AMERICAN WOODCOCK CONSERVATION PLAN

A Summary of and Recommendations for Woodcock Conservation in North America

Woodcock Task Force
Migratory Shore and Upland Game Bird Working Group
Association of Fish and Wildlife Agencies

March 2008

American Woodcock Conservation Plan

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edited by

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compiled by the:

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A **Wildlife Management Institute** Publication

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technical edit and publication design by Jennifer Rahm, consultant

Table of Contents

		Page
Introduction		1
Bird Conservation Region Action Plans		
11	Prairie Potholes *James Kelley*	11
12	Boreal Hardwood Transition *Dan Dessecker*	19
13	Lower Great Lakes/St. Lawrence Plain *Tim Post*	26
14	Atlantic Northern Forest *Dan McAuley*	39
21	Oaks and Prairies *David Haukos, James Kelley*	53
22	Eastern Tallgrass Prairie *James Kelley*	61
23	Prairie Hardwood Transition *James Kelley*	69
24	Central Hardwoods *David Krementz, Nick Myatt*	77
25	West Gulf Coastal Plain/Ouachita *David Krementz, Nick Myatt*	86
26	Mississippi Alluvial Valley *David Krementz, Nick Myatt*	93
27	Southeastern Coastal Plain *Scot Williamson*	102
28	Appalachian Mountains *Mark Banker*	110
29	Piedmont *William Palmer*	122
30	New England/Mid-Atlantic Coast *Scot Williamson*	132
31	Peninsular Florida *Scot Williamson*	142
37	Gulf Coastal Prairie *James Kelley*	145
Appendix I		149
Appendix II		151
Bibliography		153

Executive Summary

The American woodcock (*Scolopax minor*) is a popular game bird throughout eastern North America and is managed on the basis of two populations: eastern and central. Both populations have experienced significant declines since surveys were first implemented in the mid-1960s. Loss and degradation of early succession forest habitat is believed to be the primary factor responsible for these declines. Changes in land use and societal attitudes towards even-aged forest-management practices (i.e. clearcutting) that create early succession habitat will likely contribute to continued declines in woodcock populations. The *American Woodcock Conservation Plan* documents changes in woodcock densities and habitat that occurred from the early 1970s to present. Population density deficits were calculated and specific habitat acreage goals for erasing such deficits were developed.

There has been a loss of over 839,000 singing male woodcock since the early 1970s. This corresponds to a population-density deficit of just over 778,000 males. Approximately 21.3 million acres (8.6 million ha) of new woodcock habitat needs to be created in order to eliminate this deficit and return woodcock densities to those observed during the early 1970s.

Introduction

The American woodcock (*Scolopax minor*) is a popular game bird throughout eastern North America. Approximately 520,000 hunter days were expended to harvest nearly 300,000 woodcock in the United States during the 2004 to 2005 hunting season (Kelley and Rau 2006). Woodcock are managed on the basis of two regions or populations, Eastern and Central, as recommended by Owen et al. (1977, Figure 1). Population trends are monitored by singing-ground surveys (SGSs) within each state and province in the central and northern portions of woodcock breeding range (Figure 1). SGSs were developed to exploit the conspicuous courtship display of the male woodcock. Early studies demonstrated that counts of singing males provide indices to woodcock populations and could be used to monitor annual changes (Mendall and Aldous 1943, Goudy 1960, Duke 1966, and Whitcomb 1974). There have been long-term (1968 to 2006) woodcock declines of 1.9 percent per year in the Eastern Region and 1.8 percent per year in the Central Region (Kelley and Rau 2006, Figure 2).

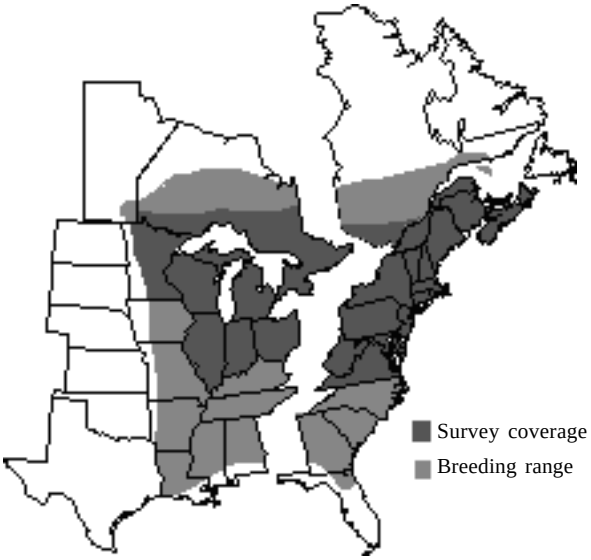


Figure I-01. Woodcock management regions, primary breeding range, and SGS coverage.

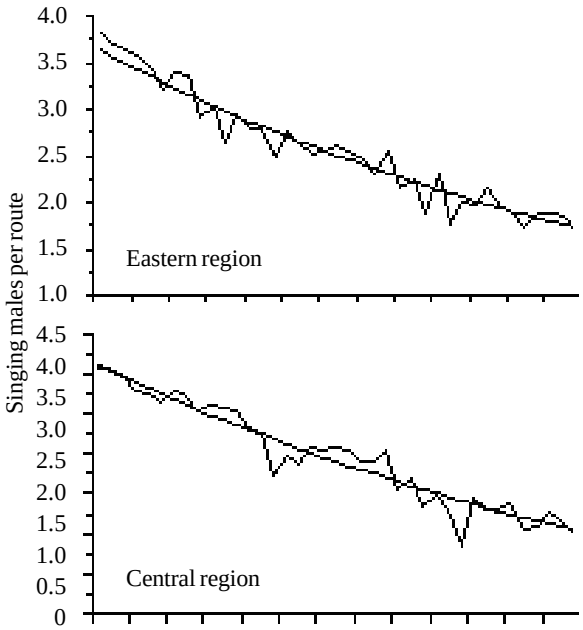


Figure I—02. Long-term trends (smooth line) and annual indices of the number of woodcock heard on the SGS, 1968 to 2006 (Kelley and Rau 2006).

The ratio of immature birds per adult female in the harvest provides an index to recruitment of young into the population and is measured by the national Wing-collection Survey. Age- and sex-related plumage characteristics (Martin 1964, Sepik 1994) are examined on approximately 10,000 wings submitted by hunters each year to derive the recruitment index. There have been long-term declines in woodcock recruitment in both regions (Figure 3). Wing receipts also provide information on the geographic distribution of the harvest (Appendix 1).

It is widely believed that loss of early succession forest habitat is responsible for declines in woodcock recruitment and in overall population status. The Woodcock Task Force of the Association of Fish and Wildlife Agencies was formed to document loss of woodcock habitat that has occurred during the past three

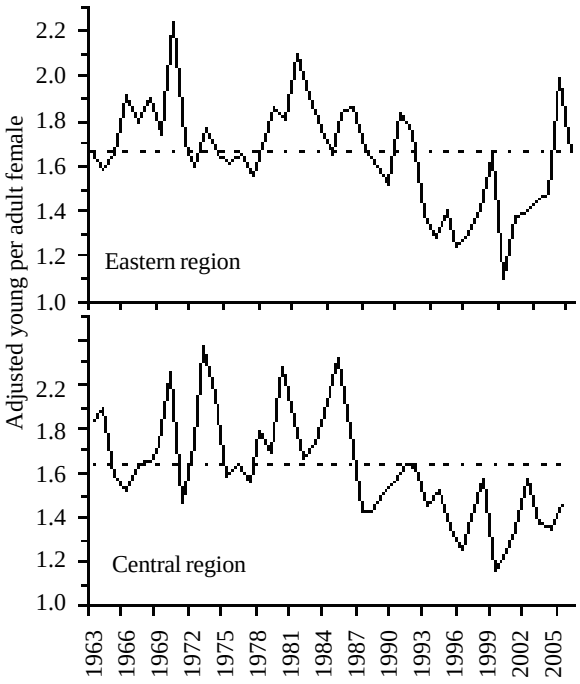


Figure I-03. Weighted and annual indices of recruitment (United States), from 1963 to 2005. The dashed line is the 1963 to 2005 average (Kelley and Rau 2006)

decades and to develop habitat-management recommendations that are needed to halt, and ultimately to reverse, population declines. The Woodcock Task Force recognizes that significant acreage of former woodcock habitat has reverted to land uses that makes it forever unavailable to new management efforts. Therefore, we did not develop objectives that strove for a return to absolute population sizes observed during the early 1970s. Instead, we adopted a framework for returning woodcock densities to former levels.

Goal. The goal of the Woodcock Management Plan is to halt the decline of woodcock populations and to return them to densities which provide adequate opportunity for utilization of the woodcock resource

Objectives. Objectives of the plan are:

1. to halt woodcock population declines by 2012 as measured by SGSs
2. to achieve positive population growth by 2022 as measured by SGSs
3. to halt decline of early succession habitat by 2012 as measured by the Forest Inventory Analysis system (FIA)
4. to increase early succession habitat by 2022 as measured by the FIA.

Woodcock Ecology and Management

Breeding

Habitat important to breeding woodcock can be divided into several categories (Figure 4).

Singing ground. Male woodcock perform courtship activities in a variety of openings, such as clearcuts, natural openings, roads, pastures, cultivated fields and reverting agricultural fields. The quality of singing ground is influenced by the proximity of nesting and brood-rearing habitat. Singing grounds are often less than 109.4 yards (100 m) from diurnal cover (Straw et al. 1994).

Nesting and brood-rearing habitat. Most woodcock nests are in young, second-growth hardwood stands that are near feeding areas as well as near singing grounds. Woody stem density of nesting areas varies between 14,600 to 49,000 stems per hectare. Preferred brood habitat is characterized by a protective, dense, hardwood cover on good soil that supports an abundance of earthworms (Straw et al. 1994).

Diurnal habitat. A wide variety of plant species may comprise suitable diurnal habitat. Good habitat is indicated by early succession growth or by growth forms that provide adequate protection for birds. The abundance of earthworms is a critical determinant of woodcock use of a site. Woodcock may sometimes use more mature forest if there is a dense understory. Use of coniferous stands is minimal in northern breeding areas (Straw et al. 1994).

Nocturnal habitat. Woodcock often leave diurnal areas at dusk and fly to openings, such

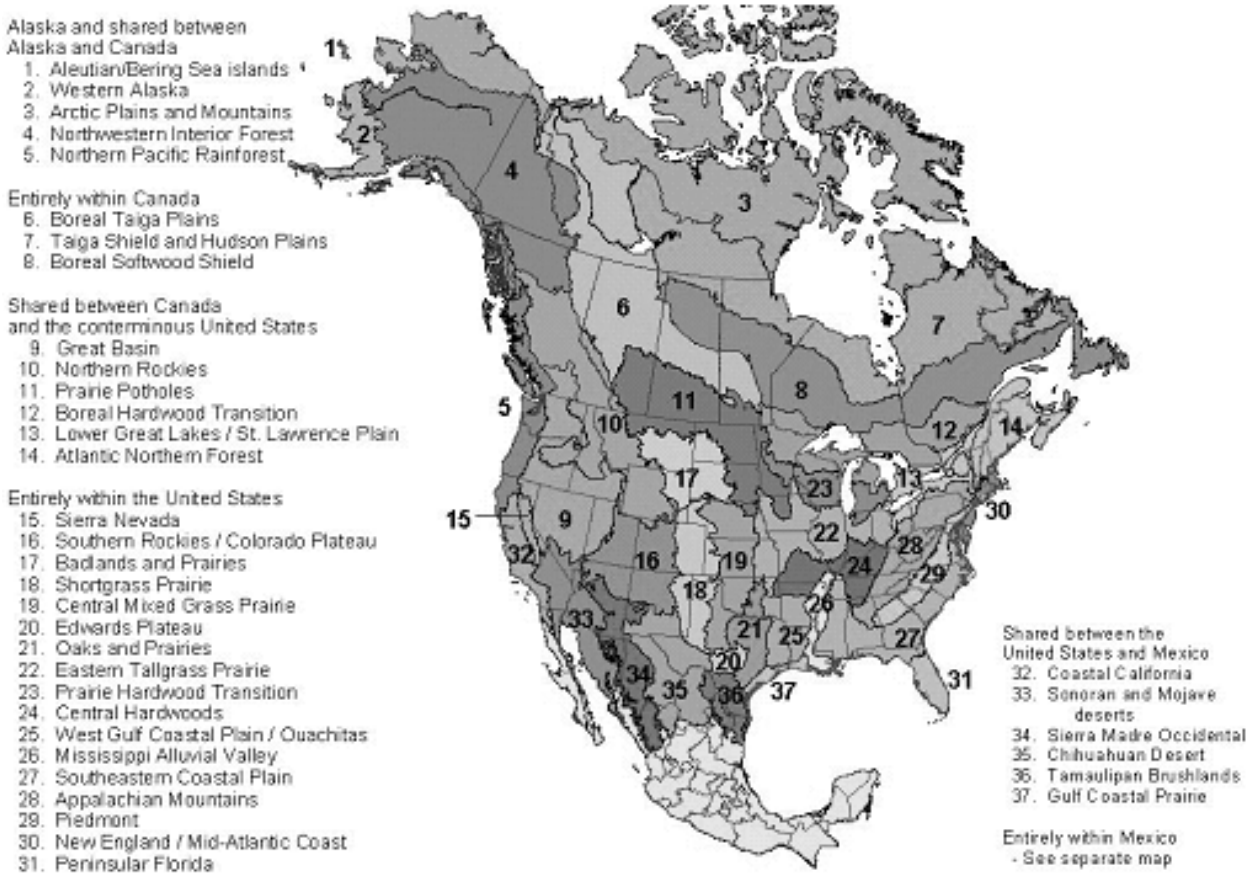


Figure I—04 Bird conservation regions in North America, excluding portions of Mexico. Map produced by the North American Bird Conservation Initiative.

as clearcuts, abandoned agricultural fields and pastures (Straw et al. 1994).

Migration and Wintering

Little is known about the habitat requirements of woodcock during migration. Sheldon (1971) outlined potential woodcock migration pathways based on band-recovery data. Recent telemetry studies in the Central Region provide further insights to the migration pathways used by woodcock (Myatt and Krementz unpublished data, 2002). Krementz and Jackson (1999) have developed a habitat management manual for wintering woodcock.

Diurnal habitat. Diurnal habitat use by woodcock on the wintering grounds varies widely. Forest types used range from bottomland hardwoods to upland pine and pine-hardwoods (Roberts 1993). Bottomland habitat used typically is found in the middle zones of the floodplain, above the oxbows dominated by bald cypress and swamp tupelo but at lower elevations than upland forests. Dense monocultures of southern pines tend to acidify soils and to degrade habitat for woodcock (Krementz and Jackson 1999). However, southern pine (longleaf, shortleaf, loblolly and slash) forests can provide good woodcock habitat if there is a suitable understory and a litter layer with good soils underneath (Krementz and Jackson 1999). Specific areas used by woodcock in pine forests are often depressions or drainages dominated by hardwoods (Roberts 1993). In a study of the use of prescribed fire in pine stands it was determined that recently burned stands

were preferred by woodcock due to the presence of bare soils, compared to stands burned 2 to 3 years earlier (Johnson and Causey 1982).

Nocturnal habitat. Nocturnal woodcock habitat during winter includes pastures, fallow fields, agricultural fields, and young clearcuts (Roberts 1993). Woodcock in Louisiana commonly use taller, unmowed sections of pastures and wet areas, but extremely dense vegetation may need to be mowed or grazed to create a more open condition (Glasgow 1958). In the southestern United States, young clearcuts or old fields were preferred as nocturnal habitat compared to pastures or hayfields (Krementz 2000). Presence of shrubbery and bare ground that provides easy access to soil for foraging seem to be important site factors (Krementz 2000).

Singing grounds. A variety of openings are used by male woodcock for singing grounds in the south, but they seem to prefer brushy fields or young pine plantations (Roberts 1993).

Nesting and brood-rearing habitat. Habitat requirements of nesting woodcock in the south are not well known (Whiting and Boggus 1982). A description of 32 nest sites in Alabama indicated that 61 percent occurred in mixed pine-hardwood, 17 percent in hardwoods, 13 percent in pines and 9 percent in open sites (Roboski and Causey 1981). Tree basal area on nest sites ranged from 5 to 37 square miles per hectare, and stem densities ranged from 5,000 to 50,000 stems per hectare (Roboski and Causey 1981).

Factors Responsible for Population Declines

Most biologists believe that loss of early succession forest habitat throughout the range is responsible for the observed declines in woodcock recruitment and the overall population status. Early succession wildlife habitat has declined throughout much of the eastern United States, mostly from forest maturation, from declines in farm abandonment, from drainage and from conversion of bottomland hardwoods to agriculture and pine plantations through fire suppression and urbanization.

Forestland is maturing because disturbance factors, such as fire, have been suppressed. In addition, there has been an increase in the number of small (fewer than 100 acres [fewer than 40.5 hectares]) forest tracts that have nonindustrial private owners, who are less likely to harvest timber. Further, negative societal attitudes towards active forest management have reduced suppression and, therefore, increased maturation. Public misconceptions about forest management have fostered the belief that wildlife species that inhabit mature forests are imperiled. In many cases, the exact opposite is true. For example, in the northeastern United States, most woodland breeding bird species have increasing population trends. Whereas, more than half of all successional or shrub species are declining (U.S. Geological Survey Breeding Bird Survey 2006).

What Needs To Be Done?

In the absence of natural forest disturbance factors, habitat managers must replicate those factors in order to conserve species that depend on early succession habitat. Without management programs to create patches of young forest, species that are associated with them will continue to decline and eventually will disappear. Interestingly, there is increasing evidence that species typically considered to be associated only with mature forest will seek out food and cover resources provided by early succession habitats, especially during the juvenile stage. Therefore, the challenge is to protect, create or restore an appropriate mix of young and old forest.

Proper habitat management for woodcock involves careful consideration of the juxtaposition of various covers that serve different purposes. For example, clearings (more than 0.5 acre [more than 0.2 hectare]) provide singing ground for males. But, it is critical that such clearings be placed near suitable nesting and brood-rearing cover consisting of young, second-growth hardwoods. Creating feeding covers of dense shrubs and stands of young hardwoods on moist, rich soil is also important. Finally, nocturnal roosting areas consisting of old fields or of recently harvested woodland of at least 3 to 5 acres (1.2 to 2.0 hectares) should be located within 0.5 mile (0.8 km) of suitable feeding cover. Active forest-management programs in hardwood and mixed-hardwood forests can provide all of these necessary components.

A landscape-level approach to woodcock management involves using management units of 500 to 1,000 acres (202.3 to 404.7 hectares), which should support approximately 500 woodcock. Ideally, several units should be located within 1 to 2 miles (1.6 to 3.2 km) of each other to allow interchange of birds. Within management units, habitat treatments should be centered on broad-leaved deciduous or on deciduous shrub-scrub wetlands where moist soils are found. By locating (where allowable) treatments across wet areas or streams, suitable woodcock habitat will be created along a moisture gradient that will provide a consistent supply of earthworms throughout summer. Even-age forest management treatments of more than or equal to 5 acres (2.0 hectares) will stimulate sprouting of shade-intolerant species, such as aspen, to create ideal woodcock habitat. Short rotation cutting cycles of no more than 20 years ensures that forested habitat will not become too mature and will not experience a decline in woodcock use.

Woodcock Population and Habitat Goals

The Woodcock Management Plan is intended to be used primarily for planning purposes. Specifically, the intent is to determine the extent of population loss from the early 1970s, as well as the loss of early succession habitat since that time. Next, we determined the acreage of early succession habitat that must be created in each bird conservation region (BCR) and state to return woodcock densities to those observed in the early 1970s. It should be pointed out that the population and habitat goals developed in this process constitute objective estimates of what it will take without being constrained by factors that may prevent creation of new woodcock habitat. This will allow bird-conservation planners to determine where the greatest need for woodcock conservation overlaps with the needs of other bird species. We recognize that practical limitations may prevent total achievement of habitat goals to fully restore woodcock densities in many portions of woodcock range. Therefore, we also determined the amount of early succession habitat that must be created annually in each BCR to halt decline of such habitat (i.e. stabilize availability). Pursuing this objective in a given region should stabilize woodcock numbers in that region by providing a steady state of early succession habitat availability.

Analytical Approach

Woodcock Population Goals

We used a deficit approach to derive population and habitat goals. Average woodcock populations of singing males only were estimated from 1970 to 1975 and from 2000 to 2004 for each BCR (Figure 5), or portion of a BCR, covered by an SGS. This was accomplished by determining the average number of singing males on each SGS route for each time period. We then converted estimates from singing males per route to singing males per acre since we knew how many acres each survey route sampled. Based on these data, density contours were developed for the entire SGS area. In the United States, individual counties were assigned a density category based on which density contour the majority of its land area fell within. The total number of singing males in each county was determined by multiplying the density estimate by the total land-base acreage (not simply acres of woodcock habitat) in the county. In Canada, population estimates were determined at the provincial level only. The population estimate for an entire BCR was determined by summing population estimates from individual counties or provinces found within the BCR. The effective density of singing males in each time period was determined by dividing the number of singing males by the number of manageable acres found in the BCR during that time period. We defined manageable acres as all timberland as determined by the FIA.

We derived a woodcock density deficit by subtracting the current effective density from the historical effective density. The population deficit is the number of singing males that need to be added to a given BCR to achieve the effective density observed during 1970 to 1975. The population deficit was calculated by multiplying the density deficit by the current number of manageable acres (Appendix II).

Woodcock Breeding Habitat Goals

Knowledge of population deficits was used to determine breeding habitat goals for each BCR. Habitat goals are the additional acres of woodcock habitat in a given breeding BCR that must be created to produce sufficient birds such that the effective density of singing males will equal those found during 1970 to 1975. We identified woodcock habitat as being small-diameter (seedling or sapling) and nonstocked forest inventory categories (Cushwa et al. 1977, Gutzwiller et al. 1982).

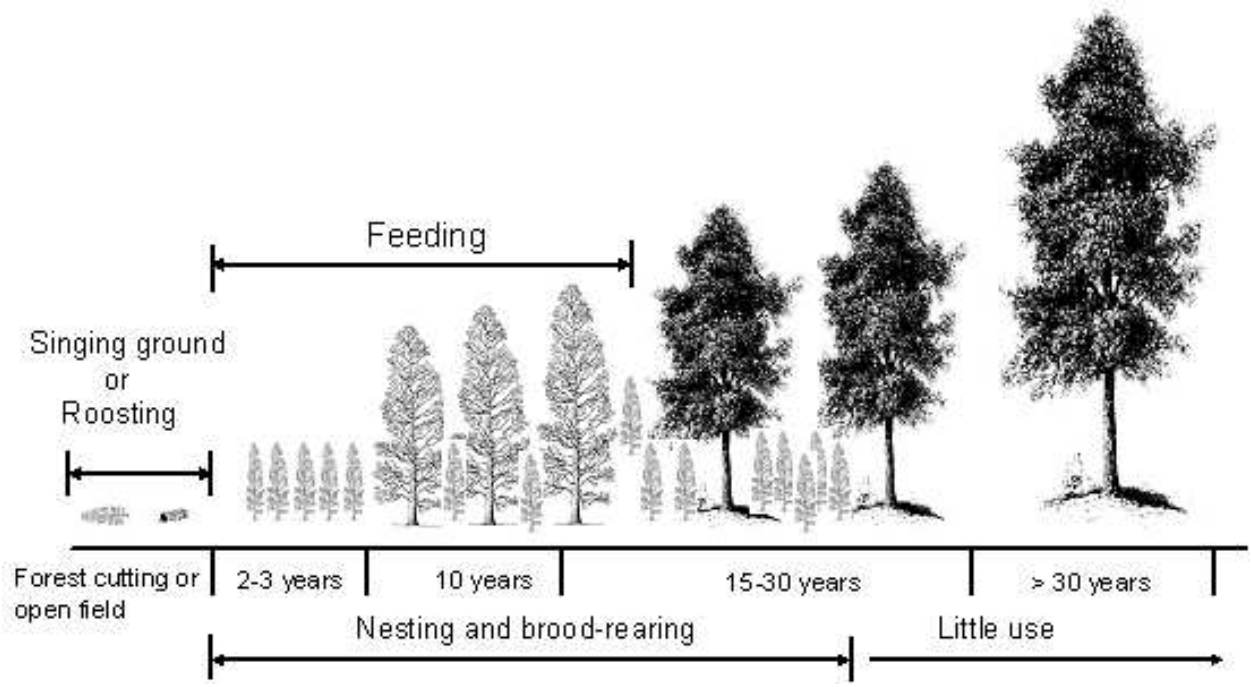


Figure I—05. Key habitat components required by woodcock in relation to forest succession.

First, we developed a habitat multiplier to determine how many acres of new habitat would be needed to add one singing male to the BCR. For each BCR, we calculated a habitat multiplier by dividing the acreage of early successional habitat (small-diameter and nonstocked forest) for the 1970 to 1975 period by the number of singing males found in the BCR during the same period. Acreage goals were calculated for each BCR by multiplying the population deficit by the habitat multiplier specific to that BCR.

There has been a loss of over 839,000 singing male woodcock since the early 1970s (Tables 1 and 2). This corresponds to a population density deficit of just over 778,000 males. Approximately 21.3 million acres (8.6 million hectares) of new woodcock habitat needs to be created in order to eliminate this deficit and to return woodcock densities to those observed during the early 1970s (Tables 1 and 2).

Stabilization of Early Succession Habitat

To estimate the amount of early succession habitat that must be created annually to stabilize its availability, we first determined the current extent of small-diameter (seedling or sapling) forestland. We assumed a time horizon of 20 years for the lifetime viability of early succession habitat as being suitable for woodcock habitat. The current acreage of small-diameter forestland for each BCR was divided by 20 to determine the amount of new early succession habitat that needs to be created to halt the decline of such habitat.

In order to halt the decline of early succession habitat, approximately 4.7 million acres (1.9 million hectares) must be created annually (Tables 3 and 4). Habitat management should focus primarily on forest types that are potentially valuable woodcock habitat but that currently are too mature for woodcock use due to forest succession. This constitutes creation of new habitat because it concentrates on areas that once contained woodcock but no longer do. New habitat can also be created by converting nonforested habitat to habitat that would support woodcock. Examples of such

conversions would be withdrawing row crop fields from production and areas being actively reforested. Management of habitat that currently contains woodcock obviously will be part of the conservation effort. However, this could be better described as habitat enhancement rather than habitat creation. We have no information to guide us on how to quantitatively predict woodcock response to enhancement. Therefore, we did not include it in goal calculations. Recommended techniques for managing woodcock breeding habitat are provided by Sepik et al. (1981).

Woodcock Wintering Habitat Goals

A significant portion of woodcock migration and wintering range is not covered by SGSs. Although woodcock nesting occurs in southern areas of the United States, the primary importance of this region is providing wintering habitat. Without density estimates for southern areas, development of population and habitat goals was not possible using the same deficit approach that was used for breeding areas. Instead, action plans for southern BCRs will focus on documentation of habitat loss, on description of current habitat composition and on identification of areas where current and potential woodcock habitat (manageable acres) exists. Recommended habitat management techniques in wintering areas are provided by Krementz and Jackson (1999).

Table I-01. Changes in the population of singing-males (1970s vs. present), population density deficits and habitat goals for returning woodcock densities to those observed during the 1970s.

Bird conservation region	State/Province	Population of singing males Historical	Population of singing males Current	Loss or gain (-/+) of singing males	Population density deficit (males)	Habitat goal (in acres)
11	Minnesota	41,773	33,337	- 8,436	1,126	3,999
12	U.S. locations					
	Michigan	407,260	304,934	- 102,325	89,880	898,880
	Minnesota	182,669	156,067	- 26,602	96,864	968,648
	Wisconsin	108,141	79,712	- 28,429	34,977	349,769
	Subtotal	698,070	540,714	- 157,356	221,721	2,217,217
	Canadian locations					
	Manitoba	63,064	21,609	- 41,455	Not calculated	Not calculated
	Ontario	491,666	381,358	- 110,308	126,537	1,265,370
	Quebec	58,347	58,276	- 71	139	1,390
	Subtotal	613,077	461,243	- 151,834	126,676	1,266,760
	Total	1,311,147	1,001,957	- 309,191	348,397	3,483,977
13	U.S. locations					
	New York	97,888	62,239	- 35,649	37,184	1,599,693
	Ohio	25,413	13,276	- 12,137	10,855	323,716
	Pennsylvania	12,831	7,882	- 4,948	5,423	80,247
	Vermont	6,344	4,363	- 1,981	1,305	26,758
	Subtotal	142,477	87,760	- 54,716	54,767	2,030,415
	Canadian locations					
	Ontario	193,746	149,638	- 44,108	48,767	1,350,647
	Quebec	46,318	46,184	- 134	7,273	201,231
	Subtotal	240,064	195,822	- 44,242	56,040	1,551,878
	Total	382,541	283,583	- 98,958	110,807	3,582,293
14	U.S. locations					
	Connecticut	2,349	896	- 1,453	1,520	55,527
	Maine	168,170	108,952	- 59,219	62,358	1,912,514
	Massachusetts	4,445	2,393	- 2,052	1,996	74,827
	New Hampshire	29,505	21,970	- 7,535	7,493	268,986
	New York	43,741	28,230	- 15,512	14,000	481,465
	Vermont	27,906	20,582	- 7,324	8,702	394,122
	Subtotal	276,117	183,023	- 93,094	96,069	3,187,441
	Canadian locations					
	New Brunswick	181,679	142,681	- 38,997	44,191	525,426
	Nova Scotia	67,372	52,373	- 14,999	14,129	179,157
	Prince Edward Island	10,973	6,799	- 4,173	3,105	35,116
	Quebec	101,344	99,329	- 2,015	5,596	78,904
	Subtotal	361,368	301,182	- 60,186	67,021	818,603
	Total	637,484	484,205	- 153,280	163,090	4,006,044
22	Illinois	18,495	32,302	+13,807	0	0
	Indiana	19,273	9,998	- 9,275	14,206	267,633

Table I-01 (continued). Changes in the population of singing-males (1970s vs. present), population density deficits and habitat goals for returning woodcock densities to those observed during the 1970s.

Bird conservation region	State/Province	Population of singing males		Loss or gain (-/+) of singing males	Population density deficit (males)	Habitat goal (in acres)
		Historical	Current			
22 (continued)	Michigan	4,037	2,978	- 1,059	1,859	35,025
	Minnesota	3,536	3,074	- 462	754	14,210
	Ohio	26,166	14,409	- 11,757	21,112	397,747
	Total	71,506	62,761	- 8,745	37,931	714,615
23	Illinois	599	481	- 118	449	5,204
	Indiana	8,012	4,502	- 3,510	6,499	75,324
	Michigan	134,278	99,832	- 34,446	58,143	673,879
	Minnesota	48,226	42,781	- 5,445	12,172	141,078
	Wisconsin	114,890	84,519	- 30,371	53,152	616,032
	Total	306,005	232,114	- 73,891	130,415	1,548,742
24	Illinois	3,697	6,971	+ 3,273	0	0
	Indiana	11,715	4,716	- 6,999	8,043	509,126
	Ohio	443	211	- 232	0	0
	Total	15,856	11,977	- 3,878	8,043	509,126
26	Illinois	121	292	+ 172	0	0
27	Virginia	8,189	2,186	- 6,003	5,355	496,951
28	Maryland	2,518	1,099	- 1,419	892	30,315
	New Jersey	5,048	1,176	- 3,871	3,549	120,663
	New York	38,704	22,817	- 15,888	17,744	603,293
	Ohio	17,540	8,741	- 8,799	10,005	340,169
	Pennsylvania	71,497	42,030	- 29,466	30,414	1,034,059
	Virginia	13,068	4,284	- 8,784	9,306	316,389
	West Virginia	31,120	13,898	- 17,222	16,276	553,368
	Total	179,495	94,047	- 85,448	88,186	2,998,256
29	Maryland	4,158	1,308	- 2,850	2,850	133,950
	New Jersey	5,243	909	- 4,334	4,334	203,698
	Pennsylvania	8,111	2,439	- 5,672	5,672	266,584
	Virginia	20,188	5,499	- 14,689	14,689	690,383
	Total	37,700	10,156	- 27,544	27,545	1,294,615
30	Connecticut	10,261	3,388	- 6,873	5,872	283,020
	Delaware	5,199	1,377	- 3,822	3,699	178,287
	Maine	6,006	3,906	- 2,100	1,956	94,299
	Maryland	13,427	3,738	- 9,689	7,496	361,291
	Massachusetts	6,006	3,906	- 2,100	9,536	459,628
	New Hampshire	4,321	3,090	- 1,230	759	36,597
	New Jersey	20,651	2,983	- 17,668	17,198	828,948
	New York	7,908	2,707	- 5,201	3,372	162,533
	Rhode Island	3,765	1,302	- 2,464	1,934	93,204
	Virginia	3,979	1,079	- 2,899	2,507	120,858
All	All	3,091,539	2,252,276	839,263	827,991	21,257,283

Table I-02. Changes in the population of singing male American woodcock (1970s versus present), population density deficits and habitat goals for returning woodcock densities to those observed during the 1970s.

State or province	BCR	Populatin of singing males		Loss or gain	Population density	
		Historical	Current	of singing males (-/+)	deficit (males)	Habitat goal (acres)
Connecticut	14	2,349	896	- 1,453	1,520	55,527
	30	10,261	3,388	- 6,873	5,872	283,020
Subtotal		12,610	4,285	- 8,326	7,392	338,547
Delaware	30	5,199	1,377	- 3,822	3,699	178,287
Illinois	22	18,495	32,302	+13,807	0	0
	23	599	481	- 118	449	5,204
	24	3,697	6,971	+3,273	0	0
	26	121	292	+172	0	0
Subtotal		22,912	40,046	+17,135	271	33,851
Indiana	22	19,273	9,998	- 9,275	14,206	267,633
	23	8,012	4,502	- 3,510	6,499	75,324
	24	11,715	4,716	- 6,999	8,043	509,126
Subtotal		39,000	19,215	- 19,784	26,170	1,266,892
Maryland	28	2,518	1,099	- 1,419	892	30,315
	29	4,158	1,308	- 2,850	2,850	133,950
	30	13,427	3,738	- 9,689	7,496	361,291
Subtotal		20,103	6,145	- 13,958	11,238	525,556
Massachusetts	14	4,445	2,393	- 2,052	1,996	74,827
	30	6,006	3,906	- 2,100	9,536	459,628
Maine	14	168,170	108,952	- 59,219	62,358	1,912,514
	30	6,006	3,906	- 2,100	1,956	94,299
Subtotal		174,176	112,857	- 61,319	64,314	2,006,813
Michigan	12	407,260	304,934	- 102,325	89,880	898,880
	22	4,037	2,978	- 1,059	1,859	35,025
	23	134,278	99,832	- 34,446	58,143	673,879
Subtotal		545,575	407,745	- 137,830	72,013	4,770,463
Minnesota	11	41,773	33,337	- 8,436	1,126	3,999
	12	182,669	156,067	- 26,602	96,864	968,648
	22	3,536	3,074	- 462	754	14,210
	23	48,226	42,781	- 5,445	12,172	141,078
Subtotal		276,204	235,260	- 40,945	16,568	1,009,622
New Hampshire	14	29,505	21,970	- 7,535	7,493	268,986
	30	4,321	3,090	- 1,230	759	36,597
Subtotal		33,826	25,061	- 8,765	8,252	305,583
New Jersey	28	5,048	1,176	- 3,871	3,549	120,663
	29	5,243	909	- 4,334	4,334	203,698
	30	20,651	2,983	- 17,668	17,198	828,948
Subtotal		30,942	5,069	- 25,873	25,081	1,153,309

Table I-02 (continued). Changes in the population of singing male American woodcock (1970s versus present), population density deficits and habitat goals for returning woodcock densities to those observed during the 1970s.

State or province	BCR	Populatin of singing males		Loss or gain	Population density	
		Historical	Current	of singing males (-/+)	deficit (males)	Habitat goal (acres)
New York	13	97,888	62,239	- 35,649	37,184	1,599,693
	14	43,741	28,230	- 15,512	14,000	481,465
	28	38,704	22,817	- 15,888	17,744	603,293
	30	7,908	2,707	- 5,201	3,372	162,533
Subtotal		188,242	115,993	- 72,249	72,300	2,395,533
Ohio	13	25,413	13,276	- 12,137	10,855	323,716
	22	26,166	14,409	- 11,757	21,112	397,747
	24	443	211	- 232	0	0
	28	17,540	8,741	- 8,799	10,005	340,169
Subtotal		69,562	36,637	- 32,925	41,972	931,135
Pennsylvania	13	12,831	7,882	- 4,948	5,423	80,247
	28	71,497	42,030	- 29,466	30,414	1,034,059
	29	8,111	2,439	- 5,672	5,672	266,584
Subtotal		92,439	52,352	- 40,086	41,509	1,459,266
Rhode Island	30	3,765	1,302	- 2,464	1,934	93,204
Vermont	13	6,344	4,363	- 1,981	1,305	26,758
Virginia	27	8,189	2,186	- 6,003	5,355	496,951
	28	13,068	4,284	- 8,784	9,306	316,389
	29	20,188	5,499	- 14,689	14,689	690,383
	30	3,979	1,079	- 2,899	2,507	120,858
Subtotal		45,424	13,048	- 32,375	31,857	1,624,581
West Virginia	28	31,120	13,898	- 17,222	16,276	553,368
Wisconsin	12	108,141	79,712	- 28,429	34,977	349,769
	23	114,890	84,519	- 30,371	53,152	616,032
Subtotal		223,031	164,231	- 58,800	64,134	4,329,003
Manitoba	12	63,064	21,609	- 41,455		
New Brunswick	14	181,679	142,681	- 38,997	44,191	525,426
Nova Scotia	14	67,372	52,373	- 14,999	14,129	179,157
Ontario	12	491,666	381,358	- 110,308	126,537	1,265,370
	13	193,746	149,638	- 44,108	48,767	1,350,846
Subtotal		685,413	530,996	- 154,416	175,304	2,616,216
Prince Edwards Island	14	10,973	6,799	- 4,173	3,105	35,116
Quebec	12	58,347	58,276	- 71	139	1,390
	13	46,318	46,184	- 134	7,273	201,231
	14	101,344	99,329	- 2,015	5,596	78,904
Subtotal		206,009	203,789	- 2,220	13,008	281,756

Table Introduction-03. Acreage of early succession habitat (ESH; small-diameter forestland) and the number of ESH acres that must be created annually to stabilize availability of such habitat.

BCR	State or province	Acres small diameter forest	Acres to stabilize
11	Iowa	2,904	145
	Minnesota	126,953	6,348
	Total	129,857	6,493
12	Michigan	2,928,151	146,408
	Minnesota	4,319,526	215,976
	Wisconsin	2,020,144	101,007
	Subtotal United States	9,267,821	463,391
	Ontario	1,382,200	69,110
	Quebec	3,649,000	182,450
	Subtotal Canada	5,031,200	251,560
	Total	14,299,021	714,951
13	New York	1,301,100	65,055
	Ohio	358,900	17,945
	Pennsylvania	128,500	6,425
	Vermont	45,400	2,270
	Subtotal United States	1,833,900	91,695
	Ontario	1,882,700	94,135
	Quebec	219,100	10,955
	Subtotal Canada	2,101,800	105,090
	Total	3,935,700	196,785
14	Connecticut	14,316	716
	Maine	4,973,720	248,686
	Massachusetts	19,230	962
	New Hampshire	408,156	20,408
	New York	462,086	23,104
	Vermont	387,082	19,354
	Subtotal United States	6,264,590	313,230
	New Brunswick	2,810,200	140,510
	Nova Scotia	816,300	40,815
	Prince Edwards Island	122,500	6,125
	Quebec	1,465,000	73,250
	Subtotal Canada	5,214,000	260,700
	Total	11,478,590	573,930
21	Oklahoma	575,964	28,798
	Texas	95,214	4,761
	Total	671,178	33,559
22	Illinois	242,801	12,140
	Indiana	72,221	3,611
	Iowa	234,144	11,707
	Michigan	10,781	539
	Minnesota	13,311	666
	Missouri	393,749	19,687
	Ohio	209,676	10,484
	Total	1,176,683	58,834
23	Illinois	0	0
	Indiana	30,577	1,529
	Iowa	41,670	2,084
	Michigan	615,231	30,762
	Minnesota	396,939	19,847
	Wisconsin	1,243,911	62,196
	Total	2,328,328	116,416
24	Alabama	261,568	13,078
	Arkansas	417,046	20,852
	Illinois	50,871	2,544
	Indiana	239,874	11,994
	Kentucky	583,543	29,177
	Missouri	1,059,121	52,956
	Ohio	2,564	128
	Tennessee	597,180	29,859
	Total	3,211,767	160,588
25	Arkansas	1,959,770	97,989
	Louisiana	229,015	11,451
	Oklahoma	969,927	48,496
	Texas	2,647,552	132,378
	Total	5,806,264	290,313
26	Arkansas	211,528	10,576
	Illinois	3,660	183
	Kentucky	0	0
	Louisiana	390,163	19,508
	Missouri	26,989	1,349
	Tennessee	3,407	170
	Total	635,747	31,787
27	Alabama	7,682,620	384,131
	Florida	3,894,577	194,729
	Georgia	5,572,533	278,627
	Kentucky	28,985	1,449
	Louisiana	467,345	23,367
	Mississippi	6,915,223	345,761
	North Carolina	4,171,620	208,581
	South Carolina	2,431,075	121,554
	Tennessee	799,984	39,999
	Virginia	613,161	30,658
	Total	32,577,123	1,628,856
28	Alabama	2,458,767	122,938
	Georgia	468,479	23,424
	Kentucky	474,202	23,710
	Maryland	65,095	3,255
	New Jersey	18,424	921
	New York	654,520	32,726
	North Carolina	481,702	24,085
	Ohio	555,423	27,771
	Pennsylvania	1,645,394	82,270
	Tennessee	560,411	28,021
	Virginia	581,794	29,090
	West Virginia	879,639	43,982
	Total	8,843,850	442,193
29	Alabama	245,001	12,250
	Georgia	1,876,542	93,827
	Maryland	49,337	2,467
	New Jersey	39,309	1,965
	North Carolina	1,840,065	92,003
	Pennsylvania	22,765	1,138
	South Carolina	1,210,237	60,512
	Virginia	1,615,976	80,799
	Total	6,899,232	344,962

Table Introduction-03 (continued). Acreage of early succession habitat (ESH; small-diameter forestland) and the number of ESH acres that must be created annually to stabilize availability of such habitat.

BCR	State or province	Acres small diameter forest	Acres to stabilize
30	Connecticut	88,000	4,400
	Delaware	47,000	2,350
	Maine	51,900	2,595
	Maryland	168,700	8,435
	Massachusetts	105,800	5,290
	New Hampshire	41,900	2,095
	New Jersey	139,100	6,955
	New York	25,900	1,295
	Rhode Island	21,300	1,065
	Virginia	62,800	3,140
	Total	752,400	37,620
31	Florida	1,517,705	75,885
37	Louisiana	186,894	9,345
	Texas	131,169	6,558
	Total	1,835,768	91,788
Total		95,130,638	4,756,532

Table Introduction-04. Acreage of early succession habitat (ESH; small diameter forestland) and the number of ESH acres that must be created annually to stabilize availability of such habitat.

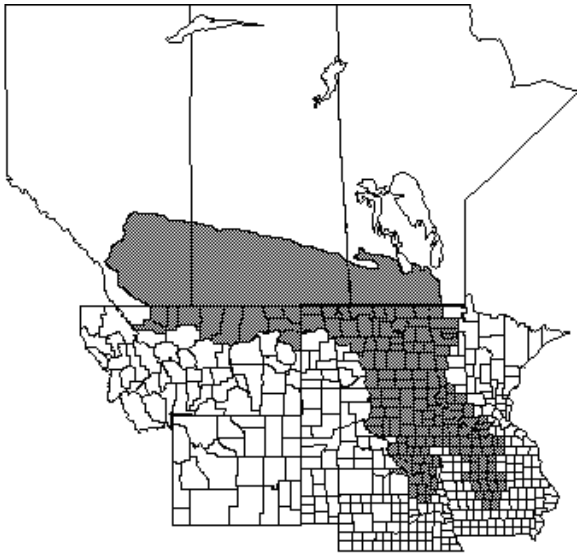
State or province	BCR	Acres small-diameter forest	Acres to stabilize
Alabama	24	261,568	13,078
	27	7,682,620	384,131
	28	2,458,767	122,938
	29	245,001	12,250
Subtotal		10,647,956	532,398
Arkansas	24	417,046	20,852
	25	1,959,770	97,989
	26	211,528	10,576
Subtotal		2,588,344	129,417
Connecticut	14	14,316	716
	30	88,000	4,400
Subtotal		102,316	5,116
Delaware	30	47,000	2,350
Florida	27	3,894,577	194,729
	31	1,517,705	75,885
Subtotal		5,412,282	270,614
Georgia	27	5,572,533	278,627
	28	468,479	23,424
	29	1,876,542	93,827
Subtotal		7,917,554	395,878
Iowa	11	2,904	145
	22	234,144	11,707
	23	41,670	2,084
Subtotal		278,718	13,936
Illinois	22	242,801	12,140
	23	0	0
	24	50,871	2,544
	26	3,660	183
Subtotal		297,332	14,867
Indiana	22	72,221	3,611
	23	30,577	1,529
	24	239,874	11,994
Subtotal		342,672	17,134
Kentucky	24	583,543	29,177
	26	0	0
	27	28,985	1,449
	28	474,202	23,710
Subtotal		1,086,730	54,337
Louisiana	25	229,015	11,451
	26	390,163	19,508
	27	467,345	23,367
	37	186,894	9,345
Subtotal		1,273,417	63,671
Massachusetts	14	19,230	962
	30	105,800	5,290
Subtotal		125,030	6,252
Maryland	28	65,095	3,255
	29	49,337	2,467
	30	168,700	8,435
Subtotal		283,132	14,157
Maine	14	4,973,720	248,686
	30	51,900	2,595
Subtotal		5,025,620	251,281

Table Introduction-04 (continued). Acreage of early succession habitat (ESH; small diameter forestland) and the number of ESH acres that must be created annually to stabilize availability of such habitat.

State or province	BCR	Acres small-diameter forest	Acres to stabilize
Michigan	12	2,928,151	146,408
	22	10,781	539
	23	615,231	30,762
Subtotal		3,554,163	177,708
Minnesota	11	126,953	6,348
	12	4,319,526	215,976
	22	13,311	666
	23	396,939	19,847
Subtotal		4,856,729	242,836
Mississippi	27	6,915,223	345,761
Missouri	22	393,749	19,687
	24	1,059,121	52,956
	26	26,989	1,349
Subtotal		1,479,859	73,993
New Brunswick	14	2,810,200	140,510
New Hampshire	14	408,156	20,408
	30	41,900	2,095
Subtotal		450,056	22,503
New Jersey	28	18,424	921
	29	39,309	1,965
	30	139,100	6,955
Subtotal		196,833	9,842
New York	13	1,301,100	65,055
	14	462,086	23,104
	28	654,520	32,726
	30	25,900	1,295
Subtotal		2,443,606	122,180
North Carolina	27	4,171,620	208,581
	28	481,702	24,085
	29	1,840,065	92,003
Subtotal		6,493,387	324,669
Nova Scotia	14	816,300	40,815
Ohio	13	358,900	17,945
	22	209,676	10,484
	24	2,564	128
	28	555,423	27,771
Subtotal		1,126,563	56,328
Oklahoma	21	575,964	28,798
	22	98,765	4,938
	25	969,927	48,496
Subtotal		1,644,656	82,233
Ontario	12	1,382,200	69,110
	13	1,882,700	94,135
Subtotal		3,264,900	163,245
Pennsylvania	13	128,500	6,425
	28	1,645,394	82,270
	29	22,765	1,138
Subtotal		1,796,659	89,833
Prince Edwards Island	14	122,500	6,125
Quebec	12	3,649,000	182,450
	13	219,100	10,955
	14	1,465,000	73,250
Subtotal		5,333,100	266,655
Rhode Island	30	21,300	1,065
South Carolina	27	2,431,075	121,554
	29	1,210,237	60,512
Subtotal		3,641,312	182,066
South Dakota	11	12,876	644
	22	0	0
Tennessee	24	597,180	29,859
	26	3,407	170
	27	799,984	39,999
	28	560,411	28,021
Subtotal		1,960,982	98,049
Texas	21	95,214	4,761
	25	2,647,552	132,378
	37	131,169	6,558
Subtotal		2,873,935	143,697
Virginia	27	613,161	30,658
	28	581,794	29,090
	29	1,615,976	80,799
	30	62,800	3,140
Subtotal		2,873,731	143,687
Vermont	13	45,400	2,270
	14	387,082	19,354
Subtotal		432,482	21,624
Wisconsin	12	2,020,144	101,007
	23	1,243,911	62,196
Subtotal		3,264,055	163,203
West Virginia	28	879,639	43,982
Total		95,130,638	4,756,532

Bird Conservation Region 11: Prairie Potholes

James R. Kelley, Jr.
U.S. Fish and Wildlife Service



Affected States and Provinces: Minnesota, Iowa, North Dakota, South Dakota, Nebraska, Manitoba, Saskatchewan and Alberta
Current Area of Forestland: 1,642,049 acres (664,521 ha) (378,882 acres [153,330 ha] of small-diameter and nonstocked timberland)
Woodcock Trend Estimate (1968–2004: 0.9
Percent of Change per Year (1994–2004): 9.2
Woodcock Population Estimate (1970): 84,774
Singing Males Only (2004): 47,228 (includes only Minnesota and Manitoba)

Physiography and Habitat Description

BCR 11 includes the western limit of the woodcock's breeding range in the Central Region. The full extent of the bird conservation region extends beyond the Central Region into Montana and northward to Alberta. The portions of the bird conservation region in Minnesota, Iowa, eastern portions of North Dakota and South Dakota, and northeast Nebraska are contained in sections 251A (Red River Valley) and 251B (northcentral Glaciated Plains) of the Prairie Parkland Temperate Province (McNab and Avers 1994). The Red River drains an area of prominent alluvial fans. Whereas, other areas are level to rolling till plains. Most wetlands have been drained for agricultural purposes. Central portions of the bird conservation region are contained in sections 332A (northeastern Glaciated Plains), 332B (western Glaciated Plains) and 332 D (northcentral Great Plains) of the Great Plains Steppe Province (McNab and Avers 1994). Western portions of the bird conservation region are contained in section 331E (Northern Glaciated Plains) of the Great Plains-Palouse Dry Steppe Province (McNab and Avers 1994). These areas include gently undulating to rolling continental glacial till plains with areas of kettle holes, kames and moraines. Dryland farming and grazing occur on most of the area.

Between the current and baseline forest inventories there has been a net gain of approximately 371,000 acres (150,140 ha, 23 percent) of forestland in the U.S. portion of this bird conservation region (Table 11-01). Included in this increase is a net gain of nearly 53,000 acres (21,450 ha, 16 percent) of small-diameter and nonstocked forest. I was not able to obtain historical forest inventory data for the

Manitoba portion of the bird conservation region that is covered by the Singing-ground Survey. Because Saskatchewan and Alberta are largely outside the primary range of woodcock, I chose not to analyze habitat data for those portions of the bird conservation region.

Major forest types in the U.S. portion of this bird conservation region include paper birch (22 percent), red maple upland (12 percent), bur oak (11 percent), sugar maple/beech/yellow birch (6 percent) and oak hickory (5 percent, Tables 11-02 and 11-03). Stand-size class distribution and physiographic classes of the major forest types are contained in Tables 11-04 and 11-05, respectively. Approximately 84 percent of the 17.5 million acres (7.1 million ha) of forestland in the region is under private ownership. Slightly over 18 percent is state or county forest, and national forest comprises nearly 7 percent of all forestland (Table 11-06).

Harvest and Population Status

Much of BCR 11 is a transitional area between the grassland of the prairie region and the northern hardwoods of the Great Lakes region. Because Minnesota and Manitoba comprise the majority of the land area within the primary range of woodcock within the bird conservation region, they account for the bulk of woodcock harvest and hunter numbers. Estimates from the harvest information program indicate that 12,000 hunters in Minnesota harvested approximately 42,200 birds throughout the state in 2005 (Kelley and Rau 2006). It is likely that the portion of this harvest that occurred in BCR 11 is relatively small compared to harvest in the central and eastern portions of the state.

The portions of BCR 11 covered by the Singing-ground Survey are a small portion of Manitoba and all of Minnesota. The long-term trend estimate for woodcock in the surveyed portion of the bird conservation region is 0.9 percent per year; although, this estimate is likely nonsignificant (U.S. Geological Survey 2004, unpublished data). The total estimate of singing males in the surveyed areas within the bird conservation region has declined from 84,734 during the early 1970s to the current estimate of 47,228 birds (Table 11-07). The magnitude of this decline is inconsistent with the estimated trend for the population in this bird conservation region. Manitoba accounted for a large portion of this decline; however, because it is at the fringe of the surveyed area, I am not confident in the accuracy of this result. This fact, combined with the lack of historical forest inventory data for Manitoba, forced development of population and habitat goals to be restricted to the Minnesota portion of the bird conservation region.

The total estimate of singing males in the Minnesota portion of the bird conservation region has declined from 41,733 during the early 1970s, to the current estimate of 33,337 birds (Table 11-07). The total woodcock population deficit for the Minnesota portion of the bird conservation region is just over 1,100 singing males (Table 11-07). The population deficit is much lower than the actual loss of singing males. This is due to the fact that the density of singing males on manageable acres for the two time periods is fairly comparable (Table11-0 7).

Habitat Goals

To restore woodcock densities in the Minnesota portion of BCR 11 to those observed during the early 1970s, a total of just over 1,100 singing males need to be added to the population (Table 11-07). This estimate pertains only to manageable acres in the Minnesota portion of the bird conservation region. Achieving this goal will require the creation of 4,000 acres (1,620 ha) of new woodcock habitat in Minnesota (Table 11-07).

However, if the management goal is to replace the total loss of singing males that has occurred since the early 1970s (without regard to density) then approximately 30,000 acres (12,140 ha) of new woodcock habitat need to be created in the Minnesota portion of BCR 11. This assumes that approximately 3.6 acres (1.5 ha) of new habitat will add one singing male to the population.

