Partners in Flight Canada

Maritime Canada Landbird Conservation Plan

Busby, D., P.J. Austin-Smith Sr., R. Curley, A. Diamond, T. Duffy, M. Elderkin, S. Makepeace, D. Diamond, R. Melanson, C. Staicer and B. Whittam

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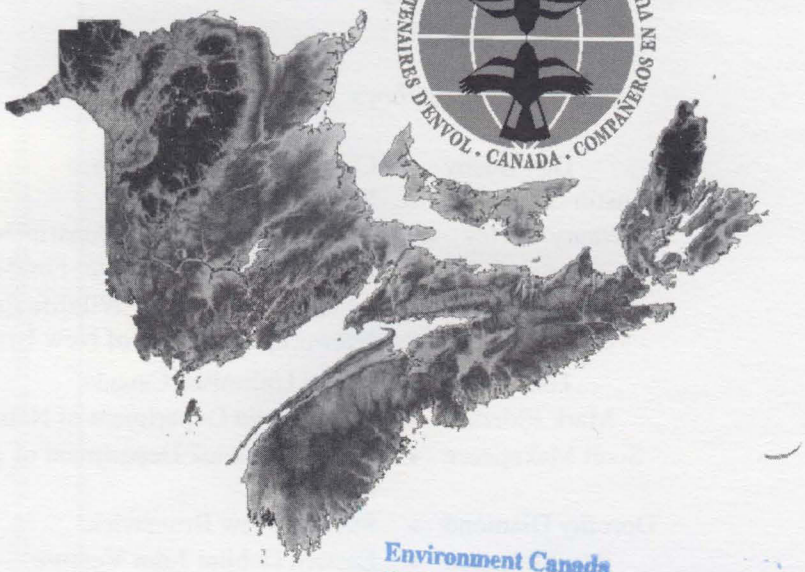

PARTNERS IN FLIGHT - CANADA

Maritime Canada Landbird Conservation Plan

February 2006

Prepared by

PARTNERS IN FLIGHT
Maritime Canada Landbird Conservation Working Group

PARTNERS IN FLIGHT
Maritime Canada Landbird Conservation Plan
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Executive Summary

The Maritime Canada Landbird Conservation Plan is part of the Partners in Flight – Canada program (PIF - Canada). PIF is one of the four pillars of bird groups that comprise the North American Bird Conservation Initiative (NABCI - Canada) endorsed by Canada, the United States and Mexico. The goal of PIF is to maintain the diversity and abundance of all North American landbirds. The present regional landbird conservation plan covers New Brunswick, Nova Scotia and Prince Edward Island, which lie within Bird Conservation Region (BCR) 14. This BCR also includes eastern Quebec and parts of Maine, New Hampshire, Vermont, Massachusetts, New York and Connecticut. Efforts to plan for the entire BCR 14 region are presently underway, but that plan will not address the level of detail required for local planning and conservation activities.

Landbirds abound throughout all habitats in the Maritimes. Landbirds consist of ten very different groups of birds:

- Hawks, eagles and falcons
- Partridges, grouse, and quail
- Pigeons and doves
- Cuckoos
- Owls
- Nightjars (nighthawks and whip-poor-wills)
- Swifts and hummingbirds
- Kingfishers
- Woodpeckers
- Passerines

This last and largest group contains over twenty families of birds such as warblers, thrushes and blackbirds. There are approximately 160 landbird species that regularly inhabit the Maritimes, most of which (~100) breed here but winter elsewhere. However about 44 species occur here year-round including six non-native (introduced) species. An additional four species occur only during migrations south to north or *vice versa*. Another eight species are found in the area only during winter. In addition to species that occur here regularly, about 100 species are considered accidental or irregular.

The Maritime Provinces have few landbird species in critical need of immediate conservation action. There are no species listed under the Species at Risk Act (SARA – www.speciesatrisk.gc.ca) or by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC – www.cosewic.gc.ca) as Endangered in the Maritimes. One species, the Peregrine Falcon (*anatum* subspecies - NB, NS, PE), is listed by both SARA and COSEWIC as Threatened in the region. SARA and COSEWIC list both the Ipswich Savannah Sparrow (NS) as a Species of Special Concern while COSEWIC lists Bicknell's Thrush (NB, NS), Short-eared Owl (NB, NS, PE) and Red-shouldered Hawk (NB) as Species of Special Concern.

Although PIF aims to provide valuable, timely expertise and actions for the conservation of all landbird species, it is those species that have not been COSEWIC-listed for the Species at Risk Act (SARA) that are the main subject of the PIF initiative. Preventing common birds from becoming uncommon and unlisted birds from becoming listed is the goal. Of the 160 landbird species in the Maritimes, 15 have been classified in this plan as High priority for planning and conservation. Twenty-four are considered to be of Medium priority and a further 21 species are in the Early Watch category.

A High priority listing does not necessarily imply that urgent action must occur immediately. The Northern Parula, one of the High priority species here, is widely distributed over much of eastern North America and its population appears to be stable or increasing. This warbler however, is not evenly distributed throughout its range, being highly concentrated in habitats in BCR 14, thus compelling this region to make its long-term conservation a high stewardship priority. Of the 15 High priority species, approximately half will require some form of action such as improved monitoring, research, and/or habitat management in the near future.

Few of the Medium priority species can be considered as urgently in need of conservation action. While still common, however, most are facing long-term population declines. For others, there is insufficient information on population status, habitat requirements, wintering ground issues or basic biology. For these species there is a need to begin long-term planning for research and population monitoring.

The Early Watch list contains a mix of species, none of which is considered to be a priority in the near future. Nonetheless all are considered to be of some conservation concern. Some species are a priority in other BCRs but not necessarily in BCR 14. For others there is some concern within BCR 14 but not necessarily outside. Some species may be showing short-term population declines and others may have declined in the past but are now stable or increasing.

While this plan addresses landbird conservation planning and implementation for the three Maritime Provinces, not all priorities are equal in all provinces or areas. Some species within each of the priority

categories will be ranked higher or lower depending upon provincial concerns. The Partners in Flight process recognizes that landbird conservation can only be achieved through partnerships because no single government or organization has the authority, mandate or responsibility to ensure effective conservation of birds. PIF aims to create cooperative partnerships of interested stakeholders to achieve mutually agreeable planning and implementation of realistic conservation goals.

It must be emphasized that this document is a first step toward creating a dynamic and systemic process that will be regularly updated to reflect progress in attaining the required goals.

Table 1 lists the Maritime Canada priority species.

Table 1. List of priority landbird species[1] in the Maritime Provinces.

Priority		
High	**Medium**	**Early Watch**
Short-eared Owl (SC)[2]****	Red-shouldered Hawk (SC)*	Northern Harrier
Chimney Swift	Peregrine Falcon (T)**	Cooper's Hawk
Olive-sided Flycatcher***	Black-billed Cuckoo	Northern Goshawk
Eastern Wood-Pewee	Long-eared Owl	Spruce Grouse
Boreal Chickadee	Boreal Owl	Ruffed Grouse
Wood Thrush***	Whip-poor-will	Belted Kingfisher
Bicknell's Thrush (SC)****	Common Nighthawk	Yellow-bellied Sapsucker
Northern Parula	Black-backed Woodpecker	Yellow-bellied Flycatcher
Bay-breasted Warbler***	Pileated Woodpecker	Least Flycatcher
Canada Warbler***	Gray Jay	Great Crested Flycatcher
Rose-breasted Grosbeak	Eastern Kingbird	Warbling Vireo
Nelson's Sharp-tailed Sparrow***	Bank Swallow	Horned Lark
Ipswich Savannah Sparrow (SC)**	Barn Swallow	Purple Martin
Rusty Blackbird***	Brown Creeper	Cliff Swallow
Purple Finch	Veery	Eastern Bluebird
	Black-throated Blue Warbler	Black-throated Green Warbler
	Chestnut-sided Warbler	Pine Warbler
	Cape May Warbler	Blackpoll Warbler
	Blackburnian Warbler	American Redstart
	Vesper Sparrow	Eastern Meadowlark
	Bobolink	Brown-headed Cowbird
	Pine Grosbeak	
	Red Crossbill	
	White-winged Crossbill	

[1] Species listed in taxonomic order; see Appendix 2 for species scientific names

[2] COSEWIC and SARA definitions: SC = Species of Special Concern; T = Threatened

* COSEWIC-listed species (www.cosewic.gc.ca)

** SARA-listed species (www.speciesatrisk.gc.ca)

*** Continental priority (Rich *et al.* 2004)

**** Both COSEWIC-listed and Continental Priority species

Sommaire

Le Plan de conservation des oiseaux terrestres des provinces Maritimes est le fruit des efforts de Partenaires d'envol – Canada, l'un des quatre partenaires clés de l'Initiative de conservation des oiseaux de l'Amérique du Nord (ICOAN – Canada), qui a été entérinée par le Canada, les États-Unis et le Mexique. Partenaires d'envol s'est donné comme objectif de préserver la diversité et l'abondance de toutes les espèces d'oiseaux terrestres du continent. Le présent plan de conservation régional vise le Nouveau-Brunswick, la Nouvelle-Écosse et l'Île-du--Prince-Édouard, qui se trouvent tous dans la région de conservation des oiseaux (RCO) 14. Cette RCO englobe également l'Est du Québec et certaines parties du Maine, du New Hampshire, du Vermont, du Massachusetts, de l'État de New York et du Connecticut. Un plan visant tout le territoire de la RCO 14 est en cours d'élaboration, mais ce document ne renfermera pas le niveau de détail nécessaire à la réalisation d'activités de planification et de conservation à l'échelle locale.

Les oiseaux terrestres abondent dans tous les habitats des provinces Maritimes. Ils se classent en dix groupes fort différents les uns des autres :

- Buses, aigles et faucons
- Perdrix, gélinottes et colins
- Pigeons et tourterelles
- Coulicous
- Rapaces nocturnes
- Engoulevents
- Martinets et colibris
- Martins-pêcheurs
- Pics
- Passereaux

Ce dernier groupe, qui englobe le plus grand nombre d'espèces, compte une vingtaine de familles d'oiseaux tels que des parulines, des grives et des oiseaux noirs. Les provinces Maritimes servent d'habitat à environ 160 espèces d'oiseaux terrestres; la plupart (une centaine d'espèces) y nichent, mais hivernent ailleurs. Quelque 44 espèces passent toute l'année ici, dont six espèces non indigènes (introduites). Quatre espèces font halte dans la région uniquement pendant leurs migrations entre le sud et le nord, et huit autres n'y séjournent qu'en hiver. Aux espèces couramment observées viennent s'ajouter une centaine d'espèces considérées comme accidentelles ou peu communes.

Les provinces Maritimes comptent peu d'espèces d'oiseaux terrestres qui ont besoin de mesures de conservation immédiates. En effet, on n'y trouve ni espèce inscrite à la *Loi sur les espèces en péril* (LEP – www.especesenperil.gc.ca), ni espèce en voie de disparition désignée par le Comité sur la situation des espèces en péril au Canada (COSEPAC – www.cosepac.gc.ca). Une espèce, le Faucon pèlerin de la sous-espèce *anatum* (Nouveau-Brunswick, Nouvelle-Écosse et Île-du-Prince-Édouard), figure sur les listes de la LEP et du COSEPAC à titre d'espèce menacée dans la région. La LEP et le COSEPAC considèrent le Bruant des près de la sous-espèce *princeps* (Nouvelle-Écosse) comme une espèce préoccupante, tandis que le COSEPAC a accordé à la Grive de Bicknell (Nouveau-Brunswick et Nouvelle-Écosse), au Hibou des marais (Nouveau-Brunswick, Nouvelle-Écosse et Île-du-Prince-Édouard) et à la Buse à épaulettes (Nouveau-Brunswick) le statut d'espèces préoccupantes.

Partenaires d'envol s'efforce de mettre à contribution de l'expertise et des mesures opportunes pour assurer la conservation de l'ensemble des espèces d'oiseaux terrestres. Cependant, le groupe s'intéresse surtout aux espèces qui ne figurent pas sur les listes du COSEPAC et de la *Loi sur les espèces en péril.* L'objectif consiste à éviter que des oiseaux communs ne deviennent rares et que des oiseaux non désignés ne soient inscrits comme espèces en péril. Des 160 espèces d'oiseaux terrestres qui fréquentent les provinces Maritimes, Partenaires d'envol en a classé 15 dans la catégorie des espèces hautement prioritaires qui devront faire l'objet de plans et de mesures de conservation, 24 dans la catégorie des espèces moyennement prioritaires et 21 autres dans la catégorie de la surveillance précoce.

Les oiseaux classés hautement prioritaires n'ont pas nécessairement besoin de mesures de conservation immédiates. La Paruline à collier, par exemple, occupe un territoire qui couvre la majeure partie de l'Est de l'Amérique du Nord, et sa population semble être stable ou en croissance. Cependant, cette répartition n'est pas uniforme, les populations étant fortement concentrées dans les habitats de la RCO 14. Cette situation amène Partenaires d'envol à faire de la conservation à long terme de cette espèce une haute priorité de gérance. Des 15 espèces hautement prioritaires, environ la moitié devra faire l'objet de mesures quelconques dans un proche avenir, qu'il s'agisse de l'amélioration des programmes de surveillance existants, de la réalisation d'études ou de la mise en place de mesures de gestion de l'habitat.

Seules quelques rares espèces moyennement prioritaires ont besoin de mesures de conservation immédiates. Cependant, bien qu'elles soient encore communes, la plupart de ces espèces pourraient connaître un déclin démographique à long terme. Dans certains cas, il n'y a pas suffisamment d'information sur la situation des populations, les caractéristiques essentielles de leur habitat, leurs aires d'hivernage ou leur biologie de base. Il faudra donc entreprendre l'élaboration de plans à long terme pour la réalisation de travaux de recherche et de surveillance de ces populations.

Les espèces devant faire l'objet d'une surveillance précoce sont très variées, mais aucune n'est considérée comme prioritaire dans l'avenir immédiat. Néanmoins, elles suscitent toutes des préoccupations. Certaines espèces sont prioritaires dans d'autres RCO, mais pas nécessairement dans la RCO 14. D'autres suscitent des inquiétudes dans la RCO 14, mais pas nécessairement ailleurs. Dans certains cas, les populations ont récemment connu un déclin, alors que, dans d'autres, elles ont accusé un recul par le passé, mais elles sont maintenant stables ou en croissance.

Ce document présente les efforts de conservation à déployer dans les trois provinces Maritimes, mais il faut savoir que le degré de priorité accordé à chaque espèce peut varier selon la province ou le secteur. De même, pour chaque catégorie de priorité, le classement des espèces varie lui aussi selon la situation observée dans chaque province. Partenaires d'envol reconnaît que la conservation des oiseaux terrestres n'est possible qu'au moyen de partenariats, parce que le pouvoir, le mandat ou la responsabilité d'assurer la conservation des oiseaux n'appartiennent pas à un seul gouvernement ou à un seul organisme. Partenaires d'envol cherche donc à nouer des liens de coopération avec des intervenants qui s'intéressent aux oiseaux afin de dresser des plans acceptables à toutes les parties et d'atteindre des objectifs de conservation réalistes.

