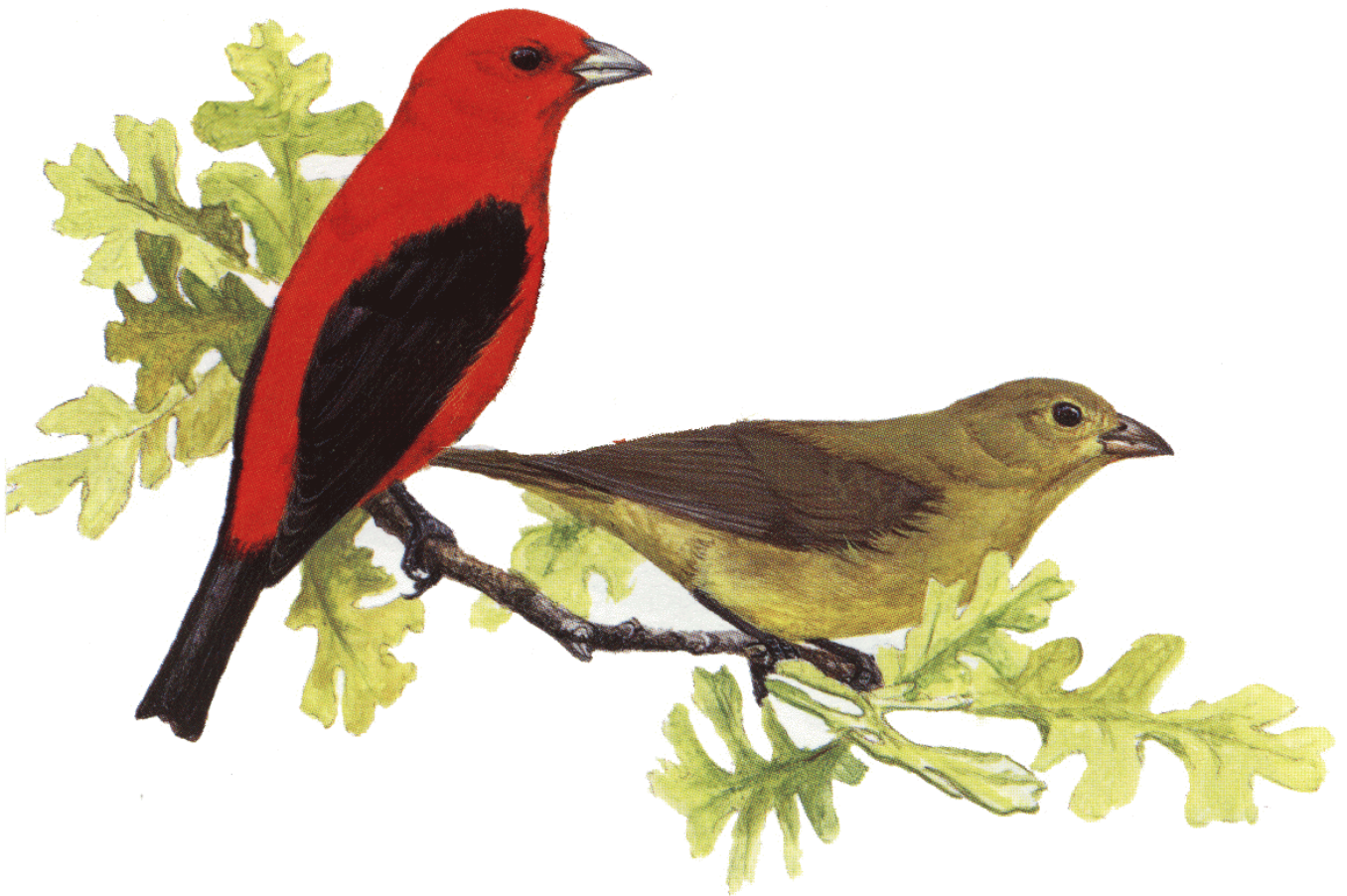




**Partners in Flight
Bird Conservation Plan**

Northern Ridge & Valley

(Physiographic Area 17)



Partners In Flight Landbird Conservation Plan:

Physiographic Area 17: Northern Ridge and Valley

VERSION 1.1: October 2003

Prepared by:

Kenneth V. Rosenberg
PIF Northeast Regional Coordinator
and
Bruce Robertson
Conservation Associate
Cornell Lab of Ornithology

Address comments to:

Kenneth V. Rosenberg
PIF Northeast Regional Coordinator
Cornell Lab of Ornithology
159 Sapsucker Woods Rd.
Ithaca, NY 14850
607- 254-2412
kvr2@cornell.edu

TABLE OF CONTENTS

<i>EXECUTIVE SUMMARY</i> _____	4
<i>INTRODUCTION</i> _____	6
A. Goal _____	6
B. Process _____	7
C. Implementation _____	7
<i>SECTION 1: THE PLANNING UNIT</i> _____	7
A. Physical Features _____	7
B. Potential Vegetation: _____	9
C. Natural Disturbances: _____	9
D. History and Land Use: _____	11
<i>SECTION 2: PRIORITY BIRD SPECIES</i> _____	11
A. General Avifauna _____	11
B. Priority Species Pool _____	12
<i>SECTION 3: BIRD CONSERVATION ISSUES AND OPPORTUNITIES</i> _____	16
A. Early vs. Late-successional Habitats and Species -- Historical Baselines _____	16
B. Urban and Recreational Development _____	17
C. Changing Forest Structure and Forest Health _____	17
D. Bird Conservation Opportunities and Solutions _____	18
<i>SECTION 4: PRIORITY HABITATS AND SUITES OF SPECIES</i> _____	20
A. Shrub-Early Successional _____	21
B. Deciduous (Oak Hickory) and Riparian Forest _____	28
C. Agricultural / Grassland _____	37
D. Northern Hardwood- Mixed Forest _____	46
E. Freshwater Wetland _____	51
<i>LITERATURE CITED</i> _____	56
<i>APPENDIX 1: ECOLOGICAL UNITS AND VEGETATION ALLIANCES</i> _____	66
<i>APPENDIX 2: AVIFAUNAL ANALYSIS</i> _____	67
<i>APPENDIX 3: POPULATION ESTIMATES AND ASSUMPTIONS</i> _____	70
<i>APPENDIX 4: LANDOWNER INCENTIVE PROGRAMS</i> _____	73
<i>APPENDIX 5: IMPORTANT BIRD AREAS PROGRAM IN THE NORTHERN RIDGE AND VALLEY PHYSIOGRAPHIC AREA</i> _____	77

LIST OF TABLES AND FIGURES

	Page
<u>Figure 1.1</u> - Northern Ridge and Valley Physiographic Area 17	8
<u>Figure 1.2</u> - Forest Type in the Northern Ridge and Valley Physiographic Area 17	10
<u>Table 1.1</u> - Natural vegetation and cover types in the Northern Ridge and Valley Physiographic Area	9
<u>Table 1.2</u> - Current land-use and ownership patterns in the Northern Ridge and Valley Physiographic area	11
<u>Table 2.1</u> - Priority breeding-species pool for Area 17	14
<u>Table 4.1</u> - Priority habitat-species suites for Area 17	20
<u>Table 4.2</u> - Population estimates and targets (number of pairs) for priority species of Early-Successional and Forest Edge habitat in the Northern Ridge and Valley Physiographic Area	23
<u>Table 4.3</u> - Population estimates and targets (number of pairs) for priority species of Deciduous and Riparian habitats in the Northern Ridge and Valley Physiographic Area	29
<u>Table 4.4</u> - Population estimates and targets (number of pairs) for priority species of Grassland and Agricultural habitats in the Northern Ridge and Valley Physiographic Area	39
<u>Table 4.5</u> - Population estimates and targets (number of pairs) for priority species of Northern Hardwood and Mixed Forest habitats in the Northern Ridge and Valley Physiographic Area	47
<u>Table 4.6</u> - Population estimates and targets (number of pairs) for priority species of Freshwater Wetland habitats in the Northern Ridge and Valley Physiographic Area	52
<u>Table A2.1</u> - Species with high proportions of their total population in Area 17	67
<u>Table A2.2</u> - Species showing significant population declines within Area 17	68
<u>Table A2.3</u> - Species showing significant population increases within Area 17	69
<u>Table A3.1</u> - Percent of population thresholds	71

EXECUTIVE SUMMARY

Area - 4,561,879 ha (53/58)

Description - The Northern Ridge and Valley extends from southeastern Pennsylvania, through northwestern New Jersey and southeastern New York nearly to the base of the Adirondack Mts. It includes portions of several major river valleys, including the Hudson, Delaware, and Susquehanna Rivers. Ecologically, this is a transitional area, with forested ridges grading from primarily oak-hickory forests in the south to northern hardwood forests further north. Pine-oak woodlands and barrens and hemlock ravine forests are also important along ridges, whereas bottomland and riparian forests are important in the valleys, which are now largely cleared for agricultural and urban development. Roughly 55% of the physiographic area is forested today, the vast majority occurring at higher elevations. About 40% of the area is in agricultural production, primarily a mixture of dairy pastureland and corn. Over 200,000 ha is state forest land in PA and NJ; other important public lands include High Point State Park (NJ) and Wallkill National Wildlife Refuge.

Priority bird species and habitats –

The highest priority species do not form a cohesive habitat group, but rather are separated among different habitat types within this region: agricultural grassland, shrub-early successional, deciduous and northern hardwood forests, and wetland habitats. The individual species of greatest concern and most in need of immediate management actions are Henslow's Sparrow and Golden-winged Warbler. Habitats are presented below in an order that reflects the number of continental- and regional-level species of concern that require immediate management (IM) or management action (MA), as defined in Table 4.1. This ordering of habitats should not be interpreted as an absolute ranking, but rather as one method of ordering habitats according to which habitats and their associated species require the most immediate conservation attention across the physiographic area. Management activities at any local site need to consider landscape and regional contexts, the habitat potential of the site, and the priority species that occur at the site. Achieving a sufficient balance among all of these habitat types across the region (but not necessarily within any one particular landscape) to support the priority species across this physiographic area should be a consideration for any management at the local level. For example, managing for the grassland habitat-species suite of birds should not be considered as high of priority as mature oak-hickory/riparian forest or early-successional forest species across the entire physiographic area, but local sites that currently support or historically have supported Henslow's Sparrow or Upland Sandpiper (both of which are high priority species at the continental level) should be considered priority areas for grassland management.

Shrub-early Successional -

Golden-winged Warbler – Persists at high elevation in Pennsylvania, but still occurs in low elevation in New York. Also common in naturally disturbed sites (e.g. alder swamps); may be “safe haven” from competing Blue-winged Warbler.

American Woodcock – American Woodcock require a mix of habitats, including forest openings or clearings, alder or other young hardwoods on moist soils, young second-growth hardwoods, and large fields.

Field Sparrow – In most regions and habitats Field Sparrows require more than 2 ha of breeding habitat.

Objective: Roughly 71,000 ha of natural barrens and other disturbed habitats are required to support entire habitat-species suite (e.g. 70,000 pairs of Eastern Towhees); 7,000 ha should be protected or managed at high elevations to support 3,500 pairs of Golden-winged Warblers.

Deciduous (oak-hickory) and Riparian Forest-

Cerulean Warbler – Recently expanding populations; both in mature upland (oak) and bottomland (sycamore) forests.

Worm-eating Warbler – Favors dry, upland forests on steep slopes with dense shrubby understory; ground nester.

Louisiana Waterthrush -- Requires late succession (>60 yr.); rocky, flowing streams; sensitive to declining stream quality and loss of riparian forest buffers.

Objective: Roughly 1 million ha of deciduous and mixed forest is required to support entire habitat-species suite (e.g. 300,000 pairs of Wood Thrush); of this, 92,000 ha should be suitable to support a combination of 6,000 pairs of Cerulean Warblers and 22,000 pairs of Worm-eating Warblers. In addition, 8,000 km of forested stream are required to support 5,200 pairs of Louisiana Waterthrush.

Agricultural/Grassland –

Henslow's Sparrow – Formerly more widespread until very recently; requires tall, unmowed pastures or margins of airport land.

Upland Sandpiper – Few breeding sites remain; area sensitive.

Grasshopper Sparrow – Grasshopper Sparrows are known to breed in lightly grazed pasture, reclaimed surface mines, old hayfields, moderately grazed pastures, coastal grassland barrens, airfields and cool season grasslands.

Objective: roughly 100,000 ha of disturbed or shrubby habitat is required to support the old field-associated species of this habitat suite (e.g., 110,000 pairs of Field Sparrows) and an additional 170,000 ha of early successional forest is required to support the species associated with young forest (e.g., 167,000 pairs of Eastern Towhees). Of this, 10,000 ha (25,000 acres) should be suitable to support 4,400 pairs of Golden-winged Warblers in areas without significant Blue-winged Warbler populations or in areas where habitat segregation minimized threats from hybridization.

Northern Hardwood-mixed Forest-

Wood Thrush – Habitat consists of forests with moist woodland understory of deciduous shrubs or saplings.

Canada Warbler – Prefers forests with more coniferous species and dense understory vegetation near streams or boggy areas.

Eastern Wood-pewee – Prefers intermediate-aged forests with closed or open canopies and little understory. They can inhabit fragments as small as 0.5 ha during breeding season.

Objective: Based on published density estimates, roughly 1 million ha of northern hardwood forest is required to support the entire habitat-species suite (e.g. 300,000 pairs of Wood Thrush), with 10,000 ha suitable to maintain 4,000 pairs of Canada Warblers.

Freshwater Wetland-

The birds in this section are not strictly PIF species, however they are included in this report because it is important to maintain a complete representation of birds in this physiographic area.

American Black Duck – Has a range of breeding habitat from coastal marshes to freshwater forest ponds and streams

King Rail – Preferred habitat for the King Rail is fresh or brackish wetland marshes with vegetation consisting of grasses, cattails, rushes and sedges.

Objective: Based on published density estimates, roughly 4,500 ha of freshwater wetlands are required to support 670 pairs of American Black Duck.

Conservation recommendations and needs –

This area is under increasing pressure from growing urban areas around Albany, Harrisburg, and outlying suburbs of New York City and Philadelphia. Suburban and second-home development continues to fragment forests and devour pastureland, open shrub habitats and wetlands.

Reduction of forest understory and regeneration due to overpopulation of white-tailed deer and maturing forests with closed canopies, as well as forest-health problems caused by insect and disease outbreaks, also represent major conservation issues for forest birds in remaining tracts.

The small proportion of forest land in public (mostly state) ownership presents an important opportunity for implementing conservation objectives. In particular, identification and protection of important sites for breeding Cerulean Warblers should be a high priority. Active management for Golden-winged Warblers, where feasible, should also be a high priority, especially identification and study of remaining sites where Golden-winged Warblers may persist in sympatry with

expanding Blue-winged Warblers. In addition to breeding habitat, the ridges and river valleys of this physiographic area represent major flyways for migratory passerines, raptors, and waterfowl. Ongoing efforts to monitor migration and stopover (e.g. Hawk Mountain Sanctuary) should be fully supported and enhanced.

Specific conservation recommendations in this physiographic area include:

- determine range of suitable habitats and identify present breeding sites for Golden-winged Warbler in this region;
- identify and designate Bird Conservation Areas (BCA) as defined in PIF plan (not to be confused with New York's Bird Conservation Area Program), within which long-term sustainability of priority forest bird populations is a primary management objective;
- identify present-day concentrations of Cerulean Warbler within the region; determine protection status and specific threats at these sites;
- identify, and either acquire, manage or restore grasslands > 50 ha with potential to support Henslow's Sparrow or Upland Sandpiper.

INTRODUCTION

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

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

A. Goal

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

B. Process

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

- (1) identify species and habitats most in need of conservation;
- (2) describe desired conditions for these habitats based on knowledge of species life history and habitat requirements;
- (3) develop biological objectives that can be used as management targets or goals to achieve desired population levels.;
- (4) recommend conservation actions that can be implemented by various entities at multiple scales to achieve biological objectives.

Throughout the planning process and during the implementation phase, this strategy emphasizes partnerships and actions over large geographic scales. Information and recommendations in the plans are based on sound science and consensus among interested groups and knowledgeable individuals. Specific methods used to complete this process are described within the plan or in its appendices. Additional details on PIF history, structure, and methodology can be found in Finch and Stangel (1993) and Bonney et al. (2000).

C. Implementation

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

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

SECTION 1: THE PLANNING UNIT

A. Physical Features

The Northern Ridge and Valley extends from southeastern Pennsylvania, through northwestern New Jersey and southeastern New York nearly to the base of the Adirondack Mts. and to the southwestern corner of Vermont (Fig. 1.1). It includes portions of several major river valleys, including the Hudson, Delaware, and Susquehanna Rivers. In all, the total land area is 4,561,879 ha (11,272,398 acres), including roughly 35,236 ha of water.

The Northern Ridge and Valley is primarily demarcated by its broad, parallel-running mountain ridges and river valleys that stretch from the Maryland border, northeast through New Jersey and

to the upper Hudson Valley of New York. Elevations in the planning unit range from 300 to 4,860 ft. In Pennsylvania, this region is very geographically distinctive. The southeastern border, known as the Kittatinny Mountain or ridge in the east and Blue Mountain to the west stretches nearly unbroken from the Maryland border to the New Jersey border. The western and northern edge of this region is largely known as the Allegheny Front. In New Jersey and New York, this physiographic area continues north through the Kittatinny Mountains and the Shawangunk Hills into the Hudson River Valley. East of the Hudson river, the Taconic Foothills and Rensselaer Hills form an area of more rolling topography, compared with the sharper ridge systems to the west and south. Throughout the planning unit, rock composition consists largely of sandstone, siltstone, shale and conglomerate with some limestone and coal (Crossley 1999).

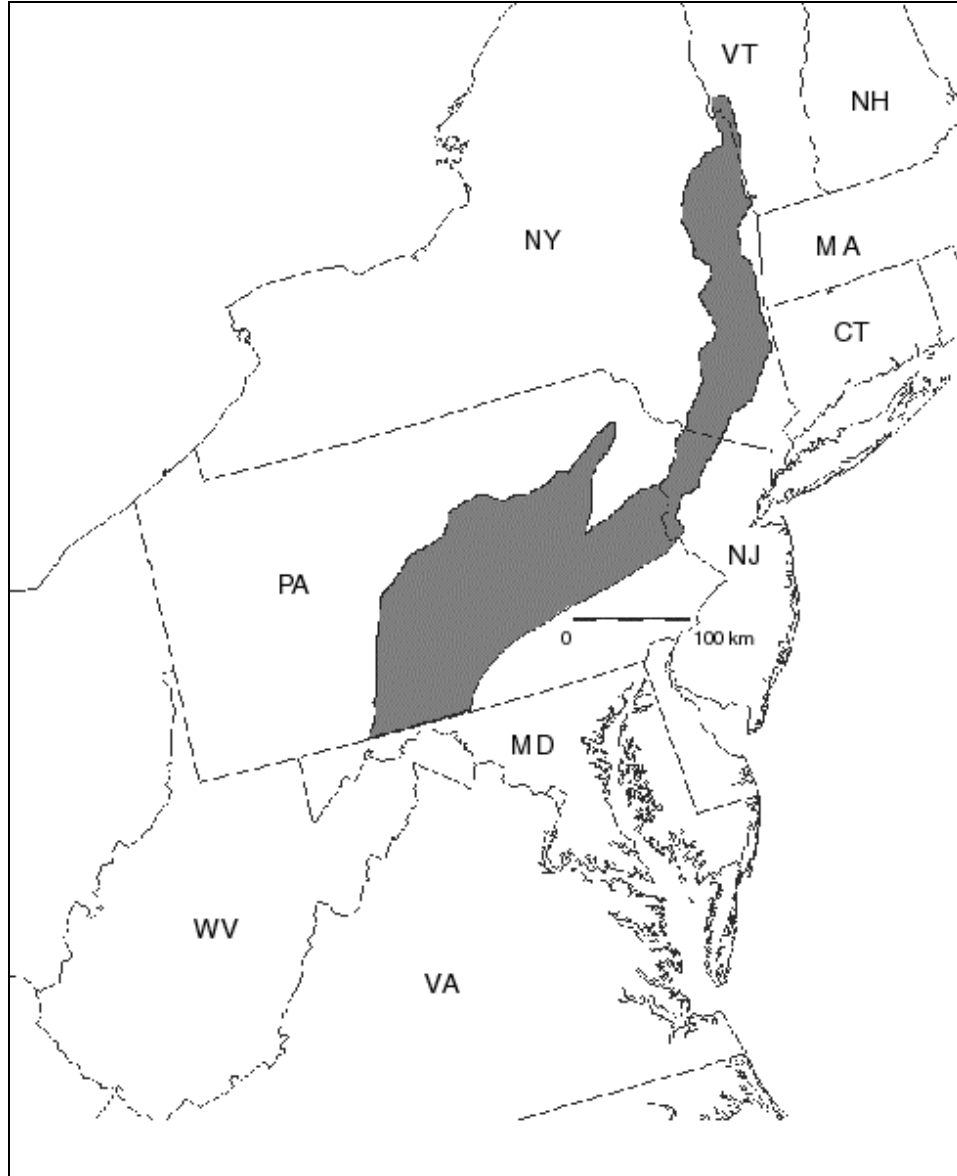


Figure 1.1. Northern Ridge and Valley Physiographic Area 17 covering 4,561,879 ha across Pennsylvania, New Jersey, New York and Vermont. Funding for the preparation of this map was provided by the National Fish and Wildlife Foundation, through a challenge grant to The Nature Conservancy, Wings of America Program. Matching funds were donated by Canon U.S.A. Inc.

B Potential Vegetation:

The dominant habitat type of this region is temperate broadleaf and mixed forest and is demarcated from other regions in part by its geography and elevation. The three most dominant and widespread forest-tree associations in the region are the southern hardwoods (oak-hickory and formerly chestnut), the northern hardwoods (beech, birch and maple also hemlock) and the oak-pine forests, which occur at higher elevations (Fig. 1.2). Locally, larch and white cedar are found often in association with bogs (Bull 1974). Oak-hickory forests dominate on ridge systems throughout Pennsylvania and New Jersey, and in the southern portions of the Hudson Valley, whereas northern hardwoods dominate from about Albany northward. Significant areas of oak-pine forest occur along ridges in central Pennsylvania and in the eastern foothills of the Catskill Mountains, whereas white-pine dominated forests occur primarily east of the Hudson River.

At present, approximately 2.4 million ha (roughly 55%) of the land area within the planning unit is forested, including approximately 1.7 million ha of Oak-hickory forest and smaller amounts of the other forest types (Table 1.1 and 1.2). Not included in the USFS Forestry Inventory Analysis (FIA) data are significant tracts of riparian forests, dominated by sycamores and cottonwoods, along the Hudson, Delaware, and Susquehanna rivers and their tributaries.

Table 1.1. Natural vegetation and cover types in the Northern Ridge and Valley physiographic area. Forest types are taken from USFS FIA data. Nonforest cover types are modified from USGS data. Water coverage is combined from both databases by adding USGS water in the "nonforest" section of the USFS database.

Vegetation or Cover type	Area (ha)	Area (ac)	% of area
Oak-hickory forest	1,740,304	4,300,292	38.1
Maple-beech-birch forest	380,430	940,043	8.3
Oak-pine forest	286,766	708,599	6.3
White-red-jack pine forest	86,099	212,752	1.9
Spruce-fir forest	1,692	4,181	0.04
Corn, wheat, irrigated agriculture	1,293,483	3,196,196	28.35
Bluestem grassland	38,521	95,185	0.84
Grama, wheatgrass grassland	10,252	25,333	0.22
Pasture, hay, mixed crops	689,094	1,702,752	15.11
Water	35,236	87,068	0.77

C. Natural Disturbances:

Historically, fire likely played an important role in maintaining much of the oak-dominated forests of the southern portion of this planning unit, as well as the pine-oak and barren habitats throughout the area. Fire is an important factor in oak regeneration, and the fire suppression policies of the last half of the 20th century has had significant impacts on the natural processes and vegetation composition of deciduous forests and barrens. Insect outbreaks may also have had significant negative effects in the southern portions of the Northern Ridge and Valley. For instance, gypsy moths and wooly adelgids are currently causing disturbances in natural forest communities by destroying large numbers of oaks and hemlocks, respectively. Weather events (e.g., hurricanes, tornadoes, ice and snow storms) also affect the forest's composition. By breaking off large branches or razing entire trees, storms can open up small forest pockets. In this region, weather events probably played a more important role than fire.

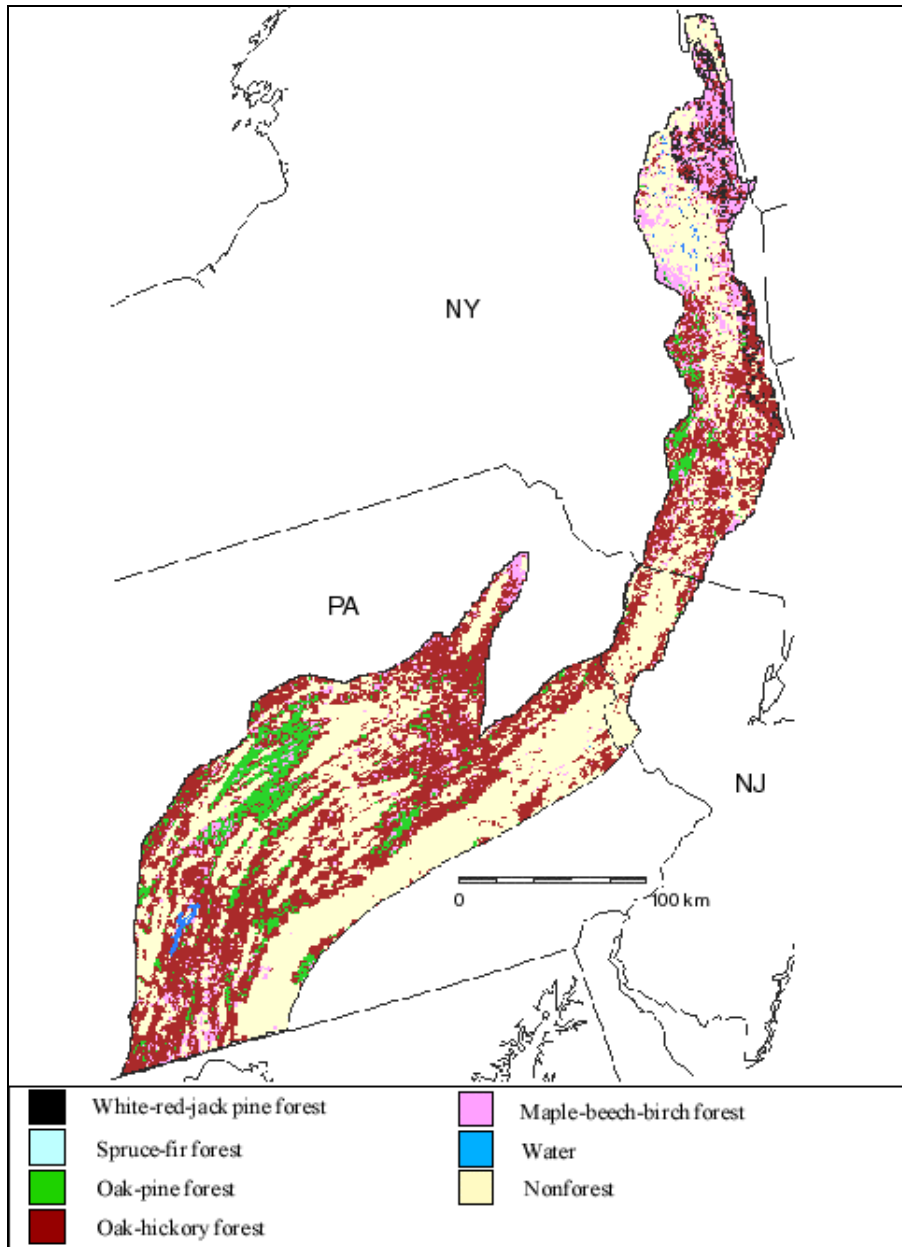


Figure 1.2. Forest Types in the Northern Ridge and Valley Physiographic Area 17. From USFSFIA data. Funding for the preparation of this map was provided by the National Fish and Wildlife Foundation, through a challenge grant to The Nature Conservancy, Wings of America Program. Matching funds were donated by Canon U.S.A. Inc.