In this region the vast majority of timberland is under private ownership. Therefore, state and federal resource agencies will need to enlist thehelp of individual and commercial private forestland owners in order to achieve habitat management goals. A large percentage of timberland in the Minnesota portion of the bird conservation region is comprised of aspen. Therefore, traditional, even-age forest management can be utilized to create early succession habitat for woodcock.

Table 11–01. Current and historical (1970–1975) stand-size distribution, in acres (percent of column total) of timberland in the U.S. portion of BCR 11 and in portions of individual states within the bird conservation region

	Current stand-size distribution					Historical stand-size distribution				
	Total forestland	Large diameter[1,2]	Medium diameter[1,3]	Small diameter[1,4]	Non-stocked[1,5]	Total forestland	Large diameter[1,2]	Medium diameter[1,3]	Small diameter[1,4]	Non-stocked[1,5]
Iowa	219,896	148,476	63,844	2,904	4,674	125,100	58,362	33,475	30,847	2,416
	(15.6)	(67.5)	(29.0)	(1.3)	(2.1)	(9.8)	(46.7)	(26.8)	(24.7)	(1.9)
Minnesota	519,679	202,938	186,072	126,953	3,716	629,900	202,100	279,400	148,400	0
	(36.9)	(39.1)	(35.8)	(24.4)	(0.7)	(38.4)	(32.1)	(44.4)	(23.6)	(0.0)
Nebraska	149,996	65,211	53,300	28,530	2,956	37,100	20,200	13,500	3,400	0
	(10.7)	(43.5)	(35.5)	(19.0)	(2.0)	(2.9)	(54.4)	(36.4)	(9.2)	(0.0)
North Dakota	414,165	184,118	126,669	91,169	12,209	308,767	92,386	136,221	71,021	9,139
	(29.4)	(44.5)	(30.6)	(22.0)	(2.9)	(24.3)	(29.9)	(44.1)	(23.0)	(3.0)
South Dakota	103,167	43,988	39,865	12,876	6,438	50,960	21,387	12,531	10,335	6,707
	(7.3)	(42.6)	(38.6)	(12.5)	(6.2)	(4.0)	(42.0)	(24.6)	(20.3)	(13.2)
Total	1,406,903	644,731	469,750	262,431	29,992	1,151,827	394,435	475,127	264,003	18,262
	(100.0)	(45.8)	(33.4)	(18.7)	(2.1)	(100.0)	(34.2)	(41.2)	(22.9)	(1.6)

[1] Percentages for various diameter categories and nonstocked category refer to percent of total forestland for current and historical time periods within each state.
[2] Softwoods are at least 9 inches, and hardwoods are at least 11 inches in diameter at breast height.
[3] Trees are at least 5 inches in diameter at breast height but are smaller than large-diameter trees.
[4] Saplings are between 1 to 5 inches diameter at breast height. Softwood seedlings are more than 6 inches tall, and hardwood seedlings are more than 12 inches tall.
[5] Commercial forestland on which stocking of trees is less than 16.7 percent.
[6] Data represents commercial forestland on which stocking of trees is less than 16.7 percent.

Table 11-02. Percent occurrence of forest types between states within the U.S. portion of BCR 11.

Forest type	Minnesota	Iowa	North Dakota	South Dakota	Nebraska	Total
Aspen	68.0	0.0	32.0	0.0	0.0	100.0
Balsam poplar	77.3	0.0	22.7	0.0	0.0	100.0
Black ash/American elm/Red maple	46.6	14.3	39.1	0.0	0.0	100.0
Bur oak	28.4	8.1	36.1	9.4	18.0	100.0
Cottonwood	23.0	11.4	55.7	0.0	9.9	100.0
Eastern red cedar	0.0	0.0	0.0	0.0	100.0	100.0
Eastern red cedar/Hardwood	0.0	100.0	0.0	0.0	0.0	100.0
Elm/Ash/Locust	18.1	1.3	67.7	8.7	4.2	100.0
Hard maple/Basswood	67.7	12.3	20.0	0.0	0.0	100.0
Mixed upland hardwoods	14.5	27.4	29.6	8.6	19.9	100.0
Nonstocked	13.7	17.3	45.2	23.8	0.0	100.0
Other exotic hardwoods	23.2	0.0	0.0	76.8	0.0	100.0
Red maple/Upland	0.0	0.0	0.0	0.0	100.0	100.0
River birch/Sycamore	0.0	100.0	0.0	0.0	0.0	100.0
Silver maple/American elm	100.0	0.0	0.0	0.0	0.0	100.0
Sugar maple/Beech/Yellow birch	100.0	0.0	0.0	0.0	0.0	100.0
Sugarberry/Hackberry/Elm/Green ash	21.2	12.0	43.6	13.3	9.9	100.0
White oak	1.0	99.0	0.0	0.0	0.0	100.0
White oak/Red oak/Hickory	1.9	98.1	0.0	0.0	0.0	100.0
Willow	100.0	0.0	0.0	0.0	0.0	100.0

Table 11-03. Forest composition of timberland, in acres (percent of column total), within the U.S. portion of BCR 11.

Forest type	Minnesota	Iowa	North Dakota	South Dakota	Nebraska	Total
Aspen	230,036	0	108,272	0	0	338,308
	(44.3)	(0.0)	(19.8)	(0.0)	(0.0)	(22.0)
Balsam poplar	20,905	0	6,123	0	0	27,028
	(4.0)	(0.0)	(1.1)	(0.0)	(0.0)	(1.8)
Black ash/American elm/Red maple	4,265	1,312	3,578	0	0	9,155
	(0.8)	(0.6)	(0.7)	(0.0)	(0.0)	(0.6)
Bur oak	34,472	9,792	43,822	11,407	21,788	121,281
	(6.6)	(4.5)	(8.0)	(11.1)	(14.5)	(7.9)
Cottonwood	22,437	11,061	54,288	0	9,644	97,429
	(4.3)	(5.0)	(9.9)	(0.0)	(6.4)	(6.3)
Eastern red cedar	0	0	0	0	26,536	26,536
	(0.0)	(0.0)	(0.0)	(0.0)	(17.7)	(2.2)
Eastern red cedar/Hardwood	0	4,997	0	0	0	4,997
	(0.0)	(2.3)	(0.0)	(0.0)	(0.0)	(1.7)
Elm/Ash/Locust	41,196	2,904	154,314	19,897	9,644	227,954
	(7.9)	(1.3)	(28.2)	(19.3)	(6.4)	(14.8)
Hard maple/Basswood	42,268	7,709	12,471	0	0	62,449
	(8.1)	(3.5)	(2.3)	(0.0)	(0.0)	(4.1)
Mixed upland hardwoods	21,047	39,734	42,959	12,450	28,806	144,995
	(4.0)	(18.1)	(7.8)	(12.1)	(19.2)	(9.4)
Nonstocked	3,716	4,674	12,209	6,438	0	27,036
	(0.7)	(2.1)	(2.2)	(6.2)	(0.0)	(1.8)
Other	19,781	45,044	12,664	17,951	19,858	33,568
	(3.8)	(20.5)	(2.3)	(17.4)	(13.2)	(2.2)
Other exotic hardwoods	1,681	0	0	5,574	0	7,255
	(0.3)	(0.0)	(0.0)	(5.4)	(0.0)	(0.7)
Red maple/Upland	0	0	0	0	11,824	11,824
	(0.0)	(0.0)	(0.0)	(0.0)	(7.9)	(0.8)
River birch/Sycamore	0	6,816	0	0	0	6,816
	(0.0)	(3.1)	(0.0)	(0.0)	(0.0)	(0.4)
Silver maple/American elm	12,999	0	0	0	0	12,999
	(2.5)	(0.0)	(0.0)	(0.0)	(0.0)	(2.2)
Sugarberry/Hackberry/Elm/Green ash	46,946	26,667	96,606	29,450	21,896	221,566
	(9.0)	(12.1)	(17.7)	(28.5)	(14.6)	(14.4)
Sugar maple/Beech/Yellow birch	16,058	0	0	0	0	16,058
	(3.1)	(0.0)	(0.0)	(0.0)	(0.0)	(2.4)
White oak	116	11,638	0	0	0	11,755
	(<0.1)	(5.3)	(0.0)	(0.0)	(0.0)	(0.8)
White oak/Red oak/Hickory	929	47,549	0	0	0	48,478
	(0.2)	(21.6)	(0.0)	(0.0)	(0.0)	(3.1)
Willow	827	0	0	0	0	827
	(0.2)	(0.0)	(0.0)	(0.0)	(0.0)	(0.6)

Table 11-04. Stand-size class composition (in thousands of acres) of the most common forest types found in states within the U.S. portion of BCR 11. Large-diameter trees equal hardwoods that are at least 11 inches diameter, 9 inches for softwoods; size class has more than 50 percent of stocking in medium- and large-diameter trees, with stocking of large trees equal to or greater than medium-diameter trees. Medium-diameter trees equal trees that are at least 5 inches diameter but are not as large as large-diameter trees; size class has more than 50 percent of stocking in medium- and large-diameter trees, with stocking of large-diameter trees less than stocking of medium-diameter trees. Small-diameter trees are than 5 inches diameter; size class has at least 50 percent of the stocking in small diameter trees.

	Forest type																				
Stand-size class	Aspen	Elm/Ash/Locust	Sugarberry/Hackberry/Elm/Green ash	Mixed upland hardwoods	Bur oak	Cottonwood	Hard maple/Basswood	White oak/Red oak/Hickory	Sugar maple/Beech/Yellow birch	Silver maple/American elm	Eastern red cedar	Nonstocked	Balsam poplar	Eastern red cedar/Hardwood	Red maple/Upland	White oak	Other exotic hardwoods	Black ash/American elm/Red maple	Willow	River birch/Sycamore	All forest types
Iowa																					
Large	0.0	0.0	15.4	10.2	9.8	11.1	7.7	41.7	12.0	15.9	0.0	0.0	0.0	5.0	0.0	11.6	0.0	1.3	0.0	6.8	148.5
Medium	0.0	0.0	11.3	29.6	0.0	0.0	0.0	5.9	9.5	4.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	63.8
Small	0.0	2.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.9
Minnesota																					
Large	10.1	27.2	30.4	10.4	27.9	22.4	40.5	0.0	13.3	13.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	202.9
Medium	113.1	13.1	12.8	10.6	6.6	0.0	1.8	0.9	0.0	0.0	0.0	0.0	13.3	5.0	0.0	0.0	0.0	3.3	0.0	0.0	186.1
Small	106.9	0.9	3.7	0.0	0.0	0.0	0.0	0.0	2.8	0.0	0.0	0.0	7.6	0.0	0.0	0.0	0.0	1.0	0.8	0.0	127.0
Nebraska																					
Large	0.0	0.0	9.9	19.2	14.4	9.6	9.6	0.0	0.0	0.0	2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	65.2
Medium	0.0	0.0	1.6	9.6	7.4	0.0	0.0	0.0	0.0	0.0	18.0	0.0	0.0	4.8	0.0	0.0	0.0	0.0	0.0	0.0	53.3
Small	0.0	0.0	10.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.0	0.0	0.0	12.1	0.0	0.0	0.0	0.0	0.0	0.0	28.5
North Dakota																					
Large	27.9	43.9	46.9	6.2	17.4	20.5	12.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.7	0.0	184.1
Medium	45.9	41.0	8.1	21.0	2.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.1	0.0	0.0	0.0	0.0	1.9	0.0	0.0	126.7
Small	34.4	16.2	17.9	10.5	6.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.8	1.7	0.0	0.0	91.2
South Dakota																					
Large	0.0	1.9	24.5	6.0	0.0	0.0	0.0	0.0	0.0	0.0	6.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	44.0
Medium	0.0	11.5	4.9	6.4	11.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.6	0.0	0.0	0.0	39.9
Small	0.0	6.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	12.9
Total																					
Large	38.0	73.1	127.1	51.9	69.4	63.6	70.3	41.7	25.3	28.9	9.1	0.0	0.0	5.0	0.0	11.8	0.0	1.3	7.7	6.8	644.7
Medium	159.0	65.6	38.7	77.2	28.1	0.0	1.8	6.8	9.5	4.4	18.0	0.0	19.5	9.8	0.0	0.0	5.6	5.2	0.0	0.0	469.7
Small	141.3	26.5	32.0	10.5	6.7	0.0	0.0	0.0	2.8	0.0	6.0	0.0	7.6	12.1	0.0	0.0	3.8	2.7	0.8	0.0	262.4

Table 11-05. Physiographic class composition (in thousands of acres) of the most common forest types found in the U.S. portion of BCR 11.

	Forest types																				
Physiographic class	Aspen	Elm/Ash/Locust	Sugarberry/Hackberry/Elm/Green ash	Mixed upland hardwoods	Bur oak	Cottonwood	Hard maple/Basswood	White oak/Red oak/Hickory	Sugar maple/Beech/Yellow birch	Silver maple/American elm	Eastern red cedar	Nonstocked	Balsam poplar	Eastern red cedar/Hardwood	Red maple/Upland	White oak	Other exotic hardwoods	Black ash/American elm/Red maple	Willow	River birch/Sycamore	All forest types
Bays and wet pocosins	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Beaver ponds	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Broad floodplains/ Bottomland	3.1	0.0	52.5	4.5	0.0	18.7	0.0	0.0	0.0	3.0	9.0	6.4	0.0	0.0	0.0	0.0	0.0	3.0	1.9	0.0	102.1
Cypress ponds	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Deep sands	0.0	0.0	0.0	0.0	1.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.6	0.0	0.0	0.0	0.0	0.0	0.0	6.4
Dry tops	0.0	6.6	0.0	0.0	0.0	0.0	2.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.3
Dry slopes	0.0	9.1	0.0	25.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	41.0
Flatwoods	213.4	59.9	33.4	28.8	25.2	10.7	5.0	7.6	3.7	0.0	0.0	7.6	13.6	0.0	0.0	0.0	5.6	1.0	0.0	0.0	420.3
Moist slopes and coves	0.0	4.9	0.0	4.2	4.8	0.0	3.5	0.0	6.1	0.0	9.0	0.0	3.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	35.8
Narrow floodplains/ Bottomland	2.3	0.0	68.3	0.0	6.2	25.8	0.0	0.0	0.0	26.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.6	0.0	140.9
Other	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.7
Other hydric	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.3
Other mesic	17.1	15.8	3.7	16.0	9.9	8.4	20.7	5.0	11.1	0.0	0.0	0.0	4.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	111.9
Other xeric	3.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.5
Rolling uplands	96.2	80.5	22.8	60.7	56.3	0.0	40.1	35.9	16.7	3.5	15.1	12.2	6.1	22.3	0.0	11.8	5.4	4.9	0.0	6.8	501.9
Small drains	0.0	0.0	14.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	15.1
Swamps/Bogs	2.8	0.0	2.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	11.6

Table 11-06. Forest ownership categories in the U.S. portion of BCR 11, in acres (percent of column total).

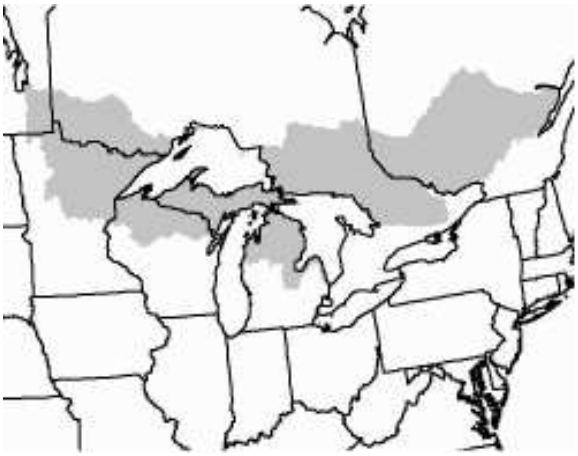
Ownership	Total	Minnesota	Iowa	North Dakota	South Dakota	Nebraska
County/Municipal	21,650	6,836	9,087	5,728	0	6,141
	(1.5)	(1.3)	(4.1)	(1.4)	(0.0)	(1.6)
National forest	7,038	728	0	6,309	0	0
	(0.5)	(0.1)	(0.0)	(1.5)	(0.0)	(0.0)
Other federal	39,072	0.0	14,550	14,878	0	9,644
	(2.8)	(0.0)	(6.6)	(3.6)	(0.0)	(6.4)
Other local government	0	0	0	0	0	0
	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)
Private	1,155,813	427,992	167,659	323,081	96,729	140,353
	(82.2)	(82.4)	(76.2)	(78.0)	(93.8)	(93.6)
State	146,293	77,550	24,884	43,859	0	0
	(10.4)	(14.9)	(10.3)	(10.6)	(0.0)	(0.0)
U.S. Department of Defense	3,717	0	3,717	0	0	0
	(0.3)	(0.0)	(1.7)	(0.0)	(0.0)	(0.0)
U.S. Fish and Wildlife Service	33,320	6,574	0	20,309	6,438	0
	(2.4)	(1.3)	(0.0)	(4.9)	(6.2)	(0.0)
U.S. National Park Service	0	0	0	0	0	0
	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)
All	1,406,903	519,679	219,896	414,165	103,167	149,996
	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)

Table 11-07. Calculation of population deficits, woodcock counts and habitat goals, in acres, for woodcock in the Minnesota portion of BCR 11. Historical time period refers to 1970 to 1975. Population deficit and habitat goal pertains only to the Minnesota portion of the bird conservation region due to lack of historical forest inventory data for Manitoba. Habitat goal was calculated as the population deficit multiplied by the number of acres of early succession habitat per singing male observed in the 1970 to 1975 time period (3.55 acres of early successional habitat per singing male) (Miles 2004).

	Historical	Current
Total land area	17,603,168	17,603,168
Manageable land	629,900	519,679
Population of singing males	41,733	33,337
Population deficit of singing males		1,126
Habitat goal		4,000

Bird Conservation Region 12: Boreal Hardwood Transition

Daniel R. Dessecker
Ruffed Grouse Society



Affected States and Provinces: Manitoba, Michigan, Minnesota, Ontario, Quebec, Wisconsin
Current Area of Forestland: 77,619,282 acres (31,411,750 ha) (14,624,100 acres [5,918,230 ha] of small-diameter and nonstocked forestland)
Woodcock Trend Estimate (1968–2004): 0.1
Percent of Change per Year (1995–2004): 0.8
Woodcock Population Estimate (1970): 1,311,147
Singing Males Only (2004): 1,001,957

Physiography and Habitat Description

The Boreal Hardwood Transition Bird Conservation Region (BCR 12) is, as the name implies, a transitional zone where the predominantly coniferous forests of northern latitudes intermix with the predominantly deciduous forests of southern latitudes. Landforms are typically flat to gently rolling. Wetlands and lakes of various sizes are interspersed across the landscape. Upland soils are variable with relatively nutrient-poor sands common on level xeric sites and deep nutrient-rich loams characteristic of mesic sites.

Predominant forest types include pine, spruce/fir, maple/beech/birch and aspen/birch (Tables 12-01 and 12-02). Since 1970, the area of maple/beech/birch forest has increased commensurate with a slight loss of aspen/birch forest; although, this rate of change varies by jurisdiction. The relatively high proportion of aspen/birch forest within BCR 12 provides abundant opportunities to sustain quality woodcock habitats.

Between the current and baseline forest inventories the total area of forest has increased by approximately 3,775,000 acres (1,527,700 ha, 5.1 percent; Tables 12-03A and 12-03B). In addition, small-diameter forest has increased by approximately 1,431,800 acres (580,000 ha, 10.8 percent). This increase in small-diameter forest is largely a result of extensive forest management on public and industrial forests in Minnesota, Ontario and Quebec, primarily in the spruce/fir and aspen/birch forest types (Tables 12-04 and 12-05).

Within the U.S. portion of BCR 12, 50.7 percent of the forest is in private ownership, and the remainder is in public ownership (Table 12-06). Crown (public) land is common throughout the Canadian portions of BCR 12; although, these data are unavailable at the bird-conservation-region level.

Harvest and Population Status

Woodcock breeding densities are typically higher in BCR 12 than in any other bird

conservation region. Singing-ground Survey data document long-term declines in breeding woodcock populations within all of the jurisdictions in BCR 12. These declines range from 1 percent per year, in Minnesota, to 1.9 percent per year, in Ontario and Wisconsin (Kelley and Rau 2006).

Estimates from the harvest information program indicate that the states of Michigan, Minnesota and Wisconsin support 28,000, 12,000 and 16,000 active woodcock hunters, respectively. Combined, these states account for 54.6 percent of the woodcock hunting days in the United States. These hunters harvest approximately 107,000, 42,000 and 38,000 woodcock in Michigan, Minnesota and Wisconsin, respectively (Kelley and Rau 2006).

Population and Habitat Goals

To restore woodcock population densities in BCR 12 to those observed during the 1970s, a total of approximately 201,100 singing males need to be added to the population (Table 12-01A). Achieving this goal will require the establishment of approximately 3,484,000 acres (1,410,500 ha) of new woodcock habitat in addition to that typically being maintained on the landscape (Table 12-07B and 12-07C).

Habitat Management Recommendations

Sustaining aspen/birch forest communities through traditional clearcut regeneration treatments is the single highest priority management recommendation to restore woodcock population densities to 1970s levels. Unfortunately, most public agencies are reducing aspen-management goals largely in response to some public concerns regarding the aesthetics of clearcut treatments. The woodcock population restoration goal outlined here will likely not be met if these reductions in aspen regeneration treatments continue.

In addition, guidelines affecting the management of forested riparian areas are increasingly proscriptive with regard to the removal of overstory vegetation through active forest management. Such guidelines complicate efforts to establish small-diameter forest habitats on moist-soil sites where earthworms are available to foraging woodcock, habitats that are extremely important to woodcock in BCR 12.

Riparian areas unquestionably warrant special consideration during the planning and implementation of active forest management. However, small-diameter forest and shrubland habitats in riparian areas are critical to woodcock and other wildlife, and they should be incorporated as a component of riparian area management. The potential negative impacts of management activities can be mitigated by the use of light-on-the-land harvest equipment and by timing activities to coincide with frozen-ground conditions where applicable.

Table 12-01. Percent composition of forest types for states within BCR 12.

Forest type	Minnesota	Wisconsin	Michigan	Total
Aspen	49.2	25.3	25.5	100.0
Balsam fir	40.3	18.6	41.1	100.0
Balsam poplar	60.0	5.9	34.1	100.0
Black ash/American elm/Red maple	45.6	26.2	28.2	100.0
Black spruce	63.1	14.5	22.5	100.0
Eastern white pine	15.6	31.5	52.8	100.0
Hard maple/Basswood	19.5	37.7	42.8	100.0
Jack pine	30.5	15.2	54.3	100.0
Nonstocked	48.6	18.7	32.7	100.0
Northern red oak	19.5	32.8	47.7	100.0
Northern white cedar	27.2	12.7	60.2	100.0
Other pine/Hardwood	26.1	23.9	50.0	100.0
Paper birch	62.3	17.1	20.5	100.0
Post oak/Blackjack oak	1.7	61.2	37.1	100.0
Red maple/Upland	8.1	36.5	55.3	100.0
Red pine	24.1	26.1	49.7	100.0
Sugar maple/Beech/Yellow birch	7.1	27.4	65.4	100.0
Tamarack	64.5	19.7	15.8	100.0
White oak/Red oak/Hickory	10.3	27.0	62.7	100.0
White spruce	30.3	16.7	53.0	100.0

Table 12-02. Forest composition of timberland, in acres (percentage of column total), within the U.S. portion of BCR 12.

Forest type	Minnesota	Wisconsin	Michigan	Total
Aspen	4,179,437	2,146,938	2,170,855	8,497,230
	(35.2)	(25.3)	(15.0)	(24.4)
Balsam fir	366,076	169,077	372,919	908,071
	(3.1)	(2.0)	(2.6)	(2.6)
Balsam poplar	414,568	40,592	235,584	690,743
	(3.5)	(0.5)	(1.6)	(2.0)
Black ash/American elm/Red maple	684,089	391,981	422,846	1,498,916
	(5.8)	(4.6)	(2.9)	(4.3)
Black spruce	1,342,163	307,860	478,575	2,128,597
	(11.3)	(3.6)	(3.3)	(6.1)
Eastern white pine	66,695	134,362	225,138	426,196
	(0.6)	(1.6)	(1.6)	(1.2)
Hard maple/Basswood	488,177	941,763	1,070,458	2,500,398
	(4.1)	(11.1)	(7.4)	(7.2)
Jack pine	345,574	172,456	615,837	1,133,867
	(2.9)	(2.0)	(4.3)	(3.3)
Nonstocked	156,289	59,976	105,227	321,492
	(1.3)	(0.7)	(0.7)	(0.9)
Northern red oak	135,568	228,508	332,419	696,495
	(1.1)	(2.7)	(2.3)	(2.0)
Northern white cedar	572,452	266,393	1,266,680	2,105,525
	(4.8)	(3.1)	(8.8)	(6.0)
Other pine/Hardwood	150,559	137,471	287,791	575,821
	(1.3)	(1.6)	(2.0)	(1.7)
Paper birch	949,336	261,136	313,003	1,523,474
	(8.0)	(3.1)	(2.2)	(4.4)
Post oak/Blackjack oak	4,976	178,073	108,086	291,134
	(<0.1)	(2.1)	(0.7)	(0.8)
Red maple/Upland	78,407	352,711	534,399	965,517
	(0.7)	(4.2)	(3.7)	(2.8)
Red pine	330,207	357,540	680,298	1,368,045
	(2.8)	(4.2)	(4.7)	(3.9)
Sugar maple/Beech/Yellow birch	382,772	1,472,533	3,513,886	5,369,191
	(3.2)	(17.4)	(24.3)	(15.4)
Tamarack	781,424	239,333	191,305	1,212,062
	(6.6)	(2.8)	(1.3)	(3.5)
White oak/Red oak/hickory	50,581	131,820	306,387	488,787
	(0.4)	(1.6)	(2.1)	(1.4)
White spruce	85,179	46,942	149,227	281,348
	(0.7)	(0.6)	(1.0)	(0.8)

Table 12-03A. Current and historical (1970–1975) stand-size distribution, in acres (percentage of column total), of timberland in the U.S. portion of BCR 12 and in portions of individual states within the bird conservation region.

	Current stand-size distribution					Historical stand-size distribution				
	Total timberland	Large diameter[1,2]	Medium diameter[1,3]	Small diameter[1,4]	Non-stocked[1,5]	Total timberland	Large diameter[1,2]	Medium diameter[1,3]	Small diameter[1,4]	Non-stocked[1,5]
Michigan	14,472,184	5,301,229	6,137,576	2,928,151	105,227	14,928,400	3,607,050	6,929,650	4,129,750	261,850
	(42.1)	(36.6)	(42.4)	(20.2)	(0.7)	(48.0)	(24.2)	(46.4)	(27.7)	(1.8)
Minnesota	11,882,889	2,674,379	4,732,696	4,319,526	156,289	8,581,900	1,906,600	4,535,700	2,099,700	39,900
	(34.6)	(22.5)	(39.8)	(36.4)	(1.3)	(27.6)	(22.2)	(52.9)	(24.5)	(0.5)
Wisconsin	8,027,509	2,358,438	3,585,364	2,020,144	63,562	7,569,200	1,046,000	3,938,300	2,432,000	152,900
	(23.3)	(29.4)	(44.7)	(25.2)	(0.8)	(24.4)	(13.8)	(52.0)	(32.1)	(2.0)
Total	34,382,582	10,334,046	14,455,636	9,267,821	325,079	31,079,500	6,559,650	15,403,650	8,661,450	454,65
	(100.0)	(30.1)	(33.8)	(27.0)	(0.9)	(100.0)	(21.1)	(49.6)	(27.9)	(1.5)

[1] Percentages for various diameter categories and nonstocked category refer to percent of total forestland for current and historical time periods within each state.

[2] Softwoods equal at least 9 inches, and hardwoods are at least 11 inches in diameter at breast height; size class has more than 50 percent of stocking in medium- and large-diameter trees, with stocking of large trees equal to or greater than medium-diameter trees.

[3] Trees equal at least 5 inches in diameter at breast height but are smaller than large-diameter; size class has more than 50 percent of stocking in medium- and large-diameter trees, with stocking of large-diameter trees less than stocking of medium-diameter trees .

[4] Saplings equal 1 to 5 inches diameter at breast height; softwood seedlings measure more than 6 inches tall; hardwood seedlings measure more than 12 inches tall; size class has at least 50 percent of the stocking in small-diameter trees.

[5] Commercial forestland on which stocking of trees is less than 16.7 percent.

Table 12-03B. Current and historical (ca. 1980) stand-size distribution, in acres (percentages refer to column total), of timberland in the Canadian portion of BCR 12 and portions of individual provinces within the bird conservation region.

	Current stand-size distribution			Historical stand-size distribution		
Area	Total timberland	Large diameter[1,2]	Small diameter[1,3]	Total timberland	Large diameter[1,2]	Small diameter[1,3]
Ontario	13,688,400	12,306,200	1,382,200	13,251,000	12,204,200	1,046,800
	(31.7)	(89.9)	(10.1)	(31.0)	(92.1)	(7.9)
Quebec	29,548,300	25,889,300	3,649,000	29,513,700	26,484,300	3,029,400
	(68.3)	(87.6)	(12.3)	(69.0)	(89.7)	(10.3)
Total	43,236,700	38,195,500	5,031,200	42,764,700	38,688,500	4,076,200
	(100.0)	(88.3)	(11.6)	(100.0)	(90.5)	(9.5)

[1] Percentages for various diameter categories and non-stocked category refer to percent of total forestland for current and historic time periods within each state.

[2] Stands of trees greater than 5 inches in diameter at breast height.

[3] Stands of trees less than or equal to 5 inches in diameter at breast height and non-stocked stands.

Table 12-04. Stand size class composition (in thousands of acres) of the most common forest types found in states within BCR 12. Large-diameter trees are hardwoods that equal at least 11 inches diameter, 9 inches for softwoods; size class has more than 50 percent of stocking in medium- and large-diameter trees, with stocking of large trees equal to or greater than medium-diameter trees. Medium-diameter trees equal at least 5 inches diameter but are not as large as large-diameter trees; size class has more than 50 percent of stocking in medium- and large-diameter trees, with stocking of large-diameter trees less than stocking of medium-diameter trees. Small-diameter trees are trees that equal less than 5 inches diameter; size class has at least 50 percent of the stocking in small-diameter trees.

	Forest types																			
Stand-size class	Aspen	Sugar maple/Beech/Yellow birch	Hard maple/Basswood	Black spruce	Northern white cedar	Paper birch	Black ash/American elm/Red maple	Red pine	Tamarack	Jack pine	Red maple/Upland	Balsam fir	Northern red oak	Balsam poplar	Other pine/Hardwood	White oak/Red oak/Hickory	Eastern white pine	Post oak/Blackjack oak	White spruce	All forest types
Michigan																				
Large	418.5	1,792.7	568.9	41.0	450.1	80.7	93.5	406.1	33.4	145.5	157.5	71.7	243.6	27.2	113.6	112.8	141.6	39.6	45.6	5,301.2
Medium	903.4	1,521.7	465.5	199.9	705.9	191.3	235.1	221.6	62.9	277.8	309.5	137.1	68.9	92.5	89.4	122.6	60.9	32.8	73.8	6,137.6
Small	849.0	199.5	36.0	237.6	110.6	41.0	94.3	52.6	95.0	192.6	67.5	164.1	20.0	115.9	84.8	71.1	22.6	35.7	29.9	2,928.2
Minnesota																				
Large	860.1	126.5	285.0	23.6	251.9	199.8	99.4	149.6	63.4	148.9	7.6	60.9	80.4	69.5	71.4	19.1	53.8	0.0	10.8	2,674.4
Medium	1,473.1	206.3	190.0	398.8	258.9	588.3	392.6	115.3	311.9	131.3	50.9	117.0	46.6	216.4	52.9	26.2	5.9	5.0	31.8	4,732.7
Small	1,846.2	50.0	13.2	919.7	61.6	161.2	192.1	65.2	406.1	65.4	20.0	188.2	8.5	128.7	26.3	5.3	7.0	0.0	42.6	4,319.5
Wisconsin																				
Large	254.9	643.4	458.8	15.0	125.1	28.3	36.4	235.6	8.1	25.5	73.8	9.2	134.4	9.5	40.1	64.1	107.8	51.6	16.9	2,492.4
Medium	902.4	741.3	450.2	83.7	134.2	195.6	284.8	87.0	108.2	96.7	253.4	59.7	73.5	17.6	27.4	49.1	15.5	68.7	18.9	3,790.6
Small	989.7	87.8	32.8	209.2	7.1	37.2	70.8	35.0	123.0	50.3	25.5	100.1	20.5	13.6	70.0	18.6	11.1	57.8	11.2	2,128.7
Total																				
Large	1,533.4	2,562.6	1,312.7	79.6	827.1	308.8	229.3	791.3	105.0	319.9	238.8	141.9	458.5	106.2	225.1	196.0	303.2	91.2	73.2	10,468.0
Medium	3,279.0	2,469.3	1,105.7	682.4	1,099.1	975.2	912.4	424.0	483.0	505.7	613.8	313.7	189.0	326.4	169.6	197.8	82.3	106.5	124.5	14,660.9
Small	3,684.8	337.3	82.0	1,366.6	179.3	239.4	357.2	152.8	624.1	308.3	112.9	452.5	49.0	258.1	181.1	94.9	40.7	93.5	83.6	9,376.4

Table 12-05. Physiographic class composition (in thousands of acres) of the most common forest types found in states within BCR 12.

Physiographic class	Forest types																				
	Aspen	Sugar maple/Beech/Yellow birch	Hard maple/Basswood	Black spruce	Northern white cedar	Paper birch	Black ash/American elm/Red maple	Red pine	Tamarack	Jack pine	Red maple/Upland	Balsam fir	Northern red oak	Balsam poplar	Other pine/Hardwood	White oak/Red oak/Hickory	Eastern white pine	Nonstocked	Post oak/Blackjack oak	White spruce	All forest types
Bays and wet pocosins	165.1	53.0	8.0	757.0	1,080.1	95.0	426.7	8.8	437.9	27.7	0.0	177.6	1.6	63.7	7.1	2.7	31.3	53.9	4.9	10.2	3,601.2
Beaver ponds	11.1	0.0	0.0	0.0	0.0	3.4	6.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	24.0
Broad floodplains/ Bottomland	115.8	5.7	9.0	22.8	23.4	6.8	59.2	6.0	20.3	3.7	0.0	21.8	0.0	29.8	0.0	4.5	1.7	7.7	0.0	6.8	404.4
Deep sands	261.6	126.5	55.7	1.9	2.5	10.7	3.6	367.0	2.6	457.4	22.4	13.4	77.1	11.0	151.0	64.7	47.8	23.8	80.0	11.9	1,976.3
Dry slopes	20.1	10.3	10.5	6.0	0.6	20.2	0.0	26.2	0.0	4.4	0.0	0.0	2.8	0.0	20.9	2.7	2.3	7.3	8.3	0.0	155.9
Dry tops	37.4	6.4	12.3	3.4	2.4	6.0	0.0	9.8	2.6	9.0	0.0	2.7	9.1	7.5	6.6	0.0	11.1	0.9	0.0	3.3	144.4
Flatwoods	3,602.0	2,016.3	692.5	118.6	203.4	323.9	224.9	451.0	48.8	279.2	565.5	252.0	142.2	309.1	139.7	196.3	177.0	71.1	79.8	112.9	10,575.4
Moist slopes and coves	118.7	86.2	15.1	9.5	36.0	37.9	14.7	7.5	0.0	7.3	9.7	16.6	2.4	12.1	3.5	0.0	5.6	0.0	0.0	2.2	402.4
Narrow floodplains/ Bottomland	91.4	32.9	23.0	6.5	27.4	17.4	121.5	6.6	10.3	13.7	0.0	21.3	0.0	8.1	0.0	3.6	0.6	13.3	0.0	7.3	482.1
Other	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.5	0.0	0.0	4.5
Other hydric	53.5	3.0	0.0	133.4	68.4	14.1	90.7	0.0	44.4	0.5	0.0	33.1	0.0	27.2	4.9	1.3	0.0	14.0	5.5	5.2	566.1
Other mesic	806.3	137.2	79.5	81.9	110.1	146.3	113.5	39.5	37.6	72.8	59.7	76.5	23.1	101.3	42.1	9.1	12.6	12.4	7.9	10.8	2,066.3
Other xeric	69.4	10.0	3.4	0.0	0.0	4.8	0.0	46.6	0.0	53.1	4.8	4.1	8.3	0.0	20.6	6.9	6.7	1.5	12.1	5.4	281.8
Rolling uplands	3,031.3	2,859.8	1,588.1	61.0	87.5	758.4	50.7	399.2	5.3	192.2	303.3	184.2	427.6	64.9	178.1	197.1	124.0	32.9	92.6	89.1	11,176.2
Small drains	19.4	7.6	0.9	0.0	24.5	8.1	38.9	0.0	6.0	0.0	0.0	10.2	0.0	11.5	0.0	0.0	3.6	7.2	0.0	0.6	172.5
Swamps/Bogs	94.0	14.3	2.5	926.6	439.3	70.6	348.3	0.0	596.4	12.8	0.0	94.8	2.3	44.5	1.3	0.0	1.9	71.1	0.0	15.6	2,793.3
Total	8,497.2	5,369.2	2,500.4	2,128.6	2,105.5	1,523.5	1,498.9	1,368.0	1,212.1	1,133.9	965.5	908.1	696.5	690.7	575.8	488.8	426.2	321.5	291.1	281.3	34,826.8

Table 12-06. Forest ownership in BCR 12, in acres (percentage of column total).

Ownership	Total	Minnesota	Wisconsin	Michigan
County/Municipal	3,655,862	1,771,383	1,734,671	149,774
	(10.5)	(14.9)	(20.5)	(1.0)
National forest	5,227,704	1,767,181	1,253,558	2,206,936
	(15.0)	(14.9)	(14.8)	(15.2)
Other federal	107,868	89,433	7,114	11,320
	(0.3)	(0.8)	(0.1)	(0.1)
Other local government	28,967	7,135	6,883	14,949
	(0.1)	(0.1)	(0.1)	(0.1)
Private	17,649,900	4,476,437	4,834,088	8,339,282
	(50.7)	(37.7)	(57.1)	(57.6)
State	8,035,204	3,742,817	632,086	3,660,262
	(23.1)	(31.5)	(7.5)	(25.3)
U.S. Department of Defense	9,968	0	0	9,968
	(<0.1)	(0.0)	(0.0)	(0.1)
U.S. National Park Service	73,593	18,836	3,307	51,451
	(0.2)	(0.20)	(<0.1)	(0.4)
U.S. Fish and Wildlife Service	37,912	9,668	0	28,244
	(0.1)	(0.1)	(0.0)	(0.2)
All	34,826,778	11,882,889	8,471,706	14,472,184
	(100.0)	(100.0)	(100.0)	(100.0)

Table 12-07A. Calculation of singing males and of singing-male deficit for woodcock in BCR 12. Historical time period refers to 1970 to 1975. The population deficit is not simply the current population of singing males minus the historical level. The deficit considers the density of singing males on manageable acres for each time period.

Population of singing males	Historical	Current
U.S. locations		
Michigan	407,260	304,934
Minnesota	182,669	156,067
Wisconsin	108,141	79,712
Subtotal	698,070	540,714
Canadian locations		
Manitoba	63,064	21,609
Ontario	491,666	381,358
Quebec	58,347	58,276
Subtotal	613,077	461,243
Total	1,311,147	1,001,957
Population deficit of singing males		
U.S. locations		
Michigan		35,077
Minnesota		7,344
Wisconsin		32,067
Subtotal		74,488
Canadian locations[1]		
Ontario		126,537
Quebec		139
Subtotal		126,676
Total		201,164

[1] Does not include Manitoba.

Table 12-07B. Compilation of historical and current habitat, in acres, for woodcock in BCR 12. Historical time period refers to 1970 to 197l. Data is total land area.

State or province	Historical	Current
U.S. locations		
Michigan	41,027,334	41,027,334
Minnesota	22,839,411	22,839,411
Wisconsin	14,415,616	14,415,616
Subtotal	78,282,362	78,282,362
Canadian locations		
Manitoba	3,779,682	3,779,682
Ontario	47,247,620	47,247,620
Quebec	34,476,319	34,476,319
Subtotal	85,503,621	85,503,621
Total	163,785,983	163,785,983
Manageable acres		
U.S. locations		
Michigan	14,928,400	14,472,184
Minnesota	8,581,900	11,882,889
Wisconsin	7,569,200	8,027,509
Subtotal	31,079,500	34,382,582
Canadian locations[1]		
Ontario	13,251,000	13,688,400
Quebec	29,513,700	29,548,300
Subtotal	42,764,700	43,236,7000
Total	73,844,200	77,619,282

[1] Does not include Manitoba.

Table 12-07C. Calculation of habitat goal, in acres, which is calculated as the population deficit multiplied by 10 acres.

	Habitat goal
U.S. location	
Michigan	350,770
Minnesota	73,440
Wisconsin	320,670
Subtotal	744,880
Canadian location[1]	Ontario
1,265,370	
Quebec	1,390
Subtotal	1,266,760
Total	2,011,640

[1] Does not include Manitoba.

Bird Conservation Region 13: Lower Great Lakes/St. Lawrence Plain

Timothy Post
New York Department of Environmental Protection

Affected States and Provinces: Vermont, New York, Pennsylvania, Ohio, Ontario and Quebec
Current Area of Forestland: 23,592,700 acres (9,547,730 ha) (3,960,600 acres [1,602815 ha] of small-diameter and nonstocked forest)
Woodcock Trend Estimate (1968–2004): -1.9
Percent of Change per Year (1995–2004): 0.0
Woodcock Population Estimate (1970): 382,540
Singing Males Only (2004): 283,582

Physiography and Habitat Description

BCR 13 is composed of the Lake Ontario Plain, the eastern Lake Erie Plain, the St. Lawrence Plain, the Mohawk Valley and Upper Hudson River valleys, and the Champlain Valley (Figure 13-01). The bird conservation region encompasses parts of New York, Pennsylvania, Vermont, Ohio, Ontario and Quebec. The map above right shows the relevant counties for states that are included in the data analysis for BCR 13. Much of the area is relatively flat, low-elevation river and lake plains. The topography and climate (relatively high rainfall and snowfall due to lake-effect events) of much of the area also lead to considerable amounts of sheet water wetlands. Historically, the area has been dominated by agriculture, and the same is true today in parts of the area. In other parts of the area, farmland abandonment has occurred (and continues), which leads to reversion of grassland to shrubland and young forests. Some of the sheet water wetlands revert to swamps and alder runs, which are prime

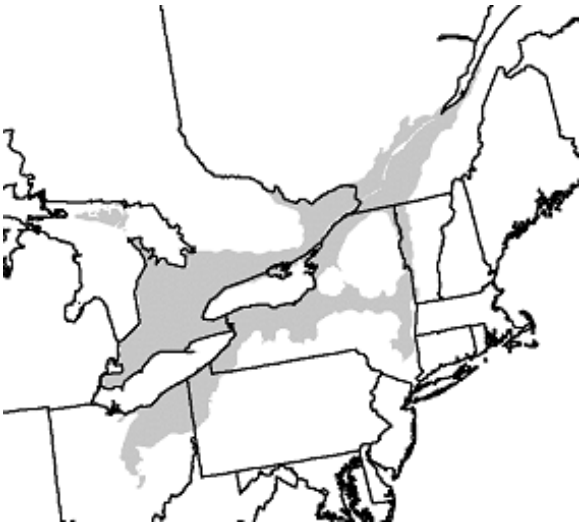


Figure 13-01. BCR 13, St. Lawrence Valley and Lower Great Lake Plain

breeding and migration habitats for woodcock. In much of the Canadian portion, intensive agriculture still dominates the landscape. Portions of the United States' side, such as the Champlain Valley and Hudson valleys, northern Ohio, and the southern shore of Lake Ontario, are under intense development pressure. The

majority of the bird conservation region is comprised of Ontario (42 percent) and New York (27 percent). Smaller portions include Quebec (14 percent), Ohio (11 percent), Pennsylvania (4 percent) and Vermont (2 percent).

The St. Lawrence Plain encompasses the floodplain of the St. Lawrence River and parts of the eastern Great Lakes (Partners in Flight 2000). Portions of the area are in southern Canada, including a small part of southernmost Quebec and a larger portion of southern Ontario that lies south and east of the Canadian Shield. The U.S. portions include the St. Lawrence Valley of northern New York, the Lake Champlain Valley of northwestern Vermont, and adjacent parts of New York and the Mohawk and upper Hudson River corridor.

This physiographic area is a vast, flat plain, which during the last glacial epoch lay at the bottom of the Champlain Sea. As this sea receded, roughly 12,000 years ago, thick deposits of clay, and in some places sand, remained to form the modern soils of the region. This area, therefore, represents the best farmland in eastern Canada and northeastern United States. Elevations rarely exceed 492 feet (150 m) in Quebec, 656 feet (200 m) in Ontario and 984 feet (300 m) in Vermont and New York, except for a few highland portions that reach 1,640 feet (500 m).

Historically, the St. Lawrence Plain was dominated by either sugar maple/beech/birch forest, mesic oak hardwood forest, red maple/black ash swamp forest, or silver maple floodplain forest. The maple/beech/birch (northern hardwood) forests of this region were diverse (with 10 tree species per site) and represented the northern limit for a number of eastern deciduous forest species (Desponts 1996). Silver maple forests filled the floodplain of the St. Lawrence River and other rivers, and stands of swamp white oak that formed at the back edge of the floodplain were another distinctive feature of this region (Desponts 1996). Pre-European settlement was prevalent in the St. Lawrence Region for 5,000 years, and hunting, fishing and agriculture were practiced. When Jacques Cartier arrived in 1535, he noted numerous clearings along the river where corn, beans and squash were planted. Native Americans practiced slash-and-burn agriculture, moving every 10 to 15 years. There were many Native American villages of 1,000 to 2,000 people. Thus pre-European inhabitants had already created habitats for woodcock.

The St. Lawrence Plain represents one of the earliest and most extensive areas of European settlement and development in North America; very little of the original vegetation of the region remains intact. Human pressure has been particularly intense in the Canadian portions of the region, which contain most of the arable land in Canada.

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

Agriculture has been the primary land use throughout the planning unit for over 200 years. In recent decades, agriculture has concentrated and intensified in Quebec and Ontario, with abandonment of arable land in those provinces and with increasing urbanization and industrialization along the St. Lawrence River. Major Canadian urban centers of Quebec, Montreal and Ottawa are located in this region,

primarily occupying former tidal and riverine wetlands and river islands. More intensified agriculture has resulted in loss of hedgerows and margins, increased livestock production, and continued clearing of remaining riparian stands and woodlots.

In the U.S. portions, urbanization has been less intense overall but still intense in some locations. Local development around Burlington, Vermont, and Plattsburgh, New York, has affected land that formerly provided habitat for woodcock. In northern New York, land-use trends include increasing agricultural abandonment, shift towards intensified dairy production and "hobby farming," and increasing acres planted to corn, grain and other row crops (T. M. Jasikoff 2000, unpublished information).

The forest habitats that remain tend to be in smaller blocks that are reduced in tree-species diversity due to repeated selected cutting of sugar maple associates, such as hickory, basswood and butternut. A few more extensively forested patches remain on poor soils along the edges of the Canadian Shield and the Adirondack highland. In many portions of the region, however, farmland abandonment is leading to increased reforestation. This phenomenon is creating habitat for early successional species. Because so little of the natural vegetation remains in this region, effects of natural disturbance processes are dwarfed by human-induced disturbance and change. The natural mosaic of alder bottoms, shrub wetlands, grassland, freshwater marshes, bogs and fens, hardwood and conifer swamps, and upland hardwoods constitute prime habitat for woodcock.

Currently, the less developed and less intensely managed agricultural landscapes of the St. Lawrence Plain support large populations of early successional bird species, such as woodcock. Unlike in many other agricultural regions, climate and poor drainage conditions favor establishment of freshwater wetlands. These climatic conditions and the large-scale reversion of agricultural land make the area important to early successional species, such as woodcock and golden-winged warbler. Seasonal wetlands and wetlands provide important habitat for these species. Woodcock utilize moist soils for foraging, and golden-winged warblers appear to show some tendency toward wetter habitats in this area.

The vast majority of land in this planning unit is in private ownership. The dynamic between agricultural intensification, agricultural abandonment and urban development constitutes the most important bird conservation issue in the region. And, various programs which promote wildlife conservation on private land constitute the primary opportunity to enhance regional bird populations. Allowing nature to take its course cannot restore ecosystems the the conditions present prior to European settlement. These conditions are likely lost forever due to the permanent loss of land to human development, the disruption of natural processes and the loss of keystone species (Askins 2000).

In Quebec, BCR 13 spans an international boundary and extends from the western end of Lake Erie almost to the head of the St. Lawrence estuary (up to the Cap Tourmente on the north shore and Rivière-du-Loup on the south shore) (North Atlantic Bird Conservation Initiative 2003). BCR 13 is one of the most densely populated regions in Canada since 90 percent of the Quebec population and a large part of the Ontario population inhabits the territory. In consequence, its remaining natural ecosystems are deeply fragmented by agriculture, by urban expansion and by roads, rail lines and other linking infrastructure. In the meantime, it also encompasses an array of biologically rich and diverse ecosystems containing a disturbingly large number of plant and animal species at risk or in decline. In

Quebec, 24 species of aquatic birds, 19 species of shorebirds, 28 species of land birds and 17 species of waterfowl have been identified as possible priority species in this bird conservation region. In such a setting, the aspirational quality of the North American Bird Conservation Initiative really shines.

In Ontario, BCR 13, encompasses 77,720 square miles (201,300 km^2) of generally flat, low lying land to the south of the Canadian Shield in Ontario and Quebec and to the north of various highland systems in the four eastern U.S. states (Partners in Flight 2005). In Ontario, BCR 13 encompasses 32,700 square miles (84,700 km^2), including all of southwestern Ontario, Manitoulin Island, a 31- to 62-mile- (50- to 100-km-) wide strip along the north shore of Lake Ontario and the upper St. Lawrence River, and the lower Ottawa Valley. The conservation needs and recommended actions for priority land birds are not uniform across southern Ontario because people, land uses, habitats and land birds are unevenly distributed across the region. The variation in physical features across the region affects the current distribution and abundance of land birds and their habitats. The overall topography of the Ontario portion of BCR 13 is quite subdued, with elevations ranging from a low of 164 feet (50 m) above sea level at the confluence of the Ottawa and St. Lawrence rivers to a high of 1,775 feet (541 m) in the Blue Mountains south of Collingwood. The local topography generally consists of flat to gently sloping plains, with the notable exception of the Niagara Escarpment, a 98- to 164-mile- (30- to 50-m-) high bedrock scarp that snakes its way for some 310 miles (500 km) across the landscape of southwestern Ontario.

The temperate climate of this region is influenced by the Great Lakes. Summers are relatively warm, and winters are cool. Annual precipitation of 28.3 to 39.4 inches (720 to 1000 mm) is spread throughout the year. Snowfall is particularly heavy in "snowbelt" areas located downwind of the Great Lakes. Despite the loss of much of the original forested and wetland habitats, some land-bird habitats are more extensive now than in 1800. For example, shrub/successional habitats have likely increased overall, due to natural succession of abandoned farmland and frequent logging in working forests (Larson et al. 1999). Open alvar grassland and shrubland have increased in areas (e.g. Manitoulin Island, Bruce Peninsula) affected by a series of large, intense forest fires in the early 1900s that were fueled by waste wood left by previous logging activities (Brownell and Riley 2000).

The United States Portion of Lake Ontario and Lake Erie Plain covers the lower Great Lakes Plain covers the low lying areas to the south of Lake Ontario in New York, northeastern Ohio and a small part of northwestern Pennsylvania (Partners in Flight 2003). It also includes a large portion of Ontario, which is north of Lake Erie and Lake Ontario. This region was originally covered with a mixture of oak/hickory, northern hardwood and mixed coniferous forests. The Carolinian Forest element in Ontario harbors unique and rare ecological communities. Roughly 74 percent of the land area is in agricultural production. Several large urban cities (Rochester, Syracuse, Buffalo, Windsor) are found in this area, which comprises 7.1 percent of the land. Several important national wildlife refuges, national parks and state wildlife management areas, including Montezuma and Pt. Pelee national parks, are found here.

The vast majority of the lower Great Lakes Plain is in agricultural production. Forests that remain are in relatively small blocks. Agricultural abandonment is occurring, which will temporarily favor early successional species. But, increasingly, land is being lost to development. Conversion of grassland to cropland may also be detrimental to woodcock.

The New York portion of the lower Great Lakes Plain was not extensively settled by Europeans until after the American Revolution ended in 1783. Initial colonization was during the 1790s. A similar time frame for settlement probably applies for southern Ontario. The region was found to have large areas of productive farmland, and clearing of the presettlement forests generally took place during the first half of the 19th century. Forests were cleared both for agricultural purposes and for fuel wood. By the end of the 19th century, less than 20 percent of the original forest remained in many of the landscapes within this region (Zipperer et al. 1990). Today, in many portions of southern Ontario and northwestern New York, forest cover remains very low (at less than 25 percent), with agriculture and urban areas dominating these landscapes. However, forest cover has increased since the beginning of the 20th century in some areas, including the area north of the Carolinian Forest and south of the Canadian Shield in Ontario and the northeastern portion of this planning unit toward central New York. In 1990, forest cover in Onondaga County, New York, was estimated at about 35 percent. It was also estimated that the existing forest cover was fragmented into more than 3,000 forest islands within the county (Zipperer et al. 1990).

Wetland habitats experience similar loss during the period of settlement and high agricultural land use. Thibault and Zipperer (1994) estimated that, by 1926, the landscape around Syracuse, in Onondaga County, was 80 percent agricultural with the remaining 20 percent either in forest or wetland cover. Similar to forest cover, wetland cover has increased during the past century in some portions of the planning area where agricultural land use has diminished. Thibault and Zipperer (1994) found that 50 percent of the wetlands that existed in 1964 were new, compared to 1926, and another 32 percent of wetlands were new in 1988. These increasing amounts of forest and wetland cover in some portions of the lower Great Lakes Plain are a result of the poor agricultural value of the land and the resulting farm abandonment. A general shift away from intensive farming to hobby farming and to more urban-suburban land uses also contributes to these trends.

