Partners in Flight
Bird Conservation Plan

The
Mid-Atlantic Piedmont
(Physiographic Area 10)

AMERICAN
BIRD
CONSERVANCY

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Partners In Flight
Landbird Conservation Plan

Physiographic Area 10:
Mid-Atlantic Piedmont

Version 1.0

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Executive Summary

Area - 6,649,100 ha

Description - The Mid-Atlantic Piedmont is an area of gently rolling topography that stretches in a wide band across much of central Virginia, Maryland, southeastern Pennsylvania, and northern New Jersey. It once supported an extensive hardwood forest that included Appalachian oak, oak-hickory, and pine-oak forest types. Large stands of loblolly-shortleaf pine forest were formerly common in the southernmost portions of this area. Today, roughly 45% of the Mid-Atlantic Piedmont is forested and an equal amount is in agricultural production. The region is experiencing the effects of rapid development, especially in the Philadelphia, Baltimore, and Washington D.C. metropolitan areas. The conversion of forest and agricultural lands to residential use and the resulting need for roads, power lines, and other infrastructure will continue to fragment and isolate undeveloped areas throughout the region into the foreseeable future.

Priority Bird Species and Habitats:

Deciduous and mixed forest/bottomlands -

Cerulean Warbler -- Small, but locally important populations; requires tall, yet partly
            open forest canopy in upland and riparian bottomland forests.
Wood Thrush -- Prefers moist deciduous forests with dense understory vegetation.
Louisiana Waterthrush -- Sensitive to stream quality and loss of riparian forest buffers.
Kentucky Warbler -- Requires large, unbroken tracts of moist deciduous forest with
            dense understory and ground cover.

Conservation Objective: Roughly 1.2 million ha of forest to support the entire habitat-species suite (e.g. 350,000 pairs of Wood Thrush); in addition, 11,000 km of forested streams are required to support 7,600 pairs of Louisiana Waterthrush.

Shrub-scrub/barrens –

Prairie Warbler – Occurs in the highest relative abundance of any physiographic area.
Field Sparrow -- Common, yet declining nearly throughout the East.
Whip-poor-will -- Poorly monitored; may favor natural pine-oak barrens.
American Woodcock -- Shows steep population declines; requires combination of forest
            clearings, second-growth hardwoods, and moist soils for foraging.
Northern Bobwhite -- Declining throughout the Northeast.

Conservation Objective: Roughly 40,000 ha of shrub and barrens habitat to support 40,000 pairs of Prairie Warblers and 65,000 Northern Bobwhite.

Agricultural grasslands -

Henslow's Sparrow – Formerly an uncommon breeder (until 1980's); requires tall,
        dense, unmowed pasture.
Grasshopper Sparrow -- Largest population in the Northeast; numbers have undergone
        dramatic decline in recent years.

Conservation Objective: Roughly 100,000 ha of pasture or other managed grassland to
support 40,000 pairs of Grasshopper Sparrow and other grassland birds.

Conservation Recommendations and Needs -

Managing the effects of human population growth while maintaining healthy natural
systems is the greatest conservation challenge facing this region. The future of local
bird populations will depend heavily on protecting areas of conservation significance.
Forest habitat remains relatively abundant, but it is highly fragmented. Efforts to identify
and maintain contiguous blocks of forest large enough to support the full array of
breeding birds must be a priority. Agricultural lands throughout the Mid-Atlantic
Piedmont support the largest population of Grasshopper Sparrows in the northeastern
United States, as well as isolated populations of Upland Sandpiper, Dickcissel, and
other state-listed grassland species. Many of these areas formerly supported
Henslow's Sparrows. The suite of birds associated with early successional habitats,
including grasslands and shrublands, is the most rapidly declining group in this region.
Restoring, protecting, and managing early-successional habitat must become a
conservation priority, as least at the state level.

Specific conservation recommendations for this physiographic area include:

• Identify and protect forest blocks that support significant populations of Cerulean and
    Kentucky Warbler or Wood Thrush;

• Protect or restore barrens that support Prairie Warbler, Whip-poor-will, and other
    shrub-nesting species; manage and monitor populations of priority species in other
    disturbed areas;

• Identify and acquire, manage, or restore grassland habitats > 50 ha with the potential
    to support Henslow's Sparrow, or that support significant populations of Upland
    Sandpiper, Vesper Sparrow, or Grasshopper Sparrow.

Introduction

Continental and local declines in bird populations have led to concern for the future of migratory and resident landbirds. The reasons for these population declines are both numerous and 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 and nest predation. Scientists and the concerned public agree that a coordinated conservation initiative focusing on nongame landbirds is needed to address the problem of declining species.

In 1990, various government agencies, conservation organizations, academic institutions, private industry, and other citizens joined forces to form Partners in Flight (PIF). This voluntary, international coalition is dedicated to reversing the downward trends of declining species and "keeping common birds common" (Pashley et al. 2000).

PIF helps 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 of PIF's strategy for bird conservation is a series of scientifically based Bird Conservation Plans, of which this document is one. The spatial scale for the plan is the physiographic area, modified from original strata devised by the Breeding Bird Survey (Robbins et al. 1986). Although Bird Conservation Plans identify conservation priorities and biological objectives at the physiographic area level, implementation of PIF strategies takes place at multiple scales, including the individual state/province, federal agency region, and joint venture.

A. Goal

The goal of each PIF Bird Conservation Plan is to ensure the maintenance of healthy populations of native landbirds. This document advances that goal by encouraging a proactive approach to landbird conservation. The plan focuses primarily on nongame landbirds, which have been underrepresented in previous conservation efforts, and many of which exhibit significant population declines. It lists management actions that may arrest or even reverse these declines if taken in a timely manner.

The PIF approach to bird conservation differs from most federal and state-level threatened and endangered species listing processes in that (1) it is voluntary and nonregulatory, and (2) it focuses proactively on relatively common species in areas where conservation actions can be the most effective, rather than placing local emphasis on rare and peripheral populations.

B. Process

PIF Bird Conservation Plans emphasize effective and efficient management through a four-step process designed to identify and achieve necessary actions for bird conservation (Finch and Stangel 1993):

(1) identify the species and habitats that are most in need of conservation;
(2) describe the desired conditions for these habitats based on knowledge of species life history and habitat requirements;
(3) develop realistic biological objectives that can be used as management targets or goals to achieve desired conditions;
(4) recommend conservation actions that various entities can implement at multiple scales to achieve the 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. This plan and its appendices describe the specific methods used to complete the process.

C. Implementation

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

PIF Landbird Conservation Plans complement other bird conservation initiatives such as the North American Waterfowl Management Plan, the United States Shorebird Conservation Plan, and the North American Colonial Waterbird Plan. Integrating these initiatives during conservation 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 avian communities.

Section 1: The Planning Unit

A. Physical Characteristics

The Mid-Atlantic Piedmont is the second largest physiographic area in the Northeast United States and covers an area of approximately 66,491 sq km. The higher and more rugged Blue Ridge and Ridge and Valley regions of the Appalachian Mountains form its border in the west. Its eastern border is the fall line, where erosion-resistant igneous and metamorphic rock give way to the sands and clays of the coastal plain. To the south, the political border between North Carolina and Virginia arbitrarily separates this planning unit and the Southern Piedmont physiographic area. From here, the Mid-Atlantic Piedmont extends northward in a broad band across central Virginia, Maryland, and southeastern Pennsylvania before ending in northern New Jersey (Figure 1).

The Mid-Atlantic Piedmont varies in elevation from approximately 60m in the east to an average of 300m in the west, though some individual peaks reach 600m. Metamorphic rock, folded by tectonic forces, underlies most of the area. Weathering and erosion have erased most surface indications of this folding and created the gently rolling topography evident today. In some locations, however, erosion has not yet leveled the most resistant rock and isolated mountains or *monadnocks* remain. These can be quite sizable and often appear as "islands of forest" among the surrounding lowland terrain.

Precipitation in the Mid-Atlantic Piedmont averages from 840mm to 1300mm annually, with slightly more during the spring and summer months than at other times of the year. The annual frost-free period averages from 120 days at the higher elevations and the northernmost portions of the area to 180 days at lower elevations in its southern half.

Despite an adequate amount of precipitation, few natural lakes and ponds occur in this physiographic area. Most of its original wetlands have been drained to accommodate human agricultural use. Freshwater impoundments created to control flooding, generate electrical power, provide drinking water, or support farm operations have done little to compensate for the loss of natural wetlands. The most sizable water impoundments, the John H. Kerr Reservoir (20,000 ha), Smith Mountain Lake (8,400 ha), and Lake Anna (5,260 ha) are all in Virginia, yet smaller reservoirs and ponds dot the landscape throughout the region.

Other water features in this area include numerous streams and rivers that flow from the Appalachian highlands to the Coastal Plain. The longest of these are the Delaware, Susquehanna, Potomac, Rappahannock, and James Rivers. The bottomland forests associated with major rivers form natural corridors that connect otherwise isolated woodlands. In some locations along these rivers, frequent flood events sweep away most woody vegetation and create wide, sandy floodplains. Elsewhere, seasonal variations in water flow create sizable pool and riffle complexes.
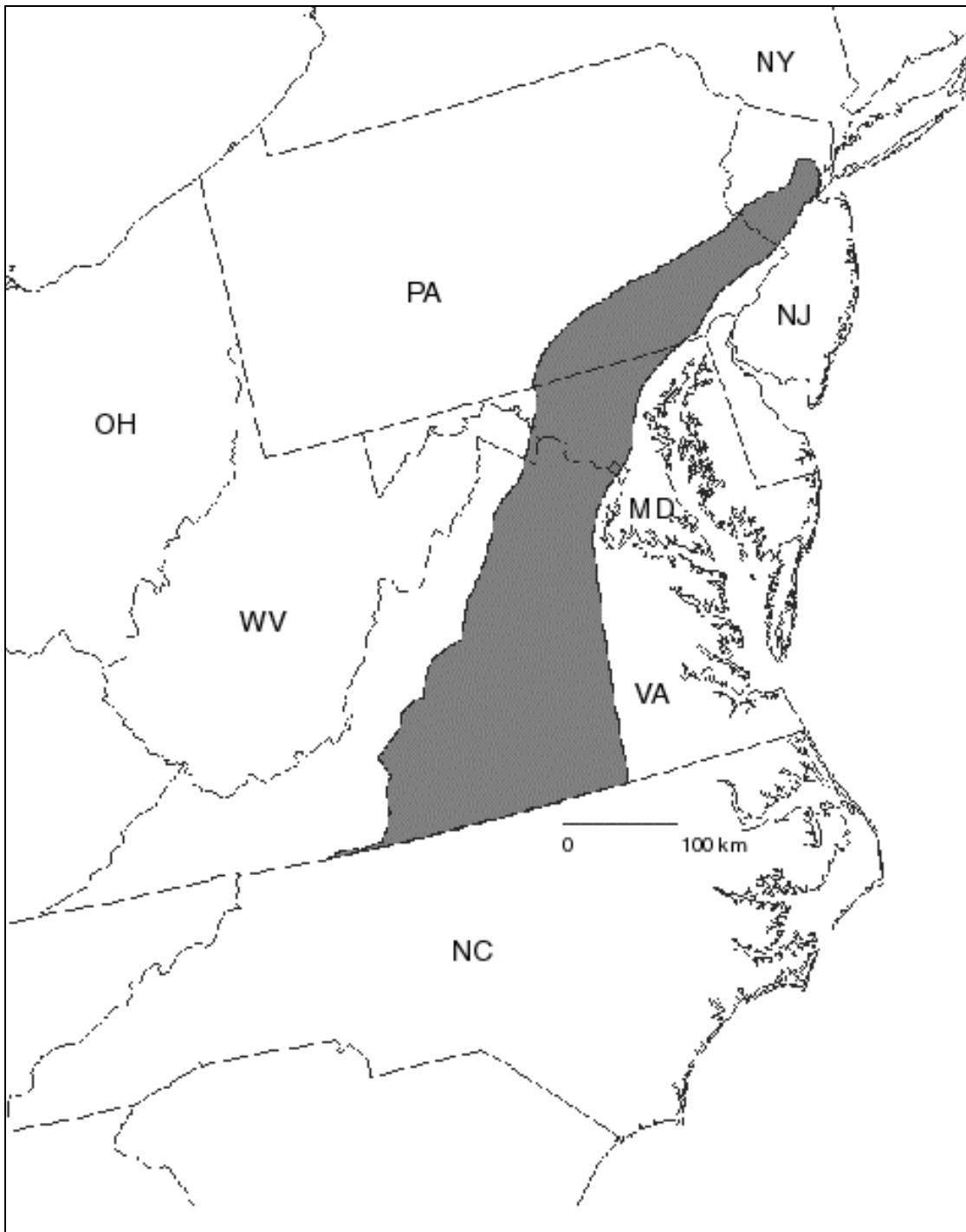
Figure 1 – The Mid-Atlantic Piedmont, physiographic area 10, covering 6,649,100 ha (16,429,926 ac) in Virginia, West Virginia, Maryland, Pennsylvania, and New Jersey.