Another disturbance factor that affects vegetation structure is the activity of mammals, most notably beaver and deer. The activity of beavers in this region may have played an enormous role in shaping the extent of grassland and shrubland habitat. Heavy deer browsing can dramatically alter the understory structure, density and species composition by eliminating entire classes of younger trees. Degradation of forest understory removes valuable cover and nesting habitat, altering bird communities dramatically.

D. History and Land Use:

In pre-colonial times much of the planning unit was covered with a vast and largely unbroken forest (Bull 1974). Most of this forest was logged during the 18th and early 19th century to provide lumber and to clear the land for agriculture. McWilliams and Brauning (2000) estimate that extensive logging left Pennsylvania only about 25% forested by 1800. This large reduction in the distribution and abundance of forests in the region from its pre-colonial composition must have had dramatic effects on the distribution and abundance of forest dwelling birds in the planning unit.

The extent of agricultural land in Pennsylvania reached its peak in 1900 when nearly two-thirds of the state was farmland (McWilliams and Brauning 2000) providing grassland and open-country species with enough habitat to become abundant nearly statewide. Today, the percent farmland in Pennsylvania is closer to 20%. Roughly 40% (2 million ha) of the land area in the Northern Ridge and Valley is currently under agricultural use, a mosaic of pastureland and corn and other crops (Table 1.2). These agricultural lands are concentrated at lower elevations, along the linear valleys, leaving the ridges largely forested. Pressures on existing farmland is resulting in increased urbanization in the major river valleys, especially in the vicinity of Albany, NY, Harrisburg, PA and outlying suburbs of New York City and Philadelphia.

Table 1.2. Current land-use and ownership patterns in the Northern Ridge and Valley physiographic area. Forest types are taken from USFS FIA data; non-forest types are from USGS data. Water coverage is combined from both databases by adding USGS water in the "non-forest" section of the USFS database.

Land classification	Area (ha)	Area (ac)	% of area
Forested land	2,495,877	6,164,816	54.7
Public ownership	805,015	1,988,389	17.6
Federally managed	77,477	191,368	1.7
State managed	727,538	1,797,018	15.9
other public			
Private industrial	??		
Private non-industrial	??		
Agricultural land	1,992,829	4,922,288	43.7
Other "grassland"	38,521	95,147	0.8
Residential/ developed			
Freshwater wetlands/water	35,236	87,033	0.8
Total land area	4,561,877	11,272,398	100

SECTION 2: PRIORITY BIRD SPECIES

A. General Avifauna

Roughly 175 bird species have been documented as breeding within physiographic area 17 (Peterson 1985, various atlases). Of the nongame landbirds (140 species), the majority are migratory; these include 103 Neotropical migratory species. The landbird avifauna is transitional, including many species of both northern and southern affinity that are near limits of their range. An analysis of all Neotropical migratory species in the Northeast U.S. (Rosenberg and Wells 1995) found the composition of breeding species in this area to be most similar to that of Southern New England and quite distinct from the Mid-Atlantic Ridge and Valley to the south. From a continental perspective, this region ranks moderately high in terms of immediate conservation concern, based on high atlas-block concentrations of high-priority species such as Cerulean, Golden-winged, and Worm-eating warblers (Rosenberg and Wells 1995, 2000).

Ten species were estimated to have $\geq 2\%$ of their total population breeding in the planning unit (Appendix 2), indicating their potential 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, 2000). These include many of the regionally important forest species, such as Scarlet Tanager, Worm-eating Warbler, Wood Thrush, Louisiana Waterthrush, and Cerulean Warbler as well as important early successional species including Blue-winged Warbler, Golden-winged Warbler, American Woodcock, Field Sparrow and Eastern Towhee.

The primary measure of population trend used by PIF at present is the Breeding Bird Survey (BBS), which provides data on roughly 140 of the 175 species breeding within Area-17 (N = 46 routes). For many species in this region, however, especially those of high-elevation or other patchily distributed habitats, BBS coverage is poor, and reported trends often lack statistical significance. Nevertheless, an insignificant declining trend for a species on existing BBS routes may be reason enough to examine the population trend more closely, and to initiate measures to halt or reverse this trend.

Of the species sampled by BBS, 24 have declined significantly ($P < 0.10$) since 1966, and 6 additional species have declined since 1980 (Appendix 2). The 30 declining species in this region are nearly all associated with grassland and other early successional habitats, including urban areas. These include 13 of the 17 species with steepest declining trends ($>3\%/yr.$). Declining forest-breeding species include Yellow-billed and Black-billed Cuckoo, Least Flycatcher, Eastern Wood Pewee, Yellow-shafted Flicker, Baltimore Oriole, and Blue Jay; all these are associated either with successional forests, forest openings, or edges.

In contrast, 38 species show increasing population trends, with 3 of these species only increasing since 1980 (Appendix 2). A majority of these fall in two categories, either species associated with regenerating and mature forests, or species that have adapted particularly well to human activities or development. In the first group are many species of higher-elevation coniferous forests (e.g. Hermit Thrush, Black-throated Green Warbler, Blue-headed Vireo, Dark-eyed Junco, Common Raven), and several that have expanded their distributions southward with the maturing of conifer plantations (e.g. Red-breasted Nuthatch, Blackburnian Warbler, Sharp-shinned Hawk). Also increasing are many widespread forest species such as Ovenbird, American Redstart, Pileated Woodpecker, Scarlet Tanager, and Red-eyed Vireo. In addition, unlike in the Mid-Atlantic Ridge and Valley to the south, bottomland (valley) species such as Northern Parula, Cerulean Warbler, and Warbling Vireo appear to be increasing.

Species associated with human activities include those using bird feeders or nest boxes, as well as those that breed in urban wetlands. Among the early successional species that are increasing are those that have adapted well to suburban and agricultural habitats (e.g. Red-tailed Hawk, American Crow, Gray Catbird) and those that use nest boxes (Tree Swallow, Eastern Bluebird).

B. Priority Species Pool

From among the breeding avifauna, a pool of species may be derived that represents priorities for conservation action within the physiographic area (Table 2.1). Note that a species may be considered a priority for several 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 Table 2.1. 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 Rocky Mountain Bird Observatory. This system ranks species according to seven measures of conservation vulnerability. These include four global measures (i.e., they do not change from area to area), as well as threats to breeding populations (TB), area importance (AI), and population trend (PT), which are specific to each physiographic area. Categories of priority status are determined by examining combinations of parameter scores, as well as the combined rank score, which is a

measure of overall conservation priority. This process of identifying priority species has been standardized across all physiographic areas of North America. For more information about how scores are assigned see the PIF Handbook of Species Prioritization at <http://www.rmbo.org/pubs/downloads/Handbook.pdf>. Scores for all breeding species in the Northern Ridge and Valley region 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, 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* (Rich et al. 2004), 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 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 Watch 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 Watch 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 listed under the U.S. Endangered Species Act 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 2.1, 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 breeding-species pool for Area 17. 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) See text for definition and interpretation of entry levels. 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 on 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
<i><u>IA. High Continental Concern + High Regional Responsibility</u></i>						
	Golden-winged Warbler (NJ, NY-SC)	26	1.8	3	4	B
	Worm-eating Warbler	24	5.3	4	3	B
	Wood Thrush	22	4.0	5	2	B
	Blue-winged Warbler	22	2.9	3	2	B
	Prairie Warbler	20	< 1	3	2	B
	Willow Flycatcher	19	< 1	3	3	B
<i><u>IB. High Continental Concern + Low Regional Responsibility</u></i>						
	Henslow's Sparrow (NJ-E; NY-T)	28	< 1	2	5	B
	Cerulean Warbler (NJ, NY-SC)	24	2.4	2	3	B
	American Woodcock	22	< 1	2	5	R
	American Black Duck	22	< 1	2	4	R
	Red-headed Woodpecker (NJ-T; NY-SC)	21	< 1	2	5	R
	Kentucky Warbler (NJ-SC)	21	< 1	2	3	B
	Upland Sandpiper (NJ-E; NY, PA-T)	21	< 1	2	3	B
	King Rail (NY-T; PA-E; NJ-SC)	21	< 1	2	3	B
	Canada Warbler (NJ-SC)	20	< 1	2	3	B
	Olive-sided Flycatcher	19	< 1	2	3	B
<i><u>IIA. High Regional Concern</u></i>						
	Field Sparrow	20	1.3	4	5	R
	Baltimore Oriole	20	1.9	5	4	B
	Eastern Towhee	20	1.4	4	5	R
	Eastern Wood-pewee	19	1.8	5	4	B
	Brown Thrasher	19	< 1	3	5	B
<i><u>IIB. High Regional Responsibility</u></i>						
	Louisiana Waterthrush	23	3.3	4	3	B

Northern Ridge and Valley (Area 17) PIF Landbird Conservation Plan - October 2003

Scarlet Tanager	21	5.8	5	2	B
Wood Duck	19	5.8	5	1	R
<i>II.C. High Regional Threats</i>					
Sedge Wren (NJ-E;NY-T;PA-T)	20	< 1	2	3	B
Grasshopper Sparrow (NJ-T;NY-SC)	19	< 1	2	5	B
<i>III. Additional Federally Listed</i>					
Bald Eagle (NJ,PA-E;US,NY-T)	18	< 1	2	3	R
<i>IV. Additional State Listed</i>					
Whip-poor-will (NY-SC)	19	< 1	2	3	B
Long-eared Owl (NJ-T)	19	< 1	2	3	R
Yellow-breasted Chat (NY,NJ-SC)	18	< 1	2	5	B
Northern Goshawk (NJ-E;NY-SC)	18	< 1	3	3	R
Vesper Sparrow (NJ-E;NY-SC)	18	< 1	2	5	B
American Bittern (NJ,PA-E;NY-SC)	18	< 1	2	3	B
Least Bittern (NY-T;PA-E;NJ-SC)	18	< 1	2	3	B
Yellow-crowned Night Heron (PA-E;NJ-T)	18	< 1	2	3	B
Loggerhead Shrike (NJ,NY,PA-E)	18	< 1	2	3	B
Veery (NJ-SC)	17	< 1	3	3	B
Northern Harrier (NY-T;NJ,PA-SC)	17	< 1	2	3	R
Eastern Meadowlark (NJ-SC)	17	< 1	2	5	R
Cooper's Hawk (NJ-T;NY-SC)	17	< 1	4	3	R
Bobolink (NJ-T)	16	< 1	2	2	B
Least Flycatcher (NJ-SC)	16	< 1	2	4	B
American Kestrel (NJ-SC)	16	< 1	4	3	R
Peregrine Falcon (NJ,NY,PA-E)	16	< 1	2	3	R
Red-shouldered Hawk (NJ-T;NY-SC)	16	< 1	2	3	R
Sharp-shinned Hawk (NJ,NY-SC)	16	1.4	5	2	R
Barn Owl (NJ,PA-SC)	16	< 1	2	3	R
Pied-billed Grebe (NJ-SC;NY-T)	16	< 1	2	3	R
Broad-winged Hawk (NJ-SC)	16	< 1	3	3	B
Black-crowned Night Heron (NJ-T;PA-SC)	16	< 1	2	3	B
Common Nighthawk (NJ,NY-SC)	15	< 1	2	3	B
Spotted Sandpiper (NJ-SC)	15	< 1	2	3	B
Black-throated Green Warbler (NJ-SC)	14	< 1	2	1	B
Osprey (NJ,PA-T;NY-SC)	14	< 1	2	3	B
Barred Owl (NJ-T)	14	< 1	2	3	R
Great Blue Heron (NJ-SC)	14	< 1	3	1	R
Horned Lark (NJ,NY-SC)	14	< 1	2	4	R
Winter Wren (NJ-SC)	13	< 1	2	3	R
Savannah Sparrow (NJ-T)	13	< 1	2	2	B
Cliff Swallow (NJ-SC)	11	< 1	2	2	B

Thirteen species on the PIF continental Watch List have manageable populations within this planning unit (Table 2.1); these are considered to be of high overall concern throughout their range. Three additional species (American Woodcock, Upland Sandpiper, and King Rail) are considered to be high priorities by other bird conservation initiatives and meet the same PIF watch list criteria. Of these 16 species, 6 have populations large enough for this area to be considered significant to their overall conservation, whereas 10 species have smaller, more patchily distributed populations. Golden-winged, Blue-winged, and Worm-eating warblers, and Wood Thrush are among the species of highest global importance. The highest priority species are birds of both mature forests and shrub habitats. Cerulean Warblers have expanded their range into this region in recent decades, whereas Golden-winged Warbler is experiencing a precipitous population decline at present.

Ten additional species are considered to be of high regional importance. Five species in tier IIA - Baltimore Oriole, Eastern Wood-pewee, Field Sparrow, Eastern Towhee, and Brown Thrasher - show a combination of high area importance and declining populations in the physiographic area. These are common species of forest and shrub habitats. In tier IIB, Scarlet Tanager, Wood Duck, and Louisiana Waterthrush have disproportionately large breeding populations in the area, but have stable or uncertain trends; these are species for which the region shares the responsibility for long-term planning. Tier IIC contains two additional species with small breeding populations that are highly threatened within the physiographic area. These two species highlight the need to protect sensitive and threatened grasslands; note that both of these species are legally listed in two or three states.

Bald Eagle is federally listed as threatened with proposed delisting and has small breeding populations within the planning unit. A long list of 33 additional species are listed as endangered, threatened, or special concern in at least one state and have at least small breeding populations within the Northern Ridge and Valley. As elsewhere in the Northeast, state-listed species are dominated by raptors, wetland, and grassland species, many of which are considered rare or peripheral in the region and otherwise score relatively low in the PIF prioritization process. Conservation attention for these species, however, will often benefit other high-priority species in the same habitats.

The overall priority species pool of 60 species (34% of the breeding avifauna) includes many common species of forests and successional habitats, many of which are declining in the Northern Ridge and Valley. Considering all factors, the species of highest conservation concern include Golden-winged Warbler, Cerulean Warbler, and associated suites of shrubland and mature-forest breeders. Henslow's Sparrow and Upland Sandpiper represent an additional suite of grassland birds that deserves conservation attention wherever actions do not conflict with objectives for higher priority forest or shrubland species. These focal species help define conservation actions for larger suites of species in their respective habitats (see Section 4).

SECTION 3: BIRD CONSERVATION ISSUES AND OPPORTUNITIES

A. Early vs. Late-successional Habitats and Species -- Historical Baselines

Because most of the Northeast region has undergone major changes in forest cover during the past two centuries, the relative importance placed on early- versus late-successional species and their habitats today depends in large part on the historical baseline chosen for comparison. This issue, which permeates bird-conservation planning throughout the Northeast, must be resolved before priority species and habitats are determined. The priority species pool for the Northern Ridge and Valley includes many species that are dependent on successional habitats, and the vast majority of these show declining population trends. The planning unit also supports many regionally and even globally important populations of forest birds, and in contrast, most populations of forest birds in this region appear stable or even increasing.

To some extent, deciding on the "value" of early-successional bird populations is subjective; for example, the fact that two of the species with significant declining trends in the region are Rock Dove and House Sparrow is hardly reason for concern, as they are mostly associated with urban, agricultural, or other disturbed areas. Other species such as Golden-winged Warbler, however, rank high in regional importance and their declines are a matter of great conservation concern. Similarly, American Woodcock is a species of global concern that requires disturbed or managed habitats.

This plan recognizes the overall importance of both mature-forest and early successional species in long-term conservation planning, and calls for a balance of maintaining naturally disturbed

habitats, grasslands, and early successional stages within the managed forest landscape. Important disturbed habitats for migratory birds in this region include, airports, reclaimed mines, and areas that are currently in agricultural production. These areas could be managed to benefit high-priority grassland species, thus maintaining the overall diversity of the avifauna.

B. Urban and Recreational Development

Urban and suburban areas cover a relatively small portion (~3%) of the Northern Ridge and Valley planning unit. Perhaps the greatest threat from urbanization is the loss of agricultural land (especially dairy farms) around small and medium-sized cities. Subdivision of pastureland and large farms is particularly detrimental to area-sensitive grassland species, such as Upland Sandpiper and Henslow's Sparrow. Loss of shrubland habitats is also a major factor where development takes place in areas that were previously left fallow.

Most forests along riparian corridors in the region have historically been heavily impacted by human activity. In the Hudson River Valley many areas are more than 50% forested (Crossley 1999); however, it is more typical for these forests to be highly fragmented. As urban development spreads out of the major valleys onto the ridges, forest fragmentation is becoming a more important issue. Expansion of major urban centers, most notably the greater New York City metropolitan area are an increasing source of habitat destruction and fragmentation in this region. The large demographic shift from metropolitan to rural areas has resulted in loss of critical wildlife habitat especially in New Jersey, already the most densely populated state.

Another major threat associated with urban and recreational development is the overpopulation of white-tailed deer in areas that are not subjected to hunting. Deer have seriously altered the understory of forests in many areas, and may be the single greatest threat to high-priority forest-understory birds.

Although urban habitats are often thought of as non-habitat for most birds, several species in the priority pool for this unit are currently utilizing urban areas as their primary breeding habitat. In addition, municipal parks and even wooded neighborhoods can provide suitable stopover habitat that is critical to migrating landbirds in largely deforested valleys.

C. Changing Forest Structure and Forest Health

The primary goal of this bird conservation plan is to ensure the long-term maintenance of all important forest types in the future landscape mosaic. This must be achieved through careful forest-planning on both private and public lands, with the goals of economic gains and sustainability balanced with the needs of birds and other wildlife. This balance will likely differ in areas of different land ownership. By taking a landscape perspective, we can take advantage of the opportunities in each area, such that the cumulative result will be to maintain healthy bird populations into the future.

At present, one of the most important disturbance factors affecting forested habitats in this region is the prevalence and spread of native and exotic insect pests and disease. Beginning with American chestnut blight, a series of such elements threaten the integrity and health of Appalachian forest ecosystems. These include gypsy moth, which stresses oak and other hardwood forests, dogwood anthracnose, hemlock woolly adelgid, and the complex of organisms attacking American beech, collectively referred to as beech bark disease. In addition, oak decline is a condition that further threatens dominant oak forests. Threats from these factors are particularly insidious, because in most cases, no effective control agents are currently known (SAMAB 1996, USFS 1996).

In the Northern ridge and Valley, hemlock woolly adelgid constitutes an extreme threat to the health and diversity of forest habitats. Vast areas are affected, with nearly 100% mortality of hemlock trees in many areas. It is feared that hemlock will be lost as a component of the ridge

and ravine forests, with potentially major consequences for breeding birds.

In addition to pests and disease, the problem of diminishing understory is also affecting the suitability of some forests to support breeding bird populations. As many young forests age, larger and more mature trees dominate resulting in a significantly denser canopy that blocks sunlight from younger and smaller understory plants and trees. As noted earlier, white-tailed deer have a similar, detrimental effect on understory vegetation. This understory vegetation is needed to support populations of many high-priority forest dwelling birds like Worm-eating Warbler and Wood Thrush as well as most early successional species.

D. Bird Conservation Opportunities and Solutions

Several factors contribute to an optimistic assessment of future bird conservation planning in this region: (1) most priority bird species are still abundant and widespread, exemplifying the PIF objective of "keeping common birds common;" (2) increasing levels of cooperation exist among land-management agencies, private landowners, and conservation advocacy groups; and (3) some key sites important to breeding birds in this area are already under protection by state and federal government agencies or conservation organizations and efforts are increasing to manage lands appropriately.

Roughly 7% of the planning unit (325,000 ha) consists of federal or state-owned recreation lands. A majority of these are on the forested ridges and include over 200,000 ha of state forest land in Pennsylvania and New Jersey, the Delaware Water Gap National Recreation Area, High Point State Park in NJ, and the eastern edge of the Catskill State Park in NY. These large public lands represent core areas where implementation of conservation objectives for high-priority bird species may be incorporated into other planning efforts.

State agencies and NGO's provide a number of specific programs for implementing bird conservation objectives in the Northern Ridge and Valley:

Important Bird Areas Program

Identification of Important Bird Areas (IBA) within the New York, Pennsylvania and New Jersey portions of this planning unit has recently been carried out by National Audubon Society's New York (Wells 1998), Pennsylvania (Crossley 1999) and New Jersey state offices. Identified IBAs include 30 sites in New York and 37 in Pennsylvania portion of the planning area (Appendix 5). The New Jersey IBA program is still in its initial stages of organization and has not yet designated IBAs in the state. Conservation planning for these Important Bird Areas has begun and includes implementation of PIF plan objectives for high-priority landbirds. Specific sites will be referred to in greater detail under appropriate habitat sections below.

How the Important Bird Area program fits into the Partners in Flight bird conservation planning and implementation process has not been fully resolved. The IBA program is not only targeted at protecting sites that are important to PIF priority species, but also protects areas that are important migratory habitat for many species, support large numbers of particular species during the breeding or wintering seasons, provide habitat for birds listed as endangered, threatened or species of concern by state or federal agencies, sites that hold unique habitat types with characteristic bird life or sites that provide extraordinary opportunities for research or monitoring.

New York State Bird Conservation Areas

The Bird Conservation Area Program was established in 1997 by state legislation and is based on Important Bird Areas program work by the National Audubon Society of New York State. This legislation applies criteria for designating Bird Conservation Areas (BCAs) to state-owned lands and waters, and seeks to "safeguard and enhance" bird populations and their habitats on these areas. An area is designated as a BCA if it is found to be important habitat for one or more

species. In general, a site is nominated because of its importance to large numbers of waterfowl, pelagic seabirds, shorebirds, wading birds, migratory birds, or because of high species diversity, importance to species at risk, or its importance as a bird research site.

The goal of the BCA Program is to provide a comprehensive, ecosystem approach to conserving birds and their habitats on state lands and waters, by integrating bird conservation interests in agency planning, management and research projects, within the context of agency missions. Further, the BCA Program will develop a process for designating BCAs and implementing programs to benefit bird populations, serving as models for other states, local governments and private landowners.

As of April, 2003, 25 sites have been designated, including some in the Northern Ridge and Valley. Administrating the program is a small staff with the New York Department of Environmental Conservation and the Office of Parks, Recreation and Historic Preservation who can be contacted for more information.

New Jersey's Landscape Project

Since 1994 the New Jersey Division of Fish and Wildlife's Endangered and Nongame Species Program has been using a large scale (landscape level) approach to protect rare species and important habitat in the state. The Landscape Project uses GIS technology to identify critical wildlife habitats within large landscapes that must be preserved to assure the conservation rare species and focuses on large areas that are ecologically similar with regard to their plant and animal communities. The primary purpose of the program is to provide information that will help planning and protection programs at all levels of government. Information will also be used to prioritize land parcels for purchase through acquisition programs. Mapping of this sort will likely encourage management of new areas while improving existing management efforts. Contact: www.state.nj.us/dep/gis

Pennsylvania Natural Area Program

This program, a part of the Pennsylvania Bureau of State Parks, attempts to maintain certain areas within the state park system at a higher level of ecological integrity. A "natural area" is an area within a state park of unique scenic, geologic or ecological value which will be maintained in a natural condition by allowing physical and biological processes to operate, usually without direct human intervention. These areas are set aside to provide locations for scientific observation of natural systems, to protect examples of typical and unique plant and animal communities and to protect outstanding examples of natural interest and beauty. In areas of high recreational activity and in otherwise hostile or degraded landscapes these areas may provide significant benefits for priority birds by improving habitat quality and reducing disturbance.

Ducks Unlimited Wetland Programs

Ducks Unlimited is actively working on wetland restoration and protection throughout the Pennsylvania portion of the planning unit. Their Beyond the Bay Program focuses on improving water quality and restoring and enhancing key waterfowl migration and wintering habitats in the Chesapeake Bay watershed. Under this Initiative, DU along with its conservation partners, including the Chesapeake Bay Foundation, Pennsylvania Game Commission, USFWS, and Natural Resources Conservation Service, works with private landowners to restore wildlife habitat on their property. To date, the Initiative has completed 225 projects restoring over 800 acres of wetlands, 625 acres of upland buffers, and 60 miles of stream bank habitat.

In 1985, Ducks Unlimited initiated the nationwide MARSH (Matching Aid to Restore States Habitat) program to protect and enhance waterfowl habitat at the state level. The program is funded on a 7.5% reimbursement based on the state's chapter income. To date, the MARSH program has generated \$1,526,558 for cost share on waterfowl projects in Pennsylvania. The

Pennsylvania Game Commission, U.S. Fish and Wildlife Service and other co-operators have contributed an additional \$4,817,834 to the future of waterfowl. Thus far, 377 projects have been completed, restoring and protecting more than 18,276 acres of wetland habitat in the state.

SECTION 4: PRIORITY HABITATS AND SUITES OF SPECIES

When species in the priority pool (Table 2.1) are sorted by habitat, the highest priority habitats and associated species can be identified (Table 4.1). The following section is separated into habitats that are either in need of critical conservation attention or are critical for long-term planning to conserve regionally important bird populations. The highest priority species do not form a cohesive habitat group, but rather are separated among different habitat types within this region: agricultural grassland, shrub-early successional, deciduous and northern hardwood forests, and wetland habitats. The individual species of greatest concern and most in need of immediate management actions are Henslow's Sparrow and Golden-winged Warbler. Habitats are presented below in an order that reflects the number of continental- and regional-level species of concern that require immediate management (IM) or management action (MA), as defined in Table 4.1. This ordering of habitats should not be interpreted as an absolute ranking, but rather as one method of ordering habitats according to which habitats and their associated species require the most immediate conservation attention across the physiographic area. Management activities at any local site need to consider landscape and regional contexts, the habitat potential of the site, and the priority species that occur at the site. Achieving a sufficient balance among all of these habitat types across the region (but not necessarily within any one particular landscape) to support the priority species across this physiographic area should be a consideration for any management at the local level. For example, managing for the grassland habitat-species suite of birds should not be considered as high of priority as mature oak-hickory or early-successional forest species across the entire physiographic area, but local sites that currently support or historically have supported Henslow's Sparrow or Upland Sandpiper (both of which are high priority species at the continental level) should be considered priority areas for grassland management. Within each habitat-species suite, certain species that represent particular limiting requirements (e.g., area sensitivity, snags) are considered priority species for setting population-habitat objectives and determining conservation actions and are capitalized in each habitat section and noted by bold typeface in the table below (see Lambeck 1997).

