Partners in Flight
Bird Conservation Plan
for
The St. Lawrence Plain
(Physiographic Area 18)

American Bird Conservancy

Partners In Flight Landbird Conservation Plan:

Physiographic Area 18: Saint Lawrence Plain

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Address comments to:
Kenneth V. Rosenberg
PIF Northeast Regional Coordinator
Cornell Lab of Ornithology
159 Sapsucker Woods Rd.
Ithaca, NY 14850

607- 254-2412
kvr2@cornell.edu

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EXECUTIVE SUMMARY

Area - 11,955,272 ha
Description - This physiographic area is a vast, flat plain, with elevations rarely exceeding 200m in Canada, and 300m in Vermont and New York. This area was originally a forest-wetland complex, although very little of the forest remains today. It now represents the best farmland in eastern Canada and much of the northeastern U.S. Agriculture has been the primary land use throughout the planning unit for over 200 years, with increasing urbanization and industrialization along the St. Lawrence River. Currently, the agriculture-dominated landscape of the St. Lawrence Plain represents a vast "agricultural grassland," which supports some of the largest populations of grassland and other early successional bird species in eastern North America. Unlike in many other agricultural regions, climate and poor drainage conditions favor establishment of freshwater wetlands and promote late season harvesting, which enhance the value of the region to breeding birds. In addition, these grassland habitats, interspersed with numerous freshwater wetlands, are vital to breeding and migrating waterfowl and other wetland bird species. Forest habitats remain primarily as isolated fragments that are reduced in tree-species diversity due to repeated selected cutting of sugar maple associates such as hickory, basswood, and butternut. The vast majority of lands in this planning unit are in private ownership.

Priority bird species and habitats

Grasslands **-**
Henslow's Sparrow -- Important regional population in St. Lawrence Valley of New York
Upland Sandpiper -- Largest population in Northeast; area sensitive
Bobolink -- Perhaps a higher density here than anywhere else in its range; population trend is stable overall since 1966, but has shown 2-3% declines since 1980.

Objective: Roughly 775,000 ha of suitable grassland habitat is required to support the entire habitat-species suite (e.g. 680,000 pairs of Bobolinks), with 100,000 ha maintained in large enough patches to support 7,600 pairs of Upland Sandpipers, and 2,000 ha intensively managed to support 1,000 pairs of Henslow's Sparrows in New York and Ontario.

Shrub-early succession **-**
Golden-winged Warbler -- Still expanding in the area in abandoned agricultural land; as abandonment halts and existing habitat becomes forest, however, populations are bound to decline.
American Woodcock -- Shows steep population declines; requires combination of forest clearings, second-growth hardwoods, and moist soils for foraging.

Objective: Roughly 50,000 ha of shrub habitats need to be maintained to support 20,000 pairs of Golden-winged Warblers and other species in this habitat suite

Riparian deciduous forest -

Cerulean Warbler -- The St. Lawrence Plain population of this Watch List species is apparently expanding in forest fragments, but is not sufficiently detected in the Breeding Bird Survey.

Objective: Roughly 550,000 ha of mature forest habitats need to be maintained to support 165,000 pairs of Wood Thrush and other species in this habitat suite. Roughly 5,000 ha should be managed to support 3,000-5,000 pairs of Cerulean Warblers in areas where they occur.

Conservation recommendations and needs -

Because of agriculture, this is now the largest and most important area of grassland in the Northeast. As a result, grassland birds have thrived, regardless of their pre-disturbance status, and are more abundant here than anywhere else in the region. Indeed, the Bobolink population here is the highest of anywhere within its range. Several of these species, however, have been in decline in recent years. Maintenance of grassland and wetland habitats is dependent of continuation of agriculture, especially dairy farming. Consolidation into large farms resulting in more intensive agriculture, row cropping, and conversion to urban use and other development all damage bird habitat. Maintenance of Henslow's Sparrow populations is the highest priority, and suffering no additional loss of grassland habitat important for other species is also important. Farm abandonment and some other processes have created shrub habitat of value to Golden-winged Warbler and American Woodcock. Conversion of more grassland to shrub should not be encouraged, but improving and maintaining current shrubland should be a priority. The small remaining riparian and deciduous forest habitat in the St. Lawrence Plain supports several high priority birds, most notably a large and expanding population of Cerulean Warbler. The combination of regional climatic and economic factors offers tremendous potential for conservation and management of early successional bird species within this planning unit. The late growing season and poor drainage has resulted in a temporal distribution of traditional farming practices that maximizes benefits to wetland birds and nesting grassland species in spring and early summer (June). Therefore, bird conservation measures are generally compatible with local economic objectives and receive support from private landowners and local industry. Throughout the planning unit, a balance should be maintained between agricultural grassland and shrub habitats, taking advantage of local economic forces and land-ownership patterns. In both cases, largescale reversion to forest is not desirable.

Specific conservation needs for this physiographic area include:

- Develop and implement supplemental inventory and monitoring programs to identify important sites for Henslow's Sparrow, Golden-winged Warbler, and other uncommon, patchily distributed species not well monitored by BBS.
- Establishment and use of native, warm season grasses as a late-season hay crop.
- Determine effects of current game and waterfowl management practices on priority nongame species -- especially the relationships between American Woodcock management and Golden-winged Warbler population expansion.
- Protection and management of mature forests to maximize benefits to Cerulean Warbler; e.g., preserve tallest trees, encourage maturing of canopy species, prevent fragmentation of existing forests; encourage compatible land uses, such as maple syrup production.

INTRODUCTION

Continental and local declines in numerous bird populations have led to concern for the future of migratory and resident landbirds. Reasons for declines are complex. Habitat loss, degradation, and fragmentation on breeding and wintering grounds and along migratory routes have been implicated for many species. Additional factors may include reproductive problems associated with brood parasitism, nest predation, and competition with exotic species. Scientists and the concerned public agreed that a coordinated, cooperative, conservation initiative focusing on nongame landbirds was needed to address the problem of declining species. In 1990, Partners in Flight (PIF) was conceived as a voluntary, international coalition of government agencies, conservation organizations, academic institutions, private industry, and other citizens dedicated to "keeping common birds common" and reversing the downward trends of declining species.

PIF functions to direct resources for the conservation of landbirds and their habitats through cooperative efforts in the areas of monitoring, research, management, and education, both nationally and internationally. The foundation for PIF's long-term strategy for bird conservation is a series of scientifically based Landbird Conservation Plans, of which this document is one. The geographical context of these plans are physiographic areas, modified from original strata devised by the Breeding Bird Survey (Robbins et al. 1986). Twelve physiographic areas overlap the northeastern United States (USFWS Region-5). Although priorities and biological objectives are identified at the physiographic area level, implementation of PIF objectives will take place at different scales, including individual states, federal agency regions, and joint ventures.

A. Goal

The goal of PIF Landbird Conservation Planning is to ensure long-term maintenance of healthy populations of native landbirds. This document was prepared to facilitate that goal by stimulating a proactive approach to landbird conservation. The conservation plan primary addresses nongame landbirds, which have been vastly underrepresented in conservation efforts, and many of which are exhibiting significant declines that may be arrested or reversed if appropriate management actions are taken. The PIF approach differs from many existing federal and state-level listing processes in that it (1) is voluntary and nonregulatory, (2) focuses proactively on relatively common species in areas where conservation actions can be most effective, rather than the frequent local emphasis on rare and peripheral populations. PIF Landbird Conservation Planning therefore provides the framework to develop and implement habitat conservation actions on the ground that may prevent the need for future species listings.

B. Process

PIF Landbird Conservation Planning emphasizes effective and efficient management through a four-step process designed to identify and achieve necessary actions for bird conservation:

(1) identify species and habitats most in need of conservation; i.e. prioritization
(2) describe desired conditions for these habitats based on knowledge of species life history and habitat requirements

(3) develop biological objectives that can be used as management targets or goals to achieve desired conditions
(4) recommend conservation actions that can be implemented by various entities at multiple scales to achieve biological objectives.

Throughout the planning process and during the implementation phase, this strategy emphasizes partnerships and actions over large geographic scales. Information and recommendations in the plans are based on sound science and consensus among interested groups and knowledgeable individuals. Specific methods used to complete this process are described within the plan or in its appendices. Additional details on PIF history, structure, and methodology can be found in Finch and Stangel (1993) and Bonney et al. (1999).

C. Implementation

This landbird conservation strategy is one of many recent efforts to address conservation of natural resources and ecosystems in the Northeast. It is intended to supplement and support other planning and conservation processes (e.g. The Nature Conservancy Ecoregion Plans, USFWS Ecosystem Plans, Atlantic Coast Joint Venture, Important Bird Areas initiatives) by describing a conservation strategy for nongame landbirds that are often not addressed or only incidentally addressed in other plans.

PIF strategies for landbird conservation are one of several existing and developing planning efforts for bird conservation. PIF Landbird Conservation Plans are intended to compliment other initiatives such as the North American Waterfowl Management Plan, National Shorebird Conservation Plan, and North American Colonial Waterbird Plan. Ongoing efforts to integrate with these initiatives during objective setting and implementation will help ensure that healthy populations of native bird species continue to exist, and that all of our native ecosystems have complete and functional avifaunal communities. In particular, the emerging North American Bird Conservation Initiative (NABCI) will provide a geographical and political framework for achieving these ambitious goals across Canada, Mexico, and The United States.

SECTION 1: THE PLANNING UNIT

A. Physical Features

The St. Lawrence Plain is the third largest physiographic area in the Northeast region, encompassing the floodplain of the St. Lawrence River and much of the eastern Great Lakes (Figure 1). Most of the area is in Canada, including the southernmost portions of Quebec and most of southern Ontario, south and east of the Canadian Shield. The U.S. portions include the St. Lawrence Valley of northern New York and the Lake Champlain Valley of northwestern Vermont and adjacent parts of New York. The total area under consideration is roughly 120,100 square kilometers.

Within the U.S. portion of the planning unit are xx Ecological Units (Keys et al. 1995), all within the Laurentian Mixed-Forest and New England - Adirondack provinces (Appendix 1). A few Ecological Units extend into adjacent physiographic area 27 (N. New England).

This physiographic area is a vast, flat plain, which during the last glacial epoch lay at the bottom of the Champlain Sea. As this sea receded roughly 12,000 years ago, thick deposits of clay, and in some places sand, remained to form the modern soils of the region. This area therefore represents the best farmland in eastern Canada and northeastern U.S. Elevations rarely exceed 150m in Quebec, 200m in Ontario, and 300m in Vermont and New York, except for a few highland portions that reach 500m.