Ce document représente une première étape vers la création d'un processus dynamique et systématique qui sera régulièrement actualisé afin de refléter les progrès accomplis dans l'atteinte des objectifs fixés.

Le tableau 1 présente la liste des espèces prioritaires[1] dans les provinces Maritimes.

Degré de priorité		
Hautement prioritaire	**Moyennement prioritaire**	**Surveillance précoce**
Hibou des marais (EP)[2]****	Buse à épaulettes (EP)*	Busard Saint-Martin
Martinet ramoneur	Faucon pèlerin (EM)**	Épervier de Cooper
Moucherolle à côtés olive***	Coulicou à bec noir	Autour des palombes
Pioui de l'Est	Hibou moyen-duc	Tétras du Canada
Mésange à tête brune	Nyctale de Tengmalm	Gélinotte huppée
Grive des bois***	Engoulevent bois-pourri	Martin-pêcheur d'Amérique
Grive de Bicknell (EP)****	Engoulevent d'Amérique	Pic maculé
Paruline à collier	Pic de Goa	Moucherolle à ventre jaune
Paruline à poitrine baie***	Grand Pic	Moucherolle tchébec
Paruline du Canada***	Mésangeai du Canada	Tyran huppé
Cardinal à poitrine rose	Tyran tritri	Viréo mélodieux
Bruant de Nelson***	Hirondelle de rivage	Alouette hausse-col
Bruant des prés (sous-espèce *princeps*) (EP)**	Hirondelle rustique	Hirondelle noire
Quiscale rouilleux***	Grimpereau brun	Hirondelle à front blanc
Roselin pourpré	Grive fauve	Merlebleu de l'Est
	Paruline bleue	Paruline à gorge noire
	Paruline à flancs marron	Paruline des pins
	Paruline tigrée	Paruline rayée
	Paruline à gorge orangée	Paruline flamboyante
	Bruant vespéral	Sturnelle des prés
	Goglu des prés	Vacher à tête brune
	Durbec des sapins	
	Bec-croisé des sapins	
	Bec-croisé bifascié	

[1] Espèces énumérées en ordre taxonomique; les noms scientifiques se trouvent à l'annexe 2.

[2] Définitions du COSEPAC et de la LEP : EP = Espèce préoccupante; EM = Espèce menacée

* Espèce figurant sur les listes du COSEPAC (www.cosepac.gc.ca)

** Espèce inscrite à la LEP (www.especesenperil.gc.ca)

*** Priorité à l'échelle du continent (Rich *et al.*, 2004)

**** Espèce inscrite par le COSEPAC et considérée comme prioritaire à l'échelle continentale

Introduction

Birds are highly conspicuous features of landscapes, occupying a broad range of habitats. As major vertebrate components of ecological systems, birds are sensitive environmental indicators because they exist at or near the top of food chains. Population changes often mirror broader fluctuations in their habitats. In recent years, declining populations of landbirds have led to concerns about their welfare and to the need to examine the reasons for such decreases. In response, efforts are underway to conserve and manage landbird habitats to forestall declines that might place a species at risk of disappearing. Proactive approaches to landbird conservation recognize the need to plan and take effective action to maintain landbird populations.

The North American Bird Conservation Initiative (NABCI) endorsed by Canada in 1999, is a formal international arrangement wherein agencies and organizations in Canada, United States, and Mexico have agreed *to maintain the diversity and abundance of all North American birds.* This goal is to be accomplished through the implementation of four main programs: The North American Waterfowl Management Plan (NAWMP) for waterfowl, Wings Over Water (WOW) for seabirds and colonial waterbirds, Canadian Shorebird Conservation Plan (CSCP) for sandpipers and plovers, and Partners in Flight (PIF) for landbirds. A broad picture of landbird conservation issues and priorities is presented in The North American Landbird Conservation Plan (Rich *et al.*2004)

The goal of Partners in Flight -Canada (Downes *et al.* 2000) is ***to ensure the long-term viability of populations of native Canadian landbirds across their range of habitats***. Landbirds consist of ten very different groups of birds: hawks, eagles and falcons; partridges, grouse, and quail; pigeons and doves; cuckoos; owls; nightjars (nighthawks and whip-poor-wills); swifts and hummingbirds; kingfishers; woodpeckers; and passerines, the largest group of species that contains over twenty families of birds such as warblers, thrushes and blackbirds. PIF priorities are to prevent the rarest species from becoming extinct, to prevent uncommon species from becoming threatened species, and to 'keep common birds common'. The PIF plan provides a framework for the development and implementation of species and habitat conservation measures that will help to avert the formal requirement to list species as endangered or threatened. It differs from past agency efforts in that it is voluntary, non-regulatory and partnership-based.

The Maritimes Canada Landbird Conservation Plan is one of several regional Canadian plans to address this new initiative under the PIF-Canada program.

Maritime Canada Landbird Planning Unit (BCR 14)

The Maritime Provinces, consisting of New Brunswick (NB), Nova Scotia (NS) and Prince Edward Island (PEI), provide breeding, migration and wintering habitat for a large number of landbirds. In addition, several landbird species migrate through this region on their way to and from breeding grounds in more northern regions of eastern Canada. Although the Maritimes comprise less than 1.5% of the land area of Canada, approximately 160 species (53%) of the total Canadian breeding species of landbirds (300) are found here. The region supports breeding populations of about 144 species. Of those, approximately 44 are year-round residents of the area and 100 are summer breeders that winter elsewhere. There is also a small number of species, mainly Arctic breeders, which occur only in the winter.

Maritime Canada has a responsibility to ensure the continued viability for several species of nationwide concern because a considerable proportion of their population and/or breeding range lies within this region (Dunn 1997). Partners in Flight will build on past and present conservation efforts by a wide variety of agencies throughout the Maritimes. The partners committed to the process and working towards these goals include federal and provincial government agencies, educational institutions, non-governmental conservation organizations, private organizations and individuals (Appendix 1)

Goals and Objectives

The Partners in Flight - Maritime Canada Landbird Conservation Plan is a regional program of PIF-Canada (Partners in Flight – Canada), designed to contribute to the national plan by:

- Expanding on present conservation activities for landbirds,
- Coordinating activities of stakeholders,
- Identifying new strategies for landbird conservation, and
- Mitigating present and future threats to landbirds in the region.

The goal of the Maritime Canada Landbird Conservation Plan is to ensure sustainability of the present diversity of landbirds in the region.

Rosenberg and Hodgman (2000), referring to the entire Bird Conservation Region (BCR 14) of which Maritime Canada is a part, noted that careful planning

is needed to balance economic goals and sustainability of forests against the requirements of birds on both private and public lands. Although economic realities will continue to drive landscape changes, choices may exist for modifying economic ventures to allow for wildlife and habitat considerations. If so, practical conservation measures, in this case for birds, must be available for implementation in partnerships with individuals, industry, resource agencies and other organizations that control the land base.

To achieve the goal of this plan, the following actions will be required:

1. Assess the role of Maritime Canada in sustaining populations of summer and year-round resident birds, as well as those that migrate through the region;

2. Evaluate population trends, habitat needs, and important sites for each species in the region throughout their annual cycles;

3. Identify species for which population information is lacking;

4. Evaluate threats to present and future populations in the region, including further loss of habitat;

5. Determine conservation priorities for each species that reflect rankings in the Canadian plan, biological sensitivity, and regional responsibility; and

6. Develop and implement conservation plans in consultation and cooperation with partners and stakeholders including those beyond Maritime borders.

Physical and Vegetative Features

Bird Conservation Region 14 includes NB, NS, PEI, the Gaspe Peninsula and Eastern Townships of Quebec, most of the states of Maine, New Hampshire and Vermont and parts of New York, Massachusetts and Connecticut (Fig.1). New Brunswick, Nova Scotia and Prince Edward Island together possess a diversity of landscapes and habitats found in few other areas of Canada.

The Maritime land mass lies between the warmer continental regions to the west and southwest, and the cooler boreal region to the north. Coastal waters are affected by the cold Labrador Current, the warmer Gulf of St. Lawrence, the warm Gulf Stream and the cold, fast-moving tidal currents of the Bay of Fundy.

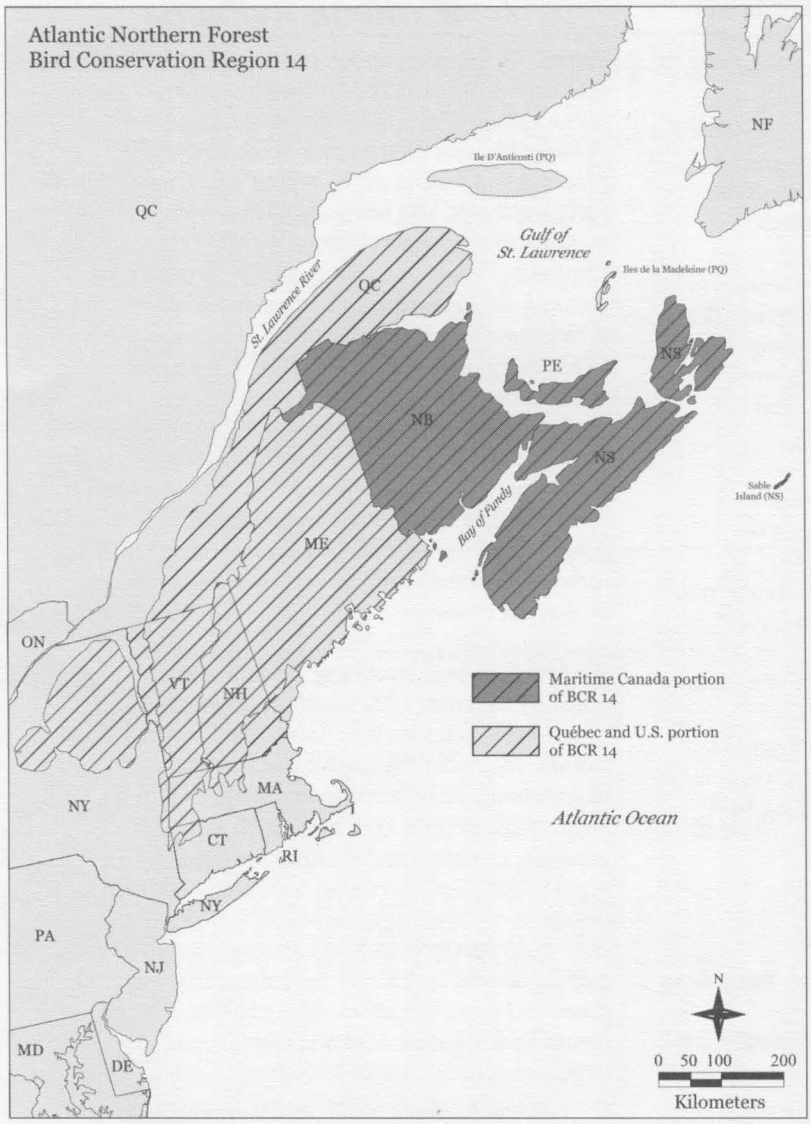
The Maritime region is a geologically complex area that physiographically forms part of the Appalachian Region (Roland 1982). The relatively low relief of the landscape ranging from low coastal plains and islands to elevations of 750m in northern New Brunswick gives the terrain an open rolling appearance. Salt marsh, bays and estuaries are prominent features of the highly indented Maritime coastline (Roland 1982). Highlands within the area form the headwaters of numerous rivers, several of which are tidal such as the Petitcodiac, Shubenacadie and Stewiacke that empty into the eastern end of the Bay of Fundy. Peatlands, bogs and other wetlands are abundant in the interior of New Brunswick and Nova Scotia. Lakes and countless streams dot the Maritime landscape.

Climate in the Maritimes is strongly influenced by warm continental air masses that sweep eastward across the region to become tempered by the cool oceanic waters. The winters tend to be milder and the summers cooler than the rest of the country except for the New Brunswick interior where the weather is more continental. The region also receives considerable precipitation (average 1000mm annually).

Soils in the region are quite varied ranging from mainly podzols, formed by a combination of high precipitation, cool temperatures and glacial deposits under mixed or coniferous forest (Simmons *et al.* 1984) to the deep reddish sandstone soils of Prince Edward Islands.
The Maritimes lie in the Acadian Forest belt (Simmons *et al.* 1984), a transitional zone between the vast coniferous boreal region to the north and the deciduous forests to the south and west. Forested areas are dominated by sugar maple (*Acer saccharum*), beech (*Fagus grandifolia*) and birch (*Betula* spp), or by red spruce (*Picea rubens*) and balsam fir (*Abies balsamea*) forest, or mixed amounts of these. Black and white spruce (*P.mariana, P.glauca*), white pine (*Pinus strobus*), hemlock (*Tsuga canadensis*), and red maple (*Acer rubrum*) are common. The boreal element (spruce-fir) occurs in the highlands and also forms a band around the cool Bay of Fundy and occurs on the Atlantic mainland coasts and islands of Nova Scotia.

History and Land Use

Previous to European colonization it is likely that forest tree diseases, pests, windstorms and fire were factors influencing forests in the Maritimes. But beginning with the first colonists, forest clearing for settlements and farmland, and then for timber, the Maritime landscape was greatly changed. Early settlements formed narrow bands around the coastlines



of the area but later population expansion lead to penetration of the interior of the region with subsequent land clearing for agriculture. More recently small farms have disappeared and are being replaced by large agricultural holdings.

Forest harvesting for timber and clearing for agriculture, together with natural disturbances such as fires and windstorms, greatly reduced forest cover in the Maritimes. As a consequence, the greatest amount of cleared land in the region was reached between 1880 and 1930 (Erskine 1992). Forests presently cover 85% and 75% of New Brunswick and Nova Scotia respectively. In Prince Edward Island, the current amount of farmland is approximately 50% of the landmass, although it reached 85% in the late 1800s. Intensive forestry practices beginning in the early 1900's have changed the amounts of tree cover types and seral stages of the remaining forests. Softwood plantations for pulpwood now exist where hardwoods once grew in New Brunswick and Nova Scotia.

Many Maritime wetlands such as freshwater marshes and bogs have been used as dumps or filled in for development. Dyking of saltmarshes around the Bay of Fundy for hay production and pasturing cattle began in the 1600's. Upwards of 60% of the pre-colonial tidal marshes have been dyked.

Intensive land development for high-density housing, commercial use, mining and other activities has permanently replaced many landscapes to those with little or no vegetation.

Conservation

Protection of birds in the Maritimes initially began with legislation restricting the pursuit of gamebirds. Not until the early 1900's were small birds given a measure of protection in Nova Scotia. The Migratory Birds Convention Act (1917), an act that protects all migratory birds, followed soon after. Maritime and the federal governments concentrated on bird protection through hunting regulations and the establishment of game sanctuaries from the 1920's up until the 1940's and 1950's when monitoring and research activities first began.

It was left to Maritime resource agencies to formulate wildlife policies and regulations for habitat protection over most lands. Provincial conservation measures were designed primarily to protect game species but also benefiting small birds when centred on setting aside tracts of land as sanctuaries and wildlife management areas. The conservation of birds in managed landscapes in the Maritimes is a recent innovative scheme to aid efforts for sustaining bird populations as well as other animals and plants. Other non-government organizations also own or manage lands that are primarily set aside for wildlife including landbirds. Forestry companies in the region integrate wildlife with forest practices and some have set aside wildlife areas.