The Mohawk and Upper Hudson valleys are primarily a diverse river floodplain. Historically, the Hudson River has been a major breeding and, more critically, a migration corridor for woodcock. The upper Hudson River corridor and the Mohawk River corridor were under intense development pressure that led to a critical loss of riparian forests habitats. The pressure remains a threat to breeding and critical migration habitats. Reversion of formerly open, shrubland habitats to mature forests also adds to the loss of critical habitats.

Threats

In portions of BCR 13, urban sprawl and other development represent the largest threat to woodcock habitats. Urbanization affects these habitats in two related ways: direct loss through development and rising economic pressures in surrounding areas that force private farmers to sell land to developers. These pressures are particularly acute in Canada—near the major metropolitan areas of Montreal, Toronto, Kingston and Ottawa—and in the United States—in Vermont portions of the Champlain Valley, near Burlington, and in New York, near Rochester, Syracuse and Buffalo. Protection of riverine wetlands from industrial development is also a high priority along the St. Lawrence River and throughout the bird conservation region. These habitats provide critical breeding and migration habitats for woodcock.

Intensive agricultural expansion also has caused, and continues to cause, a decline in breeding and migration habitats in portions of the bird conservation region. Historical agricultural practices provided ample habitat for woodcock;

the small farms predominant created a mosaic of habitat types that favored woodcock. Modern, intensive agricultural practices often leave little residual habitat for woodcock. The filling of wetlands, removal of forest patches and movement towards bigger, consolidated fields with little shrub or forest remaining has reduced habitat for woodcock. This trend continues throughout portions of the bird conservation region, especially in southern Canada.

Between the current and baseline forest inventories, there has been a gain of over 1 million acres (404,690 ha, 13 percent) of timberland in BCR 13 (Tables 13-01A and 13-01B). However, there has been a net loss of over 2.3 million acres (930,787 ha, 56 percent) of small-diameter and nonstocked forest during the same period (Table 13-02). New York, Ohio and Vermont all showed significant losses of useable habitat and a high-percent loss during the time period (Tables 13-03 and 13-04). Pennsylvania, Quebec and Ontario all showed small losses of habitat; actually, Quebec and Ontario showed increases in habitat in the early successional stage but decreases in the amount of habitat in the appropriate forest types, which equated to an overall loss of suitable habitat. Major forest types include maple/beech/birch, oak/hickory, elm/ash/red maple, white/red/jack pine, aspen/birch and spruce/fir (Table 13-03, 13-04 and 13-05). Approximately 91 percent of the timberland in the U.S. portion of the region is under private ownership (Table 13-06).

Woodcock Harvest and Population Status

The 2003 Woodcock Status Report (Kelley 2003) provides estimates for hunter numbers and for harvest of woodcock in states included in BCR 13 (Table 13-07). It should be noted that, since the majority of each state does not fall within BCR 13 and since there is no data from the Canadian portions of the bird conservation region, these data should be used only for comparative purposes. There has been a declining trend in both number of hunters and in the estimated harvest over 33 years (Table 13-08). Since the specific numbers are subject to yearly variation, the most compelling information is in the general trends shown. Such dramatic declines, particularly in New York, show what appears to be a precipitous decline in hunting effort and harvest in only 33 years.

The American Woodcock Status Report (Kelley 2006) provides the most up to date estimates of population trends for states and provinces in the bird conservation region. The long-term trend (1968 to 2006) for the eastern region is 1.9 percent per year. Whereas, the period from 1996 to 2006 showed no trend in the population (Table 13-09). This is encouraging news. But, with early successional habitat trends still declining, it is uncertain how long this population stability will be maintained. It is important to remember that Table 13-09 provides population trends for the entire state or province, not for a portion of the state or province in BCR 13. BCR 13 encompasses a fairly substantial part of New York but only relatively small parts of Vermont and Pennsylvania. Ohio, Ontario and Quebec fall in between. Most of the state or province often is not included. Since the majority of each state or province does not fall within BCR 13, Table 13-09 provides only a rough estimate of the actual population trend for this bird conservation region. It is clear that woodcock populations in New York and Ohio continue to exhibit serious declines. Populations in Vermont and Pennsylvania appear to be stabilizing, while populations in Ontario and Quebec are on the rise. New York and Ohio need to take action to halt the declining trends.

Population and Habitat Goals

There has been a decline of nearly 99,000 singing male woodcock in the bird conservation

region since the early 1970s (Tables 13-10 and 13-11). To restore woodcock densities in BCR 13 to those observed during the early 1970s, a total of nearly 3.6 million acres (1.4 million ha) of new woodcock habitat needs to be created (Table 13-12). In BCR 13, the vast majority of timberland is under private ownership. Therefore, state and federal resource agencies will need to enlist the help of individual and commercial private forestland owners in order to achieve habitat-management goals. This is a tremendous amount of acreage to manage and will require a monumental undertaking and cooperation from a diverse group of parties, as well as considerable monetary investment.

Potential for Habitat Management

Areas and habitats where potential exists for active management include the following.

1. Federal Land
   A. Fort Drum: 120,000 acres (48,360 ha). It is owned by the U.S. Department of Defense and is one of the most significant shrubland breeding bird communities in New York. Breeding species include golden-winged warbler, woodcock and common nighthawk.
   B. Iroquois National Wildlife Refuge, New York
   C. Montezuma National Wildlife Refuge, New York
   D. Point Pelee, Ontario.
   E. Finger Lakes National Forest, New York
   F. Missisquoi Bay National Wildlife Refuge, Vermont
   G. Erie National Wildlife Refuge, Pennsylvania
2. State Land
   A. New York
      a. Portions of New York that are within BCR 13 are also within the Adirondack Park Forest Preserve. The Adirondack Park has New York's constitutional provisions that prohibit logging or burning on state land. This effectively eliminates the ability to manage state-owned land for woodcock. The areas affected include: St. Lawrence, Washington, Essex, Saratoga, Clinton and Fulton.
      b. There are substantial areas owned by New York that are not within a forest preserve that could be managed to benefit woodcock. Although regulated, there is also private land within forest preserves that could be managed, where logging is allowed.
      c. Wildlife Management Areas (WMAs): Upper and Lower Lakes State WMA, Eastern Lake Ontario Marshes, Lake Champlain Marshes (Kings Bay, Ausable Marshes, Monty's Bay, Wickham Marsh, Putts Creek), Lewis Preserve WMA, Lake Alice WMA, Wilson Hill WMA, Point Peninsula WMA, Ashland Flats WMA, Fish Creek WMA, Northern Montezuma WMA, Lake Shore Marshes WMA, Oak Orchard/Tonawanda WMA, Carlton Hill WMA, French Creek WMA, Indian River WMA, Perch River WMA, Littlejohn WMA, Happy Valley WMA, Three Mile Bay WMA, Cicero Swamp WMA, Three Rivers WMA, Braddock Bay WMA, Carlton Hill WMA, High Tor WMA, Carters Pond WMA, Capital District WMA, Partridge Run WMA, Knox WMA.
      d. The New York State Department of Environmental Conservation also owns considerable acreage in state forests throughout BCR 13. The portions outside of the Adirondack

Preserve are open to management.

e. The New York Power Authority, and the New York Office of Parks, Recreation and Historic Preservation also have considerable land holdings, particularly in the Upper St. Lawrence River and Thousand Islands. Although, they tend to be less amenable to habitat management.

B. Vermont

a. Wildlife Management Areas (WMAs): Bird Mountain WMA, Black Creek WMA, Blueberry Hill WMA, Brandon Swamp WMA, Buczek Marsh WMA, Cornwall Swamp WMA, Dead Creek WMA, East Creek WMA, Elm Brook WMA, Fairfield Swamp WMA, Fred Johnson WMA, Gale Meadows WMA, Halfmoon Cove WMA, Hubbardton Battlefield WMA, Intervale WMA, Lemon Fair WMA, Lewis Creek WMA, Little Otter Creek WMA, Loves Marsh WMA, Little Otter Creek WMA, Maquam WMA, Marsh Pond WMA, Mud Creek WMA, Pond Woods WMA, Rock River WMA, Sandbar WMA, Snake Mountain WMA, The Narrows WMA, Ward Marsh WMA.

C. Pennsylvania

a. Game Lands: 314, 101, 191, 109, 152, 154, 29, 202, 277, 214, 213, 270.

D. Ohio

a. Auburn Marsh Wildlife Area, Beach City Wildlife Area, Berlin Lake Wildlife Area, Brush Creek Wildlife Area, Camp Belden Wildlife Area, Dorset Wildlife Area, Funk Bottoms Wildlife Area, Grand River Wildlife Area, Hambden Orchard, Highlandtown Wildlife Area, Jockey Hollow Wildlife Area, Keen Wildlife Area, Killbuck Marsh Wildlife Area, Leesville Lake Wildlife Area, Lower Killbuck Creek Wildlife Area, Mohican Wildlife Area, Mohler Wildlife Area, Mosquito Creek Wildlife Area, New Lyme Wildlife Area, Orwell Wildlife Area, Shenango Wildlife Area, Shreve Lake Wildlife Area, Spencer Lake Wildlife Area, Valley Run Wildlife Area, Wellington Wildlife Area, West Branch State Park Wildlife Area.

3. Private Land

A. Private land and paper company land represent the vast majority of the land in this BCR and, therefore, the greatest opportunity for management.

4. Partnerships

A. Because of the large portions of the planning unit within Canada, coordinated efforts are vital for the success of any conservation plan. North American Bird Conservation Initiative planning is underway. It is a large-scale international effort for bird conservation. Current funding is largely through grants for wetlands protection, which should provide great utility for woodcock conservation, since early successional habitats near wetlands will be incorporated into the plans.

B. Outreach will play a critical role in the northeast as woodcock and the entire early successional bird suite is more threatened, due to more widespread and greater declines in populations, than any other species suite (grassland suite is in similar predicament). This is contrary to the misconception that forest interior species are in most decline and most threatened. Managers, environmentalists and the public need to be educated that shrubland and early successional habitats are important to birds and need

to be protected or managed for. These habitats provide critical diversity to the area. A program to develop demonstration sites throughout the various states and provinces would be beneficial in helping to educate the public and would provide habitat guidance to those interested in managing for woodcock and other early successional birds.

Calculations to determine habitat goals for woodcock were to be based on available Canadian Forest Inventory Data (Tables 13-01B and 13-02) and woodcock density information (Tables 13-10 and 13-11). The calculations for the number of acres of habitat needed to produce a woodcock based on these data appear to be unrealistic. Therefore, habitat goals for the plan are presented in two ways. Table 13-12 shows the figures based on the Canadian forest data, and Table 13-13 shows figures for Canadian habitat goals based on the United States average for acres needed per woodcock. Future versions of this plan should try to address this apparent discrepancy in the data used for calculations, and recalculate the results.

Table 13-01A. Current and historical (1970 to 1975) stand-size distribution,in acres, of timberland in BCR 13 and in portions of individual states within BCR 13.

	Current stand-size distribution					Historical stand-size distribution				
Area	Total timberland	Large diameter[1]	Medium diameter[2]	Small diameter[3]	Non-stocked[4]	Total timberland	Large diameter	Medium diameter	Small diameter	Non-stocked
New York	6,611,200	3,348,100	1,942,600	1,301,100	19,400	5,674,700	1,529,800	928,100	2,607,500	609,300
Ohio	1,570,700	778,200	433,700	358,900	0	1,268,700	496,100	315,300	457,300	[5]
Pennsylvania	761,200	428,200	199,100	128,500	5,500	919,200	359,700	195,400	364,100	[5]
Vermont	461,000	312,400	103,200	45,400	0	481,500	221,700	109,400	143,500	6,900
Total	9,404,100	4,866,900	2,678,600	1,833,900	24,900	8,344,100	2,607,300	1,548,200	3,572,400	616,200

[1] Softwoods are at least 9 inches, and hardwoods are at least 11 inches in diameter at breast height; size class has more than 50 percent of stocking in medium- and large-diameter trees, with stocking of large trees equal to or greater than medium-diameter trees.

[2] Trees are at least 5 inches in diameter at breast height but are smaller than large-diameter; size class has more than 50 percent of stocking in medium- and large-diameter trees, with stocking of large-diameter trees less than stocking of medium-diameter trees .

[3] Saplings are 1 to5 inches diameter at breast height. Softwood seedlings are more than 6 inches tall, and hardwood seedlings are more than 12 inches tall; size class has at least 50 percent of the stocking in small-diameter trees.

[4] Data referes to commercial forestland on which stocking of trees is less than 16.7 percent.

[5] Calculation is included with small diameter.

Table 13-01B. Current and historical (1980) stand-size distribution, in acres, of timberland in the Canadian portion of BCR 13 and in portions of individual provinces within the bird conservation region

	Current stand-size distribution			Historical stand-size distribution		
Area	Total timberland	Large diameter[1]	Small diameter[2]	Total timberland[1]	Large diameter[2,3]	Small diameter[2,5]
Ontario	12,568,800	10,686,100	1,882,700	12,274,100	10,478,400	1,795,700
Quebec	1,619,800	1,400,700	219,100	1,403,700	1,185,400	218,300
Total	14,188,600	12,086,800	2,101,800	13,677,800	11,663,800	2,014,000

[1] Trees are more than 5 inches in diameter at breast height.
[2] Trees are fewer than or equal to 5 inches in diameter at breast height.

Table 13-02. Forest, in acres, by forest type and stand-size class in 2005 in the lower Great Lakes or St. Lawrence Plain portion of BCR 13.

Forest type	Total	Large diameter[1]	Small diameter[2]	Percent of small diameter
Aspen/Birch	2,764,900	2,379,400	385,500	13.9
Elm/Ash	169,300	126,800	42,500	25.1
Maple/Beech/Birch	10,566,000	9,429,700	1,136,300	10.8
Oak	1,574,400	1,369,500	204,900	13.0
Oak/Pine	22,600	20,100	2,500	11.1
Pine	1,829,500	1,569,300	260,200	14.2
Spruce/Fir	2,636,200	2,072,300	563,900	21.4
Miscellaneous coniferous	286,000	235,600	50,400	17.6
Miscellaneous deciduous	2,528,100	1,847,300	680,800	26.9
Miscellaneous mixed forest	936,300	823,200	113,100	12.1
Total	23,313,300	19,873,200	3,440,100	14.8

[1] Stands of trees are more than 5 inches diameter at breast height.
[2] Stands of trees equal 5 inches diameter at breast height.

Table 13-03. Historical and current acreage of suitable habitat (small diameter, excludes nonhabitat, e.g., conifers)

	Historical			Current		
State/Province	Appropriate stage	Percentage of appropriate type	Total usable	Appropriate stage	Percentage of appropriate type	Total usable
New York (1968)	3,686,300.0	82.0	3,022,766.0	1,186,000.0	21.3	1,186,000.0
Ohio (1968)	466,446.0	97.0	452,452.6	736,300.0	18.2	134,000.0
Ontario (2005)	1,795,700.0	81.0	1,454,517.0	1,882,700.0	76.0	1,430,852.0
Pennsylvania (1978)	382,928.0	98.0	375,269.4	1,531,300.0	22.7	348,100.0
Quebec (2005)	218,300.0	81.0	176,823.0	219,100.0	76.0	166,516.0
Vermont (1973)	150,240.0	66.0	99,158.4	399,200.0	11.4	45,400.0
Total	6,699,914.0	83.0	5,580,986.4	5,954,600.0	56.0	3,310,868.0

Table 13-04. Historical and current suitable woodcock habitat, in acres, in the United States and Canada, using small-diameter size, and percent of change.

Country	Historical	Current	Percentageof change
Canada (1980 to 2005)	1,597,368	1,631,340	2
United States (1970 to 2003)	3,949,649	1,713,500	57
Total	5,547,017	3,344,840	40

Table 13-05. Forest (in thousands of acres) by most common forest types for states in BCR 13.

Forest type	Vermont	New York	Pennsylvania	Ohio	Total
Aspen/Birch	32.3	348.2	43.2	23.9	447.6
Elm/Ash/Red maple	19.7	695.9	57.8	220.8	994.2
Exotic softwoods	1.5	113.2	0.0	3.4	118.1
Loblolly/Shortleaf pine	0.0	5.5	0.0	0.0	5.5
Maple/Beech/Birch	336.6	3,514.1	487.4	665.9	5,004.0
Nonstocked	0.0	19.4	5.5	0.0	24.9
Oak/Gum/Cypress	0.0	0.0	0.0	2.1	2.1
Oak/Hickory	10.6	849.8	142.5	618.6	1,621.5
Oak/Pine	0.0	130.2	0.0	0.0	130.2
Pinyon/Juniper	0.0	14.9	0.0	0.0	14.9
Spruce/Fir	0.0	135.7	0.0	6.1	141.7
White oak/Red oak/Jack pine	60.3	784.5	24.9	29.9	899.5

Table 13-06. Acerage of forest ownership in portions of states within BCR 13.

Ownership	Total	Vermont	New York	Pennsylvania	Ohio
National forest	50,800	45,400	5,400	0	0
Other federal	68,100	6,300	57,600	0	4,200
Private	8,601,700	351,300	6,042,100	713,900	1,494,300
State/County/Municipal	683,600	58,000	506,000	47,300	72,200
All	9,404,200	461,000	6,611,200	761,200	1,570,700

Table 13-07. Active woodcock hunters, days afield and woodcock harvest (percent of column) in states included in BCR 13.

	Active woodcock hunters		Days afield		Harvest	
	2001–2002	2002–2003	2001–2002	2002–2003	2001–2002	2002–2003
New York	5,300	5,600	25,700	31,100	8,800	17,100
	(37)	(36)	(147)	47)	(55)	(62)
Ohio	3,100	5,200	9,200	23,400	6,600	3,400
	(135)	(108)	(93)	137)	(87)	(43)
Pennsylvania	13,400	9,600	53,100	40,900	20,100	10,100
	(45)	(44)	(52)	57)	(52)	(40)
Vermont	900	1,200	4,700	6,900	3,100	2,000
	(39)	(45)	(36)	55)	(28)	(31)

Table 13-08. Number of woodcock killed by duck stamp buyers and the curent and historical number of hunters per state.

	Estimated number of woodcock killed by duck stamp buyers		Number of hunters	
	1968	2001	1968	2001
New York	76,528	5,593	21,977	3,493
Ohio	15,345	6,280	3,561	3,221
Pennsylvania	30,917	11,866	12,069	5,277
Vermont	4,553	3,446	1,578	920

Table 13-09. Woodcock population trend estimates for states and provinces included in BCR 13, where p represents the statistical significanc.

	Percentage of change (1968–2006)	Significance	Percentage of change (1996–2006)
New York	2.5	$p < 0.01$	2.5
Ohio	6.2	$p < 0.01$	6.7
Ontario	1.9	$p < 0.01$	3.1
Pennsylvania	3.4	$p < 0.01$	0.2
Quebec	1.3	$p < 0.01$	7.6
Vermont	0.7	na	0.9

Table 13-10. Historical and current singing males per acre of land.

		Historical		Current	
	Total land	Number of singing males	Singing males per acre of land	Number of singing males	Singing males per acre of land
U.S. locations					
New York	16,659,488	97,888	0.0059	62,239	0.0037
Ohio	7,396,762	25,413	0.0034	13,276	0.0018
Pennsylvania	2,330,541	12,831	0.0055	7,882	0.0034
Vermont	1,038,541	6,344	0.0061	4,363	0.0042
Subtotal	27,425,332	142,476	0.0052	87,760	0.0032
Canadian locations					
Ontario	20,750,294	193,746	0.0093	149,638	0.0072
Quebec	6,848,903	46,318	0.0068	46,184	0.0067
Subtotal	27,599,197	240,064	0.0087	195,822	0.0071
Total	55,024,529	382,540	0.0070	283,582	0.0052

Table 13-11. Effective densities of woodcock per acre of land and population deficit.

	Early density	Late density	Density deficit	Population deficit
U.S. locations				
New York	0.0172	0.0094	0.0078	51,804
Ohio	0.0200	0.0085	0.0116	18,186
Pennsylvania	0.0140	0.0104	0.0036	2,743
Vermont	0.0132	0.0095	0.0037	1,711
Subtotal				74,444
Canadian locations				
Ontario	0.0158	0.0119	0.0039	48,760
Quebec	0.0330	0.0285	0.0045	7,265
Subtotal				56,024
Total				130,468

Table 13-12. Acres of habitat needed to restore woodcock populations to 1970s level, population deficit and habitat goals. (Calculations for Canadian locations are based on averages of U. S. data[1].)

	Habitat needed per woodcock	Population deficit	Habitat goals
U.S. locations			
New York	30.88	37,184	1,599,693
Ohio	17.80	10,855	323,716
Pennsylvania	29.25	5,423	80,247
Vermont	15.64	1,305	26,758
Subtotal		54,767	2,030,415
Canadian locations			
Ontario	27.7	48,767	1,350,647
Quebec	27.7	7,273	201,231
Subtotal		56,040	1,551,878
Total		110,807	3,582,293

[1] This table calculates the habitat goals, in acres, for Canada by using the average of the U.S. data (total acreage of the United States divided by the U.S. woodcock population deficit, or 27.7 acres per woodcock). The calculations, using the Canadian data for woodcock per acre, resulted in unrealistic figures. The results were recalculated by utilizing more realistic U.S. figures for acres per woodcock.

Bird Conservation Region 14: Atlantic Northern Forest

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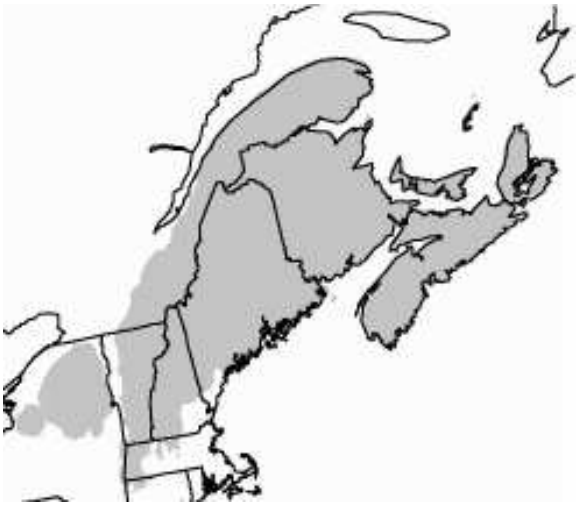

Affected States: Maine, New Hampshire, Vermont, Massachusetts, Connecticut, New York
Current Area of Forestland: 63,484,982 acres (25,691,737 ha) (11,549,711 acres [4,674,050 ha] of small-diameter and nonstocked forest)
Woodcock Trend Estimate (1966–2004): -0.43
Percent of Change per Year (1994–2004): 0.34
Woodcock Population Estimate (1970): 637,484
Singing Males Only (2004): 484,205

Physiography and Habitat Description

The Atlantic Northern Forest (BCR 14) is 70 percent forested and is comprised of 63.4 million acres (25.7 million ha) of forest, similar to the total forest area during 1968 to 1973 (Table 14-01). Approximately 79 percent of the forest is privately owned; 21 percent is in public ownership (crown, federal, state, county) (Tables 14-02 and 14-03).

BCR 14 is a transitional forest landscape between deciduous-dominated forests to the south and coniferous-dominated forests to the north. Predominant forest types include spruce/fir and maple/beech/birch.

Maple/beech/birch forests have increased consistently with the loss of spruce/fir forest area since 1970 in BCR 14 states (Tables 14-04 and 14-05). Spruce/fir forest acreage has increased in the Canadian provinces as pine forests and mixed hardwood/softwood acreage has decreased (Tables 14-06 and 14-07). Although aspen/birch forests comprise only 7.5 percent of the current forest, aspen/birch forest has increased by 27.5 percent in the entire bird conservation region since 1970 (Tables 14-04, 14-05, 14-06 and 14-07), and much of this increase has been in the small-diameter size class (Tables 14-08 and 14-09).

The increase in aspen and other deciduous forests, particularly in the small-diameter size class, is largely a result of extensive forest management on industrial forests in Maine and New Brunswick. Deciduous tree species are often a component of conifer-dominated forests in this region. After harvest, the deciduous regeneration can outcompete the coniferous regeneration, which can lead to fores- type conversion. This conversion from coniferous to

deciduous is sometimes interrupted by selecting against deciduous regeneration through the use of herbicides or mechanical treatment and instead planting spruce plantations.

The estimated woodcock breeding population density for BCR 14 has decreased by 0.43 percent per year since 1970. The estimated number of singing males in BCR 14 decreased from 384,592 in 1970 to 292,119 in 2005. The greatest percent loss of males has occurred in Connecticut (62 percent), Massachusetts (46 percent) and Prince Edward Island (38 percent) (Tables 14-10 and 14-11). This decrease is likely a result of the decrease of small-diameter size class forests in all the states in the bird conservation region, except Maine (Table 14-01). Based on the calculated deficit of singing males and based on the estimated acreage of forest per male in each state or province, we need to manage about 4,760,000 acres (1,926,325 ha) of forestland to increase woodcock populations to historical levels (Table 14-10).

The relatively high proportion of the forest owned and managed by the forest products industry in Maine (43 percent), New Brunswick (19 percent) and Nova Scotia (18 percent) will aid in sustaining regional woodcock populations. The increase in aspen/birch forests in Maine will, likewise, aid in attaining this objective. However, ongoing declines in the area of small-diameter stands in other states and provinces will likely continue declines of woodcock populations within these portions of this region.

The area of small-diameter forest required to maintain 1970 woodcock population densities are identified for each state or province (Table 14-10). We would recommend that all aspen/birch forests be maintained on the landscape using a 60-year rotation. Using this rotation length, approximately 33 percent of the aspen/birch forest at any given point in time would be in the small-diameter size class. We recommend management of all aspen/birch, red maple and all intolerant hardwood stands so that between 15 and 20 percent is maintained in small-diameter size classes. In this region, even-aged management of spruce/fir forest types usually results in mixed intolerant hardwood/spruce fir forests that are used extensively by woodcock. The challenge will be to attain habitat goals in the nonindustrial forests of the bird conservation region. Intolerant hardwoods make up a small percentage of all species in BCR 14 (Table 14-12). Table 14-13 shows the distribution of forest types across physiographic classes found in the states in BCR 14.

Table 14-01. Curent and historical composition, in acres (percentage of column) within portions of states and provinces in BCR 14. Historical data represent 1968 to 1973.

	Current stand-size distribution					Historical stand-size distribution				
	Total timberland	Large diameter[2]	Medium diameter[3]	Small diameter[4]	Non-stocked[5]	Total timberland	Large diameter	Medium diameter	Small diameter	Non-stocked
U.S. locations										
Connecticut	410,488	310,530	80,690	14,316	4,951	399,100	188,000	125,300	85,800	0
	(0.65)[1]	(0.7)	(0.8)	(0.1)		(0.6)	(0.5)	(1.5)	(0.6)	
Maine	16,701,511	5,492,210	6,188,814	4,973,720	46,767	16,395,400	5,982,100	5,254,700	5,015,500	143,100
	(26.3)	(13.1)	(61.0)	(43.3)		(26.2)	(14.8)	(62.1)	(37.6)	(30.6)
Massachusetts	748,328	619,243	109,855	19,230	0	757,800	333,900	257,300	152,500	14,100
	(1.2)	(1.5)	(1.1)	(0.2)		(1.2)	(0.8)	(3.0)	(1.1)	(3.0)
New Hampshire	4,188,680	2,357,323	1,410,003	408,156	13,198	4,194,700	1,715,100	1,420,300	1,027,500	31,800
	(6.6)	(5.6)	(13.9)	(3.6)		(6.7)	(4.3)	(16.8)	(7.7)	(6.8)
New York	3,240,178	1,646,266	1,125,621	462,086	6,205	3,356,100	1,291,300	560,500	1,255,800	248,500
	(5.1)	(3.9)	(11.1)	(4.0)		(5.4)	(3.2)	(6.6)	(9.2)	(53.1)
Vermont	4,143,397	2,524,822	1,231,493	387,082	0	3,948,400	1,839,400	845,100	1,233,000	30,900
	(6.5)	(6.0)	(12.1)	(3.4)		(6.3)	(4.6)	(10.0)	(9.2)	(6.6)
Subtotal	29,432,582	12,950,394	10,146,477	6,264,590	71,121	29,051,500	11,349,800	8,463,200	8,770,100	468,400
	(46.4)	(31.0)	(100.0)	(54.6)		(46.4)	(28.2)	(100.0)	(65.8)	(100.0)
Canadian locations										
New Brunswick	15,104,300	12,294,100[6]	[6]	2,810,200[7]	[7]	14,684,600	12,523,600[6]	[6]	2,161,000[7]	[7]
	(23.8)	(29.4)		(24.5)		(23.5)	(31.1)		(16.2)	
Nova Scotia	9,571,500	8,755,200[6]	[6]	816,300[7]	[7]	9,696,700	8,842,600[6]	[6]	854,100[7]	[7]
	(15.1)	(21.0)		(7.1)		(15.5)	(21.9)		(6.4)	
Prince Edward Isle	601,200	478,700[6]	[6]	122,500[7]	[7]	666,100	542,000[6]	[6]	124,100[7]	[7]
	(0.9)	(1.1)		(1.1)		(1.1)	(1.3)		(0.9)	
Quebec	8,775,400	7,310,400[6]	[6]	1,465,000[7]	[7]	8,475,900	7,047,000[6]	[6]	1,428,900[7]	[7]
	(13.8)	(17.5)		(12.8)		(13.5)	(17.5)		(10.7)	
Subtotal	34,052,400	28,838,400[6]		5,214,000[7]	[7]	33,523,300	28,955,200[6]	[6]	4,568,100[7]	[7]
	(53.6)	(69.0)		(45.4)		(53.6)	(71.8)		(34.2)	
Total	63,484,982	41,788,794[6]	[6]	11,478,590[7]	[7]	62,574,800	40,305,000[6]	[6]	13,338,200[7]	[7]

[1] Percentages for various diameter categories and for nonstocked category refer to percent of total forestland for current and historical time periods within each state.
[2] Softwoods are at least 9 inches, and hardwoods are at least 11 inches in diameter at breast height.
[3] Trees are at least 5 inches in diameter at breast height but are smaller than large-diameter trees.
[4] Saplings are 1 to 5 inches diameter at breast height. Softwood seedlings are more than 6 inches tall, and hardwood seedlings more than 12 inches tall.
[5] Data refers to commercial forestland on which stocking of trees is less than 16.7 percent.
[6] Data is included in large-diameter totals.
[7] Data is included in small-diameter totals.

Table 14-02. Current timberland, in acres (percentage of column) by ownership by states in BCR 14.

Ownership class	Total	Connecticut	Maine	Massachusetts	New Hampshire	New York	Vermont
County and municipal	365,717 (1.3)	14,405	151,352	25,914	119,531	32,481	22,034
National forest	1,020,852 (3.5)	0	47,240	0	624,785	0	348,827
Other federal	32,766 (0.1)	0	7,910	0	0	0	24,857
Other local government	5,872 (0.02)	0	5,872	0	0	0	0
Private	26,179,599 (89.5)	356,472	15,971,553	461,242	3,161,281	2,954,687	3,274,364
State	1,447,172 (4.9)	39.611	477.147	240,441	238,284	222,778	228,912
U.S. Department of Defense	91,905 (0.3)	0	7,123	20,731	14,072	30,232	19,747
U.S. Fish and Wildlife Service	93,205 (0.3)	0	33,314	0	30,727	0	29.165
Total	29,237,090	410,488	16,701,511	748,328	4,188,680	3,240,178	3,947,905

Table 14-03. Current timberland, in acres (percentage of column) by ownership by provinces in BCR 14.

Ownership class	Total	New Brunswick	Nova Scotia	Prince Edward Island	Quebec
Federal/Native	5,187 (0.01)	0	2,717	2,470	
Federal/Other	269,971 (0.7)	18,031	249,470	2,470	
Industrial private	12,211,257 (30.8)	3,035,630	2,181,010	0	6,994,617
Nonindustrial private	9,800,960 (24.7)	4,613,960	4,512,690	674,310	
Provincial/Crown	17,351,181 (43.8)	7,249,450	2,717,000	49,400	7,335,331
Total	39,638,556	14,917,071	9,662,887	728,650	14,329,948

Table 14-04. Forest composition, in acres (percentage of column) within BCR 14, using 1968 to 1973 inventories.

Forest type	Connecticut (1972)	Massachusetts (1972)	Maine (1971)	New Hampshire (1973)	New York (1968)	Vermont (1973)	Total
Aspen/Birch	13,100 (0.6)	18,200 (0.8)	1,350,200 (61.8)	212,300 (9.7)	358,000 (16.4)	218,000 (10.7)	2,169,800 (100)
Elm/Ash/Cottonwood/ Red maple	109,700 (3.1)	187,800 (5.3)	1,626,3006 (45.7)	628,700 (17.7)	532,500 (14.9)	446,900 (13.3)	3,531,900 (100)
Maple/Beech/Birch	69,900 (0.8)	192,900 (2.3)	3,524,700 (41.3)	1,240,000 (14.5)	1,518,700 (17.8%)	1,836,200 (23.2)	8,382,400 (100)
Nonstocked	0 (0.0)	14,100 (3.1)	143,100 (30.1)	31,800 (6.8)	248,500 (53.1)	30,900 (6.7)	468,400 (100)
Oak/Hickory	124,400 (17.7)	129,500 (18.4)	0 (0.0)	274,800 (39.1)	132,500 (14.7)	70,900 (10.1)	732,100 (100)
Pine	82,000 (1.7)	215,900 (4.5)	1,965,200 (40.6)	1,211,800 (29.2)	421,900 (8.7)	557,600 (15.3)	4,443,400 (100)
Spruce/Fir	0 (0.0)	13,500 (0.5)	7,929,000 (29.7)	627,100 (23.5)	392,500 (17.7)	751,000 (28.6)	9,713,100 (100)

Table 14-05. Forest composition, in acres (percentage of column) within BCR 14, using 2003 to 2004 inventories.

Forest type	Conntecticut (2004)	Massachusetts (2004)	Maine (2003)	New Hampshire (2003)	New York (2004)	Vermont (2004)	Total
Aspen/Birch	0	0	2,262,279	252,114	180,807	295,325	2,990,524
	(0.0)	(0.0)	(75.6)	(8.42)	(6.0)	(9.9)	(100)
Elm/Ash/Cotton-wood/Red maple	29,709	102,839	1,007,107	308,724	570,403	379,743	2,3986,525
	(1.2)	(4.3)	(42.0)	(12.9)	(23.8)	(15.8)	(100)
Maple/Beech/Birch	107,437	305,877	6,242,279	2,081,794	1,684,222	2,403,575	12,647,233
	(0.8)	(2.4)	(49.4)	(16.5)	(13.3)	(19.0)	(100)
Nonstocked	4,9511	0	48,282	13,198	6,205	987	73,624
	(0.0)	(0.0)	(79.4)	(15.3)	(0.0)	(5.3)	(100)
Oak/Hickory	189,634	139,402	227,627	298,704	66,044	48,973	970,385
	(19.5)	(14.4)	(23.5)	(30.8)	(6.8)	(5.0)	(100)
Other Softwood	39,611	106,755	1,296,526	216,989	194,221	297,049	2,151,151
	(1.8)	(4.9)	(60.3)	(10.1)	(9.0)	(13.8)	(100)
Pine	39,146	71,173	926,769	596,356	407,892	324,776	2,366,112
	(1.7)	(3.0)	(39.2)	(25.2)	(17.2)	(13.7)	(100)
Spruce/Fir	0	22,281	4,690,370	420,797	130,384	197,478	5,461,310
	(0.0)	(0.4)	(85.9)	(7.7)	(2.4)	(3.6)	(100)

Table 14-06. Forest composition, in acres (percentage of column) within Canadian provinces (with inventory year) in BCR 14. Acreage of forest types contained within provinces, 1979 to 1985 inventories.

Forest type	New Brunswick (1979)	Nova Scotia (1985)	Price Edward Island (1980)	Quebec (1980)	Total
Aspen/Birch	876,600	536,500	131,393		1,544,493
	(56.8)	(34.7)	(8.5)		(100)
Conifer	5,576,100	4,341,900	272,704	3,832,700	14,023,404
	(39.8)	(31)	(1.9)	(27.3%)	(100)
Deciduous	2,194,300	2,817,500	293,547	1,665,100	6,970,447
	(31.5)	(40.4)	(4.2)	(23.9%)	(100)
Oak		89,600			89,600
		(100)			(100)
Oak/Pine	0	0	0	0	0
		901,000			901,000
		(100)			(100)
Maple/Beech	1,317,700	2,281,000	162,154		3,760,854
	(35.1)	(60.6)	(4.3)		(100)
Mixed	6,912,200	2,447,700		2,978,100	12,338,000
	(56)	(19.9)		(24.1%)	(100)
Spruce/Fir	5,576,100	3,440,900	272,704		9,289,704
	(60)	(37)	(3)		(100)
Total					48,917,502

Table 14-07. Forest composition, in acres (percentage of column) within Canadian provinces (with inventory year) in BCR 14. Acreage of forest types contained within provinces, 1997 to 2000 inventories.

Forest type	New Brunswick (1998)	Nova Scotia (1998)	Prince Edward Island (2000)	Quebec (1997)	Total
Aspen/Birch	1,605,000	236,200	161,300		2,002,500
	(80.1)	(11.8)	(8.1)		(100)
Conifer	6,222,700	5,675,800	264,600	3,834,100	15,997,200
	(38.9)	(35.5)	(1.6)	(24)	(100)
Deciduous	5,153,600	1,327,700	336,600	1,530,000	8,347,900
	(61.7)	(15.9)	(4.0)	(18.3)	(99.9)
Maple/Beech	3,548,600	1,036,700	175,300		4,760,600
	(74.5)	(21.8)	(3.7)		(100)
Mixed	3,728,000	2,568,000		3,411,300	9,707,300
	(38.4)	(26.5)		(35.1)	(100)
Oak		39,400			39,400
		(100)			(100)
Oak/Pine		15,400			15,400
		(100)			(100)
Pine		1,135,200			1,135,200
		(100)			(100)
Spruce/Fir	6,222,700	4,540,600	264,600		11,027,900
	(56.4)	(41.2)	(2.4)		(100)
Total					53,033,400

Table 14-08A. Current stand-size class composition, in acres, of the most common forest types found in states within BCR 14. Large-diameter trees are hardwoods that measure at least 11 inches diameter, 9 inches for softwoods; size class has more than 50 percent of stocking in medium- and large-diameter trees, with stocking of large trees equal to or greater than medium-diameter trees. Medium-diameter trees are trees that measure at least 5 inches diameter but are not as large as large-diameter trees; size class has more than 50 percent stocking in medium- and large-diameter trees, with stocking of large-diameter trees less than stocking of medium-diameter trees. Small-diameter trees are trees that measure less than 5 inches diameter; size class has at least 50 percent of the stocking in small-diameter trees.

	Forest type														
Stand-size class	Jack pine	Red pine	Eastern white pine	White pine/Hemlock	Eastern hemlock	Balsam fir	White spruce	Red spruce	Red spruce/Balsam fir	Black spruce	Tamarack	Northern white cedar	Pitch pine	Scotch pine	Other exotic softwoods
Connecticut															
Large diameter	0	0	0	0	39,611	0	0	0	0	0	0	0	0	0	0
Medium diameter	0	0	4,488	0	0	0	0	0	0	0	0	0	0	0	0
Small diameter	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Maine															
Large diameter	0	13,413	299,404	126,659	191,726	344,622	41,196	597,808	278,246	17,514	9,100	562,728	0	0	0
Medium diameter	5,803	7,392	121,187	28,194	53,858	491,645	56,321	330,587	190,947	214,110	34,427	345,797	0	0	6,155
Small diameter	0	17,779	13,116	4,596	6,717	1,150,948	83,136	178,737	511,530	203,022	15,320	59,268	0	0	11,428
Massachusetts															
Large diameter	0	0	10,367	20,731	86,024	0	0	22,281	0	0	0	0	0	0	0
Medium diameter	0	0	0	0	20,731	0	0	0	0	0	0	0	0	0	0
Small diameter	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
New Hampshire															
LaZge diameter	0	4,660	254,146	63,374	213,250	26,886	0	33,713	57,612	0	0	0	0	0	0
Medium diameter	0	0	0	0	0	78,322	0	72,861	67,649	0	0	0	14,576	0	0
Small diameter	0	0	0	0	3,739	76,074	0	0	7,682	0	0	0	0	0	0
New York															
Large diameter	0	49,064	103,096	39,772	120,268	10,649	0	0	0	0	0	13,663	0	3,763	22,673
Medium diameter	0	0	21,366	0	0	18,894	0	26,522	0	0	0	12,572	0	15,053	0
Small diameter	0	0	0	0	0	29,131	0	0	15,468	14,921	0	0	0	0	0
Vermont															
Large diameter	0	9,872	97,302	77,720	242,888	48,665	0	18,378	35,958	0	0	23,200	0	0	0
Medium diameter	0	0	16,130	0	9,914	82,383	0	0	7,443	0	0	0	0	0	21,047
Small diameter	0	0	0	0	0	4,651	0	0	0	0	0	0	0	0	0
Total															
Large diameter	0	77,009	764,315	328,256	893,767	430,822	41,196	672,180	371,816	17,514	9,100	599,591	0	3,763	22,673
Medium diameter	5,803	7,392	163,171	28,194	84,503	671,244	56,321	429,970	266,039	214,110	34,427	358,369	14,576	15,053	27,202
Small diameter	0	17,779	13,116	4,596	10,456	1,260,804	83,136	178,737	534,680	217,943	15,320	59,268	0	0	11,428
Forest type total	5,803	102,180	940,602	361,046	988,726	2,362,870	180,653	1,280,887	1,172,535	449,567	58,847	1,017,228	14,576	18,816	61,303

Table 14-08B. Current stand-size class composition, in acres, of the most common forest types found in states within BCR 14. Large-diameter trees are hardwoods that measure at least 11 inches diameter, 9 inches for softwoods; size class has more than 50 percent of stocking in medium- and large-diameter trees, with stocking of large trees equal to or greater than medium-diameter trees. Medium-diameter trees are trees that measure at least 5 inches diameter but are not as large as large-diameter trees; size class has more than 50 percent stocking in medium- and large-diameter trees, with stocking of large-diameter trees less than stocking of medium-diameter trees. Small-diameter trees are trees that measure less than 5 inches diameter; size class has at least 50 percent of the stocking in small- diameter trees.

	Forest type															
Stand-size class	White pine/Red oak/ White ash	Eastern red cedar/ Hardwood	Other Pine/Hardwood	White oak/Red oak/ Hickory	Northern red oak	Bur oak	Chestnut oak/ Black oak/Scarlet oak	Red maple/Oak	Mixed upland hardwoods	Sweetbay/Swamp tupelo/Red maple	Black ash/American elm/Red maple	River birch/Sycamore	Cottonwood	Willow	Sycamore/Pecan/ American elm	Sugarberry/Hackberry/ Elm/Green ash
Connecticut																
Large diameter	20,341	0	0	93,627	19,806	0	0	0	9,903	0	0	0	0	0	0	0
Medium diameter	0	0	0	56,396	19,806	0	0	0	0	0	0	0	0	0	0	0
Small diameter	14,316	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Maine																
Large diameter	124,500	0	5,964	19,501	50,223	0	0	0	0	0	11,907	0	0	0	0	0
Medium diameter	115,748	0	8,507	45,083	76,799	0	0	13,401	1,251	17,266	64,452	0	1,317	0	4,303	9,923
Small diameter	32,986	0	1,520	7,648	9,349	0	0	5,623	16,799	0	41,400	16,892	6,081	17,152	4,997	2,024
Massachusetts																
Large diameter	37,829	0	0	22,281	91,207	0	20,731	0	0	0	0	0	0	0	0	0
Medium diameter	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Small diameter	2,246	0	0	5,183	0	0	0	0	0	0	0	0	0	0	0	0
New Hampshire																
Large diameter	194,939	0	0	99,194	84,619	0	0	0	0	0	0	0	0	0	0	0
Medium diameter	50,085	0	0	40,412	60,284	0	0	0	0	11,217	0	0	0	0	0	0
Small diameter	14,576	0	0	14,195	0	0	0	0	3,393	0	0	0	0	0	12,505	0
New York						6,565										
Large diameter	73,801	10,247	0	3,416	0	0	0	0	15,053	0	0	0	0	0	9,861	0
Medium diameter	44,387	0	0	13,816	27,326	0	0	14,921	15,116	0	14,921	0	0	0	0	11,290
Small diameter	14,921	0	0	0	0	0	0	0	15,116	0	0	0	0	0	15,116	0
Vermont																
Large diameter	108,563	0	0	16,130	14,809	0	18,034	0	0	4,937	0	0	0	0	0	0
Medium diameter	15,188	0	0	0	0	0	0	0	0	0	0	0	0	0	0	22,034
Small diameter	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9,303	0
Total						6,565										
Large diameter	559,973	10,247	5,964	254,149	260,664	0	38,765	0	24,956	4,937	11,907	0	0	0	9,861	0
Medium diameter	225,408	0	8,507	155,707	184,215	0	0	28,322	16,367	28,483	79,373	0	1,317	0	4,303	43,247
Small diameter	79,045	0	1,520	27,026	9,349	0	0	5,623	35,308	0	41,400	16,892	6,081	17,152	41,921	2,024
Forest type total	864,426	10,247	15,991	436,882	454,228	6,565	38,765	33,945	76,631	33,420	132,680	16,892	7,398	17,152	56,085	45,271

Table 14-08C. Current stand-size class composition, in acres, of the most common forest types found in states within BCR 14. Large-diameter trees are hardwoods that measure at least 11 inches diameter, 9 inches for softwoods; size class has more than 50 percent of stocking in medium- and large-diameter trees, with stocking of large trees equal to or greater than medium-diameter trees. Medium-diameter trees are trees that measure at least 5 inches diameter but are not as large as large-diameter trees; size class has more than 50 percent stocking in medium- and large-diameter trees, with stocking of large-diameter trees less than stocking of medium-diameter trees. Small-diameter trees are trees that measure less than 5 inches diameter; size class has at least 50 percent of the stocking in small-diameter trees.

	Forest type													
Stand-size class	Silver maple/American elm	Red maple/Lowland	Sugar maple/Beech/ Yellow birch	Black cherry	Cherry/Ash/Yellow poplar	Hard maple/Basswood	Elm/Ash/Locust	Red maple/Upland	Aspen	Paper birch	Balsam poplar	Other	Nonstocked	Total
Connecticut												4,951	4,951	
Large diameter	0	19,806	102,486	0	0	4,951	0	0	0	0	0	0	0	310,531
Medium diameter	0	0	0	0	0	0	0	0	0	0	0	0	0	80,690
Small diameter	0	0	0	0	0	0	0	0	0	0	0	0	0	14,316
Maine													46,767	46,767
Large diameter	0	10,970	2,443,798	1,774	19,455	0	0	89,298	104,280	119,144	8,979	0		5,492,209
Medium diameter	4,633	71,641	2,590,030	0	70,685	0	0	270,428	370,328	530,123	34,958	1,515		6,188,814
Small diameter	11,654	35,287	1,193,222	4,017	58,997	15,499	3,121	139,387	456,679	587,809	49,979	0		4,973,719
Massachusetts														
Large diameter	0	0	239,035	8,931	59,827	0	0	0	0	0	0	0	0	619,244
Medium diameter	0	0	66,843	0	0	0	0	22,281	0	0	0	0	0	109,855
Small diameter	0	0	0	0	11,800	0	0	0	0	0	0	0	0	19,229
New Hampshire													13,198	13,198
Large diameter	16,768	0	1,153,665	0	29,614	14,620	0	58,020	5,491	46,752	0	0	0	2,357,323
Medium diameter	0	18,220	786,632	0	21,178	0	0	103,986	0	84,581	0	0	0	1,410,003
Small diameter	0	0	126,877	15,363	0	0	0	18,461	32,098	69,615	13,578	0	0	408,156
New York													6,205	12,770
Large diameter	0	0	755,764	0	13,663	65,142	3,416	141,086	35,415	0	0	0	0	1,489,812
Medium diameter	0	15,919	514,945	0	18,870	0	0	135,686	29,974	29,131	0	0	0	980,709
Small diameter	0	0	136,868	45,178	26,028	0	0	11,190	13,137	18,529	0	0	0	355,603
Vermont													0	0
Large diameter	0	0	1,427,045	0	0	48,341	4,033	113,702	34,447	47,566	0	987	0	2,392,577
Medium diameter	0	0	723,004	0	4,033	14,871	0	196,845	38,542	62,811	0	0	0	1,214,245
Small diameter	0	0	190,314	0	24,857	0	0	0	40,467	71,492	0	0	0	341,084
Total													71,121	77,686
Large diameter	16,768	30,776	6,121,793	10,705	122,559	133,054	7,449	402,106	179,633	213,462	8,979	987	0	12,661,696
Medium diameter	4,633	105,780	4,681,454	0	114,766	14,871	0	729,226	438,844	706,646	34,958	1,515		9,984,316
Small diameter	11,654	35,287	1,647,281	64,558	121,682	15,499	3,121	169,038	542,381	747,445	63,557	0	0	6,112,107
Forest type total	33,055	171,843	12,450,528	75,263	359,007	163,424	10,570	1,300,370	1,160,858	1,667,553	107,494	2,502	71,121	28,835,805

Table 14-09. Current stand-size class composition, in acres, of the most common forest types found in Canadian provinces within BCR 14. Large- and medium-diameter size-class includes all pole- and sawtimber-sized stands, where trees measure more than 5 inches diameter at breast height. Small-diameter size-class includes all seedling/sapling stands, where trees measure less than 5 inches diamter at breast height.

Stand-size class	Pine	Spruce/Fir	Conifer	Oak/Pine	Oak	Maple/Beech	Aspen/Birch	Deciduous	Mixed	Total
New Brunswick										
Large-medium diameter		5,222,000				2,852,500	1,141,000		3,078,600	12,294,100
Small diameter		1,000,700				696,100	464,000		649,400	2,810,200
Nova Scotia										
Large-medium diameter	1,008,500	4,033,900		14,500	38,300	1,007,300	229,500		2,423,200	8,755,200
Small diameter	126,700	506,700		900	1,100	29,400	6,700		144,800	816,300
Prince Edward Isle										
Large-Medium diameter		221,700				153,500	103,500			478,700
Small diameter		42,900				21,800	57,800			122,500
Quebec										
Large-Medium diameter			3,331,800					1,284,600	2,694,000	7,310,400
Small diameter			502,300					245,400	717,300	1,465,000
Total										
Large-medium diameter	1,008,500	9,477,600	3,331,800	14,500	38,300	4,013,300	1,474,000	1,284,600	8,195,800	28,838,400
Small diameter	126,700	1,550,300	502,300	900	1,100	747,300	528,500	245,400	1,511,500	5,214,000

Table 14-10A. Compilation of historical and current habitat (in acres) for woodcock in BCR 14. Historical time period refers to 1968 to 1973 for the United States and 1979 to 1985 for Canada.

Land area	Historical	Current
U.S. locations		
Connecticut	604,525	604,525
Maine	21,832,518	21,832,518
Massachusetts	1,069,446	1,069,446
New Hampshire	5,230,125	5,230,125
New York	6,540,326	6,540,326
Vermont	5,114,656	5,114,656
Canadian locations		
New Brunswick	17,897,795	17,897,795
Nova Scotia	14,157,199	14,157,199
Prince Edward Island	1,489,246	1,489,246
Quebec	17,364,567	17,364,567
Total	91,300,404	91,300,404
Manageable acres		
U.S. locations		
Connecticut	399,100	410,488
Maine	16,395,400	16,701,511
Massachusetts	757,800	748,328
New Hampshire	4,194,700	4,188,680
New York	3,356,100	3,240,178
Vermont	3,948,400	4,143,397
Canadian locations		
New Brunswick	14,684,600	15,104,300
Nova Scotia	9,696,700	9,571,500
Prince Edward Island	666,100	601,200
Quebec	8,475,900	8,775,400
Total	62,574,800	63,484,982

Table 14-10B. Calculation of singing males and of singing-male deficit for woodcock in BCR 14. Historical time period refers to 1968 to 1973 for the United States and 1979 to 1985 for Canada. The population deficit is not simply the current population of singing males minus the historical level; it considers the density of singing males on manageable acres for each time period.

Population of singing males	Historical	Current
U.S. locations		
Connecticut	2,349	896
Maine	168,170	108,952
Massachusetts	4,445	2,393
New Hampshire	29,505	21,970
New York	43,741	28,230
Vermont	27,906	20,582
Canadian locations		
New Brunswick	181,679	142,681
Nova Scotia	67,372	52,373
Prince Edward Island	10,973	6,799
Quebec	101,344	99,329
Total	637,484	484,205
Population deficit of singing males		
U.S. locations		
Connecticut		1,520
Maine		62,358
Massachusetts		1,996
New Hampshire		7,493
New York		14,000
Vermont		8,702
Canadian locations		
New Brunswick		44,191
Nova Scotia		14,129
Prince Edward Island		3,105
Quebec		5,596
Total		163,090

Table 14-10C. Calculation of habitat goal (in acres), which is calculated as the population deficit multiplied by acreage estimate based on the numbers of singing males heard in each state bird conservation region in the 1970s and the amount of early successional habitat at that time. Multipliers ranged from 31 (Maine) to 45 (Vermont) in the United States and from 11 (Prince Edward Isle) to 14 (Quebec) in Canada.

	Habitat goal
U.S. location	
Connecticut	55,527
Maine	1,912,514
Massachusetts	74,827
New Hampshire	268,986
New York	481,465
Vermont	394,122
Canadian location	
New Brunswick	525,426
Nova Scotia	179,157
Prince Edward Island	35,116
Quebec	78,904
Total	4,006,044

Table 14-11. Current land area, in acres, and estimated number of singing male woodcock found in states and provinces in BCR 14.

