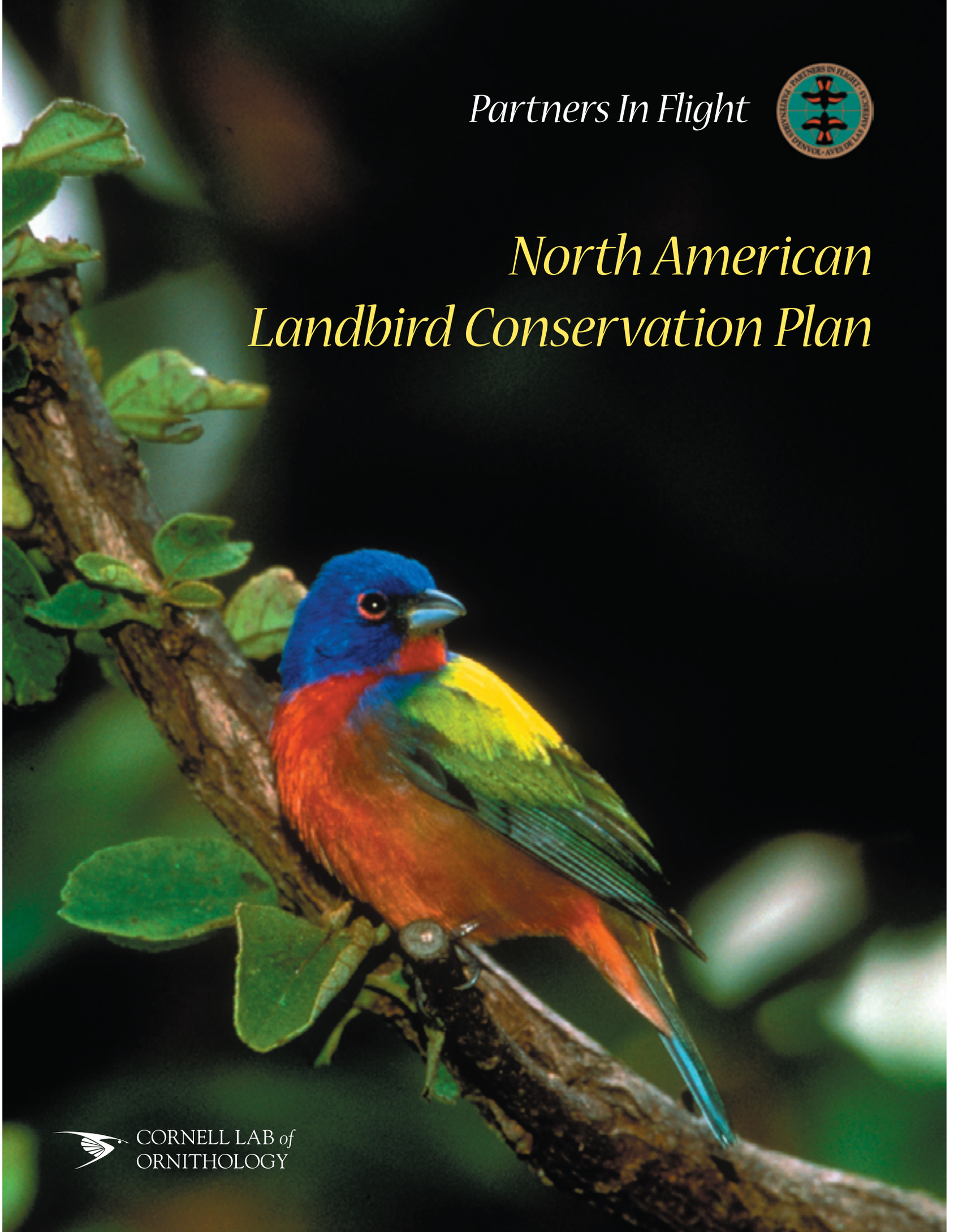
Partners In Flight

North American Landbird Conservation Plan



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Partners In Flight North American Landbird Conservation Plan

September 2003

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We acknowledge our debt to the International Association of Fish and Wildlife Agencies for securing funding that supported Partners in Flight regional coordinators during the development of regional and state bird conservation plans, and through the beginning stages of this continental plan. Analysis and writing was further supported by employers of the Plan's authors (see above). We thank the staff of the Cornell Laboratory of Ornithology, particularly Julie Hart, who designed and laid out the document. and xx for financing the printing.

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We also deeply appreciate the contributions of all individuals who reviewed species assessment scores at various geographic scales over the past decade. Without this thorough review and evaluation from hundreds of experts, this Plan simply would not have been possible. We are especially grateful to the Rocky Mountain Bird Observatory, which has supported the database with substantial staff time over the past decade.

Digital range map data were provided by NatureServe in collaboration with Robert Ridgely, James Zook, The Nature Conservancy/Migratory Bird Program, Conservation International/Center for Applied Biodiversity Science, World Wildlife Fund-US, and Environment Canada/WILDSPACE. Andrew Couturier converted the maps to areas and assigned ranges to degree blocks. We thank Jon Bart for providing analysis of monitoring needs and commenting on that important section of the plan.

PIF recognizes a great debt to Chandler Robbins, who had the foresight to create the Breeding Bird Survey (BBS), and to the thousands of BBS volunteers who faithfully collect data year after year. We especially thank John Sauer for providing useful and timely analyses of BBS data that proved invaluable to our efforts. The BBS is one of the primary data sources for PIF species assessment, and it seems that everywhere we turn, we find BBS data to be of great value in both expected and novel ways.

Table of Contents

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An Invitation to Action

Birds are the most familiar and widely enjoyed wildlife in North America. Every year, more people watch and feed birds than ever before. Birds also fill critical roles in ecological systems. From predators to prey, and from pollinators to dispersers of seeds, the important functions of birds in our environment cannot be overstated. Equally important, birds have served as inspiration for our music, poetry, philosophy, and other fundamental components of human culture since the beginning of civilization itself. Yet, over the past several decades, populations of some once-common species have declined precipitously, and more species than ever are experiencing range reductions or becoming threatened and endangered. Although many species remain common, we must take proactive action now to preserve the full breadth of benefits that birds provide to human society.

The turn of this new millennium has seen a proliferation of conservation initiatives founded on voluntary partnerships and galvanized into action by documented declines of North American bird populations. Following the lead of the North American Waterfowl Management Plan, Partners in Flight (PIF) formed in 1990 with the collective commitment to conserve the resident, short-distance, and Neotropical migrant landbirds that occupy every major biome and habitat on the continent. Whereas the mandate to conserve waterfowl populations was rooted in the economic importance of sport hunting, PIF's mandate is rooted in a broad constituency that represents the fastest growing and economically most important segment of outdoor nature enthusiasts in North America.

This North American Landbird Conservation Plan provides a continental synthesis of priorities and objectives that will guide landbird conservation actions at national and international scales. While our scope for this first version was limited to the 448 native landbirds that breed in the U.S. and Canada, full participation by our Mexican partners will add another 450 breeding species to the next iteration of the Plan. Together with equally ambitious plans for shorebirds, waterbirds, and waterfowl, this document serves as the blueprint for continental habitat conservation under the North American Bird Conservation Initiative (NABCI).

As documented in this plan, fully 100 landbird species in Canada and the United States warrant inclusion on the Partners in Flight Watch List, due to a combination of threats to their habitats, declining populations, small population sizes, or limited distributions. Of these, 28 especially vulnerable species require immediate action to protect small remaining populations, and 44 more are in need of management to reverse long-term declines. This Plan also highlights the need for stewardship of the species and landscapes characteristic of each portion of the continent, identifying 161 species (including 66 on the Watch List) that are particularly representative of large avifaunal biomes, and whose needs should be considered in conservation planning. Taken together, the pool of Watch List and Stewardship Species represent the landbirds of greatest continental importance for conservation action. Although the recommended actions may vary from region to region, no area in North America is without a conservation need.

One of 28 landbird species in the United States and Canada in need of immediate conservation attention, the Golden-winged Warbler is rapidly declining in the Northeast and Appalachian regions, while expanding its population into southern Canada.

A troubling finding of the Plan is that more than half the species identified as continentally important warrant improved monitoring. For 25 of the 100 Watch List Species, we lack even a first approximation of range-wide trends. Also troubling are the many gaps in our knowledge of the causes of population declines and of the effectiveness of our conservation programs. Addressing these monitoring and research needs will be critical for prioritizing actions and evaluating their success.

Breeding primarily in the Canadian Arctic and wintering in threatened grasslands of the South-central United States, the Smith's Longspur is a symbol of the need for international cooperation between these two countries.

This Plan also presents, for the first time, estimates of total population size for all 448 landbird species and population objectives for the 195 species of continental importance. These objectives are based on the extent of declines since the late 1960s and call for the reversal of those declines over the next 30 years. For some species it will be sufficient to maintain current population levels. For the 31 species that have declined by more than 50%, however, our objective is to double current populations, often involving additional habitat for millions of birds, through active management or other appropriate actions.

Most conservation action necessary to meet these ambitious population objectives will take place at regional and local scales, within states and provinces. Issues and appropriate actions differ substantially from region to region, as detailed in existing regional and state PIF plans and as summarized in Part II of this plan. The following over-arching threats are faced by landbirds across all of North America, however, and potential solutions must be sought at national and international levels:

- Unplanned and unregulated urban and suburban development in virtually every region, leading to loss and fragmentation of most habitat-types. Models exist for growth that is compatible with sustainable wildlife habitats, but too often the will to implement is lacking.
- Intensified and changing agricultural practices (including grazing and pesticide use), continuing to cause precipitous population declines in species of open habitats. Bird-friendly practices and mitigation measures to enhance habitats exist (e.g. Farm Bill programs), but these need to be explicitly tied to objectives for priority bird species and combined with economic incentives to be effective at large enough scales.
- Forest-management practices over vast regions (including fire suppression, deer over-browse, exotic diseases, lack of management on public lands), leading to changes in forest structure and composition and reducing suitability for high-priority species, even in the face of increased overall forest cover in some regions. Needs and objectives for priority forest birds must be incorporated explicitly into forest-management plans within agencies, with incentives to implement on private lands.
- Significant outright loss of major bird habitats through intensified modern land-uses and spread of exotic vegetation—examples include massive conversion of the boreal forest through industrial forestry, permanent removal of > 10% of diverse Appalachian hardwood forests via mountaintop-removal-valley-fill mining, as well as rapid loss of western pinyon-juniper, sagebrush, California chaparral, and remnant native prairies and barrens.
- Uncontroled habitat loss and other threats to migratory species on their wintering grounds

beyond our borders, often compounded by lack of knowledge of species' distributions, habitat needs, or effects of land-use trends. Inclusion of Mexico and Caribbean nations in future updates of this plan will ensure much greater attention to wintering ground issues for many species.

- General increase in dispersed (though unmeasured) mortality factors, such as communication towers, wind power development, domestic cats, lighted buildings in migration corridors, and competition with exotic species such as European Starlings and House Sparrows. Although some programs exist to minimize effects from these factors, no overall plan exists to address their cumulative impact on bird populations.

Collectively, these factors contribute to a high proportion of population declines and anticipated future threats among PIF Watch List Species. Addressing these issues at the highest possible administrative levels will be essential for meeting the continental population objectives outlined in this Plan.

Implementation of PIF objectives for landbirds will be led by existing national councils within each home country, cooperating to form an international PIF council that will address international issues, and advised by an international science group. While this PIF plan outlines the scientific foundation for landbird conservation at the continental scale, national strategic plans will outline the process for implementation within each country. Partnerships are key to this process, and PIF will work with existing and new Joint Ventures and other cooperative activities to integrate landbird conservation with work on other species groups. Because evaluation and reassessment are necessary components of adaptive implementation, we expect that this Plan will be revised at five-year intervals to incorporate the latest biological information. Mexican partners are rapidly completing assessment and planning for all birds, and full incorporation of conservation needs for this diverse segment of the North American avifauna is anticipated in 2004 or early 2005. We hope that full participation by Caribbean and other Latin American partners will proceed rapidly, as well.

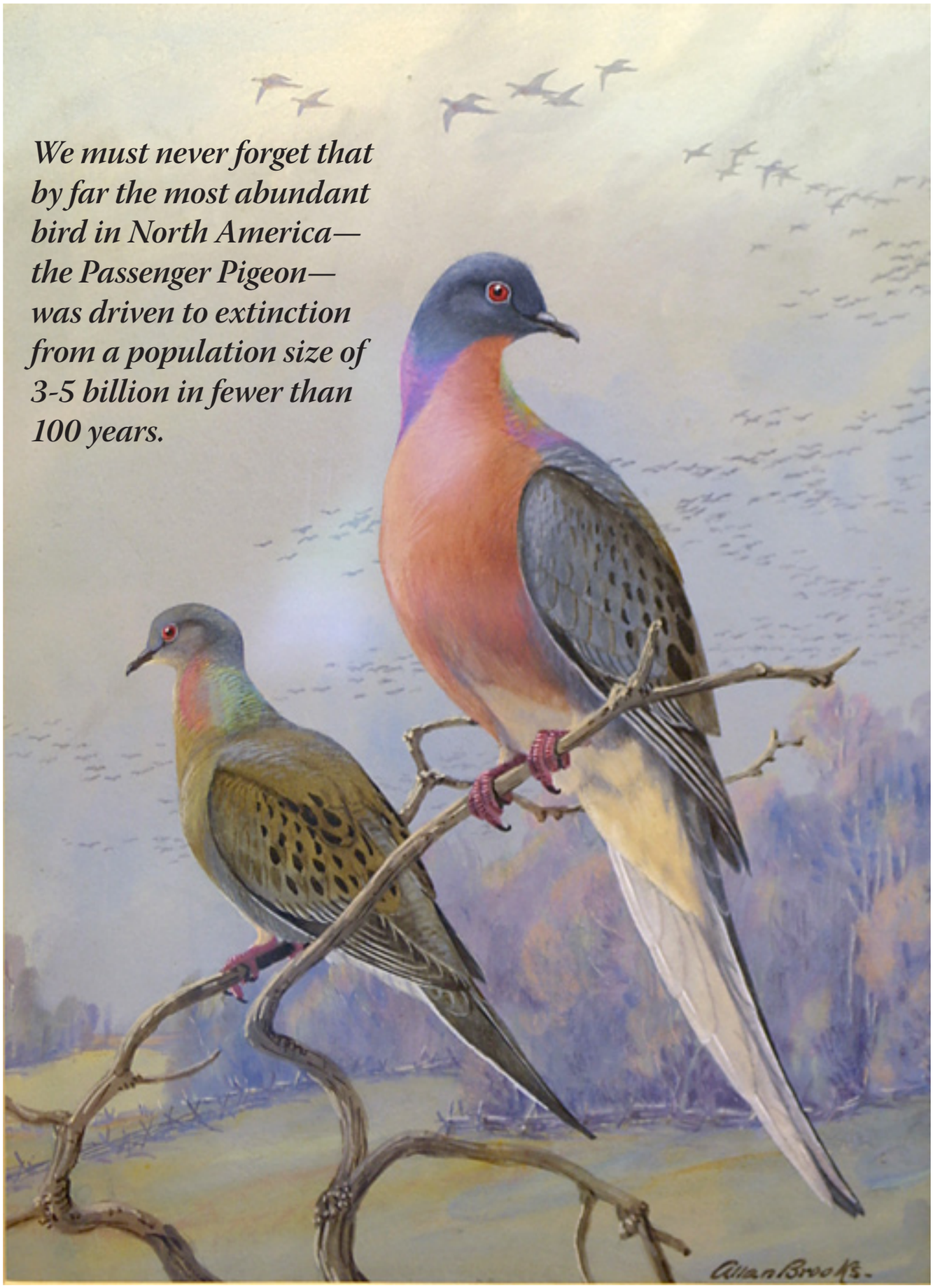
This call to action is aimed at several critical audiences, whose collective action is absolutely necessary if these challenges are to be met. We ask funding entities and decision-makers at all levels to allocate resources sufficient to address the major threats faced by high-priority landbirds and their habitats. We ask land managers to incorporate the needs of continentally important landbird species into existing management plans and on-the-ground initiatives. We urge ornithologists and conservation biologists to fill in the many gaps in our knowledge of North American landbirds, throughout their annual cycles, and to work towards monitoring all bird species sufficiently well for us to detect significant population changes. Finally, all the agencies, organizations, corporations, and individuals that have joined in the PIF collective must turn rhetoric into action on the vast lands we control and manage and through the scientific, educational, and management programs we administer. Together, our actions can halt the hemorrhagic loss of our wildlife habitats, reverse the declines of our bird species, and ensure a diverse and healthy avifauna across our entire continent far into the future.

PARTNERS IN FLIGHT MISSION

•Helping species at risk•

•Keeping common birds common•

•Voluntary partnerships for birds, habitats, and people•


We must never forget that by far the most abundant bird in North America—the Passenger Pigeon—was driven to extinction from a population size of 3-5 billion in fewer than 100 years.

Part 1. The Continental Plan

INTRODUCTION

Development of Partners in Flight

Birds are perhaps the most highly valued and actively appreciated component of North America's biological diversity. Approximately 1,200 species, representing nearly 15% of the world's known bird species, inhabit Canada, the United States, and Mexico, Approximately two-thirds of these, including warblers, thrushes, sparrows, finches, hummingbirds, flycatchers, raptors and other groups, occupy principally terrestrial habitats. These "landbirds" are the focus of this document.

Landbirds are an important component of the economy, providing untold billions in dollars of ecosystem services each year. Through their consumption of pest insects, pollination of plants, dispersal of native seeds, and other services, birds contribute to the maintenance of ecosystems that also support human life. Nature-based recreation, a high proportion of which involves observing birds, is the fastest growing segment of the tourism industry, increasing approximately 30% annually since 1987. In 1996 in the U.S. alone, 160 million people (77% of the population) spent $29.2 billion to observe, photograph or feed wildlife.

While birds are valuable to humans in many ways, declines in numerous landbird populations are creating serious concern for their futures. Some species are in sufficient trouble to merit immediate conservation action. Others remain widespread but deserve attention to prevent continued decreases. Because landbird habitats are directly affected by human use of the land, the health of all North American species is in our hands. We therefore have a stewardship responsibility for maintaining healthy populations of still-common species and not simply for preventing extinctions. We must never forget that by far the most abundant bird in North America—the Passenger Pigeon—was driven to extinction from a population size of 3-5 billion in fewer than 100 years (Blockstein 2002).

The causes of population declines in birds are numerous, but the loss, modification, degradation, and fragmentation of habitat almost always play a major role. Threats to habitats come primarily from uncontrolled urban and suburban development and from intensified land-use practices in agricultural and forested regions. Birds are a vital element of every terrestrial habitat in North America. Conserving habitat for birds will therefore contribute to meeting the needs of other wildlife and entire ecosystems.

Recognition that a cooperative, non-adversarial conservation approach was required to address bird and habitat issues at a continental scale led to formation in 1990 of Partners in Flight/Compañeros en Vuelo/ Partenaires d'Envol. This voluntary, non-advocacy, international coalition was originally dedicated to reversing declines of Neotropical migratory songbirds, but soon expanded its mission to include all landbirds. Partners include federal, state, provincial and territorial government agencies, non-governmental organizations, numerous universities, concerned individuals, and private industry in Canada, the U.S., Mexico and beyond.

The Partners in Flight mission is expressed through three related concepts:

- *Helping species at risk.* Species exhibiting warning signs today must be conserved before they become imperiled. Allowing species to become threatened or endangered results in long-term and costly recovery efforts whose success often is not guaranteed. Species that have attained endangered or threatened status must not only be protected from extinction, but must be recovered.

- *Keeping common birds common.* Native birds, both resident and migratory, must be retained in

Each spring, throngs of bird watchers flock to High Island, Texas to observe the songbird migration. During 2001, in the U.S. alone, 66.1 million people (31 percent of the U.S. population) participated in wildlife-watching activities, spending $38.4 billion.

healthy numbers throughout their natural ranges. We have a responsibility to be good stewards of species that represent the integrity of North America's diverse and unique ecosystems.

- *Voluntary partnerships for birds, habitats and people.* A central premise of PIF is that the resources of public and private organizations throughout the Americas must be combined, coordinated, and increased in order to achieve success in conserving bird populations in this hemisphere. The power of PIF lies in the synergy that builds when diverse, committed partners who care about birds work together for a common goal.

Purpose and Scope of this Plan

Purpose

This Plan provides a continental perspective on North American landbird conservation, presenting geographic, species, and habitat priorities. An international approach is essential because most species breed, migrate, and winter in more than one country, such that Canada, the U.S. and Mexico share many of the same birds at different times of year. Migratory birds are an international resource that requires conservation planning at a continental scale - a different approach than what may be suitable for more sedentary wildlife.

What the PIF North American Landbird Conservation Plan does:

- Summarizes the conservation status of landbirds across North America, illustrating broad patterns based on a comprehensive, biologically-based species assessment.
- Identifies species most in need of attention at the continental scale, recognizing that additional species will need attention in each region.
- Emphasizes the important need for stewardship of biome-restricted species that may not otherwise be in need of immediate conservation attention.
- Promotes conservation throughout birds' seasonal cycles, and in all regions of North America—not just during breeding periods or where species at risk occur.
- Presents continental-scale population objectives for species identified as continentally important and identifies general actions necessary to meet those objectives.
- Demonstrates the need for greater resources for landbird conservation.
- Outlines ways in which continental scale issues and objectives relate to regional conservation efforts.
- Promotes a coordinated approach to landbird conservation among nations and regions of North America, which will serve as a stepping stone to even broader geographic cooperation in future.

Our audience includes decision-makers, land-managers and scientists at national and international levels, who collectively have the ability to meet PIF's ambitious goals for landbirds.

Based on a comprehensive continental assessment of 448 native landbird species, we establish population objectives and recommended actions for Species of Continental Importance. These objectives and recommendations will facilitate the integration of landbird conservation actions with those described in other continental- and national-scale plans for birds. These include the North American Waterfowl Management Plan (North American Waterfowl Management Plan Committee 1998), Canadian and U.S. Shorebird Conservation Plans (Donaldson et al. 2000, Brown et al. 2001), and Waterbird Conservation for the Americas (Kushlan et al. 2002).

We consider two types of landbirds to be of high conservation importance—those that show some combination of population declines, small ranges, or distinct threats to habitat, and those that are restricted to a major habitat type, but otherwise not at risk. This rationale forms the basis for grouping species into those warranting attention due to concern (i.e., the PIF Watch List), and those that should be recognized as stewardship responsibilities.

Although this Plan identifies Species of Continental Importance, we do not advocate species-based conservation as the only, or best, approach to addressing issues. That approach is required in some cases, particularly in protecting endangered species. However, we encourage planners to identify common issues or habitats among suites of high priority species. This enables a more practical approach for implementing conservation actions, which will simultaneously benefit many bird species and other organisms as well.

This Plan is not intended to replace existing or developing regional and state PIF plans. The required conservation and management strategies for several hundred landbird species are far too complex and

variable across North America to be treated only at a continental scale. Implementation of on-the-ground bird conservation strategies must take place at state, provincial, and local levels, guided by regional and continental planning. Over the last seven years, PIF has engaged in a comprehensive planning effort, resulting in several dozen regional bird conservation plans covering all states or physiographic areas in the U.S. (Pashley et al. 2000, www.PartnersInFlight.org). Similar regional efforts are underway in Canada and Mexico. These regional and state PIF plans (Appendix C) identify priority species and habitats, set goals and objectives, discuss local issues and opportunities, and outline strategies for local or regional partners to implement bird conservation objectives. Part II of this Plan summarizes the salient issues faced by North American landbirds, reflecting the recurring messages of the regional plans.

Scope

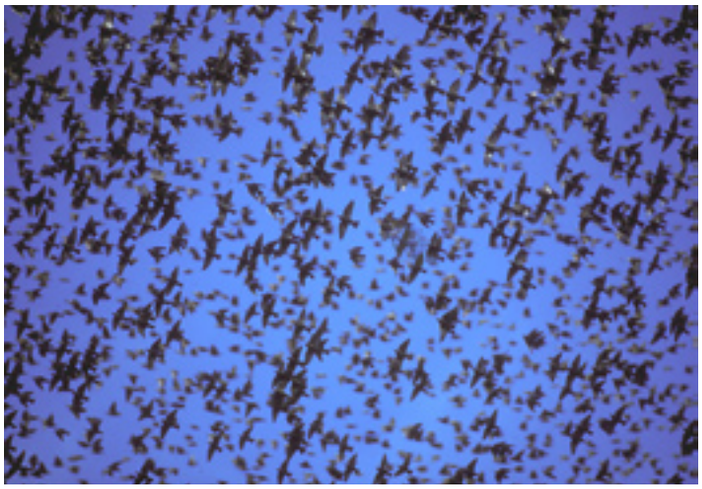
Geographic

For the purposes of this document, "North America" includes Canada, the continental U.S., and Mexico. However, this version of the Plan is limited to landbirds that regularly breed in the continental U.S. and Canada. Nonetheless, Mexican scientists provided important ideas and strategies for this plan as well as considerable data on the status in Mexico of many species included here.

Under the guidance of the Mexican National NABCI Committee, a working group was established in 2002 to develop the species assessment process for all bird species present in that country (approximately 1,100 species). Mexico is following the PIF methodology, and the first conservation status assessment for all Mexican species is expected by the end of 2003. Thus, we are preparing for a smooth integration of about 450 Mexican landbird species in future iterations of this Plan. Species assessment also has taken place for portions of the Caribbean, and partners are coordinating bird

The PIF Continental Plan considers 448 landbird species native to the United States and Canada from the following 45 families. Colored text shows additional familes with landbirds native to Mexico that will be treated in future versions of the Plan.

Family	Taxa	Family	Taxa
Tinamidae	Tinamous	Pipridae	Manakins
Cathartidae	Vultures	Laniidae	Shrikes
Accipitridae	Hawks, Eagles & allies	Vireonidae	Vireos & Greenlets
Falconidae	Falcons & Caracaras	Corvidae	Jays, Crows & allies
Cracidae	Chachalacas & allies	Alaudidae	Horned Lark
Phasianidae	Pheasants, Grouse, Turkeys	Hirundinidae	Swallows
Odontophoridae	Quail & allies	Paridae	Chickadees & Titmice
Columbidae	Doves & Pigeons	Remizidae	Verdin
Psittacidae	Parrots & Parakeets	Aegithalidae	Bushtit
Cuculidae	Cuckoos & Anis	Sittidae	Nuthatches
Tytonidae	Barn Owls	Certhiidae	Brown Creeper
Strigidae	True Owls	Troglodytidae	Wrens
Caprimulgidae	Nightjars	Cinclidae	American Dipper
Nyctibiidae	Potoos	Regulidae	Kinglets
Apodidae	Swifts	Sylviidae	Arctic Warbler, Gnatcatchers & allies
Trochilidae	Hummingbirds	Turdidae	Thrushes
Trogonidae	Trogons & Quetzals	Timaliidae	Wrentit
Momotidae	Motmots	Mimidae	Mockingbirds, Thrashers & Catbirds
Alcedinidae	Kingfishers	Motacillidae	Wagtails & Pipits
Bucconidae	Puffbirds	Bombycillidae	Waxwings
Galbulidae	Jacamars	Ptilogonatidae	Silky Flycatchers
Ramphastidae	Barbets & Toucans	Peucedramidae	Olive Warbler
Picidae	Woodpeckers & allies	Parulidae	Wood Warblers
Furnariidae	Spinetails, Leaftossers & allies	Coerebidae	Bananaquit
Dendrocolaptidae	Woodcreepers	Thraupidae	Tanagers, Euphonias & allies
Thamnophilidae	Antshrikes, Antwrens, Antbirds & allies	Emberizidae	Towhees, Sparrows, Seedeaters & allies
Formicariidae	Antthrushes & Antpittas	Cardinalidae	Saltators, Grosbeaks, Buntings & allies
Tyrannidae	Flycatchers, Becards, & Tityras	Icteridae	Blackbirds, Orioles & allies
Cotingidae	Cotingas	Fringillidae	Finches



The introduced European Starling, which now numbers at least 120 million in North America, outnumbers native Northern Flickers by more than 10-to-1 in most regions.

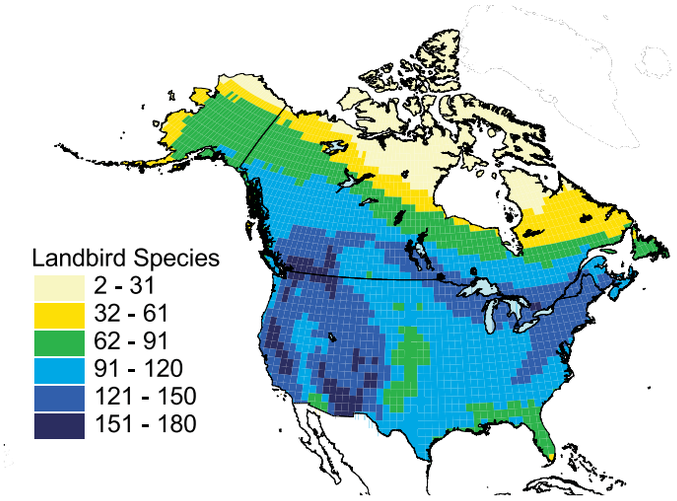


Figure 1a. Landbird species richness during the breeding season in each lat-long block of the U.S. and Canada, from an overlay of range maps of all 448 species.

conservation across that region as well.

Considering for now only Canada and the United States, the highest diversity of breeding landbirds occurs in the western U.S., especially near the Mexican border, and in the transition between eastern deciduous and northern boreal forest types in eastern Canada (Fig. 1a). Arctic regions support the fewest breeding landbird species. In the non-breeding season, these same species are most concentrated from the southwestern U.S. through Mexico and into Central America (Fig. 1b).

Taxonomic

Landbirds are defined here as those species having principally terrestrial life cycles (see box). This document provides status information for the 448 native species with manageable populations that breed in Canada and the U.S. This PIF Plan treats Neotropical migrant, short-distance migrant, and largely resident species. Scientific names for all species are given in Appendix A.

Although this Plan deals only with native species, we recognize that the important negative effects of introduced and exotic species should be considered during conservation planning for native birds (Dunn et al. 2001). There are relatively few introduced landbird species of consequence in North America, but their influence can be disproportionately large. For example, three introduced species - European Starling (120 million birds), House Sparrow (82 million) and Rock Dove (26 million)—comprise an estimated 5% of all landbirds breeding in Canada and the U.S. and are among the most widespread birds on the continent. As an example of the potential impact of exotic species, starlings—which compete with our native Northern Flickers for nesting

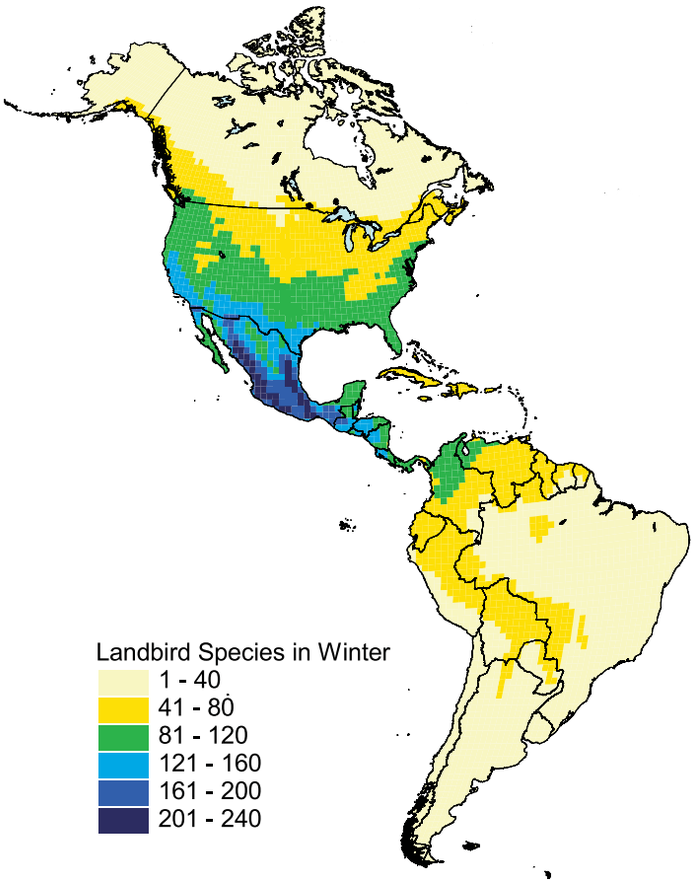
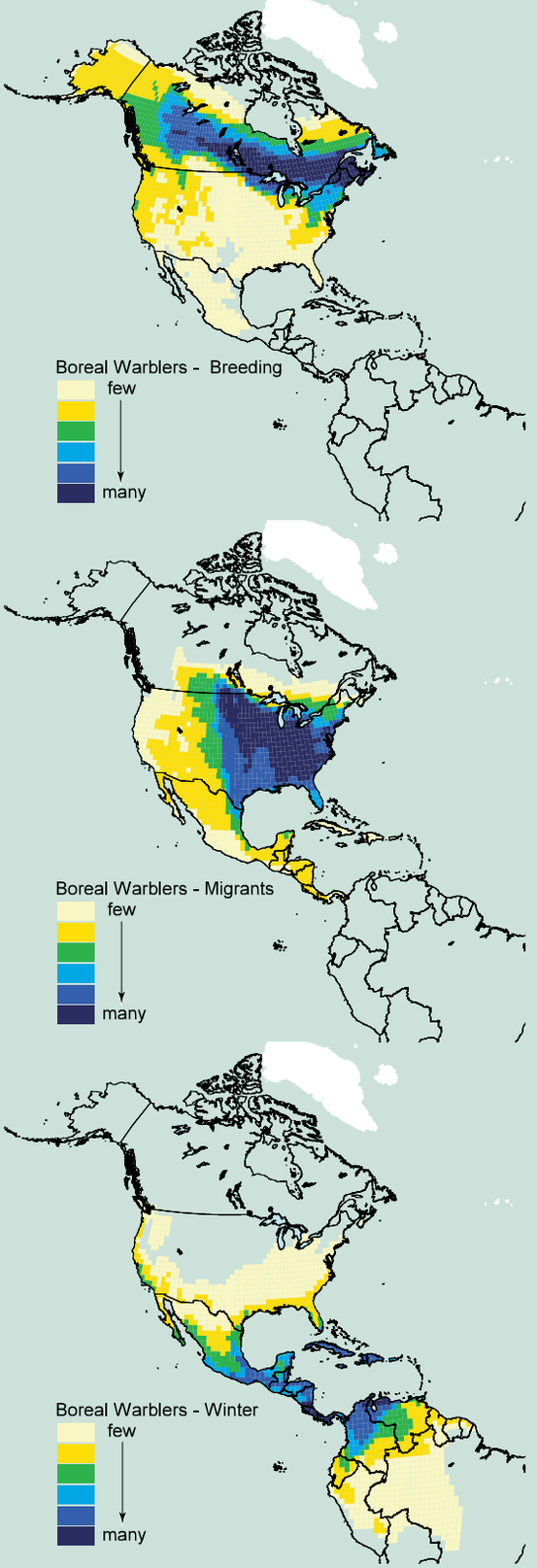


Figure 1b. Landbird species richness during winter for the 448 species that breed in the U.S. and Canada.

cavities—outnumber flickers by more than 10:1 in most regions.

In this Plan we only address full species (American Ornithologists' Union 1998). We recognize the importance of conserving subspecies and populations,



Number of boreal-breeding warblers occurring in each lat-long block (a) during the breeding season, (b) during migration, and (c) during winter, illustrating important linkages among boreal forest, habitats in eastern U.S., and tropical habitats in Central America, northern South America, and the Greater Antilles.

but there is not yet consensus on a consistent way to identify those that are truly in need of conservation attention. Thus, it is important to emphasize that subspecies and populations treated in many regional PIF plans can have continental significance that is not reflected in this document.

Seasonal

In this assessment, we considered information from both the breeding and non-breeding seasons. We provide information on geographic links between seasons highlighting areas, for example, where most breeding species of a particular region spend the winter. For species that winter in tropical areas, these geographic links highlight the need for better information on species' distributions and threats on their wintering grounds. For the migration season, there is little information available for estimating the vulnerability and needs of most species. Therefore, species assessment in this Plan is based primarily on breeding and winter considerations. The Plan does, however, discuss conservation issues that apply to the migration seasons, such as loss of stopover habitats and mortality from collisions with buildings and towers. . These issues remain a critical priority for PIF to address in the near future.

The Partners in Flight Planning Approach

Throughout the development of regional bird conservation plans, PIF has followed a stepwise planning approach that ensures a sound scientific basis for decision-making and a logical process for setting, implementing, and evaluating conservation objectives. Originally described as the PIF 'Flight Plan' (Pashley et al. 2000), this approach now has been applied at a continental scale here. The steps, detailed in the sections that follow, include:

- Assessing conservation vulnerability among all native landbird species;
- Identifying species most in need of conservation attention at a continental level, including consideration of their geographic and habitat affinities;
- Setting numerical population objectives for Species of Continental Importance;
- Identifying conservation needs and recommended actions for priority species and their habitats;
- Outlining an implementation strategy for meeting species and habitat objectives at a continental scale;

- Evaluating success, making revisions, and setting updated objectives for the future.

ASSESSING CONSERVATION VULNERABILITY

The first step in PIF's planning process is a conservation status assessment of each species throughout its range and annual cycle. PIF has developed a species assessment process that evaluates several components of species vulnerability and provides an overall conservation assessment of the species (Hunter et al. 1992, Carter et al. 2000, Panjabi et al. 2001). This process has been thoroughly tested, reviewed and updated, and its scientific credibility acknowledged by the American Ornithologists' Union (Beissinger et al. 2000). During the development of this Plan, the process was further improved to address issues raised by Beissinger et al. (2000) and by Canadian and Mexican partners.

Notably, this assessment process is based entirely on biological criteria. While political, economic, and social considerations frequently must be factored into decisions on setting priorities, we believe those decisions should be made after a biologically-based assessment has identified species and issues truly in need of attention. This will increase the probability of making good conservation decisions and efficient use of limited resources.

Species Assessment Factors

Species assessment was based on the PIF North American Species Assessment Database, which contains standardized data on the status of North American landbirds at the continental scale <http://www.rmbo.org/pif/pifdb.html>. We reviewed and updated the vulnerability data for all factors in the database, ensuring that our assessment reflected the current state of knowledge. Close coordination among Canada, the U.S., and Mexico made it possible for the update to consider the entire North American continent as defined herein.

Each species was given scores for six factors, assessing distinct aspects of vulnerability: Population Size (PS), Breeding Distribution (BD), Non-breeding Distribution (ND), Threats to Breeding (TB), Threats to Non-breeding (TN), and Population Trend (PT). (See box for details.) Scores for each factor reflect the degree of each species' vulnerability (i.e., risk of significant population decline or rangewide extinction) as a result of that factor. Scores ranged from "1" for low vulnerability to "5" for high vulnerability. Complete descriptions, justifications, scoring criteria, and definitions for each factor can be found in Panjabi et al. (2001), available at the Rocky Mountain Bird Observatory web site <http://www.rmbo.org/pif/pifdb.html>. Scores and selected other data for all 448 native landbird species regularly breeding in the continental U.S. and Canada are provided in Appendix A.

The Partners in Flight Vision: Populations of native birds will occur in their natural numbers, natural habitats, and natural geographic ranges, through coordinated efforts by scientists, government, and private citizens.

The Elegant Trogon, ranging from southern Arizona to Costa Rica, is among the 195 Species of Continental Importance identified in this plan.

