bird Conservation Region 11 in Canada and the United States.



2.2 Climate

The climate of the Prairie Pothole Region is semi-arid to dry sub-humid, with one-half of the total precipitation falling as rain between April and June, one-quarter as rain between July and October, and one-quarter as snow, typically between November and March (Coupland 1973). Total precipitation increases along a west to east gradient. Long, cold winters, a short growing season, and a dry wind further characterize the region. The lack of precipitation and high evapotranspiration are a greater detriment to plant growth than either a deficiency of heat or a short frost-free season (Coupland 1973).

2.3 Dominant Native Habitats

The dominant natural vegetation of BCR11 in terms of area covered is prairie grassland, followed by deciduous woodlands, and then wetlands. Mixed-grass prairies dominate over most of the region. Native vegetation in the northern and western fringes of the BCR is dominated by fescue prairies, and the southeastern portion (Red River Valley, southern Minnesota, and north-central Iowa) is tallgrass prairie. The dominant woodlands of the north are most often referred to as "aspen parklands", as the primary tree species is aspen poplar. The aspen parklands extend along the northern edge of the BCR in a belt 100 to 200 km in width. Because of historical glaciation in the area, numerous small freshwater wetlands called "prairie potholes" are prominent over all but the southwestern portion of the BCR. Native vegetation in the southwestern portion is dominated by grasslands and scattered saline lakes, badlands, and riparian woodlands. BCR11 also includes outliers of the Rocky Mountains, such as the Cypress and Sweetgrass Hills. Coniferous or aspen forests and fescue grasslands blanket these refugia of mountain flora and fauna.

2.4 Disturbance Regimes

The major disturbance factors in grasslands and parklands in pre-settlement times were drought, grazing, fire, and flooding along certain riparian areas. Drought conditions and grazing pressure by native herbivores, such as bison, pronghorn, elk, and ground squirrels, were relatively more important in western landscapes, while eastern tallgrass prairies experienced a higher fire frequency from fires ignited by lightning and aboriginal peoples (Vickery et al. 2000). Under these natural regimes, disturbance intensity varied among sites, resulting in a heterogeneous grassland mosaic.

European settlement has greatly influenced all of these disturbance factors and the associated habitats. Extensive cultivation has reduced the area of native habitats to less than one third of their former extent, with remaining native grasslands often on poor soil with low growth potential. The quelling of prairie fires and planting of shelterbelts and trees around homesteads has led to a marked increase in wooded cover within parts of the grasslands; whereas other wooded portions of the aspen parkland have been converted to pasture or cropland, with some timber sold as lumber, pulp, or value-added products. Altered flooding regimes in riparian areas within the grasslands have been detrimental for cottonwood populations. Current grazing management practices have promoted repeated, yearly grazing of pastures by domestic livestock, rather than the sporadic grazing that historically occurred. Exotic species, such as crested

wheatgrass, smooth brome, timothy, leafy spurge, spotted knapweed, and purple loosestrife, are also increasing within the region. As a result of past and current human land uses, native grasslands (including parklands) are now considered North America's most endangered ecosystem, and the Canadian plains are among the most intensively developed landscapes in the world (Coupland 1973).

2.5 Avifauna and Monitoring Programs

BCR11 has long been known to provide habitat for a large diversity of bird species. It is recognized as an important waterfowl breeding and staging area for most species of dabbling and diving ducks, but the Northern Pintail population in the region has undergone a substantial long-term decline (Miller and Duncan 1999). Significant shorebird breeding and staging areas have also been recognized within BCR11. Although population data for most waterbird species other than waterfowl is generally lacking, distributional data show the region to be especially important for species such as Eared Grebe, American White Pelican, American Bittern, Yellow Rail, and Franklin's Gull. Six species of landbirds are found exclusively in the Prairie Pothole and Great Plains regions: Ferruginous Hawk, Sprague's Pipit, Lark Bunting, Baird's Sparrow, McCown's Longspur, and Chestnut-collared Longspur (Mengel 1970; a seventh species, Cassin's Sparrow, is found only in the US portion). Nineteen additional landbird species are secondarily adapted to grasslands with strong affinities to the Great Plains (e.g., Greater Sage-Grouse, Prairie Falcon, Burrowing Owl, Horned Lark, Western Meadowlark). Densities of landbirds in prairie riparian areas are among the highest known in Canada (Savoy 1991). Overall, 228 species of landbirds are known to regularly use BCR11 for breeding or wintering. Unfortunately, grassland birds have shown steeper, more consistent, and more geographically widespread declines than any other ecological guild of North American birds (Askins 1993, Peterjohn and Sauer 1993, Herkert 1995) or communities found in any other geographical region (see Figure 7 in Rich et al. 2003).

Broad-scale, multi-species monitoring of bird populations within Canadian portions of BCR11 is conducted primarily through volunteer-based surveys such as the North American Breeding Bird Survey (BBS). The BBS has been conducted in the Prairie Provinces since the late 1960's (Sauer et al. 2002). Volunteers travel predetermined 40-km routes, stopping for 3 minutes at each of the 50 points on a route to record all birds detected visually or aurally. Of the 314 routes within or intersecting BCR11, 208 are in Canada (59 in Manitoba, 62 in Saskatchewan, 87 in Alberta). BBS survey data are used for information on distribution, relative abundance, and population trends of species. Because not all routes are surveyed in any one year and population trend analyses require each route to be surveyed at least three times by a single observer, the number of routes used in species trend calculations may be considerably lower than the total number. For example, only 91 of the possible 208 BBS routes within the Canadian portion of BCR11 were surveyed two or more times between 1996 and 2000 (Dale et al. 2002). BBS coverage is typically sparse in areas of the prairies far from major centres, and the Canadian Landbird Monitoring Strategy identified grassland birds as a group requiring improved monitoring coverage (Downes et al. 2000). As a result, a Grassland Bird Monitoring Project (GBM) has been conducted since 1996 using similar methodology as the BBS to increase coverage in areas where remaining unbroken native grassland habitat and birds are concentrated

(Dale et al. 2002). GBM defined 31 transects in Saskatchewan and Alberta, of which 14 are monitored annually.

Several other projects contributing to landbird monitoring in prairie Canada, along with their associated strengths and shortcomings, are also outlined in the Canadian Landbird Monitoring Strategy (Downes et al. 2000). The Christmas Bird Count (CBC) is conducted at the regional level to monitor population trends and distribution of wintering birds. Volunteers record all birds observed within predetermined 15-mile-diameter circles during a single day within two weeks of December 25. The Alberta Birdlist Program, run by the Federation of Alberta Naturalists, receives records on all birds observed by naturalists for a specific location and time period at any time of the year and maintains these observations within a provincial database. The Saskatchewan and Manitoba Conservation Data Centres have online forms to submit observation records and web-accessible databases to retrieve information. These databases, together with the Biodiversity/Species Observation Database in Alberta, typically focus on occurrences of rare, uncommon, and sensitive species. Provincial bird atlases provide important distributional information and may be used to detect change when updated periodically. Banding stations operated by the Delta Marsh Bird Observatory, Last Mountain Bird Observatory, Calgary Bird Banding Society (at Inglewood Bird Sanctuary), and Beaverhill Bird Observatory monitor the migration of landbird species through the Prairie Provinces. The Prairie Nest Record Scheme provides a database depository for breeding bird nests discovered across the three provinces and provides some data on productivity. Lastly, there are a number of other monitoring and research programs that operate within BCR11 and provide information on landbirds, though they are often species- or locale-specific.

3.0 PRIORITY LANDBIRD SPECIES AND HABITATS IN BCR11

3.1 Priority Landbird Species

Because landbird species have a diverse range of ecological requirements, geographic distributions, threats, and management issues, conservation planning at the species level could be very complex and result in many conflicting management prescriptions. However, conservation efforts focused on a smaller suite of priority species and habitats within a given area can help maintain both the common and rarer species in the area. Accordingly, Partners in Flight developed an objective method that identifies bird species that are most in need of conservation attention and ultimately areas where conservation efforts may be most effective (PIF 2001). This species assessment and prioritization process identifies species that are currently endangered or threatened, those which may be of future concern but have not yet reached critically low population levels, as well as species that are primarily endemic to a particular region. Such assessments assist bird conservation efforts in moving from a reactive, emergency approach to a proactive, preventative approach (Beissinger et al. 2000).

3.1.i PIF Assessment and Prioritization Process

Assessment in the PIF context refers to the compilation and evaluation of data regarding the biological vulnerability of each species and provides objective, unbiased scores for seven criteria that can be used in a variety of conservation applications (PIF 2001). Six of the criteria are biologically-based and represent vulnerability factors (i.e., species' vulnerability to major population decline or range-wide extinction). These are as follows: *Breeding Distribution*, *Non-breeding Distribution*, *Density Index*, *Population Trend, Threats to Breeding*, and *Threats to Non-breeding*. The seventh factor, *Area Importance*, is not a vulnerability factor, but instead reflects local stewardship responsibility (i.e., relative importance of a given area to a species' conservation). The percent of the species' global population that occurs within the BCR is also included as a supplementary measure of stewardship responsibility. Each species is given a score between 1 and 5 for each of the seven core criteria at the BCR level: 1 indicates the least vulnerable with regard to that parameter and 5 the most vulnerable. These criteria are explained in further detail in Appendix I and in the PIF Handbook on Species Assessment and Prioritization (PIF 2001).

Prioritization involves an examination of the scores generated by the assessment process to determine relative conservation priorities among species based on regional responsibility and overall vulnerability to major population declines or regional extirpation. Total Assessment Scores are first calculated by summing the seven assessment criteria scores (PIF 2001), and landbirds with Total Assessment Scores of less than 19 are excluded. Further combinations of area importance, percent of population within BCR11, and the six vulnerability factors are then used to divide species into Priority Species Pools (see Appendix I for further details). Generally, a species may be considered a priority species under one or more of the following conditions: high global vulnerability with moderate or high regional responsibility, or moderate global vulnerability but regionally important due to severe declines, high threats, or large and/or important populations of the species in our BCR.

3.1.ii Application in BCR11

Using data from both the Rocky Mountain Bird Observatory and Bird Studies Canada, a list of all landbird species thought to occur in BCR11 during the summer or winter was compiled. This comprehensive list was reviewed by various bird experts, resulting in a list of 259 landbird species categorized as either occurring in >10% of the BCR, local, marginal, or accidental within BCR11 (Appendix II). The standard PIF assessment and prioritization process was then applied to species which occurred locally or in >10% of the BCR to identify priority species (see Appendix III for assessment criteria scores). This process identified 25 priority species for the Canadian portion of BCR11 as shown in Table 1.

Table 1. Priority landbird species identified for the Prairie Pothole Bird Conservation Region 11 using the Partners in Flight species assessment and prioritization process. For details on this process, see Appendix I.

Priority Pool	BCR11 Priority Landbird Species	
	Breeding	**Wintering**
High BCR Responsibility (IA)	Greater Sage-Grouse	Greater Sage-Grouse
	Sharp-tailed Grouse	Short-eared Owl
	Northern Harrier	
	Swainson's Hawk	
	Black-billed Cuckoo	
	Short-eared Owl	
	Sprague's Pipit	
	Lark Bunting	
	Grasshopper Sparrow	
	Baird's Sparrow	
	Le Conte's Sparrow	
	Nelson's Sharp-tailed Sparrow	
	McCown's Longspur	
	Chestnut-collared Longspur	
	Bobolink	
Moderate BCR Responsibility (IB)	Burrowing Owl	
High Declines and/or Stewardship Responsibility (IIA)	Long-eared Owl	Snowy Owl
		Bohemian Waxwing
Large Proportion of Population in BCR (IIB)	Ferruginous Hawk	Sharp-tailed Grouse
	Sedge Wren	
	Clay-colored Sparrow	
High Threats (IIC)	Prairie Falcon	Prairie Falcon
	Loggerhead Shrike	Golden Eagle

Species accounts for all priority species were prepared to summarize pertinent biological information from various sources and are presented in Appendix IV. Each two-page account identifies, when known, the following information for a given priority species:

- **Reason for Concern**: population and/or habitat status, causes for declines, monitoring difficulties, and Committee on the Status of Endangered Wildlife in Canada status
- **Distribution**: percent of the North American breeding range in Canada, as well as an outline of the breeding distribution with specific detail for BCR11 and general wintering distribution
- **Habitat Requirements**: general habitat associations and specific breeding habitats for some species (e.g., lek sites for Greater Sage-Grouse and Sharp-tailed Grouse), nesting and foraging habitat associations, and finally wintering habitat associations for resident and wintering species
- **Ecology**: approximate arrival and departure dates from breeding grounds, rates of site fidelity, clutch size and likelihood of renesting or double-brooding, and typical adult and nestling diets
- **Area Requirements**: territory sizes and the minimum patch size utilized
- **Management Issues**: response to management practices and human influences (primarily burning, mowing, grazing, planted cover programs) and response to other factors such as nest parasitism.

Some of the information presented in the species accounts has been further summarized in Table 2 to highlight primary reasons for concern, habitat requirements, and management issues. Several issues and concerns are shared among several species (e.g., limitations of existing monitoring, knowledge deficiencies, active reduction of prey species that are considered agricultural pests) and will be discussed in further detail in the following sections of the plan.

Many of these priority species have also been identified as important priorities through processes such as provincial and national status assessments (Appendix V) and PIF conservation planning at the national or international scales (Dunn 1997, Dunn et al. 1999, Rich et al. 2003). Two species not listed in Table 1 as priority species merit special mention due to their COSEWIC listings: Red-headed Woodpecker and Sage Thrasher. The Red-headed Woodpecker is listed nationally as a Species of Special Concern. Although populations appear to be experiencing a moderate decline and this species received more than the minimum score of 19 during the assessment process, it did not meet any of the criteria score combinations necessary for classification into a priority pool. Subsequent iterations of this landbird conservation plan should carefully examine the population trend for the Red-headed Woodpecker to examine future listing as a regional priority species. The Sage Thrasher is listed as Endangered by COSEWIC; however, populations in the Canadian portion of BCR11 are too small to assess trends as this species is at the extreme periphery of its range. Population sizes are larger and more manageable in other portions of their range (e.g., South Okanagan and Similkameen valleys of British Columbia). The PIF scoring process assigns species peripheral to BCR11 lower scores than species for which a core of the population is found in the BCR, and accordingly the Sage Thrasher did not achieve sufficiently high scores to make the regional priority list. A national recovery strategy for the Sage Thrasher and a national management plan for the Red-headed Woodpecker will be developed under the Canadian Species at Risk Act; agencies implementing the BCR11 Landbird Conservation Plan are directed to these documents for further direction on conservation objectives and activities relevant for these species.

Table 2. Overview of priority landbird species in BCR11. For more details (e.g., minimum area requirements), please refer to the appropriate species account in Appendix IV.

Priority Species	Primary Reasons for Concern	Habitat Requirements	Management Issues	Species-Specific Recommended Actions
Greater Sage-Grouse	• habitat loss and degradation • population declines • restricted distribution	• sagebrush stands interspersed with meadows and riparian areas • lek sites on flat areas or small knolls that are sparsely vegetated and are within or adjacent to sagebrush stands	• fragmentation and conversion of sagebrush to other uses • reduction in forb availability and increase in forage grasses in sagebrush stands • human disturbance and infra-structure near lek and nest sites • mortality from West Nile Virus	• maintain and/or restore sagebrush habitat • research – causes of population declines, factors influencing productivity and survival, other needs outlined in recovery strategy • monitoring – standardized annual spring lek survey, searches for unknown leks • education – population declines, habitat requirements, reduce lek disturbance • additional recovery strategy recommendations
Sharp-tailed Grouse	• habitat loss and degradation • high stewardship responsibility • population declines	• mosaic of grasslands, wetlands, and woodlands • traditional lek sites with good visibility • nesting areas with structural diversity • riparian and upland wintering areas with deciduous shrubs	• annual disturbance that reduces vegetation diversity and cover • human disturbance, particularly at leks • possible mortality from shooting	• conserve grassland • GMP – managed grazing • GMP – delayed haying • research – impacts of local hunting
Northern Harrier	• possibly area-sensitive • habitat loss • high stewardship responsibility • population declines	• mosaic of tall, densely-vegetated, open habitats, including grasslands, shrublands, wet meadows, and wetland margins • abundant vole populations	• frequent (e.g., annual) or intensive habitat disturbance (e.g., heavy grazing) • lack of suitable habitat for small mammal prey • haying of wetland margins	• maintain PNC • GMP – promote winter cereals in eastern portions of BCR • GMP – delayed grazing • GMP – planted nesting cover • GMP – maintain wetland margins for vole prey • GMP – delayed haying

PRIORITY SPECIES	Primary Reasons for Concern	Habitat Requirements	Management Issues	Species-Specific Recommended Actions
Ferruginous Hawk	• habitat loss and degradation • high stewardship responsibility • control of ground squirrel prey • nest abandonment from disturbance • range contraction	• large, open grasslands and shrubland communities with rolling or rugged terrain • ground squirrels in areas of reduced cover • secluded nest sites in isolated trees, small open tree patches, or elevated ground within large grasslands	• pest control management against prey species or exclusion of prey due to intensive agriculture • conversion of grassland landscapes to >30% croplands • human disturbance near nest sites during laying and early incubation • degradation of trees in abandoned farmyards, shelterbelts, and pasture sites	• promote no net loss of native habitat • convert marginal cropland to grassland • provide and maintain nest sites • GMP – reduce pest management • GMP, education – reduce nest site disturbance • additional recovery plan recommendations
Golden Eagle	• population declines • reduced prey availability	• open grasslands and shrublands • cliff ledges, escarpments, rocky bluffs, artificial structures, or in large trees in isolated areas	• electrocutions and collisions with human infrastructure • management against prey • knowledge deficiencies • human disturbance near nests • lead poisoning	• research – geographic origin of wintering prairie population • research – prey species needs • GMP – adopt electrocution guidelines
Prairie Falcon	• limitations of existing monitoring • moderately-high stewardship responsibility • reduced prey availability • habitat degradation • small population size	• open grassland and shrubsteppe near badlands, rivers, or coulees with cliffs for nesting • abundant prey, especially ground squirrels, near nest cliffs	• pest control management against prey • human disturbance near nest sites, especially before hatching	• GMP – reduce nest site disturbance • GMP – reduce pest management
Black-billed Cuckoo	• habitat degradation • high stewardship responsibility • limitations of existing monitoring • recent population declines	• brushy thickets and coulees, often near water or roads	• pesticide spraying for forest tent caterpillars • degradation of riparian habitat • removal of shrubby vegetation along roads	• research – basic science needs • GMP – riparian grazing management

PRIORITY SPECIES	Primary Reasons for Concern	Habitat Requirements	Management Issues	Species-Specific Recommended Actions
Burrowing Owl	• low productivity and high mortality • population declines • range contraction • habitat loss and degradation	• nest burrows in treeless areas with short, sparse vegetation • patches of taller vegetation, such as wet meadows, for hunting small mammal prey near nests	• pest control management against burrowing mammals as well as vertebrate and invertebrate prey • provision of nest sites, including nest boxes • collisions with vehicles • lack of habitat mosaic encompassing areas for nesting and foraging • fragmentation of grasslands in areas with high-quality soil	• convert cropland to pasture in high-quality soils • provide nest boxes • research – causes of declines, other needs outlined in recovery strategy • GMP – reduce unnecessary control of ground squirrels, badgers, and grasshoppers • GMP – managed grazing • education – population declines, habitat requirements, conservation and stewardship options • additional recovery strategy recommendations
Long-eared Owl	• habitat loss and degradation • limitations of existing monitoring • possibly population declines	• open forests and dense woodlands adjacent to grassland and shrubland	• knowledge deficiencies • degradation of riparian habitat	• research – basic science needs • monitoring – nocturnal owl survey • GMP – riparian grazing management
Short-eared Owl	• habitat loss • limitations of existing monitoring • possibly population declines	• large areas of open grasslands and wetlands with a tall vegetation and shrub component • abundant vole populations	• loss of wetlands • lack of suitable habitat for small mammal prey	• maintain PNC • GMP – promote winter cereals in eastern portions of BCR • GMP – delayed grazing • GMP – planted nesting cover • GMP – maintain wetland margins for vole prey • GMP - delayed haying

PRIORITY SPECIES	Primary Reasons for Concern	Habitat Requirements	Management Issues	Species-Specific Recommended Actions
Sedge Wren	• habitat loss • limitations of existing monitoring • moderately-high stewardship responsibility	• open, wet meadows with tall, dense vegetation	• loss of wet meadows • frequent habitat disturbance that reduces vegetation height and density (e.g., heavy grazing) • nest losses from delayed haying	• maintain PNC • GMP – promote winter cereals in eastern portions of BCR • GMP – delayed grazing • GMP – planted nesting cover • GMP – maintain wetland margins • GMP – delayed haying
Sprague's Pipit	• area-sensitive • high stewardship responsibility • native grassland specialists • population declines • range contraction • restricted distribution	• native grasslands of moderate height, low to moderate vegetation density, low to moderate litter depth, and little or no woody vegetation • minimum area requirements	• shrub encroachment • invasion of non-native vegetation species • inadequate vegetation height in drier areas or excessive litter accumulation in moister areas • pesticide use	• maintain native grassland • convert marginal cropland to native grassland • research – wintering needs • research – impacts of pesticide use • GMP – delayed haying • GMP – grazing systems • GMP – reduce use of granular pesticides
Bohemian Waxwing	• high stewardship responsibility • limitations of existing monitoring • possibly population declines	• fruit-bearing shrubs or trees	• collisions with windows or vehicles in urban areas • knowledge deficiencies	• monitoring – analyze existing CBC data • monitoring – improve in non-urban areas
Clay-colored Sparrow	• possibly area-sensitive • high stewardship responsibility	• patches of low shrubs or shrub-like forbs for nesting with relatively dense litter and tall grasses • open habitats with short or sparse vegetation for foraging	• nest losses due to disturbance, particularly haying in alfalfa fields	• GMP – delayed haying

PRIORITY SPECIES	Primary Reasons For Concern	Habitat Requirements	Management Issues	Species-Specific Recommended Actions
Grasshopper Sparrow	• area-sensitive • habitat loss and degradation • population declines	• large grasslands of moderate height and litter depth, minimal woody vegetation, and patches of bare ground • minimum area requirements	• inadequate litter accumulation in drier areas or excessive accumulation and high, dense grass growth in moister areas • pesticide use? • use of hayfields for nesting may lead to low reproduction in some years	• maintain native grassland • convert marginal cropland to permanent grassland, preferably native • research – wintering needs • research – use and impact of winter cereals • research – impacts of pesticide use • GMP – delayed haying • GMP – grazing systems • GMP – reduce use of granular pesticides • GMP – provide planted and native pasture
Baird's Sparrow	• habitat loss and degradation • high stewardship responsibility • limitations of existing monitoring • population declines • restricted distribution • possibly area-sensitive	• grasslands, preferably native, with moderate litter depth and vegetation height, patchy distribution of grass and forbs, and little to no shrub cover and density • minimum area requirements	• grassland loss and shrub and exotic encroachment • inadequate litter accumulation in drier areas due to frequent haying, heavy grazing, etc. or excessive litter accumulation in moister areas • response to disturbance varies with frequency and type of disturbance, vegetation type, and moisture regime • use of inappropriate habitats, such as croplands or hayfields, may lead to low reproduction in some years • pesticide use	• maintain native grassland • convert marginal cropland to permanent grassland, preferably native • research – wintering needs • research – use and impact of winter cereals • research – impact of pesticides • GMP – delayed haying • GMP – grazing systems • GMP – reduce use of granular pesticides

PRIORITY SPECIES	Primary Reasons For Concern	Habitat Requirements	Management Issues	Species-Specific Recommended Actions
Nelson's Sharp-tailed Sparrow	• habitat loss • high stewardship responsibility • limitations of existing monitoring	• dense emergent vegetation in wetlands and dense sedges and grasses near wetlands	• knowledge deficiencies • wetland loss and drainage • removal of wetland vegetation, including heavy grazing or haying of wetland margins	• maintain PNC • GMP – delayed grazing • GMP – planted nesting cover • GMP – eliminate wetland drainage • monitoring – need nocturnal and marsh monitoring
McCown's Longspur	• high stewardship responsibility • limitations of existing monitoring • population declines • restricted distribution	• grasslands and fields with short grass, minimal vegetation cover and litter depth, and patches of bare ground	• possibly pesticide use • excessive accumulation of litter and vegetation • use of inappropriate habitats such as fallow fields	• research – use and impacts of anthropogenic habitats • maintain grassland • GMP – promote heavy grazing
Chestnut-collared Longspur	• habitat loss and degradation • high stewardship responsibility • population declines • range contraction • restricted distribution • possibly area-sensitive	• native grasslands in good to excellent condition with short to moderate grass height, some bare ground, minimal litter depth, and minimal shrub coverage • minimum area requirements	• inadequate litter accumulation and vegetation in drier areas and excessive litter accumulation and residual vegetation in moister areas • degradation of range condition with increased grazing pressure • possibly pesticide use	• maintain native grassland • convert marginal cropland to permanent grassland, preferably native • research – wintering needs • research – impact of pesticides • GMP – grazing systems • GMP – reduce use of granular pesticides
Bobolink	• possibly area-sensitive • possibly decreased reproductive success • moderately-high stewardship responsibility • population declines	• large grasslands with moderately tall, dense grass and forbs with moderate litter depth and limited woody vegetation	• grassland loss and shrub encroachment • inadequate litter accumulation in drier areas or excessive accumulation in moister areas • nest losses due to disturbance, possibly especially haying	• maintain PNC • GMP – promote winter cereals in eastern portions of BCR • GMP – delayed grazing • GMP – planted nesting cover

3.2 Priority Landbird Habitats

Habitat is defined as the specific physical and biotic components of an environment that permit an organism to naturally live, grow, and reproduce; bird habitat thus includes components such as tree cavities or abandoned burrow holes used for nesting and thorny bushes or sagebrush used for foraging. Landbirds are ubiquitous and use a wide variety of habitats ranging from cliff faces to tall shrubs and from sparse grasslands to deep marshes. While landbirds may utilize diverse habitat types, those habitats supporting many priority species are generally considered higher priority for conservation action than those with few priority species. The 25 priority landbird species identified in this plan typically utilize components within one or more of the following three broad habitat categories (Table 3): grasslands, wetlands, or woodlands (including aspen parkland, riparian or coulee habitat, and shrubland). Specifically, 23 of the species regularly use grasslands and 11 of these are restricted to this habitat, while only 2 are restricted to woodlands and none are restricted to wetlands. These broad habitat types are described below. The habitat descriptions draw heavily on the following primary sources: Coupland (1973), Rowe and Coupland (1984), and Trottier (1992). Scientific names for flora and avian species mentioned in the text can be found in Looman and Best (1987) and American Ornithologists' Union (2003).

3.2.i Grasslands

Grassland topography in BCR11 varies from flat to undulating to rolling hills, and numerous coulees and ravines are associated with river systems. Topography and subsequent drainage patterns act in concert with other factors such as soils, temperature, and annual precipitation to determine the nature of the grassland vegetation community at a given site. Three native grassland associations are generally recognized within the Canadian portion of BCR11: tall-grass, mixed-grass, and fescue (Figure 3). Within Canada, tall-grass prairie has historically been found in significant amounts only in southern Manitoba, where soil moisture levels are highest within the Canadian prairies. Mixed-grass prairie occurs where moisture is typically limiting to the growth of trees, specifically throughout southern Alberta to southeastern Saskatchewan and southwestern Manitoba. This grassland type is also found in open areas of aspen parkland in southeastern Saskatchewan and southern Manitoba. Fescue prairie is found almost exclusively within the Canadian portion of BCR11 where the climate is relatively cool and moist, specifically in a narrow band between the mixed-grass prairie and aspen parkland zones in southwestern Alberta as well as in the Cypress Hills. Fescue prairie has greater species richness than mixed-grass prairie and produces almost twice as much forage; however, it is easily eliminated if grazed too heavily, too early, or too continuously.

Prior to increased human settlement, tall-grass prairie was frequently disturbed by lightning and human-caused fires and, to a lesser degree, by grazing from native herbivores. Periodic drought conditions and grazing pressure by native herbivores (bison, elk, pronghorn, ground squirrels, prairie dogs) were the primary disturbance forces in mixed-grass prairie communities as well as in fescue prairie, although fescue prairie received higher winter use by grazing bison and elk. Disturbances varied both spatially and temporally on the landscape, creating a mosaic of habitats within the prairie ecosystem. They also increased plant species richness and prevented shrub encroachment and conversion to woodlands.

Table 3. Broad habitat associations of priority landbird species in BCR11. Some habitat associations represent an interaction between yearly moisture and vegetation (e.g., species will use wetland margins in drier years).

Species	Grassland	Wetland	Woodland
Greater Sage-Grouse	✓		
Sharp-tailed Grouse	✓		✓
Northern Harrier	✓	✓	
Swainson's Hawk	✓		✓
Ferruginous Hawk	✓		✓
Golden Eagle*	✓		
Prairie Falcon[+]	✓		
Black-billed Cuckoo			✓
Snowy Owl*	✓		
Burrowing Owl	✓		
Long-eared Owl	✓		✓
Short-eared Owl	✓	✓	
Loggerhead Shrike	✓		✓
Sedge Wren	✓	✓	
Sprague's Pipit	✓		
Bohemian Waxwing*			✓
Clay-colored Sparrow	✓		✓
Lark Bunting	✓		
Grasshopper Sparrow	✓		
Baird's Sparrow	✓		
Le Conte's Sparrow	✓	✓	
Nelson's Sharp-tailed Sparrow	✓	✓	
McCown's Longspur	✓		
Chestnut-collared Longspur	✓		
Bobolink	✓	✓	

*present only in winter
[+]also uses cliff habitats

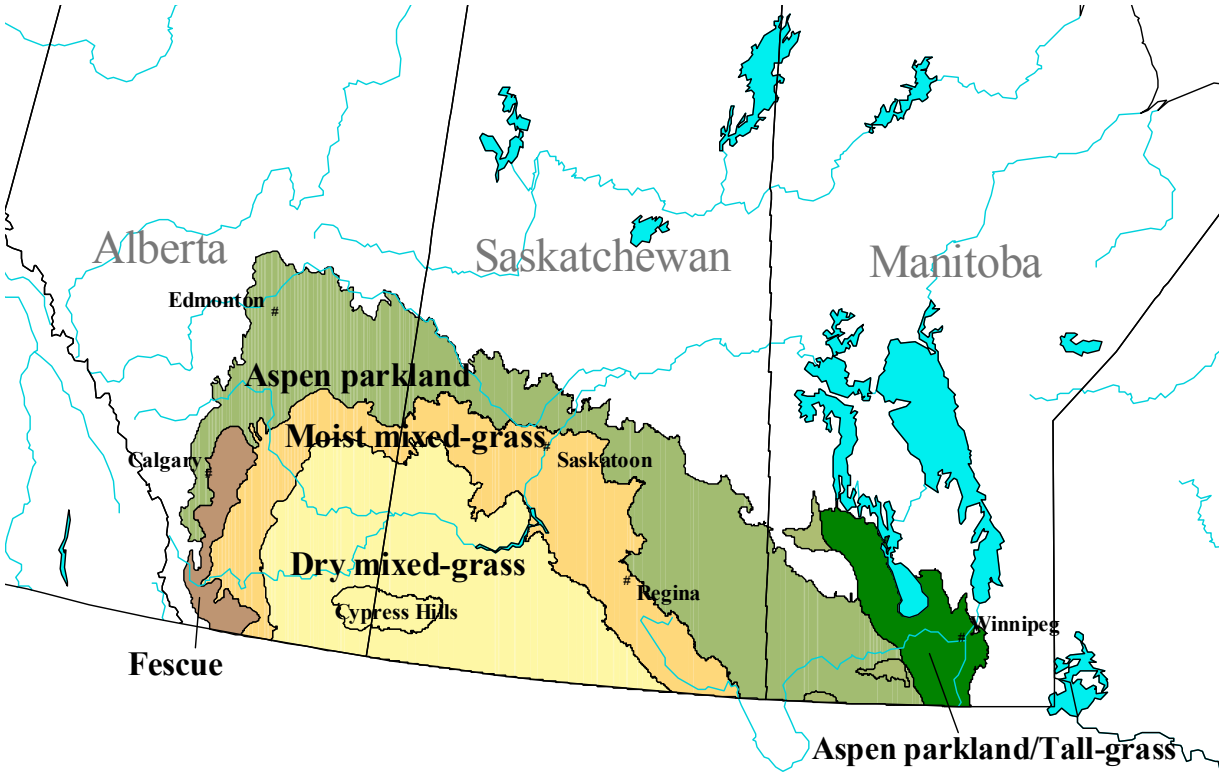


Figure 3. Native grassland ecoregions in the Canadian portion of Prairie Pothole Bird Conservation Region 11 (based on Ecoregions of Canada, ESWG 1996).

Grasslands typically support considerably fewer breeding landbird species than woodlands (Wiens and Rotenberry 1985) and may be dominated by only a small number of species (Knopf 1996, Prescott and Murphy 1996). Several species such as Sprague's Pipit and McCown's Longspur are found only in prairie grasslands (Mengel 1970). Although most grassland bird species are not restricted to either tall-grass, mixed-grass, or fescue prairie, their distribution may be determined by local habitat characteristics within these landscapes (Wiens 1974; Figure 4). Local-level grassland characteristics known to influence use by birds include the amount of bare ground, litter cover or depth, vegetation cover, height, or density (including grasses, forbs, shrubs), type of vegetation (native, tame, crop), size of grassland patch, and surrounding matrix habitat. For example, Horned Lark, Chestnut-collared Longspur, and Burrowing Owl utilize areas of short-grass with patches of bare ground, such as those created by heavy grazing or burning. Lighter grazing and higher moisture, on the other hand, will promote taller, dense vegetation growth used for nesting by Le Conte's Sparrows in the summer and for foraging by Snow Buntings in the winter. Although Loggerhead Shrike or Clay-colored Sparrow may need a shrub component in the landscape, other species such as Sprague's Pipit and Baird's Sparrow usually avoid shrubby areas. Greater Sage-Grouse also require shrubby areas, but they rely specifically on sagebrush.

Although landbird species may use croplands to a limited extent, bird abundance, diversity, and productivity are far lower in cultivated cropland than in native grasslands (Owens and Myres 1973, Hartley 1994), and such fields may function as an ecological trap. Grasslands planted with tame species, on the other hand, are often used as grassland birds select habitat based on vegetation structure over species composition (Rotenberry and Wiens 1980, Dale 1983, Madden 1996, Davis and Duncan 1999). Thus unless specified otherwise, the grassland category as used in the remainder of this document includes both native and tame grassland habitats, but not croplands. It is important to note that in most instances provision and maintenance of native grassland habitat is preferred from a conservation standpoint.

3.2.ii Woodlands

Within the Prairie Pothole Region, trees and shrubs generally grow in areas where precipitation levels exceed evaporation or where the soil has good moisture-retention capabilities and above-average moisture content, such as margins of waterbodies or watercourses, north-facing slopes, lower slopes, sand hills, depressions on otherwise flat topography, etc. Accordingly, the common types of woodlands in BCR11 are aspen parkland, riparian woodlands and those associated with coulee complexes, forested uplands in the Cypress Hills, shrublands, and trees planted in shelterbelts and farmyards. Individual trees in a savannah community are rare within the Canadian portion of BCR11.

Aspen parkland woodlands are found along the northern boundary of BCR11 and range from scattered aspen groves in areas dominated by open grasslands to areas dominated by aspen forest with scattered grassy meadows. They can also be found at lower elevations along the north side of the Cypress Hills and nearby creeks. River valleys, coulee complexes, and their associated woodlands represent the major invasion routes for many woody plant species after the last glaciation. For example, bur oak has migrated from the east into the Qu'Appelle Valley, while

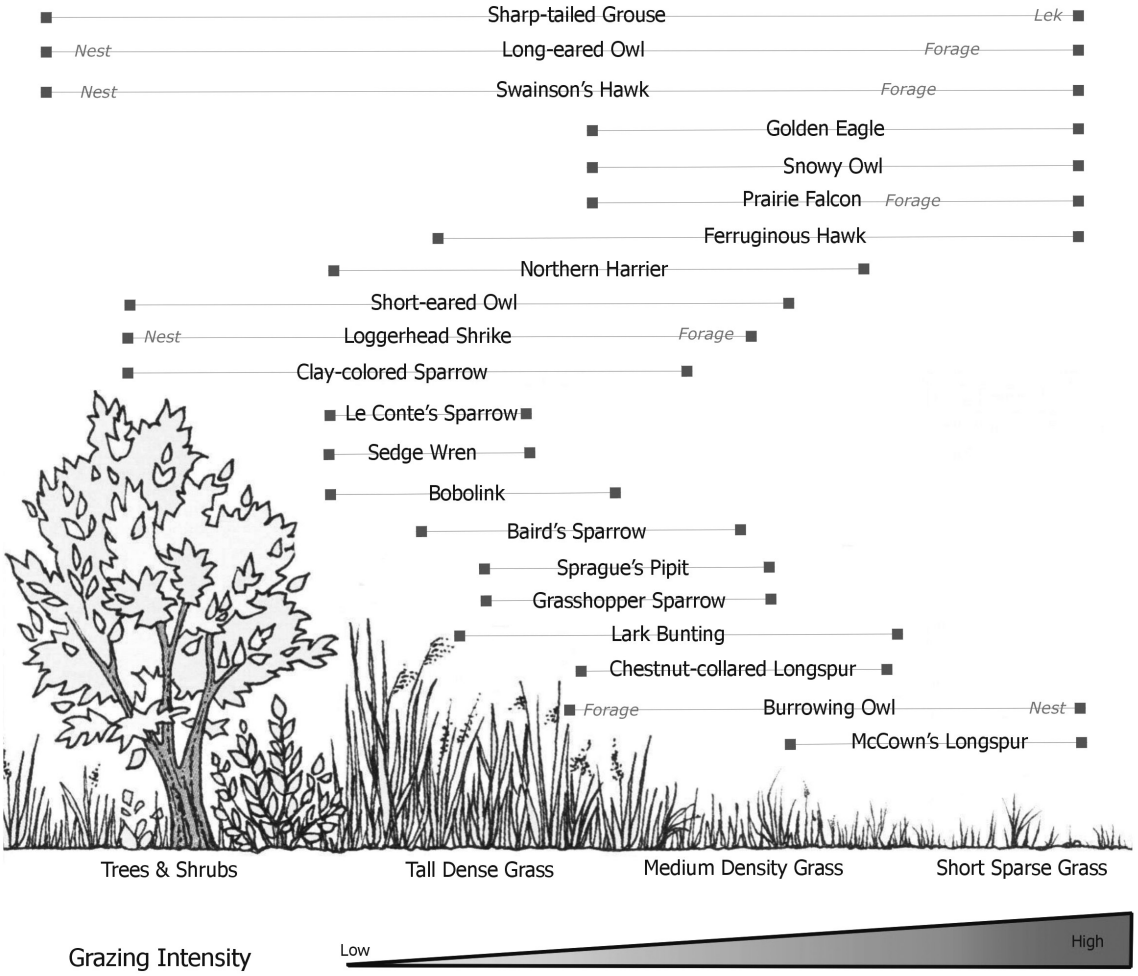


Figure 4. Grassland habitat associations of priority species in BCR11 and their relationship to grazing intensity (adapted from Samson and Knopf 1996 and SWCC 2002). Note that Greater Sage-Grouse are not shown here as they are associated almost exclusively with a specific habitat, namely sagebrush shrublands.