	Total land area[1]	Number of singing males		Loss	
		1970	Current	Singing males	Percent
State					
Connecticut	604,525	1,417	541	-876	62
Maine	21,832,518	101,457	65,730	-35,727	35
Massachusetts	1,069,446	2,681	1,444	-1,238	46
New Hampshire	5,230,125	17,800	13,255	-4,546	26
New York	6,540,326	26,389	17,031	-9,358	35
Vermont	5,114,656	16,836	12,417	-4,419	26
Subtotal	40,391,597	166,580	110,417	-56,164	34
Province					
New Brunswick	17,897,795	109,606	86,079	-23,527	21
Nova Scotia	14,157,199	40,645	31,596	-9,049	22
Prince Edward Island	1,489,246	6,620	4,102	-2,518	38
Quebec	17,364,567	61,141	59,925	-1,216	2
Subtotal	50,908,807	218,012	181,702	-36,310	17
Total	91,300,404	384,592	292,119	-92,474	24

[1] Area given in acres.

Table 14-12. Current forest area, in acres (percentage of total column) of forest types by states in BCR 14.

Forest type	Total	Connecticut	Maine	Massachusetts	New Hampshire	New York	Vermont
Aspen	1,185,882 (4.1)	0	931,287	0	37,589	103,551	113,456
Balsam fir	2,377,669 (8.1)	0	1,987,215	0	181,281	73,473	135,700
Balsam poplar	122,292 (0.4)	0	93,916	0	13,578	14,798	0
Black ash/American elm/ Red maple	132,680 (0.5)	0	117,759	0	0	14,921	0
Black cherry	75,263 (0.3)	0	5,791	8,931	15,363	45,178	0
Black spruce	449,567 (1.5)	0	434,646	0	0	14,921	0
Bur oak	6,565 (0.02)	0	0	0	0	6,565	0
Cherry/Ash/ Yellow poplar	381,203 (1.3)	0	149,137	71,627	50,791	80,758	28,889
Chestnut oak/Black oak/Scarlet oak	38,765 (0.1)	0	0	20,731	0	0	18,034
Cottonwood	7,398 (0.02)	0	7,398	0	0	0	0
Eastern hemlock	988,727 (3.4)	39,611	252,302	106,755	216,989	120,268	252,802
Eastern red cedar/ Hardwood	10,247 (0.04)	0	0	0	0	10,247	0
Eastern white pine	968,473 (3.3)	4,488	433,708	10,367	254,146	152,331	113,432
Elm/Ash/Locust	17,969 (0.06)	0	3,121	0	0	10,816	4,033
Hard maple/Basswood	178,223 (0.6)	4,951	15,499	0	14,620	79,940	63,211
Jack pine	5,803 (0.02)	0	5,803	0	0	0	0
Mixed upland hardwoods	80,331 (0.3)	9,903	18,050	0	3,393	48,985	0
Nonstocked	71,121 (0.2)	4,951	46,767	0	13,198	6,205	0
Northern red oak	454,228 (1.6)	39,611	136,371	91,207	144,903	27,326	14,809
Northern white cedar	1,032,026 (3.5)	0	967,793	0	0	41,033	23,200
Other	2,503 (.0.01)	0	1,515	0	0	0	987
Other exotic softwoods	61,303 (0.2)	0	17,583	0	0	22,673	21,047
Other pine/Hardwood	15,991 (0.05)	0	15,991	0	0	0	0
Paper birch	1,682,350 (5.8)	0	1,237,076	0	200,947	62,458	181,869
Pitch pine	14,576 (0.05)	0	0	0	14,576	0	0
Red maple/Lowland	171,844 (0.6)	19,806	117,898	0	18,220	15,919	0
Red maple/Oak	33,945 (0.1)	0	19,024	0	0	14,921	0
Red maple/Upland	1,329,966 (4.5)	0	499,112	22,281	180,467	317,559	310,547
Red pine	102,180 (0.35)	0	38,584	0	4,660	49,064	9,872
Red spruce	1,280,886 (4.4)	0	1,107,133	22,281	106,573	26,522	18,378
Red spruce/Balsam fir	1,172,535 (4.0)	0	980,723	0	132,943	15,468	43,400
River birch/Sycamore	16,892 (0.06)	0	16,892	0	0	0	0
Scotch pine	18,817 (0.06)	0	0	0	0	18,817	0
Silver maple/ American elm	33,054 (0.1)	0	16,286	0	16,768	0	0
Sugar maple/Beech/ Yellow birch	12,647,233 (43.3)	102,486	6,227,050	305,877	2,067,174	1,604,282	2,340,364
Sugarberry/Hackberry Elm/Green ash	45,270 (0.2)	0	11,946	0	0	11,290	22,034
Sweetbay/Swamp tupelo/Red maple	33,421 (0.1)	0	17,266	0	11,217	0	4,937
Sycamore/Pecan/ American elm	56,085 (0.2)	0	9,299	0	12,505	24,977	9,303
Tamarack	58,848 (0.2)	0	58,848	0	0	0	0
White oak/Red oak/ Hickory	436,882 (1.5)	150,023	72,232	27,464	153,801	17,232	16,130
White pine/Hemlock	361,046 (1.2)	0	159,449	20,731	63,374	39,772	77,720
White pine/Red oak/ White ash	879,226 (3.0)	34,658	273,234	40,075	259,600	147,908	123,752
White spruce	180,653 (0.6)	0	180,653	0	0	0	0
Willow	17,152 (0.06)	0	17,152	0	0	0	0
Total	29,237,090	410,488	16,701,511	748,328	4,188,680	3,240,178	3,947,905

Table 14-13A. Physiographic class composition, in acres, of the most common forest types found in states within BCR 14.

	Forest type																	
Physiographic class	Jack pine	Red pine	Eastern white pine	White pine/Hemlock	Eastern hemlock	Balsam fir	White spruce	Red spruce	Red spruce/Balsam fir	Black spruce	Tamarack	Northern white cedar	Pitch pine	Scotch pine	Other exotic softwoods	White pine/Red oak/White ash	Eastern red cedar/Hardwood	Other pine/Hardwood
Bays and wet pocosins	0	0	0	0	0	0	0	11,433	0	19,903	5,623	33,608	0	0	0	0	0	0
Beaver ponds	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Broad floodplains/ Bottomland	0	0	0	0	0	4,651	0	0	0	5,986	0	18,605	0	0	0	5,071	0	0
Deep sands	0	0	4,428	0	0	0	0	0	0	0	0	0	0	0	0	13,663	0	0
Dry slopes	0	0	0	6,759	0	4,561	0	11,584	0	0	0	0	0	0	0	0	0	0
Dry tops	0	0	0	0	0	0	0	8,433	0	0	0	0	0	0	0	0	0	0
Flatwoods	5,803	61,702	276,387	71,476	80,073	1,327,727	90,223	570,578	630,512	266,835	39,827	542,419	14,576	0	13,195	184,420	10,247	209
Moist slopes and coves	0	5,986	21,561	13,084	169,174	43,903	10,255	68,084	31,827	0	0	27,728	0	0	0	58,844	0	0
Narrow floodplains/ Bottomland	0	0	20,181	0	0	38,366	5,971	6,097	5,630	5,986	0	36,028	0	0	0	6,922	0	0
Other hydric	0	0	0	0	0	12,203	0	0	0	14,624	0	31,925	0	0	0	5,623	0	0
Other mesic	0	0	0	5,783	27,402	36,994	0	22,621	17,334	5,986	0	23,260	0	0	0	10,758	0	0
Other xeric	0	0	0	0	0	0	0	12,404	0	0	0	0	0	0	0	0	0	0
Rolling uplands	0	34,492	632,253	263,943	679,717	813,694	72,709	549,012	470,237	25,581	880	156,295	0	18,817	48,108	592,398	0	15,782
Swamps/bogs	0	0	13,663	0	11,290	69,574	1,496	16,423	16,994	104,666	7,863	129,408	0	0	0	1,527	0	0
Small drains	0	0	0	0	21,073	25,996	0	4,218	0	0	4,654	32,749	0	0	0	0	0	0
Total	5,803	102,180	968,473	361,046	988,727	2,377,669	180,653	1,280,886	1,172,535	449,567	58,848	1,032,026	14,576	18,817	61,303	879,226	10,247	15,991

Table 14-13B . Physiographic class composition, in acres, of the most common forest types found in states within BCR 14.

Physiographic class	Forest types																
	White oak/Red oak/Hickory	Northern red oak	Bur oak	Chestnut oak/Black oak/Scarlet oak	Red maple/Oak	Mixed upland hardwoods	Sweetbay/Swamp tupelo/Red maple	Black ash/American elm/Red maple	River birch/Sycamore	Cottonwood	Willow	Sycamore/Pecan/American elm	Sugarberry/Hackberry/Elm/Green ash	Silver maple/American elm	Red maple/Lowland	Sugar maple/Beech/Yellow birch	Black cherry
Bays and wet pocosins	0	0	0	0	0	0	0	5,872	0	0	0	0	0	0	0	0	0
Beaver ponds	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3,644	0	0
Broad floodplains/ Bottomland	0	0	0	0	0	0	6,413	12,034	0	0	0	9,303	4,774	0	1,446	0	0
Deep sands	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dry slopes	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	137,447	0
Dry tops	0	14620	0	0	0	0	0	0	0	0	0	0	0	0	0	5,986	0
Flatwoods	42,780	31,721	6,565	0	20,544	8,651	0	13,455	2,210	0	10,052	0	0	5,442	626	1,845,437	17,524
Moist slopes and coves	12,743	22,281	0	0	0	4,951	0	0	0	0	0	0	0	0	0	837,291	8,931
Narrow floodplains/ Bottomland	0	10,771	0	0	0	5,529	11,841	5,717	0	0	0	27,363	29,205	16,768	20,606	16,974	2,503
Other hydric	0	0	0	0	0	0	0	8,865	0	0	0	15,116	0	0	11,495	0	0
Other mesic	19,806	24,107	0	0	0	0	0	0	0	0	0	0	0	0	0	144,633	0
Other xeric	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11,159	0
Rolling uplands	361,554	349,571	0	38,765	13,401	46,083	0	5,360	9,239	7,398	7,100	0	11,290	0	804	9,613,635	46,305
Small drains	0	1,157	0	0	0	15,116	0	20,476	0	0	0	4,303	0	0	33,372	15,026	0
Swamps/Bogs	0	0	0	0	0	0	15,166	60,900	5,442	0	0	0	0	10,844	99,851	19,644	0
Total	436,882	454,228	6,565	38,765	33,945	80,331	33,421	132,680	16,892	7,398	17,152	56,085	45,270	33,054	171,844	12,647,233	75,263

Table 14-13C. Physiographic class composition, in acres, of the most common forest types found in states within BCR 14.

	Forest types									
Physiographic class	Cherry/Ash/Yellow poplar	Hard maple/Basswood	Elm/Ash/Locust	Red maple/Upland	Aspen	Paper birch	Balsam poplar	Other	Nonstocked	Total
Bays and wet pocosins	0	0	0	0	0	1,468	0	0	0	77,907
Beaver ponds	0	0	0	0	0	3,779	0	0	1,468	8,891
Broad floodplains/ Bottomland	14,576	0	0	0	20,026	5,270	0	0	0	108,155
Deep sands	0	0	0	0	0	0	0	0	0	18,091
Dry tops	0	0	0	0	0	18,553	0	0	0	47,592
Dry slopes	0	0	0	0	0	17,792	5,630	0	0	183,773
Flatwoods	99,646	16,295	5,333	354,279	412,775	517,824	58,604	1,515	24,205	7,681,692
Moist slopes and coves	4,353	14,620	0	50,341	42,574	77,587	5,986	0	0	1,532,104
Narrow floodplains/ Bottomland	0	15,116	0	303	46,071	13,404	2,993	0	0	350,345
Other hydric	0	0	0	4,404	4,465	0	0	0	0	108,720
Other mesic	49,070	0	0	6,121	6,940	25,756	0	0	4,951	431,522
Other xeric	0	0	0	0	0	0	0	0	0	23,563
Rolling uplands	213,558	132,192	12,637	913,428	635,584	973,846	43,092	987	23,032	17,832,779
Small drains	0	0	0	1,088	5,954	6,217	5,986	0	7,288	204,673
Swamps/Bogs	0	0	0	0	11,493	20,856	0	0	10,177	627,277
Total	381,203	178,223	17,969	1,329,966	1,185,882	1,682,350	122,292	2,503	71,121	29,237,084

Bird Conservation Region 21: Oaks and Prairies

David Haukos
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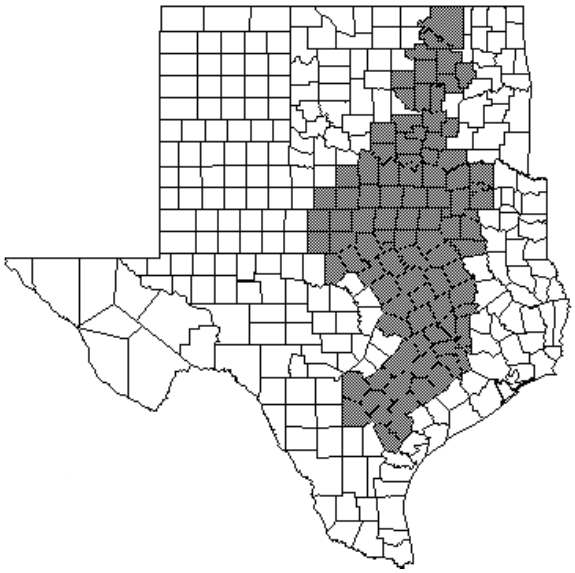


Affected States: Texas and Oklahoma
Current Area of Forestland: 2,817,788 acres (1,140,330 ha) (678,075 acres [274,410 ha] of small-diameter and nonstocked forest)
Woodcock Trend Estimate: not applicable
Percent of Change per Year: not applicable
Woodcock Population Estimate: not applicable
Singing Males Only: not applicable

Physiography and Habitat Description

Historical forest inventory data for Oklahoma is lacking, preventing estimation of habitat trends for the state. Early successional habitat occupies approximately 24 percent of the timberland in this bird conservation region (Table 21-01). Texas has experienced a significant loss of early succession forest. Major forest types include post oak/blackjack oak (21 percent), white oak/red oak/hickory (18 percent) and loblolly pine (14 percent, Tables 21-02–21-04). Approximately 97 percent of the 2.8 million acres (1.13 million ha) of timberland in the region is under private ownership (Table 21-05).

Population Status

Woodcock occur over a wide area of the eastern portions of Texas and Oklahoma. The species has been reported in Christmas bird counts (CBC) and in breeding bird surveys in each state. The CBC has recorded winter sightings of woodcock throughout Oklahoma with the exception of the panhandle and the northwest portion. In Texas, woodcock have been reported throughout the eastern two-thirds of the state with only the Panhandle, South Plains, Rolling Plains and Trans-Pecos regions not having woodcock recorded during the CBC. The bulk of the woodcock population in BCR 21 is east of Interstate 35. Wintering birds are primarily found south of Interstate 20.

The highest densities of woodcock are in extreme eastern Oklahoma and Texas (in BCR 25), but woodcock are commonly encountered in adjacent areas of BCR 21. Indeed, the highest densities found in Texas are comparable to those reported in Louisiana where a woodcock is considered a major game bird. Public locations in Texas that have reported woodcock sightings include: Hagerman and Attwater Prairie-Chicken national wildlife refuges (NWRs), Upper White Rock Creek of Dallas, Lake Tawakoni, Palmetto State Park, Big Thicket National Preserve, Tyrrell Park, in Beaumont, Memorial Park in Houston, Spring Creek Park of Harris County, Brazos Bend

State Park, W.W. McAllister Park in San Antonio, and many national forests. However, managers of Little River and Trinity River NWRs, in eastern Texas, reported that woodcock are rarely seen on their refuges.

Woodcock have been seen in Oklahoma during all seasons, but they are transient in most years. Most woodcock are found in southeastern and east-central Oklahoma. The east-central area is drained by the Arkansas River, and the southeast area contains rivers originating in the Ouachita Mountains. Wintering birds can be found in extreme southern Oklahoma.

During the early to mid-1970s, there was an increase in woodcock in Oklahoma due to early successional woody growth occurring on previously cleared but abandoned farmland and pasture, a decrease in wildfire, the increased availability of unused land purchased for speculative purposes, and the idle land left following reservoir construction. In fact, birds were found as far west as Salt Plains NWR during this period. In 1970, woodcock were found breeding in the ecology preserve of Oklahoma State University, in Payne County.

Harvest

Harvest in eastern Texas from 1977 to 2003 was comprised of 26.6 percent adult males, 37.5 percent adult females, 17.2 percent juvenile males and 18.6 percent juvenile females. Hunters pursuing woodcock in eastern Texas generally are successful, with frequent occurrences of harvesting a bag limit. Woodcock hunters in Texas commonly achieve harvest success similar to or greater than the average daily and seasonal bag per hunter, 1.4 and 9.6, respectively, in the central management units. Current reports by hunters indicate that most woodcock harvested in eastern Texas were found in recently burned, 60- to 70-year-old stands of pines with a grass understory, containing mixed hardwoods on a sandy soil.

However, woodcock harvests in Oklahoma and Texas are likely underreported. Indeed, only 172 and 990 woodcock wings were received from hunters in Oklahoma and Texas, respectively, from hunting seasons between 1963 and 2005.

It was estimated that during 1975 to 1976, between 2,000 and 3,000 woodcock were harvested in Oklahoma. However, recent estimates of harvest in Texas and Oklahoma vary depending on the source. During 1990 in Oklahoma, the state survey estimated 7,200 birds harvested by 2,100 hunters. Whereas, the annual questionnaire of the U.S. Forest Service resulted in an estimated harvest of 1,100 birds by 500 hunters. Similarly in Texas during 1990, the state survey estimated that 2,400 hunters harvested 7,700 birds, and the U.S. Forest Service reported a harvest of 4,000 by 1,300 hunters.

Habitat Ecology

Woodcock winter habitat requirements can be broken down into three components—nocturnal, diurnal and courtship (from mid-December until migration)—with all three components required before an area will be used to any extent. Additionally, three layers of each habitat type—the ground surface, the understory and the overstory—must be evaluated and, if possible, managed. A commonly repeated theme is that the structure of habitat is more important than species composition. In the south, measured home ranges for woodcock are reported to be 50 acres (20 ha) for adult males, 27.7 acres (11.2 ha) for adult females, 26.4 acres (10.7 ha) for juvenile females and 41.8 acres (16.9 ha) for juvenile males.

In general, woodcock are associated with moist areas of regrowth or with relatively younger stands of habitat (i.e., early successional) within forests. Birds are usually

found in mature forests only if a dense understory is present. Habitat for courtship flights is generally forest openings or fields adjacent to forests, but woodcock displaying in Texas will also use U.S. Forest Service roads. There are interactions between cover types, earthworms (primary forage) and the presence of woodcock. Those species commonly associated with woodcock habitat (e.g., alder, hawthorn, birch, ash) typically have leaves with a high nitrogen and sugar contents, which illustrate the preferred areas for earthworms eaten by woodcock. Additionally, alder have nitrogen-fixing soil bacteria.

Typically, nocturnal habitats are fields or forest openings where birds can feed: clearcuts, abandoned agriculture fields, pastures, existing crop fields, forest regeneration areas and other forest openings. Foraging occurs primarily in nocturnal roosting fields during winter. In winter, nocturnal habitats need to be more than 1.2 miles (2 km) from diurnal areas. It is recommended that nocturnal winter habitat have sparse ground cover, good soil moisture and herbaceous or brushy cover that measures between 1.6 to 3.3 feet (0.5 to 1 m) tall. Burning should be done to remove ground cover, but a light overhead canopy of woody stems must be preserved.

Diurnal habitats are dense, thick understories of early successional species represented by hawthorn, alder, aspen or dogwood stands. Generally, areas dominated by coniferous species are only used during periods of drought. Throughout the South, woodcock diurnal habitat is primarily bottomland and adjacent hardwoods with dense stands (closed canopy) of blackberry/dewberry, green briar, supplejack, hawthorn or water oak thickets. Use of long-leaf pine areas 40 to 50 years old occurs when bottomland floods, especially when prescribed fire has been used to enhance the habitat. In the south, larger trees can be part of the overstory of woodcock habitat compared to habitat used further north. Soils are moist, poorly drained and high in organic matter and earthworms. Prescribed fire is used to reduce ground cover in pineland, with a fall/early winter burn recommended to aid in creating foraging sites.

In east Texas, diurnal habitat for woodcock is mixed pine/hardwoods and young pine regeneration areas. They use pine plantation thickets that are fewer than 10 years old, and they are commonly found and nest in “beetle spots,” which are 1.2- to 3.3-acre (0.5- to 2-ha) areas of the forest either killed by the southern pine beetle or cleared to remove beetles.

In east Texas, woodcock are commonly found in pine plantations with trees measuring 5.9 to 15.4 feet (1.8 to 4.7 m) tall, where foraging cover is sparse at 0 to 0.8 feet (0 to 0.25 m) above ground and where foraging mobility occurs in denser areas at 0.8 to 2.5 feet (0.25 to 0.75 m) above ground for protection from predators. Foraging activity was positively correlated with soil moisture, soil acidity and amount of bare soil. Traditionally, woodcock were found in briar patches that were 3 to 5 years old since clearing. Recently, it appears that woodcock are making more use of pine plantations, especially clearings (measuring 0.1 to 50 acres [0.04 to 20.2 ha]) that are associated with southern pine beetles.

In Oklahoma, there is a strong correlation between woodcock occurrence, bottomland habitats and adjacent grassland. Annual burning and heavy grazing of native pastureland in Oklahoma appears to negatively affect woodcock occurrence. In bottomland, woodcock are found in areas with some clearings that contain saplings of ash, elm, pecan and persimmon intermixed with green briar, broadleaf uniola and bluestem grasses. Plums and roughleaf dogwood thickets will also contain woodcock.

In Oklahoma, rainfall influences habitat use, with the birds moving to the uplands when bottomland floods. When in the uplands, woodcock use ungrazed or lightly grazed habitats. Heavy grazing of wooded areas contributes to habitat deterioration. Courtship display areas in Oklahoma are small openings (measuring less than 2.5 acre [1 ha]) in the forest.

Fall habitat is generally moist-wet alluvial deposits, within 131 feet (40 m) of water and containing an abundance of worms. Diurnal cover in Oklahoma is within 33 feet (10 m) of water with moist-wet soil conditions; it has approximately 25 percent vegetation cover and contains extensive understory and overstory canopy cover. Diurnal cover species associated with breeding woodcock in Oklahoma are eastern redbud (analogous to alder in structure), green briar, broad-leaf uniola and leafy elephant foot. Nonbreeding birds are found in areas with an overstory of American elm, hackberry, eastern cottonwood and willow. And, they are also found in shrubby-short understory that usually includes red mulberry, roughleaf dogwood, sumac and sapling elm.

Habitat Management

Woodcock management in most areas revolves around small clearcuts (measuring 4.9 to 12.4 acres [2 to 5 ha]), which can provide all required habitat types as the stand regenerates and ages. Initially, the clearcut will provide nocturnal roost sites and courtship areas. Then, as the stand ages, it will provide brood-rearing habitat and, finally, diurnal cover. Once the area is no longer used as diurnal cover, the stand is unsuitable for woodcock. It is recommended that every 5 to 10 years areas adjacent to previous cuts be cleared with techniques, such as shelterwood cuts, group selection (even-aged management), clearcut or heavy thinning. Openings for courtship displays have been successfully created by mowing in Oklahoma.

Habitat management activities for nocturnal habitat (roosting fields) should promote earthworms, reduce the use of pesticides, ease woodcock movement on the ground surface, protect woodcock from predators (especially owls), minimize ground cover with an abundance of exposed soil (approximately 50 percent) and produce a canopy of overhead vegetation measuring 1.6 to 3.3 feet (0.5 to 1 m) tall.

Currently, there appears to be limited opportunity for woodcock management on NWRs in the region. However, a considerable amount of woodcock management potential appears to exist on private land, especially paper company forests in eastern Texas. Observations indicate that woodcock respond favorable to red-cockaded woodpecker management. The following are recommendations for management of pine plantations in eastern Texas.

1. When working in upland areas, concentrate on sandy soils with high clay and low gravel content; shear or clearcut the area and windrow debris to prepare sites for woodcock. Hardwood shrubs will grow in windrows, which will provide escape routes when the pines mature.
2. Plant the pines close together in widely spaced rows.
3. Conduct a prescribed burn as soon as possible following planting of pine species, using cool winter burns to reduce ground cover without changing midstory foliage density.
4. Thin the stands early and often.

Table 21-01. Current and historical (1970–1975) stand-size distribution, in acres (precentage of column total) of forestland in BCR 21 and in portions of individual states within the bird conservation region. Historical inventory data was not available for Oklahoma.

Area	Current stand-size distribution					Historical stand-size distribution				
	Total forestland	Large diameter[1,2]	Medium diameter[1,3]	Small diameter[1,4]	Non-stocked[1,5]	Total forestland	Large diameter[1,2]	Medium diameter[1,3]	Small diameter[1,4]	Non-stocked[1,5]
Oklahoma	1,900,934	503,176	821,794	575,964	0					
	(67.5)	(26.5)	(43.2)	(30.3)	(0.0)					
Texas	916,854	519,900	294,843	95,214	6,897	1,373,900	497,300	374,100	479,400	23,100
	(32.5)	(56.7)	(32.2)	(10.4)	(0.8)		(36.2)	(27.2)	(34.9)	(1.7)
Total	2,817,788	1,023,076	1,116,637	671,178	6,897					
	(100.0)	(36.3)	(39.6)	(23.8)	(0.2)					

[1] Percentages for various diameter categories and nonstocked category refer to percent of total forestland for current and historical time periods within each state.
[2] Softwoods are at least 9 inches, and hardwoods are at least 11 inches in diameter at breast height.
[3] Trees are at least 5 inches in diameter at breast height but are smaller than large-diameter trees.
[4] Saplings are 1 to 5 inches diameter at breast height. Softwood seedlings are more than 6 inches tall, and hardwood seedlings are more than 12 inches tall.
[5] Commercial forestland on which stocking of trees is less than 16.7 percent.

Table 21-02. Current composition, in acres and percentage, of major forest types in BCR 21.

Forest type	Acres	Percent of forestland
Eastern red cedar/Hardwood	21,051	0.7
Loblolly pine	398,015	14.1
Loblolly pine/Hardwood	104,933	3.7
Mixed upland hardwoods	29,109	1.0
Oak/Gum/Cypress group	131,934	4.7
Oak/Hickory group	190,031	6.7
Overcup oak/Water hickory	56,773	2.0
Post oak/Blackjack oak	584,280	20.7
River birch/Sycamore	15,983	0.6
Sassafras/Persimmon	11,691	0.4
Shortleaf pine	116,432	4.1
Shortleaf pine/Oak	105,814	3.8
Southern scrub oak	213,741	7.6
Sugarberry/Hackberry/Elm/ Green ash	161,314	5.7
Sweetgum/Nuttall oak/Willow oak	41,363	1.5
Sweetgum/Yellow poplar	16,005	0.6
Sycamore/Pecan/American elm	61,123	2.2
White oak/Red oak/Hickory	509,874	18.1
Willow	13,689	0.5

Table 21-03. Stand-size class composition (in thousands of acres) of the most common forest types found in states within BCR 21.

	Forest type																	
Stand-size class	Post oak/Blackjack oak	White oak/Red oak/Hickory	Loblolly pine	Southern scrub oak	Oak/Hickory group	Sugarberry/Hackberry/Elm/Green ash	Oak/Gum/Cypress group	Shortleaf pine	Shortleaf pine/Oak	Loblolly pine/Hardwood	Sycamore/Pecan/American elm	Overcup oak/Water hickory	Sweetgum/Nuttall oak/Willow oak	Mixed upland hardwoods	Eastern red cedar/Hardwood	Sweetgum/Yellow poplar	River birch/Sycamore	Willow
Oklahoma																		
Large	29.6	75.8	61.7	8.9	59.7	55.0	100.6	35.3	35.3	3.8	24.5	4.7	3.8	0.0	0.0	0.0	0.0	3.1
Medium	77.1	252.3	192.9	113.1	40.0	17.8	7.7	44.5	22.2	5.6	19.3	7.5	0.0	7.8	0.0	0.0	0.0	6.6
Small	36.8	156.0	52.0	91.8	90.3	12.0	23.7	16.7	16.7	50.0	5.1	5.6	0.0	0.0	8.9	0.0	0.0	0.0
Texas																		
Large	154.0	22.6	41.4	0.0	0.0	11.3	0.0	0.0	18.2	10.5	12.6	20.4	48.0	98.2	13.3	9.3	5.3	0.0
Medium	147.1	0.0	26.5	0.0	0.0	19.7	0.0	0.0	0.0	5.3	5.3	0.0	27.0	25.4	6.9	0.0	4.0	0.0
Small	8.7	2.0	7.0	0.0	0.0	3.5	0.0	0.0	0.0	0.0	0.0	0.0	4.0	40.3	5.3	8.2	0.0	0.0
Total																		
Large	183.7	98.4	103.2	8.9	59.7	66.3	100.6	35.3	53.4	14.4	37.2	25.1	51.8	98.2	13.3	9.3	5.3	3.1
Medium	224.1	252.3	219.4	113.1	40.0	37.5	7.7	44.5	22.2	10.9	24.7	7.5	27.0	33.2	6.9	0.0	4.0	6.6
Small	45.6	158.1	59.0	91.8	90.3	15.5	23.7	16.7	16.7	50.0	5.1	5.6	4.0	40.3	14.2	8.2	0.0	0.0

Table 21-04. Stand-size class composition (in thousands of acres) of the most common forest types found in states within BCR 21.

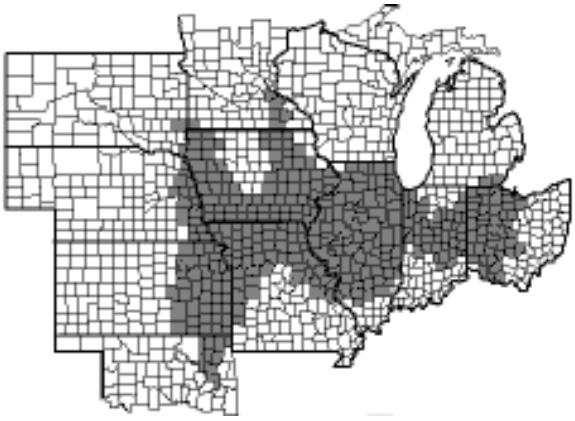
	Forest types																	
Stand-size class	Post oak/Blackjack oak	White oak/Red oak/Hickory	Loblolly pine	Southern scrub oak	Oak/Hickory group	Sugarberry/Hackberry/Elm/Green ash	Oak/Gum/Cypress group	Shortleaf pine	Shortleaf pine/Oak	Loblolly pine/Hardwood	Sycamore/Pecan/American elm	Overcup oak/Water hickory	Sweetgum/Nuttall oak/Willow oak	Mixed upland hardwoods	Eastern red cedar/Hardwood	Sweetgum/Yellow poplar	River birch/Sycamore	Willow
Broad floodplains/ Bottomland	3.2	0.0	0.0	0.0	0.0	16.6	0.0	0.0	0.0	0.0	0.0	0.0	5.3	12.3	0.0	0.0	0.0	0.0
Deep sands	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.6	0.0	0.0	0.0	0.0
Dry tops	2.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Flatwoods	31.7	3.5	36.5	0.0	0.0	8.8	0.0	0.0	0.0	0.0	8.6	6.9	29.7	33.3	0.0	0.0	0.0	0.0
Moist slopes and coves	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.0	0.0	0.0	0.0	0.0
Narrow floodplains/ Bottomland	5.3	0.5	0.0	0.0	0.0	9.1	0.0	0.0	0.0	0.0	9.3	13.5	35.3	15.6	0.0	0.0	4.0	0.0
Rolling uplands	258.8	20.8	38.5	0.0	0.0	0.0	0.0	8.3	18.2	15.9	0.0	0.0	8.6	94.1	18.6	17.5	0.0	0.0
Small drains	8.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.8	0.0	0.0	0.0
Swamps/Bogs	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.3	0.0
Other mesic	143.5	478.5	284.3	213.7	190.0	84.8	131.9	79.8	68.6	53.9	49.0	17.8	3.8	7.8	8.9	0.0	0.0	9.7
Other xeric	0.0	5.6	22.2	0.0	0.0	0.0	0.0	16.7	5.6	5.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	453.4	508.8	381.6	213.7	190.0	119.3	131.9	104.7	92.4	75.3	66.9	38.2	82.8	171.7	34.3	17.5	9.3	9.7

Table 21-05. Forest ownership in BCR 21, in acres (percentage of column total).

Ownership	Total	Oklahoma	Texas
County/Municipal	5,328	0	5,328
	(0.2)	(0.0)	(0.6)
National forest	42,108	42,108	0
	(1.5)	(2.2)	(0.0)
Other federal	39,379	39,379	0
	(1.4)	(2.1)	(0.0)
Other local government	0	0	0
	(0.0)	(0.0)	(0.0)
	(96.7)	(95.7)	(98.8)
U.S. Department of Defense	0	0	0
	(0.0)	(0.0)	(0.0)
U.S. Fish and Wildlife Service	0	0	0
	(0.0)	(0.0)	(0.0)
U.S. National Park Service	0	0	0
	(0.0)	(0.0)	(0.0)
State	5,328	0	5,328
	(0.2)	(0.0)	(0.6)
Private	2,725,744	1,819,447	906,198
All	2,817,788	1,900,934	916,854
	(100.0)	(100.0)	(100.0)

Bird Conservation Region 22: Eastern Tallgrass Prairie

James R. Kelley, Jr.
U.S. Fish and Wildlife Service



Affected States: Minnesota, Illinois, Indiana, Ohio, Michigan, South Dakota, Nebraska, Kansas, Missouri and Oklahoma
Current Area of Forestland: 13,997,738 acres (5,664,745 ha) (1,718,525 acres (695,470 ha) of small-diameter and nonstocked forest)
Woodcock Trend Estimate (1966–2004): -1.2
Percent of Change per Year (1994–2004): 0.9
Woodcock Population Estimate (1970): 71,506
Singing Males Only (2004): 62,761

Physiography and Habitat Description

The portions of BCR 22 that lie in Indiana, Ohio and Michigan are contained in sections 222G (central Till Plain, Oak Hickory) and 222H (central Till Plain, Beech/Maple) of the Eastern Broadleaf Forest Province (McNab and Avers 1994). Such areas are generally flat and are dominated by agriculture. Of the forested areas, most remnants are on the steepest slopes and poorest soils, or they are in floodplains too wet for cultivation. Most forested tracts are now second-growth woodlots less than 250 acres (101.2 ha) (McNab and Avers 1994). The central and western portions of the bird conservation region are contained in sections 251C (central Dissected Till Plains) and 251D (central Till Plains) of the Prairie Parkland Province (McNab and Avers 1994). This region is flat to rolling plains dominated by agriculture. Many streams that formerly meandered across broad valleys have been straightened by channelization and are silted in from agricultural run-off (McNab and Avers 1994).

Between the current and baseline forest inventories there has been a gain of just over 3 million acres (1.21 million ha, 31 percent) of forestland in this bird conservation region (Table 22-01). However, there has been a net loss of over 0.9 million acres (0.36 million ha, 34 percent of small-diameter and nonstocked forest during the same period. These comparisons do not include the Oklahoma portion of the bird conservation region, for which historical inventory data was not available. Major forest types include white oak/red oak/hickory (28 percent), mixed upland hardwood (15 percent), elm/ash/locust (8 percent), black ash/American elm/red maple (6 percent) and white oak (6 percent; Tables 22-02–22-05). Approximately 93 percent of the 13.4 million acres (5.4 million ha) of forestland in the region is under private ownership. Slightly over 4 percent of the region is state or county forest. Whereas, other ownership categories include only minor forestland area (Table 22-06).

Woodcock Harvest and Population Status

States in BCR 22 are not major contributors to Central Region woodcock harvest compared to states in more northerly bird conservation regions. Ohio ranks as the highest harvest state in the BCR 22 with 4,700 hunters taking approximately 6,900 birds throughout the state in 2005 (Kelley and Rau 2006). Illinois and Indiana each had approximately 2,100 hunters in 2005 that harvested 3,900 and 4,400 birds, respectively. Other states harvested less than 1,400 birds.

Much of BCR 22 lies on the southwestern edge of the area covered by the Singing-ground Survey (SGS). A large percentage of the bird conservation region in Missouri, Nebraska, Kansas and Oklahoma is not surveyed, and such states were not included in calculations of population and habitat goals. However, unsurveyed states, such as Missouri, likely serve as important migration corridors. In BCR 22 states covered by the SGS, there has been a long-term woodcock decline of 1.2 percent per year (U.S. Geological Survey 2004, unpublished data). The total estimate of singing males in surveyed states has declined from approximately 71,500 during the early 1970s, to the current estimate of just under 62,800 birds (Table 22-07). Interestingly, Illinois currently has a higher estimated population of singing males than the historical period. Illinois was, therefore, excluded from population deficit calculations for the bird conservation region.

The total woodcock population deficit for the bird conservation region is nearly 38,000 singing males (Table 22-07). The majority (93 percent) of this deficit is distributed in Indiana and Ohio.

Population and Habitat Goals

To restore woodcock densities in BCR 22 to those observed during the early 1970s, a total of nearly 38,000 singing males need to be added to the population (Table 22-07). This estimate pertains only to manageable acres in states covered by the SGS. Achieving this goal will require the creation of nearly 715,000 acres (289,353 ha) of new woodcock habitat, primarily in Indiana and Ohio. However, if the management goal is only to replace the total loss of singing males that has occurred since the early 1970s (without regard to density) then approximately 165,000 acres (66,775 ha) of new woodcock habitat needs to be created in the surveyed portion of the bird conservation region. The vast majority of timberland in this region is under private ownership. Therefore, state and federal resource agencies will need to enlist the help of individual and commercial private forestland owners in order to achieve habitat management goals.

Table 22-01. Current and historical (1970–1975) stand-size distribution, in acres (percentage of column total) of forestland in BCR 22 and in portions of individual states within the bird conservation region. Historical data not available for BCR 22 portion of Oklahoma.

	Current stand-size distribution					Historical stand-size distribution				
	Total forestland	Large diameter[1,2]	Medium diameter[1,3]	Small diameter[1,4]	Non-stocked[1,5]	Total forestland	Large diameter[1,2]	Medium diameter[1,3]	Small diameter[1,4]	Non-stocked[1,5]
Illinois	2,931,096	2,122,496	546,592	242,801	19,208	2,661,700	1,557,687	670,057	414,471	19,485
	(20.9)	(72.4)	(18.6)	(8.3)	(0.7)	(27.2)	(58.5)	(25.2)	(15.6)	(0.7)
Indiana	1,033,421	721,922	230,149	72,221	9,130	822,900	465,100	168,400	165,000	24,400
	(7.4)	(69.9)	(22.3)	(7.0)	(0.9)	(8.4)	(56.5)	(20.5)	(20.1)	(3.0)
Iowa	1,954,105	1,220,213	444,736	234,144	55,012	1,172,000	606,059	293,023	241,460	31,459
	(14.0)	(62.4)	(22.8)	(12.0)	(2.8)	(12.0)	(51.7)	(25.0)	(20.6)	(2.7)
Kansas	1,596,247	660,302	622,826	307,890	5,230	950,193	400,150	200,257	321,767	28,019
	(12.0)	(41.4)	(39.0)	(19.3)	(0.3)	(9.7)	(42.1)	(21.1)	(33.9)	(2.9)
Michigan	108,676	67,354	30,540	10,781	0	90,700	49,650	14,300	17,350	9,400
	(0.8)	(62.0)	(28.1)	(9.9)	(0.0)	(0.9)	(54.7)	(15.8)	(19.1)	(10.4)
Minnesota	139,228	74,793	45,210	13,311	5,914	128,600	102,600	24,400	1,600	0
	(1.0)	(53.7)	(32.5)	(9.6)	(4.2)	(1.3)	(79.8)	(19.0)	(1.2)	(0.0)
Missouri	3,861,275	2,226,126	1,225,359	393,749	16,041	2,665,500	1,033,200	1,010,100	287,200	326,000
	(27.6)	(57.7)	(31.7)	(10.2)	(0.4)	(27.3)	(38.8)	(37.9)	(10.8)	(12.2)
Nebraska	256,289	204,303	35,007	9,900	7,080	148,400	74,000	42,100	32,300	0
	(1.9)	(79.7)	(13.7)	(3.9)	(2.8)	(1.5)	(49.9)	(28.4)	(21.8)	(0.0)
Ohio	1,663,775	1,131,447	314,979	209,676	7,673	1,225,600	434,812	95,268	678,110	17,411
	(11.9)	(68.0)	(18.9)	(12.6)	(0.5)	(12.5)	(35.5)	(7.8)	(55.3)	(1.4)
Oklahoma	449,900	160,819	190,316	98,765	0					
	(3.4)	(35.7)	(42.3)	(22.0)	(0.0)					
South Dakota	3,726	3,726	0	0	0	2,983	2,983	0	0	0
	(<0.1)	(100.0)	(0.0)	(0.0)	(0.0)	(1.5)	(100.0)	(0.0)	(0.0)	(0.0)
Total	13,997,738	8,593,501	3,685,715	1,593,238	125,287	9,868,576	4,726,240	2,517,904	2,159,257	456,174
	(100.0)	(61.4)	(26.3)	(11.4)	(0.9)	(100.0)	(47.9)	(25.5)	(21.9)	(4.6)

[1] Percentages for various diameter categories and nonstocked category refer to percent of row total for current and historical time periods.
[2] Softwoods are at least 9 inches, and hardwoods are at least 11 inches in diameter at breast height.
[3] Trees are at least 5 inches in diameter at breast height but are smaller than large-diameter trees.
[4] Saplings are 1 to 5 inches diameter at breast height. Softwood seedlings are more than 6 inches tall, and hardwood seedlings are more than 12 inches tall.
[5] Commercial forestland on which stocking of trees is less than 16.7 percent.

Table 22-02. Current composition of major forest types in BCR 22.

Forest type	Acres	Percent of forestland
Black ash/American elm/Red maple	847,071	6.3
Black cherry	365,750	2.7
Burr oak	222,757	1.7
Cottonwood	277,421	2.1
Eastern red cedar	291,598	2.2
Elm/Ash/Locust	1,084,398	8.0
Hard maple/Basswood	325,232	2.4
Mixed upland hardwoods	1,993,507	14.8
Post oak/Blackjack oak	362,618	2.7
Red maple/Lowland	333,070	2.5
Sugarberry/Hackberry/ Elm/Green ash	665,346	4.9
White oak	774,756	5.7
White oak/Red oak/ Hickory	3,813,703	28.3

Table 22-03. Percentage composition of forest types between states within BCR 22.

Forest type	Minnesota	Michigan	Indiana	Ohio	Illinois	Missouri	Iowa	Kansas	Oklahoma	Nebraska	South Dakota	Total
Black cherry	0.0	0.0	9.4	33.0	22.9	0.0	2.6	21.7	0.0	10.4	0.0	100.0
Black walnut	0.9	0.0	20.3	13.5	14.1	14.7	17.8	18.6	0.0	0.0	0.0	100.0
Bur oak	3.8	0.0	2.7	3.6	22.7	2.6	40.4	12.7	0.0	11.5	0.0	100.0
Cherry/Ash/Yellow poplar	0.0	1.1	28.2	36.8	15.7	12.9	5.2	0.0	0.0	0.0	0.0	100.0
Cottonwood	2.2	4.1	0.0	0.0	17.4	19.0	25.9	26.6	0.0	3.1	1.6	100.0
Eastern red cedar	1.1	0.0	0.0	18.3	0.0	43.1	8.6	25.8	0.0	3.1	0.0	100.0
Eastern red cedar/Hardwood	0.0	0.0	2.5	16.9	0.8	47.2	14.0	18.6	0.0	0.0	0.0	100.0
Elm/Ash/Locust	2.5	0.0	7.7	9.8	15.3	27.9	28.5	0.0	0.0	8.4	0.0	100.0
Hard maple/Basswood	3.6	3.3	12.2	22.5	26.1	12.0	20.2	0.0	0.0	0.0	0.0	100.0
Mixed upland hardwoods	0.5	0.3	6.4	7.4	19.2	28.9	13.9	21.7	0.0	1.6	0.0	100.0
Nonstocked	5.1	0.0	7.8	6.6	16.4	13.7	47.1	0.0	0.0	3.3	0.0	100.0
Northern red oak	2.6	3.4	4.5	16.3	30.9	19.7	14.4	8.2	0.0	0.0	0.0	100.0
Post oak/Blackjack oak	0.5	0.1	0.0	0.0	11.2	41.5	1.3	21.3	24.0	0.0	0.0	100.0
River birch/Sycamore	0.0	0.0	12.3	9.0	15.0	39.4	11.5	12.8	0.0	0.0	0.0	100.0
Silver maple/American elm	1.4	0.5	6.7	2.8	30.3	26.9	31.4	0.0	0.0	0.0	0.0	100.0
Sugar maple/Beech/ Yellow birch	1.1	1.2	20.5	47.5	12.2	8.9	8.5	0.0	0.0	0.0	0.0	100.0
Sugarberry/Hackberry/Elm/ Green ash	2.3	1.5	4.6	4.5	23.4	19.4	18.8	17.0	4.8	3.7	0.0	100.0
Sycamore/Pecan/ American elm	0.0	0.0	8.2	4.3	24.8	19.8	3.6	21.2	17.9	0.0	0.0	100.0
White oak	0.0	0.1	4.2	2.1	24.8	52.9	15.9	0.0	0.0	0.0	0.0	100.0
White oak/Red oak/Hickory	0.4	0.7	6.4	10.9	27.3	33.6	11.1	6.3	3.0	0.3	0.0	100.0
Willow	3.6	2.7	0.0	2.5	3.9	24.7	21.0	31.8	9.7	0.0	0.0	100.0

Table 22-04. Forest composition of timberland, in acres, within BCR 22.

Forest type	Minnesota	Michagan	Indiana	Ohio	Illinois	Missouri	Iowa	Kansas	Oklahoma	Nebraska	South Dakota	Total
Black cherry	0	0	8,675	30,341	21,052	0	2,349	19,921	0	9,552	0	91,891
Black walnut	1,998	0	44,677	29,714	31,020	32,220	39,115	40,916	0	0	0	219,660
Bur oak	8,152	0	5,714	7,607	48,415	5,550	86,019	27,013	0	24,483	0	212,952
Cherry/Ash/Yellow poplar	0	2,268	58,246	76,035	32,498	26,726	10,658	0	0	0	0	206,431
Cottonwood	5,187	9,538	0		40,277	43,903	59,820	61,479	0	7,224	3,726	231,154
Eastern red cedar	3,547	0	0	58,083		136,998	27,508	82,062	0	9,859	0	318,057
Eastern red cedar/Hardwood	0	0	5,739	39,237	1,855	109,232	32,468	43,107	0	0	0	231,638
Elm/Ash/Locust	5,123	0	15,959	20,209	31,562	57,662	58,860	0	0	17,284	0	206,658
Hard maple/Basswood	9,748	8,856	32,641	60,388	69,883	32,188	54,220	0	0	0	0	267,924
Mixed upland hardwoods	13,063	7,420	168,473	195,318	505,353	759,102	365,099	569,298	1,238	42,975	0	2,627,3
Nonstocked	5,914	0	9,130	7,673	19,208	16,041	55,012	0	0	3,891	0	116,868
Northern red oak	3,620	4,738	6,400	23,043	43,645	27,820	20,261	11,612	0	0	0	141,138
Post oak/Blackjack oak	1,992	636	0	0	48,523	179,223	5,535	92,003	103,454	0	0	431,365
River birch/Sycamore	0	0	35,341	25,790	42,943	113,079	32,959	36,570	0	0	0	286,681
Silver maple/American elm	6,092	2,357	29,660	12,458	133,831	118,714	138,667	0	0	0	0	441,778
Sugar maple/Beech/ Yellow birch	7,802	8,695	145,387	337,264	86,924	63,357	60,657	0	0	0	0	710,086
Sugarberry/Hackberry/ Elm/Green ash	30,403	19,258	60,496	58,763	305,479	252,723	244,898	222,165	62,213	48,872	0	1,305,270
Sycamore/Pecan/ American elm	0	0	14,594	7,691	43,904	35,034	6,454	37,562	31,771	0	0	177,010
White oak	0	985	33,153	16,421	195,129	416,961	125,135	0	0	0	0	787,784
White oak/Red oak/Hickory	17,445	26,240	251,935	428,416	1,076,163	1,323,465	435,964	249,631	120,100	12,035	0	3,941,394
Willow	2,398	1,835	0	1,696	2,599	16,526	14,042	21,262	6,497	0	0	66,855

Table 22-05. Stand size class composition (in thousands of acres) of the most common forest types found in states within BCR 22.

Stand size class	Forest type																				
	White oak/Red oak/Hickory	Mixed upland hardwoods	Sugarberry/Hackberry/Elm/Green ash	White oak	Sugar maple/Beech/Yellow birch	Silver maple/American elm	Post oak/Blackjack oak	Eastern red cedar	River birch/Sycamore	Hard maple/Basswood	Cottonwood	Eastern redcedar/Hardwood	Black walnut	Bur oak	Elm/Ash/Locust	Cherry/Ash/Yellow poplar	Sycamore/Pecan/American elm	Northern red oak	Nonstocked	Black cherry	Willow
Illinois																					
Large	885.3	321.3	159.3	168.6	91.9	143.6	34.1	0.0	31.3	49.1	43.8	0.0	24.2	43.6	18.1	7.1	40.3	50.8	0.0	0.0	1.9
Medium	163.6	185.0	64.2	8.6	11.8	0.0	9.9	8.6	11.9	11.0	0.6	9.2	8.3	2.6	23.9	8.5	7.6	0.0	0.0	8.6	0.0
Small	36.2	79.1	64.0	0.0	14.2	10.8	0.0	0.0	0.0	0.0	0.0	0.0	5.7	1.7	1.9	8.6	0.0	0.0	0.0	8.6	0.0
Indiana																					
Large	211.2	91.2	44.5	18.9	123.3	22.2	0.0	0.0	28.7	32.2	0.0	0.0	34.4	6.0	6.2	31.0	14.1	4.2	0.0	0.0	0.0
Medium	25.5	56.5	9.1	12.0	22.4	7.1	0.0	0.0	0.0	0.7	0.0	0.0	5.3	0.0	8.4	36.6	0.0	0.0	0.0	6.5	0.0
Small	14.7	23.2	0.0	0.0	3.1	0.0	0.0	0.0	5.8	1.8	0.0	0.0	3.3	0.0	0.0	7.1	0.0	1.5	0.0	2.2	0.0
Iowa																					
Large	268.1	155.2	148.9	115.7	26.3	133.8	5.5	10.0	0.0	49.4	47.7	6.0	37.0	83.5	35.2	0.0	6.2	18.8	0.0	0.0	0.0
Medium	101.1	140.4	82.0	9.4	27.1	3.4	0.0	1.8	0.0	3.3	5.2	8.9	2.1	2.5	13.7	0.0	0.3	1.5	0.0	0.0	0.0
Small	66.7	69.5	14.1	0.0	7.3	1.5	0.0	15.7	0.0	1.4	6.9	17.5	0.0	0.0	10.0	0.0	0.0	0.0	0.0	2.3	0.0
Kansas																					
Large	107.8	158.2	135.9	0.0	19.9	10.2	20.5	0.0	29.3	0.0	61.5	22.8	24.1	27.0	4.1	0.0	16.2	0.0	0.0	0.0	0.0
Medium	75.1	319.0	61.0	0.0	0.0	0.0	47.4	27.4	4.9	0.0	0.0	9.9	14.0	0.0	19.8	0.0	21.4	0.0	0.0	0.0	0.0
Small	66.7	92.1	25.3	0.0	0.0	0.0	24.1	54.7	2.4	0.0	0.0	10.4	2.8	0.0	8.2	0.0	0.0	0.0	0.0	0.0	21.3
Michigan																					
Large	30.1	1.2	10.3	0.8	1.5	2.2	0.5	0.0	0.0	4.4	7.5	0.0	0.0	0.0	0.0	0.0	0.0	3.8	0.0	0.0	1.5
Medium	0.7	2.6	5.1	0.0	3.9	1.9	0.0	0.0	0.0	4.5	2.5	1.8	0.0	0.0	0.5	1.8	0.0	0.6	0.0	0.0	0.0
Small	3.9	2.2	0.2	0.0	2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Minnesota																					
Large	12.6	6.0	15.3	0.0	2.6	4.5	1.2	0.0	0.0	9.7	5.0	0.0	0.0	8.2	0.0	0.0	0.0	3.6	0.0	0.0	0.0
Medium	4.9	4.8	13.3	0.0	5.2	1.6	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	5.1	0.0	0.0	0.0	0.0	0.0	0.0
Small	0.0	2.3	1.8	0.0	0.0	0.0	0.8	3.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Missouri																					
Large	753.9	323.0	146.3	343.2	29.0	97.9	53.4	28.2	70.5	22.1	36.1	41.6	27.8	5.6	14.0	0.0	33.6	32.0	0.0	0.0	3.4
Medium	349.8	336.9	73.5	46.5	24.5	26.8	80.1	48.0	27.1	6.3	6.8	44.6	4.4	0.0	23.7	9.6	0.0	0.0	0.0	0.0	0.0
Small	69.6	121.8	31.5	0.0	6.3	5.8	4.9	40.7	14.6	3.7	0.9	16.1	4.7	0.0	20.0	17.2	1.4	1.6	0.0	0.0	13.1

Table 22-05 (continued). Stand size class composition (in thousands of acres) of the most common forest types found in states within BCR 22.