An important departure from Panjabi et al. (2001) and past PIF assessments of landbirds is the incorporation of Population Size, which replaces the Relative Abundance score. Use of Population Size is now possible because of recently developed methodology to estimate population sizes from survey data (Appendix B; Rosenberg and

The Six PIF Species Assessment Factors:

Population Size (PS) indicates vulnerability due to the total number of adult individuals in the global population. Evaluation of PS is based on the assumption that species with small populations are more vulnerable to extirpation or extinction than species with large populations. Scores were assigned using population estimates derived from Breeding Bird Survey abundance data (Rosenberg and Blancher in press) or from other sources (see Appendix B).

Breeding Distribution (BD) indicates vulnerability due to the geographic extent of a species' breeding range. The underlying assumption of BD is that species with narrowly distributed breeding populations are more vulnerable than those with widely distributed populations. BD was assessed at a truly global scale, whereby the entire range of the species was considered in the evaluation.

Non-breeding Distribution (ND) indicates vulnerability due to the geographic extent of a species' non-breeding range, with the assumption that species narrowly distributed in the non-breeding season are more vulnerable than those that are widely distributed. In practice, we did not consider range size during migratory periods, or phenomena such as migratory bottlenecks. Instead, evaluation of ND was based on the range of a species when populations are relatively sedentary (i.e., "winter"). As with BD, ND was assessed at a truly global scale.

Threats to Breeding (TB) indicates vulnerability due to the effects of current and probable future extrinsic conditions that threaten the ability of populations to survive and successfully reproduce in breeding areas within North America. Evaluation of TB included anthropogenic threats to breeding habitats, as well as other factors (e.g., competition with exotic species) that interfere with reproduction.

Threats to Non-breeding (TN) indicates vulnerability due to the effects of current and probable future extrinsic conditions that threaten the ability of North American breeding populations to survive over the non-breeding season. Evaluation of TN included anthropogenic threats to habitat, as well as other factors affecting survival during winter and migration periods.

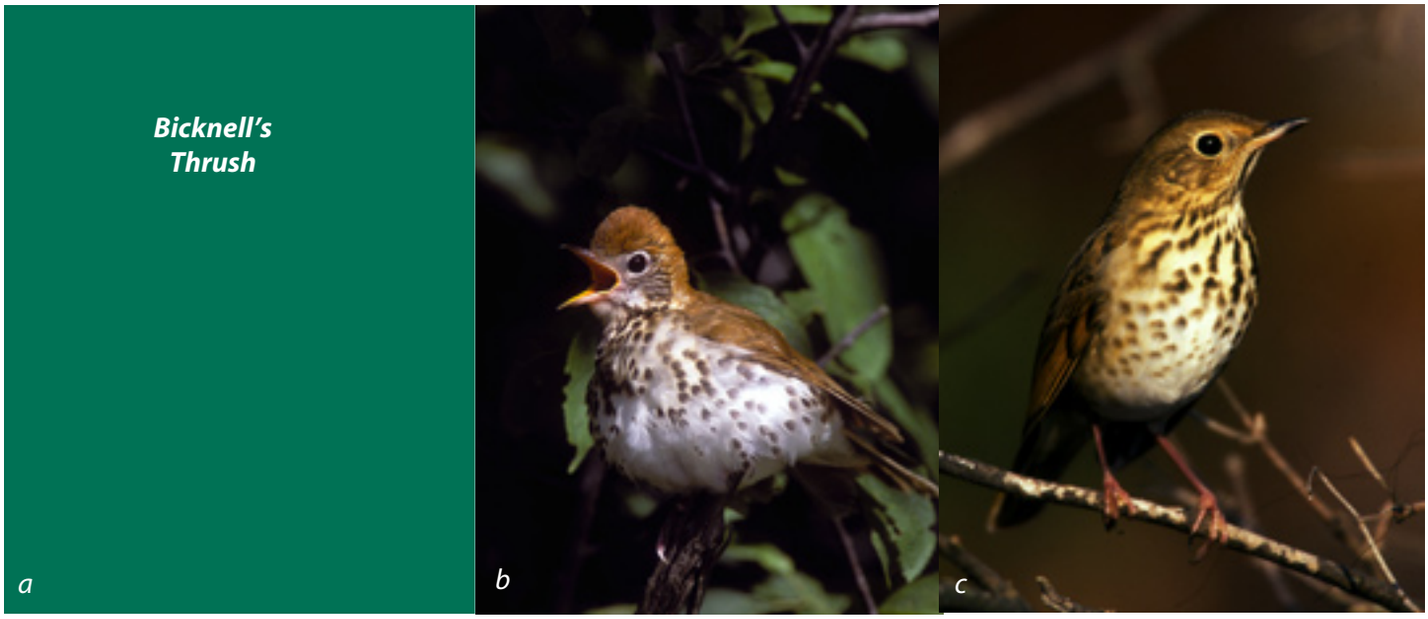
Population Trend (PT) indicates vulnerability due to the direction and magnitude of changes in population size over the past 30 years. Species declining by 50% or more over this period are considered most vulnerable, whereas species with increasing trends are least vulnerable. The Breeding Bird Survey was the primary source of data, but Christmas Bird Count or specialized data sources were used where available and appropriate. Thus, PT was based on the best available breeding or non-breeding data indicating overall trend in those populations that breed in North America.

Blancher in press). In addition to adding an important component of vulnerability, population estimates provide the foundation for setting population objectives at the continental level (see below).

We used assessment data to calculate the Combined Score, which is a single metric of relative conservation importance for each species. The Combined Score is calculated for each species as: (highest of TB or TN scores) + (highest of BD or ND scores) + PT + PS. This score can range from 4 for a widespread, relatively secure species for which we have few concerns, to 20 for a species of the very highest concern. The most vulnerable species are those with a combination of small and declining populations, limited distributions, and deteriorating habitats. The latter often already are recognized as Threatened or Endangered at federal levels. Finally, we group species with high Combined Scores into categories corresponding to the reasons for those scores.

Note that our method of calculating the Combined Score represents a departure from our previous method of simply totaling all six factor scores (Carter et al. 2000, Pashley et al. 2000). This refined approach addresses some theoretical concerns raised by Beissinger et al. (2000). Specifically, by reducing redundancy among breeding and non-breeding factors, we elevate the importance of some widespread but declining species.

The Black-capped Vireo, already recognized as federally Threatened, exhibits a combination of high vulnerability scores.



Three similar thrushes illustrate how species assessment works: The Bicknell's Thrush (a), with its tiny world distribution (BD,ND=5) and population (PS=5), as well as severely threatened winter habitat (TN=5), is among the highest scoring North American landbirds (Combined Score=18). The Wood Thrush (b) has a much larger breeding distribution (BD=2) and population (PS=2), but a small and threatened winter range (ND,TN=4) and declining trend (PT=4) warrant its inclusion on the PIF Watch List (Combined Score=14). In contrast, the very large population (PS=1) and range size (BD=1) of the Hermit Thrush (c), combined with low threats (TB,TN=2) and increasing population (PT=1), make this one of the least vulnerable of North American landbirds (Combined Score=6).

Further work is required to determine whether or not this new approach should be incorporated into scoring at sub-continental scales (e.g., in regional PIF plans).

Geographic Patterns in Assessment Scores

An overview of assessment scores shows regional differences in the average vulnerability of species. The maps below were created by combining PIF assessment data with digital range maps from NatureServe and partners (Ridgely et al. 2003). Maps depict either average scores, number of species, or number of species weighted by population size in a particular area. In each case, values were calculated based on all landbird species present in each degree block of latitude and longitude. Where maps show values south of the U.S., they include only the 448 landbirds breeding in Canada and the U.S. Future versions will revise breeding season maps to include all Mexican landbirds.

Population Size: Mean PS scores in the breeding season (Fig. 2) show that there are numerous species with small populations breeding in the desert southwest, although much of the western U.S., Florida, and parts of northern Canada and Alaska also have concentrations of species with relatively small population sizes. In contrast, most species breeding across the eastern two-thirds of the continent have relatively large global populations.

Breeding Distribution: Mean BD scores (Fig. 3) exhibit a very clear NE-SW gradient, with species in northern regions on average having larger breeding ranges (lower BD scores) and species in the southwestern U.S. having smaller ranges (higher BD scores). Note that BD scores for southwestern species are calculated on the basis of their global ranges, including the Mexican portions of range, though the score is only mapped onto the U.S. portion of the range. Landbirds in the Arctic not only tend to have large breeding distributions in North

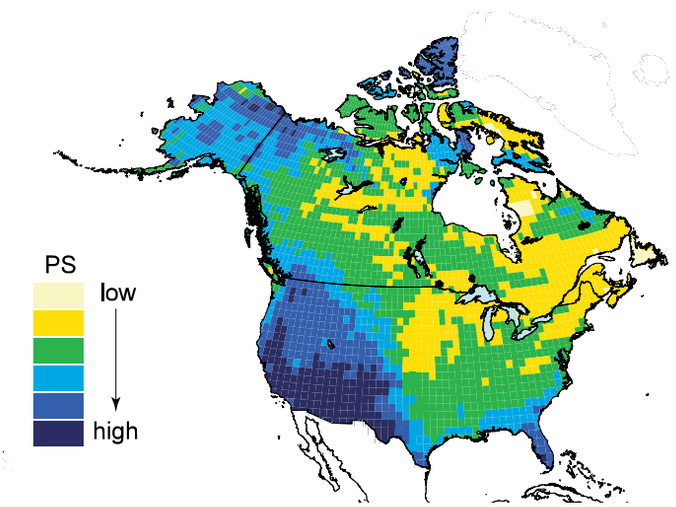


Figure 2. Average vulnerability among species occurring in each lat-long block during the breeding season, based on Population Size (PS) scores for 448 landbird species. Smallest population size =highest vulnerability; largest population size = lowest vulnerability.

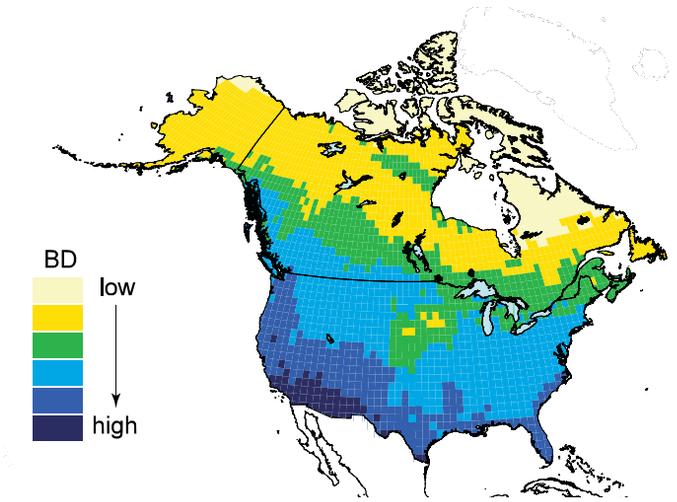


Figure 3. Average vulnerability among species occurring in each lat-long block during the breeding season, based on Breeding Distribution (BD) scores for 448 landbird species. Smallest range size = highest vulnerability; largest range size = lowest vulnerability.

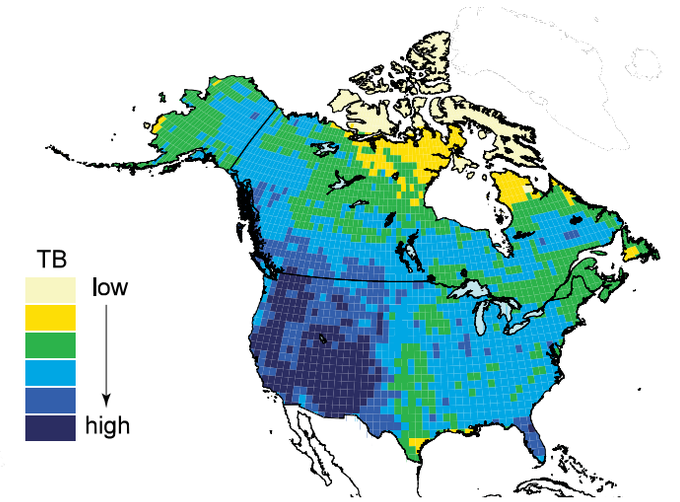


Figure 5. Average vulnerability among species occurring in each lat-long block during the breeding season, based on Threats to Breeding (TB) scores for 448 landbird species. Severe threats = highest vulnerability; no threats = lowest vulnerability.

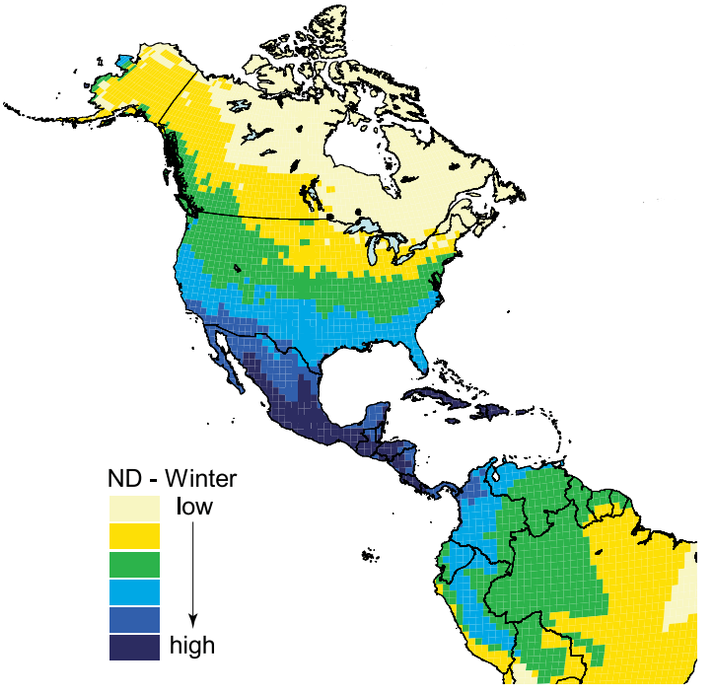


Figure 4. Average vulnerability among species occurring in each lat-long block during winter, based on Nonbreeding Distribution (ND) scores for 448 landbird species. Smallest range size = highest vulnerability; largest range size = lowest vulnerability.

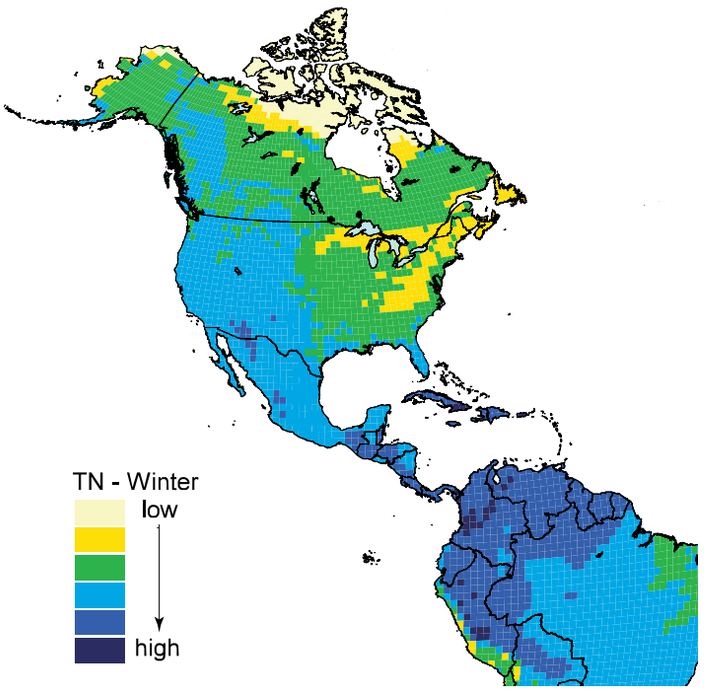
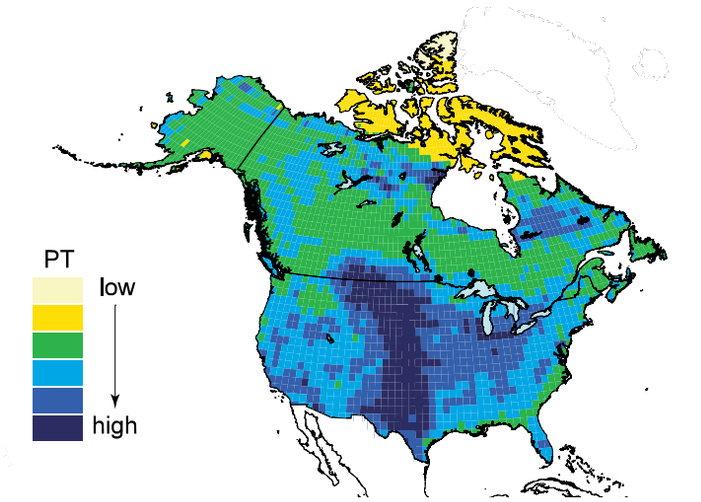


Figure 6. Average vulnerability among species occurring in each lat-long block during winter, based on Threats to Nonbreeding (TN) scores for 448 landbird species. Severe threats = highest vulnerability; No threats = lowest vulnerability.

America, but also generally have breeding range in the Eurasian Arctic. This also is true for some circumboreal species of northern forests.

Non-breeding Distribution: Mean ND scores show small distributions for landbird species wintering throughout Mexico, Central America, and the West Indies (Fig. 4), indicating that species migrating south of the U.S. concentrate in a smaller land area than those wintering in the U.S. or Canada. This pattern also illustrates why many Neotropical migrant species are thought to be more vulnerable on their wintering grounds.

Threats to Breeding: Mean TB scores (Fig. 5) also show a NE-SW gradient, with species concentrated in the Southwest and Pacific regions facing higher threats and species in the Arctic, on average, facing lower threats.



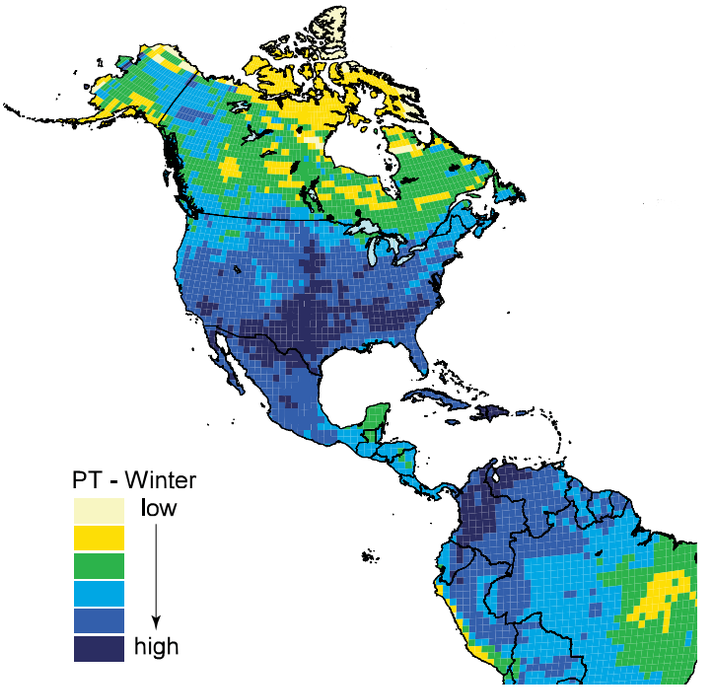
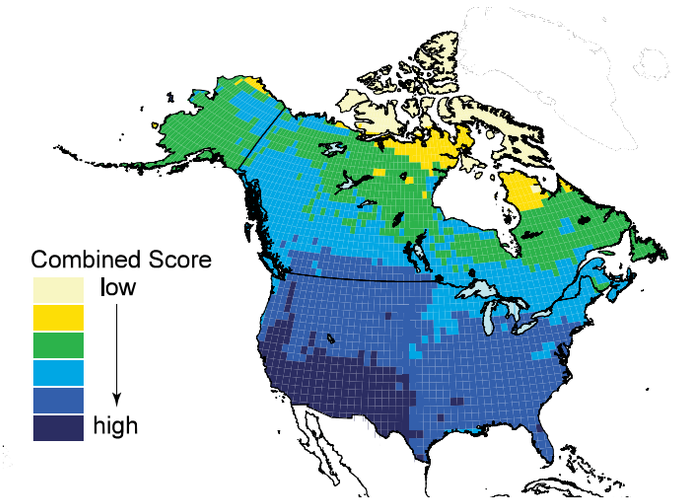


Figure 7. Average vulnerability among species occurring in each lat-long block during the breeding season (above) and in winter (below), based on Population Trend (PT) scores for 448 landbird species. Declines ≥ 50% over 30 years = highest vulnerability; increasing populations = lowest vulnerability.



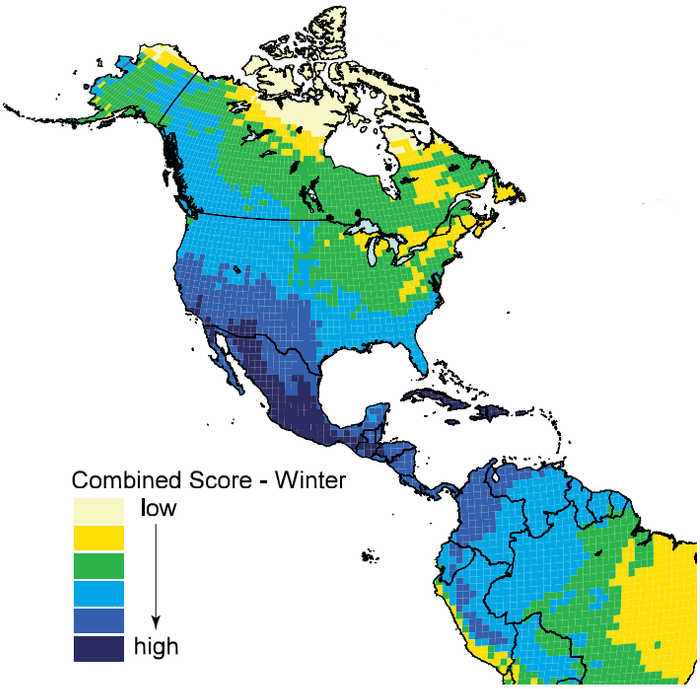


Figure 8. Average overall vulnerability among species occurring in each lat-long block during the breeding season (above) and in winter (below), based on Combined Scores for 448 landbird species. High Combined Score = highest vulnerability; low Combined Score = lowest vulnerability.

Given the larger number of species breeding in the Southwest, this pattern of elevated overall threats is even more striking.

Threats to Non-breeding: Mean TN scores are highest for Canadian and U.S. breeding species that winter in northern South America, the West Indies and Central America (Fig. 6). Average non-breeding threats also are elevated in wintering areas in the southwestern U.S. through Mexico, but are quite low for species wintering throughout most of the U.S. and Canada.

Population Trend: The pattern of mean PT scores on the breeding grounds (Fig. 7a) is strikingly unlike patterns of the other vulnerability factors. A higher proportion of species in the prairie regions have undergone significant population declines (higher average PT scores) than in most other regions. Other areas with concentrations of declining species include the southwestern U.S. and some areas around Hudson Bay. The lack of correspondence in geographic patterns between PT and other factors suggests that whether or not a species has declined significantly over the past 30 years largely is independent of its range or population size. Further, trend largely is independent of whether future threats are perceived to be high.

The pattern of mean PT scores on the wintering grounds

(Fig. 7b) indicates that a higher proportion of short-distance migrants wintering in the central and southern U.S, northern Mexico, and the Greater Antilles are exhibiting significant declines, compared with species migrating to Central America or resident in Canada and Alaska. Declining species also are concentrated in northwestern South America.

Combined Score: The mean Combined Score across all assessment factors, reflective of overall vulnerability to serious decline or extinction (Fig. 8a), mirrors the NE-SW pattern seen in many of the individual factors. In general, levels of risk are highest for landbird species breeding in the southwestern U.S., California, the Colorado Plateau and southern Great Plains, whereas vulnerability is lowest for landbirds in the Arctic region.

While the Cerulean Warbler is among the most vulnerable breeding species in Eastern forests, it may be even more highly threatened within its narrow cloud-forest winter range in northern South America.

In winter, species with higher Combined Scores clearly are concentrated in the Greater Antilles and Mexico, particularly western Mexico, illustrating the tremendous conservation importance of these areas (Fig. 8b). Overall risk is relatively high for residents and migrants wintering in the southwestern U.S and California, through Central America into northern South America, but is relatively low (on average) for species wintering farther north or east.

SPECIES OF CONTINENTAL IMPORTANCE

Selection Criteria

Partners in Flight goals include protection and restoration of species that are at risk of extinction or serious decline, as well as stewardship of the native species that are characteristic of North America's varied and unique ecosystems. These represent two rather different yet inter-related goals, and we address them both in identifying Species of Continental Importance.

Watch List Species: Conservation of species that are in trouble will allow us to retain our historic biodiversity, and attention paid to those species will benefit other less vulnerable species that use the same spaces and habitats. In many cases, statutory requirements exist to address the conservation needs of endangered and threatened species, and these often rank high on public and political agendas. Here we present the Partners in Flight Continental Watch List, comprising species that have multiple reasons for conservation concern across their entire ranges. Our intent is that Watch List designation will improve the chances that species at risk are given appropriate attention, whether that is immediate intervention, long-term planning to maintain populations, or only a close watch for change in existing conditions.

Species were selected for the Watch List according to the Combined Score, which reflects the level of concern across multiple vulnerability factors. Species were placed on the Watch List if they had a Combined Score >14, or a Combined Score = 13 with Population Trend score = 5 (the latter representing a 50% decline over 30 years).

Stewardship Species and Avifaunal Biomes: Conservation of Watch List Species alone will not address the PIF vision of maintaining healthy populations of all native birds across their ranges. To meet this goal, PIF traditionally has stressed the importance of responsibility for species that have a high proportion of their global population or range within an ecological planning area (Dunn et al. 1999, Rosenberg and Wells 1999). Here we extend that concept to the North American scale by identifying Stewardship Species.

To identify Stewardship Species that would be representative of all the major biogeographic regions in North America, we first used cluster analyses to identify groups of Bird Conservation Regions (NABCI 2000) that share similar avifaunas. We based this analysis on the percentage of the total global breeding population of each species that occurs in each BCR. We refer to the resulting clusters as 'Avifaunal Biomes' (Fig. 9). Next, we defined Stewardship Species as species that have a proportionately high percentage of their world population within a single Avifaunal Biome during either the breeding or wintering season. The cut-off for "high percentage" varied among the biomes according

to their size: 90% for large biomes, 75% for medium biomes, and 50% for small biomes. It is important to note that these Avifaunal Biomes do not represent new geographic regions for conservation implementation purposes. Rather, they constitute a tool for identifying species characteristic of different areas of the continent. We use them also in Part II of this plan to summarize conservation issues and objectives that are particular to major regions of North America.

The selection of Stewardship Species assumes that such 'biome-restricted' species have more stringent ecological requirements than species that are more evenly distributed throughout North America. Because the analysis identified species representative of each part of the continent, the group of Stewardship Species as a whole is of continental importance.

Species of Continental Importance

Collectively, we refer to 195 Watch List and Stewardship Species as Species of Continental Importance (Table 1). This term is intended to convey importance for consideration in conservation planning and implementation at the continental scale. This does not necessarily imply that every species of importance has an equally high level of concern or equal priority for action.

Watch List Species: The PIF Watch List for Landbirds (Table 1) includes 100 species (22% of the 448 species assessed), for which we have the greatest range-wide concerns, and which are most in need of conservation attention. The geographic distribution of Watch List Species during the breeding season (Fig. 10a) shows a concentration of these species in California and the arid southwest, with a moderate number distributed across the eastern and western U.S. The fewest species breed across northern Canada and Alaska, with none in the High Arctic islands. In winter, the highest concentration of Watch List species occurs in western Mexico, with high numbers of species from the southwestern U.S. through Central America (Fig. 10b). When the approximately 450 Mexican species are brought into this plan, the importance of Mexico for conservation of North American landbirds will become even more evident.

The Blackburnian Warbler is one of many "spruce-woods warblers" largely restricted the Northern Forest Avifaunal Biome. Although most are not highly threatened at present, this plan recognizes the important stewardship responsibility for maintaining the characteristic avifauna of this vast region.

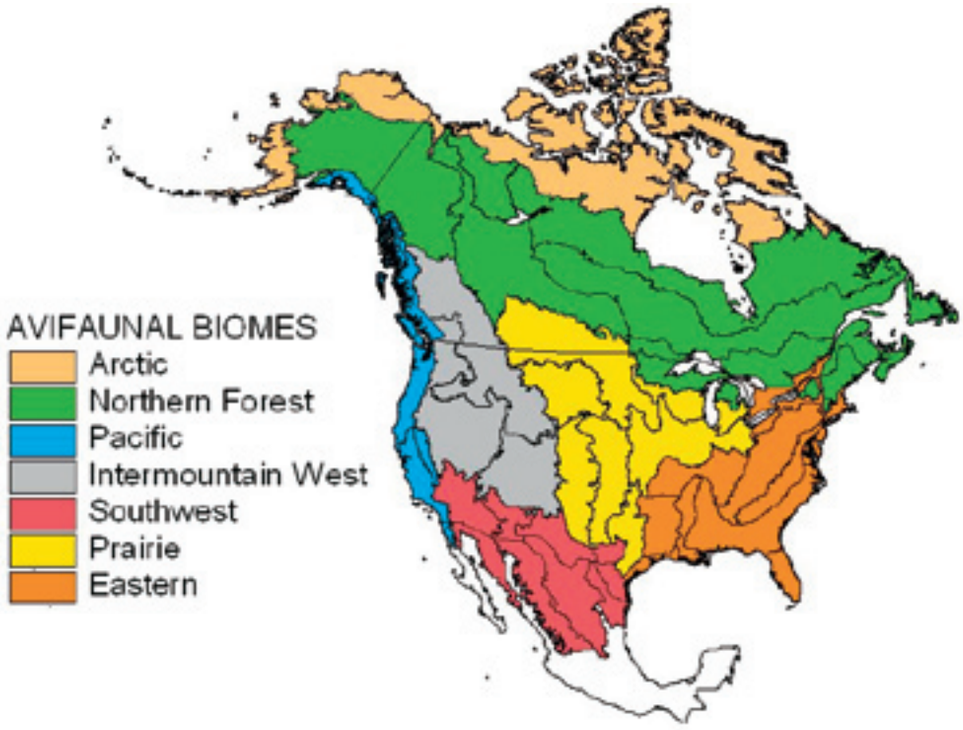


Figure 9. Avifaunal Biomes in North America, based on degree of shared landbird avifauna among Bird Conservation Regions.

Although the Watch List represents species of highest continental-level concern, not every species for which we have legitimate concerns will appear on this list. For example, there are several species that have declined

Table 1. PIF Species of Continental Importance for the US & Canada

Species[1]	Conservation Action[2]	Monitoring Need[3]	US & Canada Population[4]	Population Objective	Stewardship Biome(s)[5]
Watch List Species - Multiple causes for concern across entire range					
California Condor	IM		< 100	Recovery Plan	Pacific & Intermountain West
Gunnison Sage-Grouse	IM		2,000	Increase 100%	Intermountain West
Lesser Prairie-Chicken	IM	Mo1	< 20,000	Increase 100%	Prairie
Green Parakeet	IM	Mo1	< 5,000	Increase 50%	
Thick-billed Parrot	IM	Mo1	0 ?	Poss. Reintroduction	Southwest
Red-crowned Parrot	IM	Mo1	< 2,500	Increase 100%	
Red-cockaded Woodpecker	IM		20,000	Recovery Plan	Eastern
Ivory-billed Woodpecker	IM		0 ?	Locate	Eastern
Black-capped Vireo	IM	Mo1	4,800	Recovery Plan	Southwest
Florida Scrub-Jay	IM		10,000	Recovery Plan	Eastern
Island Scrub-Jay	IM	Mo1	8,000	Increase 10%	Pacific
Bicknell's Thrush	IM	Mo2	40,000	Increase 10%	Northern Forest
Bachman's Warbler	IM		0 ?	Locate	Eastern
Golden-winged Warbler	IM		210,000	Increase 100%	
Colima Warbler	IM	Mo1	< 250	Increase 10%	Southwest
Golden-cheeked Warbler	IM	Mo1	24,000	Recovery Plan	Southwest
Kirtland's Warbler	IM		2,100	Recovery Plans	Northern Forest
Bachman's Sparrow	IM		250,000	Increase 100%	Eastern
Henslow's Sparrow	IM		79,000	Increase 100%	Eastern
Saltmarsh Sharp-tailed Sparrow	IM	Mo2	250,000	Increase 100%	Eastern
Tricolored Blackbird	IM	Mo2	250,000	Increase 100%	Pacific
Watch List Species - Moderately abundant or widespread with declines or high threats					
Swallow-tailed Kite	IM	Mo2	3,700	Increase 100%	
Swainson's Hawk	MA		460,000	Increase 10%	
Greater Sage-Grouse	IM	Mo2	150,000	Increase 100%	Intermountain West
Blue Grouse	MA	Mo2	2,600,000	Increase 100%	Pacific
Greater Prairie-Chicken	IM	Mo2	690,000	Increase 100%	Prairie
Scaled Quail	MA		610,000	Increase 50%	Southwest
Band-tailed Pigeon	MA		970,000	Increase 100%	
White-crowned Pigeon	MA	Mo1	15,000	Increase 100%	
Mangrove Cuckoo	MA	Mo1	6,100	Increase 50%	
Short-eared Owl	MA	Mo2,3	710,000	Increase 100%	
White-throated Swift	MA		280,000	Increase 100%	
Rufous Hummingbird	MA	Mo2	6,500,000	Increase 100%	Pacific
Elegant Trogon	MA	Mo1	340	Increase 50%	
Red-headed Woodpecker	MA		2,500,000	Increase 100%	
Olive-sided Flycatcher	MA	Mo3	1,200,000	Increase 100%	
Willow Flycatcher	MA		3,300,000	Increase 50%	
Bell's Vireo	IM		1,100,000	Increase 100%	
Pinyon Jay	MA		4,100,000	Increase 100%	Intermountain West
Oak Titmouse	MA		900,000	Increase 50%	Pacific
Brown-headed Nuthatch	MA		1,500,000	Increase 50%	Eastern
Wood Thrush	MA		14,000,000	Increase 50%	Eastern
Sprague's Pipit	MA		870,000	Increase 100%	Prairie
Grace's Warbler	MA		1,000,000	Increase 50%	
Prairie Warbler	MA		1,400,000	Increase 50%	Eastern
Bay-breasted Warbler	MA	Mo3	3,100,000	Increase 50%	Northern Forest
Cerulean Warbler	MA		560,000	Increase 100%	Eastern
Prothonotary Warbler	MA		1,800,000	Increase 50%	Eastern
Worm-eating Warbler	MA		750,000	Increase 10%	Eastern
Kentucky Warbler	MA		1,100,000	Increase 50%	Eastern

Table 1. PIF Species of Continental Importance for the US & Canada - continued

Species[1]	Conservation Action[2]	Monitoring Need[3]	US & Canada Population[4]	Population Objective	Stewardship Biome(s)[5]
Canada Warbler	MA	Mo3	1,400,000	Increase 50%	Northern Forest
Brewer's Sparrow	MA		16,000,000	Increase 100%	Int.West & Southwest
Baird's Sparrow	IM		1,200,000	Increase 100%	Prairie & Southwest
Harris's Sparrow	MA	Mo3	3,700,000	Increase 100%	Arctic & Prairie
Varied Bunting	MA	Mo1	31,000	Increase 50%	
Painted Bunting	MA		3,600,000	Increase 100%	
Dickcissel	MA		22,000,000	Increase 50%	Prairie
Rusty Blackbird	MA	Mo3	2,000,000	Increase 100%	
Watch List Species - Restricted distributions or low population size					
Mountain Quail	PR	Mo2	160,000	Increase 10%	Pacific
Montezuma Quail	MA	Mo1	5,800	Increase 50%	
Flammulated Owl	PR	Mo1	29,000	Increase 10%	
Elf Owl	PR	Mo1	47,000	Increase 10%	
Spotted Owl	IM		11,000	Recovery Plans	
Antillean Nighthawk	PR	Mo1	< 500	Increase 10%	
Black Swift	MA	Mo2	84,000	Increase 50%	
Costa's Hummingbird	PR	Mo2	1,800,000	Increase 10%	
Calliope Hummingbird	PR	Mo2	1,000,000	Increase 10%	Intermountain West
Allen's Hummingbird	PR	Mo2	530,000	Increase 10%	Pacific
Lewis's Woodpecker	MA		130,000	Increase 10%	Intermountain West
Nuttall's Woodpecker	MA		290,000	Increase 10%	Pacific
Arizona Woodpecker	PR	Mo1	4,300	Increase 10%	
White-headed Woodpecker	PR		72,000	Maintain	Pacific
Thick-billed Kingbird	PR	Mo1	2,300	Increase 10%	
Gray Vireo	PR		360,000	Maintain	
Yellow-billed Magpie	PR		180,000	Increase 10%	Pacific
California Gnatcatcher	PR	Mo1	6,000	Recovery Plan	
Black-capped Gnatcatcher	PR	Mo1	< 100	Increase 10%	
Wrentit	MA		1,300,000	Increase 50%	Pacific
Bendire's Thrasher	IM	Mo2	130,000	Increase 100%	Southwest
California Thrasher	MA		190,000	Increase 50%	Pacific
Le Conte's Thrasher	PR	Mo2	150,000	Increase 10%	Southwest
Blue-winged Warbler	MA		390,000	Increase 50%	Eastern
Virginia's Warbler	PR		410,000	Increase 10%	
Lucy's Warbler	MA		920,000	Increase 10%	Southwest
Hermit Warbler	MA		2,400,000	Increase 10%	Pacific
Swainson's Warbler	PR		84,000	Maintain	Eastern
Red-faced Warbler	PR	Mo1	110,000	Increase 10%	Southwest
Abert's Towhee	PR		210,000	Increase 10%	Southwest
Rufous-winged Sparrow	PR	Mo1	8,900	Increase 10%	Southwest
Five-striped Sparrow	MA	Mo1	< 100	Increase 50%	
Black-chinned Sparrow	MA		310,000	Increase 50%	Southwest
Nelson's Sharp-tailed Sparrow	PR	Mo2,3	510,000	Maintain	Eastern
Seaside Sparrow	PR	Mo2	110,000	Increase 10%	Eastern
McCown's Longspur	PR		1,100,000	Increase 10%	Prairie
Smith's Longspur	PR	Mo3	75,000	Increase 10%	Prairie
McKay's Bunting	PR	Mo1	6,000	Increase 10%	Arctic
Audubon's Oriole	MA	Mo1	8,600	Increase 10%	
Black Rosy-Finch	PR	Mo2	< 50,000	Increase 10%	Intermountain West
Brown-capped Rosy-Finch	PR	Mo2	45,000	Increase 10%	Intermountain West
Lawrence's Goldfinch	PR	Mo2	130,000	Increase 10%	Pacific