American elm, green ash, Manitoba maple, and plains cottonwood have all invaded northward to reach their limits in the Saskatchewan River Delta area. Balsam poplar is common on moister sites in the aspen parkland and along watercourses, but extensive narrow-leaved cottonwood stands are found only on terraces of the Bow, Oldman, Belly, Waterton, and St. Mary rivers (Hosie 1990, AEP 1997a). Shrublands may be associated with the woodlands described above or may be present within the prairie landscape without an overstory tree canopy. Often shrublands will form in areas where moisture levels are slightly higher than average but not adequate for tree growth. While some shrub species may be dwarfed and hard to differentiate from herbs under prairie conditions (e.g., rose), others can grow to knee height (e.g., western snowberry).

Historical disturbances in woodland and shrubland habitats included fire, grazing/browsing, insects, disease, and firewood cutting by aboriginal people. Native grasslands within the aspen parkland mosaic were historically maintained by fire, grazing, and trampling. Fire within the woodlands component of the aspen parkland was important in maintaining aspen vigor and encouraging reproduction via suckering, but the onset of fire suppression with European settlement has resulted in a southward movement of the boundary between grasslands and the aspen parkland (Archibold and Wilson 1980). Flooding, by both severe weather events and beavers, was also an important influence for woodlands associated with watercourses. Variation in natural flow regimes created a mix of age structures corresponding to different flood events and periods of regeneration; some species, such as cottonwoods, require flooding and silt deposition for germination.

Three vegetation layers within woodlands may be utilized by landbirds such as the BCR11 priority species: ground (grasses, forbs), shrub (low and tall shrubs), and canopy (Table 4). However, not every woodland habitat will possess all layers. Shrublands and early seral stages in riparian woodlands may lack tall shrubs or trees, while other habitat components may be present only in older seral stages (e.g., snags, cavities). Because of the transitional nature of aspen parkland woodlands, a variety of landbirds may be found using them including boreal species (e.g., Olive-sided Flycatcher, Rose-breasted Grosbeak) or montane species (e.g., Violet-green Swallow, White-crowned Sparrow, Lazuli Bunting). Similarly, the diversity of habitat components and structure in riparian woodlands supports species such as Black-billed Cuckoo, Red-headed Woodpecker, Northern Flicker, House Wren, Gray Catbird, Brown Thrasher, Yellow-breasted Chat, and Baltimore Oriole. Rocky outcrops and badlands, commonly associated with river valleys or coulees, are used for nesting by Ferruginous Hawk, Golden Eagle, Prairie Falcon, and Rock Wren, while habitat structure found within shrublands is highly important for other species, such as the Greater Sage-Grouse. Species known to breed in the Cypress Hills include montane species such as those listed above. The linear nature of many riparian and shelterbelt woodlands within the otherwise treeless terrain of the prairies provides important dispersal corridors for woodland birds and migration corridors for species ranging from waterfowl to canopy-dwelling warblers. Riparian woodlands in the Great Plains have been shown to have bird communities seven times as rich as the surrounding plains habitat (Tubbs 1980).

Table 4. Woodland microhabitat associations of priority landbird species in BCR11.

Species	Ground	Shrub Abundance			Shrub Height		Canopy			
	Dense Cover	Sparse	Patchy	Dense	Low	Tall	Sapling	Mature Conif.	Mature Decid.	Snag
Sharp-tailed Grouse*	✓		✓	✓	✓	✓			✓	
Swainson's Hawk						✓			✓	
Black-billed Cuckoo				✓	✓	✓	✓		✓	
Long-eared Owl						✓		✓	✓	
Loggerhead Shrike		✓	✓		✓	✓	✓		✓	
Bohemian Waxwing*					✓	✓	✓	✓	✓	
Clay-colored Sparrow			✓	✓	✓	✓	✓			

*primarily winter habitat associations

3.2.iii Wetlands

Prairie Pothole wetlands and the surrounding rolling terrain were formed as large chunks of ice from retreating glaciers were buried by newly-deposited soil and then subsequently melted. These small, independent drainage basins receive local run-off and have no consolidated drainage systems (Huel 2000). Within the Prairie Pothole Region, wetlands commonly include wet meadows, marshes, and ponds; less frequently they may be associated with riparian systems (e.g., river oxbows) or man-made reservoirs and canals. Prairie wetlands have evolved under a regime of fluctuating water levels (Huel 2000). Although local snow accounts for only 25% of annual precipitation, snow-melt can provide over 50% of run-off, causing water levels in wetlands to peak in the spring and decline throughout the summer. In addition to seasonal fluctuations, water supplies to wetlands vary greatly from year to year.

The plant species assemblages and vegetative structure of prairie ponds and marshes are often arranged in distinct, concentric bands. These zones (wet meadow zone, shallow marsh zone, and deep marsh zone; Figure 5) are related to average water depth and its degree of permanence, with horizontal and vertical habitat heterogeneity increasing with the duration of standing water (Kantrud et al. 1989). Wetland characteristics that may influence habitat selection by birds include wetland size, extent and type of open surface water, water depth, dominant vegetation type (sedges, rushes, shrubs, etc.), landscape setting and surrounding upland habitats (grasslands, woodlands), annual water regimes (permanent, semi-permanent, temporary), and presence of special physical features (islands, peninsulas). Prairie Pothole wetlands are considered the most important waterfowl production area in North America and an important staging area for migrating shorebirds. Aspen parkland wetlands may receive higher use by nesting birds than wetlands found in grasslands because of their higher density and lower evaporation rates leading to greater permanency during the summer. The vegetated zones of wetlands, however, are also important habitat for some priority landbird species, including Northern Harrier, Sedge Wren, and Nelson's Sharp-tailed Sparrow (Table 5).

3.3 Distribution of Habitat for Priority Species

The remaining native grassland, woodland, and wetland habitats within BCR11 are dispersed throughout the Canadian Prairie Provinces. Mapping these habitats at appropriate scales for planning and implementation of both local and regional conservation activities within is complicated by the lack of consistent land cover classifications. A native vegetation inventory has been conducted for the Grassland Natural Region of Alberta (Alberta Native Prairie Vegetation Inventory) through interpretation of 1:30,000 aerial photographs taken between 1991-1993. This coverage delineates six native vegetation classes (shrub, tree, graminoid, riparian, lake, wetland) and estimates the percentage of each within each quarter section (65 ha resolution). A similar inventory was recently completed for the Central Parkland Natural Subregion in Alberta (Central Parkland Native Vegetation/Wetland Inventory) using a combination of 1:30,000 aerial photographs taken between 1997-1999 (1 ha minimum polygon size), LANDSAT-TM satellite imagery (0.25 ha minimum polygon size), and IRS satellite imagery (0.04 ha minimum polygon size). This mapping project delineates polygons of native coniferous, deciduous, grassland, and wetland habitats.

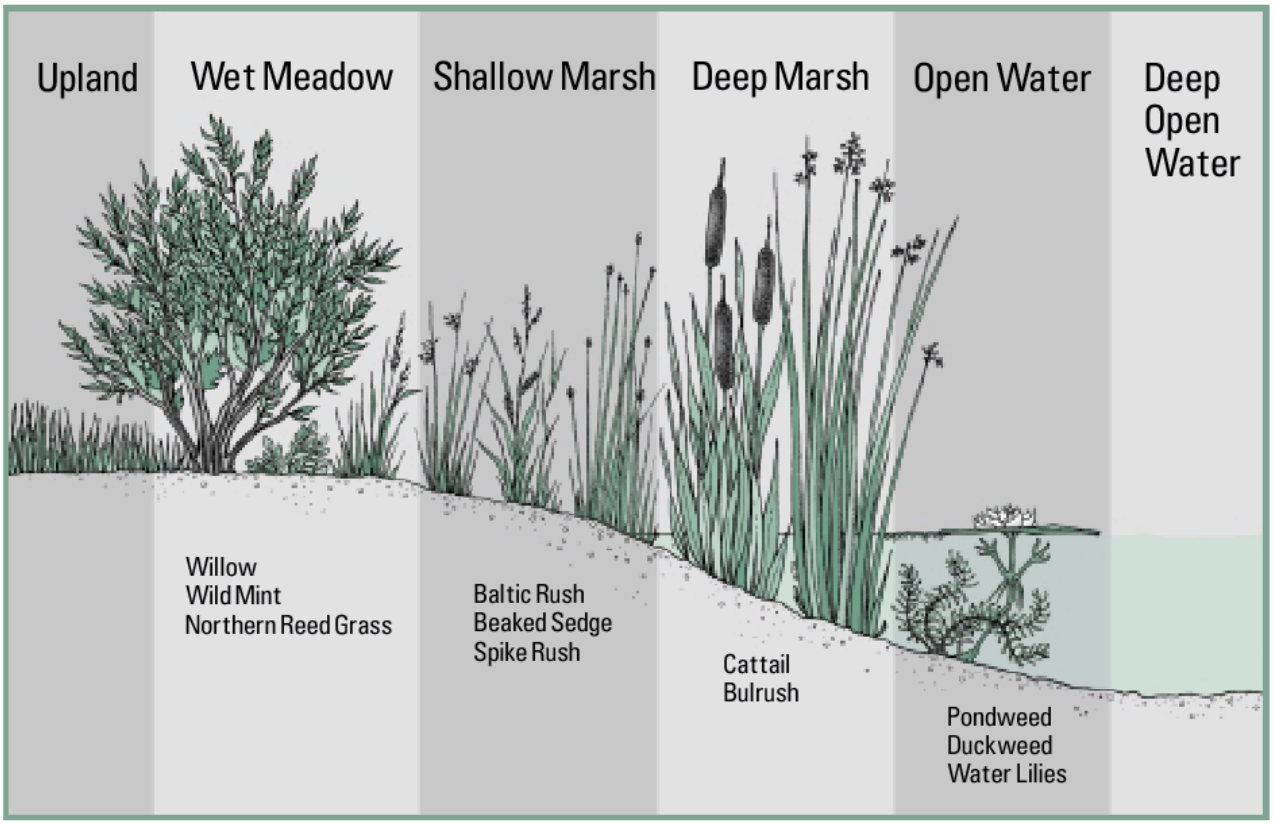


Figure 5. Vegetated zones of a typical large prairie wetland (adapted from Huel 2000). The number of zones found in smaller prairie wetlands would decrease from right to left with the size of the wetland.

Table 5. Wetland microhabitat associations of priority landbird species in BCR11.

Species	Deep Marsh	Shallow Marsh	Wet Meadow	Woody Vegetation	Nearby Fields
Northern Harrier		✓	✓	✓	✓
Short-eared Owl		✓	✓	✓	✓
Sedge Wren		✓	✓		
Clay-colored Sparrow				✓	✓
Le Conte's Sparrow		✓	✓		
Nelson's Sharp-tailed Sparrow	✓		✓		

Inventories for Saskatchewan and Manitoba use LANDSAT-TM satellite imagery from the mid-1990's at 0.09 ha resolution (South Digital Land Cover, 1994 and Land Use/Land Cover Mapping of Agro-Manitoba, 1994). Both data sets identify many similar and relevant land cover classes (cultivated cropland, deciduous forests, coniferous forests, mixedwood forests, waterbodies, and other wetlands/marshes). However, they differ slightly in their classifications of grasslands: the South Digital Land Cover for Saskatchewan delineates forage crops, native dominant grasslands, seeded grasslands/pasture, and tall shrubs, whereas the Land Use/Land Cover Mapping of Agro-Manitoba identifies only forage crops and grassland/rangeland. The Prairie Farm Rehabilitation Administration of Agriculture and Agri-Food Canada maintains a land cover classification from 1994 LANDSAT-TM imagery for the entire prairie region (0.09 ha resolution; Western Grain Transportation Payout Program (WGTPP) Generalized Landcover). The land cover classes in this data set are similar to those found in the South Digital Land Cover. Finally, Ducks Unlimited Canada has a Wetland Habitat Inventory, also based on LANDSAT-TM satellite imagery (0.09 ha resolution), which provides consistent data for wetlands across the three Prairie Provinces.

For the purpose of this plan, the current distribution of grasslands in BCR11 was mapped from the PFRA's WGTPP Generalized Landcover and includes both native and tame grass (Figure 6). The distribution of wetlands was mapped from DU's Wetland Habitat Inventory (Figure 7). The current distribution of woodlands, however, was mapped using the different land cover classifications from each province (Figure 8). While these figures illustrate the spatial arrangement of the habitats, there may be limitations or missing data (e.g., coverages for south-central Manitoba). Further investigations are necessary to help identify target areas for landbird conservation activities based on the distribution of habitats within BCR11. Rigorous, spatially-explicit, habitat-based models are currently lacking but are necessary to more accurately predict species occurrence based on both landscape- and site-level habitat associations.

CWS is currently preparing a Decision Support System for the PHJV that incorporates BBS data, landscape coverages, soil data, temperature data, latitude/longitude information, etc. to provide a map of the likelihood of observing a given species in a given area (S. Davis, Canadian Wildlife Service, *pers. comm.*). This will be completed for several priority landbird species, as well as a few shorebird species. Species-specific coverages can subsequently be overlapped to determine areas most likely to support the greatest numbers of priority species. Mapping exercises such as this will help identify target areas for conservation activities and integrate planning among various bird conservation initiatives. Several other approaches have also been used recently to assist in directing bird planning activities. CWS and NCC conducted a prairie-wide mapping project (Schmoll and Wellicome 2001, Schmoll and Wellicome, *unpubl. data*) that identified large, continuous, high-density grassland patches (i.e., predominantly areas of grazing on rangeland) as well as small clusters of high-density grassland patches within areas of fragmented prairie (i.e., predominantly areas of cereal or mixed farming). SWCC modeled Grassland Bird Conservation Areas in Saskatchewan to help facilitate delivery of NAWMP programs and broader conservation planning efforts. This project examined habitat requirements of grassland birds and then identified and ranked habitat patches with specific properties (e.g., size, shape, landscape composition, ≥ 95% grass cover) thought to be important for area-sensitive species. This Grassland Bird Conservation Areas model has been combined with a bird occurrence model to produce a decision support matrix that allows further identification of target areas. Finally,

the Nature Conservancy of Canada compiles information on the locations of viable habitats of plant species, animal species, and natural ecosystems within natural ecoregions into spatial conservation blueprints or ecoregional plans. All these plans help identify landscape-scale sites and strategies most suitable for conserving ecoregional diversity.

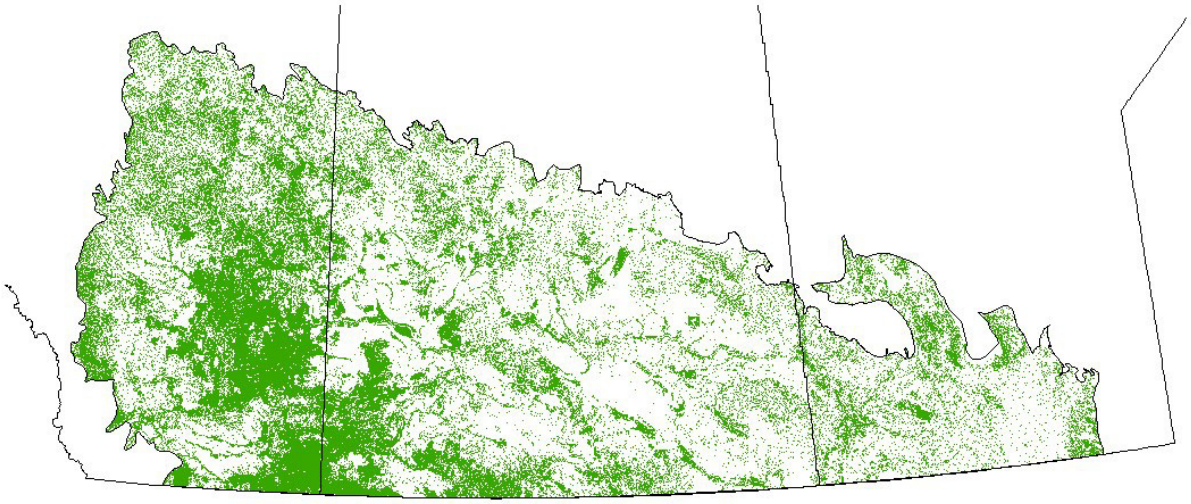


Figure 6. Remaining native and tame grassland habitat in BCR11. The data was taken from PFRA's Western Grain Transportation Payout Program Generalized Landcover (forage and grassland classes).

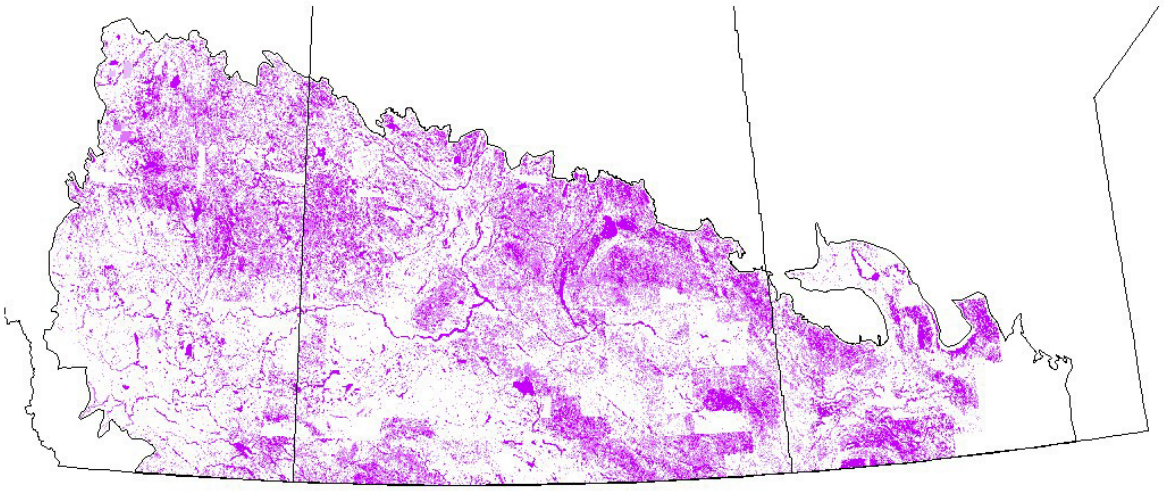


Figure 7. Remaining wetland habitat in BCR11. The data was taken from Ducks Unlimited Canada's Wetland Habitat Inventory; however, this coverage does not contain data for south-central Manitoba.

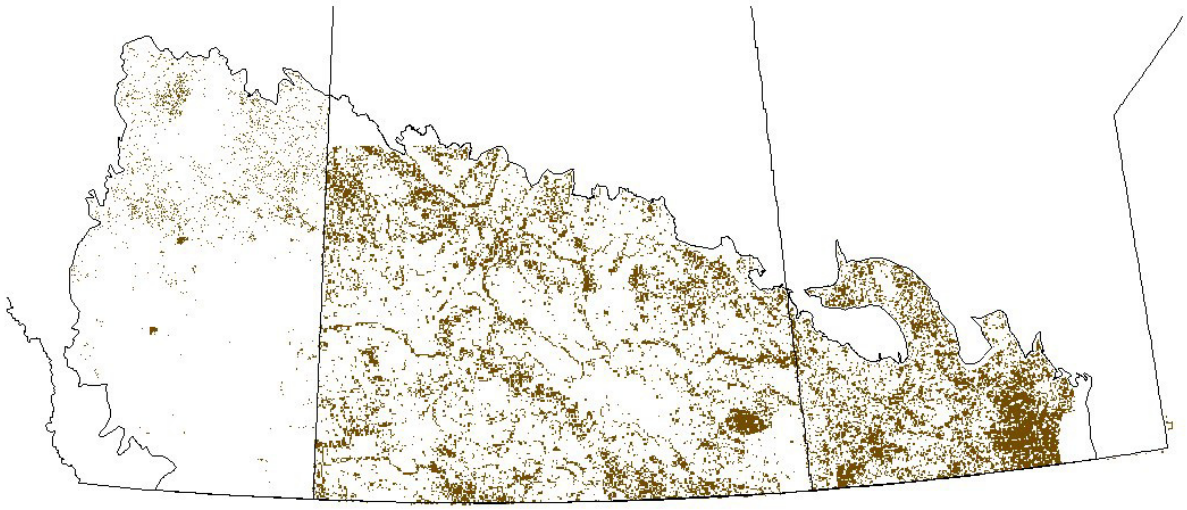


Figure 8. Remaining woodland (tree and shrub) habitat in BCR11. The data was taken from Land-Use/Land Cover of Agro-Manitoba (deciduous forest, open deciduous forest, mixedwood forest, coniferous forest land classes), the South Digital Land Cover (tall shrubs, deciduous hardwood, coniferous softwood, mixedwood land classes), the Native Prairie Vegetation Inventory (quarters with >=20% area in trees and/or shrubs), and the Central Parkland Native Vegetation/Wetland Inventory (deciduous forest, coniferous forest land classes).

4.0 THREATS TO PRIORITY LANDBIRDS AND HABITATS

Landbird populations and their associated grassland, wetland, and woodland habitats within the Prairie Pothole Region have experienced increasing levels of anthropogenic disturbance over the past two centuries. First Nations populations present in the region prior to European settlement were limited in size and nomadic in nature as they followed their primary food source, the bison. Accordingly, human impacts on prairie resources varied spatially on the landscape and spanned a relatively short duration at a given location. The residency pattern of European settlers, however, was typically more permanent and resulted in higher use of discrete portions of the landscape: permanent residences were constructed, land was broken to grow crops, and wildlife was harvested. Continued settlement, population growth, and associated development have led to numerous threats to landbird habitat and populations within BCR11.

The Canadian prairie landbase is finite, but human populations and development pressures continue to increase. Human populations in the prairies are now largely concentrated in major urban centres as lifestyle trends have shifted from rural to urban living. This results in rural growth rates that are correlated with the commuting distance to the nearest urban centre. For example, over 72% of Alberta's population live in the Edmonton-Calgary corridor, and the population in this area increased by 12.3% from 1996 to 2001 (Statistics Canada 2002). Communities proximate to Calgary experienced even higher growth rates (e.g., Okotoks – 37%, Strathmore – 43%, Cochrane – 59%). By comparison, the growth rate in the remainder of Alberta outside this corridor was only 5.3%. Many people desiring characteristics of both rural and urban living build on acreages at the outskirts of urban centres: the land area occupied by the city of Calgary has increased 22 fold over the past 75 years (Alberta Prairie Conservation Forum 2002). Regina and Saskatoon are now experiencing the 'donut effect', where population growth is larger around the city core than in the core itself (e.g., since 1996, Regina has had a 1.2% decrease in core growth rate but a 10% increase in the growth of peripheral areas, Statistics Canada 2002). Although this outlying land may be productive agricultural land, even native habitat, the increase in land value and ensuing economic realities often result in conversion to residential development.

To meet societal demands for food, employment, and high quality of life, resource production must also grow. Accordingly, the various other land-use sectors intensify their development and compete for access to land and water resources. For example from 1981 to 2001, the number of cattle in Saskatchewan increased from 2.4 million to 2.9 million head, and the number in Alberta increased from 4.2 million to 6.6 million head (Statistics Canada 2002). The Canadian Agri-Food Marketing Council, a group of leaders from the agriculture, food industry, and market sectors, has challenged producers, processors, and governments to increase Canadian exports from the current 3% to a proposed 4% of the world market (PFRA 2000). Cattle numbers on the prairies will need to increase by a further 15% to meet these projections (PFRA 2000). Similarly, the Canadian Wheat Board estimates that 400 000 ha of land will have to be brought into production in Prairie Canada to meet the world grain market demands by 2007 (D. Brewin, Canadian Wheat Board, *pers. comm*., in PFRA 2000). Because the vast majority of the landbase is already allocated, producers will be increasingly forced to make choices such as whether to produce feed grains for livestock or crops for value-added markets, and whether to maintain marginal or environmentally-sensitive lands for pasture or convert them to crop production.

Although an estimated 636 168 ha of land is currently irrigated on the Canadian prairies (approximately 81% in Alberta, 15% in Saskatchewan, and 3% in Manitoba, Statistics Canada 1997), pressure to intensify production may result in increased area under irrigation.

Competition for land resources does not come only from the residential and agricultural sectors. ALCES® modeling for the Alberta grasslands has shown the current oil and gas footprint as approximately 15 000 ha in wellsites, 18 000 ha in pipelines, and 65 000 ha of edge habitat affected by seismic lines (Alberta Prairie Conservation Forum 2002). To meet anticipated demands from population growth, the model also predicts a footprint increase of 9000 ha/year until reserves are depleted. Recent intensification of forestry activities in the northern part of the region has placed additional pressure on woodlots that are being harvested and subsequently converted to agriculture. This has eliminated some woodlots that might otherwise have been left or managed sustainably as woodlots or agroforestry operations. Currently, several pulp and oriented strandboard mill operations in the region purchase up to 20% of their wood supply from private landowners (K. Hobson, Canadian Wildlife Service, *pers. comm.*). Additional demands on habitats within BCR11 will come from the construction of new transportation and utility services. Changes to industry growth targets can only arise from increased societal awareness and acceptance of the lifestyle changes necessary to ensure sustainable land and wildlife resources.

The net result of uncontrolled human population growth, development, and competition for resources is increasing threats to both landbird populations and habitats within BCR11. Habitat loss and degradation are considered to be the leading causes of declines in landbird populations, not only in the Prairie Pothole Region, but across the continent (McNicholl 1988, Herkert 1994, Knopf 1994). Human impacts may also represent direct sources of mortality for landbirds (e.g., collisions with anthropogenic objects). These threats are discussed in further detail below and summarized in Table 6.

Photo: Chestnut-collared Longspur / M.&B. Schwarzchild, Cornell Laboratory of Ornithology

Table 6. Summary of threats facing landbird populations and habitats within the Canadian portion of BCR11.

Threat	Description
Habitat Loss	• conversion of native grasslands to tame pasture, cropland, residential developments, etc.
	• woodland encroachment on native grasslands owing to shelterbelt plantings, fire suppression, and bison extirpation/grazing suppression
	• removal/loss of riparian woodlands due to permanent flooding, flood control, and conversion to other landuses
	• drainage and filling of wetlands
Habitat Degradation	• landscape- and site-level changes in habitat structure
	• spread of non-native vegetation into native habitats
	• spread of native vegetation into new areas
	• fragmentation effects
	• reduced food availability
	• increased human activity levels
	• water quality changes
Direct Mortality	• non-target poisonings
	• chemical/pesticide effects on reproduction
	• physical destruction of nests
	• disturbance-induced nest abandonment
	• non-native predators and competitors of nests, young, and adults
	• collisions with powerlines, towers, buildings, etc.
	• legal or illegal harvest

4.1 Habitat Loss

Loss of native habitat occurs at variety of scales within BCR11, ranging from the development of a new 1 ha wellsite to a 25 ha subdivision to a 125 ha field of wheat. Although each new development may be relatively small, the cumulative result of decades of human development is substantially less native grassland habitat on the Canadian Prairies landscape compared to historical conditions. Tall-grass prairie occupies only a fraction of its former range; within Canada, estimates indicate that less than 1% remains (Table 7). Similarly, native fescue prairie has been reduced to less than a third of its former area. Mixed-grass prairie, representing over half of the remaining native grasslands in the Canadian portion of BCR11, has been reduced to 37% of its original area. The remaining intact native grasslands often have limitations for other development (i.e., remote from urban centres, marginal for crop production due to steep, stony, sandy, saline, or arid terrain, etc.). These grasslands are typically used for ranching; cattle producers generally manage larger landbases and retain more of their landbase in native vegetation than crop producers (average size of 1131 ha with 71% in native versus average size of 327 ha with 13% in native, respectively; PFRA 2000). However, increasing human populations, intensification of production, and technological advances may increase the pressure on these native remnants. Rich et al. (2003) identified native prairie as a habitat in great danger of significant loss at the continental scale.

Wetland habitat has also been declining since the early 1900's (Usher and Scarth 1990), at a slow but continual rate with distinct 'hotspot' landscapes of high wetland loss (Rakowski et al. 1974, Ignatiuk and Duncan 1995, Watmough et al. 2002). Drainage and cultivation pressure on wetlands increases during times of drought and with the development of larger, modern machinery that allows easier cultivation of large, uniform, and efficient areas. Studies examining wetland losses from 1940's to the late 1990's found an annual percent loss of area ranging from 0.25% to 0.43% and a corresponding annual loss in number of wetlands of about 0.15% (Goodman and Pryor 1972, Ignatiuk and Duncan 1995, Watmough et al. 2002). A recent study by the Prairie Habitat Joint Venture examined habitat change in NAWMP targeted areas of the Prairie Provinces between 1985 and 1999 and found a net 4.0% decrease in wetland numbers and a net 2.8% decrease in wetland area (Watmough et al. 2002). Grass and sedge basin types (i.e., small low prairie/wet meadows to shallow marshes) totaled 56% of all wetland area losses and represent the easiest types of wetlands to drain and fill.

Wooded habitat such as aspen parklands and shrublands, on the other hand, has increased in extent since European settlement (Bird 1961, Archibold and Wilson 1980). The planting of shelterbelts along fencerows and windbreaks in farmyards, the suppression of fire to protect human infrastructure, and the extirpation of bison have all contributed to the growth of trees and shrubs in areas that were previously grassland (e.g., Campbell et al. 1994). The exception is riparian woodlands whose habitat values are often severely impaired or lost completely through damming of a watercourse (Rood and Mahoney 1990) to obtain an irrigation supply or to protect human infrastructure from floods.

Populations of landbirds reflect the effects of habitat loss. Bird abundance, diversity, and productivity are far lower in cultivated cropland than in native grasslands (Owens and Myres 1973, Hartley 1994). Species-specific studies have also demonstrated how grassland loss has

had a detrimental impact; Ferruginous Hawks in southwestern Alberta declined with decreased grassland coverage and increased cultivation (Schmutz 1987). Regions experiencing the most severe declines in Loggerhead Shrike numbers between 1946 and 1986 had a corresponding 39% decline in the area of native pasture (Telfer 1992). Small wetlands in complexes, those that are often drained, are known to support a greater number of species than larger, more isolated marshes (Brown and Dinsmore 1986). Encroachment of woody vegetation can have detrimental effects for grassland bird species and beneficial effects for woodland species. For example, abundances of Baird's Sparrows decline rapidly as shrub cover exceeds 20% (Dale 1983, Madden 1996), while Red-tailed Hawks have been able to expand their range southward (Houston and Bechard 1983).

Table 7. Estimated historic and current areas (km^2) native prairie in the Canadian Prairie provinces. The percent of native prairie remaining is shown in brackets. (adapted from AEP 1997b, Alberta Prairie Conservation Forum 2000, Gauthier et al. 2001, Hammermeister et al. 2001, J. Greenall, Manitoba Conservation, *pers. comm*., R. Bjorge, Alberta Sustainable Resource Development, *pers. comm.*)

Prairie Type	**Alberta**		**Saskatchewan**		**Manitoba**	
	Historic	**Current**	**Historic**	**Current**	**Historic**	**Current**
Tall-grass	-	-	-	-	6000	<6 (<1%)
Mixed-grass	82 020	37 806 (46%)	154 255	49 120 (32%)	-	-
Moist	*34 112*	*12 039 (35%)*	*67 833*	*16 280 (24%)*	-	-
Dry	*47 908*	*25 767 (54%)*	*86 422*	*32 840 (38%)*	-	-
Fescue	14 928	4 361 (29%)	not available	not available	-	-
Aspen Parkland	57 815	7 053 (12%)	81 693	22 873 (28%)	63 622	15 952 (25%)
Cypress Hills	not available	not available	5020	3886 (71%)	-	-
Total	**154 763**	**49 220 (32%)**	**235 948**	**71 993 (30%)**	**69 622**	**15 958 (23%)**

4.2 Habitat Degradation

Though native grassland, woodland, or wetland habitat may be present on the landscape, its condition could be degraded such that the habitat sustains fewer or different landbird species than under historical conditions. Habitat degradation could result from factors such as poor management, disruption of natural disturbance regimes, and introduction of non-native species, which ultimately change vegetation structure or composition, food availability, or fragmentation levels.

Bird species diversity is positively correlated with structural vegetation characteristics such as foliage height diversity (Wilson 1974), and grassland birds select habitat based on vegetation structure more so than plant species composition (Rotenberry and Wiens 1980, Dale 1983, Madden 1996, Davis and Duncan 1999). At the landscape level, temporal and spatial variation in habitat structure produced by native or tame pastures interspersed among croplands or other land uses may vary considerably from the mosaic of habitat structure historically maintained by bison grazing or wildfires (Owens and Myers 1973). Vegetation structure may also vary from historical conditions at the site level. For example, over-utilization of grasslands may alter such vegetation parameters as percent cover, percent bare ground, litter depth, grass height, or foliage density (e.g., Bai et al. 2001). Similarly, selective logging, riparian flooding, or livestock trampling can alter the structure of woodlands, thus altering landbird abundance and diversity by changing the age structure, abundance of snags and cavities, understory development, or width of wetland vegetation zones.

Numerous other human activities can change native vegetation composition and thus landbird habitat quality (e.g., drawdown of wetlands to provide water for irrigation or oil drilling activities, application of chemicals adjacent to wetlands or other watercourses, introduction of nitrogen, phosphorous, and pathogen-rich manure). Non-native species, such as crested wheatgrass, smooth brome, leafy spurge, and purple loosestrife, can spread into native habitats (e.g., through erosion control along newly-constructed roads, on farm machinery, as ornamental plantings) and are an important factor in habitat degradation (Rich et al. 2003). The resulting vegetation in many human-influenced landscapes has a less rich and less diverse botanical fauna than native prairie (Christian 1996), which may lead to a corresponding decrease in the richness and diversity of some grassland bird communities (Sutter and Brigham 1998). Vegetation composition also changes when land uses permit native species to spread into new areas in which they did not historically occur: grasslands invaded by woody species such as aspen typically contain more bird species than those without trees (Arnold and Higgins 1986). These birds tend to be edge or generalist species with ample habitat available elsewhere (e.g., American Robin, Song Sparrow, Gray Catbird, Common Grackle). The presence of trees often reduces the habitat quality and increases predation risk for grassland species such as Burrowing Owl, Short-eared Owl, Sprague's Pipit, and Baird's Sparrow (Clayton and Schmutz 1999).

Habitat fragmentation is another source of degradation and involves the separation of large, contiguous patches of native habitat into smaller patches as a result of development. Remaining patches of native habitat can be degraded if they are too small, too isolated, or too influenced by edge effects (e.g., increased levels of nest predation or brood parasitism by Brown-headed Cowbirds along the edge) to maintain viable landbird populations or productivity. Relatively

little information is published on the effects of fragmentation on grassland birds in the northern Great Plains (Peterjohn and Sauer 1999, Johnson and Igl 2001, Davis 2003), preventing definitive conclusions about the impacts of grassland fragmentation although research is ongoing. Davis (2003) found that Sprague's Pipit relative abundance and productivity increased with increasing patch size, and Chestnut-collared Longspur and Baird's Sparrow relative abundances were also influenced by patch size and shape. However, relative abundances and the frequency and intensity of nest parasitism of other species such as Clay-colored Sparrow and Savannah Sparrow were not influenced by patch size. Helzer and Jelinski (1999) concluded that species richness is maximized when grassland patches are shaped to provide abundant interior areas (low perimeter-area ratio), and some small grassland species (e.g., Grasshopper Sparrow, Bobolink) prefer habitat patches much larger than their average territory size (reviewed in Johnson 2001). Composition of the landscape (i.e., quantity and distribution of native habitat, cropland, gravel pits, residential developments, etc.) may also be important for larger species such as Northern Harrier, Swainson's Hawk, Ferruginous Hawk, Burrowing Owl, and Short-eared Owl (e.g., Schmutz 1984).

Application of chemicals that change food availability in a given habitat (e.g., herbicides, pesticides) could render that habitat less suitable for some landbirds (e.g., George et al. 1995). High levels of human disturbances may also degrade habitat for landbirds. Finally, although most landbirds do not explicitly use waterbodies, other plant or animal species upon which landbirds rely may be sensitive to changes in water quality in wetlands or riparian woodlands. Factors affecting changes in water quality include siltation, introduction of pathogens or toxins, change in temperature, and eutrophication.

Additionally, climate change may substantially alter habitats or exacerbate the effects of resource sectors on landbirds. Ramifications of climate change within the prairie landscape may include an increase in the mean temperature and length of the growing season, changes in precipitation patterns and amounts, increases in frequency of extreme weather events or severe insect infestations, changes in species composition of native and agricultural ecosystems, and changes in timing of spring and fall bird migration (IISD 2001). The impacts of climate change on landbird populations and habitats, however, have not been explicitly modeled.