B. Potential Vegetation

The Mid-Atlantic Piedmont once supported an extensive hardwood forest. In northern portions of the area, an Appalachian oak type (Alliance = I.B.2.N.a.36) was most common. Forest stands of this type are dominated by Chestnut Oak (*Quercus prinus*) with Northern Red Oak (*Quercus rubra*), White Oak (*Quercus alba*), Black Oak (*Quercus velutina*), Black Birch (*Betula lenta*) and Red Maple (*Acer rubrum*) as common associates. Less frequent trees included Scarlet Oak (*Quercus coccinea*), Downy Serviceberry or Shadbush (*Amelanchier arborea*), Shagbark Hickory (*Carya alba*), Pignut Hickory (*Carya glabra*), Flowering Dogwood (*Cornus florida*), Black Gum (*Nyssa sylvatica*), Pitch Pine (*Pinus rigida*), White Pine (*Pinus strobus*), White Oak, Common Locust (*Robinia pseudoacacia*) and Sassafras (*Sassafras albidum*).

In southern parts of the region, an oak-hickory type forest (Alliance = I.B.2.N.a.27) still prevails. White Oak, Northern Red Oak, Scarlet Oak, Black Oak, Shagbark Hickory, Red Hickory (*Carya ovalis*), and Pignut Hickory dominate this forest type. Chestnut Oak is an important component in some areas of Virginia. Along with oaks and hickories, various pines, Tulip Poplar, Sweetgum (*Liquidambar styraciflua*), and Red Maple are locally common.

Large areas of Virginia are covered either by Loblolly-shortleaf pine forest (Alliance = I.A.8.N.b.16) or by oak-pine forest (Alliance = I.C.3.N.a.21). In the former type, both Loblolly Pine (*Pinus taeda*) and Shortleaf Pine (*Pinus echinata*) predominate. Other component species include Tulip Poplar, Red Maple, Sweetgum, Virginia Pine (*Pinus virginiana*), Eastern Red Cedar (*Juniperus virginiana*), and various oaks. In the latter forest type, White Oak, Northern Red Oak, Black Oak and White Pine predominate. Other species present include Red Maple, Shagbark Hickory, Tulip Poplar, and Red Pine (*Pinus resinosa)*.

Stands of Box-elder floodplain forest (Alliance = I.B.2.N.d.3) occur along large rivers, both in the active floodplain and on sandbars. Typically flooded in the spring, these early successional forests are dominated by Box-elder (*Acer negundo*). Other characteristic species include Sycamore (*Platanus occidentalis*), Hackberry (*Celtis laevigata*), Red Maple, Sweetgum, Winged Elm (*Ulmus alata*), Silver Maple (*Acer saccharinum*), Slippery Elm (*Ulmus rubra*), American Hornbeam (*Carpinus caroliniana*), and Red Mulberry (*Morus rubra*).

At scattered locations throughout the Piedmont, the drying effects of thin, sandy soil and frequent ground fires combine to create Pine Barrens (Alliance = V.A.6.N.q.103). This unusual community occurs as herbaceous grassland with scattered trees such as Pitch Pine, Virginia Pine, and Eastern Red Cedar. Blackjack Oak (*Quercus marilandica*) and Post Oak (*Quercus stellata*) may also be present. Each barren's species composition reflects both its history and available seed sources (NatureServe 2001).

Wetland communities occur throughout the physiographic area, though not to the extent seen in the neighboring Mid-Atlantic Coastal Plain. With few exceptions, these wetlands are small in size and located near the headwaters of the region's rivers and streams.
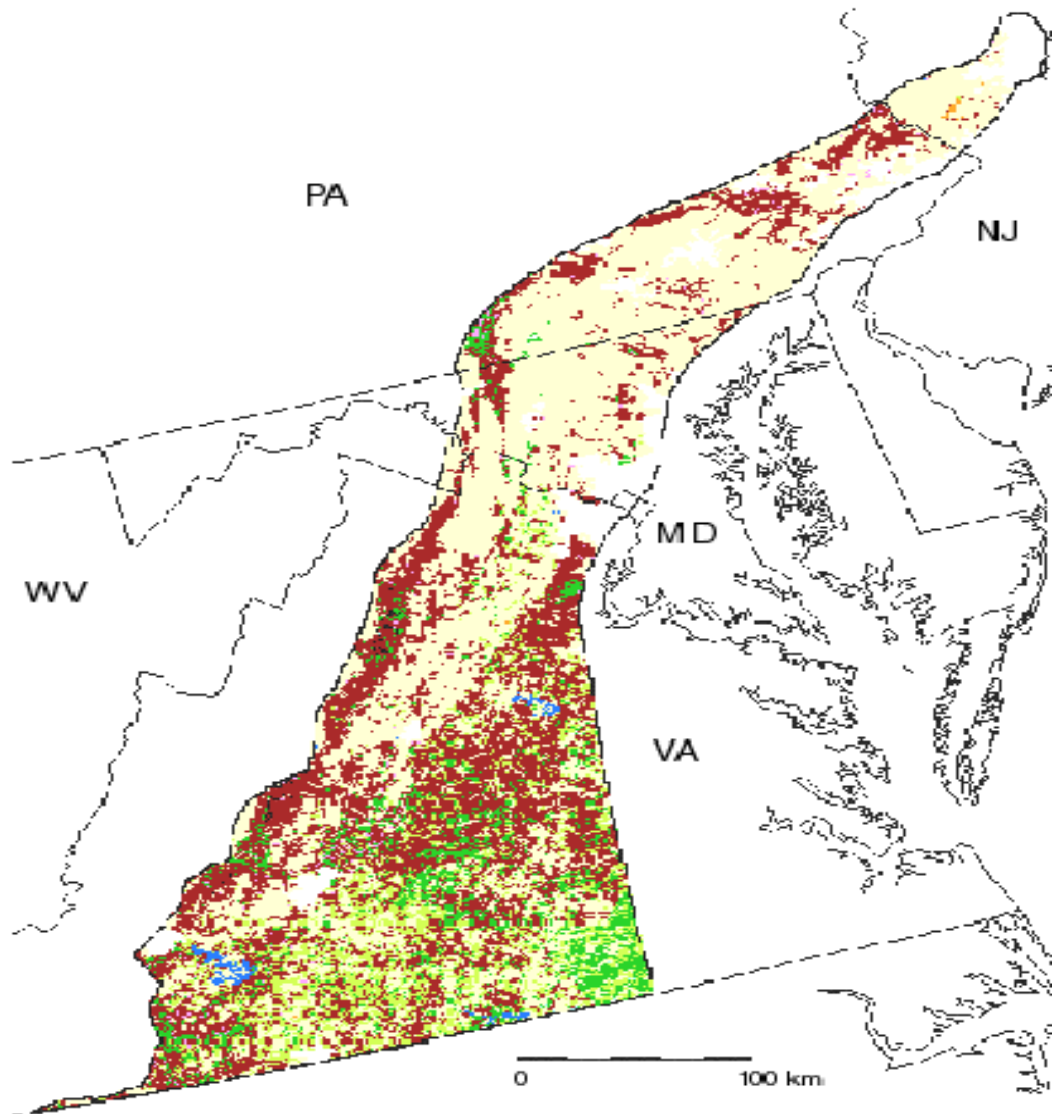
Figure 2 – Forest Cover Types of the Mid-Atlantic Piedmont

C. History and Land Use

Ecosystems within the Mid-Atlantic Piedmont have been subject to human manipulation for over one thousand years. Prior to the arrival of European settlers, Native Americans used fire to create and maintain openings in the forest (Hammett 1992, Russell 1983). As settlers arrived in the region, they discovered a rich mosaic of meadows, shrublands, and sapling woods interspersed in a larger matrix of old growth forest (Mayre 1955).

European settlers dramatically altered this landscape through wide-scale logging and conversion of the land to agricultural use during the 18th and early 19th Centuries. Local deforestation reached its peak about 1860, when a trend toward farmland abandonment began (Besley 1910). Today, roughly 45% of the area is forested and about an equal portion is in agricultural production (1996 Forest Service Forest Inventory and Analysis data). Table 1 lists the forest, crop, and other cover types now prevalent in the region.

Table 1. Areas of vegetative cover types in the Mid Atlantic Piedmont. Forest cover values are taken from USFS FIA data; nonforest cover types are modified from USGS data (Partners in Flight 2001).

Cover types	Area (ha)	Area (ac)	Percent of Total
White-red-jack pine / Longleaf-slash pine forest	12,200	30,147	0.18
Loblolly-shortleaf pine forest	645,600	1,595,278	9.71
Oak-pine forest	424,900	1,049,928	6.39
Oak-hickory forest	1,976,100	4,882,943	29.72
Oak-gum-cypress forest	3,900	9,637	0.06
Maple-beech-birch forest	37,500	92,662	0.56
Corn, soybeans, wheat	2,065,000	5,102,616	31.06
Pasture, hay, grasslands, mixed crops	957,200	2,365,241	14.40
Water	41,800	103,288	0.63
Urban	480,800	1,188,057	7.23
No data / Other	6,500	16,061	0.18
Totals	6,649,100	16,429,926	100

The most significant change in land use over the last 100 years is the development of large metropolitan centers both in and immediately adjacent to the physiographic area. The rapid growth of cities such as Newark, Philadelphia, Baltimore, and Washington, D.C. has generated effects that reach far beyond their borders. The spread of residential development outward from these major population centers and cities such as Charlottesville, Harrisburg, Allentown, and Frederick has permanently altered a vast amount of bird habitat in the region. The habitats impacted most by urban and suburban sprawl are the agricultural grassland, wetland, and other early successional types (Vickery and Dunwiddie 1997). In addition, development has fragmented and isolated most of the forests remaining in the region (Bushman and Therres 1988).

Changes in agriculture have impacted bird populations as well. Economies of scale have given larger farms a competitive advantage over smaller ones. Production on agricultural lands has intensified with the removal of hedgerows, less fallow land, and more frequent harvests of hay and feed crops. These practices reduce the habitat available for shrub nesting bird species and increase the mortality of grassland nesting birds in the region (Mitchell, et al. 2000).

Section 2: Priority Bird Species

A. General Avifauna

Roughly 140 bird species breed within the Mid-Atlantic Piedmont (Carter et al. 2000). The breeding avifauna is typical of the temperate regions of North America, yet this physiographic area represents a transitional zone between species of more northern and more southern affinities that are near the limits of their respective geographic ranges. Among all of the PIF physiographic areas in the northeastern United States, this area ranks medium to low in terms of immediate conservation concern, based on atlas block concentrations of regionally important bird species (Rosenberg and Wells 1995, 2000).