Average annual precipitation ranges from 700 mm to 1200 mm, and mean annual temperature ranges from 3° to 8° C. Growing season is 177 days at Montreal and ..... Areas to the south and east of the Great Lakes in the U.S. and Canada lie in a major snowbelt. (Keys et. al. 1995, Desponts 1996, Ricketts et al. 1999).

B. Potential Vegetation

Historically, the entire planning unit was dominated by either sugar maple-beech-birch forest (TNC Alliance = I.B.2.a.i), mesic oak hardwood forest (I.B.2.a.v.), red maple-black ash swamp forest (I.B.e.f.ii.), or silver maple floodplain forest (I.B.2.e.iii) (Appendix 1). The maple-beech-birch (northern hardwood) forests of this region were diverse (= 10 tree species per site) and represented the northern limit for a number of eastern deciduous forest species (Desponts 1996). Silver maple forests filled the floodplain of the St Lawrence and other rivers, and stands of swamp white oak that formed at the back edge of the floodplain were another distinctive feature of this region (Desponts 1996).

Nonforest alliances include pitch pine-scrub oak woodlands (II.A.2.a.i.), many emergent freshwater marshes, and freshwater tidal marsh (VIII.A.2.f.i.), as well as large river islands with beds of reeds or grass (including wild rice). The natural mosaic of freshwater marshes and dunes, bogs and fens, hardwood and conifer swamps, and barrens constitute a suite of rare ecological communities, some of which are globally endangered (Ricketts et al. 1999).

C. Natural disturbances

Because so little of the natural vegetation remains in this region, effects of natural disturbance processes are dwarfed by human-induced disturbance and change (see below). Lightning caused fires are common, especially in areas with sandy soils and dry litter accumulation (Ricketts et al. 1999). Tidal.... Seasonal flooding..

D. History and land use

This physiographic area represents one of the earliest and most extensive areas of European settlement and development in North America; very little of the original vegetation of the region remains intact. Human pressure has been particularly intense in the Canadian portions of the region, which contain most of the arable land in Canada. The following account (mostly

describing the St. Lawrence Valley of Quebec -- Desponts 1996) chronicles the major human impacts and changes to bird habitats in the region.

Pre-European settlement was prevalent in the St. Lawrence region for 5,000 years, including hunting, fishing, and agriculture. When Jacques Cartier arrived in 1535, he noted numerous clearings along the river where corn, beans, and squash were planted. Native Americans practiced slash-and-burn agriculture, moving every 10-15 yr. There were many villages of 1,000-2,000 people. Thus pre-European inhabitants may have already created habitats for grassland and other early successional birds.

The first Europeans (French) were primarily fur-trappers; by 1900 beaver populations were practically extinct, undoubtedly affecting some bird populations. The British Conquest in 1759 marked the beginning of largescale land clearing and settlement. Logging of the St. Lawrence Valley preceded other parts of eastern North America and most timber was removed before commercial timber harvesting practices became established in neighboring regions.

Agriculture has been the primary land use throughout the planning unit for over 200 years. In recent decades, agriculture has concentrated and intensified in Quebec and Ontario, with abandonment of other arable lands in those provinces, and with increasing urbanization and industrialization along the St. Lawrence River. Major Canadian urban centers of Quebec, Montreal, and Ottawa are located in this region, primarily occupying former tidal and riverine wetlands and river islands. More intensified agriculture has resulted in loss of hedgerows and margins, increased livestock production, and continued clearing of remaining riparian stands and woodlots. With urban development, however, has been the growth of urban parks and plantings, as well as the proliferation of bird feeders, which have benefited certain woodland bird populations. In addition, the establishment of conifer plantations in the region has benefited some bird species.

In the U.S. portions, urbanization has been less intense, although local development around Burlington, VT and Plattsburgh, NY has affected lands formerly in agricultural production. In northern New York, land-use trends include increasing agricultural abandonment, shift towards intensified dairy production and "hobby farming," and increasing acres planted to corn, grain, and other row crops (Jasikoff; Cornell data).

Currently, the agriculture-dominated landscape of the St. Lawrence Plain represents a vast "agricultural grassland," which supports some of the largest populations of grassland and other early successional bird species in eastern North America. Unlike in many other agricultural regions, climate and poor drainage conditions favor establishment of freshwater wetlands and promote late season harvesting, which enhance the value of the region to breeding birds. In addition, these grassland habitats, interspersed with numerous freshwater wetlands, are vital to breeding and migrating waterfowl and other wetland bird species.

Forest habitats remain primarily as isolated fragments that are reduced in tree-species diversity due to repeated selected cutting of sugar maple associates such as hickory, basswood, and butternut. A few more extensively forested patches remain on poor soils along the edges of the Canadian Shield and Adirondack highlands. In many portions of the region, however, farmland

abandonment is leading to increased reforestation. This phenomenon is creating habitat for at least one high-priority bird species, the Cerulean Warbler.

The vast majority of lands in this planning unit are in private ownership. The dynamic between agricultural intensification, agricultural abandonment, and urban development constitutes the most important bird-conservation issue in the region, and various programs which promote wildlife conservation on private agricultural lands constitute the primary opportunity to enhance regional bird populations. Important remaining patches of natural habitat in the region have been identified by Ricketts et al. (1999), including assessment of threats and recommendations for conservation action.

SECTION 2: PRIORITY BIRD SPECIES

A. General avifauna

Roughly 174 bird species have been documented as breeding within physiographic area 18 (see Appendix 2). Of the nongame landbirds (132 species), the majority are migratory; these include 74 Neotropical migratory species. The landbird avifauna is typical of northern portions of North America, but includes some species of more southern affinity that are near the northern limits of their range. An analysis of all Neotropical migratory species in the Northeast U.S. (Rosenberg and Wells 1995) found the composition of breeding species in this area to be most similar to that of Northern New England (Area 27) and the Allegheny Plateau (Area 24) (Rosenberg and Wells 1995). From a global perspective, this region (U.S. portions only) ranked relatively low in terms of immediate conservation concern (Rosenberg and Wells 1999).

Based on Breeding Bird Survey data (N = 78 routes), 8 species were estimated to have = 5% of their total population breeding in the planning unit (Appendix 2). These include probably 16% of the world's breeding Bobolinks, 9% of all Ring-billed Gulls, and nearly 8% of breeding Golden-winged Warblers. In addition, over two-thirds of all Upland Sandpipers, American Bitterns, Northern Harriers, and Sedge Wrens estimated to occur in the 12 northeastern physiographic areas are found in the St. Lawrence Plain.

Of 154 species sampled by BBS, only 16 have declined significantly since 1966, and 7 additional species have declined since 1980 (Appendix 2). Nearly all declining species are associated with grassland and other early successional or disturbed habitats, including urban areas. In addition several species of freshwater wetlands (Pied-billed Grebe, Green Heron) are also declining in the region. The only declining species that can be considered forest birds are Eastern Wood Pewee, Yellow-shafted Flicker, and Ruby-crowned Kinglet. The flicker and pewee are associated either with forest openings or edges, and the kinglet is based on a very small sample.

In contrast, 54 species show significantly increasing population trends, roughly twice the number of species that are declining. A majority of these fall in two categories, either species associated with regenerating and maturing forests, or species that have adapted particularly well to human activities or development. In the first group are three vireo species and 14 of the area's 20 breeding warblers, including Golden-winged Warbler (Cerulean Warbler is also increasing in

this region, although it is not sampled on BBS). In addition, this is one of few physiographic areas where forest species such as Wood Thrush, Veery, and Scarlet Tanager, as well as shrubland species such as Eastern Towhee and Field Sparrow, are *not* declining.

B. Priority species pool

From among the breeding avifauna, a pool of species may be derived that represents priorities for conservation action within the physiographic area (Table 2.1). Note that a species may be considered a priority for several different reasons, including global threats to the species, high concern for regional or local populations, or responsibility for conserving large or important populations of the species. The different reasons for priority status are represented by levels or tiers in Table 2.1. Our primary means of prioritizing species is through the PIF prioritization scores generated by Colorado Bird Observatory (Hunter et al. 1993, Carter et al. 2000). This system ranks species according to seven measures of conservation vulnerability. These include four global measures (i.e., they do not change from area to area), as well as threats to breeding populations (TB), area importance (AI), and population trend (PT), which are specific to each physiographic area. A total rank score is then derived, which is a measure of overall conservation priority; scores for all breeding species in the St. Lawrence Plain are found in Appendix 2.

Explanations of the tiers, or entry levels into the priority species pool (Table 2.1) are as follows:

I. *High overall (global) priority* -- species scoring = 22 in the PIF prioritization system. Indicates high vulnerability of populations throughout the species range, irrespective of specific status in this physiographic area. Species without manageable populations in the area (peripheral) are omitted.

II. *High physiographic area priority* -- species scoring 19-21 in the PIF system, with either (IIa) AI + PT = 8 or (IIb) a high percentage of the global population breeding in the physiographic area. Tier IIa indicates species that are of moderately high global vulnerability, and with relatively high abundance and/or declining or uncertain population trend in the physiographic area. Tier IIb signifies that the area shares in responsibility for long-term conservation of those species, even if they are not currently threatened. Percent of population is calculated from percent of range area, weighted by BBS relative abundance (see Rosenberg and Wells 1999). A disproportionately high percentage of global population is determined by considering the size of each physiographic area relative to the total land area of North America, south of the open boreal forest (see Appendix 3).

III. *Additional Watch List* -- species on PIF's national Watch List that did not already meet criteria I or II. Watch List species score = 20 (global scores only), or 18-19 with PT = 5. These species are considered to be of high conservation concern throughout their range, even in areas where local populations may be stable or not severely threatened.

IV. *Additional listed* -- species on federal, provincial, or state endangered, threatened, or special concern lists that did not meet any of above criteria. These are often rare or peripheral populations.

V. *Local concern* -- species of justifiable local concern or interest. May represent a geographically variable population or be representative of a specific habitat of conservation concern.

Seven species scored at least 22 in the PIF system and are considered to be of high overall or global priority. Of these, American Woodcock and Golden-winged Warbler have the largest proportion of their global populations in this region. A large and important population of Cerulean Warbler occurs in the eastern Ontario portion of the physiographic area, and important populations of Henslow's Sparrow occur in northern New York and adjacent Ontario. In addition, the St. Lawrence Plain supports over two-thirds of the Upland Sandpipers and Sedge Wrens breeding in the 12 northeastern physiographic areas. Piping Plover, although listed as a very high-priority, as well as federally endangered species, is largely extirpated as a breeder in the eastern Great Lakes.