Table 4.1. Priority habitat-species suites for Area 17 (Northern Ridge and Valley). TB (threats breeding), AI (area importance), PT (population trend), and combined PIF scores from RMBO prioritization database (Carter et al. 2000). Species are sorted according to action level and then combined 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
<u>Shrub-early successional</u>							
	Golden-winged Warbler	C	IM, MO	26	4	3	4
	American Woodcock	C	MA	22	3	2	5
	Field Sparrow	R	MA	20	3	4	5
	Eastern Towhee	R	MA	20	3	4	5
	Willow Flycatcher	C	MA	19	3	3	3
	Brown Thrasher	R	MA	19	3	3	5
	Blue-winged Warbler	C	PR	22	3	3	2
	Prairie Warbler	C	PR	20	3	3	2

<u>Deciduous (oak-hickory) and riparian forest</u>						
Worm-eating Warbler	C	MA	24	3	4	3
Cerulean Warbler	C	MA, MO	24	4	2	3
Red-headed Woodpecker	C	MA	21	4	2	5
Eastern Wood-Pewee	R	MA	19	3	5	4
Louisiana Waterthrush	R	PR	23	3	4	3
Wood Thrush	C	PR	22	3	5	2
Scarlet Tanager	R	PR	22	3	5	2
Kentucky Warbler	C	PR	21	3	2	3
Baltimore Oriole	R	PR	20	2	5	4
<u>Agricultural / Grassland</u>						
Henslow's Sparrow	C	IM, MO	28	5	2	5
Upland Sandpiper	C	MA, MO	21	4	2	3
Sedge Wren	R	MA, MO	20	4	2	3
Grasshopper Sparrow	R	MA	19	4	2	5
<u>Northern hardwood-mixed forest</u>						
Olive-sided Flycatcher	C	MA	20	5	2	3
Eastern Wood-Pewee	R	MA	19	3	5	4
Louisiana Waterthrush	R	PR	23	3	4	3
Wood Thrush	C	PR	22	3	5	2
Scarlet Tanager	R	PR	22	3	5	2
Canada Warbler	C	PR	20	3	2	3
<u>Freshwater wetland</u>						
American Black Duck	C	MA	21	3	2	4
King Rail	C	MA, MO	21	4	2	3
Wood Duck	R	PR	19	3	5	1
Bald Eagle	R	PR	18	3	2	3

^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. Shrub-Early Successional

Importance and conservation status: The decline of shrub-early successional birds in eastern North America has received relatively little attention. Loss of this habitat type to reforestation is often seen as a return to more “natural” conditions. Similarly to grassland birds in the Northeast, shrubland birds are often seen as birds that only colonized the region in response to human activity, and that must necessarily return to the lower population levels they previously experienced (Askins 2000). Historically, many of these species colonized forest gaps created by disturbances such as fires and storms and openings by native Americans, but many depended on larger openings. Fire control and intensive trapping of beavers in the remaining large patches of forest have been factors decreasing the amount of suitable habitat for shrubland habitats (Askins 2000).

Human-influenced shrubland represents a significant portion of this habitat in the planning unit, although exact acreages are not known. Naturally occurring shrublands also occur in association with Pitch Pine/Scrub Oak woodland over well-drained soils, and these communities may well represent the original habitat used by many early successional bird species. These areas are

typically fire-dependant and following fires would have been suitable habitat for this suite of species. Shrub-early successional habitat may be especially short-lived in logged areas and longer lasting in agricultural sites. Loss of early successional habitats in this region is primarily due to reforestation and suburban development.

Wetter sites too provide habitat for early successional species. With stable water levels, edges of some emergent marshes are often "fringed" with shrubs creating a habitat transition into surrounding uplands. Many bird species use these edge habitats and their territories often encompass patches of forested wetland where tree species are stunted and are structurally similar to shrub-dominated sites. Historically, beaver populations have greatly influenced these sites. As beavers have recolonized northern forests after their near elimination during the height of the colonial fur trade, some shrub habitat is lost when alder-dominated riparian areas are flooded. However, these sites readily revert to shrubland habitat after prolonged abandonment by beavers.

Significant amounts of habitat for shrub-scrub birds also exists along powerline and pipeline corridors (Litvaitis 1999). Although, not all corridors in the planning unit are managed equally; some are maintained with little shrub and tree growth and others are allowed to develop robust stands of deciduous shrubs. How these sites are managed is extremely important and determines the amount and structure of the habitat that occurs there.

Associated priority species: GOLDEN-WINGED WARBLER, AMERICAN WOODCOCK, FIELD SPARROW, EASTERN TOWHEE, Willow Flycatcher, Brown Thrasher, Blue-winged Warbler, Prairie Warbler.

Like grassland-dependent species, shrub-early successional species are experiencing habitat loss. This habitat loss and the lack of regular disturbances creating and maintaining shrub habitat is accountable for the many shrubland-dependent species that are declining in this region. Golden-winged Warbler (-3.7%), Yellow-breasted Chat (-7.0%), Field Sparrow (-3.6%), Eastern Towhee (-3.9%), and Brown Thrasher (3.0%) are all showing statistically significant declines (Appendix 2).

Golden-winged Warblers are listed as a species of concern in New York, but not in New Jersey or Pennsylvania. The ongoing Golden-wing Warbler Atlas Project (2001-2003) has documented important breeding sites for this species in the Hudson Highlands of New York, Kittatinny Mountains and Delaware Valley of New Jersey, and along the ridges of eastern Pennsylvania. At all present sites, local encroachment and hybridization with Blue-winged Warblers is a major issue facing the conservation of Golden-wings. Local elevational or habitat segregation by these two species at some sites may allow pure populations of Golden-winged Warblers to persist; identifying and conserving these "safe-haven" sites is a critical component of sustaining this species in the region.

American Woodcock was found to be distributed rather uniformly within the physiographic area, according to regional breeding bird atlas projects. Although the BBS does not adequately sample this largely nocturnal species, singing-route surveys indicate a non-significant decline of 2-3% per year since 1966 in most of the region.

Field Sparrow and Eastern Towhee are the most abundant and widespread shrub-nesting species in the region and may serve as focal species representing the total extent of habitat required by this habitat suite; Field Sparrow representing old field habitat and Eastern Towhee shrub and young forests. Both species are at the core of their range and have experienced a greater than 50% decline in population size over the last 30 years, making them both species of high regional concern. Therefore, they require management or other actions to reverse declining populations and to minimize threats.

Other priority species within this habitat suite like Brown Thrasher, Prairie Warbler and Blue-winged Warbler are less common, but also widely distributed. Blue-winged Warbler and Prairie Warbler are the only species in this group with stable or even increasing populations, and they should be considered a conservation priority only in areas that do not support Golden-winged Warblers.

Because of their diverse habitat requirements, these species probably do not constitute a "habitat-species suite" per se. Listing them together, however, highlights the need to include early successional habitats in the conservation plan, where doing so is not in conflict with higher-priority forest-bird objectives.

Habitat and population objectives: Based on extrapolations from BBS relative abundances, very rough estimates of population size for priority species in this habitat suite can be derived (Table 4.2.). These crude estimates are most useful in illustrating the relative population sizes of various species and, perhaps, giving order-of-magnitude figures for setting population objectives for the region.

Table 4.2. Population estimates and targets (number of pairs) for priority species of early successional and forest-edge habitat in the Northern Ridge and Valley physiographic area. Percent of Atlas blocks based on number of 5-km blocks in which the species was reported (from Rosenberg and Wells 1995 (appendix 3), Brauning 1992, Walsh et al. 1999, Andrie and Carrol 1988).

Species	BBS population	% lost Since 1966	Population target	% Atlas blocks		
				NY	PA	OH
Golden-winged Warbler	2,200	> 50%	4,400	20	20	38
American Woodcock	??	> 50%	??	33	30	73
Field Sparrow	54,000	> 50%	110,000	100	89	98
Eastern Towhee	83,400	> 50%	167,000	95	90	98
Willow Flycatcher	??	??	??	46	29	
Brown Thrasher	8,200	> 50%	16,400	75	68	80
Blue-winged Warbler	6,000	stable	6,600	75	19	97
Prairie Warbler	6,000	stable	6,600	65	25	88

For species that have declined significantly during the BBS period, a population target may be set to approximate pre-BBS population levels; an annual decline of 2.4% per year corresponds with a 50% loss over 30 years. For species suffering a 50% or greater loss since 1966 (PT=5), this plan calls for roughly a doubling of present-day populations as a practical objective. For species suffering a 15-50% loss since 1966 (PT=4), this plan calls for increasing the current population by 1.4. For species showing stable/possibly increasing trends (PT=2) or unknown trends (PT=3), population targets are roughly rounded up from current population estimates by a factor of 1.1. Question marks indicate insufficient data to estimate a trend or population size. Note that the relative abundances used to for these estimates are averages across all BBS routes in the physiographic area using data from 1990-1998. For more details on methods used for calculating populations and targets, (see Appendix 3).

OBJECTIVE 1. Stabilize and reverse declines of Golden-winged Warbler; strive to maintain long-term population of 4,400 breeding pairs.

OBJECTIVE 2. Maintain stable breeding population of American Woodcock throughout the physiographic area as measured by a mean of approximately 0.7 singing males per Singing Ground Survey route in Pennsylvania, 0.4 males per route in New Jersey, and 2.0 birds per route in New York (see Kelley (2002) for details on Singing Ground Survey and population indices); maintain or increase current distribution among atlas blocks in all 3 states.

OBJECTIVE 3. Stabilize or reverse declining population trend for other common shrub-nesting species, maintaining long-term populations of 110,000 pairs of Field Sparrows and 167,000 pairs of Eastern Towhees.

Based on published densities, roughly 100,000 ha (247,000 acres) of disturbed or shrubby habitat is required to support the old field-associated species of this habitat suite (e.g., 110,000 pairs of Field Sparrows) and an additional 170,000 ha (420,000 acres) of early successional forest is required to support the species associated with young forest (e.g., 167,000 pairs of Eastern Towhees). Of this, 10,000 ha (25,000 acres) should be suitable to support 4,400 pairs of Golden-winged Warblers in areas without significant Blue-winged Warbler populations or in areas where habitat segregation minimized threats from hybridization.

Implementation strategy: Conserving populations of early successional species will require active management to maintain early successional conditions, as well as tracking changes in abundance of natural, early successional communities. Development of best management practices for utility corridors might minimize use of herbicides to control tree species and allow for sufficient growth of shrubs to be suitable for some members of this suite of species.

Important components of an implementation strategy should include:

- outreach targeted at both professional and private audiences (see "*Outreach*").
- identification and protection of naturally occurring shrub or barrens habitat and potentially designating these as Important Bird Areas.
- improved monitoring for species that show long-term declines, especially at the state level.
- building partnerships with utility operators for maintenance of shrubby conditions along powerlines and other corridors.
- building a volunteer network for monitoring of shrub (and forest) birds along utility corridors (perhaps using mountain bikes).
- management of some forests with some heavy selective and shelter cuts providing habitat. Clearcuts may also be appropriate in more heavily forested landscapes.

Opportunities for conserving shrubland habitat will often be tied to management of grasslands or agricultural lands, because the majority of habitat for both species will not be maintained without human intervention. A continuum of grassland to shrubland habitat may be achieved by varying the intensity of management on any given property. Whereas many grassland species are area sensitive, most shrub-associated birds are typically not sensitive to patch size. Many of these species will use small patches of habitat within an otherwise undesirable matrix. [Bryan Watts patch assessment model]

Furthermore, maintaining shrubland species in primarily forested landscapes may be possible without causing many of the negative effects of fragmentation that affect forest dwelling species. This is because shrub species can take advantage of small habitat patches distributed throughout the forested matrix. For example, a narrow power-line corridor extending through a forested landscape may support large numbers of shrub-nesting birds without reducing suitability of the region to forest-breeding species. Managed logging may also create suitable habitat in some areas while, at the same time generating revenue.

Pine barrens represent an increasingly rare disturbance-dependent habitat type important to populations of shrubland birds. This habitat is maintained by frequent low-intensity fires that periodically remove the understory. As houses and other structures are built, fire suppression allows encroachment of species that dominate and eventually eliminate this community. Maintaining these communities will require acquisition or cooperative agreements with landowners to allow periodic burns.

A list of landowner incentive programs is presented in Appendix 4 of this report and is separated out by habitat type. Landowners and managers can reference this section to locate programs that will help promote bird conservation through habitat acquisition and management and other conservation measures.

Important Bird Areas

Several Important Bird Areas that have been identified in the planning area contain important shrub-early successional 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. Important sites for shrub and early-successional birds are (Wells 1998, Crossley 1999):

New York

- Saratoga National Historic Park-3,200 Acres; Public (U.S. Nat. Park Serv.). 12% shrub/scrub. Species include Golden-winged Warbler and Eastern Bluebird.
- John Boyd Thatcher State Park-2,300 acres; Public (NY off. of parks, rec., and hist. pres.). Some shrub/scrub. Golden-winged Warbler has bred here.
- Northern Shawangunk Mountains-100,000 acres; Mix of private, municipal, state and non-governmental conservation agency ownership. Greater than 50% deciduous woods, significant coniferous woods, shrub/scrub, non-tidal wetlands and some grasslands. Whip-poor-will, Golden-winged Warbler, Prairie Warbler, Eastern Towhee and Common Nighthawk.

Pennsylvania

- Bald Eagle Ridge-21,800 acres; Public (PA Game Comm.)/Private. Mature forests, late-successional stage fields, wetlands. Species include American Woodcock and Turkey.
- Black Moshannon State Park and State Forest- 5,800 acres; Contains several wetland types including bogs, marshes and swamps as well as a 250-acre man-made lake. Includes prime habitat for a significant Whip-poor-will population.
- Susquehanna Riverlands-2,500 acres; Private. Privately owned recreation park open to the general public. Diverse habitat types. Significant wetlands and hundreds of acres of forest and shrubland. Thicket species include Golden-winged Warbler, Yellow-breasted Chat, Blue-winged Warbler and Brown Thrasher.
- The Barrens at Scotia-6,500 acres; Public (PA Game Comm.)/ Private. One of the largest examples of pitch pine-scrub oak barrens remaining in Pennsylvania. Large number of Neotropical migrants including Blue-winged, Cape May, Black-throated Blue, Yellow-rumped, Black-throated Green, Blackburnian, Pine, Palm, Bay-breasted, Blackpoll, Cerulean, Black-and-white, Redstart, and Worm-eating Warblers. Also Ovenbird, Louisiana and Northern Waterthrush. Breeding Whip-poor-will, American Woodcock and Ruffed Grouse.

Management Recommendations: The decline in numbers of many early successional species, including the Golden-winged Warbler, are associated with loss of breeding habitat caused by reforestation, intensive agricultural use and urban/suburban development.

Litvaitis et al. (1999) suggest that management recommendations for shrubland birds will differ based on the landscape context. In more forested regions they recommend management follow a “shifting mosaic” model that will mirror a natural disturbance pattern by providing for several

small patches and a few large patches of shrub. In more modified landscapes they recommend consolidation of existing patches, including powerline corridors. Clustering patches would facilitate movement of birds between patches, and would be more likely to safeguard against local extinctions.

Habitat requirements for priority species in this habitat suite are similar, and there is overlap in management recommendations between species. In particular, management practices for American Woodcock, the only priority early-successional species that is extensively managed for (e.g. in Pennsylvania), may have important benefits for Golden-winged Warbler populations.

Golden-winged Warbler -- Golden-winged Warbler populations have shown drastic declines in this region in the past several decades. Reforestation of abandoned farmland in this region has been a significant factor in the steady declines. Several other factors may contribute, such as competition with the Blue-winged Warbler, nest parasitism by cowbirds and possibly loss of winter habitat (Confer 1999). The ability of this species to persist in areas where Blue-winged Warblers have colonized is critical to their future survival in this region.

Habitat tracts of 10-15 ha can support several pairs and are preferred over both smaller and larger areas (Confer 1992). Confer (1992) also noted that Golden-winged Warblers usually include a portion of forested edge in their territories. Confer (1999) recommends management for this species that includes three elements, 1) creation or maintenance of sufficient amounts of habitat, 2) a management program that assesses the impact of Blue-winged Warblers and Brown-headed Cowbirds and potential need for control measures and 3) the effect of winter habitat loss and needs. Habitat can be created through succession following farming and certain logging techniques. Optimal management for this species includes rotational burning or intermittent farming with a cycle of roughly 40 years that allows for roughly 25% of a managed area to be burned once every 10 years. As habitat for Golden-winged Warblers typically only remains suitable for 10-20 and will take approximately half that to become suitable. Succession in adjacent areas will provide the forest edge that is apparently a requirement of this species (Confer 1999).

American Woodcock -- American Woodcock require a mix of habitats, including forest openings or clearings for singing displays in spring, alder or other young hardwoods on moist soils for feeding and daytime cover, young second-growth hardwoods for nesting, and large fields for night-time roosts (Mendall and Aldous 1943; Connor, in Andrie and Carroll 1988). Although there have been many studies of seasonal habitat use, the relationship between specific habitat features and population demography remain unknown (Keppie and Whiting 1994). Silvicultural practices can enhance habitat available for woodcocks (Sepik et al. 1981), although a shift away from even-aged management (creating large areas of uniform shrub cover) may be detrimental to populations (Keppie and Whiting 1994). Deterred by large urban centers, extensive tracts of forest and major agricultural areas offer the best opportunities to manage for woodcock populations (Brauning 1992). Management for American Woodcock will also provide habitat for Golden-winged Warbler (Confer pers. comm.).

Field Sparrow -- In most regions and habitats Field Sparrows require more than 2 ha (Sousa 1983), but territory sizes range from 0.3 to 2.4 ha (Walkinshaw 1945, 1968, 1978; Crooks 1948; Best 1977; Evans 1978; Laubach 1984). Management practices that completely remove woody vegetation will not benefit this species (Best 1979, Stauffer and Best 1980). Disturbance, such as burning, should be avoided before territories have been established, approximately March to early April (Best 1979, Carey et al. 1994, Herkert 1994b). Burning Field Sparrow habitat while it is occupied by the birds will cause Field Sparrows to abandon their territories (Best 1979, Carey et al. 1994). Similarly to the recommendations for Golden-winged Warbler, small, isolated shrubland patches should not have more than 50-60% of total area burned at a time, and where several small patches are present, a rotating schedule also can be implemented to provide adjacent burned and unburned areas (Herkert 1994a). On larger patches (>80 ha) burning should be conducted on a rotating schedule with 20-30% of area treated annually (Herkert

1994a).

Eastern Towhee -- Eastern Towhee is known as a forest edge species, but can be found in forest interiors when there is adequate shrub understory and open canopies. Populations have been declining significantly in the Northeast over the past decades at a rate of about 2% per year between 1966 and 1998 (Palis 2000a). In the Ridge and Valley Physiographic Area, the rate of population losses has been much higher at about 4% per year. The primary cause of population decline is loss of habitat through forest succession (Palis 2000a). Populations are lower in overgrazed areas, forests where the understory is over browsed by white-tailed deer, and urbanized areas. Management strategies should strive to create and maintain suitable and diverse early- to mid-seral successional habitats with a wide variety of woody plants (Palis 2000a and Greenlaw 1996). Opening forest canopies by timber harvest will promote the growth understory vegetation. In New York, and other parts of the northeast, pine barren habitats often contain major concentrations of Eastern Towhees. Therefore, blocks of this habitat should be a high conservation priority (Greenlaw 1996).

Research and monitoring needs: Within the planning unit, populations of 7 of the 8 focal species within this habitat appear adequately monitored by the BBS with a minimum of 16 of 123 possible routes reporting for those species. American Woodcock is underreported on the BBS as compared with Atlas results, but is adequately sampled by singing-ground route survey.

Basic research on the biology of high priority species in this suite is warranted, especially for the Golden-winged Warbler. Specific needs for this species on the breeding grounds include:

- determine range of suitable habitats and identify present breeding sites for Golden-winged Warbler in this region.
- develop improved monitoring program for Golden-winged Warbler that considers their patchy distribution and low population size.
- designate sites where significant populations of Golden-winged Warblers occur as Important Bird Areas and encourage monitoring programs at these sites.

In addition, general research and monitoring needs for this habitat include:

- compare early successional habitats resulting from natural disturbances vs. forestry practices with regard to suitability for high-priority species
- determine effects of woodcock habitat management techniques on other priority, early-successional bird species
- what are regional patterns of land-use, relative to early successional habitats?
- specific recommendations about burning regimes.

Species specific research needs can be found in their respective TNC wings management abstracts: www.conserveonline.org.

Outreach: This group of species, with the exception of American Woodcock is largely overlooked by land managers and biologists. Considerable attention has focused on the decline of American Woodcock populations and where management programs have been introduced for this species other birds of early successional habitats have likely benefited. Recently, awareness of habitat loss for early successional species has broadened to include nongame birds. Consequently, attention, especially by conservationists, has been focused on grassland and shrub-nesting birds.

One of the greatest challenges ahead in dealing with the decline of early-successional habitat and associated bird species is convincing the public that action is needed that such efforts are not contradictory to maintaining diverse ecosystems (Litvaitis et al. 1999). Important components of a public (and professional) outreach message would include:

- most species using this habitat type are in decline.
- shrubland-associated species are not typically sensitive to patch size, unlike grassland birds, therefore even efforts on small properties can effect local populations.
- this habitat occurs in the Allegheny Plateau due to via human disturbance either through forestry practices or former agricultural land.
- suitable habitat for some species exists in such heavily managed systems as utility corridors.
- periodic disturbances, either mechanical or fire for example, are important if persistence of some of this habitat type is desired over long periods of time.

B. Deciduous (Oak Hickory) and Riparian Forest

Importance and conservation status: The deciduous forests of the Appalachians reach their northern limit in the Northern Ridge and Valley region and are among the most diverse forests in North America. Oaks dominate the majority of these forests, with important distinctions in species composition (including mixing with pines) that are dependent on gradients of moisture and elevation. Forests broadly classified as oak-hickory cover 1.8 million ha., or 38% of the physiographic area (Table 1.1). The largest tracts are in the highlands along the many northeast-southwest running ridges. Across the entire physiographic area, the forest is somewhat fragmented by the intervening valley areas that are primarily agricultural increases, early successional, or human development.

From a bird-conservation perspective, the importance of this habitat type is great, because of the number of associated bird species with high priority scores in the planning unit. In general, these species are relatively abundant throughout the region, but many also show significantly declining population trends in the physiographic area. Setting habitat and population objectives is therefore not as straightforward as in rare or patchy habitat types. Conservation planning should focus on extensive tracts of representative forest types, and should address the microhabitat needs of species showing regional or local declines. Many of the high-priority species in this habitat are dependent on particular characteristics of the forest understory.

Much of the riparian habitat in the Northern Ridge and Valley, especially in the major river valleys, has been drastically impacted by agriculture, urbanization and other human activity. This forest type generally occurs at lower elevations and includes bottomland-hardwood communities, including forests dominated by sycamore, box-elder, elms, maples, ash, or cottonwood. Riparian forests are typically highly fragmented, decreasing their value to area sensitive residents such as Cerulean Warbler and Yellow-throated Vireo.

Unlike in the mid-Atlantic Ridge and Valley to the south, large areas of National Forest and other federal lands do not exist in this physiographic area. Significant areas of state-owned lands exist, however, including 70,000 ha of state parks (primarily in New York and New Jersey) and 224,000 ha of state forest lands (primarily in Pennsylvania). The Delaware Watergap National Recreation Area also covers significant areas of bottomland and adjacent forests on slopes. These public lands are extremely important for the conservation of forest-dependent species in this region.

Associated priority species: WORM-EATING WARBLER, CERULEAN WARBLER, WOOD THRUSH, LOUISIANA WATERTHRUSH, Red-headed Woodpecker, Eastern Wood-pewee, Scarlet Tanager, Kentucky Warbler, Baltimore Oriole.

Some of the highest priority species within this habitat suite are near the northern limit of their range, but still occur widely where oak-hickory forest remains. The focal species occupy the full range of mature deciduous forest types and represent optimal conditions of canopy structure (Cerulean Warbler), understory structure (Wood Thrush, Worm-eating and Kentucky Warblers), and specialized conditions along streams (Louisiana Waterthrush).

Cerulean Warbler is one of the fastest declining songbirds in North America and in October 2000 it was petitioned for threatened listing under the federal endangered species act (decision pending). It is declining over much of its breeding range despite the fact that its range has expanded, particularly in the Northeast. This species is currently listed as a species of concern in 13 states, threatened in two states and endangered in one state. Within the planning unit it is listed as a species of concern in New York and New Jersey. In this region, the Cerulean Warbler is showing a non-significant population increase (based on only 10 BBS routes), but is showing a survey-wide decline of 4.0%. Significant populations occur in the Hudson valley and adjacent highlands of New York, Delaware Valley and adjacent ridges in New Jersey, and scattered throughout the Pennsylvania portion of the region. In many parts of its range, the Cerulean Warbler is not adequately sampled by BBS making it difficult to accurately measure population trends.

Worm-eating Warbler, Red-headed Woodpecker, and Kentucky Warbler are patchily distributed, primarily in the southern portions of the physiographic area. Other priority species, such as Wood Thrush, Louisiana Waterthrush, Scarlet Tanager, Baltimore Oriole, and Eastern Wood Pewee, are much more common and widespread. Of these, however, the woodpecker, oriole, and wood-pewee are showing significantly declining populations. For instance, Red-headed Woodpecker is nearly extirpated in the New York and New Jersey portions of the region.

Wood Thrush is a very common bird in the Eastern forests, but is of high conservation concern because it has experienced steady, long-term declines throughout its range. Rangewide, it has declined more than 40%. It is stable in this region, making it a species of high regional responsibility. In other words, conservation of Wood Thrush populations in the Northern Ridge and Valley is critical to the overall well-being of this species.

Unlike the Wood Thrush, Louisiana Waterthrush is not as widespread with a low overall density. They are difficult to monitor and require the unique and threatened habitat type of moist forest, woodland, and ravines along streams.

Habitat and population objectives: Based on extrapolations from BBS relative abundances, very rough estimates of population size for priority species in this habitat suite can be derived (Table 4.3). These crude estimates are most useful in illustrating the relative population sizes of various species and, perhaps, giving order-of-magnitude figures for setting population objectives for the region.

Table 4.3. Population estimates and targets (number of pairs) for priority species of Deciduous and riparian habitats in the Northern Ridge and Valley physiographic area. Percent of Atlas blocks based on number of 5-km blocks in which the species was reported (from Rosenberg and Wells 1995 (appendix 3)).

Species	BBS population	% lost Since 1966	Population target	% Atlas blocks		
				NY	PA	NJ
Worm-eating Warbler	20,000	uncertain	22,000	15	34	78
Cerulean Warbler	6,800	incr.?	7,500	5	13	55
Red-head. Woodpecker	120	> 50%	250	6	19	16
Eastern Wood-Pewee	55,000	15-50%	77,000	90	89	92
Louisiana Waterthrush	4,800	uncertain	5,200	20	36	86
Wood Thrush	277,200	stable	300,000	100	92	97
Scarlet Tanager	70,000	Incr.?	75,000	90	86	97
Kentucky Warbler	2,700	uncertain	3,000	0	36	50
Baltimore Oriole	58,000	15-50%	81,000	100	87	102

For species that have declined significantly during the BBS period, a population target may be set to approximate pre-BBS population levels; an annual decline of 2.4% per year corresponds with a 50% loss over 30 years. For species suffering a 50% or greater loss since 1966 (PT=5), this plan calls for roughly a doubling of present-day populations as a practical objective. For species suffering a 15-50% loss since 1966 (PT=4), this plan calls for increasing the current population by 1.4. For species showing stable/possibly increasing trends (PT=2) or unknown trends (PT=3), population targets are roughly rounded up from current population estimates by a factor of 1.1. Question marks indicate insufficient data to estimate a trend or population size. Note that the relative abundances used to for these estimates are averages across all BBS routes in the physiographic area using data from 1990-1998. For more details on methods used for calculating populations and targets, (see Appendix 3).

OBJECTIVE 1. Encourage possible population expansion and sustain a regional population of 7,500 pairs of Cerulean Warblers distributed among the existing large forest blocks (e.g., ≥ 1700 ha; Hamel 1992b) within this planning unit.