Table 1. PIF Species of Continental Importance for the US & Canada - continued

Species[1]	Conservation Action[2]	Monitoring Need[3]	US & Canada Population[4]	Population Objective	Stewardship Biome(s)[5]
Additional Stewardship Species - High percent of Global Population in single biome (breeding or winter)					
Mississippi Kite	PR	Mo2	190,000	Increase 10%	Prairie
Bald Eagle	PR	Mo2,3	330,000	Maintain	Pacific
Red-shouldered Hawk	PR	Mo2	820,000	Maintain	Eastern
Spruce Grouse	PR	Mo3	1,200,000	Maintain	Northern Forest
Sharp-tailed Grouse	PR	Mo2	1,200,000	Increase 10%	Prairie
Gambel's Quail	PR		1,100,000	Increase 10%	Southwest
Chuck-will's-widow	MA	Mo2	15,000,000	Increase 50%	Eastern
Lucifer Hummingbird	PR	Mo1	< 150	Maintain	Southwest
Red-bellied Woodpecker	PR		10,000,000	Maintain	Eastern
Williamson's Sapsucker	PR		310,000	Increase 10%	Intermountain West
Yellow-bellied Sapsucker	PR	Mo3	9,200,000	Increase 10%	Northern Forest
Red-naped Sapsucker	PR		2,200,000	Increase 10%	Intermountain West
Red-breasted Sapsucker	PR	Mo3	2,500,000	Increase 10%	Pacific
Black-backed Woodpecker	PR	Mo3	1,300,000	Increase 10%	Northern Forest
Yellow-bellied Flycatcher	PR	Mo3	6,200,000	Maintain	Northern Forest
Acadian Flycatcher	PR		4,700,000	Maintain	Eastern
Alder Flycatcher	PR	Mo3	49,000,000	Maintain	Northern Forest
Gray Flycatcher	PR		1,200,000	Maintain	Intermountain West
Dusky Flycatcher	PR		3,500,000	Increase 50%	Intermountain West
Pacific-slope Flycatcher	PR		7,900,000	Increase 10%	Pacific
Northern Shrike	PR	Mo3	210,000	Maintain	Northern Forest
White-eyed Vireo	PR		16,000,000	Maintain	Eastern
Yellow-throated Vireo	PR		1,400,000	Maintain	Eastern
Blue-headed Vireo	PR		6,900,000	Maintain	Northern Forest
Philadelphia Vireo	PR	Mo3	4,300,000	Maintain	Northern Forest
Gray Jay	PR	Mo3	16,000,000	Maintain	Northern Forest
Steller's Jay	PR		3,700,000	Maintain	Pacific
Western Scrub-Jay	PR		2,700,000	Maintain	Pacific
Clark's Nutcracker	PR		1,000,000	Maintain	Intermountain West
Cave Swallow	PR	Mo2	2,200,000	Maintain	Southwest
Chestnut-backed Chickadee	PR		6,900,000	Increase 10%	Pacific
Boreal Chickadee	MA	Mo3	7,800,000	Increase 100%	Northern Forest
Black-crested Titmouse	PR	Mo1	760,000	Maintain	Southwest
Verdin	MA		4,500,000	Increase 100%	Southwest
Cactus Wren	PR		4,100,000	Increase 50%	Southwest
Carolina Wren	PR		15,000,000	Maintain	Eastern
Black-tailed Gnatcatcher	PR		1,800,000	Increase 10%	Southwest
Mountain Bluebird	PR		5,200,000	Maintain	Intermountain West
Varied Thrush	PR	Mo3	26,000,000	Maintain	Pacific
Sage Thrasher	PR		7,900,000	Maintain	Intermountain West
Brown Thrasher	MA		7,300,000	Increase 50%	Eastern
Curve-billed Thrasher	PR		1,200,000	Increase 50%	Southwest
Crissal Thrasher	PR	Mo2	130,000	Maintain	Southwest
American Pipit	PR	Mo2	20,000,000	Maintain	Arctic
Phainopepla	PR		900,000	Maintain	Southwest
Tennessee Warbler	PR	Mo3	62,000,000	Increase 10%	Northern Forest
Nashville Warbler	PR		34,000,000	Maintain	Northern Forest
Chestnut-sided Warbler	MA		9,400,000	Increase 50%	Northern Forest
Magnolia Warbler	PR	Mo3	32,000,000	Maintain	Northern Forest
Cape May Warbler	PR	Mo3	3,200,000	Maintain	Northern Forest
Black-throated Gray Warbler	PR		2,900,000	Increase 10%	Pacific
Black-throated Green Warbler	PR	Mo3	9,600,000	Increase 10%	Northern Forest
Blackburnian Warbler	PR		5,900,000	Maintain	Northern Forest

Table 1. PIF Species of Continental Importance for the US & Canada - continued

Species[1]	Conservation Action[2]	Monitoring Need[3]	US & Canada Population[4]	Population Objective	Stewardship Biome(s)[5]
Yellow-throated Warbler	PR		1,600,000	Maintain	Eastern
Pine Warbler	PR		11,000,000	Maintain	Eastern
Palm Warbler	PR	Mo3	23,000,000	Maintain	Northern Forest
Louisiana Waterthrush	PR		260,000	Maintain	Eastern
Connecticut Warbler	MA	Mo3	1,200,000	Increase 50%	Northern Forest
Mourning Warbler	PR	Mo3	7,000,000	Increase 50%	Northern Forest
Hooded Warbler	PR		4,000,000	Increase 10%	Eastern
Green-tailed Towhee	PR		4,100,000	Increase 10%	Int.West & Southwest
Eastern Towhee	MA		11,000,000	Increase 50%	Eastern
Canyon Towhee	PR		1,600,000	Maintain	Southwest
California Towhee	PR		2,400,000	Increase 10%	Pacific
Cassin's Sparrow	MA		10,000,000	Increase 50%	Southwest
American Tree Sparrow	PR	Mo3	26,000,000	Increase 50%	Prairie
Black-throated Sparrow	MA		14,000,000	Increase 100%	Southwest
Sage Sparrow	PR		3,900,000	Maintain	Intermountain West
Lark Bunting	MA		27,000,000	Increase 50%	Prairie
Grasshopper Sparrow	MA		14,000,000	Increase 100%	Prairie
Fox Sparrow	PR		16,000,000	Maintain	Pacific
Lincoln's Sparrow	PR	Mo3	39,000,000	Maintain	Northern Forest
Swamp Sparrow	PR	Mo3	9,000,000	Maintain	Northern Forest
White-throated Sparrow	PR	Mo3	140,000,000	Increase 50%	N.Forest & Eastern
Golden-crowned Sparrow	PR	Mo3	5,200,000	Maintain	Arctic & Pacific
Chestnut-collared Longspur	MA		5,600,000	Increase 50%	Prairie
Pyrrhuloxia	MA		1,900,000	Increase 50%	Southwest
Indigo Bunting	PR		28,000,000	Increase 50%	Eastern
Yellow-headed Blackbird	PR		23,000,000	Maintain	Southwest
Scott's Oriole	PR		820,000	Maintain	Southwest
Gray-crowned Rosy-Finch	PR	Mo1	< 500,000	Maintain	Arctic
Cassin's Finch	MA		1,900,000	Increase 50%	Intermountain West
Additional Stewardship Species - High percent of Western Hemisphere Population in single biome (breeding or winter)					
Rough-legged Hawk	PR	Mo3	260,000	Maintain	Arctic
Gyrfalcon	PR	Mo3	53,000	Maintain	Arctic
Peregrine Falcon	PR	Mo2,3	340,000	Maintain	Arctic
Willow Ptarmigan	PR	Mo1	11,000,000	Increase 10%	Arctic
Rock Ptarmigan	PR	Mo1	4,100,000	Increase 10%	Arctic
Snowy Owl	PR	Mo3	140,000	Maintain	Arctic
Winter Wren	PR	Mo3	18,000,000	Maintain	Pacific
Bohemian Waxwing	PR	Mo3	1,400,000	Maintain	Northern Forest
Lapland Longspur	PR	Mo3	74,000,000	Increase 10%	Arctic & Prairie
Snow Bunting	PR	Mo3	19,000,000	Maintain	Arctic
Pine Grosbeak	PR	Mo3	2,200,000	Increase 10%	Northern Forest
White-winged Crossbill	PR	Mo3	21,000,000	Maintain	Northern Forest
Hoary Redpoll	PR	Mo3	13,000,000	Increase 10%	Arctic

[1] Species are sorted by reason for continental importance, then taxonomically
[2] Recommended Conservation Action: IM = Immediate Action, MA = Management, PR = Long-term Planning & Responsibility
[3] Monitoring Need (see text for more information): Mo1 = no trend data, Mo2 = BBS inadequate, Mo3 = inadequate northern coverage
[4] United States & Canada Population: estimates are rounded to two greatest digits, not meant to imply level of precision
[5] Stewardship Biome(s): indicates biome of high Stewardship responsibility, including Watch List species meeting Stewardship criteria; where more than one biome is listed, first is for breeding season, second is for winter

by more than half over the past 30 years, but which do not qualify for the Watch List because they are still relatively abundant and widespread, and do not face high threats across their entire range (e. g. Loggerhead Shrike). Many other species that have undergone severe declines have done so only in a portion of the range (e. g. Burrowing Owl, Bewick's Wren). Such species often will be included on lists of regionally important species, which may indicate incipient problems at broader scales. In addition, future versions of the PIF continental Plan will address the conservation concerns of the many subspecies and distinct populations that warrant our attention.

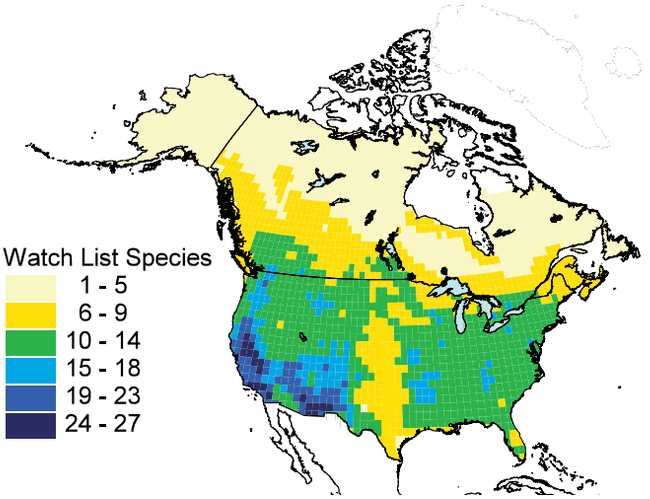


Figure 10a. Number of PIF Watch List species occurring in each lat-long block during the breeding season.

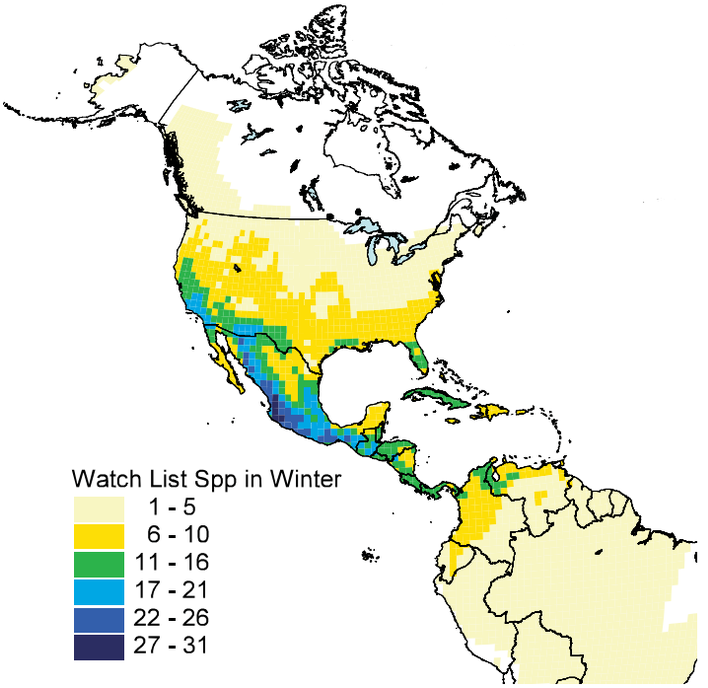
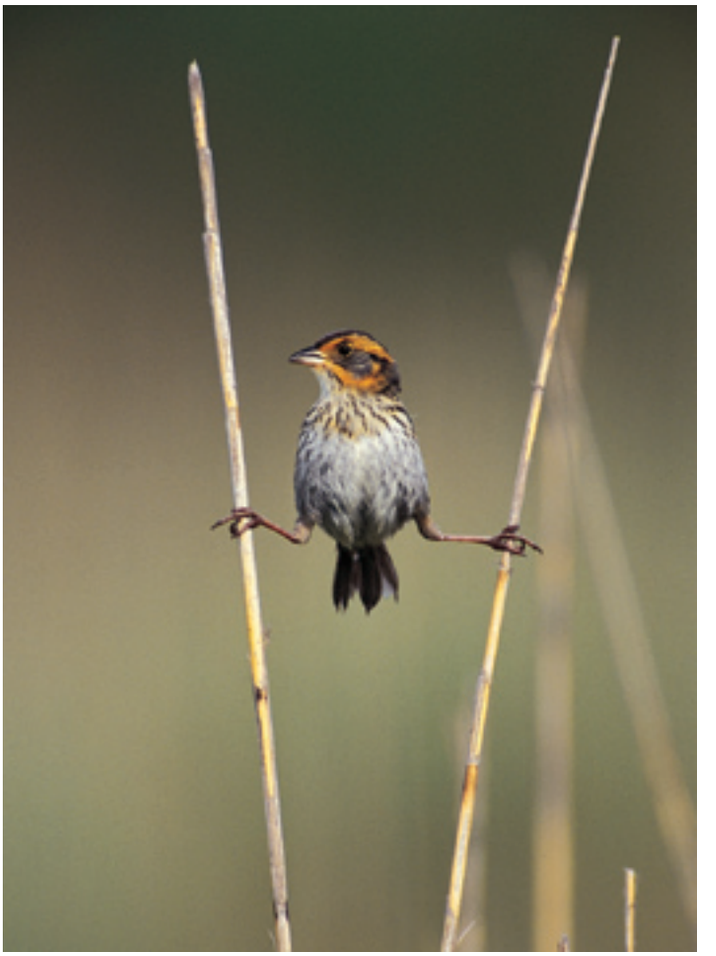


Figure 10b. Number of PIF Watch List species occurring in each lat-long block during winter (based only on species that breed within the U.S. and Canada).



The Saltmarsh Sharp-tailed Sparrow exhibits multiple causes for concern across its narrow range; its coastal marsh habitat is shared with numerous water bird and waterfowl species.

Three groupings of Watch List species may be distinguished (Table 1), based on the reasons they are considered to be continentally important:

Species with multiple causes for concern across their entire range: Twenty-one species are on the Watch List because they have a combination of small population, narrow distribution, high threats, and declining population trends. These species are of highest continental concern and priority for conservation action at national and international scales. A majority of these are legally listed as Endangered or Threatened in either the U.S. or Canada, and as such have recovery plans in place. Notable in this group, however, are several species without the same legal status, including Bicknell's Thrush and Saltmarsh Sharp-tailed Sparrow. Henslow's Sparrow has status in Canada, but not in the U.S. Ivory-billed Woodpecker and Bachman's Warbler already may be extinct, and California Condor exists in the wild only as a reintroduced population.

Note that Red-crowned and Thick-billed parrots are

included here on the basis of small present-day or historic breeding populations within the U.S. Both are highly threatened within their Mexican breeding range and require collaborative conservation measures between the U.S. and Mexico. Both Gunnison Sage-Grouse and Lesser Prairie-Chicken are resident game birds with notably low populations.

Ten of the Watch List Species in this group largely are resident year-round within their range, whereas 8 are classified as Neotropical migrants (species breeding north of Mexico and for the most part migrating south of the U.S. for the winter). Three are temperate migrants (wintering primarily in the U.S.). As a group, these species are found all across North America except for the Arctic. Further, 86% also are Stewardship Species, which means they are relatively concentrated within a single Avifaunal Biome. It is therefore the responsibility of regional planners to meet the global conservation needs of those species.

Moderately abundant or widespread species with declines or high threats: Thirty-seven species are on the Watch List primarily because they are declining and/or threatened throughout their ranges, though still fairly widespread or with moderately large populations. Many of these species still number in the millions (e.g., Dickcissel, Wood Thrush), but are threatened with serious reductions in population or geographic range in the future. Several other species (e.g., Swallow-tailed Kite, Mangrove Cuckoo, Elegant Trogon) are fairly widespread outside the U.S. and Canada, but are

With an extremely small and shrinking global range and population, the recently recognized Gunnison Sage-Grouse is among the most vulnerable North American landbirds.

Although still fairly widespread and with a moderately large population, the Red-headed Woodpecker warrants Watch List status because of steep, yet unexplained, range-wide declines.

threatened in the U.S. portion of their range. Five species are afforded U.S. federal legal status in part of their range or for a particular recognized subspecies. This group also includes four resident game bird species with seriously declining populations.

About half the species in this group are classified as Neotropical migrants. Ten species are temperate migrants, and 9 are essentially resident. As a group, these species breed in all parts of the U.S. and Canada. At the same time, 57% are concentrated enough within a single Avifaunal Biome to be classified as Stewardship Species.

Species with restricted distributions or low population size: Another 42 species are on the Watch List because they are restricted to a small range or have small global populations (often both). Many of these species are not known to be declining or seriously threatened at present, but many others are, (e.g., Spotted Owl, Montezuma Quail, Bendire's Thrasher, Rufous-winged Sparrow, Audubon's Oriole). PIF recognizes that these species with small populations and restricted range are particularly vulnerable to relatively minor changes from current conditions, whether or not their populations are currently in decline.

Sixty-four percent of species in this group also are Stewardship Species, indicating relatively high concentration in a single Avifaunal Biome. All but five are endemic to parts of western North America, with a disproportionate number restricted to the southwestern U.S. and northern Mexico. Fourteen species have their world distributions concentrated along the Pacific Coast. The Yellow-billed Magpie, for example, is restricted

Not all Watch List species are of high concern; the Yellow-billed Magpie is not threatened, but its small population is entirely restricted to a small area of California, making it highly sensitive to future environmental changes.

entirely to California. The few eastern species include Swainson's and Blue-winged Warbler, Seaside Sparrow, and Nelson's Sharp-tailed Sparrow in winter. Fifteen species in this category are classified as Neotropical migrants. However, most are relatively short-distance migrants wintering primarily within Mexico.

Stewardship Species: Of the 100 Watch List Species, 66 also are Stewardship Species, defined as being characteristic of a single Avifaunal Biome. These species merit special attention for conservation action within their core ranges. An additional 95 continentally important Stewardship Species do not qualify for the Watch List (Table 1). The majority (59%) of additional Stewardship Species has stable or unknown population trends, though four species (Boreal Chickadee, Verdin, Black-throated Sparrow, Grasshopper Sparrow) have declined by 50% or more in the past 30 years.

In total, 75 Stewardship Species (including those on the Watch List) are biome-restricted in their winter range, illustrating the importance of conservation action in non-breeding areas. A subset of 13 species have extensive populations in the Old World, but a high proportion of their Western Hemispheric population is restricted to a North American Avifaunal Biome (usually Arctic or Northern Forest). These are included (Table 1) as additional Stewardship Species because they represent a significant and characteristic component of the North American biomes in which they occur.

Stewardship Species are broadly distributed across Canada and the U.S. during the breeding seasons (Fig. 11a), in a pattern that mirrors the richness of all landbird species (Fig. 1a). Winter Stewardship Species are more heavily concentrated in the southern U.S. (Fig. 11b), particularly the Southwest and into Mexico, and along the U.S. West Coast.

CONTINENTAL LANDBIRD OBJECTIVES AND NEEDS

Once species have been identified as requiring conservation attention at the continental level, the next step is to set specific, measurable population objectives. In this plan, PIF has established population objectives for the 195 Species of Continental Importance (Table 1). Next, we assigned each of these species to an "action category," according to the level and immediacy of conservation action required to meet the population objectives. Conservation actions also include Long-term Planning and increased monitoring and research to fill critical information gaps. In this section, we also assign species to groups representing monitoring needs. Finally, we outline the major, over-arching conservation issues and threats facing landbirds in North America.

Population Objectives

The establishment of population objectives is one of the more difficult tasks in the practice of conservation biology. Setting objectives as minimum viable population size – that number of individuals necessary to keep a species from the brink of extinction – is a desperate standard. Except under special circumstances PIF does not operate in that realm. We believe a more desirable objective is to sustain healthy, genetically diverse populations of birds, well distributed across their historical ranges. Because this is a large continent, this often means maintaining millions, or even tens of millions, of individuals of a given species. These numbers may sound high, but they represent what is required if we are to have healthy, intact ecosystems and high biotic integrity across the continent. "Keeping Common Birds Common" is more than a catch phrase for PIF — it's a true goal.

Setting population objectives requires knowledge of population size and trends, as well as agreement on historic baselines to which present-day populations can

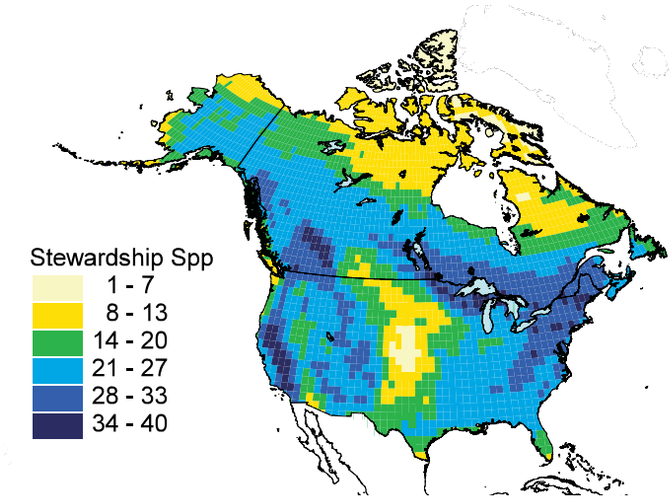


Figure 11a. Number of PIF Stewardship species occurring in each lat-long block during the breeding season.

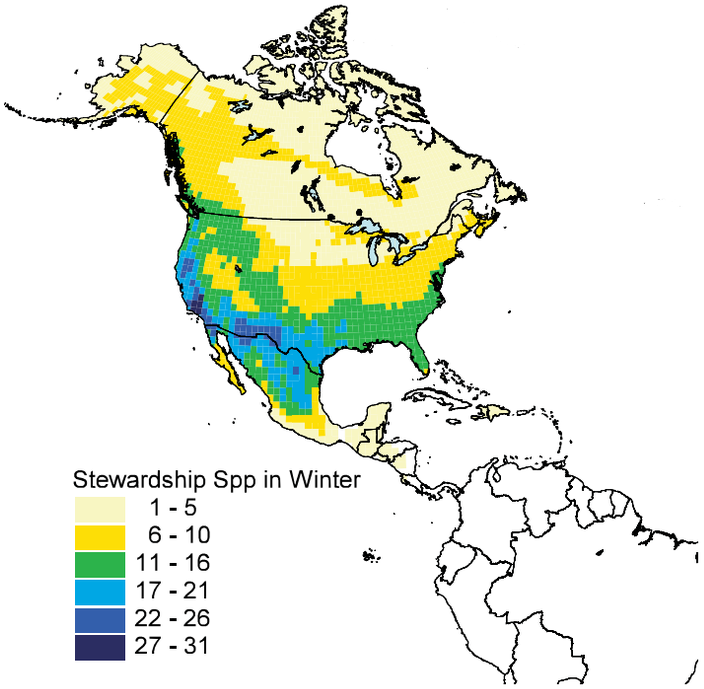


Figure 11b. Number of PIF Stewardship species occurring in each lat-long block in winter (based only on species that breed within the U.S. and Canada).

be compared. The target used in this Plan is to maintain current populations, or to return declining species' numbers at least to their level in the late 1960s. This date was selected because that target is achievable and realistic for most of the 448 species of landbirds treated here. Acceptance of this baseline recognizes that the extensive losses and modifications of habitat since the European settlement of North America are historical realities that are not likely to be reversed to a significant extent. It also recognizes that prior to 1966 and the start of the Breeding Bird Survey, there were no consistent data for most landbird species upon which to base

The very small world population and distribution of the Florida Scrub-Jay contribute to its extreme vulnerability and Threatened status.

measurable population objectives.

Population objectives were determined for each species based on degree of population change since 1966, according to the trend data used in the species assessment process. However, we recognize that trend estimates are not exact. Rather than proposing population objectives that represent estimates of the actual number of birds in 1966 (which would generate a different target for each species), we assigned each Species of Continental Importance to one of four population objective categories (Table 1), as described below. For species that are the subject of legally mandated Recovery Plans, we defer to the objectives of those plans.

Double Population: For all species that have undergone severe declines of 50% or more over 30 years (i.e., those with Population Trend scores of 5), the objective is to double the current population over the next 30 years. Reversing declines and doubling present-day populations is warranted for nearly a third of the 100 Watch List Species, as well as for 4 additional Stewardship Species (Table 1).

Increase Population by 50%: For species that have undergone moderate declines (15-50% over 30 years, as indicated by Population Trend scores of 4), the objective is to increase the population by 50% over the next 30 years. This objective is warranted for 23 Watch List Species and 17 additional Stewardship Species.

Increase Population by 10%: Species with unknown or imprecise past trend (Population Trend scores of 3) may be seriously declining without our knowledge. Our conservative objective for these species, therefore, is to increase current populations by 10% in the next 30

Among a large suite of declining species in the mid-continental prairies, the Greater Prairie-Chicken will require active management to increase its population over the next 30 years.

years while simultaneously improving our knowledge of population status. This is the objective for 33 Watch List Species and 22 additional Stewardship Species.

Maintain Population: For species with stable or increasing populations, PIF's objective is to maintain stable populations and maintain the course of increasing populations. This objective applies to only 4 Watch List Species, but to more than half of the additional Stewardship Species.

By combining the suggested population objectives with our estimates of population size (Table 1), a rough numerical population target for each species at the continental level can be determined. For example, this Plan calls for a doubling of present-day Brewer's Sparrow populations over the next 30 years to restore a range-wide population of roughly 32 million breeding individuals.

Presenting numerical population targets for smaller planning units and jurisdictions is beyond the scope of this continental plan. On the PIF web site (www.partnersinflight.org), we will provide estimates of that portion of the continental population objective for each species that should be provided by a given state, Bird Conservation Region, or other geographic unit. Regardless of whether objectives are "stepped down" from continental targets or established by "bottom-up" methods within a planning unit, It is important for regions to work together so that their efforts collectively will meet continental objectives for the most important species.

Recommended Conservation Action

Meeting PIF's population objectives will require a large and serious level of coordinated, on-the-ground conservation action. Of the 195 landbird Species of Continental Importance, however, not all require the same level or immediacy of conservation attention. We used combinations of assessment scores to place each Species of Continental Importance into one of three groups, which indicate the relative level of conservation action required. Specific actions for each species or groups of species will vary across the continent, and we do not attempt to list them in this Plan. Specific needs and strategies for local action are detailed in the many finer-scale PIF plans (Appendix C).

Immediate Action (IM): Immediate action is needed for 28 Watch List Species, either to reverse or stabilize significant, long-term population declines in species with small populations, or to protect species with the smallest populations for which trends are poorly known (Table 1). Populations of these species are at risk of extirpation over broad portions of their range, and immediate and focused attention to their needs represents the highest conservation priority for landbirds. Nine species in this group already are the subject of intensive recovery efforts or are feared extinct. Other species do not have such federal legal status at present, but are of serious concern. These include several resident game bird species, most notably Lesser Prairie-Chicken and Gunnison Sage-Grouse, as well as songbirds such as Henslow's Sparrow, Bendire's Thrasher, and Tricolored Blackbird. A few other species in this category, such as Bicknell's Thrush, Colima Warbler, and Island Scrub-Jay, require the highest level of vigilance to sustain their tiny world populations.

Species in need of immediate action occur throughout the U.S. and southern Canada, but no single location supports more than 4-5 species (Fig. 12). Immediate actions in Florida and parts of the southwestern U.S. will benefit the greatest number of species, while so far, vast areas of northern Canada and Alaska have no landbirds in such dire need.

Management (MA): Management or other on-the-ground conservation actions are needed to reverse significant, long-term population declines or sustain vulnerable populations for 44 Watch List Species (Table 1). Although many of these species are still relatively widespread, actions are necessary to prevent these species from becoming in danger of regional or range-wide extirpation in the future. Of the additional Stewardship

Species (Table 1), 14 also require Management action in order to meet population objectives.

Every part of North America south of the Arctic supports multiple Species of Continental Importance in need of Management (Fig. 13). High concentrations of species are found in such diverse regions as the Appalachian Mountains, southern Ontario, U.S. Midwest, Northern Rockies, California, and along the Mexican border in Arizona and New Mexico. Although total numbers of species in the Great Plains are lower, more than 50% of the Species of Continental Importance in that region are in need of Management action due to population decline (Fig. 7a).

Long-Term Planning and Responsibility (PR): Long-term Planning is needed to maintain sustainable populations of 28 Watch List Species, and of the majority of additional Stewardship Species (Table 1). This action level applies to species with relatively stable or increasing populations regardless of population size, or relatively abundant species for which population trends are poorly known. A majority of species in this category are restricted to single Avifaunal Biome, emphasizing the stewardship responsibility of jurisdictions in those areas. Although Long-term Planning may be considered

Like several other grassland specialists, the Baird's Sparrow warrants Immediate Action to reverse long-term population declines and reduce high threats to its habitat.

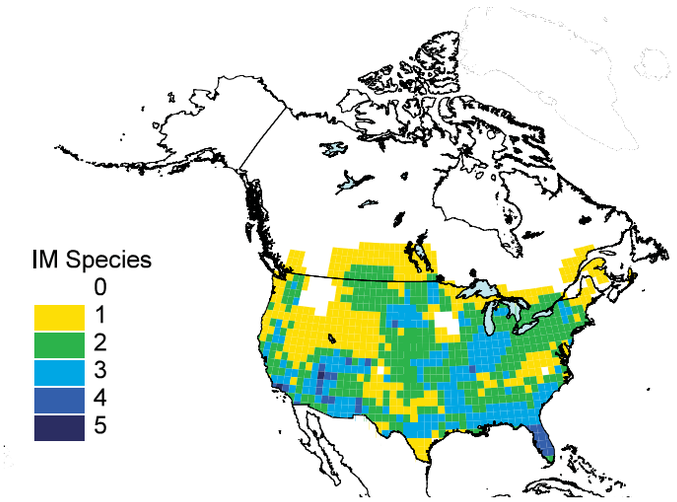


Figure 12. Number of PIF Species of Continental Importance breeding in each lat-long block that require Immediate Action. These species typically exhibit a combination of very small population size or range, high threats, and declining population trend.

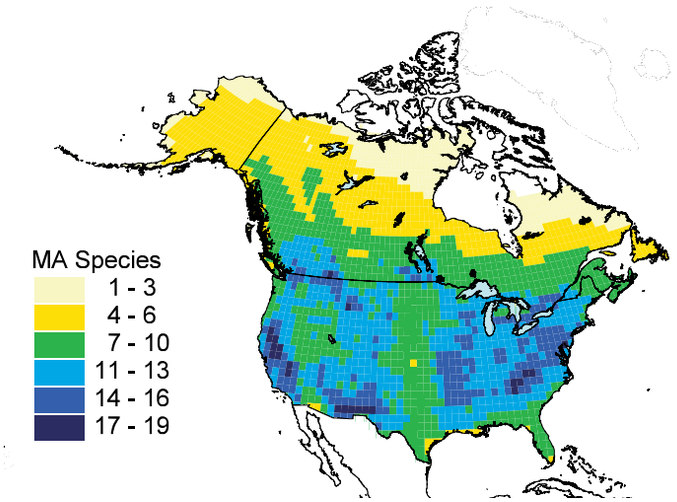


Figure 13. Number of PIF Species of Continental Importance breeding in each lat-long block that require Management Action to reverse significant long-term population declines or eliminate high threats.

of lower conservation priority, such action is critical to achieving PIF's continental goals. Action taken to protect vulnerable species when they are still relatively healthy will be far less expensive—and more successful—than waiting until they are endangered.

The number of Species of Continental Importance in this action category is highest across the northern and boreal forests of Canada, the northern Rocky Mountains, and in many parts of the western U.S. (Fig. 14). Although there are fewer PR species in the Arctic, these represent a high proportion of that region's landbird avifauna. Throughout much of Canada and in Alaska, the highest priority for conservation action consists of careful planning and implementation of land-use choices that

lead to long-term sustainability of the many Species of Continental Importance supported there.

For many Species of Continental Importance in the PR action category, population trends are unknown and knowledge of threats and limiting factors is poor. If populations of these species were known to be declining, close to three-quarters would be reassigned to the Management action or, in some cases, to the Immediate Action category. Thus, it is very important to fill the many gaps in monitoring and research identified in the following sections of this plan.

Monitoring Needs

Population monitoring is critical for all stages of conservation planning, including assessment of population status, identification of causal factors in population change, setting of population targets, and evaluating success of conservation action. Without continued attention to information needs, PIF will be unable to evaluate the success of our conservation actions or refine our objectives for the future. While the BBS provides indicators of population status for many landbirds that breed in the U.S. and Canada, work is needed to improve survey precision for most species (Bart et al. in review). For many other species, BBS is unsuitable, and will remain so even if survey coverage and analysis is enhanced. These species will require different survey approaches. We have separated monitoring needs for this latter group into three broad categories:

While not highly threatened at present, the Snow Bunting and other northern-nesting landbirds require long-term planning and habitat protection to maintain this characteristic component of the continent's avifauna.

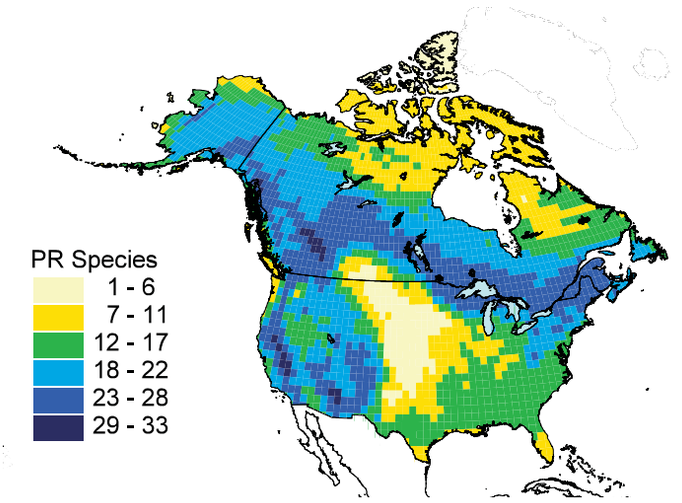


Figure 14. Number of PIF Species of Continental Importance breeding in each lat-long block that require Long-term Planning and Responsibility to sustain healthy populations. These are primarily biome-restricted species that are not known to be declining or highly threatened at present.

Species for which we have no trend data (Mo1): These are species for which there are essentially no data on population trend. There are 89 species in this category, of which 25 are on the Watch List and 5 are additional Stewardship Species (Table 1). Many of these species breed along the U.S.-Mexico border (Fig. 15a), have large breeding populations south of the Mexican border, and winter in Mexico and Central America, so it is unlikely that increased monitoring efforts in the U.S. alone will permit accurate estimation of range-wide trends. The distribution of these species shows the need to expand bird-monitoring programs as Mexico becomes a full participant in the next North American PIF plan. A few others are Arctic species that do not migrate to portions of Canada or the U.S. where they can be surveyed outside the breeding season.

Species for which the BBS is inadequate (Mo2): This category includes species for which BBS data are few and trends have very low precision, and for which alternative sources of trend give no estimates of survey precision. Of the 64 species in this category, 21 are on the Watch List and 9 are additional Stewardship Species. This group includes many raptors, grouse, owls, caprimulgids, and hummingbirds, as well as some species with habitats that are very poorly sampled by the roadside BBS. Many of these species will require surveys targeted on certain habitats or species groups, such as raptor migration counts or nocturnal owl monitoring.

Species with inadequate northern coverage (Mo3):

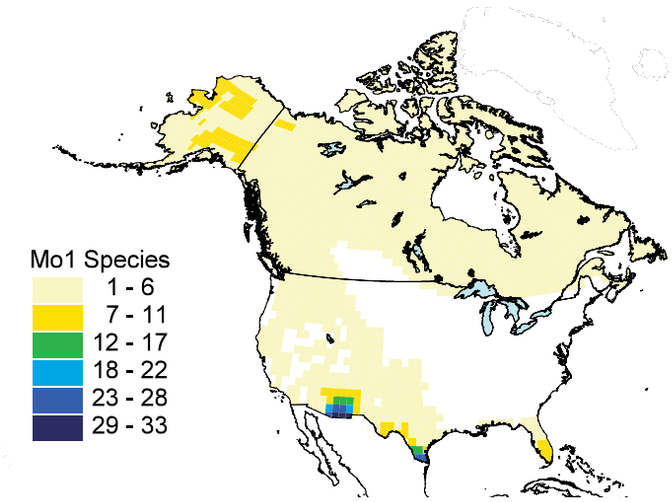


Figure 15a. Number of species in Monitoring Need category Mo1 (no trend data) that occur in each lat-long block during the breeding season.

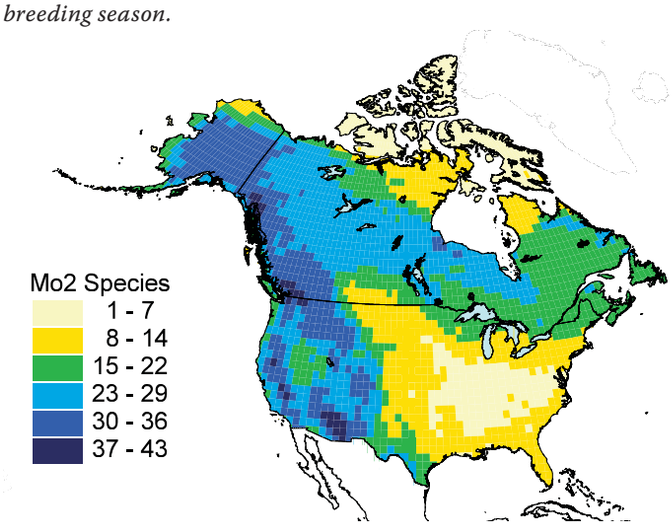


Figure 15b. Number of species in Monitoring Need category Mo2 (poor trend data; high or unquantified variance) that occur in each lat-long block during the breeding season.

Species in this category have more than one-third of their range in boreal and Arctic regions, north of the BBS coverage area (Fig. 15c). Significant bias can be present in trend estimates based on <2/3 of a species' range (Bart et al. in review). The category includes 82 species, 8 of which are on the Watch List and 35 are additional Stewardship Species. Most species in this category are migratory, wintering in the U.S. or Central America (Fig. 15d) such that they are amenable to monitoring by migration counts or winter surveys such as the Christmas Bird Count.

PIF has long been involved in identifying gaps in monitoring, developing monitoring strategies, and recommending best monitoring practices (e.g. Butcher et al. 1993, Downes et al. 2000, http://www.nabci-us.org/aboutnabci/monstratframe.pdf, Bart et al. in review). There is a new emphasis on Coordinated Bird

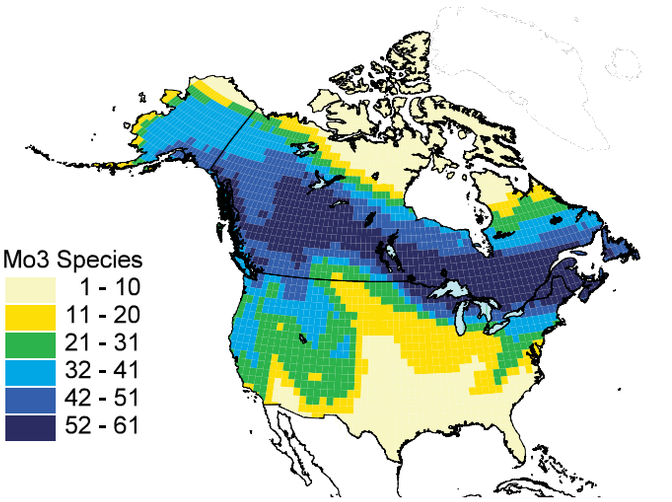


Figure 15c. Number of species in Monitoring Need category Mo3 (inadequate geographic coverage) that occur in each lat-long block during the breeding season.