Priority level II includes six species with relatively high total scores and with relatively large or declining populations in the physiographic area. These include 3 forest species, 1 shrub-nesting species (Brown Thrasher), and 2 species of agricultural grasslands. As noted above, this physiographic area supports a globally significant (and stable) population of Bobolinks. Four additional Watchlist species (level III) occur in the area, and may be considered as priorities regardless of their specific status in the St. Lawrence Plain. These include a regionally important population of American Black Duck.

Bald Eagle and Peregrine Falcon are the only additional federally listed species in the planning unit, and 22 additional species are listed as either endangered, threatened, or of Special Concern in New York or Vermont, or as Vulnerable in Canada These are primarily wetland or grassland species and raptors that are represented by peripheral, although in some cases locally high, populations. This area represents the last stronghold for breeding Loggerhead Shrikes in the Northeast, although even here populations are now largely extirpated. Inclusion of these additional species in the priority species pool highlights the continued concern for sensitive and threatened habitats in this region.

The overall priority species pool of 41 species (23 % of the avifauna) does not form a cohesive group, but rather represents a cross-section of species from most major habitats. Considering all priority categories, the species of highest conservation concern or in need of immediate attention to restore or sustain populations include Henslow's Sparrow, Golden-winged Warbler, Cerulean Warbler, American Woodcock, Upland Sandpiper, and Bobolink. These may represent focal species that help define conservation actions in their respective habitats

Table 2.1. Priority species pool for Area 18. PIF regional and global scores from CBO (Carter et al. 2000). Percent of population calculated from percent of range area, weighted by BBS relative abundance (see Rosenberg and Wells 1999; Appendix 3) See text for definition and interpretation of entry levels.

Entry level	Species	Total score	% of pop.	AI	PT	Local status [a]
I						
	Piping Plover (US-E)	28	< 1?	2	5	B (ext)
	Henslow's Sparrow (CAN-E,NY-T)	27	< 1?	2	5	B
	Golden-winged Warbler (NY-SC)	24	7.7	4	1	B
	Cerulean Warbler (CAN-V, NY-SC)	24	< 1?	2	3	B
	American Woodcock	23	5.6	5	4	B
	Upland Sandpiper (NY-T)	23	2.2	3	5	B
	Sedge Wren (NY-T)	23	< 1	2	5	B
II						
a	Eastern Wood-pewee	21	2.3	4	5	B
	Brown Thrasher	20	1.2	3	5	B
	Killdeer	20	2.3	5	5	B
b	Bobolink	20	15.6	5	2	B
	Black-billed Cuckoo	19	5.2	5	2	B
	Veery	19	5.1	5	2	B
III						
	Canada Warbler	20	< 1	3	2	B
	American Black Duck	19	3.4	4	2	R?
	Black-throated Blue Warbler	19	1.8	2	1	B
	Wood Thrush	19	2.1	3	2	B
IV						
	American Bittern (NY-SC)	19	3.6	5	2	B
	Short-eared Owl (NY-E, CAN-V)	19	< 1	2	3	B
	Red-h. Woodpecker (CAN-V, NY-SC)	19	< 1	2	3	B
	Whip-poor-will (NY-SC)	19	< 1	2	3	B
	Peregrine Falcon (CAN,US-T, NY-E)	18	< 1	3	3	B
	Northern Harrier (NY-T)	18	1.5	4	2	B
	Sharp-shinned Hawk (NY-SC)	18	2.2	5	3	R
	Northern Goshawk (NY-SC)	18	< 1	3	3	R
	Loggerhead Shrike (CAN, NY,VT-E)	18	< 1	1	5	B
	Grasshopper Sparrow (NY-SC)	18	< 1	2	5	B
	Red-shouldered Hawk (CAN-V; NY-SC)	17	< 1	2	3	B, R
	Common Loon (VT-E; NY-SC)	16	1.0	3	1	B
	Least Bittern (CAN-V; NY-T)	16	< 1	1	3	B
	Black Tern (ON-V; NY-E; VT-T)	16	< 1	2	3	B
	Vesper Sparrow (NY-SC)	16	< 1	2	5	B
	Long-eared Owl (VT-SC)	16	< 1	2	3	R
	Pied-billed Grebe (NY-T; VT-SC)	15	< 1	2	4	B
	Cooper's Hawk (NY, VT-SC)	15	< 1	2	3	R

Osprey (NY-SC; VT-E)	15	< 1	2	3	B
Bald Eagle (US-T)	15	< 1	1	3	B
Sora (VT-SC)	14	< 1	2	3	B
Horned Lark (NY-SC)	14	< 1	2	5	R
Common Nighthawk (NY-SC)	14	< 1	2	3	B
Common Tern (NY-T; VT-E)	13	< 1	2	3	B

[a] Local status: B = breeding population only; R = found year-round, although breeding population may differ from wintering population; ext = extirpated.

[b] Relative abundance (from BBS) is highest of any physiographic area in North America.

SECTION 3: BIRD CONSERVATION ISSUES AND OPPORTUNITIES

A. Early vs. late-successional habitats and species -- historical baselines

Most of the Northeast region has undergone major changes in forest cover during the past two centuries, due to logging, clearing for agriculture, and in many places widespread recent reforestation. Therefore, the relative importance placed on early- versus late-successional species and their habitats today depends in large part on the historical baseline chosen for comparison. This issue, which permeates bird-conservation planning throughout the Northeast, must be resolved before priority species and habitats are determined. Early successional (especially grassland) birds have arguably been shown to be part of the original avifauna in many parts of the Northeast, and therefore worthy of conservation concern (refs, Wells and Rosenberg 1999). As indicated by the avifaunal analysis above, many grassland species occur in higher abundances in the St. Lawrence Plain than in other physiographic areas of the Northeast. Although originally forested, this region has been dominated by agricultural production for over 200 years and today represents the largest contiguous area of grassland habitats in eastern Canada and the northeastern U.S. Therefore, unlike in most other parts of the region, grassland habitats and associated species may be of higher conservation priority than adjacent forested habitats and species.

In addition, early-successional shrub habitats that support globally important populations of Golden-winged Warbler and American Woodcock must be considered a high priority within this physiographic area.

In this region, a substantial portion of the grassland and shrub habitats exist as seasonal or permanent wetlands, and the importance of these wetlands to breeding and transient waterfowl has bee recognized. Much overlap exists between conservation goals for waterfowl and other nongame wetland birds, as well as the landbird species that are the primary focus of this plan. For example, regionally important populations of American Bittern, Northern Harrier, Sedge Wren use wetter portions within the grassland matrix, as well as emergent freshwater marshes. In addition, Golden-winged Warblers use (favor?) wetland-shrub habitats (esp. beaver ponds?) in this region. Finally, many of the wooded or forested habitats remaining in the St. Lawrence Plain are woodland swamps or riparian groves. Although not a high priority within this planning unit, the value of these forested wetlands for regionally important forest birds (e.g. Cerulean

Warbler, Wood Thrush) should be recognized, and areas managed as forest can enhance breeding opportunities for these species.

B. Regional economics of agricultural production

Maintenance of productive grassland and wetland habitats is dependent on continuation of economically viable agricultural processes, especially dairy farming, throughout the region. Current trends are towards farmland abandonment, consolidation of farms into larger, more intensive operations, and increased acres planted to row crops. Further economic pressures include urban and other development at the expense of traditional farming practices, as is occurring nationally. These trends have resulted in increased old-field and shrub habitats and fragmentation of large grassland habitats. Continuation of these processes without active conservation planning may result in the loss of the area's unique value to grassland and open-wetland birds.

An overall bird conservation plan for this physiographic area should be compatible with economically viable agriculture and should include, where possible, incentives for continuation of active, private farming while providing maximum possible wildlife habitat. In this region, incentives for promotion of traditional (i.e. late) mowing schedules are particularly important, as well as practical. In northern New York, conversion of dairy farmland to hunting camps and hobby farms has served to maintain local economies as well as a grassland-dominated landscape. Economic conditions and opportunities for incentive programs vary among different portions of the planning unit, and certainly vary between Canada and the U.S.

In forested habitats, some similar options may be available to promote land uses that are compatible with priority bird-habitat needs. For example, in Ontario, Cerulean Warbler productivity is high in forests managed for maple syrup production (Jason Jones, in litt.)

C. Urbanization and habitat fragmentation

In certain portions of the St. Lawrence Plain, urban development, rather than farmland abandonment represents the largest threat to agricultural grassland and wetland habitats. Urbanization affects these habitats in two related ways -- direct loss through development, and rising economic pressures in surrounding areas that force private farmers to sell land to developers. These pressures are particularly acute in Canada, near major metropolitan areas of Montreal, Quebec, and Ottawa, and in Vermont portions of the Champlain Valley near Burlington.

In areas affected by urbanization, fragmentation of large grassland habitats is a major factor. In these areas, establishment of core areas (BCAs?) should be a priority to consolidate the best remaining habitats and minimize further fragmentation. Protection of riverine wetlands from industrial development is also a high priority along the St. Lawrence River, especially as stopover habitat for waterfowl and other wetland species.

As noted earlier, growth of trees in urban areas has benefited certain woodland species (see Table 3) and has undoubtedly improved habitat conditions as stopover for migrating passerines (relative to the recent past).

D. Integration of U.S. and Canadian planning efforts

Coordination of U.S. and Canadian conservation planning has just begun in the Northeast region. Because of the large portions of the planning unit within Canada, such coordinated efforts are vital for the success of any conservation plan.

E. Bird conservation opportunities and solutions

The combination of regional climatic and economic factors offers tremendous potential for conservation and management of early successional bird species within this planning unit. The late growing season and poor drainage has resulted in a temporal distribution of traditional farming practices that maximizes benefits to wetland birds and nesting grassland species in spring and early summer (June). Therefore, bird conservation measures are generally compatible with local economic objectives and receive support from private landowners and local industry. Furthermore, the increase in recreational use (hunting camps) and hobby farming on otherwise abandoned agricultural land enhances the regional opportunities for bird-habitat conservation. Overall, a strategy that uses existing federal programs such as Partners for Wildlife (USFWS) and provisions of the Farm Bill (NRCS) to promote traditional, economically viable farming while maximizing benefits to wildlife holds great promise. Many of these initiatives are already operating in northern New York.