OBJECTIVE 2. Maintain a sustainable population of 22,000 pairs of Worm-eating Warblers

OBJECTIVE 3. Maintain stable breeding population of 300,000 pairs of Wood Thrushes (16-17 birds per BBS route) distributed throughout the physiographic area (shared with Northern hardwood-mixed forests objective).

OBJECTIVE 4. Maintain a sustainable population of 5,200 pairs of Louisiana Waterthrushes distributed among a large number of watersheds within well-forested landscapes.

Assumption: maintaining suitable habitat for these four focal species will be sufficient to support sustainable populations of most other birds in this habitat suite.

These objectives indicate the amount of suitable habitat needed to support population objectives. This does not assume that all existing forest habitat is suitable for these species. Based on published average density estimates of 3 pairs/10 ha for Wood Thrushes across their range (Roth et al. 1996), roughly 1 million ha (2.5 million acres) of deciduous forest is required to support entire habitat-species suite, including 300,000 pairs of Wood Thrush; of this total, 92,000 ha (227,000 ac) of mature oak-hickory and riparian forest is required to support 7,500 pairs of Cerulean Warblers and 22,000 pairs of Worm-eating Warblers. Habitat for Worm-eating Warbler should be distributed across the region in a system of large forest blocks (e.g., ≥ 350 ha; Robbins et al. 1989) with minimal nonforest edge and a high probability of producing source populations. In addition, 8,000 km of forested streams is required to support 5,200 pairs of Louisiana Waterthrush.

Implementation strategy: Implementing the broad objectives for this habitat-species suite will require a comprehensive forest management plan for the entire Northern Ridge and Valley region that acknowledges the long-term importance of maintaining large source populations of priority forest birds. Elements of such a plan that are most relevant to the high-priority birds include:

- maintaining a balance of forest-age classes, including adequate amounts of mid-successional as well as late-successional forest
- ensuring long-term tree-species composition; i.e. prevent loss of particular species from stands through disease or selective harvest.
- ensuring adequate structural diversity, especially regarding understory components (shrubs, tree falls); monitor effects of natural disturbances as well as deer browsing and forestry practices
- set maximum allowable levels of forest fragmentation, especially due to planned development or other factors that permanently eliminate forest habitat and create forest edges next to non-forest land uses; e.g. do not allow any 10,000 km² landscape to fall below 70% forest cover

- identify and designate PIF Bird Conservation Areas (BCA), within which long-term sustainability of priority bird populations is a primary management objective.

An as yet untested approach to the long-term conservation of forest birds is the establishment of Bird Conservation Areas (BCA) within the forested landscape that maximize the chances of sustaining source populations of priority species. Such an approach would essentially superimpose an island or patch model onto a seemingly continuous landscape. Identification of potential BCAs would take into account present-day local distributions of priority species, specific habitat relationships that optimize density or reproductive success, land ownership status, and prospects for long-term maintenance of desired habitat conditions. Land-management goals within BCAs would explicitly include sustainability of priority bird populations; i.e., these areas would sustain target populations for the physiographic area. Areas outside of designated BCAs might support similar habitats and bird populations, and might contribute substantially to the overall bird community, but they would not be *essential* to meeting specific population objectives for priority species. This basic approach is being developed and tested in patchily distributed grassland habitats in the Midwestern U.S. (Sample and Mossman 1997; Fitzgerald et al. 1998; and Winter et al. 1998).

A procedure for designating Bird Conservation Areas for forest birds in a region such as the Northern Ridge and Valley planning unit would involve the following steps:

- determine local optimum densities of priority species in suitable habitats.
- determine area required to support source population (e.g. 500 pairs) of priority species, assuming optimum habitat conditions.
- determine present distribution of priority species; e.g. using Breeding Bird Atlas or similar occurrence data.
- identify potential patches of suitable or optimal habitat, using GIS, that meet requirements of habitat type (e.g. forest type, elevation), minimum size, and known or suspected occupancy for each priority (focal) species.
- superimpose suitable habitat patches identified for multiple priority species to identify patches capable of supporting entire habitat-species suite.
- overlay land-ownership, conservation status, and other relevant features (e.g. using GAP analysis) to identify potential BCAs.
- work cooperatively with landowners, local conservation NGO's, state and federal agency personnel, municipal conservation commissions, land trusts, etc. to develop long-term habitat conservation plans for these areas.

This basic procedure is similar to that used for GAP Analysis, identification of focal areas within TNC's Ecoregions, and other conservation planning processes, but it has not been applied previously to PIF planning for forest birds. Note that if similar initiatives to identify conservation focus areas are ongoing within a physiographic region, then a modified approach could begin with already-identified areas (i.e., existing or target conservation lands), assessing their potential for supporting priority bird populations, and then following the above procedure to identify any additional locations that are needed to meet population objectives.

If BCAs are being identified in more than one forest type, then these processes should be coordinated, or perhaps combined. If forest types occur primarily as a mosaic over large landscapes (more likely), then particular BCAs might be selected that are large enough to meet the needs of species in both habitats.

A list of landowner incentive programs are listed in Appendix 4 of this report and is separated out by habitat type. Landowners and managers can reference this section to locate programs that will help promote bird conservation through habitat acquisition and management and other conservation measures.

Important Bird Areas

Several Important Bird Areas that have been identified in the planning area contain important riparian-deciduous (oak-hickory) forest habitat and will be an important focus for implementation phase of the PIF conservation plans. IBAs in the state of New York have been shown to contain 95% of the known breeding population of Cerulean Warbler, the top priority bird in this habitat suite. As a part of the IBA designation process conservation strategies for these sites will be produced. Important sites for birds occupying riparian-deciduous forest are (Wells 1998, Crossley 1999):

New York

- Schodack Island State Park-1,000 acres; Private (NY Dept. of Parks, Rec., and Hist. Pres. and U.S. Army Corps of Eng.). Breeding species include Cerulean Warbler (up to 13 pairs) as well as wintering Bald Eagles.

Pennsylvania

- Bald Eagle Ridge-21,800 acres; Public (PA Game Comm.)/Private. Mature forests, late-successional stage fields, wetlands. Breeders include Cerulean Warbler and Worm-eating Warbler. Migrant Wood Thrush, Scarlet Tanager and Ovenbird. Especially important to migrating raptors including Golden Eagle and Broad-winged Hawk.
- The Hook Natural Area-5,119 acres; Public (Dept. Cons. & Nat. Res.). Second-growth oak forests with a rhododendron understory. Perhaps the largest contiguous forest block in the state. Species include Hooded, Black-and-white, Black-throated Green, Black-throated Blue, and Pine Warblers, Louisiana Waterthrush, Acadian Flycatcher, Winter Wren and others. Over 175 breeding species with large numbers of area-sensitive, forest-interior species.
- Susquehanna Riverlands-2,500 acres; Private. Privately owned recreation park open to the general public. Diverse habitat types. Significant wetlands and hundreds of acres of forest and shrubland. Species include Scarlet Tanager, Ovenbird, Worm-eating Warbler, Pine Warbler, Red-eyed Vireo and Rose-breasted Grosbeak. Riparian forests support Yellow-throated Vireo, Warbling Vireo and American Redstart.
- South Mountain, Caledonia, Michaux State Forest-40,000 acres; Public (Dept. of Cons & Nat. Res.). A mixed forest area with a dense understory of rhododendron in stream valleys. Wood Thrush, Veery and Ovenbird, Hooded Warbler, Eastern Wood-pewee, Canada Warbler, Hermit Thrush, Kentucky Warbler and Worm-eating Warbler.
- St. Anthony Wilderness- 70,000 acres; Public (PA Game Comm.). Contains very large, healthy and intact forests making it a valuable habitat for interior forest species such as Cerulean Warbler, Red-headed woodpecker, and Eastern Wood-pewee.
- Upper Delaware Scenic River- 38,400 acres; Public (NPS) and Private. Contains a wide variety of habitat including riparian, woodland, and rhododendron and laurel thickets. Species include worm-eating Warbler, Louisiana Waterthrush
- Frankstown Branch- 5,000 acres; Private/State. Prime riparian forest habitat with steep wooded slopes, and floodplain forests. Species with high breeding concentrations include Eastern Wood-pewee, Wood Thrush, Cerulean Warbler, Louisiana Waterthrush, and Baltimore Oriole.

- Canoe Creek Watershed- 15,259 acres; Public (PGC, DCNR) and Private. This area has a high level of diversity in habitats allowing for numerous bird species as well. Made up of large, unfragmented forests, rhododendron and laurel thickets, and several miles of riparian forest along the creek. Species found here include, Cerulean Warbler, Louisiana Waterthrush, and Red-shouldered Hawk.

Management Recommendations: As with the other habitat types in this region, the decline of migratory birds within this habitat is primarily due to loss or degradation of the birds' nesting, wintering, or migratory-stop over environments. Habitat requirements for the priority species are similar for the most part with some subtle differences. For example, Wood Thrush inhabits the interior or edges of mature moist forests, often near water. Louisiana Waterthrush prefers forests around fast moving streams, while Worm-eating Warblers prefer moderate to steep sloped well-drained forests. A common characteristic of all the priority species is that they tend to breed in higher density and with greater success in large forest tracts with high structural diversity and multiple vegetation layers (e.g., canopy, sub-canopy, understory). Forest habitats with these characteristics are generally managed through either landscape level or ownership level efforts.

Landscape Level

Over the last few decades forest cover in the Northeast has increased substantially as lands were abandoned and regrew to forests. Despite this, some of the bird species often considered "forest" species are in decline in the Northeast or throughout their range. Although "forest fragmentation", in general, is often cited as the cause for declines, the exact causes for these declines are unknown but could include: problems in the wintering grounds, problems during migration (loss of habitat, towers, wires, etc), fragmentation of habitat by urban/suburban development, forest fragmentation due to other losses of breeding habitat (mountain top mining and filling, commercial clearcuts of large size), deer browsing on forest regeneration, acid rain, pesticides, and other potential causes.

The effects of fragmentation of forest cover on some forest breeding birds has been fairly extensively studied and depend on a number of factors, including:

- *percent forest cover of the area in question* - The higher the percent forest cover, the less the effect of fragmentation that is occurring.
- *landscape position* - Amount and type of forest and fragmentation in the area seen from a larger landscape viewpoint. Areas of higher forest cover, with larger blocks of contiguous forest, will be less affected by some fragmentation factors.
- *adjacent land use* - Adjacent land use can be an important component that determines the amount of detrimental impact. Fragmentation adjacent to an active farm or subdivision for example, will have much more detrimental impacts than fragmentation adjacent to another block of forest.
- *size of forest and fragmentation* - Small clearcuts or shelter cuts in a forested landscape will have minimal, or potentially even positive impacts on many birds. Nesting near edges of cuts may or may not reduce nesting success. Post fledged and non-nesting birds may find openings created to be important foraging areas since productivity of insects and fruits will be higher in these areas. Very large clearcuts will have more serious impacts due to the amount of area cut.
- *shape of forest and fragmentation* - The more edge created, the more potential for negative impacts.

- *type of fragmentation* - Fragmentation due to suburban or urban development will be negative for almost all species of conservation concern. Impacts of fragmentation due to forestry practices can vary from positive to minimally negative to negative depending on the factors discussed above. Clearcuts and shelter cuts will also regrow to forests relatively rapidly so any such fragmentation is comparatively short term. In areas of moderate to high forest cover, it is unlikely that small scale forestry practices are a serious cause of fragmentation. Very large commercial cuts of hundreds or thousands of acres are a more serious concern due to the size of the area deforested.

In areas of high forest cover, the effects of fragmentation are normally minimal. In areas of low forest cover, the forests are already more highly fragmented, and additional fragmentation is a larger concern.

Although fragmentation is often blamed, there are other problems in the forested breeding areas. Overpopulation of deer in some areas prevent forests from regenerating normally, thereby altering the structure and species composition. Understory is often scant or absent due to over browsing. This can have a serious detrimental impact on birds that want or need an understory of shrubs or saplings. In addition, acid rain and pesticides can have negative impacts in some places.

Maturing forests can also be having an impact. As fields revert to forest, and the forest matures, and is not logged, the canopy closes, thereby limiting understory. This, along with deer browsing tends to produce a lot of "park-like" forests that are very likely not as productive as more diverse forests.

Regardless of the forest cover, a balance must be struck between the birds that need early successional habitats and those that require forest for breeding. It is important to look beyond the parcel in question to get a better understanding of what needs to be done at landscape and regional levels.

Because this physiographic area, as a whole, is about 55% forested, landscape contexts vary considerably across the planning unit, ranging from those with $\leq 30\%$ forest cover to those with $\geq 70\%$ forest cover. Landscape-level management recommendations will vary based on the landscape context.

In general, for landscapes that are $\geq 70\%$ forested, maintaining the overall forested nature of the landscape should be the priority, with less concern about managing the size of individual forest patches. Studies have shown that forest fragmentation effects tend to be minimal in well-forested landscapes (Robinson et al. 1995 and Rosenberg et al. 1999). Losing large amounts of forest to other land uses which reduce the overall forest cover, such as agriculture or human development (housing, shopping, recreation), is the largest concern in these landscapes. Timber harvesting that is part of a biologically-sound forest management plan will have minimal or potentially even positive impacts on many forest birds that utilize early-successional forest habitats during the post-breeding period.

As percent forest cover decreases at the landscape-level, fragmentation effects become more of a concern and managing for the size and shape of forest patches becomes more important. Maryland Partners in Flight provides an excellent publication on habitat management guidelines for forest and other landbirds (Maryland PIF1997). Many of the recommendations from this publication are applicable to the moderately- to less-forested landscapes in this physiographic area. Maintaining the largest possible forest tracts are of primary importance, ideally at least 7,500 acres (3,000 ha) for conservation. Human development should be concentrated on the periphery to prevent fragmentation and the negative effects associated with non-forest edges and to maintain the largest possible areas of suitable forest habitat for species that are area-sensitive. In landscapes toward the lower end of the % forest cover continuum, forest management should be done with more concern over fragmentation effects. In landscapes with relatively low amounts

of forest cover, even the temporary openings and internal forest edges created by timber harvest can lead to increased parasitism rates from brown-headed cowbirds or increased predation rates near these openings. See further discussion of fragmentation effects in the following paragraphs.

In regions with low percent forest cover or highly fragmented areas, Maryland PIF emphasizes the importance of maximizing the amount of contiguous forest "interior" (forest area more than 100m from non-forest edges) within each forest tract. Management and acquisition efforts should be targeted first at less isolated forest patches and should promote the reforestation of gaps between larger forest patches. Increasing forest connectivity is likely to benefit the dispersal ability and habitat quality for many forest interior birds.

At the landscape scale, this physiographic area has a limited number of large areas of contiguous forest of high quality habitat for forest birds. Where these areas remain, primarily in state and national parks, private forest preserves and timber holdings, forest interior birds may reproduce at high rates, creating a large surplus of young birds on a yearly basis. On the other hand, forest birds occupying highly fragmented forests, especially those in an agricultural or human-developed landscape, may have lower reproductive rates due to the effects of predators and nest parasites. Area-sensitive species may not occupy these patches at all. Only through the influx of new birds from "source" habitats can these populations be maintained. As a result, conservation of highly productive source populations may be essential to maintaining viable populations throughout an entire region. Conservation efforts that attempt to maintain large patches of contiguous habitat and suspected source populations may be especially effective in achieving regional bird conservation goals.

Publicly owned land such as state parks and forests contain many of the remaining large patches of contiguous forest in the Northern Ridge and Valley. Management of these areas should emphasize maintaining the types of forest present (plant species composition, successional stages, vegetation structure), landscape patterns (patch configuration and shape, patch size, distance between patches, amount of non-forest edge), and amounts of forest cover with the intent of maintaining source populations of priority forest birds.

Franzreb et al. (2000) suggest a perspective for forest management in different landscape patterns. They also state that even-aged management may only be consistent with goals for conservation of forest birds in highly forested landscapes. Even-aged harvests are extreme forms of local disturbance and may have a severe impact upon habitat suitability of surrounding forest in more agriculturally dominated regions. But even in more forested areas, attempts should be made to aggregate harvest areas and optimize cut shape and area to minimize disturbances.

Ownership Level

Private land owners can play an important role in forest bird conservation within the context of their land ownerships and management objectives (Sweeney and Wigley 1993).

Maryland PIF (1997) suggest avoiding even the loss of small forests (<25 acres or 10 ha), especially along streams and riparian corridors where forested areas are extremely scarce. These sites are important, perhaps critical, to the survival of migrating birds in many habitat suites because they provide necessary migratory stopover sites. Removal of small woods that would improve the quality of grassland habitat may be a consideration for land managers.

In smaller forest blocks, timber activity near forested riparian areas can negatively impact forest bird populations in these areas by reducing the overall forest cover and habitat distribution. Some species are easily extirpated from strips of riparian forest if strips are too narrow. Studies designed to ascertain specific recommendations for the suggested width of strips has yielded a variety of results. Some suggest that riparian strips should be at least 60 meters on either side of a river in order to prevent extirpation of more area sensitive species, other suggest more or less. Maintaining riparian forest buffers of at least 100m is probably a good working rule.

Other forest management recommendations include reducing deer numbers as well as prescribed burns. Deer populations can be controlled through exclosures and hunting, promoting a diverse forest understory. Controlled burns can also promote forest regeneration and provide snags and other habitat characteristics that are important for fire- or gap-dependent native forest vegetation and some bird species.

Worm-eating Warbler -- Well-drained upland deciduous forests with understory patches of mountain laurel or other shrubs are favored by Worm-eating Warbler. They are also found near streams or drier portions of swamps with brushy understory and are almost always associated with hillsides (Gale 1995, Bushman and Therres 1988). Worm-eating Warbler is also sensitive to fragmentation requiring large tracts (300-1,000 ha) of unfragmented habitat with minimal non-forested edge for successful nesting (Patton and Hanners 1996).

Cerulean Warbler -- Declines are most often attributed to destruction of both breeding habitat in North America and wintering habitat in the Andes. Breeding areas in the Northeast are often in floodplains or other mesic conditions and are typified by large mature trees and closed or semi-open canopies. According to the Cerulean Warbler Atlas Project (1996-1998), the birds may seek out the most mature forest conditions available in the region. Landscape situation and context has a strong bearing on whether otherwise suitable breeding habitat will actually contain warblers (Hamel 1992b).

The management potential for populations of Cerulean Warblers is not known. Populations in large tracts of good habitat are apparently stable, suggesting that factors responsible for the decline are not operating uniformly everywhere (Hamel 1992a). The persistent increase in the known range, particularly in the Northeast, suggests that management potential is good (Hamel 1992b). Because the Cerulean Warbler is a management priority, habitat management should consist of forest management that creates appropriate structure for Cerulean Warblers and preventing chemical contamination and maintaining natural hydrology (Hamel 1992a). According to Hands et al. (1989), reforestation and protection of young trees in large lowland tracts should provide future habitat.

Louisiana Waterthrush -- Louisiana Waterthrush is an uncommon bird that prefers mature bottomland forests with moist but often sparse undergrowth near rapidly moving streams (Degraaf and Rappole 1995). In the Eastern United States, they can also be found near swamps and scrub or thickets and ravines near streams (Brown 1999). Preferable habitat is large tracts of land (probably greater than 100 ha) with little undergrowth near flowing waters of streams (Brown et al. 1999). The key component of the Louisiana Waterthrush's breeding habitat is rapidly, clean flowing water (Degraaf and Rappole 1995). They are not usually found in areas of high fragmentation or areas where water quality is negatively affected by urban or agricultural landuse (Brown et al. 1999).

Wood Thrush -- Key habitat for Wood Thrush is a moist woodland understory of deciduous shrubs or saplings and a fairly open forest floor with decaying leaf litter; bottomland and other rich hardwood forests are good examples. Pine forests with a deciduous understory and well-wooded residential areas are also used. Nest predation and cowbird parasitism rates are also a problem, but are found to be higher in small tracts and along the edges of larger forests (Sallabanks 1993). Where possible, Wood Thrushes can be commonly found in woodlots 1-5 ha in size, but this depends on surrounding land use (Whitcom et al. 1981 in Degraaf and Rappole 1995). According to a study by Simons et al. (2000), Wood Thrush populations in the Smoky Mountains residing in high quality habitat may be able to increase the population numbers, but that extensive areas of suitable habitat outside protected areas are needed to sustain North American breeding populations. Understanding the breeding habitat requirements more thoroughly will be an important step in reversing population declines and building and maintaining future population.

Research and monitoring needs: Within the planning unit, populations of only 6 of the 9 focal species within this habitat appear adequately monitored by the BBS with a minimum of 14 of 46 possible routes reporting for those species. Red-headed Woodpecker, and Cerulean and Kentucky Warblers are reported on too few routes to reliably estimate a population trend in the region.

General research needs for priority forest birds in this region include:

- determine range of suitable habitats and identify present breeding sites for Cerulean Warbler in this region; develop better understanding of site conditions that attract these birds in this physiographic area.
- determine factors limiting Wood Thrush populations in this region and causes of population declines.
- conduct population ecology studies of species for which less is known, such as Louisiana Waterthrush, Cerulean Warbler, Wood Thrush, and Worm-eating and Kentucky Warblers.
- design and conduct targeted monitoring program to track population trends of forest interior species and raptors that are not well-covered by BBS in this physiographic area.
- assess the effects of various logging practices (especially selection and shelterwood cuts) on occurrence, breeding density, and nesting success of the priority species in this habitat suite.
- monitor reproductive success of this suite of species at different locations throughout region to better understand where forest fragmentation causes problems and where it does not.
- determine relative importance and use of other habitat types during the post-fledging period prior to migration. Some information has now been collected on this topic for Wood Thrushes, but little is known for most species.
- assess sensitivity of species in this habitat suite to pesticides currently being used to control gypsy moths and other insect pest species.
- catalog the number, size and arrangement of conservation lands within the planning unit and complete BCA needs (as described above); develop region-wide monitoring program targeted for high priority forest birds.

Species specific research needs can be found in their respective TNC wings management abstracts: www.conserveonline.org

Outreach: An estimated 80% of forest land in the eastern United States is privately owned. Outreach targeted at owners of private woodlots and large timber companies to manage (or not manage) their land to benefit forest birds could benefit these species. In the Northern Ridge and Valley, the Cerulean Warbler is of particular concern and is currently under consideration for federal threatened listing by the US Fish and Wildlife Service. Proactive management on private lands would benefit conservation efforts and landowner interests.

Another tool for forestland conservation with tremendous potential is conservation of open space. Conservation of open space has benefits for property tax stability, ecotourism and maintenance of nearby property values (Kerlinger 2000). The state of New York has a state open space plan (NYDEC 1998) that outlines regional priorities for state land acquisition. Wildlife and ecosystem conservation may act as supporting criteria in qualifying a land for acquisition and increasing its priority. Unfortunately, many current priorities are targeted at purchasing access areas for recreational activities and little money is even indirectly targeted at wildlife conservation. Continuing effort to include wildlife conservation priorities in the agenda may yield great rewards.

C. Agricultural / Grassland

Importance and conservation status: Unfortunately, the pre-settlement extent of natural grasslands in the Northern Ridge and Valley and throughout the Northeast is unknown (Vickery and Dunwiddie 1997, Askins 1997), making determination of the historical importance of grassland habitat in this region difficult. However, Askins (1997) and Bollinger (1991) argue that

destruction of the Great Plains, which once harbored the largest numbers of grassland birds in North America, gives added importance to populations in the Northeast making them a “more significant component of the entire, continent-wide population.”

There is evidence to show that large, scattered, native grassland existed in the northeastern United States in pre-colonial times (Day 1953, Marks et al 1992, Patterson and Sassman 1988, Askins 1997, Mehrhoff 1997, Vickery and Dunwiddie 1997). Perhaps the most compelling of this evidence is the existence of many subspecies of grassland birds native to the region such as the Heath Hen, (Ipswich) Savannah Sparrow, and eastern subspecies of Henslow’s Sparrow (*A.h. susurrans*) (Askins 1993, 1997). Natural fires and those set by native Americans (Zaremba and Hubbs 1991, Tyndal 1992, Vickery and Dunwiddie 1997), ice and wind storms are all significant disturbances that contributed to the persistence of grassland habitat in the Northeast.

As of 1998, there were roughly 48,773 ha of bluestem, grama and wheatgrass grasslands in the Northern Ridge and Valley (USFS FIA data). Another 689,094 ha were pasture, hay and other mixed crops and approximately 1,293,483 ha were cultivated in with corn, wheat or other irrigated agriculture. Total agricultural land comprised 1,982,577 ha, approximately 43% of the entire physiographic area, while native grasslands comprised less than one percent.

Both agricultural changes and development are threatening remaining grassland habitats in the region. Most priority bird species require large, contiguous patches of grassland to breed successfully. In some areas, airports and military bases provide the best remaining habitat. Land management that regulates the frequency and type of disturbance to grassland will play a huge role in the maintenance of existing grasslands, the restoration of unmanaged areas, and the creation of new habitat in the planning unit.

Associated priority species: HENSLOW’S SPARROW, UPLAND SANDPIPER, GRASSHOPPER SPARROW, and Sedge Wren.

A high proportion of the declining species in this region are associated with grasslands. Grasshopper Sparrow (-7.2%), Vesper Sparrow (-5.6%), Ring-necked Pheasant (-5.4%) and Eastern Meadowlark (-6.4%) are all declining at alarming annual rates (BBS 1966-1999). Several species are found on state endangered species lists: Henslow’s Sparrow (NJ-Endangered, NY-threatened; Upland Sandpiper (NJ-Endangered, NY-Threatened, PA-Threatened); Grasshopper Sparrow (NJ-Threatened, NY-Species of Concern).

Henslow’s Sparrow, a very specialized species, is at the eastern extreme of its present breeding range in this physiographic area, and it is in danger of regional extirpation. Intensive management in areas that supported this species in the recent past is urgently needed to save this species as a regional breeder. Similarly, Upland Sandpiper persists at very few sites in the region, and maintenance of large grassland patches is critical to its future survival.

Upland Sandpipers are one of the most specialized and area sensitive species in this suite. Many sites supporting this species would likely support populations of one or more other priority species. Population trend estimates for Upland Sandpipers are only available for FWS region 5 as a whole, because too few routes encounter this species. Data from the BBS indicate a stable population from 1980 through 1996 in the northeast region (+0.1%, $P = 0.98$, $n = 23$ routes), although serious declines undoubtedly preceded the start of the BBS.

Grasshopper Sparrow has declined over 50% from its original BBS population in the past 30 years. Like the other species in this habitat suite numbers have declined due to loss of habitat either due to human settlement, cultivation, or reforestation. Losses are compounded as a result of mowing and subsequent predation (Ehrlich et al. 1992).

Sedge Wren is an extremely rare and local breeder in the Northern Ridge and Valley and was found in less than 5% of the breeding bird atlas blocks in the region. This species is listed in 10 states across the Northeast. Within the planning unit it is listed as endangered in New Jersey and threatened in Pennsylvania and New York. This species was poorly sampled by the BBS and population trends in the physiographic area are uncertain, but likely tend toward the almost ubiquitous declines that grassland and wetland species in this region are showing. The Sedge Wren also occupies large, un-mowed pastures, or recently fallow fields, often in association with Henslow's Sparrow. This species has a tendency to appear in widely scattered localities during the middle of summer, and many of these birds are not confirmed as breeding locally.

Habitat and population objectives: Based on extrapolations from BBS relative abundance (see Appendix 3), very rough estimates of population size for priority species in this habitat suite can be derived (Table 4.4). These crude estimates are most useful in illustrating the relative population sizes of various species and, perhaps, giving order-of-magnitude figures for setting population objectives for the region.