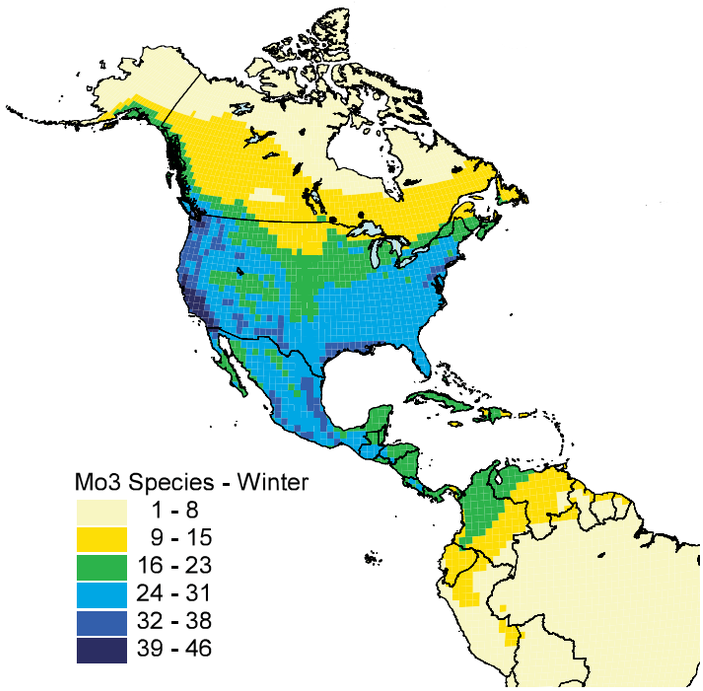


Figure 15d. Number of species in Monitoring Need category Mo3 (inadequate geographic coverage) that occur in each lat-long block during winter.

Monitoring (CBM, Bart in press), an initiative that is aimed at ensuring the most cost-effective and efficient action through coordination of monitoring efforts among neighboring jurisdictions, and among the major bird initiatives (particularly waterbirds, shorebirds and landbirds). Initial actions of CBM are focused on improved monitoring in the western U.S. and Canada, and in the Arctic—both of which have been identified in this Plan as areas in need of attention.

PIF supports monitoring of all species at least to the level of allowing periodic status assessment, but it is not

Montezuma Quail is one of many southwestern species for which we have no reliable data on population trends. Developing a bird-monitoring program within Mexico is one of PIF's highest continental priorities.

feasible to conduct detailed, high quality monitoring on all species (e.g. programs that also investigate causes of population change or test responses to management activities). It is therefore important to determine priorities in carrying out the recommendations below, and these priorities will vary among regions and agencies:

- Increase the number of routes in the BBS and other similar programs, and institute efforts to estimate and correct for potential bias. With enhancements that could realistically be achieved, BBS should be able to meet precision targets (Bart et al. in review) for 80% of the landbirds currently sampled by this survey.
- Through the Mexican NABCI Committee (ICAAN), support the Mexican government and partners to develop and implement the Mexican Bird Monitoring Strategy, particularly standardized breeding season monitoring.
- Establish new programs for species that can be monitored in the breeding season but which cannot be adequately sampled by even an improved BBS (including most species with restricted ranges). Most effort should be focused on Watch List species, developing multi-purpose surveys designed to investigate population change and potential causal factors simultaneously. All new monitoring programs should be designed with clearly defined and achievable objectives and should take into account such issues as detectability, sample frames, and unbiased population estimates, and should cover multiple species whenever possible.
- Institute a standardized, breeding-season monitoring program for birds in the boreal forest, as recommended by a recent PIF workshop on boreal monitoring (Machtans 2003).
- Improve the quality of data for the many northern and arctic species which can most easily be monitored on their temperate wintering grounds, by conducting additional critical evaluation of winter surveys, especially the Christmas Bird Count. Research is needed on best analysis methods and precision estimation, and analysis and reporting should be done on an annual basis. The Monitoring in Protected Areas in Mexico program (part of the ICAAN Mexican plan) should be pursued as a means of monitoring Neotropical migrants in the non-breeding season.
- Continue improvement of migration monitoring to meet information needs of many raptors, and of the large group of northern nesting Neotropical migrants that are largely inaccessible for monitoring both in the breeding or wintering seasons. More evaluation and research is needed on best analysis methods and precision estimation, and annual analysis and reporting should be instituted (Dunn in press).
- Improve standardization, management, and accessibility of the many existing bird-monitoring data sets, and improve analysis capabilities across multiple programs, taking advantage of rapid advances in computer and internet technologies (Bart in review).

Another important monitoring need is to track the amount, condition and configuration of the habitats on which birds depend (http://www.nabci-us.org/aboutnabci/monstratframe.pdf). Habitat monitoring cannot substitute for population monitoring, because bird numbers often fluctuate independently of habitat condition. Nonetheless, knowledge of habitat change is a crucial component of effective land-use planning at the landscape level. Analysis of remote-sensing data has often been used for this purpose regionally, but is lacking at the national and continental scale. We recommend a coordinated program of regular habitat assessment at the continental scale, as a tool for ensuring that landbirds have sufficient habitat to support healthy populations in all parts of North America, during all phases of their life cycle.

Research Needs

Partners in Flight has summarized and published research needs in order to encourage researchers and funding agencies to focus on the issues of greatest importance to landbird conservation. Perspectives and general guidance are available in several publications (Marzluff and Sallabanks 1998, Fitzpatrick 2002, Ruth et al. 2003, Williams 2003), while more specific priorities are outlined in Donovan et al. (2002).

Many of the priority information needs that should be addressed by research are too specific to local or regional circumstances to be summarized at the continental level. These needs are included in regional conservation plans (Appendix C), and are available in a searchable database <http://www.partnersinflight.org/pifneeds/searchform.cfm>. There are, however, some common themes reflected by these regional research priorities, many of which are inter-related.

- ***Identifying critical habitat components:*** General habitat associations of landbirds are well known, but the specific components are less well known. Rarely can we provide detailed guidance to land managers on habitat components that are critical for high priority species, such as vegetation structure or landscape context. Habitat needs during non-breeding seasons, including along migration routes, are even less well known.

- *Identifying the causes of population change:* Measurement of demographic parameters (nest success, productivity, survival, immigration) helps to identify factors limiting populations, and contributes to understanding of metapopulation dynamics (gene flow, source vs. sink populations). Measurements of season-specific survival are needed to assess mortality levels in non-breeding seasons.

- ***Examining responses of bird populations to land uses:*** There is a critical need for research to determine effects of various types of land use on avian populations and to better define management aimed at mitigating negative effects. Land uses affecting bird populations include livestock grazing, silviculture, recreation, fire suppression, oil and gas development, mining, water control and development, agriculture, habitat fragmentation, suburbanization, and wind-power development. Only by understanding the responses and tolerances of birds to land use and management regimes can effective mitigation actions be developed.

Research is urgently needed to understand the response by priority species such as White-headed Woodpecker to forest management, fire suppression, habitat fragmentation, and other land uses.

- ***Examining the effects of abiotic environmental factors:*** Research is needed on the importance of abiotic factors on bird population regulation, including climate change, drought, contaminants (acid deposition, pesticides), communication towers, and wind generators.

- ***Investigating interactions among birds and other flora and fauna:*** We need to understand the relative

Examples of measurable criteria for evaluating success of the Continental Plan

- Number of species on the Watch List and in the various categories of recommended conservation action
- Number of priority species on track for meeting 30-year population objectives
- Number of landbird habitat improvement projects supported by the Neotropical Migratory Conservation Act, North American Wetlands Conservation Act, and similar granting authorities
- Number of hectares of habitat protected and restored, by Bird Conservation Region and habitat type
- Number of species remaining with monitoring needs
- Number of peer-reviewed research publications addressing priority landbird conservation issues
- Number of new partnerships and delivery mechanisms (e.g., Joint Ventures) in place throughout the continent to meet landbird population and habitat objectives
- Number of agency plans into which landbird objectives have been incorporated
- Activity and effectiveness of Continental Council

importance of disease, predation, nest parasitism and introduced species. Effects may be magnified by land use and abiotic factors, so these should not be studied in isolation.

- ***Combining research and management:*** Bird conservation plans are built upon existing, and therefore incomplete, information about the ecological and environmental factors affecting bird populations. Research should be combined with ongoing management to evaluate assumptions and contribute new information for revision and improvement of those plans (adaptive management). Combining research and management also is fundamental to testing the effects of management action on bird population response.

- ***Improving monitoring:*** As noted in the previous section, there is need for research on monitoring methods and analysis procedures, particularly for monitoring that takes place outside the breeding season.

New research should be applied, and should move away from descriptive, correlative and short-term work in small geographic areas, to large-scale replicated studies, controlled experiments, and long-term studies of demography (Donovan et al. 2002). Results that lead to concrete recommendations for habitat management are needed. Finally, there is a need for collaborative research with practitioners of other disciplines, particularly in fields other than biology (climatologists, land use planners, contaminants specialists).

Funding and institutional support are of course the foundation for ensuring that needed research is undertaken. Providing adequate resources will require cooperation and collaboration among management agencies, research facilities, industry, and non-governmental organizations, all of which have a role to play in support of landbird research.

Continental threats and issues for landbirds

In many cases the general causes of bird-population declines are already known and can be addressed, although additional research and monitoring are needed to pinpoint the most effective management actions for high-priority species and habitats. A majority of threats to landbird populations are those affecting many species at once, through modification or destruction of habitats. While special action may be required to meet the needs of the highest-priority species, PIF advocates conservation actions directed at habitat issues that will simultaneously benefit suites of priority species, as well as other wildlife.

Conservation issues affecting Species of Continental Importance in particular regions are described in more detail in Part II of this Plan. Specific, on-the-ground conservation actions at continental scales are difficult to define because variation in biogeography and conservation issues is far too great for such actions to be appropriate in all regions. Nonetheless, there are several over-arching threats faced by landbirds across North America that can, at least in part, be addressed with action on the national or international stage, as summarized below.

- Habitat loss remains the critical factor for most species. While most native grassland was long ago converted to agriculture and subjected to livestock grazing, rapid habitat loss continues today. Habitats in danger of significant loss include western pinyon-juniper, sagebrush, California chaparral, and remnant native prairies. Selective harvest of old-growth forests, and conversion of large areas of southern boreal forest to agriculture are additional examples of ongoing, large-scale habitat loss. While a return to pre-settlement conditions is not feasible, land-use planning at broad scales can contribute to providing habitat sufficient to maintain healthy populations of North American landbirds throughout their native ranges.

- Habitat does not have to be lost entirely to have major effects on bird populations. Fragmentation and degradation of many habitat types is caused by development associated with urban and suburban growth. Such developmental sprawl is particularly rampant along the Atlantic and Gulf coasts, California, the Great Lakes region, and most recently in the Rocky Mountain states. Models are available for growth that is more environmentally sensitive, but these models need to be implemented much more widely.

- Increasing intensity of agriculture and livestock grazing continues to contribute to precipitous population declines in many species that use open, shrubland and grassland habitats. Invasion of exotic species is particularly important as a degrading factor in disturbed habitats. Bird-friendly practices and mitigation measures to enhance these habitats exist (e.g., Farm Bill programs in the U.S.), but these need to be expanded to other jurisdictions, better leveraged by conservation interests, more explicitly linked to bird conservation objectives, and improved

with respect to program funding and economic incentives.

- Forest-management practices over vast regions (including industrial forestry, fire management, and management of forest pathogens) has led to changes in forest structure and composition that reduce suitability for some high-priority species, even in the face of increased overall forest cover in some regions. Needs and objectives for priority forest birds must be incorporated explicitly into forest-management plans within agencies, and incentives offered to encourage implementation on private lands. Recent trends towards lack of management on public lands also may be having detrimental effects on some priority bird species.

- Livestock grazing has had enormous effects on native vegetation across most of the U.S. A century or more of the selective removal of palatable plant species, soil compaction, water developments and other livestock management activities have degraded ecosystems and have had significant impacts on native bird populations (Saab et al. 1995).

- Exotic invasive plants and animals are having increasingly serious direct and indirect impacts on many ecosystems, particularly in the U.S. The quantity and quality of habitat for many species is being reduced, often at alarming rates, by serious disruptions in natural processes.

- Habitat loss and degradation pose threats to bird populations not only when it occurs in breeding areas, but also along migration routes and in wintering areas. At the same time, little is known of species' distributions, habitat needs, or responses to land-use trends in non-breeding seasons. Inclusion of Mexico and Caribbean nations in future updates of this Plan will lead to much greater attention to non-breeding issues for many species.

- Landbirds also face mortality from factors not directly related to habitat and difficult to quantify. These include communication towers, wind power development, domestic and feral cats, lighted buildings, and competition with introduced species such as European Starlings and House Sparrows. Although some programs exist to locally minimize effects from these factors, no plan exists to comprehensively address their cumulative impact on bird populations.

Threatened by extensive degradation of its sagebrush habitat by over-grazing and invasive plant species, the Greater Sage-Grouse has received much recent conservation attention.

Collectively, these 8 factors contribute to a high proportion of population declines among Watch List Species, and addressing these issues at the largest possible administrative scales will go a long way towards meeting PIF's continental objectives for landbirds.

TAKING ACTION

Linking across geographic scales

Most on-the-ground conservation action will take place at sub-continental scales, where action can be tailored to the needs and conservation issues specific to a region. Detailed conservation plans have already been written for most physiographic areas and states in the U.S. (Appendix C) and are currently being written for remaining portions of the U.S. and Canada. Implementation actions, programs, and initiatives will vary among the three countries represented in this North American Plan. Each country has developed or is developing a separate national strategic plan, which outlines the goals and steps that need to be taken to conserve landbird populations and their habitats and to integrate with conservation of other wildlife.

Regional planners are naturally focused on regional objectives, but the effectiveness of regional conservation action can be increased by linking objectives for BCRs or physiographic regions to those of the continent and those of states and provinces. For example, Species of Continental Importance likely are included in regional plans; but if not, planners should consider whether revisions to existing plans could better address the needs of these species in their area. Continental population objectives for these species can be stepped down to regional, provincial, or state-level objectives, adjusted as needed based on the capacity within the region, and then rolled up again to ensure that continental objectives

will be met. Partners in Flight will continue to provide guidance throughout this process. Although only numbers for continental populations are presented in this plan, data on the percent of population present in each Bird Conservation Region, state or province will be posted on the PIF website <www.partnersinflight.org> to aid in stepping down numerical objectives.

While on-the-ground conservation action will take place at sub-continental scales, there are additional actions required for meeting PIF objectives that are appropriate for implementation at the national and international level. These tasks include the following:

- Coordinate conservation planning and action across geographic scales and political boundaries. Provide leadership in ensuring the Continental Plan is implemented.
- Promote landscape-level land-use planning that will lead to retention in all parts of North America of sufficient and suitably diverse habitat for sustaining healthy native bird populations.
- Develop and support bird-friendly guidelines for agriculture, forestry, energy industry, urban planning, water management and other human activities that have the most impact on bird habitats.
- Promote international treaties and policies that protect the environment either directly or indirectly (e.g., trade policies).
- Promote coordinated international legal protection for species at risk.
- Work with other conservation initiatives to integrate landbird conservation objectives with those for other taxa.
- Forge national and international-scale partnerships to accomplish PIF objectives.

The steeply declining Olive-sided Flycatcher breeds across the coniferous forests of Canada and the western United States and migrates to winter in the mountains from southern Mexico to northern South America—clearly conservation of this species will require international cooperation and action.

Implementation

Implementation of this Continental Plan consists of a variety of actions. They include a suite of habitat and non-habitat based actions that lead to reaching the population objectives for landbird species outlined above. Successful implementation also depends on meeting the diverse needs identified in regional plans for monitoring, research, education and outreach. These actions must occur at several scales, but in this Plan we focus on actions that are appropriate for implementation at national and international scales.

PIF needs many and varied partners to implement the conservation actions discussed in this plan. Good partnerships develop shared goals and objectives, synergy and excitement. Because partners bring different skills to a common task, each partner sees its capacity enhanced. Each partner may also tap different sources of funding, and cooperation among partners creates new opportunities for involving new segments of society in maintaining a healthy environment.

A key role of PIF, therefore, is to work with individuals, agencies and other organizations responsible for public and private lands to integrate their management objectives with those outlined here. Those entities that own the greatest amount of land and whose current management priorities have the greatest potential for compatibility with birds are the ones that can have the greatest positive effects. These should be the primary targets for PIF implementation activity. Fortunately many of these agencies and organizations already are part of the "PIF Collective," and this collective has the primary responsibility for meeting PIF objectives. A successful model for identifying and evaluating specific land parcels that can contribute to meeting population targets of priority bird species has been presented for the mid-Atlantic Coastal region (Watts and Bradshaw 2003).

The Joint Ventures, which were formed to implement the North American Waterfowl Management Plan, provide a very effective model for a public/private conservation partnership. The Joint Ventures involve multiple levels of government, industry, landowners, and a wide range of non-governmental organizations in effective

partnerships to deliver conservation on the ground. Most of the existing Joint Ventures have embraced the goal of integrated bird conservation, including attention to landbirds. In areas that do not have existing Joint Ventures, similar partnerships will need to be formed and funded. While collectively these partnerships will deliver integrated habitat conservation for all birds, PIF's continued role will be to promote the needs of terrestrial birds and their habitats.

Most implementation programs take place within jurisdictional units, such as states and provinces. In the United States, an important opportunity exists over the next few years to increase resources for non-game birds within state agencies. Incorporation of PIF objectives into federally mandated Comprehensive Wildlife Conservation Plans will be a critical step in this process. Each state will develop its own priorities and procedures for developing these plans and for incorporating the needs of all birds (see Hodgman 2003 for an example).

Management of specific sites for particular bird species and their habitats has always played an important role in conservation. National Wildlife Refuges in the United States have been delineated primarily to date in wetland systems, and priority landbirds will benefit from establishing more refuges entirely in upland habitats. A valuable program for identifying and managing specific sites is the Important Bird Areas program of BirdLife International. Important Bird Areas have been established in Europe, Africa, and South America, and this successful approach is now being implemented through BirdLife partners in the U.S. (National Audubon Society), Canada (Bird Studies Canada and Canadian Nature Federation) and Mexico (Consejo Internacional para la Preservación de las Aves en México [CIPAMEX]). Finally, public land management agencies have mechanisms for identifying special management areas in their land-use planning processes that can be used to identify and protect important bird habitat. Bird populations cannot survive using protected areas alone, of course, but special areas are important for ensuring protection of key habitats and places that might otherwise be lost.

PIF Bird Conservation Plans, Joint Venture Implementation Plans and other regional, state and local implementation plans should be the foundations for presenting and accomplishing site-specific conservation actions. While natural links exist among other bird groups through the NABCI framework, integration with programs for other taxa can also reap mutual benefits, and finding best management practices across landscapes can have broad-scale implications for habitat availability and quality. The Wildlands Project, Yellowstone to Yukon initiative, North American Bat Conservation Plan, Partners In Amphibian and Reptile Conservation, and Mesoamerican Biological Corridor are examples of other excellent initiatives focusing on species other than birds, but with which we inevitably have shared goals. By combining our efforts, we not only enhance our opportunities to protect landbirds, but we also improve our chances of improving the quality of the environment upon which we all depend.

The following three administrative structures will facilitate coordination of conservation planning and action across geographic scales and political boundaries:

National Councils: Each country included in this Plan has a national forum or council that will guide PIF activities at a national level. The exact structures vary nationally in response to the needs and desires of PIF partners, but are generally composed of representatives of Federal and State/Provincial governments, non-governmental agencies, academia and others. National councils serve in an advisory role in each country to identify program-wide priorities, discuss policy issues, facilitate effective communication and coordination, and identify issues for discussion and resolution at other national and international fora.

Continental Council: International cooperation would be facilitated through formation of a Continental Council composed of representatives designated by the national councils. The Continental Council would serve in an advisory role to oversee the implementation, evaluation and revision of the PIF North American Landbird Conservation Plan.

Science Committee: Guidance on the biological foundation for PIF will be provided by an international Science Committee (formerly the PIF Technical Committee) composed of representatives from the U.S., Canada and Mexico. The Science Committee is responsible for maintaining, revising and evaluating the technical content of the PIF North American Landbird Conservation Plan and PIF Species Assessment Databases. The Science Committee will be responsible for addressing all other technical issues concerning landbird conservation at national and international levels. Further, the Science Committee will provide assistance in stepping down continental objectives to lower scales.

Evaluation

Evaluation is a critical component of conservation planning and implementation. Plans must be

periodically upgraded to reflect improved knowledge. Importantly, there are assumptions behind every recommendation made in the bird conservation planning process. All of these assumptions should be explicitly stated, and the degree of support for them addressed. Elements of evaluation include examining the relationships between habitat and population responses to actions, completeness of conservation planning, and revision of plans.

Regular assessment of the success of this Continental Plan will provide important opportunities to modify approaches, bring in new partners, or re-direct efforts, maximizing the likelihood of conservation success on an ongoing basis. Population monitoring is one important means of determining conservation success, but there are many other criteria that can be used to determine whether this Plan is being successfully implemented (see box).

The Partners in Flight North American Landbird Conservation Plan will be revised once Mexico becomes a full partner, and the Plan will then be evaluated every five years thereafter. The Continental Council, in cooperation with the national councils and the Science Committee, will oversee this process. Input will be actively solicited from regional PIF committees and regional implementation bodies. These periodic re-assessments will ensure that this Continental Plan responds effectively to changing conservation requirements and opportunities and, most importantly, addresses the highest priority needs for landbirds.

Landbird Conservation Goals for the Next Decade

Landbird conservation in North America has made major advances in the past decade, and a maturing infrastructure is prepared to accomplish large-scale, long-term conservation across the continent. Evidence of this change was apparent at the Third International Partners in Flight Conference: A Workshop on Bird Conservation Implementation and Integration, in Monterey, California, 20–24 March 2002 (Ralph and Rich in press). In order to see that the momentum continues, aided by this Continental Plan, we propose the following specific goals adapted from Fitzpatrick (2002) to guide us into the next decade. The goals are stated as desired conditions we anticipate in 2013.

Habitat management in place to stabilize all high-priority species throughout their life cycles in Canada, the United States, Mexico and the Caribbean

- Existing Joint Ventures deliver habitat programs for all birds.
- Measurable action and results on the ground based on best current information and adaptive management practices.
- Conservation plans and implementation efforts through regional partnerships protect priority bird species and habitats in Mexico.
- Conservation plans and implementation efforts expanded to encompass the Caribbean.

Substantial new funding supports all-bird conservation

- Government and private funding increased significantly to meet the challenges of an all-bird and all-season approach.
- Full funding at appropriate levels of Neotropical Migratory Bird Conservation Act and equivalent legislation in the United States, Canada, and Mexico
- The U.S., as the richest of the participating countries, leads the way in creating a funding infrastructure that leaves out no bird or habitat.

Wildlife agencies within countries, states, and provinces fully embrace all-bird conservation as a high priority for resource allocation and program implementation

- Priorities and objectives for landbirds and terrestrial habitats incorporated into all existing agency management plans
- Significant increase in staff and resources devoted to non-game wildlife
- Increased cooperation and coordination among agencies and jurisdictions

Non-government Organizations shepherd bird conservation

- Mission-focused, not-for-profits supply important guidance for setting long-term objectives, adjusting management strategies, measuring results, and sharing the labor required to achieve long-term conservation.
- Non-government Organizations coordinated among themselves and taking full advantage of their respective strengths.

Citizens engaged in numbers befitting a revolution

- Numbers of amateur bird watchers directly involved

in bird conservation reflects the level of their participation in the enjoyment of identifying wild birds in wild places.

- Amateur bird watchers play an important role in conservation science by participating in organized monitoring programs and large-scale studies.
- Bird-watching public is an effective constituency, influencing government policy and willing to contribute resources in proportion to their numbers.

Fewer gaps in understanding of populations and trends

- Comprehensive monitoring schemes in place for boreal and Arctic, Mexico, the Caribbean, and for all priority species.
- Expanded arsenal of census approaches so that the results for individual species can be compared and pooled among species.
- New programs developed for marshbirds, nocturnal species, certain raptors and others whose ecological requirements render them difficult to detect by conventional census methods.
- Studies of single-species and ecological assemblages increase understanding of population expansions, declines or fluctuations.

Scientific auditing produces adaptive responses to monitoring projects and conservation plans

- Conservation plans and management practices modified to reflect current knowledge (adaptive management).
- Field experiments test assumptions of conservation plans and directly dictate new management decisions.
- National and regional specialists in place to track research and management accomplishments, keep plans fresh and updated, coordinate research objectives, catalyze interactions among partners and funding sources.

PIF North American Landbird Conservation Plan updated to incorporate additional countries and new information.

- Mexico is a full partner in the Plan.
- Caribbean and Central American nations have completed assessment and planning activities in cooperation with Plan partners.
- Plan updated, accomplishments measured, and new population objectives set.

Conservation of the Red-faced Warbler, and many other highly sought "border birds" depends on full participation of Mexico in future versions of the PIF North American Landbird Conservation Plan.

Part 2. Habitat Issues and Recommendations

Partners in Flight recognizes that there are important differences in habitats, conservation issues and appropriate strategies for action among the various regions of the continent. We cannot produce a simple prescription for landbird habitat conservation on a continental scale. Conservation plans have, in fact, already been written for many parts of North America (Appendix C). Collectively these plans provide an excellent blueprint for meeting the conservation needs of many North American landbirds.

This part of the Continental Plan constitutes a summary of issues that affect landbirds across large areas of the U.S. and Canada. It illustrates the interconnectedness of all regions of North America and highlights the roles that each portion of the continent has to play in bird conservation

For convenience of presentation, we have placed Species of Continental Importance (Table 1) into the Avifaunal Biomes that were defined for purposes of selecting Stewardship Species (p. xx). This presentation is not intended to promote Avifaunal Biomes as new conservation planning units. We do intend that Species of Continental Importance be considered for the appropriate level of conservation in these areas, but that species of regional conservation concern will be added to round out the conservation that needs to be accomplished. Nonetheless, presentation on an Avifaunal Biome basis does highlight species that should be considered in planning at smaller scales within these regions, in order to meet the continental-scale goals set out in this Plan. Moreover, taking an overview of conservation issues at a geographic scale between those of the region and the continent may provide insight into issues on which neighboring planning units fruitfully can work together.

Each Avifaunal Biome section follows the model of regional conservation plans, defining habitats that are essential for Species of Continental Importance, and identifying activities which are paramount to conserving that biome's characteristic avifauna. Sections also portray overarching themes across the continent and among biomes. Issues presented in Part I such as monitoring, management recommendations, and patterns of threat, also are mentioned where appropriate.

For the purpose of continental summary, we have assigned each Species of Continental Importance to a broad habitat category (see box). These are very general, and do not indicate specific habitat needs of individual species. They are used here for organizing purposes, and to connect some general messages in the text to species listed in each.

Just as habitats are not confined to single regions of the continent, there are broad landbird conservation issues that affect more than just one biome. The following is a summary of many issues found in regional plans that

Habitats included in the Avifaunal Biome tables

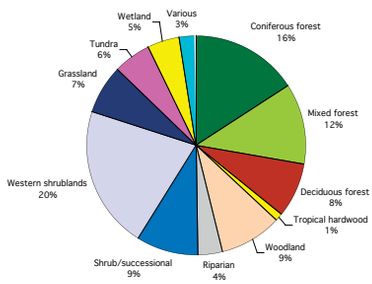
Major habitat category	Habitat types included
Tundra	Arctic tundra, alpine tundra
Shrub/successional	Early successional forest, forest edge, eastern North American climax shrub, taiga-tundra transition
Western shrublands	Western climax shrub communities, shrubsteppe, chaparral, desert scrub, shrubby grassland, montane shrub
Riparian	Shrub and woodland associated with watercourses in the arid West
Wetland	Marsh, swamp, bog, wet grass, wet shrub (except riparian), coastal marsh
Tropical hardwood	Tropical hardwoods, mangrove
Woodland	Open short-stature forest, Pinyon-Juniper, oak-juniper, oak savannah
Coniferous forest	All types, including pine, fir, spruce, cedar. All ages (young to mature). Applied to birds that use habitats embedded within coniferous forests (gaps, stream edge, wet forest, bogs)
Deciduous forest	As above, but for deciduous forest.
Mixed forest	As above, but for mixed deciduous-coniferous forests (including western pine-oak communities). Also applied to forest bird species that use a variety of coniferous or deciduous habitats (including riparian)
Grassland	Tallgrass, shortgrass, and mixed grass communities; open agricultural types, especially pasture
Various	Applied to remaining species that range or forage widely over a variety of the habitats listed above

span across biomes:

- ***Habitat Loss, degradation and fragmentation:*** Affects all bird habitats everywhere, especially in areas where human populations or agricultural development are highest. Many birds do best when breeding or wintering within very large blocks of habitat. Loss of grasslands and degradation of coastal wetlands in the East, shrublands in coastal areas of the Pacific, riparian in the Southwest, shrublands in the Intermountain west, and prairies in the heart of the continent are particularly prominent.
- ***Forestry and woodland management:*** Affects many areas of the country, especially changes that result in tree species composition and structure.
- ***Fire management strategies:*** Affect a variety of grassland, shrub and forest habitats. Of particular concern is fire suppression within coniferous or mixed forests in the Eastern, Intermountain West and Southwestern biomes and too much fire in intermountain shrublands and remnant tallgrass prairie.
- ***Wetland issues:*** Conversion of wetlands for agricultural production, drainage, water diversions, and the alteration of hydrologic regimes affect mangrove forests and coastal marshes In the East, while in the West issues revolve more around riparian concerns. In the Prairie biome both wetland basins and riparian issues are of concern.
- ***Exotic or Invasive species:*** Affect most portions of the continent but may be most critical in shrubsteppe in the Intermountain West, mixed grass prairie in the Prairies and riparian areas of the Southwest.
- ***Resource extraction industry issues:*** Continentally, effects may be most wide-reaching with logging operations in Northern Forest, Pacific and Intermountain West biomes, mountaintop mining in the Eastern biomes, Hydro-electric and water storage development in the Prairie, Intermountain West and Southwestern biomes and wind-farm development in the Prairie biome.
- ***Livestock grazing management:*** Most prominent in rural areas of the continent including the Prairies, Intermountain West and Southwest.
- ***Climate change:*** This issue has been identified primarily for birds in the far northern latitudes or alpine areas, but has the potential to affect many more birds through changes in precipitation patterns, loss of coastline habitats, and effects on weather on migratory routes.
- ***Lack of information:*** Affects the management of all bird species, but may be most crucial when population trends are unknown (see Monitoring section) especially in the Arctic and Northern Forests or in the Southwestern biomes. Research is needed on basic ecology of poorly-known species and habitats, such as thorn forest in southern Texas and Mexico.
- ***Contaminants and pesticides:*** Acid rain issues affect the Eastern and Northern Forest biomes, and pesticides affect broad areas in the Prairie and Eastern biomes.

For readers wishing to delve deeper into the conservation issues for landbirds in any particular portion of the continent, we encourage consulting the appropriate regional plan (Appendix C).

Habitat associations among the 195 landbird species of Continental Imortance.



ARCTIC AVIFAUNAL BIOME

The Arctic Avifaunal Biome (Fig. 9) includes three Bird Conservation Regions and covers areas north of the tree line in Canada and Alaska, as well as Alaska's west coast and the Aleutian Islands. Some of the bird species characteristic of this region also breed in alpine areas that extend farther south (Fig. 16a). Habitat consists largely of vegetated and rocky tundra, with some shrubs and ecotones with treed areas adjacent to Northern Forest BCRs.

The Arctic is relatively pristine and is not under widespread threat of human development, although local areas may be heavily affected. Not a single Species of Continental Importance in this Avifaunal Biome has good trend data (Table 2). While there are only three Species of Continental Importance in need of Management, all three have undergone severe population declines. Although the number of species in the Arctic requiring Long-term Planning is small, these represent a large proportion of the breeding landbirds in the biome. The most pressing landbird conservation issue for this region is the lack of population monitoring (Fig. 15). Habitat degradation in the wintering range and climate change may be having effects on Arctic species that are going undetected due to lack of information on population status. Most species breeding in the Arctic Avifaunal Biome are short-distance migrants, and many winter along the northern Pacific Coast and across the northern U.S. and southern Canada (Fig. 16b).

Primary Habitats

Tundra

Arctic and alpine tundra consist of two separate subcategories that depend on elevation. The low elevation tundra list includes two Watch List Species (McKay's Bunting and Short-eared Owl (Table 2) and most of the additional Stewardship Species. The threat to McKay's Bunting comes from the potential for unintentional release of exotic mammalian predators (e.g., rats) on the few islands on which they exist. Stewardship is the most important ecosystem-level conservation need for the tundra habitat. Climate change may most affect species in higher elevation alpine areas, through restriction and fragmentation of habitat as a result of tree lines moving up slope. Other high elevation species that breed above tree line and whose range could be restricted by climate change include Gray-crowned Rosy-Finch and American Pipit.

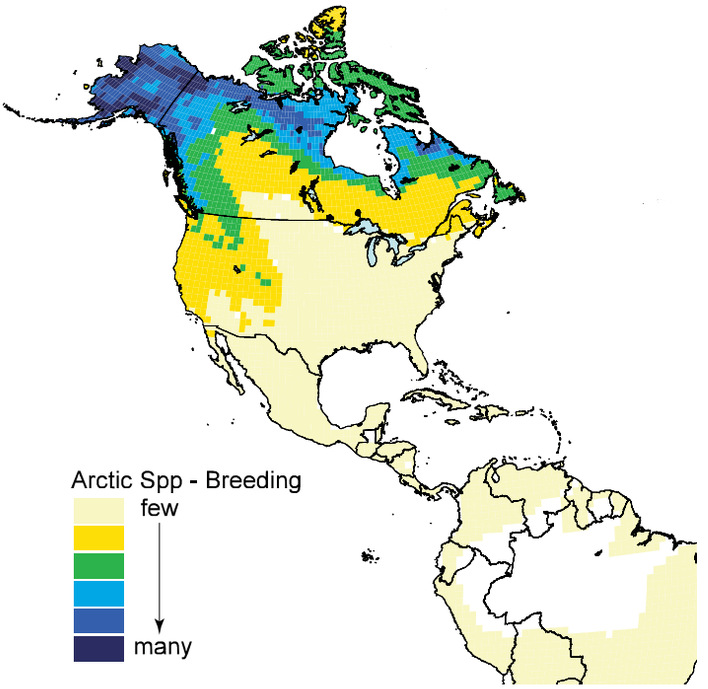


Figure 16a. Number of species during the breeding season in each lat-long block, weighted by the percent of total population of each species breeding within the Arctic Avifaunal Biome.

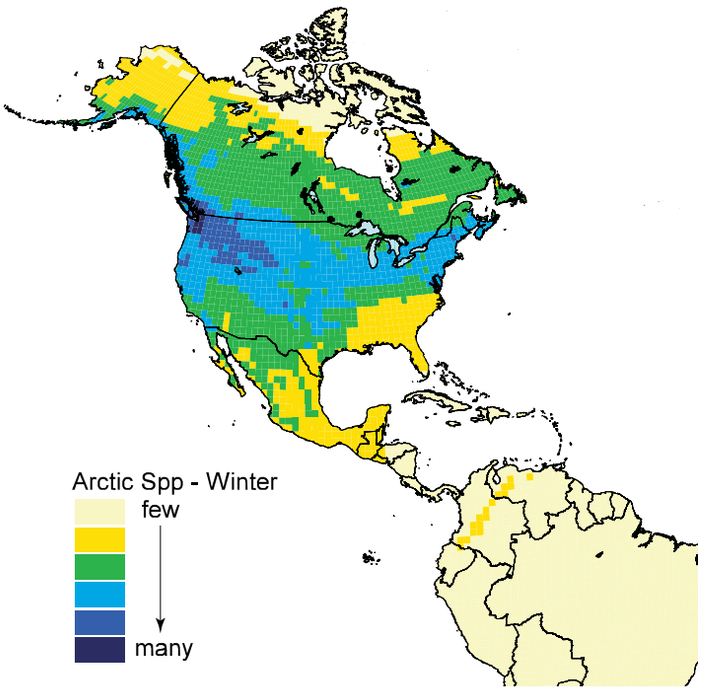


Figure 16b. Number of species during winter in each lat-long block, weighted by the percent of total population of each species breeding within the Arctic Avifaunal Biome.

Shrub/successional

Several species in this region use shrublands, consisting primarily of transitional habitat between tree line and tundra: Harris's Sparrow and Hoary Redpoll at low

Table 2. Species of Continental Importance in the Arctic Avifaunal Biome (including BCRs 1, 2, and 3)

Species[1]	% Breeding Population	% Winter Population	Primary Habitat	Continental Population Objective	Continental Monitoring Need
Management					
Harris's Sparrow	86%	0%	Shrub/successional	Increase 100%	Mo3
Short-eared Owl	13%	<1%	Tundra	Increase 100%	Mo2,3
Rusty Blackbird	12%	<1%	Coniferous forest	Increase 100%	Mo3
Long-term Planning & Responsibility					
McKay's Bunting	100%	100%	Tundra	Increase 10%	Mo1
American Pipit	85%	<1%	Tundra	Maintain	Mo2
Gray-crowned Rosy-Finch	83%	17%	Tundra	Maintain	Mo1
Golden-crowned Sparrow	75%	1%	Shrub/successional	Maintain	Mo3
Smith's Longspur	57%	0%	Shrub/successional	Increase 10%	Mo3
Snowy Owl *	100%	2%	Tundra	Maintain	Mo3
Snow Bunting *	100%	4%	Tundra	Maintain	Mo3
Hoary Redpoll *	100%	6%	Shrub/successional	Increase 10%	Mo3
Lapland Longspur *	100%	<1%	Tundra	Increase 10%	Mo3
Rough-legged Hawk *	99%	<1%	Tundra	Maintain	Mo3
Rock Ptarmigan *	99%	78%	Tundra	Increase 10%	Mo1
Gyrfalcon *	97%	11%	Tundra	Maintain	Mo3
Peregrine Falcon *	94%	4%	Various	Maintain	Mo2,3
Willow Ptarmigan *	76%	19%	Shrub/successional	Increase 10%	Mo1

[1]Species are sorted by Action Category (Immediate, Management, Planning & Responsibility), then by decreasing % of population (by greater of breeding or winter population). Species highlighted in yellow are Watch List species, with at least 10% fo their global population in this biome. Species in green (in species or % population columns) are Stewardship Species, with >75% of their population in this biome.
*For these species, % of Population is for Western Hemisphere, all others are % Global Population.

altitudes, and Golden-crowned Sparrow in alpine areas. While not under threat by direct human alteration, transitional habitats in the Arctic are prime candidates to be strongly affected by climate change. Two Species of Continental Importance, Harris's and Golden-crowned Sparrows are also biome-restricted on their wintering grounds in the Prairies and the Pacific, respectively, and climate change may affect these two more than most transitional breeding species.

Coniferous forest

Coniferous forests make up a small percentage of the landscape, but where these forests are wet they can provide habitat for Rusty Blackbird, the only Watch List Species in this biome not associated with tundra habitat.

Most Arctic-nesting landbirds winter in human-populated parts of North America, particularly in the U.S., where habitat loss and degradation is far more severe than in the Arctic. Most information on population status comes from winter counts (especially Christmas Bird Counts), which are subject to many biases and require better analysis and evaluation to produce more reliable trend results.

One of relatively few Arctic-breeding passerines, the Harris's Sparrow is perhaps most vulnerable within its small wintering range in the south-central United States.