Monitoring and Research

Public interest in recording bird sightings led to the development of the Audubon Society Christmas Bird Count (CBC), a volunteer effort that expanded in the

1950's and 1960's. Besides the CBC, volunteer bird monitoring projects in the Maritimes include Feeder Watch, the Breeding Bird Survey, the Maritimes Breeding Bird Atlas, the Migration Monitoring Network (Downes 1998) and others. The Nest Record Scheme and Monitoring Avian Productivity and Survivorship (MAPS) stations also complement the other volunteer bird programs in the Maritimes.

Additional data collection projects by provincial resource agencies, the Canadian Wildlife Service, the Canadian Forestry Service and university researchers have been ongoing for many decades. Such work is crucial for tracking bird species abundance and population trends in the Maritimes.

Avian research is vital for managing landbirds and their habitats in the region. Landbird research is conducted at Maritime universities, the CWS, provincial wildlife departments, Parks Canada and non-government organizations. Research topics have ranged from studies on the effects of forest fragmentation on bird populations to determining the requirements of cavity-nesting birds and their reproductive success. Public interest and concern also led to research, inventory and management programs by many agencies for several raptors including bald eagles, ospreys and peregrine falcons.

Public Education

Efforts to educate the public about birds date back more than 100 years when bird columns were published in a few Maritime newspapers. Natural history and bird societies were formed in the early and mid 20th century and continued to increase in number throughout that era. These organizations promoted the conservation of birds and many regularly published leaflets and bird sightings. Biologists, naturalists, natural history groups and bird societies continue to promote bird conservation in the Maritimes through regular meetings and publications in various naturalists' magazines.

Natural history organizations, museums, provincial and federal natural resource agencies in the Maritimes provide bird displays, printed material and, often, speakers to schools and community organizations. Bird banding stations also play a role in education by introducing visitors to landbirds. Most monitoring projects rely on volunteers, thus providing opportunities to teach bird identification, banding and disseminate information on bird conservation activities.

Maritime Avifauna

Present bird species and populations in the Maritimes are consequences of the profound changes in the region's landscapes since pre-settlement times. Widespread forests with closed canopies were the predominant feature of the region's landscape noted by early explorers, and birds associated with such habitats were more numerous (Erskine 1992). Tree-fall gaps created by windstorms on thin soils, provided open areas as did fires, forest diseases and pests, thereby providing a successional mosaic of habitats for birds (Rosenberg and Hodgman 2000). Since early colonization, the reduction in mature forests and hardwood stands through timber harvesting and, more recently, stand conversion to softwoods, has had the most obvious and widespread influence on landbird diversity. The approximately 160 landbird species that now breed within the Maritimes may represent an increase over the numbers present during pre-settlement times.

Avifaunal changes resulting from human activities, noted by Erskine (1992), include an increase in generalist species such as Song Sparrows, American Robins and Alder Flycatchers, which are well adapted to temporary early successional stages. Clearing for farms allowed open land birds such as Horned Larks, grackles, cowbirds and Killdeer to spread into the region. However, Savannah Sparrows and Sharp-tailed Sparrows were indigenous to this area, as were perhaps Bobolinks that, previous to clearing for settlements, may have used floodplain meadows (Erskine 1992). In urban and suburban areas, feral pigeons, starlings and House Sparrows are common introduced birds. Where large open spaces, vegetated edges or wooded areas exist, a wider variety of birds may be present. Within the past few decades, milder winters may have assisted immigrant species including Mourning Dove, Northern Cardinal, and Northern Mockingbird to become established in the Maritimes, adding to the diversity of regional avifauna.

Although no landbird extinctions have occurred in the Maritimes since the Passenger Pigeon became extinct, concerns have been raised about those that have lost habitat due to increasingly intensive human activities, as well as about expanding ranges and populations of certain bird species (e.g. cowbirds) that negatively affect native species. Further avifaunal changes, both in species and species numbers will undoubtedly occur with widespread shifts in landscapes and a changing climate. Throughout the northeastern North America, expanding cities, dense road networks, sprawling industrial developments, farming and forest harvesting have made large areas of land inhospitable to landbirds that require undisturbed habitats. Maritime Canada, with its smaller human population and remaining tracts

of forest, becomes vital in this context, especially to forest birds. However, forest cutting as the major source of revenue for much of the Maritimes, will continue to be widespread in the region as the demand for pulp, lumber, and chipwood increases with population growth. In addition, economic pressures on farmers to expand and/or use land intensively are expected to increase. Future landbird conservation efforts must focus on maintaining tracts of forested land of adequate size and age, areas of second-growth forest, coastal softwoods and scrub, grasslands and marsh/wetlands to sustain the present diversity of landbirds.

Conservation Planning Process

Landbird Priority Species Selection

Selection of priority species in this Maritime Landbird Conservation Strategy involved a stepwise scheme. The first step was that of assigning scores under the PIF species assessment process based on six biologically related categories termed *vulnerability factors,* and a seventh factor, *breeding area importance*. Each species was then evaluated based on its present population levels and risk in the Maritimes. Species perceived to be of concern were grouped into a priority list based on several factors including rarity, poorly known biology, continental concern, vulnerability, habitat availability trends, wintering ground concerns or other specific issues. Their primary occurrence in this area was also an important determinant as well as their value as ecological indicators. It must be emphasized that not all species have an equal priority throughout the three provinces. Appendix 2 presents the PIF-Canada Priority Setting scheme applied to the 60 species considered for the Maritime region of BCR 14. Appendix 3 is a synoptic list of 39 high and medium priority landbird species using the priority-rating scheme.

Species/Habitat Associations and Population Assessments

Based on the foregoing synoptic list of 39 High and Medium priority species, and with the addition of 21 lower ranked, Early Watch species, the 60 species of concern in the Maritimes were placed within broad habitat groupings in accordance with their perceived priority status. These rankings range from High to Early Watch. In some cases, species that rank lower may require more immediate attention depending upon whether direct conservation action, research or monitoring is required to address concerns for their continued presence in this region. Population assessments (trends) were based on interpretation of the most recent monitoring data, primarily BBS results.

Landbird Conservation Strategy

Forest Habitats

Natural disturbances, i.e. disease, insect infestations, windstorms, fire, and now, intensive forestry, influence forest landscapes by altering landscape structure and patterns through stand development and tree species composition (Parminter 1998). After a disturbance, forest renewal takes place over time through natural regeneration, a series of vegetative successional stages or seres. These have been described in terms of tree size or age (seedling, pole, etc) and/or foliage diversity (vertical and horizontal vegetation profiles). Intensive forestry however omits the earliest seral stages of seedling and shrub growth by planting young trees and physically or chemically destroying competing plants. Forest landscapes therefore, are composed of stands that reflect the frequency and intensity of disturbances as well as natural recruitment of plant species. Furthermore, mature and old growth forest stands undergo a shifting pattern of small patch or gap disturbances when individual or a small group of trees die.

The diversity of seral stages in stands throughout the forest landscape is reflected in the avifauna of a region. Bird species and species abundance fluctuate with changes in size and age of forest stands. Forest birds tend to be linked to tree species architecture and structure or profiles of forest vegetation. For example, in mature conifer-dominated forests, birds, especially warblers, exploit food resources at different levels in the tree canopy by niche specialization, i.e. foraging in different parts of the tree and/or using different feeding techniques. This partitioning of mature trees into microhabitats reduces competition between species, allowing each to occupy a slightly different niche.

The Acadian forest of the Maritime region is considered transitional between the temperate broad-leafed forests to the south and the northern coniferous forests. Most forested areas here, with the exception of southwestern New Brunswick where broad leaf stands predominate, have a distinctly boreal nature due to the cooler climate and relatively unproductive soils (Maxwell and Black 1972 in Erskine 1992). Spruces, balsam fir, white birch and poplars, common trees of more boreal forests, are found throughout the region in

coniferous forest stands, in mixed forests and at various stages of most forest succession. As noted by Erskine (1992), the regional avifauna, rather than being transitional between temperate and boreal, has a distinctly boreal character and is similar to "other boreal regions of Canada east of the Rockies".

Issues

Niemi *et al.* (1998) although referring primarily to boreal forests, note that birds play an important ecological role and, therefore, sustaining bird populations is beneficial for maintaining healthy forests. They point out however, that there is a lack of knowledge concerning the ability to mimic natural disturbance regimes, lack of understanding of forest fragmentation effects on forest birds, and lack of knowledge regarding factors that control variability in forest bird populations. Forest fragmentation (affecting approx. 75% of the Acadian forest) and stand conversion (i.e. extensive spruce plantations replacing soft wood and mixed stands) as well as a decrease in size of forest stands, have occurred throughout the region. Selectively cutting hardwood forest within short time intervals changes their structure resulting in fewer and more scattered mature, closed canopy stands (Villard 2000).

These factors profoundly influence bird populations as well as the movements or dispersal of forest-dwelling birds. Villard (2000) noted that Ovenbird populations, an indicator species requiring open under-story within closed-canopy mature forests, were reduced in selectively cut New Brunswick forests and their movements restricted. A study of cutting in Nova Scotia hardwoods, found marked differences in species composition between uncut (control) and cutover plots (3-5 year post harvest) (Freedman, *et al.* 1981). The most important species on the control plots were Least Flycatchers and Ovenbirds while Chestnut-sided Warbler, Common Yellowthroat and White-throated Sparrow were most common on the cutover plots. Milton and Towers (1990) studying bird species abundance on natural regeneration versus forest plantations in Nova Scotia found greater diversity on natural regeneration plots. They also noted that a major factor influencing bird communities at different seral stages after a mature forest is cut, is the density of the cull and standing dead trees. Hagan *et al.* (1997) also suggest leaving slash in clearcuts can have a "positive effect on bird communities". Norton and Hannon (1997) recommend leaving up to 40% of residual vegetation on cutover areas to benefit birds. Often slash or waste wood is either burned on site or chipped and then burned or dumped elsewhere.

Other attempts to modify forestry practices to benefit birds include the provision of vegetated corridors between forest stands which will enhance the movement of some, but not all, species of forest birds (St. Clair *et al.*1998). Bergeron *et al.* (1998) note that forest managers should maintain the natural variability in southeastern boreal forests by developing "silvicultural techniques to maintain a spectrum of forest compositions over the landscape…". Another approach is to mimic the natural sporadic changes in forest cover due to diseases, pests, windstorms and fire by clear-cutting in areas where such events are likely to occur naturally. Selection cutting can be undertaken in other, less disease-susceptible or fire-prone areas.

In recent years woodlot owners and forestry companies in the Maritimes have begun to manage forested land using practices that attempt to sustain both the integrity of the forest and wildlife populations. Descriptions of these practices can be found in the Forest Habitat Program, NB Department of Natural Resources and Energy, the NB Greater Fundy Ecosystem Forest Management Guidelines to Protect Native Biodiversity in the Fundy Model Forest (Woodley and Forbes 1997), the Forest-Wildlife Guidelines and Standards for Nova Scotia, the PEI Macphail Woods Ecological Forestry Project, and other forest management guidelines. Generally, specific management objectives for birds (e.g. birds per ha or total population objectives) have been lacking, especially for birds that are poorly monitored. Wildlife policies and minimum standards for habitat requirements, such as per cent cover, number of snags, amount of mature trees and other features, have been developed by provincial governments, the forest industry and woodlot owners. These strategies highlight the retention of forest cover-types as well as critical habitat elements, rather than the setting aside of natural areas.

Forestry issues affecting landbirds some of which the forest-guidelines address, include:

- Length of harvesting rotations, intensity of harvest, and patch size required to mimic natural systems and maintain adequate bird habitat for feeding and reproduction;
- Retention of snags, dying trees, and large diameter trees, especially live aspen, to allow for the needs of cavity-nesters (Parker and Doucette 2004);
- Numbers of large trees needed for raptor nesting;
- The area of surviving old growth forests;
- Effect of corridors, edges and isolated patches on forest bird reproduction and survival;
- Need for connectivity between forest patches;
- Width of buffer zones left along riparian areas, shorelines and wetland areas;
- Need for tree thinning v/s the need for dense thickets for breeding or winter protection;
- Disturbance during the bird breeding season;

- Research on bird-habitat associations and area of specific landscape cover-type needed to sustain healthy populations of each species:
- Need for integrated pest management to reduce widespread applications of pesticides, also research on birds as agents of pest management e.g. spruce-budworm specialists;
- Increasing numbers of forest roads which tend to become permanent, as harvested areas need to be accessible to large, heavy equipment.

Coniferous Forest Habitats

Species and Population Assessments

Coniferous forest birds identified in this plan as High priority (Table 1) include Bicknell's Thrush. This species inhabits softwoods and mixed woods, usually dense regenerating forests at higher elevations and stunted, wind-blown coastal coniferous and highland forest. It is listed as a COSEWIC Species of Special Concern and, as such, requires immediate attention. Other species of regional importance include Bay-breasted Warbler, ranked High, and Cape May Warbler, ranked Medium, both of which are found in softwood stands. Their population levels seem largely dependent on spruce budworm cycles. The effect of forest cutting on these species is unclear. Northern Parula, another bird rated High, has possibly increased yet there is concern regarding continued supply of forests with "*Usnea*" vegetation, which it uses for nesting, and for adequate habitat in its southern wintering range. Further, BCR 14 is host to the highest densities of the species, conferring a high stewardship responsibility for long-term management of the species.

Boreal Chickadee population declines are troubling and information on the cause(s) is needed before management efforts to conserve this species can proceed. These birds are found in mid-aged to mature spruce, and spruce-fir forests. Loss of snags as nest sites for these birds may be a factor in their declines and could also affect the continued survival of Black-backed Woodpeckers and Boreal Owls, both Medium priority species in the Maritimes. Two other High priority species are the Olive-sided Flycatcher and Rusty Blackbird, both declining species listed by the Continental Plan as High priority and both of which are of high regional concern.

Little or no firm trend information is available for the other Medium priority species for which the Maritimes is a relatively important area, except for Blackburnian Warbler and Pine Grosbeak. Blackburnian populations are stable or perhaps increasing while those of Pine Grosbeaks have declined significantly. Long-eared Owl is an enigmatic and little-known species that appears not to be declining, but is so little known that work is needed to further our understanding of its status.

Early Watch species in coniferous forest, including Blackpoll Warbler, Yellow-bellied Flycatcher, Black-throated Green Warbler, Spruce Grouse and Pine Warbler, do not seem to be in jeopardy in this region. Nonetheless, these species populations should be carefully monitored to ensure that any significant declines would be detected promptly.

Table 2. Coniferous (softwood) forest priority species.