4.3 Direct Mortality Threats

Although most land-use effects on avian demography are the outcome of habitat loss and degradation, some human-caused threats to landbirds are not directly associated with habitat change. For example, chemical applications to cropland can increase mortality through non-target poisonings or can decrease reproductive success (e.g., DDT, carbofuran; McEwen et al. 1972, Fox et al. 1989, Yosef and Deyrup 1998). Grazing, haying, crop seeding, petroleum exploration, recreational activities, or other human disturbances on the landscape, especially during the breeding season, may also decrease reproductive success of landbirds through physical destruction of nests or disturbance-induced nest abandonment (e.g., Schmutz 1987, Bollinger et al. 1990, Jensen et al. 1990, Dale et al.1997). Introduced animal species (e.g., dogs, cats, European Starlings, House Sparrows) may transmit disease, prey on adult landbirds or their nests, and compete for food or preferred breeding habitat. For example, rural free-roaming cats in the more heavily-populated state of Wisconsin kill an estimated 39 million birds a year

(Coleman and Temple 1995). Some native mammal species such as striped skunks, raccoons, or red foxes may increase in association with human populations, resulting in elevated nest predation rates (Houston and Schmutz 1999). Urban development can be directly detrimental to landbirds if they collide with buildings, transmission towers, power lines, aircraft, vehicles, etc. (Avery et al. 1978, Houston and Schmutz 1995). Although wind power generation is generally considered to have fewer environmental effects than electric generation via fossil fuel combustion, turbine towers can represent a collision hazard for birds, and raptors perching on towers may be struck when the turbine starts spinning. Finally, as popular game birds, Greater Sage-Grouse (no longer hunted in Canada) and Sharp-tailed Grouse have traditionally experienced mortality due to legal hunting (Braun et al. 1994, Johnson and Braun 1999). Many raptor species, on the other hand, have historically been viewed as vermin and thus were illegally shot (Houston and Bechard 1984, MacWhirter and Bildstein 1996), although attitudes have generally shifted.

5.0 POPULATION OBJECTIVES FOR PRIORITY LANDBIRDS

To successfully address the threats facing landbirds and their habitats in BCR11, we must first describe the desired endpoint or conditions we wish to achieve. Credible, scientifically-defensible population and habitat objectives provide the direction for how management prescriptions and conservation activities operate on the landscape and provide a measure against which to gauge progress and effectiveness of our actions. Although habitat objectives are sometimes easier than population objectives to establish and evaluate for certain species (e.g., easier to assess habitat quantity through remote sensing at landscape level than to survey population numbers range-wide; Twedt and Loesch 2000), habitat quantity is not necessarily correlated with habitat quality, and the quality may be affected by factors extrinsic to the habitat patch itself (e.g., change in land-use of surrounding habitat; Donovan et al. 2000). Furthermore, habitat may not be the limiting factor or threat to a species' persistence; other factors could include direct mortality threats. This plan outlines population objectives as a first step with the assumption that if numerical population objectives are achieved then sufficient habitat has also likely been achieved. Future iterations will also include habitat objectives.

Several factors must be considered when setting population objectives for any species including:

- type and availability of population data (e.g., current and baseline data on population size estimates, trends, etc.);
- utility of existing monitoring programs;
- knowledge of habitat requirements (e.g., specialize in riparian habitats);
- knowledge of breeding biology (e.g., only breed in BCR in wet years); and
- distribution of known habitats (e.g., widespread versus localized).

Partners in Flight Working Groups must set population objectives with considerably less data and general knowledge about the above factors than those setting objectives for waterfowl populations under the NAWMP planning process (Pashley and Warhurst 2000). The types of population data currently available for priority landbird species in BCR11 are outlined in Table 8. While adequate distributional data exists for more than 80% of the species, population

estimates are currently available for fewer than 20% of the priority species. Abundance and trend data are available for several species but inadequate or lacking for many more.

The target of the PIF North American Landbird Conservation Plan is "to maintain current populations or to return declining species' numbers to at least their level in the late 1960's" (Rich et al. 2003). This particular time period was selected to ensure the greatest likelihood of baseline data (i.e., after the onset of the Breeding Bird Survey) and to accept a degree of technological and agricultural development (i.e., after the end of the DDT era). Species from across the continent were assigned to one of four categories based on the degree of population change they had experienced over the past 30 years. The population objective categories were as follows:

- ***increase population by 100% over next 30 years*** – for species which have undergone severe declines of 50% or more (i.e., Population Trend scores of 5).
- ***increase population by 50% over next 30 years*** – for species which have undergone moderate declines of 15-50% (i.e., Population Trend scores of 4).
- ***increase population by 10% over next 30 years*** – for species with unknown or imprecise trends (i.e., Population Trend scores of 3). These species may be declining without our knowledge, so an increase of 10% will ensure that they do not decline further while we improve our knowledge of their population status.
- ***maintain current population over next 30 years*** – for species with stable or increasing trends (i.e., Population Trend scores of 1 or 2).

Numerical population targets were then obtained by combining these objectives with an estimate of the current population size, usually calculated using BBS data from 1990 to 2000 (see description in Appendix B, Rich et al. 2003). These numeric population estimates, however, are first-time estimates subject to further analyses and refinement.

Prairie PIF used a similar methodology as above to establish population objectives for priority landbirds in the Canadian portion of BCR11 with three modifications. First, targets are based on the average relative abundance of a given species between 1990 and 2000, rather than an absolute population size estimate. The average relative abundance will be calculated from BBS data and supplemented or replaced with other surveys where BBS is not adequate and for wintering species. Numeric population size estimates such as those employed in the PIF North American Landbird Conservation Plan were not used in this plan because additional analyses and refinement were deemed necessary prior to application in BCR11. Other knowledge and information deficiencies outlined in the following section also currently limit our ability to confidently set discrete numerical population targets. The second modification was to defer to the existing objectives listed in recovery plans or strategies for four priority species listed nationally by COSEWIC in order to maintain consistency among conservation initiatives (Greater Sage-Grouse, Harris et al. 2001; Ferruginous Hawk, Schmutz et al. 1994; Burrowing Owl, Hjertaas et al. 1995; Loggerhead Shrike, Johns et al. 1994; a Sprague's Pipit recovery strategy is currently under development). Finally, when the local Population Trend for BCR11 was unknown, the global Population Trend score was used to set the objective.

Table 8. Type of population data available for priority landbird species in BCR11. ✓ = data available, ✗ = data not available, ? indicates uncertainty (availability of data needs investigation)

Species	Population Estimate	# per BBS Route (including GBM routes)	Trend (from BBS and/or GBM unless otherwise noted)	Distribution
Greater Sage-Grouse	✓	✓ - lek surveys	✓ - lek surveys	✓
Sharp-tailed Grouse	✗	✗ ? – CBC	✓ - provincial lek surveys, CBC	✓
Northern Harrier	✗	✓?	✓?	✓
Swainson's Hawk	✗ ?	✓?	✗ ? [3]	✓
Ferruginous Hawk	✓	✗ - directed search?	✗ [3]	✓
Golden Eagle	✗	✗ [3]	✓ - migration monitoring	✗
Prairie Falcon	✓?	✗ - directed search?	✗ [3]	✓
Black-billed Cuckoo	✗	✗	✓? [1]	✓?
Snowy Owl	✗	✗ ? – CBC [3]	✗ ? – CBC [3]	✓
Burrowing Owl	✓?	✗ - directed search?	✗ [2,3]	✓
Long-eared Owl	✗	✗ [6]	✗ [6]	✗
Short-eared Owl	✗	✗	✗	✗
Loggerhead Shrike	✓?	✓	✓ [5]	✓
Sedge Wren	✗	✓?	✗ ? [4]	✓
Sprague's Pipit	✗	✓	✓	✓
Bohemian Waxwing	✗	✓ - CBC	✓ - CBC	✓
Clay-colored Sparrow	✗	✓	✓	✓
Lark Bunting	✗	✓	✓	✓
Grasshopper Sparrow	✗	✓	✓	✓
Baird's Sparrow	✗	✓	✓	✓
Le Conte's Sparrow	✗	✓?	✗ ? [4]	✓
Nelson's Sharp-tailed Sparrow	✗	✗ [4]	✗ [4]	✓
McCown's Longspur	✗	✓	✓	✓
Chestnut-collared Longspur	✗	✓	✓	✓
Bobolink	✗	✓	✓	✓

[1] Aspects of its behaviour may exclude this species from adequate coverage by BBS / [2] Operation Burrowing Owl and Operation Grassland Community landowner surveys may be useful. / [3] A dedicated, repeatable survey must be designed and implemented to adequately address this data deficiency. Such a survey may be species-specific or monitor several species (e.g., raptors). / [4] Implementation of a Marsh Monitoring Program may be useful. / [5] Roadside driving routes surveyed every five years coupled with an expanded area-directed search in Alberta could prove useful. / [6] Expansion of the Nocturnal Owl Survey may be useful.

The population objectives for priority landbird species in BCR11 are shown in Table 9. Overall, the objectives are to increase populations by 100% for five priority species, by 50% for nine priority species, and by 10% for two priority species. Five additional priority species were placed into the 'maintain current populations' category, while the objectives for the final four species deferred to their recovery plans or strategies. The population objectives outlined in this plan should be revisited every five years as knowledge gaps are filled and the plan is updated. If warranted by further investigations and discussions with US counterparts, objectives may be set for the entire BCR rather than just the Canadian portion, particularly for species with sparse distributions.

To help understand how conservation activities should be targeted in order to meet a given population objective, the suspected limiting factors for each priority species were identified (Table 10). Habitat quantity and/or habitat quality were described as the likely limiting factors for most species, although specific habitat quantity, quality, and configuration requirements are rarely known. This emphasizes the need to acquire the information necessary to incorporate habitat objectives into future iterations of this plan. Such habitat objectives will not replace population objectives, but rather will work in concert with them to help fine tune conservation activities. One approach to setting these habitat targets would be to delineate alternative models that manipulate habitat quantity, quality, and configuration on the regional landscape based on the estimated density or relative abundance of a given species in a given habitat. Habitat targets can then be selected from among those scenarios that meet the population objectives (Donovon et al. 2000). Multi-species models may be necessary to maximize overlap and minimize conflict among species requirements when setting habitat targets for the various grassland species.

Table 9. Population objectives for the priority landbird species in BCR11. Prairie PIF population objectives were linked to national recovery plan population objectives for Greater Sage-Grouse, Ferruginous Hawk, Burrowing Owl, and Loggerhead Shrike (a recovery plan for Sprague's Pipit is under development).

Species	Objective
Greater Sage-Grouse	Stable or increasing population trend with at least 365 and 500 males in AB and SK, respectively, during the spring; and maintain active lek numbers of at least 16 and 30 individuals in AB and SK, respectively
Sharp-tailed Grouse	Increase 1990-2000 average relative abundance by 50% over the next 30 years
Northern Harrier	Increase 1990-2000 average relative abundance by 50% over the next 30 years
Swainson's Hawk	Increase 1990-2000 average relative abundance by 50% over the next 30 years
Ferruginous Hawk	Maintain present range and distribution with a minimum of 2500 pairs and a stable or increasing population trend
Golden Eagle	Increase 1990-2000 average relative abundance by 50% over the next 30 years
Prairie Falcon	Maintain current population
Black-billed Cuckoo	Increase 1990-2000 average relative abundance by 50% over the next 30 years
Snowy Owl	Increase 1990-2000 average relative abundance by 10% over the next 30 years
Burrowing Owl	Stop population decline by 2007 and increase population sizes to viable numbers
Long-eared Owl	Increase 1990-2000 average relative abundance by 100% over the next 30 years
Short-eared Owl	Increase 1990-2000 average relative abundance by 100% over the next 30 years
Loggerhead Shrike	Stop the decline in current population trends
Sedge Wren	Maintain current population
Sprague's Pipit	Increase 1990-2000 average relative abundance by 100% over the next 30 years
Bohemian Waxwing	Increase 1990-2000 average relative abundance by 50% over the next 30 years
Clay-colored Sparrow	Maintain current population
Lark Bunting	Increase 1990-2000 average relative abundance by 100% over the next 30 years
Grasshopper Sparrow	Increase 1990-2000 average relative abundance by 100% over the next 30 years
Baird's Sparrow	Increase 1990-2000 average relative abundance by 50% over the next 30 years
Le Conte's Sparrow	Maintain current population
Nelson's Sharp-tailed Sparrow	Maintain current population
McCown's Longspur	Increase 1990-2000 average relative abundance by 50% over the next 30 years
Chestnut-collared Longspur	Increase 1990-2000 average relative abundance by 10% over the next 30 years
Bobolink	Increase 1990-2000 average relative abundance by 50% over the next 30 years

Table 10. Limiting factors for priority landbird species in BCR11. ✓ indicates the factor is thought be limiting. ? indicates uncertainty about the impacts of that factor, though it is suspected to be limiting.

Species	Habitat Quantity	Habitat Quality	Other
Greater Sage-Grouse		✓ - habitat condition	
Sharp-tailed Grouse		✓ - food availability, habitat condition	
Northern Harrier		✓ - food availability	
Swainson's Hawk		✓ - food availability	
Ferruginous Hawk	✓	✓ - food availability	✓ - nest disturbance , area sensitive
Golden Eagle		✓ - food availability	
Prairie Falcon		✓ - food availability	
Black-billed Cuckoo	✓?	✓ - food availability	
Snowy Owl		✓ - food availability	
Burrowing Owl		✓ - burrow and food availability	
Long-eared Owl		✓ - food availability	
Short-eared Owl	✓	✓ - food availability	
Loggerhead Shrike		✓ - habitat condition	
Sedge Wren	✓		
Sprague's Pipit	✓	✓ - habitat condition	✓ - area sensitive, productivity impacts
Bohemian Waxwing		✓ - food availability	
Clay-colored Sparrow			
Lark Bunting	✓		
Grasshopper Sparrow	✓		
Baird's Sparrow	✓	✓ - habitat condition	✓ - area-sensitive
Le Conte's Sparrow	✓		
Nelson's Sharp-tailed Sparrow	✓		
McCown's Longspur	✓?		
Chestnut-collared Longspur	✓	✓ - habitat condition	✓ - area sensitive
Bobolink	✓?	✓ - habitat condition	✓ - hay cutting

6.0 KNOWLEDGE GAPS AND INFORMATION NEEDS

Although we have some good information about priority landbird species, their habitats, and their responses to human influences, many aspects remain to be investigated. The extent of information available varies by species: much more is known about habitat preferences for Greater Sage-Grouse and Burrowing Owl than for Nelson's Sharp-tailed Sparrow. Lack of complete knowledge, however, is not an excuse for lack of action. Rather, we need to proceed with activities such as improved monitoring, additional research, and habitat protection, and adjust our assessment of priority species and conservation actions as better information becomes available. This section and its summary in Table 11 will help guide those interested and able to fill knowledge gaps, and will help ensure available resources are used most efficiently by identifying and prioritizing information needs. To assist integration with conservation planning efforts for other bird groups, information needs are presented in three broad categories: populations, habitats, and other research. A priority level (Low, Moderate, or High) was assigned to each information need by the Praire PIF Working Group and is presented in parentheses.

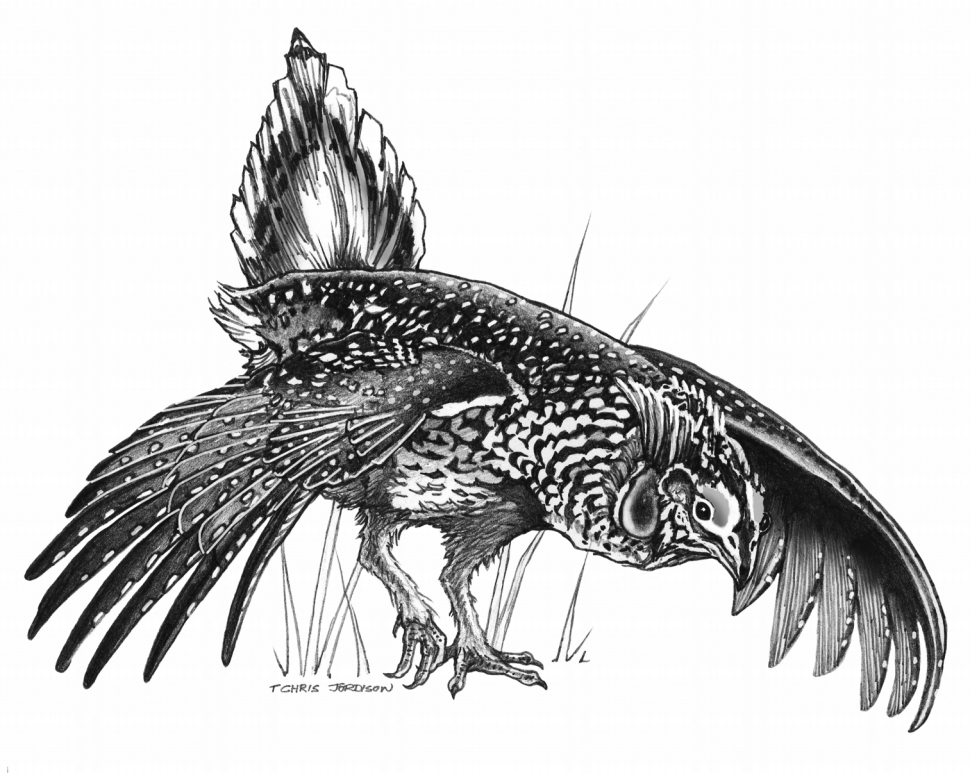


Table 11. Knowledge gaps and information needs for populations and habitats in BCR11.

Category	Knowledge Gap/Information Need	Priority
Populations – Inventory & Monitoring	• additional suite- or species-specific monitoring where existing survey coverage is inadequate	High
	• accurate population trends and estimates	High
	• improved monitoring coverage for grassland birds	Mod-high
	• effective data management and dissemination	Mod
	• accurate species distributions	Low
Populations – Demographics & Habitat Requirements	• factors that influence productivity and survival throughout the annual cycle	High
	• solutions to problems resulting from direct disturbances and infrastructure development	High
	• landscape-scale habitat associations	Mod-high
	• species-specific minimum area requirements	Mod
	• basic ecological and natural history information for some species	Mod
	• factors influencing large-scale movements in nomadic or irruptive species	Mod
	• linkages between breeding and wintering areas, migration routes and dispersal scale	Mod
	• impacts of interspecific competition from non-native species or nest parasitism from over-abundant species	Low
	• importance of peripheral populations	Low
Habitats – Inventory & Monitoring	• quality of native habitats	High
	• standardized habitat information for the prairies	Mod-high
Habitats – Management & Species Responses	• responses to habitat fragmentation	High
	• Good Management Practices for various land-uses	High
	• spatially-explicit habitat-based planning models	Mod
Other Research – Ecosystem Change	• potential impacts of climate change	Mod
	• other changes due to human influences	Mod
Other Research – Agricultural Policy	• policies affecting landbird habitat	High
Other Research – Socioeconomic Influences	• impacts of trends in land tenure, land-user attitudes, and market conditions	Mod
	• value of landbirds	Low-mod

6.1 Populations

6.1.i Inventory and Monitoring

The Canadian Landbird Monitoring Strategy, prepared by PIF-Canada (Downes et al. 2000), provides a framework and action plan for long-term monitoring of Canadian landbirds. This comprehensive document describes the status and limitations of existing multi-species, range-wide surveys, provides recommendations for improvement, and outlines species/habitats in need of enhanced monitoring. Accordingly, the following discussion focuses to the Prairie Pothole Region of Canada and the landbird species therein, presenting each knowledge gap or information need followed by a priority ranking and short explanation.

- additional suite- or species-specific monitoring where existing survey coverage is inadequate (HIGH)
  - woodpeckers and nuthatches found primarily in aspen parkland habitat have often completed their courtship and nesting activities before the start of the earliest BBS routes in late May, while riparian habitats such as those used by the Black-billed Cuckoo or Red-headed Woodpecker are not covered well by the BBS. The effectiveness of the Marsh Monitoring Program for monitoring landbirds utilizing wetland habitats is unknown. Relatively little is known about the abundance and population trends of nocturnal or secretive species such as Long and Short-eared Owls, though the Guidelines for Nocturnal Owl Monitoring (Takats et al. 2001) that are currently being adopted across Canada may help supplement the monitoring deficiencies for owls. The Canadian Landbird Monitoring Strategy provides more details on additional surveys that may be required (Downes et al. 2000). Optimally, new surveys should take a multi-species approach, investigate both population change and causal factors, and account for detectability, sampling times, and unbiased population estimates (Rich et al. 2003, Ruth et al. 2003).

- accurate population trends and estimates (HIGH)
  - without accurate local population trends and estimates (e.g., Table 8), it is difficult to assign scores in the PIF species assessment/prioritization process and to set population objectives. Existing local and regional data (e.g., CBC data) must be better utilized and fully analyzed to clarify our knowledge of population trends. The accuracy of trends generated by surveys such as the CBC and BBS must also be assessed (Ruth et al. 2003; e.g., is there 80% power to detect a 2% annual decline after 25 years of monitoring?), as it likely varies by species depending on the species' abundance, irruptiveness, behavioural habits, and habitat preferences. Improvements to monitoring deficiencies outlined above may also help generate trends for species not adequately covered otherwise. Accurate population estimates should be developed preferably using two or more independent methods, but may be troublesome for species with nomadic or irruptive distributions within BCR11 (e.g., Bohemian Waxwing, Lark Bunting) compared to species with relatively small populations or concentrated distributions (e.g., Greater Sage-Grouse). The draft numeric population estimates found in the PIF North American Landbird Conservation Plan (Rich et al. 2003) should be refined with additional information such as detectability distance and more habitat-specific numeric estimates before they are stepped down to the BCR level.
- improved monitoring coverage for grassland birds (MODERATE-HIGH)

- the PIF North American Landbird Conservation Plan found that the species breeding within the prairie ecosystem and most in need of monitoring are those that use grassland habitats (Rich et al. 2003). Although the Breeding Bird Survey provides reasonable coverage and sample size for monitoring many grassland and aspen parkland birds in areas with easy access for volunteers (see www.mp2-pwrc.usgs.gov/bbs/results/routemaps/index.html for route location maps), BBS coverage is less adequate in grassland areas located far from urban centres. The Grassland Bird Monitoring Project increased the number of routes on which a given species was detected, the number of individual birds of each species detected, and the proportion of routes suitable for trend calculations (Dale et al. 2002). Hence, the adoption of the GBM program as a regular survey could help fill this need.

- effective data management and distribution (MODERATE)
  - to maximize data contributions, access, and utility to the widest array of potential users (i.e., scientists, managers, policy makers, public), data collection protocols need to be standardized and compatible among jurisdictions (e.g., Schmutz et al. 1994). In addition, a central electronic information network, preferably web-based, should be created and maintained to house available data sets, applications, models, and other information products (e.g., publications). Such a network requires technical support staff and should be user-friendly, allowing direct links between scientific information, management questions, and rigorous decision-making (Ruth et al. 2003).

- accurate species distributions (LOW)
  - species distributions must be well-established to monitor range contractions or expansions (e.g., Johns et al. 1994). Although most have been generally delineated, additional distributional data can be obtained from almost any geo-referenced survey or monitoring program. Checklist and atlas programs are also particularly valuable, as they receive data from a broad volunteer base.

6.1.ii Demographics and Habitat Requirements

- factors influencing productivity and survival throughout the annual cycle (HIGH)
  productivity and survival information is important when determining the causes of population declines and how to target conservation activities (Donovan and Thompson 2001, Rich et al. 2003, Ruth et al. 2003). The Canadian Landbird Monitoring Strategy (Downes et al. 2000) suggested that the Monitoring Avian Productivity and Survivorship (MAPS) program from the United States may not be feasible to adopt on a large scale, but it could be focussed on a small number of species or in areas recognized as priorities. Project NestWatch has been recently introduced by Bird Studies Canada to coordinate and supplement existing Nest Record Scheme programs. Standardized manuals, brochures, and data entry are now available online to increase the amount and quality of data collected through higher participation and more return visits to nests.

- solutions to problems resulting from direct disturbances and infrastructure development

(HIGH)

- the magnitude of infrastructure and direct human disturbance impacts on reproduction, survival, and energetics of landbirds in BCR11 has not been evaluated. Mitigative measures to these problems also need to be developed and evaluated (Avian Powerline Interaction Committee 1996, Stevens and Clark 1998, Rich et al. 2003).

- landscape-scale habitat associations (MODERATE-HIGH)
  - microhabitat associations are well-established for many species, but landscape-scale habitat associations are not (Rich et al. 2003). Stops on BBS routes were recently geo-referenced to allow linkage of species abundance or trend data with habitat data. Recent projects in southern Alberta and Saskatchewan have been designed specifically to examine broad-scale habitat associations using point-count data (T. Wellicome, Canadian Wildlife Service, *pers. comm.*)

- basic ecological and natural history information for certain species (MODERATE)
  - basic and/or recent natural history information is lacking for certain species (Donovan et al. 2002, Ruth et al. 2003) such as the Black-billed Cuckoo (e.g., Bent 1940, Spencer 1943) and Nelson's Sharp-tailed Sparrow (e.g., Murray 1969). Breeding phenology, natal philopatry, breeding site fidelity, diet selection, and food availability could be important when making management decisions that may affect landbird reproductive success, survival, or preferred food items (e.g., use of chemicals to control weeds or insects). Microhabitat associations are needed for landbird species using wetlands: few studies have directly examined the influence of wetland characteristics on landbird species occurring therein, and those that have are from the US (Fairbaim and Dinsmore 2001a, b).

- factors influencing large-scale movements in nomadic or irruptive species (MODERATE)
  - better understanding of the factors triggering or influencing movements in nomadic and irruptive species (e.g., Snowy Owl, Long-eared Owl, Short-eared Owl, Lark Bunting) could help determine the best ways to monitor these species and where the effects of human land uses may be the greatest.

- linkages between breeding and wintering areas, migration routes, and dispersal scale (MODERATE)
  - specific wintering areas for most landbird species breeding in BCR11 are not known or are only suspected based on a few band returns (e.g., Loggerhead Shrike – Johns et al. 1994, Yosef 1996). Knowledge of important areas used throughout the annual cycle of a species can help us understand potential threats, causes of declines, and bottlenecks that may influence population trends (Ruth et al. 2003). Similarly, knowledge of the scale and frequency of dispersal is necessary to protect source populations and define biologically meaningful population units (Donovan et al. 2002). Although influencing conservation activities outside of Canada may be difficult, we can support such activities in critical areas.

- species-specific minimum-area requirements (MODERATE)
  - minimum-area requirements for most species are largely unknown and may vary

regionally (Johnson and Igl 2001). This information could be important when designing effective protected areas or implementing habitat stewardship programs in various areas.

- impacts of interspecific competition from non-native species or nest parasitism from over-abundant species (LOW)
  - the extent to which non-native competitors or parasitic nesters are responsible for limiting or regulating native populations (Rich et al. 2003) is unknown. Similarly, knowledge of locations with particular concentrations of these species within the BCR is limited. Demographic impacts on grassland birds from these sources are generally suspected to be low relative to forested landscapes.

- importance of peripheral populations (LOW)
  - studies have shown that peripheral populations often differ genetically and morphologically from core populations (Lesica and Allendorf 1995). When extinctions are governed primarily by extrinsic instead of demographic factors, then conservation of such peripheral populations may be important to the species' persistence (Araujo and Williams 2001). The PIF assessment process currently ranks Area Importance for peripheral species like the Sage Thrasher as low because this species is at the northern edge of its range in BCR11, with only 2% of the North American breeding range in Canada (Environment Canada 2001). If, however, remaining individuals of Canadian populations carry unique genes enabling them to survive and reproduce in changing conditions, then conservation of such populations may be more important.

6.2 Habitats

6.2.i Inventory and Monitoring

Given that habitat loss and degradation are thought to be the leading causes of population declines in landbirds, conservation efforts and management strategies are often focused on habitats and landscapes to benefit the greatest number of species (Ruth et al. 2003). Accordingly, habitat inventories and monitoring are crucial for measuring and describing changes in the state of the landbase and habitat-based objectives that direct conservation activities (Rich et al. 2003, Ruth et al. 2003).

- quality of native habitats (HIGH)
  - information on habitat quality and its links to direct measures of survival (e.g., adult survival, juvenile survival) and reproduction (e.g., nest success, number of nesting attempts, number fledged; Donovan and Thompson 2001) is generally lacking. Furthermore, habitat structure and composition preferences vary from species to species. The use of surrogate measures of habitat quality (e.g., presence or abundance of alien species, species richness, livestock stocking rates) and conditions under which they are valid predictors of habitat quality need to be investigated further (Beutel et al. 1999, Donovan et al. 2002).

- standardized habitat information for the prairies (MODERATE-HIGH)
  - provincial-level habitat coverages exist for each of the three Prairie Provinces (i.e., Manitoba: Land Use/Land Cover Mapping of Agro-Manitoba, 1994; Saskatchewan: South Digital Land Cover, 1994; Alberta: Native Prairie and Parkland Vegetation Inventories). However, data sources, land-cover classes, and accuracy vary from one province to the next and need to be ground-truthed. Consistent, accessible coverages that identify land-cover classes applicable to birds and that incorporate regular updates would help target conservation activities and integrate efforts across jurisdictional boundaries and species groups (Ruth et al. 2003). As wetland habitat is critical to the other bird species groups, opportunities should be investigated to collaborate with these groups in wetland data acquisition and monitoring (e.g., Habitat Monitoring Program under Prairie Habitat Joint Venture). Other data sources, such as Agricultural Census and municipal data, may be used to acquire additional habitat information.

6.2.ii Habitat Management and Species Responses

- responses to habitat fragmentation (HIGH)
  - fragmentation effects (i.e., patch-size, edge, isolation) on landbirds have been studied extensively in forested landscapes while limited results from grasslands vary regionally and have generally originated from tall-grass and eastern regions (Johnson and Igl 2001, but see Davis 2003). Similarly, research is required into how densities and reproductive success of priority species vary in response to fragmentation of riparian and floodplain forests, wet meadows, and other wetlands (Donovan et al. 2002).

- Good Management Practices for various land-use sectors (HIGH)

- the identification of land-use practices that promote the integration of habitat conservation with economic sustainability is integral to landbird conservation activities (Donovan et al. 2002). For example, agroforestry may be neutral from a wildlife standpoint and provide additional income or products when practiced on lands where the wildlife community has already been altered, but may be detrimental to landbirds if practiced as a monoculture or in areas of considerable native habitat. The effects of Good Management Practices on species' abundances, productivity, and survival must be evaluated to ensure the management practices are effective and to help tailor recommendations to specific circumstances (Rich et al. 2003). Similarly, habitat treatments implemented for other bird species groups must also be evaluated with respect to the impacts or benefits to landbirds.

- spatially-explicit habitat-based planning models (MODERATE)
  - spatially-explicit habitat-based models should be developed for a variety of species or species suites (Raphael et al. 1998), and are indeed underway for some areas within the BCR (e.g., CWS and SWA Decision Support systems/matrices). Information required for these models could include species abundance/diversity, land-cover data, and species thresholds with respect to various disturbances or land uses (e.g., abundance of species "X" decreases by 50% when 3 wellsites per 100 ha are present or when 20% of the landscape is in row crops). Such models could be overlain with comparable models for other bird species groups to further delineate areas of high conservation priority versus areas that can be developed with less detriment to the bird community. Assumptions from these models will need to be rigorously tested.

6.3 Other Research

6.3.i Ecosystem Change

- potential impacts of climate change (MODERATE)
  - the effects of climate change on landbird productivity, population trends, distribution, etc., and on their habitats are largely unknown (Rich et al. 2003; but see Price 1995 and O'Connor et al. 1999) and need to be modeled. Specifically, research must look at how species will be affected if the grassland/parkland boundary moves further north, if shallow wetlands are desiccated, if vegetative species composition changes, if agriculture practices change in response to climate change, etc.

- other changes due to human influences (MODERATE)
  - humans are responsible for ecosystem changes other than global warming, and the response of landbirds to factors such as the encroachment of aspen parkland (due to fire suppression), invasion of alien species, and changes in wetland and stream water quality/quantity should be examined (e.g., Donovan et al. 2002).

6.3.ii Land-Use Policy

- policies affecting landbird habitat (HIGH)
  - the suite of municipal, provincial, and federal land-use policies that affect native grassland habitats needs to be examined (Goosen et al. 1993). A comparable analysis of agricultural policies affecting wetlands has been conducted for each prairie province (CSALE 2001, Kwasniak 2001, Tyrchniewicz 2001). In addition, the effectiveness of conservation initiatives relative to policy changes needs to be evaluated.

6.3.iii Socioeconomic Influences

- impacts of trends in land tenure, land-user attitudes, and market conditions (MODERATE)
  - the societal climate and land-tenure patterns have changed over the past decades. For example, many rural residents are selling or renting their land and moving to more urban centres, while many First Nations groups are gaining control over portions of their traditional territories. Additionally, increasing land prices near urban centres make it economically advantageous to convert grassland habitat to residential land. Attitudes toward conservation responsibilities for habitat, and associated landbird resources, should be evaluated under these new and emerging conditions.

- value of landbirds (LOW-MODERATE)
  - the revenues generated by wildlife-related recreational activities have been examined in several studies (e.g., Filion et al. 1994), but many of the environmental services provided by wildlife, specifically landbirds, are more difficult to quantify and not as tangible (e.g., consumption of pest insects, seed dispersal, pollination). The benefits of landbirds, including financial, cultural, and environmental aspects, should be examined to provide a complete understanding of their value to society.

7.0 STRATEGIES FOR IMPLEMENTATION

Joint Ventures created through NAWMP are the primary partnerships charged with implementing biologically-based population and habitat objectives of conservation plans for the various bird groups. While some BCRs overlap several Joint-Venture areas, BCR11 overlaps only two: the Prairie Habitat Joint Venture in Canada and the Prairie Pothole Joint Venture in the United States. Within these Joint Ventures, high priority waterfowl landscapes have been targeted for conservation efforts over the last 15 years. Efforts have been specifically directed at wetlands and surrounding uplands used by waterfowl, and the side benefits to waterbird and shorebird species have likely been considerable. For example, Ducks Unlimited Canada's Prairie Program under NAWMP established dense nesting cover (DNC; now called planted nesting cover or PNC) on cropland in aspen parklands, though the priority landbird species identified in this plan did not necessarily benefit to the same extent as the other bird groups (Dale and McKeating 1996). The knowledge, management expertise, and partnerships developed by the PHJV through the NAWMP experience will facilitate success in the implementation of this landbird conservation plan. Such partnerships will help avoid duplication of efforts and expenditures, encourage designation of new funds for conservation, and maximize the utility of each partner's strengths to further research, monitoring, habitat protection, land management, policy, marketing, or communication. Because previous efforts have focused on priority waterfowl and their habitats, additional partnerships and approaches may need to be fostered to adequately address priority landbird concerns (e.g., more extension programs and agreements to maintain native grassland habitat in good condition).

Implementation of landbird conservation in BCR11 will require a willingness to work across real or perceived boundaries. Bird Conservation Regions encompass areas with biologically-similar attributes for birds and do not recognize national, provincial, or municipal jurisdictions. We should strive to integrate our efforts across such scales. Positive achievements in one portion of a species' range must not be negated by detrimental land-use practices or policies in another. In fact, synergisms will occur when programs applied at one scale are reinforced and supplemented by programs at another scale. For example, adoption of the Grassland Bird Monitoring Program in SK and AB will not only assist determination of population trends for these provinces, but will contribute valuable data to continental trends determined using BBS. Furthermore, implementation through the PHJV framework will provide opportunities for integration of conservation activities across bird groups. Application of a landscape or ecosystem approach should help ensure the conservation of grassland, woodland, and wetland habitats utilized by priority landbird, shorebird, waterbird, and waterfowl species.

Presented below are six broad-scale approaches or strategies to the implementation of this landbird conservation plan. There are a wide variety of available tools that can be incorporated into conservation efforts ranging from the adoption of the Marsh Monitoring Program throughout the prairies and the promotion of conservation easements for habitat stewardship, to the dissemination of communication products identifying priority landbird concerns and the preparation of Burrowing Owl nest boxes by local Scout troops. Decisions regarding the use of specific tools are left to the implementation partners themselves, as each partner must base its participation on the mandate of its agency or organization, the scale at which it operates, and available financial and personnel resources. Even the smallest contribution is valuable and can

help achieve the long-term objectives outlined in this plan. We do, however, recommend that implementation partners convene and prepare an action plan based on the information and strategies presented here. The action plan should outline both short and long-term projects, potential funding opportunities, timeframes for deliverables, and the designated delivery agent.

7.1 Habitat and Land Management

Recommendation 1: ***Maintain intact and ecologically functional native grassland, woodland, and wetland habitats.***

Landbird habitat has been heavily impacted by human land uses occurring in BCR11; habitat loss and degradation are the leading causes of population declines. Accordingly, we must maintain any remaining native grassland, woodland, and wetland habitats. Although prairie riparian areas and woodlands contain the most diverse and rich landbird communities in the BCR (Tubbs 1980, Savoy 1991), most BCR11 priority species require some grassland component (Table 3, Figure 4). Similarly, only about one quarter of the 25 priority landbird species use some component of wetlands (though wetland margins may be used by more species in drier years). Thus preventing the loss or conversion of native grassland habitat is most important from the perspective of priority landbird species. Area-sensitive species will receive greater benefits from the maintenance of intact grassland habitat in large blocks compared to an equal amount in small, isolated blocks. Native grassland, woodland, and wetland habitats must not only be retained, but they must also be maintained in an ecologically functional condition. This does not mean that land-uses cannot occur; in fact, appropriate management and wise stewardship of the habitat resource often occur in concert and provide landowners with an economic reason for conserving grasslands. For example, light to moderate grazing by cattle can increase plant species diversity, promote thick and vigorous vegetation growth, and control build-up of plant material (Smoliak et al. 1990, Bai et al. 2001).

Recommendation 2: ***Restore cultivated or degraded habitat to a condition which will support more priority landbirds.***

Simply maintaining the current quantity of native habitat will not be sufficient to reach the population objectives for landbirds. The quality of degraded habitats must also be improved and some cultivated lands returned to permanent cover, ideally using native seed mixes. Factors contributing to habitat degradation can include inadequate management, disruption of natural disturbance regimes, introduction of non-native species, and application of chemicals that reduce food availability (e.g., seeds, insects, or prey species). For example, chemical applications to remove sagebrush in pastures will decrease the habitat quality for Greater Sage-Grouse. Degradation of habitat resources can lead to changes in vegetation composition, vegetation structure, and erosion, while habitats in good condition typically have higher bird productivity and abundance, and greater resilience to disturbances such as drought. There are, however, some habitats not historically found within the prairie landscape but that are now utilized by landbirds and thus should be maintained. These include Planted Nesting Cover, trees and shrubs in old shelterbelts and abandoned farmyards, and fruit trees in urban centres.

Recommendation 3: ***Develop and evaluate Good Management Practices (GMP) for all land-***

use sectors where such GMPs are not already available. Wherever possible, integrate landbird population and habitat management considerations into existing GMP activities.