Six bird species have a disproportionately large share of their global populations breeding within the area (see Appendix 1, Avifaunal Analysis). These include five deciduous forest species (Wood Thrush, Acadian Flycatcher, Scarlet Tanager, Louisiana Waterthrush, and Eastern Wood-pewee) and one species associated with pine barrens and early successional habitats (Prairie Warbler). The Mid-Atlantic Piedmont is in the heart of these species' geographic ranges and, therefore, it has a major role in sustaining their populations over the long term.

The most widely used measure of regional bird population trends presently available is the Breeding Bird Survey (BBS), a program which provides data on roughly 130 of the 140 species breeding within the physiographic area. For many species, especially those with nocturnal habits or those associated with habitats unevenly distributed across the landscape, BBS coverage is poor and reported population trends often lack statistical significance. Nevertheless, an apparent decline in a species' relative abundance on existing BBS routes may be reason enough to examine the population more closely and initiate measures to stabilize its numbers pending a more definitive analysis.

By examining changes in relative abundance across all survey routes (N=47) in the physiographic area during the years 1966 to 2000, one can determine the average annual change and roughly estimate the amount of population gain or loss over the BBS period. Appendix 1, Avifaunal Analysis, shows the results of these calculations.

Of the species recorded in the BBS, 25 have declined significantly (P<0.10) since 1966 and two more have declined significantly since 1980 (see Appendix 1, Table A1.2). Among these, 20 are associated with either grassland or early successional habitats. Five nest in mature forests and two species are found in wetland habitats.

Grassland species such as the Upland Sandpiper, Horned Lark, Vesper Sparrow, Grasshopper Sparrow, and Eastern Meadowlark have decreased by an average of 10% per year and are among the most steeply declining birds in this area. This continues a trend noted throughout the eastern United States (Askins 2000). A lack of BBS data prevents a definitive assessment of population trends for the Savannah Sparrow, Bobolink, and Dickcissel in the Piedmont, however, these birds are known to be declining elsewhere in their ranges (Rosenberg and Wells 1999).

Species that associate with shrub and early successional habitats such as the Field Sparrow, Northern Bobwhite, Purple Martin, and Brown Thrasher, have seen large population declines, averaging 4% per year over the BBS period. Other species, e.g., Eastern Towhee, Blue-winged Warbler, Yellow-breasted Chat, Indigo Bunting, and Song Sparrow, have experienced more moderate, yet still statistically significant, declines.

Populations of five forest-nesting species exhibit significant declining trends in this area. These are the Least Flycatcher, Yellow-billed Cuckoo, Rose-Breasted Grosbeak, Northern Flicker, and Great Crested Flycatcher. Two wetland species, Black-crowned Night Heron and Green Heron, are declining also.

In contrast to the above, a total of 40 bird species exhibit increasing trends. As in other areas of the United States, those species displaying the greatest increases are habitat generalists and are either nonmigratory or short distance migrants. Among them are birds associated with human-altered habitats such as suburban backyards (House Finch, Northern Cardinal, Gray Catbird, Tufted Titmouse, Carolina Chickadee, House Wren), urban ponds and wetlands (Canada Goose, Tree Swallow, Great Blue Heron), and conifer plantations (Pine Warbler). A number of species associated with mature forest habitats have increased locally, evidence of change in regional woodlands over the BBS period (Wild Turkey, Cooper's Hawk, Red-shouldered Hawk, Worm-eating Warbler, Pileated Woodpecker, Northern Parula).

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. Note that a species may be considered a priority for several 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 categories or tiers in the table below. Our primary means of identifying priority species is through the PIF species assessment process (Hunter et al. 1993, Carter et al. 2000) using scores generated by the Rocky Mountain Bird Observatory. This system assesses species on the basis of 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. Categories of priority status are determined by examining combinations of parameter scores, as well as the total rank score, which is a measure of overall conservation priority. This process of species assessment has been standardized across all physiographic areas of North America. Parameter scores for all physiographic areas may be found at: <http://www.rmbo.org/pif/pifdb.html>.

Note: The parameter scores for all physiographic areas in the Northeast were updated in August 2003 to reflect and be consistent with methods used in the *PIF North American Landbird Conservation Plan* (Rich et al. 2004). The priority species pool presented below reflects these updated scores and a revised set of entry levels (i.e., Tiers). If you note changes in the priority species pool or individual scores from a previous version of this plan or those found at <http://www.rmbo.org/pif/pifdb.html>, they

are likely due to the process of updating scores and entry levels to reflect the North American Plan.

There are six entry levels into the priority species pool, as follows:

Tier I. *High Continental Priority.* -- Species on the *PIF Continental Watch List* (as published in the PIF North American Plan [Rich et al. 2004]), or species of equivalent watch list ranking from other taxonomic groups, which are typically of conservation concern throughout their range. These are species showing high vulnerability in a number of factors, expressed as any combination of high global parameter scores, with AI ≥ 2 (so that species without manageable populations in the region are omitted). High level of conservation attention warranted.

> Tier IA. *High Continental Concern + High Regional Responsibility*. Species for which this region shares in major conservation responsibility; i.e., conservation in this region is critical to the overall health of this species. These species are on the *PIF Continental Concern List* with AI of 3 – 5 for this region, or a high percent population (above threshold in IIB).

> Tier IB. *High Continental Concern + Low Regional Responsibility*. Species for which this region can contribute to rangewide conservation objectives where the species occurs. Species on the *PIF Continental Concern List* with AI of 2 for this region.

Tier II. *High Regional Priority*. Species that are of moderate continental priority (not on *Continental Watch List)*, but are important to consider for conservation within a region because of various combinations of high parameter scores, as defined below; total of 7 parameter scores = ≥ 19.

> Tier IIA. *High Regional Concern*. Species that are experiencing declines in the core of their range and that require immediate conservation action to reverse or stabilize trends. These are species with a combination of high area importance and declining (or unknown) population trend; total of 7 parameters ≥ 19, with AI + PT ≥ 8.

> Tier IIB. *High Regional Responsibility*. Species for which this region shares in the responsibility for long-term conservation, even if they are not currently declining or threatened. These are species of moderate overall priority with a disproportionately high percentage of their total population in the region; total of 7 parameters ≥ 19, with AI = 5 or % population > threshold (see Appendix 3).

> Tier IIC. *High Regional Threats*. Species of moderate overall priority that are uncommon in a region and whose remaining populations are threatened, usually because of extreme threats to sensitive habitats. These are species with high breeding threats scores within the region (or in combination with high nonbreeding threats outside the region); total of 7 parameters ≥ 19 with TB + TN > 6, or local TB or TN = 5.

Tier III. *Additional Federally Listed*. Species protected under federal endangered species laws receive conservation attention wherever they occur.

Tier IV. *Additional State Listed*. - Species on state or provincial endangered, threatened, or special concern lists that did not meet any of above criteria. These often represent locally rare or peripheral populations.

Tier V. *Additional Stewardship Responsibility*. Representative or characteristic species for which the region supports a disproportionately high percentage of the world population (see Appendix), but which did not meet any of the above criteria. Includes moderate- and low-scoring species for which the region has long-term stewardship responsibility, even if these species are not of immediate conservation concern. These species are not included in the table below, but they can be found by reviewing the "% of population" numbers available at <http://www.rmbo.org/pif/pifdb.html>.

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

Table 2.1 Priority Species Pool for Area 10. PIF regional and global scores from the PIF Species Assessment Database housed at Rocky Mountain Bird Observatory (Carter et al., 2000). Percent of population calculated from percent of range area, weighted by BBS relative abundance (see Rosenberg and Wells, 2000; Appendix 3); AI = Area Importance; PT = Population Trend. See text for definition and interpretation of entry levels. Species with AI = 1 are not included in this table as such a score indicates a peripheral population without manageable numbers in this area. Local status categories include species with breeding populations only (B) or species with at least part of the population found in the area year-round (R). Species that are federally or state listed are noted in the Priority Species Pool by country and/or state using the following codes: E = Endangered, T = Threatened, SC = Special Concern.

Entry Level	Species	Combined Score	% of pop.	AI	PT	Local Status
IA. *High Continental Concern + High Regional Responsibility*						
	American Woodcock	23	< 1	3	5	R
	Wood Thrush	23	4.3	4	4	B
	Prairie Warbler	23	6.2	5	3	B
IB. *High Continental Concern + Low Regional Responsibility*						
	Henslow's Sparrow (NJ-E; MD,VA-T)	28	< 1	2	5	B
	Bachman's Sparrow (VA-T)	25	< 1	2	3	B
	Cerulean Warbler (NJ-SC)	24	< 1	2	3	B
	Kentucky Warbler (NJ-SC)	23	< 1	2	5	B
	Brown-headed Nuthatch	22	< 1	2	3	R
	Prothonotary Warbler	22	< 1	2	3	B
	Dickcissel (PA-T; VA-SC)	21	< 1	2	3	R
	Upland Sandpiper (MD,NJ-E; PA,VA-T)	21	< 1	2	3	B
	Blue-winged Warbler	21	1.5	2	2	B
	Short-eared Owl (NJ,PA-E; MD-SC)	20	< 1	2	3	R
	Canada Warbler (NJ-SC)	20	< 1	2	3	B
	Worm-eating Warbler	20	1.7	2	1	B
	Willow Flycatcher	18	< 1	2	3	B
	Red-headed Woodpecker (NJ-T)	17	< 1	2	1	R
IIA. *High Regional Concern*						
	Field Sparrow	20	2.0	4	5	R
	Eastern Screech-Owl	20	2.5	4	4	R

Chimney Swift	20	2.5	4	4	B
Green Heron	20	< 1	3	5	B
Northern Bobwhite (PA-SC)	20	< 1	3	5	R
Eastern Towhee	19	1.4	3	5	R

IIB. *High Regional Responsibility*

Acadian Flycatcher	22	3.4	4	3	B
Scarlet Tanager	22	3.2	4	3	B
Whip-poor-will	21	2.7	3	4	B
Louisiana Waterthrush	21	3.2	4	1	B

IIC. *High Regional Threats*

Loggerhead Shrike (NJ,PA,MD-E; VA-T)	20	< 1	2	5	R
Sedge Wren (NJ-E; MD,PA-T; VA-SC)	20	< 1	2	3	B

IV. *Additional State Listed*

Long-eared Owl (NJ-T, VA-SC)	19	< 1	2	3	R
Eastern Meadowlark (NJ-SC)	18	< 1	3	5	R
Northern Parula (NJ-SC)	18	< 1	2	3	B
Vesper Sparrow (NJ-E)	18	< 1	2	5	R
Bobolink (NJ-T)	18	< 1	2	3	B
Broad-winged Hawk (NJ-SC)	18	< 1	3	4	B
Grasshopper Sparrow (NJ-T)	17	< 1	3	3	R
Yellow-breasted Chat (NJ-SC)	17	1.2	3	3	B
Northern Harrier (NJ-E; PA,VA-SC)	17	< 1	2	3	R
Sharp-shinned Hawk (NJ-SC)	17	< 1	4	3	R
Veery (NJ-SC)	17	< 1	2	3	B
Barn Owl (NJ,PA,VA-SC)	16	< 1	2	3	R
American Kestrel (NJ-SC)	16	< 1	4	4	R
Cooper's Hawk (NJ-T)	16	< 1	3	2	R
Horned Lark (NJ-SC)	15	< 1	2	5	R
Common Nighthawk (NJ-SC)	15	< 1	2	3	B
Red Crossbill (VA-SC)	15	< 1	2	3	R
Red-shouldered Hawk (NJ-E)	14	< 1	2	1	R
Osprey (NJ,PA-T)	14	< 1	2	3	R
Great Blue Heron (NJ-SC)	14	< 1	3	1	R
Brown Creeper (VA-SC)	14	< 1	2	3	R
Barred Owl (NJ-T)	13	< 1	2	2	R
Cliff Swallow (NJ-SC)	12	< 1	2	3	B

Analysis:

Tier I includes fifteen species that are recognized as continental-level Watch List species by Partners in Flight (Rich et al. 2004), along with two additional species (American Woodcock and Upland Sandpiper) that are considered to be high priorities by the shorebird conservation initiative and meet the same PIF watch list criteria. The two species with the highest combined scores, Henslow's Sparrow and Bachman's Sparrow, have been extirpated from this physiographic unit as breeding populations during the last 20 years.