Species	Priority[1]	Habitat	Population trend	Comments	PIF score[2]
Bicknell's Thrush	H	Coniferous and mixed forest, coastal and highland stunted and thick regeneration	No data	COSEWIC "Species of Special Concern"; effects of forestry unknown; Continental priority	28
Bay-breasted Warbler	H	Medium to mature coniferous and mixed forest	Moderate decline	Cycles with spruce budworm; restricted wintering habitat; Continental priority	26
Northern Parula	H	Medium to mature coniferous and mixed forest	Possible increase	Very high area importance, concern for wintering habitat	21
Boreal Chickadee	H	Medium to mature coniferous forest	Significant decline	Year-round resident of boreal forest; high breeding area importance	20
Olive-sided Flycatcher	H	Wet, open coniferous forest	Significant decline	Fairly low area importance but a species of Continental priority	19
Cape May Warbler	M	Mature coniferous forest	Moderate decline	High area importance; restricted wintering range; probably linked to spruce budworm cycle	24
Blackburnian	M	Medium to mature	Significant	Very high area importance	20

Species	Priority[1]	Habitat	Population trend	Comments	PIF score[2]
Warbler		coniferous and mixed forest	increase		
Pine Grosbeak	M	Open coniferous and mixed forest, edges	Significant decline	High regional concern for decline; need to study effects of forestry on breeding and wintering habitat	19
Boreal Owl	M	Mature coniferous forest; snags	No data	High regional concern; insufficient information	18
Black-backed Woodpecker	M	Coniferous forest	Possible increase	Moderate area importance; need studies of effects of fire suppression	18
Brown Creeper	M	Mature coniferous and mixed forest	Uncertain	Moderate area importance; insufficient understanding of its biology	17
Long-eared Owl	M	Coniferous and mixed forest; grasslands	No data	Insufficient information	17
Gray Jay	M	Coniferous forest, especially Black Spruce	Uncertain	Year-round resident of boreal forest; fairly low area importance; moderate regional concern	15
White-winged Crossbill	M	Coniferous forest	Possible increase	Moderate area importance	15
Red Crossbill	M	Coniferous forest, especially pine	Significant increase	Concern for apparent serious decline of Newfoundland form	13
Blackpoll Warbler	EW	Coniferous and mixed forest, coastal and highland stunted and thick regeneration	Significant decline	Relatively high PIF priority but currently of low regional concern	22
Yellow-bellied Flycatcher	EW	Wet coniferous forest, multi-layered	Uncertain	Relatively high PIF priority but currently of low regional concern	21
Black-throated Green Warbler	EW	Medium to mature mixed forest	Stable	Very high area importance; high PIF score	20
Spruce Grouse	EW	Coniferous forest	No data	Insufficient information	18
Pine Warbler	EW	Coniferous forest, especially pine	Significant increase	Moderate regional concern for supply of pine habitat	16

1. Maritime region species priority: H = High, M = Medium, EW = Early Watch (either rates fairly high on PIF list but there is little regional concern or rates low on PIF list but there is some regional concern).
2. Partners in Flight Canada rank.

Mixed Wood and Deciduous Forest Habitats

Species and Population Assessments

Several mixed wood and hardwood (deciduous) forest species are also considered to be of immediate concern in this portion of BCR 14 (Table 3). Five of these species arre categorized as High priority based on trend data indicating significant or moderate population declines. Canada Warbler, a bird of dense under-story in mid to mature mixed woods, has lost breeding as well as wintering habitat. The Wood Thrush, a bird that inhabits mature hardwoods with a shrub under-story of 1-3m, is uncommon to rare at the northern limit of its range in the Maritimes. Nonetheless, it is considered an important species here along with the Rose-breasted Grosbeak, Purple Finch, and Eastern Wood-Pewee. These latter three birds are of High regional concern.

The Black-throated Blue Warbler, a Medium priority species, is most commonly found in mature hardwood forests, but also in mixed woods with a shrubby under-story. Although the diminishing area of mature hardwoods may threaten the population here, the greatest threat appears to be deforestation on restricted areas of their Caribbean wintering grounds. Populations of the Chestnut-sided Warbler, a bird of open second growth in mixed wood and hardwood forests, have shown moderate declines. However, there are no known concerns for their breeding populations in this region. Two other Medium priority birds, Black-

billed Cuckoo and Veery, have shown declines while Whip-poor-will population trends are uncertain. Red-shouldered Hawks are a COSEWIC Species of Special Concern in New Brunswick, thus requiring special attention, while Pileated Woodpeckers in the Maritimes, although showing population increases, are dependent upon a continuing supply of large trees for nesting.

Early Watch species in hardwoods and mixed woods, i.e. those that are not a High or Medium priority in the Maritimes, include Ruffed Grouse whose populations tend to reflect forest cutting and other land use cycles. Northern Goshawks, generally found in mature mixed woods, are of concern, especially in Nova Scotia, because of declining areas of mature forests. Among the remaining Early Watch list species, neither the Yellow-bellied Sapsucker nor the Least Flycatcher seem to be at any risk, given the widespread occurrences of these birds in the Maritimes (Erskine 1992). The Great Crested Flycatcher is considered a southern species and is most commonly encountered in deciduous forests of southern New Brunswick, and, more rarely, in Nova Scotia. Another southern species, Cooper's Hawk, also is considered to be at the northern limits of its range in the southwestern border region between New Brunswick and Maine. The American Redstart is one of the most abundant warblers in the region while the Warbling Vireo, primarily associated with more southern broad-leafed forests, seems to have always been scarce in the Maritimes (Erskine 1992). All of these species, however, must not fall beyond our conservation vision. They are either high stewardship responsibility species or there is some conservation concern either within or outside BCR 14.

Goal: To ensure adequate coniferous, deciduous and mixed forests of various seral stages, including large stands of mature closed canopy trees and old growth forests with canopy gaps, are available for the continued well-being of species that depend upon such habitats.

Recommendations:

Habitat Management and Protection

Improve or develop techniques to manage habitats for forest dependent species, and undertake stewardship programs to ensure the long-term supply of suitable forest habitats.

Table 3. Deciduous (hardwood) and mixed woods priority species.

Species	Priority[1]	Habitat	Population trend	Comments	PIF score[2]
Canada Warbler	H	Medium to mature deciduous and mixed forest with dense, wet under-story	Significant decline	Very high area importance; Continental priority species; wintering and breeding habitat concerns	25
Wood Thrush	H	Medium to mature deciduous and mixed forest with shrub layer	Significant decline	Nearly absent from PEI, uncommon in NS; Canadian portion of 14 unlikely to be major factor in conservation; Continental priority species	24
Rose-breasted Grosbeak	H	Deciduous and mixed forest with shrub layer	Moderate decline	High area importance; less concern in Maritimes than in U.S. portion of BCR	20
Purple Finch	H	Open deciduous and mixed forest of any age	Significant decline	Very high area importance; still common in preferred habitats; high regional concern	20
Eastern Wood-Pewee	H	Mature deciduous forest with open areas	Significant decline	Moderate area importance; high regional concern	19
Black-throated Blue Warbler	M	Mature deciduous forest with shrub layer	Possible increase	Very high area importance; breeding habitat at risk in PEI; concern for restricted Caribbean wintering area	24
Chestnut-sided Warbler	M	Deciduous and mixed second growth forest	Moderate decline	Very high area importance; no major regional concern	23
Black-billed Cuckoo	M	Deciduous and mixed forest edges; shrubby and open wet areas	Significant decline	Moderate area importance; decline appears to be unrelated to fluctuations in insect abundance	21

Species	Priority[1]	Habitat	Population trend	Comments	PIF score[2]
Whip-poor-will	M	Deciduous and mixed forest	Uncertain	Fairly low area importance; high regional concern; poorly understood species	21
Veery	M	Deciduous forest with wet shrub layer	Moderate decline	Very high area importance; high regional concern	21
Red-shouldered Hawk	M	Mature deciduous and mixed forest	Possible increase	COSEWIC "Species of Special Concern" in NB; fairly low area importance	17
Pileated Woodpecker	M	Deciduous and mixed late succession forest	Significant increase	High area importance; increasing populations but concern for long term supply of large trees	15
Ruffed Grouse	EW	Deciduous and mixed forest edges	Significant decline	High area importance; no major regional concern	21
Northern Goshawk	EW	Mature deciduous and mixed forest	Uncertain	High area importance; "Sensitive" species in NS	20
Yellow-bellied Sapsucker	EW	Medium to mature deciduous forest	Moderate decline	Moderate area importance; no major regional concern	20
Least Flycatcher	EW	Medium to mature deciduous forest	Moderate decline	High area importance; no major regional concern	19
American Redstart	EW	Medium to mature deciduous forest, especially riparian	Moderate decline	Very high area importance; no major regional concern	19
Great Crested Flycatcher	EW	Mature deciduous floodplain and open forest	Possible increase	Moderate area importance; concern in NB for loss of floodplain forest	17
Cooper's Hawk	EW	Mature deciduous forest	Uncertain	Fairly low area importance; need better information on habitat, distribution and abundance	15
Warbling Vireo	EW	Mature deciduous floodplain forest	Significant increase	Fairly low area importance; rare in PEI and NS	15

1. Maritime region species priority: H = High, M = Medium, EW=Early Watch (either rates fairly high on PIF list but there is little regional concern or rates low on PIF list but there is some regional concern).
2. Partners in Flight Canada rank.

Forest conservation measures for the effective management of many softwood forest landbirds with declining populations, especially those that require cavities such as Boreal Chickadees, Boreal Owl and Black-backed Woodpeckers, should be undertaken whenever possible. Longer forest cutting rotations, for example, would allow for the growth of older stands that would provide trees suitable for cavity-nesters. Likewise, older softwood forests supply conditions essential for the development of heavy growths of *Usnea*, the beard-lichens used by nesting Northern Parulas. Protecting older or mature softwood forests generally will enhance the probability of maintaining these and other landbird populations that are dependent upon such habitats.

Hardwood and mixed wood species requiring direct or indirect management actions because of declining populations include Canada Warbler, Rose-breasted Grosbeak, Purple Finch, Eastern Wood-Pewee, Whip-poor-will, Veery and Pileated Woodpecker. Other Early Watch list species associated with hardwood forests should benefit to varying degrees from management actions for higher priority species.

Undertaking conservation actions for the continued survival of forest dwelling landbirds will require comprehensive planning of future forests and forestry management practices. Franzeb *et al.* (1998) recommend a five-step hierarchy in establishing and implementing forest management programs. Their plan hinges on evaluating the composition and physiognomy of the landscape mosaic, then exploring alternatives for manipulating landscape changes to benefit forest birds. As they point out, "partnerships and cooperation across ownerships are important to incorporate different rotation schedules and spatial arrangements of harvested sites so that larger blocks of mature forest, rather than scattered small tracts, are emphasized in the management of forest-associated

species." If forest dependent bird populations are to be maintained, it will be essential to have the full support of forestry interests including small woodlot owners. Forest habitat management techniques therefore must be practical, as well as cost-effective, if the co-operation of the forest industry is to be expected. Monetary incentives may be required to assist smaller woodlot owners in managing their lands in a sustainable manner. Stewardship programs offer an avenue for encouraging woodlot owners and forestry companies to adopt bird conservation practices.

Population Monitoring and Inventory

Improve or develop techniques to monitor priority forest birds and their habitats, and undertake periodic inventories of the supply of the forest habitats.

Monitoring softwood forest birds such as Bicknell's Thrush, a species for which there is no trend information, requires special efforts in scattered coastal and high elevation forested tracts throughout the Maritimes. Bird Studies Canada established a High Elevation Landbird Program in 2002 to collect population data on this species. BSC also has initiated an owl survey that may provide information on Boreal and Long-eared Owls and other secretive species for which population trends are presently unknown. Population trends for both Brown Creeper and Gray Jays, species of high priority in the region, are uncertain, and therefore these species require more intensive monitoring. Early Watch species associated with forests should continue to be monitored to ensure that any species declines are detected promptly. Furthermore, permanent forest census stations should be established to monitor bird population trends and, perhaps more importantly, to document changes in both qualitative and quantitative forest habitat supply throughout the region.

Plans are in place for a second Maritimes Breeding Bird Atlas, 20 years after fieldwork for the first one was completed. This project, to begin in 2006, is a high priority for determining distribution and abundance changes in all habitats over time and is fully supported by PIF.

Research

Undertake research to determine the mechanisms of population regulation and the life history of forest birds showing chronic or episodic declines.

Research programs designed specifically for individual species such as Bay-breasted and Cape May Warblers that exhibit episodic declines are required to determine population regulation mechanisms and life history requirements of these birds. In addition, studies are needed to determine the present productivity and survivorship of other High and Medium priority forest birds in the region including Bicknell's Thrush, Olive-sided Flycatcher, Rusty Blackbird, both species of crossbills, Rose-breasted Grosbeak, Purple Finch and Eastern Wood-Pewee. Investigations into the effects of present forest management practices on bird populations, including the long-term impacts of intensive practices on priority birds, are perhaps among the most important programs to initiate or to support if already underway.

An area of urgent need is in determining causes for population declines in species whose range includes wintering grounds in the Caribbean, Central America and South America. Often, factors affecting bird habitats in those areas are poorly understood but remain an essential component of conservation and recovery strategies on the birds' breeding grounds.

Communication and Education

Communicate to forestry workers, contractors, landowners and the large forest companies about the importance of forests to birds, and the influence of land use practices on bird populations and sustainability.

The plan must encourage the forestry community to provide a mosaic of forest landscapes that will include a mix of successional stages up to large mature stands. Existing forest management programs should be reviewed for their suitability as integral components of bird conservation plans. Forestry workers, contractors and forest companies must be provided with informative materials concerning appropriate, and practical measures to achieve this goal. Resource agencies should ensure that forest bird conservation measures are incorporated with forestry practices in established forest demonstration areas or consider establishing additional demonstration areas for forest bird conservation. Forestry workshops should also be offered to the forest industry to encourage forest contractors to undertake ecologically sound practices that will benefit forest birds as well as other components of forest ecosystems. Further, PIF offers to work with the forest industry to develop beneficial management practices for woodland birds and recommend that those practices be a part of forestry certification.

Partnerships

Form a network to share scientific information on forest dependent birds, or join existing networks of

expertise involving non-government, provincial and federal agencies in Maritime Canada and abroad.

As noted by Franzeb *et al.* (1998), partnerships are needed to incorporate different forest rotation schedules and spatial arrangements of harvested sites into goal-oriented plans. Partners for this initiative must include wildlife management agencies, individual landowners, forest co-operatives, forestry associations, provincial and federal resource agencies, as well as the many and diverse non-professional groups whose efforts contribute importantly to bird conservation activities.

Further, relationships with organizations in other countries, namely those hosting species on their wintering grounds, are encouraged and supported. This can include both government and non-government, as well as professional and non-professional groups.

Non-forest Habitat

Wetlands

Issues

Wetland ecosystems historically have been considered wastelands and therefore of little economic value. As a result, wetlands have frequently been altered or lost because their ecological functions and their resulting value to society have not been understood. Since 1800, an estimated 20 million hectares, almost 15 percent of Canada's total wetland base, has been drained or lost to other functions. In the Maritimes, 65% of coastal salt marshes have been converted to non-wetland functions (A Wetland Conservation Vision for Canada, NAWCC). Wetlands are used not only by waterbirds such as ducks, geese, rails and herons, but also by landbirds such as blackbirds, swallows, warblers, and birds of prey. Many of these birds depend upon these productive habitats for food and nest sites. Freshwater marshes, fens and bogs should be maintained in their natural state and PIF supports provincial and federal wetland policies that seek " no net loss "of wetlands. In cases where wetland loss is unavoidable, other wetland sites should be created to maintain the overall inventory of wetlands.