Table 4.4. Population estimates and targets (number of pairs) for priority species of grassland and agricultural habitats in the Northern Ridge and Valley physiographic area. Percent of Atlas blocks based on number of 5-km blocks in which the species was reported (from Rosenberg and Wells 1995 (appendix 3), Brauning 1992, Walsh et al. 1999, Andrie and Carrol 1988).

Species	BBS population	% lost Since 1966	Population target	% Atlas blocks		
				NY	PA	NJ
Henslow's Sparrow	0	> 50%	100	2	1	2
Upland Sandpiper	35	> 50%	70	2	4	6
Sedge Wren	0	??	50	1	0	2
Grasshopper Sparrow	13,000	> 50%	26,000	10	49	34

For species that have declined significantly during the BBS period, a population target may be set to approximate pre-BBS population levels; an annual decline of 2.4% per year corresponds with a 50% loss over 30 years. For species suffering a 50% or greater loss since 1966 (PT=5), this plan calls for roughly a doubling of present-day populations as a practical objective. For species suffering a 15-50% loss since 1966 (PT=4), this plan calls for increasing the current population by 1.4. For species showing stable/possibly increasing trends (PT=2) or unknown trends (PT=3), population targets are roughly rounded up from current population estimates by a factor of 1.1. Question marks indicate insufficient data to estimate a trend or population size. Note that the relative abundances used to for these estimates are averages across all BBS routes in the physiographic area using data from 1990-1998. For more details on methods used for calculating populations and targets, (see Appendix 3).

OBJECTIVE 1: Re-establish a viable breeding population of at least 100 pairs of Henslow's Sparrows.

OBJECTIVE 2: Maintain and enhance large grassland sites in each state to support viable population of 100 pairs of Upland Sandpipers.

OBJECTIVE 3: Increase the regional Grasshopper Sparrow population to 26,000 pairs.

Based on published density estimates, roughly 78,000 ha (192,700 ac) of suitable grassland habitat is needed within the agricultural matrix to support 26,000 pairs of breeding Grasshopper Sparrows, primarily in patches >20 ha in size; of this, 200 ha (500 ac) should be suitable to support 100 pairs of Henslow's Sparrow, and 1,300 ha (3,300 ac) should be in patches large

enough to support 100 pairs of Upland Sandpipers. Specific sites known to support uncommon and area sensitive species should be protected.

Assumption: maintaining suitable habitat for these focal species will be sufficient to ensure the long-term representation of the full habitat/species suite in this region.

Implementation strategy: Maintaining existing populations of any grassland bird species in the Northern Ridge and Valley is closely associated with human use of the habitat. Most of the grasslands in the region are of agricultural origin, yet, many modern agricultural practices can be detrimental to successful reproduction of these species. This contradiction needs to be considered in any implementation strategy. If farmers are unable to "earn a living", these lands will be converted to other uses such as residential developments and surrounding land will revert to forest. This scenario is evident throughout the Northeast. Keeping farmland as farmland and balancing any detrimental effects of agricultural uses will be key to successful implementation. Combinations of increased awareness among conservationists and the public are essential for successful implementation.

Mitchell et al. (2000) recommend a multi-faceted approach to curtail declines in grassland breeding birds throughout the Northeast. It includes:

- Maintenance of existing grassland habitats
- restoration of degraded grasslands
- creation of new grassland habitats
- education and outreach efforts to encourage agricultural practices that reduce impacts on grassland nesting birds.
- ongoing monitoring, evaluation and assessment programs.

A list of landowner incentive programs is presented in Appendix 4 of this report and is organized by habitat type. Landowners and managers can reference this section to locate programs that will help promote bird conservation through habitat acquisition and management and other conservation measures.

Important Bird Areas

Several Important Bird Areas that have been identified in the planning area contain important agricultural/grassland 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 (Wells 1998, Crossley 1999). Important sites for shrub and early-successional birds are:

New York

- Saratoga National Historic Park-3,200 Acres; Public (U.S. Nat. Park Serv.). 24% grassland. Species include Northern Harrier, Upland Sandpiper, Henslow's Sparrow (up to 16 pairs), Grasshopper Sparrow, Savannah Sparrow, Bobolink, and Eastern Meadowlark.
- Fort Edward Grasslands-10,000 Acres; Multiple private landowners. Primarily pasture, agricultural/cultivation with some residential development. An exceptional grassland bird breeding and wintering area. Breeding Northern Harrier, Upland Sandpiper, Grasshopper Sparrow, Henslow's Sparrow, Vesper Sparrow, Savannah Sparrow, Bobolink and Eastern Meadowlark. Short-eared Owl and Northern Harrier Winter here.
- Galeville Airport-621 acres; Public (U.S. Gen. Serv. Admin.). Primarily grasslands, but with significant acreage of shrubland, non-tidal wetlands and deciduous woods. Important wintering site for Short-eared Owl, Northern Harrier, Rough-legged Hawk, Red-tailed Hawk,

American Kestrel, Northern Shrike. Breeding Northern Harriers, Upland Sandpiper, Grasshopper Sparrow, Henslow's Sparrow, Vesper Sparrow, Savannah Sparrow, Eastern Meadowlarks, and Bobolinks.

Pennsylvania

- Freedom Township Grasslands-2,000 acres; Public (Nat. Park Serv.)/ Private. Extensive pastures, hayfield and large yards from open grassland habitat suitable for a diversity of grassland birds. Upland Sandpiper, Loggerhead Shrike, Eastern Meadowlark, Short-eared Owl, Barn Owl, Bobolink, Grasshopper Sparrow, Northern Bobwhite.
- Hershey Special Habitat-665 Acres; Private. A unique combination of prime owl roosting habitat (mature Eastern White Pine groves) combined with large areas of open grasslands. Species include Short-eared Owl.

Management recommendations: In the Northeast, habitat destruction through urbanization, row-crop agricultural techniques, and ecological succession in which encroachment of woody species into grasslands reduce the available breeding habitat are drastically affecting populations of nearly all the priority species in this habitat suite. Fragmentation of habitat into small, widely scattered plots is another serious threat affecting multiple species.

For the most part, grassland birds in this region depend upon human activity to maintain grassland habitat. Small changes in management practices and, in some cases, creation of new grassland habitat will benefit grassland species. Grassland birds have always depended on the creation of ephemeral habitat and have a strong ability to locate and colonize new areas (Askins 2000).

Numerous studies in the Northeast have revealed a clear, positive relationship between grassland area and the diversity and abundance of breeding birds using grasslands (Bollinger and Gavin 1992, Smith and Smith 1992, Vickery et al. 1994, Norment 1999a and b). Consideration should be given to consolidation of adjacent grassland fields, through the elimination of hedgerows, stone walls, or tree lines, in areas where open land occupies a considerable amount of the surrounding landscape and grassland management can be identified as a reasonable management alternative. Connecting adjoining fields could increase the overall abundance or diversity of grassland birds to numbers greater than what the fields would accommodate when separated.

Intact grasslands large enough to support breeding populations of some of the more area-sensitive species and those with larger home ranges are rare in this physiographic region. In general, fields less than 100 ha in size should be considered low priorities for grassland maintenance or enhancement activities, while areas of more than 100 ha should be the highest priorities for such actions. While grasslands as small as 60 ha may be sufficient for more area sensitive species such as Upland Sandpiper, evidence shows that these birds are more likely to persist and reproduce in grasslands of higher acreage. Ideally, grasslands of 500+ ha would provide viable populations of all species in this habitat suite (Carter 1992, Herkert 1994a and b, Jones and Vickery 1997, Tate et al. 1999, Johnson et al. 1999).

Prescribed fire can be an effective tool to prevent woody encroachment in grasslands. Fire alters the structure of grasslands by reducing woody species cover, decreasing litter, and removing dead, aboveground vegetation (DeBano et al. 1998). These effects could reduce vegetation density and overall community height in warm season grasslands, making them more attractive as nesting habitat for grassland birds. However, fire also has been shown to increase productivity of warm season grasses increasing the height and density of live stems of tall grasses, making these areas potentially less attractive to some grassland breeding birds (Howe 1995, DeBano et al. 1998). Therefore, prescribed burns must be carefully planned and

understood before being used as a management option for grassland habitats in this region.

Many Refuge managers and other wildlife managers in the region prefer to establish warm season instead of cool season grasses because of ease of maintenance with prescribed fire. Warm season grasses emerge late in the spring, creating a wide window of opportunity for conducting dormant-season prescribed burns, which stimulate warm season grass productivity. Warm season grasslands, however, can be much more difficult and costly to establish. Studies in the Midwest have demonstrated that several species of grassland birds respond positively to prescribed fire in warm season grasslands (Sample and Mossman 1997). Species such as Grasshopper Sparrow, Savannah Sparrow, and Bobolink have shown increases in breeding activity following prescribed burns (Herkert 1994a and b, Johnson 1997). In contrast, recent studies have shown that dormant-season burns fail to increase grass cover (Howe 1995, Mitchell 2000) and often fail to reduce shrub cover (Euler 1974, Mitchell 2000) in cool season grasslands.

If current mixtures of warm season grasses fail to provide adequate habitat for grassland breeding birds in the Northeast, it may be advisable for managers to focus on cool season grasslands to meet habitat objectives. As described by Norment (1999b), "if the primary management goal is to create good habitat for grassland birds, then planting nonnative cool season grasses may be a more effective strategy, at least in cooler parts of the Northeast." As an alternative, different warm season grass mixtures may need to be developed. Work by Norment (1999a, 1999b) and Paton et al. (1999), and studies in Wisconsin (Sample and Mossman 1997, p. 65), indicate that alternative grassland mixes, such as shorter grasses, lower seeding rates, or mixes of warm and cool season grasses, and wildflowers may provide better grassland bird breeding habitat.

Used on a large scale, fire can also be more cost-effective than mowing and herbicide treatments. Similar management practices that apply prescribed burns of agricultural mowing in early spring or well after breeding will likely benefit most species in this habitat suite (Carter 1999, Dechant et al. 1999, Tate et al. 1999, Stewart 1975, Whitmore 1981, Frawley 1989, Rodenhouse et al. 1995, Vickery 1996). However, inappropriately applied these management tools are detrimental to grassland birds.

Mowing can also be an effective means of managing grassland habitat, but can also negatively affect grassland birds if done during the wrong time of year. Furthermore, it may not be totally effective in eliminating woody vegetation from shrub-dominated fields. Since many of the high priority grassland birds in this planning unit can raise two broods in a single breeding season, postponing mowing until after September 1 will allow these birds the greatest opportunity to maximize annual reproductive success. At a minimum, mowing should be delayed until late June to allow for young to fledge from first nesting attempts. Bollinger (1995) found that fields with early mowing dates the previous year had lower bird densities than fields with later mowing dates. He suggested that mowing-induced nest destruction was partially responsible for lower breeding densities in the following year. While some studies have shown that abundance of some grassland birds is reduced in the year following mowing (Bollinger 1995, Herkert 1994a, Mazur 1996), Norment (1999a) found high numbers of grassland birds in fields that had been mowed during late summer or fall of the previous year.

If mowing every two or three years is sufficient to deter woody growth, such a schedule may be more beneficial to grassland birds than annual mowing. Warm season grassland do not need to be mowed as frequently as cool season grassland to control shrub invasion, so a three to four year schedule may be adequate for warm season grasses (Myers and Dickerson 1984). Thus, dividing fields and mowing sections on a rotational basis, where feasible, may be the most appropriate means of using mowing to manage grasslands for bird populations.

Restoration or new establishment of grasslands (e.g., from strip-mined areas) may offer potential habitat. Short-eared Owls, Henslow's Sparrow and several others have been shown to breed in old strip-mines. This species suffers from loss of grassland to development, changing land-use

patterns, wetland loss, and changing farming practices (Tate et al. 1999). Airports and airfields also offer excellent habitat for breeding colonies, providing level expanses of short grass fields attractive to Upland Sandpipers and other grassland birds in this region. Restoring natural disturbance regimes such as reestablishment of the role of fire and beavers should be encouraged where ever possible.

Because such a large proportion of grassland birds in this region are in decline we include some brief species abstracts to highlight the priority and habitat requirements of several grassland birds and direct attention to management of these species. We make the assumption that maintaining suitable habitat for Henslow's Sparrow and Upland Sandpiper in the planning area will be sufficient to support sustainable populations of most other birds in this habitat suite.

The following are more specific recommendations for sustaining high-priority species:

Henslow's Sparrow -- Population declines have been attributed to the loss of grassland breeding habitats, either through urbanization or succession to shrublands and forests, as well as intensive production of row cropping which reduces or eliminates the use of hay fields and grazing land (Smith 2000). Management recommendations from Herkert (1998) in Smith (2000) are:

This species likely requires at least 30 ha of contiguous grassland (Zimmerman 1988, Smith and Smith 1992, Mazur 1996). Where contiguous management units are not available, efforts should be made to provide a complex of smaller units located near enough to one another to facilitate colonization from adjacent territories in available habitat (Mazur 1996). Grassland restoration areas should be more than 50 ha and preferably larger than 100 ha in size (Herkert et al. 1993). Disturbance of any kind should be avoided during the breeding season as it will reduce available habitat for at least one breeding season (Herkert et al. 1993, Hanson 1994, Melde and Koford 1996). Implement a rotational disturbance regime to maintain grassland habitat (Zimmerman 1988, Herkert 1994b, Melde and Koford 1996). Birds require a dense and moderately tall (>30cm) grassy vegetation (Smith 1992). Remove woody vegetation when it becomes taller than fully-grown herbaceous vegetation (Smith 1992, Herkert et al. 1993, Mazur 1996) or use prescribed fire (Eddleman 1974).

In order to avoid destruction of nests, conduct management treatments before birds arrive in the spring (15 April) or after the young have fledged (15 September) (Smith 1992, Hanson 1994, Mazur 1996). In Missouri, implement conservation haying (one annual cut after mid-July) on a two to three year rotation (Swengel 1996) and provide idle or lightly grazed grasslands. Light grazing was defined as grazing pressure that left less than 40% vegetative cover at 25 cm (Skinner 1982, Skinner et al. 1984). Prescribed burns should be conducted in early spring (March to early April) or late fall (October and November) (Herkert et al. 1993). In New York, burn once every five to six years or mow every four to five years (Mazur 1996). These intervals will allow vegetation to recover between disturbances to provide suitable habitat while keeping succession in check.

There appear to be significant differences between nesting habitat preferences in eastern sites and birds nesting in the Midwest. Such differences could correspond to differences in habitat selection by the two recognized subspecies. Therefore, management recommendations for the Northern Ridge and Valley should consider alternate management activities, particularly with respect to the roles played by fire and grazing, and the requirements for standing dead vegetation and litter depth in the two regions. The role of litter depth in habitat selection has not been well investigated in eastern locations. In Pennsylvania, reclaimed strip-mines support Henslow's Sparrow and management should attempt to maintain these habitats (Smith 2000).

Upland Sandpiper -- Upland Sandpipers breed in extensive, open grasslands, which in the Northeast historically included old hayfields, pastures, wet meadows, sandplain grasslands, and blueberry barrens. They tend to be loosely colonial while breeding and often return to the same nesting fields in successive years (Carter 1992). Nesting territories are generally comprised of independent nesting sites with adjacent communal areas for feeding and loafing (Swanson 1996).

A variety of vegetation structures are required by this species for breeding. They build their nests in areas of mixed, tall grasses and forbs not taller than 60 cm and they forage in areas with short grasses (Swanson 1996, Jones and Vickery 1997). They generally do not occupy areas with uniform graminoid or forb cover (Buhnerkempe and Westmeier 1988, Swanson 1996). A variety of native and introduced grasses have been associated with Upland Sandpiper nesting fields, including timothy (*Phleum* spp.), bluegrass (*Poa* spp.), needlegrass (*Stipa* spp.), bluestem (*Andropogon* spp.), quackgrass (*Agropyron* spp.), Junegrass (*Koeleria* spp.), and brome grass (*Bromus* spp.) (Carter 1992).

Vickery et al. (1994) found that in addition to grassland area, the only vegetation parameter that was a significant predictor of Upland Sandpiper abundance in Maine grasslands was patchiness of cover types. The density of this species was subsequently found to be positively associated with bare ground and negatively correlated with tall forbs and tall shrubs (Vickery et al. 1999). In New York, Bollinger (1995) found Upland Sandpiper abundance to be negatively associated with total vegetation cover and vegetation height.

Grasshopper Sparrow -- Grasshopper Sparrows have been observed breeding in the following habitats in the Northeast: lightly grazed pasture, reclaimed surface mines, old hayfields, moderately grazed pastures, coastal grassland barrens, airfields and cool season grasslands.

Whitmore and Hall (1978) found Grasshopper Sparrows to be abundant on reclaimed surface mines in West Virginia: up to 17 pairs per 10 ha. Dominant vegetation was fescue (*Festuca* sp.), birdsfoot trefoil (*Lotus corniculatus*), red top (*Agrostis gigantea*), timothy (*Phleum pratense*), and oats (*Avena* sp). Whitmore (1979a) reported average heights of vegetation in breeding territories between 22-36 cm. Sparrow breeding activity increased as vegetation height and grass cover decreased, and bare ground increased, over time. Conversely, sparrow pairs decreased as grass cover increased, and bare ground declined. Wray et al. (1982) also found that Grasshopper Sparrow abundance declined as grass density increased.

During peak breeding periods, Whitmore (1979b) observed that Grasshopper Sparrow territories had average litter depths of 1.5 cm. Whitmore (1979a) concluded that the sparrows require sparsely vegetated grasslands with at least 24% bare ground, 74% litter cover, and 27% grass cover, at the time of spring arrival. Whitmore (1981) found lower values for the following variables in Grasshopper Sparrow territories vs. non territories: grass/forb/shrub/litter cover and litter depth. Mean bare ground in territories was 29%, while mean grass cover was 25.7%. The researcher pointed out that Grasshopper Sparrows prefer to nest in bunchy grasses, and forage in openings or gaps between bunches. Wray et al. (1982) reported that increased litter and grass density inhibits Grasshopper Sparrow foraging efficiency.

Vickery et al. (1994, 1999) evaluated Grasshopper Sparrows on Maine grassland barrens. The researchers identified areas of short graminoid cover and forb cover as significant, positive predictors of Grasshopper Sparrow relative abundance, with litter cover and blueberry cover negatively associated with this species. Bollinger (1995), in sampling 90 hayfields in New York, found Grasshopper Sparrows breeding on older fields (had not been replanted in more than 15 years). Grasshopper Sparrow abundance was positively related to plant richness, field size, and vertical patchiness, and negatively related to litter depth. According to Bollinger, Grasshopper Sparrows "prefer the lowest and sparsest fields" (Bollinger 1991) with short, patchy, grass-dominated vegetation (Bollinger 1995).

Smith (1997) observed Grasshopper Sparrows breeding in pastures in central New York. The minimum pasture area containing Grasshopper Sparrows was 16.2 ha, with an average size of 49.1 ha. On average, Grasshopper Sparrows occupied the least productive of the pastures studied. The researcher recorded the following habitat characteristics: mean grass height/territory of 54 cm; mean percent goldenrod/territory of 9.4%; and mean percent goldenrod/pasture of 38.5%. Grasshopper Sparrows bred on fields that had been mowed 1 to 6

years earlier. Smith noted that the Grasshopper Sparrows appeared to prefer shorter vegetation than Henslow's Sparrows (Smith 1997).

Minimum Grasshopper Sparrow breeding habitat in the Northeast is characterized by large areas (20-30 ha) with abundance increasing with habitat size. Preferred habitats contain bare ground (about 25%), grasses of short to medium height (20-50 cm), and shallow litter (0-2 cm). Suitable habitats are found in old hayfields (Bollinger 1995), although the birds also breed in moderately grazed pastures (Smith 1997) and ungrazed, cool season grasslands (Norment 1999a). In the Midwest, Grasshopper Sparrows reportedly nest in low, sparse, grass-dominated habitats, with shallow litter (Cody 1968, Wiens 1969), including hayed and burned sites (Swengel 1996). Kahl et al. (1985) report optimum vegetation height of 20-30 cm and litter depth of 0.1-1.0 cm for the species in Missouri.

Research and monitoring needs: A variety of methods, centered largely around haying practices, have been proposed to minimize losses of some species' nests and nestlings during typical agricultural activities (Bollinger and Gavin 1992, Jones and Vickery 1997). However, little is known about relative reproductive success following these practices. For example, would leaving unmowed sections or strips increase fledging success or serve to focus mammalian predation on nests later in the season when females are less likely to re-nest? Furthermore, lifetime reproductive output is not known for individuals in agricultural ecosystems.

Within the planning unit, populations of 1 of the 4 focal species within this habitat appear adequately monitored by the BBS with a minimum of 15 of 123 possible routes reporting for those species. Monitoring programs for Upland Sandpiper are currently conducted in most states where the species has special status, including Pennsylvania.

Monitoring of grassland birds like other species with patchy distributions will require special efforts targeted toward appropriate habitats. A monitoring program for grassland birds within the Northern Ridge and Valley, may be inappropriate. Rather, specific sites within the region could be included in a northeast regional program. Monitoring of IBAs may become a substantial portion of that effort.

Effective censusing for some species can be difficult and some techniques have the potential to increase nest predation. In areas with dense, regularly occurring populations of priority grassland species, local population should be monitored by annual census. Where breeding activity is very scarce and sporadic, casual reports from birdwatchers may be the only feasible means of surveying populations. Birdwatchers should be actively encouraged to search in old fields and along grassy, wetland margins throughout the summer months. Biologists employed by private consulting firms to inventory wetlands and farmlands associated with potential development sites may represent a valuable source of information on occurrences.

Monitoring programs at Important Bird Areas are in the planning stages for several state programs. They will begin after an inventory has been taken and will be carried out by volunteers. These efforts may or may not cover Partners in Flight priority species, but rather will be targeted at species within the IBA that met criteria in identification of the IBA.

The Northeast PIF Grassland Bird Working Group could be used to nominate sites (given statistical considerations) based on results of the regional grassland bird surveys conducted by Massachusetts Audubon in 1997 and 1998. State working groups could assist with identifying qualified volunteers to perform the actual counts.

Specific research and monitoring needs in this physiographic area include:

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

- Develop and implement supplemental inventory and monitoring programs to identify important sites for Henslow's Sparrow and other uncommon, patchily distributed grassland species not well monitored by BBS.
- Evaluate the effects of specific farming and management practices, such as timing of haying and grazing intensity, on productivity of grassland birds.

Other species-specific research needs can be found in their respective TNC wings management abstracts: www.conserveonline.org.

Outreach: Considerable effort has been given to developing guidelines for management of grassland habitats in the northeast (see booklets by Jones and Vickery 1997). We encourage the broad distribution of these materials throughout the region. Agency personnel could be especially effective at encouraging airports to consider habitat management for grassland birds, which may actually discourage loafing by species such as gulls and other large birds. Agency personnel also should consider their land management practices on refuges and wildlife management areas in the region and consider delaying mowing for as long as possible. Despite the overall increased awareness and outreach materials developed for this suite of species more needs to be done to reverse declining trends in populations of grassland birds in the Northern Ridge and Valley.

Another tool for grassland conservation with tremendous potential is conservation of open space. Conservation of open space has benefits for property tax stability, ecotourism and maintenance of nearby property values (Kerlinger 2000). The state of New York has a state open space plan (NYDEC 1998) that outlines regional priorities for state land acquisition. Wildlife and ecosystem conservation may act as supporting criteria in qualifying a land for acquisition and increasing its priority. Unfortunately, many current priorities are targeted at purchasing access areas for recreational activities and little money is even indirectly targeted at wildlife conservation. Continuing efforts to include wildlife conservation priorities in the agenda may yield great rewards.

D. Northern Hardwood- Mixed Forest

Importance and conservation status: Northern hardwood and mixed forests, (including forests dominated by sugar maple, beech, and birch, spruce-fir, and white pine-jack pine) constitute roughly 10% of the planning unit. These forests occur primarily at higher elevations along ridges and more widely near the northern end of the physiographic area in New York. In addition, many stands of hemlock are scattered through the region, especially in ravines and north-facing slopes of ridges.

The importance of this habitat type to birds in the planning unit is less than that of the more extensive oak-hickory forests. Bird species typical of this habitat are typically near the southern limit of their breeding range and occur in small patchy populations. Some widespread species of oak-hickory forests also occur in significant numbers in this forest type. Conservation planning should focus on extensive tracts of representative forest types, and should address the microhabitat needs of species showing regional or local declines. Many priority species in this habitat are dependent on particular characteristics of the forest understory.

A major conservation issue in this region is the loss of native hemlock stands to the exotic pest, the hemlock woolly adelgid. Loss of this habitat is proceeding at an alarming rate and is affecting the more specialized breeders such as Canada Warbler, Northern Goshawk, and Barred Owl. Use of exotic Norway spruce plantations in these areas may partially mitigate the loss of hemlocks for some coniferous forest species, but this remains to be quantified.

Associated priority species: EASTERN WOOD-PEWEE, WOOD THRUSH, CANADA WARBLER, Olive-sided Flycatcher, Louisiana Waterthrush, and Scarlet Tanager.

There is much overlap between the bird communities in northern hardwood and oak-hickory forests within this region. Comments on widespread species, such as Wood thrush, Eastern Wood Pewee, and Scarlet Tanager in the deciduous and riparian forest section apply equally well here. More specialized priority species, such as Canada Warbler, and Olive-sided Flycatcher, are associated with conifer elements, especially hemlocks. The flycatcher may breed at very few sites within the region, although historically it was more widespread, at least in Pennsylvania. This species is declining globally, but is at the edge of its range in the higher Appalachian ridges. Canada Warbler, another species experiencing rangewide declines, is patchily distributed at the highest elevations, especially in wet or boggy situations.

Habitat and population objectives: Based on extrapolations from BBS relative abundances, very rough estimates of population size for priority species in this habitat suite can be derived (Table 4.5). These crude estimates are most useful in illustrating the relative population sizes of various species and, perhaps, giving order-of-magnitude figures for setting population objectives for the region.

Table 4.5. Population estimates and targets (number of pairs) for priority species of northern hardwood and mixed forest habitats in the Northern Ridge and Valley physiographic area. Percent of Atlas blocks based on number of 5-km blocks in which the species was reported (from Rosenberg and Wells 1995 (appendix 3)).

Species	BBS population	% lost Since 1966	Population target	% Atlas blocks		
				NY	PA	NJ
Olive-sided Flycatcher	??	??	50	1	1	0
Eastern Wood-Pewee	55,000	15-50%	77,000	90	89	59
Louisiana Waterthrush	4,800	uncertain	5,200	20	36	55
Wood Thrush	277,200	stable	300,000	100	92	97
Scarlet Tanager	70,000	Incr.?	75,000	90	86	62
Canada Warbler	3,600	uncertain	4,000	5	8	25

For species that have declined significantly during the BBS period, a population target may be set to approximate pre-BBS population levels; an annual decline of 2.4% per year corresponds with a 50% loss over 30 years. For species suffering a 50% or greater loss since 1966 (PT=5), this plan calls for roughly a doubling of present-day populations as a practical objective. For species suffering a 15-50% loss since 1966 (PT=4), this plan calls for increasing the current population by 1.4. For species showing stable/possibly increasing trends (PT=2) or unknown trends (PT=3), population targets are roughly rounded up from current population estimates by a factor of 1.1. Question marks indicate insufficient data to estimate a trend or population size. Note that the relative abundances used to for these estimates are averages across all BBS routes in the physiographic area using data from 1990-1998. For more details on methods used for calculating populations and targets, (see Appendix 3).