The Henslow's Sparrow was never a common breeding bird in this area, the southern extent of its historical range. Nevertheless, isolated populations of this species were found in grasslands throughout the region as recently as the 1980s. Over the past

twenty years, their numbers have fallen dramatically (Boone and Dowell 1996). The last known breeding population of Henslow's Sparrow in this area was in Loudoun County, Virginia, a rapidly developing county near Washington, D.C. (Virginia Society of Ornithology 1987). Since then, only scattered individuals have been seen in the region.

Bachman's Sparrows nest across the Southeast in pine savannahs and abandoned fields that include scattered shrubs or small trees. Once locally common in southern Virginia, the last known instance of this species breeding in the Piedmont was in 1989 (Virginia Society of Ornithology 1989). It was once uncommon in Maryland and Pennsylvania, yet it no longer is known to breed in those states (Robbins and Blom 1996, Brauning 1992).

Similarly, the Cerulean Warbler, the next highest scoring species, has never been common in the Mid-Atlantic Piedmont, but unlike the previous two species, it has been expanding its range in the east. Its original breeding range was in the Ohio Valley; it was rare and irregular east of the Appalachian Mountains until the early 20th Century (Cooke 1904). Since then, this species has established stable breeding populations in the mature, bottomland forests associated with many of the area's rivers and streams (Chestem 1996).

In contrast, the Wood Thrush, Prairie Warbler and Kentucky Warbler are considered common in this area. Wood Thrush and Kentuck Warbler prefer extensive tracts of moist, deciduous forest with a heavy shrub layer for breeding habitat, though each will nest on dry, wooded hillsides and ravines (Robbins et al. 1989). These two species are particularly vulnerable to the adverse effects of forest fragmentation and nest parasitism (Bushman and Therres 1988). Prairie Warblers use early successional shrub habitats and still common in this area but face significant threats across their breeding range from loss of these early successional habitats. American Woodcock also uses early successional forest habitat for breeding and has the same combined score as these three species, but has a more limited and locally scattered breeding population in this physiographic area.

Of the eight remaining species in Tier I only two of these species, the Blue-winged Warbler and Worm-eating Warbler, are considered common in this area while the other species are uncommon breeders. Regardless of their local status, all these species have high continental priority for conservation action wherever they occur.

Tier II includes twelve species of high regional importance. The six species in Tier IIA have declining populations in the heart of their geographic range and warrant immediate conservation action. The four species in Tier IIB have disproportionately large populations in this area and appear to be stable or increasing, with the exception of Whip-poor-will, which needs improved monitoring and conservation action to halt declines. This physiographic area shares in the responsibility for the long-term conservation of these Tier IIB species. Tier IIC contains two species with breeding populations that are highly vulnerable to local threats. They highlight the need to protect sensitive grassland habitats. Note that both of these species are listed in all states within this planning unit.

Twenty-three additional species are listed as endangered, threatened, or special concern in at least one state and have small breeding populations within the region. Most of these species are at the periphery of their geographic ranges and score relatively low in the PIF assessment process. Conservation attention for state-listed species, however, often benefits other priority species in the same habitat and highlight threats to sensitive habitats such as bottomland forests, grasslands, shrublands, and wetlands.

The 52 species in the priority species pool (33% of the breeding avifauna) include birds of various habitat types. Considering all factors, the species of highest conservation concern are Henslow's Sparrow, Bachman's Sparrow, Cerulean Warbler, American Woodcock, Wood Thrush and Prairie Warbler. These six are among the focal species used to target regional conservation efforts and to define objectives for habitat conservation.

C. Priority Nonbreeding Species

In addition to breeding birds, the PIF database also lists conservation priority scores for species that winter in this physiographic area.   Table 2.2 lists the species added to the priority species pool due entirely to their winter scores. Each associates with either open water bodies or wetlands during the winter months. Their presence highlights the need to protect these important regional habitats.

Table 2.2 Priority winter species pool for Area 10. PIF scores from RMBO database (Carter et al. 2000). Local status: W = winter only; R = found year-round, although breeding population and winter population may differ.

Tier	Species	Total score	TN	AI (Winter)	PT (Winter)	Local Status
I – Continental Priority						
	American Black Duck	25	3	4	5	R
II – Regional Priority						
A.	Rusty Blackbird	21	3	4	5	W
	Greater Scaup	20	3	3	5	W
C.	Canvasback	20	3	3	4	W
	Redhead	20	3	2	4	W

Section 3: Priority Habitats and Suites of Species

By sorting the bird species in the priority pool according to habitat, one can identify the highest priority habitats and their associated species (Table 3.1). Either these habitats support birds in need of urgent conservation attention or they are vital to the survival of regionally important bird populations. The priority species in the Mid-Atlantic Piedmont do not form a single cohesive group, but are associated with five different habitat types (forest, grassland, pine barrens, shrub-early successional, and freshwater wetland).

Forest and grassland habitats share the largest number of extant breeding species that are considered continental priorities in need of immediate action or management attention, while shrub-early successional habitats support the largest combination of continental and regional species in need of management actions to reverse declines in

the core of their ranges. Therefore, these three habitats have the highest regional conservation priorities. Pine barrens habitats have priority due to the area's globally significant Prairie Warbler population and its declining populations of Bachman's Sparrow, Field Sparrow, and Northern Bobwhite. Lastly, decreasing trends in Green Heron populations, the area's value to wintering American Black Duck, and the presence of several wetland species on state-level lists make freshwater wetland habitats a conservation concern.

Within each habitat group, there are some species that are geographically widespread and share habitat requirements with other, less common, species in the group. Others have particular limiting habitat requirements (e.g., availability of snags, susceptibility to disturbance, area sensitivity). These are deemed focal species (Lambeck 1997) for setting population-habitat objectives and are highlighted in each section of Table 3.1.

Table 3.1 Priority habitats and associated species suites for Physiographic Area 10, Mid-Atlantic Piedmont. TB (threats breeding), AI (area importance), PT (population trend), and combined PIF scores from RMBO species assessment database (Carter et al. 2000). The focal species for each habitat are in bold type. Species are sorted within habitat types according to action level and then total score. Scale of Concern indicates whether a species is of continental (C) or regional (R) concern. State-listed species are not included in this analysis because they may not be of concern in all states within a region.

Habitat	Common Name	Scale of Concern	Action Level [a]	Combined Score	TB	AI	PT
Deciduous Forest							
	Cerulean Warbler	C	MA, MO	24	4	2	3
	Wood Thrush	C	MA	23	3	4	4
	Kentucky Warbler	C	MA	23	3	2	5
	Eastern Screech-Owl	R	MA, MO	20	3	4	4
	Chimney Swift	R	MA, MO	20	3	4	4
	Prothonotary Warbler	C	PR, MO	22	3	2	3
	Acadian Flycatcher	R	PR	22	3	4	3
	Scarlet Tanager	R	PR	22	3	4	3
	Louisiana Waterthrush	R	PR	21	3	4	1
	Canada Warbler	C	PR	20	3	2	3
	Worm-eating Warbler	C	PR	20	3	2	1
	Red-headed Woodpecker	C	PR	17	4	2	1
Shrub – early successional							
	American Woodcock	C	MA	23	3	3	5
	Prairie Warbler	C	MA	23	3	5	3
	Whip-poor-will	R	MA, MO	22	4	3	4
	Northern Bobwhite	R	MA	21	4	3	5
	Field Sparrow	R	MA	20	3	4	5
	Eastern Towhee	R	MA	19	3	3	5
	Blue-winged Warbler	C	PR	21	3	2	2
	Willow Flycatcher	C	PR	18	3	2	3
Agricultural grassland							
	Henslow's Sparrow	C	IM, MO	28	5	2	5
	Loggerhead Shrike	R	IM, MO	20	5	2	5
	Dickcissel	C	MA, MO	21	4	2	3

Upland Sandpiper	C	MA, MO	21	4	2	3
Short-eared Owl	C	MA, MO	20	4	2	3
Sedge Wren	R	MA, MO	20	4	2	3

Pine Barrens

Bachman's Sparrow	C	IM, MO	25	4	2	3
Brown-headed Nuthatch	C	PR	22	3	2	3
Prairie Warbler	C	MA	23	3	5	3
Whip-poor-will	R	MA, MO	22	4	3	4

Freshwater wetland

American Black Duck	R	MA	25 (W)	3	4	5
Green Heron	R	MA, MO	20	3	3	5

[a] Action levels: IM = immediate management or policy needed to prevent regional extirpation; MA = management or other actions needed to reverse or stabilize declining populations or reduce threats (TB + PT ≥ 7 or =6 if continental action level=MA); PR = long-term planning to ensure stable populations (TB + PT < 7); MO = additional monitoring needed to better understand status or population trends.

A. Deciduous and Mixed Deciduous-Coniferous Forests

Importance and conservation status: In the northern half of this physiographic area, the former deciduous and mixed forest has been reduced to a fraction of its original size by agricultural, urban, and suburban development. The remaining woodlands have been subject to ongoing disturbances (e.g., selective timber harvests, fragmentation, exotic insects and disease). Of these disturbances, fragmentation has had the greatest impact on forest birds. Several priority species associated with forest habitat require unbroken patches of a particular size to reproduce successfully. Fragmentation has rendered many forests in the region unsuitable for these species (Robbins et al. 1989).

A greater proportion of the landscape is forested in the southern half of the area, yet these woodlands bear little resemblance to those existing before the arrival of European settlers. Three centuries of selective timber harvest and fire suppression have changed the species composition of many forests that were once dominated by Pitch Pine and other fire-adapted trees. The absence of frequent, low level ground fires has permitted hardwoods to flourish and to replace the original open pine forests with pine-hardwood forests (Watts 1999). As in the northern part of the area, these forests have been subject to ongoing fragmentation and isolation.

Priority Bird Species: Cerulean Warbler*, Wood Thrush*, Kentucky Warbler, Acadian Flycatcher, Prothonotary Warbler, Louisiana Waterthrush*, Worm-eating Warbler, Eastern Screech-Owl, Scarlet Tanager, Red-headed Woodpecker, Eastern Wood-Pewee, Cooper's Hawk, Red-shouldered Hawk*. (* indicates focal species in this suite)*

Cerulean Warblers breed in extensive swamps and bottomlands, open stands of tall trees along riverbanks (Evans 1978), and large, mature, deciduous forests (Hamel 1992). They nest and forage within the upper portions of the canopy, use some of the largest trees available, and appear to have one of the largest forest area requirements among the priority species (Robbins et al. 1992). In Maryland, Robbins et al. (1989) found that maximum Cerulean Warbler densities occurred in forests at least 3,000 ha in size and predicted that occurrence would reach 50% of maximum in patches of 700 ha.

Wood Thrush breed in shady, mature upland forests, often near a swamp, pond, or stream. This species requires moderate densities of subcanopy and midstory saplings but a relatively open understory with decaying leaf litter (James et al. 1984, Roth 1996). The probability of occurrence increases with forest patch size up to a maximum value at 500 ha (Robbins et al. 1989). Across their range, wood thrush nest at a density averaging 3 pair per 10 hectare (Roth et al. 1996).

Louisiana Waterthrush breed near moving water in upland deciduous forests with dense undergrowth; wooded valleys of swiftly flowing brooks or streams; occasionally in forested wetlands.   Robbins et al. (1989) predict a maximum probability of occurrence within forest patches of at least 3,000 ha and a 50% reduction in probability within patches of 350 ha.