Forestry policies are in place to create buffers around wetlands and in many jurisdictions, wetlands are now protected, by legislation, from being destroyed. Ecologically significant wetlands must not be altered. In recent years cooperative efforts of government and non-governmental organizations, through such programs as the North American Waterfowl Management Plan, have resulted in the conservation of thousands of hectares of wetlands in the Maritimes. Nonetheless additional efforts are required to protect Maritime wetlands.

Specific wetland issues include:

- Development of cottage subdivisions and the construction of permanent residential, industrial and other economic ventures that endanger freshwater wetlands, salt marshes and barrier beach ponds along the coasts;
- Alteration of bogs through peat mining, loss of ecologically significant bogs to development of commercial cranberry bogs, and the destruction of bog areas through inappropriate use of All Terrain Vehicles;
- Poor crop practices on agricultural lands which contribute sediments and nutrients to fresh and estuarine waters leading to eutrophication of wetlands;
- Coastal flooding and erosion that is predicted to increase as global warming raises ocean levels.

Species and Population Assessments

Several landbird species that inhabit wetlands are of regional priority (Table 4). Significant loss and/or alteration of salt marshes since European colonization in some areas of the region has resulted in restricting habitat for birds such as Nelson's Sharp-tailed Sparrow. This species has been considered of High priority due to lack of firm trend data. Some evidence suggests that it might be more common than thought, as there is now considerable documentation of it occupying a wider range of wetland habitat in the Maritimes (Hanson and Shriver, in press; Nocera *et al.* 2005). The Short-eared Owl, a COSEWIC species, has been of interest over the past several years in the region because of suspected population declines due to agricultural land use practices. Rusty Blackbird populations in the region may have declined although the difficulty of accessing their often-remote habitats, might in part explain the lack of firm trend data for this species. The Northern Harrier population, an Early Watch species, seems to be stable in the region but bears monitoring as continuing land changes may influence its breeding and foraging habitats.

Table 4. Wetland (marshes, bogs, wet meadows) priority species.

Species	Priority[1]	Habitat	Population trend	Comments	PIF score[2]
Nelson's Sharp-tailed Sparrow	H	Salt marsh, flood plain meadow, dykeland, hayfield edges	Uncertain	High area importance; Continental priority species; concern for loss of salt marsh but recent studies indicate it is more common than previously thought	27
Short-eared Owl	H	Marsh lands, coastal bogs, sedge meadows, hay fields	No data	Fairly low area importance; Continental priority species; COSEWIC "Species of Special Concern"	19
Rusty Blackbird	H	Forested wetlands; bogs, alder swales	Uncertain	Fairly low area importance; Continental priority species; high regional concern	18
Northern Harrier	EW	Fresh and salt marshes, bogs, hay fields	Possible increase	Fairly low area importance	16

1. Maritime region species priority: H = High, M = Medium, EW = Early Watch (either rates fairly high on PIF list but there is little regional concern or rates low on PIF list but there is some regional concern).
2. Partners in Flight Canada rank.

Goal: To insure adequate wetland areas including bogs, fens, fresh and saltwater marshes are available for the continued well- being of species that depend upon such habitats.

Recommendations:

Habitat Management and Protection

Improve or develop techniques to manage habitats for wetland species and undertake or support stewardship programs to ensure the long-term supply of suitable wetland habitats.

This conservation effort needs to focus on maintaining quality wetland habitat that currently exists. Municipal, provincial and federal governments must implement, or continue to implement, wetland conservation policies that contain a mitigation process, and seek to achieve a no net wetland loss. Technical assistance must be provided by biologists to industry, particularly forestry, agriculture and to operators of All Terrain Vehicles to develop beneficial management practices that will reduce wetland degradation.

Potential wetland restoration projects need to be identified, particularly tidal projects that will benefit Nelson's Sharp-tailed Sparrow, and restoration plans developed through partnerships like the Eastern Habitat Joint Venture.

Population Monitoring and Inventory

Improve or develop techniques to monitor priority wetland birds and their habitats and undertake periodic inventories of the supply of the wetland habitats.

Monitoring wetland birds will require special efforts throughout the Maritimes. Habitat-based monitoring programs designed to monitor owls and other secretive species are now underway. Additional innovative species-specific techniques will need to be developed. Census stations should be established to monitor species population trends, as well as changes in wetland habitat supply. Sewage impoundments are unusual but apparently important habitats that could be monitored for some wetland birds, especially shorebirds and waterfowl. Nelson's Sharp-tailed Sparrows may be more widespread than previously thought so it is imperative to support and encourage existing surveys in all occupied habitats to obtain accurate population data for this species.

Research

Undertake research to determine the mechanisms of population regulation and the life history of wetland birds showing chronic or episodic declines.

Research centred on specific habitat requirements, productivity and survivorship of priority wetland landbirds is needed in the region. In addition, studies of effects of present wetland management practices on priority bird populations are required to determine if such management approaches are effective for conservation of the regions' landbirds. Investigations on the long-term effects on birds of converting wetlands to other uses, e.g. cranberry production, and the effects of commonly used pesticides on birds and

their food sources are largely undocumented in the Maritimes. An additional project is that of determining the long-term effects of ATVs on vegetation, soils and drainage patterns of these important ecosystems.

Communication and Education

Educate wetland owners and those who use wetlands about the need to protect these aquatic systems. Provide opportunities to enhance these habitats through stewardship programs.

The plan must work with existing programs to encourage landowners and communities to consider conserving a mosaic of wetlands, both fresh and saltwater. Landowners and communities must be provided with informative materials concerning appropriate and practical measures for restoring and maintaining productive wetlands. Resource agencies should ensure that wetland demonstration areas are established to show and promote conservation practices that will benefit wetland birds.

Partnerships

Share scientific and management information on wetland birds through existing wetland conservation partnerships involving non-government, provincial and federal agencies in Maritime Canada

Partners for this initiative include individual, municipal, and corporate landowners, non-government environmental organizations, resource co-operatives, cranberry growers associations, agriculturalists, and provincial and federal resource agencies.

Grasslands and agricultural (old fields, barrens)

Issues

Grasslands include agricultural operations (hay lands, cultivated fields, edge areas, etc), abandoned farmlands including old fields, as well as sand dunes and barren lands around coastlines. At higher elevations they may result from fire, wind throw, or intensive grazing of unfenced public lands. All provide varying amounts of suitable habitat for grassland birds. The decline of farming, especially small-scale family-owned farms once common in the Maritimes, may pose difficulties for the continued well-being of present grassland birds. Fields abandoned by farmers are of short-term benefit to grassland birds. However, because the land eventually reverts to forest, areas that are left untended for more than a few years become less favorable to open land birds. Modern farmers use their land more intensively to reduce costs and increase production.

Issues in some jurisdictions related to farming and the management of grassy areas include:

- Early harvesting (June) of hay for improved nutritive qualities may disrupt nesting birds (e.g. Bobolinks, Nocera *et al. 2005*);
- Clearing hedgerows to increase the size of fields decreases woody perches and grassy edge vegetation for nest sites;
- Exposing birds on farmlands to insecticides, herbicides, fungicides and other chemicals;
- Increasing land tilled for row crops which reduces bird habitat while increasing the need for pesticides;
- Spring burning of fields and barrens which destroys nesting habitat;
- Increasing blueberry production with use of pesticides;
- Lack of vegetative strips or buffer zones along watercourses;
- Allowing cattle unrestricted access to watercourses leading to siltation through destruction of streamside vegetation;
- Allowing untreated animal wastes to flow into watercourses and wetlands (PEI excepted).

Species and Population Assessments

Grassland birds (Table 5), particularly Bobolinks (medium priority) and Short-eared Owls (high priority), are dependent upon undisturbed open lands for their continued existence within the region. Small numbers of these species may have existed in the Maritimes in pre-settlement times surviving in barrens, bogs, wet meadows, and forest gaps created by fires, windstorms and forest pests. However their numbers increased with the spread of farmlands. In agricultural areas, these and other grassland species such as Vesper Sparrows, occupy unused and cultivated hay fields with rough borders. In recent years their populations have greatly declined. On coastal and other windswept barrens, birds are less likely to be displaced by human disturbances. Although cattle and sheep grazing on coastal headlands and islands may cause local declines in some grassland bird populations, other species, especially those on migration, may benefit from foraging or roosting on grazed lands. Black-billed Cuckoos frequent old field/alder shrub areas and their numbers may fluctuate with tent caterpillar outbreaks. In this region, cuckoos are at their northeastern range limit, as are meadowlarks and bluebirds.

Table 5. Grassland/agricultural landbird priority species.

Species	Priority[1]	Habitat	Population trend	Comments	PIF score[2]
Ipswich Savannah Sparrow	H	Grass dunes, Sable Island, NS	Stable or increasing	Sub-species of Savannah Sparrow; Very high area importance; breeds almost entirely on Sable Island, NS; COSEWIC "Species of Special Concern"	16[3]
Short-eared Owl	H	Marsh lands, coastal bogs, sedge meadows, hay fields	No data	Fairly low area importance; Continental priority species; COSEWIC "Species of Special Concern"	19
Bobolink	M	Grasslands, meadows, hay fields	Moderate decline	High area importance; high regional concern; studies in progress	21
Vesper Sparrow	M	Field edges, pastures, clearings, blueberry fields	Significant decline	Fairly low area importance for species but very high area importance for eastern sub-species; high regional concern	18
Eastern Kingbird	M	Orchards, wetland edges, woody marsh, alder swales	Moderate decline	Moderate area importance; high regional concern;	17
Eastern Meadowlark	EW	Grasslands, fields	Significant decline	Fairly low area importance; moderate regional concern	18
Horned Lark	EW	Grasslands, dunes, fields, barrens	Significant decline	Fairly low area importance; moderate regional concern	14
Eastern Bluebird	EW	Grasslands, old fields, clearcuts	Significant increase	Fairly low area importance; moderate regional concern	13
Brown-headed Cowbird	EW	Farmlands, forest edges	Significant decline	Fairly low area importance; often considered a pest species, there is a need to understand the sharp population declines	13

1. Maritime region species priority: H = High, M = Medium, EW=Early Watch (either rates fairly high on PIF list but there is little regional concern or rates low on PIF list but there is some regional concern).
2. Partners in Flight Canada rank.
3. The PIF score is for the species, not the sub-species.

Goal: To insure adequate open spaces such as old fields, edge areas and other grasslands are available for the continued well-being of species that depend upon such habitats.

Recommendations:

Habitat Management and Protection

Improve or develop techniques to manage habitats for grassland species, and undertake stewardship programs to ensure the long-term supply of suitable grassland habitats.

Effective management for birds of open land will require maintaining and, if necessary, increasing grassland bird populations with the cooperation of agricultural communities. Grassland habitat management techniques must be practical as well as cost-effective if the co-operation of the agricultural community is to be expected. Monetary or other forms of incentives may be required to assist farmers who delay hay cutting in order to allow nesting Bobolink young to fledge. Stewardship programs may offer an avenue for encouraging farmers to adopt grassland bird conservation practices.

Population Monitoring and Inventory

Improve or develop techniques to monitor priority grassland birds and their habitats, and undertake periodic inventories of the supply of grassland habitats.

Habitat-based programs need to be designed specifically to monitor grassland birds in the Maritimes. Species which need increased monitoring to enable better population estimates include Ipswich Sparrows, Short-eared Owls, and Vesper Sparrows. In addition, permanent census stations should be

established to monitor population trends and to record changes in grassland habitat supply at the appropriate landscape scale for the various types of open lands.

Research

Undertake research to determine the mechanisms of population regulation and the life history of grassland birds showing chronic or episodic declines.

Research studies should focus on habitat requirements, productivity and survivorship of grassland birds in the region. In addition, investigations are required to determine the effectiveness of mowing bars, delayed cutting of hay and other agricultural practices on grassland bird populations. Research should also be undertaken to determine the long-term effects of intensive agricultural activities (e.g. clean farming, row crops, etc) on open country birds including the effects of commonly used pesticides. Short-eared Owls are in need of intensive study in the region as their biotic requirements and population cycles are little known.

Communication and Education

Educate farmers and other landowners about land use practices that will promote grassland bird conservation. Provide opportunities to enhance grassland habitats through stewardship.

The plan will encourage research (e.g. Nocera *et al.* 2005) to understand ways to reduce grassland nesting species losses due to early haying practices. It also should encourage other practices such as leaving areas that are difficult to till, i.e. corners of fields, low wet sites, and other areas, in natural vegetation. As most grassland in the Maritimes is of agricultural origin, farmers and farming communities must be provided with informative materials concerning appropriate, and practical measures for aiding grassland bird populations. Agricultural demonstration areas should be established to show practices leading to the sustainability of grassland birds. Workshops could be offered to landowners to encourage them to undertake conservation practices that will benefit grassland birds.

Partnerships

Form a network of expertise involving federal, provincial and non-government agencies in Maritime Canada to share scientific information on grassland birds with the farming community

Participants could include individual farmers, farmer's co-operatives, agricultural associations and non-farming landowners. Existing partnerships with governments, non-government agencies, universities and farmers in the form of conservation clubs, environmental farm plans and soil and crop improvement associations, etc. should be actively supported. Where these initiatives are lacking, they should be encouraged.

Developed Lands

Issues

Land development, that is, permanent conversion of forested and open lands to housing and commercial use is an important issue and one that has widespread effects on landbird populations. Urban, suburban lands, industrial parks, parklands, golf courses, military reservations, cemeteries, and other developed areas provide a mosaic of mostly permanent habitats used primarily by generalist and edge species. City size is increasing in several Maritime areas, thereby threatening adjacent green areas.

Urban and suburban expansion leads to wider roads, more power lines, industry and subdivisions, the need for more and efficient agriculture, more traffic, and consequently, the loss of bird habitat. Roads, which create permanent cuts across landscapes used by birds, create potentially damaging edge effects. Examples are birds picking up grit on roadsides, vehicles striking hawks and owls in pursuit of prey, and birds eating roadkills

Millions of birds also collide with telecommunication towers or strike tall-lighted buildings during migration each year in North America. Wetland habitats are degraded and often destroyed by road building. Rights of way for pipelines and power lines involve cutting forested areas often into long linear sections, and creating edge vegetation that is periodically cut and/or treated with herbicides. These developments result in increased human disturbance to remote forest birds, and the isolation of some bird populations from others.

Mining activities like strip mines, settling ponds, gravel and sand pits, although less extensive than other types of development, nonetheless convert woodlands into generally un-vegetated areas with little value to birds for decades (Erskine 1992). Steep banks, however, do provide nesting habitats for birds such as Bank Swallow and Belted Kingfisher that burrow in earthen banks. Recently, however, safety concerns in some jurisdictions have required steep banks to be graded to gentle slopes thereby destroying potential habitat for these birds.

A continuing concern is the chemical contamination of soils in developed areas by the dumping of toxic wastes

or application of persistent biocides. In some cases these may affect entire ecosystems (Erskine 1992).

Table 6 provides a list of the species that occupy developed lands and that are most likely to be affected by further expansion of these man-made habitats.