Good Management Practices are recommendations designed to enhance habitat quality while trying to balance economic viability. In the context of this plan, this means to maintain or enhance conditions for landbirds. The benefits of many GMPs extend beyond wildlife to economic, sustainable land use, creating a win-win opportunity; however, some GMPs are not economically feasible without financial incentives (e.g., delayed haying results in reduced feed quality). GMPs that address landbird concerns should be developed for each major land-use sector operating within the prairie landscape. Many prairie management and conservation organizations have undertaken the development of such initiatives already; we recommend streamlining and coordinating efforts by incorporating landbird considerations into these existing efforts. Where appropriate GMPs are not currently under development, efforts should begin promptly. These science-based GMPs must be developed in collaboration with stakeholders within an adaptive management framework – if subsequent research and evaluation do not indicate positive influences on landbirds, then the GMPs must be altered and tested again. Key concepts that should be incorporated include the following:

- *minimize alteration and disruption of landbird habitat*. Current land-uses, ranging from cattle grazing on grasslands to timber harvest in woodlands, should maintain the habitat conditions utilized by landbirds. The timing and intensity of disturbance may be altered to produce the desired conditions, with specific management prescriptions depending on factors such as the soil type, precipitation levels, etc. For example, wetland and riparian areas are particularly susceptible to soil compaction during moist conditions in the spring, while native grassland requires sufficient rest after grazing disturbance to allow plants to rebuild roots, energy supplies, and vigour, and to allow adequate native grass seed head production.
- *minimize disruption of landbird breeding activities*, *particularly during incubation and fledging periods.* The impacts of certain disturbances on landbird abundance and productivity are minimized when activities are timed to occur outside the peak nesting period or to provide an interval between disturbances sufficient to allow successful re-nesting and fledging of young. As a general rule, incubation typically lasts 11-16 days while the nestling stage lasts 9-16 days; the majority of grassland birds have fledged one brood by July 15 (Dale et al. 1997, Dickson and Dale 1999).
- *minimize direct mortality of landbirds.* Through considerations of landbird values during the development of new infrastructure and considerations of the impacts of daily activities (e.g., coordinate multiple users of communication towers, minimize factors known to influence window collisions, use of flushing bars on farm tractors), landbird mortalities can be substantially reduced.

7.2 Research and Monitoring

Recommendation 4: ***Pursue research and monitoring activities to fill the knowledge gaps and information needs identified in this plan (Table 11).***

There is much we do not know about landbirds, their demographics and habitat requirements, population trends, and responses to habitat management. Population and habitat research and monitoring programs are required to sustainably and effectively manage landbirds and land uses within BCR11. For example, research into the lethal effects of Carbofuran led to restrictions on the use of granular forms that may be ingested by landbirds. Many other detrimental pesticides are commonly used within landbird habitats, often with limited understanding of the potential impacts on birds, their young, or their food supplies. Investigation of factors that may limit a species' productivity or survival and cause population declines requires knowledge of many aspects of a species' natural history and ecology throughout its annual cycle. Work on habitat-based planning models, such as the landbird Decision Support System being prepared by CWS, is necessary to identify and prioritize areas where conservation efforts can be best directed to maximize benefits for the priority landbird species. These examples of research gaps highlight the need to work at various scales and across disciplines to acquire relevant information and data to address landbird conservation issues.

7.3 Policy

Recommendation 5: ***Review legislation, policies, and programs that affect landbirds and their associated habitats.***

Landbirds, land uses, and our attempts to sustainably manage them, are subject to a suite of governmental legislation, policies, and programs. These influences may sometimes operate to the detriment of landbirds and be in conflict with one another. For example, financial assistance programs to install irrigation systems may work counter to programs that attempt to remove marginal croplands from annual production. Programs which are not designed for bird conservation may be highly beneficial: Prairie Farm Rehabilitation Administration's successful Permanent Cover Programs (PCP I and II) were designed to reduce erosion on marginal croplands by offering producers a one-time payment to convert the land to permanent cover. This subsequently improved grassland habitat for landbirds (McMaster and Davis 1998) and provided more benefits than the Conservation Reserve Program in the United States because the program allowed continued use of the land, a factor appealing to both landowners and birds (B. Dale, Canadian Wildlife Service, *pers. comm.*). The program has now been re-introduced by Agriculture and Agri-Food Canada as the Greencover Canada Program and offers higher payments to those who employ native vegetation in the conversion. Such incentive programs can create or enhance significant areas of landbird habitat (approximately 522,000 ha were converted for up to 21 years under PCP I and II). However, other policies or legislation, such as crop insurance, tax benefits, and export growth targets, can provide incentives to maintain cropland and thus pose challenges for landbird conservation. A review of program and policy impacts on landbirds may be integrated with similar reviews for other bird groups.

7.4 Communication and Outreach

<u>Recommendation 6:</u> Disseminate the information contained in and resulting from this plan to all groups with an interest in landbird conservation. Adapt the communication tools to suit the audience (e.g., prepare shorter document for agricultural groups, municipalities, real-estate developers, etc.).

This plan seeks to collate information about priority landbirds on the Canadian prairies, the threats facing the birds and their habitat, desired population targets, and information required to address these issues. The technical and scientific nature of the document encourages its use by biologists and conservation program managers rather than local producers, bird enthusiasts, municipal employees, etc. Hence this document requires distribution to the former audiences to maximize its utility. Furthermore, the contents and information contained herein must be communicated to raise awareness in the latter groups in alternative fashions, such as through the preparation of a short summary document and associated presentations. It will also be important to produce outreach materials that illustrate the benefits of Good Management Practices (see Recommendation 3) for landbirds. Opportunities to integrate communication and outreach tools with existing initiatives, as well as with communication activities for the shorebird and waterbird conservation plans, should be explored and utilized.

8.0 LITERATURE CITED

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APPENDIX I. Description of Partners in Flight species assessment and prioritization process.

The two primary components of the PIF scoring process are assessment and prioritization (PIF 2001). Assessment refers to the compilation and evaluation of data regarding the biological vulnerability of each species and provides objective, unbiased scores for several criteria that can be used in a variety of conservation applications. Prioritization involves an examination of the scores generated by the assessment process to determine relative conservation priorities among species. The PIF process has been reviewed raised by the scientific community and revised to accommodate concerns (Carter et al. 2000, Beissinger et al. 2000, PIF 2001).

Assessment Process

In the assessment process, data are compiled for seven criteria (PIF 2001), six of which are biologically-based and represent vulnerability factors (i.e., species' vulnerability to major population decline or range-wide extinction). These include *Breeding Distribution*, *Non-breeding Distribution*, *Density Index*, *Population Trend, Threats to Breeding*, and *Threats to Non-breeding*. The seventh factor, *Area Importance*, is not a vulnerability factor, but instead reflects local stewardship responsibility (i.e., relative importance of a given area to a species' conservation). In addition, the percent of the species' global population that occurs within the BCR is included as a supplementary measure of stewardship responsibility. Each species is given a score between 1 and 5 for each of the seven core criteria: 1 indicates the least vulnerable with regard to that parameter and 5 the most vulnerable. Criteria are explained in further detail below based on the PIF Handbook on Species Assessment and Prioritization (see PIF 2001 for full details on scoring and thresholds). Note that criteria are scored for the entire BCR including US portions and are derived using empirical data wherever possible: data from the BBS and the CBC are most often used, but when these data are insufficient, other available data sets or expert opinion can be used to assign scores. Scores for all species occurring in Canada and the United States are available on the Rocky Mountain Bird Observatory website (http://www.rmbo.org/pif/pifdb.html).

Breeding Distribution (BD) and Non-breeding Distribution (ND) reflect the global distribution of breeding or non-breeding individuals of a species during the appropriate season. Species with a narrowly-distributed population at any given time (e.g., migration staging area) are more vulnerable to local threats and extinction, and thus score higher than those with a widely-distributed population.

Density Index (DI) reflects the average abundance of breeding individuals within a species' range. Species that are rare or uncommon, and thus occur at low densities across their range, may be more vulnerable to decline or extinction than those that are common. Hence, less abundant species score higher than more abundant ones (e.g., an eagle may score higher than a robin as the eagle inherently occurs at lower densities). DI is scored globally and is calculated as the average number of individuals detected per BBS route, based on all routes on which the species occurred over the last 10 years. [Note that PIF (2001) refers to this measure as *Relative Abundance*].

Population Trend (PT) measures the direction and magnitude of changes in population size over the past 30 years. The highest scores are given to species with severe population declines (i.e., 50% over 30 years). PT scores also ensure the data upon which the trend is based are of a reliable quality. While local surveys may be used to assess a given species' population trend, species for which no trend data are available are assigned a score of 3 (i.e., expert opinion not used to score this criterion). PT is calculated at the BCR or local level for breeding birds based on BBS data, where possible, and at the global level for wintering birds based on BBS or CBC data.

Threats to Breeding (TB) and Threats to Non-breeding (TN) evaluate the effects of current and future (i.e., next 30 years) environmental conditions on the ability of a species to maintain healthy populations through successful reproduction and survival over the non-breeding season, including during migration. Examples of threats to suitable conditions and population persistence include predation, parasitism, further habitat fragmentation, deterioration, or loss, and anthropogenic mortality (e.g., from poaching, pesticide poisoning, collisions with power lines or buildings). Species whose breeding or non-breeding conditions are expected to face extreme deterioration receive high scores, while those whose breeding or non-breeding conditions expected to improve receive low scores. TB and TN can be assessed either at a global, BCR, or local level (local scores used for breeding species where available and when specific wintering grounds of a breeding population are known).

Area Importance (AI) estimates the relative importance of a given BCR to a species and its conservation based on the abundance of the species in that BCR relative to other BCRs. The region containing the core area of a species' population has the highest responsibility for ensuring the viability of that species, and conservation efforts should be higher in the core than in the periphery. Accordingly, a high score is received if the species' population is at a higher density in a given BCR than in other BCRs. AI is calculated by identifying the BCR with the highest mean number of individuals per BBS route across all routes in that region. The mean numbers of birds per route in a given BCR is then divided by this maximum abundance value to give the percent of the maximum abundance attained in the given BCR. BBS data is used to calculate the local AI values for breeding birds, while CBC data is used to calculate the local AI values for wintering birds.

Percent of Population (%POP) is an additional measure of the importance of a BCR to a species population. Although %POP is not included in the Total Assessment Score (i.e., the sum of the seven component scores listed above), %POP is used to subdivide species within priority pools (see next section). Areas with large proportions of a species' population need to take greater conservation responsibility for that species because an increase or decrease in a population trend has greater potential impacts in areas with a higher number of individuals. For example, a 3% per year decrease in an area with an initial local population of 10 000 affects the global population more than a 3% per year decrease in an area that contained only 100 individuals. To calculate %POP, the DI value for a species in a given BCR is weighted (multiplied) by the size of that region and divided by similar values summed across all BCRs in which the species occurs to give the proportion of the total population in the given BCR.

Prioritization Process

In the PIF prioritization process, scores for the assessment criteria are examined to prioritize species based on regional responsibility and overall vulnerability to major population declines or to regional extirpation. As the first step in prioritization, Total Assessment Scores are calculated by summing the seven core assessment scores (PIF 2001). For breeding birds, global scores are used for BD, ND, DI, and TN and local scores are used for TB, PT, and AI. For wintering birds, global scores are used for BD, ND, DI, TB, and PT while local scores are used for TN and AI. Landbirds with Total Assessment Scores of less than 19 are not eligible for inclusion as priority species. Further combinations of AI, %POP, and the six vulnerability factors are then used to divide species into Priority Species Pools, as described below.

Global Priority (Pool I): These species show high vulnerability in most of the seven factors, and thus are of conservation concern throughout their range. A minimum AI score ensures that only species with manageable populations within the BCR are included. Two subdivisions of this pool have been adopted.

High BCR11 Responsibility (Pool IA): These are species for which conservation in this region is critical to the overall health of the species. Required scores for inclusion are Total $\geq$ 22 with AI $\geq$ 3.

Moderate BCR11 Responsibility (Pool IB): This pool includes species for which this region can contribute significantly to range-wide conservation objectives in areas where the species occurs. Scoring is as follows: Total $\geq$ 22, but AI = 2.

Regional Priority (Pool II): Species in this pool are of moderate overall priority but are important to consider for conservation within the BCR because of several high parameter scores. Three subdivisions of this pool have been adopted.

High Declines and/or Stewardship Responsibility (Pool IIA): These species are experiencing declines in the core of their North American range and also have a high area importance score for the BCR. These species require short-term conservation action to mitigate the causes of the declines. Required scores for inclusion are Total = 19-21 and AI + PT $\geq$ 8.

Large Proportion of Population in BCR11 (Pool IIB): These species may not be currently threatened or declining but have a high proportion of their total population in the BCR and thus require long-term conservation action. Required scores for inclusion are Total = 19-21 and %POP > BCR threshold (e.g., 25% for BCR 11; see PIF Handbook 2001).

High Threats (Pool IIC): Species are included in this pool if remaining populations face extreme threats to sensitive breeding or non-breeding habitats, even though such species may be relatively uncommon within the BCR. Scoring is as follows: Total = 19-21 with TB + TN > 6 *or* Total = 19-21 with local TB or TN = 5.

Appendix II. Landbird species occurring in BCR11 during breeding and wintering. Species listed as *>10% of BCR* occur over >10% of the area of BCR11. *Local* species are those that occur in pockets throughout much of range within the BCR; have a range restricted due to specific habitat requirements; or are found in < 20 sites in the BCR each year. *Marginal* species are found only along fringes of the BCR and are probably much more abundant in an adjacent BCR. *Accidental* species occur irregularly in the BCR from year-to-year, and usually in very small numbers (accidental breeders are shown in grey). *Not in BCR* indicates that the species is not found within the BCR (i.e., either in Canada or the US). Scientific names, common names, and taxonomic order follow AOU (2003).

Common Name	Scientific Name	Breeding	Wintering
Order Galliformes			
Gray Partridge	*Perdix perdix*	>10% of BCR	>10% of BCR
Ring-necked Pheasant	*Phasianus colchicus*	>10% of BCR	>10% of BCR
Ruffed Grouse	*Bonasa umbellus*	>10% of BCR	>10% of BCR
Greater Sage-Grouse	*Centrocercus urophasianus*	>10% of BCR	>10% of BCR
Blue Grouse	*Dendragapus obscurus*	Marginal	Marginal
Sharp-tailed Grouse	*Tynpanuchus phasianellus*	>10% of BCR	>10% of BCR
Greater Prairie-Chicken	*Tympanuchus cupido*	>10% of BCR	>10% of BCR
Wild Turkey	*Meleagris gallopavo*	>10% of BCR	>10% of BCR
Northern Bobwhite	*Colinus virginianus*	Marginal	Marginal
Order Ciconiiformes			
Black Vulture	*Coragyps atratus*	Accidental	Not in BCR
Turkey Vulture	*Cathartes aura*	>10% of BCR	Not in BCR
Order Falconiformes			
Osprey	*Pandion haliaetus*	>10% of BCR	Not in BCR
Mississippi Kite	*Ictinia mississippiensis*	Accidental	Not in BCR
Bald Eagle	*Haliaeetus leucocephalus*	Marginal	>10% of BCR
Northern Harrier	*Circus cyaneus*	>10% of BCR	Marginal
Sharp-shinned Hawk	*Accipiter striatus*	>10% of BCR	Marginal
Cooper's Hawk	*Accipiter cooperii*	>10% of BCR	Marginal
Northern Goshawk	*Accipiter gentiles*	Marginal	>10% of BCR
Broad-winged Hawk	*Buteo platypterus*	>10% of BCR	Not in BCR
Swainson's Hawk	*Buteo swainsoni*	>10% of BCR	Not in BCR
Red-tailed Hawk	*Buteo jamaicensis*	>10% of BCR	>10% of BCR
Ferruginous Hawk	*Buteo regalis*	>10% of BCR	Not in BCR
Rough-legged Hawk	*Buteo lagopus*	Not in BCR	>10% of BCR
Golden Eagle	*Aquila chrysaetos*	>10% of BCR	>10% of BCR
American Kestrel	*Falco sparverius*	>10% of BCR	>10% of BCR
Merlin	*Falco columbarius*	>10% of BCR	>10% of BCR
Gyrfalcon	*Falco rusticolus*	Not in BCR	>10% of BCR
Peregrine Falcon	*Falco peregrinus*	Local	Marginal
Prairie Falcon	*Falco mexicanus*	>10% of BCR	>10% of BCR

Common Name	Scientific Name	Breeding	Wintering
Order Columbiformes			
Rock Pigeon	*Columba livia*	>10% of BCR	>10% of BCR
Mourning Dove	*Zenaida macroura*	>10% of BCR	>10% of BCR
Order Cuculiformes			
Black-billed Cuckoo	*Coccyzus erythropthalmus*	>10% of BCR	Not in BCR
Yellow-billed Cuckoo	*Coccyzus americanus*	>10% of BCR	Not in BCR
Order Strigiformes			
Barn Owl	*Tyto alba*	>10% of BCR	Marginal
Western Screech-Owl	*Otus kennicottii*	Accidental	Not in BCR
Eastern Screech-Owl	*Otus asio*	>10% of BCR	>10% of BCR
Great Horned Owl	*Bubo virginianus*	>10% of BCR	>10% of BCR
Snowy Owl	*Bubo scandiacus*	Not in BCR	>10% of BCR
Northern Hawk Owl	*Surnia ulula*	Accidental	Marginal
Northern Pygmy-Owl	*Glaucidium gnoma*	Marginal	Marginal
Burrowing Owl	*Athene cunicularia*	>10% of BCR	Not in BCR
Barred Owl	*Strix varia*	Marginal	Marginal
Great Gray Owl	*Strix nebulosa*	Marginal	Marginal
Long-eared Owl	*Asio otus*	>10% of BCR	>10% of BCR
Short-eared Owl	*Asio flammeus*	>10% of BCR	>10% of BCR
Boreal Owl	*Aegolius funereus*	Marginal	Marginal
Northern Saw-whet Owl	*Aegolius acadicus*	>10% of BCR	>10% of BCR
Order Caprimulgiformes			
Common Nighthawk	*Chordeiles minor*	>10% of BCR	Not in BCR
Common Poorwill	*Phalaenoptilus nuttallii*	>10% of BCR	Not in BCR
Chuck-will's-widow	*Caprimulgus carolinensis*	Accidental	Not in BCR
Whip-poor-will	*Caprimulgus vociferous*	>10% of BCR	Not in BCR
Order Apodiformes			
Chimney Swift	*Chaetura pelagica*	>10% of BCR	Not in BCR
Ruby-throated Hummingbird	*Archilochus colubris*	>10% of BCR	Not in BCR
Black-chinned Hummingbird	*Archilochus alexandri*	Accidental	Not in BCR
Calliope Hummingbird	*Stellula calliope*	Marginal	Not in BCR
Rufous Hummingbird	*Selasphorus rufus*	Marginal	Not in BCR
Order Coraciiformes			
Belted Kingfisher	*Ceryle alcyon*	>10% of BCR	Marginal
Order Piciformes			
Lewis's Woodpecker	*Melanerpes lewis*	Marginal	Not in BCR
Red-headed Woodpecker	*Melanerpes erythrocephalus*	>10% of BCR	Marginal
Red-bellied Woodpecker	*Melanerpes carolinus*	Marginal	Marginal
Williamson's Sapsucker	*Sphyrapicus thyroideus*	Accidental	Not in BCR
Yellow-bellied Sapsucker	*Sphyrapicus varius*	>10% of BCR	Marginal
Red-naped Sapsucker	*Sphyrapicus nuchalis*	Marginal	Not in BCR
Red-breasted Sapsucker	*Sphyrapicus rubber*	Accidental	Not in BCR
Downy Woodpecker	*Picoides pubescens*	>10% of BCR	>10% of BCR
Hairy Woodpecker	*Picoides villosus*	>10% of BCR	>10% of BCR

Common Name	Scientific Name	Breeding	Wintering
Order Piciformes (cont'd)			
American Three-toed Woodpecker	*Picoides dorsalis*	Marginal	Marginal
Black-backed Woodpecker	*Picoides arcticus*	Marginal	Marginal
Northern Flicker	*Colaptes auratus*	>10% of BCR	>10% of BCR
Pileated Woodpecker	*Dryocopus pileatus*	>10% of BCR	>10% of BCR
Order Passeriformes			
Olive-sided Flycatcher	*Contopus cooperi*	Marginal	Not in BCR
Western Wood-Pewee	*Contopus sordidulus*	>10% of BCR	Not in BCR
Eastern Wood-Pewee	*Contopus virens*	>10% of BCR	Not in BCR
Yellow-bellied Flycatcher	*Empidonax flaviventris*	Marginal	Not in BCR
Acadian Flycatcher	*Empidonax virescens*	Marginal	Not in BCR
Alder Flycatcher	*Empidonax alnorum*	>10% of BCR	Not in BCR
Willow Flycatcher	*Empidonax traillii*	>10% of BCR	Not in BCR
Least Flycatcher	*Empidonax minimus*	>10% of BCR	Not in BCR
Gray Flycatcher	*Empidonax wrightii*	Accidental	Not in BCR
Dusky Flycatcher	*Empidonax oberholseri*	Marginal	Not in BCR
Eastern Phoebe	*Sayornis phoebe*	>10% of BCR	Not in BCR
Say's Phoebe	*Sayornis saya*	>10% of BCR	Not in BCR
Great Crested Flycatcher	*Myiarchus crinitus*	>10% of BCR	Not in BCR
Western Kingbird	*Tyrannus verticalis*	>10% of BCR	Not in BCR
Eastern Kingbird	*Tyrannus tyrannus*	>10% of BCR	Not in BCR
Scissor-tailed Flycatcher	*Tyrannus forficatus*	Accidental	Not in BCR
Loggerhead Shrike	*Lanius ludovicianus*	>10% of BCR	Not in BCR
Northern Shrike	*Lanius excubitor*	Not in BCR	>10% of BCR
White-eyed Vireo	*Vireo griseus*	Marginal	Not in BCR
Bell's Vireo	*Vireo bellii*	Marginal	Not in BCR
Yellow-throated Vireo	*Vireo flavifrons*	>10% of BCR	Not in BCR
Blue-headed Vireo	*Vireo solitarius*	Marginal	Not in BCR
Warbling Vireo	*Vireo gilvus*	>10% of BCR	Not in BCR
Philadelphia Vireo	*Vireo philadelphicus*	Marginal	Not in BCR
Red-eyed Vireo	*Vireo olivaceus*	>10% of BCR	Not in BCR
Gray Jay	*Perisoreus Canadensis*	Marginal	Marginal
Blue Jay	*Cyanocitta cristata*	>10% of BCR	>10% of BCR
Pinyon Jay	*Gymnorhinus cyanocephalus*	Accidental	Not in BCR
Clark's Nutcracker	*Nucifraga Columbiana*	Marginal	Marginal
Black-billed Magpie	*Pica hudsonia*	>10% of BCR	>10% of BCR
American Crow	*Corvus brachyrhynchos*	>10% of BCR	>10% of BCR
Common Raven	*Corvus corax*	>10% of BCR	>10% of BCR
Horned Lark	*Eremophila alpestris*	>10% of BCR	>10% of BCR
Purple Martin	*Progne subis*	>10% of BCR	Not in BCR
Tree Swallow	*Tachycineta bicolor*	>10% of BCR	Not in BCR
Violet-green Swallow	*Tachycineta thalassina*	>10% of BCR	Not in BCR
Northern Rough-winged Swallow	*Stelgidopteryx serripennis*	>10% of BCR	Not in BCR
Bank Swallow	*Riparia riparia*	>10% of BCR	Not in BCR
Cliff Swallow	*Petrochelidon pyrrhonota*	>10% of BCR	Not in BCR
Barn Swallow	*Hirundo rustica*	>10% of BCR	Not in BCR
Black-capped Chickadee	*Poecile atricapilla*	>10% of BCR	>10% of BCR
Mountain Chickadee	*Poecile gambeli*	Marginal	Marginal
Boreal Chickadee	*Poecile hudsonica*	Marginal	Marginal
Bridled Titmouse	*Baeolophus wollweberi*	Accidental	Not in BCR

Common Name	Scientific Name	Breeding	Wintering
Order Passeriformes (cont'd)			
Tufted Titmouse	*Baeolophus bicolor*	Marginal	Marginal
Red-breasted Nuthatch	*Sitta Canadensis*	>10% of BCR	>10% of BCR
White-breasted Nuthatch	*Sitta carolinensis*	>10% of BCR	>10% of BCR
Brown Creeper	*Certhia Americana*	Marginal	>10% of BCR
Cactus Wren	*Campylorhynchus brunneicapillus*	Accidental	Not in BCR
Rock Wren	*Salpinctes obsoletus*	>10% of BCR	Not in BCR
Canyon Wren	*Catherpes mexicanus*	Accidental	Accidental
Carolina Wren	*Thryothorus ludovicianus*	Accidental	Accidental
Bewick's Wren	*Thryomanes bewickii*	Accidental	Not in BCR
House Wren	*Troglodytes aedon*	>10% of BCR	Not in BCR
Winter Wren	*Troglodytes troglodytes*	Marginal	Not in BCR
Sedge Wren	*Cistothorus platensis*	>10% of BCR	Not in BCR
Marsh Wren	*Cistothorus palustris*	>10% of BCR	Not in BCR
American Dipper	*Cinclus mexicanus*	Not in BCR	Marginal
Golden-crowned Kinglet	*Regulus satrapa*	Marginal	>10% of BCR
Blue-gray Gnatcatcher	*Polioptila caerulea*	Marginal	Not in BCR
Northern Wheatear	*Oenanthe oenanthe*	Accidental	Not in BCR
Eastern Bluebird	*Sialia sialis*	>10% of BCR	Not in BCR
Western Bluebird	*Sialia mexicana*	Accidental	Not in BCR
Mountain Bluebird	*Sialia currucoides*	>10% of BCR	Not in BCR
Townsend's Solitaire	*Myadestes townsendi*	Marginal	Marginal
Veery	*Catharus fuscescens*	>10% of BCR	Not in BCR
Swainson's Thrush	*Catharus ustulatus*	>10% of BCR	Not in BCR
Hermit Thrush	*Catharus guttatus*	>10% of BCR	Not in BCR
Wood Thrush	*Hylocichla mustelina*	>10% of BCR	Not in BCR
American Robin	*Turdus migratorius*	>10% of BCR	>10% of BCR
Varied Thrush	*Ixoreus naevius*	Not in BCR	Accidental
Gray Catbird	*Dumetella carolinensis*	>10% of BCR	Not in BCR
Northern Mockingbird	*Mimus polyglottos*	Marginal	Accidental
Sage Thrasher	*Oreoscoptes montanus*	Local	Not in BCR
Brown Thrasher	*Toxostoma rufum*	>10% of BCR	Marginal
Bendire's Thrasher	*Toxostoma bendirei*	Accidental	Not in BCR
European Starling	*Sturnus vulgaris*	>10% of BCR	>10% of BCR
Sprague's Pipit	*Anthus spragueii*	>10% of BCR	Not in BCR
Bohemian Waxwing	*Bombycilla garrulous*	Accidental	>10% of BCR
Cedar Waxwing	*Bombycilla cedrorum*	>10% of BCR	>10% of BCR
Blue-winged Warbler	*Vermivora pinus*	Marginal	Not in BCR
Golden-winged Warbler	*Vermivora chrysoptera*	Marginal	Not in BCR
Tennessee Warbler	*Vermivora peregrine*	>10% of BCR	Not in BCR
Orange-crowned Warbler	*Vermivora celata*	>10% of BCR	Not in BCR
Nashville Warbler	*Vermivora ruficapilla*	Marginal	Not in BCR
Northern Parula	*Parula Americana*	Marginal	Not in BCR
Yellow Warbler	*Dendroica petechia*	>10% of BCR	Not in BCR
Chestnut-sided Warbler	*Dendroica pensylvanica*	>10% of BCR	Not in BCR
Magnolia Warbler	*Dendroica magnolia*	Marginal	Not in BCR
Cape May Warbler	*Dendroica tigrina*	Marginal	Not in BCR
Yellow-rumped Warbler	*Dendroica coronata*	>10% of BCR	Not in BCR
Black-throated Gray Warbler	*Dendroica nigrescens*	Accidental	Not in BCR
Black-throated Green Warbler	*Dendroica virens*	Marginal	Not in BCR
Townsend's Warbler	*Dendroica townsendi*	Marginal	Not in BCR

Common Name	Scientific Name	Breeding	Wintering
Order Passeriformes (cont'd)			
Blackburnian Warbler	*Dendroica fusca*	Marginal	Not in BCR
Yellow-throated Warbler	*Dendroica dominica*	Accidental	Not in BCR
Pine Warbler	*Dendroica pinus*	Marginal	Not in BCR
Prairie Warbler	*Dendroica discolor*	Accidental	Not in BCR
Palm Warbler	*Dendroica palmarum*	Marginal	Not in BCR
Bay-breasted Warbler	*Dendroica castanea*	Marginal	Not in BCR
Cerulean Warbler	*Dendroica cerulean*	Marginal	Not in BCR
Black-and-white Warbler	*Mniotilta varia*	>10% of BCR	Not in BCR
American Redstart	*Setophaga ruticilla*	>10% of BCR	Not in BCR
Prothonotary Warbler	*Protonotaria citrea*	Marginal	Not in BCR
Worm-eating Warbler	*Helmitheros vermivorus*	Accidental	Not in BCR
Ovenbird	*Seiurus aurocapillus*	>10% of BCR	Not in BCR
Northern Waterthrush	*Seiurus noveboracensis*	Marginal	Not in BCR
Louisiana Waterthrush	*Seiurus motacilla*	Marginal	Not in BCR
Kentucky Warbler	*Oporornis formosus*	Marginal	Not in BCR
Connecticut Warbler	*Oporornis agilis*	Marginal	Not in BCR
Mourning Warbler	*Oporornis Philadelphia*	>10% of BCR	Not in BCR
MacGillivray's Warbler	*Oporornis tolmiei*	Marginal	Not in BCR
Common Yellowthroat	*Geothlypis trichas*	>10% of BCR	Not in BCR
Hooded Warbler	*Wilsonia citrine*	Marginal	Not in BCR
Wilson's Warbler	*Wilsonia pusilla*	Marginal	Not in BCR
Canada Warbler	*Wilsonia Canadensis*	Marginal	Not in BCR
Yellow-breasted Chat	*Icteria virens*	>10% of BCR	Not in BCR
Summer Tanager	*Piranga rubra*	Accidental	Not in BCR
Scarlet Tanager	*Piranga olivacea*	>10% of BCR	Not in BCR
Western Tanager	*Piranga ludoviciana*	Marginal	Not in BCR
Green-tailed Towhee	*Pipilo chlorurus*	Accidental	Not in BCR
Spotted Towhee	*Pipilo maculates*	>10% of BCR	Not in BCR
Eastern Towhee	*Pipilo erythropthalmus*	>10% of BCR	Not in BCR
Cassin's Sparrow	*Aimophila casssinii*	Accidental	Not in BCR
American Tree Sparrow	*Spizella arborea*	Not in BCR	>10% of BCR
Chipping Sparrow	*Spizella passerine*	>10% of BCR	Not in BCR
Clay-colored Sparrow	*Spizella pallida*	>10% of BCR	Not in BCR
Brewer's Sparrow	*Spizella breweri*	>10% of BCR	Not in BCR
Field Sparrow	*Spizella pusilla*	>10% of BCR	Not in BCR
Vesper Sparrow	*Pooecetes gramineus*	>10% of BCR	Accidental
Lark Sparrow	*Chondestes grammacus*	>10% of BCR	Not in BCR
Black-throated Sparrow	*Amphispiza bilineata*	Accidental	Not in BCR
Lark Bunting	*Calamospiza melanocorys*	>10% of BCR	Not in BCR
Savannah Sparrow	*Passerculus sandwichensis*	>10% of BCR	Not in BCR
Grasshopper Sparrow	*Ammodramus savannarum*	>10% of BCR	Not in BCR
Baird's Sparrow	*Ammodramus bairdii*	>10% of BCR	Not in BCR
Henslow's Sparrow	*Ammodramus henslowii*	Marginal	Not in BCR
Le Conte's Sparrow	*Ammodramus leconteii*	>10% of BCR	Not in BCR
Nelson's Sharp-tailed Sparrow	*Ammodramus nelsoni*	>10% of BCR	Not in BCR
Fox Sparrow	*Passerella iliaca*	Marginal	Marginal
Song Sparrow	*Melospiza melodia*	>10% of BCR	Marginal
Lincoln's Sparrow	*Melospiza lincolnii*	>10% of BCR	Not in BCR
Swamp Sparrow	*Melospiza Georgiana*	>10% of BCR	Accidental
White-throated Sparrow	*Zonotrichia albicollis*	>10% of BCR	Accidental

Common Name	Scientific Name	Breeding	Wintering
Order Passeriformes (cont'd)			
Harris's Sparrow	*Zonotrichia querula*	Not in BCR	Marginal
White-crowned Sparrow	*Zonotrichia leucophrys*	Marginal	Marginal
Golden-crowned Sparrow	*Zonotrichia atricapilla*	Accidental	Not in BCR
Dark-eyed Junco	*Junco hyemalis*	>10% of BCR	>10% of BCR
McCown's Longspur	*Calcarius mccownii*	>10% of BCR	Not in BCR
Lapland Longspur	*Calcarius lapponicus*	Not in BCR	>10% of BCR
Chestnut-collared Longspur	*Calcarius ornatus*	>10% of BCR	Not in BCR
Snow Bunting	*Plectrophenax nivalis*	Not in BCR	>10% of BCR
McKay's Bunting	*Plectrophenax hyperboreas*	Accidental	Not in BCR
Northern Cardinal	*Cardinalis cardinalis*	>10% of BCR	>10% of BCR
Rose-breasted Grosbeak	*Pheucticus ludovicianus*	>10% of BCR	Accidental
Black-headed Grosbeak	*Pheucticus melanocephalus*	>10% of BCR	Not in BCR
Blue Grosbeak	*Passerina caerulea*	>10% of BCR	Not in BCR
Lazuli Bunting	*Passerina amoena*	>10% of BCR	Not in BCR
Indigo Bunting	*Passerina* cyanea	>10% of BCR	Not in BCR
Dickcissel	*Spiza Americana*	>10% of BCR	Not in BCR
Bobolink	*Dolichonyx oryzivorus*	>10% of BCR	Not in BCR
Red-winged Blackbird	*Agelaius phoeniceus*	>10% of BCR	>10% of BCR
Eastern Meadowlark	*Sturnella magna*	Marginal	Accidental
Western Meadowlark	*Sturnella neglecta*	>10% of BCR	Marginal
Yellow-headed Blackbird	*Xanthocephalus xanthocephalus*	>10% of BCR	Accidental
Rusty Blackbird	*Euphagus carolinus*	Marginal	Marginal
Brewer's Blackbird	*Euphagus cyanocephalus*	>10% of BCR	Not in BCR
Common Grackle	*Quiscalus quiscula*	>10% of BCR	Marginal
Great-tailed Grackle	*Quiscalus mexicanus*	Accidental	Not in BCR
Brown-headed Cowbird	*Molothrus ater*	>10% of BCR	Marginal
Orchard Oriole	*Icterus spurious*	>10% of BCR	Not in BCR
Bullock's Oriole	*Icterus bullockii*	Marginal	Not in BCR
Baltimore Oriole	*Icterus galbula*	>10% of BCR	Not in BCR
Gray-crowned Rosy-Finch	*Leucosticte tephrocotis*	Not in BCR	>10% of BCR
Black Rosy-Finch	*Leucosticte atrata*	Accidental	Not in BCR
Pine Grosbeak	*Pinicola enucleator*	Marginal	>10% of BCR
Purple Finch	*Carpodacus purpureus*	>10% of BCR	>10% of BCR
House Finch	*Carpodacus mexicanus*	>10% of BCR	>10% of BCR
Red Crossbill	*Loxia curvirostra*	Marginal	>10% of BCR
White-winged Crossbill	*Loxia leucoptera*	Marginal	>10% of BCR
Common Redpoll	*Carduelis flammea*	Not in BCR	>10% of BCR
Hoary Redpoll	*Carduelis hornemanni*	Not in BCR	>10% of BCR
Pine Siskin	*Carduelis pinus*	>10% of BCR	>10% of BCR
American Goldfinch	*Carduelis tristis*	>10% of BCR	>10% of BCR
Evening Grosbeak	*Coccothraustes vespertinus*	Accidental	>10% of BCR
House Sparrow	*Passer domesticus*	>10% of BCR	>10% of BCR

Appendix III. Assessment criteria scores and priority pools for priority species occurring in BCR11. A score of 1 indicates the least vulnerable with regards to that parameter while a score of 5 indicates the most vulnerable. Abbreviations are as follows: DI-Density Index, BD-Breeding Distribution, ND-Non-breeding Distribution, PT-Population Trend, TB-Threats to Breeding, TN-Threats to Non-breeding, AI-Area Importance, and %POP-% Population. Note that species are not sorted taxonomically here but rather based on their total score. Explanations of each criterion can be found in Appendix I.