It is perhaps fortuitous that as agricultural grassland reverts to old-field and shrub-scrub habitats (undesirable under the above scenario), a second suite of high-priority bird species is benefited. In areas where farmland abandonment has already taken place, or is inevitable, regenerating habitats must be maintained in early shrub stages through active management to support Golden-winged Warblers and American Woodcock. State owned Wildlife Management Areas and federal refuges may play a large role in managing these habitats, many of which are also suitable as seasonal wetlands. Throughout the planning unit, a balance should be maintained between agricultural grassland and shrub habitats, taking advantage of local economic forces and land-ownership patterns. In both cases, largescale reversion to forest is not desirable.

To maximize the effectiveness of bird conservation strategies, we must focus on specific areas that are both most important for high-priority bird populations and have the greatest potential for management or protection. Identification of *Important Bird Areas* in the planning unit has recently begun, at least in New York (Wells 1998) and Vermont. Within the St. Lawrence Plain portion of NY, eight IBAs have been selected (see below), primarily on the basis of documented populations of important grassland, wetland, and other early successional species. The NY IBA program is dedicated to developing sound conservation strategies for these sites, in cooperation with local landowner needs and existing programs such as Partners in Wildlife. Recent state legislation has recognized IBAs and has dedicated funds for state management and acquisition of important sites.

Also in the NY portion of the Planning unit, the DOD facility at Fort Drum represents a large block of land where active management for early successional landscapes benefits several high-priority bird species. DOD biologists (Rich LeClerc) are active in research and conservation of these species, and Fort Drum has been nominated as a state IBA in recognition of its regional importance as a source area for grassland birds.

SECTION 4: PRIORITY HABITATS AND SUITES OF SPECIES

When species in the priority pool are sorted by habitat, the highest priority habitats and associated species can be identified (Table 4.1). These represent the habitats that are either in need of critical conservation attention or are critical for long-term planning to conserve regionally important bird populations. The highest priority species do not form a cohesive habitat group, but rather divide among grassland, shrub, forest, and wetland habitats. Given the current land-use of the region, and the global significance of regional populations of Henslow's Sparrow and Bobolink, agricultural grasslands probably constitute the habitat of highest conservation priority in the St. Lawrence Plain. The global significance of a large and possibly expanding Golden-winged Warbler population, coupled with declining population of American Woodcock make shrub and early successional habitats another high priority. Similarly, high local densities of Cerulean Warblers in portions of the physiographic area highlight the need to focus conservation attention on remnant and regenerating deciduous woodlands in areas that currently support this species. Other forest habitats, although supporting a suite of regionally high-priority species, are of lower priority than in other northeastern physiographic areas. Finally, the existing emphasis on waterfowl habitats (e.g., for American Black Duck), as well as the presence of several other wetland species on state and local concern lists, make freshwater wetlands and their relationship to local agricultural a key conservation concern.

Table 4.1. Priority habitat-species suites for Area 18. TB (threats breeding), AI (area importance), PT (population trend), and total PIF scores from CBO prioritization database (Carter et al. 2000). Focal species for each habitat in boldface.

Habitat	Species	Total score	TB	AI	PT	Action level [a]
Agricultural Grassland						
	Henslow's Sparrow	27	4	2	5	II, V
	Upland Sandpiper	23	4	3	5	III
	Sedge Wren	23	4	2	5	III
	Bobolink	20	3	5	2	III
	Short-eared Owl	19	4	2	3	III
	Loggerhead Shrike	18	4	1	5	II
	Grasshopper Sparrow	18	3	2	5	III
	Northern Harrier	18	4	4	2	III
	Vesper Sparrow	16	3	2	5	III
	Horned Lark	14	3	2	5	VI

Shrub-early successional					
Golden-winged Warbler	24	3	4	1	II, V
American Woodcock	23	3	5	4	III, V
Brown Thrasher	20	3	3	5	III
Common Nighthawk	14	3	2	3	VI
Riparian-deciduous and mixed forest					
Cerulean Warbler	24	3	2	3	II, V
Eastern Wood-pewee	21	3	4	5	III
Canada Warbler	20	3	3	2	IV
Veery	19	2	5	2	IV
Black-billed Cuckoo	19	2	5	2	IV
Black-throated Blue Warbler	19	2	2	1	IV
Wood Thrush	19	2	3	2	IV
Red-headed Woodpecker	19	3	2	3	III
Whip-poor-will	19	3	2	3	IV
Sharp-shinned Hawk	18	3	5	3	IV
Northern Goshawk	18	3	3	3	IV
Red-shouldered Hawk	17	3	2	3	IV
Long-eared Owl	16	3	2	3	IV
Cooper's Hawk	15	3	2	3	IV
Freshwater wetland, Lakeshore and River					
Piping Plover	28	5	2	5	I
American Black Duck	19	3	4	2	III, V?
American Bittern	19	3	5	2	IV
Short-eared Owl	19	3	2	3	IV
Least Bittern	16	3	1	3	IV
Northern Harrier	18	3	4	2	IV
Common Loon	16	3	3	1	VI
Black Tern	16	3	2	3	III
Pied-billed Grebe	16	3	2	4	IV
Bald Eagle	15	2	1	3	VI
Osprey	15	2	2	3	VI
Sora	14	3	2	3	IV
Common Tern	13	2	2	3	IV

[a] Action levels: I = crisis; recovery needed; II = immediate management or policy needed rangewide; III = management to reverse or stabilize populations; IV = long-term planning to ensure stable populations; V = research needed to better define threats; VI = monitor population changes only.

A. Agricultural Grassland

Importance and conservation status: As indicated above, this planning unit has been maintained as an agriculture-dominated landscape for over 200 years and now represents the largest and most important area of grassland habitat in the Northeast. Although it is unclear what their historical status was in the region pre-European settlement, several bird species maintain populations in this physiographic area that are currently the highest of any in the northeast region, and at least for the Bobolink, the highest in North America. Therefore, unlike the majority of northeastern physiographic areas where forest habitats remain highest priority, grasslands are the most important habitat in the St Lawrence Plain.

The future of grassland bird habitats in this area is dependent on global economic factors affecting traditional dairy farming practices (see Conservation Issues, above). Specific threats to productive grasslands include farmland abandonment, conversion to intensive farming practices that promote early haying practices, and urban development. Programs and incentives that promote traditional (early) haying, such as the establishment of native, warm season grasses, reclaiming of abandoned or marginal farmland, and encouragement of hobby farming have the greatest potential for grassland bird conservation.

Associated priority species: HENSLOW'S SPARROW (New York, Ontario), UPLAND SANDPIPER, BOBOLINK; also Grasshopper Sparrow, Vesper Sparrow, Sedge Wren, Northern Harrier, Short-eared Owl, Loggerhead Shrike.

Habitat and population objectives: Based on extrapolations from BBS relative abundances (assuming each route samples approximately 2.5 - 25.1 km^2 of habitat; see Appendix 3), VERY ROUGH estimates of population size for priority species can be derived (Table 4.2).

Table 4.2 Population estimates for priority species of grassland habitat in the St. Lawrence Plain physiographic area. Percent of Atlas blocks based on number of 5-km blocks in which the species was reported during the State breeding bird Atlas for New York (N=400; Andrle and Carroll 1988), Vermont (N=31; Laughlin and Kibbe 1985), Ontario (N=710; Cadman et al. 1987), and Quebec (N=250; Gauthier and Aubry 1996).

Species	BBS population	% Atlas blocks			
		NY	VT	ON	QC
Henslow's Sparrow	500	3	0	4	1
Upland Sandpiper	7,600	34	32	48	68
Sedge Wren	2,000	5	3	17	7
Bobolink	682,800	95	97	96	100
Short-eared Owl	150	3	3	7	10
Loggerhead Shrike	90	2	6	17	8
Grasshopper Sparrow	9,600	10	10	43	3
Northern Harrier	2,300	55	39	84	58
Vesper Sparrow	26,200	20	39	85	74
Horned Lark	11,000	20	35	74	41

These crude estimates are most useful in illustrating the relative population sizes of various species and, perhaps, giving order-of-magnitude figures for setting population objectives for the region. Note that the relative abundances used for these estimates are averages across all BBS routes in the physiographic area, using data from 1990-1998.

BBS data also indicate that populations of Bobolinks have declined at roughly 2%-3% and Upland Sandpipers nearly 4% per yr since 1980. Vesper Sparrows have declined by 4.7% per year since 1966, whereas populations of Grasshopper sparrows and Northern Harriers have not changed significantly. Based on this information, plus knowledge of specialization and area sensitivity within the grassland system and global threats to these species, the following overlapping habitat and population objectives may be derived:

> OBJECTIVE 1. Strive to double the regional population of Henslow's Sparrow over next 10 years (to 1,000+ pairs?) . Assumption: intensive management for Henslow's Sparrow at most important sites (IBAs or BCAs) will provide adequate habitat for all other priority species in this suite at and around those sites.
>
> OBJECTIVE 2. In areas where no Henslow's Sparrows occur, strive to maintain acreage of productive grassland habitat at or above current (1997) levels (no net loss), AND reverse and stabilize area's BBS population trend for common indicator species (Bobolink, Vesper Sparrow) over next 10 years.

Based on published average density estimates of 9.1 Bobolinks per 10 ha, roughly 775,000 ha (1.9 million ac) of suitable grassland habitat is required to support the entire habitat-species suite (e.g. 680,000 pairs of Bobolinks), with 100,000 ha (250,000 ac) maintained in large enough patches to support 7,600 pairs of Upland Sandpipers, and 2,000 ha (5,000 ac) intensively managed to support 1,000 pairs of Henslow’s Sparrows in New York and Ontario.

Implementation strategy: An overall conservation strategy for grassland birds in this planning unit will include (1) thorough inventory of potential grassland habitats to determine the most important sites for priority species, especially areas currently supporting Henslow's Sparrows -- determine ownership patterns, economic and conservation status, potential threats; (2) identification and promotion of management practices that benefit grassland bird species; and (3) incentive programs that promote and encourage traditional farming practices, specifically late-season haying, and management of lands to benefit wildlife.

An inventory of grassland birds in northern New York and Vermont began in 1997, under the direction of Massachusetts Audubon and the Northeast Grassland Working Group of PIF. Roadside surveys in several sections of the St. Lawrence Valley, NY revealed over 500 pairs of Bobolink and Savannah Sparrow, over 300 pairs of Eastern Meadowlark, 100 pairs of Grasshopper Sparrow, 45 pairs of Henslow's Sparrow [need more detail on sites], 29 Northern Harriers, 19 Upland Sandpipers, and 2 Short-eared Owls (Keenan, unpubl. report). Only 20 pairs of Grasshopper Sparrows (and no Henslow's) were located in the Champlain Valley of Vermont (Wells, pers. comm).