OBJECTIVE 1. Maintain population of 4,000 pairs of Canada Warblers throughout the physiographic area.

OBJECTIVE 2. Maintain stable population for Wood Thrush; eventually reaching and maintaining long-term population of 300,000 breeding pairs (shared with deciduous forest objective).

Assumptions: (1) maintaining suitable habitat (including habitat structure and quality) for Wood Thrush and Canada Warblers will be sufficient to support sustainable populations of most other birds in this habitat suite; (2) maintaining adequate area for forest-breeding raptors will meet requirements of other potentially area-sensitive species.

Based on published density estimates, roughly 1 million ha (2.5 million acres) of northern hardwood forest is required to support the entire habitat-species suite (e.g. 300,000 pairs of Wood Thrush), with 10,000 ha (25,000 ac) suitable to maintain 4,000 pairs of Canada Warblers.

Implementation strategy: An overall strategy to meet objective for northern hardwood forest birds will be similar to, or included within, the strategy outlined for deciduous forest species

above. Specific actions that pertain to the more specialized coniferous forest species and their habitats include:

- identify important patches of hemlock and pine forest; document occurrence of priority species; monitor health status of trees
- assess use of exotic conifer plantations and establish a management plan for these plantations in each state that considers priority bird species
- incorporate priority bird species objectives into existing land conservation plans (e.g. TNC) that focus on high-elevation forest habitats.

Important Bird Areas:

Some Important Bird Areas that have been identified in the planning unit that contain important northern hardwood-mixed forest 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 northern hardwood-mixed forest bird species are (Wells 1998, Crossley 1999):

New York

- John Boyd Thatcher State Park-2,300 acres; Public (NY off. of parks, rec., and hist. pres.). Primarily mixed woods. Breeders include Northern Goshawk, Hermit Thrush, Winter Wren, Magnolia, Black-throated Blue, Black-throated Green, Blackburnian, Canada and Worm-eating Warblers and both Louisiana and Northern Waterthrush. Good historic Peregrine Falcon habitat.
- Stissing Preserve-1,000 acres; Private (owned by The Nature Conservancy, but neighboring parcels are private). Primarily deciduous with some mixed woods. Supports Hermit Thrush, Black-throated Blue Warbler, Winter Wren, Acadian Flycatcher, Brown Creeper, Canada Warbler, Barred Owl and wintering Bald and Golden Eagle.
- Bashakill Wildlife Management Area-2,100 acres; Public (NY Dept. Env. Cons.). Primarily non-tidal wetlands surrounded by mixed and deciduous woods. Nesting Sharp-shinned Hawk, Cooper's Hawk, Northern Goshawks and Red-shouldered Hawks.
- Northern Shawangunk Mountains-100,000 acres; Mix of private, municipal, state and non-governmental conservation agency ownership. Greater than 50% deciduous woods, significant coniferous woods, shrub/scrub, non-tidal wetlands and some grasslands. Breeding Northern Goshawk, Common Raven, Winter Wren, Hermit Thrush, Pine Warbler, and Peregrine Falcon. Many other birds use this area during migration.
- Rensselaer Forest Tract- 20,000 acres; Mix of Private landowners, and multiple State agencies. Situated on a plateau, it is thickly wooded with abundant wetlands. Some of the breeding birds found here are Red-Shouldered Hawk, Northern Goshawk, Scarlet Tanager, and Canada Warbler.

Pennsylvania

- Black Moshannon State Park and State Forest- 5,800 acres; Contains several wetland types including bogs, marshes and swamps as well as a 250-acre man-made lake. Also a primarily unfragmented mixed forest of oak, hemlock, pine, birch and hickory. 28 species of warblers including Canada, Magnolia, Cerulean and Blackburnian, Northern Goshawk and Northern Saw-whet Owl.
- Rothrock State Forest (Part) & Stone Mountain- 5,000+ acres; A mountainous region of unfragmented deciduous and mixed forest. Includes 3 natural areas: Detweiler Run, Bear Meadows and Alan Seeger Natural Area. A major raptor migration site. Species include Acadian Flycatcher, Red-eyed Vireo, Blackburnian Warbler, Ovenbird, Canada Warbler, Scarlet Tanager, Solitary Vireo and Black-throated Blue Warbler.
- Tuscarora Ridge- ("The Pulpit")-160 sq. miles; Public (Dept. Cons. & Nat. Res.)/Private. A major raptor migration funnel. Broad-winged Hawk, Sharp-shinned Hawk, Red-tailed Hawk, Bald Eagle, Peregrine Falcon, Osprey and Northern Harrier.
- The Hook Natural Area-5,119 acres; Public (Dept. Cons. & Nat. Res.). Second-growth oak forests with a rhododendron understory. Perhaps the largest contiguous forest block in the state. Species include Hooded, Black-and-white, Black-throated Green, Black-throated Blue, and Pine Warblers, Louisiana Waterthrush, Acadian Flycatcher, Winter Wren and others. Over 175 breeding species with large numbers of area-sensitive, forest-interior species.
- Tall Timbers, Snyders-Middleswarth Natural Areas-1,160 acres; Public (Dept. Cons. & Nat. Res.). Virgin old-growth forest, mixed forest of second growth. Part of a large contiguous block of the Bald Eagle State Forest. Forest-interior/ old-growth species include Louisiana Waterthrush, Magnolia Warbler, Winter Wren, Brown Creeper and Barred Owl. One of the only known natural nesting sites in PA for Chimney Swift. 176 species use this site during migration.
- Waggoner's Gap – Kittatinny Ridge-3,000 acres; Public (Dept. of Cons. & Nat. Res.)/ Private. A major flyway for migrating raptors. Sharp-shinned Hawk, Red-tailed Hawk, Broad-winged Hawk and Bald Eagle.
- St. Anthony's Wilderness-70,000 acres; Public (PA Game Comm.). A large mountainous and forested area. Still largely a wilderness unbroken by habitation or roads. Species include Northern Goshawk, Acadian Flycatcher, Ovenbird, Great-crested Flycatcher, Louisiana Waterthrush, Whip-poor-will. 50+ interior-forest breeding species.
- Hershey Special Habitat-665 acres; Private. A unique combination of prime owl roosting habitat (mature Eastern White Pine groves) combined with large areas of open grasslands. Species include Long-eared Owl and Great-horned Owl.
- Hawk Mountain Sanctuary, Kittatinny Ridge-102,400 acres; Public (PA Game Comm.). The premier raptor migration corridor in the northeastern U.S. The ridge is covered in second-growth deciduous forest. Some farmland and rural communities. Species include Bald Eagle, Peregrine Falcon, Osprey, Northern Goshawk, Northern Harrier and Northern Saw-whet Owl.
- South Mountain, Caledonia, Michaux State Forest-40,000 acres; Public (Dept. of Cons & Nat. Res.). A mixed forest area with a dense understory of rhododendron in stream valleys. Species include Wood Thrush, Eastern Wood-pewee, and Canada Warbler.

Management Recommendations: As mentioned above, this habitat type is very similar to deciduous oak-hickory forests. Therefore, there are similar management recommendations for

this habitat. For more information see deciduous (oak-hickory) and riparian forest section above. Specific management guidelines for specialized coniferous forest species include:

Wood Thrush -- see Management and Recommendations for deciduous (oak-hickory) and riparian section above

Canada Warbler -- This species frequently occupies sites with a higher percentage of coniferous species and also appear to select stands with relatively dense understory vegetation (Conway 1999). Canada Warbler is often found in moist boggy areas of forest or those near streams (Catlin 1999). According to BBS data, Canada Warbler has been experiencing declines of 1.8 percent per year from 1966-1998 survey-wide with a 2.7 percent per year decline from 1980 to 1998. Preserves for this species will need to be large containing at least small tracts of good habitat surrounded by forested buffer (Catlin 1999). In addition, the management treatments that will be most effective are those that increase shrub density while limiting ground cover at the same time (Catlin 1999).

Eastern Wood-pewee -- It inhabits a broad range of forest types including deciduous, coniferous, and mixed forests (Palis 2000b). They prefer forests with little understory with either open or closed canopies. Can inhabit forest fragments as small as 0.5 ha during the breeding season as well as riparian areas as narrow as 20 meters (Palis 2000b). According to BBS data, Eastern Wood-pewee has declined throughout its range. Threats include loss or degradation of habitat, nest parasitization by Brown-headed Cowbirds, and possible poisoning by chemical pesticides. Habitat preferred by Eastern Wood-pewees can be maintained by selectively removing large trees, or creating openings in understory through prescribed burns (Palis 2000b).

Research and monitoring needs: Within the planning unit, populations of only 2 of the 7 focal species within this habitat appear adequately monitored by the BBS with a minimum of 14 of 46 possible routes reporting for those species. Canada Warbler and Blackburnian Warbler were recorded on too few BBS routes to reliably estimate population trends within the region. Monitoring of these species will require directed efforts.

Overall research and monitoring needs for deciduous forest birds will benefit birds in this forest type as well. Specific needs for more specialized priority species of mixed forest include:

- determine specific habitat needs (and causes of declines) for Canada Warbler; why, for example, is Canada Warbler declining while Black-throated Blue Warbler is stable, if both require shrubby understory of mature forest?
- identify any breeding populations of Olive-sided Flycatchers within the region, and determine specific habitat needs;
- determine effects of hemlock loss due to woolly adelgid on bird populations;
- assess use of exotic conifer plantations by priority bird species, especially raptors.

Species specific research needs can be found in their respective TNC wings management abstracts: www.conserveonline.org

Outreach: Increased public awareness of forest birds will be necessary for full implementation of this conservation plan. This can be achieved through PIF state working groups, as well as programs by NGOs such as National Audubon Society's Important Bird Areas Program. There is a growing awareness among professionals even outside avian conservation largely because of such high profile initiatives as PIF. State PIF working groups should include professionals from organizations and agencies whose mandate covers forested habitats. Keeping working groups abreast of the latest information on conservation of these species should remain a focus. Additional partners should be sought to help meet monitoring and perhaps atlas needs. This habitat holds some of the most attractive species which could be used to encourage participation in birding and ultimately capable volunteer for citizen science projects and other volunteer opportunities.

E. Freshwater Wetland

Importance and conservation status: This habitat suite represents a continued nationwide concern for wetland habitats and their potentially vulnerable species. We include this section among the terrestrial habitats and priority bird species in order to have complete representation of species that emerged from the PIF species assessment process, and to promote all-bird conservation at all levels. Specific issues, objectives, and conservation strategies are discussed more fully within the North American Waterfowl Management Plan, Waterbird conservation Plan for the Americas, and the U.S. Shorebird Conservation Plan.

The New York Department of Environmental Conservation has done an extensive inventory of status and trends in wetlands in the state (NYDEC 2000) that may be indicative of regional trends. There is an estimated 170,000 acres of freshwater wetlands in the Hudson Valley region of New York state, which roughly corresponds to the New York portion of the planning unit. Wetlands comprise roughly 4.4% of the land area in the Hudson Valley and roughly 7% of the wetlands in the state. Roughly 60% of wetlands in the Appalachian Highlands are forested wetlands, 21% are shrub/scrub wetlands, 12% are emergent vegetation and only 6% are open water wetlands (NYDEC 2000). From the mid-1980s to mid-1990s New York has lost extensive shrub/scrub and emergent wetlands. Between the mid-80s and mid-90s there was a net loss of wetlands in the Hudson Valley (-2,900 acres).

Over 50% of the wetlands in the state of Pennsylvania are concentrated in the northeast and northwest portions of the state that fall within this planning unit. Consequently, the valley and ridge regions of the planning unit in Pennsylvania are extremely important to waterfowl and other wetland species, many of which are rare within the planning unit and are found on many state endangered species lists. Currently wetland losses in Pennsylvania are estimated at 75 acres a year statewide. Since 1990, 3,728 acres of wetlands have been restored in Pennsylvania through various regulatory and non-regulatory programs and partnerships.

In northeastern New Jersey, causes for wetland loss and conversion have changed over time. The region's agricultural sector was displaced by low density housing and by highway, airport, landfill, and port facility construction that often took place in wetland areas away from population centers. Today highway construction, commercial and industrial building, higher density residential development, and flood control efforts are the major activities affecting wetlands. Furthermore, the growth of the New York metropolitan area is quickly increasing human activity in what is already the most densely populated state in the United States (986 people/ sq. mile). Demand for land in the area is reflected in prices of wetlands ranging from \$90,000 to \$200,000 per acre (USFWS 1994). Passage of coastal and inland wetland protection laws has slowed, but not stopped, the dramatic and protracted wetland loss experienced from the 1950s to the 1970s (Kane 1990).

Associated priority species: AMERICAN BLACK DUCK, KING RAIL, Wood Duck, and Bald Eagle.

With two exceptions (American Black Duck and King Rail) these species do not score extremely highly in the global PIF species assessment system, but a disproportionately large number of wetland species are found on state endangered species lists. This habitat suite therefore represents continued nationwide concern for wetland habitats and their potentially vulnerable species. The large number of species that are found on state endangered species lists however reflect a regional concern for many species as well.

King Rail populations have declined dramatically in the past 30 years throughout many portions of its range. There are only 2 confirmed areas in Pennsylvania for King Rail breeding and nesting, but it is possible that it no longer occurs regularly in any location in the state because not much is

known of its habits (Pennsylvania Game Commission 2002). It is currently listed as endangered in Pennsylvania and Threatened in New Jersey.

American Black Duck, although it is not currently listed in any of the states in this region, is also experiencing population declines due mostly to habitat loss and hunting. Populations numbers are difficult to measure, but estimates based on the Midwinter Survey (a survey sponsored by federal, state, and private agencies that began in 1955) show that along the Atlantic Flyway, American Black Duck numbers fell 46% from 582,500 in 1955 to 313,000 in 1996 (Serie 1996 in Longcore and Clugston 1999).

Before 1981, up to 300,000 were hunted annually in Atlantic Flyway states alone having major effects on the breeding populations (Serie 1994 in Longcore and Clugston 1999). As a result to public pressure and the threat of a lawsuit, the US Fish and Wildlife service reduced the numbers of Black Ducks allowed for harvest by 25% in each Atlantic Flyway state (Longcore and Clugston 1999). Due to these more stringent laws in both the United States and Canada, the numbers of Black Ducks in the Midwinter Survey have stabilized.

Habitat and population objectives: Based on extrapolations from BBS relative abundances, very rough estimates of population size for priority species in this habitat suite can be derived (Table 4.6). These crude estimates are most useful in illustrating the relative population sizes of various species and, perhaps, giving order-of-magnitude figures for setting population objectives for the region.

Table 4.6. Population estimates and targets (number of pairs) for priority species of Freshwater Wetland habitats in the Northern Ridge and Valley physiographic area.

Species	BBS population	% lost Since 1966	Population target
American Black Duck	480	15-50%	670
King Rail	??		
Wood Duck	34,800	Incr.	34,800
Bald Eagle	??		

For species that have declined significantly during the BBS period, a population target may be set to approximate pre-BBS population levels; an annual decline of 2.4% per year corresponds with a 50% loss over 30 years. For species suffering a 50% or greater loss since 1966 (PT=5), this plan calls for roughly a doubling of present-day populations as a practical objective. For species suffering a 15-50% loss since 1966 (PT=4), this plan calls for increasing the current population by 1.4. For species showing stable/possibly increasing trends (PT=2) or unknown trends (PT=3), population targets are roughly rounded up from current population estimates by a factor of 1.1. Question marks indicate insufficient data to estimate a trend or population size. Note that the relative abundances used to for these estimates are averages across all BBS routes in the physiographic area using data from 1990-1998. For more details on methods used for calculating populations and targets, (see Appendix 3).

OBJECTIVE 1. Stabilize or reverse declining population trend for American Black Duck at breeding pairs.

OBJECTIVE 2. Restore and maintain a stable population of King Rails.

Assumption: maintaining suitable habitat (including habitat structure and quality) for American Black Duck and King Rail will be sufficient to support sustainable populations of the other birds in this habitat suite.

Based on published density estimates, roughly 4,500 ha (11,200 acres) of freshwater wetlands are required to support 670 pairs of American Black Duck.

Implementation strategy: As in other habitats, maintenance and recovery of wetland species depends on the protection of suitable habitat. A strategy for maintaining wetland breeding birds would include the following:

- maintenance of valuable wetland habitat
- restoration of degraded wetlands
- education and outreach efforts to promote the importance of healthy wetlands for birds and other animals
- ongoing monitoring of priority species.

Important Bird Areas

Some Important Bird Areas that have been identified in the planning unit that contain important freshwater 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 freshwater wetland occupying bird species are (Wells 1998, Crossley 1999):

New York

- Vischer Ferry Nature and Historic Preserve-600 acres; Public (NY State Thruway Authority-leased by Clifton, NY). Estimated 60% non-tidal wetland, 25% deciduous woods, 10% riparian, 5% coniferous woods. Species include breeding Least Bitterns, American Bitterns, Common Moorhens, Virginia Rails, Marsh Wrens, Osprey and Pied-billed Grebes. Important concentration area for post-breeding herons and egret.
- Carter Pond-446 acres; Public (NY Dept. of Env. Cons.). Primarily non-tidal wetlands with some mixed woods and shrub/scrub. State listed species that breed here include Pied-billed Grebes, Least Bitterns. Other breeders include Virginia Rail, Sora and Common Moorhen.
- Black Creek Marsh-700 acres; Public/Private (NY Dept. of Env. Cons. owns large portion). Primarily non-tidal wetland, with open water and freshwater marsh surrounded by swampy deciduous woods and fields. Breeding American Bittern, Least Bittern, Great Blue Heron, Green Heron, Virginia Rail, Sora, Common Moorhen, Common Snipe, Marsh Wren. Important migratory stopover, hosting large concentrations of water fowl. Eastern Bluebird, Bobolink, Woodcock, Ruffed Grouse –add scrub and grassland?
- Stockport Flats-1,543 acres; Public/Private (primary owner is NY Dept. of Env. Cons.). Primarily tidal (freshwater) wetland and riverine with deciduous forest and scrub. Supports Least Bittern, Virginia Rail, Marsh Wren, and Pied-billed Grebe and Northern Harrier are found during migration.
- Tivoli Bays-1,722 acres; Public/Private (Primarily owned by NYDEC but some small private parcels. Primarily tidal (freshwater) wetland and riverine with deciduous woods and shrub/scrub. Documented species include Least Bittern (10-20 pairs), Virginia Rail (10-20 pairs), Sora, Common Moorhen, Marsh Wren (100-1000 pairs). One of the last known breeding areas for King Rail in the state. Large number of waterfowl and wintering species include Bald Eagle, Northern Harrier and Osprey.
- Bashakill Wildlife Management Area-2,100 acres; Public (NY Dept. Env. Cons.). Primarily non-tidal wetlands surrounded by mixed and deciduous woods. Species include Wood Duck,

Pied-billed Grebe, migratory American and Least Bitterns, nesting Ospreys, migratory Bald Eagles, Northern Harriers, Virginia Rails, Soras and Common Moorhens.

- Ashokan Reservoir-8,000 acres; Public (NY City DEP). Supplies water to New York City and is surrounded by intact deciduous forests. Bald Eagles nest at this location regularly.
- Rensselaer Forest Tract-20,000 acres; Mix of Private landowners, and multiple State agencies. Situated on a plateau, it is thickly wooded with abundant wetlands. Pied-billed Grebes breed here. Breeding birds within the wetlands are generally rare, but do include American Black Duck.

Pennsylvania

- Black Moshannon State Park and State Forest- 5,800 acres; Contains several wetland types including bogs, marshes and swamps as well as a 250-acre man-made lake. Northern Harrier, Pied-billed Grebe, Olive-sided Flycatcher, American Bittern,.
- South Mountain, Caledonia, Michaux State Forest-40,000 acres. Public (Dept. of Cons & Nat. Res.). A mixed forest area with a dense understory of rhododendron in stream valleys. Species include Wood Duck, Common Loon, Pied-billed Grebe, Common Merganser, Great Blue and Green Heron.
- Susquehanna Riverlands-2,500 acres; Private. Privately-owned recreation park open to the general public. Diverse habitat types. Significant wetlands and waterfowl habitat. Species include Bald Eagle, Peregrine Falcon and Osprey.
- Sheets Island Archipelago- 2,700+ acres; Public (DCNR). The archipelago is made up of low islands in the Susquehanna River and provides breeding grounds for large numbers of migratory birds. Wade Island has the only known breeding area for the Great Egret as well as the largest colony of Black-crowned Night-Heron.
- Lake Ontelaunee- 4,300 acres; Public (MUN). Main reservoir for the town of Reading and is surrounded by deciduous forests, shrubby flood plains, and wooded riparian areas. Species include Pied-billed Grebe, Bald Eagle, and Great Egret.
- Blue Marsh Lake- 8,000 acres; Public (USACE) and Private. The 1,150 acre man-made lake is adjacent to state game land consisting mainly of woodlands and grasslands. Located on a flyway, many species are found here including the Bald Eagle.
- Upper Delaware Scenic River-38,400 acres; Public (NPS) and Private. Contains a wide variety of habitat including riparian, woodland, and rhododendron and laurel thickets. Species include Bald Eagle and Pied-billed Grebe.
- Quakertown Swamp- 400+ acres; Public (PGC) and Private. This is one of the largest inland wetlands in southeastern Pennsylvania. Species include Least Bittern, American Bittern, Great Egret, and Black-crowned Night-Heron.
- Canoe Creek Watershed-15,259 acres; Public (PGC, DCNR) and Private. This area has a high level of diversity in habitats allowing for numerous bird species as well. Made up of large, unfragmented forests, rhododendron and laurel thickets, and several miles of riparian forest along the creek. Species include Great Egret, Bald Eagle, Least Bittern, Black-crowned Night-Heron, and Pied-billed Grebe.

Management Recommendations: The decline of freshwater wetland species is largely uncertain, but is most likely linked to the dramatic losses of wetland habitat. Over-hunting has

contributed to the decline of some species like the American Black Duck. In addition, it is probable that pollution of important breeding areas from anthropogenic sources and acid rain also have an adverse affect on bird populations in wetlands. Chemical pollutants can cause reductions in aquatic invertebrates, the preferred food for most wetland birds.

King Rail -- Preferred habitat for the King Rail is fresh or brackish wetland marshes with vegetation consisting of grasses, cattails, rushes and sedges. In nesting areas, water levels need to be consistently shallow (Meanley 1992). However, these shallow areas are often the ones that are drained for agricultural or other uses. According to Reid (1989), a complex of wetland habitats is necessary for King Rail survival.

American Black Duck -- This species has a range of breeding habitat from coastal marshes to freshwater forest ponds and streams. There is little information about the area requirements of the Black Ducks' breeding habitat. There is evidence that in some areas Mallards are expanding into the Black Duck range often interbreeding with one another (Audubon 2002).

There are several organizations such as the Black Duck Joint Venture, the American Black Duck Symposium and the Atlantic Coast Joint Venture that have been focusing on the protection of thousands of hectares of habitat since 1986. With these efforts in addition to the reduction in hunting, there is hope that Black Duck numbers will begin to increase, approaching the population goal of 260,000 in the Atlantic Flyway (Longcore and Clugston 1999).

Research and Monitoring Needs: Monitoring production of Black Ducks is possible through an interstate network of refuges and management areas, but will require endorsement by the Flyway Council and appropriate state and federal biologists charged with managing waterfowl populations in the region. Such a need would be more likely to be filled if the region's state directors and the federal division of refuges fully embrace the concepts of NABCI.

The following are specific research and monitoring needs in this physiographic region:

- support efforts to monitor American Black Ducks via aerial surveys in cooperation with federal biologists;
- identify factors that affect habitat quality for breeding Black Ducks in coastal versus inland habitats (why disturbance is important during pairing, but not during the rest of the year).
- monitor American Black Duck reproductive success
- develop a regional protocol for monitoring patchily distributed, secretive bird species in wetlands
- determine microhabitat needs of priority bird species breeding in this habitat
- evaluate habitat requirements, including nest site characteristics, water quality, and minimum wetland area needed during both the breeding and non-breeding seasons.
- map and monitor health of important wetland sites

Outreach: Continued wetland education and conservation is important to the survival of all wetland birds. Efforts should be taken to continue to encourage hunters to learn to identify and refrain from harvesting the Black Duck, through distribution of color posters at sporting goods stores, municipal offices, wildlife refuges, etc. In some cases, wildlife refuge managers should be made aware of specific habitat requirements in order to maintain them. For example, water levels should be maintained during King Rail nesting and natural drying processes should be protected during brooding period (Reid 1989).

LITERATURE CITED

- Andrle, R.F. and J.R. Carrol (eds.). 1988. The atlas of breeding birds in New York state. Cornell University Press. 551pp.
- Askins, R.A. 1993. Populations trends in grassland, shrubland, and forest birds in eastern North America. In: Current Ornithology. Vol. 11; Power, D.M., (ed.): pp. 1-34. Plenum Press, New York.
- Askins, R.A. 1997. History of Grasslands in the Northeastern United States: Implications for Bird Conservation. In: *Grasslands of Northeastern North America, Ecology and Conservation of Native and Agricultural Landscapes*. Vickery, P.D. and P. W. Dunwiddie, (eds.): pp. 119-136. Massachusetts Audubon Society, Lincoln, MA. ISBN 0-932691-25-0.
- Askins, R.A. 2000. Restoring North America's birds: Lessons from landscape ecology. Yale University Press. 320pp.
- Audubon. 2002. WatchList: American Black Duck. Available online at <http://audubon2.org/webapp/watchlist/viewspecies.jsp?id=8>.
- Best, L. B. 1977. Territory quality and mating success in the Field Sparrow (*Spizella pusilla*). Condor 79:192-204.
- Best, L. B. 1979. Effects of fire on a Field Sparrow population. American Midland Naturalist 101:434-443.
- Bollinger, E. K. 1991. Conservation of grassland birds in agricultural areas. In: Westview Special Studies in Natural Resources and Energy Management: Challenges in the Conservation of Biological Resources: A Practitioner's Guide. Decker, D.J., (ed.): pp. 279-287. Westview Press, Boulder, Colorado.
- Bollinger, E. K. 1995. Successional changes and habitat selection in hayfield bird communities. Auk 112:720-730.
- Bollinger, E. K. and T. A. Gavin. 1992. Eastern Bobolink populations: Ecology and conservation in an agricultural landscape. In: Ecology and conservation of neotropical migrant landbirds; Hagan, J.M., III and D.W. Johnson, (eds.), 497-505. Smithsonian Institution Press, Washington, D.C.
- Bonney, R.E., D.N. Pashley, R.J. Cooper, and L. Niles (Eds.). 2000 Strategies for bird conservation: The Partners in Flight planning process. Proceedings RMRS-P-16. Rocky Mountain Research Station, Forest Service, U.S. Department of Agriculture, Ogden, UT.
- Brauning, D.W. (ed.) 1992. Atlas of breeding birds in Pennsylvania. University of Pittsburgh Press. 484pp.
- Brown, B. with Revisions by M. Koenen and D.W. Mehlman. 1999. Species Management Abstract for Louisiana Waterthrush (*Serriurus motacilla*). The Nature Conservancy. Available online at: www.conserveonline.org.
- Buhnerkempe, J. E., and R. L. Westmeier. 1988. Breeding biology and habitat of upland sandpipers on prairie chicken sanctuaries in Illinois. Transactions of the Illinois State Academy of Science 81:153-162.
- Bull, J. 1974. Birds of New York State. Comstock Publishing Associates, a division of Cornell University Press, Ithaca, NY.