	DI	BD	ND	PT	TB	TN	AI	%POP	TOTAL	POOL
Breeding Scores										
Baird's Sparrow	3	4	4	4	4	4	5	90.1	28	IA
Sprague's Pipit	3	4	3	5	4	3	5	86.4	27	IA
Nelson's Sharp-tailed Sparrow+	4	3	5	2	4	4	5	50.9	27	IA
McCown's Longspur	2	4	4	4	4	4	5	31.4	27	IA
Greater Prairie-Chicken*	3	5	5	3	4	4	2	3.6	26	IB
Greater Sage-Grouse	3	3	3	5	4	4	3		25	IA
Swainson's Hawk	4	2	3	4	3	4	5	28.7	25	IA
Henslow's Sparrow*	4	3	4	3	4	4	3		25	IA
Chestnut-collared Longspur	2	4	3	3	4	4	5	75.2	25	IA
Burrowing Owl	4	2	3	5	4	3	2	1.0	23	IB
Sharp-tailed Grouse+	3	2	2	4	3	3	5	48.9	22	IA
Northern Harrier+	4	1	1	4	4	3	5	24.8	22	IA
Black-billed Cuckoo	4	2	2	4	3	3	4	20.1	22	IA
Short-eared Owl+	4	1	1	5	4	4	3	4.0	22	IA
Lark Bunting	1	3	3	5	4	3	3	9.1	22	IA
Le Conte's Sparrow+	3	2	3	2	4	4	4	20.2	22	IA
Bobolink	2	2	2	4	4	4	4	30.1	22	IA
Blue Grouse*	4	3	3	3	3	3	2		21	IB
Ferruginous Hawk	4	2	2	1	4	3	5	25.1	21	IIB/IIC
Prairie Falcon	5	2	1	3	4	3	3	2.4	21	IIC
Long-eared Owl	5	1	1	5	3	3	3		21	IIA
Grasshopper Sparrow	3	1	2	5	4	3	3	14.4	21	IA
Clay-colored Sparrow+	2	2	3	2	3	3	5	32.5	20	IIB
Sedge Wren	3	2	3	1	3	3	4	30.9	19	IIB
Loggerhead Shrike	3	1	1	5	4	3	2	4.6	19	IIC

	DI	BD	ND	PT	TB	TN	AI	%POP	TOTAL	POOL
Wintering Scores										
Greater Prairie-Chicken*	3	5	5	3	4	4	3	3.6	27	IA
Greater Sage-Grouse	3	3	3	5	4	4	3		25	IA
Short-eared Owl+	4	1	1	5	4	4	5	4.0	24	IA
Sharp-tailed Grouse+	3	2	2	4	4	3	5	48.9	23	IA
Blue Grouse*	4	3	3	3	3	3	2		21	IB
Golden Eagle+	5	1	1	4	4	3	2	2.0	20	IIC
Prairie Falcon	5	2	1	3	4	3	2		20	IIC
Long-eared Owl*	5	1	1	5	2	3	3		20	IIA
Snowy Owl	4	2	1	3	2	2	5		19	IIA
Bohemian Waxwing+	3	2	2	4	2	2	4		19	IIA

* only found in US

+ may be found in Peace Parkland portion of BCR6

Appendix IV. Species accounts for BCR11 priority landbird species (in alphabetical order)

Each two-page account follows a standard format:

- **Title Line**: provides the common and scientific names as identified by AOU (2003). The next line shows if the species is a breeding or wintering priority and provides the criteria scores for Area Importance and Population Trend, the Total Assessment Score, and finally the Priority Pool.
- **Reason for Concern**: gives a general summary of population and/or habitat status, causes for declines, monitoring difficulties, and COSEWIC status (if a given species is listed nationally).
- **Distribution**: estimates the percent of the North American breeding range in Canada, as well as outlining the breeding distribution with specific detail for BCR11 and wintering distribution or general wintering area, if known. Relative abundance maps based on BBS data from Sauer et al. (2003) are included for breeding species, while relative abundance maps for wintering species are based on CBC data from Sauer et al. (1996). Simple range maps are used as indicated in the account of a few species when BBS or CBC maps were inadequate. The sources are indicated in the specific accounts. It is important to note the maps presented in the species accounts may have limitations and should not be used as a definitive source on bird presence or absence, but rather to help visually display approximate ranges and relative abundances for the various species.
- **Habitat Requirements**: outlines general habitat associations. This section also details specific breeding habitats for some species (e.g., lek sites for Greater Sage-Grouse and Sharp-tailed Grouse), nesting and foraging habitat associations, and finally wintering habitat associations for resident and wintering species.
- **Ecology**: details approximate arrival and departure dates from breeding grounds, rates of site fidelity, clutch size and likelihood of renesting or double-brooding, and typical adult and nestling diets.
- **Area Requirements**: provides territory sizes and the minimum patch size utilized, if available.
- **Management Issues**: summarizes the species' response to management practices and human influences (primarily burning, mowing, grazing, planted cover programs) and their response to other factors such as nest parasitism.

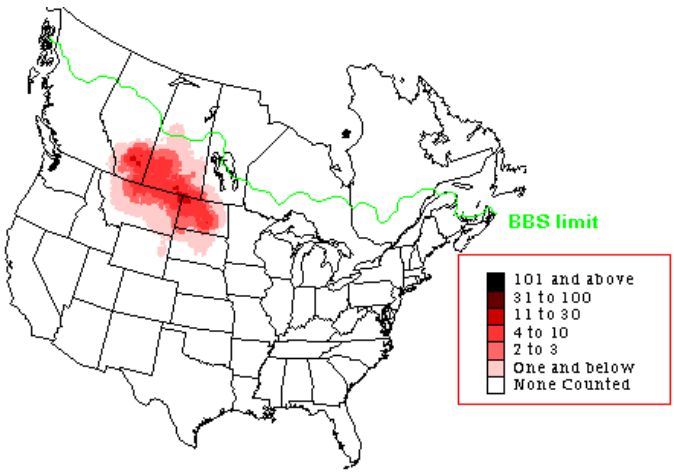
Complete references cited in these accounts can be found in the Literature Cited section.

Baird's Sparrow *Ammodramus bairdii*

Breeding Priority Area Imp: 5 Pop'n Trend: 4 Total: 27 Priority Pool: IA

Reason for Concern. Concern for Baird's Sparrows is high because of their restricted global range (nest only in the northern Great Plains), significant continental population declines (3.0% per year between 1966 and 2002, n=127, p=0.02), continued habitat loss, their use of inappropriate habitats such as crops and hayland, and monitoring difficulties (Green et al. 2002, Sauer et al. 2003). Abundances of Baird's Sparrows in BCR11 are among the highest relative to other BCRs.

Distribution. Almost 50% of Baird's Sparrows' breeding range lies within Canada (Environment Canada 2001), with the majority in BCR11. They breed from southcentral Alberta to southwestern Manitoba, from northeastern Montana through North Dakota, and from northern South Dakota into northwestern Minnesota (Environment Canada 2001). The wintering range extends from extreme southeast Arizona through southern New Mexico and a large portion of Texas into northeastern Mexico.



Habitat Requirements. Baird's Sparrows generally prefer native and tame grasslands (reviewed in Dechant et al. 2001 and Green et al. 2002). Shrubby landscapes are not preferred, although they will accept widely scattered bushes (<20%, Dale 1983, Madden 1996). Baird's Sparrows will inhabit areas of exotic vegetation similar in structure to native species (e.g., Kentucky blue grass, crested wheatgrass, hayfields, weedy stubble fields; Dale 1990, Mahon 1995, Madden 1996, Davis and Duncan 1999, Dale et al. 2002). Other general habitat requirements include moderate litter depth (up to 3 or 4 cm), moderate vegetation height (> 15 cm), patchy distribution of grass and forbs, and sparse shrub cover and density (reviewed in Dechant et al. 2001, McMaster and Davis 2001).

Grass nests are constructed in a depression (natural, hoof print, or scraped by adult) in dense residual cover or at the base of a clump of grass (Davis and Sealy 1998, Green et al. 2002). Nesting sites in Saskatchewan are typically characterized by taller vegetation, greater density of standing dead vegetation, lower density of live grasses <10 cm tall, greater litter depth, and less bare ground than randomly selected sites (Green et al. 2002). Foraging habitat for Baird's Sparrows may also include adjacent cropland, hayland, and in particular edges, as this species forages hidden from view on the ground in areas between grass clumps and litter and typically avoids open areas (Green et al. 2002).

Ecology. Baird's Sparrows are irruptive, moving about from year to year in response to changes

in habitat and local environmental conditions (Wershler et al. 1991, Green 1992), and this makes accurate tracking of trends difficult. The peak arrival time of Baird's Sparrows on the breeding grounds is mid to late May, although some birds may arrive in late April (Davis and Sealy 1998, Green et al. 2002). Little is known about breeding site fidelity. The nesting period lasts from late May through mid August (Stewart 1975, De Smet 1992, Davis and Sealy 1998). Clutch sizes average about 4.5 eggs, and double brooding has been documented with two peaks in clutch-initiation dates (late May–early June and mid–late July; De Smet 1992, Davis and Sealy 1998, Davis, *in press*). Although the timing of departure for the wintering grounds is unknown for the Prairie Provinces, it typically occurs from mid September to October in other portions of Baird's Sparrows' range (Green et al. 2002). Major diet items for this species during the breeding season include beetles, grasshoppers, and caterpillars, but they also forage on grass and weed seeds (Green et al. 2002).

Area Requirements. The area requirements of Baird's Sparrows are poorly understood with studies showing little influence of pasture size on bird density (Davis et al. *unpubl. data*) and others showing density and occurrence to increase with increasing field size (Johnson and Igl 2001, McMaster and Davis 2001). The minimum area requirements in Saskatchewan ranged from 14-63 ha (SWCC 1997, S. Davis, Canadian Wildlife Service, *pers. comm.*). The average territory size in North Dakota ranged from 0.8 to 2.25 ha (Winter 1999).

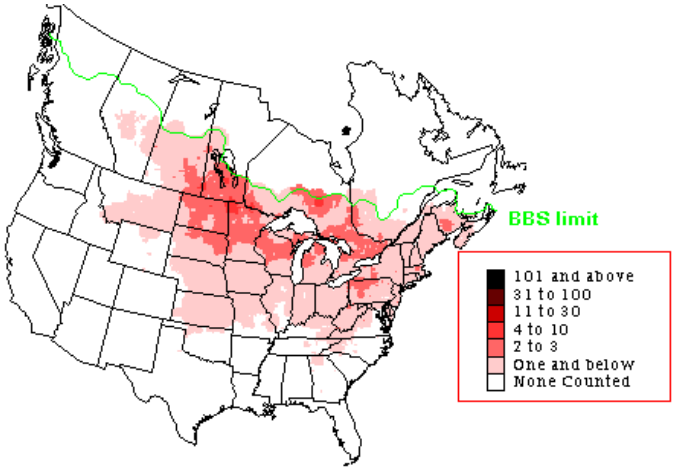
Management Issues. The continued fragmentation and loss of grassland habitat is of primary concern. Although Baird's Sparrows need moderate cover, they are negatively affected by dense cover and therefore require the periodic disturbance of grassland through burning, mowing, or grazing to maintain and improve habitat suitability (Dale et al. 1997). Since vegetative structure, shrub encroachment, and accumulation of residual vegetation and litter are determined by prairie type and moisture regime, the optimal frequency of disturbance varies by region (Madden 1996). Baird's Sparrow population numbers following prescribed burns in North Dakota were typically depressed during the first growing season, but increased to pre-burn levels or higher within one to five years (Madden 1996, Winter 1999). The response of birds to mowing varies with the timing, frequency, vegetation type (native vs. exotic), and amount of cover removed (Dechant et al. 2001), and recovery after disturbance can take considerably longer where soil or moisture is poor (Dale et al. 1999). Heavy grazing dissuades Baird's Sparrows (e.g., Owens and Myers 1973, Kantrud 1981, Dale 1983), while light to moderate levels of livestock grazing that maintain moderate residual vegetative and litter cover can provide suitable habitat (Mahon 1995, Davis et al. 1999). A significant portion of the population uses inappropriate habitats such as crop or hayfields in some years (e.g., 10% on GBM routes in 1996, Dale et al. 2002; 35% in Manitoba in 1991, De Smet 1992). Baird's Sparrows' nests may be parasitized (0-36% of nests) by Brown-headed Cowbirds (Maher 1973, De Smet 1992, Davis and Sealy 1998), perhaps because of the sparrows' willingness to accept cowbird eggs and the overlap of the two species' breeding season (Davis 1994, Davis and Sealy 1998).

Black-billed Cuckoo *Coccyzus erythropthalmus*

Breeding Priority Area Imp: 4 Pop'n Trend: 4 Total: 22 Priority Pool: IA

Reason for Concern. Black-billed Cuckoo population trends are difficult to track because their numbers vary greatly from year to year in response to outbreaks of forest insects (Hughes 2001). There is, however, evidence for an annual population decline of 3.4% between 1980 and 2001 over their entire breeding range (n=961, $p<0.01$; Hughes 2001, Sauer et al. 2002). This decline is also reflected in data for BCR11, but the preceding population increase between 1966 and 1979 (21.7%, n=118, $p<0.01$) raises the question whether long-term population changes are a natural trait of this species (Dunn 2002). The current decline has been particularly strong in the west, where degradation of riparian habitat gives reason for concern. Manitoba had the highest densities recorded in any breeding census (Sauer et al. 2002), and moderately-high abundances in BCR11 indicate a high stewardship responsibility for this region.

Distribution. The northwestern limit of Black-billed Cuckoos' breeding distribution reaches the Athabasca River in central Alberta, arches southeast through central Saskatchewan and southern Manitoba, and southward along the eastern slopes of the Rockies (Hughes 2001). Approximately 25% of the total range is in Canada (Environment Canada 2001). The southern limit of the breeding range may extend through northcentral Texas and the Carolinas (Hughes 2001). The South American wintering grounds of this neotropical migrant are poorly known and probably stretch from Colombia and Venezuela to Peru or even Bolivia and Ecuador (reviewed in Hughes 2001).



Habitat Requirements. Black-billed Cuckoos prefer forests, thickets, groves of trees, and forest edges; their breeding habitat is often associated with water, riparian habitat, and tangles of willow, alder, and vines (Godfrey 1986, Hughes 2001). In aspen parkland, this species occurs within brushy thickets along roads and streams, and in the grassland region, they are found in the dense bush of some coulees and occasionally in gardens with thick surrounding vegetation (Salt and Salt 1976, Semenchuk 1992). The nest is a fragile platform of twigs, leaves, and grasses, built in a thick shrub, tangle of vine, or low in the dense foliage of a tree (Bent 1940, Spencer 1943, Hughes 2001). Nests in BCR11 were found in willow thickets, choke cherry, hawthorn, bur oak, and Manitoba maple (Sealy 1978, Hughes 2001).

Ecology. Black-billed Cuckoos arrive relatively late in the spring on their breeding grounds. The earliest observations are in mid May, but peak arrival occurs from late May to early June (Bent 1940). Arriving birds appear to be prospecting for concentrations of forest caterpillars,

and such insect outbreaks determine both the distribution and the timing of breeding (Bent 1940, Sealy 1978, Hughes 2001). The earliest nests were found in May during a caterpillar outbreak in Manitoba, with the peak-nesting season usually stretching from mid June to late July (Sealy 1978), and accordingly BBS conducted late May to early June may fail to detect Black-billed Cuckoos. This species is rarely seen, keeping within the vegetation (Hughes 2001), however they are highly vocal and therefore easy to detect. Although a typical clutch is 2-3 eggs, females will lay additional eggs in the nests of other Black-billed Cuckoos or other bird species, and abundant food may promote a clutch size increase to 4-5 eggs (Bent 1940, Sealy 1978, Hughes 1997). Under optimal food conditions production of a second brood may be possible (Hughes 2001). The adults' diet is primarily large insects, such as caterpillars, crickets, grasshoppers, and butterflies, but they may also consume other birds' eggs, aquatic larvae or fish, and seeds. The nestlings are fed with caterpillars, such as tent caterpillar and gypsy moth larvae, grasshoppers, and other large insects (reviewed in Hughes 2001). Fall migration is inconspicuous, and the birds are thought to leave the breeding grounds in late August and early September soon after the young have become independent (Semenchuk 1992, Hughes 2001). Fidelity to breeding sites is probably low.

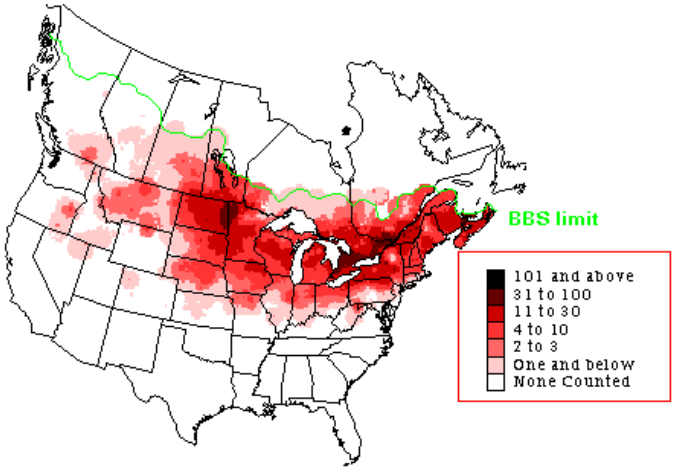
Area Requirements. Black-billed Cuckoos are probably territorial, although there is no information on home range size (Hughes 2001). The abundance of breeders in Saskatchewan was correlated with forest area, but no birds were found in groves of <1.2 ha size (Hughes 2001). The minimum size of occupied groves varied from 0.4 ha to 4 ha in the US (Forman et al. 1976, Martin 1981).

Management Issues. Because of the association with forest caterpillar outbreaks, Black-billed Cuckoo populations may be susceptible to pesticide spraying (Hughes 2001). Habitat loss and degradation through increased grazing pressure in riparian habitat along streams and the removal of roadside shrubs and other dense woody vegetation may have adverse effects on Black-billed Cuckoos (Hughes 2001). Risks, hazards, and effects of habitat change during migration and in wintering areas are unknown.

Bobolink *Dolichonyx oryzivorus*

Breeding Priority Area Imp: 4 Pop'n Trend: 4 Total: 22 Priority Pool: IA

Reason for Concern. From the mid 1960's to late 1970's Bobolinks showed an increase (4.4%, n=163, p<0.01) on BBS routes in Canada. However since 1980, there has been a decrease of 5.2% per year (n=278, p<0.01), particularly in Saskatchewan, and this has resulted in an overall decline of 2.3% per year since 1966 (n= 307, p<0.01; Sauer et al. 2002). Although this species is currently fairly common and widespread, western populations may experience the same threats as eastern populations, specifically the loss of large grassland habitat blocks and changes in agricultural practices resulting in earlier and more frequent haying during the nesting period (Herkert 1997). Bobolink abundances in BCR11, particularly the US portion, are high relative to other BCRs.



Distribution. An estimated 30% of Bobolinks' North American breeding range is in Canada (Environment Canada 2001). They breed throughout the majority of BCR11 in Canada with the exception of southwestern and southcentral Alberta, and peak Canadian abundances are in southeastern Saskatchewan and Manitoba (Sauer et al. 2002). This species also breeds through BCR11 in the United States (Environment Canada 2001). The principal wintering grounds are on grasslands in central South America (east of the Andes from eastern Bolivia and southwestern Brazil through Paraguay and northeastern Argentina) (Martin and Gavin 1995).

Habitat Requirements. Bobolinks prefer habitat composed of moderately tall, dense grasses and some forbs with moderate litter accumulation but minimal shrubs and other woody vegetation (reviewed in Dechant et al. 2001). The species occupies native and tame grasslands, haylands, lightly to moderately grazed pastures, no-till cropland, cereal crops, abandoned fields, wet meadows, and planted cover, such as Conservation Reserve Program (CRP), Permanent Cover Program (PCP), and Planted Nesting Cover fields (PNC; Martin and Gavin 1995, Dechant et al. 2001).

Nest sites are often in wet habitats or locations transitional between areas with drier soils and those with poor drainage (Martin 1971, Wittenberger 1978, 1980). Ground nests are placed under shade at the base of large forbs and are generally open overhead. If forb cover is sparse and litter cover is deep, however, a canopy may be constructed over the nest (Martin and Gavin 1995). Bobolinks forage most frequently between 6 and 15 cm above the ground in forbs interspersed with expanses of grasses or sedges. Individuals will occasionally forage in trees or

shrubs near their nesting area (Martin and Gavin 1995).

Ecology. Both sexes of Bobolinks exhibit high site fidelity (Martin 1971, Wittenberger 1978). Arrival of Bobolinks on the breeding grounds in Alberta and Saskatchewan occurs in late May and early June,, though they may be earlier in Manitoba. Birds depart by early September (Maher 1974, Salt and Salt 1976). The peak breeding season in North Dakota occurs between early June and mid July (Stewart 1975). Clutch sizes range from 3 to 7 eggs but average 5 eggs (Martin and Gavin 1995). Bobolinks usually produce a single brood, particularly on northern breeding grounds where the season is short, but renesting has been documented in the case of nest failure. The principal foods for adults and juveniles during the summer are adult and larval insects as well as weed and grain seeds; on the other hand, dependent young are fed exclusively on invertebrates (Martin and Gavin 1995).

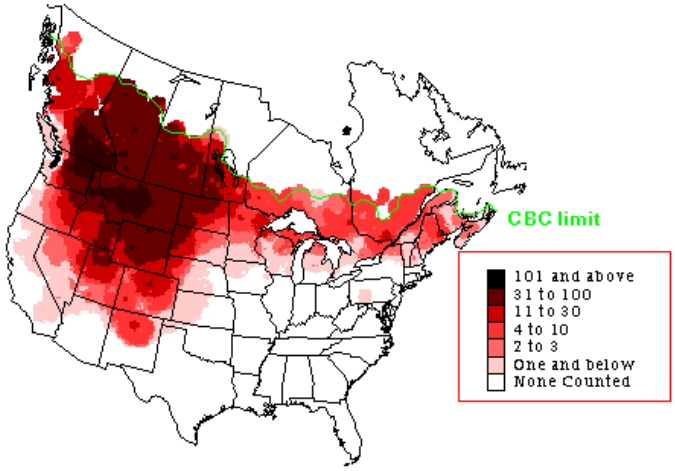
Area Requirements. Bobolinks appear to be area sensitive as abundance increases with increasing patch size (reviewed in Dechant et al. 2001). Nest predation and parasitism rates decreased and abundance increased for Bobolinks at the interior of patches compared to the edges (Johnson and Temple 1990, Helzer 1996). Territories include both foraging and nesting areas and range from a mean size of about 0.5 ha in good habitat to 2.0 ha in lower-quality habitat (reviewed in Martin and Gavin 1995).

Management Issues. The loss of agricultural grasslands (i.e., native and tame haylands and pastures), presumably a result of conversion to cropland and encroachment of woody vegetation, has likely caused a 90% decline in Bobolink populations in Illinois since 1952 (Herkert 1997). The encroachment of woody vegetation and accumulation of litter also decrease habitat suitability in eastern portions of Bobolinks' range, but litter accumulation is not an issue throughout most of the Canadian portion of BCR11 because of low moisture conditions. Therefore, properly-timed (i.e., outside breeding season) disturbances such as burning, mowing, and grazing can be beneficial (Herkert 1991, Madden 1996). Although responses varied across their range, burned areas were generally used by breeding Bobolinks within two years of the disturbance (e.g., Martin 1971, Herkert 1991, Madden 1996). Haylands may be used by Bobolinks, but such habitats likely function as an ecological trap: earlier and more frequent mowing of haylands was capable of producing a regional population decline (Herkert 1997) as reproductive success is severely reduced (Bollinger et al. 1990). Dale et al. (1997) found the abundance of Bobolinks in Saskatchewan to be highest in tame hayland mowed annually or periodically (idle for four to eight years) when compared to idle native grassland, while Davis et al (2003) found Bobolinks to be attracted to PNC sites planted with native versus tame grasses and no influence of time since management. Light to moderate grazing may be beneficial to this species, but overgrazing, particularly in short-grass habitats, can have negative effects (Dechant et al. 2001). Bobolinks in Manitoba and Saskatchewan avoided wheat fields and occupied PNC fields, PCP fields, and idle native grassland (Dale 1993, Dhol et al. 1994, Hartley 1994, McMaster and Davis 1998). Overall, managing for this species will involve providing large areas of native and tame grasslands of moderate height and density with adequate litter, while controlling succession and reducing disturbance to nesting habitat during the breeding season (Dechant et al. 2001).

Bohemian Waxwing *Bombycilla garrulus*

Wintering Priority Area Imp: 4 Pop'n Trend: 4 Total: 19 Priority Pool: IIA

Reason for Concern. Bohemian Waxwings show a negative population trend in CBC and BBS data, but this trend is not significant (Dunn 2002). The census data, however, is very weak and even a 50% population change over 20 years could not be detected with the current methods. The main reasons for such weaknesses are as follows: the breeding range is located at and beyond the northern fringe of breeding surveys, loosely colonial nesting habits make them easily overlooked during surveys, and flocks vary tremendously in size and distribution with their nomadic nature (Cadman et al. 1987, Dunn 2002). There is a high responsibility for stewardship because of a concentration of breeding birds in Canada and of wintering birds in the Canadian part of BCR11.



Distribution. In contrast to the Cedar Waxwings, Bohemian Waxwings are circumpolar in distribution, with a relatively limited breeding distribution in northwestern North America. Breeding by Bohemian Waxwings occurs in western boreal forests and mountainous regions, possibly as far as northern Manitoba in the east to Washington and Montana in the south, and Yukon and Alaska in the north (Godfrey 1986, Sauer et al. 2002). Although Bohemian Waxwings can stay in the boreal forest, wintering birds concentrate heavily in BCR11 (Sauer et al. 2002), with the core range extending when berry crops are low (mainly west to Oregon, south to New Mexico, and sometimes east through southern Canada and the northern US; Sauer 1997). About 80% of Bohemian Waxwings' North American breeding distribution and 30% of the wintering distribution are in Canada (Environment Canada 2001).

Habitat Requirements. Bohemian Waxwings breed in coniferous forest, muskeg, and less often in mixed woodlands, with a general preference for edges and openings (Semenchuk 1992). Their nests are usually 1-15 m high on an outer horizontal limb of a conifer, often located near a lake or stream where berries and flying insects are abundant (Terres 1980, Semenchuk 1992).

Wintering habitat for Bohemian Waxwings is highly variable and mostly determined by the availability of fruit-bearing trees or shrubs (Semenchuk 1992). Wintering birds in BCR11 are found in deciduous or mixed forests, woodlots, shelterbelts in agricultural lands, riparian habitat, suburban areas, and city parks.

Ecology. The breeding biology of Bohemian Waxwings is not well known. Spring movements occur in April and May (Semenchuk 1992). The birds nest in loose colonies, but no territories are defended (Bent 1950, Salt and Salt 1976). Because waxwings tend to nest in loose colonies in good berry areas, their fidelity to breeding sites is very low (Witmer et al. 1997). Breeding is relatively late in the season, possibly to synchronize fledging with the first berry crops (Witmer et al. 1997). Females have been observed incubating 4-6 eggs from the end of May to mid July, and occurrence of second broods is unclear (Bent 1950, Godfrey 1986, Ehrlich et al. 1988). Breeding waxwings capture insects in the air or from the vegetation and feed a mix of arthropods and berries to their young (Ehrlich et al. 1988). Their preferred fruit are mountain ash and juniper berries, but saskatoons, choke cherries, rose hips, red elderberries, wild red raspberries, and others are also taken (Semenchuk 1992). Fall movements begin in September and October (Semenchuk 1992). During migration, thousands can congregate in large flocks, sometimes mixed with Cedar Waxwings (Witmer et al. 1997). The nature of their migration is poorly understood, but it appears that Bohemian Waxwings vacate the northernmost part of their breeding range, are nomadic in search of food sources, and are driven south and east during winters with a low abundance of berries.

Area Requirements. Bohemian Waxwings are gregarious and non-territorial. They can make use of smaller patches of berries, moving on when these patches are depleted (Salt and Salt 1976). There is currently no information on home range sizes of breeding or wintering birds.

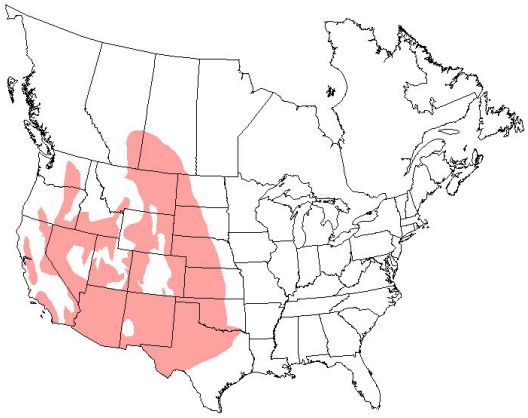
Management Issues. This species has likely benefited from the planting of ornamental fruit-bearing shrubs and trees in urban areas and possibly by the creation of edge habitat with shrubby vegetation in agricultural areas. These food sources may also stabilize movements and demography (Witmer et al. 1997). Collisions of birds with the reflective windows of buildings or with cars are assumed to have risen with the expansion of urban centres (Witmer et al. 1997). Closely-related Cedar Waxwings suffered egg-shell thinning and reduced hatching success in the 1960's and 1970's where fruiting trees and shrubs were treated with pesticides (Witmer et al. 1997). The effects of forestry in boreal regions on Bohemian Waxwings are unknown because the proportion of conifers may be reduced, while understory shrubs and berries may increase in abundance. We understand little about the responses of this bird species to the variable abundance of berries, which may be affected by dry years, fruiting cycles, and possible long-term changes similar to those in cone crops (e.g., Dale et al. 2001).

Burrowing Owl *Athene cunicularia*

Breeding Priority Area Imp: 2 Pop'n Trend: 5 Total: 23 Priority Pool: IB

Reason for Concern. Burrowing Owls are listed as Endangered by COSEWIC (Wellicome and Haug 1995). Populations have declined considerably, with an average of over 20% per year during the last decade in the Prairie Provinces (Hjertaas et al. 1995). There is a decreasing trend in brood size in some parts of their range, the breeding range in Canada is contracting, and the species is now effectively extirpated in Manitoba (Clayton and Schmutz 1995, De Smet 1997, Wellicome 1997, Holroyd et al. 2001). The primary causes of low productivity and high mortality in Burrowing Owl populations are under debate but likely include the cultivation of grasslands and pastures, loss of burrowing mammals that provide nest sites, use of pesticides, higher densities of ground predators, and reduced food availability during the nestling period (Wellicome and Haug 1995, Wellicome 2000, Holroyd et al. 2001). The risks during migration and in wintering areas are unclear but are also thought to be increasing.

Distribution. Less than 10% of Burrowing Owls' North American breeding range is in Canada (Environment Canada 2001). While some populations in the US are resident year-round, owls from BCR11 are migratory. Some Canadian owls may winter in the southern US, but most seem to leap-frog over the wintering areas of their southern neighbours and migrate into Mexico and possibly as far south as Central America (James 1992). .



* breeding range adapted from Wellicome and Holroyd 2001

Habitat Requirements. The critical habitat elements for this species are the presence of burrows for nest sites, treeless areas with short or sparse vegetation, and possibly edge habitat patches of taller, non-woody vegetation for prey (Haug et al. 1993, Wellicome 1997, Dechant et al. 2001). Nests are generally in well-drained terrain with few rocks, including in old burrows of ground squirrels, prairie dogs, badgers, or foxes (Dechant et al. 2001). Most nesting occurs in pastures, native prairie, fallow fields, and right-of-way strips, but Burrowing Owls will occasionally nest in fallow fields, cultivated lands, or in parks or residential areas (Wedgewood 1976, Haug 1985, Haug and Oliphant 1990, De Smet 1992, Schmutz 1997, Clayton and Schmutz 1999). Burrowing Owls show a consistent preference for short and sparse vegetation across their breeding range, although in certain areas, they also prefer increased distance to cropland, level ground, presence of grazing by livestock, and high density of ground squirrel burrows (James et al. 1991, Clayton and Schmutz 1999).

Foraging owls, particularly those foraging nocturnally, tend to avoid cropland, preferring fallow fields or pasture. Burrowing Owl foraging habitat choice likely represents a trade-off between

prey density (e.g., small mammals more abundant in cropland, hayfields, fallow patches with tall vegetation) and prey accessibility in less dense or shorter vegetation (Haug and Oliphant 1990, Wellicome 1994, Sissons et al. 2001).

Ecology. Burrowing Owls return to nesting areas from early April to early May and depart for wintering areas in early September and mid October (Wellicome 1997). Nest burrows are chosen and modified soon after arrival, and females begin egg-laying within two weeks of arrival. Their clutches average 9 eggs but range from 6 to 11 eggs (Wellicome 2000). Owls often breed within a few kilometres of where they were hatched, and the fidelity of adults to nesting areas is high (De Smet 1997, Wellicome et al. 1997, Poulin et al. 2001). Artificial nest sites and natural nest burrows that produced successful broods are more likely to be re-used (De Smet 1992, 1997). Burrowing Owls are opportunistic predators and take insects and small vertebrates in proportion to their availability (Haug et al. 1993). During the day, nesting owls generally capture insects in the vicinity of their nests (Haug and Oliphant 1990, Schmutz et al. 1991b). Nocturnal hunting forays cover greater distances from nest sites and yield the majority of the food in the form of small rodents (Haug and Oliphant 1990, Schmutz et al. 1991b, Wellicome 2000).

Area Requirements. Foraging owls used nocturnal home ranges of 8-481 ha in Saskatchewan, with averages of 242 ha and 34 ha reported from two separate studies (Haug 1985, Sissons et al. 2001). Home range size appears variable because Burrowing Owls require larger areas when food is scarce or when patches of high prey density are far apart.

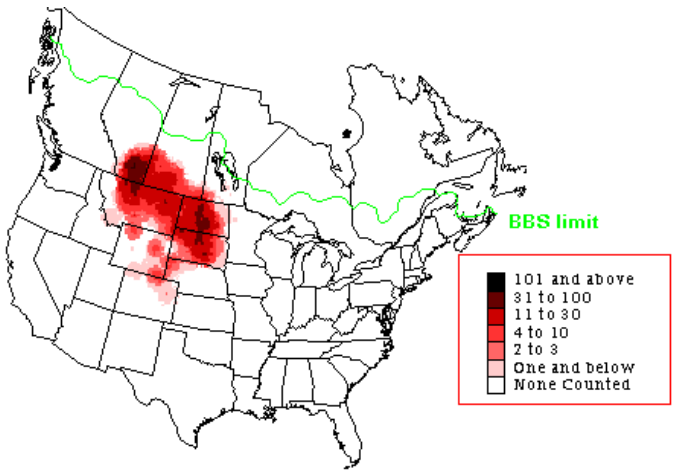
Management Issues. Burrowing Owls benefit from an integrated management of rangelands that sustains ground squirrels, prairie dogs, and badgers for providing nest sites and that enhances conditions for large insects and voles as prey (Holroyd et al. 2001). Some study results emphasize the importance of buffer zones in surrounding agricultural areas and a habitat mosaic that includes patches with taller vegetation for prey but also areas short, sparse vegetation (Wellicome et al. 1997, Clayton and Schmutz 1999). Burrowing Owls accept artificial nest burrows where nest sites are scarce, have better breeding success in them, and may benefit from a standard design for artificial nests (De Smet 1997, Wellicome et al. 1997, Poulin 1999). This species may be able to forage more efficiently in tall vegetation when perches are created or grazing is allowed (Dechant et al. 2001). Livestock manure is often used by owls for lining their burrows and appears to have a positive effect, possibly due to improved thermoregulation, attraction of dung beetles as prey, or decreased predation rates on such nests (Dechant et al. 2001). Burrowing Owls may benefit from approaches that minimize collisions with vehicles and development and reduce disturbance impacts, for example by the oil and gas industry (Scobie and Faminow 2000).

Chestnut-collared Longspur *Calcarius ornatus*

Breeding Priority Area Imp: 5 Pop'n Trend: 3 Total: 25 Priority Pool: IA

Reason for Concern. Chestnut-collared Longspurs are restricted in range to native mixed-grass prairie habitat, much of which has been lost to cultivation and urban development. Recent population declines of this species in Canada (1.7% per year from 1966-2001, n=51, p=0.3; 4.2% per year from 1980-2001, n=45, p=0.06; Sauer et al. 2002) are likely to continue as native prairie is converted to cropland (Hill and Gould 1997) and subject to overgrazing (Anstey et al. 1995). Chestnut-collared Longspur abundances in BCR11 are among the highest of all BCRs, giving this area a high stewardship responsibility.

Distribution. Approximately 35% of the North American breeding range of this species occurs in Canada. Chestnut-collared Longspurs within BCR11 breed from southern Alberta to southern Manitoba and from Montana east into North and South Dakota (Environment Canada 2001). Range reductions have been occurring in Manitoba (K. De Smet, Manitoba Conservation, *pers. comm.*) and around Saskatoon where the species has virtually disappeared (Leighton et al. 2002). The winter range spans western Oklahoma through northern Texas and New Mexico to southern Arizona and the northwest portion of Mexico (Environment Cananda 2001).



Habitat Requirements. Chestnut-collared Longspurs prefer open native mixed-grass and short-grass uplands and moist lowlands in drier habitats, with some bare ground, minimal litter accumulation, and minimal shrub coverage (reviewed in Hill and Gould 1997 and Dechant et al. 2001). They prefer sites in good to excellent range condition (Canadian Wildlife Service, *unpubl. data*). Some scattered shrubs and low forbs serve as suitable singing posts (Harris 1944, Fairfield 1968, Kantrud 1981, Davis 1994). In order of preference, Chestnut-collared Longspurs prefer native grasslands, moderately- to heavily-grazed pastures, and sparse haylands (reviewed in Dechant et al. 2001, though only 4% found in Manitoba hayfields, De Smet 1992). Fallow fields, stubble, and dense idle areas may also support limited numbers of Chestnut-collared Longspurs if vegetation is of suitable height and density (Fairfield 1968, Owens and Myers 1973, Stewart 1975).

This species nests in areas of sparse native vegetation (< 20 to 30 cm tall), such as tame pastures and recently burned, mowed, or grazed fields (Harris 1944, Fairfield 1968, Owens and Myers 1973, Anstey et al. 1995, Davis et al. 1999). Nests are usually located in a depression on the ground concealed by a clump of grass or next to a rock, pile of cow manure, or other object

(Harris 1944, Fairfield 1968, S. Davis, Canadian Wildlife Service, *unpubl. data*). Chestnut-collared Longspurs typically forage on the ground or in vegetation within a few inches of the ground.

Ecology. Arrival dates for Chestnut-collared Longspurs on their Canadian breeding grounds are usually in April (Maher 1973, Cleveland et al. 1988), with females arriving approximately 1-2 weeks later than males (Harris 1944, Hill and Gould 1997). Males are highly philopatric, returning to the same breeding sites in the following year more than two thirds of the time, whereas females have return rates of less than 50% (Maher 1973, Hill and Gould 1997). The initiation of an average 4-egg clutch begins in early to mid May, with most second or replacement clutches being initiated by early July with a few in late July (Harris 1944, Maher 1973, Dickson and Dale 1999). Approximately 65% of the nests in southern Saskatchewan are depredated (Davis *in press*), while 48% of nests in southwestern Manitoba were unsuccessful (De Smet 1992). Adults eat a mix of seeds, spiders, and other insects, while the young are fed only arthropods, of which grasshoppers are dominant (Hill and Gould 1997, D. Hill, University of Calgary, *pers. comm.*). Birds begin to flock as the breeding season ends and feed further from breeding areas (e.g., in ditches, dry sloughs, and rough ground; Harris 1944). Departure for the wintering grounds peaks in mid to late September (Maher 1973, Cleveland et al. 1988).