Also beginning in 1997 was the designation of Important Bird Areas in this part of New York. Several contain important grassland habitats. As a part of the designation process conservation strategies for these sites will be produced. Important sites for grassland birds are:

- Chazy Landing / Kings Bay Area—3800 Acres; Private/ NY DEC. Vesper Sparrow, Northern Harrier and Short-eared Owl (8 in 1995) are breeders.

- Plattsburgh Airfield—500 Acres; DOD. Breeding birds include Vesper Sparrow (7pairs in 97), Grasshopper Sparrow (7 pairs in 97) and Northern Harriers are found. 1994 reports of 17 Grasshopper Sparrows, 19 Savannah Sparrows, and 12 Vesper Sparrows.

- Crown Point State Historic Site—360 Acres; Primary use is historic preservation/ tourism, also wildlife conservation. primarily a grassland with scrub/shrub and deciduous and mixed woods.

- Webb Royce Swamp-50 Acres; wildlife conservation/ agricultural; Northern Harrier is a likely breeder in the agricultural hayfields.

- Perch River Grasslands-- 6000 Acres; Private, surrounding a State Wildlife Management Area. One of the most significant concentrations of breeding grassland birds in the state. Breeders include 50-70 Henslow's Sparrow (80+ in 1997), 10-20 Grasshopper Sparrows, 5-10 Sedge Wrens, 1 Black rail, 10+ Upland Sandpipers, 400+ Bobolinks, 400+ Savannah Sparrows.

- Perch River Wildlife Management Area—8000 Acres; Owned by NY DEC. Henslow's Sparrow is a known breeder.

- Point Peninsula—6400 Acres; Private/NY DEC. May be one of the most critical winter concentrations of arctic-breeding Short-eared owls. Winter 97/98 totals documented Short-eared Owl (up to 30), Northern Shrike (8), and a maximum of 57 Northern Harriers.

- Fort Drum Grasslands-120,000 Acres; DOD. One of the most significant grassland and shrubland breeding bird communities in NY state. Breeding species include Upland Sandpiper (30+ in 1996), Henslow's Sparrow (30+ in 1995), Short-eared Owl and the largest, and perhaps only population of singing Clay-collared Sparrows in the state.

- Lisbon Grasslands--40,000 Acres; Private State Wild. Management Area. Known breeders include Nelson's Sharp-tailed Sparrow and LeConte's Sparrow.

- Upper St. Lawrence River/ Thousand Islands-100,000 Acres; Mostly private/NY State Power Authority, Office of Parks, Recreation and Historic Preservation, DEC. Freshwater marshes, wetlands and adjacent grasslands; Breeders include Sedge Wren, Loggerhead Shrike other grassland species undocumented.

Management guidelines: Specific management guidelines for breeding Henslow's Sparrows in the Northeast are generally not available. For Bobolinks and other grassland birds in general, a

variety of methods, centered largely around haying practices, have been proposed to minimize losses of nests and nestlings during typical agricultural activities (Bollinger and Gavin 1992, Jones and Vickery 1997). However, little is known about relative reproductive success following these practices. For example, would leaving unmowed sections or strips increase fledging success or focus predation on nests later in the season when females are less likely to renest? Furthermore, lifetime reproductive output is not known for individuals in agricultural ecosystems in this region. The following management practices have been identified and are being incorporated into regional programs such as Partners for Wildlife (USFWS):

- Establishment and use of native, warm season grasses as a late-season hay crop. Favors mid-summer haying (after nesting season); especially appealing to hobby farmers and absentee landowners who rely on borrowed equipment.

- Reclamation and renovation of abandoned fields through brush removal and prescribed grazing.

- Re-planting of cool season grasses on marginal or abandoned farmland to restore pastureland.

Research and monitoring needs:

- Determine precise habitat and area needs of Henslow's Sparrow in this region. Research should include demographic factors in order to determine characteristics of sites with potential to support source populations.

- Develop and implement supplemental inventory and monitoring programs to identify important sites for Henslow's Sparrow and other uncommon, patchily distributed grassland species not well monitored by BBS.

- Evaluate the effects of specific farming and management practices, such as timing of haying and grazing intensity, on productivity of grassland birds.

Outreach: Because the success of this bird-conservation plan depends so much on cooperation of private landowners and local agencies, educating this public as to the value of their lands to grassland birds is a critical first step. Further education on specific best management practices is also critical; development and dissemination of management guidelines, such as those created by Mass. Audubon, is therefore a high priority.

B. Shrub-Early Successional Habitats

Importance and conservation status: Early successional shrub habitats result primarily from farmland abandonment, and in some cases from maintenance of shrub-wetlands and beaver activity. Whereas succession to woody vegetation may be undesirable in productive grassland areas, shrub habitats support several additional high priority species in this region. Most notably, this is currently the primary area of population expansion for Golden-winged Warblers in the Northeast. In areas where farmland has already been abandoned, and in areas currently managed

as woody habitats for wildlife, attention to the needs of Golden-winged Warbler and associated species is a high conservation priority. Because this habitat is shared by American Woodcock and in some cases important waterfowl species such as Wood Duck and American Black Duck, management for both game and nongame species in these areas may be particularly compatible.

Associated priority species: GOLDEN-WINGED WARBLER, AMERICAN WOODCOCK; also Brown Thrasher, Common Nighthawk.

Within this physiographic area, Golden-winged Warblers are most widespread and abundant in Ontario, especially along the edge of the Canadian Shield. They are patchily distributed and increasing in the adjacent St. Lawrence Valley of New York, but populations in Vermont and Quebec may have declined in recent years. In this region, Golden-wings seem to favor wetter areas in relatively early stages of succession. These include abandoned agricultural fields, alder bogs and beaver-created wetlands. Ideal habitat includes a dense shrub layer, scattered taller trees (or edge of woodland), and a grass-forb layer for concealing their ground nests (Mills 1987, Confer 1992). Patches of 10-15 ha can support up to six pairs, and these may be preferred over smaller and larger habitat patches (Confer 1999). Because of great variability in habitat use and population fluctuation throughout The Golden-winged Warbler's range, specific requirements and management options need to be studied and assessed within the St. Lawrence Plain.

American Woodcock was found to be distributed rather uniformly within the physiographic area, according to regional breeding bird atlas projects. Although the BBS does not adequately sample this largely nocturnal species, singing-route surveys indicate a significant decline of 2-3% per year since 1968 in most of the region, except for southern Quebec (Bruggink 1996). Woodcocks require a mix of habitats, including forest openings or clearings for singing displays in spring, alder or other young hardwoods on moist soils for feeding and daytime cover, young second-growth hardwoods for nesting, and large fields for night-time roosts (Mendall and Aldous 1943; Connor, in Andrle and Carroll 1988). Although there have been many studies of seasonal habitat use, the relationship between specific habitat features and population demography remain unknown (Keppie and Whiting 1994). Silvicultural practices can enhance habitat available for woodcocks (Sepik et al. 1981), although a shift away from even-aged management (creating large areas of uniform shrub cover) may be detrimental to populations (Keppie and Whiting 1994).

Habitat and population objectives: Based on extrapolations from BBS relative abundances (assuming each route samples approximately 2.5-6.3 km^2 of habitat; see Appendix 3), VERY ROUGH estimates of population size for priority species can be derived (Table 4.3).

These crude estimates are most useful in illustrating the relative population sizes of various species and, perhaps, giving order-of-magnitude figures for setting population objectives for the region. Note that the relative abundances used for these estimates are averages across all BBS routes in the physiographic area, using data from 1990-1998.

Table 4.3 Population estimates for priority species of shrub habitat in the St. Lawrence Plain physiographic area. Percent of Atlas blocks based on number of 5-km blocks in which the species was reported during the State breeding bird Atlas for New York (N=400; Andrle and Carroll 1988), Vermont (N=31; Laughlin and Kibbe 1985), Ontario (N=710; Cadman et al. 1987), and Quebec (N=250; Gauthier and Aubry 1996).

Species	BBS population	% Atlas blocks			
		NY	VT	ON	QC
Golden-winged Warbler	15,400	10	19	26	9
American Woodcock	2,200+	35	71	83	72
Brown Thrasher	38,400	80	94	96	74
Common Nighthawk	1,000	15	22	56	25

American Woodcock is among the steepest declining species in this physiographic area (according to BBS), and Brown Thrashers also have declined by 2%-3% per year since 1966. In contrast, the highest-priority species in this suite, Golden-winged Warbler, is increasing. The following habitat and population objectives are suggested:

OBJECTIVE 1. Increase acreage of early successional shrub habitats suitable for Golden-winged Warbler, using current population centers as core habitat units; encourage and assist Golden-winged Warbler population expansion, with goal of a stable population of 20,000 pairs. Assumption: enhancing habitat conditions for Golden-winged Warbler will also benefit most other priority species in this habitat suite.

OBJECTIVE 2. Stabilize and reverse declining trend in American Woodcock population; strive to increase regional population significantly above current levels in next 10 years.

Based on published average densities of 4 pairs of Golden-winged Warblers per 10 ha (Gauthier and Aubry 1996), roughly 50,000 ha (75,000 ac) of shrub habitats need to be maintained to support 20,000 pairs of Golden-winged Warblers and other species in this habitat suite

Implementation strategy; Specific management strategies that will benefit shrub-nesting birds in this planning unit are less clear than are those for grassland species. A conservation plan for this suite will include the following elements:

- Identification of current population centers for priority species. (The Golden-winged Warbler Atlas Project began in 1999.)
- Exploitation of current patterns of farmland abandonment
- Active discouragement of woody succession
- Merging with conservation and management objectives currently employed for game and wetland species.

In contrast with grassland habitats and birds, conservation opportunities for shrub-nesting species may be greatest on public lands, particularly on state Wildlife Management Areas that already exist in areas with poorest drainage and marginal farming conditions. Active management of these areas for American Woodcock populations should be a highest priority, and where possible, opportunities to enhance Golden-winged Warbler habitats in areas managed for waterfowl and other wetland species should be encouraged.

Identification of Important Bird Areas (IBAs) in this region has focused on priority grassland and wetland species. Incorporation or shrub-nesting species into this process should be encouraged, in order to identify regionally important sites for Golden-winged Warbler and American Woodcock. IBAs with portions of shrub habitat include: Plattsburgh Airfield, Perch River Grasslands, Perch River Wildlife Management Area, Point Peninsula. IBAs with greater acreages of habitat include:

- Fort Drum Grasslands-120,000 Acres; DOD. One of the most significant grassland and shrubland breeding bird communities in NY state. Breeding species include Common Nighthawk.