Habitat and population objectives: Extrapolating from BBS relative abundances, one can derive rough estimates of population sizes for the priority species in this habitat suite (Table 3.2). These approximations are useful in illustrating the relative population sizes of various species and providing order-of-magnitude figures for setting regional population objectives (See Appendix 2, Population Estimates and Assumptions).

For species that have declined significantly during the BBS period, a population target may be set to approximate pre-BBS population levels. When BBS data indicate that a species has suffered a 50% or greater loss since 1966, this plan calls for doubling its present population as a practical objective. For species with stable populations or unknown trends, population targets are rounded up from current estimates.

Table 3.2 lists the proportion of Piedmont Atlas blocks in which trained observers noted each priority bird species during the most recent breeding bird atlas effort. These values indicate how geographically widespread each is within the Piedmont.

Extrapolating from BBS relative abundances, one can derive rough estimates of population sizes for the priority species in this habitat suite (Table 3.2). These approximations are useful in illustrating the relative population sizes of various species and providing order-of-magnitude figures for setting regional population objectives (See Appendix 2, Population Estimates and Assumptions).

For species that have declined significantly during the BBS period, a population target may be set to approximate pre-BBS population levels. When BBS data indicate that a species has suffered a 50% or greater loss since 1966, this plan calls for doubling its present population as a practical objective. For species with stable populations or unknown trends, population targets are rounded up from current estimates.

Table 3.2 lists the proportion of Piedmont Atlas blocks in which trained observers noted each priority bird species during the most recent breeding bird atlas effort. These values indicate how geographically widespread each is within the Piedmont.

Table 3.2. Population estimates and targets (number of pairs) for priority species of forest habitats in the Mid-Atlantic Piedmont. % Atlas Blocks values show the percentage of 5-km blocks in which the species was reported among all blocks that comprise the Piedmont region of that state.

Species	BBS Population	% Lost Since 1966	Population Target	% Atlas Blocks			
				NJ	PA	MD	VA
Cerulean Warbler	4,500	Increasing	5,000	4	9	21	11
Wood Thrush	280,000	<10%	350,000	84	93	100	98
Kentucky Warbler	9,000	40%	15,000	10	34	72	59
Acadian Flycatcher	45,000	Stable	50,000	14	35	91	82
Prothonotary Warbler	500	Stable	600	1	1	11	7
Louisiana Waterthrush	5,300	Increasing	7,600	28	27	58	39
Worm-eating Warbler	2,000	Increasing	3,000	20	16	34	27
Eastern Screech-Owl	27	>90% (?)	50	50	58	53	Unk
Chimney Swift	187,800	>10%	262,950				
Scarlet Tanager	50,500	<10%	51,000	69	68	92	93
Red-headed Woodpecker	6,400	Stable	6,500	2	26	29	Unk

Conservation Objective 1: Maintain regional populations of 5,000 pairs of Cerulean Warbler; 350,000 pairs of Wood Thrush; and 7,600 pairs of Louisiana Waterthrush.

Justification: With the highest PIF total concern score in this physiographic area, the Cerulean Warbler requires immediate conservation attention throughout its range to ensure its long-term survival. Its numbers within this region appear to be increasing. The population target is little more than 10% greater than current estimates.

Justification: Wood Thrush is one of the best indicator species for upland deciduous and mixed forests in this region. It is common and widespread; it occurs with all other priority species in this suite.   Its numbers appear to have changed slightly during the BBS period. The population target represents a 25% increase over current estimates.

Justification: The Louisiana Waterthrush is an excellent indicator species for forested wetland and forested riverine habitat specialists. Its numbers within this region appear to be stable. The population target represents a 40% increase over current estimates.

Assumptions: This plan assumes that maintaining suitable habitat (including vegetation structure and quality) for 5,000 pair of Cerulean Warbler and 350,000 pair of Wood Thrush will provide enough forest habitat to support target populations of all other priority species in this habitat suite. Furthermore, it assumes that maintaining suitable habitat (including water quality) for 7,600 pair of Louisiana Waterthrush will provide adequate habitat to support target populations of other riverine forest species.

Conservation Objective 2: Stabilize or reverse the declining population trend for Kentucky Warbler and maintain a long-term regional population of 15,000 pairs.

Justification: Analysis of BBS data indicates that the Kentucky Warbler has experienced a significant population decline over the period 1966-1999. The population target approximates the number existing at the start of the BBS period.

<u>Assumptions</u>: Intact forest area appears to be one of the most important habitat attributes for the Kentucky Warbler in this region (Lynch and Whigham 1984). This plan assumes that active management to protect large forest tracts remaining in this area from fragmentation and to restore a dense understory and ground cover will provide enough habitat to restore the Kentucky Warbler population to its 1966 level.

Also, this plan assumes that the apparent decline in Eastern Screech-owl populations reflects the unsuitability of using BBS data to monitor population trends of nocturnal species. Recent breeding bird atlas efforts have not detected any change in Eastern Screech-owl distribution or abundance in this area (Jeschke 1996, Brauning 1992).

Implementation Strategy

Conservation Actions

1. <u>Identify large blocks of deciduous and mixed forest for conservation action.</u>

Background and Progress: Large blocks of forest are becoming increasingly uncommon within this area as urbanization continues to fragment the landscape. The most extensive tracts now exist on government-owned lands. Shenandoah National Park, George Washington National Forest (Lee and Pedlar Ranger Districts) and Jefferson National Forest (Glenwood Ranger District) in Virginia; Michaux State Forest and Weiser State Forest in Pennsylvania; and Catoctin Mountain Park in Maryland have the largest amounts of publicly owned forest, yet their combined area is not enough to meet regional habitat objectives. Privately owned woodlands will be required to support target populations. All sizable forest tracts remaining in the region need to be identified for conservation planning purposes. Efforts have begun recently to identify blocks of forest considered to be of significance to breeding birds.

2. <u>Reduce the current rate of forest fragmentation.</u>

Background and Progress: Based on published breeding densities, roughly 1.2 million ha of deciduous and mixed forest are required to support the target bird populations. Within this area, approximately 11,000 km of forested rivers and streams are needed to support target populations of riverine habitat specialists. Public land holdings in the Mid-Atlantic Piedmont alone will not meet this goal. PIF partner organizations must identify large private land holdings and offer their owners incentives for their protection. The Nature Conservancy's success in protecting Sugarloaf Mountain, a 1,335-hectare, forested monadnock in central Maryland, provides an excellent example of how this can be done. Maryland's Forest Conservation Act requires developers to avoid unnecessary destruction of contiguous forest tracts and mandates reforestation with permanent legal protections as mitigation when damage cannot be avoided.

3. <u>Establish and promote incentive programs that encourage the management of forestlands to benefit wildlife</u>.

Background and Progress (Excerpted from Maryland Partners in Flight, 1997): There are many incentive programs for private landowners designed to promote forest conservation and management. Some are intended specifically to benefit wildlife. Many more provide varying degrees of incidental benefit to wildlife habitat. Incentives range from technical assistance, cost-sharing, or direct payments to property tax benefits, and both state and federal income tax deductions.

The Forest Stewardship Program (FSP) in conjunction with the Stewardship Incentive Program (SIP) and the Woodland Incentive Program (WIP) are among the most important assistance programs for non-industrial private forest landowners. These programs provide technical assistance and cost sharing for reforestation and forest management activities. Landowners' objectives under FSP may include wildlife habitat enhancement or the protection of soil, water quality, wetlands, and streams. To be eligible, landowners must have at least 1 and no more than 1,000 acres of non-industrial forestland and an approved Forest Stewardship Plan covering all the contiguous forest and meet other requirements.

The Forestry Incentives Program provides up to 65 percent cost-share assistance for tree planting, site preparation, and timber stand improvement. Its primary purpose is to increase future supplies of sawtimber and to continue sustained yield, multipurpose management of private non-industrial forestland. Program requirements include an area between 10 and 1,000 acres, with the potential to produce at least 50 cubic feet per acre per year, and a forest management plan.

Private forest landowners may also be eligible for a variety of tax incentives. Under the Forest Conservation and Management Agreement (FCMA) program, the assessment of forestland for property tax purposes may be frozen at a valuation of $100 per acre. The agreement requires a Forest Stewardship Plan prepared by a professional forester and approved by the Forest Service on a minimum of 5 contiguous acres. The landowner must sign a 15-year legal contract with the state to follow the plan. There are entry and inspection fees and penalties for premature withdrawal or nonperformance.

Important Bird Areas:

Several Important Bird Areas in this region contain large areas of deciduous and mixed forest habitat and will be a focus for management actions during the implementation phase of PIF conservation plans. As a part of the designation process, conservation strategies for these sites will be produced. IBAs with significant forest habitat include:

Pennsylvania

- South Mountain, Caledonia State Park and Michaux State Forest – 16,000 ha; Pennsylvania DCNR / privately owned. Large contiguous area of mixed forest types. High density of Hooded Warbler and Eastern Wood-pewee, also populations of Canada, Kentucky, and Worm-eating Warblers, Wood Thrush.

- Unami Creek Valley —1,760 ha; Municipal / privately owned. Diverse bottomland deciduous forest with dense understory. Breeding populations of Cerulean, Kentucky, Worm-eating Warblers, Acadian Flycatcher, and Red-shouldered Hawk.

Maryland

- C&O Canal National Historical Park – 5,840 ha; National Park Service. A narrow, largely wooded, corridor following the eastern shore of the Potomac River. This area supports large breeding populations of Cerulean Warbler, Louisiana Waterthrush, and Wood Thrush, among other forest bird species.

- Rock Creek Park – 720 ha; National Park Service / Maryland-National Capital Planning Commission. This area's forested bottomland and upland areas support large breeding populations of Wood Thrush, Scarlet Tanager, Eastern Wood-pewee, and Red-shouldered Hawk.

Research and Monitoring Needs:

1. Research is needed on the demographics of priority forest bird species in the region.

2. Further study is needed to refine existing knowledge of the habitat requirements for species within the suite.

3. Supplemental inventory and monitoring programs must be developed to determine population levels and to identify important sites for raptors and other bird species not well monitored by BBS.

B. Shrub and 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. While succession to woody vegetation may be undesirable in productive grasslands, shrub habitats do support several high priority species in this region. Most notably, the Prairie Warbler occurs here in the highest relative abundance of any physiographic area. In areas where farmland has been abandoned and in areas currently managed as shrub habitat for wildlife, attention to the needs of Prairie Warbler and associated species is a high conservation priority. Since American Woodcock and Northern Bobwhite also share this habitat, management for both game and nongame species in these areas may be particularly compatible.

Priority bird species: American Woodcock*, Prairie Warbler*, Field Sparrow, Whip-poor-will, Blue-winged Warbler, Northern Bobwhite, Eastern Towhee *(* indicates focal species in this habitat suite)*

American Woodcock prefer moist areas with scattered alder, dogwood, crab apple, and hawthorn (Sheldon 1967). It feeds at twilight or night by probing damp ground in fields or woods for earthworms, grubs, slugs, and insects (Hamel 1992).

Prairie Warblers use a variety of habitats characterized as open, having few trees and high ground cover, to include pine scrub (Nolan 1978). It uses abandoned fields with scattered saplings and scrubby thickets, cut over or burned over woods, and woodland margins (Hamel 1992).

The Prairie Warbler occurs here in the highest relative abundance of any physiographic region. Its numbers appear to be declining, most likely due to the loss of abandoned, early successional fields and pasturelands to urban and suburban development along with the elimination of hedgerows within agricultural landscapes (Watts 1999).

Habitat and population objectives: Extrapolating from BBS relative abundances, one can derive rough estimates of population size for priority species in this habitat suite (Table 3.4). These approximations are useful in illustrating the relative population sizes of various species and providing order-of-magnitude figures for setting regional population objectives (See Appendix 2, Population Estimates and Assumptions).