Stand size class	Forest type																				
	White oak/Red oak/Hickory	Mixed upland hardwoods	Sugarberry/Hackberry/Elm/Green ash	White oak	Sugar maple/Beech/Yellow birch	Silver maple/American elm	Post oak/Blackjack oak	Eastern redcedar	River birch/Sycamore	Hard maple/Basswood	Cottonwood	Eastern redcedar/Hardwood	Black walnut	Bur oak	Elm/Ash/Locust	Cherry/Ash/Yellow poplar	Sycamore/Pecan/American elm	Northern red oak	Nonstocked	Black cherry	Willow
Nebraska																					
Large	8.5	36.1	37.7	0.0	0.0	4.0	0.0	0.0	0.0	29.8	5.4	0.0	0.0	11.7	11.0	0.0	1.9	0.0	0.0	0.0	0.0
Medium	0.0	22.1	0.0	0.0	7.0	0.0	0.0	7.2	0.0	0.0	0.0	7.2	0.0	9.7	1.9	0.0	0.0	0.0	0.0	0.0	0.0
Small	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ohio																					
Large	346.8	100.6	13.6	16.4	254.9	12.5	0.0	0.0	25.8	57.8	6.2	29.7	20.4	7.6	8.0	15.8	7.7	20.5	0.0	15.4	1.7
Medium	71.5	64.6	30.4	0.0	41.2	0.0	0.0	26.6	0.0	2.6	0.0	0.0	2.6	0.0	0.0	39.5	0.0	2.6	0.0	7.6	0.0
Small	10.1	30.2	14.8	0.0	41.1	0.0	0.0	31.5	0.0	0.0	0.0	9.6	6.7	0.0	12.2	20.8	0.0	0.0	0.0	7.3	0.0
Oklahoma																					
Large	26.4	1.2	30.8	0.0	0.0	0.0	71.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.8	0.0	0.0	0.0	0.0
Medium	54.7	0.0	18.9	0.0	0.0	0.0	50.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Small	27.9	0.0	0.0	0.0	0.0	0.0	11.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
South Dakota																					
Large	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Medium	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Small	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total																					
Large	2,772.4	1,368.5	796.8	675.6	657.2	438.0	187.0	96.2	191.3	259.7	213.2	109.7	185.8	193.1	117.2	157.8	125.7	137.7	12.8	39.0	8.5
Medium	1,307.9	1,202.5	376.1	99.9	457.7	68.3	187.6	93.1	98.5	115.1	21.6	111.3	83.6	28.4	102.8	66.6	51.1	26.8	0.0	24.0	1.7
Small	367.9	488.0	176.4	12.0	93.9	25.2	41.4	142.3	17.0	8.5	7.8	44.0	21.2	1.7	48.5	101.9	1.4	4.2	0.0	25.0	34.4

Table 22-06. Forest ownership in BCR 22, in acres (percentage of column total).

Ownership	Total	Minnesota	Iowa	Missouri	Illinois	Indiana	Ohio	Michigan	South Dakota	Nebraska	Kansas	Oklahoma
County/Municipal	150,671	10,906	14,151	28,498	69,226	0	0	1,476	0	0	27,891	0
	(1.1)	(7.1)	(0.7)	(0.8)	(2.3)	(0.0)	(0.0)	(1.4)	(0.0)	(0.0)	(1.7)	(0.0)
National forest	12,081	0	0	12,081	0	0	0	0	0	0	0	0
	(0.1)	(0.0)	(0.0)	(0.3)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)
Other federal	196,514	4,404	43,586	47,845	19,400	23,932	0	0	0	0	12,242	45,106
	(1.5)	(2.9)	(2.2)	(1.3)	(0.7)	(2.4)	(0.0)	(0.0)	(0.0)	(0.0)	(1.3)	(10.0)
Other local government	18,893	0	0	1,059	0	7,976	0	0	0	9,859	0	0
	(0.1)	(0.0)	(0.0)	(<0.1)	(0.0)	(0.8)	(0.0)	(0.0)	(0.0)	(3.8)	(0.0)	(0.0)
Private	12,482,976	125,346	1,856,228	3,323,945	2,772,850	951,842	1,332,750	97,115	3,726	234,396	1,477,099	404,794
	(93.3)	(81.7)	(92.1)	(92.6)	(94.0)	(94.7)	(98.4)	(92.9)	(100.0)	(91.5)	(92.5)	(90.0)
State	398,464	12,771	77,351	161,987	71,805	21,325	21,189	5,904	0	12,035	20,001	0
	(3.0)	(8.3)	(3.8)	(4.5)	(2.4)	(2.1)	(1.6)	(5.6)	(0.0)	(4.7)	(1.3)	(0.0)
U.S. Department of Defense	89,474	0	16,057	14,403	0	0	0	0	0	0	59,014	0
	(0.7)	(0.0)	(0.8)	(0.4)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(3.7)	(0.0)
U.S. Fish and Wildlife Service	23,978	0	7,981	0	15,997	0	0	0	0	0	0	0
	(0.2)	(0.0)	(0.4)	(0.0)	(0.5)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)
U.S. National Park Service	0	0	0	0	0	0	0	0	0	0	0	0
	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)
All	13,373,051	153,427	2,015,354	3,589,817	2,949,277	1,005,075	1,353,939	104,495	3,726	256,289	1,596,247	449,900
	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)

Table 22-07A. Compilation of historical and current population and habitat, in acres, for woodcock in BCR 22.

	Historical	Current
Illinois	32,459,296	32,459,296
Indiana	11,431,680	11,431,680
Michigan	922,458	922,458
Minnesota	2,339,488	2,339,488
Ohio	13,510,195	13,510,195
Total	60,663,117	60,663,117
Manageable acres		
Illinois	2,661,700	2,931,096
Indiana	822,900	1,033,421
Michigan	90,700	108,676
Minnesota	128,600	139,228
Ohio	1,225,600	1,663,775
Total	4,929,500	5,876,196

Table 22-07B. Calculation of singing males and of singing-male deficit for woodcock in BCR 22.

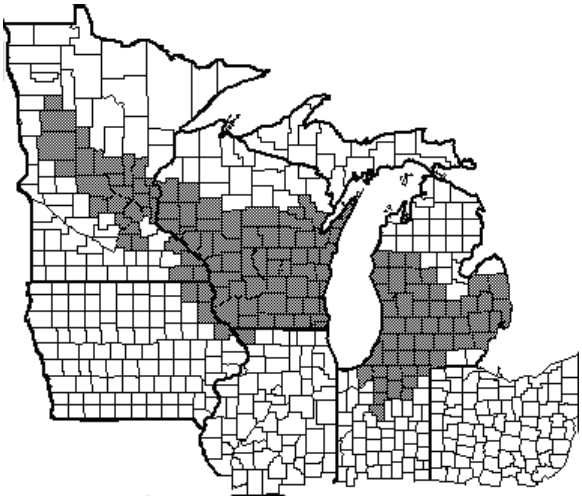
Population of singing males	Historical	Current
Illinois	18,495	32,302
Indiana	19,273	9,998
Michigan	4,037	2,978
Minnesota	3,536	3,074
Ohio	26,166	14,409
Total	71,506	62,761
Population deficit of singing males[3]		
Illinois		0
Indiana		14,206
Michigan		1,859
Minnesota		754
Ohio		21,112
Total		37,931

Table 22-07C. Calculation, in acres, of habitat goals for woodcock in BCR 22. Goals are developed only for states included in the Singing-ground Survey.

	Habitat goal
Illinois	0
Indiana	267,633
Michigan	35,025
Minnesota	14,210
Ohio	397,747
Total	714,615

Bird Conservation Region 23: Prairie Hardwood Transition

James R. Kelley, Jr.
U.S. Fish and Wildlife Service



Affected States: Minnesota, Wisconsin, Iowa, Illinois, Michigan and Indiana
Current Area of Forestland: 14,768,003 acres (5,976,463 ha) (2,505,874 acres [1,014,100 ha] of small-diameter and nonstocked forest)
Woodcock Trend Estimate (1968–2004): -1.0
Percent of Change per Year (1995–2004): -0.5
Woodcock Population Estimate (1970): 184,612
Singing Males Only (2004): 140,034 (excludes Iowa)

Physiography and Habitat Description

The portions of the BCR outside of Minnesota are contained in sections 222I (Erie and Ontario Lake Plain), 222J (southcentral Great Lakes), 222K (southwestern Great Lakes Morainal) and 222L (Northcentral U.S. Driftless Escarpment) of the Eastern Broadleaf Forest Province (McNab and Avers 1994). Such areas are a mixture of gently rolling glacial moraines, flat outwash and lacustrine plains. Much of the land has been cleared and drained for agriculture, which is the dominant land use. The Minnesota portion of the bird conservation region is contained primarily in section 251B (Northcentral Glaciated Plains) of the Prairie Parkland Temperate Province, which is mostly level to rolling till plain dominated by agriculture (McNab and Avers 1994).

Between the current and baseline forest inventories there has been a gain of nearly 2.4 million acres (1.0 ha, 19 percent) of timberland in this bird conservation region (Table 23-01). However, there has been a net loss of over 1.0 million acres (0.4 ha, 30 percent) of small-diameter and nonstocked forest during the same period. Major forest types include white oak/red oak/hickory (18 percent), sugar maple/beech/yellow birch (10 percent), aspen (9 percent), hard maple/basswood (7 percent) and northern red oak (5 percent; Tables 23-02 and 23-03). Slightly less than 16 percent of total timberland in the region is comprised of small-diameter trees. Whereas, 34 percent of the aspen forest type in the region is comprised of small-diameter stand size (Table 23-04). Flatwoods and rolling uplands are the dominant physiographic classes on which major forest types within the region are found (Table 23-05). Approximately 82 percent of the 14.3 million acres (5.8 million ha) of timberland in the region is under private ownership. State or county forest comprises approximately 14 percent. Whereas, national forest comprises almost 3 percent of all timberland (Table 23-06).

Harvest and Population Status

BCR 23 is a transitional area between the high density of breeding woodcock in portions of BCR 12 and lower breeding densities to the south. Because Michigan and Wisconsin comprise the majority of the land area within

this bird conservation region, those states account for the bulk of woodcock harvest and hunter numbers. Estimates from the harvest information program indicate that 31,200 hunters in Michigan harvested 102,500 birds throughout the state in 2004 (Kelley and Rau 2005). In Wisconsin, nearly 16,000 hunters harvested 47,300 birds. BCR 23 lies in much of central Minnesota. Approximately 14,500 hunters harvested 38,500 woodcock in Minnesota during 2004.

In BCR 23 states covered by the Singing-ground Survey (SGS; all states except Iowa), there has been a long-term woodcock decline of 1.0 percent per year (U.S. Geological Survey 2004, unpublished data). The total estimate of singing males in surveyed states within the bird conservation region has declined from approximately 306,000 during the early 1970s to the current estimate of slightly over 232,000 birds (Table 23-07). The total woodcock population deficit for the bird conservation region is nearly 134,000 singing males (Table 23-07). The majority (83 percent) of this deficit is distributed in Michigan and Wisconsin.

Population and Habitat Goals

To restore woodcock densities in BCR 23 to those observed during the early 1970s, a total of nearly 134,000 additional singing males need to be added to the population. This estimate pertains only to manageable acres in states covered by the SGS. Achieving this goal will require the creation of slightly over 1.5 million acres (0.61 million ha) of new woodcock habitat, primarily in Michigan, Wisconsin and Minnesota (Table 23-07). However, if the management goal is only to replace the total loss of singing males that has occurred since the early 1970s (without regard to density) then approximately 856,000 acres (346,415 ha) of new woodcock habitat needs to be created in the surveyed portion of the bird conservation region. The vast majority of timberland in this region is under private ownership. Therefore, state and federal resource agencies will need to enlist the help of individual and commercial private forestland owners in order to achieve habitat management goals.

Table 23-01. Current and historical (1970–1975) stand-size distribution, in acres (percentage of column total) of timberland in BCR 23 and in portions of individual states within the bird conservation region.

	Current stand-size distribution					Historical stand-size distribution				
	Total timberland	Large diameter[1,2]	Medium diameter[1,3]	Small diameter[1,4]	Non-stocked[1,5]	Total timberland	Large diameter[1,2]	Medium diameter[1,3]	Small diameter[1,4]	Non-stocked[1,5]
Illinois	92,691	81,251	11,440	0	0	59,700	37,335	14,299	7,618	448
	(0.6)	(87.7)	(12.3)	(0.0)	(0.0)	(0.5)	(62.5)	(24.0)	(12.8)	(0.7)
Indiana	341,071	256,791	46,256	30,577	7,447	248,400	139,000	46,700	54,600	8,100
	(2.3)	(75.3)	(13.6)	(9.0)	(2.2)	(2.0)	(56.0)	(18.8)	(22.0)	(3.3)
Iowa	404,622	277,566	83,745	41,670	1,641	264,200	169,594	55,688	27,573	11,345
	(2.7)	(68.6)	(20.7)	(10.3)	(0.4)	(2.1)	(64.2)	(21.1)	(10.4)	(4.3)
Michigan	4,107,026	2,123,448	1,326,876	615,231	41,470	3,490,950	1,135,900	1,155,200	931,000	246,550
	(27.8)	(51.7)	(32.3)	(15.0)	(1.0)	(28.3)	(32.5)	(32.5)	(26.7)	(7.1)
Minnesota	2,218,032	1,031,294	750,911	396,939	38,889	1,946,500	847,600	858,900	229,400	10,600
	(15.0)	(46.5)	(33.9)	(17.9)	(1.8)	(15.8)	(43.5)	(44.1)	(11.8)	(0.5)
Wisconsin	7,604,561	3,497,852	2,774,698	1,243,911	88,099	6,346,200	1,986,200	2,302,800	1,858,000	199,200
	(51.5)	(46.0)	(36.5)	(16.4)	(1.2)	(51.4)	(31.3)	(36.3)	(29.3)	(3.1)
Total	14,768,003	7,268,202	4,993,926	2,328,328	177,546	12,355,950	4,315,630	4,433,587	3,108,190	476,243
	(100.0)	(49.2)	(33.8)	(15.8)	(1.2)	(100.0)	(34.9)	(35.9)	(25.2)	(3.9)

[1] Percentages for various diameter categories and nonstocked category refer to percentage of total forestland for current and historical time periods within each state.

[2] Softwoods aare at least 9 inches, and hardwoods are at least 11 inches in diameter at breast height; size class has more than 50 percent of stocking in medium- and large-diameter trees, with stocking of large trees equal to or greater than medium-diameter trees.

[3] Trees are at least 5 inches in diameter at breast height but are smaller than large-diameter; size class has more than 50 percent of stocking in medium- and large-diameter trees, with stocking of large-diameter trees less than stocking of medium-diameter trees.

[4] Saplings are 1 to 5 inches diameter at breast height. Softwood seedlings are more than 6 inches tall, and hardwood seedlings are more than 12 inches tall; size class has at least 50 percent of the stocking in small-diameter trees.

[5] Data referes to commercial forestland on which stocking of trees is less than 16.7 percent.

Table 23-02. Percentage composition of forest types between states within BCR 23.

Forest type	Minnesota	Wisconsin	Michigan	Iowa	Indiana	Illinois	Total
Aspen	30.8	46.1	23.0	0.0	0.1	0.0	100.0
Black ash/American elm/Red maple	17.4	43.4	36.9	0.1	2.2	0.0	100.0
Eastern white pine	3.8	77.7	18.5	0.0	0.0	0.0	100.0
Elm/Ash/Locust	20.5	43.9	26.7	7.7	1.2	0.0	100.0
Hard maple/Basswood	34.5	43.7	9.7	9.7	1.4	1.1	100.0
Jack pine	14.9	67.4	17.7	0.0	0.0	0.0	100.0
Mixed upland hardwoods	27.3	36.0	23.2	0.0	5.6	7.8	100.0
Nonstocked	21.5	50.6	22.9	0.9	4.1	0.0	100.0
Northern red oak	20.9	46.8	25.0	4.5	1.3	1.6	100.0
Other pine/Hardwood	8.4	64.8	21.9	0.0	0.5	4.3	100.0
Paper birch	27.9	66.3	5.8	0.0	0.0	0.0	100.0
Post oak/Blackjack oak	13.6	56.1	28.7	1.6	0.0	0.0	100.0
Red maple/Upland	8.4	59.8	31.8	0.0	0.0	0.0	100.0
Red maple/Oak	5.3	58.9	31.9	0.0	3.9	0.0	100.0
Red pine	7.4	56.0	35.8	0.0	0.9	0.0	100.0
Sugar maple/Beech/Yellow birch	10.5	48.8	33.4	4.4	3.0	0.0	100.0
Sugarberry/Hackberry/Elm/Green ash	15.4	44.2	31.1	3.4	4.2	1.7	100.0
Silver maple/American elm	5.5	41.9	46.9	1.1	4.6	0.0	100.0
White oak	2.9	44.9	45.3	6.5	0.4	0.0	100.0
White oakRred oak/Hickory	6.7	56.9	30.2	3.2	3.0	0.0	100.0
White pine/Red oak/White ash	8.2	66.4	25.3	0.0	0.0	0.0	100.0

Table 23-03. Forest composition, in acres (percentage of column total), of timberland within BCR 23.

Forest type	Minnesota	Wisconsin	Michigan	Iowa	Indiana	Illinois	Total
Aspen	411,557	615,225	306,659	0	1,910	0	1,335,351
	(18.6)	(8.6)	(7.5)	(0.0)	(0.6)	(0.0)	(9.3)
Black ash/American elm/Red maple	110,162	273,872	232,828	947	13,924	0	631,732
	(5.0)	(3.8)	(5.7)	(0.2)	(4.1)	(0.0)	(4.4)
Eastern white pine	8,325	170,464	40,581	0	0	0	219,371
	(0.4)	(2.4)	(1.0)	(0.0)	(0.0)	(0.0)	(1.5)
Elm/Ash/Locust	57,082	122,261	74,461	21,592	3,384	0	278,779
	(2.6)	(1.7)	(1.8)	(5.3)	(1.0)	(0.0)	(1.9)
Hard maple/Basswood	339,282	430,031	95,059	95,463	13,558	10,868	984,262
	(15.3)	(6.0)	(2.3)	(23.6)	(4.0)	(11.7)	(6.9)
Jack pine	39,545	178,768	46,897	0	0	0	265,210
	(1.8)	(2.5)	(1.1)	(0.0)	(0.0)	(0.0)	(1.9)
Mixed upland hardwoods	156,731	206,603	133,274	0	31,909	44,762	573,279
	(7.1)	(2.9)	(3.2)	(0.0)	(9.4)	(48.3)	(4.0)
Non stocked	38,889	91,686	41,470	1,641	7,447	0	181,133
	(1.8)	(1.3)	(1.0)	(0.4)	(2.2)	(0.0)	(1.3)
Northern red oak	142,324	318,412	170,112	30,513	8,622	10,877	680,860
	(6.4)	(4.4)	(4.1)	(7.5)	(2.5)	(11.7)	(4.8)
Other	247,396	842,130	693,906	56,330	90,411	5,720	1,935,895
	(11.2)	(11.8)	(16.9)	(13.9)	(26.5)	(6.2)	(13.5)
Other pine/Hardwood	18,690	143,327	48,543	0	1,036	9,599	221,194
	(0.8)	(2.0)	(1.2)	(0.0)	(0.3)	(10.4)	(1.50)
Paper birch	67,113	159,624	14,076	0	0	0	240,813
	(3.0)	(2.2)	(0.3)	(0.0)	(0.0)	(0.0)	(1.7)
Post oak/Blackjack oak	55,936	231,176	118,225	6,679	0	0	412,015
	(2.5)	(3.2)	(2.9)	(1.7)	(0.0)	(0.0)	(2.9)
Red maple/Upland	17,809	127,425	67,739	0	0	0	212,973
	(0.8)	(1.8)	(1.6)	(0.0)	(0.0)	(0.0)	(1.5)
Red maple/Oak	11,241	123,751	66,963	0	8,273	0	210,227
	(0.5)	(1.7)	(1.6)	(0.0)	(2.4)	(0.0)	(1.5)
Red pine	40,164	303,240	193,891	0	4,636	0	541,931
	(1.8)	(4.2)	(4.7)	(0.0)	(1.4)	(0.0)	(3.80)
Silver maple/American elm	10,985	83,641	93,737	2,188	9,174	0	199,726
	(0.5)	(1.2)	(2.3)	(0.5)	(2.7)	(0.0)	(1.4)
Sugar maple/Beech/Yellow birch	148,773	693,672	475,874	62,285	42,163	0	1,422,767
	(6.7)	(9.7)	(11.6)	(15.4)	(12.4)	(0.0)	(9.9)
Sugarberry/Hackberry/Elm/Green ash	94,690	271,866	191,349	21,029	26,090	10,200	615,225
	(4.3)	(3.8)	(4.7)	(5.2)	(7.6)	(11.0)	(4.3)
White oak	11,161	169,928	171,428	24,470	1,692	0	378,679
	(0.5)	(2.4)	(4.2)	(6.0)	(0.5)	(0.0)	(2.6)
White oak/Red oak/Hickory	173,643	1,469,810	779,078	81,484	76,841	665	2,581,521
	(7.8)	(20.5)	(19.0)	(20.1)	(22.5)	(0.7)	(18.0)
White pine/Red oak/White ash	16,534	133,452	50,877	0	0	0	200,863
	(0.7)	(1.9)	(1.2)	(0.0)	(0.0)	(0.0)	(1.4)

Table 23-04. Stand-size class composition (in thousands of acres) of the most common forest types found in states within BCR 23. Large-diameter trees are hardwoods that measure at least 11 inches diameter, 9 inches for softwoods; size class has more than 50 percent of stocking in medium- and large-diameter trees, with stocking of large trees equal to or greater than medium-diameter trees. Medium-diameter trees are trees that measure at least 5 inches diameter but are not as large as large-diameter trees; size class has more than 50 percent of stocking in medium- and large-diameter trees, with stocking of large-diameter trees less than stocking of medium-diameter trees. Small-diameter trees are trees that measure less than 5 inches diameter; size class has at least 50 percent of the stocking in small-diameter trees.

	Forest type																				
Stand-size class	White oak/Red oak/Hickory	Sugar maple/Beech/Yellow birch	Aspen	Hard maple/Basswood	Northern red oak	Black ash/American elm/Red maple	Sugarberry/hackberry/Elm/Green ash	Mixed upland hardwoods	Red pine	Post oak/Blackjack oak	White oak	Elm/Ash/Locust	Jack pine	Paper birch	Other pine/Hardwood	Eastern white pine	Red maple/Upland	Red maple/Oak	White pine/Red oak/White ash	Silver maple/American elm	All forest types
Illinois																					
Large	47.5	29.3	0.0	79.2	30.5	0.0	15.0	0.0	0.0	5.1	24.5	4.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.2	81.3
Medium	34.0	19.6	0.0	16.2	0.0	0.9	0.0	0.0	0.0	1.5	0.0	1.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	11.4
Small	0.0	13.4	0.0	0.0	0.0	0.0	6.0	0.0	0.0	0.0	0.0	16.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Indiana																					
Large	72.3	36.4	1.9	10.5	8.6	12.5	16.4	25.3	4.6	0.0	1.7	3.4	0.0	0.0	0.0	0.0	0.0	6.8	0.0	4.9	256.8
Medium	4.5	5.7	0.0	3.0	0.0	1.4	0.0	5.1	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	1.5	0.0	4.3	46.3
Small	0.0	0.0	0.0	0.0	0.0	0.0	9.7	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	30.6
Iowa																					
Large	47.5	29.3	0.0	79.2	30.5	0.0	15.0	0.0	0.0	5.1	24.5	4.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.2	277.6
Medium	34.0	19.6	0.0	16.2	0.0	0.9	0.0	0.0	0.0	1.5	0.0	1.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	83.7
Small	0.0	13.4	0.0	0.0	0.0	0.0	6.0	0.0	0.0	0.0	0.0	16.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	41.7
Michigan																					
Large	514.6	285.8	65.3	69.9	138.1	94.4	90.8	39.0	93.8	67.0	131.8	18.4	12.1	0.0	24.8	29.7	38.7	30.5	25.9	80.5	2,123.4
Medium	200.5	132.6	166.6	18.3	27.9	98.9	61.1	40.9	93.4	36.8	23.2	36.2	27.1	9.4	13.2	10.1	23.8	32.5	21.3	7.5	1,326.9
Small	64.0	57.5	74.8	6.9	4.1	39.5	39.4	53.3	6.7	14.4	16.4	19.9	7.7	4.6	10.5	0.8	5.3	4.0	3.6	5.8	615.2
Minnesota																					
Large	121.0	79.7	73.3	228.0	116.4	23.2	21.4	85.7	11.2	35.3	11.2	22.1	9.3	16.8	7.7	5.3	7.7	0.0	8.9	9.4	1,031.3
Medium	46.0	58.0	174.9	103.3	24.2	58.7	51.0	53.6	21.3	6.8	0.0	23.4	26.5	30.0	2.6	3.0	5.0	0.0	5.0	1.6	750.9
Small	6.7	11.1	163.4	8.0	1.7	28.3	22.3	17.5	7.7	13.9	0.0	11.5	3.8	20.3	8.4	0.0	5.1	11.2	2.6	0.0	396.9
Wisconsin																					
Large	877.7	378.9	89.7	313.1	268.7	58.1	85.7	91.6	149.1	116.4	142.8	17.9	49.0	31.1	53.8	114.7	44.0	46.6	62.0	68.5	3,363.9
Medium	478.0	257.0	304.3	108.9	37.0	165.9	133.8	72.2	114.3	93.7	20.2	63.8	64.4	92.6	52.0	29.6	59.4	58.7	47.3	14.2	2,569.5
Small	114.1	57.8	221.3	8.1	12.6	49.9	52.3	42.8	39.8	21.0	6.9	40.6	65.4	35.9	37.5	26.1	24.0	18.5	24.2	0.9	1,135.3
Total																					
Large	1,633.8	810.1	230.2	711.7	573.3	188.1	239.5	274.9	258.8	223.9	311.9	66.1	70.4	48.0	95.9	149.7	90.4	83.8	96.8	165.4	7,134.2
Medium	763.0	472.9	645.7	249.7	89.2	325.9	246.0	183.2	229.0	138.8	43.5	124.7	118.0	132.0	68.9	42.8	88.2	92.7	73.6	27.6	4,788.7
Small	184.7	139.7	459.5	22.9	18.4	117.7	129.7	115.1	54.2	49.3	23.3	88.1	76.8	60.8	56.4	26.9	34.4	33.7	30.4	6.7	2,219.8

Table 23-05. Physiographic class composition (in thousands of acres) of the most common forest types found in states within BCR 23.

Physiographic class	Forest type																				
	White oak/Red oak/Hickory	Sugar maple/Beech/Yellow birch	Aspen	Hard maple/Basswood	Northern red oak	Black ash/American Elm/Red maple	Sugarberry/hackberry/Elm/Green ash	Mixed upland hardwoods	Red pine	Post oak/Blackjack oak	White oak	Elm/Ash/Locust	Jack pine	Paper birch	Other pine/Hardwood	Eastern white pine	Red maple/Upland	Red maple/Oak	White pine/Red oak/White ash	Silver maple/American elm	All forest types
Bays and wet pocosins	7.5	12.1	57.3	7.1	0.0	157.8	52.5	0.7	5.3	5.3	0.0	0.0	5.7	8.6	3.6	14.8	0.0	0.0	6.3	5.4	621.2
Beaver ponds	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Broad floodplains/ Bottomland	9.7	3.4	15.8	0.0	4.0	65.5	83.7	7.2	4.6	0.6	2.1	1.2	0.0	7.6	0.0	0.0	0.0	0.0	0.0	62.0	343.0
Cypress ponds	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Deep sands	195.6	16.2	73.3	9.3	58.9	2.8	0.0	8.4	236.5	68.3	46.2	0.0	156.7	0.0	80.8	32.3	5.2	16.1	38.5	0.0	1,242.2
Dry slopes	64.7	7.1	6.3	6.3	12.7	0.0	0.0	1.6	6.8	0.0	4.1	3.6	3.4	0.0	3.8	2.9	2.7	3.5	0.0	0.0	148.4
Dry tops	6.9	0.0	0.0	0.0	3.6	0.0	0.0	3.6	2.6	5.3	0.9	2.3	1.9	0.0	0.8	0.0	0.0	0.0	0.0	0.0	31.2
Flatwoods	627.3	568.4	544.0	268.1	146.3	75.2	44.5	191.1	158.0	144.8	123.4	150.3	68.8	35.3	76.0	88.0	151.0	137.4	83.7	27.1	4,208.5
Moist slopes and coves	112.8	52.7	22.0	45.1	10.7	0.0	0.0	9.1	1.7	6.1	1.2	7.1	2.7	3.5	6.4	3.6	3.6	0.0	7.9	1.7	328.6
Narrow floodplains/ Bottomland	7.3	20.4	16.4	27.6	5.5	110.9	167.8	17.7	0.8	3.4	3.7	0.0	0.0	17.7	0.0	0.0	0.0	0.0	0.0	59.9	626.4
Other	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.4
Other hydric	5.2	6.3	20.2	3.5	0.0	48.5	40.0	3.4	0.0	0.0	2.3	0.0	0.0	0.0	3.0	0.0	0.0	0.0	2.7	15.9	208.7
Other mesic	86.4	81.9	90.5	44.3	38.3	21.7	20.2	53.3	9.7	7.6	13.7	28.7	4.0	7.0	5.8	2.3	16.7	10.4	7.6	4.3	658.7
Other xeric	2.4	0.0	4.2	2.3	0.0	0.0	0.0	1.3	18.9	7.0	0.0	0.0	3.9	0.0	7.5	0.0	0.0	0.0	2.8	0.0	52.7
Rolling uplands	1,449.7	648.2	442.3	562.9	398.0	4.3	93.2	258.5	96.8	156.2	181.1	85.6	14.5	132.9	33.5	68.0	33.9	42.8	48.9	1.2	5,216.0
Small drains	0.6	0.0	17.2	2.5	0.0	35.7	65.4	8.9	0.0	3.4	0.0	0.0	0.0	5.3	0.0	0.0	0.0	0.0	2.5	9.9	203.6
Swamps/bogs	2.7	6.2	22.5	0.0	2.8	106.7	44.4	0.9	0.0	4.1	0.0	0.0	3.6	22.9	0.0	7.4	0.0	0.0	0.0	11.4	398.2
Unavailable	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Table 23-06. Forest ownership, in acres (percentage of column total), in BCR 23.

Ownership	Total	Minnesota	Wisconsin	Michigan	Iowa	Indiana	Illinois
County or municipal	853,627	122,050	595,861	129,355	1,782	4,579	0
	(6.0)	(5.5)	(8.3)	(3.1)	(0.4)	(1.3)	(0.0)
Other federal	38,467	19,727	9,038	9,703	0	0	0
	(0.3)	(0.9)	(0.1)	(0.2)	(0.0)	(0.0)	(0.0)
Other local government	4,624	941	0	3,683	0	0	0
	(< 0.1)	(<0.1)	(0.0)	(0.1)	(0.0)	(0.0)	(0.0)
Private	11,680,328	1,756,174	5,884,970	3,279,910	341,388	325,196	92,691
	(81.5)	(79.2)	(82.2)	(79.9)	(84.4)	(95.3)	(100.0)
State	1,137,909	269,080	407,440	390,829	59,264	11,296	0
	(7.9)	(12.1)	(5.7)	(9.5)	(14.6)	(3.3)	(0.0)
U.S. Department of Defense	71,114	14,518	53,842	2,755	0	0	0
	(0.5)	(0.6)	(0.8)	(0.1)	(0.0)	(0.0)	(0.0)
U.S. Fish and	113,296	35,543	75,564	0	2,188	0	0
Wildlife Service	(0.8)	(1.6)	(1.1)	(0.0)	(0.5)	(0.0)	(0.0)
U. S. National Forest	422,336	0	131,545	290,792	0	0	0
	(2.9)	(0.0)	(1.8)	(7.1)	(0.0)	(0.0)	(0.0)
U.S. National Park Service	2,106	0	2,106	0	0	0	0
	(<0.1)	(0.0)	(<0.1)	(0.0)	(0.0)	(0.0)	(0.0)
All	14,323,806	2,218,032	7,160,365	4,107,026	404,622	341,071	92,691
	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)

Table 23-07A. Compilation of historical and current habitat, in acres, and population for woodcock in BCR 23. Historical time period refers to 1970–1975. Iowa is not included in the Singing-ground Survey and, therefore, is not included in calculations for BCR 23. Data reflects total land area.

	Historical	Current
Illinois	395,981	395,981
Indiana	3,070,157	3,070,157
Michigan	19,948,467	19,948,467
Minnesota	12,858,829	12,858,829
Wisconsin	27,502,970	27,502,970
Total	63,776,403	63,776,403
Manageable acres		
Illinois	59,700	92,691
Indiana	248,400	341,071
Michigan	3,490,950	4,107,026
Minnesota	1,946,500	2,218,032
Wisconsin	6,346,200	7,604,561
Total	12,091,750	14,363,381

Table 23-07B. Calculation of current and historical singing males and singling-male deficit for woodcock in BCR 23. Historical time period refers to 1970–1975.The population deficit is not simply the historical population of singing males minus the current level. The deficit considers the density of singing males on manageable acres for each time period. Iowa is not included in the Singing-ground Survey and, therefore, is not included in calculations for BCR 23.

Population of singing males	Historical	Current
Illinois	599	481
Indiana	8,012	4,502
Michigan	134,278	99,832
Minnesota	48,226	42,781
Wisconsin	114,890	84,519
Total	306,005	232,114
Population deficit of singing males		
Illinois		449
Indiana		6,499
Michigan		58,143
Minnesota		12,172
Wisconsin		53,152
Total		130,415

Table 23-07C. Calculation of habitat goal, in acres, which is calculated as the population deficit multiplied by the historical number of acres of early successional habitat per singing male (11.59 acres of early successional habitat per singing male).

	Habitat goal
Illinois	5,204
Indiana	75,324
Michigan	673,879
Minnesota	141,078
Wisconsin	616,032
Total	1,548,742

Bird Conservation Region 24: Central Hardwoods

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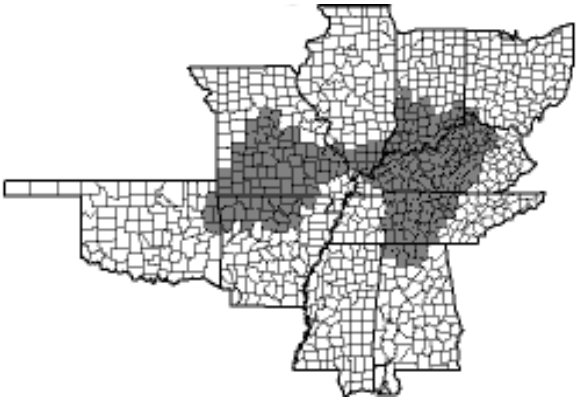

Affected States: Missouri, Illinois, Indiana, Ohio, Kentucky, Tennessee, Alabama, Arkansas and Oklahoma
Current Area of Forestland: 31,790,660 acres (12,865,362 ha) (3,324352 acres [1,345,332ha] of small-diameter and nonstocked forest)
Woodcock Trend Estimate (1966–2004): 3.0
Percent of Change per Year (1994–2004): 9.2
Woodcock Population Estimate (1970): 15,856
Singing Males Only (2004): 11,977

Physiography and Habitat Description

BCR 24 includes sections 222A (Ozark Highlands), 222D-F (Interior Low Plateau), and 222G-H (central Till Plain). These areas on either side of the Mississippi River are similar to each other and are dominated by oak/hickory deciduous forests. This region comprises the most extensive forests in the middle of the continent. Many large rivers occupy the region and along these rivers occur a diversity of floodplain and bottomland forest , as well as emergent wetlands. Threats to the habitats of the region include agricultural conversion and urbanization.

Between the current and baseline forest inventories there has been a loss of nearly 4.6 million acres (1.9 million ha, 13 percent) of timberland in this bird conservation region (Table 24-01). There was a major loss of over 1.2 million acres (0.49 ha, 79 percent) of small-diameter and nonstocked forest during the same period. Major forest types include white oak/red oak/hickory (43 percent), mixed upland hardwoods (8 percent), post oak/blackjack oak (7 percent), white oak (5 percent) and eastern red cedar/hardwood (5 percent, Tables 24-02 and 24-03). About 11 percent of total timberland in the region is comprised of small-diameter trees (Table 24-04). Rolling uplands

and dry slopes are the dominant physiographic classes on which major forest types within the region are found (Table 24-05). Around 86 percent of the 32.7 million acres (13.2 million ha) of timberland in the region is under private ownership. Federal land comprises 11 percent. Whereas, state or county land comprises 3 percent of all timberland (Table 24-06).

Harvest and Population Status

Only a part of BCR 24 is included in the Singing-ground Survey (SGS). These areas include southern Illinois, Indiana and Ohio. This region was probably never an important source of woodcock production.

For the portion of BCR 24 covered by the SGS there has been a long-term woodcock increase of 3 percent per year. The total estimate of singing males in survey states within the bird conservation region has declined from 15,856 during the early 1970s to the current estimate of 11,977 birds (Table 24-07). Illinois has experienced an increase in singing males and, therefore, does not have a population deficit. Although there has been an absolute decline in Ohio, at least on a density basis, the state does not have woodcock population deficit. The population deficit for Indiana is 8,043 singing males (Table 24-07).

Habitat Goals

As mentioned above, Illinois and Ohio do not have population deficits. Approximately 509,000 acres (206,000 ha) of new habitat is needed to eliminate the population deficit in Indiana (Table 24-07). This estimate pertains only to manageable acres in areas covered by the SGS. In BCR 24, the majority of timberland is under private ownership. Therefore, state and federal resource agencies will need to enlist the help of individual and commercial private forestland owners in order to achieve habitat management goals.

The focus of these habitat improvement efforts will have to be a significant increase in nonstocked and small-diameter tree classes. Old field management by federal and state agencies will have to be a priority as it seems that the loss of small-diameter and nonstocked classes was a result of private forest owner decisions. The bird conservation region has a wide variety of forest types. Most of these forest types occur on drier sites that are not typically thought of as better woodcock breeding areas. Possibly managing mesic sites for woodcock will be a strategy.

Table 24-01. Current and historical (1970–1976) stand-size distribution, in acres (percentage of column total), of forestland in BCR 24 and in portions of individual states within the bird conservation region.

	Current stand-size distribution					Historical stand-size distribution				
	Total forestland	Large diameter[1,2]	Medium diameter[1,3]	Small diameter[1,4]	Non-stocked[1,5]	Total forestland	Large diameter[1,2]	Medium diameter[1,3]	Small diameter[1,4]	Non-stocked[1,5]
Alabama	1,067,911	448,222	358,121	261,568	0	996,200	237,200	433,300	325,700	0
	(3.4)	(2.6)	(3.2)	(8.1)	(0.0)	(2.7)	(2.5)	(3.9)	(3.6)	(0.0)
Arkansas	4,991,672	2,330,897	2,243,729	417,046	0	5,179,700	672,800	1,319,500	3,175,900	11,500
	(15.7)	(13.4)	(20.2)	(13.0)	(0.0)	(14.2)	(7.1)	(11.8)	(34.9)	(0.2)
Illinois	1,064,802	739,739	272,254	50,871	1,938	2,454,200	1,330,900	643,800	446,100	33,400
	(3.3)	(4.3)	(2.4)	(1.6)	(1.7)	(6.7)	(14.1)	(5.8)	(4.9)	(0.5)
Indiana	3,076,225	2,325,113	500,564	239,874	10,674	2,824,500	1,432,400	650,600	705,700	35,800
	(9.7)	(13.4)	(4.5)	(7.5)	(9.5)	(7.8)	(15.2)	(5.8)	(7.7)	(0.5)
Kentucky	5,755,247	3,421,130	1,700,734	583,543	49,840	9,629,000	1,505,400	2,100,300	14,600	6,008,700
	(18.1)	(19.7)	(15.3)	(18.2)	(44.3)	(26.5)	(16.0)	(18.8)	(0.2)	(89.7)
Missouri	10,259,771	5,024,508	4,134,616	1,059,121	41,526	9,406,700	2,835,000	3,849,800	2,138,300	583,600
	(32.3)	(29.0)	(37.1)	(33.0)	(36.9)	(25.8)	(30.1)	(34.5)	(23.5)	(8.7)
Ohio	94,965	66,764	25,637	2,564	0	927,600	349,500	32,600	535,100	10,400
	(0.3)	(0.4)	(0.2)	(<0.1)	(0.0)	(2.5)	(3.7)	(0.3)	(5.9)	(0.2)
Tennessee	5,480,067	2,974,686	1,899,594	597,180	8,607	4,983,100	1,069,600	2,133,500	1,765,200	14,800
	(17.2)	(17.2)	(17.1)	(18.6)	(7.6)	(13.7)	(11.3)	(19.1)	(19.4)	(0.2)
Total	31,790,660	17,331,059	11,135,249	3,211,767	112,585	36,401,000	9,432,800	11,163,400	9,106,600	6,698,200
	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)

[1] Percentages for various diameter categories and nonstocked category refer to percent of total forestland for current and historical time periods within each state.
[2] Softwoods are at least 9 inches, and hardwoods are at least 11 inches in diameter at breast height.
[3] Trees are at least 5 inches in diameter at breast height but are smaller than large-diameter trees.
[4] Saplings are 1-5 inches diameter at breast height. Softwood seedlings are more than 6 inches tall, and hardwood seedlings are more than 12 inches tall.
[5] Commercial forestland on which stocking of trees is less than 16.7 percent.

Table 24-02. Percentage composition of forest types between states within BCR 24.

Forest type	Alabama	Arkansas	Illinois	Indiana	Kentucky	Missouri	Ohio	Oklahoma	Tennessee	Total
Chestnut oak	3.9	0.0	0.0	11.9	33.7	0.0	0.0	0.0	50.4	100.0
Chestnut oak/Black oak/Scarlet oak	0.0	0.5	0.7	4.3	17.0	73.8	0.0	0.0	3.7	100.0
Eastern red cedar	0.0	23.2	1.9	3.5	17.8	38.2	0.0	0.0	15.3	100.0
Eastern red cedar/Hardwood	1.2	18.2	0.5	4.2	27.6	27.0	0.0	0.0	21.3	100.0
Loblolly pine	30.8	24.4	0.0	0.0	2.8	0.0	0.0	0.0	42.0	100.0
Mixed upland hardwoods	7.6	12.1	2.4	9.1	9.7	16.2	1.2	0.0	41.7	100.0
Other	8.4	4.4	7.6	23.5	25.4	15.7	1.7	3.4	10.0	100.0
Post oak/Blackjack oak	0.8	26.2	0.5	0.0	2.7	56.3	0.0	11.3	2.1	100.0
Sassafras/Persimmon	0.0	4.2	16.8	35.1	7.8	33.6	0.0	0.0	2.5	100.0
Shortleaf pine	0.0	50.8	5.5	2.7	1.1	36.5	0.0	3.0	0.4	100.0
Shortleaf pine/Oak	1.9	0.0	1.0	2.1	3.0	82.7	0.0	6.0	3.3	100.0
Sugar maple/Beech/Yellow birch	1.3	0.0	5.4	52.3	26.5	11.0	1.7	0.0	1.8	100.0
Sugarberry/Hackberry/Elm/Green ash	10.1	3.9	11.5	7.2	33.4	14.0	0.0	0.8	19.2	100.0
Sweetgum/Yellow poplar	11.5	2.0	7.5	11.9	32.9	0.4	0.0	33.8	0.0	100.0
Sycamore/Pecan/American elm	0.7	16.0	7.3	12.0	30.2	15.7	0.0	2.3	15.8	100.0
Virginia pine/Southern red oak	5.6	66.4	0.0	4.4	22.0	0.0	0.0	0.0	1.6	100.0
White oak/Red oak/Hickory	1.6	18.0	2.9	6.5	17.7	35.3	0.0	3.6	14.5	100.0
White oak	2.1	6.8	2.1	8.6	3.6	65.6	0.0	0.0	11.1	100.0
White pine/Red oak/White ash	0.0	16.8	0.0	3.3	50.0	0.7	0.0	0.0	29.1	100.0
Yellow poplar/White oak/Red oak	1.4	0.0	1.4	24.9	22.1	0.0	0.0	0.0	50.3	100.0

Table 24-03. Forest composition of timberland, in acres (percentage of column total), within BCR 24.

Forrest type	Alabama	Arkansas	Illinois	Indiana	Kentucky	Missouri	Ohio	Oklahoma	Tennessee	Total
Chestnut oak	17,653	0	0	53,533	151,984	0	0	0	227,201	450,371
	(1.7)	(0.0)	(0.0)	(1.7)	(2.6)	(0.0)	(0.0)	(0.0)	(4.3)	(1.4)
Chestnut oak/Black oak/Scarlet oak	0	2,039	2,773	16,940	67,058	291,579	0	0	14,627	395,016
	(0.0)	(0.04)	(0.3)	(0.6)	(1.2)	(2.8)	(0.0)	(0.0)	(0.3)	(1.2)
Eastern red cedar	0	208,422	17,457	31,833	160,046	343,905	0	0	138,072	899,735
	(0.0)	(4.2)	(1.6)	(1.0)	(2.8)	(3.4)	(0.0)	(0.0)	(2.6)	(2.8)
Eastern red cedar/Hardwood	20,985	315,060	9,284	72,122	477,927	467,394	0	0	369,796	1,732,568
	(2.0)	(6.3)	(0.9)	(2.3)	(8.3)	(4.6)	(0.0)	(0.0)	(7.0)	(5.3)
Loblolly pine	105,335	83,453	0	0	9,503	0	0	0	143,386	341,677
	(9.9)	(1.7)	(0.0)	(0.0)	(0.2)	(0.0)	(0.0)	(0.0)	(2.7)	(1.0)
Mixed upland hardwoods	190,022	302,709	60,579	226,533	241,390	405,820	30,765	0	1,041,931	2,499,749
	(17.8)	(6.1)	(5.7)	(7.4)	(4.2)	(4.0)	(32.4)	(0.0)	(19.7)	(7.6)
Other	245,560	128,836	222,313	689,478	745,517	459,657	48,818	100,974	292,850	2,934,003
	(23.0)	(2.6)	(20.9)	(22.4)	(13.0)	(4.5)	(51.4)	(9.0)	(5.5)	(9.0)
Post oak/Blackjack oak	17,687	583,431	11,936	0	59,539	1,251,797	0	251,713	47,521	2,223,624
	(1.7)	(11.7)	(1.1)	(0.0)	(1.0)	(12.2)	(0.0)	(22.6)	(0.9)	(6.8)
Sassafras/Persimmon	0	13,300	53,445	112,003	24,921	106,966	0	0	8,088	318,723
	(0.0)	(0.3)	(5.0)	(3.6)	(0.4)	(1.0)	(0.0)	(0.0)	(0.2)	(1.0)
Shortleaf pine	0	239,736	25,878	12,780	5,340	172,208	0	14,261	1,752	471,955
	(0.0)	(4.8)	(2.4)	(0.4)	(0.09)	(1.7)	(0.0)	(1.3)	(0.03)	(1.4)
Shortleaf pine/Oak	8,075	0	4,185	8,663	12,642	347,047	0	25,247	13,686	419,545
	(0.8)	(0.0)	(0.4)	(0.3)	(0.2)	(3.4)	(0.0)	(2.3)	(0.3)	(1.3)
Sugar maple/Beech/Yellow birch	9,574	0	40,862	395,894	200,424	83,411	12,819	0	13,907	756,891
	(0.9)	(0.0)	(3.8)	(12.9)	(3.5)	(0.8)	(13.5)	(0.0)	(0.3)	(2.3)
Sugarberry/Hackberry/Elm/	78,852	30,554	89,413	55,780	259,903	108,832	0	5,932	149,113	778,379
Green ash	(7.4)	(0.6)	(8.4)	(1.8)	(4.5)	(1.1)	(0.0)	(0.5)	(2.8)	(2.4)
Sweetgum/Yellow poplar	68,092	11,684	44,389	70,137	194,679	2,372	0	200,214	0	591,567
	(6.4)	(0.2)	(4.2)	(2.3)	(3.4)	(0.02)	0.00	(17.9)	0.00	(1.8)
Sycamore/Pecan/American elm	2,136	46,171	21,203	34,755	87,453	45,399	0	6,688	45,602	289,407
	(0.2)	(0.9)	(2.0)	(1.1)	(1.5)	(0.4)	(0.0)	(0.6)	(0.9)	(0.9)
Virginia pine/Southern red oak	23,884	281,847	0	18,492	93,127	0	0	0	6,805	424,155
	(2.2)	(5.6)	(0.0)	(0.6)	(1.6)	(0.0)	(0.0)	(0.0)	(0.1)	(1.3)
White oak	37,894	120,518	36,946	152,777	63,601	1,162,551	0	0	197,213	1,771,500
	(3.5)	(2.4)	(3.5)	(5.0)	(1.1)	(11.3)	(0.0)	(0.0)	(3.7)	(5.4)
White oak/Red oak/Hickory	231,547	2,550,128	413,678	917,617	2,509,443	5,007,702	2,564	510,999	2,051,601	14,195,279
	(21.7)	(51.1)	(38.9)	(29.8)	(43.6)	(48.8)	(2.7)	(45.8)	(38.9)	(43.4)
White pine/Red oak/White ash	0	73,787	0	14,638	219,451	3,127	0	0	127,717	438,720
	(0.0)	(1.5)	(0.0)	(0.5)	(3.8)	(0.03)	(0.0)	(0.0)	(2.4)	(1.3)
Yellow poplar/White oak/Red oak	10,615	0	10,462	192,252	171,303	0	0	0	388,987	773,619
	(1.0)	(0.0)	(1.0)	(6.2)	(3.0)	(0.0)	(0.0)	(0.0)	(7.4)	(2.4)

Table 24-04. Stand-size class composition (in thousands of acres) of the most common forest types found in states within BCR 24. Large-diameter trees are hardwoods that measure at least 11 inches diameter, 9 inches for softwoods; size class has more than 50 percent of stocking in medium- and large-diameter trees, with stocking of large trees equal to or greater than medium-diameter trees. Medium-diameter trees are trees that measure at least 5 inches diameter but are not as large as large-diameter trees; size class has more than 50 percent of stocking in medium- and large-diameter trees, with stocking of large-diameter trees less than stocking of medium-diameter trees. Small-diameter trees are trees that measure less than 5 inches diameter; size class has at least 50 percent of the stocking in small-diameter trees.

	Forest type																				
Stand-size class	White oak/Red oak/Hickory	Mixed upland hardwoods	Post oak/Blackjack oak	White oak	Eastern red cedar/Hardwood	Eastern red cedar	Sugarberry/Hackberry/Elm/Green ash	Yellow poplar/White oak/Red oak	Sugar maple/Beech/Yellow birch	Shortleaf pine/Oak	Sweetgum/Yellow poplar	Shortleaf pine	Chestnut oak	White pine/Red oak/White ash	Chestnut oak/Black oak/Scarlet oak	Loblolly pine	Sassafras/Persimmon	Sycamore/Pecan/American elm	Cherry/Ash/Yellow poplar	River birch/Sycamore	All forest types
Alabama																					
Large	173.8	18.8	4.2	21.3	0.0	0.0	16.7	2.2	9.6	0.0	16.7	0.0	17.7	0.0	0.0	44.2	0.0	2.1	0.0	7.2	448.2
Medium	55.1	110.0	2.7	16.6	21.0	0.0	12.4	8.5	0.0	0.0	39.1	0.0	0.0	0.0	0.0	11.1	0.0	0.0	0.0	11.9	358.1
Small	2.7	61.2	10.8	0.0	0.0	0.0	49.8	0.0	0.0	8.1	12.3	0.0	0.0	0.0	0.0	50.0	0.0	0.0	0.0	0.0	261.6
Arkansas																					
Large	1,437.0	134.0	190.2	40.8	32.2	26.5	15.0	0.0	0.0	143.8	1.9	181.0	0.0	14.4	0.0	46.6	0.0	17.4	0.0	10.5	2,330.9
Medium	1,014.1	100.2	358.6	79.8	230.2	124.7	15.6	0.0	0.0	115.8	3.5	55.0	0.0	46.0	0.0	21.7	0.0	23.7	0.0	11.4	2,243.7
Small	99.0	68.5	34.6	0.0	52.7	57.2	0.0	0.0	0.0	22.2	6.3	3.7	0.0	13.4	0.0	15.2	13.3	5.1	0.0	0.0	417.0
Illinois																					
Large	319.0	38.5	11.9	36.9	0.0	2.1	52.7	6.3	24.0	4.2	28.8	24.7	0.0	0.0	0.0	0.0	24.4	15.7	0.0	11.6	739.7
Medium	76.7	22.1	0.0	0.0	0.0	15.4	33.9	0.0	11.7	0.0	15.0	0.8	0.0	0.0	0.0	0.0	26.7	0.0	15.5	3.7	272.3
Small	18.0	0.0	0.0	0.0	9.3	0.0	2.8	4.2	5.1	0.0	0.6	0.4	0.0	0.0	2.8	0.0	2.3	5.5	0.0	0.0	50.9
Large	803.5	105.3	0.0	142.8	29.8	12.2	35.1	150.7	363.1	8.7	54.2	12.8	53.5	14.6	16.9	0.0	66.4	17.4	95.3	41.5	2,325.1
Medium	89.6	93.0	0.0	10.0	26.1	11.9	12.0	22.8	14.6	0.0	7.9	0.0	0.0	0.0	0.0	0.0	24.4	10.6	38.5	31.4	500.6
Small	24.5	28.3	0.0	0.0	16.2	7.8	8.7	18.8	18.2	0.0	8.0	0.0	0.0	0.0	0.0	0.0	21.2	6.7	31.9	0.0	239.9
Kentucky																					
Large	1,755.0	129.6	44.6	50.7	124.4	30.2	166.5	122.9	154.9	6.9	94.7	3.2	105.1	61.9	43.5	5.9	5.0	60.7	49.1	22.7	3,421.1
Medium	652.2	83.3	1.0	12.9	198.0	68.4	81.7	35.0	33.3	5.7	84.7	2.1	37.3	128.3	23.5	3.6	6.4	22.4	4.4	32.7	1,700.7
Small	102.2	28.4	14.0	0.0	155.5	61.5	11.7	13.3	12.2	0.0	15.3	0.0	9.7	29.3	0.0	0.0	13.5	4.4	0.0	9.6	583.5
Missouri																					
Large	2,672.3	113.3	490.2	734.5	71.6	62.0	63.1	0.0	42.7	222.1	0.0	123.1	0.0	3.1	159.9	0.0	7.5	31.1	0.0	44.1	5,024.5
Medium	1,919.6	170.0	671.5	411.0	283.0	184.5	22.5	0.0	27.8	115.7	0.0	44.2	0.0	0.0	102.0	0.0	22.5	14.3	1.6	13.2	4,134.6
Small	415.8	122.5	90.1	17.1	112.8	97.4	23.3	0.0	12.9	9.2	2.4	4.9	0.0	0.0	29.7	0.0	77.0	0.0	0.8	5.9	1,059.1

Table 24-04 (continued). Stand-size class composition (in thousands of acres) of the most common forest types found in states within BCR 24. Large-diameter trees are hardwoods that measure at least 11 inches diameter, 9 inches for softwoods; size class has more than 50 percent of stocking in medium- and large-diameter trees, with stocking of large trees equal to or greater than medium-diameter trees. Medium-diameter trees are trees that measure at least 5 inches diameter but are not as large as large-diameter trees; size class has more than 50 percent of stocking in medium- and large-diameter trees, with stocking of large-diameter trees less than stocking of medium-diameter trees. Small-diameter trees are trees that measure less than 5 inches diameter; size class has at least 50 percent of the stocking in small-diameter trees.