- Bushman, E.S., and G.D. Therres. 1988. Habitat management guidelines for forest interior breeding birds of coastal Maryland. Maryland Department of Natural Resources, Wildlife Tech. Pub. 88-1. 50 pp.
- Carey, M., D. E. Burhans, and D. A. Nelson. 1994. Field Sparrow (*Spizella pusilla*). In: The Birds of North America No.103.. A. Poole and F. Gill eds. The Academy of Natural Sciences, Philadelphia, PA and The American Ornithologists' Union, Washington, D.C.
- Carter, J. W. 1992. Upland sandpiper, *Bartramia longicauda*. In: Migratory nongame birds of management concern in the Northeast. K. J. Schneider and D. M. Pence, (eds.): pp: 235-252. U.S. Fish and Wildlife Service, Newton Corner, Massachusetts. 400 pp.
- Carter, J.W.; revisions by G. Hammerson and D.W. Mehlman. 1999. Species Management Abstract: Upland Sandpiper (*Bartramia longicauda*). The Nature Conservancy. Available online at: <http://www.conserveonline.org>.
- Carter, M. F., W. C. Hunter, D. N. Pashley, and K. V. Rosenberg. 2000. Setting conservation priorities for landbirds in the United States: The Partners In Flight approach. Auk 117:541-548.
- Catlin, D.; revisions by M. Koenen and D.W. Mehlman. 1999. Species Management Abstract: Canada Warbler (*Wilsonia canadensis*). The Nature Conservancy. Available online at: <http://www.conserveonline.org>.
- Cody, M. L. 1968. On the methods of resource division in grassland bird communities. The American Naturalist 102:107-147.
- Confer, J.L. 1992. Golden-winged warbler. Pages 369-383 in K.J. Schneider and D.M. Pence, editors. Migratory nongame birds of management concern in the Northeast. U.S. Fish and Wildlife Service, Newton Corner, Massachusetts. 400 pp.
- Confer, J.L.; revisions by G. Hammerson and D.W. Mehlman. 1999. Species Management Abstract: Golden-winged Warbler (*Vermivora chrysoptera*). The Nature Conservancy. Available online: <http://www.conserveonline.org>.
- Conway, C. J. 1999. Canada Warbler. (*Wilsonia canadensis*). In The Birds of North America, No. 421 A. Poole and F. Gill, eds. The Academy of Natural Sciences, Philadelphia, PA and The American Ornithologists' Union, Washington, D.C.
- Crooks, M. P. 1948. Life history of the Field Sparrow, *Spizella pusilla pusilla* (Wilson). M.S. thesis. Iowa State College, Ames, Iowa. 109 pages.
- Crossley, Gary J. 1999. A guide to critical bird habitat in Pennsylvania. Pennsylvania Audubon Society. Signal Graphics Printing, Mechanicsburg, PA.
- Day, G. M. 1953. The Indian as a factor in the northeastern forest. Ecology 34: 329-346.
- DeBano, L. F., D. G. Neary, and P. F. Folliott. 1998. Chapter 9: Vegetation. In: Fire's Effects on Ecosystems. John Wiley & Sons, Inc. New York, NY.
- Dechant, J.A., M.L. Sondreal, D.H. Johnson, L.D. I., Goldade, A.L. Zimmerman, and B.R. Euliss. Revisions by M. Koenen, G. Hammerson, and D.W. Mehlman. 1999. Species Management Abstract: Bobolink (*Dolichonyx oryzivorus*). The Nature Conservancy. Available Online at: <http://www.conserveonline.org>.
- Degraaf, R.M. and J.H. Rappole. 1995. Neotropical Migratory Birds: Natural History, Distribution and Population Change. Cornell University Press, Ithaca, NY.

- Eddleman, W.R. 1974. The effects of burning and grazing on bird populations in native prairie in the Kansas Flint Hills. Unpublished report, National Science Foundation-Undergraduate Research Program. Kansas State University, Manhattan, KS. 33 pp.
- Ehrlich, P.R., D.S. Dobkin, and D. Wheye. 1992. *Birds in Jeopardy: The Imperiled and Extinct Birds of the United States and Canada, Including Hawaii and Puerto Rico*. Stanford University Press.
- Emlen, J. T., and M. J. DeJong. 1981. The application of song detection threshold distance to census operations. Pp. 346-352 In *Estimating numbers of terrestrial birds* (C. J. Ralph and J. M. Scott, editors). *Studies in Avian Biology* 6.
- Euler, D.L. 1974. The ecology of fire in upstate New York. Ph.D. thesis. Cornell University. DA1, Vol. 35-05B. 94 pp.
- Evans, E. W. 1978. Nesting responses of Field Sparrows (*Spizella pusilla*) to plant succession on a Michigan old field. *Condor* 80:34-40.
- Finch, D.M. and Stangel P.W. (eds.). 1993. Status and management of Neotropical migratory birds. Gen. Tech. Rep. RM-229. USDA Forest Service 422 pp.
- Fitzgerald, J.A., D.N. Pashley, S.J. Lewis, and B. Pardo. 1998. Partners in Flight Bird Conservation Plan for The Northern Tallgrass Prairie (Physiographic Area 40). Available at <http://www.partnersinflight.org>.
- Franzreb, K.E., D.M. Finch, P.B. Wood, D.E. Capen. 2000. Management strategies for the conservation of forest birds. In: Bonney, R, D.N. Pashley, R.J. Cooper, L. Niles (eds.). 2000. *Strategies for Bird Conservation: The Partners in Flight planning approach*. Proceedings RMRS-P-16. Rocky Mountain Research Station, Forest Service, U.S. Department of Agriculture, Ogden, UT.
- Frawley, B.J. 1989. The dynamics of nongame bird breeding ecology in Iowa alfalfa fields. M.S. thesis. Iowa State University, Ames, IA. 94 pp.
- Gale, G.A. 1995. Habitat selection in the Worm-eating Warbler (*Helmitheros vermivorus*): testing different spatial scales. University of Connecticut, Storrs, Connecticut. Ph.D. dissertation
- Greenlaw, J.S. 1996. Eastern Towhee (*Pipilo erythrophthalmus*). In: *The Birds of North America* No.262. A. Poole and F. Gill eds. The Academy of Natural Sciences, Philadelphia, PA and The American Ornithologists' Union, Washington, D.C.
- Hamel, P.B.; revisions by F.J. Dirrigl, Jr., G. Hammerson, and D.W. Mehlman. 1992a. Species Management Abstract: Cerulean Warbler (*Dendroica cerulea*). The Nature Conservancy. Available online at: <http://www.conserveonline.org>.
- Hamel, P.B. 1992b. Cerulean Warbler (*Dendroica cerulea*). Pages 385-400 in K.J. Scheider and D.M. Pence (eds.) *Migratory nongame birds of management concern in the Northeast*. U.S. Department of Interior, Fish and Wildlife Service, Newton Corner, Massachusetts. 400pp.
- Hands, H.H., R.D. Drobney, and M.R. Ryan. 1989. Status of the Henslow's Sparrow in the north central United States. A report by the Missouri Co-operative Fish and Wildlife Research Unit, School of Forestry, Fisheries and Wildlife, University of Missouri, Columbia, MO. 12 pp.
- Hanson, L.G. 1994. The Henslow's Sparrow (*Ammodramus henslowii*) of Minnesota: population status and breeding habitat analysis. M.S. thesis. Central Michigan University, Mount Pleasant, MI. 29 pp.

Herkert, J. R. 1994a. Breeding bird communities of midwestern prairie fragments: the effects of prescribed burning and habitat-area. *Natural Areas Journal* 14:128-135.

Herkert, J. R. 1994b. The effects of habitat fragmentation on midwestern grassland bird communities. *Ecological Applications* 4:461-471.

Herkert, J.R. 1998. Effects of management practices on grassland birds: Henslow's Sparrow. Northern Prairie Wildlife Research Center, Jamestown, ND. 14 pp.

Herkert, J.R., R.E. Szafoni, V.M. Kleen, and J.E. Schwegman. 1993. Habitat establishment, enhancement and management for forest and grassland birds in Illinois. Illinois Department of Conservation, Division of Natural Heritage, Natural Heritage Technical Publication 1, Springfield, IL. 20 pp.

Howe, H. F. 1995. Succession and fire season in experimental prairie plantings. *Ecology* 76:1917-1925.

Hunter, W. C., M. F. Carter, D. N. Pashley, and K. Barker. 1993. The Partners In Flight prioritization scheme. Pp. 109-119 in D. Finch and P. Stangel (eds.), *Status and management of Neotropical migratory birds*. USDA General Technical Report RM-229, Rocky Mountain Forest and Range Experiment Station, Fort Collins, Colorado.

Johnson, D. H. 1997. Effects of fire on bird populations in mixed-grass prairie. In *Ecology and Conservation of Great Plains Vertebrates*. F. L. Knopf and F. B. Samson, (eds). Springer-Verlag, New York, NY.

Johnson, D.H., L.D. Igl., A. Dechant, M.L. Sondreal, C.M. Goldade, M.P. Nenneman, and B.R. Euliss; revisions by G. Hammerson, J. Michaud, M. Koenen, and D.W. Mehlman. 1999. Species Management Abstract: Grasshopper Sparrow (*Ammodramus savannarum*). The Nature Conservancy. Available online at: <http://www.conserveonline.org>

Jones, A. and P. D. Vickery. 1997. Conserving grassland birds, managing agricultural lands including hayfields, crop fields, and pastures for grassland birds. A handbook published through the Grassland Conservation Program, Center for Biological Conservation, Massachusetts Audubon Society, Lincoln, MA, in collaboration with Silvio O. Conte National Fish and Wildlife Refuge and the U.S. Fish and Wildlife Service North American Waterfowl Management Program.

Kahl, R. B., T. S. Baskett, J. A. Ellis, and J. N. Burroughs. 1985. Characteristics of summer habitats of selected nongame birds in Missouri. University of Missouri-Columbia, College of Agriculture, Agricultural Experiment Station. Research Bulletin 1056.

Kane, R. 1990. Conservation of Birds and Bird Habitats in New Jersey. New Jersey Audubon Society. Online: <http://www.njaudubon.org/conservation/opinions/90win.html>

Kelley, J.R., Jr. 2002. American woodcock population status, 2002. U.S. Fish and Wildlife Service, Laurel, Maryland. 16 pp. Available online at: <http://migratorybirds.fws.gov>.

Keppie, D. M. and R. M. Whiting, Jr. 1994. American Woodcock. *The Birds of North America*, No. 100. A. Poole and F. Gill, Eds. The Academy of Natural Sciences, Philadelphia, PA and The American Ornithologists' Union, Washington, D.C.

Kerlinger, P. 2000. Economics of open space conservation. In: Bonney, R, D.N. Pashley, R.J. Cooper, L. Niles (eds.). 2000. *Strategies for Bird Conservation: The Partners in Flight planning approach*. Proceedings RMRS-P-16. Rocky Mountain Research Station, Forest Service, U.S. Department of Agriculture, Ogden, UT.

- Lambeck, R. J. 1997. Focal species: a multi-species umbrella for nature conservation. *Conservation Biology* 11:849-856.
- Laubach, R. 1984. Breeding birds of Sheeder Prairie Preserve, west-central Iowa. *Proceedings of the Iowa Academy of Science* 91:153-163.
- Litvaitis, J. A., D. L. Wagner, J. L. Confer, M. D. Tarr, E. J. Snyder. 1999. Early-successional forests and shrub-dominated habitats: Land-use artifact or critical community in the northeastern United States. *Northeast Wildlife* 54:101-118
- Longcore, J.R. and D.A. Clugston. 1999. American Black Duck. In: *Status and Trends of the Nation's Biological Resources*. USGS Biological Resources Division. Available online at: <http://biology.usgs.gov/s+t/SNT/index.htm>.
- Marks, P.J., S. Gardescu, and F.K. Seischab. 1992. The response of forb species to seasonal timing of prescribed burns in remnant Wisconsin prairies. In: *Proceedings of the Eight North American Prairie Conference*, Western Michigan University, Kalamazoo, Michigan (R. Brewer ed.), pp. 11-15
- Maryland Partners in Flight Management Committee. 1997. *Habitat management guidelines for the benefit of landbirds in Maryland*. U.S. Fish and Wildlife Service Annapolis field office. Available online: www.mdbirds.org/mdpif/lmg.html
- Mazur, R. 1996. Implication of field management for Henslow's Sparrow habitat at Saratoga National Historic Park, New York. M.S. thesis. University of New York, Syracuse, NY. 33 pp.
- McWilliams, G.M. and D.W. Brauning. 2000. *The Birds of Pennsylvania*. Comstock Publishing Associates, Cornell University Press, Ithaca, NY.
- Meanley, B. 1992. King Rail (*Rallus elegans*). In: *The Birds of North America No.3*. A. Poole and F. Gill eds. The Academy of Natural Sciences, Philadelphia, PA and The American Ornithologists' Union, Washington, D.C.
- Mehroff, L.J. 1997. Thoughts on the biogeography of grassland plants in New England. In: *Grasslands of Northeastern North America, Ecology and Conservation of Native and Agricultural Landscapes*; Vickery, P.D. and P. W. Dunwiddie, (eds.): pp. 119-136. Massachusetts Audubon Society, Lincoln, MA. ISBN 0-932691-25-0.
- Melde, P.B., and R.R. Koford. 1996. Henslow's Sparrow nesting observations, habitat associations and history in Iowa. *Iowa Bird Life* 66:117-122.
- Mendall, H. L. and C. M. Aldous. 1943. *The Ecology and Management of the American Woodcock*. Maine Cooperative Wildlife Research Unit, University of Maine, Orono, ME. 201pp.
- Mitchell, L. R. 2000. Use of prescribed fire for management of old fields in the Northeast. MS Thesis. Cornell University, Ithaca, NY.
- Mitchell, L.R., C.R. Smith, and R.A Malecki. 2000. Ecology of grassland birds in the northeastern United States – A literature review with recommendations for management. U.S. Geological Survey-BRD, New York Cooperative Fish and Wildlife Research Unit, Department of Natural Resources, Cornell University, Ithaca, NY. 69 pp.
- Myers, R. E., and J. Dickerson. 1984. How to plant and maintain switchgrass. USDA Soil Conservation Service Information Sheet NY-63.

New York State Department of Environmental Conservation (NYDEC). 1998. Conserving Open Space in New York State: State open space conservation plan and final generic environmental impact statement. NYDEC and Office of Parks, Recreation and Historic Preservation. 105 pp.

New York State of Department of Environmental Conservation (NYDEC). 2000. Highlights of the freshwater wetlands status and trends study. Available online: <http://www.dec.state.ny.us/website/dfwmr/habitat/fwwprog.htm>

Norment, C. 1999a. Effects of grassland bird management on nongame bird community structure and productivity. Final report to the U.S. Fish and Wildlife Service and the Research Foundation of State University of New York. Department of Biological Sciences, SUNY College at Brockport, Brockport, NY.

Norment, C. 1999b. Effects of habitat manipulations on grassland bird populations. Final report to the U.S. Fish and Wildlife Service and the Research Foundation of State University of New York. Department of Biological Sciences, SUNY College at Brockport, Brockport, NY.

Palis, J. 2000a. Revisions by S. Cannings. Species management abstract: Eastern Towhee (*Pipilo erythrophthalmus*). The Nature Conservancy. Available online at: <http://www.conserveonline.org>.

Palis, J. 2000b. Revisions by S. Cannings. Species management abstract: Eastern Wood-pewee (*Contopus virens*). The Nature Conservancy. Available online at: <http://www.conserveonline.org>.

Patterson, W.A. III, and K.E. Sassman. 1988. Indian fires in the prehistory of New England. In: Holocene Human Ecology in Northeastern North America; G.P. Nichols, (ed.): pp. 107-135. Plenum, New York.

Patton, S. and L. Hanners. Revisions by F. Dirrigl Jr., G. Hammerson, and D.W. Mehlman. 1996. Species Management Abstract for Worm-eating Warbler (*Helmitheros vermivorus*). The Nature Conservancy. Available online at: www.conserveonline.org.

Paton, W. C., W. Yang, and K. Frazer. 1999. Evaluating the effects of grassland restoration on the avian community at Rhode Island National Wildlife Refuge Complex. Final report to the U.S. Fish and Wildlife Service and the University of Rhode Island, Department of Natural Resources Science, Kingston, RI.

Pennsylvania Game Commission. 2002. King Rail Profile. Available online at: http://sites.state.pa.us/PA_Exec/PGC/kingrail/profile.htm.

Peterson, R. T. 1985. A Field Guide to the Birds. 4th Edition. Houghton Mifflin Co., Boston, MA.

Reid, F. A. 1989. Differential habitat use by waterbirds in a managed wetland complex. University of Missouri, Columbia, Missouri. Ph.D. dissertation. 243 pp.

Rich, T.D., C.J. Beardmore, H. Berlanga, P.J. Blancher, M.S. Bradstreet, G.S. Butcher, D.W. Demarest, E.H. Dunn, W.C. Hunter, E.E. Iñigo-Elias, J.A. Kennedy, A.M. Martell, A.O. Panjabi, D.N. Pashley, K.V. Rosenberg, C.M. Rustay, J.S. Wendt, T.C. Will. 2004. Partners In Flight North American Landbird Conservation Plan. Cornell Lab of Ornithology, Ithaca, NY.

Robinson, S. K., F. R. Thompson, T. M. Donovan, D. R. Whitehead, J. Faaborg. 1995. Regional forest fragmentation and the nesting success of migratory birds. Science 267:1987-1990.

Robbins, C. S., D. Bystrak, and P. H. Geissler. 1986. The Breeding Bird Survey: its first fifteen years, 1965-1979. U.S. Fish and Wildlife Service Resource Publication 157, Washington, D.C.

Robbins, C.S., D.K. Dawson, and B.A. Dowell. 1989. Habitat area requirements of breeding birds of the Middle Atlantic states. *Wild. Monog.* 103:1-34.

Rodenhouse, N.L., L.B. Best, R.J. O'Connor, and E.K. Bollinger. 1995. Effects of agricultural practices and farmland structures on Neotropical migratory birds. In: *Ecology and management of Neotropical migratory birds: a synthesis and review of critical issues.* T.E. Martin, and D.M. Finch (eds.): pp: 269-293. Oxford University Press, New York, NY.

Rosenberg, K. V. and J. V. Wells. 2000. Global perspectives on Neotropical migrant conservation in the Northeast: Long-term responsibility vs. immediate concern. In R. E. Bonney, D.N. Pashley, R. J. Cooper, and L. Niles (Eds.). 2000. *Strategies for bird conservation: The Partners in Flight planning process.* Proceedings RMRS-P-16. Rocky Mountain Research Station, Forest Service, U.S. Department of Agriculture, Ogden, UT.

Rosenberg K.V., and J.V. Wells. 1995. Importance of geographic areas to Neotropical migrant birds in the Northeast. Cornell Lab of Ornithology, Ithaca, NY.

Rosenberg, K.V., J.D. Lowe, and A.A. Dhondt. 1999. Effects of forest fragmentation on breeding tanagers: a continental perspective. *Conservation Biology* 13: 568-583.

Roth, R. R., M. S. Johnson, and T. J. Underwood. 1996. Wood Thrush (*Hylocichla mustelina*). In *The Bird of North America*, No. 246 (A. Poole and F. Gill, Eds.). The Academy of Natural Sciences, Philadelphia, PA, and The American Ornithologists' Union, Washington, D.C.

Sallabanks, R. 1993. revisions by R. Dirrig Jr., G. Hammerson, D.W. Mehlman. Species Management Abstract: Wood Thrush (*Hylocichla mustelina*). Available online at: www.conserveonline.org.

Sample, D. W. and Mossman, M. J. 1997. Managing habitat for grassland birds: a guide for Wisconsin. Wisconsin Department of Natural Resources Publication No. SS-925-97

Schneider, K. J., and D. M. Pence (eds.). 1992. Migratory Nongame Birds of Management Concern in the Northeast pp. 315-330. U.S. Department of the Interior, Fish and Wildlife Service, Newton Corner, Massachusetts. 400 pp.

Sepik, G. F., R. B. Owen, Jr., and M. W. Coulter. 1981. A landowner's guide to woodcock management in the northeast. Life Sciences and Agriculture Experiment Station Miscellaneous Report 253. USFWS Moosehorn National Wildlife Refuge and University of Maine, Orono, ME. 23pp.

Serie, J. R. 1996. Results of the 1996 Midwinter Waterfowl Survey in the Atlantic Flyway states. Preliminary Report, February 1996. Office of Migratory Bird Management, U.S. Fish and Wildlife Service, Laurel, Md. 7 pp.

Serie, J. R., compiler. 1994. Atlantic Flyway, waterfowl harvest and population survey data. U.S. Fish and Wildlife Service, Laurel, Md. 85 pp.

Simons, T.R., G.L. Farnsworth, and S.A. Shriner. 2000. Evaluating Great Smoky Mountains National Park as a population source for the Wood Thrush. *Conservation Biology* 14(4): 1133-1144.

Skinner, R.M. 1982. Vegetation structure and bird habitat selection on Missouri prairies. Ph.D. dissertation. University of Missouri, Columbia, MO. 108 pp.

Skinner, R.M., T.S. Baskett, and M.D. Blendon. 1984. Bird habitat on Missouri prairies. *Terrestrial Series* 14. Missouri Department of Conservation, Jefferson City, MO. 37 pp.

- Smith, C.R. 1992. Henslow's Sparrow. In: Migratory Nongame Birds of Management Concern in the Northeast. K.J. Schneider and D.M. Pence, (eds.): pp. 315-330. U.S. Department of the Interior, Fish and Wildlife Service, Newton Corner, Massachusetts. 400 pp.
- Smith, C. R. 1997. Use of public grazing lands by Henslow's Sparrows, Grasshopper Sparrows, and associated grassland birds in central New York State. In: Grasslands of Northeastern North America. P.D. Vickery and P. W. Dunwiddie, (eds.): pp. 171-186.
- Smith, C.R. revised by D.W. Mehlman. 2000. Species and Management Abstracts: Henslow's Sparrow (*Ammodramus henslowii*). The Nature Conservancy. Available online at: <http://www.conserveonline.org>.
- Smith, D.J., and C.R. Smith. 1992. Henslow's sparrow and grasshopper sparrow: A comparison of habitat use in Finger Lakes National Forest, New York. Bird Observer 20(4):187-194.
- Sousa, P. J. 1983. Habitat suitability index models: Field Sparrow. FWS/OBS-82/10.62. U.S. Fish and Wildlife Service. 14 pages.
- Southern Appalachian Man and the Biosphere Cooperative (SAMAB). 1996. The southern Appalachian assessment summary report. SAMAB, Asheville, NC.
- Stauffer, D. F., and L. B. Best. 1980. Habitat selection by birds of riparian communities: evaluating effects of habitat alterations. Journal of Wildlife Management 44:1-15.
- Swengel, S. R. 1996. Management responses of three species of declining sparrows in tallgrass prairie. Bird Conservation International 6:241-253.
- Stewart, R.E. 1975. Breeding birds of North Dakota. Tri-College Center for Environmental Studies, Fargo ND. 295 pp.
- Swanson, D.A. 1996. Nesting ecology and nesting habitat requirements of Ohio's grassland-nesting birds: a literature review. Ohio Fish and Wildlife Report 13: 1-60
- Sweeney, J.M. and T.B. Wigley. 1993. The private sector and partners in flight. North American Wildlife and Natural Resources Conference Transactions, No. 58. p. 433-437.
- Tate, G.R.; Revisions by G. Hammerson and D.W. Mehlman. 1999. Species Management Abstract: Short-eared Owl (*Asio flammeus*). The Nature Conservancy. Available online at: <http://www.conserveonline.org>.
- Tyndall, R. W. 1992. Historical considerations of conifer expansion in Maryland Serpentine barrens. Castanea 57:123-131.
- US Fish and Wildlife Service. 1994. The Impact of Federal Programs on Wetlands: A Report to Congress by the Secretary of the Interior. Washington, D.C. Available online: <http://www.doi.gov/oepc/wetlands2>.
- Vickery, P.D. 1996. Grasshopper Sparrow (*Ammodramus savannarum*). In: The Birds of North America No.239. A. Poole and F. Gill eds. The Academy of Natural Sciences, Philadelphia, PA and The American Ornithologists' Union, Washington, D.C.
- Vickery, P.D., P.W. Dunwiddie. 1997. Grasslands of northeastern North America: Ecology and conservation of nature and agricultural landscapes. Massachusetts Audubon, Lincoln, MA.

- Vickery, P.D., M. I. Hunter, Jr., and S. M. Melvin. 1994. Effects of habitat area on the distribution of grassland birds in Maine. *Conservation Biology* 8:1087-1097.
- Vickery, P.D., M. L. Hunter, Jr., and J. V. Wells. 1999. Effects of fire and herbicide treatment of habitat selection in grassland birds in southern Maine. *Studies in Avian Biology* 19:149-159
- Walkinshaw, L. H. 1945. Field Sparrow, 39-54015. *Bird-Banding* 16:1-14.
- Walkinshaw, L. H. 1968. Eastern Field Sparrow. Pages 1217-1235 in O. L. Austin, editor. *Life histories of North American cardinals, grosbeaks, buntings, towhees, finches, sparrows, and allies*. Dover Publications, Inc., New York, New York.
- Walkinshaw, L. H. 1978. Life history of the eastern Field Sparrow in Calhoun County, Michigan. University Microfilm International, Ann Arbor, Michigan. 153 pages.
- Walsh, J, V. Elia, R. Kane, and T. Halliwell. 1999. *Birds of New Jersey*. New Jersey Audubon Society. 704pp.
- Wells, J. V. 1998. Important bird areas in New York State. National Audubon Society, New York, NY.
- Whitcomb, R.F., C.S. Robbins, J.F. Lynch, B.L. Whitcomb, M.K. Klimkiewicz, and D. Bystrak. 1981. Effects of forest fragmentation on the avifauna of the eastern deciduous forest. Pages 125-205 in: R.L. Burgess and D.M. Sharpe, (eds.), *Forest island dynamics in man-dominated landscapes*. Springer-Verlag, New York.
- Whitmore, R.C. 1981. Structural characteristics of Grasshopper Sparrow habitat. *Journal of Wildlife Management* 45:811-814.
- Whitmore, R. C. and G. A. Hall. 1978. The response of passerine species to a new resource: reclaimed surface mines in West Virginia. *American Birds* 32:6-9.
- Whitmore, R. C. 1979a. Short-term change in vegetation and its effect on Grasshopper Sparrows in West Virginia. *Auk* 96:621-625.
- Whitmore, R. C. 1979b. Temporal variation in the, selected habitats of a guild of grassland sparrows. *Wilson Bulletin* 91(4): 592-598.
- Wiens, J.A. 1969. An approach to the study of ecological relationships among grassland birds. *Ornithological Monographs* 8:1-93.
- Winter, M., D.H. Johnson, T.M. Donovan, and W.D. Svedarsky. 1998. Evaluation of the Bird Conservation Area Concept in the Northern Tallgrass Prairie. Annual Report: 1998. Northern Prairie Wildlife Research Center, U.S. Geological Survey, Jamestown, ND: Northern Prairie Wildlife Research Center Home Page. Available online at: <http://www.npwrc.usgs.gov/resource/1999/bcarprt/bcarprt.htm>.
- Wray, T., II, K. A. Strait, and R. C. Whitmore. 1982. Reproductive success of grassland sparrows on a reclaimed surface mine in West Virginia. *Auk* 99:157-164.
- Zaremba, R.E. and K. Hubbs. 1991. The Albany pine bush: Fire management concerns in an urban landscape. In: *Proceedings 17th Tall Timbers Fire Ecology Conference: High-intensity fire in Wildlands, Management Challenges and Options*. (S.M. Herman Conference coordinator). May 18-21, 1989. Tallahassee, FL. 424 pp.