Conservation Issues

- Lack of information on population status of most Arctic landbirds
- Climate change affecting distributions of high-elevation species
- Introduction of exotic mammalian predators to islands.
- Habitat degradation in wintering areas of many Arctic-breeding species

Recommended Actions

- Develop BCR-level plans for the Canadian portion of this Avifaunal Biome, and support implementation of plans in Alaskan portion.
- Conduct critical analysis to determine suitability of Christmas Bird Counts for monitoring Watch List, Stewardship, and other Arctic-nesting species during the non-breeding season.
- Evaluate evidence of decline in Harris's Sparrow, and if robust, conduct research into causes.
- Encourage existing monitoring programs in the region (primarily for shorebirds and waterfowl) to incorporate landbird counts.
- Model projected habitat loss and fragmentation of alpine zones in western Canada and Alaska as a result of climate change, to determine degree of threat to alpine species.
- Determine cause of Short-eared Owl decline where declines have been documented, and determine population status in the Arctic.
- Conduct research on Hall and St. Matthew Islands to determine population status, limiting factors and potential threats to McKay's Bunting.
- Monitor status and prevent introduction of exotic mammalian predators.

The Hoary Redpoll, one of several Arctic species with populations also in the Old World, rarely reaches populated areas of southern Canada and the northern United States, even in winter.

NORTHERN FOREST AVIFAUNAL BIOME

The Northern Forest Avifaunal Biome is by far the largest, and comprises six Bird Conservation Regions (Fig. 9). About 80% of the land area in this region is forested, with most of the remainder consisting of tundra and wetland. Of the forest cover, about half is boreal coniferous. There also are extensive areas of non-commercial, open forests in the northern taiga (small trees, shrubs and muskeg). Northern deciduous and mixed woodlands predominate in the Great Lakes and Maritimes, and in the western boreal plains.

This area is a veritable 'Neotropical migrant factory,' representing the core breeding range for more than 75% of Canada's warblers and a similar percentage of thrushes, vireos and flycatchers. An estimated 90% or more of the birds in this region migrate out of it for the winter (e.g., Fig. 17). Migration corridors in the U.S. and wintering areas extending as far south as northern South America are crucial to their protection. Species characteristic of the Northern Forest region breed mostly in Canada (Fig. 18a), and they winter in the Pacific and Eastern Biomes as well as Mexico and throughout Central America and northern South America (Fig. 18b).

Population trend data for most species characteristic of this region come only from the southern portion of the range (Fig. 15), and migration monitoring may be the best means of getting information from broader areas in the near term (see http://www.bsc-eoc.org/national/cmmn.html). For the longer term, breeding season monitoring suitable to remote areas needs to be developed and implemented across the region. Many parts of this region are subject to a variety of development pressures, including forestry, energy development and other industrial activities. Where soils and climate are suitable, agriculture, recreational and urban development occur, particularly along the southern edge of the zone and from the Great Lakes eastward.

Despite increased forestry and other industrial activity in the boreal, northern portions of the region are relatively little affected by humans to date, whereas wintering areas of many boreal species (often in the Caribbean) are relatively restricted in size and have been heavily modified in habitat. The major conservation issues for the region include effect on birds of human land use,

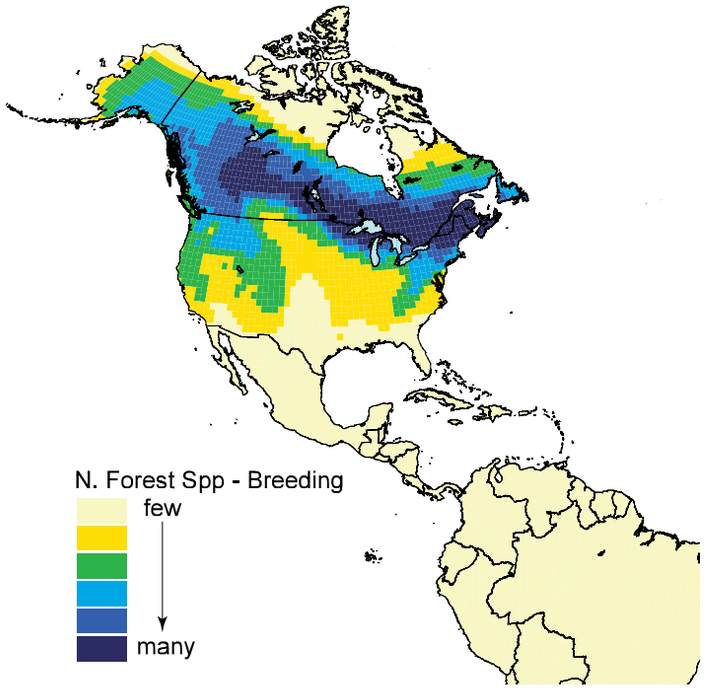


Figure 17a. Number of species during the breeding season in each lat-long block, weighted by the percent of total population of each species breeding within the Northern Forest Avifaunal Biome.

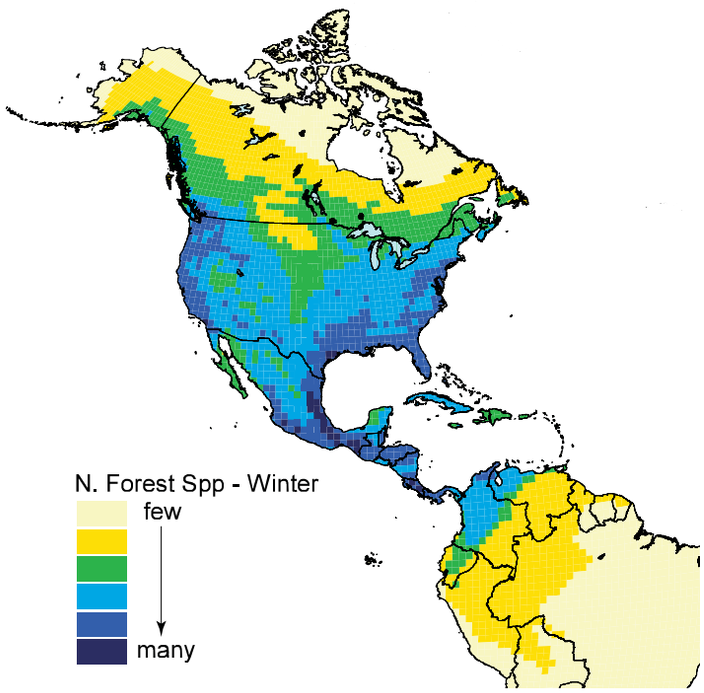


Figure 17b. Number of species during winter in each lat-long block, weighted by the percent of total population of each species breeding within the Northern Forest Avifaunal Biome.

degradation and loss of wintering habitat, potential effects of climate change, and acid rain.

Several Watch List Species are restricted to specific habitats, some of them very limited in extent. Kirtland's Warbler, the Watch List Species most at risk in this

Table 3. Species of Continental Importance in the Northern Forest Avifaunal Biome (including BCRs 4, 6-8, 12 and 14)

Species[1]	% Breeding Population	% Winter Population	Primary Habitat	Continental Population Objective	Continental Monitoring Need
Immediate Action					
Kirtland's Warbler	100%	0%	Coniferous forest	Recovery Plans	
Bicknell's Thrush	95%	0%	Coniferous forest	Increase 10%	Mo2
Golden-winged Warbler	76%	0%	Shrub/successional	Increase 100%	
Management					
Bay-breasted Warbler	100%	0%	Coniferous forest	Increase 50%	Mo3
Connecticut Warbler	99%	0%	Coniferous forest	Increase 50%	Mo3
Canada Warbler	97%	0%	Mixed forest	Increase 50%	Mo3
Chestnut-sided Warbler	93%	0%	Shrub/successional	Increase 50%	
Boreal Chickadee	92%	92%	Coniferous forest	Increase 100%	Mo3
Rusty Blackbird	86%	1%	Coniferous forest	Increase 100%	Mo3
Olive-sided Flycatcher	61%	0%	Coniferous forest	Increase 100%	Mo3
Blue Grouse	18%	18%	Coniferous forest	Increase 100%	Mo2
Harris's Sparrow	14%	<1%	Shrub/successional	Increase 100%	Mo3
Wood Thrush	13%	0%	Mixed forest	Increase 50%	
Long-term Planning & Responsibility					
Palm Warbler	100%	<1%	Wetland	Maintain	Mo3
Cape May Warbler	100%	<1%	Coniferous forest	Maintain	Mo3
Yellow-bellied Flycatcher	100%	0%	Coniferous forest	Maintain	Mo3
Tennessee Warbler	100%	0%	Mixed forest	Increase 10%	Mo3
Philadelphia Vireo	99%	0%	Mixed forest	Maintain	Mo3
White-throated Sparrow	99%	1%	Mixed forest	Increase 50%	Mo3
Spruce Grouse	98%	98%	Coniferous forest	Maintain	Mo3
Mourning Warbler	98%	0%	Shrub/successional	Increase 50%	Mo3
Northern Shrike	96%	26%	Shrub/successional	Maintain	Mo3
Blackburnian Warbler	96%	0%	Mixed forest	Maintain	
Alder Flycatcher	94%	0%	Shrub/successional	Maintain	Mo3
Black-backed Woodpecker	94%	94%	Coniferous forest	Increase 10%	Mo3
Magnolia Warbler	94%	0%	Mixed forest	Maintain	Mo3
Swamp Sparrow	94%	<1%	Wetland	Maintain	Mo3
Yellow-bellied Sapsucker	93%	<1%	Mixed forest	Increase 10%	Mo3
Nashville Warbler	92%	<1%	Mixed forest	Maintain	
Black-throated Green Warbler	92%	0%	Mixed forest	Increase 10%	Mo3
Gray Jay	91%	91%	Coniferous forest	Maintain	Mo3
Lincoln's Sparrow	91%	<1%	Wetland	Maintain	Mo3
Blue-headed Vireo	90%	0%	Mixed forest	Maintain	
Nelson's Sharp-tailed Sparrow	49%	<1%	Wetland	Maintain	Mo2,3
Bohemian Waxwing *	98%	55%	Coniferous forest	Maintain	Mo3
White-winged Crossbill *	97%	86%	Coniferous forest	Maintain	Mo3
Pine Grosbeak *	90%	88%	Coniferous forest	Increase 10%	Mo3
Smith's Longspur	39%	0%	Shrub/successional	Increase 10%	Mo3

[1]Species are sorted by Action Category (Immediate, Management, Planning & Responsibility), then by decreasing % of population (by greater of breeding or winter population). Species highlighted in yellow are Watch List species, with at least 10% fo their global population in this biome. Species in green (in species or % population columns) are Stewardship Species, with >75% of their population in this biome.

*For these species, % of Population is for Western Hemisphere, all others are % Global Population.

region, is found only in large patches of young jack-pine forest. Bicknell's Thrush uses dense and stunted conifers at high elevation and sometimes in regenerating industrial forest. While the scrubby habitat used by Smith's Longspur seems widespread, this species occupies only a narrow transitional zone between the northern forest and tundra. Conservation action directed at breeding areas of these species will do little for other Species of Continental Importance. In contrast, action directed at their wintering areas (Neotropical woodland and native grassland in the south central U.S.) should prove beneficial to a variety of species.

Primary Habitats

Coniferous forest

The largest group of Species of Continental Importance in the biome uses boreal coniferous forest (Table 3). Two-thirds of them require better trend information primarily from areas not currently covered by BBS. These species vary widely in preference for age and density of forest, degree of association with wet areas, and tolerance of deciduous or mixed forests. None of the species of this habitat is critically imperiled, and most are abundant and widespread. Nonetheless, this group includes many Neotropical migrant species that have undergone periods of notable decline.

Mixed and deciduous forest

A somewhat smaller group of species is associated with mixed and deciduous forest, including Wood Thrush and Yellow-bellied Sapsucker. Forests at the southern edge of the Northern Forest Region bordering the Prairies, including Aspen Parkland and the fringe of the boreal forest proper, are rapidly being lost to agriculture and other development. Additional concerns about habitat are associated with forestry and energy-sector activities, which are important issues for species that use mature to old-growth deciduous and mixed woodlands.

Shrub/successional

Shrub-nesting species using deciduous or coniferous forests, such as Mourning and Chestnut-sided Warbler, may find additional new habitats resulting from the regeneration of disturbed forests. However, some species dependent on specific types of shrub habitat, such as Golden-winged Warbler, may not benefit from industrial forestry activities. Over half of all the continentally important birds in these shrub habitats have suffered moderate to severe population declines.

Wetland

Wetlands are represented by Swamp Sparrow, and by Nelson's Sharp-tailed Sparrow, which also uses grassland.

Requiring mature conifers for breeding and mature lowland rainforest in winter, the Bay-breasted Warbler is the most vulnerable among a suite of Northern Forest warblers that migrate to the Neotropics.

Palm Warbler is characteristic of northern bogs with a few shrubs or trees. A subset of the boreal coniferous species group is associated with wet areas, including Rusty Blackbird and, in the eastern portion of its range, Canada Warbler. Both are Watch List Species that have undergone severe declines. Problems may lie primarily in the wintering areas, and there is a possibility that large numbers of Rusty Blackbirds may be killed as part of blackbird control aimed at other species. However, effects of acid rain on Canadian wetlands have also been suggested as a factor contributing to the decline of this species (Greenberg and Droege 1999). Bog habitats are affected by peat extraction and logging operations, but only in some portions of the Avifaunal Biome. Each of the Species of Continental Importance associated with wetlands is in need of monitoring in areas north of BBS coverage.

Conservation Issues

- Large-scale forestry activities, resulting in habitat fragmentation, change in tree-species and age

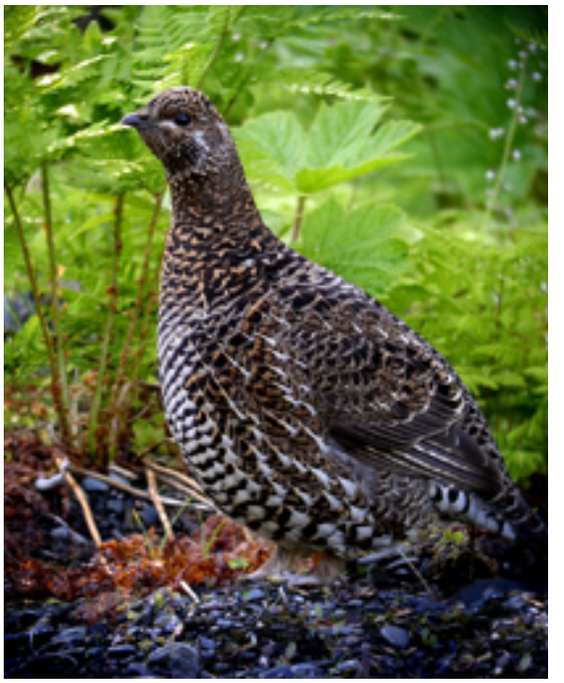
composition, use of pesticides, degradation of forest riparian areas, and fire suppression.

- Energy exploration, mining, hydro-electric development and other northern industries, resulting in habitat fragmentation, increased road access, and use of contaminants.
- Agriculture and urban development (limited to southern portions of the region).
- Degradation and loss of wintering and migration habitats affecting species that breed in northern forests.
- Climate change affecting distributions of birds in relation to northward retreat of boreal forests.
- Acid rain affecting vegetation and causing reduction in calcium-rich prey needed for reproduction.

Recommended Actions

- Promote 'best practices' guidelines for industry that call for maintaining a mosaic of habitats across the Avifaunal Biome, sufficient in variety, forest age, and area to maintain healthy populations of all components of the Northern Forest avifauna.
- Develop plans for BCRs that do not yet have them.
- Develop improved monitoring for species with a large portion of their range north of the BBS-coverage area.

Rusty Blackbird



Canada's tremendous stewardship responsibility to conserve its characteristic avifauna is illustrated by the Spruce Grouse, one of 30 species with 90% or more of its North American breeding population in the Northern Forest.

- Confirm declines in boreal species for which data comes from only a small portion of the breeding range, and conduct research on causes of declines.
- Continue research on effects of forestry practices on Golden-winged Warbler to determine management options in the northern potions of its range.
- Continue research and management directed at Kirtland's Warbler and Bicknell's Thrush (U.S. and Canadian recovery teams).
- Determine status of Smith's Longspur numbers and winter habitat availability.
- Determine the importance of the expanding Canadian range of the Golden-winged Warbler.
- Conduct research on the importance of distribution and quality of migration stopover habitat to migratory species.

PACIFIC AVIFAUNAL BIOME

The Pacific Avifaunal Biome is made up of three Bird Conservation Regions (Fig. 9) that extend from south-coastal Alaska south to northern Baja California in Mexico. This region encompasses nearly the entire Pacific coastline of North America, including coastal archipelagos. Dominating the northern portion of the landscape are the magnificent coniferous rainforests, including Sitka and other spruces, western hemlock and red cedar, Douglas fir, coastal redwood, and giant sequoia. These forests have been greatly altered in recent decades by forestry. In the southern half of the region, drier forests of pine, oak woodlands, chaparral, and coastal scrub habitats support a large number of endemic species. These habitats have been extensively altered and lost due to human encroachment. Important riparian habitats occur throughout the biome, particularly in the southern portion and in montane wet meadows throughout.

The Pacific Avifaunal Biome has a distinct group of species that are concentrated along the coast both in the breeding and wintering seasons (Fig. 19a, b). Many are resident year round, while many others breed here and winter in western Mexico (Fig. 19b). The region also is very important for northern breeding species that winter in the moderate climate along the Pacific coast. For example, large populations of raptors such as Red-tailed Hawk, American Kestrel, and Northern Harrier winter in the interior valleys where agriculture dominates. The majority of the wintering populations of Stewardship species such as Fox Sparrow and Golden-crowned Sparrow occur in this biome.

Overall, this region has relatively high breeding season threats (Fig. 5), and a high proportion of Watch List species (Fig. 10a). The main conservation issues for the region as a whole are related to effects on birds of forest management (e.g., timber harvest, fire suppression), loss of wetlands and riparian woodlands, and urban/residential/agricultural encroachment into oak, chaparral and coastal scrub habitats. Lowland and coastal habitats are heavily encroached upon by urban development and agriculture, as are the former grasslands of the Central Valley of California.

There are Watch List and Stewardship species representative of all the major terrestrial habitats in the Pacific Biome, but the greatest number of these species

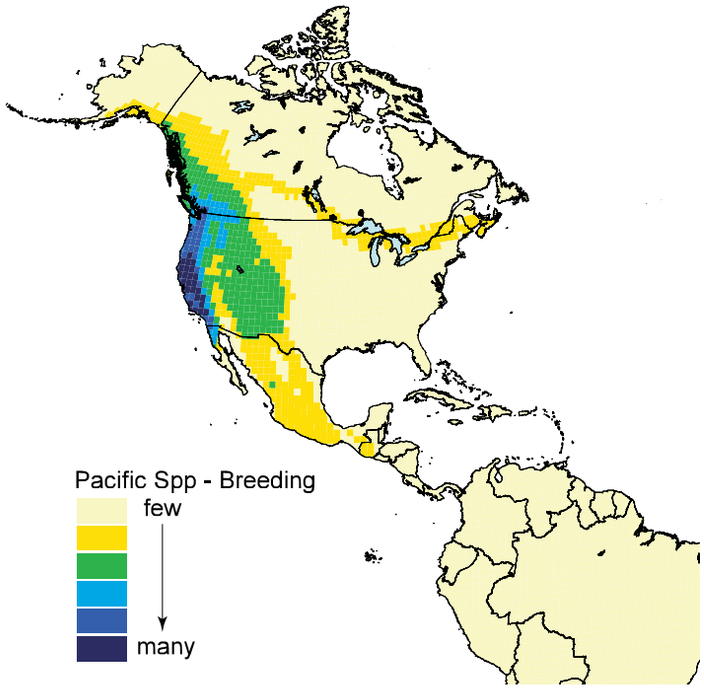


Figure 19a. Number of species during the breeding season in each lat-long block, weighted by the percent of total population of each species breeding within the Pacific Avifaunal Biome.

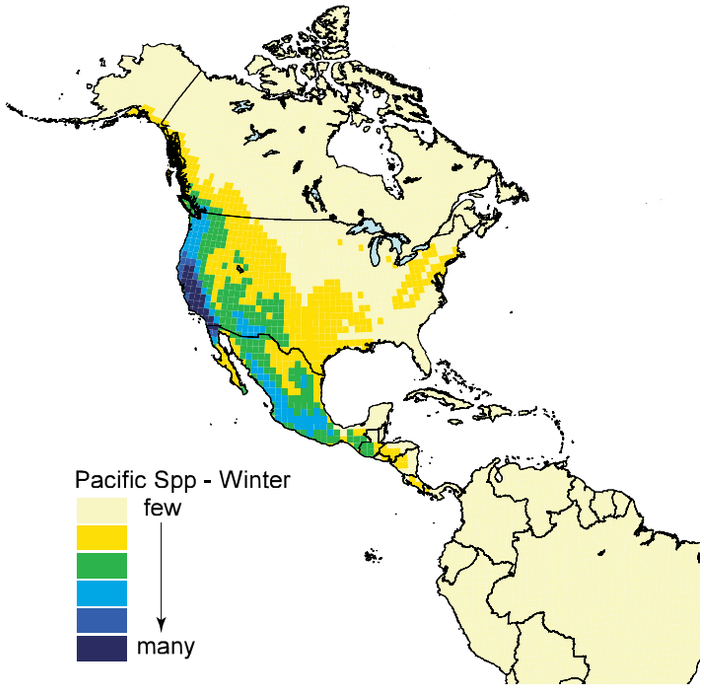


Figure 19b. Number of species during winter in each lat-long block, weighted by the percent of total population of each species breeding within the Pacific Avifaunal Biome.

can be placed in two major groups – those associated with the characteristic moist coniferous forests (17 species) and those associated with drier oak woodland, chaparral, and/or other scrub habitats (17 species). More specifically, mature coniferous forest (12 species) and oak habitats (15 species) stand out as supporting the most

Table 4. Species of Continental Importance in the Pacific Avifaunal Biome (includes BCRs 5, 15 and 32)

Species[1]	% Breeding Population	% Winter Population	Primary Habitat	Continental Population Objective	Continental Monitoring Need
Immediate Action					
Tricolored Blackbird	91%	65%	Wetland	Increase 100%	Mo2
California Condor	59%	59%	Various	Recovery Plan	
Spotted Owl	40%	40%	Coniferous forest	Recovery Plans	
Management					
Island Scrub-Jay	100%	100%	Western shrublands	Increase 10%	Mo1
Oak Titmouse	99%	99%	Woodland	Increase 50%	
Wrentit	97%	97%	Western shrublands	Increase 50%	
Nuttall's Woodpecker	96%	96%	Woodland	Increase 10%	
California Thrasher	95%	95%	Western shrublands	Increase 50%	
Hermit Warbler	94%	0%	Coniferous forest	Increase 10%	
Blue Grouse	75%	75%	Coniferous forest	Increase 100%	Mo2
Rufous Hummingbird	61%	0%	Western shrublands	Increase 100%	Mo2
Black-chinned Sparrow	44%	<1%	Western shrublands	Increase 50%	
Black Swift	29%	0%	Various	Increase 50%	Mo2
Lewis's Woodpecker	4%	25%	Riparian	Increase 10%	
Willow Flycatcher	24%	0%	Riparian	Increase 50%	
Band-tailed Pigeon	22%	18%	Mixed forest	Increase 100%	
Olive-sided Flycatcher	15%	0%	Coniferous forest	Increase 100%	Mo3
White-throated Swift	10%	4%	Various	Increase 100%	
Long-term Planning & Responsibility					
Yellow-billed Magpie	100%	100%	Woodland	Increase 10%	
Allen's Hummingbird	98%	4%	Western shrublands	Increase 10%	Mo2
Mountain Quail	96%	96%	Western shrublands	Increase 10%	Mo2
Pacific-slope Flycatcher	91%	0%	Mixed forest	Increase 10%	
Chestnut-backed Chickadee	90%	90%	Coniferous forest	Increase 10%	
Golden-crowned Sparrow	6%	85%	Western shrublands	Maintain	Mo3
Lawrence's Goldfinch	84%	29%	Woodland	Increase 10%	Mo2
Red-breasted Sapsucker	78%	77%	Mixed forest	Increase 10%	M03
White-headed Woodpecker	73%	73%	Coniferous forest	Maintain	
Varied Thrush	33%	72%	Coniferous forest	Maintain	Mo3
Black-throated Gray Warbler	69%	0%	Mixed forest	Increase 10%	
Bald Eagle	60%	39%	Wetland	Maintain	Mo2,3
California Towhee	55%	55%	Western shrublands	Increase 10%	
Steller's Jay	54%	54%	Coniferous forest	Maintain	
Western Scrub-Jay	53%	53%	Western shrublands	Maintain	
Fox Sparrow	8%	52%	Western shrublands	Maintain	
Flammulated Owl	25%	0%	Mixed forest	Increase 10%	Mo1
Winter Wren *	26%	50%	Coniferous forest	Maintain	Mo3
California Gnatcatcher	17%	17%	Western shrublands	Recovery Plan	Mo1
Costa's Hummingbird	15%	6%	Western shrublands	Increase 10%	Mo2

[1]Species are sorted by Action Category (Immediate, Management, Planning & Responsibility), then by decreasing % of population (by greater of breeding or winter population). Species highlighted in yellow are Watch List species with at least 10% of their population in this biome. Species in green (in species or % population columns) are Stewardship Species with more than 75% of their population in this biome.
*For these species, % of Population is for Western Hemisphere, all others are % Global Population.

Species of Continental Importance.

Two other habitats are noteworthy because they support a diverse assemblage of birds and/or significant regional

The Lawrence's Goldfinch is one of 10 Watch List species with 80% or more of its global breeding population restricted to the Pacific Avifaunal Biome. High threats to habitats from human development in this region take on an added urgency due to this extremely high stewardship responsibility.c

subspecies or distinct populations. Riparian habitats (7 species) are a high conservation priority for both reasons, especially within the southern portions of the region (i.e., southwestern Oregon and all of California). Perhaps the most specialized species in the biome are birds of the highly threatened and limited distribution coastal scrub habitat of California.

Primary Habitats

Coniferous forest

Coniferous rainforests are the flagship habitats of the Pacific Biome. These highly productive and intensively managed forests are sustained by a mild maritime climate and lots of rain. In old-growth forests, there are trees over 60 m tall, multi-layered canopies and subcanopies, and shrubby understories and forest floors carpeted with mosses and ferns. A figurehead species in coniferous forest, because of its endangered status and close association with old-growth forests is the Spotted Owl. These forests also support Watch List and regional specialist species like Hermit Warbler, Band-tailed Pigeon, and Rufous Hummingbird.

Woodland

Oak habitats (savannahs and woodlands) occur where people want to live. They have become highly fragmented and increasingly degraded from loss due to human development (urban, residential, and agricultural), encroachment of coniferous forest and invasion of exotic species, and lack of oak regeneration. A relatively recent and dramatic threat, especially in California is Sudden Oak Death Syndrome. Oak habitats also have the highest percentage of continentally important species with declining trends in the biome. Among these are Western Bluebird, Oak Titmouse, Lark Sparrow, Western Wood-pewee, and Ash-throated Flycatcher. In addition to declines there have been regional extirpations; Western Bluebird from Vancouver Island, British Columbia, White-breasted Nuthatch from western Washington, Lewis's Woodpecker from western Washington and Oregon, and Blue-gray Gnatcatcher from several locations in California.

Among a suite of endemic breeding species of California's threatened oak and chaparral habitats, the Allen's Hummingbird migrates a short distance to winter entirely in western Mexico.

Riparian

Riparian woodland and shrub habitats are perhaps the most critical habitats overall because of the diversity of birds they support and their importance during migration. In the Pacific Biome, this is most evident in southwestern Oregon and California. These habitats are dominated by deciduous canopies of pure or mixed stands of cottonwood, ash, willow, and alder. They have been reduced in extent and quality from numerous factors including flood control (i.e., dams), channelization, dredging, clearing for agriculture, and exotic species. Consequently, several species such as populations of Least Bell's Vireo, Yellow-billed Cuckoo, and Willow Flycatcher in California have suffered population declines and extirpations resulting in state or federal listing status. Other highly characteristic species of riparian habitats such as Yellow Warbler and Warbling Vireo have suffered from habitat loss and cowbird parasitism.

Western shrublands

The majority of California's human population lives in the coastal region where coastal shrub and chaparral habitats are the dominant feature of the landscape. These are relatively dry habitats characterized by a dense shrub layer. Most of these

Red-breasted Sapsucker is a characteristic species of the temperate rainforests of the northern Pacific Coast.

habitats occur along the coastal strip, but some can be found in the interior and in montane environments (e.g., chaparral). Although these habitats are limited in extent, they support a suite of unique and specialized species and are among the most threatened and least protected habitats. Primary conservation issues are habitat loss and fragmentation to human development. The endangered California Gnatcatcher epitomizes these habitats, but other highly associated Watch List species include Wrentit, California Thrasher, Black-chinned Sparrow, and Mountain Quail.

Conservation Issues

- Loss and fragmentation of remaining mature coniferous forest through commercial forestry, especially on public lands.
- Other forest-management issues, including fire suppression, prescribed fire, and recreation.
- Loss and potential restoration of riparian forest and shrub.
- Urban and residential development, especially in oak, chaparral and coastal scrub habitats.
- Forest health, especially in pine forest and oak woodlands.
- Loss and contamination of freshwater wetlands.
- Exotic species, both plants and animals.

Recommended Actions

- Incorporate scientifically sound bird conservation objectives into forest management (public and private lands) through policy and planning.
- Conduct restoration and management of riparian, pine, oak, chaparral, and coastal scrub habitats to support native conditions and species, as well as natural processes.
- Secure conservation status for highest-priority wetland, riparian, oak, chaparral, and coastal scrub habitats.
- Work with local and regional planners in designing bird-friendly conditions in developing human communities and habitats.
- Focus species-specific conservation efforts on unique (i.e., not captured well under habitat efforts), declining, and regionally extirpated species such as Black Swift, Tricolored Blackbird, Olive-sided Flycatcher, Lewis's Woodpecker, and Burrowing Owl.

INTERMOUNTAIN WEST AVIFAUNAL BIOME

The Intermountain West Avifaunal Biome (Fig. 9) is composed of three of the largest Bird Conservation Regions south of the boreal forest. The extensive mountain ranges and broad basins produce large elevational gradients that create a complex and variable ecology. From low elevation Great Basin woodland and shrublands to alpine tundra, the area spans 5 life zones. This area is known for its coniferous forest, pinyon-juniper woodland, and cold semidesert shrubsteppe. The West's most important wetland complexes also are found here. Although these habitats still cover large expanses, most have been changed significantly by anthropogenic forces. A large percent of this area is in public ownership in both Canada and the U.S..

The Intermountain West is the center of distribution for many western birds. Over half of the Species of Continental Importance (Table 5) have 75% or more of their population here (Fig. 20a). Many breeding species from the Intermountain West migrate through this biome and winter over much of Mexico or in the Southwestern biome (Fig. 20b). Threats and/or declining trends among species of continental importance are spread across conifer forest, pinyon-juniper woodland, shrubsteppe and riparian habitats. About half the Species of Continental Importance in this biome are not adequately monitored.

Breeding only on alpine peaks of the Intermountain West, the Brown-capped Rosy-Finch has one of the smallest populations and range of any North American landbird.

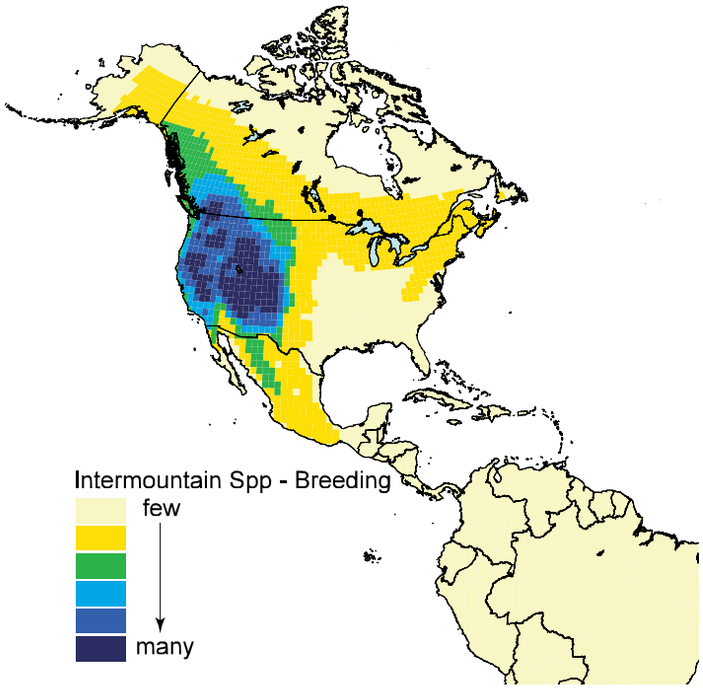


Figure 20a. Number of species during the breeding season in each lat-long block, weighted by the percent of total population of each species breeding within the Intermountain West Avifaunal Biome.

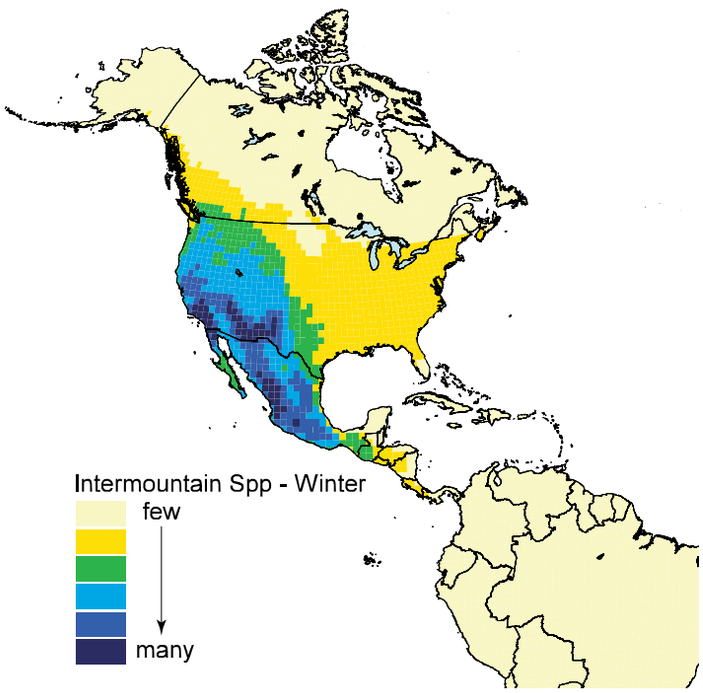


Figure 20b. Number of species during winter in each lat-long block, weighted by the percent of total population of each species breeding within the Intermountain West Avifaunal Biome.

Of interest is the reintroduction of California Condors to the southern part of this avifaunal biome. Habitat for condors must be relatively undisturbed and provide large carrion such as mule deer. This is a highly managed population and will undoubtedly remain so.

Table 5. Species of Continental Importance in the Intermountain West Avifaunal Biome (includes BCRs 9, 10 and 16)

Species[1]	% Breeding Population	% Winter Population	Primary Habitat	Continental Population Objective	Continental Monitoring Need
Immediate Action					
Gunnison Sage-Grouse	100%	100%	Western shrublands	Increase 100%	
Greater Sage-Grouse	80%	80%	Western shrublands	Increase 100%	Mo2
Bendire's Thrasher	45%	6%	Western shrublands	Increase 100%	Mo2
California Condor	41%	41%	Various	Recovery Plan	
Spotted Owl	20%	20%	Coniferous forest	Recovery Plans	
Management					
Brewer's Sparrow	94%	1%	Western shrublands	Increase 100%	
Pinyon Jay	92%	92%	Woodland	Increase 100%	
Lewis's Woodpecker	87%	52%	Riparian	Increase 10%	
Cassin's Finch	86%	61%	Coniferous forest	Increase 50%	
Willow Flycatcher	46%	0%	Riparian	Increase 50%	
White-throated Swift	38%	<1%	Various	Increase 100%	
Rufous Hummingbird	36%	0%	Western shrublands	Increase 100%	Mo2
Black Swift	29%	0%	Various	Increase 50%	Mo2
Olive-sided Flycatcher	21%	0%	Coniferous forest	Increase 100%	Mo3
Swainson's Hawk	15%	0%	Grassland	Increase 10%	
Grace's Warbler	14%	0%	Mixed forest	Increase 50%	
Long-term Planning & Responsibility					
Black Rosy-Finch	100%	100%	Tundra	Increase 10%	Mo2
Brown-capped Rosy-Finch	100%	99%	Tundra	Increase 10%	Mo2
Sage Thrasher	99%	31%	Western shrublands	Maintain	
Gray Flycatcher	96%	0%	Woodland	Maintain	
Calliope Hummingbird	95%	0%	Western shrublands	Increase 10%	Mo2
Red-naped Sapsucker	95%	9%	Mixed forest	Increase 10%	
Williamson's Sapsucker	94%	15%	Coniferous forest	Increase 10%	
Green-tailed Towhee	92%	2%	Western shrublands	Increase 10%	
Clark's Nutcracker	89%	89%	Coniferous forest	Maintain	
Dusky Flycatcher	86%	0%	Western shrublands	Increase 50%	
Sage Sparrow	83%	35%	Western shrublands	Maintain	
Mountain Bluebird	76%	35%	Western shrublands	Maintain	
Gray Vireo	68%	0%	Woodland	Maintain	
Virginia's Warbler	62%	0%	Woodland	Increase 10%	
Flammulated Owl	40%	0%	Coniferous forest	Increase 10%	Mo1
White-headed Woodpecker	27%	27%	Coniferous forest	Maintain	
McCown's Longspur	21%	<1%	Grassland	Increase 10%	

[1]Species are sorted by Action Category (Immediate, Management, Planning & Responsibility), then by decreasing % of population (by greater of breeding or winter population). Species highlighted in yellow are Watch List species with at least 10% of their population in this biome. Species in green (in species or % population columns) are Stewardship Species with more than 75% of their population in this biome.

Primary Habitats

Coniferous forest

Forest types of the Intermountain West include Ponderosa pine, mixed conifer, spruce-fir, and whitebark pine, among others. Several species-suites separate themselves out due to the many forest types included in this category. White-headed Woodpecker, Lewis's Woodpecker, Flammulated Owl, and Cassin's Finch need open, dry, old Ponderosa pine forests that historically were produced by low intensity fires. Williamson's Sapsucker, Olive-sided Flycatchers, and Spotted Owl are

found in mixed conifer and/or spruce-fir forest types. Clark's Nutcrackers are characteristic of whitebark pine forests, which have been reduced significantly by fire suppression that favors spruce-fir. In general, extensive timber harvest and fire suppression have taken a toll on these characteristic bird species.

Deciduous forest

Aspen is a declining habitat type, threatened by fire suppression and resulting conifer succession, overgrazing/browsing by cattle and elk, and by timber and hardwood harvest. Few bird species are limited to aspen but many reach their highest breeding densities here. Cavity nesters predominate; Red-naped Sapsuckers and Mountain Bluebirds are the Stewardship Species of greatest importance.

.The Swainson's Hawk undergoes among the longest-distance migrations of any North American raptor. Although still a common breeder in the dry grasslands of the Intermountain West, this species is subject to poisoning on its southern South American wintering grounds.

Woodland

Pinyon-Juniper woodlands are especially characteristic of the Intermountain West Region. This habitat supports the largest nesting bird species list of any upland vegetation type in the West (Colorado PIF 2000). Pinyon Jay, Gray Vireo and Gray Flycatcher are species of continental importance in this habitat. Degradation of pinyon-juniper has been widespread and continuous since settlement. Conversion to grassland has had mixed results for livestock and minimal usefulness to wildlife. Fire suppression has allowed juniper to encroach into grasslands.