- Upper St. Lawrence River/ Thousand Islands-100,000 Acres; Mostly private/NY State Power Authority, Office of Parks, Recreation and Historic Preservation, DEC. Significant portion of shrub/scrub habitat remains.

- Lower St. Lawrence River—48,000 Acres. Mostly private/NY State Power Authority, Office of Parks, Recreation and Historic Preservation, DEC. Significant portions of shrub/scrub habitat remains.

- Indian River Lakes/Black Lakes—80,000 Acres; Private. Mixture of a variety of habitats with significant portion of scrub/shrub. 20-30 pairs of Golden-winged Warbler breed here.

- Eastern Lake Ontario Barrier Beaches-24,000 Acres; Private and public. Some shrub/scrub

***Management guidelines*:** Any management program for Golden-winged Warbler needs to address four concerns to be beneficial. First, the program must maintain or create sufficient amounts of appropriate habitat. Second, the management program needs to assess the impact of blue-winged warblers and may need to institute control measures. Third, a management program needs to assess the effect of nest parasitism by cowbirds and may need to institute control measures. Fourth, the effect of loss of winter habitat needs to be assessed and corrective efforts need to be considered. (Confer et al.1999)

For upland sites, habitat can be created through succession following farming or fires, and sometimes logging. In New York, clearcutting is often followed by a dense and uniform growth of saplings without openings for patches of herbs. Such openings are rarely if ever used by golden-winged warblers in New York. Brushhogging, i.e., cutting woody stems of shrubs at their base, has not been followed by nesting bird occupancy in the few sites studied. Perhaps cutting shrubs stimulates regeneration of a dense growth of woody stems without the requisite herbaceous growth. Golden-winged warblers sometimes nest under powerline right-of-ways if

maintenance produces the appropriate patches of shrubs. Frequent application of herbicides may prevent the development of the requisite shrubbiness (Confer 1992).

The optimal management practice may be a rotation of burning or intermittent farming. A cycle of about 40 years with about 25% of the managed area burned once each decade could produce the following successional sequence. Golden-winged warbler habitat would begin to appear perhaps within ten years and last about 10-20 years, although these times are approximations and would be influenced by factors such as soil quality, the size and intensity of the burn, and proximity to seed sources. Allowing succession to continue for approximately 40 years would provide the forest edge that is used in almost all territories (Confer 1992).

It is worth noting that many other species would use this habitat, including several priority species. For the first ten years after a burn, the successional habitat would favor field species including perhaps Henslow's Sparrow, American woodcock, and possibly the Upland Sandpiper. As shrubs invaded and a site became suitable for Golden-winged Warblers, such habitat would provide resources for other species, including winter browse for deer. Allowing aspen to develop would support many other species including Ruffed Grouse, which use aspen buds as a major winter food source (Confer 1999).

Research and monitoring needs: Much less attention has been given to shrub-nesting birds in this area, compared with grassland and wetland species. Critical needs for this group include:

- Detailed inventory of most important sites for nesting Golden-winged Warblers, with estimates of population size and habitat requirements (Golden-winged Warbler Atlas Project begun in 1999).

- Study interactions of Golden-winged Warbler and Blue-winged Warbler (very recently expanding into this area) in areas of current overlap -- attempt to determine habitat-management options (e.g., successional stage, water regime) that will discourage Blue-winged Warblers and favor Golden-wings.

- Determine effects of current game and waterfowl management practices on priority nongame species -- especially the relationships between American Woodcock (possibly Ruffed Grouse) management and Golden-winged Warbler population expansion.

- Determine causes of population declines in American Woodcock and develop management strategies for reversing this decline.

The necessity for control of blue-winged warblers and brown-headed cowbirds also should be assessed by research (Confer 1999)

Outreach:

C. Riparian-deciduous and Mixed Forest

Importance and conservation status: Original forest cover in this region is reduced to roughly 5% of its original extant, and remaining patches are highly fragmented. In some parts of this physiographic area, however, remnant groves of floodplain and northern hardwood forest still exist or are regenerating. In addition, many areas are currently managed as forested wetlands to benefit waterfowl. These forest patches support several high-priority forest bird species, especially a large an expanding population of Cerulean Warbler, which does not show up in the BBS database. In addition, existing floodplain and hardwood forest stands undoubtedly have a high (but unknown) value to transient species during migration periods. Around urban areas, development continues to threaten remaining forest stands.

Associated priority species: CERULEAN WARBLER, also Eastern Wood-Pewee, Black-billed Cuckoo, Canada Warbler, Veery, Black-throated Blue Warbler, Wood Thrush, etc.

The stronghold for Cerulean Warblers in this physiographic area is in eastern Ontario, where they were found breeding in roughly 60 Atlas blocks during the 1980's (Cadman et al. 1987). This population has been fairly well studied by Oliarnyk and Robertson (1996), who documented high reproductive success, and very low incidences of cowbird parasitism. Successful territories were associated with larger than average trees and a dense upper canopy. More recently, very large local populations have been inventoried in the Frontenac Axis region, with birds occupying relatively short-stature (15-20 m) mixed deciduous forest dominated by sugar maple and oaks (Jason Jones et al., unpublished data). Forests in this region are the result of regeneration after agricultural abandonment and are more or less contiguous with extensive coniferous forests of the Canadian Shield to the north (Oliarnyk and Robertson 1996). Cerulean Warblers have been found, however, in patches as small as 10 ha, where they have also bred successfully (Jason Jones, unpublished data). Extrapolated populations of up to 3,000 pairs in eastern Ontario (up to 96 pairs per km^2) may well represent the largest population of Cerulean Warblers in existence, at least north of current population centers in West Virginia and Pennsylvania.

Of the remaining priority forest species, Eastern Wood-Pewee and Wood Thrush are the most common and widespread, occurring throughout the physiographic area. Other species are more patchily distributed; the Frontenac Axis forests that support Cerulean Warblers also hold concentrations of Whip-poor-will, Red-headed Woodpecker, Long-eared Owl, and Red-shouldered Hawk (Cadman et al. 1987)

Habitat and population objectives: Based on extrapolations from BBS relative abundances (assuming each route samples approximately 2.5 km^2 of forest habitat; see Appendix 3), VERY ROUGH estimates of population size for priority species can be derived (Table 4.2).

These crude estimates are most useful in illustrating the relative population sizes of various species and, perhaps, giving order-of-magnitude figures for setting population objectives for the region. Note that the relative abundances used for these estimates are averages across all BBS routes in the physiographic area, using data from 1990-1998.

Table 4.2 Population estimates for priority species of forested habitat in the St. Lawrence Plain physiographic area. Percent of Atlas blocks based on number of 5-km blocks in which the species was reported during the State breeding bird Atlas for New York (N=400; Andrle and Carroll 1988), Vermont (N=31; Laughlin and Kibbe 1985), Ontario (N=710; Cadman et al. 1987), and Quebec (N=250; Gauthier and Aubry 1996).

Species	BBS population	% Atlas blocks			
		NY	VT	ON	QC
Cerulean Warbler	???	2	0	8	2
Eastern Wood-pewee	150,900	85	97	99	98
Canada Warbler	7,800	10	45	40	51
Veery	386,500	90	94	99	99
Black-billed Cuckoo	51,500	30	87	59	46
Black-thr. Blue Warbler	18,700	10	55	20	57
Wood Thrush	163,500	95	97	95	86
Red-headed Woodpecker	1,800	13	26	53	8
Whip-poor-will	1,500	20	39	54	26
Sharp-shinned Hawk	1,500	13	35	38	30
Northern Goshawk	400	7	26	17	15
Red-shouldered Hawk	2,000	9	48	32	36
Long-eared Owl	???	3	3	14	11
Cooper's Hawk	500	5	13	22	8

Recent inventories of Cerulean Warbler throughout the region have documented an expanding population in southeastern Ontario and adjacent northeastern NY, plus birds found in at least two sites in Vermont and one in southern Quebec (CEWAP; unpublished data). Recent estimates of the Ontario breeding population are as high as 3,000 pairs (Jason Jones, pers. comm.). Eastern Wood-Pewee populations have shown a long-term declins of 2%-3% per year, whereas BBS population trends for most other priority forest species in this physiographic area are either increasing or stable. Therefore, the primary habitat and population objectives for this suite are:

OBJECTIVE 1. Encourage and assist population expansion of Cerulean Warbler. Strive to maintain a stable regional population of 3,000-5,000 pairs.

OBJECTIVE 2. In areas that do not support Cerulean Warblers, prevent further loss of remnant forests and continue to maintain stable populations of priority forest species. In particular, manage habitat to benefit declining Eastern Wood-Pewee.
[NOTE: A Canadian perspective on this conservation objective may be different, because a number of species using these forest in the St. Lawrence Valley are near the northern limits of their range (e.g. Yellow-throated Vireo, Great Crested Flycatcher, Wood Thrush) and therefore may be of greater national significance.]

Based on published average densities of 3 pairs of Eastern Wood-Pewee and Wood Thrush per 10 ha (Gauthier and Aubry 1996), roughly 550,000 ha (770,000 ac) of mature forest habitats need to be maintained to support 165,000 pairs of Wood Thrush and other species in this habitat

suite. Roughly 5,000 ha (7,500 ac) should be managed to support 3,000-5,000 pairs of Cerulean Warblers in areas where they occur.

Implementation strategy; With forest habitats being of relatively low priority in this planning unit, compared with early successional habitats, a conservation strategy for forest birds should not be in direct conflict with plans for other habitats; i.e., regeneration of mature forest from grassland and shrub habitats is not generally recommended. Achieving the primary objectives for this suite will entail:

• Completion of inventory for most important sites that support or potentially support Cerulean Warblers

• Protection and management of existing sites to maximize benefits to Cerulean Warbler; e.g., preserve tallest trees, encourage maturing of canopy species, prevent fragmentation of existing forests.

• Allow and encourage canopy development in other potential sites that currently exist as forest patches or are managed as forested wetlands, to enhance the possibility of further population expansion.

• Develop multiple-use strategies (e.g. production of maple syrup, shelterwood silviculture) that are compatible with priority species habitat needs on private lands.

Ricketts et al (1999) have identified the largest intact patches of forest and woodlands in the region, including the Bruce Peninsula and Ganaraska Forest in Ontario, and Chaumont Barrens in New York. Also in New York, the following designated Important Bird Areas (Wells 1998) include large acreages of deciduous or mixed forest. Inventories are needed to assess the populations of priority species in this habitat type that are found at these sites.