Zimmerman, J.L. 1988. Breeding season habitat selection by the Henslow's Sparrow (*Ammodramus henslowii*) in Kansas. *Wilson Bulletin* 100(1):17-24.

APPENDIX 1: ECOLOGICAL UNITS AND VEGETATION ALLIANCES

Appendix 1. Ecological Units and associated vegetation alliances within the Northern Ridge and Valley PIF planning unit (physiographic area 17). Modified from Keys et al. (1995). O-H-ADF = oak-hickory-ash dry forest; SM-B-B = Sugar Maple-beech-birch forest. Human use categories: F = forestry, A = agriculture, R = recreation, U = urban, M = mining, D = Development.

Subunit (state)	Description	Vegetation	Human use
221Ba (NY, NJ)	Hudson Limestone Valley	white pine-red pine forest, sugar maple- chinquapin oak forest, sycamore-box elder floodplain forest	A, F
221Bb (NY, VT)	Taconic Foothills	N. hardwoods, sugar maple- chinquapin oak forest, talus slope woodland	F, A
221Bc (NY)	Hudson Glacial Lake Plains	sugar maple-chinquapin oak forest, white pine-red pine forest	A, F, U
221Bd (NY, NJ, PA)	Kittatinny-Shawangunk Ridges	oak-heath dry forest, sugar maple- chinquapin oak forest, ridgetop pitch pine barrens	F
M221Ac (PA, MD)	Northern Ridge and Valley	oak-heath dry forest, oak pine dry forest, red cedar-white ash woodland	A, F
M221Ad (PA, MD)	Northern Great Valley	oak-heath dry forest, chinquapin oak forest, sycamore-box elder floodplain forest	A, F, U, D

APPENDIX 2: AVIFAUNAL ANALYSIS

In this section, we provide additional details on the roughly 175 bird species known to breed within physiographic area 17. Global and physiographic area scores for all species in this planning unit can be found by accessing the PIF species assessment database at Rocky Mountain Bird Observatory: www.rmbo.org.

Species of regional importance

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, 2000). Because of the small size of this planning unit, we consider a species to be of regional importance if $\geq 2\%$ of its population occurs in the unit (see Rosenberg and Wells 1995, 2000 for methods).

Ten species were estimated to have $\geq 2\%$ of their total population breeding in the planning unit (Table A2.1). These include many of the regionally important forest species, such as Scarlet Tanager, Worm-eating Warbler, Wood Thrush, Louisiana Waterthrush, and Cerulean Warbler.

Table A2.1. Species with high proportions of their total population in Area-17. Percent of population calculated from percent of range area, weighted by BBS relative abundance (Appendix 3). Population trend from BBS data (% change per year from 1966-1999). Area Importance (AI) and global scores from RMBO (Carter et al. 2000).

Species	% of pop.	relative abundance	Trend (% per year)	Significance	N
Scarlet Tanager	5.8	7.47	1.1	0.04	45
Wood Duck	5.8	1.09	13.9	0.09	20
Worm-eating Warbler	5.3	0.70	0.7	0.82	30
Gray Catbird	5.0	18.69	0.9	0.07	46
Wood Thrush	4.0	16.83	-0.5	0.29	45
Louisiana Waterthrush	3.3	0.41	1.1	0.82	27
Blue-winged Warbler	2.9	0.48	0.5	0.68	24
Eastern Phoebe	2.2	6.19	0.8	0.11	46
Cerulean Warbler	2.4	0.25	3.7	0.31	10
Rock Dove	2.1	25.19	-2.0	0.03	44

Species of immediate concern

Our primary measure of population trend at present is the Breeding Bird Survey (BBS), which provides data on roughly 140 of the 175 species breeding within Area-17. For many species in this region, however, especially those with patchy distributions, BBS coverage is poor, and reported trends often lack statistical significance. Nevertheless, a significant declining trend for a species on existing BBS routes may be reason enough to examine the population trend more closely, and to initiate measures to halt or reverse these trend.

Of the 10 species with $\geq 2\%$ of their total population in the planning unit, only Rock Dove has declined significantly ($P < 0.10$) since 1966 (Table A2.1), illustrating how declining trends alone do not automatically indicate concern for a species! This is one of very few physiographic areas where Cerulean Warbler and Wood Thrush are *not* declining.

Other declining species may be of local or regional concern, even if they don't rank highly in regional importance. In addition, suites of declining species may signal added regional concern

for a habitat type that also supports high-priority species. A complete list of the 30 species showing declines on BBS routes in this region is presented in Table A2.2.

Table A2.2. Species showing significant population declines within Area 17, based on Breeding Bird Survey, 1966-1999 trends (N = 46 routes). CF = conifer forests; HF = hardwood or mixed forests; ES = early successional; GR = grassland; W = wetland; UR = urban.

Species	Trend (% per year)	Significance	N	Relative abundance	Primary habitat
Eastern Screech-Owl	-17.7	0.00	6	0.03	HF
American Black Duck	-8.2	0.06	7	0.37	W
Grasshopper Sparrow	-7.4	0.01	32	1.96	GR
Yellow-billed Cuckoo	-7.0 ^a	0.00	40	2.39	HF
Yellow-breasted Chat	-7.0	0.02	22	0.85	ES
Black-billed Cuckoo	-6.5 ^a	0.04	39	0.76	HF
Eastern Meadowlark	-6.4	0.00	44	7.34	GR
Golden-winged Warbler	-5.7 ^a	0.08	16	0.27	ES
Vesper Sparrow	-5.6	0.01	33	1.40	GR
Ring-necked Pheasant	-5.4	0.00	40	3.60	GR
Purple Finch	-5.1	0.01	12	0.14	ES, CF
Eastern Towhee	-3.9	0.00	46	10.07	ES
Field Sparrow	-3.6	0.00	46	8.40	ES
Red-winged Blackbird	-3.4	0.00	46	63.53	ES, W
Yellow-shafted Flicker	-3.4	0.00	46	5.87	HF, ES
Common Grackle	-3.2	0.00	46	78.42	ES, UR
Brown Thrasher	-3.0	0.01	44	1.85	ES
Bank Swallow	-2.4	0.05	21	2.31	ES, W
Least Flycatcher	-2.3	0.09	31	1.03	HF
Baltimore Oriole	-2.3	0.00	46	8.52	HF, UR
Northern Mockingbird	-2.3 ^a	0.00	43	5.56	UR, ES
House Sparrow	-2.1	0.00	46	44.51	UR
Barn Swallow	-2.0 ^a	0.01	45	25.16	GR
Rock Dove	-2.0	0.03	44	25.19	UR
House Wren	-1.7	0.00	45	14.18	ES, UR
Chimney Swift	-1.7 ^a	0.07	42	6.97	UR
Blue Jay	-1.6	0.00	46	11.35	HF, UR
Eastern Wood-pewee	-1.3	0.09	45	6.07	HF
American Robin	-1.0	0.01	46	63.74	UR, ES
Song Sparrow	-1.0	0.02	46	26.68	ES

^A significant declining trend for period 1980-1996 only.

Increasing species

It is informative to also examine the species that are increasing significantly in a physiographic area. In the Northern Ridge-and-Valley, 38 species show increasing population trends, slightly more than the number of species that are declining. Increasing trends for many species are much steeper than declining trends, with 30 species more than doubling since 1966. A majority of these fall in two categories, either species associated with regenerating and mature forests, or species that have adapted particularly well to human activities or development. In the first group are many species of higher-elevation coniferous forests (e.g. Hermit Thrush, Black-throated Green Warbler, Blue-headed Vireo, Dark-eyed Junco, Common Raven), and including several that have expanded their distributions southward with the maturing of conifer plantations (e.g. Red-breasted Nuthatch, Blackburnian Warbler, Sharp-shinned Hawk). Also increasing are many widespread mature forest species such as Ovenbird, American Redstart, Pileated Woodpecker, Scarlet Tanager, and Red-eyed Vireo. In addition, unlike in the Mid-Atlantic Ridge and Valley to

the south, bottomland (valley) species such as Northern Parula, Cerulean Warbler, and Warbling Vireo appear to be increasing.

Species associated with human activities include those using bird feeders or nest boxes, as well as those that breed in urban wetlands. Several species, such as House Finch, Red-bellied Woodpecker, and Northern Cardinal have experienced widespread population increases throughout the Northeast. Among the early successional species that are increasing are those that have adapted well to suburban and agricultural habitats (e.g. Red-tailed Hawk, American Crow, Ruby-throated Hummingbird, Gray Catbird) or those that use nest boxes (Tree Swallow, Eastern Bluebird).

Table A2.3. Species showing significant population increases within Area 17, based on Breeding Bird Survey, 1966-1999 trends (N = 46 routes). CF = conifer forests; HF = hardwood or mixed forests; ES = early successional; GR = grassland; W = wetland; UR = urban.

Species	Trend (% per year)	Significance	N	Relative abundance	Primary habitat
Wild Turkey	33.4	0.01	26	0.29	HF
Canada Goose	22.0	0.00	36	2.92	W, UR
Red-bellied Woodpecker	20.1	0.02	40	1.81	HF, UR
Hermit Thrush	19.4	0.03	18	0.23	CF
Great-horned Owl	19.3	0.02	11	0.06	HF, ES
Northern Parula	17.3	0.05	18	0.15	HF, CF
Blackburnian Warbler	14.7 ^a	0.09	9	0.10	CF, HF
Wood Duck	13.6	0.09	20	1.09	W, UR
Great Blue Heron	12.8	0.00	30	0.33	W
Blue-headed Vireo	12.0	0.04	20	0.93	HF, CF
Orchard Oriole	11.4 ^a	0.06	22	0.25	ES
Common Raven	11.3	0.04	15	0.15	HF, CF
Slate-colored Junco	10.9	0.04	9	0.12	CF, UR
Red-breasted Nuthatch	10.5	0.02	9	0.05	CF
N. Rough-winged Swallow	8.2	0.04	30	0.66	ES, W
Red-tailed Hawk	8.1	0.00	41	0.53	ES, HF
House Finch	6.8	0.00	45	12.09	UR
Black-throat. Green Warbler	6.7	0.03	18	0.41	HF, CF
Sharp-shinned Hawk	6.4	0.08	13	0.04	CF, HF
Tree Swallow	5.6	0.00	43	2.48	ES, W
Ruby-throated Hummingbird	5.2 ^a	0.07	29	0.32	ES, UR
Eastern Bluebird	5.1	0.01	43	2.92	ES
Turkey Vulture	4.8	0.06	36	1.66	ES
Warbling Vireo	4.4	0.00	29	0.96	HF, ES
Mallard	4.1	0.00	40	2.26	W, UR
American Redstart	3.5	0.03	41	2.54	HF
Willow Flycatcher	3.3	0.09	35	0.96	ES
Ovenbird	3.2	0.00	44	10.02	HF
Pileated Woodpecker	2.8	0.00	38	0.93	HF
Tufted Titmouse	2.7	0.00	45	8.30	HF, UR
Red-eyed Vireo	2.4	0.00	45	15.26	HF
White-breasted Nuthatch	1.9	0.09	46	2.26	HF, UR
American Crow	1.4	0.00	46	41.19	ES, UR
Gray Catbird	1.3	0.05	45	18.69	ES
Northern Cardinal	1.1	0.01	46	15.09	ES, UR
Common Yellowthroat	1.1	0.01	45	12.92	ES, W
Black-capped Chickadee	1.1	0.08	44	5.51	HF, UR
Scarlet Tanager	1.1	0.04	45	7.47	HF

^A significant increasing trend for period 1980-1996 only.

APPENDIX 3: POPULATION ESTIMATES AND ASSUMPTIONS

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

Percent of Population

The percent of total or global population (% pop) for a species is calculated according to the methods originally described by Rosenberg and Wells (1999). For species sampled by the BBS, the Relative Abundance value for each physiographic area is multiplied by the size of that area (km²) and then summed across all the physiographic areas in which the species occurred to yield a total "BBS population." The area-weighted value for each physiographic area is then divided by this total to yield the proportion of the total population in that area. Thus:

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

Estimates of % Pop are relative values and are not dependent on the "correctness" of Relative Abundance values for individual routes; i.e., even if BBS greatly underestimates absolute abundance of "poorly sampled" species, such as nightjars and raptors, Relative Abundance values and % pop estimates should be valid, *as long as the detectability of a species on BBS routes is relatively constant across the range of the species*. These estimates are more questionable for species occupying very patchy habitats (e.g. wetlands) in regions where BBS routes do not adequately sample these habitats.

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

Within PIF plans, a threshold of % Pop has been determined that signifies a disproportionate abundance of a priority species in a physiographic area, or that an area shares a disproportionate responsibility for the long-term conservation of that species. This threshold is based on the size of a physiographic area relative to the total area of North America south of the open boreal forest (roughly 12 million km²). An analysis of North American bird species' distribution and abundance (K. V. Rosenberg, unpublished data) resulted in the % Pop thresholds listed in Table A3.1.

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

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

Absolute population estimates

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

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

Because BBS route locations are selected at random (ref), the first assumption is reasonable. Furthermore, several studies have shown that common habitat types are represented along secondary roads used as BBS routes in roughly the same proportions as in the overall landscape. The third assumption is the most problematic; although most species probably do have a fairly constant average detection distance, selecting that distance is difficult and has a large effect on total population estimates. For example, an entire BBS route composed of 50 stops, each consisting of a 0.25 mi. (400 m)-radius circular count, potentially surveys roughly 25 km² of heterogeneous landscape. For a species that is detected routinely only out to 200 m at each stop, the effective area surveyed is reduced to 6.3 km²; for a species detected only out to a distance of 100 m, the BBS route surveys 1.6 km². A simple method of extrapolating avian density from counts of singing males using detection threshold distances was proposed by Emlen and DeJong (1981), who also provided average maximum detection distances for 11 species of common forest birds. These distances ranged from 72 m (Blue-gray Gnatcatcher) to 186 m (Wood Thrush) and averaged 128 m for the 11 species. Emlen and DeJong (1981) further proposed that numbers of singing males be doubled to obtain a total population estimate and that a correction factor be applied to account for variable singing rate (i.e. birds that were missed because they didn't sing during the survey period).

In the absence of additional empirical data on species-specific detection distances and singing frequencies, we may take a simple and conservative approach to estimating regional population sizes from BBS relative abundance data. Species were initially placed in three categories, according to their presumed detection-threshold distances. A majority of forest-breeding songbirds and similar species of scrubby and open habitats were assigned a detection distance of 125 m (close to the average distance for forest birds in Emlen and DeJong's study) -- for these species a BBS route samples an effective area of 2.5 km². A second group of species that are detected primarily visually or have unusually far-carrying vocalizations in open habitats were assigned detection distances of 400 m; i.e., they are detected out to the limit of each BBS circular

stop (e.g. raptors, Upland Sandpiper). For these species the BBS samples roughly 25 km². A third group of species is considered to be intermediate and was assigned a detection distance of 200 m (effective sampling area = 6.3 km²). These include species, such as Bobolink and Eastern Meadowlark, that are detected by a combination of song and visual observations in open habitats.

Population estimates for a physiographic area are then calculated as the average landscape-level density (number of birds per route * effective area sampled by each route) multiplied by the size (km²) of the physiographic area. Note that landscape-level densities are not assumed to be similar to species densities in uniform optimum habitats, but rather reflect habitat heterogeneity at larger scales as sampled by BBS routes. Because the great majority of detections on typical BBS routes are of singing or displaying males, the population estimate derived from this method is assumed to represent number of breeding pairs, unless specifically noted otherwise.

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

APPENDIX 4: LANDOWNER INCENTIVE PROGRAMS

Excerpts from Maryland PIF (1997):

There is a wide variety of incentive programs for private landowners designed to promote forest conservation and management, agricultural best management practices, and other conservation measures. Many 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. Among the many relevant state and federal laws, the "Federal Agricultural Improvement and Reform Act of 1996," commonly known as the 1996 Farm Bill, is of special interest, since it is the major source of federal funding for conservation programs for privately owned land.

Indeed, the number and variety of programs, of agencies that administer them, and of eligibility conditions seem at times bewildering in their complexity. Individual programs that are here today may be gone tomorrow as federal and state priorities, laws, and appropriations change. In this brief account, it is possible to mention only some of the most important and to suggest where the landowner should go for more complete accurate, and current information.

The **Land and Water Conservation Fund** was first passed in 1964 and was amended in 2000. The LWCF provides money to federal, state, and local governments to purchase land, water and wetlands. Lands and waters purchased are used to provide recreational opportunities and clean water, preserve wildlife habitat and maintain the pristine nature of wilderness areas among others. Land is bought from landowners at fair-market value (unless the owner chooses to offer the land as a donation or at a bargain price). The Fund receives money mostly from fees paid by companies drilling offshore for oil and gas. Other funding sources include the sale of surplus federal real estate and taxes on motorboat fuel. Funding includes \$900 million in permanent funding split evenly between federal and state programs, with half of state funds going to local governments. Also, \$125 million are dedicated to urban parks and recreation under the **UPARR** program.

New Jersey's **Green Acres Program** awards loans and grants to local units for the acquisition of land for conservation purposes. Signed in 1999, the program will allow New Jersey to preserve 1 million acres over 10 years. Green Acres' primary focus is acquiring land that creates linkages between existing protected lands to form open space corridors. Increasingly, Green Acres gathers other public and private partners together to assist in buying and managing open space. The Program works with municipal and county governments, nonprofit organizations, and the state Farmland Preservation Program to meet compatible conservation goals. Green Acres also accepts donations of conservation and recreation land to the State. Since the 1980s, private citizens interested in land preservation have donated more than 5,400 acres of land. The **Natural Lands Trust** was established by statute to preserve land in its natural state for the enjoyment of the public and biodiversity protection. Waterfowl habitat is acquired and protected with monies from the sale of waterfowl stamps.

Pennsylvania is able to support some research and protection efforts through its **Wild Resource Conservation Fund**. The fund is financed entirely by public contributions, either through voluntary checkoffs on the state income tax return, or through direct donations or the purchase of a license plate.

Forestry Incentives

Forestry incentive programs are generally intended primarily to conserve forested land as forest and to promote reforestation and good forest management. Although the individual landowners' objectives may vary, the overall goals are to ensure a continuing supply of forest products while

also providing such environmental benefits as clean water, clean air, wildlife habitat, recreation, and natural beauty.

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. SIP is federally funded under the 1996 Farm Bill. WIP is funded by the state and user fees. The administering agency will vary by state. These programs provide both technical assistance and cost-sharing for reforestation and various forest management activities. Landowners' objectives under FSP may include wildlife habitat enhancement or the protection of soil, water quality, wetlands, and streams. They may also include, but are not required to include, the production of timber and other forest products. To be eligible, landowners must have at least 1 and no more than 1,000 acres of non-industrial forest land and an approved Forest Stewardship Plan covering all the contiguous forest and meet other requirements.

The **Forestry Incentives Program**, also federally funded under the 1996 Farm Bill, 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 softwood sawtimber and to continue sustained-yield, multipurpose management of private non-industrial forest land. Requirements include an area of 10-1,000 acres, with the potential to produce at least 50 cubic feet per acres per year, and a forest management plan. Those interested should check with their Project Forester or Soil Conservation District (see below) for current information.

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 use-rate valuation of \$100 per acres. 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 back-tax penalties for premature withdrawal or nonperformance.

There is also a **Federal Income Tax Incentive (PL96-451)** that permits up to \$10,000 of capitalized reforestation costs each year to be eligible for a 10-percent investment tax credit and a 7-year amortization. Federal timber tax law is complicated and poorly understood, even by many IRS agents and other wise qualified accountants. It is best to consult an expert in this specialized field for advice.

Agricultural and Wetland Incentives

There are numerous incentive programs for instituting agricultural best management practices (BMPs) and various conservation practices, generally related to control of soil erosion; the protection of streams from sediment, excess nutrients, and other pollutants; management of animal wastes; and the preservation or restoration of wetlands. Incentives include technical advice, cost-sharing, and direct payments.

Most of the conservation programs available to farmland owners are provided under the 1996 Farm Bill. The Primary sources of information for landowners are the local offices of the USDA Farm Service Agency (FSA), the Soil Conservation District (SCD), the USDA Natural Resources Conservation Service (NRCS), and the Cooperative Extension Service-these last two having offices in each county.

The **Conservation Reserve Program (CRP)** is intended to protect highly erodible 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.

Marginal pastureland may be eligible if it will be devoted to a riparian buffer to be planted to trees or other wildlife cover. Eligible acreage is ranked by the expected environmental benefits. Factors considered include vegetation most beneficial to wildlife, water and soil quality benefits, and tree plantings. Contracts are from 10-15 years. The program targets environmentally sensitive croplands and encourages producers to plant long-term conserving cover to improve soil, water and wildlife habitat.

The **Environmental Quality Incentives Program (EQIP)** combines the functions of the former Agricultural Conservation Program and Water Quality Incentives Program, among others, and is intended to maximize environmental benefits per dollar expended. It provides technical and educational assistance to farmers and cost-share and incentive payments up to 75 percent of cost for conservation practices such as manure management facilities, riparian corridor management (including stream bank stabilization, tree planting, and fencing), pastureland management and cropland erosion control practices. Nationally, overall funds are allocated half for crop production and half for livestock operations. The primary focus is soil conservation and water quality, but incentive payments can be made for wildlife habitat management.

The **Wetlands Reserve Program (WRP)** as amended under the 1996 Farm Bill offers landowners financial incentives and technical assistance to enhance wetlands in exchange for retiring marginal agricultural land. It focuses on restoring and protecting wetland 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 renewed "**Swampbuster**" provisions are designed to induce farmers not to drain agricultural wetlands or else to mitigate losses.

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

Wildlife Programs

Traditionally, most government wildlife programs have been geared to game species such as grouse, turkey, quail and ducks. Many projects designed to improve wetlands and other habitat for game species will also benefit nongame species, as will the more general wildlife habitat enhancements offered through forestry and agricultural programs. For more detailed information, contact your state wildlife agency, local SCD and NRCS offices, and the US Fish and Wildlife Service (USFWS).

The **Wildlife Habitat Incentives Program (WHIP)** under the 1996 Farm Bill provides \$50 million over the life of the bill for wildlife habitat improvement on private lands. It is designed to address regionally specific goals by providing cost-share payments to private landowners to improve food, shelter, and nesting areas. Unlike most agricultural programs, it is not restricted to productive farmland but may be available to relatively small holdings. For eligible practices, NRCS will pay up to 75 percent of the establishment costs, up to \$10,000. Projects must be maintained for at least 10 years. The program may be used for the establishment of native warm-season grasses.

USFWS programs that emphasize wetlands include North American Waterfowl Management Plan Joint Venture Projects, which offer financial assistance for the restoration of wetlands significant to waterfowl and other wetland-dependent species; and the North American Wetlands Conservation Act, which provides funding for cost-share grants for wetland conservation projects involving acquisition, restoration, and enhancement.

Several private organizations also have programs to improve habitat for game birds and sport fish. Among these are Ducks Unlimited, Trout Unlimited, the Izaak Walton League, the Ruffed Grouse Society, Quail Unlimited, and Pheasants Forever. While specifically designated 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 a multiyear initiative to restore, protect and

enhance wetlands, stream buffers and wildlife habitat in Maryland, Virginia and Pennsylvania. Pheasants Forever, as another example, has supported landowners wishing to establish warm season grasses.

The USFWS's **Private Stewardship Program** is a new program designed to fund local, private and voluntary conservation efforts that benefit any federally listed endangered or threatened species as well as any proposed species, candidate species or other at risk species. For FY 2002 the Fish and Wildlife Service will award approximately \$10 million to private landowners and their partners (non-federal) to assist them in executing a conservation project. Landowners must match 10% of the awarded amount with either cash or in-kind donations. Some examples of types of projects awarded include, managing non-native species, planting native vegetation to restore a rare plant community, implementing measures to reduce risk of disease to imperiled species, or restoring habitats of at risk species. The FWS may be able to assist landowners in preparing or implementing a plan. For more information see the USFWS website or contact your local FWS office.

Conservation Easements

Conservation easement programs may be used to preserve from development farmland, forest land, wetlands, and other real property with conservation values. Generally, they restrict the use of land to specified purposes such as farming, forestry, or wildlife conservation. While permitting the landowner to continue managing the land productively, they generally prohibit or sharply restrict future development. Most easements are required to be in perpetuity. Most easement programs are voluntary but some easements are mandatory (e.g., under the Forest Conservation Act).

Easements may be donated to private or public land trusts or they may be transferred in a "bargain sale" for less than full market value. Generally, depending on the individual conditions of the contract, the granting or "bargain sale" of a conservation easement will provide the landowner with income, property, and/or estate tax benefits.

According to a 1994 Land Trust Alliance survey, of the 1,100 land trusts in the United State, 80 percent devote at least some attention to protecting wildlife habitat (American Farmland, Summer 1995).

Other programs provide direct payment to the landowner in exchange for a restriction on future development. In some cases these may also involve the transfer of development rights to an area designated for intensive development. Sale of easements frequently result in a capital gains tax to the seller but because the loss of development potential usually lower the market value of the property, it may result in lower property or estate taxes.

Programs that provide for the purchase of development rights include the federally funded **Forest Legacy Program** (reauthorized in the 1996 Farm Bill). The 1996 Farm Bill also introduced a new federal **Farmland Protection Program** to provide up to \$35 million in additional support to states that have farmland conservation programs for the purchase of easements so that farmers can preserve their land in agriculture.

Natural Area Registries programs have been established to recognize landowners with areas of special significance. They provide some technical advice and a personal sense of stewardship but no financial benefit. Interested landowners should consult The Nature Conservancy.

APPENDIX 5: IMPORTANT BIRD AREAS PROGRAM IN THE NORTHERN RIDGE AND VALLEY PHYSIOGRAPHIC AREA

Table A5.1. Important Bird Areas in the Northern Ridge and Valley (Area 17) in the state of New York. IBAs are referred to by the page number on which they can be found in Wells 1998.

Site Names of New York IBAs	Page #
Ashokan Reservoir	132
Bashakill Wildlife Management Area	129
Black Creek Marsh	106
Carter Pond	169
Fort Edward Grasslands	170
Galeville Airport	133
John Boyd Thatcher State Park	107
Northern Shawangunk Mountains	135
Rensselaer Forest Tract	126
Saratoga National Historic Park	160
Schodack Island State Park	128
Stissing Preserve	114
Stockport Flats	108
Tivoli Bays	115
Vischer Ferry Nature and Historic Preserve	162

Table A5.2. Important Bird Areas in the Northern Ridge and Valley (Area 17) and the state of Pennsylvania. IBAs are given with site numbers referencing site descriptions in Crossley (1999).

Site Names of Pennsylvania IBAs	Site #
Bald Eagle Ridge	32
Black Moshannon SP and SF	33
Blue Marsh Lake	53
Blue Mountain Ridge	39
Canoe Creek Watershed	76
Frankstown Branch	75
Freedom Township Grasslands	41
Hawk Mountain Sanctuary, Kittatinny Ridge	51
Hershey Special Habitat	45
Lake Ontelaunee	52
Quakertown Swamp	66
Rothrock State Forest (Part) and Stone Mountain	35
Second Mountain Corridor – SGL 211	44
Sheets Island Archipelago	46
South Mountain, Caledonia, Michaux	40
St. Anthony's Wilderness	43
Susquehanna Riverlands	50
Tall Timbers, Snyders-Middleswarth Natural Area	38
The Barrens at Scotia	34
"The Hook" Natural Area	37
Thickhead Wild Area in Rothrock	35
Tuscarora Ridge, The Pulpit	36
Upper Delaware Scenic River	60
Waggoner's Gap	39