Birds may be affected by specific land development issues such as:

- Urban and suburban development creating small patches, isolated trees, fragmented forests, reclaiming wetlands, and degrading wet habitats;
- Unnecessary tree cutting and land clearing by land realty companies, housing construction companies, road building companies, municipalities, especially in industrial zones, power companies, home and cottage owners, and the growing of grass as woodland ground cover in cities;
- Increased exposure to industrial and household chemicals, pesticides, and toxins;
- Increased numbers of predators including domestic and feral cats, squirrels, gulls, and corvids (possibly increasing due to artificial feeding, food found in dumps, and roadside garbage);
- Road hazards, including toxins put on roads in winter for melting ice;
- Birds striking windows and tall structures such as telecommunication towers, sky scrapers and wind turbines, especially during migration.

Species and Population Assessments

Table 6. Developed lands/urban priority landbird species.

Species	Priority[1]	Habitat	Population trend	Comments	PIF score[2]
Chimney Swift	H	Urban and open areas; large hollow trees	Significant decline	Fairly low breeding area importance; high regional concern; high Canadian concern	20
Peregrine Falcon	M	Cliffs, bridges, tall buildings	No data	Fairly low area importance; *anatum* sub-species COSEWIC "Threatened Species" in NS, NB;	18
Barn Swallow	M	Buildings, bridges	Significant decline	High area importance; high regional concern	18
Common Nighthawk	M	Barrens, urban, open forest	Moderate decline	Fairly low area importance	16
Bank Swallow	M	Exposed banks, cliffs, borrow pits	Uncertain	Very high area importance; high regional concern for apparent local decline	16
Belted Kingfisher	EW	Exposed banks near water	Moderate decline	Very high area importance	19
Purple Martin	EW	Urban, nest boxes	Stable	Fairly low area importance; Maritime population is on northern limit of range and shows considerable year-to-year fluctuation	13
Cliff Swallow	EW	Buildings, bridges	Moderate decline	Fairly low area importance	13

1. Maritime region species priority: H = High, M = Medium, EW=Early Watch (either rates fairly high on PIF list but there is little regional concern or rates low on PIF list but there is some regional concern).
2. Partners in Flight Canada rank.

Recommendations

Population Monitoring and Inventory

Improve or develop techniques to monitor priority birds and their populations on developed lands.

Monitoring birds on developed lands will require unique approaches addressing species diversity as well as problems such as urban noise and light pollution, around such areas throughout the Maritimes. Census stations could be established to monitor species population trends in developed or developing areas, perhaps based on the present BBS.

Winter monitoring also should be considered to track changes in wintering bird populations throughout the region, in all habitats, including developed areas. Project Feederwatch now provides useful data on the distribution of wintering birds attracted to feeding stations, but additional monitoring in developed areas should be considered. This would entail a standardized protocol designed to measure bird species populations in mid-winter.

Research

Undertake research to determine the mechanisms of population regulation and the life history of birds showing chronic or episodic declines.

Research on habitat requirements, productivity and survivorship of edge or generalist landbird species in relation to developed areas is needed without delay to provide basic data upon which to plan management programs. In addition, studies of present management practices on suburban bird populations are required to determine if such approaches are effective. Urban wildlife and urban forestry literature also should be consulted for studies of landbird populations in urban and suburban areas.

Communication and Education

Educate private and corporate landowners, communities, and others about land uses that enhance habitats through stewardship.

The plan must encourage landowners and communities to consider planning for a diversity of habitats wherever there is the possibility of doing so in developing areas. Landowners and communities must be provided with information concerning appropriate, and practical measures for restoring and/or maintaining forest, open land and wetlands in urban/suburban areas. Resource agencies could establish demonstration areas for education and present workshops to encourage conservation practices that will benefit "backyard" birds.

Partnerships

Form a network of expertise involving non-government, provincial and federal agencies in Maritime Canada to share scientific information on bird conservation practices for private, community and corporate landowners.

Partners for this initiative will include individual, municipal, and corporate landowners, public utilities, private corporations, business associations, and other private and public agencies. Where appropriate, provincial and federal agencies also would be involved, primarily for support and information purposes.

Landbird Conservation Plan Implementation

In cooperation with the appropriate partners, the first responsibility of the coordinator and /or lead organization will be the preparation of detailed plans and a schedule of implementation so that the goals are met in a timely manner.

The primary goal of this Maritime Landbird Conservation Plan is to provide direction for the preparation of specific action plans that will help maintain the present diversity of landbirds and their habitats in Maritime Canada. This must be done in cooperation with other conservation initiatives for birds and other organisms that share the same habitats. To further this goal will require a critical review of present monitoring schemes and, if necessary, the adoption of innovative methodologies and techniques for acquiring accurate trend data on the species of interest and their habitats. Research on many aspects of breeding bird biology is required to further the aims of this regional plan.

Avian Monitoring

As pointed out by Sauer and Cooper (1996), monitoring provides vital data about bird populations. But, as they also note, present bird surveys including the BBS have limitations that restrict their use for "evaluating the response of bird populations to management or in identifying causes of population change" (Sauer and Cooper 1996). Robbins (2000) points out that threatened and endangered species are too few in number to be monitored by the BBS. He also notes that nocturnal species, colonial species and those found in habitats other than along roadsides will not be adequately sampled. Furthermore, even for well-sampled species, population trends along roads may not be mirrored by those away from roads (Robbins 2000).

Dunn (2001) cautions against using relatively short term population declines (i.e.5 and 10 year trends) upon which to base conservation actions without detailed evaluation. She notes that there is a need for devising population "thresholds" on a species by species basis that would be suitable for taking action. Additional survey schemes at the appropriate geographic scale (local, regional) for monitoring birds should be considered. Using BBS data for management

purposes will require further refinement if it is to be used for acquiring local survey information.

Designing surveys linked to management objectives is necessary if the data are to be useful. Methods appropriate to well-defined objectives need to be used together with proper experimental design including adequate sample sizes that will allow statistical analysis (Johnson 1996). Rather than using retrospective studies based on population monitoring for assessing the results of management actions which provide "weak inferences", Nichols (1996) recommends the "use of monitoring data in experimental or constrained design studies or in adaptive management..." to provide valid results. Furthermore as pointed out by Sauer (1996) there are limitations of monitoring at different geographic scales if attempting to assess management effects. Difficulties arise when attempting to combine local survey data with large-scale survey data (Sauer 1996).

Monitoring birds in developed landscapes, e.g. urban and suburban areas, should be considered both to provide information for possible management and to increase public awareness of birds (Sauer *et al.* 1996).

Research

Lack of crucial information on breeding biology and habitat information presently limits efforts for the conservation of many landbirds. The Breeding Biology Research and Monitoring Database (BBIRD) program presently underway in some areas of North America, is a cooperative project using standardized sampling protocols for studies of nesting success and habitat requirements (BBIRD - Montana Cooperative Wildlife Research Unit).

The MAPS program also was designed to provide annual estimates of productivity, survivorship, recruitment and population size. Similarly the Nest Record Scheme database may provide useful data on productivity and survivorship but requires evaluation (Downes 1996).

Action plans should identify and address the lack of information on basic aspects of breeding biology and microhabitat requirements of High and Medium priority bird species. Also research focusing on their population dynamics would be critical for meeting conservation goals.

Habitat Monitoring and Management

Twedt and Loesch (1996) suggest that habitat objectives, as well as population goals, need to be established. They recommend that assessments of present "avian habitats obtained from remotely sensed data and the historical distribution of habitats should be used in establishing habitat objectives". These objectives should include monitoring existing habitats, restoring habitats and creating new or alternative habitats. They also suggest "that the area covered by conservation plans be reassessed from remotely sensed imagery at intervals appropriate to detect predicted habitat changes" (Twedt and Loesch 1996).

Canterbury *et al.* (2000) have developed a method for monitoring regional effects of land use changes and habitat structure on indices of forest disturbance (habitat index) and disturbance to the breeding-bird community (bird community index). As they note, comparing trends in these indices might help determine whether population changes result from local habitat effects or from other factors such as changes at the landscape scale or in wintering habitats.

Consideration should be given to using Geographic Information System (GIS) technology (Peterson *et al.* 2000) together with hand-held GPS units for this plan. Spatially organized computer databases for various landscape features e.g. forest cover, waterways, roads and developed lands, can provide visual presentations for actual habitat situations at various landscape scales. Furthermore, predictive models, e.g. Habitat Suitability Indexes (HSI) for species, can be integrated with GIS maps and tested for reliability. Depending upon the availability of such digitized spatial datasets, the plans could utilize GIS technology to inventory and analyze the extent, and also quality, of existing avian habitats at various landscape scales. A pilot project could be tested in a small area prior to attempting larger scale geographic applications. It should be emphasized that the ability to display, manipulate and analyze avian habitat data using GIS can provide crucial information necessary to attain the goals of the region's landbird conservation efforts.

Habitat management plans in the Maritime region should focus on producing dynamic mosaic models that would allow for various land uses to occur through time across the regional landscape, such as habitat supply models based on arbitrary blocks like those used in breeding bird atlas schemes. Geopolitical boundaries are unsuitable, although obvious restrictions and/or regulations will require recognition of provincial borders. Watersheds might also be ecologically appropriate areas for planning a mix of

habitat for the management and conservation of breeding and migrating landbirds. In connection with forest habitats, Hunter (1990) should be consulted for a discussion of synthesis and implementation including ecosystem classification, forest models and costs-benefits of managing forests.

This document is primarily habitat-based and points to issues that threaten both habitats and their landbird populations. Devising habitat conservation and management action plans will require identification of sets or suites of priority bird species in the major habitats that are affected by these issues. Following this exercise, species that have the most critical habitat requirements of the group should be highlighted to provide direction for management and if necessary, research efforts. An important consideration is that of encouraging international conservation of wintering habitats of migratory landbirds.

Implementation of this Maritime landbird conservation plan effectively will require:

- A designated coordinator and/or lead organization to assume responsibility for designing specific habitat conservation and management action plans, and to coordinate the actions of the partners;
- Availability of dedicated staff and adequate stable funding, with the means to undertake required activities and to measure progress towards these goals; and
- Firm direction following a reasonable schedule towards attainable habitat and species population goals.

Summary

Partners in Flight is a relatively new program and its implementation is an evolving process. It has become very well established in many parts of the U.S. where secured funding sources there have greatly facilitated the development and application of PIF programs.

In Canada, PIF is comprised of a willing coalition of partners that includes federal and provincial governments, universities, non-government conservation organizations, First Nations, industry and citizens, all with a common vision toward landbird conservation. Although there have been small amounts of funding provided through a national working group, these funds have been primarily directed toward development of conservation plans such as this one. To date, there has been little dedicated funding for conservation programs, although some regional PIF programs have had some success in attracting and levering funds for local conservation efforts.

In the Maritimes, PIF is currently in the planning stage. Our hope is that the current document will serve as a starting point, for those both within and outside PIF, for identification of priority species and habitats, and to highlight priority research and monitoring needs. Our intention is to use the current plan to support new and existing research, monitoring and communications plans that contribute to priority landbird conservation actions.

As PIF - Maritimes grows, so will the need for continued updating of this plan. We welcome the participation and cooperation of organizations with expertise in landbird science and conservation that wish to contribute to its goals. For inquiries, please contact the lead author of this plan.

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Appendix 1

List of potential Maritime landbird conservation plan partners.

Agencies and organizations

Atlantic Canada Universities
Canadian Nature Federation (CNF)
Canadian Wildlife Service (CWS)
Department of Fisheries and Oceans (DFO)
Ducks Unlimited Canada (DUC)
Eastern Habitat Joint Venture (EHJV)
Ecology Action Centre
Federation of Nova Scotia Naturalists (FNSN) and its affiliates
First Nations
Island Nature Trust (Prince Edward Island)
Natural History Society of Prince Edward Island
Nature Conservancy of Canada (NCC)
Nature Trust of New Brunswick
New Brunswick Museum
New Brunswick Department of Natural Resources (NBDNR)
New Brunswick Department of Agriculture (NBDA)
New Brunswick Federation of Naturalists (NBFN) and its affiliates
Nova Scotia Bird Society (NSBS)
Nova Scotia Department of Natural Resources (NSDNR)
Nova Scotia Department of Agriculture (NSDA)
Nova Scotia Forest Alliance
Nova Scotia Museum of Natural History
Nova Scotia Nature Trust
Parks Canada (PC)
Prince Edward Island Department of Environment, Energy and Forestry
Ruffed Grouse Society
Wildlife Habitat Canada (WHC)
World Wildlife Fund (WWF)

Conservation and Monitoring Initiatives

Atlantic Cooperative Wildlife and Ecology Research Network (ACWERN)
Atlantic Canada Conservation Data Centre (ACCDC)
Breeding Bird Survey (BBS)
Maritimes Breeding Bird Atlas
Bird Studies Canada (BSC)
Eastern Habitat Joint Venture (EHJV)
Important Bird Areas Program (IBA)
North American Bird Conservation Initiative (NABCI)
Partners in Flight (PIF)
Ramsar Wetlands of International Importance

Others

Industry
Landowners
Municipalities
Tourism
Volunteers
Corporations

Additional partners are expected to be identified as specific plans are developed.

Appendix 2

PIF-Canada Priority Setting Scheme and Species Scores.

Key features of the Canadian priority-setting system are the reflection of two kinds of responsibility: supervisory responsibility, and preservation responsibility. The first has been previously neglected in schemes that rank vulnerable or endangered species. Supervisory responsibility means "the extent to which a species is especially typical of a region" such that the region has responsibility to ensure its continuation, whereas preservation responsibility (termed 'concern') means "a high level of concern because of rarity, very limited distribution, loss of habitat, or declining numbers" (Dunn 1997). The first responsibility describes species that are abundant or common; the second describes species that are rare or declining but may not be Canada's whole responsibility. Thus all birds occurring in Canada have been given a rank from 1-5 that reflects Canadian Supervisory Responsibility (a composite of proportion of breeding range falling within Canada times the proportion of global range found within temperate NA.). This score can be further adjusted to reflect provincial responsibility. 'Concern' scores are an average of a trend score and a 'vulnerability' score (the latter based on breadth of range and global abundance), but both are incomplete. Although much detail is needed to describe the data input for each of these scores, in general, concern scores are highest for species with long-term population declines. Some difficulty in setting this score involves how much weight to give trend values over vulnerability scores (Dunn 1997). However, the scheme is be used as an aid for land managers and focuses attention on broad conservation issues.