Western shrublands

Shrub-nesting species comprise the largest number of continentally important species in this biome. The sagebrush 'sea' was once a major feature of the open expanses of the West. Conversion for agriculture, invasion of nonnative grasses, overgrazing, development, sagebrush eradication and changes in fire regimes have caused considerable loss of habitat and declines of associated bird populations. Cheatgrass has invaded about half of the existing sagebrush habitat. Shrubsteppe was called the highest priority habitat for conservation based on trends in bird populations and habitat in the Interior Columbia Basin project (Saab and Rich 1997, Paige and Ritter 1999). Greater Sage-Grouse, Gunnison's Sage-Grouse, Sage Sparrow, Sage Thrasher, Brewer's Sparrow and Green-tailed Towhee are continentally important sagebrush species. Montane shrublands embedded in forests provide many species with valuable food and cover. These may be critical to western hummingbirds during migration. Dusky Flycatcher, Virginia's Warbler, Calliope Hummingbird, Green-tailed Towhee, Rufous Hummingbird, and Mountain Bluebird are species of continental importance here. Currently there are few west-wide conservation problems affecting this habitat.

Riparian

Riparian habitat is highly productive and sensitive to disturbance. Black Swift, Rufous Hummingbird, Willow Flycatcher, Lewis's Woodpecker, Calliope Hummingbird, and Dusky Flycatcher are found in various riparian habitats throughout the Intermountain West. Characteristics of riparian habitat vary widely depending on the matrix and elevation, from cottonwood gallery forests to willow thickets to spruce-fir forests. Riparian areas have been substantially altered by development of all types, including de-watering and alteration of water flows, invasion of nonnative species, logging, grazing, and recreation.

Tundra

Alpine tundra is a specialized, fragile habitat type. It is easily disturbed and takes decades to recover. Livestock grazing, mining, recreation and global climate change are affecting this habitat. Black Rosy-Finch and Brown-capped Rosy-Finch are the two alpine tundra endemics on the Watch List. As global climate change progresses, the extent of alpine habitats will be reduced, putting rosy-finches in a precarious position of losing their habitat in all but the highest mountain tops.

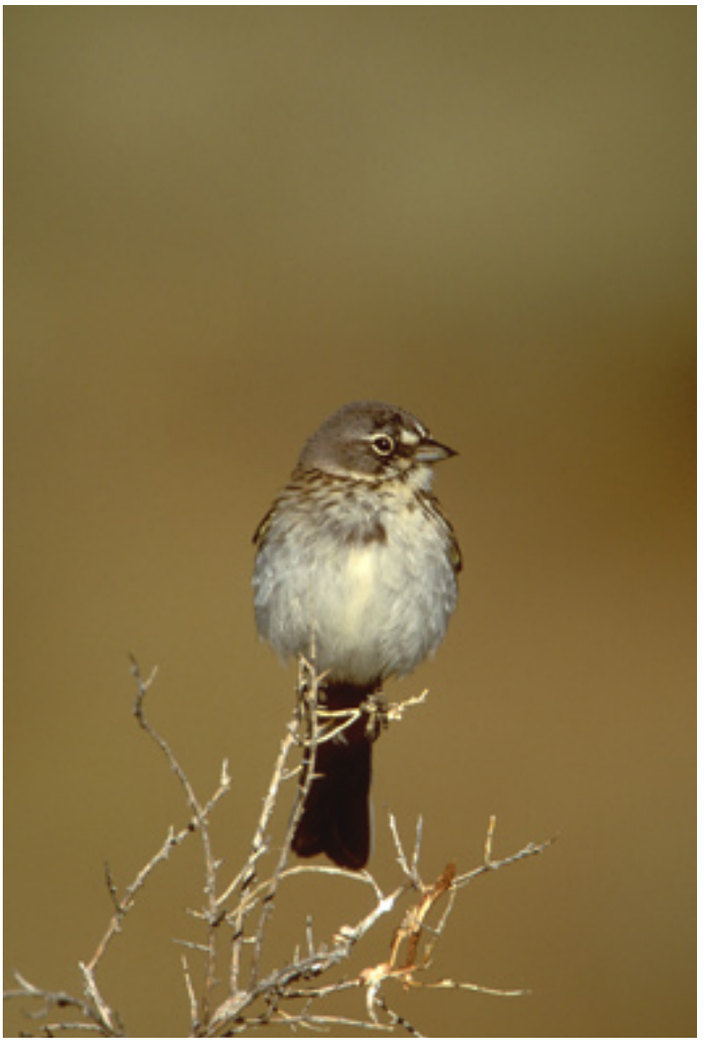
Conservation Issues

- Livestock grazing, changing the structure and composition of fragile grassland and shrublands.

- Invasion of exotic plants, especially affecting sagebrush and other shrubland habitats.
- Changes in natural fire intensity and frequency through decades of fire-supression, affecting both forest and shrubland habitats.
- Logging practices affecting forest structure and composition, especially for mature-forest and cavity-nesting species.
- Continued degradation of riparian habitat.
- Conversion of sagebrush and pinyon-juniper habitats, through agriculture and suburban development.
- Water diversions, alteration of stream flows, and spring developments.
- Recreational offroad vehicle use.

Recommended Actions

- Manage dry Ponderosa pine forests to restore historic characteristics. In general for other forest types, retain of old-growth stands and snags, thin younger dense trees, and restore the role of fire.
- Retain large, mature tracts of pinyon-juniper; ensure supply of seed producing pinyon pine. Write Best Management Practices for this woodland type. Work with Mexican counterparts to protect/conserve Gray Vireo wintering habitat in Sonora.
- Maintain/promote growth of native grasses and forbs in shrubsteppe. Prevent large scale wildfire that results in cheatgrass invasion or destroys high value sagebrush. Restore with native species following disturbance. Maintain water quality and quantity and vegetation in embedded springs, seeps and riparian areas.
- Protect extensive, high quality examples of riparian. Manage and restore degraded stretches. Manage invasive Russian olive and salt cedar. Restore natural flows and flooding regimes. Protect known Black Swift colonies.
- Protect existing alpine habitat from disturbance.



The Sage Sparrow is one of several species strictly associated with Intermountain West sagebrush habitats, which are highly threatened by conversion, over-grazing, invasive grasses, and changing fire-regimes

SOUTHWEST AVIFAUNAL BIOME

The Southwest Avifaunal Biome is composed of five Bird Conservation Regions that encompass the deserts of the U.S. and Mexico (Fig. 9). Geography and natural environmental forces have combined to create a high diversity of habitats within this area, which is adapted to little rainfall and periodic drought. This diversity has created an equally high number of habitat specialists. Habitats in this region can be very broadly categorized as montane coniferous forest, shrubland, woodland, thorn forest, grassland, or riparian.

Conservation issues affecting landbirds in the southwestern U.S. largely are mirrored in Mexico, and both countries share responsibility for over half the U.S.- and Canadian-breeding Watch List Species with small populations or restricted ranges that are found here. In winter, these species largely are resident or migrate only short distances to Mexico and northern Central America (Fig. 21b). Although the present version of this plan only covers the United States portion of this Avifaunal Biome, clearly conservation of this diverse region will require international partnerships, as well as focused attention within Mexico. Full participation of Mexico in the next version of the plan will highlight these needs.

The pattern for most landbird species in this region is one of narrow distributions in all seasons (Fig. 3 and 4), high threats (Fig. 5 and 6), declining population trends (Fig. 7a), and small population size (Fig. 2). Species of Continental Importance with multiple reasons for concern are spread across habitats. However, the majority of Watch List Species with small populations or limited distributions are found within coniferous forest or riparian areas, while the majority of Watch List Species with declining trends or threats are riparian or grassland birds. Southwestern shrub and woodland birds exhibit high habitat specialization. At least 20 Species of Continental Importance are not monitored sufficiently for us to determine population trends -- the largest number in any Avifaunal Biome.

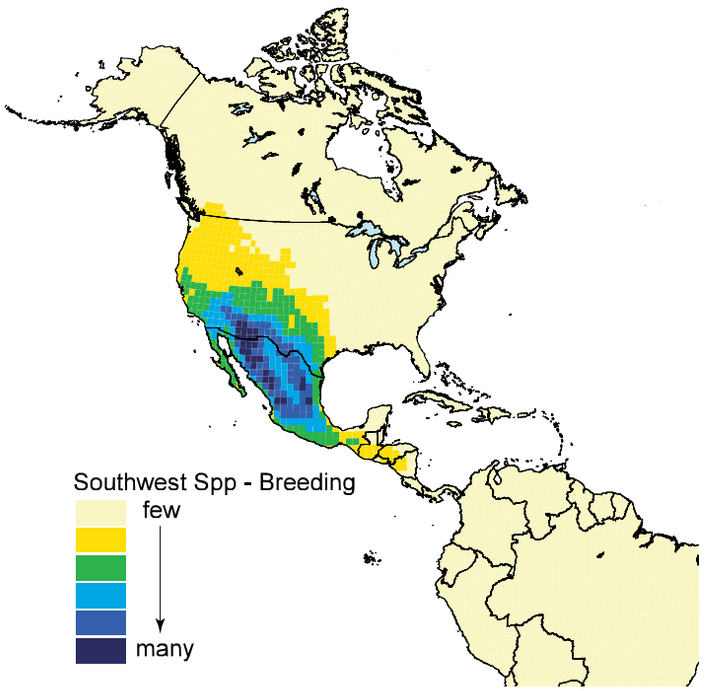


Figure 21a. Number of species during the breeding season in each lat-long block, weighted by the percent of total population of each species breeding within the Southwest Avifaunal Biome.

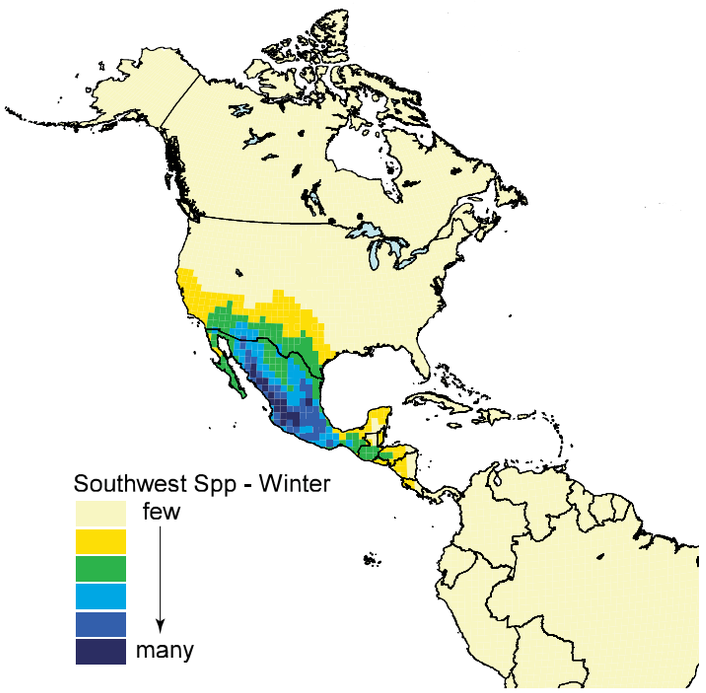


Figure 21b. Number of species during winter in each lat-long block, weighted by the percent of total population of each species breeding within the Southwest Avifaunal Biome.

Primary Habitats

Coniferous and mixed forests

Coniferous forests of the southwestern mountains are important not only to breeding birds, but they serve as the primary migratory corridor for western hummingbirds and many other continentally important montane species from the Intermountain West and the Pacific, such as Hermit Warbler. These forests support more breeding species with no trend data than any other habitat in the Southwest. These forests include the pine-oak mixed forest type as well as higher elevation mixed-conifer. Timber harvest, livestock grazing and

Table 6. Species of Continental Importance in the Southwest Avifaunal Biome (includes BCRs 20 and 33-36)

Species[1]	% Breeding Population	% Winter Population	Primary Habitat	Continental Population Objective	Continental Monitoring Need
Immediate Action					
Golden-cheeked Warbler	100%	0%	Woodland	Recovery Plan	Mo1
Baird's Sparrow	0%	95%	Grassland	Increase 100%	
Colima Warbler	94%	7%	Woodland	Increase 10%	Mo1
Black-capped Vireo	94%	3%	Western shrublands	Recovery Plan	Mo1
Thick-billed Parrot	90%	53%	Mixed forest	Poss. Reintroduction	Mo1
Bendire's Thrasher	51%	85%	Western shrublands	Increase 100%	Mo2
Bell's Vireo	63%	0%	Riparian	Increase 100%	
Red-crowned Parrot	50%	50%	Woodland	Increase 100%	Mo1
Spotted Owl	33%	33%	Mixed forest	Recovery Plans	
Tricolored Blackbird	2%	33%	Wetland	Increase 100%	Mo2
Green Parakeet	24%	24%	Woodland	Increase 50%	Mo1
Management					
Lucy's Warbler	98%	12%	Woodland	Increase 10%	
Verdin	89%	89%	Western shrublands	Increase 100%	
Cassin's Sparrow	63%	86%	Grassland	Increase 50%	
Brewer's Sparrow	<1%	86%	Western shrublands	Increase 100%	
Black-throated Sparrow	72%	83%	Western shrublands	Increase 100%	
Scaled Quail	82%	82%	Grassland	Increase 50%	
Pyrrhuloxia	80%	80%	Western shrublands	Increase 50%	
Black-chinned Sparrow	45%	76%	Western shrublands	Increase 50%	
Varied Bunting	67%	16%	Riparian	Increase 50%	Mo1
Five-striped Sparrow	63%	63%	Western shrublands	Increase 50%	Mo1
Montezuma Quail	55%	55%	Mixed forest	Increase 50%	Mo1
Sprague's Pipit	0%	51%	Grassland	Increase 100%	
White-throated Swift	24%	51%	Various	Increase 100%	
Grace's Warbler	50%	22%	Mixed forest	Increase 50%	
Painted Bunting	46%	1%	Western shrublands	Increase 100%	
Audubon's Oriole	32%	32%	Riparian	Increase 10%	Mo1
Hermit Warbler	<1%	22%	Mixed forest	Increase 10%	
Elegant Trogon	21%	21%	Mixed forest	Increase 50%	Mo1
Lewis's Woodpecker	1%	17%	Riparian	Increase 10%	
Swainson's Hawk	15%	0%	Grassland	Increase 10%	
Band-tailed Pigeon	12%	13%	Mixed forest	Increase 100%	
Long-term Planning & Responsibility					
Abert's Towhee	100%	100%	Riparian	Increase 10%	
Black-tailed Gnatcatcher	96%	96%	Western shrublands	Increase 10%	
Cave Swallow	93%	96%	Various	Maintain	Mo2
Gambel's Quail	95%	95%	Western shrublands	Increase 10%	
Crissal Thrasher	94%	94%	Western shrublands	Maintain	Mo2
Red-faced Warbler	92%	25%	Coniferous forest	Increase 10%	Mo1
Le Conte's Thrasher	89%	89%	Western shrublands	Increase 10%	Mo2
Cactus Wren	82%	82%	Western shrublands	Increase 50%	
Canyon Towhee	79%	79%	Western shrublands	Maintain	
Rufous-winged Sparrow	78%	78%	Western shrublands	Increase 10%	Mo1
Curve-billed Thrasher	78%	78%	Western shrublands	Increase 50%	
Black-crested Titmouse	77%	77%	Woodland	Maintain	Mo1

Table 6. Species of Continental Importance in the Southwest Avifaunal Biome - continued

Species	% Breeding Population	% Winter Population	Primary Habitat	Continental Population Objective	Continental Monitoring Need
Lucifer Hummingbird	76%	2%	Western shrublands	Maintain	Mo1
Scott's Oriole	76%	43%	Woodland	Maintain	
Yellow-headed Blackbird	1%	75%	Wetland	Maintain	
Green-tailed Towhee	1%	75%	Western shrublands	Increase 10%	
Phainopepla	75%	3%	Woodland	Maintain	
Gray Vireo	23%	73%	Western shrublands	Maintain	
Elf Owl	73%	16%	Woodland	Increase 10%	Mo1
Lawrence's Goldfinch	14%	66%	Western shrublands	Increase 10%	Mo2
Costa's Hummingbird	62%	59%	Western shrublands	Increase 10%	Mo2
Arizona Woodpecker	56%	56%	Mixed forest	Increase 10%	Mo1
McCown's Longspur	0%	43%	Grassland	Increase 10%	
Virginia's Warbler	38%	0%	Mixed forest	Increase 10%	
Black-capped Gnatcatcher	31%	31%	Western shrublands	Increase 10%	Mo1
Flammulated Owl	26%	22%	Mixed forest	Increase 10%	Mo1
Thick-billed Kingbird	21%	12%	Riparian	Increase 10%	Mo1

[1]Species are sorted by Action Category (Immediate, Management, Planning & Responsibility), then by decreasing % of population (by greater of breeding or winter population). Species highlighted in yellow are Watch List species with at least 10% of their population in this biome. Species in green (in species or % population columns) are Stewardship Species with more than 75% of their population in this biome.

changes in fire regimes have affected birds such as Montezuma Quail, Spotted Owl, Arizona Woodpecker and Red-faced Warbler. The Thick-billed Parrot utilized pine-oak forests in Arizona prior to the 1930's, but is now extirpated from the U.S. It still can be found, however, only 50 km south of the border.

Western shrublands

These can be placed into four general types: Chihuahuan, Mojave, or Sonoran desert shrubland, and shrublands in the Edward's Plateau. These shrublands support different bird communities. In the Chihuahuan Desert, most of the continentally important birds are Stewardship Species with good trend data. In contrast, continentally important birds in the Sonoran and Mojave Deserts are primarily Watch List Species and have poor or no trend data. These shrublands are important for Intermountain West shrub migrants and winterers as well as resident species. In some areas, these habitats are under heavy pressure from suburban development. In the Sonoran Desert the retention and regeneration of columnar cacti and retention of large patches of shrubland are crucial to the maintenance of desert species such as Elf Owl, Bendire's Thrasher and Rufous-winged Sparrow.

Woodland

Ashe juniper/oak woodland on the Edward's Plateau supports the most highly restricted Watch List Species in the region breeds -- Golden-cheeked Warbler. Other woodlands may have more tall shrubs than small trees per se, or are composed of taller woody vegetation within grasslands. Three quarters of all continentally important woodland species in either season have poor to no trend data. Alterations in fire regimes and other land-use decisions have resulted in high habitat fragmentation and lack of early successional shrub growth, affecting such birds as Black-capped Vireo, Black-chinned Sparrow, and Elf Owl.

Thorn forests, primarily in Mexico, but also bordering the Rio Grande (Rio Bravo) in Texas, are under heavy pressure from pollution and agricultural and residential development. Species of Continental Importance breeding in this habitat are all Watch List Species and none have viable trend data. Little is known about this habitat compared with others in the Southwest. The Red-crowned Parrot is legally designated in Mexico as an endangered species and is in need of Immediate Action; we estimate as high as 50% of its remaining world population now occurs in the U.S.

Grassland

Grasslands support the highest number of Species of Continental Importance with declining trends in any southwestern habitat type. These grasslands have as much value for their support of Prairie Biome breeding species during migration and winter as they do for southwestern grassland breeding birds. Because of the nomadic nature of grassland species it is important to maintain large patches of high-quality grasslands across

all BCRs in the Southwest in order to accommodate grassland birds through time. Impacts to these grasslands include historical overgrazing, altered fire regimes, shrub encroachment and eradication of prairie-dogs affecting wintering grassland specialists such as Swainson's Hawk, Sprague's Pipit, Baird's Sparrow and McCown's Longspur.

Riparian

Riparian woodlands carry the highest diversity of landbird species of all habitats in this avifaunal biome. Riparian areas may be found within all above types of habitats and may not even carry water year-round. Nevertheless, they are critical to many more northerly breeding Neotropical migrant species as well as breeding or wintering Species of Continental Importance in this region. Riparian concern species (not including migration) are all on the Watch List. However, poor monitoring data are associated with those whose primary distribution is found in Mexico. Interestingly, the two Watch List Species primarily wintering in southwestern riparian areas also have poor trend data: Lewis's Woodpecker and Lawrence's Goldfinch. The retention or regeneration of riparian forests with the re-creation of natural flooding regimes hold high value for breeding species such as Lucy's Warbler and Thick-billed Kingbird. Wetlands in the region are largely restricted to riparian areas, and the health of riparian areas is critical.

Although causes of its steep decline are not well known, the Bendire's Thrasher is in need of immediate conservation attention protect its small global population in the arid shrublands of the Southwest.

Conservation Issues

- Changes in natural fire intensity and frequency.
- Alteration of hydrologic regimes (including, but not limited to construction of dams and loss of regular flooding, river channelization, invasion of exotic plant species, and xerification).
- Grazing management (including overgrazing and prairie-dog eradication) in all habitats.
- Forest and woodland management (including changes in structure and age class composition, timber harvest, and suburban development).
- Agricultural or suburban development in thorn forest, Sonoran shrubland and grasslands.
- Habitat fragmentation in all habitats, through suburban development, habitat conversion, catastrophic fire or other means.
- Shrub encroachment in grasslands.

Recommended Actions in the United States

- Continued research and management for the Listed Golden-cheeked Warbler and Black-capped Vireo and support for reintroduction or natural recolonization of Thick-billed Parrot in the U.S..
- Conduct monitoring in the following southwestern habitats: thorn forest, coniferous forests, woodlands, Sonoran and Mojave shrublands, and riparian. Additionally, conduct basic habitat research in thorn forest.
- Reintroduce or mimic intermittent flooding regimes on major rivers.
- Institute habitat-conserving livestock grazing regimes in all habitats.
- Develop best management practices for all habitats.
- Continue community-growth development planning in high-development areas near Austin, San Antonio, Brownsville-McAllen, El Paso-Las Cruces and the Tucson-Phoenix area.
- Develop community-involved, well-planned, fire management strategies in woodlands, grasslands and coniferous forests.
- Maintain many patches of high-quality grasslands distributed throughout the entire region.

PRAIRIE AVIFAUNAL BIOME

The seven BCRs of the Prairie Avifaunal Biome cover the center of the U.S. and extend into southern Canada (Fig. 9). This biome historically comprised North America's extensive native grasslands, ranging along a precipitation gradient from shortgrass prairies and sagebrush plains in the west to tallgrass prairies and prairie-oak savannahs in the east. The perimeter of the region formed a transition with forest biomes creating savannahs of different types depending upon where in the region they where found. The prairies were studded with numerous wetlands associated with glacial depressions, estuaries, large river systems and playas. Fire, the major element of disturbance, interacted with historical grazing, topography, wetland distribution, and drought cycles to maintain a great complexity of prairie ecotypes within a deceptively homogeneous sea of grass.

Landbird species that breed in this Biome (Table 7, Fig. 22a) winter primarily in the Southwestern and Eastern Biomes, and throughout Mexico (Fig. 22b), though a few migrate into South America. The Prairie Biome provides wintering habitat for many Arctic species. Almost 40% of the species on the PIF continental Watch List because of declining trends or high threats breed here. Not surprisingly, birds associated with grasslands are the most threatened in this region, both during the breeding season and in winter. The precipitous population declines of birds in this region (Fig. 7a) contrast strongly with the other continental patterns of vulnerability (Figs. 2-6). This Plan calls for increases in populations in all but one of the Species of Continental Importance. Although most species breeding in this Avifaunal Biome are widespread, a few have highly restricted ranges. Monitoring needs among the continentally important prairie birds include the prairie grouse, which have poor to no Breeding Bird Survey coverage, and those species from the Northern Forest or Arctic that winter in the biome.

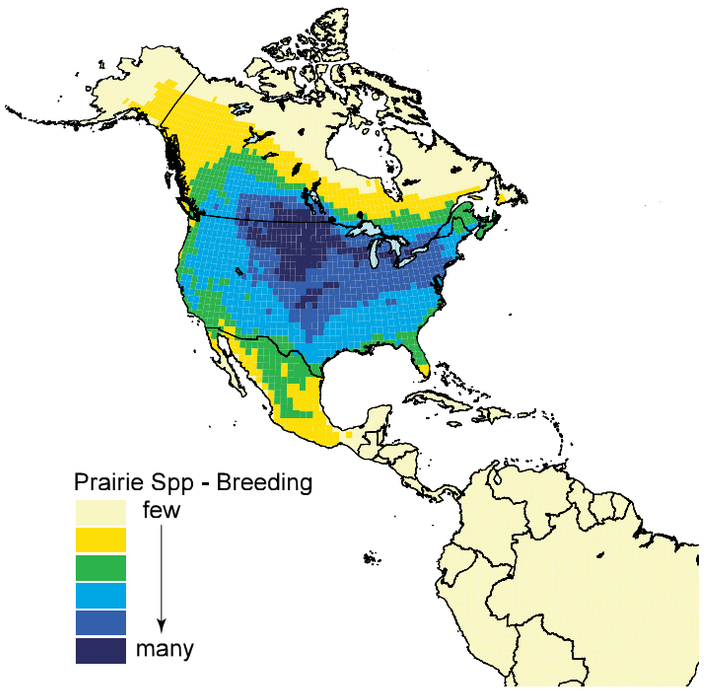


Figure 22a. Number of species during the breeding season in each lat-long block, weighted by the percent of total population of each species breeding within the Prairie Avifaunal Biome.

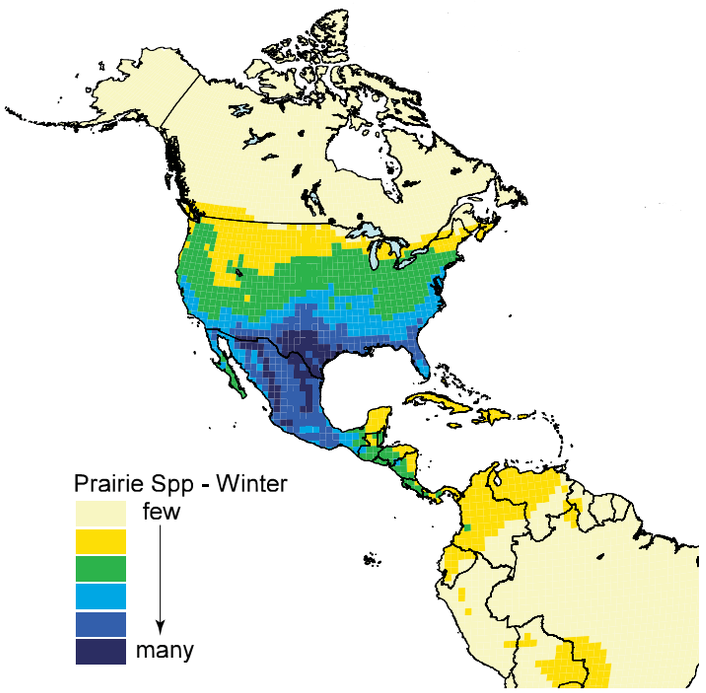


Figure 22b. Number of species during winter in each lat-long block, weighted by the percent of total population of each species breeding within the Prairie Avifaunal Biome.

Primary Habitats

Grassland

Grasslands, the dominant habitat in this biome, comprise three distinct types: tallgrass, mixed-grass and shortgrass. In the drier western portion of the Region, contiguous shortgrass tracts of significant size still persist, due largely to the continued dominance of ranching as a land use, but habitat quality and the fragmenting intrusion of incompatible habitat elements emerge as problems for grassland birds. More than 99% of the original tallgrass prairie has been converted to agriculture or urbanization. Wetland drainage, wetland degradation, changes in the fire disturbance regime, and

Table 7. Species of Continental Importance in the Prairie Avifaunal Biome (includes BCRs 11, 17-19, and 21-23)

Species[1]	% Breeding Population	% Winter Population	Primary Habitat	Continental Population Objective	Continental Monitoring Need
Immediate Action					
Lesser Prairie-Chicken	100%	100%	Western shrublands	Increase 100%	Mo1
Henslow's Sparrow	63%	18%	Grassland	Increase 100%	
Greater Sage-Grouse	20%	20%	Western shrublands	Increase 100%	Mo2
Golden-winged Warbler	10%	0%	Shrub/successional	Increase 100%	
Management					
Baird's Sparrow	100%	5%	Grassland	Increase 100%	
Chestnut-collared Longspur	99%	23%	Grassland	Increase 50%	
Harris's Sparrow	0%	97%	Shrub/successional	Increase 100%	Mo3
Greater Prairie-Chicken	97%	97%	Grassland	Increase 100%	Mo2
Sprague's Pipit	96%	18%	Grassland	Increase 100%	
Lark Bunting	95%	31%	Grassland	Increase 50%	
Grasshopper Sparrow	83%	6%	Grassland	Increase 100%	
Dickcissel	80%	0%	Grassland	Increase 50%	
Red-headed Woodpecker	69%	39%	Woodland	Increase 100%	
Swainson's Hawk	68%	0%	Grassland	Increase 10%	
Painted Bunting	39%	0%	Shrub/successional	Increase 100%	
Rusty Blackbird	<1%	28%	Deciduous forest	Increase 100%	Mo3
Willow Flycatcher	16%	0%	Riparian	Increase 50%	
Bell's Vireo	14%	0%	Shrub/successional	Increase 100%	
Scaled Quail	13%	13%	Grassland	Increase 50%	
Short-eared Owl	6%	12%	Grassland	Increase 100%	Mo2,3
Blue-winged Warbler	10%	0%	Shrub/successional	Increase 50%	
Long-term Planning & Responsibility					
Smith's Longspur	0%	99%	Grassland	Increase 10%	Mo3
Sharp-tailed Grouse	86%	86%	Western shrublands	Increase 10%	Mo2
American Tree Sparrow	0%	85%	Shrub/successional	Increase 50%	Mo3
McCown's Longspur	79%	57%	Grassland	Increase 10%	
Mississippi Kite	77%	0%	Woodland	Increase 10%	Mo2
Nelson's Sharp-tailed Sparrow	51%	0%	Wetland	Maintain	Mo2,3
Lapland Longspur *	0%	99%	Grassland	Increase 10%	Mo3

[1]Species are sorted by Action Category (Immediate, Management, Planning & Responsibility), then by decreasing % of population (by greater of breeding or winter population). Species highlighted in yellow are Watch List species, with at least 10% fo their global population in this biome. Species in green (in species or % population columns) are Stewardship Species, with >75% of their population in this biome.
*For these species, % of Population is for Western Hemisphere, all others are % Global Population

woody invasion have further reduced the array of grass habitats available. On wetter western rangelands, new practices of repeated burning to support successive cattle rotations now threaten Greater Prairie-Chicken in the core of its range.

Breeding birds in grassland habitats are primarily short-distance migrants and many overwinter in the southern portions of the biome. Other prairie-breeding species, such as Baird's Sparrow and Sprague's Pipit, winter primarily in the Southwest Avifaunal Biome. Tallgrass and mixed-grass prairies are important for migrating and wintering Watch List Species from the prairies, as well as open country birds from the Northern Forest and Arctic Biomes, such as Lapland and Smith's Longspur. Within the Prairie Biome, most of the continentally important breeding birds in need of monitoring occur in grassland habitats.

Because of its requirements for large blocks of heterogeneous grassland, Greater Prairie-Chicken serves as an umbrella species for planning and implementation of tallgrass prairie bird conservation. The Grassland Bird Conservation Area (GBCA) model is articulated

in the Northern Tallgrass Prairie Physiographic Area 40 PIF Plan and has been subsequently scaled for use in landscapes with less available habitat than is found in the Dakotas. With attention to wetland enhancement and microhabitat management within tracts, GBCAs for Greater Prairie-Chicken should also meet the needs of Short-eared Owl, Grasshopper Sparrow, Henslow's Sparrow, Nelson's Sharp-tailed Sparrow, and Dickcissel.

Similar GBCA models for Greater Sage-Grouse, Chestnut-collared Longspur, Lesser Prairie-Chicken, and Scaled Quail might drive conservation for all birds of sagebrush plains, northern shortgrass prairie, southern shortgrass/shinnery, and southern arid grassland, respectively.

With its shrinking population restricted to a small area of arid shortgrass, the Lesser Prairie-Chicken is among the most vulnerable landbirds of the Prairie Avifaunal Biome. Along with its "greater" cousin, these area-sensitive birds represent focal species for immediate conservation action

In the eastern tallgrass portion of the region, restoration of native prairie is an important conservation strategy. Management of extensive reclaimed surface mines in Illinois and Indiana also provide great potential for grassland birds. In the western portion—and in general throughout the region—a focus on management to improve the quality of existing grassland is appropriate. Attention to native prairie vegetative diversity and structure should be coupled with an effort to restore ecological process—e.g.,, management to recreate more complex hydrology or greater diversity of livestock grazing pressure.

Shrub/successional and woodland

Shrubland habitats are often ecotones with grasslands or woodlands and provide habitat for Sharp-tailed Grouse, Scaled Quail, Willow Flycatcher, Bell's Vireo, Golden-winged Warbler, Blue-winged Warbler, American Tree Sparrow, Harris's Sparrow, and Painted Bunting. Landscape analysis and models to identify appropriate areas for maintaining dynamic ecotones will serve the needs of species dependent on savannah habitats such as Mississippi Kite, Swainson's Hawk, and Red-headed Woodpecker.

Conservation Issues

- Expanding urbanization continues to fragment grassland, savannah, and shrubby transitional habitats.
- Wetland drainage, stream alteration, and agricultural pattern tiling have radically altered the hydrology that historically shaped a complex mosaic of prairie types that supported a diversity of prairie birds.
- The invasion of non-native grasses and woody vegetation, resulting largely from fire suppression and altered livestock grazing regimes. Problems include red cedar in mixed-grass prairie, reed-canary in wet prairies and sedge meadows, cheatgrass in sagebrush, and overabundance of shin-oak in shinnery, and of cool-season grasses and shrubs in tallgrass areas.
- Wind energy farms on grassland sites reduce habitat available to grassland birds. Many grassland-nesting species avoid areas surrounding wind tower or other structures.
- New strategies of intensive livestock grazing, employing multiple spring burns and continuous rotations of livestock, threaten Greater Prairie-Chickens in the core of their range in eastern Kansas.

Recommended Conservation Actions

- In tallgrass prairie areas, follow the Greater Prairie-Chicken Grassland Bird Conservation Area model.
- In short- and mixed-grass prairie, fire and livestock grazing tools should be used to create a heterogeneous mixture of grassland conditions. Aggressive control of woody vegetation encroachment should avoid herbicidal methods where possible.

- Reintroduce and maintain prairie-dog colonies in short and mixed-grass prairie.
- Within the range of Lesser Prairie-Chicken, the needs of this species should drive grassland bird conservation.
- Institute appropriate rest-rotation livestock grazing across the landscape to produce a mosaic of grass pastures and continuing health of the ranching industry.
- Increase the percentage of area-appropriate native grasses and forbs in CRP formulas. Promote late mowing dates for hayfields.
- Restore riparian woodland corridors, floodplain forests, and streamside buffers in the eastern portion of the biome; buffer wetland basins and prairie streams with appropriate grassy strips and restore wide, braided river channels without trees in the west.
- Create source populations of woodland birds by focusing on the expansion of existing patches of forests within landscapes that are at least 70% forested. Where savannah-type habitats exist, create or maintain patches of 2,000-acre blocks of habitat.
- Develop placement practices for wind energy and other high towers which are appropriate for the conservation of grassland birds.
- Support landscape-level, ecosystem-based habitat strategies for waterfowl that also benefit the entire grassland and wetland non-game bird suites.

Although still fairly widespread and abundant, the Grasshopper Sparrow is declining steeply within the core of its range in the Prairie Avifaunal Biome.

EASTERN AVIFAUNAL BIOME

The Eastern Avifaunal Biome (Fig. 9) is made up of ten Bird Conservation Regions that stretch from the St. Lawrence Plain and Southern New England south to Florida and the Gulf Coast and west to the edge of the prairies. Nearly the entire Eastern Avifaunal Biome was once covered by either eastern deciduous or southeastern longleaf pine forests. Notable exceptions include areas of subtropical grasslands in Florida and the western Gulf coastal plain, the narrow strip of coastal salt marsh from Maine to Texas, coastal mangrove forests in Florida, and small areas of pine barrens, high-elevation coniferous forest and freshwater wetlands. Large portions of this region have been converted to agriculture, plantation forestry, or urban development, with smaller areas affected by mountaintop mining, or loss of grassland habitat. Not surprisingly, the major conservation issues in this region are related to effects of such conversions on bird habitats.

The vast majority of continentally important breeding birds in the Eastern Biome (Table 8) are Neotropical migrants. The breeding avifauna of the Eastern Biome (Fig. 23a) shifts in winter to areas from the extreme southeastern U.S, south through eastern Mexico, the Greater Antilles, Central American and into South America (Fig. 23b). Much of the southeastern portion of the biome also provides habitat for wintering Species of Continental Importance from the Northern Forest and Prairie Biomes that have declining trends (Fig. 7b). Northeastern portions of the biome provide wintering areas for some Arctic Biome species. Forest-associated birds comprise the largest group of Species of Continental Importance. Birds with poor trend data are primarily restricted to longleaf pine and coastal habitats.

Primary Habitats

Deciduous and coniferous forest

The most imperiled Watch List and Stewardship Species are or were forest birds of the original bottomland-hardwood or southeastern pine forests, requiring conditions that are rare or absent today. While protection and restoration of remnant bottomland forests of the Southeast are probably too late for Ivory-billed Woodpecker and Bachman's Warbler, such habitat is critical for Swallow-tailed Kite, and Cerulean, Prothonotary, and Swainson's Warblers. Similarly, survival of the endangered Red-cockaded Woodpecker depends on continued intensive management of remnant longleaf pine forests (especially using fire); these forests also support a group of specialized species including Bachman's Sparrow and Brown-headed Nuthatch, as well as Red-headed Woodpeckers and wintering Henslow's Sparrows.

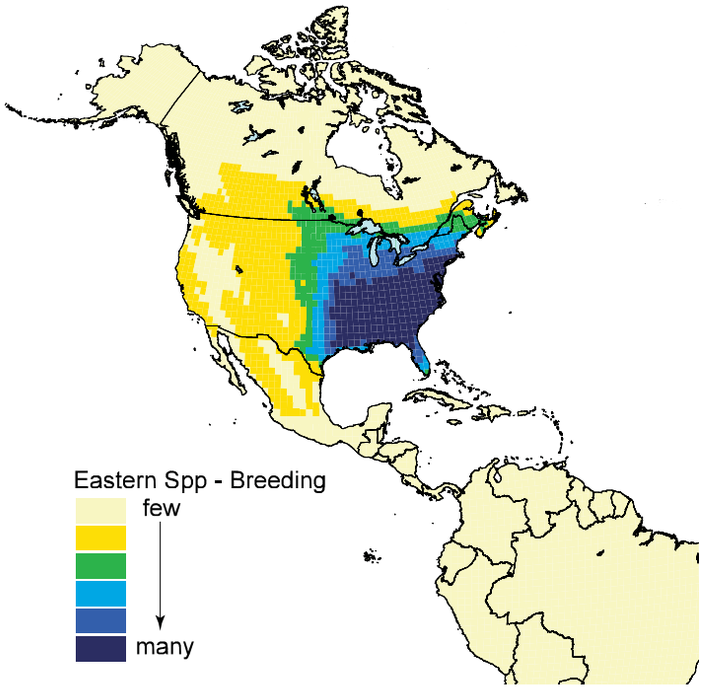


Figure 23a. Number of species during the breeding season in each lat-long block, weighted by the percent of total population of each species breeding within the Eastern Avifaunal Biome.