	Forest type																				
Stand-size class	White oak/Red oak/Hickory	Mixed upland hardwoods	Post oak/Blackjack oak	White oak	Eastern red cedar/Hardwood	Eastern red cedar	Sugarberry/Hackberry/Elm/Green ash	Yellow poplar/White oak/Red oak	Sugar maple/Beech/Yellow birch	Shortleaf pine/Oak	Sweetgum/Yellow poplar	Shortleaf pine	Chestnut oak	White pine/Red oak/White ash	Chestnut oak/Black oak/Scarlet oak	Loblolly pine	Sassafras/Persimmon	Sycamore/Pecan/American elm	Cherry/Ash/Yellow poplar	River birch/Sycamore	All forest types
Ohio																					
Large	0.0	20.5	0.0	0.0	0.0	0.0	0.0	0.0	10.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.0	0.0	66.8
Medium	2.6	7.7	0.0	0.0	0.0	0.0	0.0	0.0	2.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.6	0.0	25.6
Small	0.0	2.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.6
Stand size class																					
Oklahoma																					
Large	218.5	0.0	85.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.7	0.0	0.0	0.0	0.0	0.0	6.7	0.0	0.0	336.8
Medium	139.6	0.0	79.8	0.0	0.0	0.0	0.0	0.0	0.0	25.2	0.0	7.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	290.1
Small	152.9	0.0	86.3	0.0	0.0	0.0	5.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	289.0
Tennessee																					
Large	1,391.5	513.7	29.5	153.9	33.7	14.2	65.2	309.3	7.1	13.7	78.9	1.8	177.3	11.9	6.8	33.0	2.2	17.8	0.0	0.0	2,974.7
Medium	568.6	399.5	18.0	43.3	277.0	81.4	62.8	48.8	6.8	0.0	76.1	0.0	42.0	74.4	7.8	37.0	3.9	20.6	8.0	0.0	1,899.6
Small	91.5	128.7	0.0	0.0	59.0	42.5	21.1	30.9	0.0	0.0	45.2	0.0	7.9	41.4	0.0	73.4	2.0	7.2	0.0	0.0	597.2
Total																					
Large	8,770.5	1,073.7	856.3	1,180.8	291.8	147.1	414.3	591.3	611.6	399.4	275.2	353.2	353.5	105.9	227.2	129.6	105.6	169.0	158.4	137.6	17,667.8
Medium	4,518.1	985.8	1,131.6	573.6	1,035.2	486.2	240.8	115.0	96.8	262.5	226.3	109.8	79.2	248.6	133.3	73.5	84.0	91.6	70.6	104.3	11,425.3
Small	906.6	440.2	235.8	17.1	405.5	266.4	123.3	67.3	48.4	39.5	90.1	9.0	17.6	84.1	32.4	138.6	129.1	28.9	32.7	15.6	3,500.7

Table 24-05. Physiographic class composition (in thousands of acres) of the most common forest types found in states within BCR 24.

	Forest type																			
Physiographic class	White oak/Red oak/Hickory	Mixed upland hardwoods	Post oak/Blackjack oak	White oak	Eastern red cedar/Hardwood	Eastern red cedar	Sugarberry/Hackberry/Elm/Green ash	Yellow poplar/White oak/Red oak	Sugar maple/Beech/Yellow birch	Sweetgum/Yellow poplar	Shortleaf pine	Chestnut oak	White pine/Red oak/White ash	Virginia pine/Southern red oak	Shortleaf pine/Oak	Chestnut oak/Black oak/Scarlet oak	Loblolly pine	Sassafras/Persimmon	Sycamore/Pecan/American elm	All forest types
Bays and wet pocosins	0.0	0.0	0.0	0.0	13.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.3
Beaver ponds	0.0	0.0	0.0	0.0	0.0	0.0	10.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	19.5
Broad floodplains/ Bottomland	50.4	9.3	0.0	1.8	16.4	0.0	75.1	6.0	0.0	7.7	0.0	0.0	4.9	4.5	0.0	0.0	0.0	1.5	86.9	491.0
Deep sands	3.6	0.0	0.0	3.1	370.0	0.0	0.0	5.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	12.4
Dry slopes	3,494.8	174.8	650.6	773.7	74.0	215.9	8.7	7.6	43.4	6.7	87.6	37.1	0.0	11.9	179.5	204.1	9.9	48.4	2.3	6,550.2
Dry tops	660.1	41.5	322.9	90.7	0.0	65.4	0.0	2.1	0.0	0.0	40.3	49.7	9.4	5.7	96.5	68.0	0.0	12.1	0.0	1,586.6
Flatwoods	472.7	118.5	106.0	26.0	0.0	48.4	50.1	33.1	62.0	117.9	39.0	0.0	24.6	8.6	30.7	2.8	25.3	66.9	40.4	1,884.1
Moist slopes and coves	596.5	105.6	1.8	37.4	1,017.2	1.3	13.7	105.5	116.8	26.1	13.3	24.0	4.3	8.0	33.6	18.3	0.0	11.3	7.4	1,287.6
Narrow floodplains/ Bottomland	108.8	62.1	13.1	20.8	42.9	6.7	212.6	5.2	15.0	55.8	4.2	0.0	3.1	0.0	3.7	0.0	2.4	11.0	93.1	1,000.8
Other hydric	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.2
Other mesic	567.9	1.9	0.0	3.0	1.8	10.7	9.7	22.3	15.5	0.0	20.4	6.7	4.8	0.0	29.3	0.0	0.0	12.0	6.7	1,099.6
Other xeric	70.1	5.2	36.4	7.3	0.0	13.0	0.0	0.0	1.5	0.0	6.4	0.0	0.0	1.5	9.3	3.2	0.0	0.0	0.0	154.6
Rolling uplands	8,117.0	1,937.0	841.1	801.0	194.8	537.5	248.9	564.3	478.3	377.3	260.9	332.9	381.8	102.1	318.8	97.2	301.9	155.6	45.0	18,311.1
Swamps/Bogs	0.0	0.0	0.0	0.0	0.0	0.0	9.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	36.1
Small drains	46.1	13.2	0.0	6.8	0.0	0.9	3.9	21.8	11.5	0.0	0.0	0.0	5.9	0.0	0.0	1.5	2.1	0.0	7.7	167.3

Table 24-06. Forest ownership, in acres (percent of column total), in BCR 24.

Ownership	Total	Alabama	Arkansas	Illinois	Indiana	Kentucky	Missouri	Ohio	Oklahoma	Tennessee
County and	159,539	2,859	5,994	28,769	16,279	29,338	23,872	10,255	20,963	21,209
municipal	(0.5)	(0.3)	(0.1)	(2.7)	(0.5)	(0.5)	(0.2)	(10.8)	(2.3)	(0.4)
National forest	2,607,426	53,665	685,300	260,073	182,499	86,012	1,331,330	0	0	8,547
	(7.8)	(5.0)	(13.7)	(24.4)	(5.9)	(1.5)	(13.0)	(0.0)	(0.0)	(0.2)
Other federal	536,078	41,587	74,322	0	45,036	107,846	106,085	0	24,484	136,717
	(1.6)	(3.9)	(1.5)	(0.0)	(1.5)	(1.9)	(1.0)	(0.0)	(2.7)	(2.5)
Private	27,962,788	863,180	4,118,569	713,286	2,524,688	5,400,686	8,262,438	84,710	836,920	5,158,313
	(85.5)	(80.8)	(82.5)	(67.0)	(82.1)	(93.8)	(80.5)	(89.2)	(91.4)	(94.1)
State	1,031,167	38,451	99,479	38,991	177,115	78,658	457,742	0	33,447	107,284
	(3.2)	(3.6)	(2.0)	(3.7)	(5.8)	(1.4)	(4.5)	(0.0)	(3.7)	(2.0)
U.S. Department	281,159	26,330	8,012	0	100,882	43,796	54,137	0	0	48,001
of Defense	(0.9)	(2.5)	(0.2)	(0.0)	(3.3)	(0.8)	(0.5)	(0.0)	(0.0)	(0.9)
U.S. Fish and	109,607	41,839	0	23,685	29,728	8,912	5,444	0	0	0
Wildlife Service	(0.3)	(3.9)	(0.0)	(2.2)	(1.0)	(0.2)	(<0.1)	(0.0)	(0.0)	(0.0)
U. S. National	18,716	0	0	0	0	0	18,716	0	0	0
Park Service	(<0.1))	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.2)	(0.0)	(0.0)	(0.0)
All	32,706,482	1,067,911	4,991,676	1,064,804	3,076,226	5,755,250	10,259,766	94,965	915,814	5,480,071
	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)

Table 24-07A. Compilation of historical and current habitat, in acres, for woodcock in BCR 24.

	Historical	Current
Illinois	4,048,314	4,048,314
Indiana	8,805,504	8,805,504
Ohio	264,179	264,179
Total	13,117,997	13,117,997
Manageable acres		
Illinois	2,454,200	1,064,802
Indiana	2,824,500	3,076,225
Ohio	927,600	94,965
Total	6,206,300	4,235,992

Table 24-07B. Calculation of singing males and of singing-male deficit for woodcock in BCR 24.

Population of singing males	Historical	Current
Illinois	3,697	6,971
Indiana	11,715	4,716
Ohio	443	211
Total	15,856	11,977
Population deficit		
of singing males		
Illinois		0
Indiana		8,043
Ohio		0
Total		8,043

Table 24-07C. Calculation of habitat goal, in acres, for woodcock in BCR 24.

	Habitat goal
Illinois	0
Indiana	509,126
Ohio	0
Total	509,126

Bird Conservation Region 25: West Gulf Coastal Plain/Ouachita

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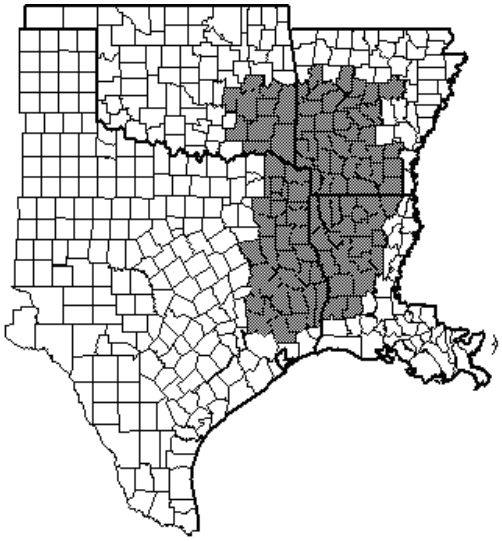

Affected States: Arkansas, Louisiana, Oklahoma and Texas
Current Area of Forestland: 33,236,000 acres (13,450,276 ha) (5,852,571 acres [2,368,477 ha] of small-diameter and nonstocked forest)
Woodcock Trend Estimate: not applicable
Percent of Change per Year: not applicable
Woodcock Population Estimate: not applicable
Singing Males Only: not applicable

Physiography and Habitat Description

The portions of BCR 25 are contained in sections 232F (coastal Plains and Flatwoods), 231E (midcoastal Plains, Western), and 231G (Arkansas Valley). Such areas are pine dominated with largely shortleaf pine in the north, which includes the Ouachita Mountains, and longleaf pine in the south. Hardwood-dominated bottomland along the Arkansas River and other drainages occur. Much of this land has been converted to pine plantation, pasture or other land uses.

Between the current and baseline forest inventories there has been a loss of nearly 362,000 acres (146,500 ha, 2 percent) of timberland in this bird conservation region (Table 25-01). Worse, there has been a net loss of over 4,152,000 acres (1,680.273 ha, 42 percent) of small-diameter and nonstocked forest during the same period. Major forest types include loblolly pine (38 percent), loblolly/hardwood (12 percent), white oak/red oak/hickory (11 percent), shortleaf pine (6 percent), sweetgum/Nuttall oak/willow oak (6 percent) and shortleaf pine/oak (6 percent, Tables 25-02 and 25-03). About 24 percent of the total timberland is comprised of small-diameter trees (Table 25-04). Rolling uplands and flatwoods are the dominant physiographic classes on which major forest types within the region are found (Table 25-05). Approximately 87 percent of the 34.3 million acres (13,880 million

ha) of timberland in the region is under private ownership (Table 25-06). Federal land comprises almost 10 percent of timberland while state or county forest ownership comprises another 2 percent.

Habitat Goals

The substantial decline in both small-diameter and nonstocked classes of trees from historical distributions is a major concern. It seems that the loss in the small-diameter class can be attributed to the concomitant increase in medium- and, especially, large-diameter tree classes. Of the medium- and large-diameter classes for wintering woodcock, the shift to the large-diameter class is preferable compared to a shift to the medium-diamter class. Most of the current forestland is in loblolly pine (approximately 38 percent). Undoubtedly, much of that loblolly pine is under plantation management. While loblolly pine is used by wintering woodcock, other forest types with a greater component of hardwood would be preferable, e.g., loblolly pine/hardwood and sweetgum/Nuttall oak/willow oak.

Of the possible ways to alter loblolly pine stands to include a greater hardwood component, the primary mechanism will be an increase in the need for hardwood products and the ability to substitute hardwood fiber into previously pine-only products. Both of these mechanisms revolve around the notion that (1) some hardwoods are more suited for stands where pines are grown off-site or only with the aid of moderate to intensive management, and (2) changing technologies have allowed the substitution of hardwood fiber in previously pine-only products. With profit margins shrinking, the luxury of planting pines on sites that are better suited for hardwoods will no longer be appropriate. The increased demand for cheaper hardwood fiber will increase the need for hardwood management on marginal pineland. Thus, the need for large-scale federal or state programs to subsidize a shift in pine production may not be as necessary in this bird conservation region as elsewhere. During the hopeful shift from pine dominated stands to pine/hardwood stands, federal and state land managers should be encouraged to manage for a larger component of hardwood stands of small-diameter and nonstocked classes.

Without sufficient wintering habitat, any increases in woodcock production on the breeding grounds will be for naught because the limiting population factor will shift to insufficient wintering habitat.

Table 25-01. Current and historical (1970–1976) stand-size distribution, in acres (percentage of column total), of forestland in BCR 25 and in portions of individual states within the bird conservation region.

	Current stand-size distribution					Historic stand-size distribution				
	Total forestland	Large diameter[1,2]	Medium diameter[1,3]	Small diameter[1,4]	Non-stocked[1,5]	Total forestland	Large diameter[1,2]	Medium diameter[1,3]	Small diameter[1,4]	Non-stocked[1,5]
Arkansas	11,250,900	5,999,212.0	3,291,919.0	1,959,777.0	12,300	11,173,500	3,882,700	3,015,200	4,235,100	40,500
	(33.9)	(37.1)	(35.7)	(33.8)	(26.6)	(33.3)	(26.4)	(34.0)	(43.2)	(19.6)
Louisiana	8,330,800	3,993,805.0	2,046,868.0	229,015.0	15,900	8,722,000	4,368,600	2,258,100	1,947,200	148,100
	(25.1)	(24.7)	(22.2)	(3.9)	(34.3)	(26.0)	(29.7)	(25.4)	(19.9)	(71.6)
Oklahoma	3,467,800	974,026	1,523,839	969,927	0	3,185,900	885,300	1,103,100	1,191,700	6,000
	(10.4)	(6.0)	(16.5)	(16.7)	(0.0)	(9.5)	(6.0)	(12.4)	(12.2)	(2.9)
Texas	10,186,500	5,179,429.0	2,359,493.0	2,647,552.0	18,100	10,517,400	5,580,500	2,500,600	2,424,000	12,100
	(30.6)	(32.1)	(25.6)	(45.6)	(39.0)	(31.3)	(37.9)	(28.2)	(24.7)	(5.9)
Total	33,236,000	16,146,472	9,222,119	5,806,271	46,300	33,598,800	14,717,100	8,877,000	9,798,000	206,700
	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)

[1] Percentages for various diameter categories and nonstocked category refer to percent of total forestland for current and historical time periods within each state.
[2] Softwoods are at least 9 inches, and hardwoods are at least 11 inches in diameter at breast height.
[3] Trees are at least 5 inches in diameter at breast height but are smaller than large-diameter trees.
[4] Saplings are 1 to 5 inches diameter at breast height. Softwood seedlings are more than 6 inches tall, and hardwood seedlings are more than 12 inches tall.
[5] Data refers to commercial forest land on which stocking of trees is less than 16.7 percent.

Table 25-02. Percentage composition of forest types between states within BCR 25.

Forest type	Arkansas	Louisiana	Oklahoma	Texas	Total
Bald cypress/Water tupelo	23.8	51.3	0.0	24.9	100.0
Eastern red cedar/Hardwood	65.6	0.0	24.7	9.7	100.0
Loblolly pine	30.8	29.3	3.6	36.2	100.0
Loblolly pine/Hardwood	28.1	28.9	2.0	41.0	100.0
Longleaf pine	0.0	80.8	0.0	19.2	100.0
Mixed upland hardwoods	44.3	37.2	1.4	17.1	100.0
Nonstocked	20.4	18.3	0.0	61.3	100.0
Oak/Gum/Cypress group	0.0	0.0	100.0	0.0	100.0
Other	32.5	18.3	25.2	24.1	100.0
Overcup oak/Water hickory	14.1	41.6	1.7	42.5	100.0
Post oak/Blackjack oak	26.4	0.0	34.1	39.5	100.0
Shortleaf pine	48.1	5.1	26.8	20.0	100.0
Shortleaf pine/Oak	48.6	1.3	26.5	23.7	100.0
Slash pine	0.0	77.9	0.0	22.1	100.0
Sugarberry/Hackberry/Elm/Green ash	26.6	17.6	16.1	39.7	100.0
Swamp chestnut oak/Cherrybark oak	30.0	22.2	0.0	47.7	100.0
Sweetbay/Swamp tupelo/Red maple	8.2	37.4	0.0	54.3	100.0
Sweetgum/Nuttall oak/Willow oak	42.7	30.3	2.1	24.8	100.0
Sweetgum/Yellow poplar	45.0	40.1	0.0	14.9	100.0
White oak/Redoak/Hickory	44.5	18.9	21.5	15.1	100.0

Table 25-03. Forest composition of timberland, in acres (percentage of column total), within BCR 25.

Forest type	Arkansas	Louisiana	Oklahoma	Texas	Total
Baldcypress/Water tupelo	68,067	146,904	0	71,133	286,104
	(0.6)	(1.7)	(0.0)	(0.7)	(0.8)
Eastern red cedar/Hardwood	175,220	0	65,999	26,006	267,225
	(1.5)	(0.0)	(1.9)	(0.2)	(0.8)
Loblolly pine	3,976,489	3,781,497	464,743	4,673,619	12,896,348
	(34.2)	(44.2)	(13.1)	(44.4)	(37.7)
Loblolly pine/Hardwood	1,167,031	1,198,501	83,600	1,701,720	4,150,852
	(10.0)	(14.0)	(2.4)	(16.2)	(12.1)
Longleaf pine	0	181,669	0	43,074	224,743
	(0.0)	(2.1)	(0.0)	(0.4)	(0.7)
Mixed upland hardwoods	283,068	237,853	9,260	109,460	639,641
	(2.4)	(2.8)	(0.3)	(1.0)	(1.9)
Nonstocked	32,233	29,054	0	97,095	158,382
	(0.3)	(0.3)	(0.0)	(0.9)	(0.5)
Oak/Gum/Cypress group	0	0	150,588	0	150,588
	(0.0)	(0.0)	(4.2)	(0.0)	(0.4)
Other	370,645	208,351	287,140	274,515	1,140,651
	(3.2)	(2.4)	(8.1)	(2.6)	(3.3)
Overcup oak/Water hickory	91,077	268,105	11,122	273,932	644,236
	(0.8)	(3.1)	(0.3)	(2.6)	(1.9)
Post oak/Blackjack oak	290,394	0	374,626	434,152	1,099,172
	(2.5)	(0.0)	(10.5)	(4.1)	(3.2)
Shortleaf pine	1,048,039	110,246	583,175	435,768	2,177,228
	(9.0)	(1.3)	(16.4)	(4.1)	(6.4)
Shortleaf pine/Oak	983,557	25,929	536,598	479,688	2,025,772
	(8.5)	(0.3)	(15.1)	(4.6)	(5.9)
Slash pine	0	562,874	0	159,938	722,812
	(0.0)	(6.6)	(0.0)	(1.5)	(2.1)
Sugarberry/Hackberry/Elm/Green ash	174,157	115,097	105,314	259,248	653,816
	(1.5)	(1.3)	(3.0)	(2.5)	(1.9)
Swamp chestnut oak/Cherrybark oak	152,351	112,608	0	242,115	507,074
	(1.3)	(1.3)	(0.0)	(2.3)	(1.5)
Sweetbay/Swamp tupelo/Red maple	12,453	56,545	0	82,059	151,057
	(0.1)	(0.7)	(0.0)	(0.8)	(0.4)
Sweetgum/Nuttall oak/Willow oak	917,059	651,277	46,139	532,921	2,147,396
	(79)	(7.6)	(1.3)	(5.1)	(6.3)
Sweetgum/Yellow poplar	140,844	125,316	0	46,593	312,753
	(1.2)	(1.5)	(0.0)	(0.4)	(0.9)
White oak/Red oak/Hickory	1,734,692	735,257	836,525	588,032	3,894,506
	(14.9)	(8.6)	(23.5)	(5.6)	(11.4)

Table 25-04. Stand-size class composition (in thousands of acres) of the most common forest types found in states within BCR 25. Large-diameter trees are hardwoods that measure at least 11 inches diameter, 9 inches for softwoods; size class has more than 50 percent of stocking in medium- and large-diameter trees, with stocking of large trees equal to or greater than medium-diameter trees. Medium-diameter trees are trees that measure at least 5 inches diameter but are not as large as large-diameter trees; size class has more than 50 percent of stocking in medium- and large-diameter trees, with stocking of large-diameter trees less than stocking of medium-diameter trees. Small-diameter trees are trees that measure less than 5 inches diameter; size class has at least 50 percent of the stocking in small-diameter trees.

	Forest type																				
Stand-size class	Loblolly pine	Loblolly pine/Hardwood	White oak/Red oak/Hickory	Shortleaf pine	Sweetgum/Nuttall oak/Willow oak	Shortleaf pine/Oak	Post oak/Blackjack oak	Slash pine	Sugarberry/Hackberry/Elm/Green ash	Overcup oak/Water hickory	Mixed upland hardwoods	Swamp chestnut oak/Cherrybark oak	Sweetgum/yellow poplar	Baldcypress/Water tupelo	Eastern red cedar/Hardwood	Longleaf pine	Sweetbay/Swamp tupelo/Red maple	Oak/Gum/Cypress group	Oak/Hickory group	Sycamore/Pecan/American elm	All forest types
Arkansas																					
Large	1,773.4	663.9	970.5	804.5	523.6	645.9	78.1	0.0	112.5	49.5	108.4	114.8	39.2	51.6	25.0	0.0	8.9	0.0	0.0	29.5	5,999.2
Medium	1,145.9	300.8	571.0	176.4	251.8	305.2	189.0	0.0	29.4	35.4	114.9	13.9	41.5	13.0	94.3	0.0	3.6	0.0	0.0	5.8	3,291.9
Small	1,057.2	202.3	193.2	67.2	141.7	32.5	23.3	0.0	32.2	6.1	59.7	23.6	60.1	3.5	56.0	0.0	0.0	0.0	0.0	1.2	1,959.8
Louisiana																					
Large	1,413.8	682.4	437.9	110.2	375.1	7.3	0.0	252.2	59.8	161.8	66.6	93.7	30.9	109.6	0.0	152.6	31.1	0.0	0.0	8.7	3,993.8
Medium	1,117.6	218.4	121.1	0.0	144.1	10.9	0.0	183.9	19.4	65.7	72.4	15.3	16.6	35.2	0.0	13.2	13.1	0.0	0.0	0.0	2,046.9
Small	1,250.0	297.7	176.2	0.0	132.1	7.7	0.0	126.8	35.9	40.6	98.8	3.6	77.9	2.1	0.0	15.8	12.4	0.0	0.0	12.5	2,290.2
Oklahoma																					
Large	67.8	3.8	155.5	298.6	28.5	177.5	93.1	0.0	37.1	0.0	9.3	0.0	0.0	0.0	5.5	0.0	0.0	77.8	0.0	19.4	974.0
Medium	315.5	11.6	370.4	195.4	11.5	239.8	207.7	0.0	45.0	5.6	0.0	0.0	0.0	0.0	17.6	0.0	0.0	30.7	54.5	18.4	1,523.8
Small	81.5	68.1	310.6	89.2	6.1	119.3	73.8	0.0	23.2	5.6	0.0	0.0	0.0	0.0	42.9	0.0	0.0	42.1	90.4	17.4	969.9
Texas																					
Large	2,053.7	857.9	265.6	364.9	303.1	261.0	218.5	103.5	120.4	195.5	46.2	197.7	9.2	58.6	16.8	36.9	49.7	0.0	0.0	20.4	5,179.4
Medium	1,257.2	344.1	146.1	40.7	101.1	112.4	124.4	47.4	63.4	36.7	16.1	13.3	27.5	12.6	6.6	0.0	9.0	0.0	0.0	1.0	2,359.5
Small	1,362.8	499.7	176.4	30.2	128.7	106.4	91.3	9.1	75.5	41.7	47.1	31.1	9.9	0.0	2.6	6.2	23.4	0.0	0.0	5.6	2,647.6
Total																					
Large	5,308.7	2,208.0	1,829.5	1,578.2	1,230.3	1,091.7	389.7	355.7	329.8	406.9	230.6	406.2	79.3	219.7	47.2	189.5	89.6	77.8	0.0	78.0	16,146.5
Medium	3,836.2	874.9	1,208.6	412.5	508.6	668.3	521.1	231.2	157.2	143.4	203.4	42.5	85.5	60.7	118.5	13.2	25.7	30.7	54.5	25.3	9,222.1
Small	3,751.4	1,067.9	856.4	186.5	408.6	265.8	188.4	135.9	166.9	93.9	205.7	58.4	147.9	5.7	101.5	22.0	35.7	42.1	90.4	36.6	7,867.4

Table 25-05. Physiographic class composition (in thousands of acres) of the most common forest types found in states within BCR 25.

Physiographic class	Forest type																			
	Loblolly pine	Loblolly pine/Hardwood	White oak/Red oak/Hickory	Shortleaf pine	Sweetgum/Nuttall oak/Willow oak	Shortleaf pine/Oak	Post oak/Blackjack oak	Slash pine	Sugarberry/Hackberry/Elm/Green ash	Overcup oak/Water hickory	Mixed upland hardwoods	Swamp chestnut oak/Cherrybark oak	Sweetgum/Yellow poplar	Baldcypress/Water tupelo	Eastern red cedar/Hardwood	Longleaf pine	Nonstocked	Sweetbay/Swamp tupelo/Red maple	Oak/Gum/Cypress group	Other
Bays and wet pocosins	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.7	0.0	12.6
Beaver ponds	0.0	1.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.9	0.0	0.0	0.0	0.0	9.4	0.0	0.0	23.9
Broad floodplains/ Bottomland	31.0	49.7	6.5	0.0	295.0	0.0	6.3	0.0	181.5	264.0	7.3	41.9	14.5	51.7	7.1	0.0	14.1	11.6	0.0	1,057.3
Cypress ponds	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.4	0.0	0.0	0.0	0.0	0.0	6.3
Deep sands	6.6	0.0	7.1	0.0	6.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	12.0	0.0	0.0	0.0	51.7
Dry slopes	0.0	0.0	50.8	18.3	0.0	54.2	27.6	0.0	0.0	0.0	0.0	4.4	0.0	0.0	10.2	0.0	0.0	0.0	0.0	187.8
Dry tops	0.0	3.1	25.6	32.2	0.0	37.6	8.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	129.7
Flatwoods	1,920.8	1,429.2	537.6	73.5	1,065.2	50.8	74.8	434.7	176.0	180.8	206.4	193.3	92.6	21.2	59.2	55.1	40.9	41.9	0.0	8,858.0
Moist slopes and coves	11.3	9.4	21.1	2.2	20.1	20.7	10.2	0.0	0.0	0.0	0.0	8.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	119.7
Narrow floodplains/ Bottomland	56.2	131.1	127.9	0.0	395.8	6.1	6.3	0.0	120.5	154.8	48.6	187.8	25.6	62.3	0.0	0.0	12.2	31.5	0.0	1,466.7
Other hydric	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	22.6	0.0	0.0	0.0	0.0	0.0	46.8
Other mesic	458.6	78.0	836.7	566.5	55.7	531.0	374.6	0.0	105.3	11.1	18.5	0.0	0.0	0.0	66.0	0.0	0.0	0.0	150.6	3,528.5
Other xeric	28.4	17.6	5.6	16.7	9.6	5.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.9	0.0	0.0	0.0	0.0	0.0	93.9
Rolling uplands	6,406.9	2,406.3	2,275.8	1,467.9	252.7	1,318.1	591.1	285.4	62.6	2.1	358.7	53.1	173.5	2.3	124.8	157.6	73.7	23.7	0.0	18,338.6
Small drains	0.0	9.4	0.0	0.0	29.0	1.7	0.0	2.7	0.0	0.0	0.0	11.7	5.0	0.2	0.0	0.0	0.0	17.6	0.0	88.5
Swamps/Bogs	0.0	15.0	0.0	0.0	17.7	0.0	0.0	0.0	7.9	22.2	0.0	0.0	1.5	118.6	0.0	0.0	8.2	23.0	0.0	240.4

Table 25-06. Forest ownership, in acres (percentage of column total) in BCR 25.

Ownership	Total	Arkansas	Louisiana	Oklahoma	Texas
County and municipal	189.7	46.0	136.0	0.0	7.7
	(0.6)	(0.4)	(1.6)	(0.0)	(<0.1)
National forest	3,254.3	1,684.3	661.6	222.7	685.7
	(9.5)	(14.5)	(7.7)	(6.3)	(6.5)
Other local government	10.9	0.0	0.0	0.0	10.9
	(<0.1)	(0.0)	(0.0)	(0.0)	(0.1)
Private	29,721.7	9,506.2	7,471.3	3,110.6	9,633.5
	(86.8)	(81.8)	(87.4)	(87.5)	(91.5)
State	473.1	120.1	185.5	77.8	89.7
	(1.4)	(1.0)	(2.2)	(2.2)	(0.9)
U.S. Department of Defense	167.4	55.1	10.6	0.0	101.7
	(0.5)	(0.5)	(0.1)	(0.0)	(1.0)
U.S. Fish and Wildlife Service	49.8	38.9	10.9	0.0	0.0
	(0.1)	(0.3)	(0.1)	(0.0)	(0.0)
Other federal	383.4	166.8	71.1	143.8	1.7
	(1.1)	(1.4)	(0.8)	(4.0)	(<0.1)
Total	34,250.4	11,617.4	8,547.1	3,554.8	10,531.1
	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)

Bird Conservation Region 26: Mississippi Alluvial Valley

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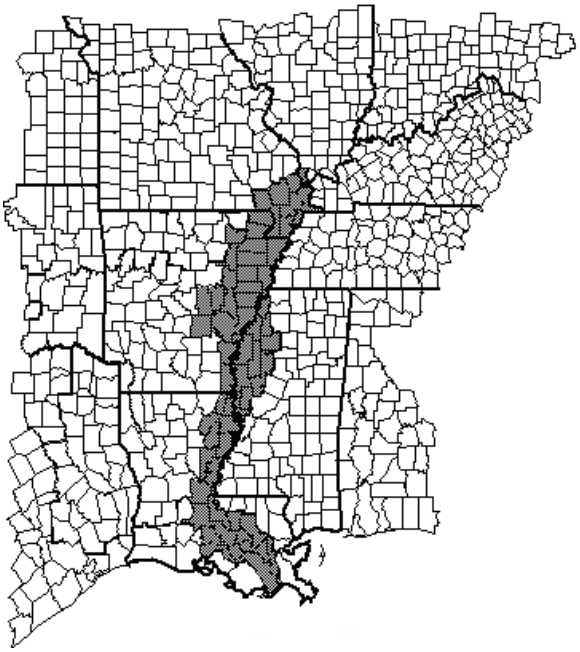


Affected States: Arkansas, Illinois, Kentucky, Louisiana, Mississippi, Missouri and Tennessee
Current Area of Forestland: 5,218,978 acres (2,112,068 ha) (655,381 acres [265,226 ha] of small-diameter and nonstocked forest)
Woodcock Trend Estimate: not applicable
Percent of Change per Year: not applicable
Woodcock Population Estimate: not applicable
Singing Males Only: not applicable

Physiography and Habitat Description

The portions of BCR 26 are contained in section 234A (Mississippi Alluvial Basin). This area is classified as southern floodplain forest and oak/hickory forest. The predominant vegetation form is cold-deciduous, alluvial broadleaf forest, with small areas of cool-deciduous, broad-leaved forest on upland sites. About 90 percent of the area is agricultural, cleared of natural vegetation and drained by a system of ditches. Because of these ditches, periodic flooding, which was a principal historical disturbance, has been reduced, eliminated or significantly altered in timing.

Between the current and baseline forest inventories there has been a decrease of nearly 520,000 acres (210,440 ha, 10 percent) of forestland in this bird conservation region (Table 26-01). There has also been a net loss 493,000 acres (200,000 ha, 43 percent) of small diameter, nonstocked forest during the same period. Major forest types include sugarberry/hackberry/elm/green ash (19 percent), sweetgum/Nuttall oak/willow oak (17 percent), bald cypress/water tupelo (14 percent), white oak/red oak/hickory (9 percent), overcup oak/water hickory (7 percent) and loblolly pine (6 percent, Tables 26-02 and 26-03). Around 12 percent of total

timberland in the region is comprised of small-diameter trees (Table 26-04). Flatwoods and broad floodplains/bottomland are the dominant physiographic classes on which major forest types within the region are found (Table 26-05). Around 82 percent of the 5.9 million acres (2.4 million ha) of timberland in the region is under private ownership (Table 26-06). Federal land comprises 7 percent while state and county forest comprises about 10 percent of all timberland.

BCR 26 was once an important migration and wintering area for woodcock. The conversion of the forestland there has had an unknown impact on woodcock migration and has undoubtedly had a negative impact on the amount of wintering habitat.

Habitat Goals

The substantial loss of small-diameter and nonstocked tree classes from historical to current times is a major concern. The Mississippi Alluvial Valley was, at one time, thought of as an important migration corridor and, to a lesser extent, a wintering site, especially the southern portion. While the habitat use by migrating woodcock has been little researched, it is evident that wintering woodcock need access to early successional habitats at some time during the winter. This need must be met. Clearly early successional habitats are not being managed for. Instead, medium- and large-diameter tree classes are being managed for. These younger habitats are important for wintering woodcock and need to be managed in such a way that they are available for a long term and on a readily available basis. Woodcock will not fly far (less than 1.2 miles [2 km]) to reach early successional habitat types on a daily basis.

Federal properties amount to less than 10 percent of available timberland. Still, these properties must be managed for early successional stands. Unfortunately, the current management philosophy on most federal land in this bird conservation region is to convert all open land into closed-canopy bottomland forests. This myopic view needs to be re-evaluated.

On all private land, the movement away from clearcutting as a tool for managing bottomland hardwoods has contributed to the current forest age-class and spatial pattern. The reduction in clearcutting has undoubtedly suffered because of the public's misunderstanding of its use. Possibly, public education will allow a greater acceptance of clear cutting. Another approach to increasing early successional habitats on private land will be to target noncorporate timberland owners to appreciate the need and use of early successional habitats by wildlife.

Many wildlife species including the woodcock heavily use and depend on early successional timber stands.

Table 26-01. Current and historical (1970–1976) stand-size distribution, in acres (percentage of column total) of forestland in BCR 26 and in portions of individual states within the bird conservation region.

	Current stand-size distribution					Historical stand-size distribution				
	Total forestland[1]	Large diameter[2,3]	Medium diameter[2,4]	Small diameter[2,5]	Non-stocked[2,6]	Total forestland[1]	Large diameter[2,3]	Medium diameter[2,4]	Small diameter[2,5]	Non-stocked[2,6]
Arkansas	1,949,604	1,175,699	560,367	211,528	2,010	1,832,800	887,900	425,400	511,100	8,400
	(37.4)	(35.6)	(44.4)	(33.3)	(10.2)	(31.9)	(27.1)	(32.5)	(49.0)	(8.0)
Illinois	48,629	29,208	15,762	3,660	0	108,600	58,110	28,350	19,680	2,460
	(0.9)	(0.9)	(1.2)	(0.6)	(0.0)	(1.9)	(1.8)	(2.2)	(1.9)	(2.4)
Kentucky	24,639	19,821	4,818	0	0	11,902	5,284	2,852	3,751	15
	(0.5)	(0.6)	(0.4)	(0.0)	(0.0)	(0.2)	(0.2)	(0.2)	(0.4)	(<0.1)
Louisiana	2,927,468	1,928,467	592,038	390,163	16,800	3,476,300	2,187,800	746,300	462,800	79,400
	(56.1)	(58.4)	(46.9)	(61.4)	(85.6)	(60.6)	(66.7)	(57.0)	(44.3)	(75.9)
Missouri	264,095	146,608	89,674	26,989	824	292,500	124,900	107,100	46,200	14,300
	(5.1)	(4.4)	(7.1)	(4.2)	(4.2)	(5.1)	(3.8)	(8.2)	(4.4)	(13.7)
Tennessee	4,543	1,136	0	3,407	0	16,000	16,000	0	0	0
	(<0.1)	(<0.1)	(0.0)	(0.5)	(0.0)	(0.3)	(0.5)	(0.0)	(0.0)	(0.0)
Total	5,218,978	3,300,939	1,262,659	635,747	19,634	5,738,102	3,279,994	1,310,002	1,043,531	104,575
	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)

[1] Percentages for various diameter categories and nonstocked category refer to percent of total forestland for current and historical time periods within each state.
[2] Softwoods are at least 9 inches, and hardwoods are at least 11 inches in diameter at breast height.
[3] Trees are at least 5 inches in diameter at breast height but are smaller than large-diameter trees.
[4] Saplings are 1 to 5 inches diameter at breast height. Softwood seedlings more than 6 inches tall, and hardwood seedlings are more than 12 inches tall.
[5] Data refers to commercial forestland on which stocking of trees is less than 16.7 percent.

Table 26-02. Percentage composition of forest types between states within BCR 26.

Forest type	Arkansas	Illinois	Kentucky	Louisiana	Mississippi	Missouri	Tennessee	Total
Baldcypress/ Water tupelo	19.4	0.0	0.6	72.7	6.8	0.4	0.1	100.0
Cottonwood	44.6	0.0	4.8	42.5	8.0	0.0	0.0	100.0
Cottonwood/Willow	22.8	0.0	0.0	77.2	0.0	0.0	0.0	100.0
Loblolly pine	36.5	0.0	0.0	59.9	3.7	0.0	0.0	100.0
Loblolly pine/ Hardwood	15.5	0.0	0.0	76.4	8.1	0.0	0.0	100.0
Mixed upland hardwoods	37.6	0.0	0.9	52.7	0.0	8.8	0.0	100.0
Oak/Gum/ Cypress group	0.0	0.0	0.0	0.0	100.0	0.0	0.0	100.0
Other	30.5	1.3	0.0	38.3	0.0	29.8	0.0	100.0
Overcup oak/ Water hickory	37.5	0.0	0.0	44.5	16.5	1.6	0.0	100.0
Red maple/Lowland	31.7	0.0	0.0	64.8	0.0	3.5	0.0	100.0
Sassafras/ Persimmon	52.1	18.5	0.0	25.7	0.0	3.8	0.0	100.0
Sugarberry/Hackberry Elm/Green ash	32.3	0.0	0.8	41.6	22.9	2.4	0.0	100.0
Swamp chestnut oak/ Cherrybark oak	29.3	0.0	0.0	65.1	4.7	0.9	0.0	100.0
Sweetbayswamp tupelo/Red maple	38.5	5.7	0.0	49.4	0.0	6.4	0.0	100.0
Sweetgum/Nuttall oak/Willow oak	25.7	0.0	0.0	56.3	17.3	0.7	0.0	100.0
Sweetgum/ Yellow poplar	37.2	0.0	0.0	51.6	0.0	11.2	0.0	100.0
Sycamore/Pecan/ American elm	23.6	0.0	2.2	64.1	6.9	3.2	0.0	100.0
White oak/Red oak/ Hickory	67.7	3.8	0.0	4.6	8.1	15.8	0.0	100.0
Willow	24.4%	3.8	0.0	57.0	7.6	5.9	1.3	100.0
Yellow poplar/White oak/Red oak	92.6	7.4	0.0	0.0	0.0	0.0	0.0	100.0

Table 26-03. Forest composition of timberland, in acres (percentage of column total), within BCR 26.

Forest type	Arkansas	Illinois	Kentucky	Louisiana	Mississippi	Missouri	Tennessee	Total
Baldcypress/	167,190	0	4,818	624,951	58,201	3,746	1,136	860,042
Water tupelo	(8.6)	(0.0)	(19.6)	(21.3)	(7.8)	(1.4)	(25.0)	(14.4)
Cottonwood	44,364	0	4,818	42,275	7,974	0	0	99,431
	(2.3)	(0.0)	(19.6)	(1.4)	(1.1)	(0.0)	(0.0)	(1.7)
Cottonwood/Willow	13,123	0	0	44,436	0	0	0	57,559
	(0.7)	(0.0)	(0.0)	(1.5)	(0.0)	(0.0)	(0.0)	(1.0)
Loblolly pine	125,128	0	0	205,428	12,672	0	0	343,228
	(6.4)	(0.0)	(0.0)	(7.0)	(1.7)	(0.0)	(0.0)	(5.7)
Loblolly pine/	24,088	0	0	119,038	12,672	0	0	155,798
Hardwood	(1.2)	(0.0)	(0.0)	(4.0)	(1.7)	(0.0)	(0.0)	(2.6)
Mixed upland	51,106	0	1,205	71,501	0	11,929	0	135,741
hardwoods	(2.6)	(0.0)	(4.9)	(2.4)	(0.0)	(4.5)	(0.0)	(2.3)
Oak/Gum/	0	0	0	0	60,130	0	0	60,130
Cypress group	(0.0)	(0.0)	(0.0)	(0.0)	(8.1)	(0.0)	(0.0)	(1.0)
Other	86,315	3,660	0	108,332	0	84,321	0	282,628
	(4.4)	(7.5)	(0.0)	(3.7)	(0.0)	(31.9)	(0.0)	(4.7)
Overcup oak/	166,107	0	0	196,821	72,930	6,893	0	442,751
Water hickory	(8.5)	(0.0)	(0.0)	(6.7)	(9.8)	(2.6)	(0.0)	(7.4)
Red maple/Lowland	14,926	0	0	30,538	0	1,649	0	47,113
	(0.8)	(0.0)	(0.0)	(1.0)	(0.0)	(0.6)	(0.0)	(0.8)
Sassafras/	22,308	7,917	0	11,003	0	1,611	0	42,839
Persimmon	(1.1)	(16.3)	(0.0)	(0.4)	(0.0)	(0.6)	(0.0)	(0.7)
Sugarberry/	366,165	0	8,981	471,498	258,921	26,724	0	1,132,289
Hackberry/Elm/	(18.8)	(0.0)	(36.4)	(16.0)	(34.8)	(10.1)	(0.0)	(18.9)
Green ash								
Swamp chestnut	31,004	0	0	68,915	4,989	939	0	105,847
oak/Cherrybark oak	(1.6)	(0.0)	(0.0)	(2.3)	(0.7)	(0.4)	(0.0)	(1.8)
Sweetbay/Swamp	18,641	2,757	0	23,923	0	3,074	0	48,395
tupelo/Red maple	(1.0)	(5.7)	(0.0)	(0.8)	(0.0)	(1.2)	(0.0)	(0.8)
Sweetgum/Nuttall	262,602	0	0	575,422	176,906	6,719	0	1,021,649
oak/Willow oak	(13.5)	(0.0)	(0.0)	(19.6)	(23.8)	(2.5)	(0.0)	(17.1)
Sweetgum/	26,641	0	0	36,875	0	8,016	0	71,532
Yellow poplar	(1.4)	(0.0)	(0.0)	(1.3)	(0.0)	(3.0)	(0.0)	(1.2)
Sycamore/Pecan/	50,748	0	4,818	138,162	14,825	6,929	0	215,482
American elm	(2.6)	(0.0)	(19.6)	(4.7)	(2.0)	(2.6)	(0.0)	(3.6)
White oak/Red oak/	370,826	20,924	0	25,026	44,352	86,373	0	547,501
Hickory	(19.0)	(43.0)	(0.0)	(0.9)	(6.0)	(32.7)	(0.0)	(9.2)
Willow	62,431	9,712	0	146,135	19,438	15,174	3,407	256,297
	(3.2)	(20.0)	(0.0)	(5.0)	(2.6)	(5.7)	(75.0)	(4.3)
Yellow poplar/	45,892	3,660	0	0	0	0	0	49,552
White oak/Red oak	(2.4)	(7.5)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.8)

Table 26-04. Stand-size class composition (in thousands of acres) of the most common forest types found in states within BCR 26. Large-diameter trees are hardwoods that are at least 11 inches diameter or are 9 inches for softwoods; size class has more than 50 percent of stocking in medium- and large-diameter trees, with stocking of large trees equal to or greater than medium-diameter trees. Medium-diameter trees are trees that are at least 5 inches diameter but are not as large as large-diameter trees; size class has more than 50 percent of stocking in medium- and large-diameter trees, with stocking of large-diameter trees less than stocking of medium-diameter trees. Small-diameter trees are trees that are less than 5 inches diameter; size class has at least 50 percent of the stocking in small-diameter trees.

	Forest type																		
Stand-size class	Sugarberry/Hackberry/Elm/Green ash	Sweetgum/Nuttall oak/Willow oak	Baldcypress/Water tupelo	White oak/Red oak/Hickory	Overcup oak/Water hickory	Loblolly pine	Willow	Sycamore/Pecan/American elm	Loblolly pine/Hardwood	Mixed upland hardwoods	Swamp chestnut oak/Cherrybark oak	Cottonwood	Sweetgum/Yellow poplar	Oak/Gum/Cypress group	Cottonwood/Willow	Yellow poplar/White oak/Red oak	Sweetbay/Swamp tupelo/Red maple	Red maple/Lowland	All forest types
Arkansas																			
Large	261,996	197,461	109,326	221,867	120,647	40,183	33,592	50,748	14,068	8,038	29,140	27,883	0	0	8,039	22,830	0	0	1,175,699
Medium	65,954	45,813	51,860	138,992	34,009	54,509	20,791	0	0	23,521	1,864	16,481	9,082	0	5,084	23,062	15,827	6,338	560,367
Small	38,215	19,328	6,004	9,966	11,451	30,436	8,048	0	10,019	19,547	0	0	17,560	0	0	0	2,814	8,588	211,528
Illinois																			
Large	0	0	0	16,739	0	0	1,795	0	0	0	0	0	0	0	0	0	2,757	0	29,208
Medium	0	0	0	4,185	0	0	7,917	0	0	0	0	0	0	0	0	0	0	0	15,762
Small	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3,660	0	0	3,660
Kentucky																			
Large	4,163	0	4,818	0	0	0	0	4,818	0	1,205	0	4,818	0	0	0	0	0	0	19,821
Medium	4,818	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4,818
Small	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Louisiana																			
Large	308,938	386,762	554,267	25,026	153,106	37,185	36,394	121,104	77,378	13,108	45,428	15,811	30,691	0	41,345	0	12,466	14,087	1,928,467
Medium	136,341	117,682	64,551	0	33,126	44,704	79,180	14,839	12,263	11,457	16,716	17,193	0	0	0	0	11,457	16,451	592,038
Small	26,219	70,979	6,132	0	10,589	123,539	30,561	2,218	29,397	46,936	6,771	9,272	6,184	0	3,091	0	0	0	390,163
Mississippi																			
Large	236,738	170,431	58,201	25,344	46,673	0	12,963	14,825	6,336	0	4,989	7,974	0	34,353	0	0	0	0	618,827
Medium	14,209	0	0	12,672	21,067	0	0	0	0	0	0	0	0	9,798	0	0	0	0	57,746
Small	7,974	6,475	0	6,336	5,190	12,672	6,475	0	6,336	0	0	0	0	15,979	0	0	0	0	80,248
Missouri																			
Large	8,655	0	3,746	43,761	6,893	0	11,260	6,929	0	4,528	939	0	2,507	0	0	0	3,074	0	146,608
Medium	18,068	6,719	0	35,873	0	0	3,746	0	0	0	0	0	2,691	0	0	0	0	1,649	89,674
Small	0	0	0	6,738	0	0	168	0	0	7,401	0	0	2,818	0	0	0	0	0	26,989

Table 26-04 (continued). Stand-size class composition (in thousands of acres) of the most common forest types found in states within BCR 26. Large-diameter trees are hardwoods that are at least 11 inches diameter or are 9 inches for softwoods; size class has more than 50 percent of stocking in medium- and large-diameter trees, with stocking of large trees equal to or greater than medium diameter trees. Medium diameter trees are trees that are at least 5 inches diameter but are not as large as large diameter trees; size class has more than 50 percent of stocking in medium- and large-diameter trees, with stocking of large-diameter trees less than stocking of medium-diameter trees. Small-diameter trees are trees that are less than 5 inches diameter; size class has at least 50 percent of the stocking in small-diameter trees.

	Forest type																		
Stand-size class	Sugarberry/Hackberry/Elm/Green ash	Sweetgum/Nuttall oak/Willow oak	Bald cypress/Water tupelo	White oak/Red oak/Hickory	Overcup oak/Water hickory	Loblolly pine	Willow	Sycamore/Pecan/American elm	Loblolly pine/Hardwood	Mixed upland hardwoods	Swamp chestnut oak/Cherrybark oak	Cottonwood	Sweetgum/Yellow poplar	Oak/Gum/Cypress group	Cottonwood/Willow	Yellow poplar/White oak/Red oak	Sweetbay/Swamp tupelo/Red maple	Red maple/Lowland	All forest types
Tennessee																			
Large	0	0	1,136	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,136
Medium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Small	0	0	0	0	0	0	3,407	0	0	0	0	0	0	0	0	0	0	0	3,407
Total																			
Large	820,490	754,654	731,494	332,737	327,319	77,368	96,004	198,424	97,782	26,879	80,496	56,486	33,198	34,353	49,384	22,830	18,297	14,087	3,919,766
Medium	239,390	170,214	116,411	191,722	88,202	99,213	111,634	14,839	12,263	34,978	18,580	33,674	11,773	9,798	5,084	23,062	27,284	24,438	1,320,405
Small	72,408	96,782	12,136	23,040	27,230	166,647	48,659	2,218	45,752	73,884	6,771	9,272	26,562	15,979	3,091	3,660	2,814	8,588	715,995

Table 26-05. Physiographic class composition (in thousands of acres) of the most common forest types found in states within BCR 26.

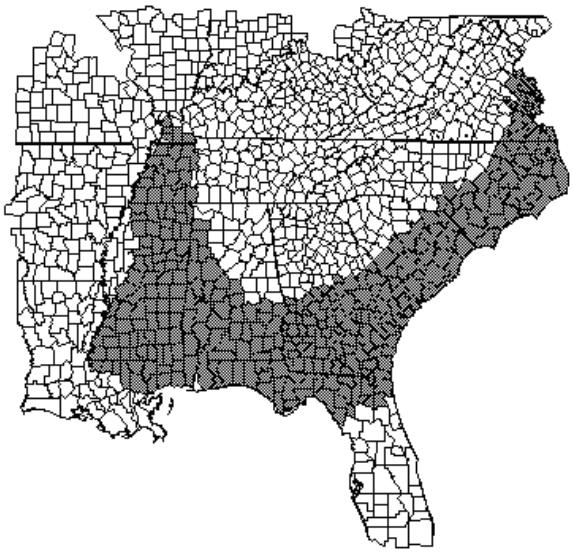
Physiographic class	Forest type																				
	Sugarberry/Hackberry/Elm/Green ash	Sweetgum/Nuttall oak/Willow oak	Baldcypress/Water tupelo	White oak/Red oak/Hickory	Overcup oak/Water hickory	Loblolly pine	Willow	Sycamore/Pecan/American elm	Loblolly pine/Hardwood	Mixed upland hardwoods	Swamp chestnut oak/Cherrybark oak	Cottonwood	Sweetgum/Yellow poplar	Oak/Gum/Cypress group	Cottonwood/Willow	Yellow poplar/White oak/Red oak	Sweetbay/Swamp tupelo/Red maple	Red maple/Lowland	Sassafras/Persimmon	Other	All forest types
Bays and wet pocosins	0.0	0.0	0.0	0.0	0.0	0.0	3.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.1
Beaver ponds	0.0	0.0	0.0	0.0	0.0	0.0	7.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.9
Broad floodplains/ Bottomland	81.8	239.2	222.1	10.3	140.6	0.0	106.7	111.5	0.0	0.9	0.0	46.2	9.3	0.0	54.5	0.0	6.3	5.0	0.0	6.0	1,278.9
Deep sands	0.0	0.0	0.0	6.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	12.4	0.0	0.0	0.0	0.0	18.5
Dry slopes	0.0	0.0	0.0	24.9	0.0	0.0	0.0	0.0	12.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	80.6
Dry tops	0.0	0.0	0.0	10.9	0.0	0.0	0.0	0.0	0.0	0.0	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	13.6
Flatwoods	402.8	515.0	52.9	158.3	151.1	215.8	31.5	55.4	96.8	74.9	70.1	37.8	28.4	0.0	3.1	0.0	9.3	34.1	21.3	0.0	2,125.4
Moist slopes and coves	0.0	15.1	0.0	30.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.4	0.0	0.0	0.8	0.0	72.5
Narrow floodplains/ Bottomland	22.7	69.1	9.6	0.0	62.3	0.0	12.1	21.0	0.0	4.0	10.2	0.0	11.2	0.0	0.0	0.0	2.8	1.6	0.8	0.0	297.9
Rolling uplands	0.0	6.3	0.0	258.5	9.2	114.8	2.3	0.0	34.1	52.9	9.0	0.0	22.7	0.0	0.0	28.8	0.0	0.0	12.0	0.0	630.0
Small drains	0.0	0.0	32.7	0.0	6.7	0.0	5.2	0.0	0.0	0.0	10.7	0.0	0.0	0.0	0.0	0.0	0.0	6.3	0.0	0.0	61.5
Swamps/Bogs	0.0	0.0	461.3	0.0	0.0	0.0	68.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	11.5	0.0	0.0	0.0	557.4
Other hydric	14.6	0.0	65.6	0.0	5.0	0.0	8.0	12.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	112.0
Other mesic	244.3	5.0	15.9	47.6	68.0	12.7	11.5	14.8	12.7	2.9	5.0	15.4	0.0	60.1	0.0	0.0	0.0	0.0	0.0	0.0	703.8
Other xeric	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.7

Table 26-06. Forest ownership, in acres (percentage of column total), in BCR 26.