A full description of the priority setting process can be obtained at http://www.rmbo.org/pif/process/process.html (Panjabi *et al.* 2001)

Species	Priority	PIF score	Global Relative abundance	Global Breeding distribution	Global Non-breeding distribution	Breeding area importance	Threats non-breeding	Threats breeding	Breeding population trend	Trend interpretation
Bicknell's Thrush *(Catharus bicknelli)*	High	28	5	5	3	5	4	3	3	No data
Nelson's Sharp-tailed Sparrow *(Ammodramus nelsoni)*	High	27	4	4	5	4	4	3	3	Uncertain
Ipswich Savannah Sparrow *(Passerculus sandwichensis princeps)*	High	27	5?	5?	5?	5?	3?	2?	2?	No data
Bay-breasted Warbler *(Dendroica castanea)*	High	26	4	3	4	4	4	3	4	Mod.Dec.
Canada Warbler *(Wilsonia Canadensis)*	High	25	4	2	3	5	4	2	5	Sign.Dec.
Wood Thrush *(Hylocichla mustelina)*	High	24	3	2	4	4	4	2	5	Sign.Dec.
Northern Parula *(Parula Americana)*	High	21	3	2	4	5	2	3	2	Poss.Inc.
Chimney Swift *(Chaetura pelagica)*	High	20	2	1	3	2	3	4	5	Sign.Dec.
Boreal Chickadee *(Poecile hudsonicus)*	High	20	4	1	1	4	2	3	5	Sign.Dec.
Rose-breasted Grosbeak *(Pheucticus ludovicianus)*	High	20	3	2	3	4	2	2	4	Mod.Dec.
Purple Finch *(Carpodacus purpureus)*	High	20	3	2	1	5	2	2	5	Sign.Dec.
Short-eared Owl *(Asio flammeus)*	High	19	4	1	1	2	4	4	3	No data
Eastern Wood-Pewee *(Contopus virens)*	High	19	3	1	2	3	3	2	5	Sign.Dec.
Olive-sided Flycatcher *(Contopus cooperi)*	High	19	4	1	2	2	3	2	5	Sign.Dec.
Rusty Blackbird *(Euphagus carolinus)*	High	18	4	1	2	2	3	3	3	Uncertain
Cape May Warbler *(Dendroica tigrina)*	Medium	24	4	2	4	4	3	3	4	Mod.Dec.
Black-throated Blue Warbler *(Dendroica caerulescens)*	Medium	24	4	3	4	5	4	2	2	Poss.Inc.
Chestnut-sided Warbler *(Dendroica pensylvanica)*	Medium	23	3	2	4	5	3	2	4	Mod.Dec.

Species	Priority	PIF score	Global Relative abundance	Global Breeding distribution	Global Non-breeding distribution	Breeding area importance	Threats non-breeding	Threats breeding	Breeding population trend	Trend interpretation
Black-billed Cuckoo *(Coccyzus erythropthalmus)*	Medium	21	4	2	2	3	3	2	5	Sign.Dec.
Whip-poor-will *(Caprimulgus vociferous)*	Medium	21	4	2	3	2	3	4	3	Uncertain
Bobolink *(Dolichonyx oryzivorus)*	Medium	21	2	2	2	4	4	3	4	Mod.Dec
Veery *(Catharus fuscescens)*	Medium	21	3	2	2	5	3	2	4	Mod.Dec.
Blackburnian Warbler *(Dendroica fusca)*	Medium	20	3	2	3	5	3	3	1	Sign.Inc.
Pine Grosbeak *(Pinicola enucleator)*	Medium	19	4	1	2	2	2	3	5	Sign.Dec.
Peregrine Falcon *(Falco peregrinus)*	Medium	18	5	1	1	2	3	3	3	No data
Boreal Owl *(Aegolius funereus)*	Medium	18	5	2	2	2	2	2	3	No data
Black-backed Woodpecker *(Picoides arcticus)*	Medium	18	4	2	2	2	3	3	2	Poss.Inc.
Vesper Sparrow *(Pooecetes gramineus)*	Medium	18	2?	1?	2?	2?	2?	4	5	Sign.Dec.
Barn Swallow *(Hirundo rustica)*	Medium	17	2	1	1	4	2	2	5	Sign.Dec.
Brown Creeper *(Certhia Americana)*	Medium	17	4	1	1	3	2	3	3	Uncertain
Eastern Kingbird *(Tyrannus tyrannus)*	Medium	17	3	1	2	3	2	2	4	Mod.Dec.
Red-shouldered Hawk *(Buteo lineatus)*	Medium	17	4	2	2	2	2	3	2	Poss.Inc.
Long-eared Owl *(Asio otus)*	Medium	17	5	1	1	2	3	2	3	No data
Common Nighthawk *(Chordeiles minor)*	Medium	16	3	1	1	2	2	3	4	Mod.Dec.
Bank Swallow *(Riparia riparia)*	Medium	16	2	1	1	5	2	2	3	Uncertain
Gray Jay *(Perisoreus Canadensis)*	Medium	15	3	1	1	2	2	3	3	Uncertain
White-winged Crossbill *(Loxia leucoptera)*	Medium	15	2	1	1	3	3	3	2	Poss.Inc.
Pileated Woodpecker *(Dryocopus pileatus)*	Medium	15	4	1	1	4	2	2	1	Sign.Inc.
Red Crossbill *(Loxia curvirostra)*	Medium	13	2	1	1	2	3	3	1	Sign.Inc.
Blackpoll Warbler *(Dendroica striata)*	Early Watch	22	3	2	4	2	3	3	5	Sign.Dec.
Ruffed Grouse *(Bonasa umbellus)*	Early Watch	21	4	2	2	4	2	2	5	Sign.Dec.
Yellow-bellied Flycatcher *(Empidonax flaviventris)*	Early Watch	21	3	2	4	3	4	2	3	Uncertain
Northern Goshawk *(Accipiter gentiles)*	Early Watch	20	5	1	1	4	3	3	3	Uncertain
Yellow-bellied Sapsucker *(Sphyrapicus varius)*	Early Watch	20	3	2	2	5	2	2	4	Mod.Dec
Black-throated Green Warbler *(Dendroica virens)*	Early Watch	20	3	2	3	5	3	2	2	Stable
Belted Kingfisher *(Ceryle alcyon)*	Early Watch	19	4	1	1	5	2	2	4	Mod.Dec
Least Flycatcher *(Empidonax minimus)*	Early Watch	19	3	1	3	4	2	2	4	Mod.Dec
American Redstart *(Setophaga ruticilla)*	Early Watch	19	3	1	2	5	2	2	4	Mod.Dec
Eastern Meadowlark *(Sturnella magna)*	Early Watch	18	2	1	1	2	3	4	5	Sign.Dec.
Spruce Grouse *(Falcipennis Canadensis)*	Early Watch	18	5	1	1	2	3	3	3	No data
Great Crested Flycatcher *(Myiarchus crinitus)*	Early Watch	17	3	1	3	3	3	2	2	Poss.Inc.
Pine Warbler *(Dendroica pinus)*	Early Watch	16	3	3	3	2	2	2	1	Sign.Inc.

Species	Priority	PIF score	Global Relative abundance	Global Breeding distribution	Global Non-breeding distribution	Breeding area importance	Threats non-breeding	Threats breeding	Breeding population trend	Trend interpretation
Northern Harrier *(Circus cyaneus)*	Early Watch	16	4	1	1	2	3	3	2	Poss.Inc.
Cooper's Hawk *(Accipiter cooperii)*	Early Watch	15	4	1	1	2	2	2	3	Uncertain
Warbling Vireo *(Vireo gilvus)*	Early Watch	15	3	1	4	2	2	2	1	Sign.Inc.
Horned Lark *(Eremophila alpestris)*	Early Watch	14	1	1	1	2	1	3	5	Sign.Dec.
Purple Martin *(Progne subis)*	Early Watch	13	2	1	1	2	3	2	2	Stable
Cliff Swallow *(Petrochelidon pyrrhonota)*	Early Watch	13	1	1	1	2	2	2	4	Mod.Dec
Eastern Bluebird *(Sialia sialis)*	Early Watch	13	3	1?	2	2	2	2	1	Sign.Inc.
Brown-headed Cowbird *(Molothrus ater)*	Early Watch	13	2	1	1	2	1	1	5	Sign.Dec.

Appendix 3

Maritime Canada High and Medium priority landbird species synopses.

	Species	Priority	General habitat	Synopsis	PIF Score
1	Bicknell's Thrush	High	Coniferous and mixed forest, coastal and highland stunted and thick regeneration	Bicknell's Thrush is the only extant avian species endemic to northeastern North America, found almost entirely within the Atlantic Northern Forest Bird Conservation Region. It is one of the least known of all North American bird species and is listed by Partners in Flight as a species of continental priority. It inhabits high elevation areas throughout its range. Its population is highly fragmented on the breeding grounds. Population estimates continue to be revised and are crude but suggest there are between 20,000 and 40,000 individual birds. It winters primarily in the Dominican Republic where there is high concern for the loss of habitat. Although population trends are unknown it has disappeared from several sites where it once occurred. Bicknell's Thrush is listed by COSEWIC as a species of Special Concern. Nova Scotia lists it as a Vulnerable Species under their Endangered Species legislation.	28
2	Ipswich Savannah Sparrow	High	Grass dunes, Sable Island, NS	The Ipswich form of the Savannah Sparrow is endemic to only one location - Sable Island, Nova Scotia. Rough estimates indicate there are about 1000 to 2000 breeding pairs. They appear to be very productive and are experiencing no immediate obvious threats. Sable Island is protected as a Canadian Wildlife Service Migratory Bird Sanctuary. They winter along the US eastern seaboard from Massachusetts to Georgia where coastal development may pose threats, although no specific problems have been documented. COSEWIC currently lists the subspecies as a Species of Special Concern.	27
3	Nelson's Sharp-tailed Sparrow	High	Salt marsh, estuary, flood plain meadow, hayfield	Nelson's Sharp-tailed Sparrow consists of three distinct populations, including a western one in the prairie provinces and north central U.S. and a central one around the Hudson Bay lowlands of Ontario and Quebec. The Atlantic breeding population is confined to the Maritimes, eastern Quebec and coastal Maine. Populations have likely declined in recent history, but although once thought to be threatened by coastal development, recent work indicates that it successfully occupies wet meadows upland of the coastal marshes and is common in many areas. This species is listed by Partners in Flight as a species of continental priority.	27
4	Bay-breasted Warbler	High	Medium to mature coniferous and mixed forest	The Bay-breasted Warbler breeding distribution covers much of Canada's boreal forest and extreme northeastern U.S. It winters in southern central America and the northern tip of South America. BCR14 has a high area responsibility for the species. The BBS indicates a steady moderate decline of the species, possibly as much related to wintering grounds habitat loss as to breeding grounds habitat issues. Bay-breasted Warbler populations are thought to fluctuate with spruce budworm populations, which have been low for the past decade. Spruce budworm spraying during outbreak periods may also affect these warbler populations by suppressing a major component of its diet in the breeding season. The Bay-breasted Warbler is listed by Partners in Flight as a species of continental priority.	26

	Species	Priority	General habitat	Synopsis	PIF Score
5	Canada Warbler	High	Medium to mature deciduous and mixed forest with dense, wet under-story	The Canada Warbler breeding range reaches from the Maritimes across the boreal forest of Canada and southward through the central ridge of the Allegheny Mountains to Tennessee and Georgia. It is thought to winter mainly in eastern Columbia and in the northern Andes of Peru and Ecuador. Its population has been in a steady significant decline. BCR14 has a high breeding area importance. Habitat loss on the wintering grounds has been cited as a major conservation concern, although there is some evidence of similar problems on the breeding grounds. The Canada Warbler is listed by Partners in Flight as a species of continental priority.	25
6	Wood Thrush	High	Medium to mature deciduous and mixed forest with shrub layer	The Wood Thrush breeds in deciduous forest over eastern North America from Florida north to southern Ontario and Quebec. The Maritimes represent the northeastern limit of its range. It is nearly absent from PEI, uncommon in NS but fairly common in parts of southern and western NB. BCR14 has a relatively small area importance for this species and it is unlikely to play a major role in conservation efforts to halt the long-term declines of this species across its range. Partners in Flight lists the Wood Thrush as a species of continental priority.	24
7	Northern Parula	High	Medium to mature coniferous and mixed forest	The Northern Parula breeding range covers much suitable coniferous and mixed wood habitat of eastern North America from Florida and Texas north to southern Ontario and Quebec. However it is particularly abundant throughout BCR14, hence a very high area importance rating. It winters on Caribbean Islands and coastal Central America where its habitats may need monitoring. Populations are thought to be stable or increasing so there are no immediate conservation concerns. However the very high area importance for this species imparts a high responsibility to keep this species within our bird conservation vision.	21
8	Chimney Swift	High	Urban and open areas; large hollow trees	The Chimney Swift breeds from Florida and Texas north to the southern prairie provinces, Ontario, Quebec and the Maritimes. It is nearly absent from PEI but is widely scattered throughout NS and NB. Its numbers have declined markedly over the past 30 years and there is high conservation concern in Canada for this species. Factors thought to be related to the decline are reduction of large hollow trees in forests, elimination of urban chimneys and reduction of airborne insects. Studies are needed to investigate these ideas. Chimney Swifts winter in the upper Amazon River drainage of South America, particularly Peru, southern Ecuador and northern Chile.	20
9	Boreal Chickadee	High	Medium to mature coniferous forest	The boreal Chickadee is one the few landbird species that is almost completely restricted to the boreal forests of Canada. It also occurs in extreme northern parts of the U.S. It is a year-round resident. Although still common throughout, populations have shown a steady significant decline over the past few decades. BCR14 has a high breeding area importance for this bird. It may make an appropriate species for a long-term indicator of boreal forest ecosystems.	20

	Species	Priority	General habitat	Synopsis	PIF Score
10	Rose-breasted Grosbeak	High	Deciduous and mixed forest with shrub layer	The Rose-breasted Grosbeak is a breeding bird of the hardwood and mixed wood forests of eastern and central North America. It has a relatively broad wintering range, extending from southern Mexico through Central America and across northwestern South America. BCR14 has a fairly high breeding area importance. Although range-wide the species is showing a moderate decline over the past three decades, populations in BCR14 appear to recently be increasing slightly. Not a major concern in BCR14, this species occupies a habitat that several other declining species also occupy. Therefore it merits being kept in the forefront of our conservation planning.	20
11	Purple Finch	High	Open deciduous and mixed forest of any age	The Purple Finch breeds in suitable habitat over northeastern North America's mixed wood and coniferous forest, across Canada's boreal forest to the west coast and south along the U.S. west coast. It winters mainly in southern parts of its breeding range in Canada and south to Florida and Texas. Its breeding densities are very high in BCR14, giving it a high area importance. This species has experienced persistent declines over most of its range causing some concern in both the U.S. and Canada. However the species is still fairly common in preferred habitats. This species is surprisingly unstudied and should be the subject of conservation attention before its numbers decline further.	20
12	Short-eared Owl	High	Marsh lands, coastal bogs, sedge meadows, hay fields	The Short-eared Owl ranges throughout North America, Eurasia and parts of South America. In North America it breeds in suitable marsh and grassland habitats north from the central U.S. to Alaska and the Canadian Arctic. It winters from central U.S. south to Mexico and Florida. SEOW has a fairly low breeding area importance for BCR14. However there is almost no information on population trends and there are perceived threats to both breeding and wintering habitats. Therefore Partners in Flight has listed the species as one of high continental concern. COSEWIC lists it as a Species of Special Concern and several U.S. states have also listed it. Although not urgent in BCR14, it is a species that should be watched and considered in conservation planning activities.	19
13	Olive-sided Flycatcher	High	Wet, open coniferous forest	The Olive-sided Flycatcher breeds in coniferous forest from northeastern North America across Canada's boreal forest into Alaska and south into the western U.S. coniferous forests. It winters in parts of Mexico and Panama as well as the Andes Mountains of north and west south America. This species is experiencing prolonged and significant long-term population declines and has, therefore, been ranked by Partners in Flight as a species of continental priority. It is of fairly low area importance in BCR14 although it occurs throughout the Maritimes in suitable habitat such as forest edges and openings, especially around bogs and marshes.	19
14	Eastern Wood-Pewee	High	Mature deciduous forest with open areas	The Eastern Wood-Pewee is a breeding bird of the more mature deciduous woodlands of eastern North America, from Texas and Florida north to southern Manitoba and the Maritimes. It prefers openings and edges to closed forest. In BCR 14 it is at the northeastern limit of its breeding range and has a moderate breeding area importance. The species winters over much of northeastern South America, particularly Columbia, Venezuela and Peru. The species has declined significantly across its range and it appears that trend is continuing.	19