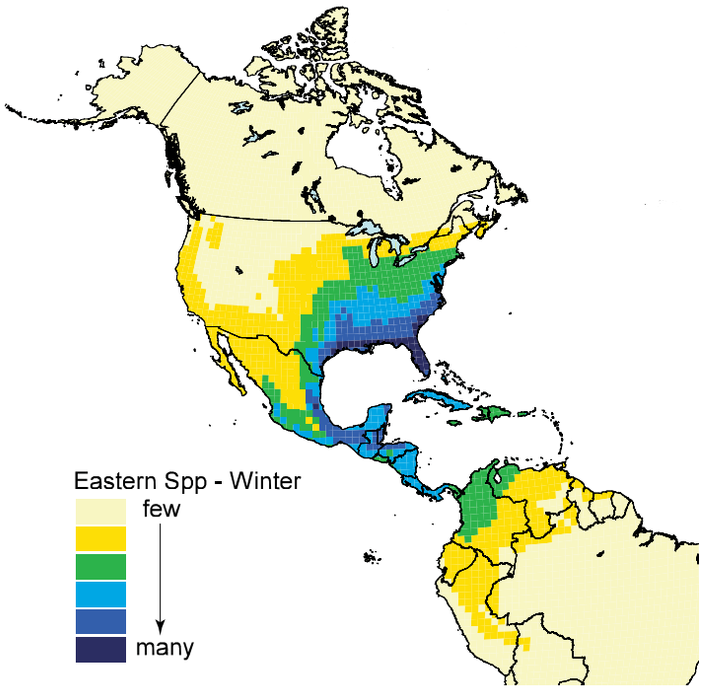


Figure 23b. Number of species during winter in each lat-long block, weighted by the percent of total population of each species breeding within the Eastern Avifaunal Biome.

Table 8. Species of Continental Importance in the Eastern Avifaunal Biome (includes BCRs 13, 24-31 and 37)

Species[1]	% Breeding Population	% Winter Population	Primary Habitat	Continental Population Objective	Continental Monitoring Need
Immediate Action					
Red-cockaded Woodpecker	100%	100%	Coniferous forest	Recovery Plan	
Ivory-billed Woodpecker	100%	100%	Mixed forest	Locate	
Florida Scrub-Jay	100%	100%	Shrub/successional	Recovery Plan	
Bachman's Warbler	100%	0%	Deciduous forest	Locate	
Bachman's Sparrow	100%	100%	Coniferous forest	Increase 100%	
Saltmarsh Sharp-tailed Sparrow	100%	100%	Wetland	Increase 100%	Mo2
Henslow's Sparrow	35%	83%	Grassland	Increase 100%	
Golden-winged Warbler	14%	0%	Shrub/successional	Increase 100%	
Swallow-tailed Kite	3%	0%	Deciduous forest	Increase 100%	Mo2
Management					
Brown-headed Nuthatch	100%	100%	Coniferous forest	Increase 50%	
Worm-eating Warbler	100%	0%	Deciduous forest	Increase 10%	
Prairie Warbler	99%	26%	Shrub/successional	Increase 50%	
Prothonotary Warbler	98%	0%	Deciduous forest	Increase 50%	
Kentucky Warbler	98%	0%	Deciduous forest	Increase 50%	
Eastern Towhee	95%	97%	Shrub/successional	Increase 50%	
Cerulean Warbler	97%	0%	Deciduous forest	Increase 100%	
Blue-winged Warbler	89%	0%	Shrub/successional	Increase 50%	
Brown Thrasher	43%	86%	Shrub/successional	Increase 50%	
Chuck-will's-widow	84%	13%	Mixed forest	Increase 50%	Mo2
Wood Thrush	83%	0%	Deciduous forest	Increase 50%	
Rusty Blackbird	< 1%	70%	Deciduous forest	Increase 100%	Mo3
Red-headed Woodpecker	30%	60%	Mixed forest	Increase 100%	
Dickcissel	19%	0%	Grassland	Increase 50%	
Painted Bunting	16%	3%	Shrub/successional	Increase 100%	
Willow Flycatcher	13%	0%	Shrub/successional	Increase 50%	
Sprague's Pipit	0%	13%	Grassland	Increase 100%	
Mangrove Cuckoo	5%	5%	Tropical hardwood	Increase 50%	Mo1
White-crowned Pigeon	3%	3%	Tropical hardwood	Increase 100%	Mo1
Long-term Planning & Responsibility					
Seaside Sparrow	100%	100%	Wetland	Increase 10%	Mo2
Hooded Warbler	100%	0%	Deciduous forest	Increase 10%	
Nelson's Sharp-tailed Sparrow	0%	100%	Wetland	Maintain	Mo2,3
Swainson's Warbler	99%	0%	Deciduous forest	Maintain	
Yellow-throated Warbler	98%	28%	Deciduous forest	Maintain	
Acadian Flycatcher	98%	0%	Deciduous forest	Maintain	
Louisiana Waterthrush	94%	0%	Deciduous forest	Maintain	
Pine Warbler	92%	91%	Coniferous forest	Maintain	
White-eyed Vireo	86%	36%	Shrub/successional	Maintain	
Carolina Wren	83%	83%	Deciduous forest	Maintain	
White-throated Sparrow	< 1%	83%	Shrub/successional	Increase 50%	Mo3
Red-shouldered Hawk	83%	64%	Deciduous forest	Maintain	Mo2
Red-bellied Woodpecker	81%	81%	Deciduous forest	Maintain	
Indigo Bunting	79%	0%	Shrub/successional	Increase 50%	
Yellow-throated Vireo	77%	0%	Deciduous forest	Maintain	
Antillean Nighthawk	< 1%	0%	Shrub/successional	Increase 10%	Mo1

[1]Species are sorted by Action Category (Immediate, Management, Planning & Responsibility), then by decreasing % of population (by greater of breeding or winter population). Species highlighted in yellow are Watch List species with at least 10% of their population in this biome. Species in green (in species or % population columns) are Stewardship Species with more than 75% of their population in this biome.

Almost 80% of the Eastern Biome Species of Continental Importance are associated with forests or forest edges. The largest group of species inhabits mature deciduous forests, especially the vast oak-hickory dominated forests of the Appalachian highlands. Although no species in this group is critically imperiled, many are suffering population declines. Watch List and Stewardship Species representing this diverse community include Wood Thrush and Cerulean, Worm-eating, Kentucky, and Hooded Warblers. Many declining forest birds are associated with dense understory conditions created by local disturbance; such conditions are becoming less common due to lack of forest management and over-browsing by white-tailed deer. Cerulean Warbler is the most specialized and threatened bird of deciduous forest; this species is in need of focused conservation attention throughout its range. Outside of the breeding season coastal forests and woodlands along the Atlantic Ocean and Gulf of Mexico are crucial as migratory stops for Neotropical migrants from the Eastern, Prairie, and Northern Forest Biomes.

The Brown-headed Nuthatch is one of several species endemic year-round to the pine forests of the southeastern United States

Shrub/successional

Shrub habitats are associated with larger-scale disturbances, especially those created by forest succession, farmland abandonment, and to a lesser extent fire and weather events. In a class by itself, Florida Scrub-Jay is the flagship species for Florida's unique and endangered, fire-dependent oak-scrub habitat. Many other shrub-nesting species have undergone declines, including Golden-winged Warbler, Painted Bunting, Prairie Warbler, Blue-winged Warbler, White-eyed Vireo, Eastern Towhee, and Indigo Bunting. Managing for shrub-nesting birds often is compatible with actions to conserve American Woodcock and other game species. These habitats are important for migrating birds from the Eastern and Northern Forest Biomes and provide wintering habitat in the southeastern U.S.

Wetlands

The band of coastal salt marsh surrounding the Eastern Biome supports the entire world populations of Saltmarsh Sharp-tailed and Seaside sparrows, as well as the entire wintering population of Nelson's Sharp-tailed Sparrow. Although most coastal marshes are federally protected, specific conditions required by breeding sparrows often are found in unprotected marsh ecotones and are not necessarily provided by management or restoration activities directed at shorebirds or waterfowl. These sparrows also are very poorly monitored and require targeted surveys to determine status and trends.

Grassland

Existence of the now-extinct race of Greater Prairie-Chicken (Heath Hen) argues for historic grasslands in the East (Askins 1993). Grassland birds in the Eastern Region today depend on agricultural landscapes and other artificial habitats such as reclaimed strip mines and airfields. The rapidly declining Henslow's Sparrow is of highest continental concern among this species suite, although Eastern subspecies and populations of Vesper Sparrow, Grasshopper Sparrow, as well as Upland Sandpiper, are important priorities in regional conservation initiatives.

Tropical hardwood

In Florida, coastal mangrove swamps are the primary habitat for Mangrove Cuckoo and White-crowned Pigeon. This tropical habitat is an extension of extensive mangroves throughout the Caribbean basin. In Florida, this specialized habitat is highly threatened by development outside Everglades National Parks and a few smaller protected areas. This habitat is also important for migrating and wintering warblers, providing a "tropical" wintering area within the U.S.

Conservation Issues

- Urban development and human population growth is the single largest threat to bird habitats, causing loss and fragmentation of forests and shrublands, primarily in coastal and valley regions.
- Maturation of forest throughout the East, resulting in lack of successional habitats as well as reduction in disturbance-generated forest structure such as shrubby understory. These conditions are exacerbated by lack of forest management on public lands and by over-browsing by white-tailed deer.
- Mountaintop-removal-valley-fill mining in the southern Appalachians threatens to remove up to 20% of diverse mixed-mesophytic and oak-hickory forests critical to Cerulean Warblers and other high-priority forest species.
- Changing and intensifying agricultural practices that reduce suitability for grassland birds.

Recommended Actions

- Exhaustively search for any extant populations of Ivory-billed Woodpecker or Bachman's Warbler, using modern acoustic monitoring and GIS techniques
- Implement Endangered Species Recovery Plan objectives for Florida Scrub-Jay and Red-cockaded Woodpecker.
- Protect and restore bottomland-hardwood forest tracts large enough to support populations of Swallow-tailed Kite, Cerulean Warbler, and Swainson's Warbler; follow models of Mississippi Valley and Southeastern Coastal Plain initiatives.
- Institute comprehensive forest planning on all public lands, incorporating needs and objectives to reverse declines of Cerulean Warbler and other priority bird species
- Implement conservation measures to enhance reproduction and survival of salt-marsh sparrows, including protection and restoration of high-marsh ecotones, control of invasive phragmites, and management of water levels

Although still common, the Eastern Towhee is one of many disturbance-dependent, shrub-nesting species showing precipitous population declines in the Eastern United States.

- Enhance habitat conditions for breeding Henslow's Sparrow and other grassland birds through agricultural incentive programs, management of DOD, public airfield properties, and other public lands
- Identify, protect and enhance critical breeding sites for Golden-winged Warbler, especially in areas where Blue-winged Warblers are absent or where hybridization is minimal.
- Manage adequate acreage of shrub communities to reverse declines of priority bird species, including protection of natural barrens and proper management of power line corridors; link objectives with those of American Woodcock, Northern Bobwhite, and other game species.

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Appendices

APPENDIX A. ASSESSMENT SCORES AND ESTIMATED POPULATION SIZE OF NORTH AMERICAN LANDBIRDS

APPENDIX B. METHODS USED TO ESTIMATE POPULATION SIZES AND PERCENTS

APPENDIX C. REGIONAL PIF BIRD CONSERVATIN PLANS AND CONTACTS

APPENDIX A. ASSESSMENT SCORES AND ESTIMATED POPULATION SIZE OF NORTH AMERICAN LANDBIRDS

Common Name	Scientific Name	PS	BD	ND	TB	TN	PT	Combined Score	Est. Global Population	% Population in US & Canada	Monitoring Need
Black Vulture	*Coragyps atratus*	2	1	1	1	1	1	5	5 - 50,000,000	< 1%	
Turkey Vulture	*Cathartes aura*	3	1	1	1	1	1	6	4,500,000	29%	
California Condor	*Gymnogyps californianus*	5	5	5	5	5	5	20	< 100	93%	
Osprey	*Pandion haliaetus*	4	1	1	2	2	1	8	460,000	46%	Mo2,3
Hook-billed Kite	*Chondrohierax uncinatus*	4	1	1	2	2	2	9	50 - 500,000	< 1%	Mo1
Swallow-tailed Kite	*Elanoides forficatus*	4	3	3	4	3	5	16	150,000	< 5%	Mo2
White-tailed Kite	*Elanus leucurus*	4	1	1	1	1	2	8	53,000	20%	Mo2
Snail Kite	*Rostrhamus sociabilis*	3	3	3	3	3	2	11	0.5 - 5,000,000	< 1%	Mo1
Mississippi Kite	*Ictinia mississippiensis*	4	3	3	2	3	3	13	190,000	100%	Mo2
Bald Eagle	*Haliaeetus leucocephalus*	4	2	1	3	3	1	10	330,000	100%	Mo2,3
Northern Harrier	*Circus cyaneus*	3	1	1	3	3	4	11	1,300,000	35%	Mo2,3
Sharp-shinned Hawk	*Accipiter striatus*	3	1	1	2	2	2	8	1,100,000	53%	Mo2,3
Cooper's Hawk	*Accipiter cooperii*	3	1	1	2	3	1	8	570,000	97%	Mo2
Northern Goshawk	*Accipiter gentilis*	4	1	1	3	3	3	11	490,000	49%	Mo2
Gray Hawk	*Asturina nitida*	3	1	1	2	1	1	7	0.5 - 5,000,000	< 1%	Mo1
Common Black-Hawk	*Buteogallus anthracinus*	3	3	3	3	3	2	11	0.5 - 5,000,000	< 1%	Mo1
Harris's Hawk	*Parabuteo unicinctus*	4	1	1	3	3	4	12	390,000	10%	Mo2
Red-shouldered Hawk	*Buteo lineatus*	3	2	2	2	2	1	8	830,000	99%	Mo2
Broad-winged Hawk	*Buteo platypterus*	3	1	1	3	3	2	9	1,800,000	96%	Mo2
Short-tailed Hawk	*Buteo brachyurus*	3	1	1	3	3	3	10	0.5 - 5,000,000	< 5%	Mo1
Swainson's Hawk	*Buteo swainsoni*	4	2	3	3	4	3	14	490,000	94%	
White-tailed Hawk	*Buteo albicaudatus*	3	1	1	3	3	3	10	0.5 - 5,000,000	< 1%	Mo1
Zone-tailed Hawk	*Buteo albonotatus*	3	1	1	3	2	3	10	0.5 - 5,000,000	< 1%	Mo1
Red-tailed Hawk	*Buteo jamaicensis*	3	1	1	1	1	1	6	2,200,000	89%	
Ferruginous Hawk	*Buteo regalis*	5	2	3	4	3	1	13	23,000	100%	Mo2
Rough-legged Hawk	*Buteo lagopus*	3	1	1	2	2	2	8	530,000	50%	Mo3
Golden Eagle	*Aquila chrysaetos*	4	1	1	3	3	3	11	170,000	47%	Mo2
Crested Caracara	*Caracara cheriway*	3	1	1	2	2	2	8	0.5 - 5,000,000	< 5%	Mo2
American Kestrel	*Falco sparverius*	2	1	1	2	2	2	7	5,800,000	75%	
Merlin	*Falco columbarius*	3	1	1	2	2	1	7	1,300,000	50%	Mo2,3
Aplomado Falcon	*Falco femoralis*	4	1	1	3	2	4	12	50 - 500,000	< 1%	Mo1
Gyrfalcon	*Falco rusticolus*	4	1	1	2	2	1	8	110,000	50%	Mo3
Peregrine Falcon	*Falco peregrinus*	3	1	1	3	3	1	8	1,200,000	29%	Mo2,3
Prairie Falcon	*Falco mexicanus*	5	2	2	3	3	2	12	36,000	96%	Mo2
Plain Chachalaca	*Ortalis vetula*	3	4	4	2	2	2	11	0.5 - 5,000,000	< 1%	Mo1
Ruffed Grouse	*Bonasa umbellus*	2	2	2	2	2	4	10	8,300,000	100%	Mo2
Greater Sage-Grouse	*Centrocercus urophasianus*	4	3	3	4	4	5	16	150,000	100%	Mo2
Gunnison Sage-Grouse	*Centrocercus minimus*	5	5	5	5	5	5	20	2,000	100%	
Spruce Grouse	*Falcipennis canadensis*	3	1	1	2	2	1	7	1,200,000	100%	Mo3
Willow Ptarmigan	*Lagopus lagopus*	2	1	1	2	2	3	8	37,000,000	30%	Mo1
Rock Ptarmigan	*Lagopus mutus*	2	1	1	2	2	3	8	8,200,000	50%	Mo1
White-tailed Ptarmigan	*Lagopus leucurus*	3	3	3	2	2	3	11	2,000,000	100%	Mo1
Blue Grouse	*Dendragapus obscurus*	3	3	3	3	3	5	14	2,600,000	100%	Mo2
Sharp-tailed Grouse	*Tympanuchus phasianellus*	3	2	2	3	2	3	11	1,200,000	100%	Mo2
Greater Prairie-Chicken	*Tympanuchus cupido*	3	5	5	4	4	5	17	690,000	100%	Mo2
Lesser Prairie-Chicken	*Tympanuchus pallidicinctus*	5	5	5	5	5	5	20	20,000	100%	Mo1
Wild Turkey	*Meleagris gallopavo*	3	2	2	2	2	1	8	1,300,000	90%	Mo2
Mountain Quail	*Oreortyx pictus*	4	4	4	3	3	3	14	160,000	100%	Mo2
Scaled Quail	*Callipepla squamata*	3	3	3	4	3	4	14	1,200,000	50%	
California Quail	*Callipepla californica*	3	4	4	2	2	3	12	990,000	87%	
Gambel's Quail	*Callipepla gambelii*	3	4	4	2	2	3	12	1,800,000	60%	
Northern Bobwhite	*Colinus virginianus*	2	2	2	3	3	5	12	9,200,000	82%	

Appendix A. Assessment scores and estimated population size of North American landbirds - continued

Common Name	Scientific Name	PS	BD	ND	TB	TN	PT	Combined Score	Est. Global Population	% Population in US & Canada	Monitoring Need
Montezuma Quail	*Cyrtonyx montezumae*	4	4	4	3	3	4	15	58,000	10%	Mo1
White-crowned Pigeon	*Columba leucocephala*	3	4	4	4	4	5	16	550,000	< 5%	Mo1
Red-billed Pigeon	*Columba flavirostris*	3	3	3	3	3	3	12	0.5 - 5,000,000	< 1%	Mo1
Band-tailed Pigeon	*Columba fasciata*	3	3	3	3	3	5	14	3,900,000	25%	
White-winged Dove	*Zenaida asiatica*	2	2	3	2	2	3	10	19,000,000	25%	
Mourning Dove	*Zenaida macroura*	1	1	1	1	1	2	5	130,000,000	85%	
Inca Dove	*Columbina inca*	3	3	3	2	2	1	9	1,900,000	25%	
Common Ground-Dove	*Columbina passerina*	3	1	1	3	3	4	11	2,300,000	50%	
White-tipped Dove	*Leptotila verreauxi*	2	1	1	2	2	2	7	5 - 50,000,000	< 1%	Mo1
Green Parakeet	*Aratinga holochlora*	4	5	5	4	4	4	17	50 - 500,000	< 1%	Mo1
Thick-billed Parrot	*Rhynchopsitta pachyrhyncha*	5	5	5	5	4	5	20	4,000	< 1%	Mo1
Red-crowned Parrot	*Amazona viridigenalis*	5	5	5	5	5	5	20	< 5,000	50%	Mo1
Black-billed Cuckoo	*Coccyzus erythropthalmus*	3	2	2	3	3	4	12	1,100,000	100%	
Yellow-billed Cuckoo	*Coccyzus americanus*	2	1	2	3	3	4	11	9,200,000	92%	
Mangrove Cuckoo	*Coccyzus minor*	4	3	3	3	3	4	14	50 - 500,000	< 5%	Mo1
Greater Roadrunner	*Geococcyx californianus*	3	2	2	2	2	3	10	1,100,000	50%	
Smooth-billed Ani	*Crotophaga ani*	2	1	1	3	3	4	10	5 - 50,000,000	< 1%	Mo1
Groove-billed Ani	*Crotophaga sulcirostris*	3	2	2	1	1	1	7	0.5 - 5,000,000	< 5%	Mo2
Barn Owl	*Tyto alba*	3	1	1	2	2	3	9	4,900,000	7%	Mo2
Flammulated Owl	*Otus flammeolus*	5	3	4	3	3	3	15	37,000	77%	Mo1
Western Screech-Owl	*Otus kennicottii*	3	2	2	3	2	3	11	740,000	73%	Mo2
Eastern Screech-Owl	*Otus asio*	3	2	2	2	2	3	10	770,000	96%	Mo2
Whiskered Screech-Owl	*Otus trichopsis*	4	4	4	2	2	3	13	50 - 500,000	< 5%	Mo1
Great Horned Owl	*Bubo virginianus*	2	1	1	1	1	3	7	5,300,000	43%	Mo3
Snowy Owl	*Nyctea scandiaca*	4	1	1	2	2	2	9	290,000	50%	Mo3
Northern Hawk Owl	*Surnia ulula*	4	1	1	2	2	2	9	130,000	50%	Mo3
Northern Pygmy-Owl	*Glaucidium gnoma*	4	2	2	3	3	2	11	100,000	84%	Mo2
Ferruginous Pygmy-Owl	*Glaucidium brasilianum*	2	1	1	2	2	2	7	5 - 50,000,000	< 1%	Mo1
Elf Owl	*Micrathene whitneyi*	4	4	5	3	3	3	15	190,000	24%	Mo1
Burrowing Owl	*Athene cunicularia*	3	1	2	4	3	4	13	3,300,000	19%	Mo2
Spotted Owl	*Strix occidentalis*	5	3	3	4	4	4	16	15,000	70%	
Barred Owl	*Strix varia*	3	1	1	2	2	1	7	560,000	100%	Mo2
Great Gray Owl	*Strix nebulosa*	4	1	1	2	2	3	10	63,000	50%	Mo2
Long-eared Owl	*Asio otus*	4	1	1	3	3	4	12	120,000	30%	Mo2
Short-eared Owl	*Asio flammeus*	3	1	1	3	4	5	13	2,400,000	29%	Mo2,3
Boreal Owl	*Aegolius funereus*	4	1	1	3	2	3	11	220,000	30%	Mo1
Northern Saw-whet Owl	*Aegolius acadicus*	4	2	2	2	2	2	10	65,000	96%	Mo2
Lesser Nighthawk	*Chordeiles acutipennis*	2	1	1	2	2	2	7	5,900,000	25%	Mo2
Common Nighthawk	*Chordeiles minor*	2	1	1	3	3	4	10	11,000,000	96%	Mo2
Antillean Nighthawk	*Chordeiles gundlachii*	4	5	2	2	2	3	14	50 - 500,000	< 1%	Mo1
Common Pauraque	*Nyctidromus albicollis*	2	1	1	2	2	2	7	5 - 50,000,000	< 1%	Mo1
Common Poorwill	*Phalaenoptilus nuttallii*	3	2	3	2	2	2	10	2,900,000	98%	Mo2
Chuck-will's-widow	*Caprimulgus carolinensis*	2	2	3	3	3	4	12	15,000,000	100%	Mo2
Buff-collared Nightjar	*Caprimulgus ridgwayi*	3	4	4	3	3	3	13	0.5 - 5,000,000	< 5%	Mo1
Whip-poor-will	*Caprimulgus vociferus*	3	2	3	3	3	4	13	2,100,000	75%	Mo2
Black Swift	*Cypseloides niger*	4	3	4	3	2	4	15	150,000	58%	Mo2
Chimney Swift	*Chaetura pelagica*	2	1	3	3	3	4	12	15,000,000	100%	
Vaux's Swift	*Chaetura vauxi*	3	3	3	3	2	3	12	1,500,000	47%	
White-throated Swift	*Aeronautes saxatalis*	4	2	3	2	2	5	14	410,000	69%	
Broad-billed Hummingbird	*Cynanthus latirostris*	3	4	4	2	2	2	11	0.5 - 5,000,000	< 5%	Mo1
White-eared Hummingbird	*Hylocharis leucotis*	3	4	4	2	2	2	11	0.5 - 5,000,000	< 1%	Mo1
Berylline Hummingbird	*Amazilia beryllina*	3	4	4	3	2	3	13	0.5 - 5,000,000	< 1%	Mo1
Buff-bellied Hummingbird	*Amazilia yucatanensis*	3	5	5	2	2	2	12	0.5 - 5,000,000	< 5%	Mo1
Violet-crowned Hummingbird	*Amazilia violiceps*	3	4	4	2	2	3	12	0.5 - 5,000,000	< 5%	Mo1

Appendix A. Assessment scores and estimated population size of North American landbirds - continued

Common Name	Scientific Name	PS	BD	ND	TB	TN	PT	Combined Score	Est. Global Population	% Population in US & Canada	Monitoring Need
Blue-throated Hummingbird	*Lampornis clemenciae*	3	4	4	3	2	3	13	0.5 - 5,000,000	< 5%	Mo1
Magnificent Hummingbird	*Eugenes fulgens*	3	3	3	3	3	2	11	0.5 - 5,000,000	< 1%	Mo1
Lucifer Hummingbird	*Calothorax lucifer*	4	5	5	2	2	2	13	50 - 500,000	< 1%	Mo1
Ruby-throated Hummingbird	*Archilochus colubris*	2	1	3	2	2	1	8	7,300,000	100%	
Black-chinned Hummingbird	*Archilochus alexandri*	3	3	5	2	2	2	12	2,000,000	93%	Mo2
Anna's Hummingbird	*Calypte anna*	3	4	4	1	1	2	10	1,500,000	100%	
Costa's Hummingbird	*Calypte costae*	3	5	5	3	2	3	14	3,600,000	50%	Mo2
Calliope Hummingbird	*Stellula calliope*	3	3	5	3	2	3	14	1,000,000	100%	Mo2
Broad-tailed Hummingbird	*Selasphorus platycercus*	3	3	5	2	2	2	12	3,800,000	80%	
Rufous Hummingbird	*Selasphorus rufus*	2	3	5	2	2	5	14	6,500,000	100%	Mo2
Allen's Hummingbird	*Selasphorus sasin*	3	5	5	3	2	3	14	530,000	100%	Mo2
Elegant Trogon	*Trogon elegans*	4	3	3	3	3	4	14	50 - 500,000	< 1%	Mo1
Ringed Kingfisher	*Ceryle torquata*	2	1	1	2	2	2	7	5 - 50,000,000	< 1%	Mo1
Belted Kingfisher	*Ceryle alcyon*	3	1	1	2	2	4	10	2,200,000	100%	Mo3
Green Kingfisher	*Chloroceryle americana*	2	1	1	2	2	2	7	5 - 50,000,000	< 1%	Mo1
Lewis's Woodpecker	*Melanerpes lewis*	4	3	4	4	3	3	15	130,000	100%	
Red-headed Woodpecker	*Melanerpes erythrocephalus*	3	2	2	3	3	5	13	2,500,000	100%	
Acorn Woodpecker	*Melanerpes formicivorus*	3	2	2	2	2	2	9	3,700,000	50%	
Gila Woodpecker	*Melanerpes uropygialis*	3	4	4	2	2	3	12	3,300,000	25%	
Golden-fronted Woodpecker	*Melanerpes aurifrons*	3	3	3	3	3	4	13	1,700,000	50%	
Red-bellied Woodpecker	*Melanerpes carolinus*	2	2	3	2	2	2	9	10,000,000	100%	
Williamson's Sapsucker	*Sphyrapicus thyroideus*	4	3	3	3	3	3	13	310,000	100%	
Yellow-bellied Sapsucker	*Sphyrapicus varius*	2	2	2	2	2	3	9	9,200,000	100%	Mo3
Red-naped Sapsucker	*Sphyrapicus nuchalis*	3	3	3	3	3	3	12	2,200,000	100%	
Red-breasted Sapsucker	*Sphyrapicus ruber*	3	3	4	3	3	3	13	2,500,000	100%	Mo3
Ladder-backed Woodpecker	*Picoides scalaris*	3	2	2	2	2	4	11	2,100,000	33%	
Nuttall's Woodpecker	*Picoides nuttallii*	4	5	5	4	4	3	16	290,000	100%	
Downy Woodpecker	*Picoides pubescens*	2	1	1	2	1	2	7	13,000,000	100%	
Hairy Woodpecker	*Picoides villosus*	2	1	1	2	2	1	6	9,400,000	80%	
Arizona Woodpecker	*Picoides arizonae*	4	5	5	3	3	3	15	50 - 500,000	< 5%	Mo1
Red-cockaded Woodpecker	*Picoides borealis*	5	4	4	5	5	4	18	20,000	100%	
White-headed Woodpecker	*Picoides albolarvatus*	4	4	4	4	3	2	14	72,000	100%	
Three-toed Woodpecker	*Picoides tridactylus*	3	1	1	3	3	2	9	1,700,000	50%	Mo3
Black-backed Woodpecker	*Picoides arcticus*	3	2	2	3	3	3	11	1,300,000	100%	Mo3
Northern Flicker	*Colaptes auratus*	2	1	1	2	2	4	9	16,000,000	91%	Mo3
Gilded Flicker	*Colaptes chrysoides*	3	5	5	3	3	2	13	1,100,000	25%	
Pileated Woodpecker	*Dryocopus pileatus*	3	1	1	2	2	1	7	930,000	100%	
Ivory-billed Woodpecker	*Campephilus principalis*	5	5	5	5	5	5	20	0 ?	100%	
Northern Beardless-Tyrannulet	*Camptostoma imberbe*	3	3	3	2	2	2	10	0.5 - 5,000,000	< 5%	Mo1
Olive-sided Flycatcher	*Contopus cooperi*	3	1	2	3	4	5	14	1,200,000	99%	Mo3
Greater Pewee	*Contopus pertinax*	3	4	4	3	3	3	13	0.5 - 5,000,000	< 1%	Mo1
Western Wood-Pewee	*Contopus sordidulus*	2	1	2	3	3	4	11	9,700,000	80%	
Eastern Wood-Pewee	*Contopus virens*	2	1	2	2	2	4	10	6,000,000	100%	
Yellow-bellied Flycatcher	*Empidonax flaviventris*	2	2	4	3	3	1	10	6,200,000	100%	Mo3
Acadian Flycatcher	*Empidonax virescens*	3	2	4	3	3	2	12	4,700,000	100%	
Alder Flycatcher	*Empidonax alnorum*	2	1	3	2	2	2	9	49,000,000	100%	Mo3
Willow Flycatcher	*Empidonax traillii*	3	1	4	3	2	4	14	3,300,000	100%	
Least Flycatcher	*Empidonax minimus*	2	1	3	2	2	4	11	14,000,000	100%	Mo3
Hammond's Flycatcher	*Empidonax hammondii*	2	3	4	3	2	2	11	13,000,000	100%	
Gray Flycatcher	*Empidonax wrightii*	3	4	4	3	2	1	11	1,200,000	100%	
Dusky Flycatcher	*Empidonax oberholseri*	3	3	4	2	2	4	13	3,600,000	99%	
Pacific-slope Flycatcher	*Empidonax difficilis*	2	4	5	3	2	3	13	8,300,000	96%	
Cordilleran Flycatcher	*Empidonax occidentalis*	3	3	4	3	2	3	13	2,600,000	85%	
Buff-breasted Flycatcher	*Empidonax fulvifrons*	3	4	4	3	3	3	13	0.5 - 5,000,000	< 1%	Mo1

Appendix A. Assessment scores and estimated population size of North American landbirds - continued

Common Name	Scientific Name	PS	BD	ND	TB	TN	PT	Combined Score	Est. Global Population	% Population in US & Canada	Monitoring Need
Black Phoebe	*Sayornis nigricans*	3	2	2	3	2	1	9	970,000	33%	
Eastern Phoebe	*Sayornis phoebe*	2	1	2	2	2	2	8	16,000,000	100%	
Say's Phoebe	*Sayornis saya*	3	1	3	2	2	2	10	3,700,000	91%	
Vermilion Flycatcher	*Pyrocephalus rubinus*	3	1	1	2	2	2	8	2,000,000	10%	
Dusky-capped Flycatcher	*Myiarchus tuberculifer*	2	1	1	2	2	3	8	5 - 50,000,000	< 1%	Mo1
Ash-throated Flycatcher	*Myiarchus cinerascens*	2	2	3	2	2	2	9	8,900,000	75%	
Great Crested Flycatcher	*Myiarchus crinitus*	2	1	3	2	2	2	9	7,500,000	100%	
Brown-crested Flycatcher	*Myiarchus tyrannulus*	2	1	1	2	2	2	7	7,700,000	10%	
Great Kiskadee	*Pitangus sulphuratus*	2	1	1	2	2	3	8	5 - 50,000,000	< 1%	Mo1
Sulphur-bellied Flycatcher	*Myiodynastes luteiventris*	3	3	3	2	3	3	12	0.5 - 5,000,000	< 1%	Mo1
Tropical Kingbird	*Tyrannus melancholicus*	1	1	1	1	1	2	5	> 50,000,000	< 1%	Mo1
Couch's Kingbird	*Tyrannus couchii*	3	4	4	2	2	2	11	1,700,000	10%	
Cassin's Kingbird	*Tyrannus vociferans*	3	3	4	2	2	3	12	4,300,000	50%	
Thick-billed Kingbird	*Tyrannus crassirostris*	3	4	5	3	3	3	14	0.5 - 5,000,000	< 1%	Mo1
Western Kingbird	*Tyrannus verticalis*	2	1	4	2	2	2	10	19,000,000	96%	
Eastern Kingbird	*Tyrannus tyrannus*	2	1	2	2	2	4	10	13,000,000	100%	
Gray Kingbird	*Tyrannus dominicensis*	3	4	4	3	3	3	13	780,000	10%	Mo1
Scissor-tailed Flycatcher	*Tyrannus forficatus*	2	4	5	2	2	3	12	7,900,000	90%	
Rose-throated Becard	*Pachyramphus aglaiae*	3	3	3	3	3	3	12	0.5 - 5,000,000	< 1%	Mo1
Loggerhead Shrike	*Lanius ludovicianus*	3	1	1	3	3	5	12	4,200,000	88%	
Northern Shrike	*Lanius excubitor*	4	3	1	2	2	2	11	210,000	100%	Mo3
White-eyed Vireo	*Vireo griseus*	2	2	4	2	2	2	10	17,000,000	92%	
Bell's Vireo	*Vireo bellii*	3	3	5	4	3	5	17	1,500,000	75%	
Black-capped Vireo	*Vireo atricapillus*	5	5	5	5	3	5	20	8,000	60%	Mo1
Gray Vireo	*Vireo vicinior*	4	4	5	4	4	2	15	410,000	90%	
Yellow-throated Vireo	*Vireo flavifrons*	3	2	3	3	3	2	11	1,400,000	100%	
Plumbeous Vireo	*Vireo plumbeus*	3	2	4	3	2	2	12	2,700,000	80%	
Cassin's Vireo	*Vireo cassini*	3	3	3	3	2	2	11	4,600,000	100%	
Blue-headed Vireo	*Vireo solitarius*	2	2	3	2	2	1	8	6,900,000	100%	
Hutton's Vireo	*Vireo huttoni*	3	3	3	3	2	2	11	2,100,000	39%	
Warbling Vireo	*Vireo gilvus*	2	1	4	3	2	2	11	22,000,000	80%	
Philadelphia Vireo	*Vireo philadelphicus*	3	2	4	2	2	1	10	4,300,000	100%	Mo3
Red-eyed Vireo	*Vireo olivaceus*	1	2	2	2	2	2	7	140,000,000	100%	
Yellow-green Vireo	*Vireo flavoviridis*	3	3	3	3	3	3	12	0.5 - 5,000,000	< 1%	Mo1
Black-whiskered Vireo	*Vireo altiloquus*	3	4	3	3	3	3	13	780,000	10%	Mo1
Gray Jay	*Perisoreus canadensis*	2	1	1	2	2	2	7	16,000,000	100%	Mo3
Steller's Jay	*Cyanocitta stelleri*	3	2	2	2	2	2	9	4,400,000	85%	
Blue Jay	*Cyanocitta cristata*	2	1	2	1	1	4	9	22,000,000	100%	
Green Jay	*Cyanocorax yncas*	3	3	3	2	2	3	11	0.5 - 5,000,000	< 5%	
Brown Jay	*Cyanocorax morio*	3	3	3	1	1	2	9	0.5 - 5,000,000	< 1%	Mo1
Florida Scrub-Jay	*Aphelocoma coerulescens*	5	5	5	5	5	5	20	10,000	100%	
Island Scrub-Jay	*Aphelocoma insularis*	5	5	5	4	3	3	17	8,000	100%	Mo1
Western Scrub-Jay	*Aphelocoma californica*	3	3	3	2	2	2	10	3,400,000	80%	
Mexican Jay	*Aphelocoma ultramarina*	3	4	4	3	3	3	13	2,200,000	11%	Mo1
Pinyon Jay	*Gymnorhinus cyanocephalus*	3	3	3	4	3	5	15	4,100,000	100%	
Clark's Nutcracker	*Nucifraga columbiana*	3	2	2	2	2	1	8	1,000,000	99%	
Black-billed Magpie	*Pica hudsonia*	3	2	2	2	2	2	9	3,400,000	100%	
Yellow-billed Magpie	*Pica nuttalli*	4	5	5	3	3	3	15	180,000	100%	
American Crow	*Corvus brachyrhynchos*	2	1	1	1	1	2	6	31,000,000	100%	
Northwestern Crow	*Corvus caurinus*	3	5	5	1	1	2	11	1,400,000	100%	Mo3
Tamaulipas Crow	*Corvus imparatus*	4	5	5	2	2	2	13	50 - 500,000	< 1%	Mo1
Fish Crow	*Corvus ossifragus*	3	3	4	1	1	1	9	790,000	100%	
Chihuahuan Raven	*Corvus cryptoleucus*	3	3	3	2	1	4	12	740,000	50%	
Common Raven	*Corvus corax*	2	1	1	2	1	1	6	16,000,000	24%	Mo3

Appendix A. Assessment scores and estimated population size of North American landbirds - continued