Area Requirements. The area requirements of Chestnut-collared Longspurs are poorly understood. The minimum area requirements in Saskatchewan were approximately 18-56 ha (SWCC 1997). Territory sizes in the Prairie Provinces generally range from 0.2 to 1.0 ha but may increase to 4.0 ha in marginal habitat (Harris 1944, Fairfield 1968, Hill and Gould 1997).

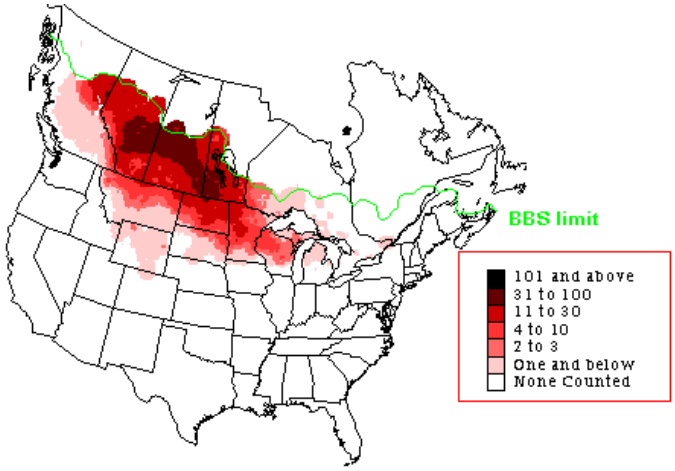
Management Issues. Chestnut-collared Longspurs appear to respond negatively to burning in the first year post-fire, but abundances increase after the second year post-fire (Maher 1973, Owens and Myers 1973). Reducing vegetation height in potential nesting areas through mowing can increase habitat quality (Owens and Myres 1973, Stewart 1975), but fields hayed only every three years in Saskatchewan were avoided (Dale et al. 1997). Throughout Chestnut-collared Longspurs' nesting range, grazed areas are preferred to ungrazed areas (Felske 1971, Maher 1973, Dale 1983, Kantrud 1981, Kantrud and Kologiski 1982, but see Davis et al. 1999), although abundance decreases on overgrazed pastures (Anstey et al. 1995). It was formerly thought that Chestnut-collared Longspurs preferred native pasture over tame pasture (Owens and Myers 1973, Anstey et al. 1995, Davis and Duncan 1999), but some studies have shown equal use of both habitats (Prescott and Wagner 1996, Davis et al. 1999). Appropriate grazing intensity should correspond with habitat productivity (i.e., sparse short grass grazed more lightly than wetter, denser mixed grass) (Dechant et al. 2001). This species may be vulnerable to pesticide use, as hatching success and food availability for juveniles are reduced in areas treated with pesticides (pyrethroid insecticide; Martin et al. 1998). Furthermore, foraging on seeds treated with fungicides or other chemicals before planting may negatively affect this species (Hill and Gould 1997). Overall, the keys to management for Chestnut-collared Longspurs include providing and maintaining native pastures with relatively short vegetation and sparse shrub and litter accumulation, while managing grazing intensity for local conditions (Dechant et al. 2001).

Clay-colored Sparrow *Spizella pallida*

Breeding Priority Area Imp: 5 Pop'n Trend: 3 Total: 20 Priority Pool: IIB

Reason for Concern. BBS and CBC data indicate a 1-2% annual population decline in Clay-colored Sparrows across North America between 1966 and 2002 (Dunn 2002, Sauer et al. 2002). Although this trend is not entirely consistent in all geographic areas and for all time periods, it seems to hold for Alberta and Saskatchewan. The high abundances and proportion of the breeding range for this species gives BCR11 a high stewardship responsibility. The range of Clay-colored Sparrows has expanded with logging, and abandoned fields may benefit the species (Knapton 1994). Populations and distribution at the beginning of BBS monitoring in the 1960's may have been higher than in pre-settlement times. On the other hand, intensification in agriculture, chemical spraying, nest predation, and cowbird parasitism are all potential limiting factors for Clay-colored Sparrows (Knapton 1994, Dechant et al. 2001).

Distribution. Approximately 70% of this species' North American breeding range is in Canada (Environment Canada 2001), and they are found throughout BCR11 (Sauer et al. 2002). Clay-colored Sparrows are migratory, and there is no overlap of the breeding range with the wintering areas, which extends from southern Texas to south-central Mexico (Knapton 1994).



Habitat Requirements. Clay-colored Sparrows occur in shrubby grasslands, pastures, planted cover, roadsides, fields, thickets near water, forest edges such as clearcuts, and sometimes in city parks (Knapton 1994, Dechant et al. 2001, McMaster and Davis 2001). The nest is usually built <30 cm above ground where vegetation is dense with little light penetration to the ground, for example, in western snowberry bushes or dense patches of tall grasses or forbs (Salt 1966, Knapton 1978).

Among the best predictors of Clay-colored Sparrow occurrence are the percentage of low shrub cover and the distance from patches of low shrub (Knapton 1978, Dale 1983, Anstey et al. 1995, Prescott and Murphy 1996, SWCC 1997). In areas without shrubs, birds prefer ground that is covered densely by leaf litter, herbaceous plants, or grassy vegetation (Dale 1983, Davis and Duncan 1999, Prescott et al. 1995, Shutler et al. 2000). Planted nesting cover that is not subjected to frequent mowing is preferred over cropland and hayfields (Dale 1993, Hartley 1994, McMaster and Davis 2001, Prescott and Murphy 1996). Clay-colored Sparrows also use a variety of pastures, preferring native pastures over tame vegetation in some situations (Anstey et al. 1995, Davis and Duncan 1999, Jones 1994; but see Wilson and Belcher 1989, Prescott and Murphy 1996). Their habitat preferences may be confounded by the fact that shrub cover is

often higher in native pasture, while foraging areas are typically comprised of open habitat with short or sparse vegetation, arable lands, or weedy fields (Anstey et al. 1995, Knapton 1994, Davis and Duncan 1999).

Ecology. Clay-colored Sparrows begin to leave wintering areas in late March and arrive at breeding grounds, often in large flocks and well synchronized, in the first half of May (Knapton 1994, Davis *in press*). The nesting season starts in late May and can last until early August, with more than half of the breeding birds attempting a second brood in many years (Knapton 1978). The average clutch size is 3.8 (range: 3 – 5; Davis *in press*). Adults and juveniles leave breeding sites between early August and early October (Knapton 1994). Site fidelity of males over subsequent years can be as high as 85% (Knapton 1994). Major food items throughout the year include a wide variety of seeds and invertebrates, with a higher proportion of catkins in spring and many larger insects (e.g., butterflies, damselflies) when feeding nestlings (Knapton 1994).

Area Requirements. Most sparrow species defend a territory for feeding as well as nesting, but Clay-colored Sparrows tend to have very small breeding territories and forage elsewhere. These nesting territories are usually 0.1-0.5 ha in size (Dechant et al. 2001) but can be as small as 0.04-0.1 ha (Knapton 1994). Larger tracts of shrubby grassland are preferred and productivity is generally higher in these larger patches as rates of Brown-headed Cowbird parasitism are lower in such patches (Dechant et al. 2001).

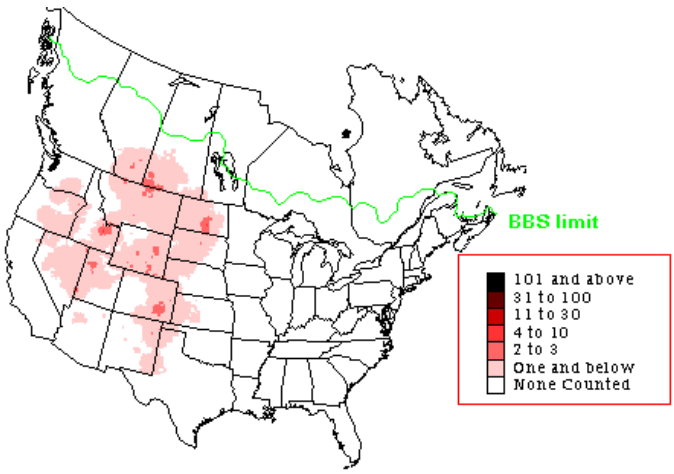
Management Issues. Large, contiguous areas of grasslands with at least some low shrub cover are ideal conditions for Clay-colored Sparrows (Dechant et al. 2001), though Davis et al. (*unpubl. data*) found little influence of pasture size on Clay-colored Sparrow densities. Conversion of shrubland to cropland will remove breeding opportunities unless brushy edges are maintained (Dechant et al. 2001). Fires that reduce shrub cover have a negative short-term effect on breeding densities (Pylypec 1991). Favourable conditions can be maintained by leaving grasslands idle for five to ten years between treatments of burning, mowing, or herbicides (Dechant et al. 2001). Where woody vegetation is absent, dense planted cover (e.g., alfalfa) may be acceptable for nesting if mowed only periodically outside of the nesting season (Hartley 1994, Prescott and Murphy 1996, Dale et al. 1997, McMaster and Davis 1998). Light to moderate grazing may enhance habitat conditions by providing foraging areas with short vegetation, if enough shrub cover is maintained for breeding opportunities (Dechant et al. 2001).

Ferruginous Hawk *Buteo regalis*

Breeding Priority Area Imp: 5 Pop'n Trend: 1 Total: 21 Priority Pool: IIB/IIC

Reason for Concern. Previously listed as Threatened, Ferruginous Hawks have been down-listed nationally to a species of Special Concern (COSEWIC 2002), and population numbers have apparently stabilized over the past 25 years. The breeding range, however, has retracted since settlement along the northern periphery in Canada (Houston and Bechard 1984, Schmutz 1984, Schmutz 1999), and remaining occupied areas of BCR11 have relatively high abundances of this species. Major concerns include the loss of grassland habitat resulting from extensive agriculture and woodland expansion due to fire suppression (CWS 2001) and the abandonment of breeding sites because of human disturbance. Intensive agricultural practices also exclude prey species, thereby reducing habitat suitability for Ferruginous Hawks (Houston and Bechard 1984).

Distribution. The Canadian distribution of Ferruginous Hawks represents about 10% of their North American breeding range (Environment Canada 2001) and is presently only half of their historic range in Canada (Schmutz and Schmutz 1980). The entire range within Canada, with the exception of two known nests in interior British Columbia, lies within BCR11 from southern Alberta to southeastern Saskatchewan and southwestern Manitoba.



Ferruginous Hawks also breed throughout BCR11 in Montana, central and western North Dakota, and south through much of South Dakota and into northern Nebraska (Environment Canada 2001). Northern populations are migratory, with those east of the Rockies wintering most commonly in Texas and northern Mexico (Bechard and Schmutz 1995).

Habitat Requirements. Ferruginous Hawks prefer open grasslands and shrubsteppe communities, characterized by rolling or rugged terrain (Bechard and Schmutz 1995, Dechant et al. 2001). Grasslands, including native and tame grasslands, pastures, and haylands, are commonly used by this species (Bechard and Schmutz 1995), while aspen parklands, high elevations, forest interiors, and narrow canyons are generally avoided (Janes 1985, Bechard et al. 1990). Areas of Alberta with >50% cultivation receive limited use (Schmutz 1984), and prey abundance is lower in areas with >30% cultivation (Schmutz 1989).

Ferruginous Hawks opportunistically build stick nests on or near the ground, in trees, large shrubs, artificial platforms, and even occasionally on abandoned buildings, haystacks, or river cutbanks (reviewed in Dechant et al. 2001 and Schmutz 1999). Nest-site selection depends on

available substrates, adjacent land use, and topography (Dechant et al. 2001). Ground nests are generally built on elevated areas of large grasslands, removed from human activities (e.g., Lokemoen and Duebbert 1976). Tree nesters also tend to avoid areas of intensive agriculture or high human disturbance, preferring single or patchy trees over densely-wooded areas (e.g., Schmutz 1984, Bechard et al. 1990). Tree nests tend to produce more young than ground nests, likely due to increased protection from predators (Schmutz et al. 1984). Ferruginous Hawks are easily disturbed and prone to abandonment, particularly during the early nesting period (Fyfe and Olendorff 1976), and may, on occasion, have nest sites usurped by Canada Goose pairs (J. Schmutz, University of Saskatchewan, *pers. comm.*, K. De Smet, Manitoba Conservation, *pers. comm.*). Peak nest density in southwestern Alberta occurred at 11-30% cultivation (i.e., greater than 70% grassland coverage) and declined linearly as the amount of grassland decreased (Schmutz 1987). Hawks in Alberta also generally avoided nesting within 0.5 km of occupied farmyards (Schmutz 1984), although in Manitoba, proximity of nests to agriculture and associated roads did not negatively affect productivity (De Smet and Conrad 1991, De Smet 1992).

Landscapes with moderate amounts (< 50%) of cropland and hayland are used for nesting and foraging (reviewed in Dechant et al. 2001). Density and productivity of Ferruginous Hawks are closely tied to prey abundance (Woffinden 1975, Houston and Bechard 1984, Schmutz 1989, Bechard and Schmutz 1995). Areas of tall, dense vegetation (e.g., taller small-grain crops) are generally avoided due to decreased prey visibility when foraging (Wakeley 1978, Houston and Bechard 1984, Schmutz 1987). Furthermore, areas of intensive agriculture, such as annual plowing and biennial fallowing, exclude many prey species and hence are also unsuitable foraging habitat (Schmutz 1989).

Ecology. Arrival on the Canadian breeding grounds occurs between late March and early April (Schmutz 1999). Site and mate fidelity are common in this species, as adults generally return to the same territory, and even nest site, yearly and pair with the same mate for several years (reviewed in Dechant et al. 2001). Eggs are laid in late April or early May, with average clutch size varying between 2 and 5 eggs (Bechard and Schmutz 1995, K. De Smet, Manitoba Conservation, *pers. comm.*). Renesting attempts after failed nesting within the same year are rare (Woffinden 1975). The young remain in the nest for six to eight weeks after an incubation period of about 36 days. Juveniles depart from the breeding grounds in August; adults follow in late September or early October (Schmutz and Fyfe 1987). Breeding birds east of the continental divide feed primarily on ground squirrels (90% of diet in Alberta; Schmutz et al. 1980) and pocket gophers, although birds, amphibians, reptiles, and insects may also be consumed (Dechant et al. 2001). Much evidence exists from Alberta linking Ferruginous Hawks' density and/or reproductive success with abundance of Richardson's ground squirrels (Schmutz et al. 1980). A crash in ground squirrel numbers in southern Manitoba and across the Canadian prairies during the 1990's let to reduced nesting success and productivity and a 35% decline in nesting pairs in southwestern Manitoba from 1996-2002 (K. De Smet, Manitoba Conservation, *pers. comm.*)

Area Requirements. This species is typically only found nesting on large blocks of uncultivated land. Although it has been suggested that 1 km^2 be used as the minimum area requirement (Fitzgerald et al. 1999), Ferruginous Hawks nest successfully in Saskatchewan

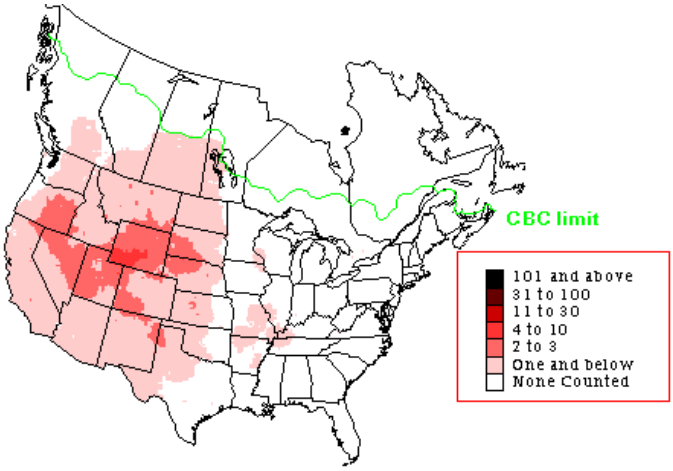
when there is approximately 5 km^2 of pasture around or adjacent to the nest (J. Schmutz, University of Saskatchewan, *pers. comm.*). Home range sizes are extremely large and often encompass a variety of habitat types; home ranges in the western US averaged between 3.14 and 8.09 km^2 but may be >20 km^2 in some areas (Wakeley 1978, Janes 1985).

Management Issues. The conversion of grasslands to croplands negatively impacts Ferruginous Hawks in many areas (Schmutz 1984). Response of this species to prescribed or natural burns and mowing is largely unknown. Grazing, on the other hand, is usually beneficial as it reduces vegetative cover and increases prey visibility (Lokemoen and Duebbert 1976, Wakeley 1978, Kantrud and Kologiski 1982, Houston and Bechard 1984), especially if nest trees are protected from rubbing and trampling. In addition to protecting large tracts of native grasslands from cultivation, management actions for Ferruginous Hawks should include providing suitable nest sites, protecting active nest areas from disturbance, and improving habitat for prey (Dechant et al. 2001).

Golden Eagle *Aquila chrysaetos*

Wintering Priority Area Imp: 2 Pop'n Trend: 4 Total: 20 Priority Pool: IIC

Reason for Concern. Although Golden Eagle populations and productivity in Canada are likely stable (Kirk and Hyslop 1998), long-term declines have been shown in breeding populations in the western United States (Kochert and Steenhof 2002). CBC data from 1959 to 1988 showed an annual decline of 1% (n=722, p<0.1). The threats faced by this species include electrocutions and collisions with artificial structures, habitat alteration causing declines in prey populations, direct human disturbance, consumption of poison intended for pest species, and possible poaching for feathers and body parts (De Smet 1986, Kirk 1996).



Distribution. Golden Eagles historically nested throughout much of North America (Bent 1937) but now breed primarily in the western half of the continent from the Arctic coast to central Mexico (Kochert et al. 2002). Some of the highest breeding densities in North America are found in the southern Yukon (Kirk 1996). Southern populations are generally resident, while northern populations move southward for winter, often migrating thousands of kilometres to areas further south than some southern residents (reviewed in Kochert et al. 2002). Wintering birds typically concentrate from southern British Columbia through BCR11 and south through the western breeding range. Approximately 50% of the Golden Eagle's North American breeding range and 30% of the wintering range are in Canada (Environment Canada 2001).

Habitat Requirements. The habitats commonly used by this species include grasslands, shrublands, arctic and alpine tundra, and open woodlands, especially in areas of rugged topography or mountainous terrain (reviewed in Kochert et al. 2002). During winter, Golden Eagles use open habitats, sagebrush shrublands, and riparian communities, generally avoiding urban, cultivated, and forested lands (Fischer et al. 1984, Hayden 1984, Marzluff et al. 1997). Pairs construct large stick nests in isolated areas on cliff ledges, escarpments, rocky bluffs, artificial structures, or in large trees (Kochert et al. 2002). A pair may use the same nest in consecutive years or shift to one of several alternate nests on their territory (Boeker and Ray 1971). Foraging also occurs in open areas such as native grasslands and shrub-steppe.

Ecology. Migrating eagles leave their northern breeding areas during September and October, with immature individuals typically migrating a few days earlier than adults. The return of Golden Eagles to their breeding grounds in March and April, however, is led by adult birds (Sherrington 1998). This species shows high site fidelity to both breeding and wintering grounds

(Kochert et al. 2002). Reproductive output of Golden Eagles is low as they do not begin breeding until four or five years of age (Steenhof et al. 1983) and only raise one brood per season. The clutch size usually ranges from 1 to 3 eggs, though siblicide may occur after hatching particularly when food is limited (Edwards and Collopy 1983). Additionally, annual reproductive success varies with weather and prey abundance, and pairs may not lay eggs during periods of low prey abundance (Kirk 1996, Steenhof et al. 1997, McIntyre and Adams 1999). Foraging commonly occurs in the early morning and evening, with eagles foraging on small to medium-sized mammals such as prairie dogs, ground squirrels, hares or rabbits, and marmots. Eagles also will take snakes, birds, carrion, and other large prey such as young ungulates and domestic livestock (Olendorff 1976, Boag 1977), with the relative importance of taxa dependent on the region.

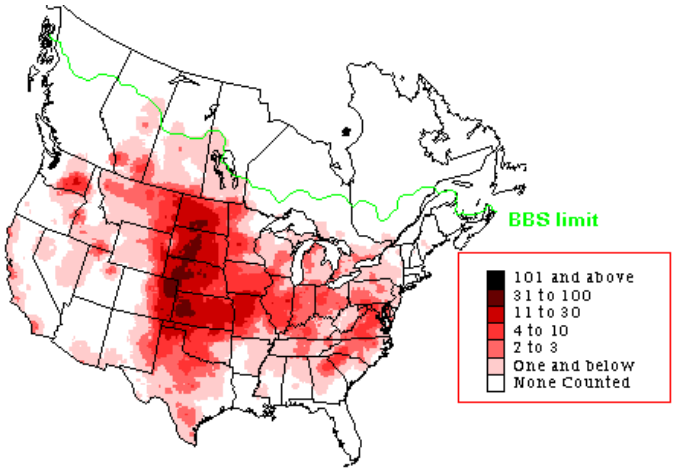
Area Requirements. Breeding season home ranges vary from 20 to 30 km^2 and average about 25 km^2 (Smith and Murphy 1973, Collopy and Edwards 1989, Marzluff et al. 1997). Non-breeding home ranges in Idaho averaged 304 km^2 (Marzluff et al. 1997).

Management Issues. Greater than 70% of recorded deaths of Golden Eagles are the result of human causes, primarily collisions with powerlines (electrocutions), wind turbines, fences, and vehicles, followed by gunshots and non-target poisonings (Bortolotti 1984, Franson et al. 1995). Guidelines have been developed to reduce raptor electrocutions (Avian Power Line Interaction Committee 1996). Furthermore, management for this species requires the maintenance of prey populations. For example, overgrazing in eagle wintering areas of the western US altered habitat quality by reducing prey populations and changing the vulnerability of prey (Kochert 1989). Golden Eagles may also be sensitive to disturbance in nesting areas, but the evidence is anecdotal (Kochert et al. 2002). Monitoring of breeding populations is difficult because nesting pairs are sparsely distributed in remote environments; BBS routes do not adequately cover Golden Eagle nesting habitat (Kirk 1996). More information is needed on how various mortality factors influence trends (Kochert et al. 2002). There seems to be a general lack of information on this species in BCR11.

Grasshopper Sparrow *Ammodramus savannarum*

Breeding Priority Area Imp: 3 Pop'n Trend: 5 Total: 21 Priority Pool: IA

Reason for Concern. Long-term yearly declines of 3.9% (n=1506, p<0.01) across their range and 5.0% per year in Canada from 1966 to 2001 (n=86, p<0.01; Sauer et al. 2002) have raised concern for Grasshopper Sparrow populations. Loss, fragmentation, and degradation of prairie habitat are the primary threats contributing to these declines. Though territory sizes are relatively small, this species is area sensitive and requires large interior grasslands distant from suburban development (Dechant et al. 2001).



Distribution. BCR11 represents only a small portion of Grasshopper Sparrows' breeding range: only 8% of their North American breeding range is located in Canada (Environment Canada 2001). This species breeds through BCR11 in the US and within Canadian portions from southern Alberta through southern Saskatchewan to southern Manitoba, with peak abundances along the Alberta-Saskatchewan border and in southern Saskatchewan (Environment Canada 2001, Sauer et al. 2002). Wintering areas are in the southeastern US, extreme southwestern US, Mexico, and northern regions of Central America.

Habitat Requirements. The preferred habitats of Grasshopper Sparrows are grasslands of intermediate height, moderate litter depth, minimal woody vegetation coverage, and with clumps of vegetation interspersed among patches of bare ground (reviewed in Vickery 1996 and Dechant et al. 2001). Both native and tame grasslands represent suitable breeding habitat for Grasshopper Sparrows (Wilson and Belcher 1989, Madden 1996, Davis and Duncan 1999), including native prairie, CRP fields, tame pastures, and haylands (Dechant et al. 2001). Grasshopper Sparrows only occasionally inhabit cropland, and densities therein are much lower than in grassland habitats (e.g., Basore et al. 1986, Best et al. 1997, McMaster and Davis 2001).

The well-concealed ground nests of this species are often found at the base of a clump of grass and are domed with overhanging vegetation (Vickery 1996). Grasshopper Sparrows forage exclusively on the ground, particularly on bare exposed areas (Vickery 1996).

Ecology. Grasshopper Sparrows arrive on their Canadian breeding grounds in mid May and depart by mid September. Breeding site fidelity appears to be lower in prairie regions than in eastern regions (Vickery 1996), but no data is available for Canadian portions of the breeding range. The common clutch size is 4 to 5 eggs with pairs throughout most portions of the

breeding range producing at least two broods per season (Vickery 1996). Renesting is also common following nest failure. Grasshopper Sparrows' summer diet consists primarily of small invertebrates (especially grasshoppers); their winter diet is primarily seeds (Vickery 1996).

Area Requirements. Grasshopper Sparrows have a relatively small territory size of <2 ha but are area sensitive, preferring large tracts of grassland over smaller patches (Herkert 1994, Vickery et al. 1994). The minimum area requirements are thought to range from 30 to 100 ha. These sparrows are more abundant at interior grassland areas away from woodland edges (Dechant et al 2001), perhaps due to nest parasitism by Brown-headed Cowbirds (Johnson and Temple 1990).

Management Issues. Large areas of contiguous grassland of intermediate height, moderate litter cover, and low shrub density should be provided to effectively manage for Grasshopper Sparrows (Dechant et al. 2001). Grasshopper Sparrows generally avoid burned areas in the year immediately post-fire but responded positively to prescribed burning in both North and South Dakota, with abundance increasing between two and four years post-fire (see references summarized in Dechant et al. 2001). Mowing, provided that it does not occur during the nesting period, may be preferable to burning in some locations to reduce litter density and improve habitat quality (Swengel 1996). Light to moderate grazing may benefit this species in areas with high, dense grass by reducing vegetation height and density and creating open patches (Kantrud 1981, Whitmore 1981, Kantrud and Kologiski 1982, Vickery 1996). Where vegetation is sparse, however, grazing may reduce vegetation height and coverage below that required by Grasshopper Sparrows and create unsuitable habitat (Dechant et al. 2001). This species is regularly parasitized by Brown-headed Cowbirds in southwestern Manitoba (17 of 40 nests; De Smet 1992).

Greater Sage-Grouse *Centrocercus urophasianus*

Breeding/Wintering Priority Area Imp: 3 Pop'n Trend: 5 Total: 25 Priority Pool: IA

Reason for Concern. Greater Sage-Grouse in Canada are designated as Endangered (COSEWIC 2002). These birds have a very restricted range, and their populations have decreased precipitously since European settlement. Population numbers in Alberta have declined by 85-95% over the past 30 years; they have declined by 80% in Saskatchewan over the past 15 years (CWS 2001). Although Greater Sage-Grouse are upland game birds in the US, hunting pressure south of the border is not thought to influence current declines as heavily as other factors including habitat loss and fragmentation, grazing practices, predation, and drought. Conservation plans are currently being developed in US portions of this species' range.

Distribution. About 5% of the North American range of Greater Sage-Grouse lies within Canada (Environment Canada 2001). They are a resident species throughout their range and are restricted to the range of sagebrush within the mixed-grass ecoregion (extirpated from range in British Columbia; Aldridge 1998, CWS 2001). Their range within the Canadian portion of BCR11 covers approximately 4000 km^2 in southeastern Alberta and 4300 km^2 in southwestern Saskatchewan (CWS 2001). US portions of BCR11 have populations only in Montana, though they may be found historically in other western states.

* resident range taken from Schroeder 2002

Habitat Requirements. Greater Sage-Grouse are almost entirely restricted to the range of sagebrush throughout the year (Aldridge 1998). The dominant species of sagebrush in Alberta is hoary sagebush, which is most often associated with June grass, blue grama, spear grass, and western wheatgrass (Aldridge 1998). The interspersion of sagebrush stands with meadows and riparian areas increases the habitat suitability for this species (Dechant et al. 2001).

Breeding (lek), nesting, brood rearing, and wintering sites used by Greater Sage-Grouse are dependent on the appropriate canopy cover, height, and density of sagebrush (Aldridge 1998, Dechant et al. 2001). Leks, or strutting grounds, are generally on flat sites but can also be located on small knolls or ridges (Aldridge 1998). Lek sites are usually sparsely vegetated (15-25% sagebrush canopy cover) and located within or adjacent to sagebrush stands that serve as nesting, foraging, and roosting sites (Aldridge 1998, Dechant et al. 2001). Spring roosts used by males have sagebrush standing <30 cm tall with a canopy cover of 20 to 50% (Aldridge 1998). Nesting usually occurs near the lek in sagebrush stands ranging in height from about 20 to 80 cm with a canopy density of 20 to 50% and moderate amounts of herbaceous understory (Aldridge

1998, Dechant et al. 2001). Female grouse in Alberta selected sagebrush stands of 7.5 to 15 m radius for nesting and place their nests under the tallest, most dense plants. Open, moist sagebrush habitat is preferred during the early brood-rearing period; later in brood rearing, broods and hens can move considerable distances away from sagebrush into wetlands, moist meadows, and riparian areas where food is most abundant (Aldridge 1998, Dechant et al. 2001). Dense sagebrush habitat, similar in composition to nesting habitat, is selected for rearing when mesic type habitats are limiting (Aldridge 2000). Wintering habitat consists of tall, dense sagebrush that is most often located on flat, southern aspects (Aldridge 1998, Dechant et al. 2001). Sagebrush serves as the sole food source and protection from inclement weather during the winter months (Aldridge 1998), but extreme snow depths could limit access.

Ecology. Greater Sage-Grouse are considered to be residents throughout their range, with only short migrations during the harshest of winters (Aldridge 1998). Both sexes show strong lek-site fidelity. Males move to the leks in late winter, and territory establishment and courtship displays begin as soon as the snow melts (Aldridge 1998). Lek activity may last from late February through early June in Canadian portions of BCR11 (CWS 2001). Peak clutch-initiation date in Alberta is in late April with clutch sizes ranging from 7 to 9 eggs. The diet consists entirely of sagebrush leaves and buds during the winter but shifts to include forbs and insects during the late spring and summer (Aldridge 1998). The main predators of Greater Sage-Grouse are Golden Eagles, particularly on the lekking grounds, although they may be preyed upon by Ferruginous Hawks, Swainson's Hawks, Cooper's Hawks, and Northern Harriers, coyotes, bobcats, weasels, and domestic cats (Schroeder et al. 1999, CWS 2001).

Area Requirements. Leks in Saskatchewan have a mean size of 0.7 ha and, in suitable habitat, an average density of one per 36 km^2 (CWS 2001). Nests are generally located within 3 to 5 km of the lek where breeding took place (Aldridge 1998, 2000).

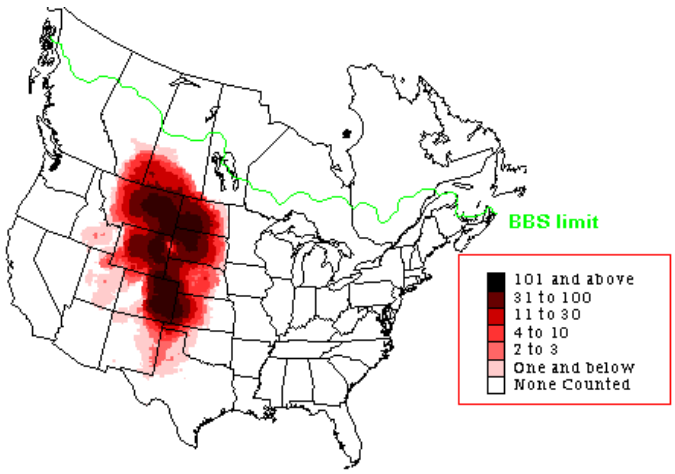
Management Issues. The fragmentation and conversion of native sagebrush to tame forage and cropland has severely reduced suitable nesting, brood-rearing, and wintering habitat for Greater Sage-Grouse and contributed significantly to their decline (Dechant et al. 2001, Aldridge 2000, Connelly et al. 2000). Livestock grazing in grouse habitats may be positive if it promotes growth of forbs but negative if heavy grazing leads to a decrease in understory productivity or if habitats are treated to increase grass forage (Beck and Mitchell 2000, Connelly et al. 2000). Use of altered habitats by Greater Sage-Grouse depends on the configuration with native habitats (Schroeder et al. 1999). Human activity (e.g., oil and gas development) in close proximity to lekking or nesting grounds increases the stress on these birds and may result in lek or nest abandonment (Schroeder et al. 1999, Connelly et al. 2000). The increase in Alberta coyote numbers in the early 1990's has been implicated as a contributing factor in the decline of Greater Sage-Grouse. Lekking areas within 800 m of power lines are avoided due to increased predation risk from raptors, and grouse are also prone to collisions with farm vehicles, fence, and power lines (CWS 2001).

Lark Bunting *Calamospiza melanocorys*

Breeding Priority Area Imp: 3 Pop'n Trend: 5 Total: 22 Priority Pool: IA

Reason for Concern. Lark Buntings are difficult to monitor due to pronounced annual fluctuations in population numbers but seem to show long-term consistent population declines in Canada (10.3% per year from 1966 to 2001, n=37, p=0.02) and throughout its range (-1.5%, p=0.02, n=352; Sauer et al. 2002). Additionally, this species is thought to be area sensitive and may suffer nest losses from agricultural activities during their peak breeding season.

Distribution. The breeding range of Lark Buntings in Canada (16% of the North American breeding range) lies entirely within the Canadian portion of BCR 11 (Environment Canada 2001). They breed from southern Alberta through southern Saskatchewan and extreme southwestern Manitoba, with peak abundances in extreme southern Saskatchewan (Sauer et al. 2002). Lark Buntings regularly breed in US portion of BCR11 in Montana and western North and South Dakota, irregularly in eastern North and South Dakota, and are absent from Minnesota and Iowa (Shane 2000). The wintering areas are in Texas, southern New Mexico, southern Arizona, and the northern half of Mexico (Shane 2000).



Habitat Requirements. Preferred habitat for Lark Buntings are grasslands of low to moderate grass height with dense vegetation coverage, patches of bare ground, and above average shrub component (Dechant et al. 2001, K. De Smet, Manitoba Conservation, *pers. comm.*). Those habitats may include short-grass prairie, mixed-grass prairie, shrubsteppe, weedy fallow croplands, minimum-tillage croplands, planted cover fields (e.g., CRP, PCP), hay meadows, and native or tame pastures (reviewed in Shane 2000 and Dechant et al. 2001). Roadside ditches are also used in Canada (A. Smith, Canadian Wildlife Service, *pers. comm*.).

Lark Buntings are ground nesters and generally nest in a depression near or under protective vegetation such as forbs, tall grasses, or low shrubs (e.g., Shane 1972, Stewart 1975). Vegetative cover is an important component of their nesting habitat and may be crucial to their nesting success as it serves to shelter the nest from rain, solar radiation, and predators (Shane 2000, Dechant et al. 2001). Vegetation heights around ground nests in mid-western US averaged 25 to 30 cm tall (Baldwin et al. 1969, Shane 1972). Lark Buntings use open areas, often without protective cover, for foraging (Lima 1990).

Ecology. This species arrives on its northern breeding grounds in late May with peak breeding

activity occurring in June and July (Stewart 1975). Fall migration begins in late July and continues through August (Semenchuk 1992). Little is known about Lark Buntings' fidelity to previous breeding sites, but their nomadic ways might suggest that territory fidelity would be minimal compared to other species. Clutch size is 4 to 5 eggs and, owing to their relatively late arrival and early departure on the breeding grounds, they generally produce only a single brood (Shane 2000). Lark Buntings are gregarious, and males maintain only loose territories during the early phases of breeding (Shane 2000). Breeding adults forage on the ground for grasshoppers, ants, scarab beetles, bugs, and seeds of grasses, grain, and forbs (Baldwin et al. 1969); nestlings are fed primarily invertebrates.

Area Requirements. The territory size of individuals in South Dakota and Colorado averaged 0.2 ha in idle mixed-grass and alfalfa fields to 1.1 ha in heavily winter-grazed short grass pasture (Shane 2000). This species prefers areas ≥10 km^2, and they have been associated with large areas of contiguous grasslands, indicating Lark Buntings may be area sensitive (Dechant et al. 2001).

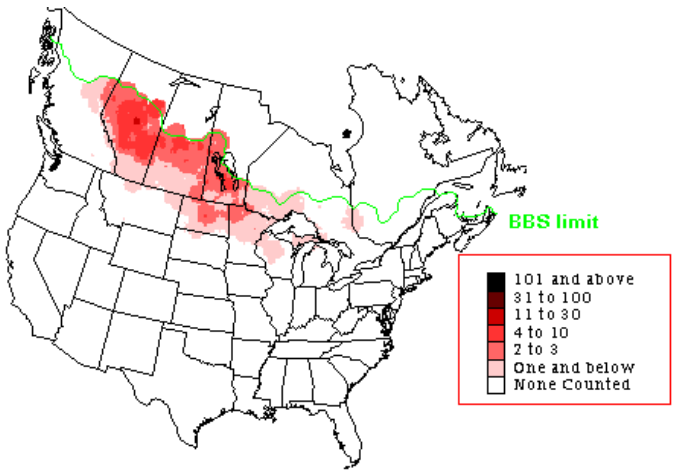
Management Issues. The response of Lark Buntings to burning is unknown, whereas their response to grazing varies with grassland type and the intensity of grazing. Although heavy grazing in short-grass prairie is often detrimental since it reduces vegetation height and coverage, light to moderate grazing, particularly in winter and in areas of tall grass, may be acceptable (reviewed in Dechant et al. 2001). Lark Buntings in North Dakota avoided haylands mowed the previous year (Kantrud 1981). Birds in aspen parkland of Alberta, Saskatchewan, Manitoba, and the northern states were generally more abundant in both CRP and PCP grasslands than in cropland (McMaster and Davis 1998, Dechant et al. 2001). Brood parasitism by Brown-headed Cowbirds does not appear to be limiting reproductive success (Shane 2000), but no studies have investigated the relationship between patch size and nest success or the prevalence of brood parasitism (Dechant et al. 2001). Little is known about the effects of pesticides on Lark Buntings (Shane 2000, Dechant et al. 2001). Management actions for this species should include providing large grassland areas with short vegetation and protective nest cover and managing grazing systems and intensity to correspond to the type of grassland (Dechant et al. 2001).