For species that have declined significantly during the BBS period, a population target may be set to approximate pre-BBS population levels. When BBS data indicate that a species has suffered a 50% or greater loss since 1966, this plan calls for doubling its present population as a practical objective. For species with stable populations or unknown trends, population targets are rounded up from current estimates.

Table 3.4 lists the proportion of Piedmont Atlas blocks in which trained observers noted each priority bird species during the most recent breeding bird atlas effort. These values indicate how geographically widespread each is within the Piedmont.

Table 3.4. Population estimates and targets (number of pairs) for priority species of shrub and early successional habitats in the Mid-Atlantic Piedmont. % Atlas Blocks values show the percentage of 5-km blocks in which the species was reported among all blocks comprising the Piedmont region of each state.

Species	BBS Population	% Lost Since 1966	Population Target	% Atlas Blocks			
				NJ	PA	MD	VA
American Woodcock	17,500	95%	35,000	29	20	21	Unk
Prairie Warbler	19,000 [a]	>35%	40,000 [a]	33	15	57	64
Field Sparrow	92,000	80%	184,000	61	85	99	99
Whip-poor-will	450	35%	700	<1	3	23	27
Blue-winged Warbler	7,200	60%	14,400	62	35	29	2
Northern Bobwhite	89,000	98%	178,000	12	44	90	Unk
Eastern Towhee	154,000	70%	308,000	81	87	98	0

a BBS Population and Population Target values are shared with Pine Barren Habitat.

Conservation Objective 1: Reverse declining trends in regional American Woodcock populations and maintain a long-term population of 35,000 pairs.

Justification: Habitat loss and degradation have reduced regional American Woodcock populations by approximately 95% during the BBS period. Doubling their current numbers is deemed a practical conservation objective.

<u>Assumptions</u>: This plan assumes that maintaining suitable habitat (including habitat structure and quality) for American Woodcock will be sufficient to support sustainable populations of most other birds in this habitat suite.

Conservation Objective 2: Stabilize the declining population trend in Prairie Warbler and maintain a long-term population of 40,000 pairs.

<u>Justification</u>:   Habitat loss and degradation have reduced regional Prairie Warbler populations by an estimated 35% during the last ten years. The stated objective, shared with the Pine Barrens habitat type, restores their numbers to previous levels.

Implementation Strategy

Conservation Actions

1. <u>Conduct a thorough inventory of existing shrub habitat to determine the most important sites for priority species, especially areas that support breeding populations of American Woodcock and Northern Bobwhite</u>.

Background and Progress: None.

2. <u>Reduce the rate of shrub and early successional habitat loss.</u>

Background and Progress: None.

3. <u>Shift management of small grassland patches (e.g., < 6ha), which have minimal value for priority grassland birds, to less intensive management supporting shrubland habitat.</u>

Background and Progress: See similar recommendations in Watts (1999).

Research and Monitoring Needs: Unknown at this time.
1. Develop best management practices for utility rights-of way (ROW) to benefit shrub-early successional birds. ROWs have the potential to provide substantial amounts of early successional habitat for priority birds if management appropriately, but additional research is needed to determine which techniques are most effective for maintaining vegetation structure that is suitable for birds while also meeting the needs of the utilities.

2. Monitoring programs for species not covered well by the Breeding Bird Survey are needed, including Whip-poor-will.

C. Agricultural Grasslands

Importance and conservation status: Grasslands have been a component of the landscape in this physiographic area for more than a thousand years. The amount of

land in agricultural grasses peaked during the 19th Century and has been declining ever since. Without a major change in agricultural economic conditions, the fate of grassland habitats in this area will rely on programs and incentives to reclaim abandoned farmland, encourage hobby farming, and promote traditional haying on existing agricultural lands.

Priority Bird Species: Henslow's Sparrow*, Upland Sandpiper*, Dickcissel, Sedge Wren, Loggerhead Shrike, Bobolink*, Eastern Kingbird, Northern Harrier, Grasshopper Sparrow, Vesper Sparrow *(* indicates focal species in this habitat suite)*

Henslow's Sparrows breed in weedy fields, wet meadows, and occasionally in dry and cultivated uplands with widely scattered shrubs. Their nests, usually solitary or loosely colonial, are usually in a depression on the ground and well hidden by surrounding vegetation. Their territory size is usually between 0.3 and 1.2 hectare.

The Henslow's Sparrow was never common in this region, yet small, scattered populations did exist as recently as the 1970's and early 1980's (Brauning 1992). Breeding bird atlas efforts in New Jersey, Pennsylvania, and Maryland over the past decade have failed to detect any Henslow's Sparrow nesting in the Piedmont region of these states (R. Kane, pers. comm., Brauning 1992, Boone and Dowell 1996). In Loudoun County, Virginia, site of the last known breeding population, the most recent observation of two individuals on the same day during the breeding season was in 1997 (Virginia Society of Ornithology 2000).

Upland Sandpipers nest in open pastures or grassy fields, often in hayfields of alfalfa or clover (DeGraff et al. 1980); sometimes in fields around airports and on golf courses. They need extensive areas (8-12 ha) of grass that is 0.3 to 1 m high. Their territories are often in loose groups. The Upland Sandpiper was common in the Mid-Atlantic Piedmont at the start of the 20th Century, even though this region is near the limit of its geographic range. Soon thereafter, its population began a gradual decline (MacReynolds 1937). Today, the Upland Sandpiper is considered uncommon to rare throughout the region.

Bobolinks breed in hayfields, meadows, marshes, and fallow fields. Their territory sizes usually range from 1 to 15 ha. As with the Upland Sandpiper, the Bobolink was once a locally common breeding species of hayfields and meadows in the Mid-Atlantic Piedmont. Always more abundant at higher elevations (Dowell 1996), this species underwent a dramatic population decline in the early 20th Century (Todd 1940). Today, the Bobolink is considered uncommon to rare throughout the region.

Habitat and population objectives: Extrapolating from BBS relative abundances, one can derive rough estimates of population size for priority species in this habitat suite (Table 3.3). These approximations are useful in illustrating the relative population sizes of various species and providing order-of-magnitude figures for setting regional population objectives (See Appendix 2, Population Estimates and Assumptions).

For species that have declined significantly during the BBS period, a population target may be set to approximate pre-BBS population levels. When BBS data indicate that a

species has suffered a 50% or greater loss since 1966, this plan calls for doubling its present population as a practical objective. For species with stable populations or unknown trends, population targets are rounded up from current estimates.

Table 3.3 lists the proportion of Piedmont Atlas blocks in which trained observers noted each priority bird species during the most recent breeding bird atlas effort. These values indicate how geographically widespread each is within the Piedmont.

Table 3.3   Population estimates and targets (number of pairs) for priority species of grassland habitats in the Mid-Atlantic Piedmont. % Atlas Blocks values show the percentage of 5-km blocks in which the species was reported among all blocks that comprise the piedmont region of each state.

Species	BBS Population	% Lost Since 1966	Population Target	% Atlas Blocks			
				NJ	PA	MD	VA
Henslow's Sparrow	No Data	>99%	100	0	0	0	0
Upland Sandpiper	133	>99%	266	2	2	<1	Unk
Sedge Wren	No Data	Unknown	100	<1	0	0	0
Dickcissel	No Data	Unknown	100	2	1	4	5
Loggerhead Shrike	No Data	Unknown	100	0	0	1	16

Several species are known to breed in this physiographic area, yet were not reported in the BBS data. Nominal population targets are based on minimum viable breeding population levels (Shaffer 1981).

Conservation Objective 1: Restore and maintain a long-term population of at least 100 pairs of Henslow's Sparrow.

Justification: With the highest total concern score in this physiographic area, the Henslow's Sparrow requires immediate conservation action throughout its range to ensure its long-term survival. Known to breed in this physiographic area within the past 20 years, the identification and restoration of suitable habitat will enable the Mid-Atlantic Piedmont to support a viable breeding population.

Assumption: This plan assumes that individuals from Henslow's Sparrow populations in nearby physiographic areas will colonize patches of suitable grassland habitat in the Mid-Atlantic Piedmont. It further assumes that 100 breeding pairs represent a regional population that is viable over the long term.

Conservation Objective 2: Reverse sharply declining population trends for Upland Sandpiper, Grasshopper Sparrow, and Vesper Sparrow. Restore and maintain long-term populations at levels that are twice current estimates.

Justification: The loss and degradation of grassland habitat have reduced the regional populations of Upland Sandpiper, Grasshopper Sparrow, and Vesper Sparrow by more than 95% during the BBS period.   Doubling the current number of individuals in each of these species is deemed a practical objective.

Assumption: This plan assumes that maintaining grasslands of adequate size and quality for target populations of Upland Sandpiper will satisfy the requirements of other area-sensitive priority species in this habitat suite.

Conservation Objective 3: Stabilize the declining population trend in Bobolinks and maintain a long-term population of 7,500 pairs.

Justification: The loss and degradation of grassland habitat have reduced the regional populations of Bobolink by more than 30% during the BBS period. This objective calls for restoring the Bobolink to its pre-1966 abundance.

Implementation Strategy

Conservation Actions

1. Conduct a thorough inventory of existing and potential grassland habitats to determine the most important sites for priority species, especially areas that recently supported breeding populations of Henslow's Sparrow.

Background and Progress: Large blocks of contiguous grassland are becoming increasingly uncommon within the region as urbanization continues to alter the landscape and vegetative succession continues on abandoned farmlands. Few extensive grassland tracts exist on government-owned lands. PIF partners must identify all remaining sizable tracts in the physiographic area for conservation planning. Based on published density estimates, roughly 100,000 ha of pasture or other managed grassland are required to support the entire habitat-species suite.

2. Identify management practices that benefit grassland bird species.

Background and Progress: Research efforts are underway to determine which land management practices lead to the development of suitable grassland habitat. References such as Mitchell, et al. (2000) and Maryland Partners in Flight (1997) provide conservation professionals with specific recommendations for grassland restoration and improvement.

3. Establish and promote incentive programs that encourage traditional farming practices, specifically late-season haying, and management of lands to benefit wildlife.

Background and Progress (Excerpt from Maryland Partners in Flight, 1997): There are many incentive programs for private landowners designed to promote agricultural best management practices and other conservation measures. Several are intended specifically to benefit wildlife. Many more provide varying degrees of incidental benefit to wildlife. Incentives range from technical assistance, cost-sharing, or direct payments to property tax benefits, and state and federal income tax deductions.

The Conservation Reserve Program (CRP) is intended to protect highly erodable and environmentally sensitive croplands by encouraging landowners to establish grass, trees, or other long-term cover in order to reduce soil erosion, improve water quality, and enhance wildlife habitat. As a benefit for nesting birds, grass-planting contracts now provide that the grass cannot be cut before July 15. The program offers cost-share assistance and annual rental payments.

The Environmental Quality Incentives Program (EQIP) provides technical and educational assistance to farmers and cost-share and incentive payments up to 75 percent of cost for conservation practices such as pastureland management and cropland erosion control practices. The primary focus is soil conservation and water quality, but incentive payments can be made for wildlife habitat management.

The Wetlands Reserve Program (WRP) offers landowners financial incentives and technical assistance to enhance wetlands in exchange for retiring marginal agricultural land. It focuses on restoring and protecting wetlands to enhance water quality and wildlife habitat. It provides for an enrollment cap of 975,000 acres, one-third to be placed in permanent easements, one-third in 30-year easements, and one-third in restoration-only cost-share programs.

The Conservation of Private Grazing Land initiative provides landowners with technical, educational, and related assistance to improve management of private grazing lands.

Several private organizations have programs to improve wildlife habitat. Among these are Ducks Unlimited, the Izaak Walton League, Ruffed Grouse Society, Quail Unlimited, and Pheasants Forever. While specifically designed for the benefit of game species, their programs may also benefit nongame wildlife. For example, the Chesapeake Bay Foundation and Ducks Unlimited are engaged in an initiative to restore, protect, and enhance wildlife habitat in Maryland, Virginia, and Pennsylvania. Similarly, Pheasants Forever has supported landowners wishing to establish warm season grasses.