- Indian River Lakes/Black Lakes—80,000 Acres; Private. Mixture of deciduous woods, mixed woods, shrub and grassland habitat.
- Eastern Lake Ontario Barrier Beaches-24,000 Acres; Private and public. Some portions of deciduous woods.
- Four Brothers Islands—18 Acres; The Nature Conservancy. Small amounts of mixed forest.
- Fort Drum Grasslands-120,000 Acres; DOD. Large acreages of deciduous and mixed woods and riparian habitats.
- Indian River Lakes/Black Lakes—80,000 Acres; Private. Mixture of deciduous woods, mixed woods, shrub and grassland habitat.
- Lisbon Grasslands--40,000 Acres; Private State Wild. Management Area. Primarily non-tidal wetlands with a mixture of deciduous and mixed woods, shrub and grassland habitats.
- Lower St. Lawrence River—48,000 Acres. Mostly private/NY State Power Authority, Office of Parks, Recreation and Historic Preservation, DEC. Primary habitat types are grasslands and deciduous woods with significant populations of Cerulean Warbler.
- Lisbon Grasslands--40,000 Acres; Private State Wild. Management Area. Primarily non-tidal wetlands with a mixture of deciduous and mixed woods, shrub and grassland habitats.

- Perch River Wildlife Management Area—8000 Acres; Owned by NY DEC. Some deciduous and mixed woods.
- Upper St. Lawrence River/ Thousand Islands-100,000 Acres; Mostly private/NY State Power Authority, Office of Parks, Recreation and Historic Preservation, DEC. Primary habitat types are grasslands and deciduous woods with significant populations of Cerulean Warbler.

Management guidelines: **[need to write -- CEWAP results, etc.]**

Research and monitoring needs: Ongoing research in southeastern Ontario and northern New York is aimed at determining population status and habitat requirements of Cerulean Warblers at this northern edge of their range. This research should be strongly supported. Future research needs for forest habitats in this physiographic area include:

• Careful monitoring of known Cerulean Warbler breeding sites

• Determining habitat and area requirements for other priority forest birds, especially in relation to current management practices for forested wetlands and current land-use trends.

• Determining use of forest patches, including urban greenbelts, by transients in spring and fall.

Outreach:

D. Riverine and Freshwater Wetlands

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APPENDIX 1: ECOLOGICAL UNITS AND VEGETATION

Appendix 1. Ecological Units and associated vegetation alliances within the St Lawrence Plain PIF planning unit (physiographic area 18). Modified from Keys et al. (1995). SM-B-B = Sugar Maple-beech-birch forest. Human use categories: F = forestry, A = agriculture, R = recreation, RS = residential, U = urban, D = development, M = mining.

Subunit (state)	Description	Vegetation	Human use
212Ea (NY, QE)	St. Lawrence Glacial Marine Plain	SM-B-B, wetlands	A, F
212Eb (NY, QE)	St. Lawrence Till Plain	SM-B-B, red maple-black ash seepage swamp	F, A
212Ec (NY, VT, QE)	Champlain Glacial Lake and Marine Plains	SM-B-B, oak-heath dry forest, silver maple floodplain forest	A, F
212Ed (VT, QE)	Champlain Hills	SM-B-B, sugar maple-chinquapin oak forest, n. talus slope forest	F, A
212Ee (NY)	St. Lawrence Glacial Lake Plain	SM-B-B, red maple-black ash swamp, wetlands	A, F

APPENDIX 2: AVIFAUNAL ANALYSIS

In this section we provide additional details on the status of the roughly 187 species known to breed in the physiographic area. Global and area scores for all species from the PIF prioritization database (Carter et al. 2000) are provided in Table A2.1. All BBS data have been updated through 1999, and were taken from: http://www.mbr.-pwrc.usgs.gov/cgi-bin/atlas99.pl?S18.

Species with high proportions of their total populations in this region are considered of greatest importance for long-term conservation planning; ie., this region has the greatest responsibility for the long-term maintenance of their populations (Rosenberg and Wells 1995, 1999). Because of the small size of this planning unit, we consider a species to be of regional importance if =5% of its population occurs in the unit (see Rosenberg and Wells 1995, 1999 for methods), or if the area supports an exceptionally high relative abundance (BBS data).

Based on Breeding Bird Survey data (N = 78 routes), 8 species were estimated to have = 5% of their total population breeding in the planning unit (Table A2.2). These include probably 16% of the world's breeding Bobolinks, 9% of all Ring-billed Gulls, and nearly 8% of breeding Golden-winged Warblers. Bobolinks and Tree Swallows occur here in higher relative abundance than in any other physiographic area.

Table A2.2. Species with high proportions of their total population in Area-18. Percent of population calculated from percent of range area, weighted by BBS relative abundance (see Rosenberg and Wells 1999). Population trend from BBS data (% change per year from 1966-1999).

Species	% of pop.	rel. abun.	Pop. trend	Sig.	N
Bobolink	15.6	35.83 [a]	-0.9	0.19	78
Ring-billed Gull	9.2	32.83	4.3	0.01	68
Golden-winged Warbler	7.7	0.33	6.0	0.06	17
American Woodcock	5.6	0.05	-7.3	0.12	16
Black-billed Cuckoo	5.2	1.08	-0.7	0.64	64
Tree Swallow	5.2	22.11 [a]	2.9	0.00	78
Veery	5.1	8.10	-0.4	0.62	75
Virginia Rail	5.1	0.08	15.0	0.08	10

[a] Relative abundance is the highest recorded for any physiographic area

Declining Species

Of the 8 species with 55 of their population in the physiographic area, only the American Woodcock has shown declines since 1966 (Table A2.2). Of full 154 species sampled by BBS, 16 have declined significantly since 1966, and 7 additional species have declined since 1980 (Table A2.3). Nearly all declining species are associated with grassland and other early successional or disturbed habitats, including urban areas. Note that although Bobolinks show a stable long-term trend, they have declined significantly in the region since 1980. In addition several species of freshwater wetlands (Pied-billed Grebe, Green Heron) are also declining in the region. The only declining species that can be considered forest birds are Eastern Wood Pewee, Yellow-shafted Flicker, and Ruby-crowned Kinglet. The flicker and pewee are associated either with forest openings or edges, and the kinglet is based on a very small sample.

Table A2.3. Species showing large or significant population declines within Physiographic Area 18, based on Breeding Bird Survey, 1966-1999 trends (N = 78 routes). CF = conifer forests; HF = hardwood or mixed forests; ES = early successional; GR = grassland; W = wetland; UR = urban.

Species	Trend (% per year)	N	Significance	Relative abundance	Primary habitat
Loggerhead Shrike	-18.7	10	0.00	0.05	GR
Purple Martin	-12.1 [a]	31	0.00	1.09	ES
Ruby-crowned Kinglet	-10.3	15	0.09	0.19	CF
American Woodcock	-7.3	16	0.10	0.06	ES
American Kestrel	-5.2 [a]	60	0.01	0.88	GR, ES
Chimney Swift	-4.7	47	0.00	1.13	ES, UR
Vesper Sparrow	-4.7	56	0.02	2.51	GR
Upland Sandpiper	-3.9 [a]	46	0.07	1.98	GR
Brown-headed Cowbird	-3.3	77	0.00	14.02	GR, ES

Bank Swallow	-2.9	58	0.05	12.62	W, ES
Horned Lark	-2.5	53	0.01	3.12	GR
Bobolink	-2.5 [a]	75	0.00	42.18	GR
Yellow-shafted Flicker	-2.1	77	0.00	4.02	ES, HF
Barn Swallow	-2.0 [a]	75	0.00	31.28	GR
Eastern Meadowlark	-1.9	77	0.00	19.44	GR
Eastern Wood Pewee	-1.8	72	0.07	3.22	HF
Brown Thrasher	-1.8	62	0.00	2.78	ES
Eastern Kingbird	-1.6 [a]	74	0.09	9.11	GR
Killdeer	-1.4	78	0.00	12.63	GR, W
Red-winged Blackbird	-1.3 [a]	75	0.05	117.87	GR, W
Savannah Sparrow	-1.3	77	0.00	35.12	GR
House Sparrow	-1.1	77	0.02	33.29	UR
European Starling	-1.0	78	0.01	108.48	UR

[a] Significant declining trend for period 1980-1996 only.

Increasing species

It is informative to also examine the species that are increasing significantly in a physiographic area. In the St. Lawrence Plain, 54 species show significantly increasing population trends, roughly twice the number of species that are declining (Table A2.4). A majority of these fall in two categories, either species associated with regenerating and maturing forests, or species that have adapted particularly well to human activities or development. Species associated with human activities include those using bird feeders or nest boxes (e.g. Eastern Bluebird, Black-capped Chickadee), as well as those that breed in urban wetlands (e.g. Canada Goose). Several species, such as House Finch and Northern Cardinal have experienced widespread population increases throughout the Northeast. In contrast with those in Table A2.2, many of the early successional species that are increasing tend to be those that have adapted well to suburban and urban habitats

Table A2.4. Species showing significant population increases within Physiographic Area 18, based on Breeding Bird Survey, 1966-1999 trends (N = 78 routes). CF = conifer forests; HF = hardwood or mixed forests; ES = early successional; GR = grassland; W = wetland; UR = urban.