Le Conte's Sparrow *Ammodramus leconteii*

Breeding Priority Area Imp: 4 Pop'n Trend: 2 Total: 22 Priority Pool: IA

Reason for Concern. Wet meadows and shallow marsh edges, habitats used by Le Conte's Sparrows, are being lost. Currently Canadian populations appear stable with an insignificant increase from 1980 to 2001 (1.6%, n=119, p=0.27), while numbers in the U.S. over this period exhibit a slight increase (4.3%, p=0.01, n=57; Sauer et al. 2002). However, detection rates on the BBS are low, and both local summer and winter densities vary annually as a result of changes in moisture levels (Lowther 1996). BCR11 has a high stewardship responsibility for this species.

Distribution. Canada contains 85% of the North American breeding range of Le Conte's Sparrows (Environment Canada 2001). They are found breeding throughout BCR11 in Canada and have higher abundances in the northern half of the BCR than in the southern half (Sauer et al. 2002). This species is found within the United States portion of BCR11 in eastern North Dakota and extreme northeastern South Dakota and east through to northern Minnesota (Environment Canada 2001). The wintering grounds are located from eastern Texas and Oklahoma through central Missouri and southern Illinois to western Kentucky, Tennessee, and Georgia to the Gulf of Mexico (Lowther 1996).



Habitat Requirements. Though habitat use varies widely by region and yearly moisture conditions, Le Conte's Sparrow habitat is typically characterized by tall, thick, herbaceous vegetation (e.g., native and tame grasses, sedges, rushes, and forbs; Dechant et al. 2001) and thick litter for nesting cover (Madden 1996). Breeding populations can be found in wetland margins and sedge meadows, and on prairie, grasslands within aspen parkland**,** idle pasture, hayfields, fallow fields, and planted cover fields (e.g., CRP, PCP, PNC reviewed in Lowther 1996 and Dechant et al. 2001).

Relatively few Le Conte's Sparrows' nests have been found and described as they build very cryptic nests (Lowther 1996). Those that have been located are often on or just above (<20 cm) the ground surface at the base of a grass clump or in a thick tangle of vegetation (Peabody 1901, Walkinshaw 1937, Lowther 1996). Such ground-nesting sites in marshy lowland areas may be susceptible to flooding should water levels rise suddenly.

Ecology. The breeding season for Le Conte's Sparrows lasts from early May until late August or early September (Murray 1969, Stewart 1975). Drastic fluctuations in local population

numbers are observed from year to year, most likely due to variation in moisture conditions (Stewart 1975, Knapton 1979, Madden 1996). Observed increases in abundance are often correlated with moist years following a period of drought (Igl and Johnson 1999). The common clutch size of Le Conte's Sparrows is usually 4 to 5 eggs (Lowther 1996). Renesting following nest failure has been observed, but birds are not known to double-brood (Bent 1968 and Johnsgard 1979 in Dechant et al. 2001). Adults forage on the ground and in low, dense grasses or bushes for grass seeds, spiders, and other insects (Lowther 1996), while the young are fed exclusively on insects (Semenchuk 1992).

Area Requirements. Although evidence for minimum area requirements is limited (Johnson and Igl 2001), the needs of this species, especially in winter, are poorly understood (Lowther 1996). Estimates of breeding territory sizes in North Dakota and Minnesota were approximately 0.0009-0.004 ha (0.9 – 4 m^2; Murray 1969, Cooper 1984).

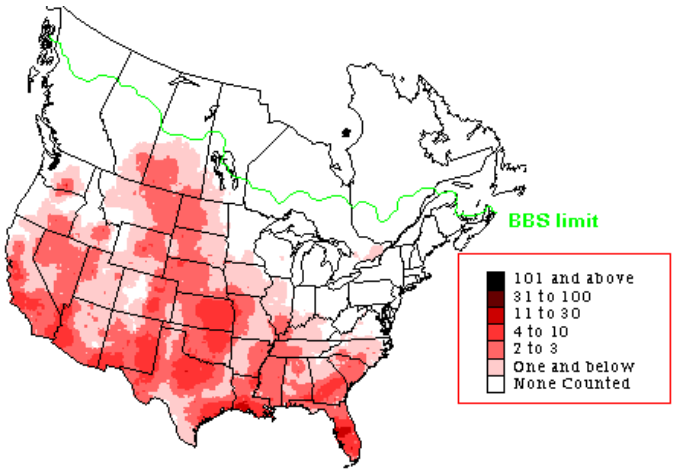
Management Issues. Important management steps for Le Conte's Sparrows should include controlling succession and providing moist uplands and lowland margins, with tall, thick, herbaceous vegetation and thick litter (Dechant et al. 2001). Although abundances may be reduced for the year following management, periodic burning, mowing, or grazing treatments (two to six year intervals) may be required to ensure such habitat for Le Conte's Sparrows (Dechant et al. 2001, Davis et al. 2003). Abundance of this species was higher on moist grasslands that had been burned, particularly those burned at short two to four year intervals (Madden 1996). Intermittent mowing may allow use by some breeding pairs (Kantrud 1981, Dale et al. 1997), but annual mowing can negatively affect breeding Le Conte's Sparrows by destroying nests and reducing the thick litter layer preferred for nesting (Murray 1969, Lowther 1996, Dale et al. 1997). Le Conte's Sparrows are known to use both native and tame pastures (Prescott and Murphy 1996), but the effects of grazing remain unclear (Bock et al. 1993 in Dechant et al. 2001). Occurrence, however, was higher on hayed PCP sites than on grazed PCP sites in Alberta, Saskatchewan, and Manitoba (McMaster and Davis 2001). Conversion of native habitat to cropland appears to be detrimental for Le Conte's Sparrows as they were not observed in cropland in the aspen parkland or prairie regions of BCR11 (Dale 1993, Jones 1994, Prescott and Murphy 1999, McMaster and Davis 2001). Overall, more research is needed on habitat requirements of this species and on its response to habitat disturbance.

Loggerhead Shrike *Lanius ludovicianus excubitorides*

Breeding Priority Area Imp: 2 Pop'n Trend: 5 Total: 19 Priority Pool: IIC

Reason for Concern. Two subspecies of Loggerhead Shrikes occur in Canada. COSEWIC has classified the eastern subspecies (*migrans*), found only in extreme eastern portions of BCR11, as Endangered and the western subspecies (*excubitorides*) as Threatened (COSEWIC 2002). Loggerhead Shrikes have likely been declining since the early 1900's, but since the 1960's, they have experienced declines of 3.8% per year range-wide (n=1431, p<0.01) and 10.0% per year in Canada (n=71, p<0.01; Sauer et al. 2002). Populations in eastern Saskatchewan and Manitoba continue to decline while those in central Saskatchewan and Alberta appear stable (CWS 2001) after a substantial population decline and range reduction. Habitat loss and alteration due to changing agricultural practices have decreased the availability and quality of suitable breeding habitat (Yosef 1996), and chemical use in agricultural activities may also impact shrike and their prey (Yosef 1996, Yosef and Deyrup 1998).

Distribution. Approximately 8% of Loggerhead Shrikes' breeding range is found within Canada (Environment Canada 2001). The distribution of breeding prairie populations closely approximates Canadian BCR11 boundaries (i.e., from central and southern Alberta through central and southern Saskatchewan to southwestern Manitoba), although in recent years the breeding range of this species in the Prairie Provinces has been receding southward (Prescott and Bjorge 1999). Loggerhead Shrikes are also found throughout the American portion of BCR11. Wintering occurs throughout the southern United States and Mexico and probably into central America.



Habitat Requirements. Loggerhead Shrikes prefer open grassland habitat, interspersed with trees or shrubs for nesting and perching. The variety of habitats used includes native prairies or tame pastures with scattered trees, sagebrush desert, agricultural fencerows or shelterbelts, abandoned farmsteads, transportation rights-of-way, parks and golf courses, and riparian areas or woody draws (Yosef 1996, Dechant et al. 2001). The availability of hunting perches (e.g., dead branches of trees, tall shrubs, utility wires, fences) and impaling stations (e.g., sharp twigs, thorns, barbed wire) may be important components of habitat selection (Yosef 1996, Dechant et al. 2001). The general structure of Loggerhead Shrikes' habitat is similar across their range, although elements such as tree and shrub species used for nesting reflect local preferences and abundances (Prescott and Bjorge 1999). Thorny buffaloberry, willow, or common caragana are the primary shrub components of their habitat in the Prairie Provinces (Prescott & Bjorge 1999).

Nest sites are frequently located in the center or lower half of three to six metre tall shrubs or in shelterbelt trees up to ten metres tall. Loggerhead Shrikes in southwestern Manitoba generally used willow shrubs in pasturelands and caraganas or deciduous trees in shelterbelts for nesting; nesting sites contained significantly more pasture, fewer trees, and longer fencerows than random sites (De Smet 1992, Hellman 1994). Nesting success at these sites decreased as the understory height and cover increased (Hellman 1994). Nesting areas in southeastern Alberta had more thorny buffaloberry, greater cover of grass ≥20 cm, and taller grasses and forbs than unoccupied, heavily-grazed sites (Prescott and Collister 1993). Hence, there is variation surrounding the importance of understory vegetation in nest-site selection and subsequent success. The preferred foraging habitat for Loggerhead Shrikes in Canada's mixed-grass prairie is ungrazed areas with grass height ≥20cm (Prescott and Collister 1993), and they prefer perennial grasslands over cereal crops and railway right-of-ways (Collister 1994). Foraging success in mixed grass prairie is highest, however, within the right-of-ways (Collister 1994).

Ecology. Loggerhead Shrikes usually arrive on the breeding grounds around April with males arriving before females. Adult males exhibit greater site fidelity than females, but overall return rates of adults ranged from 16% in southwestern Manitoba to 32% in southeastern Alberta (return rate for juveniles was <1%; Collister and De Smet 1997). Most birds in Alberta have departed for the wintering grounds by late August (Precott and Bjorge 1999). Clutch initiation peaks in mid to late May (arrival and clutch-initiation dates are slightly earlier and departure dates slightly later for birds in the more southerly sections of BCR11). Clutch sizes in the northern and western parts of the range tend to be larger than other areas (Collister 1994): the average clutch size in southwestern Manitoba and southeastern Alberta was 6.3 eggs (Collister and De Smet 1997, Prescott and Bjorge 1999). Most birds produce a single clutch, although pairs may renest after early nest-failures and double broods are rarely successful in western Canada (De Smet 1992, Collister 1994, Dechant et al. 2001). Loggerhead Shrikes are opportunistic predators and appear to adjust their diet based on local prey availability. Their diet is dominated by invertebrate prey (e.g., crickets, grasshoppers, beetles) but also includes vertebrates (e.g., small mammals, birds, amphibians) (Yosef 1996). Impaling stations are often used to secure prey for storage and during consumption as shrike lack talons.

Area Requirements. The average territory size in Alberta was 8.5 ha and territories were asymmetrical in shape (Collister 1994). Territory size, however, has been known to range from 2.7 - 25 ha (Yosef 1996).

Management Issues. Management actions for this species will require providing suitable grassland habitat for foraging and nesting. Foraging habitats may require a shorter grass component (e.g., moderately grazed or mowed) for insect foraging and a taller grass component to provide vertebrate foraging opportunities. Shelterbelts, riparian areas, abandoned farmsteads, and other shrubby habitats must also be maintained to provide scattered trees and shrubs for nesting and perching. Conversion of native grassland habitat to cropland, particularly row crops, is generally detrimental to Loggerhead Shrikes. Prescribed burning appears to be tolerated, provided that the frequency of disturbance is low enough to ensure that trees and shrubs are not eliminated (Dechant et al. 2001). Grazing is also tolerated, if trees and shrubs used for perching and nesting are protected against cattle grazing and rubbing (Yosef 1996). In some portions of the breeding range, grazed areas may actually be preferred as they provide a mosaic of foraging

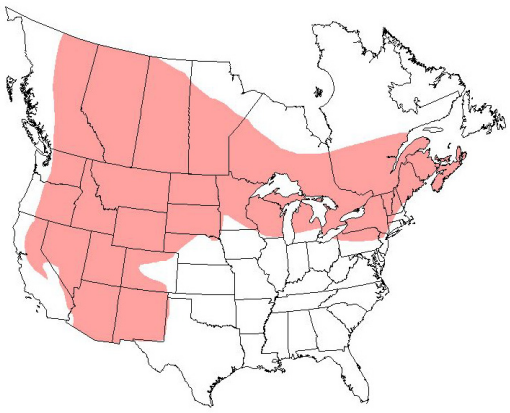
habitats and scattered shrubs which are ideal for nesting (De Smet 1992). Although many agricultural pesticides and fertilizers thought to bioaccumulate in Loggerhead Shrikes and reduce prey availability (Yosef 1996, Yosef and Deyrup 1998) are no longer used, their residues are still present in the environment. Effects of newer chemicals are also largely unknown.

Long-eared Owl *Asio otus*

Breeding Priority Area Imp: 3 Pop'n Trend: 5 Total: 20 Priority Pool: IIA

Reason for Concern. CBC data suggest declines in Long-eared Owl populations in certain states and stable numbers elsewhere (-1.6% per year from 1959-1988, n=709, $p<0.05$). Canadian trends are not separable from those in the U.S. because CBC data include birds from across all parts of the species' range (Dunn 2002). All regions stress the lack of adequate information (Marks et al. 1994) due to the lack of BBS data for this species, irruptive populations, and difficulties in detecting individuals. As the only existing data is at the range level, improved monitoring is essential to determine local trends in our BCR. Threats faced by Long-eared Owls include the destruction and degradation of riparian habitat and the reforestation of open areas traditionally used by the owls for hunting (Marks et al. 1994).

Distribution. Long-eared Owls are distributed across North America and Eurasia between 30^0 and 65^0N (Marks et al. 1994). This species breeds from southeastern Yukon and northern Alberta across central Canada to the Maritime Provinces, south to Virginia, west across the central U.S. and south to northern Baja California, southern Arizona and southern New Mexico (Marks et al. 1994). Fifty percent of the North American breeding range of this species is located within Canada (Environment Canada 2001), but individuals usually migrate from the northern portion of the breeding range (Marks et al. 1994). Long-eared Owls are year-round residents throughout southern portions of BCR11, though rarely in Canada.



* breeding range adapted from Environment Canada 2001

Habitat Requirements. Open forests and dense woodlands adjacent to grasslands or shrublands are the common breeding habitats for Long-eared Owls (Marks et al. 1994). Winter habitat is very similar to breeding habitat, with dense vegetation particularly important for concealment and cover at winter roosts. A greater variety of habitats may be used during migration than during breeding and wintering seasons (Marks et al. 1994). Long-eared Owls typically nest in abandoned nests of raptors and large corvids, and occasionally in cavities in trees or cliffs or on the ground. Although nesting and roosting occur in dense forests, birds hunt almost exclusively in adjacent open habitats (open forest hunting occurs below the canopy; Marks et al. 1994). Most prey is captured on the ground or from low vegetation.

Ecology. The migratory behaviour of this species is poorly understood. Nomadic behaviour in response to fluctuating prey numbers is well documented in northern Europe (Marks et al. 1994).

The same behaviour has not been documented in North America, but recent data from Saskatchewan are suggestive (Stoffel 2001). Long-eared Owls are regular migrants from their breeding range in northern Canada, and some individuals have been known to migrate long distances (southern Canada to Mexico). Communal roosting is common outside the breeding season. Eggs are laid beginning in mid March through mid May, with only one brood produced per year and a mean clutch size in North America of 4.5 eggs (ranges from 2 to 10 eggs). A wide variety of small mammals (particularly voles) and, to a lesser extent, birds form the principal food sources (Marks et al. 1994).

Area Requirements. The area requirements of this species are also poorly understood. A single breeding male in Idaho used 190-220 ha per night in May, while two breeding pairs used a core area within 1 km of nests, occasionally moving up to 3 km. Long-eared Owls do not appear to defend a territory around nest sites and may nest in loose colonies, with nests separated by as little as 14 m (Marks et al. 1994).

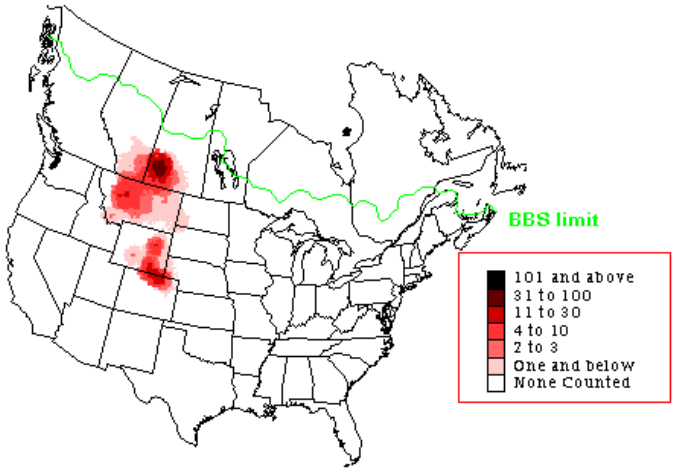
Management Issues. Although there are suggestions of a population decline in this species, much more information is needed to adequately determine any trend. Monitoring efforts need to be enhanced. Recent standardized owl monitoring protocols (Takats et al. 2001) and monitoring initiatives by Bird Studies Canada are positive steps in this direction. Nocturnal banding programs to track trends and to check for evidence of large-scale movements should be encouraged. More information is needed on the causes and extent of nomadism and the general biology of Long-eared Owls in the northern section of their range (Dunn 2002). They appear to be relatively tolerant of human activities within their territories. Maintenance of healthy riparian habitat, particularly in the arid west, would be highly beneficial to this species (Marks et al. 1994).

McCown's Longspur *Calcarius mccownii*

Breeding Priority Area Imp: 5 Pop'n Trend: 4 Total: 27 Priority Pool: IA

Reason for Concern. The global breeding range for McCown's Longspurs is restricted to the Great Plains of North America, and within this range, occurrence is sporadic in some areas due to climatic effects (With 1994a). BCR11 has a high stewardship responsibility as the abundance of McCown's Lonspurs herein is among the highest of all BCRs. Population trends for this species suggest an annual decline of 13.1% in Canada (n=24, p<0.01; Sauer et al. 2002), but our confidence in the trend is low because of poor coverage.

Distribution. Canada represents 31% of the North American breeding range and contains 57% of the breeding population of McCown's Longspurs (Environment Canada 2001). The breeding range within BCR11 extends from southern Alberta to southern Saskatchewan, south throughout the BCR in Montana, and into southwestern North Dakota and northwestern South Dakota (Sauer et al. 2002). The highest abundances of all BBS routes in North America were found in west-central Saskatchewan. McCown's Longspurs winter from Kansas to southeastern Arizona and south into northern Mexico (Environment Canada 2001, Sauer et al. 2002).



Habitat Requirements. Short-grass and heavily-grazed mixed-grass prairie, with little litter, limited vegetation cover, and patches of bare ground is the primary habitat of McCown's Longspurs (e.g., Felske 1971, Maher 1973, Stewart 1975, Prescott and Wagner 1996). They will also use croplands to a lesser extent including minimum and conventional tilled land, small grain stubble fields, and summer fallow fields (Felske 1971; Stewart 1975, Dale et al. 2002). High, barren hillsides with a southern exposure are frequently used for breeding (Dechant et al. 2001).

The nests of this species tend to be built in a shallow cup on the ground in close proximity to clumps of grass, cow dung, prickly-pear, or shrubs (Dechant et al. 2001), though nests near shrubs experience higher predation rates (With 1994b). The relative exposure of nests may be adaptive in decreasing the predation rates near shrubs (With 1994b) and providing a favourable microclimate (high solar radiation early in season, good drainage under nest; With and Webb 1993). Foraging occurs in nearby short grasses and on bare ground patches (With 1994a).

Ecology. The breeding season lasts from late March through mid October in the southern parts of McCown's Longspurs' range but may be considerably shorter in the north (With 1994a). Data on breeding site fidelity is lacking. Clutch sizes usually range from 3 to 4 eggs (With

1994a), and second broods are possible, particularly in southern breeding areas, but may be limited by female energy reserves (Felske 1971). Breeding birds forage on the ground for seeds; the remainder of the diet is comprised mostly of grasshoppers (Maher 1973). Grasshoppers also represent over 80% of the nestlings' diet (Maher 1973).

Area Requirements. The territory area requirements vary by region (Dechant et al. 2001). Territory sizes in Saskatchewan ranged from 0.5 to 1.0 ha (Felske 1971). The minimum area requirements and the relationships between patch size, nest success, and rates of brood parasitism by Brown-headed Cowbirds are unknown (Dechant et al. 2001).

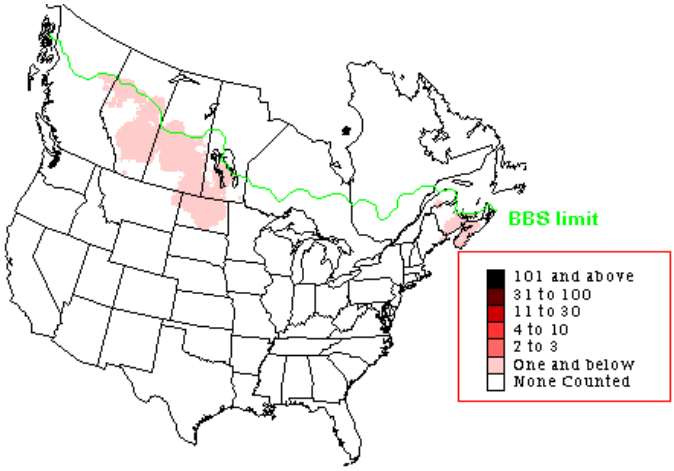
Management Issues. Management priorities for this species include providing adequate-sized, sparsely-vegetated native grasslands (Dechant et al. 2001). The short- or long-term responses of McCown's Longspurs to burning are poorly understood, although several authors have suggested that the suppression of prairie fires has negatively affected this species (With 1994a). Grazing, on the other hand, has the potential to improve habitat quality in areas with thick, tall grass by reducing vegetation height and coverage (Stewart 1975, Kantrud and Kologiski 1982). McCown's Longspurs in Alberta and Saskatchewan prefer native pastures grazed continuously or in early summer over native pastures with deferred grazing, crested wheatgrass pastures with spring grazing, and pastures with complementary grazing (Prescott et al. 1993, Dale and McKeating 1996, Prescott and Wagner 1996). Dale et al. (1999) found birds in southern Alberta occurred almost exclusively on grazed areas burned one to several times. However, heavily-grazed areas may function as an ecological trap; predation on eggs and nestlings may limit the productivity of McCown's Longspurs (over 50% of nests in Saskatchewan and Colorado were depredated by predators, such as the thirteen-lined ground squirrel; With 1994a) and nests in heavily-grazed pastures experience higher predation rates than those in moderately-grazed pastures (Felske 1971, Maher 1973, With 1994a). The abundance of this species in cropland was greater than in PCP grasslands (McMaster and Davis 1998), and between 18 and 40% of McCown's Longspurs identified in the GBM Pilot Project were found in cropland (Dale et al. 2002). Supplementation of the BBS routes with GBM Pilot Project routes may improve the coverage, sample size, and thus monitoring of this species.

Nelson's Sharp-tailed Sparrow *Ammodramus nelsoni*

Breeding Priority Area Imp: 5 Pop'n Trend: 2 Total: 27 Priority Pool: IA

Reason for Concern. A large majority of Nelson's Sharp-tailed Sparrows' breeding range occurs within Canada. The primary cause for concern is habitat loss through draining of marshlands and filling of wet meadows for agriculture and urban expansion. Fluctuating water levels may also have a negative effect on the species. Although trend analyses indicate insignificant increases in Canadian populations from 1966 to 2001 (1.4% annual increase, n=53, p=0.67, but 5.1% increase since 1980, n=49, p=0.07; Sauer et al. 2002), detection rates on BBS are low and further monitoring is required. BCR11 has a high stewardship responsibility for Nelson's Sharp-tailed Sparrows as much of their breeding range is in Canada and abundances are high.

Distribution. Approximately 90% of the breeding range of this species lies in Canada (Environment Canada 2001). Within the Canadian portion of BCR11, Nelson's Sharp-tailed Sparrows can be found breeding from southcentral Alberta through central Saskatchewan to southern Manitoba, while in the United States, they breed through eastern North Dakota and northcentral South Dakota east to northwestern Minnesota. The wintering grounds are thought to be coastal marshes in the United States along the southeastern coast and the Gulf of Mexico (Greenlaw and Rising 1994).



Habitat Requirements. Although Nelson's Sharp-tailed Sparrows respond well to call playbacks, many observers fail to survey at night when these birds are calling or can not hear the call (D. Prescott, Alberta Sustainable Resource Development, *pers. comm.*). The habitat preferences of this species are thus based primarily on notes of incidental observation (Dechant et al. 2001, but see Davis et al. 2003). Fens, wet meadows, peatlands, pond or lake margins with emergent cattails, native prairie, and idle fields all represent suitable habitat for Nelson's Sharp-tailed Sparrows, but actual sites shift with changes in moisture conditions (reviewed in Dechant et al. 2001). The preferred habitat is dense emergent vegetation in lakes, ponds, or marshes and wet grassy meadows (reviewed in Dechant et al. 2001). Prairie populations of Nelson's Sharp-tailed Sparrows typically choose wetter nesting sites than Le Conte's Sparrows (Murray 1969).

Nests are built on or slightly above the ground among emergent vegetation in damp areas with persistent litter (Murray 1969, Stewart 1975, Greenlaw and Rising 1994). Plants of the shallow-marsh and deep-marsh zones of wetlands (e.g., slough sedges and grasses, cattails, bulrushes) are

used for nesting in dry years; in wet years, those plants within wet-meadow zones (e.g., sedges, prairie cord grass) are used (Dechant et al. 2001). This species will only nest in fen areas when dominated by cattails, reeds, and bulrushes (Dechant et al. 2001), and they have been known to nest in wetlands located in wooded areas. Foraging habitat for Nelson's Sharp-tailed Sparrows is dense sedges and grasses in marshes, meadows, or at the edges of ponds. They forage on the ground or from surrounding vegetation by reaching up or clambering through the vegetation column (Greenlaw and Rising 1994).

Ecology. Nelson's Sharp-tailed Sparrows generally arrive on the nesting grounds in the Canadian portion of BCR11 in late May to early June (Murray 1969, Greenlaw and Rising 1994). Nelson's Sharp-tailed Sparrows in North Dakota are more abundant in dry than wet years (Stewart 1975). Breeding site fidelity for Nelson's Sharp-tailed Sparrow is unknown, though it is strong and equally developed (>50% return rate) in experienced breeders of the closely related Saltmarsh Sharp-tailed Sparrow (Greenlaw and Rising 1994). Mid June to early August represents the peak breeding season in North Dakota (Murray 1969, Stewart 1975). Clutch sizes usually range between 3 and 5 eggs with some females double brooding. Departure for the wintering grounds generally occurs from early September to mid October (Greenlaw and Rising 1994). The breeding season diet of Nelson's Sharp-tailed Sparrows is dominated by insects, spiders, amphipods, and other small invertebrates. The diet may be supplemented by seeds during the colder months.

Area Requirements. Nelson's Sharp-tailed Sparrows are loose colonial nesters with males overlapping their home ranges (Murray 1969, Greenlaw and Rising 1994). The area requirements, however, are poorly understood, especially for northern birds. No studies have examined the average size of wetlands used in Canada, but within the American portion of BCR11, wetlands ranging from 5.0 to 250 ha are used (Dechant et al. 2001).

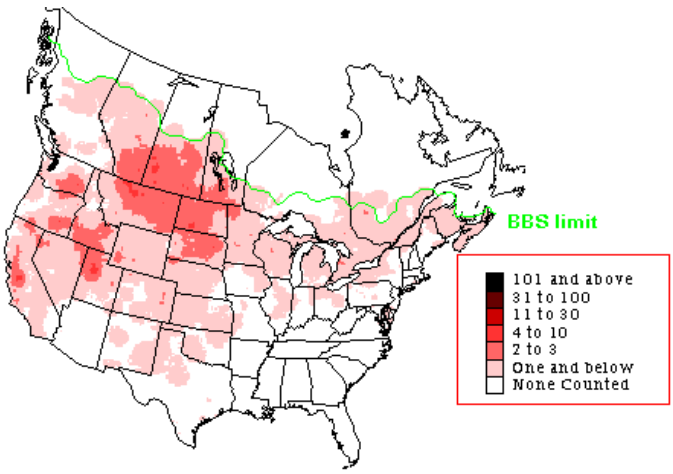
Management Issues. Known habitat needs for Nelson's Sharp-tailed Sparrows include dense or emergent vegetation near damp areas of freshwater wetlands (Dechant et al. 2001), but information is generally lacking on basic habitat requirements, population regulation, and response to human impacts. Although the effects of burning, mowing, or grazing on Nelson's Sharp-tailed Sparrows have not been adequately examined, the removal of vegetation by burning or mowing may cause local extirpation of populations (Greenlaw and Rising 1994), and Davis et al. (2003) found that this species was rarely detected in fields during the first year after a management treatment. The relationships between presence or abundance of Nelson's Sharp-tailed Sparrows and field type (i.e., tame and seeded-native PNC, idle and grazed native grassland, hayland) in the Prairie Provinces have also been unpredictable, varying from year to year and by study area (e.g., Dhol et al. 1994, Hartley 1994, Jones 1994, Prescott and Murphy 1999, Davis et al. 2003).

Northern Harrier *Circus cyaneus*

Breeding Priority Area Imp: 5 Pop'n Trend: 4 Total: 22 Priority Pool: IA

Reason for Concern. Habitat loss from the drainage of wetlands, conversion of native prairies, and reforestation (MacWhirter and Bildstein 1996) has resulted in moderate annual population declines of 0.9% since 1966 throughout the entire breeding range of Northern Harriers (n=983, p=0.07; Sauer et al. 2002). BBS data indicate significant annual declines of 1.4% in Canada (n=277, p=0.01; Sauer et al. 2002), while migration counts indicate stable trends (MacWhirter and Bildstein 1996). Causes for these discrepancies could include variable or low densities and poor detectability. The abundance of Northern Harriers in BCR11 is among the highest of all BCRs, giving it high stewardship responsibility.

Distribution. Approximately 35% of the Northern Harriers' North American breeding range is in Canada, extending throughout BCR11 (Environment Canada 2001). Wintering occurs throughout the United States, Mexico, Central America, and Caribbean. Individuals are broadly distributed on the breeding and wintering grounds, but local abundance varies with changes in prey availability (MacWhirter and Bildstein 1996).



Habitat Requirements. Northern Harriers prefer open habitats comprised of tall, dense vegetation with dense litter. The common habitats used include wet or dry grasslands with native or tame vegetation, fresh to alkali marshes, lightly-grazed pastures, croplands, old or fallow fields, and brushy areas (MacWhirter and Bildstein 1996, Dechant et al 2001).

Ground-nesting Northern Harriers construct well-concealed nests in tall, dense vegetation, including living and residual grasses, forbs, cattails, or low shrubs such as western snowberry (Duebbert and Lokemoen 1977, Kantrud and Higgins 1992, Murphy 1993, Herkert et al. 1999). The majority of nests are located in undisturbed wetlands or grasslands dominated by thick vegetation; croplands are used infrequently (Duebbert and Lokemoen 1977, Kantrud and Higgins 1992). Harriers virtually always hunt on the wing, usually in open habitats of moderate to heavy cover, such as ungrazed prairies and wetlands (MacWhirter and Bildstein 1996). Nest-site placement may represent a trade-off between proximity to upland prey populations and low nest predation risk in wetter areas (Simmons and Smith 1995).

Ecology. The arrival of this species on the breeding grounds ranges from late March through April, with males arriving before females, and nesting occurring between April and July

(reviewed in Dechant et al. 2001). Breeding site fidelity is thought to be low (MacWhirter and Bildstein 1996). Only a single brood averaging 4.4 eggs is produced per season, but renesting may occur following nest failure (MacWhirter and Bildstein 1996). Departure for wintering grounds begins late summer; some birds, however, may remain on breeding grounds as late as November (Semenchuk 1992). The productivity of Northern Harriers appears to be strongly linked to prey abundance (MacWhirter and Bildstein 1996). In the Northern Great Plains, voles represent the dominant prey items, although other birds, small mammals, reptiles, and frogs also supplement Northern Harriers' diet (MacWhirter and Bildstein 1996). Insects are only a small forage component and are primarily consumed by recently-fledged young (MacWhirter and Bildstein 1996).

Area Requirements. The territory and home range sizes seem to vary considerably among sites due to variation in prey abundance and habitat (MacWhirter and Bildstein 1996). Typically, however, males maintain larger overlapping home ranges and forage further from the nest (≥10 km) than females. Northern Harrier territories may range from 0.8 to 120 ha, while home ranges vary from 100 to 1600 ha (reviewed in MacWhirter and Bildstein 1996, Dechant et al. 2001). Studies in CRP fields in North Dakota found low abundance in blocks of contiguous grassland <100 ha (Dechant et al. 2001).

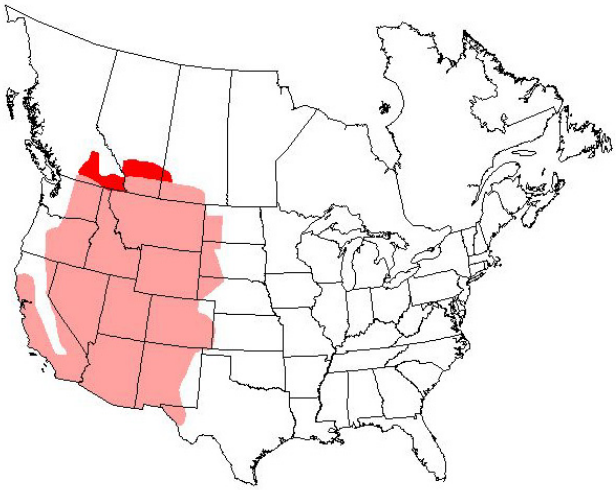
Management Issues. The management priorities for this species include providing a mosaic of extensive tall, densely-vegetated wetlands and grasslands (Dechant et al. 2001). Areas that are annually hayed, burned, or tilled are generally avoided by nesting Northern Harriers (Hecht 1951, Duebbert and Lokemoen 1977). Heavily-grazed areas are also generally avoided, but lightly-grazed and deferred-grazed areas are used (Kantrud and Kologiski 1982, Prescott et al. 1995). Periodic disturbance (e.g., mowing or burning every three to five years) outside of the nesting period may be required to create and maintain suitable habitat for this species and their prey (Dechant et al. 2001).

Prairie Falcon *Falco mexicanus*

Breeding/Wintering Priority Area Imp: 3 Pop'n Trend: 3 Total: 21 Priority Pool: IIC

Reason for Concern. Prairie Falcons are vulnerable to environmental changes because of their small population sizes (5,000-6,000 pairs in the US, 250-500 pairs in Canada; Kirk and Banasch 1996). Currently, limited census data indicate an increase in numbers (Dunn 2002). Irrigation of lands, decline of ground squirrels, new chemical treatments in agriculture, and increased human activity at nest cliffs are potential threats. The majority of Canadian breeding pairs are found in BCR11, and Alberta and Saskatchewan provide important post-breeding summer habitat for falcons that nest in Idaho (K. Steenhof, United States Geological Survey, *pers. comm.*).

Distribution. The breeding range of Prairie Falcons is limited to western and central North America, with approximately 10% of their distribution in Canada (Environment Canada 2001). Breeding pairs in BCR11 are found in southern Alberta and Saskatchewan (Kirk and Banasch 1996). The winter distribution of Prairie Falcons within North America extends from southern Canada (occasionally) to southern Mexico (Steenhof 1998).



* range adapted from Patton 2002; darker shading indicates breeding, lighter indicates year-round

Habitat Requirements. Prairie Falcons breed in open habitats such as badlands and major river coulees where cliffs offer suitable nest sites and allow hunting in nearby shrubsteppe-desert and grasslands (Woodsworth and Freemark 1981, Steenhof 1998). The nest site is on average about 20 m above ground and is often sheltered by an overhang or cap rock (Woodsworth and Freemark 1981, Runde and Anderson 1986). Prairie Falcons do not build a nest structure: they merely scrape loose debris to form a small depression on ledges, cavities, potholes, and crevices, or use stick nests built by Common Ravens, Ferruginous Hawks, or Golden Eagles. Minimum nest dimensions can be as small as 11 cm high, 18 cm wide, 33 cm long, with a floor area of 645 cm^2 (Steenhof 1998). Hunting falcons preferred native prairie over irrigated cropland more than expected by chance (Hunt 1993).

Ecology. Male Prairie Falcons return to their nest sites in late February or early March (Woodsworth and Freemark 1981). Females arrive about two weeks later, and the pair engages in noisy flight displays and copulations until the termination of egg laying towards mid April (Fyfe 1972, Steenhof 1998). An average of 4.5 eggs form a complete clutch and hatch around mid May (Edwards 1973, Steenhof 1998). Prairie Falcons start leaving the nesting areas in June and July, often moving widely in different directions before they arrive on their winter range

(Dekker 1982, Schmutz et al. 1991, Steenhof 1998). Site fidelity to nest sites is generally high (>60%) and reached 96% in an Alberta study, with young birds nesting at median distances of 13 to 54 km from where they were hatched (Runde 1987).

Ground squirrels are the staple prey of Prairie Falcons during the breeding season (Hunt 1993, Steenhof 1998), until the squirrels begin spending more time in their burrows in mid-summer. Falcons then leave the breeding area in search of more available prey, and as winter approaches, they switch almost completely to songbirds, such as Horned Larks and Western Meadowlarks (Schmutz et al. 1991, Steenhof 1998).

Area Requirements. Breeding pairs defend only a small area around their nest site, but foraging areas overlap with adjacent neighbours (Hunt 1993). Breeding densities depend on the availability of suitable nest sites. In optimal habitat, pairs nest an average distance of 660 m from each other although they may nest as close as 36 m (Steenhof 1998). Average home ranges in Alberta were 72 km^2; while elsewhere they were 59 to 315 km^2 (Hunt 1993, Steenhof 1998).