Important Bird Areas:

Two Important Bird Areas in the planning unit contain important grassland habitat and will be a focus for the implementation phase of PIF conservation plans. As a part of the designation process, conservation strategies for these sites will be produced. IBAs with significant grassland habitat include:

<u>Pennsylvania</u>

- Green Lane Reservoir – 1,620 ha, publicly owned. Land of various habitat types surrounds the reservoir, including deciduous forest, grasslands, barrens, and shrub-early successional vegetation. Grassland bird species known to nest within the area include Eastern Meadowlark, Savannah and Grasshopper Sparrow.

- Freedom Township Grasslands – 810 ha, National Park Service / privately owned. Extensive pastures, hayfields, and large neighboring yards form open grassland habitat. This area support resident populations of Upland Sandpiper, Loggerhead Shrike, Bobolink, Grasshopper Sparrow, Northern Bobwhite.

Research and Monitoring Needs

1. Determine precise habitat and area needs of Henslow's Sparrow in this region. Research should focus on determining the characteristics of sites with potential to support source populations.

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

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

4. Develop supplemental inventory and monitoring programs to determine regional population levels and to identify important sites for Sedge Wren, Dickcissel, Loggerhead Shrike, and Northern Harrier.

D. Pine Barrens

Importance and conservation status: Along with the Mid-Atlantic Coastal Plain, the Mid-Atlantic Piedmont constitutes the northern limit of the southeastern pine ecosystem (Watts 1999). Low-intensity ground fires caused by lightning strikes (Komarek 1974) and indigenous people (Ware et al. 1993) historically maintained this ecosystem. Fires occurred over large areas every 3 to 5 years (Chapman 1932) and maintained a forest with an open midstory and a dense cover of forbs and grasses (Platt et al. 1991). Three centuries of fragmentation and fire suppression have allowed closed-canopy pine and pine-hardwood forests to develop, replacing the open pine forest. Currently, pine barrens occur on only about 1% of their former range (Ware et al. 1993).

Priority bird species: Bachman's Sparrow*, Prairie Warbler*, Brown-headed Nuthatch*, and Whip-poor-will *(* indicates focal species in this habitat suite)*

Bachman's Sparrow inhabits abandoned fields vegetated mostly with broomsedge and scattered loblolly pines, deciduous shrubs, and red cedar.

Prairie Warblers use a variety of habitats characterized as open with few trees and high ground cover (Nolan 1978). It uses abandoned fields with scattered saplings and scrubby thickets, cut over or burned over woods, and woodland margins (Hamel 1992).

Bachman's Sparrows and Prairie Warblers are both highly sensitive to understory conditions, requiring open understories with dense grass cover and scattered woody vegetation. Their preferred conditions exist in the first one to four years following a prescribed burn (Dunning and Watts 1990). Neither species is restricted to pine barrens habitat. The Prairie Warbler remains widespread throughout the region, but Bachman's Sparrow is found only in Virginia, where it is considered rare. The last known breeding record in the Piedmont was in 1968 (Virginia Society of Ornithology, 1987).

Brown-headed Nuthatch inhabits pine forests, preferring mature loblolly pine woods (Hamel 1992). It is locally uncommon in the Virginia Piedmont, though a small number regularly overwinter at the Kerr Reservoir (Virginia Society of Ornithology, 1987).

Habitat and population objectives: Extrapolating from BBS relative abundances, one can derive rough estimates of population size for priority species in this habitat suite (Table 3.5). These approximations are useful in illustrating the relative population sizes of various species and providing order-of-magnitude figures for setting regional population objectives (See Appendix 2, Population Estimates and Assumptions).

For species that have declined significantly during the BBS period, a population target may be set to approximate pre-BBS population levels. When BBS data indicate that a species has suffered a 50% or greater loss since 1966, this plan calls for doubling its present population as a practical objective. For species with stable populations or unknown trends, population targets are rounded up from current estimates.

Table 3.5 lists the proportion of Piedmont Atlas blocks in which trained observers noted each priority bird species during the most recent breeding bird atlas effort. These values indicate how geographically widespread each is within the Piedmont.

Table 3.5 Population estimates and targets (number of pairs) for priority species of Pine Barrens habitat in the Mid-Atlantic Piedmont. % Atlas Blocks values show the percentage of 5-km blocks in which the species was reported among all blocks that comprise the piedmont region of each state.

Species	BBS Population	% Lost Since 1966	Population Target	% Atlas Blocks			
				NJ	PA	MD	VA
Bachman's Sparrow	No Data [a]	Unknown [a]	100	0	0	0	Unk
Prairie Warbler	19,000 [b]	>35%	40,000 [b]	33	15	57	64
Brown-headed Nuthatch	No Data [a]	Unknown [a]	100	0	0	0	Unk
Whip-poor-will	450	>35%	700	<1	3	23	27

a No population or trend data are available for this species in this physiographic area. Trend for this species in South Atlantic Piedmont physiographic area (-1% per year) yields 30% population loss.
Nominal population targets are based on minimum viable breeding populations for species known to breed in this physiographic area, but not reported in the BBS data (Shaffer 1981).
b BBS Population value and Population Target are shared with Shrub – Early Successional Habitats.

Conservation Objective 1: Restore and maintain a long-term population of at least 100 pairs of Bachman's Sparrow and Brown-headed Nuthatch.

Justification: While Bachman's Sparrow and Brown-headed Nuthatch were not reported in the BBS data, they have been known to breed in this habitat. A population target of 100 breeding pairs is deemed to be an appropriate minimum viable population, pending more study of these species in the Mid-Atlantic Piedmont.

Assumptions: This plan assumes that individuals from Bachman's Sparrow and Brown-headed Nuthatch populations in nearby physiographic areas will colonize areas of suitable pine barren habitat in the Mid-Atlantic Piedmont. It further assumes that 100 breeding pairs represent a regional population that is viable over the long term.

Conservation Objective 2: Stabilize the declining population trend in Prairie Warbler and maintain a long-term population of 40,000 pairs.

Justification: Habitat loss and degradation have reduced regional Prairie Warbler populations by more than 35% during the past ten years. This objective, shared with the Shrub - Early Successional habitat type, restores their numbers to previous levels.

Assumptions: This plan assumes that maintaining suitable habitat (including vegetation structure and quality) for Prairie Warbler will be adequate to support target populations of Whip-poor-will and other priority birds in this habitat suite.

Implementation Strategy

Conservation Actions

1. Identify large blocks of pine barrens for conservation action.

Background and Progress: Pine barrens habitat is becoming increasingly uncommon within the region as urbanization continues to penetrate the landscape. PIF partners must identify sizable tracts that remain for conservation planning.

2. Reduce rate of pine barrens habitat loss.

Background and Progress: None.

Research and Monitoring Needs

1. Research is needed to determine the influence of habitat restoration on the colonization and breeding success of Bachman's Sparrow and Brown-headed Nuthatch.

2. Develop supplemental inventory and monitoring programs to determine regional population levels of Bachman's Sparrow and Brown-headed Nuthatch and to identify locally important sites for their conservation.

E. Freshwater Wetlands

Importance and conservation status: Freshwater wetland types in the Mid-Atlantic Piedmont include open water, emergent marshes, and either seasonally or permanently flooded forests. Historically, marshes were associated most frequently with the upper reaches of small tributaries. Though many have been lost in connection with agricultural development, others have resulted from reservoir and pond construction. Forested wetlands have decreased in size and number due to human activity.

Green Heron favors forested water margins, especially where dense woody vegetation fringes ponds, rivers, lakes, or estuaries (Hancock and Kushlan 1984). It nests near or

away from water and either on the ground or in trees. It has a preference for conifers when available (Hamel 1992).

Habitat and population objectives: Extrapolating from BBS relative abundances, one can derive rough estimates of population size for priority species in this habitat suite (Table 3.6). These approximations are useful in illustrating the relative population sizes of various species and providing order-of-magnitude figures for setting regional population objectives (See Appendix 2, Population Estimates and Assumptions).

For species that have declined significantly during the BBS period, a population target may be set to approximate pre-BBS population levels. When BBS data indicate that a species has suffered a 50% or greater loss since 1966, this plan calls for doubling its present population as a practical objective. For species with stable populations or unknown trends, population targets are rounded up from current estimates.

Table 3.6 lists the proportion of Piedmont Atlas blocks in which trained observers noted each priority bird species during the most recent breeding bird atlas effort. These values indicate how geographically widespread each is within the Piedmont.

Table 3.6 Population estimates and targets (number of pairs) for priority species of wetland habitats in the Mid-Atlantic Piedmont. % Atlas Blocks values show the percentage of 5-km blocks in which the species was reported among all blocks that comprise the piedmont region of each state.

Species	BBS Population	% Lost Since 1966	Population Target	% Atlas Blocks			
				NJ	PA	MD	VA
Green Heron	15,700	30%	22,500	70	62	80	Unk

Conservation Objective 1: Restore nominal breeding populations of wetland species known to nest in this physiographic area within the past 20 years. Restore and maintain a long-term population of at least 22,500 Green Herons.

Justification: While the King Rail was not reported in the BBS data, this species is known to have bred in this physiographic area. A population target of 100 breeding pairs is deemed to be an appropriate minimum viable population, pending more study.

Assumptions: This plan assumes that individuals from King Rail populations in nearby physiographic areas will colonize suitable wetland habitat in the Mid-Atlantic Piedmont. It is further assumes that 100 breeding pairs represent a regional population that is viable over the long term.

Conservation Objective 2: Stabilize the declining population trend in Green Heron and maintain a long-term population of 22,500 pairs.

Justification: The Green Heron is one of the best indicator species for freshwater wetland habitats in this region. It is common and widespread; it is found in a wide variety of local wetland types. It occurs with all other priority species within this suite.

<u>Assumptions</u>: This plan assumes that maintaining enough suitable habitat for Green Heron will be sufficient to support target populations of most other birds in this habitat suite.

Implementation Strategy

Conservation Actions:

1. <u>Identify remaining freshwater wetlands for conservation action.</u>

Background and Progress: Numerous efforts have taken undertaken to identify all remaining wetland areas within the Mid-Atlantic Piedmont region. Resources such as the National Wetlands Inventory and state wetland inventories are currently available to assist in conservation planning.

2. <u>Reduce rate of freshwater wetlands habitat loss.</u>

Background and Progress: Freshwater wetlands enjoy considerable protection under a variety of federal, state, and local laws. While wetland habitat losses continue due to permitted activities, the rate of loss has slowed considerably in recent years.

Important Bird Areas:

Some Important Bird Areas that have been identified in the planning unit that contain important wetland habitat and will be an important focus for implementation phase of the PIF conservation plans. As a part of the IBA designation process, conservation strategies for these sites will be produced. IBAs with significant wetland habitat include:

Pennsylvania

- Great Marsh – 970 ha, privately owned. Great Marsh is the largest and most biologically diverse freshwater marsh in eastern Pennsylvania. It contains a 970 ha marsh complex situated within a 2000-acre watershed. The site includes shrub swamps, swamp forests and a corridor of floodplain forest extending to the reservoir at Marsh Creek State Park. It supports breeding species such as Least Bittern, Pied-billed Grebe, American Coot, Marsh Wren, and Dickcissel.

- Glen Morgan Lake – 325 ha, privately owned. This shallow lake has thick emergent vegetation and open water thick in submerged aquatic plants and invertebrates. It supports the largest Pied-billed Grebe breeding colony known in Pennsylvania, and breeding populations of Least Bittern, American Coot, and Common Moorhen.

- Quakertown Swamp – 160 ha, Pennsylvania Game Commission / privately owned. One of the largest intact inland wetlands in southeastern PA. Breeding populations of American and Least Bitterns, Black-crowned Night-heron, Virginia Rail, Sora.