Ownership	Total	Arkansas	Illinois	Kentucky	Louisiana	Mississippi	Missouri	Tennessee
County and municipal	137,248 (2.3)	9,400 (0.5)	0 (0.0)	0 (0.0)	98,152 (3.4)	17,063 (2.3)	12,632 (4.8)	0 (0.0)
National forest	185,705 (3.1)	34,167 (1.7)	20,924 (43.0)	0 (0.0)	22,148 (0.8)	58,695 (7.8)	49,771 (18.8)	0 (0.0)
Private	4,892,254 (81.9)	1,543,280 (79.2)	17,994 (37.0)	24,639 (100.0)	2,505,855 (85.6)	628,439 (83.0)	167,504 (63.4)	4,543 (100.0)
State	491,428 (8.2)	193,566 (9.9)	9,712 (20.0)	0 (0.0)	232,568 (7.9)	32,881 (4.3)	22,701 (8.6)	0 (0.0)
U.S. Fish and Wildlife Service	103,637 (1.7)	94,102 (4.8)	0 (0.0)	0 (0.0)	2,769 (0.1)	0 (0.0)	6,765 (2.6)	0 (0.0)
U.S. National Park Service	3,074 (<0.1)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	3,074 (1.2)	0 (0.0)
Other federal	162,454 (2.7)	75,089 (3.9)	0 (0.0)	0 (0.0)	65,973 (2.3)	19,743 (2.6)	1,649 (0.6)	0 (0.0)
All	5,975,799 (100.0)	1,949,605 (100.0)	48,629 (100.0)	24,639 (100.0)	2,927,466 (100.0)	756,821 (100.0)	264,096 (100.0)	4,543 (100.0)

Bird Conservation Region 27: Southeastern Coastal Plain

Scot J. Williamson
Wildlife Management Institute



Affected States: Kentucky, Tennessee, Mississippi, Louisiana, Alabama, Florida, Georgia, South Carolina, North Carolina and Virginia
Current Area of Forestland: 79,924,752 acres (32,344,747 ha) (33,418,693 [13,524,210 ha] acres of small-diameter and nonstocked forest)
Woodcock Trend Estimate (1966–2004: -1.62 (pertain only to Virginia portion)
Percent of Change per Year (1994–2004): +3.30
Woodcock Population Estimate (1970): 8,189
Singing Males Only (2004): 2,186

Physiography and Habitat Description

BCR 27 occupies the coastal plain regions of Virginia, North Carolina, South Carolina and Georgia, the Panhandle portion and northern counties of peninsular Florida, southern Alabama, the region of Mississippi east of the Mississippi Alluvial Valley, southwestern Kentucky, western Tennessee and extreme southeast Louisiana. Woodcock are believed to be year-around residents throughout most of BCR 27 and nonbreeding residents on the southern fringes (Keppie and Whiting 1994).

BCR 27 includes the southeastern Plains and the mid-Atlantic and southern Coastal Plain mentioned for the Environmental Protection Agency's level III ecoregions (see http://www.epa.gov/wed/pages/ecoregions/level_iii.htm). The southeastern Plains are a mosaic of cropland, pasture, woodland and forest. Natural vegetation is mostly oak/hickory/pine and southern mixed forest that lay inland of the coastal plain. Elevations and relief are greater than in the Southern Coastal Plain but are generally less than in much of the Piedmont. Streams in this area are relatively low gradient and sandy bottomed. The Southern Coastal Plain extends from South Carolina and Georgia through much of central Florida and along the Gulf Coast lowlands of the Florida Panhandle, Alabama and Mississippi. Most of the ecoregion is flat coastal plain, but it contains barrier islands, coastal lagoons, marshes and swampy lowland along the Gulf and Atlantic coasts. This ecoregion is generally lower in elevation with less relief and wetter soils than the southeastern Plains. Once covered by a variety of forest communities that included trees of longleaf pine, slash pine, pond pine, beech, sweetgum, southern magnolia, white oak and laurel oak, land cover in the region is now mostly slash and loblolly pine with oak/gum/cypress forest in some low lying areas, citrus

groves, pasture for beef cattle and urban landscape. In BCR 27, the mid-Atlantic Coastal Plain extends from eastern North Carolina to eastern Virginia. The region is generally flat with deep, moist soils. Land cover is primarily forest, followed by agriculture, open habitats and wetlands. Forest cover is mostly loblolly pine and hardwood.

Forest Composition

Primary forest types in the bird conservation region include loblolly pine, slash pine and loblolly pine/hardwood (Table 27-01). And, 56 percent of the forest is composed of pine or mixed pine/hardwood. Twenty-two percent, or 17 million acres (6.9 million ha), is classified as lowland hardwood types.

Trends in Forested Habitats

Comparisons of forest inventory analysis (FIA) data between 1970 and 2005 illustrate the change in the availability of early successional (seedling/sapling) habitat available to woodcock (Figure 27-01). Early successional habitat, expressed as a percentage of the forested landscape, has increased from 34.3 percent to 40.8 percent in the bird conservation region, a 19-percent increase (Table 27-02). This habitat in BCR 27 has increased from 26.8 million acres (10.8 million ha) in the 1970s to 32.5 million acres (13.2 million ha) in 2005. The largest increases in seedling/sapling acreage occurred in those portions of the bird conservation region in Alabama and North Carolina (Figure 27-02). Mississippi witnessed a decrease in early successional acreage, but the total is still high compared to other BCR 27 states (Figure 27-02). Nonstocked forestland occurrences, which may represent certain seasonally important types of woodcock habitat, have declined from 3.6 percent to 1.1 percent (Table 27-02). Florida has lost the largest acreage of nonstocked habitat and has been replaced by Georgia as the state with the highest nonstocked habitats (Figure 27-03). In

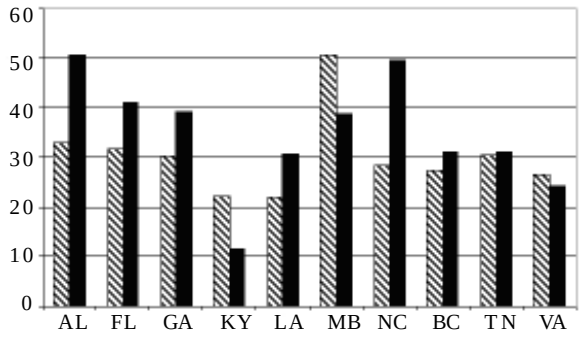


Figure 27-01. Percentage of forested landscapes characterized as seedling/sapling size class in the 1970s and in 2005 for portions of states comprising BCR 27.

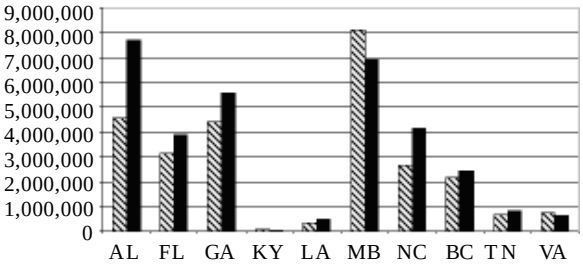


Figure 27-02. Acreage of seedling/sapling habitats in the 1970s and in 2005 for portions of states comprising BCR 27.

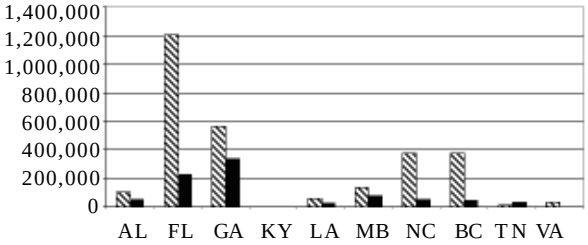


Figure 27-03. Acreage characterized as nonstocked (nonforested) habitat in the 1970s and in 2005 for portions of states comprising BCR 30

the 30 years between the surveys, BCR 27 has lost 2 million acres (0.8 million ha) of nonstocked habitats, has gained 5.7 million acres (2.3 million ha) of early successional habitat and has gained 1.5 million acres (607,000 ha) of forested habitats (Table 27-02).

Nonstocked (nonforested) habitat is used by woodcock for roosting and singing grounds. Between the 1970s and 2005, BCR 27 lost 2 million acres (0.8 million ha) of nonstocked habitat, approximately a 70-percent decline. The largest losses occurred in portions of the bird conservation region in Florida (Figure 27-03).

Trends in Woodcock Wetland Habitats

Comparisons of national wetland inventory data illustrate the change in the availability of shrub/scrub (alder) and forested wetlands, both critical components of woodcock habitat. Forested wetlands have declined in the bird conservation region from 15 million acres (6.1 million ha) in 1950 to 12 million acres (4.9 million ha) in 1990 (Koenig 2000, personal communication) (Figure 27-04). Shrub/scrub (alder) wetland acreage in the bird conservation region has declined from 3.3 million acres (1.3 million ha) in 1950 to 3.0 million acres (1.2 million ha) in 1990 (Koenig 2000, personal communication) (Figure 27-04). Although, the 1990 acreages are higher than 1970 or 1980 figures.

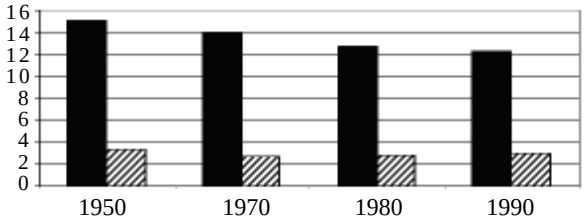


Figure 27-04. Acreage of forested wetlands (PFO) and shrub/scrub wetlands (PSS) (in millions of acres) in BCR 27.

Ownership Patterns of Habitat

The majority (91 percent) of woodcock habitat in BCR 27 occurs on privately owned forestland (Table 27-03). U.S. Forest Service national forest acreage is high in Florida and Mississippi (7.3 percent and 5.9 percent, respectively), but it accounts for less than 3 percent of the bird conservation region. State-owned forestland accounts for 2.3 percent of the bird conservation region.

Harvest and Population Status

Importance to Populations

BCR 27 provides value to regional woodcock populations as migration and wintering habitats. Breeding and nesting occur in the bird conservation region, but they occur at low levels compared to other bird conservation regions. Woodcock migrate through BCR 27, including through significant, funnel-point, stopover habitats near Cape Charles, Virginia. Woodcock also concentrate linearly along the Mississippi River during migration.

BCR 27's highest value to woodcock is as winter range. Woodcock winter throughout the bird conservation region from northeastern Virginia to Louisiana. Straw et al. (1994) identified three areas of BCR 27 with high wintering woodcock populations: southeastern Louisiana, the coastal plain of South Carolina, and eastern Virginia. Straw et al. (1994) also identified medium density wintering ranges in Mississippi, southern Alabama, western Georgia and coastal North Carolina.

Other Planning Efforts and Assessments

The measured decline of woodcock has prompted various planning and assessment efforts to highlight the importance of conservation actions dedicated to the improvement of woodcock habitat quality and quantity.

Woodcock are listed on state wildlife action plan species of greatest conservation need lists in Virginia (on tier 4), North Carolina (as high priority), South Carolina (as moderate priority), Alabama (as priority 2), Mississippi (on tier 3) and Louisiana.

The Partners in Flight Bird Conservation Plan for the South Atlantic Coastal Plain (Hunter et al. 2001) covers the approximate area covered by the Atlantic coast extension of BCR 27. Woodcock are listed as a high-priority species representing the early successional habitat type; although, mention is also made of their use of forested wetlands. The Partners in Flight Bird Conservation Plan for the East Gulf Coastal Plain (American Bird Conservancy 2001) reports on the approximate area covered by the Gulf Coast extension of BCR 27. Again, woodcock are listed as a high-priority species representing the shrub/scrub, old-field and early successional habitat types.

Harvest

U.S. Fish and Wildlife Service's woodcock wing-receipt studies show a cluster of high harvest in southeastern Louisiana, but most of BCR 27 falls within the zone of less than 101 woodcock wings submitted per county. A modest increase in wing receipts is noted for western Panhandle of Florida, coastal South Carolina and coastal North Carolina.

Harvest data are not available for counties within the bird conservation region, but statewide averages for those states with the majority of area within the bird conservation region illustrate harvest densities (Kelley and Rau 2005). In 2005, excluding Louisiana, states within BCR 27 accounted for 10,800 woodcock harvested by 92,00 hunters.

Population Trends

Only Virginia is included within the area surveyed through Singing-ground Survey estimates.

The Christmas bird count (CBC) (http://www.audubon.org/bird/cbc/hr/index.html) provides a glimpse into population trends but is subject to extreme variation due to weather effects on migration, differential observability and differential observer effort. CBC data for states included in BCR 27 were aggregated for the 1970 to 2004 period. CBC data reflects a generally stable population since the start of the 1980s with significant annual variation (Figure 27-05).

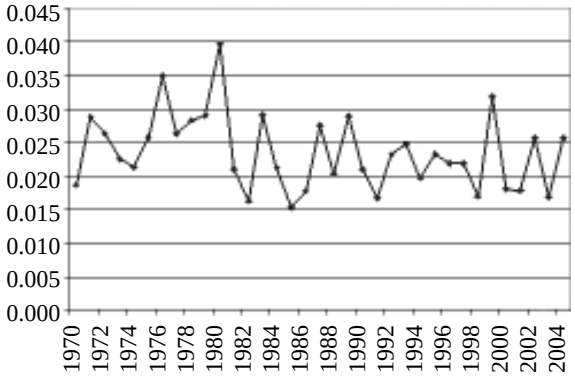


Figure 27-05. Christmas Bird Counts from 1970 to 2004 from states in BCR 27.

Habitat Goals and Management Recommendations

Virginia is the only state in BCR 27 for which population data exist. There is a population deficit of 5,355 singing males in Virginia (Table 27-04). Approximately 497,000 acres (201,000 ha) of early succession habitat needs to be created to eliminate the population deficit. Woodcock population estimates are not available for the remainder of BCR 27, so habitat goals and management recommendations are based on a comparison of the best available index to woodcock habitat—the percentage of forestland occupied by early successional habitat (small diameter plus nonstocked). By this measure, woodcock habitat has increased in BCR 27 by 3.9 percent, or 3.7 million acres (1.5 million ha) (Table 27-05). Therefore, habitat management goals are to sustain this level of early successional habitat.

Hunter et al. (2001) suggest that the gross index of early successional habitat may overrepresent early successional habitat because of changes in the intensity by which forest industry land is managed. Woodcock may be a good example of a species impacted by lower quality early successional habitat. Straw et al. (1994) describe high-quality winter range for woodcock as early successional land with high stem density, intact understory and vegetative diversity. Such structure provides abundant earthworms and protection from predation. Site preparation following clearcutting (especially bedding, ditching and mounding) affects earthworm abundance, and vegetative composition may be lowered. Herbicides applied to kill competing hardwoods results in lowered hardwood stem density, lowered vegetative diversity and simplified understory composition. Rapid crown closure of planted pine trees, especially those planted stands that are precommercially thinned, reduces understory vegetation.

Habitat management recommendations, therefore, are based not on acreage but on striving to achieve the following best management practices.

1. Employ a management-unit approach.
    a. Five-hundred to one-thousand acre units should represent a viable population unit.
2. Center management units on wetland or on wet, moist or on poorly drained, loamy soil.
3. Manage for quality winter habitat.
    a. Employ even-aged management on uplands adjacent to wet areas.
    b. A 5-acre minimum should be the final harvest size.
    c. Emphasize shade-intolerant hardwoods.
    d. Use short rotations.
    e. Rely on natural regeneration.
    f. Delay, limit or exclude site preparation and herbicides.
4. Manage roosting fields
    a. Bare ground should be intermixed with scattered weeds.
    b. Exhibit a preference for larger, more open roosting fields with wetter soils.
    c. Nonforested openings should be less than 1 mile (1.5 million km) from cover.
    d. Make log landings as large as possible.
    e. Young plantations should follow herbicide treatments, especially if mosaics of nonplanted areas exist.
    f. Maintain old fields and manage grazing on active pastures.
5. Take a metapopulation approach.
    a. Create 5 management units within 2 miles (1.2 km).
    b. Expect some interchange between units.
    c. Adjacent units should be made available to repopulate local areas of extinctions.

Table 27-01. Dominant (greater than 0.5 percent) forest type composition by state in BCR 27.

	Kentucky	Tennessee	Mississippi	Louisiana	Alabama	Florida	Georgia	South Carolina	North Carolina	Virginia	Total
Baldcypress/ Water tupelo	24,754	46,053	74,900	47,396	191,043	472,862	446,150	390,039	243,862	41,760	1,978,819
Loblolly pine	0	150,937	4,447,880	616,438	4,582,364	665,864	3,569,057	3,293,975	2,633,103	929,059	20,888,677
Loblolly pine/ Hardwood	0	99,191	2,280,286	185,315	1,952,756	231,759	1,036,629	564,283	1,267,748	345,342	7,963,309
Longleaf pine	0	0	255,502	25,051	483,969	516,114	351,510	408,870	177,448	0	2,218,464
Longleaf pine/Oak	0	0	159,583	0	170,202	252,722	174,714	126,852	114,698	0	998,771
Mixed upland hardwoods	9,260	527,596	176,227	80,483	2,928,368	744,991	964,853	337,973	806,930	182,717	6,759,397
Oak/Gum/ Cypress group	0	0	1,188,138	0	0	0	0	0	0	0	1,188,138
Oak/Hickory group	0	0	943,529	0	0	0	0	0	0	0	943,529
Other pine/ Hardwood	0	7,780	28,877	29,925	90,998	71,994	87,197	22,874	199,307	0	538,952
Pond pine	0	0	0	0	0	52,942	46,779	115,818	306,568	0	522,106
Sand pine	0	0	0	0	0	336,428	27,354	0	0	0	363,782
Shortleaf pine	0	43,138	370,532	0	205,554	16,908	76,255	3,711	8,181	2,826	727,105
Shortleaf pine/Oak	0	65,719	371,862	0	250,456	15,901	51,079	5,226	4,056	353	764,652
Slash pine	0	0	610,280	50,319	497,104	3,717,976	3,070,278	126,723	60,234	0	8,132,914
Slash pine/ Hardwood	0	0	287,653	11,127	200,508	366,739	566,957	24,999	12,980	0	1,470,962
Southern scrub oak	0	0	0	0	40,408	291,066	224,990	112,752	107,359	0	776,574
Sugarberry/ Hackberry/Elm/ Green ash	11,513	103,442	340,377	35,344	297,769	88,064	101,506	135,021	103,529	31,083	1,247,648
Sweetbay/Swamp tupelo/Red maple	0	18,139	305,568	73,588	769,800	997,720	1,522,084	466,768	1,022,345	112,495	5,288,507
Sweetgum/Nuttall oak/Willow oak	0	217,430	931,608	91,177	1,007,724	433,309	1,134,213	1,097,048	453,857	86,297	5,452,662
Sweetgum/ Yellow poplar	14,879	247,356	193,535	56,552	636,809	62,134	345,268	254,466	653,130	238,046	2,702,173
White oak/Red oak/Hickory	117,724	529,816	4,376,554	94,493	254,191	5,385	239,245	80,980	82,297	255,960	6,036,646

Table 27-02. Area of timberland, in acres (percentage of column total) by stand-size class in BCR 27 and in portions of individual states within the bird conservation region for current and historical (1970–1975) time periods (Miles 2004).

	Current stand-size distribution					Historical stand-size distribution				
	Total forestland	Large diameter	Medium diameter	Small diameter	Non-stocked	Total forestland	Large diameter	Medium diameter	Small diameter	Non-stocked
Alabama	15,207,691	4,370,156	3,103,117	7,682,620	51,799	13,798,600	4,907,000	4,244,100	4,549,600	97,900
	(19.0)	(28.7)	(20.4)	(50.5)	(0.3)	(100.0)	(35.6)	(30.8)	(33.0)	(0.7)
Florida	9,470,322	2,681,622	2,663,511	3,894,577	230,612	9,937,200	2,984,000	2,596,700	3,149,000	1,207,500
	(11.8)	(28.3)	(28.1)	(41.1)	(2.4)	(100.0)	(30.0)	(26.1)	(31.7)	(12.2)
Georgia	14,256,511	4,802,943	3,543,113	5,572,533	337,921	14,520,000	4,948,900	4,610,400	4,396,500	564,200
	(17.8)	(33.7)	(24.9)	(39.1)	(2.4)	(100.0)	(34.1)	(31.8)	(30.3)	(3.9)
Kentucky[7]	248,959	155,586	64,388	28,985	0	360,650	219,500	61,500	79,650	0
	(0.3)	(62.5)	(25.9)	(11.6)	(0.0)	(100.0)	(60.9)	(17.1)	(22.1)	(0.0)
Louisiana	1,517,196	702,703	324,895	467,345	22,252	1,507,700	876,500	241,300	330,200	59,700
	(1.9)	(46.3)	(21.4)	(30.8)	(1.5)	(100.0)	(58.1)	(16.0)	(21,9)	(4.0)
Mississippi	17,830,585	7,127,311	3,715,201	6,915,223	72,850	16,040,400	4,222,600	3,546,600	8,137,100	133,900
	(22.3)	(40.0)	(20.8)	(38.8)	(0.4)	(100.0)	(26.3)	(22.1)	(50.7)	(0.8)
North Carolina	8,439,647	2,611,914	1,606,143	4,171,620	49,971	9,201,358	3,871,590	2,475,096	2,667,629	375,053
	(10.6)	(30.9)	(19.0)	(49.4)	(0.6)	(100.0)	(42.1)	(26.9)	(29.0)	(4.1)
South Carolina	7,850,877	2,724,356	2,651,715	2,431,075	43,732	7,956,800	3,617,400	1,793,300	2,169,300	376,800
	(9.8)	(34.7)	(33.8)	(31.0)	(0.6)	(100.0)	(45.5)	(22.5)	(27.3)	(4.7)
Tennessee	2,569,826	1,200,483	536,924	799,984	32,434	2,146,300	647,200	833,200	654,600	11,300
	(3.2)	(46.7)	(20.9)	(31.1)	(1.3)	(100.0)	(30.2)	(38.8)	(30.5)	(0.5)
Virginia	2,533,138	998,639	921,339	613,161	0	2,750,784	1,190,877	800,129	726,623	33,064
	(3.2)	(39.4)	(36.4)	(24.2)	(0.0)	(100.0)	(43.3)	(29.1)	(26.4)	(1.2)
Total	79,924,752	27,375,713	19,130,346	32,577,122	841,571	78,219,792	27,485,567	21,202,525	26,860,202	2,859,417
	(100.0)	(34.3)	(23.9)	(40.8)	(1.1)	(100.0)	(35.1)	(27.1)	(34.3)	(3.7)

Table 27-03. Composition of forest ownership, in acres (percentage of column total), in BCR 27.

Ownership	Total	Kentucky	Tennessee	Mississippi	Louisiana	Alabama	Florida	Georgia	South Carolina	North Carolina	Virginia
County and municipal	345,395 (0.4)	0 (0.0)	22,084 (0.9)	82,477 (0.5)	0 (0.0)	62,393 (0.4)	20,393 (0.2)	36,590 (0.3)	28,582 (0.4)	57,914 (0.7)	34,962 (1.4)
National forest	2,362,224 (3.0)	0 (0.0)	0 (0.0)	1,047,929 (5.9)	0 (0.0)	247,438 (1.6)	694,592 (7.3)	4,131 (<0.1)	247,029 (3.1)	121,105 (1.4)	0 (0.0)
Other federal	2,587,846 (3.2)	0 (0.0)	89,807 (3.5)	414,831 (2.3)	33,378 (2.2)	121,476 (0.8)	510,601 (5.4)	510,117 (3.6)	298,925 (3.8)	521,668 (6.2)	87,042 (3.6)
Private	72,631,968 (91.0)	231,309 (92.9)	2,354,255 (91.6)	16,008,028 (89.8)	1,424,732 (93.9)	14,635,698 (96.2)	7,650,114 (80.8)	13,526,793 (94.9)	7,067,267 (90.0)	7,429,022 (88.0)	2,304,751 (94.4)
State	1,891,357 (2.4)	7,968 (3.2)	103,679 (4.0)	277,320 (1.6)	59,086 (3.9)	140,686 (0.9)	594,622 (6.3)	178,880 (1.3)	203,715 (2.6)	309,939 (3.7)	15,463 (0.6)
U.S. Fish and Wildlife Service	15,041 (<0.1)	9,682 (3.9)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	5,359 (0.1)	0 (0.0)	0 (0.0)
All	79,833,831 (100.0)	248,959 (100.0)	2,569,826 (100.0)	17,830,585 (100.0)	1,517,196 (100.0)	15,207,691 (100.0)	9,470,322 (100.0)	14,256,511 (100.0)	7,850,877 (100.0)	8,439,647 (100.0)	2,442,217 (100.0)

Table 27-05: Trends in forest cover and woodcock populations and habitat management goals for BCR 27.

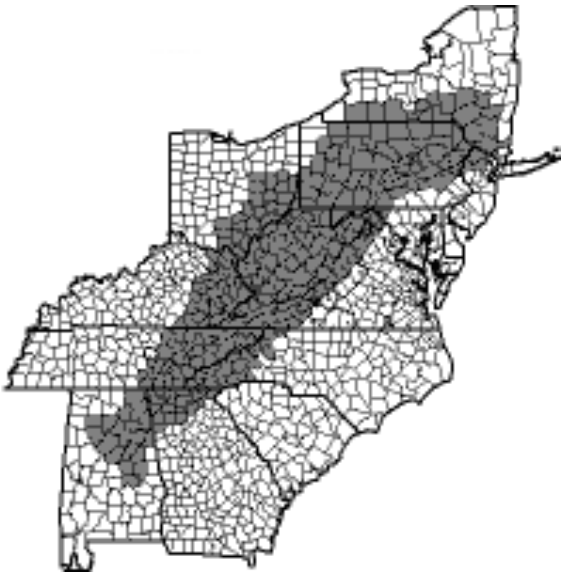
	Historic			Current				
	Total forestland	Early successional habitat	Percent early successional habitat	Total forestland	Early successional habitat	Percent early successional habitat	Percent changed	Acres changed
Alabama	13,798,600	4,647,500	33.7	15,207,691	7,734,418	50.9	17.2	3,086,918
Florida	9,937,200	4,356,500	43.8	9,470,322	4,125,189	43.6	0.3	-231,311
Georgia	14,520,000	4,960,700	34.2	14,256,511	5,910,455	41.5	7.3	949,755
Kentucky	360,650	79,650	22.1	248,959	28,985	11.6	10.4	-50,665
Louisiana	1,507,700	389,900	25.9	1,517,196	489,597	32.3	6.4	99,697
Mississippi	16,040,400	8,271,000	51.6	17,830,585	6,988,073	39.2	12.4	-1,282,927
North Carolina	9,389,368	3,042,682	32.4	8,439,648	4,221,590	50.0	17.6	1,178,908
South Carolina	7,956,800	2,546,100	32.0	7,850,878	2,474,807	31.5	0.5	-71,293
Tennessee	2,146,300	665,900	31.0	2,569,825	832,418	32.4	1.4	166,518
Virginia	2,750,693	759,687	27.6	2,533,138	613,161	24.2	3.4	-146,526
Total	78,407,711	29,719,619	37.9	79,924,752	33,418,693	41.8	3.9	3,699,074

Table 27-04. Calculation of curent and historical population deficits and habitat goals for woodcock in the Virginia portion of BCR 27.

	Historical	Current
Total land area (in acres)	4,764,122	4,764,122
Manageable land area (in acres)	2,750,784	2,533,138
Population of singing males	8,189	2,186
Population deficit of singing males		5,355
Habitat goal (in acres)		496,951

Bird Conservation Region 28: Appalachian Mountains

Mark Banker
Ruffed Grouse Society



Affected States: Alabama, Georgia, Kentucky, Maryland, New York, New Jersey, North Carolina, Ohio, Pennsylvania, Tennessee, Virginia and West Virginia
Current Area of Forestland: 66,892,834 acres (27,070,860 ha) (9,083,081 acres (3,675,832 ha) of small diameter and nonstocked forest)
Woodcock Trend estimate (1966–2004): -2.0
Percent of Change per Year (1994–2004): -0.9
Woodcock Population Estimate (1970): 179,495
Singing Males Only (2004): 94,045

Physiography and Habitat Description

The Appalachian Mountains Bird Conservation Region (BCR 28) connects the primary woodcock wintering grounds in the southeastern United States with the high-density breeding grounds in the northernmost part of the eastern flyway. BCR 28 includes parts of 12 states, extending from southern New York to northeastern Alabama and encompassing more than 67 million acres (27 million ha), or 104,000 square miles (269,360 km^2). Elevations range from over 6,500 feet (1,980 m) in the peaks of the southern Appalachians to less than 200 feet (61 m) in some valleys. Major physiographic regions included in this area are the Blue Ridge, Ridge and Valley, Cumberland Plateau, Ohio Hills, and the Allegheny Plateau. It also includes the Great Smoky Mountains.

While portions of plateaus and valleys of the bird conservation region are in agricultural use, the majority of this bird conservation region is forested. Fertile valleys with reverting farmland and wooded riparian areas are common. High elevation wetland complexes, such as the Canaan Valley (in West Virginia) and the Pocono Mountains (in Pennsylvania) regions, offer important moist soils for both migrating and breeding woodcock. Broad river valleys between parallel ridges in the Ridge and Valley Region host high densities of migrating woodcock in spring and fall.

Mature forests dominate the Appalachians. Nearly 60 percent of BCR 28 forestland is characterized as large diameter, 26 percent as medium diameter and 13 percent as seedling/sapling; less than 0.003 percent is nonstocked. Between the baseline (historical) and the most recent forest inventories, total forested acres increased by about 1.5 percent. The amount of forestland comprised of small-diameter trees declined by about 16 percent over the same time frame (Table 28-01). U.S. Forest Service forest inventory analysis data confirmed that, for states with increasing early successional habitat trends, those increases occurred primarily on nonindustrial private forests while the major

declines occurred on public land, especially on national forests.

In West Virginia, which is entirely within BCR 28, early successional (small-diameter) forest decreased 27 percent from 1989 to 2000. In Pennsylvania, the extent of seedling/sapling habitat reached a 50-year low of 10 percent in 2004 (U.S. Department of Agriculture Forest Service 2004). Acres of early successional forest declined 24 percent between 1989 and 2002. In Ohio, early successional forest declined by 48 percent from 1993 to 2002. The northeastern portion of Alabama included in BCR 28 has shown an 18 percent increase in early successional forest, with increases occurring on both public and private land. Early successional forests increased in New Jersey and Maryland within BCR 28 (three counties each) during the 1990s.

Aspen forest is a minor component (less than 1 percent) of the bird conservation region as a whole, but it does occur in significant stands north of Interstate 80. More than 80 percent of the aspen in the bird conservation region occurs in Pennsylvania and New York (Table 28-02). Dominant forest types include oak/hickory and maple/beech/birch. Mixed upland hardwoods are common and well distributed across the bird conservation region (Table 28-03). Most of the early successional forest habitat is found within the mixed upland hardwood, loblolly pine, sugar maple/beech/yellow birch, and oak/hickory forest types (Table 28-04).

As expected in mountainous terrain, the majority of forests in BCR 28 are on relatively dry upland sites. However, over 9 million acres (3.6 million ha) of forest are characterized as being on moist slopes, coves or small drains (Table 28-05). These areas may offer particularly good opportunities for management.

Eighty-one percent of the timberland in the Appalachians is privately owned. National forests represent 9 percent of the public forestland within BCR 28, but nearly 17 percent are south of Pennsylvania. The states own 8 percent of the public forests (Table 6). The average extent of forests that are10 or fewer years of age on national forests in BCR 28 is 4.2 percent. Such forests declined by 4 percent on southern Appalachian national forests since the 1990s. Just 1 percent and 2 percent of the Monongahela (in West Virginia) and Chattahoochee (in Tennessee) national forests, respectively, are in the fewer-than-10-years-old age class, respectively. This class on the George Washington and Jefferson national forests declined from 4.3 percent in 1989 to 1.8 percent in 2002.

Population and Habitat Goals

To restore woodcock densities in BCR 28 to those observed during the early 1970s, a total of over 88,000 singing males need to be added to the population (Table 28-07). This estimate pertains only to manageable acres in states covered by the Singing-ground Survey. Achieving this goal will require the creation of nearly 3 million acres (1.2 million ha) of new woodcock habitat.

Table 28-01. Current and historical (1975–1990) stand-size distribution, in acres (percentage of column total) of forestland in BCR 28 and in portions of individual states within the bird conservation region

	Current stand-size distribution					Historical stand-size distribution				
	Total forestland	Large diameter[1,2]	Medium diameter[1,3]	Small diameter[1,4]	Non-stocked[1,5]	Total forestland	Large diameter[1,2]	Medium diameter[1,3]	Small diameter[1,4]	Non-stocked[1,5]
Alabama	5,750,030	1,975,889	1,301,691	2,458,767	13,682	5,509,772	1,798,234	1,611,207	2,089,738	10,593
	(8)	(5)	(7)	(29)	(6)	(8)	(5)	(9)	(20)	(6)
Georgia	2,714,230	1,421,771	823,980	468,479	0	2,888,916	1,538,505	773,895	550,869	25,647
	(4)	(4)	(4)	(5)		(4)	(4)	(4)	(5)	(15)
Kentucky	5,624,924	3,975,652	1,170,684	474,202	4,385	5,671,524	3,584,800	1,314,607	772,117	0
	(8)	(8)	(7)	(5)	(2)	(9)	(10)	(7)	(7)	
Maryland	546,773	335,585	143,706	65,095	2,386	587,916	364,001	170,124	53,791	0
	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(<1)	
New Jersey	460,353	364,590	71,378	18,424	5,961	460,871	364,741	83,594	12,536	0
	(1)	(1)	(<1)	(<1)	(3)	(1)	(2)	(1)	(<1)	
New York	5,680,499	3,347,456	1,627,218	654,520	51,305	5,438,042	3,037,601	1,544,102	845,778	10,561
	(8)	(8)	(9)	(7)	(21)	(8)	(8)	(8)	(8)	(6)
North Carolina	3,373,843	2,253,451	638,690	481,702	0	3,453,436	2,242,249	913,115	285,153	12,919
	(5)	(6)	(4)	(6)		(5)	(6)	(5)	(3)	(8)
Ohio	4,650,744	2,939,809	1,130,723	555,423	24,789	4,261,413	2,194,634	989,330	1,072,784	4,665
	(7)	(7)	(6)	(6)	(10)	(7)	(6)	(5)	(10)	(3)
Pennsylvania	14,861,736	8,590,550	4,584,089	1,645,394	41,703	14,510,890	7,694,840	4,620,636	2,174,756	20,658
	(22)	(21)	(25)	(19)	(17)	(22)	(21)	(25)	(21)	(12)
Tennessee	5,591,151	3,344,747	1,676,562	560,411	9,431	5,710,018	3,081,455	1,678,495	944,348	5,720
	(8)	(8)	(9)	(6)	(4)	(9)	(8)	(9)	(9)	(3)
Virginia	5,841,585	3,126,582	2,131,932	581,794	1,277	5,478,689	3,127,141	1,751,333	522,305	77,910
	(9)	(8)	(12)	(7)	(1)	(8)	(9)	(9)	(5)	(46)
West Virginia	11,796,966	8,196,857	2,636,857	879,639	84,312	11,900,346	7,472,484	3,214,667	1,210,642	2,553
	(18)	(21)	(15)	(10)	(35)	(18)	(20)	(17)	(12)	(1)
Total	66,892,834	39,872,939	17,937,510	8,843,850	239,231	65,871,833	36,500,685	18,665,105	10,534,817	171,226

[1] Percentages for various diameter categories and nonstocked category refer to percent of total forestland for current and historical time periods within each state.
[2] Softwoods are at least 9 inches, and hardwoods are at least 11 inches in diameter at breast height.
[3] Trees are at least 5 inches in diameter at breast height but are smaller than large-diameter trees.
[4] Saplings are 1 to 5 inches diameter at breast height. Softwood seedlings are more than 6 inches tall, and hardwood seedlings are more than 12 inches tall.
[5] Data refers to commercial forestland on which stocking of trees is less than 16.7 percent.

Table 28-02. Percentage occurrence of forest types between states within BCR 28.

Forest type	Alabama	Georgia	Kentucky	Maryland	New Jersey	New York	North Carolina	Ohio	Pennsylvania	Tennessee	Virginia	West Virginia	Total
Aspen	0.0	0.0	0.0	0.0	0.0	35.8	0.0	13.8	47.9	0.0	0.0	2.6	100.0
Bald cypress/Water tupelo	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
Black ash/American elm/ Red maple	0.0	0.0	0.0	6.3	16.5	16.3	0.0	0.9	0.0	0.0	0.0	60.0	100.0
Black cherry	0.0	0.0	0.0	3.9	0.7	8.6	0.0	7.8	62.9	0.0	0.0	16.2	100.0
Black locust	0.0	0.0	11.8	3.8	0.0	0.0	0.0	5.9	13.0	1.0	0.0	64.5	100.0
Black walnut	0.0	0.0	7.0	0.8	0.0	10.6	0.0	30.7	43.2	0.0	0.0	7.7	100.0
Cherry/Ash/Yellow poplar	0.0	0.0	0.3	0.0	0.0	34.3	0.0	14.2	50.6	0.6	0.0%	0.0	100.0
Chestnut oak	4.8	9.6	10.6	0.5	0.4	1.4	6.8	1.7	19.4	11.8	21.6	11.3	100.0
Chestnut/Black/Scarlet oak	3.1	0.0	12.2	0.0	0.0	5.9	0.0	11.4	66.8	0.5	0.0	0.0	100.0
Cottonwood	0.0	0.0	0.0	0.0	0.0	0.0	0.0	74.7	25.3	0.0	0.0	0.0	100.0
Douglas fir	0.0	0.0	0.0	0.0	0.0	87.1	0.0	0.0	12.9	0.0	0.0	0.0	100.0
Eastern hemlock	0.8	1.2	15.0	0.0	0.0	20.9	1.6	0.0	33.3	10.1	6.7	10.4	100.0
Eastern red cedar	2.0	1.6	4.3	0.0	3.5	3.0	0.0	0.0	0.0	38.4	44.4	2.9	100.0
Eastern red cedar/ Hardwood	34.1	0.0	2.8	5.4	5.1	5.7	0.0	0.0	0.0	14.6	28.9	3.3	100.0
Elm/Ash/Locust	0.0	0.0	2.5	0.0	0.0	4.6	0.0	36.3	56.6	0.0	0.0	0.0	100.0
Hard maple/Basswood	0.0	0.0	2.9	0.0	0.0	38.2	0.0	7.5	50.1	1.3	0.0	0.0	100.0
Loblolly pine	70.4	20.3	0.0	0.0	0.0	0.0	0.6	0.0	0.0	8.0	0.7	0.0	100.0
Loblolly pine/Hardwood	74.3	15.7	0.3	0.0	0.0	0.0	0.0	0.0	0.0	9.2	0.0	0.5	100.0
Longleaf pine	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
Longleaf pine/Oak	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
Mixed upland hardwoods	6.3	1.2	3.3	1.6	1.4	1.9	13.4	5.0	4.8	9.7	8.3	43.0	100.0
Nonstocked	0.0	0.0	2.1	1.1	2.9	21.6	0.0	4.5	22.1	4.5	0.6	40.5	100.0
Northern red oak	1.0	0.6	4.0	1.2	1.1	18.2	2.9	1.6	37.7	1.8	11.7	18.2	100.0
Other	0.0	0.0	0.0	0.0	0.0	76.8	0.0	0.0	23.2	0.0	0.0	0.0	100.0
Other exotic softwoods	0.0	0.0	0.0	3.0	0.0	57.0	0.0	0.0	40.0	0.0	0.0	0.0	100.0
Other pine/Hardwood	7.6	9.4	6.5	0.0	0.0	0.0	7.0	1.7	7.1	26.8	30.4	3.5	100.0
Paper birch	0.0	0.0	0.0	0.0	0.0	14.1	0.0	0.0	85.9	0.0	0.0	0.0	100.0
Pitch pine	0.0	5.9	11.9	0.0	0.0	0.0	7.7	16.9	13.0	3.1	24.1	17.4	100.0
Post oak/Blackjack oak	23.6	14.0	14.5	0.0	1.8	0.0	4.1	1.0	0.0	10.5	15.2	15.3	100.0
Red maple/Lowland	21.1	0.0	0.0	0.0	17.9	15.8	0.0	2.9	42.3	0.0	0.0	0.0	100.0
Red maple/Oak	1.3	0.0	10.8	0.4	0.4	10.6	0.0	5.6	55.7	0.8	0.0	14.3	100.0
Red maple/Upland	0.0	0.0	0.0	1.4	0.6	29.5	0.0	0.2	54.1	0.0	0.0	14.3	100.0
Red pine	0.0	0.0	0.0	13.3	0.0	64.7	0.0	0.0	22.0	0.0	0.0	0.0	100.0
Red spruce	0.0	0.0	0.0	0.0	0.0	0.0	58.5	0.0	0.0	0.0	7.9	33.6	100.0
River birch/Sycamore	0.0	1.0	10.8	2.0	0.0	17.9	0.0	14.5	15.9	4.8	3.1	30.0	100.0
Sassafras/Persimmon	0.8	0.0	3.2	0.0	0.0	0.0	0.0	44.1	40.9	0.0	0.0	11.0	100.0
Scarlet oak	0.0	0.0	31.9	4.1	0.0	0.0	0.0	0.0	16.8	7.6	0.0	39.6	100.0

Table 28-02 (continued). Percentage occurrence of forest types between states within BCR 28.

Forest type	Alabama	Georgia	Kentucky	Maryland	New Jersey	New York	North Carolina	Ohio	Pennsylvania	Tennessee	Virginia	West Virginia	Total
Scotch pine	0.0	0.0	0.0	0.0	0.0	58.7	0.0	0.0	41.3	0.0	0.0	0.0	100.0
Shortleaf pine	25.3	37.4	8.3	0.0	0.0	0.0	11.4	0.0	6.9	10.8	0.0	0.0	100.0
Shortleaf pine/Oak	27.0	26.9	14.7	0.0	0.0	0.0	7.2	0.0	0.0	20.6	2.3	1.3	100.0
Silver maple/American elm	0.0	0.0	6.9	0.0	0.0	0.0	0.0	83.8	9.3	0.0	0.0	0.0	100.0
Southern scrub oak	0.0	29.7	0.0	0.0	0.0	0.0	0.0	0.0	70.3	0.0	0.0	0.0	100.0
Swamp chestnut oak/ Cherrybark oak	86.5	0.0	13.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
Sweetgum/Nuttall oak/ Willow oak	97.1	2.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
Sweetbay/Swamp tupelo/ Red maple	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
Sugarberry/Hackberry/ Elm/Green ash	26.6	6.2	7.6	0.0	0.7	9.1	0.0	20.4	24.5	1.1	0.0	3.9	100.0
Sugar maple/Beech/ Yellow birch	0.0	0.0	3.9	0.9	1.1	21.7	1.5	6.1	42.4	0.3	1.6	20.5	100.0
Sweetgum/Yellow poplar	46.9	12.0	23.1	0.0	0.0	0.0	2.4	0.0	0.0	15.6	0.0	0.0	100.0
Sycamore/Pecan/ American elm	6.6	6.1	3.3	0.0	0.0	9.2	0.0	44.8	11.3	1.2	0.5	17.1	100.0
Table mountain pine	0.0	8.9	0.0	0.0	0.0	0.0	3.0	0.0	3.1	0.0	72.2	12.8	100.0
Tamarac	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	100.0
Virginia pine	17.8	11.5	11.5	0.2	0.0	0.0	6.4	7.4	6.3	22.9	4.7	11.2	100.0
Virginia pine/Southern red oak	12.6	15.0	8.3	0.0	0.0	0.0	4.5	4.9	3.1	21.9	6.6	23.1	100.0
Yellow poplar	2.8	0.0	47.1	0.0	0.5	0.0	0.0	11.4	5.4	1.6	0.0	31.1	100.0
Yellow poplar/ White Oak/Red oak	3.9	9.3	13.4	0.0	0.0	0.0	15.6	10.8	6.9	8.9	24.0	7.2	100.0
White pine	0.0	4.4	4.3	0.7	0.0	16.2	18.0	5.9	18.0	1.9	23.5	7.1	100.0
White pine/Hemlock	0.0	5.3	4.0	0.0	0.0	21.9	13.8	0.0	15.2	18.9	15.9	5.0	100.0
White pine/Red oak/ White ash	0.0	5.4	1.7	0.0	0.0	21.3	17.7	5.6	21.0	6.8	19.3	1.2	100.0
White Oak	5.6	2.8	16.0	2.2	1.4	0.0	0.3	10.1	21.7	5.4	4.7	29.8	100.0
White/Red oak/Hickory	7.6	4.1	16.0	0.6	0.3	4.0	3.0	9.9	19.3	15.7	10.4	9.3	100.0
White spruce	0.0	0.0	0.0	0.0	0.0	6.7	0.0	0.0	93.3	0.0	0.0	0.0	100.0
Willow	5.1	11.6	31.9	0.0	7.1	6.4	0.0	22.3	2.6	0.0	0.6	12.3	100.0

Table 28-03. Forest composition of timberland, in acres (percentage of column total) within BCR 28.

Forest type	Alabama	Georgia	Kentucky	Maryland	New Jersey	New York	North Carolina	Ohio	Pennsylvania	Tennessee	Virginia	West Virginia
Aspen	0	0	0	0	0	128,326	0	49,567	171,762	0	0	9,169
	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(2.3)	(0.0)	(1.1)	(1.1)	(0.0)	(0.0)	(0.1)
Bald cypress/Water tupelo	14,384	0	0	0	0	0	0	0	0	0	0	0
	(0.2)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)
Black ash/American elm/	0	0	0	11,948	31,444	31,101	0	1,741	0	0	0	114,448
Red maple	(0.0)	(0.0)	(0.0)	(2.2)	(6.8)	(0.5)	(0.0)	(<0.1)	(0.0)	(0.0)	(0.0)	(1.0)
Black cherry	0	0	0	32,945	5,747	73,153	0	66,698	538,302	0	0	138,407
	(0.0)	(0.0)	(0.0)	(6.0)	(1.2)	(1.3)	(0.0)	(1.4)	(3.6)	(0.0)	(0.0)	(1.2)
Black locust	0	0	25,831	8,420	0	0	0	12,958	28,662	2,201	0	141,581
	(0.0)	(0.0)	(0.5)	(1.5)	(0.0)	(0.0)	(0.0)	(0.3)	(0.2)	(<0.1)	(0.0)	(1.2)
Black walnut	0	0	9,924	1,075	0	15,020	0	43,574	61,251	0	0	10,937
	(0.0)	(0.0)	(0.2)	(0.2)	(0.0)	(0.3)	(0.0)	(0.9)	(0.4)	(0.0)	(0.0)	(0.1)
Cherry/Ash/Yellow poplar	0	0	3,835	0	0	389,636	0	161,575	574,843	6,358	0	0
	(0.0)	(0.0)	(<0.1)	(0.0)	(0.0)	(6.8)	(0.0)	(3.5)	(3.8)	(0.1)	(0.0)	(0.0)
Chestnut Oak	225,624	450,624	499,539	22,502	20,937	68,237	322,914	80,545	915,034	556,735	1,020,866	534,547
	(3.9)	(15.7)	(8.9)	(4.1)	(4.5)	(1.2)	(8.6)	(1.7)	(6.1)	(10.0)	(18.2)	(4.5)
Chestnut/Black/Scarlet oak	55,232	0	218,523	0	0	106,290	0	202,912	1,193,900	9,606	0	0
	(1.0)	(0.0)	(3.9)	(0.0)	(0.0)	(1.9)	(0.0)	(4.4)	(8.0)	(0.2)	(0.0)	(0.0)
Cottonwood	0	0	0	0	0	0	0	16,888	5,726	0	0	0
	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.4)	(<0.1)	(0.0)	(0.0)	(0.0)
Douglas fir	0	0	0	0	0	12,379	0	0	1,835	0	0	0
	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.2)	(0.0)	(0.0)	(<0.1)	(0.0)	(0.0)	(0.0%)
Eastern hemlock	5,617	8,121	100,942	0	0	141,136	10,877	0	224,183	67,756	45,481	70,007
	(0.1)	(0.3)	(1.8)	(0.0)	(0.0)	(2.5)	(0.3)	(0.0)	(1.5)	(1.2)	(0.8)	(0.6)
Eastern red cedar	2,455	2,002	5,360	0	4,377	3,755	0	0	0	48,277	55,843	3,696
	(<0.1)	(0.1)	(0.1)	(0.0)	(1.0)	(0.1)	(0.0)	(0.0)	(0.0)	(0.9)	(1.0)	(<0.1)
Eastern red cedar/Hardwood	67,215	0	5,585	10,692	9,972	11,148	0	0	0	28,724	56,932	6,557
	(1.2)	(0.0)	(0.1)	(2.0)	(2.2)	(0.2)	(0.0)	(0.0)	(0.0)	(0.5)	(1.0)	(<0.1)
Elm/Ash/Locust	0	0	7,262	0	0	13,314	0	104,868	163,567	0	0	0
	(0.0)	(0.0)	(0.1)	(0.0)	(0.0)	(0.2)	(0.0)	(2.3)	(1.1)	(0.0)	(0.0)	(0.0)
Hard maple/Basswood	0	0	21,895	0	0	291,198	0	57,428	382,277	10,087	0	0
	(0.0)	(0.0)	(0.4)	(0.0)	(0.0)	(5.1)	(0.0)	(1.2)	(2.6)	(0.2)	(0.0)	(0.0)
Loblolly pine	1,411,975	407,174	0	0	0	0	12,999	0	0	160,533	13,182	0
	(24.5)	(14.1)	(0.0)	(0.0)	(0.0)	(0.0)	(0.3)	(0.0)	(0.0)	(2.9)	(0.2)	(0.0)
Loblolly pine/Hardwood	562,649	119,018	2,180	0	0	0	0	0	0	69,911	0	3,978
	(9.8)	(4.1)	(<0.1)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(1.2)	(0.0)	(<0.1)
Longleaf pine	146,239	0	0	0	0	0	0	0	0	0	0	0
	(2.5)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)

Table 28-03 (continued). Forest composition of timberland, in acres (percentage of column total) within BCR 28.

Forest type	Alabama	Georgia	Kentucky	Maryland	New Jersey	New York	North Carolina	Ohio	Pennsylvania	Tennessee	Virginia	West Virginia
Longleaf pine/Oak	33,489	0	0	0	0	0	0	0	0	0	0	0
	(0.6%)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)
Mixed upland hardwoods	758,472	143,146	399,480	193,073	169,014	232,967	1,614,746	607,803	581,601	1,173,858	995,367	5,187,114
	(13.2)	(5.0)	(7.1)	(35.3)	(36.7)	(4.1)	(42.9)	(13.0)	(3.9)	(21.0)	(17.8)	(44.0)
Nonstocked	0	0	4,385	2,386	5,961	44,955	0	9,432	45,892	9,431	1,277	84,312
	0.0)	(0.0)	(0.1)	(0.4)	(1.3)	(0.8)	(0.0)	(0.2)	(0.3)	(0.2)	(<0.1)	(0.7)
Northern red oak	11,542	7,223	45,829	13,514	12,131	206,520	33,393	18,235	428,862	20,601	132,925	206,555
	(0.2)	(0.3)	(0.8)	(2.5)	(2.6)	(3.6)	(0.9)	(0.4)	(2.9)	(0.4)	(2.4)	(1.7)
Other	0	0	0	0	0	496	0	0	150	0	0	0
	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(<0.1)	(0.0)	(0.0)	(<0.1)	(0.0)	(0.0)	(0.0)
Other exotic softwoods	0	0	0	3,203	28	60,679	0	0	42,613	0	0	0
	(0.0)	(0.0)	(0.0)	(0.6)	(<0.1)	(1.1)	(0.0)	(0.0)	(0.3)	(0.0)	(0.0)	(0.0)
Other pine/Hardwood	55,908	68,651	47,329	0	0	0	51,320	12,537	52,151	195,894	222,728	25,652
	(1.0)	(2.4)	(0.8)	(0.0)	(0.0)	(0.0)	(1.4)	(0.3)	(0.3)	(3.5)	(4.0)	(0.2)
Paper birch	0	0	0	0	0	5,900	0	0	35,935	0	0	0
	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.1)	(0.0)	(0.0)	(0.2)	(0.0)	(0.0)	(0.0)
Pitch pine	0	11,217	22,386	0	0	0	14,617	31,887	24,495	5,899	45,486	32,838
	(0.0)	(0.4)	(0.4)	(0.0)	(0.0)	(0.0)	(0.4)	(0.7)	(0.2)	(0.1)	(0.8)	(0.3)
Post oak/Blackjack oak	81,752	48,474	50,321	0	6,107	0	14,205	3,572	0	36,541	52,782	53,029
	(1.4)	(1.7)	(0.9)	(0.0)	(1.3)	(0.0)	(0.4)	(0.1)	(0.0)	(0.6)	(0.9)	(0.4)
Red maple/Lowland	13,588	0	0	0	11,545	10,224	0	1,867	27,291	0	0	0
	(0.2)	(0.0)	(0.0)	(0.0)	(2.5)	(0.2)	(0.0)	(<0.1)	(0.2)	(0.0)	(0.0)	(0.0)
Red maple/Oak	15,682	0	130,185	4,894	4,580	128,064	0	67,847	670,602	9,666	0	172,336
	(0.3)	(0.0)	(2.3)	(0.9)	(1.0)	(2.2)	(0.0)	(1.5)	(4.5)	(0.2)	(0.0)	(1.5)
Red maple/Upland	0	0	0	22,243	9,658	479,634	0	3,439	878,693	0	0	231,767
	(0.0)	(0.0)	(0.0)	(4.1)	(2.1)	(8.4)	(0.0)	(0.1)	(5.9)	(0.0)	(0.0)	(2.0)
Red pine	0	0	0	14,627	0	71,344	0	0	24,227	0	0	0
	(0.0)	(0.0)	(0.0)	(2.7)	(0.0)	(1.3)	(0.0)	(0.0)	(0.2)	(0.0)	(0.0)	(0.0)
Red spruce	0	0	0	0	0	0	41,060	0	0	0	5,538	23,590
	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(1.1)	(0.0)	(0.0)	(0.0)	(0.1)	(0.2)
River birch/Sycamore	0	2,989	32,869	6,066	0	54,590	0	44,196	48,396	14,698	9,476	91,433
	(0.0)	(0.1)	(0.6)	(1.1)	(0.0)	(1.0)	(0.0)	(1.0)	(0.3)	(0.3)	(0.2)	(0.8)
Sassafras/Persimmon	3,075	0	12,101	0	0	0	0	165,007	152,876	0	0	40,979
	(<0.1)	(0.0)	(0.2)	(0.0)	(0.0)	(0.0)	(0.0)	(3.5)	(1.0)	(0.0)	(0.0)	(0.3)
Scarlet oak	0	0	41,691	5,398	0	0	0	0	21,972	9,889	0	51,702
	(0.0)	(0.0)	(0.7)	(1.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.1)	(0.2)	(0.0)	(0.4)
Scotch pine	0	0	0	0	0	77,101	0	0	54,162	0	0	0
	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(1.4)	(0.0)	(0.0)	(0.4)	(0.0)	(0.0)	(0.0)

Table 28-03 (continued). Forest composition of timberland, in acres (percentage of column total) within BCR 28.