Common Name	Scientific Name	PS	BD	ND	TB	TN	PT	Combined Score	Est. Global Population	% Population in US & Canada	Monitoring Need
Horned Lark	*Eremophila alpestris*	1	1	1	2	2	4	8	140,000,000	70%	Mo3
Purple Martin	*Progne subis*	2	1	1	2	3	2	8	11,000,000	90%	
Tree Swallow	*Tachycineta bicolor*	2	1	2	2	2	2	8	20,000,000	100%	Mo3
Violet-green Swallow	*Tachycineta thalassina*	2	1	3	2	2	2	9	11,000,000	79%	
Northern Rough-winged Swallow	*Stelgidopteryx serripennis*	2	1	3	2	2	3	10	15,000,000	34%	
Bank Swallow	*Riparia riparia*	2	1	1	2	2	3	8	46,000,000	30%	Mo3
Cliff Swallow	*Petrochelidon pyrrhonota*	1	1	1	1	2	2	6	89,000,000	92%	Mo3
Cave Swallow	*Petrochelidon fulva*	2	4	5	2	2	2	11	8,700,000	25%	Mo2
Barn Swallow	*Hirundo rustica*	1	1	1	2	2	4	8	190,000,000	27%	
Black-capped Chickadee	*Poecile atricapilla*	2	1	1	2	1	1	6	34,000,000	100%	
Carolina Chickadee	*Poecile carolinensis*	2	3	3	2	1	4	11	18,000,000	100%	
Mexican Chickadee	*Poecile sclateri*	3	4	4	3	3	3	13	0.5 - 5,000,000	< 1%	Mo1
Mountain Chickadee	*Poecile gambeli*	2	2	2	2	2	4	10	12,000,000	99%	Mo2
Boreal Chickadee	*Poecile hudsonica*	2	1	1	3	2	5	11	7,800,000	100%	Mo3
Gray-headed Chickadee	*Poecile cincta*	3	2	2	2	2	3	10	0.5 - 5,000,000	< 5%	Mo1
Chestnut-backed Chickadee	*Poecile rufescens*	2	4	4	2	2	3	11	6,900,000	100%	
Bridled Titmouse	*Baeolophus wollweberi*	3	4	4	3	2	3	13	860,000	10%	
Oak Titmouse	*Baeolophus inornatus*	3	4	4	3	3	4	14	900,000	100%	
Juniper Titmouse	*Baeolophus ridgwayi*	4	3	3	3	3	3	13	330,000	100%	
Tufted Titmouse	*Baeolophus bicolor*	2	2	2	2	1	2	8	12,000,000	100%	
Black-crested Titmouse	*Baeolophus atricristatus*	3	4	4	2	2	2	11	1,000,000	74%	Mo1
Verdin	*Auriparus flaviceps*	2	3	3	2	2	5	12	8,900,000	50%	
Bushtit	*Psaltriparus minimus*	3	2	2	2	2	4	11	4,500,000	66%	
Red-breasted Nuthatch	*Sitta canadensis*	2	1	1	2	2	1	6	18,000,000	100%	Mo3
White-breasted Nuthatch	*Sitta carolinensis*	2	1	1	2	2	1	6	10,000,000	90%	
Pygmy Nuthatch	*Sitta pygmaea*	3	3	3	3	3	3	12	2,300,000	74%	
Brown-headed Nuthatch	*Sitta pusilla*	3	4	4	3	3	4	14	1,500,000	100%	
Brown Creeper	*Certhia americana*	2	1	1	3	2	3	9	5,400,000	93%	
Cactus Wren	*Campylorhynchus brunneicapillus*	2	3	3	2	2	4	11	8,300,000	50%	
Rock Wren	*Salpinctes obsoletus*	3	1	2	2	2	4	11	4,200,000	80%	
Canyon Wren	*Catherpes mexicanus*	3	2	2	2	2	4	11	660,000	50%	
Carolina Wren	*Thryothorus ludovicianus*	2	2	2	2	2	2	8	17,000,000	89%	
Bewick's Wren	*Thryomanes bewickii*	2	2	2	3	3	3	10	6,000,000	76%	
House Wren	*Troglodytes aedon*	2	1	1	1	1	2	6	21,000,000	90%	
Winter Wren	*Troglodytes troglodytes*	2	1	1	3	2	1	7	36,000,000	50%	Mo3
Sedge Wren	*Cistothorus platensis*	2	3	3	3	3	1	9	6,500,000	100%	
Marsh Wren	*Cistothorus palustris*	2	2	2	3	3	1	8	7,700,000	100%	
American Dipper	*Cinclus mexicanus*	3	2	2	3	3	3	11	630,000	93%	Mo2
Golden-crowned Kinglet	*Regulus satrapa*	2	2	1	2	2	3	9	34,000,000	100%	Mo3
Ruby-crowned Kinglet	*Regulus calendula*	1	1	2	2	2	4	9	72,000,000	100%	Mo3
Arctic Warbler	*Phylloscopus borealis*	2	1	1	2	3	3	9	27,000,000	10%	Mo1
Blue-gray Gnatcatcher	*Polioptila caerulea*	1	1	2	2	2	2	7	57,000,000	74%	
California Gnatcatcher	*Polioptila californica*	4	5	5	3	3	2	14	77,000	8%	Mo1
Black-tailed Gnatcatcher	*Polioptila melanura*	3	3	3	3	3	3	12	3,600,000	50%	
Black-capped Gnatcatcher	*Polioptila nigriceps*	4	5	5	3	3	3	15	50 - 500,000	< 1%	Mo1
Bluethroat	*Luscinia svecica*	3	1	1	2	3	3	10	0.5 - 5,000,000	< 5%	Mo1
Northern Wheatear	*Oenanthe oenanthe*	3	1	1	2	2	3	9	2,900,000	10%	Mo1
Eastern Bluebird	*Sialia sialis*	2	1	2	2	2	1	7	10,000,000	80%	
Western Bluebird	*Sialia mexicana*	3	3	3	3	2	4	13	1,400,000	87%	
Mountain Bluebird	*Sialia currucoides*	2	2	3	2	2	1	8	5,200,000	100%	
Townsend's Solitaire	*Myadestes townsendi*	3	2	2	3	2	2	10	770,000	95%	
Veery	*Catharus fuscescens*	2	2	2	2	3	4	11	14,000,000	100%	
Gray-cheeked Thrush	*Catharus minimus*	2	1	1	2	3	3	9	12,000,000	90%	Mo3
Bicknell's Thrush	*Catharus bicknelli*	5	5	5	3	5	3	18	40,000	100%	Mo2

Appendix A. Assessment scores and estimated population size of North American landbirds - continued

Common Name	Scientific Name	PS	BD	ND	TB	TN	PT	Combined Score	Est. Global Population	% Population in US & Canada	Monitoring Need
Swainson's Thrush	*Catharus ustulatus*	1	1	2	3	3	4	10	100,000,000	100%	Mo3
Hermit Thrush	*Catharus guttatus*	1	1	2	2	2	1	6	56,000,000	100%	Mo3
Wood Thrush	*Hylocichla mustelina*	2	2	4	3	4	4	14	14,000,000	100%	
Clay-colored Robin	*Turdus grayi*	2	3	3	2	2	3	10	5 - 50,000,000	< 1%	Mo1
American Robin	*Turdus migratorius*	1	1	1	1	1	2	5	320,000,000	96%	Mo3
Varied Thrush	*Ixoreus naevius*	2	2	4	3	2	2	11	26,000,000	100%	Mo3
Wrentit	*Chamaea fasciata*	3	5	5	3	3	4	15	1,500,000	90%	
Gray Catbird	*Dumetella carolinensis*	2	1	3	2	2	2	9	10,000,000	100%	
Northern Mockingbird	*Mimus polyglottos*	2	1	1	1	1	4	8	45,000,000	82%	
Sage Thrasher	*Oreoscoptes montanus*	2	3	3	3	2	2	10	7,900,000	100%	
Brown Thrasher	*Toxostoma rufum*	2	1	3	3	2	4	12	7,300,000	100%	
Long-billed Thrasher	*Toxostoma longirostre*	4	5	5	2	2	2	13	390,000	25%	
Bendire's Thrasher	*Toxostoma bendirei*	4	5	5	3	3	5	17	170,000	75%	Mo2
Curve-billed Thrasher	*Toxostoma curvirostre*	3	3	3	2	2	4	12	2,300,000	50%	
California Thrasher	*Toxostoma redivivum*	4	5	5	3	3	4	16	220,000	90%	
Crissal Thrasher	*Toxostoma crissale*	4	4	4	3	3	2	13	260,000	50%	Mo2
Le Conte's Thrasher	*Toxostoma lecontei*	4	5	5	3	3	3	15	190,000	75%	Mo2
Yellow Wagtail	*Motacilla flava*	2	1	1	2	2	3	8	5 - 50,000,000	7%	Mo1
White Wagtail	*Motacilla alba*	4	1	1	2	2	3	10	50 - 500,000	< 5%	Mo1
Red-throated Pipit	*Anthus cervinus*	3	3	1	2	2	3	11	0.5 - 5,000,000	< 1%	Mo1
American Pipit	*Anthus rubescens*	2	1	1	2	2	2	7	22,000,000	90%	Mo2
Sprague's Pipit	*Anthus spragueii*	3	4	3	4	4	5	16	870,000	100%	
Bohemian Waxwing	*Bombycilla garrulus*	3	1	1	2	2	2	8	2,800,000	50%	Mo3
Cedar Waxwing	*Bombycilla cedrorum*	2	1	1	2	2	2	7	15,000,000	100%	
Phainopepla	*Phainopepla nitens*	3	3	3	3	2	2	11	3,600,000	25%	
Olive Warbler	*Peucedramus taeniatus*	3	4	4	3	3	3	13	0.5 - 5,000,000	< 5%	Mo1
Bachman's Warbler	*Vermivora bachmanii*	5	5	5	5	5	5	20	0 ?	100%	
Blue-winged Warbler	*Vermivora pinus*	4	3	4	3	3	4	15	390,000	100%	
Golden-winged Warbler	*Vermivora chrysoptera*	4	4	4	4	3	5	17	210,000	100%	
Tennessee Warbler	*Vermivora peregrina*	1	2	4	2	2	3	10	62,000,000	100%	Mo3
Orange-crowned Warbler	*Vermivora celata*	1	1	2	2	2	4	9	76,000,000	100%	Mo3
Nashville Warbler	*Vermivora ruficapilla*	2	2	4	2	2	1	9	34,000,000	100%	
Virginia's Warbler	*Vermivora virginiae*	4	4	5	3	3	3	15	410,000	100%	
Colima Warbler	*Vermivora crissalis*	5	5	5	4	3	3	17	25,000	< 1%	Mo1
Lucy's Warbler	*Vermivora luciae*	3	5	5	4	3	3	15	1,200,000	80%	
Northern Parula	*Parula americana*	2	2	4	2	2	2	10	7,300,000	100%	
Tropical Parula	*Parula pitiayumi*	2	1	1	3	3	3	9	5 - 50,000,000	< 1%	Mo1
Yellow Warbler	*Dendroica petechia*	2	1	1	2	2	2	7	39,000,000	85%	
Chestnut-sided Warbler	*Dendroica pensylvanica*	2	2	4	2	3	4	13	9,400,000	100%	
Magnolia Warbler	*Dendroica magnolia*	2	1	3	2	2	1	8	32,000,000	100%	Mo3
Cape May Warbler	*Dendroica tigrina*	3	2	4	3	2	2	12	3,200,000	100%	Mo3
Black-throated Blue Warbler	*Dendroica caerulescens*	3	3	4	3	3	2	12	2,000,000	100%	
Yellow-rumped Warbler	*Dendroica coronata*	1	1	1	2	2	2	6	90,000,000	98%	Mo3
Black-throated Gray Warbler	*Dendroica nigrescens*	3	3	4	3	3	3	13	2,900,000	98%	
Golden-cheeked Warbler	*Dendroica chrysoparia*	5	5	5	5	5	5	20	24,000	100%	Mo1
Black-throated Green Warbler	*Dendroica virens*	2	2	3	3	2	3	11	9,600,000	100%	Mo3
Townsend's Warbler	*Dendroica townsendi*	2	3	3	4	3	2	11	12,000,000	100%	Mo3
Hermit Warbler	*Dendroica occidentalis*	3	5	5	4	3	3	15	2,400,000	100%	
Blackburnian Warbler	*Dendroica fusca*	2	2	3	3	3	2	10	5,900,000	100%	
Yellow-throated Warbler	*Dendroica dominica*	3	3	3	3	2	2	11	1,600,000	100%	
Grace's Warbler	*Dendroica graciae*	3	3	4	3	3	4	14	2,000,000	50%	
Pine Warbler	*Dendroica pinus*	2	3	3	2	2	2	9	11,000,000	99%	
Kirtland's Warbler	*Dendroica kirtlandii*	5	5	5	4	5	5	20	2,100	100%	
Prairie Warbler	*Dendroica discolor*	3	3	4	3	2	4	14	1,400,000	100%	

Appendix A. Assessment scores and estimated population size of North American landbirds - continued

Common Name	Scientific Name	PS	BD	ND	TB	TN	PT	Combined Score	Est. Global Population	% Population in US & Canada	Monitoring Need
Palm Warbler	*Dendroica palmarum*	2	2	3	2	2	1	8	23,000,000	100%	Mo3
Bay-breasted Warbler	*Dendroica castanea*	3	3	4	3	3	4	14	3,100,000	100%	Mo3
Blackpoll Warbler	*Dendroica striata*	2	2	4	3	2	3	12	21,000,000	100%	Mo3
Cerulean Warbler	*Dendroica cerulea*	3	4	4	4	4	5	16	560,000	100%	
Black-and-white Warbler	*Mniotilta varia*	2	2	2	2	2	3	9	14,000,000	100%	
American Redstart	*Setophaga ruticilla*	2	1	2	2	2	2	8	25,000,000	100%	Mo3
Prothonotary Warbler	*Protonotaria citrea*	3	3	4	3	4	4	15	1,800,000	100%	
Worm-eating Warbler	*Helmitheros vermivorus*	3	3	4	3	4	3	14	750,000	100%	
Swainson's Warbler	*Limnothlypis swainsonii*	4	4	5	4	4	1	14	84,000	100%	
Ovenbird	*Seiurus aurocapillus*	2	2	3	2	3	2	10	24,000,000	100%	
Northern Waterthrush	*Seiurus noveboracensis*	2	1	2	2	2	3	9	13,000,000	100%	Mo3
Louisiana Waterthrush	*Seiurus motacilla*	4	2	3	3	4	2	13	260,000	100%	
Kentucky Warbler	*Oporornis formosus*	3	3	4	3	3	4	14	1,100,000	100%	
Connecticut Warbler	*Oporornis agilis*	3	3	3	3	2	4	13	1,200,000	100%	Mo3
Mourning Warbler	*Oporornis philadelphia*	2	3	3	2	2	4	11	7,000,000	100%	Mo3
MacGillivray's Warbler	*Oporornis tolmiei*	2	3	3	2	2	3	10	5,400,000	99%	
Common Yellowthroat	*Geothlypis trichas*	2	1	2	2	2	2	8	32,000,000	100%	
Hooded Warbler	*Wilsonia citrina*	3	2	4	3	3	3	13	4,000,000	100%	
Wilson's Warbler	*Wilsonia pusilla*	2	1	3	3	2	4	12	36,000,000	100%	Mo3
Canada Warbler	*Wilsonia canadensis*	3	2	3	3	4	4	14	1,400,000	100%	Mo3
Red-faced Warbler	*Cardellina rubrifrons*	4	5	5	3	3	3	15	430,000	25%	Mo1
Painted Redstart	*Myioborus pictus*	3	3	4	3	3	3	13	0.5 - 5,000,000	< 5%	Mo1
Rufous-capped Warbler	*Basileuterus rufifrons*	3	3	3	2	2	3	11	0.5 - 5,000,000	< 1%	Mo1
Yellow-breasted Chat	*Icteria virens*	2	1	3	3	2	2	10	12,000,000	87%	
Hepatic Tanager	*Piranga flava*	4	1	1	3	3	2	10	360,000	25%	
Summer Tanager	*Piranga rubra*	3	2	2	3	2	2	10	4,100,000	80%	
Scarlet Tanager	*Piranga olivacea*	3	2	4	2	3	2	12	2,200,000	100%	
Western Tanager	*Piranga ludoviciana*	2	2	3	2	2	2	9	8,900,000	99%	
Flame-colored Tanager	*Piranga bidentata*	3	4	4	3	3	3	13	0.5 - 5,000,000	< 1%	Mo1
White-collared Seedeater	*Sporophila torqueola*	2	3	3	2	1	3	10	5 - 50,000,000	< 1%	Mo1
Olive Sparrow	*Arremonops rufivirgatus*	3	4	4	3	3	2	12	2,100,000	10%	Mo2
Green-tailed Towhee	*Pipilo chlorurus*	3	3	3	3	2	3	12	4,100,000	100%	
Spotted Towhee	*Pipilo maculatus*	2	2	2	2	2	2	8	14,000,000	90%	
Eastern Towhee	*Pipilo erythrophthalmus*	2	2	2	3	2	4	11	11,000,000	100%	
California Towhee	*Pipilo crissalis*	3	4	4	2	2	3	12	4,700,000	50%	
Canyon Towhee	*Pipilo fuscus*	2	3	3	2	2	2	9	6,500,000	25%	
Abert's Towhee	*Pipilo aberti*	4	5	5	3	3	3	15	230,000	90%	
Bachman's Sparrow	*Aimophila aestivalis*	4	4	4	4	4	5	17	250,000	100%	
Botteri's Sparrow	*Aimophila botterii*	3	4	4	3	2	3	13	0.5 - 5,000,000	< 5%	Mo1
Cassin's Sparrow	*Aimophila cassinii*	2	3	4	3	3	4	13	20,000,000	50%	
Rufous-winged Sparrow	*Aimophila carpalis*	4	5	5	3	3	3	15	74,000	12%	Mo1
Rufous-crowned Sparrow	*Aimophila ruficeps*	3	3	3	2	2	4	12	2,400,000	50%	
Five-striped Sparrow	*Aimophila quinquestriata*	4	5	5	3	3	4	16	50 - 500,000	< 1%	Mo1
American Tree Sparrow	*Spizella arborea*	2	2	2	2	2	4	10	26,000,000	100%	Mo3
Chipping Sparrow	*Spizella passerina*	1	1	2	1	2	2	7	99,000,000	90%	
Clay-colored Sparrow	*Spizella pallida*	2	2	3	2	2	4	11	23,000,000	100%	Mo3
Brewer's Sparrow	*Spizella breweri*	2	3	3	3	2	5	13	16,000,000	100%	
Field Sparrow	*Spizella pusilla*	2	2	2	3	2	5	12	8,200,000	100%	
Black-chinned Sparrow	*Spizella atrogularis*	4	3	4	3	3	4	15	390,000	80%	
Vesper Sparrow	*Pooecetes gramineus*	2	1	2	3	2	4	11	30,000,000	100%	
Lark Sparrow	*Chondestes grammacus*	2	1	3	2	2	5	12	9,900,000	89%	
Black-throated Sparrow	*Amphispiza bilineata*	2	3	3	2	2	5	12	27,000,000	50%	
Sage Sparrow	*Amphispiza belli*	3	3	4	4	3	2	13	4,300,000	90%	
Lark Bunting	*Calamospiza melanocorys*	2	3	3	3	3	4	12	27,000,000	100%	

Appendix A. Assessment scores and estimated population size of North American landbirds - continued

Common Name	Scientific Name	PS	BD	ND	TB	TN	PT	Combined Score	Est. Global Population	% Population in US & Canada	Monitoring Need
Savannah Sparrow	*Passerculus sandwichensis*	1	1	2	2	2	4	9	82,000,000	97%	Mo3
Baird's Sparrow	*Ammodramus bairdii*	3	4	5	4	4	5	17	1,200,000	100%	
Henslow's Sparrow	*Ammodramus henslowii*	4	3	5	4	4	5	18	79,000	100%	
Grasshopper Sparrow	*Ammodramus savannarum*	2	1	2	3	3	5	12	15,000,000	93%	
Le Conte's Sparrow	*Ammodramus leconteii*	3	2	4	3	3	3	13	2,900,000	100%	Mo3
Saltmarsh Sharp-tailed Sparrow	*Ammodramus caudacutus*	4	5	5	4	4	5	18	250,000	100%	Mo2
Nelson's Sharp-tailed Sparrow	*Ammodramus nelsoni*	3	4	5	3	4	2	14	510,000	100%	Mo2,3
Seaside Sparrow	*Ammodramus maritimus*	4	4	5	3	3	3	15	110,000	100%	Mo2
Fox Sparrow	*Passerella iliaca*	2	1	2	2	2	2	8	16,000,000	100%	
Song Sparrow	*Melospiza melodia*	1	1	1	2	2	4	8	54,000,000	98%	
Lincoln's Sparrow	*Melospiza lincolnii*	2	1	2	2	2	1	7	39,000,000	100%	Mo3
Swamp Sparrow	*Melospiza georgiana*	2	2	2	2	2	1	7	9,000,000	100%	Mo3
White-throated Sparrow	*Zonotrichia albicollis*	1	2	2	2	2	4	9	140,000,000	100%	Mo3
Harris's Sparrow	*Zonotrichia querula*	3	4	4	2	2	5	14	3,700,000	100%	Mo3
White-crowned Sparrow	*Zonotrichia leucophrys*	1	1	2	2	2	4	9	72,000,000	100%	Mo3
Golden-crowned Sparrow	*Zonotrichia atricapilla*	2	3	4	2	2	2	10	5,200,000	100%	Mo3
Dark-eyed Junco	*Junco hyemalis*	1	1	1	2	2	4	8	260,000,000	100%	Mo3
Yellow-eyed Junco	*Junco phaeonotus*	2	4	4	3	2	2	11	5 - 50,000,000	< 5%	Mo2
McCown's Longspur	*Calcarius mccownii*	3	5	5	3	2	3	14	1,100,000	100%	
Lapland Longspur	*Calcarius lapponicus*	1	1	1	2	2	3	7	150,000,000	50%	Mo3
Smith's Longspur	*Calcarius pictus*	4	4	5	2	3	3	15	75,000	100%	Mo3
Chestnut-collared Longspur	*Calcarius ornatus*	2	4	3	3	3	4	13	5,600,000	100%	
Snow Bunting	*Plectrophenax nivalis*	2	1	1	2	2	2	7	39,000,000	50%	Mo3
McKay's Bunting	*Plectrophenax hyperboreus*	5	5	5	3	2	3	16	6,000	100%	Mo1
Northern Cardinal	*Cardinalis cardinalis*	1	1	1	1	1	2	5	100,000,000	82%	
Pyrrhuloxia	*Cardinalis sinuatus*	2	3	3	3	3	4	12	7,700,000	25%	
Rose-breasted Grosbeak	*Pheucticus ludovicianus*	3	2	3	2	2	4	12	4,600,000	100%	
Black-headed Grosbeak	*Pheucticus melanocephalus*	3	2	4	2	2	2	11	4,900,000	80%	
Blue Grosbeak	*Guiraca caerulea*	2	1	3	2	2	2	9	7,700,000	80%	
Lazuli Bunting	*Passerina amoena*	3	2	5	3	2	2	13	2,300,000	99%	
Indigo Bunting	*Passerina cyanea*	2	1	3	2	2	4	11	28,000,000	100%	
Varied Bunting	*Passerina versicolor*	3	3	4	3	3	4	14	0.5 - 5,000,000	< 5%	Mo1
Painted Bunting	*Passerina ciris*	3	4	3	3	4	5	16	4,500,000	80%	
Dickcissel	*Spiza americana*	2	2	4	3	4	4	14	22,000,000	100%	
Bobolink	*Dolichonyx oryzivorus*	2	2	2	3	3	4	11	11,000,000	100%	
Red-winged Blackbird	*Agelaius phoeniceus*	1	1	1	2	2	4	8	210,000,000	92%	
Tricolored Blackbird	*Agelaius tricolor*	4	5	5	4	3	5	18	250,000	99%	Mo2
Eastern Meadowlark	*Sturnella magna*	2	1	1	3	3	5	11	10,000,000	80%	
Western Meadowlark	*Sturnella neglecta*	2	1	2	3	3	4	11	32,000,000	92%	
Yellow-headed Blackbird	*Xanthocephalus xanthocephalus*	2	2	3	3	3	1	9	23,000,000	100%	
Rusty Blackbird	*Euphagus carolinus*	3	1	2	2	3	5	13	2,000,000	100%	Mo3
Brewer's Blackbird	*Euphagus cyanocephalus*	2	2	1	2	1	4	10	35,000,000	99%	
Common Grackle	*Quiscalus quiscula*	1	1	2	1	1	4	8	97,000,000	100%	
Boat-tailed Grackle	*Quiscalus major*	3	4	4	1	1	1	9	3,700,000	100%	
Great-tailed Grackle	*Quiscalus mexicanus*	2	2	2	1	1	1	6	31,000,000	25%	
Shiny Cowbird	*Molothrus bonariensis*	1	1	1	1	1	1	4	> 50,000,000	< 1%	
Bronzed Cowbird	*Molothrus aeneus*	2	3	3	1	1	1	7	5,400,000	10%	
Brown-headed Cowbird	*Molothrus ater*	1	1	1	1	1	4	7	56,000,000	91%	
Orchard Oriole	*Icterus spurius*	3	2	3	3	2	3	12	4,300,000	87%	
Hooded Oriole	*Icterus cucullatus*	3	3	4	2	2	2	11	610,000	25%	
Streak-backed Oriole	*Icterus pustulatus*	3	3	3	2	2	3	11	0.5 - 5,000,000	< 1%	Mo1
Bullock's Oriole	*Icterus bullockii*	3	1	4	2	2	4	13	3,800,000	75%	
Altamira Oriole	*Icterus gularis*	3	4	4	3	2	3	13	0.5 - 5,000,000	< 1%	Mo1
Audubon's Oriole	*Icterus graduacauda*	4	5	5	4	3	3	16	50 - 500,000	< 5%	Mo1

Appendix A. Assessment scores and estimated population size of North American landbirds - continued

Common Name	Scientific Name	PS	BD	ND	TB	TN	PT	Combined Score	Est. Global Population	% Population in US & Canada	Monitoring Need
Baltimore Oriole	*Icterus galbula*	2	2	3	2	2	4	11	6,000,000	100%	
Scott's Oriole	*Icterus parisorum*	3	3	4	2	2	2	11	1,600,000	50%	
Gray-crowned Rosy-Finch	*Leucosticte tephrocotis*	4	3	2	2	2	2	11	50 - 500,000	100%	Mo1
Black Rosy-Finch	*Leucosticte atrata*	5	4	4	3	2	3	15	< 50,000	100%	Mo2
Brown-capped Rosy-Finch	*Leucosticte australis*	5	5	5	3	2	3	16	45,000	100%	Mo2
Pine Grosbeak	*Pinicola enucleator*	3	1	1	2	2	3	9	4,400,000	50%	Mo3
Purple Finch	*Carpodacus purpureus*	3	2	1	2	2	4	11	3,000,000	100%	Mo3
Cassin's Finch	*Carpodacus cassinii*	3	3	2	3	2	4	13	1,900,000	99%	
House Finch	*Carpodacus mexicanus*	2	1	1	1	1	2	6	21,000,000	79%	
Red Crossbill	*Loxia curvirostra*	2	1	1	3	3	3	9	15,000,000	38%	Mo3
White-winged Crossbill	*Loxia leucoptera*	2	1	1	3	2	2	8	41,000,000	50%	Mo3
Common Redpoll	*Carduelis flammea*	1	1	1	2	2	2	6	97,000,000	30%	Mo3
Hoary Redpoll	*Carduelis hornemanni*	2	1	1	2	2	3	8	26,000,000	50%	Mo3
Pine Siskin	*Carduelis pinus*	2	1	1	2	2	4	9	22,000,000	97%	Mo3
Lesser Goldfinch	*Carduelis psaltria*	3	2	2	2	2	4	11	3,100,000	50%	
Lawrence's Goldfinch	*Carduelis lawrencei*	4	5	5	3	2	3	15	150,000	90%	Mo2
American Goldfinch	*Carduelis tristis*	2	1	1	1	1	2	6	24,000,000	100%	
Evening Grosbeak	*Coccothraustes vespertinus*	2	2	1	2	2	4	10	6,000,000	95%	

Notes:
Species are sorted taxonomically (AOU order)
Assessment Scores (see text for more information): PS = Population Size, BD = Breeding Distribution, ND = Non-breeding Distribution, TB = Threats Breeding, TN = Threats Non-breeding, PT = Population Trend.
Est. Global Population: Breeding population estimate. See Appendix B for methods. A range of estimates is shown for species whose population size was based on order of magnitude PS scores (e.g. 0.5 - 5,000,000 means 0.5 million to 5 million). Estimates are rounded to 2 significant digits - does not imply level of precision.
% Population in US & Canada: Estimated percent of Global population in continental United States and Canada combined. See Appendix B for methods.
Monitoring Need (see text for more information): M1 = no trend data, Mo2 = BBS inadequate, Mo3 = inadequate northern coverage

APPENDIX B. METHODS USED TO ESTIMATE POPULATION SIZES AND PERCENTS

Estimates of global population size were needed for each species of landbird covered by this Plan for several reasons:

- To score the Population Size factor (PS) in our species assessment. For this purpose, we needed order of magnitude resolution on population sizes, using to the extent possible a single methodology to give comparable estimates across all species;
- To provide estimates of "current" population size for each landbird species. This gives an impression of the size of the landbird resource, and more importantly it emphasizes the magnitude of the task of attaining listed population objectives;
- To provide a starting point for estimating population sizes in each Bird Conservation Region, and an understanding of the magnitude of attaining objectives regionally. We emphasize that additional work to check and refine estimates in each region is highly desirable, because additional population data may be available, different analytical methods may provide more precision at the regional scale, and because assumptions applied at the continental level may need to be revisited within each region.

Population size estimates for the U.S. and Canada south of the arctic:

We used Breeding Bird Survey (BBS) data from the 1990s as the basis for population estimates across the U.S. and across Canada south of the arctic (i.e., excluding Bird Conservation Region [BCR] 3, see next section). BBS-based estimates of abundance were calculated according to the following steps:

1) For each BBS route run within acceptable weather conditions, counts were averaged across years to give a single average count for the 1990s for each species recorded on each route.

2) In the boreal forest portions of Canada, where BBS routes are widely scattered, routes not run during the 1990s were added to augment geographical coverage, using data from other decades for these routes (boreal routes that were run during the 1990s still provided the bulk of boreal count data, and species counts from those routes were restricted to the 1990s).

3) Species counts were averaged across all BBS routes in each geo-political polygon defined by the intersection of a BCR and a province/state/territory – for example, separate averages were calculated for each of the three U.S. states and three Canadian provinces that together comprise the Boreal Hardwood Transition (BCR 12).

4) Where a geo-political polygon was not sampled by BBS routes, we assigned averages from adjacent polygon(s) in the same BCR. In the U.S., unsampled polygons were typically smaller than 1,000 km2, so this procedure had minimal effect on continental population estimates. In boreal Canada, unsampled polygons were sometimes large (exceeding 100,000 km2 in two instances) so that population estimates for boreal BCRs are less likely to be representative of the whole region.

5) Indices of abundance were calculated for each geo-political polygon by multiplying average counts per BBS route (from step 4) times area of the geo-political polygon, and dividing by the theoretical area covered by a BBS route (25.1 km2, assuming 400-m radius around each of the 50 count circles). For example, the index of abundance for Wood Thrushes in the Ontario portion of BCR 12 equals 2.33 birds/route (55 routes sampled in 1990s) x 202,860 km2 (area of Ontario in BCR 12) / 25.1 km2 (area per BBS route) equals approximately 19,000.

6) BCR-wide indices of abundance were calculated by simple addition across all polygons making up each BCR, thus giving a population index for Wood Thrushes in all of BCR 12 of approximately 40,000. State and province-wide indices of abundance can be calculated in the same manner.

7) BCR-wide population indices were converted to population estimates by applying three correction factors (see Rosenberg and Blancher, in press, for more detail on these correction factors):

   Pair correction: Indices were multiplied by two on the assumption that typically a single member of a breeding pair is observed during BBS tallies;

   Detection area correction: Most species are not detected out to the full 400m BBS count circle. Each species was placed into one of five detection distance categories, based on presumed effective detection during 3-minute BBS counts: 80m, 125m, 200m, 400m and 800m. Because area of detection increases as the square of detection distance, the detection area correction is then simply the square

of the ratio between 400m (theoretical BBS count circle) and species-specific effective distance. For example for Wood Thrush, placed in the 200m class, the population index is multiplied by a detection area correction of 4 (square of 400/200). Note that effective detection distances are intended to incorporate not only the distance at which a species is normally heard and seen, but also the radius of its movement during a 3-min count period – this is why some wide-ranging species have been assigned an 800-m detection distance despite being counted within a 400-m BBS circle.

Time of day correction: Almost all species show a temporal change in detection across the 50 BBS stops, some declining from a dawn chorus, others peaking after sunrise or later in the morning. A time of day correction is applied to the population index to adjust counts to the maximum time of detection. This adjusts for birds not detected at other times of the morning. The correction factor is the ratio of counts at the peak of detection (calculated using a polynomial curve fit to smooth out stop-by-stop variance) relative to the average count over whole BBS routes. Time of day correction factors were calculated from survey-wide BBS stop-by-stop data. For Wood Thrush, whose detectability declines from a peak at BBS stop 1, the time of day correction is 2.30.

For Wood Thrushes, the population estimate for BCR 12 = 40,000 (index from step 6) x 2 (pair correction) x 4 (detection area correction) x 2.30 (time of day correction) = approximately 740,000 breeding individuals.

Population size estimates for arctic Canada (BCR 3):

In the absence of BBS data, we used a combination of Breeding Bird Census (BBC) density estimates (Kennedy et al. 1999) and relative abundance data from the Northwest Territories / Nunavut Bird Checklist Survey <http://www.mb.ec.gc.ca/nature/migratorybirds/nwtbcs/index.en.html> to estimate population size of landbirds in the arctic (BCR 3) portion of Canada, as follows:

1) Total landbird density was calculated from BBC data for each of three terrestrial ecozones that make up BCR 3 in Canada (Arctic Cordillera, Northern Arctic and Southern Arctic).

2) Total landbird density was split among three classes of landbirds – those likely to be detected at long distances (raptors, ravens), those at intermediate distances (birds of open country) and the rest (birds of woods and scrub).

3) Relative abundance of each landbird species was calculated from Checklist data for each of the ecozones and classes of birds above. Checklist data were first screened to remove lists in which all bird species were not recorded, or the observer self-identified as "fair" at species identification, or month was not June or July. Counts per species were averaged across years within sites before further analysis.

4) The ratio of BBC density to checklist abundance (density conversion factor) was calculated for each ecozone and class of landbird. The two northern ecozones were collapsed into one due to lack of difference in conversion factors.

5) Density conversion factors were applied to checklist abundance data to provide density estimates of each landbird species at 649 sites across the arctic (those in BCR 3 in Canada).

6) Bird densities from checklist sites were averaged within each of 30 Arctic ecoregions, then multiplied by size of region to convert to a population estimate for that ecoregion. Estimates for unsampled ecoregions were derived as area-weighted averages from all sampled ecoregions in the same terrestrial ecozone. Population estimates were then summed across ecoregions to provide a total population estimate for each landbird species in the arctic.

Estimating global populations:

For species breeding entirely within the U.S. and Canada, our estimate of global population size was a simple sum of the above two estimates (BBS-based estimate plus arctic Canada estimate).

For species with broader breeding distributions, but still at least 10% of range in the U.S. and Canada, we extrapolated global population size on the basis of proportion of breeding range outside of the U.S. and Canada. Proportions of breeding range were estimated from range maps.

For species with more than 90% of breeding range outside the U.S. and Canada, we estimated global population size to order of magnitude (as for PS scores) based on range size and a comparison to population sizes of other landbird species that were judged to have similar relative abundance.

Exceptions to the methods presented above:

We accepted independent estimates of population size for some landbird species that have been surveyed by other methods more appropriate and specific to the species, for which continental-scale estimates were available or could be estimated at a level of accuracy deemed to be superior to our standard estimates.

Some assumptions in estimating population sizes:

For a variety of reasons, the population estimates presented here are rough estimates, and will need to be improved over time, especially for use at smaller scales. Without attempting to be comprehensive, a few main assumptions of the approach are mentioned here (see Rosenberg and Blancher, in press).

Habitats are sampled in proportion to their occurrence in the regional landscape: Although BBS is designed to provide a random sample of the landscape, limitations of a road-based survey mean that the landscape sampled is a biased representation of available habitat – for example species characteristic of high elevation habitats are likely to be undersampled by BBS simply because roads tend to follow valley bottoms in mountainous regions. In northern BCRs, there is a geographic bias, with most BBS data available from the southern portions of those BCRs. Checklist and Breeding Bird Census sites are determined by individual scientists and volunteers, so are not a random sample of arctic regions. We have not accounted for habitat bias in our continental estimates, in part because it will differ from region to region, and because the magnitude of bias has not yet been estimated in many regions or at a continental scale. Correction for habitat bias should be considered when using the methods described above at smaller scales.

Birds present but not detected during BBS counts are accounted for by one or more of the three density corrections applied above (pair, detection area, and time of day corrections): Species that have a peak of detection outside of the BBS sampling window (e.g., early-season breeders, most nocturnal species) are likely to have been underestimated. Pair corrections may result in over-estimation of population size, if a high proportion of counts involve either both members of a pair, or unmated birds.

Checklist / BBC-derived estimates from arctic Canada are comparable to BBS estimates: There are no BBS data from BCR3 in Canada to test this assumption. However, checklist/BBC-derived landbird density was 79 birds/km2 in the Canadian arctic, versus a BBS-derived 127 birds/km2 in the BCR 3 portion of Alaska. This difference is in the expected direction, because the Canadian arctic has a larger proportion of High Arctic where landbird density is typically low.

Breeding density within the U.S. and Canada is similar to density elsewhere in the breeding range: Extrapolation of population size estimates to global population rely on this assumption, though it does not affect U.S./Canada population estimates, nor population objectives for the U.S. and Canada.

How accurate are the population estimates?:

Measures of precision for population estimates are not presented in this Plan. Although we have measured variance associated with some of the parameters, others have yet to be estimated. Conversion of BBS relative abundance to estimated density depends on several adjustment factors, each of which carries associated variance. A high proportion of undetected birds, habitat bias and incorrect assignment of detection distance category have potential for large effects on estimates. Nevertheless, comparison with atlas-derived population estimates suggests that population sizes are still well within the correct order of magnitude for landbirds regularly encountered on BBS routes (Rosenberg and Blancher, in press). Additional comparisons will be useful for refining the estimates and independent estimates are sought for all species.

Estimates of percent of global population:

Estimates of the percent of global population within BCRs and biomes were needed to assign BCRs to Avifaunal Biomes, to identify Stewardship Species in those biomes, to construct maps weighted by proportion of population in Avifaunal Biomes, and to provide an indication of degree of regional responsibility for Watch List and other species.

Breeding season

For the breeding season, estimates of proportion of global population were calculated by dividing regional population estimates by global population estimates.

Winter percents

For resident species, we assumed percent of global population was the same as in the breeding season. For migratory species, we based our estimates for the U.S. and Canada on Christmas Bird Count (CBC) data, calculated as follows:

1) For each CBC count circle surveyed between 1990/91 and 1997/98, birds observed per 100 party-hrs were calculated and then averaged across years to give a single effort-adjusted count per species per

count circle.

2) Effort-adjusted counts were averaged across all CBC count circles in each geo-political polygon defined by the intersection of a BCR and a province / state / territory. These average effort-adjusted counts were then multiplied by area of the geo-political polygon to yield an abundance index for each species in the polygon.

3) Abundance indices were summed across polygons within BCRs to give an abundance index for each BCR. Where a geo-political polygon was not sampled by CBC sites, an area-weighted average from other polygons in the same BCR was assigned. Most geo-political polygons without CBC count circles were in the boreal forest or arctic, where relatively few landbird species spend the winter.

4) Percent of U.S. and Canada winter population was then calculated for each BCR by dividing BCR abundance indices (from step 3) by the sum of all BCR indices across the U.S. and Canada.

5) Percent of global winter population was estimated in the same manner as summer population estimates, using proportion of winter range to estimate proportion of global range in the U.S. and Canada.

Some assumptions in estimating percent of population:

Habitat bias is consistent across the survey area: Because estimates of percent are relative measures, they are much less affected by habitat bias and density corrections than are population estimates, as long as biases are relatively consistent across the survey area. Thus percent of population based on CBC circles can be reasonably accurate despite strong potential for bias in the non-random placement of circles.

Differences in effort among CBC counts can be standardized by dividing by party-hour: In fact, species will respond differently to different types of effort (party-hour, party-mile, feeder counts, nocturnal effort). Also, response to increasing effort is likely to be non-linear, eventually becoming asymptotic. However, estimates of percent of winter population by BCR or avifaunal biome were relatively insensitive to these issues. Comparison of percents of winter population were similar whether calculated without any effort correction, correcting with party-miles, or using party-hours to correct effort. Only for a few northern species were there important differences depending on which method of error correction was used.

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