Maryland

- Monacacy Natural Management Area – 730 ha, Maryland Department of Natural Resources. Situated at the confluence of the Monocacy and Potomac Rivers, this site provides forested wetland and open water habitats for numerous species of migratory birds. The nearby Lilypons area includes numerous ponds and marshes.

Research and Monitoring Needs: Develop supplemental inventory and monitoring programs to determine population levels and identify important sites for King Rail and other uncommon, patchily distributed wetland bird species not well monitored by BBS.

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APPENDIX 1: AVIFAUNAL ANALYSIS

This section provides details on the status of the roughly 138 species known to breed in the physiographic area. All BBS data are through 1999 and were taken from the BBS web site (Sauer et al. 2000).

Species with high proportions of their total populations in this region are considered of greatest importance for long-term conservation planning; i.e., 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, a species is deemed to be of regional importance if at least 3% 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, six species were estimated to have at least 3% of their total population breeding in the planning unit (Table A1.1). These include over 6% of the world's Prairie Warblers, 4% of all Wood Thrush, and 3% of breeding Acadian Flycatcher, Louisiana Waterthrush, Scarlet Tanager, and Eastern Wood-pewee.

Table A1.1. Species with high proportions of their total population in Area 10. 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.	Relative Abundance	Pop. Trend	Significance	N
Prairie Warbler	6.2	0.70	-1.3	0.66	23
Wood Thrush	4.3	10.47	-0.1	0.70	47
Acadian Flycatcher	3.4	1.70	0.6	0.31	32
Louisiana Waterthrush	3.2	0.20	1.5	0.45	18
Scarlet Tanager	3.2	1.90	-0.4	0.53	53
Eastern Wood-pewee	3.0	6.00	-0.1	0.80	46

A. Declining Species

Of the 138 breeding species sampled by BBS, 24 have declined significantly (P<0.10) since 1966, and 2 additional species have declined since 1980 (Table A1.2). Most declining species (19 of 26) are associated with grassland and other early successional or disturbed habitats, including urban areas. Two species of freshwater wetlands (Black-crowned Night Heron, Green Heron) are also declining in this region. Five of the declining species are forest birds. This pattern of greater declines in non-forest, as compared to forest, nesting species continues one that others have noted previously in the Northeast (Askins et al. 1990, Askins 1993, Franzreb and Rosenberg 1997).

Table A1.2 Species that show declining populations in Physiographic Area 10, based on Breeding Bird Survey, 1966-1999 trends (N = 47 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	-14.0	11	0.00	0.23	
Savannah Sparrow	-13.2	10	0.61*	0.10	GR
Eastern Screech-owl	-13.8	8	0.02	0.02	HF
American Redstart	-9.8	27	0.03	0.22	HF
Bank Swallow	-9.2	9	0.09	0.06	W, ES
Vesper Sparrow	-8.9	23	0.00	0.52	GR
Horned Lark	-7.9	22	0.01	0.18	GR
Ring-necked Pheasant	-6.1	35	0.00	4.42	
Eastern Meadowlark	-4.7	56	0.00	18.60	GR
Rose-breasted Grosbeak	-4.6	11	0.08	0.07	HF
Northern Bobwhite	-4.5	53	0.00	18.71	ES
Red-winged Blackbird	-3.9	56	0.00	28.87	GR, W
Field Sparrow	-3.7	56	0.00	10.44	ES
House Sparrow	-3.5	54	0.00	33.85	
Green Heron	-3.3	49	0.03	0.62	W
Kentucky Warbler	-3.1	40	0.02	0.47	HF
Eastern Towhee	-3.1	56	0.00	9.10	ES
Common Grackle	-2.8	56	0.00	84.56	ES (UR)
Northern/Gilded Flicker	-2.7	54	0.00	4.00	HF
Eastern Kingbird	-2.5	55	0.00	3.72	GR, ES
Blue Jay	-2.4	56	0.00	13.46	HF (UR)
European Starling	-2.1	56	0.00	76.39	
Yellow-billed Cuckoo	-2.0	54	0.02	4.14	HF
Wood Thrush	-2.0	56	0.00	13.26	HF
Brown Thrasher	-1.9	54	0.00	4.08	ES
Northern Mockingbird	-1.9	56	000	23.00	
Barn Swallow	-1.8	56	0.00	19.12	GR, ES
Song Sparrow	-1.5a	45	0.04	25.32	ES
Chimney Swift	-1.2	56	0.02	12.90	UR

a Significant declining trend for the period 1980-1998 only.

* Trend values are not statistically significant, but are included for illustrative purposes.

B. Increasing species

It is informative to examine the species that are increasing in a physiographic area. In the Mid-Atlantic Piedmont, 40 species show significantly increasing population trends, compared to 26 species that are declining (Table A1.2). A majority of those increasing fall into two categories, either species associated with maturing forests or species that have adapted well to human development. Species associated with human activities include those using bird feeders (e.g., House Finch, Northern Cardinal) or nest boxes (e.g., Eastern Bluebird, Tree Swallow), as well as those that breed in urban wetlands (e.g. Canada Goose). Other species that have benefited from human activities are those associated with conifer plantations (e.g., Pine Warbler). In contrast with those in Table A1.2, many of the early successional species that are increasing have adapted well to suburban and urban habitats (e.g., Tufted Titmouse, House Wren, Chipping Sparrow, American Robin).

Table A1.3 Species showing significant population increases within Physiographic Area 10, based on Breeding Bird Survey, 1966-1999 trends (N = 47 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
Barred Owl	26.7	10	0.05	0.08	HF
Double-crested Cormorant	22.0	5	0.00	0.03	W
Tree Swallow	19.3	32	0.00	0.61	ES, W (UR)
Canada Goose	15.3	39	0.00	5.01	W, UR
Great Blue Heron	14.7	34	0.00	0.34	W
Cooper's Hawk	13.7	12	0.07	0.02	HF
House Finch	11.8	55	0.00	10.05	UR
Wood Duck	11.6	27	0.02	0.19	W
Cedar Waxwing	10.5	48	0.00	1.10	ES, UR
Red-shouldered Hawk	8.1	27	0.01	0.23	HF
Red-headed Woodpecker	7.5	24	0.05	0.16	HF
Red-tailed Hawk	6.6	48	0.00	0.59	ES
White-breasted Nuthatch	6.2	53	0.00	1.08	HF, UR
Worm-eating Warbler	5.5	17	0.08	0.11	HF
Eastern Bluebird	5.2	55	0.00	7.94	ES
Blue-gray Gnatcatcher	5.1	48	0.01	4.77	HF
Willow/Alder Flycatcher	4.6	32	0.00	0.58	ES
Fish Crow	4.3	40	0.02	0.96	W
Chestnut-sided Warbler	3.9 a	5	0.10	0.08	HF
Pine Warbler	2.8	25	0.01	4.65	CF
Red-eyed Vireo	2.7	56	0.00	17.3	HF
Tufted Titmouse	2.6	56	0.00	11.26	ES (UR)
Ovenbird	2.5	52	0.06	3.28	HF
Louisiana Waterthrush	2.5	27	0.01	0.24	HF
White-eyed Vireo	2.4	49	0.03	1.63	ES
Carolina Wren	2.0	56	0.00	11.05	ES (UR)
Eastern Phoebe	1.7	56	0.00	4.20	ES, W (UR)
Yellow Warbler	1.6	45	0.07	1.72	ES
Chipping Sparrow	1.4 a	44	0.06	13.37	ES (UR)
American Crow	1.0	56	0.00	56.02	ES (UR)

a Significant increasing trend for the period 1980-1998 only.

∗ Trend values are not statistically significant, but are included for illustrative purposes.

APPENDIX 2: POPULATION ESTIMATES AND ASSUMPTIONS

This PIF bird conservation plan presents several estimates of relative or absolute bird population sizes. Relative population size (percent of global population) illustrates 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 recorded per BBS route, across all routes in a physiographic area, for the period 1990 through 1999. These same Relative Abundance values are used to calculate Area Importance (AI) scores in the PIF species prioritization database (Carter et al. 2000). [Note: Prior to July 1999 BBS Relative Abundance was calculated differently; any previously presented or published population estimates using these values will differ from those calculated after July 1999 (J.R. Sauer, pers. com.).]

A. Percent of Population

Rosenberg and Wells (1999) originally described methods for calculating the proportion of a species' total or global population occurring in a physiographic area. To determine the "% Population" for a species sampled in the BBS, one must multiply the species' Relative Abundance value for each physiographic area by the size of that area and then sum the resulting values across all physiographic areas in which the species occurs. Dividing the weighted value for a physiographic area by this total yields the proportion of the total population in that area. Thus:

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

Estimates of % Population are relative values and are not dependent on the "correctness" of Relative Abundance values for individual routes; i.e., even if BBS data analysis greatly underestimates the absolute abundance of "poorly sampled" species, such as nocturnal species and raptors, the Relative Abundance values and % Population estimates should be valid, *as long as the detectability of a species on BBS routes is relatively constant across its geographic range*. These estimates are more questionable for species that occupy very patchy habitats (e.g. wetlands) in regions where BBS routes do not adequately sample these habitats. In cases where additional reliable survey data for groups of species are available (e.g., waterfowl, colonial waterbirds), the Relative Abundance and % Population 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 one should use these to calculate the percentage of the total population in each region.

Each PIF conservation plan establishes a threshold of % Population to indicate a disproportionate abundance of a species in a physiographic area. 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 thresholds listed in Table A3.1. Since the Mid-Atlantic Piedmont is 66,491 km^2 in size, it has a % Population threshold of 3%.

Table A2.1 Percent of Population thresholds, signifying a disproportionate population size, relative to the size of the 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

B. 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. BBS data may provide landscape-level density estimates that can be converted into regional population estimates for most relatively widespread and common species of forest, shrub, and some grassland habitats, if one makes the following assumptions:
(1) BBS routes constitute a random sample of the landscape;
(2) The habitats in question are fairly evenly distributed across the region; and
(3) Each species has a relatively fixed average detection distance at BBS stops, within which an observer can reasonably estimate the number of individual birds present.

Because BBS route locations are selected at random (Sauer et al. 2000), 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 (Keller and Scallan 1999). 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 includes 50 stops; each consists of a 0.25 mi. (400 m)-radius circular count, thereby potentially surveying roughly 25 km^2 of heterogeneous landscape. For a species that is detected routinely only within a distance of 200 m at each stop, the effective area surveyed is reduced to 6.3 km^2. For a species detected only within a distance of 100 m, the BBS route surveys 1.6 km^2.

Emlen and DeJong (1981) propose a method of estimating avian density from counts of singing males using detection threshold distances. They provide average maximum

detection distances for 11 species of common forest birds. These distances range from 72 m (Blue-gray Gnatcatcher) to 186 m (Wood Thrush) and average 128 m for the 11 species. They propose that numbers of singing males may be doubled to obtain a total population estimate and that correction factors can be applied to account for variable singing rate (i.e., birds missed because they didn't sing during the survey period).

In the absence of additional empirical data on species detection distances and singing frequencies, one may take a simple and conservative approach to estimating regional population sizes from BBS relative abundance data. Species initially are 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 are 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 are assigned detection distances of 400 m; i.e., they are detected out to the limit of each BBS circular stop. For these species, the BBS route samples roughly 25 km^2. A third group of species is considered to be intermediate and is assigned a detection distance of 200 m (effective sampling area = 6.3 km^2). This group includes species such as Bobolink and Eastern Meadowlark that are detected by a combination of song and visual observations in open habitats.

Absolute population estimates for a physiographic area are calculated as the average landscape-level density (number of birds per route x 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 needed 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) develop independent means of estimating population size to refine or calibrate estimates derived from BBS data. The crude population estimates in this PIF plan are a reasonable starting point, however, they are based on the best information yet available and can serve as preliminary population objectives for priority species in each physiographic area. These population objectives can 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.