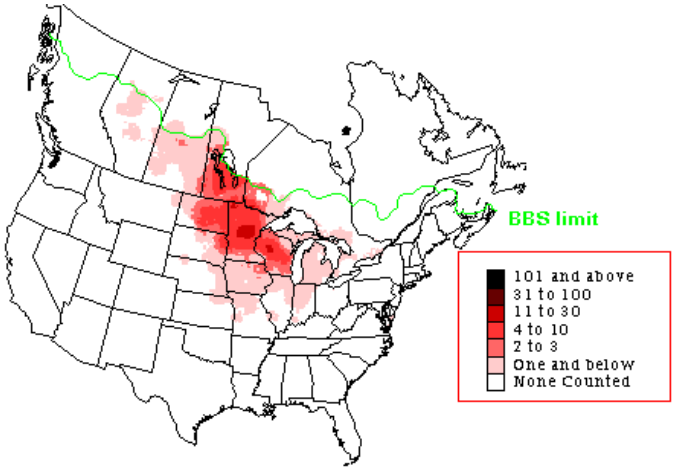
Management Issues. Historically, Prairie Falcons may been subject to shooting and extraction of birds for falconry (Steenhof 1998). Nest sites are fairly specialized and not readily available, thus urban sprawl can be of local concern in southern Alberta (Woodsworth and Freemark 1981). At a larger scale, however, Noble et al. (1993) still found suitable sites in southern Alberta that were unoccupied. Prairie Falcons will accept artificial nest sites that are excavated or blasted in suitable cliffs (Fyfe and Armbruster 1977). Human disturbance can be a problem, particularly during incubation, as eggs may break when females are flushed from their nests. Recreational and industrial activity may affect breeding falcons in some areas but not in others (Steenhof 1998). The breeding success of Prairie Falcons is linked to the abundance of ground squirrels (Steenhof 1998). Thus, habitat degradation and declining ground squirrel populations may pose a problem for the conservation of this falcon species. Prairie Falcons are more sensitive than Peregrine Falcons and Merlins in their response to pesticides (Fyfe et al. 1988). Prairie Falcons may have been affected by contamination by organochloride pesticides, but such chemical pollutants did not appear to cause population declines (Noble et al. 1993, Steenhof 1998). Although foraging for mammals may buffer pesticide effects during the nesting season, Prairie Falcons could be susceptible to a new generation of organophosphates and carbamates when preying on birds in agricultural lands (Mineau 1993, Kirk and Banasch 1996, K. Steenhof, United States Geological Survey, *pers. comm*.).

Sedge Wren *Cistothorus platensis*

Breeding Priority Area Imp: 4 Pop'n Trend: 1 Total: 19 Priority Pool: IIB

Reason for Concern. Sedge Wrens breed in wet grasslands and sedge-dominated wetlands and are vulnerable to deterioration of this sensitive habitat, mostly by conversion into intensive farmland. Although populations in the northeastern United States have experienced declines, there currently appears to be a westward expansion of this species in Canada with positive population trends here (4.2%, n=75, p<0.01; Herkert et al. 2001, Dunn 2002, Sauer et al. 2002). However, there are some difficulties in interpreting surveys due to annual climatic variation that results in variation of suitable habitat locations. Abundances in BCR11 are moderately high relative to other BCRs.

Distribution. Approximately 20% of the Sedge Wren's North American breeding range is in Canada (Environment Canada 2001), extending throughout BCR11 with peak Canadian abundances on BBS survey routes in Manitoba (Sauer et al. 2002). Sedge Wrens winter along the coastal southern US from Virginia to central Mexico.



Habitat Requirements. The ideal habitat for this species is moist soil that is not flooded; varying annual rainfall seems to determine yearly Sedge Wren distribution and abundance (Knapton 1979, Faanes 1981). A variety of open and wet habitats with tall and dense vegetation are used (Dechant et al. 2001), including mesic prairies, sedge marshes, wet grasslands with scattered low bushes, idle grasslands and fields, dense nesting cover in uplands, and organic farmland but not conventional cropland (Picman and Picman 1980, Shutler et al. 2000, Dechant et al. 2001).

Nests are built close to the ground (<1 m) among dense and tall growth in sedges and grasses (Peck and James 1987). Sedge Wrens feed in vicinity of the nest. Their foraging behaviour is inconspicuous and 'mouse-like', suggesting that these birds target insects hiding in the moist soil or in plant material close to the ground (Walkinshaw 1935). Insect abundance may be determined by rainfall, soil humidity, and productivity of adjacent marshlands.

Ecology. The dynamic and mobile breeding populations of Sedge Wrens are likely in response to varying annual precipitation that determines where wet (but not flooded) habitat occurs (Herkert et al. 2001). This species has one of the longest nesting seasons on the continent, with a breeding period from late April to early October (Walkinshaw 1935, Knapton 1979, Faanes 1981), although it is shorter on the Canadian prairies. Several nests (five to ten) are built in each

breeding territory, possibly as dummies to confuse nest predators (including other Sedge Wrens that may destroy eggs of their neighbours) or for use by females in mate selection (Picman and Picman 1980, Burns 1982, Herkert et al. 2001). Clutches contain on average 7 eggs, but can range from 2 to 8 eggs (Herkert et al. 2001). Males participate little in brood rearing, appear to be polygamous, and often move territories and initiate a second brood in July. Males may even move large distances to more southern areas for these second broods (Burns 1982, Bedell 1996). Site fidelity varies but is generally low for specific sites, as entire regions can be abandoned during drought years (Kroodsma and Verner 1978, reviewed in Herkert et al. 2001). Only limited information is available on the diet of Sedge Wrens. They eat mostly insects and spiders, which are collected from the ground and from basal stems of the vegetation (Herkert et al. 2001).

Area Requirements. Males defend territories as small as 0.13 to 0.2 ha in size, with overall breeding densities in suitable habitat in the US typically ranging from 3 to 16 singing males per 10 ha (reviewed in Herkert et al. 2001). Sedge Wrens can be present in tallgrass prairie fragments of <10 ha size, but their density is higher in larger fragments (Herkert 1991, 1994).

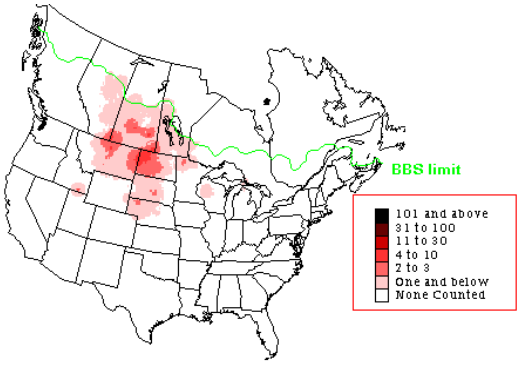
Management Issues. Wet meadows are among the easiest wetlands to cultivate into farmland, decreasing the area of suitable habitat for Sedge Wrens substantially since European settlement (Dechant et al. 2001). Because the wren's required habitats are very sensitive to flooding or drying out, annual and seasonal rainfall patterns have a large influence in determining which grasslands will be used for breeding at a given time (Herkert et al. 2001). Accordingly, smaller and isolated reserves may be insufficient to support viable Sedge Wren populations when compared to a network of wet grasslands with a gradient of moisture regimes. On the other hand, Sedge Wrens can use a variety of human-made habitats, such as abandoned fields, and seem to have benefited from conservation measures for waterfowl like the provision of PNC and the CRP (Cadman et al. 1987, Dhol et al. 1994, Hartley 1994, Shutler et al. 2000). Both native and tame seeded PNC are accepted, although native vegetation may be preferred and yield higher reproductive success (Dhol et al. 1994, Hartley 1994, Jones 1994, Prescott and Murphy 1999). Spring burning appears to have a positive effect on Sedge Wrens by increasing vegetation height and reducing litter, as long as unburned patches are available to provide nesting material (Dechant et al. 2001). Although occurrence of wrens may be reduced for the first year post-treatment (Johnson 1997, Herkert 1991), some birds may re-use the habitat later the same season if moisture and vegetation conditions permit (summarized in Dechant et al. 2001). Grazing generally reduces the density of breeding Sedge Wrens, although some forms of light rotational grazing may benefit them (Schramm et al. 1986). Because this species nests relatively late into the year, some of their broods may be destroyed if meadows are mowed in mid July after most other grassland birds have fledged (Dechant et al. 2001).

Sharp-tailed Grouse *Tympanuchus phasianellus*

Breeding/Wintering Priority Area Imp: 5 Pop'n Trend: 4 Total: 23 Priority Pool: IA

Reason for Concern. Canada contains a large proportion of existing Sharp-tailed Grouse populations and habitats, and their high abundances in BCR11 relative to other BCRs denotes a high stewardship responsibility. Although BBS results vary regionally, Canadian populations have declined annually by 3.7% from 1966 to 2001 (n=60, p=0.09; Sauer et al. 2002). Habitat loss through cultivation of native grasslands, natural succession and forest encroachment, in addition to habitat degradation through overgrazing, are cited as the primary threats (Kessler and Bosch 1982, Connelly et al. 1998). Nonetheless, populations in Canada (with the exception British Columbia), North Dakota, South Dakota, Nebraska, and eastern Montana may be more secure than those in the southern part of the range that have experienced considerable range contractions (Connelly et al. 1998).

Distribution. Seventy percent of the North American range of Sharp-tailed Grouse is located within Canada (Environment Canada 2001). This species is resident throughout its range and can be found throughout BCR11 in Canada and the United States, except in Iowa, southern Minnesota, and eastern South Dakota (Environment Canada 2001).



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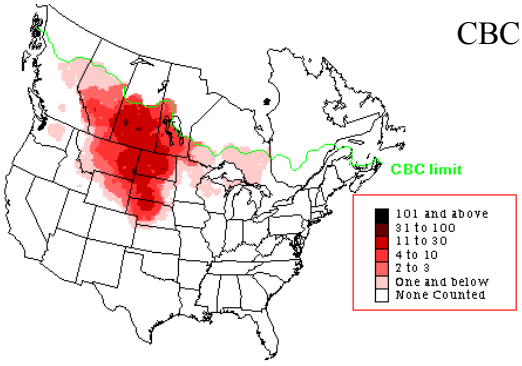


Habitat Requirements. Sharp-tailed Grouse are habitat generalists, able to utilize a mosaic of grasslands, grain fields, riparian areas, deciduous woodlands, wet meadows, and shrub stands (Marks and Marks 1988, Cope 1992, reviewed in Connelly et al. 1998). The availability of suitable spring lekking grounds is an essential habitat component (Connelly et al. 1998). Suitable lekking areas vary in composition but may include pastures, mowed meadows, muskeg, shorelines, recent burns, clearcuts in forested regions, and other areas with good visibility and easy movement (Prose 1987, Deeble 1996, reviewed in Connelly et al. 1998). Leks in Manitoba tended to be on elevated sites with high visibility (low or sparse vegetation) and near escape cover (Baydack 1988, Berger and Baydack 1992). Traditional lekking sites may shift slightly over time if local conditions are unsuitable (Baydack 1988, Tsjuji 1992).

Sharp-tailed Grouse nest in a shallow depression under or near shrubs or dense residual herbaceous cover (Connelly et al. 1998). High-quality nesting areas have structural diversity and visual obstructions (Prose 1987). Areas with abundant forbs and insects and high diversity of shrub and other cover types are important during brood rearing (Connelly et al. 1998). Available

nesting and brood-rearing habitat has been severely limited where fire suppression has reduced the presence of early and mid-successional vegetation. Sharp-tailed Grouse use riparian and upland areas with deciduous shrub and trees cover in winter for feeding, roosting, and escape cover (Prose 1987, Marks and Marks 1988, Saab and Marks 1992, Giesen and Connelly 1993). They may also roost in snow burrows (Gratson 1988). The availability of wooded habitat in close proximity to lekking grounds may be an important factor determining an area's ability to support this species. Sharp-tailed Grouse forage primarily on the ground during the spring, summer, and fall in areas with dense forb and sparse grass cover, often in early successional stages (Connelly et al. 1998). They forage on the ground as conditions permit in the winter but will also shift to foraging on fruits and buds in trees and shrubs (reviewed in Connelly et al. 1998).

Ecology. Sharp-tailed Grouse may make short movements to more wooded habitats during the winter but are considered resident throughout their range. Males gather on leks to perform elaborate courtship displays for females in April and May and in the fall to establish territories (Kobriger 1965, Gratson 1988). Leks in some areas of Manitoba are separated by an average 2.2 km (Baydack 1988); separation varies from 1.6 to 3.5 km in other portions of their range (Connelly et al. 1998). Nesting generally occurs within 3.5 km of the lek site (Kobriger 1965, Gratson 1988, Saab and Marks 1992). Females produce a single clutch averaging 11 or 12 eggs, with renesting occurring after nest destruction (Connelly et al. 1998, D. Manzer, University of Alberta, *pers. comm*.). Sharp-tailed Grouse's annual diet is dominated by plant material (90%) including buds, seeds, herbaceous matter, fruits, and flowers but may be supplemented with insects during the summer (Prose 1987, Ulliman 1995).

Area Requirements. Spring and summer home ranges in the American portion of this species' range varied from 13 to 406 ha, and winter home ranges varied from 22 to 752 ha (Saab and Marks 1992, reviewed in Connelly et al. 1998). Ranges generally averaged under 200 ha, and most annual activity occurred within 5 to 6.5 km of lek sites (Prose 1987, Giesen and Connelly 1993). The minimum area requirements are not known, but 30 km^2 has been suggested as the minimum area required for successful population persistence or reintroductions (Connelly et al. 1998).

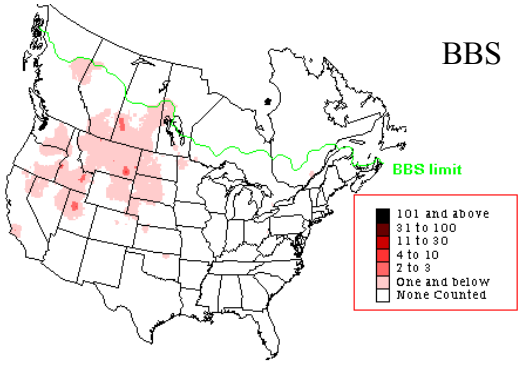
Management Issues. Annual haying and overgrazing can negatively affect this species by reducing the amount of vegetative diversity and cover needed for nesting, brood rearing, and predator evasion (Kessler and Bosch 1982, Connelly et al. 1998). Fire suppression has influenced habitat quality and populations in several regions; however, prescribed burning or mechanical treatments may be effective tools to maintain early and mid-successional vegetation and to reduce shrub and tree encroachment (Kirsch et al. 1973, R. Baydack, University of Manitoba, *pers. comm*). Sharp-tailed Grouse are popular game birds throughout much of their range, but there is little empirical evidence indicating that such harvest negatively affects populations, aside from small or isolated populations (Connelly et al. 1998). Although males are tolerant of a wider variety of disturbances than females, human presence, particularly at lekking sites, may displace both sexes and reduce reproductive opportunities (Baydack and Hein 1987). This species benefits from rehabilitation of grass and shrub cover, including the CRP in the US (Connelly et al. 1998).

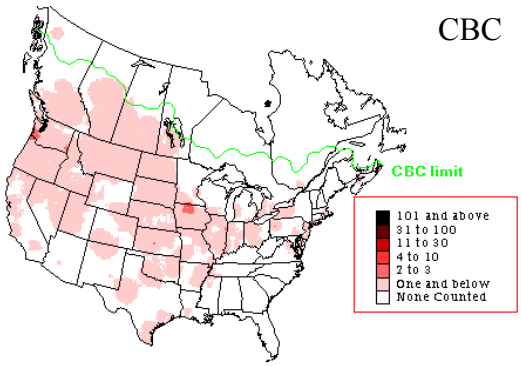
Short-eared Owl *Asio flammeus*

Breeding/Wintering Priority Area Imp: 3 Pop'n Trend: 5 Total: 22 Priority Pool: IA

Reason for Concern. COSEWIC lists Short-eared Owls as a species of Special Concern (COSEWIC 2002). Survey coverage is non-existent for much of the Short-eared Owl's range, and densities and detection rates in these areas are low. Local populations also fluctuate erratically with prey populations. Despite these limitations, data from BBS and CBC surveys indicate long-term annual declines in North American populations between the 1960's and 1990's of 3.5% (n=151, p=0.05; Canadian data shows 11.4% decline, n=31, p=0.01; Sauer et al. 2002). Possible factors for such declines include habitat loss from the destruction of marshland and grassland habitats, increasing urban expansion, and reforestation (Holt and Leasure 1993).

Distribution. Approximately 60% of the North American breeding range of this species is in Canada (Environment Canada 2001). Short-eared Owls are year-round residents in the Canadian portion of BCR11 in the extreme southeastern portion of Alberta and the southwestern section of Saskatchewan and can be found during the breeding season throughout the remaining Canadian portions of BCR11. They are also year-round residents of BCR11 in Montana, South Dakota, Nebraska, and Iowa, and breed throughout the North Dakota and Minnesota sections of the BCR (Environment Canada 2001).





Habitat Requirements. Short-eared Owls in agricultural areas prefer large expanses of open grasslands or wetlands, including native prairie, hayland, retired cropland, small-grain stubble, shrubsteppe, and wet meadow areas (Holt and Leasure 1993, Dechant et al. 2001). This species may be nomadic and travel large distances in search of prey. Fluctuations in local population numbers are common because of temporal and spatial variation in small mammal numbers (Holt and Leasure 1993, Dechant et al. 2001).

Unlike other owl species that use abandoned nests or cavities, Short-eared Owls build new nests. Their ground nests are often placed in dry uplands and occasionally wetter lowlands, such as peatlands and wetlands (Stewart 1975, Holt and Leasure 1993). Nests may be completely hidden in the dense cover of reeds, grasses, and forbs, under low shrubs, or left relatively open in fields and wetlands (Stewart 1975, Duebbert and Lokemoen 1977, Holt and Leasure 1993). Surrounding vegetation at prairie nest sites is usually 30 - 60 cm tall with a substantial component of western snowberry (Duebbert and Lokemoen 1977, Holt and Leasure 1993, Murphy 1993).

Ecology. In areas where the wintering and breeding grounds overlap, Short-eared Owls may

begin nesting by late March; in more northerly breeding areas they arrive from late March to early May (Holt and Leasure 1993). North American clutches average 5.6 eggs (range from 1 to 11 eggs), increasing in size in more northerly portions of the breeding range. The Short-eared Owl's productivity is closely linked to fluctuations in vole numbers: clutch size and timing of breeding may be adjusted based on prey availability. One brood per year is generally raised in Canada, and renesting may occur following nest failure. Southward movements to wintering areas occur from September to November. The primary prey of Short-eared Owls is small mammals, particularly voles, although other mammals and birds may be consumed (Holt and Leasure 1993).

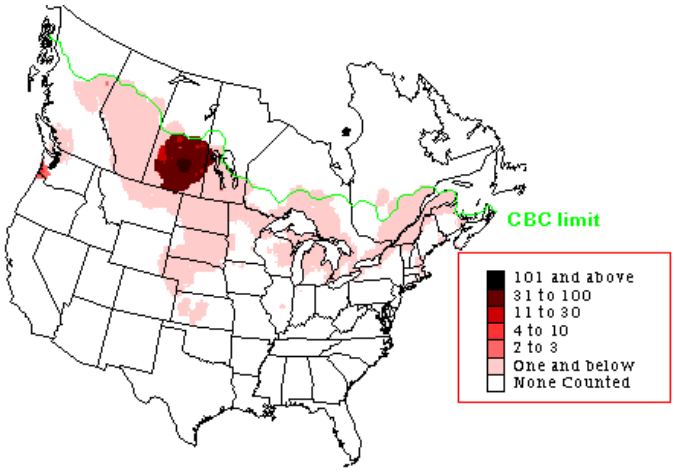
Area Requirements. This bird species is typically found nesting on large blocks of habitat and may respond more to the total amount of suitable habitat in the surrounding landscape rather than to the size of individual fragments (Dechant et al. 2001). Short-eared Owls in North Dakota were rare in CRP fields that were smaller than 100 ha, although territories in Manitoba ranged in size from 23 to 121 ha, with an average of 82 ha (Clark 1975, Dechant et al. 2001). Breeding territory sizes may also increase with decreasing vole densities (Holt and Leasure 1993).

Management Issues. The keys to management for this species involve providing large grasslands and wetlands dispersed over a large landscape and capable of supporting high densities of voles to accommodate the nomadic tendencies of this species (Dechant et al. 2001). Habitat disturbance through mowing, grazing, or burning is generally believed to negatively affect Short-eared Owls, although periodic disturbance may be necessary to maintain suitable habitat for both owls and their prey (Dechant et al. 2001).

Snowy Owl *Bubo scandiaca*

Wintering Priority Area Imp: 5 Pop'n Trend: 3 Total: 19 Priority Pool: IIA

Reason for Concern. BCR11 represents an important part of the wintering range for Snowy Owls. Monitoring of population trends for this species is difficult as their entire breeding range is north of BBS routes, and movements in many wintering areas are irruptive. However, CBC data from 1959 to 1988 show a non-significant survey-wide decline of –0.4% (n=540, p>0.01). Determination of regional trends in CBC data requires a more sophisticated analysis that can clarify long-terms trends from the noise of annual fluctuations (Kirk 1995).



Distribution. Snowy Owls are circumpolar and breed on the arctic tundra of both Eurasia and North America, with over 90% of their North American breeding range and 50% of their wintering range occurring in Canada (Environment Canada 2001). The Canadian breeding range includes the islands of the Arctic Archipelago, from Ellesmere Island in the north, to Baffin Island in the east, to Banks Island in the west, and along the northern coast of the continent from the Yukon to Labrador. Some individuals remain on their breeding grounds throughout the winter, but the majority of migrating Snowy Owls winter regularly in the northern Great Plains and midwestern United States (Kerlinger et al. 1985). Population numbers on the wintering grounds vary from year to year (Kerlinger et al. 1985). Irruptive movements occur along the Pacific northwest coast, eastern Canada and the New England states, but abundances are 10 to 100 times lower than on the northern Great, Plains (Kerlinger et al. 1985).

Habitat Requirements. The breeding habitat of Snowy Owls is rolling, treeless tundra, with prominences such mounds, hummocks, or rocks for nesting and perching. Snowy Owls are ground nesters and usually place their nest on a raised, snow-free site such as a knoll or a ridge (Watson 1957). The nest is a simple, shallow scrape made by the female, possibly containing a few feathers or bits of grass or moss. Typical wintering habitats resemble the treeless nature of the breeding range and include prairies, marshes, open stubble or hay fields, or shorelines (Boxall and Lein 1982b, Kerlinger et al. 1985). Foraging habitats for Snowy Owls in both summer and winter are areas with high prey availability (Boxall and Lein 1982a, 1982b, Parmelee 1992), and individuals typically hunt from elevated perches. Fence posts, haystacks, trees, buildings, and utility poles are used as winter perch sites.

Ecology. The departure of Snowy Owls from their wintering grounds occurs in late February and March (Kerlinger and Lein 1988a). Some adults likely re-pair year after year if conditions and previous nest success have been high (G. Court, Alberta Sustainable Resource Development,

pers. comm.). Egg-laying begins in mid-May. Clutch sizes range from 3 to 5 eggs when food is limited and increase to 7 to 11 eggs in years of high lemming populations (Parmelee 1992). Nesting may be completely aborted when lemmings are extremely scarce. Snowy Owls normally produce a single clutch per season, but the frequency of renesting after a nest failure is unclear (Parmelee 1992). Mated pairs may change nesting areas from year to year in response to prey populations. Nesting areas are abandoned after breeding, and individuals arrive on their wintering grounds from early November to late December (Kerlinger and Lein 1988a; Semenchuk 1992). There is evidence of winter site fidelity (Oeming 1975), particularly in areas where the winter prey base remains reasonably constant from year to year. The primary prey species utilized in the summer is lemmings but owls may also capture voles, Arctic hare, ptarmigan, and other birds up to medium-sized geese (reviewed in Parmelee 1992). During the winter, Snowy Owls feed primarily on small rodents such as meadow voles and deer mice (Boxall and Lein 1982a), but they will opportunistically take mammals ranging in size from shrews to hares and birds ranging from sparrows to pheasants. Females generally have a broader diet than males (Boxall and Lein 1982a).

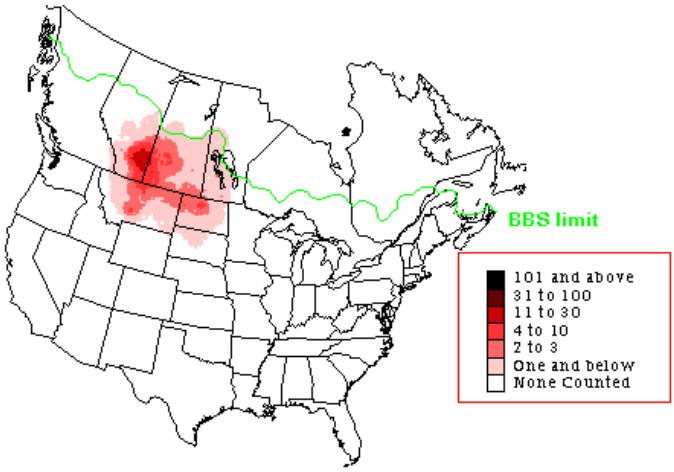
Area Requirements. The size of Snowy Owls' breeding territories can range from <2.5 km^2 in areas of high lemming density to about 10 km^2 in other areas (e.g., Pitelka et al. 1955). Although some males may wander during the winter, females wintering in southern Alberta usually establish and defend hunting territories of 1.5 to 4.5 km^2 for periods of two or three months (Boxall and Lein 1982b).

Management Issues. On their breeding grounds, Snowy Owls may still be subject to sustenance hunting by northern peoples (Parmelee 1992), while the causes of mortality among wintering owls include collisions with powerlines, wire fences, automobiles, or other structures (72% of deaths; Kerlinger and Lein 1988b). Juveniles may be vulnerable to starvation, particularly in years where productivity of young has been high in the Arctic, but food supplies are poor on the Northern Great Plains (G. Court, Alberta Sustainable Resource Development, *pers. comm.*).

Sprague's Pipit *Anthus spragueii*

Breeding Priority Area Imp: 5 Pop'n Trend: 5 Total: 26 Priority Pool: IA

Reason for Concern. Sprague's Pipits were recently designated as Threatened in Canada (COSEWIC 2002). Their range is restricted to the Great Plains of North America and is contracting, with a large proportion of the remaining breeding range and population in Canada. Canadian BBS data show an annual 7.3% decline over the past 35 years (n=89, p<0.01; Sauer et al. 2002). Sprague's Pipits are specialized in their habitat use, relying almost exclusively on native grasslands. Over 65% of native grasslands in Canada have been cultivated, resulting in substantial habitat loss for this species (CWS 2001). Migration and wintering habitats may also face pressures.



Distribution. At least 60% of this species' breeding range lies within Canada (Environment Canada 2001), with the majority in BCR11. Sprague's Pipits breed from southern and central Alberta, to west-central and south-central Manitoba, and south through Montana and northern South Dakota. The highest abundances on BBS survey routes were detected in eastern Alberta (Sauer et al. 2002). The breeding range appears to have contracted during this century, particularly in northwestern (Alberta), northeastern (Manitoba) and southeastern (Minnesota) parts of the range (CWS 2001, Sauer et al. 2002). The wintering grounds are in the southern United States through to central Mexico.

Habitat Requirements. Sprague's Pipits primarily inhabit mixed-grass prairie of moderate height, low to moderate vegetation density, low to moderate litter depth, and little or no woody vegetation (Owens and Myers 1973, Dale 1983, Madden 1996, Prescott and Murphy 1996, Sutter 1996). These birds prefer native prairie composed of grasses, such as northern wheatgrass, western wheatgrass, and June grass, over tame pasture (e.g., Wilson and Belcher 1989, Sutter 1996, Sutter and Brigham 1998, Davis and Duncan 1999). Abundances in native grassland invaded by smooth brome or crested wheatgrass (Wilson and Belcher 1989, Dale 1990, Madden 1996, Prescott and Wagner 1996), hayfields of smooth brome or alfalfa (De Smet 1992), and cropland (Davis et al. 1999) are very low. Vegetation in dry lake bottoms and alkali lake margins can also represent suitable habitat for Sprague's Pipits (Stewart 1975, Wershler et al. 1991).

Nest sites are usually at the base of a tussock of grass in an area with dense and relatively tall (about 20 cm) grasses and sedges, low forb density and cover, low litter depth, and some bare ground (6-10%; Sutter 1997; Robbins and Dale 1999, S. Davis, Canadian Wildlife Service,

unpubl. data). Foraging occurs in areas with grass several centimeters tall (Robbins and Dale 1999).

Ecology. Arrival dates in the Canadian part of BCR11 range from late April to late May, and birds depart between September and October (Prescott 1997, Davis *in press*). Between 3 and 6 eggs (average of 4.5 eggs) are laid in late May to early July (Robbins and Dale 1999), but nests initiated early in the breeding season had higher mean sizes (i.e., 5.8 eggs) than those initiated later in the season (i.e., 4.3 eggs; De Smet 1992). Nest predation is a major cause of nest failure resulting in less than half of nesting attempts being successful (Robbins and Dale 1999, CWS 2001). De Smet (1992) found a 15% nest parasitism rate by Brown-headed Cowbirds in southwestern Manitoba. Females lay replacement clutches, but double brooding has never been documented (Sutter 1996). Sprague's Pipits forage on the ground and are primarily insectivorous, eating beetles, grasshoppers, spiders, ants, and moth larvae (Robbins and Dale 1999). Seeds make up less than 3% of the diet during the breeding season (CWS 2001).

Area Requirements. Sprague's Pipits may be area sensitive as their densities increase with patch size (Davis et al. *unpubl. data*) and they are most common in large grassland areas (Dechant et al. 2001). The minimum area requirements in Saskatchewan are considered to be between 160 - 190 ha (SWCC 1997, Davis *unpubl. data*).

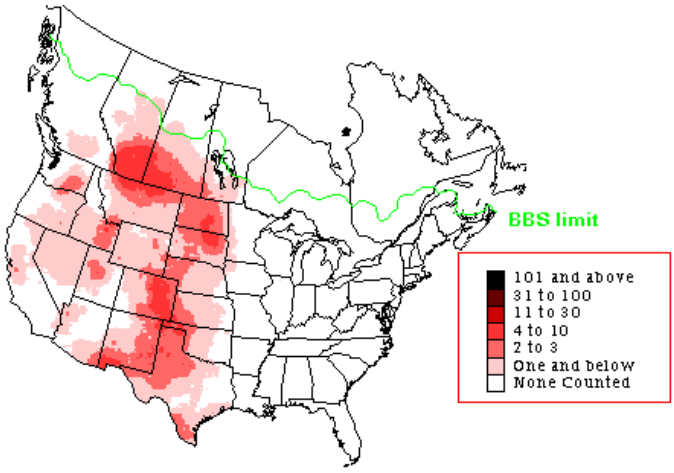
Management Issues. Managing for this species will include providing suitable tracts of native prairie habitat with moderate vegetation height and low visual obstruction, while controlling succession in these habitats (Dechant et al. 2001). Fire suppression may increase the rate of shrub encroachment in moister eastern portions of their range (Madden 1996). Sprague's Pipits will inhabit prairie that is lightly to moderately grazed (Davis et al. 1999), though use of such sites varies with soil and moisture regime (Robbins and Dale 1999). There are few sites where heavy grazing would be tolerated (Robbins and Dale 1999). They will tolerate prescribed burning in moister areas, and, in some cases, mowing done the previous year (Dechant et al. 2001). Although these techniques may have short-term negative impacts on grassland structure and bird abundance in some areas, they ultimately benefit Sprague's Pipits by preventing encroachment of woody vegetation, reducing litter build-up, and slowing the invasion of exotic plants (Robbins and Dale 1999, Dechant et al. 2001). Abundance of Sprague's Pipit increases with improved range condition (Davis et al. *unpubl. data*). Drought can influence population numbers for this species (George et al. 1992), particularly if it affects nesting habitat and food supply at the local level. The use of pesticides to control grasshoppers may also impact population numbers.

Swainson's Hawk *Buteo swainsoni*

Breeding Priority Area Imp: 5 Pop'n Trend: 4 Total: 25 Priority Pool: IA

Reason for Concern. Although numbers are thought to have been higher historically, Swainson's Hawks appear to have adapted well to agriculture (England et al. 1997). Nonetheless, there was a significant annual decline of 3.0% in Canada based on BBS data from 1980 to 2001 (n=119, p=0.01; Sauer et al. 2002). Swainson's Hawks abundances in BCR11 are among the highest within their breeding range. Population numbers are closely linked to the availability of their main prey species, Richardson's ground squirrel, which may have undergone a recent, possibly cyclic, decline on the breeding grounds in BCR11 (Schmutz et al. 2001).

Distribution. An estimated 30% of the North American breeding range of this species lies within Canada (Environment Canada 2001). Swainson's Hawks are distributed throughout both the Canadian and American portions of BCR11 (Environment Canada 2001). Grasslands in Argentina and Uruguay are the primary wintering range (England et al. 1997).



Habitat Requirements. Swainson's Hawks prefer open grassland habitat, sparse shrubland, and small, open woodlands (England et al. 1997). They have adapted well to agriculture, using a variety of habitats ranging from undisturbed native grasslands to areas that are over 90% cultivated (Schmutz 1989). This range of habitats includes native prairie, aspen parklands, riparian areas, shelterbelts, pastures, haylands, and croplands (reviewed in Dechant et al. 2001).

Nests are located in trees and shrubs that are either isolated, clumped, or part of shelterbelts, riparian habitats, and open woodlands (England et al. 1997). Pairs have nested on man-made structures or even on the ground (see references in England et al. 1997 and Dechant et al. 2001). Nesting pairs are prone to deserting their nests if disturbed during egg laying and early incubation, although this tendency varies regionally (Fyfe and Olendorff 1976) and between individuals (Dunkle 1977). Swainson's Hawks readily forage in native grasslands, hayfields, and other non-native habitats but rarely in taller crops or dense vegetation where prey are more difficult to find (Bechard 1982, Woodbridge 1991). Individuals can exploit prey effectively after a disturbance from farming operations, such as cultivating, swathing, and baling by hovering above and following farm implements to take flushed prey items (see references in England et al. 1997).

Ecology. Usually the last prairie buteo to return from their wintering grounds, Swainson's

Hawks arrive on their Canadian breeding grounds between late April and mid May. Fall migration flocks begin to form by late August through early September (England et al. 1997). Individuals exhibit considerable nest site and mate fidelity and will often reuse nests built in previous years (Gilmer and Stewart 1984, Schmutz 1991, England et al. 1997). In Canada and the Central Plains states, eggs are laid between May and June in clutches of 2 to 4 (England et al. 1997). Renesting following nest failure is uncommon but has been documented (Olendorff 1973). The diet on the prairie provinces is dominated by Richardson's ground squirrels (Schmutz et al. 1980, Schmutz et al. 2001) but also includes insects, other small rodents, young rabbits, birds, and reptiles (reviewed in England et al. 1997 and Dechant et al. 2001).

Area Requirements. The minimum area requirements for this species are unknown. The average home range size for Swainson's Hawks varies from 6.2 to 40.4 km^2 (Table 4 in England et al. 1997), with males having larger home ranges than females. Individual pairs may have overlapping foraging areas, sometimes defending only a small area around the nests (nests in Alberta are often about 1.5 km apart; Rothfels and Lein 1983).

Management Issues. The effects of burning, mowing, and grazing have not been extensively examined for this species. Several researchers have found the proportions of cultivated land and grassland in the vicinity of nest sites to be important predictors of nest placement (Gilmer and Stewart 1984, Schmutz 1984, 1987). Swainson's Hawks in southeastern Alberta preferred cultivated land over grassland and tolerated up to 90% cultivation, provided that the remaining land base was grassland (Schmutz 1987, 1989). Hawks nesting in the Regina Plain of Saskatchewan, however, were found on sites with more grasslands, trees, and shrubs within one kilometer of nesting sites than was found on randomly chosen sites (Groskorth 1995). The availability of nest trees may be limiting in many parts of the prairies, increasing the importance of trees and shrubs around abandoned farmyards; such old hedgerows are often affected by drought, rubbing by cattle, bulldozing, and aging (Schmutz et al. 2001). Large numbers of Swainson's Hawks were poisoned by extensive use of pesticides during grasshopper outbreaks on the wintering grounds in South America (Woodbridge et al. 1995), but chronic residue levels did not appear to affect their reproduction (reviewed in England et al. 1997 and Dechant et al. 2001). Overall, management for this species will require providing open grasslands that contain patches of trees or shrubs for nesting and perching, in close proximity to cultivated areas (Dechant et al. 2001). Management of prey species is also integral to the continued existence of Swainson's Hawks.

Appendix V. Status listings of priority species in BCR11

National COSEWIC status definitions follow the table. While the definitions under the provincial Wildlife Acts are generally similar, provincial officials or other resources should be consulted to obtain legal definitions.

Species	COSEWIC	MB	SK	AB
Greater Sage-Grouse	Endangered	N/A	Endangered	Endangered
Sharp-tailed Grouse				
Northern Harrier	Not At Risk			
Swainson's Hawk				
Ferruginous Hawk	Special Concern	Threatened		
Golden Eagle	Not At Risk			
Prairie Falcon	Not At Risk			
Black-billed Cuckoo				
Snowy Owl				
Burrowing Owl	Endangered	Endangered	Endangered	Threatened
Long-eared Owl				
Short-eared Owl	Special Concern			
Loggerhead Shrike	Threatened	Endangered		Special Concern
Sedge Wren	Not At Risk			
Sprague's Pipit	Threatened			Special Concern
Bohemian Waxwing				
Clay-colored Sparrow				
Lark Bunting				
Grasshopper Sparrow				
Baird's Sparrow	Not At Risk	Endangered		
Le Conte's Sparrow				
Nelson's Sharp-tld Sparrow	Not At Risk			
McCown's Longspur				
Chestnut-collared Longspur				
Bobolink				

Species	Any indigenous species, subspecies, variety, or geographically defined populations of wild fauna and flora
Extinct	A species that no longer exists
Extirpated	A species no longer existing in the wild in Canada, but occurring elsewhere
Endangered	A species facing imminent extirpation or extinction
Threatened	A species likely to become endangered if limiting factors are not reversed
Special Concern	A species of special concern because of characteristics that make it particularly sensitive to human activities or natural events
Not At Risk	A species that has been evaluated and found to be not at risk
Data Deficient	A species for which there is insufficient scientific information to support status designation