Species	Trend (% per year)	N	Significance	Relative abundance	Primary habitat
Canada Goose	29.8	38	0.04	3.72	W, UR
House Finch	18.4	49	0.00	1.18	UR
Virginia Rail	15.0	10	0.08	0.03	W
Blackburnian Warbler	11.7	22	0.10	0.22	CF
Turkey Vulture	11.8 [a]	29	0.10	0.51	ES
Willow-Flycatcher	11.4	30	0.00	0.58	ES, W
Pileated Woodpecker	9.8	44	0.00	0.33	HF
Magnolia Warbler	9.8	32	0.01	0.54	CF
Hermit Thrush	8.8 [a]	43	0.03	1.49	CF

Black-thr. Blue Warbler	8.8	25	0.02	0.31	HF
Northern Cardinal	8.5	48	0.01	1.09	UR
Ruby-thr. Hummingbird	7.1	43	0.00	0.28	ES, UR
Myrtle Warbler	6.9	41	0.05	0.86	CF (ES)
Ruffed Grouse	6.7	24	0.06	0.12	HF
Swamp Sparrow	6.6	59	0.01	2.75	W
Golden-winged Warbler	6.0	17	0.06	0.28	ES
Black-capped Chickadee	5.6	77	0.00	7.05	CF, HF, UR
Eastern Bluebird	5.6	49	0.05	0.59	ES
Northern Waterthrush	5.4	46	0.06	0.98	W, CF
Eastern Towhee	5.3 [a]	25	0.00	0.88	ES
Black-and-white Warbler	5.1	67	0.00	2.61	HF
Common Loon	5.0	28	0.08	0.52	W
Mallard	4.9	63	0.03	2.73	W, UR
Mourning Dove	4.8	77	0.00	14.03	ES, UR
Purple Finch	4.8 [a]	45	0.07	1.22	CF (ES)
Ring-billed Gull	4.3	68	0.01	23.67	W
Red-breasted Nuthatch	4.1	36	0.07	0.44	CF
Yellow-bellied Sapsucker	3.9	45	0.00	0.91	HF, CF
Red-eyed Vireo	3.8	77	0.00	13.57	HF
Scarlet Tanager	3.7	59	0.07	0.86	HF
White-breasted Nuthatch	3.6	59	0.01	0.83	HF, UR
Warbling Vireo	3.5	73	0.00	5.22	HF
Nashville Warbler	3.5	48	0.01	1.32	CF (ES)
Eastern Phoebe	3.5 [a]	70	0.00	3.71	ES, W (UR)
Cedar Waxwing	3.4	76	0.00	11.35	ES, UR
Alder Flycatcher	3.2 [a]	60	0.03	3.85	ES
Winter Wren	3.1	43	0.03	0.91	CF
Blue Jay	3.0	78	0.00	7.87	HF, UR
Chestnut-sided Warbler	2.9	66	0.00	3.65	HF (ES)
Tree Swallow	2.9	78	0.00	19.89	W (UR)
Downy Woodpecker	2.7	69	0.02	1.15	HF, UR
House Wren	2.7	72	0.02	4.25	ES (UR)
Rock Dove	2.6	73	0.03	17.06	UR
Great Blue Heron	2.3	66	0.06	1.73	W
American Goldfinch	2.3 [a]	75	0.00	21.97	ES (UR)
Mourning Warbler	2.1	49	0.07	86	HF (ES)
Yellow Warbler	1.7	78	0.01	13.40	ES
Ovenbird	1.5	77	0.01	8.09	HF
American Crow	1.4	78	0.00	49.29	ES (UR)
American Robin	1.3	78	0.00	56.63	ES (UR)
Chipping Sparrow	1.1	78	0.06	15.35	ES (UR)
Common Yellowthroat	1.0	78	0.07	16.58	ES (W)

[a] Significant increasing trend for period 1980-1996 only.

(e.g.Ruby-throated Hummingbird, Cedar Waxwing, House Wren, American Goldfinch, Chipping Sparrow, American Robin). Another group of species that has benefited from human activities are those associated with conifer plantations; these include Hermit Thrush, Blackburnian Warbler, Myrtle Warbler, Pine Warbler, and Red-breasted Nuthatch.

An important suite of species that are increasing significantly in this region includes the shrub-nesting Golden-winged Warbler and associated species such as Willow Flycatcher, Mourning Warbler, Chestnut-wided Warbler, Yellow Warbler, and Eastern Towhee. Another important group showing increases are freshwater wetland species, including Swamp Sparrow, Common Loon, Mallard, Ring-billed Gull, American Bittern, and Great Blue Heron.

APPENDIX 3: POPULATION ESTIMATES AND ASSUMPTIONS

In this PIF bird conservation plan, several estimates are presented of relative or absolute bird population sizes. Relative population size (percent of global population) is used to illustrate the importance of a given geographic area to priority bird species, whereas estimates of absolute population size are used to set numerical population objectives for habitat-species suites within a physiographic area. Both types of estimates are derived using Relative Abundance values from the Breeding Bird Survey (BBS). These values represent the average number of birds per BBS route, across all routes in a physiographic area, for the period 1990 through 1998 (J.R. Sauer, pers. com.). These same Relative Abundance values are used to calculate Area Importance (AI) scores in the PIF species prioritization database (see Carter et al. 2000). Note that prior to July, 1999 BBS Relative Abundance was calculated differently; so any previously presented or published population estimates using these values will differ from those calculated after July 1999 (J.R. Sauer, pers. com.).

Percent of Population

The percent of total or global population (% pop) for a species is calculated according to the methods originally described by Rosenberg and Wells (1999). For species sampled by the BBS, the Relative Abundance value for each physiographic area is multiplied by the size of that area (km^2) and then summed across all the physiographic areas in which the species occurred to yield a total "BBS population." The area-weighted value for each physiographic area is then divided by this total to yield the proportion of the total population in that area. Thus:

$$\%\ Pop = \frac{\text{Relative Abundance (area)}}{\sum (\text{Relative Abundance})(\text{area})}$$

Estimates of % Pop are relative values and are not dependent on the "correctness" of Relative Abundance values for individual routes; i.e., even if BBS greatly underestimates absolute abundance of "poorly sampled" species, such as nightjars and raptors, Relative Abundance

values and % pop estimates should be valid, *as long as the detectability of a species on BBS routes is relatively constant across the range of the species*. These estimates are more questionable for species occupying very patchy habitats (e.g. wetlands) in regions where BBS routes do not adequately sample these habitats.

In cases where additional survey data for groups of species are available (e.g. waterfowl, colonial waterbirds), relative abundance and % pop estimates should be calculated with these data to compare with or replace BBS data. For some species (e.g. Piping Plover), direct censuses of populations exist and should be used to calculate the percentage of the total population in each region. Wherever supplemental data exist, these new estimates should be entered into the PIF prioritization database at Colorado Bird Observatory.

Within PIF plans, a threshold of % Pop has been determined that signifies a disproportionate abundance of a priority species in a physiographic area, or that an area shares a disproportionate responsibility for the long-term conservation of that species. This threshold is based on the size of a physiographic area relative to the total area of North America south of the open boreal forest (roughly 12 million km^2). An analysis of North American bird species' distribution and abundance (K. V. Rosenberg, unpublished data) resulted in the % Pop thresholds listed in Table A3.1.

Table A3.1. Percent of Population thresholds, signifying disproportionate population size, relative to size of physiographic area.

Physiographic area size (km^2)	Proportion of North America	Percent of population threshold
< 57,000	< 0.50	2
57,000 - 80,000	0.51 - 0.69	3
81,000 - 100,000	0.70 - 0.89	4
101,000 - 125,000	0.90 - 1.09	5
126,000 - 153,000	1.10 - 1.30	6
154,000 - 173,000	1.31 - 1.49	7
174,000 - 191,000	1.50 - 1.69	8
192,000 - 222,500	1.70 - 1.89	9
223,000 - 246,000	1.90 - 2.10	10
300,000 - 500,000	2.60 - 3.50	15
> 600,000	> 5.0	25

Absolute population estimates

In order to set appropriate and justifiable habitat goals within physiographic areas, it is usually necessary to first set numerical population objectives for priority bird species. Population estimates rarely exist, however, for most nongame bird species. For relatively widespread and common species of forest, shrub, and some grassland habitats, the BBS may provide a landscape-level density estimates that can be converted into regional population estimates if the following assumptions are made:

(1) BBS routes constitute a random sample of the landscape;
(2) habitats in question are fairly evenly distributed across the region; and
(3) each bird species has a relatively fixed average detection distance at BBS stops, within which a reasonable estimate of the number of individuals present may be obtained.

Because BBS route locations are selected at random (ref), the first assumption is reasonable. Furthermore, several studies have shown that common habitat types are represented along secondary roads used as BBS routes in roughly the same proportions as in the overall landscape (refs). The third assumption is the most problematic; although most species probably do have a fairly constant average detection distance, selecting that distance is difficult and has a large effect on total population estimates. For example, an entire BBS route composed of 50 stops, each consisting of a 0.25 mi. (400 m)-radius circular count, potentially surveys roughly 25 km^2 of heterogeneous landscape. For a species that is detected routinely only out to 200 m at each stop, the effective area surveyed is reduced to 6.3 km^2; for a species detected only out to a distance of 100 m, the BBS route surveys 1.6 km^2. A simple method of extrapolating avian density from counts of singing males using detection threshold distances was proposed by Emlen and DeJong (1981), who also provided average maximum detection distances for 11 species of common forest birds. These distances ranged from 72 m (Blue-gray Gnatcatcher) to 186 m (Wood Thrush) and averaged 128 m for the 11 species. Emlen and DeJong (1981) further proposed that numbers of singing males be doubled to obtain a total population estimate and that a correction factor be applied to account for variable singing rate (i.e. birds that were missed because they didn't sing during the survey period).

In the absence of additional empirical data on species-specific detection distances and singing frequencies, we may take a simple and conservative approach to estimating regional population sizes from BBS relative abundance data. Species were initially placed in three categories, according to their presumed detection-threshold distances. A majority of forest-breeding songbirds and similar species of scrubby and open habitats were assigned a detection distance of 125 m (close to the average distance for forest birds in Emlen and DeJong's study) -- for these species a BBS route samples an effective area of 2.5 km^2. A second group of species that are detected primarily visually or have unusually far-carrying vocalizations in open habitats were assigned detection distances of 400 m; i.e., they are detected out to the limit of each BBS circular stop (e.g. raptors, Upland Sandpiper). For these species the BBS samples roughly 25 km^2. A third group of species is considered to be intermediate and was assigned a detection distance of 200 m (effective sampling area = 6.3 km^2). These include species, such as Bobolink and Eastern Meadowlark, that are detected by a combination of song and visual observations in open habitats.

Population estimates for a physiographic area are then calculated as the average landscape-level density (number of birds per route * effective area sampled by each route) multiplied by the size (km^2) of the physiographic area. Note that landscape-level densities are not assumed to be similar to species densities in uniform optimum habitats, but rather reflect habitat heterogeneity at larger scales as sampled by BBS routes. Because the great majority of detections on typical BBS routes are of singing or displaying males, the population estimate derived from this method is assumed to represent number of breeding pairs, unless specifically noted otherwise.

Clearly, much additional research and analysis is necessary to (1) test assumptions of this approach, (2) provide refined empirical estimates of detection distances and frequencies that can be applied to density estimation, and (3) to develop independent means of estimating population size in order refine or calibrate estimates derived from BBS data. The crude population estimates provided in this PIF plan are a reasonable starting point, however, that are based on the best information yet available, and that can serve as preliminary population objectives for priority species in each physiographic area. These population objectives can then be translated into habitat objectives, with the goal of assuring the long-term sustainability of priority species in each region. As better population data become available, these should be incorporated into later versions of the PIF conservation plans.