	Species	Priority	General habitat	Synopsis	PIF Score
15	Rusty Blackbird	High	Forested wetlands, bogs, alder swales	The Rusty Blackbird breeds in the boreal forest of the Maritimes and extreme northeast U.S. across Canada and Alaska. It prefers the wet and boggy habitats. This blackbird winters in the lower two-thirds of eastern U.S. The Breeding Bird Survey documents significant and persistent population declines throughout the boreal softwoods. There is much conservation concern for this species. However, population trends in the Canadian portion of BCR14 are not so clear and there is doubt as to whether the BBS provides sufficient population information to be certain of trends. Partners in Flight lists it as a species of continental priority. BCR14 has a fairly low breeding area importance.	18
16	Cape May Warbler	Medium	Mature coniferous forest	The Cape May Warbler breeds in coniferous forests from the Maritimes across Canada's boreal region into the southern Northwest Territory and south into northern Maine, Minnesota and Wisconsin. It occupies a variety of medium-to-older age coniferous habitats and is known to respond numerically to spruce budworm outbreaks. It winters in the West Indies. BCR14 has a fairly high area responsibility for this species. Populations of Cape May Warblers are thought to be generally declining although not alarmingly. Recent declines may be due to an ebb in the budworm cycle.	24
17	Black-throated Blue Warbler	Medium	Mature deciduous forest with shrub layer	The Black-throated Blue Warbler is one of our more range-restricted species. It inhabits hardwood and mixed wood habitats of southeastern Canada and a narrow "spine" from Maine south along the Appalachian Mountains to Georgia. It over winters on Caribbean Islands and parts of eastern Central America. Populations of this species appear to be either stable or increasing so there are few immediate conservation concerns, either across its range or in BCR14. However, due to BCR14's extremely high breeding area importance for the species (estimated at over 30% of the world population) and its affinity for relatively undisturbed, large tracts of habitat, the species must remain in the forefront of our planning and conservation activities to ensure its long term success.	24
18	Chestnut-sided Warbler	Medium	Deciduous and mixed second growth forest	The Chestnut-sided Warbler breeds from the Maritimes west through southern Canada into Saskatchewan and in the northeastern U.S. It winters from southern Mexico south to Panama. It's preferred habitat is scrubby second-growth, edge and early successional woodland and farmland. It likely benefited by anthropogenic changes to the landscape, although may recently be showing signs of declines. BCR14 has a very high area importance for the species.	23
19	Black-billed Cuckoo	Medium	Deciduous and mixed forest edges; shrubby and open wet areas	The Black-billed Cuckoo breeds from southern parts of the prairie provinces through to the Maritimes and south to the mid states. It prefers habitats of forest edges, thickets and abandoned farmlands, especially those associated with water. Its wintering distribution is only poorly known but includes parts of several northwestern South American countries, including Venezuela, Ecuador, Columbia, Peru and Paraguay. The onset of breeding and productivity of the BBCU is linked to outbreaks of insects, most notably the tent caterpillar and cicadas, thus making interpretation of BBS results difficult. However, it appears that populations are declining through the ups and downs of several insect outbreaks. BCR14 has a medium area responsibility for the species.	21

	Species	Priority	General habitat	Synopsis	PIF Score
20	Whip-poor-will	Medium	Deciduous and mixed forest	The Whip-poor-will is an elusive and little-known species that inhabits broadleaf forests with little under story throughout most of eastern North America. It winters in extreme southern U.S. and south into Mexico and Central America. Its population is not monitored by the BBS in Canada and there is uncertainty about its trend, although there is a long list of locations from where it has disappeared. BCR14 has a fairly low breeding area responsibility. Only a few breeding locations are known for NS. It appears to be absent from PEI. In NB, its prime breeding areas are the southwest and the lower Miramichi valley.	21
21	Veery	Medium	Deciduous forest with wet shrub layer	The Veery breeds across southern Canada from British Columbia to Newfoundland and across the northern U.S. and in higher elevations of the Appalachians. It prefers early successional deciduous forest, particularly wet areas along streams and swamps. It winters in north central South America. BCR14 has a very high area responsibility for the Veery. Recent declines in Veery populations are a moderate cause for concern.	21
22	Bobolink	Medium	Grasslands, meadows, hay fields	The Bobolink breeding range extends from British Columbia and Alberta in the west to Newfoundland in the east and from the Maritimes and central prairie provinces south to West Virginia, Missouri and Colorado. Its breeding habitat consists of a wide variety of hay fields, meadows and grasslands. It winters in south-central South America, making it one of the longest distance migrants. BCR14 has a fairly high area responsibility and Bobolink populations are declining range-wide. Although still quite common throughout its range and likely to have benefited by human alteration of the landscape, there is considerable concern for its long-term decline in population.	21
23	Blackburnian Warbler	Medium	Medium to mature coniferous and mixed forest	The Blackburnian Warbler is a bird of northeastern North America whose range reaches to Saskatchewan in the west and south along the Appalachian Mountains. It breeds in a variety of coniferous and mixed woods habitats, mostly those, which are mature. It winters over a large part of northwestern South America. It remains a conservation priority because BCR14 has a very high area responsibility for this species. However there appear to be no immediate concerns as its population is increasing over most of its range.	20
24	Pine Grosbeak	Medium	Open coniferous and mixed forest, edges	The Pine Grosbeak breeds across the sub-arctic and boreal forests of Canada, Alaska, Scandinavia and Eurasia. In North America, it breeds primarily in Canada, from Newfoundland across the boreal forest into Alaska but also along the northwest Pacific coast and south along the Rocky Mountains into the U.S. It prefers relatively open coniferous forest. It winters mainly within its breeding range and habitats. BBS results indicate a significant long-term population of the species, particularly in BCR14, where it also has a very high area responsibility. There is some evidence suggesting the long-term declines may be due to large-scale habitat changes within the managed forest.	19

	Species	Priority	General habitat	Synopsis	PIF Score
25	Peregrine Falcon	Medium	Cliffs, bridges, tall buildings	The Peregrine Falcon is one of the most widely distributed birds in the world. Formerly extirpated from much of its North American range due to the use of organic pesticides, it is now making significant returns throughout the continent. Its breeding range in NA is primarily across the Canadian Arctic, and along east and west coasts, as well as many parts of the mid-west U.S. It occupies a wide range of habitats with little obvious preference, but often in areas containing cliffs and open feeding areas. The species winters mainly in the western U.S., along coastal eastern and southern U.S., and throughout Mexico and Central and South America. Peregrines exhibit a "leap-frog" migration, with northern breeders flying farther south than the more southern breeders. Conservation efforts have been successful in arresting the declines of the species and promoting re-establishment of breeding populations. COSEWIC currently lists the "*anatum*" sub-species, the only one that breeds in BCR 14, as Threatened. Nova Scotia lists it as Endangered. Peregrine Falcons are unlikely to become a focus of PIF conservation efforts because there are well-established species at risk programs in place.	18
26	Boreal Owl	Medium	Mature coniferous forest, snags	The Boreal Owl breeds across the boreal and sub-alpine forests of Canada, Scandinavia, Siberia, Alaska and parts of mountain ranges south of the main range. In BCR 14 it is a sparse breeder, and is found primarily in the Gaspé, northeast New Brunswick and Cape Breton. It winters within its breeding range although in some years there may be nomadic movements. There is a lack of information on this species, especially in North America. Due to is scarcity and being on the extreme periphery of its breeding range in the Maritimes it is unlikely to become a focus of conservation efforts in BCR 14.	18
27	Black-backed Woodpecker	Medium	Coniferous forest	This generally rare species breeds from Alaska, across Canada's boreal and montane forests to Newfoundland and south into parts of the northern U.S. It occupies a relatively wide variety of coniferous forest types but prefers feeding in areas that have been burned or insect-damaged. It winters mainly within its breeding range and habitats. Generally, this is a little-known species. The BBS indicates possible historical declines but recent trends are towards an increase in population. Although BCR 14 has only a moderate breeding area importance for the species, research is needed to determine the effects of fire suppression on its breeding ecology.	18
28	Vesper Sparrow	Medium	Field edges, pastures, clearings, blueberry fields	The Vesper Sparrow breeds from the Maritimes south to North Carolina and west to California and interior British Columbia. The western sub-species remains quite common in its traditional grassland habitats. However the eastern sub-species has declined sharply over the past 40 years, as habitats created by agricultural expansion now are either intensively managed or are reverting to forestland. It is now only occasionally seen outside of blueberry fields in the Maritimes. The Vesper Sparrow represents a challenge to conservation planning, being a species that is in serious decline but was only allowed to prosper under man-made conditions of the past.	18

	Species	Priority	General habitat	Synopsis	PIF Score
29	Red-shouldered Hawk	Medium	Mature deciduous and mixed forest	The Red-shouldered Hawk is primarily a bird of eastern U.S. forests and western U.S. coastal forest. It extends northward into Canada in southern Ontario, Quebec and New Brunswick. It breeds mainly in mature mixed forest. In most areas it is a year-round resident. However the northern-most birds migrate south to Mexico for the winter. Although the species occupies much of the U.S. portion of BCR 14 it only breeds in extreme southern NB and Quebec in the Canadian portion. The area responsibility for 14 is low. The Red-shouldered Hawk population is thought to be stable or increasing. It is listed as a Species of Special Concern in NB and also is a COSEWIC listed species.	17
30	Long-eared Owl	Medium	Coniferous and mixed forest; grasslands	The Long-eared Owl inhabits boreal and temperate forest across North America and Eurasia. It is one of the least-known birds of BCR 14. The species inhabits a wide range forest yet records of its occurrence indicate a sparse distribution and low abundance. There are insufficient data to determine a population trend. The northern breeders likely migrate to southern U.S and Mexico in winter. Populations are thought to fluctuate somewhat with prey abundance, however that relationship is poorly understood. From a conservation standpoint, the Long-eared Owl is a fairly high priority because there is so little known about this bird.	17
31	Eastern Kingbird	Medium	Orchards, wetland edges, woody marsh, alder swales	The Eastern Kingbird breeds over most of eastern North America and north to the Yukon and Northwest Territories and west to coastal British Columbia. It occurs throughout BCR 14 in open environments including fields with shrubbery, orchards and woodland and marshland edges. 14 has a moderate area responsibility for the species. Recent moderate declines have drawn attention to the species. It winters over the western Amazon region of South America.	17
32	Barn Swallow	Medium	Buildings, bridges	The Barn Swallow is widely distributed throughout much of North America, Europe and Asia. It prospered with human settlement and adapted to nesting under eaves of buildings and inside buildings and bridges. Although only a small area of its North American range, 14 has a relatively high breeding area importance. Declines in Canada, as documented by the Breeding Bird Survey, have raised concern for this and other swallow species. But, like so many other species, it only became abundant under the influence of man-made changes to the landscape. Our conservation concerns and actions must thoroughly consider the entire perspective of these species.	17
33	Brown Creeper	Medium	Mature coniferous and mixed forest	The Brown Creeper is widely distributed across the U.S., south in to Mexico's central forests and north across Canada's southern forests during both summer and winter. It occurs throughout BCR 14, including the entire Maritimes region. Although widespread it is usually under-represented in surveys due to its cryptic coloration and little-known vocalizations. BCR 14 has a moderate area responsibility for this species. Because the species is so poorly detected the data on population size and trend is uncertain.	17

	Species	Priority	General habitat	Synopsis	PIF Score
34	Common Nighthawk	Medium	Barrens, urban, open forest	The Common Nighthawk is widely distributed across North America. It breeds in a wide variety of habitats, including urban centers, logged or open forest, dunes, grasslands and fields. Its wintering habitat and range are poorly known but include much of South America. Although still a common and widespread breeder throughout NA recent declines, as documented in the Breeding Bird Survey, and apparent retraction from many urban areas has raised concerns for this species. Because BCR 14 has a low area importance for the Common Nighthawk it is unlikely that conservation efforts here could have a major influence on the species' survival.	16
35	Bank Swallow	Medium	Exposed banks, cliffs, borrow pits	The Bank Swallow is one of our most widely distributed birds. It is a holarctic breeder, common across North America, Europe and Asia. In North America it occurs across the northern half of the U.S., in Canada from Newfoundland to Alberta and north in to the Yukon and Northwest Territories and Alaska. North America's birds winter primarily in north-central South America. Its breeding habitat consists of a variety of vertical, or near vertical, cliffs and banks along rivers, lakes, reservoirs, and roadsides. Although widespread across the continent, BCR 14 has a very high area responsibility for the Bank Swallow. Breeding Bird Survey analyses indicate an uncertain population trend. However there is considerable concern in the region that this species is declining.	16
36	Pileated Woodpecker	Medium	Deciduous and mixed late succession forest	The Pileated Woodpecker is a year-round resident of deciduous and coniferous forests of southern Canada and western, midwestern and eastern U.S. It prefers late successional forest with trees large enough to house its need for large cavities for nesting and roosting. It can also inhabit younger forests if large snag trees have been left. Somewhat of a conservation enigma, the Pileated Woodpecker shows population increases while forest tree size is decreasing. BCR 14 has a fairly high area importance for the species. While there are no immediate concerns for the Pileateds' survival this is a species whose conservation status should be monitored into the future.	15
37	Gray Jay	Medium	Coniferous forest, especially black spruce	The Gray Jay is a permanent resident of the coniferous and mixed forests of Canada and Alaska as well as a few northern U.S. mainland areas, particularly the high elevation forests of the northwest. The species appears to favour habitats containing spruce spp. BCR 14 has a fairly low area responsibility although it occurs throughout the region in appropriate habitat. The population trend is uncertain but recent Breeding Bird Survey analyses suggest a possible increase. However, there is some anecdotal concern in the region that the species is becoming less common.	15
38	White-winged Crossbill	Medium	Coniferous forest	The White-winged Crossbill is a year-round nomadic resident of the boreal forest region extending from Alaska to Newfoundland. If breeds wherever and whenever there are large crops of spruce or tamarack cones. Food abundance is probably more important than habitat type for this species' breeding activities. BCR 14 has a moderate area responsibility and it occurs throughout the Maritimes region. Populations appear to be stable or increasing.	15

	Species	Priority	General habitat	Synopsis	PIF Score
39	Red Crossbill	Medium	Coniferous forest, especially pine	The Red Crossbill is a nomadic resident of the coniferous taiga forest extending from Alaska to Newfoundland and south to the montane forests of the U.S. and Mexico. Like the White-winged Crossbill, this species is attracted to large cone crops of spruce, but also of Douglas Fir, hemlock and pine. BCR 14 has a fairly low area responsibility for this species and there are indications that, overall, the population is increasing. However, there are particular concerns for some subspecies. A COSEWIC status report is currently being written and may provide significant update to this interesting species.	13