Forest type	Alabama	Georgia	Kentucky	Maryland	New Jersey	New York	North Carolina	Ohio	Pennsylvania	Tennessee	Virginia	West Virginia
Shortleaf pine	31,604	46,672	10,338	0	0	0	14,191	0	8,646	13,503	0	0
	(0.5)	(1.6)	(0.2)	(0.0)	(0.0)	(0.0)	(0.4)	(0.0)	(0.1)	(0.2)	(0.0)	(0.0)
Shortleaf pine/Oak	132,594	132,030	72,035	0	0	0	35,356	0	0	101,322	11,480	6,580
	(2.3)	(4.6)	(1.3)	(0.0)	(0.0)	(0.0)	(0.9)	(0.0)	(0.0)	(1.8)	(0.2)	(<0.1)
Silver maple/American elm	0	0	6,462	0	0	0	0	78,623	8,749	0	0	0
	(0.0)	(0.0)	(0.1)	(0.0)	(0.0)	(0.0)	(0.0)	(1.7)	(0.1)	(0.0)	(0.0)	(0.0)
Southern scrub oak	0	6,972	0	0	0	0	0	0	16,524	0	0	0
	(0.0)	(0.2)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.1)	(0.0)	(0.0)	(0.0)
Swamp chestnut oak/	14,384	0	2,240	0	0	0	0	0	0	0	0	0
Cherrybark oak	(0.3)	(0.0)	(<0.1)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)
Sweetgum/Nuttall oak/	154,411	4,648	0	0	0	0	0	0	0	0	0	0
Willow oak	(2.7%)	(0.2)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)
Sweetbay/Swamp tupelo/	2,794	0	0	0	0	0	0	0	0	0	0	0
Red maple	(<0.1)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)
Sugarberry/Hackberry/	54,340	12,615	15,451	0	1,459	18,656	0	41,717	50,055	2,235	0	8,024
Elm/Green ash	(0.9)	(0.4)	(0.3)	(0.0)	(0.3)	(0.3)	(0.0)	(0.9)	(0.3)	(<0.1)	(0.0)	(0.1)
Sugar maple/Beech/	0	0	387,258	90,739	111,434	2,153,637	149,410	600,061	4,199,741	28,984	155,161	2,035,985
Yellow birch	(0.0)	(0.0)	(6.9)	(16.6)	(24.2)	(37.8)	(4.0)	(12.9)	(28.0)	(0.5)	(2.8)	(17.3)
Sweetgum/Yellow poplar	413,199	105,787	203,013	0	0	0	20,968	0	0	137,569	0	0
	(7.2)	(3.7)	(3.6)	(0.0)	(0.0)	(0.0)	(0.6)	(0.0)	(0.0)	(2.5)	(0.0)	(0.0)
Sycamore/Pecan/	21,170	19,460	10,482	0	0	29,413	0	143,892	36,424	3,841	1,606	54,792
American elm	(0.4)	(0.7)	(0.2)	(0.0)	(0.0)	(0.5)	(0.0)	(3.1)	(0.2)	(<0.1)	(<0.1)	(0.5)
Table mountain pine	0	4,711	0	0	0	0	1,591	0	1,630	0	38,368	6,818
	(0.0)	(0.2)	(0.0)	(0.0)	(0.0)	(0.0)	(<0.1)	(0.0)	(<0.1)	(0.0)	(0.7)	(<0.1)
Tamarac	0	0	0	0	0	0	0	0	12,219	0	0	0
	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.1)	(0.0)	(0.0)	(0.0)
Virginia pine	214,424	139,226	139,098	2,343	0	0	77,733	89,822	76,403	276,205	56,139	134,701
	(3.7)	(4.8)	(2.5)	(0.4)	(0.0)	(0.0)	(2.1)	(1.9)	(0.5)	(4.9)	(1.0)	(1.1)
Virginia pine/Southernred oak	143,562	170,684	93,955	0	0	0	51,085	55,632	35,506	248,439	74,766	262,701
	(2.5)	(5.9)	(1.7)	(0.0)	(0.0)	(0.0)	(1.4)	(1.2)	(0.2)	(4.4)	(1.3)	(2.2)
White oak	71,288	35,560	203,692	28,590	17,692	0	3,719	128,349	277,242	68,637	60,498	380,081
	(1.2)	(1.2)	(3.6)	(5.2)	(3.8)	(0.0)	(<0.1)	(2.8)	(1.8)	(1.2)	(1.1)	(3.2)
White oak/Red oak/Hickory	872,144	464,039	1,829,133	65,945	30,195	452,861	340,012	1,129,562	2,204,599	1,795,064	1,194,059	1,066,253
	(15.1)	(16.1)	(32.5)	(12.1)	(6.6)	(7.9)	(9.0)	(24.3)	(14.7)	(32.1)	(21.3)	(9.0)
White pine	0	36,112	35,296	6,171	0	133,771	147,955	48,384	148,098	15,815	193,254	58,826
	(0.0)	(1.2)	(0.6)	(1.1)	(0.0)	(2.3)	(3.9)	(1.0)	(1.0)	(0.3)	(3.4)	(0.5)
White pine/Hemlock	0	11,217	8,356	0	0	45,937	28,870	0	31,837	39,626	33,443	10,475
	(0.0)	(0.4)	(0.1)	(0.0)	(0.0)	(0.8)	(0.8)	(0.0)	(0.2)	(0.7)	(0.6)	(0.1)

Table 28-03 (continued). Forest composition of timberland, in acres (percentage of column total) within BCR 28.

Forest type	Alabama	Georgia	Kentucky	Maryland	New Jersey	New York	North Carolina	Ohio	Pennsylvania	Tennessee	Virginia	West Virginia
White pine/Red oak/	0	51,856	15,752	0	0	202,685	168,204	53,701	200,364	64,391	184,354	11,579
White ash	(0.0)	(1.8)	(0.3)	(0.0)	(0.0)	(3.6)	(4.5)	(1.1)	(1.3)	(1.1)	(3.3)	(0.1)
White spruce	0	0	0	0	0	1,192	0	0	16,478	0	0	0
	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(<0.1)	(0.0)	(0.0)	(0.1)	(0.0)	(0.0)	(0.0)
Willow	2,922	6,597	18,117	0	4,015	3,627	0	12,690	1,502	0	366	7,001
	(<0.1)	(0.2)	(0.3)	(0.0)	(0.9)	(0.1)	(0.0)	(0.3)	(<0.1)	(0.0)	(<0.1)	(<0.1)
Yellow poplar	21,909	0	364,616	0	4,056	0	0	88,267	41,966	12,644	0	240,360
	(0.4)	(0.0)	(6.5)	(0.0)	(0.9)	(0.0)	(0.0)	(1.9)	(0.3)	(0.2)	(0.0)	(2.0)
Yellow poplar/White oak/	150,188	361,244	522,176	0	0	0	607,517	420,982	267,558	346,210	934,145	278,155
Red oak	(2.6)	(12.6)	(9.3)	(0.0)	(0.0)	(0.0)	(16.1)	(9.0)	(1.8)	(6.2)	(16.7)	(2.4)
Total	5,765,831	2,878,069	5,624,922	546,774	460,352	5,698,946	3,762,742	4,656,258	14,986,801	5,591,150	5,595,522	11,796,965

Table 28-04. Stand-size class composition of the most common forest types found in the states within BCR 28

Stand-size class	Forest types																
	Mixed upland hardwoods	White oak/Red oak/Hickory	Chestnut oak	Yellow poplar/White oak/Red oak	White oak	Loblolly pine	Sweetgum/Yellow poplar	White pine/Red oak/White ash	Northern red oak	Sugar maple/Beech/Yellow birch	Virginia pine	Virginia pine/Southern red oak	Yellow poplar	Red maple/Oak	Chestnut oak/Black oak/Scarlet oak	Cherry/Ash/ Yellow poplar	All forest types
Alabama																	
Large	177,914	382,403	144,047	100,850	71,288	273,019	103,478	0	0	0	49,520	44,249	2,618	8,382	20,194	0	1,377,962
Medium	206,931	414,820	65,960	38,162	0	693,690	139,597	0	11,545	0	85,104	73,420	12,418	0	13,476	0	1,755,123
Small	373,627	74,921	15,617	11,176	0	445,266	170,124	0	0	0	79,800	25,892	6,872	7,300	21,562	0	1,232,157
Georgia																	
Large	19,533	333,754	276,668	295,494	35,560	38,629	24,843	0	7,223	0	87,928	78,135	0	0	0	0	1,197,767
Medium	38,627	112,511	173,956	37,521	0	213,684	25,665	0	0	0	40,026	55,182	0	0	0	0	697,172
Small	84,987	17,774	0	28,229	0	154,861	55,278	0	0	0	11,272	37,367	0	0	0	0	389,768
Kentucky																	
Large	190,175	1,421,002	442,706	393,075	165,817	0	78,991	8,169	45,829	350,700	52,636	37,020	211,541	77,194	188,928	0	3,663,783
Medium	93,299	340,425	48,337	106,367	27,842	0	81,810	7,583	0	22,794	41,926	51,110	127,301	21,278	29,595	0	999,667
Small	116,006	67,706	8,496	22,734	10,033	0	42,212	0	0	13,763	44,536	5,825	25,774	31,713	0	3,835	392,633
Maryland																	
Large	119,521	57,829	12,938	0	10,631	0	0	0	13,514	58,285	2,343	0	0	4,895	0	0	279,956
Medium	43,650	8,116	9,564	0	17,959	0	0	0	0	13,697	0	0	0	0	0	0	92,986
Small	29,902	0	0	0	0	0	0	0	0	18,757	0	0	0	0	0	0	48,659
New Jersey																	
Large	149,729	24,072	19,422	0	17,692	0	0	0	12,131	85,704	0	0	4,056	4,580	0	0	317,386
Medium	12,674	6,123	1,496	0	0	0	0	0	0	21,129	0	0	0	0	0	0	41,422
Small	6,611	0	0	0	0	0	0	0	0	4,601	0	0	0	0	0	0	11,212
New York																	
Large	19,003	254,494	33,995	0	0	0	0	147,713	186,984	1,519,203	0	0	0	34,363	56,241	57,375	2,309,371
Medium	44,626	181,861	17,121	0	0	0	0	51,336	19,535	554,704	0	0	0	78,459	50,049	177,753	1,175,444
Small	169,337	16,505	17,121	0	0	0	0	3,637	0	79,731	0	0	0	15,242	0	154,508	456,081
North Carolina																	
Large	1,015,908	253,583	249,009	493,409	3,719	2,941	9,302	122,898	15,937	84,028	0	33,029	0	0	0	0	2,283,763
Medium	327,839	54,633	72,360	71,178	0	8,458	6,522	24,501	5,310	42,743	0	4,169	0	0	0	0	617,713
Small	271,000	31,795	1,545	42,930	0	1,600	5,144	20,805	12,146	22,639	0	13,887	0	0	0	0	423,491
Ohio																	
Large	206,194	822,141	65,602	274,056	118,936	0	0	53,701	18,235	476,473	57,089	55,632	57,023	16,290	182,622	49,515	2,453,509
Medium	256,056	216,708	14,943	58,820	9,413	0	0	0	0	84,965	14,287	0	12,958	23,619	20,290	81,453	793,512
Small	145,553	90,714	0	88,106	0	0	0	0	0	38,623	18,447	0	18,286	27,939	0	30,607	458,275

Table 28-05. Physiographic class composition (in thousands of acres) of the most common forest types found in the states within BCR 28.

	Forest type													
Physiographic class	Mixed upland hardwoods	White oak/Red oak/Hickory	Chestnut oak	Yellow poplar/White oak/Red oak	Loblolly pine	Sweetgum/Yellow poplar	White pine/Red oak/White ash	Northern red oak	Sugar maple/Beech/Yellow birch	Virginia pine	Red maple/Oak	Chestnut oak/Black oak/Scarlet oak	Black cherry/Yellow poplar	All forest types
Bays and pocasins	0	0	0	0	2.3	0	0	0	0	0	0	0	0	2.3
Broad floodplains/Bottomland	29.9	18.2	4.3	4.9	0	9.6	0	2.0	26.2	0	0	0	0	95.2
Deep sands	0	0	159.4	1.7	0	0	0	0	0	0	0	0	0	161.1
Dry slopes	144.4	511.8	349.8	80.7	17.3	0	17.9	29.6	217.1	60.7	82.8	553.4	115.8	2,181.3
Dry tops	384.2	708.7	1,397.8	132.8	20.7	0	78.3	71.7	60.7	141.2	65.0	294.6	0	3,355.5
Flatwoods	91.3	322.5	64.6	174.7	31.8	23.8	44.0	32.1	517.8	12.3	146.0	148.0	140.7	1,749.7
Moist sopes and coves	1,680.3	2,117.8	588.2	1,877.6	5.8	132.7	246.8	201.8	1,016.0	39.2	38.8	156.6	59.1	8,160.9
Narrow floodplains/Bottomland	37.4	57.3	9.6	46.6	10.2	55.9	55.3	5.5	30.2	3.5	5.9	0	1.4	318.7
Other hydric	0	0	0	0	0	0	0	0	5.8	0	0	0	0	5.8
Other mesic	38.4	70.3	29.0	0	2.2	1.6	23.2	11.0	173.8	3.0	16.2	21.6	4.7	395.0
Other xeric	12.1	17.2	6.1	0	0	0	0	0	2.6	6.5	0	0	0	44.5
Rolling uplands	3,791.1	9,293.9	1,947.1	2,481.7	610.0	564.6	664.2	900.0	8,366.9	828.1	775.0	2,413.8	1,352.1	33,988.5
Small drains	540.9	157.0	182.5	79.4	1.4	22.4	32.0	18.0	62.7	0	7.0	0	0	1,103.3
Swamps/Bogs	0	5.4	0	0	0	0	0	0	7.9	0	0	0	0	13.4
Total	6,750.1	13,280.1	4,738.4	4,879.9	701.8	810.7	1,161.8	1,271.6	10,487.7	1,094.5	1,136.6	3,588.0	1,673.8	50,400.7

Table 28-06. Forest ownership categories in BCR 28, in acres (percentage of column total).

Ownership	Total	Alabama	Georgia	Kentucky	Maryland	New Jersey	New York	North Carolina	Ohio	Pennsylvania	Tennessee	Virginia	West Virginia
County/ Municipal	823,811 (1.2)	34,845 (0.6)	27,615 (1.0)	14,376 (0.3)	0 (0.0)	34,428 (8.0)	135,631 (2.4)	50,023 (1.5)	24,780 (0.5)	353,610 (2.4)	37,379 (0.7)	42,948 (0.8)	68,176 (0.6)
National forest	5,961,170 (9.0)	374,132 (6.5)	484,927 (17.6)	504,249 (9.0)	0 (0.0)	0 (0.0)	0 (0.0)	907,812 (27.0)	218,510 (4.8)	491,867 (3.3)	567,907 (10.1)	1,552,409 (27.2)	859,357 (7.4)
Other federal	346,707 (0.5)	55,621 (1.0)	23,547 (0.8)	50,460 (0.9)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	33,418 (0.2)	87,619 (1.6)	8,357 (0.2)	87,685 (0.8)
Other local government	46,792 (0.2)	0 (0.0)	0 (0.0)	5,861 (0.1)	0 (0.0)	0 (0.0)	15,242 (0.3)	0 (0.0)	12,126 (0.3)	6,036 (0.1)	7,527 (0.1%)	0 (0.0)	0 (0.0)
Private	53,591,127 (81.0)	5,151,451 (89.5)	2,204,604 (79.8)	4,949,697 (88.1)	238,644 (51.3)	329,337 (76.3)	5,077,110 (89.1)	2,370,661 (70.2)	4,024,593 (88.4)	10,440,344 (71.0)	4,610,041 (82.1)	3,972,734 (69.7)	10,221,911 (88.5)
State	5,324,402 (8.0)	137,787 (2.4)	20,935 (0.8)	82,722 (1.5)	226,133 (48.7)	67,611 (15.7)	451,752 (7.9)	45,347 (1.3)	274,401 (6.0)	3,349,588 (22.8)	286,393 (5.1)	120,907 (2.1)	260,826 (2.3)
U.S. Department of Defense	71,458 (0.1)	0 (0.0)	0 (0.0)	6,088 (0.1)	0 (0.0)	0 (0.0)	19,208 (0.3)	0 (0.0%)	0 (0.0)	28,127 (0.2)	18,035 (0.3)	0 (0.0)	40,463 (0.4)
All	66,205,928 (100)	5,753,835 (100)	2,761,627 (100)	5,613,453 (100)	464,777 (100)	431,375 (100)	5,698,943 (100)	3,373,843 (100)	4,554,410 (100)	14,702,990 (100)	5,614,901 (100)	5,697,355 (100)	11,538,419 (100)

Table 28-07A. Compilation of historical and current habitat, in acres, for woodcock in BCR 28. Historical time period refers to 1970 to 1975.

	Historical	Current
Maryland	994,093	994,093
New Jersey	1,009,331	1,009,331
New York	9,287,142	9,287,142
Ohio	7,516,819	7,516,819
Pennsylvania	24,189,075	24,189,075
Virginia	9,151,878	9,151,878
West Virginia	15,507,040	15,507,040
Total	67,655,379	67,655,379
Manageable acres		
Maryland	587,916	464,777
New Jersey	460,871	431,375
New York	5,438,042	5,698,943
Ohio	4,261,413	4,554,410
Pennsylvania	14,510,890	14,702,990
Virginia	5,478,689	5,697,355
West Virginia	11,900,346	11,538,419
Total	42,638,167	43,088,269

Table 28-07B. Calculation of singing males and of singing-male deficit for woodcock in BCR 28. Historical time period refers to 1970 to 1975. Alabama, Georgia, Kentucky and North Carolina are not included in the Singing-ground Survey and, therefore, are not included in these calculations.

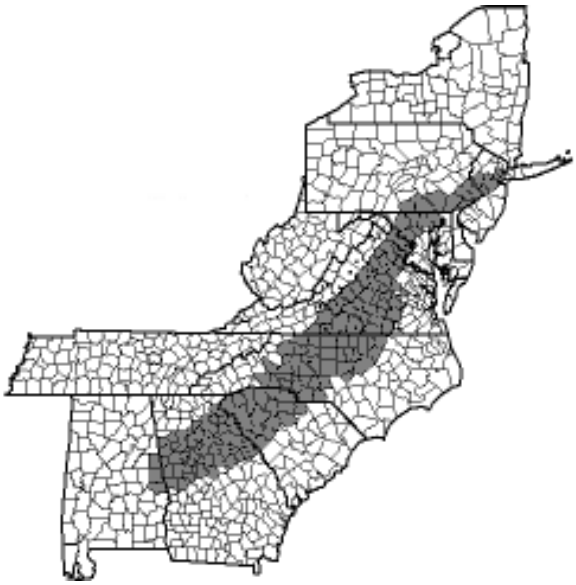
	Historical	Current
Population of singing males		
Maryland	2,518	1,099
New Jersey	5,048	1,176
New York	38,704	22,817
Ohio	17,540	8,741
Pennsylvania	71,497	42,030
Virginia	13,068	4,284
West Virginia	31,120	13,898
Total	179,495	94,045
Population deficit of singing males		
Maryland		892
New Jersey		3,549
New York		17,744
Ohio		10,005
Pennsylvania		30,414
Virginia		9,306
West Virginia		16,276
Total		88,186

Table 28-07C. Calculation of habitat goal, in acres.

	Habitat goal
Maryland	30,315
New Jersey	120,663
New York	603,293
Ohio	340,169
Pennsylvania	1,034,059
Virginia	316,389
West Virginia	553,368
Total	2,998,256

Bird Conservation Region 29: Piedmont

William L. Palmer
Pennsylvania Game Commission



Affected States: Alabama, Georgia, South Carolina, North Carolina, Virginia, Maryland, Pennsylvania and New Jersey
Current Area of Forestland: 25,744,276 acres (10,418,450 ha) (6,958,474 acres [2,816,025 ha] of small-diameter and nonstocked forest)
Woodcock Trend Estimate (1968–2004): -3.25 (excludes Alabama, Georgia, South Carolina and North Carolina)
Percent of Change per Year (1995–2004): -3.04
Woodcock Population Estimate (1970): 22,745 (excludes Alabama, Georgia, South Carolina and North Carolina)
Singing Males Only (2004): 6,127

Physiography and Habitat Description

BCR 29, the Piedmont, is a transitional interface between the Appalachian Mountains and the Atlantic Coastal Plain. The Piedmont is relatively narrow (50 miles [80 km]) in the north and is wider (more than 124 miles [200 km]) in the south. The topography ranges from gently rolling to hilly, and it formerly supported extensive forest. Today the area is fragmented, with a mixture of agriculture, forestland and suburban sprawl. Climate, soils (to some extent) and vegetation change across this region according to latitude.

The region encompasses 48,085,255 acres (19,495,620 ha) and is 56-percent forested. Forest cover ranged from 19 percent, in Pennsylvania, to 80 percent, in the three-county portion of Alabama. Between the current and baseline forest inventories (Table 29-01), there was a loss of 2,195,124 acres (888,345 ha, 7.8 percent). The largest proportional losses were in Maryland (35 percent) and New Jersey (21.2 percent) while Alabama gained timberland by 13 percent. Although there was a net gain of early successional (small-diameter and nonstocked stands) forests by 63,224 acres (25,586 ha, 1 percent), the gains were in the Georgia, North Carolina and South Carolina portions of the bird conservation region. The northern section (the woodcock breeding part) of the bird conservation region not only lost 510,000 acres (206,392 ha) of early successional forestland, but the proportion in early successional stages of growth went from 26 percent to 22 percent.

Major forest types include loblolly pine (25.8 percent), white oak/red oak/hickory (12.5 percent), mixed upland hardwoods (10.5 percent), yellow poplar/white oak/red oak (9.5 percent), loblolly pine/hardwood (9.2 percent), and sweetgum/yellow poplar (8.3 percent; Tables 29-02 and 29-03).

Types changed with latitude. All loblolly pine was in Virginia and in the states south of it. Oak/Hickory was a major type in all states, gaining in dominance from North Carolina through Pennsylvania. Some oak species were more dominant in the southern Piedmont while chestnut/blackoak /scarlet oak and northern red oak replaced them in the northern Piedmont. Stands of yellow poplar and hardwoods, like maples/beech/birch, cherry and ash, were rare south of Maryland. Forest types with substantial proportions (i.e., greater than 25 percent) and acreages greater than 1 million in small trees tended to be in the southern part of the bird conservation region and were dominated by pines (Table 29-04). Regions with the most forestland in early successional stages of growth are considered as wintering range for woodcock. This habitat situation is contrasted in the northern section of BCR 29, where breeding woodcock surveys are conducted, with fewer pines and also with less forest in small trees.

Rolling uplands is the dominant physiographic class (66 percent) in timberland (Table 29-05). The majority of area for 15 of 19 of the most common forest types was on rolling uplands. Narrow floodplains/bottomland accounted for 7.3 percent of timbered areas and was the major acreage for the remaining four most common forest types within BCR 29. Small drains and beaver ponds followed, each with 5.7 percent of the total timberland.

Approximately 94 percent of the 26.9 million acres (10.9 million ha) of forest is in private ownership and about 6 percent is in public forest. National forest has 2.5 percent of the public forest acreage, with 2 percent under state, county or municipal authority and with the remaining 1.4 percent in other federal categories (Table 29-06). The largest amount (7.4 percent) of national forest is in South Carolina, with 393,100 acres (159,084 ha).

Harvest and Population Status

BCR 29 is also a transitional area for woodcock breeding populations. From eastern Alabama into Virginia, it is used primarily for migration and wintering habitat. While from Virginia to its terminus in northern New Jersey, it also serves as breeding range. The breeding densities are relatively low in this region. Although Pennsylvania has only a small portion of the bird conservation region, it has more active woodcock hunters (9,000) than any state in the eastern region and more than the other states combined in BCR 29. Harvest information program estimates in 2005 for BCR 29 reported 17,300 hunters taking 21,000 birds.

In parts of BCR 29 that are covered by the Singing-ground Survey (Virginia, Maryland, Pennsylvania and New Jersey), there had been a long-term (1968 to 2004) decline of 3.25 percent per year in breeding woodcock populations. The estimated number of singing males has declined from 22,745 in 1970 to 6,127 currently (Table 29-07). The largest decline proportionally was the 83 percent (2,615 birds) in New Jersey, but the majority (53 percent) of the decline was 8,862 singing males in Virginia, where populations declined by 73 percent during this period.

Habitat Goals

The entire Piedmont region has value to migrating woodcock. The northern portions of the Piedmont, that survey breeding woodcock, are the areas that have lost large amounts of early successional forests. To restore breeding woodcock densities in BCR 29 to levels estimated for 1970 requires that 15,886 singing males be added to current populations in those states covered by the Singing-ground Survey. Manageable acres within those states are estimated at 8,440,600 (3,415,826 ha). To reach this population objective will require creating 1,985,750 acres (803,613 ha) of new woodcock habitat. Currently, there are approximately 1,900,000 acres (768,900 ha) in early successional forest stands, so the need is to double the amount of acreage in this stage of forest growth.

Table 29-01. Current and historical (1971–1977) stand-size distribution, in acres (percentage of column total) of timberland in BCR 29 and in portions of individual states within the bird conservation region

	Current stand-size distribution					Historical stand-size distribution				
	Total forestland	Large diameter[1,2]	Medium diameter[1,3]	Small diameter[1,4]	Non-stocked[1,5]	Total forestland[1]	Large diameter[1,2]	Medium diameter[1,3]	Small diameter[1,4]	Non-stocked[1,5]
Alabama	910,711	221,013	444,697	245,001	0	804,300	202,200	257,400	339,200	5,500
	(3.5)	(24.3)	(48.8)	(26.9)	(0.0)	(2.9)	(25.1)	(32.0)	(42.2)	(0.7)
Georgia	6,472,211	2,593,574	1,999,988	1,876,542	2,107	7,205,300	2,632,500	3,036,800	1,467,000	68,500
	(25.1)	(40.1)	(30.9)	(29.0)	(0.1)	(25.8)	(36.5)	(42.1)	(20.4)	(1.0)
Maryland	434,777	377,282	8,158	49,337	0	674,000	470,500	140,800	54,600	8,100
	(1.7)	(86.8)	(1.9)	(11.3)	(0.0)	(2.4)	(69.8)	(20.9)	(8.1)	(1.2)
New Jersey	179,047	90,846	48,892	39,309	0	227,100	94,300	60,000	61,900	10,900
	(0.7)	(50.7)	(27.3)	(22.0)	(0.0)	(0.8)	(41.5)	(26.4)	(27.3)	(4.8)
North Carolina	5,915,836	2,694,381	1,370,190	1,840,065	11,200	6,650,800	2,439,400	2,590,400	1,543,000	77,400
	(23.0)	(45.5)	(23.2)	(31.1)	(0.4)	(23.8)	(36.7)	(38.9)	(23.2)	(1.2)
Pennsylvania	518,566	371,990	115,115	22,765	8,696	572,100	400,500	76,000	95,300	0
	(2.0)	(71.7)	(22.2)	(4.4)	(2.3)	(2.0)	(70.0)	(13.3)	(16.7)	(0.0)
South Carolina	4,370,527	1,657,286	1,486,532	1,210,237	16,472	4,528,100	1,644,100	1,754,900	1,097,400	30,700
	(17.0)	(37.9)	(34.0)	(27.7)	(1.0)	(16.2)	(36.3)	(38.8)	(24.2)	(0.7)
Virginia	6,942,601	2,791,746	2,514,112	1,615,976	20,767	7,277,700	2,479,100	2,763,700	1,943,500	92,250
	(27.0)	(40.2)	(36.2)	(23.3)	(0.7)	(26.0)	(34.1)	(38.0)	(26.7)	(1.3)
Total	25,744,276	10,798,118	7,987,684	6,899,232	59,242	27,939,400	10,362,600	10,680,000	6,601,900	293,350
	(100.0)	(41.9)	(31.0)	(26.8)	(0.5)	(100.0)	(37.1)	(38.2)	(23.6)	(1.1)

[1] Percentages for various diameter categories and nonstocked category refer to percent of total forestland for current and historical time periods within each state.

[2] Softwoods are at least 9 inches, and hardwoods are at least 11 inches in diameter at breast height; size class has more than 50 percent of stocking in medium- and large-diameter trees, with stocking of large trees equal to or greater than medium-diameter trees.

[3] Trees are at least 5 inches in diameter at breast height but are smaller than large-diameter trees; size class has more than 50 percent of stocking in medium- and large-diameter trees, with stocking of large trees less than stocking of medium-diameter trees.

[4] Saplings are 1 to 5 inches diameter at breast height. Softwood seedlings are more than 6 inches tall, and hardwood seedlings are more than 12 inches tall; size class has at least 50 percent of stocking in small-diameter trees.

[5] Commercial forestland on which stocking of trees is less than 16.7 percent.

Table 29-02. Percentage composition of forest types between states within BCR 29.

Forest type	Alabama	Georgia	South Carolina	North Carolina	Virginia	Maryland	Pennsylvania	New Jersey	Total
Cherry/Ash/Yellow poplar	0.0	0.0	0.0	0.0	0.0	0.0	43.3	56.7	100.0
Chestnut oak	0.0	4.1	7.9	26.2	54.1	0.0	7.8	0.0	100.0
Chestnut oak/Black oak/Scarlet oak	0.0	0.0	0.0	0.0	0.0	56.4	43.6	0.0	100.0
Eastern red cedar	0.0	0.0	19.8	19.9	54.2	0.0	6.1	0.0	100.0
Eastern red cedar/Hardwood	0.0	3.4	52.3	44.3	0.0	0.0	0.0	0.0	100.0
Eastern white pine	0.0	4.5	18.9	59.2	16.5	0.0	1.0	0.0	100.0
Loblolly pine	6.1	37.5	25.9	12.6	18.0	0.0	0.0	0.0	100.0
Loblolly pine/Hardwood	6.3	41.5	14.7	23.7	13.8	0.0	0.0	0.0	100.0
Mixed upland hardwoods	4.4	15.9	14.5	41.2	21.8	1.7	0.5	0.0	100.0
River birch/Sycamore	0.0	18.8	11.0	24.5	40.8	5.0	0.0	0.0	100.0
Shortleaf pine	7.9	19.2	26.6	29.1	17.3	0.0	0.0	0.0	100.0
Shortleaf pine/Oak	0.4	21.2	29.1	33.6	15.6	0.0	0.0	0.0	100.0
Sugarberry/Hackberry/Elm/Green ash	0.0	18.4	33.9	26.2	17.1	0.0	4.4	0.0	100.0
Sugar maple/Beech/Yellow birch	0.0	0.0	0.0	0.0	0.0	0.0	47.8	52.2	100.0
Sweetbay/Swamp tupelo/Red maple	2.2	35.1	0.0	34.0	28.7	0.0	0.0	0.0	100.0
Sweetgum/Nuttall oak/Willow oak	4.6	56.1	13.3	10.9	15.1	0.0	0.0	0.0	100.0
Sweetgum/Yellow poplar	3.7	32.5	15.8	27.0	18.7	0.0	0.0	2.3	100.0
Nonstocked	0.0	1.9	15.2	10.3	19.1	45.4	8.0	0.0	100.0
Northern red oak	0.0	0.0	7.1	5.1	19.9	19.2	9.0	39.8	100.0
Other[1]	0.0	35.9	12.8	8.4	10.4	9.9	22.6	0.0	100.0
Other pine/Hardwood	4.2	4.8	9.9	44.4	36.7	0.0	0.0	0.0	100.0
Post oak/Blackjack oak	0.0	48.8	27.9	14.2	9.0	0.0	0.0	0.0	100.0
Virginia pine	0.0	1.6	11.6	37.9	48.9	0.0	0.0	0.0	100.0
Virginia pine/Southern red oak	0.0	3.5	15.1	32.8	48.4	0.0	0.2	0.0	100.0
White oak	0.0	7.3	23.0	11.4	29.8	23.7	4.8	0.0	100.0
White oak/Red oak/Hickory	2.1	27.0	14.6	12.7	37.6	1.0	4.1	0.9	100.0
White pine/Red oak/White ash	0.0	0.0	1.6	44.2	51.3	0.0	3.0	0.0	100.0
Yellow poplar	0.0	1.5	0.0	0.0	0.0	78.8	19.8	0.0	100.0
Yellow poplar/White oak/Red oak	1.2	6.3	6.8	30.7	51.8	1.3	1.9	0.0	100.0

[1] Other includes 26 individual forest types, each less than or equal to 0.4 percent of the total forest acreage for BCR 29.

Table 29-03. Forest composition of timberland, in acres (percentage of column total), within BCR 29.

Forest type	Alabama	Georgia	South Carolina	North Carolina	Virginia	Maryland	Pennsylvania	New Jersey	Total
Cherry/Ash/Yellow poplar	0	0	0	0	0	0	30,077	39,309	69,386
	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(5.8)	(22.0)	(0.3)
Chestnut oak	0	24,176	46,640	155,418	320,816	0	46,281	0	593,331
	(0.0)	(0.4)	(1.1)	(2.6)	(4.6)	(0.0)	(8.9)	(0.0)	(2.3)
Chestnut oak/Black oak/Scarlet oak	0	0	0	0	0	62,862	48,586	0	111,448
	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(14.5)	(9.4)	(0.0)	(0.4)
Eastern red cedar	0	0	14,497	14,606	39,765	0	4,508	0	73,376
	(0.0)	(0.0)	(0.3)	(0.2)	(0.6)	(0.0)	(0.9)	(0.0)	(0.3)
Eastern red cedar/Hardwood	0	2,947	45,125	38,257	0	0	0	0	86,329
	(0.0)	(0.0)	(1.0)	(0.6)	(0.0)	(0.0)	(0.0)	(0.0)	(0.3)
Eastern white pine	0	4,814	20,113	63,004	17,518	0	1,032	0	106,481
	(0.0)	(0.1)	(0.5)	(1.1)	(0.3)	(0.0)	(0.2)	(0.0)	(0.4)
Loblolly pine	403,006	2,496,694	1,721,095	838,383	1,195,480	0	0	0	6,654,658
	(44.3)	(38.6)	(39.4)	(14.2)	(17.2)	(0.0)	(0.0)	(0.0)	(25.8)
Loblolly pine/Hardwood	150,282	984,144	349,037	563,164	327,076	0	0	0	2,373,703
	(16.5)	(15.2)	(8.0)	(9.5)	(4.7)	(0.0)	(0.0)	(0.0)	(9.2)
Mixed upland hardwoods	118,763	427,825	391,416	1,112,440	587,593	45,908	14,173	0	2,698,118
	(13.0)	(6.6)	(9.0)	(18.8)	(8.5)	(10.6)	(2.7)	(0.0)	(10.5)
Nonstocked	0	2,107	16,472	11,200	20,767	49,337	8,696	0	108,579
	(0.0)	(0.0)	(0.4)	(0.2)	(0.3)	(11.3)	(1.7)	(0.0)	(0.4)
Northern red oak	0	0	3,915	2,801	11,033	10,639	4,987	22,055	55,430
	(0.0)	(0.0)	(0.1)	(0.0)	(0.2)	(2.4)	(1.0)	(12.3)	(0.2)
Other[1]	0	154,145	55,150	36,079	44,783	42,561	97,249	0	429,967
	(0.0)	(2.4)	(1.3)	(0.6)	(0.6)	(9.8)	(18.8)	(0.0)	(1.7)
Other pine/Hardwood	7,827	8,923	18,281	82,225	67,897	0	0	0	185,153
	(0.9)	(0.1)	(0.4)	(1.4)	(1.0)	(0.0)	(0.0)	(0.0)	(0.7)
Post oak/Blackjack oak	0	54,263	31,035	15,774	10,012	0	0	0	111,084
	(0.0)	(0.8)	(0.7)	(0.3)	(0.1)	(0.0)	(0.0)	(0.0)	(0.4)
River birch/Sycamore	0	66,138	38,676	86,204	143,647	17,717	0	0	352,382
	(0.0)	(1.0)	(0.9)	(1.5)	(2.1)	(4.1)	(0.0)	(0.0)	(1.4)
Shortleaf pine	33,298	81,226	112,691	123,243	73,243	0	0	0	423,701
	(3.7)	(1.3)	(2.6)	(2.1)	(1.1)	(0.0)	(0.0)	(0.0)	(1.6)
Shortleaf pine/Oak	2,075	104,019	142,751	164,362	76,566	0	0	0	489,773
	(0.2)	(1.6)	(3.3)	(2.8)	(1.1)	(0.0)	(0.0)	(0.0)	(1.9)
Sugarberry/Hackberry/Elm/Green ash	0	40,142	74,204	57,283	37,425	0	9,591	0	218,645
	(0.0)	(0.6)	(1.7)	(1.0)	(0.5)	(0.0)	(1.8)	(0.0)	(0.8)
Sugar maple/Beech/Yellow birch	0	0	0	0	0	0	35,978	39,309	75,287
	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(6.9)	(22.0)	(0.3)

Table 29-03 (continued). Forest composition of timberland, in acres (percentage of column total), within BCR 29.

Forest type		Alabama	Georgia	South Carolina	North Carolina	Virginia	Maryland	Pennsylvania	New Jersey	Total
Sweetbay/Swamp tupelo/Red maple		2,906	45,887	0	44,423	37,547	0	0	0	130,763
		(0.3)	(0.7)	(0.0)	(0.8)	(0.5)	(0.0)	(0.0)	(0.0)	(0.5)
Sweetgum/Nuttall oak/Willow oak		16,549	202,242	47,998	39,390	54,331	0	0	0	360,510
		(1.8)	(3.1)	(1.1)	(0.7)	(0.8)	(0.0)	(0.0)	(0.0)	(1.4)
Sweetgum/Yellow poplar		79,065	693,822	337,084	576,418	399,207	0	0	48,892	2,134,488
		(8.7)	(10.7)	(7.7)	(9.7)	(5.8)	(0.0)	(0.0)	(27.3)	(8.3)
Virginia pine		0	16,684	117,325	385,000	495,995	0	0	0	1,015,004
		(0.0)	(0.3)	(2.7)	(6.5)	(7.1)	(0.0)	(0.0)	(0.0)	(3.9)
Virginia pine/Southern red oak		0	24,976	107,787	234,066	345,368	0	1,544	0	713,741
		(0.0)	(0.4)	(2.5)	(4.0)	(5.0)	(0.0)	(0.3)	(0.0)	(2.8)
White oak		0	13,039	40,775	20,229	52,902	42,052	8,445	0	177,442
		(0.0)	(0.2)	(0.9)	(0.3)	(0.8)	(9.7)	(1.6)	(0.0)	(0.7)
White oak/Red oak/Hickory	68,110	867,132	468,521	408,935	1,210,097	33,447	130,437	29,482	3,216,161	
		(7.5)	(13.4)	(10.7)	(6.9)	(17.4)	(7.7)	(25.2)	(16.5)	(12.5)
White pine/Red oak/White ash		0	0	3,263	91,854	106,606	0	6,202	0	207,925
		(0.0)	(0.0)	(0.1)	(1.6)	(1.5)	(0.0)	(1.2)	(0.0)	(0.8)
Yellow poplar		0	1,852	0	0	0	98,331	24,659	0	124,842
		(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(22.6)	(4.8)	(0.0)	(0.5)
Yellow poplar/White oak/Red oak		28,830	155,016	166,677	751,079	1,266,925	31,922	46,120	0	2,446,569
		(3.2)	(2.4)	(3.8)	(12.7)	(18.2)	(7.3)	(8.9)	(0.0)	(9.5)

Table 29-04. Stand-size class composition (in thousands of acres) of the most common forest types found in states within BCR 29. Large-diameter trees are hardwoods that equal at least 11 inches diameter or are softwoods that equal at least 9 inches in diameter; size class has more than 50 percent of stocking in medium- and large-diameter trees, with stocking of large trees equal to or greater than medium-diameter trees. Medium-diameter trees equal at least 5 inches in diameter but are not as large as large-diameter trees; size class has more than 50 percent of stocking in medium- and large-diameter trees, with stocking of large-diameter trees less than stocking of medium-diamter trees. Small-diameter trees are trees that equal less than 5 inches diameter; size class has at least 50 percent of the stocking in small-diameter trees. Other includes 34 individual forest types, each less than 0.5 percent of total forest acreage for BCR 29.

	Forest type																				
Stand-size class	Loblolly pine	White oak/Red oak/Hickory	Mixed upland hardwoods	Yellow poplar/White oak/Red oak	Loblolly pine/Hardwood	Sweetgum/Yellow poplar	Virginia pine	Virginia pine/Southern red oak	Chestnut oak	Shortleaf pine/Oak	Shortleaf pine	Sweetgum/Nuttall oak/Willow oak	River birch/Sycamore	Sugarberry/Hackberry/Elm/Green ash	White pine/Red oak/White ash	Other pine/Hardwood	White oak	Sweetbay/Swamp tupelo/Red maple	Yellow poplar	Other	All forest types
Alabama																					
Large	105.5	26.0	27.5	10.4	17.4	15.0	0.0	0.0	0.0	0.0	7.4	8.7	0.0	0.0	0.0	0.0	0.0	2.9	0.0	26.0	221.0
Medium	197.7	35.6	56.0	8.0	83.1	22.6	0.0	0.0	0.0	0.0	25.9	7.8	0.0	0.0	0.0	7.8	0.0	0.0	0.0	35.6	444.7
Small	99.6	6.5	35.3	10.4	49.7	41.4	0.0	0.0	0.0	2.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.5	245.0
Georgia																					
Large	903.6	539.3	89.8	136.4	285.0	216.8	13.3	5.6	0.0	45.1	62.1	101.7	43.2	27.1	0.0	5.9	4.4	13.3	0.0	81.1	2,593.6
Medium	941.8	253.5	89.0	8.7	250.9	165.6	2.6	13.5	4.4	47.5	18.0	69.6	18.2	13.1	0.0	0.0	8.6	22.9	1.8	71.8	2,000.0
Small	651.3	74.3	249.1	9.9	448.3	311.5	0.9	5.9	0.0	11.4	1.0	31.0	4.8	0.0	0.0	3.0	0.0	9.6	0.0	25.3	1,876.5
Maryland																					
Large	0.0	33.4	37.8	31.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	17.7	0.0	0.0	0.0	42.1	0.0	98.3	116.1	377.3
Medium	0.0	0.0	8.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.2
Small	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
New Jersey																					
Large	0.0	29.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	61.4	90.9
Medium	0.0	0.0	0.0	0.0	0.0	48.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	48.8
Small	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	39.3	39.3
North Carolina																					
Large	241.2	297.2	395.3	497.0	154.6	268.5	163.4	86.4	102.5	95.5	68.2	15.0	59.7	41.5	60.4	44.9	12.5	8.6	0.0	81.8	2,694.4
Medium	295.3	78.3	254.7	146.3	70.0	114.2	107.9	66.0	43.9	28.5	44.2	5.7	26.5	9.6	26.4	8.4	0.0	8.8	0.0	35.3	1,370.2
Small	301.8	33.4	462.3	107.8	338.5	193.7	113.7	81.7	9.1	40.4	10.8	18.7	0.0	6.1	5.0	28.9	7.7	27.0	0.0	51.7	1,840.1

Table 29-04 (continued). Stand-size class composition (in thousands of acres) of the most common forest types found in states within BCR 29. Large-diameter trees are hardwoods that equal at least 11 inches diameter or are softwoods that equal at least 9 inches in diameter; size class has more than 50 percent of stocking in medium- and large-diameter trees, with stocking of large trees equal to or greater than medium-diameter trees. Medium-diameter trees equal at least 5 inches in diameter but are not as large as large-diameter trees; size class has more than 50 percent of stocking in medium- and large-diameter trees, with stocking of large-diameter trees less than stocking of medium-diamter trees. Small-diameter trees are trees that equal less than 5 inches diameter; size class has at least 50 percent of the stocking in small-diameter trees. Other includes 34 individual forest types, each less than 0.5 percent of total forest acreage for BCR 29.

	Forest type																				
Stand-size class	Loblolly pine	White oak/Red oak/Hickory	Mixed upland hardwoods	Yellow poplar/White oak/Red oak	Loblolly pine/Hardwood	Sweetgum/Yellow poplar	Virginia pine	Virginia pine/Southern red oak	Chestnut oak	Shortleaf pine/Oak	Shortleaf pine	Sweetgum/Nuttall oak/Willow oak	River birch/Sycamore	Sugarberry/Hackberry/Elm/Green ash	White pine/Red oak/White ash	Other pine/Hardwood	White oak	Sweetbay/Swamp tupelo/Red maple	Yellow poplar	Other	All forest types
Pennsylvania																					
Large	0.0	120.5	10.3	33.3	0.0	0.0	0.0	0.0	37.7	0.0	0.0	0.0	0.0	3.4	6.2	0.0	4.6	0.0	13.4	147.5	372.0
Medium	0.0	9.9	3.9	12.8	0.0	0.0	0.0	1.5	8.6	0.0	0.0	0.0	0.0	6.2	0.0	0.0	3.8	0.0	11.3	57.1	115.1
Small	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	22.8	22.8
South Carolina																					
Large	531.7	302.7	82.5	119.1	99.6	132.7	49.4	38.2	32.4	49.1	41.6	25.9	25.6	34.4	0.0	3.5	21.8	0.0	0.0	10.4	1,657.3
Medium	585.3	143.8	135.7	27.7	113.0	94.9	50.3	36.8	14.3	83.6	65.8	8.9	9.2	33.9	3.3	5.4	19.0	0.0	0.0	89.6	1,486.5
Small	604.1	22.0	173.2	19.9	136.4	109.5	17.7	32.8	0.0	10.1	5.3	13.2	3.8	5.9	0.0	9.4	0.0	0.0	0.0	46.9	1,210.2
Virginia																					
Large	225.1	672.0	150.5	721.2	108.4	114.6	178.5	71.6	178.1	49.6	38.2	16.4	84.9	17.4	38.0	35.1	37.9	18.9	0.0	35.1	2,791.7
Medium	532.1	376.4	268.1	367.2	116.8	115.9	196.8	135.5	132.0	19.3	31.2	26.6	40.6	10.4	49.8	18.5	15.0	5.7	0.0	47.9	2,514.1
Small	438.3	161.6	169.0	178.5	101.8	168.7	120.7	138.3	10.7	7.7	3.8	11.3	18.1	9.6	18.8	14.3	0.0	12.8	0.0	24.8	1,616.0
Total																					
Large	2,007.1	2,020.6	793.7	1,549.3	665.0	747.6	404.6	201.8	350.7	239.3	217.5	167.7	231.1	123.8	104.6	89.4	123.3	43.7	111.7	559.4	10,798.1
Medium	2552.2	897.5	815.6	570.7	633.8	562.1	357.6	253.3	203.2	178.9	185.1	118.6	94.5	73.2	79.5	40.1	46.4	37.4	13.1	337.3	7987.6
Small	2095.1	297.8	1088.9	326.5	1074.7	824.8	253.0	258.7	19.8	71.7	20.9	74.2	26.7	21.6	23.8	55.6	7.7	49.4	0.0	217.3	6849.9

Table 29-05. Physiographic class composition (in thousands of acres) of the most common forest types found in states within BCR 29.

Physiographic class	Forest type																				
	Loblolly pine	White oak/Red oak/Hickory	Mixed upland hardwoods	Yellow poplar/White oak/Red oak	Loblolly pine/Hardwood	Sweetgum/Yellow poplar	Virginia pine	Virginia pine/Southern red oak	Chestnut oak	Shortleaf pine/Oak	Shortleaf pine	Sweetgum/Nuttall oak/Willow oak	River birch/Sycamore	Sugarberry/Hackberry/Elm/Green ash	White pine/Red oak/White ash	Other pine/Hardwood	White oak	Sweetbay/Swamp tupelo/Red maple	Yellow poplar	Other[1]	All forest types
Beaver ponds	594.0	147.8	114.7	47.9	113.6	136.3	46.3	50.7	9.1	54.6	40.8	15.4	20.1	32.9	0.0	2.3	8.8	7.2	0.0	58.7	1,501.2
Broad floodplains/ Bottomland	6.6	1.3	5.3	0.3	5.2	13.9	2.3	0.0	0.0	0.0	0.0	26.9	18.8	11.6	0.0	0.0	0.0	4.3	0.0	9.1	105.6
Deep sands	5.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.6
Dry slopes	395.6	1.4	0.0	0.0	0.0	0.0	0.0	0.0	11.2	0.0	6.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.2	420.5
Dry tops	13.3	53.9	32.4	49.9	6.1	0.0	11.0	8.9	126.6	0.0	0.0	0.0	1.5	0.0	0.0	10.9	0.0	0.0	0.0	13.6	328.1
Flatwoods	138.9	79.3	81.2	24.1	43.9	121.5	39.4	25.6	4.1	0.0	0.0	21.1	6.7	0.0	1.5	0.0	4.6	7.8	4.9	121.4	726
Moist slopes and coves	1.6	151.3	155.1	346.0	0.0	2.7	7.1	7.6	86.1	4.7	0.0	0.0	0.0	0.0	55.9	6.5	42.1	0.0	8.5	1,067.5	1,942.7
Narrow floodplains/ Bottomland	10.8	0.0	75.0	68.2	55.5	177.9	6.1	0.7	0.0	0.0	0.0	97.2	216.8	86.8	0.0	1.2	0.0	34.7	0.0	84.8	915.7
Other	364.2	76.3	78.3	35.3	55.5	39.4	13.8	27.3	10.1	13.1	18.4	8.7	13.9	17.5	0.0	6.0	18.4	0.0	0.0	0.0	796.2
Other hydric	1.7	0.0	0.0	0.0	0.0	6.6	0.0	0.0	0.0	0.0	0.0	5.5	10.1	5.7	0.0	0.0	0.0	8.7	0.0	53.0	91.3
Other mesic	0.0	5.6	0.0	9.1	5.4	7.7	0.0	0.0	0.0	0.0	0.0	4.4	3.3	0.0	10.1	0.0	3.8	0.0	0.0	3.4	52.8
Other xeric	0.0	0.0	12.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.5	22.9
Rolling uplands	4,726.5	2,561.1	1,971.8	1,855.8	2,001.9	1,498.3	841.4	636.4	275.3	363.0	319.4	96.1	44.5	16.5	118.3	153.5	89.4	31.0	111.4	559.7	18,271.3
Small drains	398.8	138.2	171.9	76.3	86.6	130.1	47.6	34.1	70.9	54.3	39.0	85.2	16.6	20.2	22.1	4.8	10.4	28.7	0.0	69.2	1,505.0
Swamps/Bog	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.4	0.0	5.5	13.9

[1] Other includes 34 individual forest types, each less than 0.5 percent of total forest acreage for BCR 29.

Table 29-06. Forest ownership in BCR 29, in acres (percent of column total).

Ownership	Total	Alabama	Georgia	South Carolina	North Carolina	Virgina	Maryland	Pennsylvania	New Jersey
National forest	666,300	0	172,100	329,100	78,700	86,400	0	0	0
	(2.5)	(0.0)	(2.6)	(7.4)	(1.2)	(1.2)	(0.0)	(0.0)	(0.0)
Other federal	381,000	1,500	142,400	46,900	55500.0	123,100	11,800	0	0
	(1.4)	(0.2)	(2.2)	(1.0)	(0.9)	(1.7)	(2.5)	(0.0)	(0.0)
Private	25,143,100	869,800	6,191,900	4,053,400	6,102,700	6,769,200	376,300	537,400	242,400
	(94.1)	(98.6)	(93.8)	(90.7)	(96.6)	(95.3)	(79.5)	(92.5)	(86.3)
State/County/Municipal	524,900	11,000	97,600	41,100	81,000	126,800	85,400	43,500	38,500
	(2.0)	(1.2)	(1.5)	(0.9)	(1.3)	(1.8)	(18.0)	(7.5)	(86.3)
All	26,715,000	882,300	6,603,900	4,470,400	6,317,800	7,105,500	473,400	580,800	280,900
	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)

Table 29-07A. Compilation of historical and current population, in acres, for woodcock in BCR 29. Alabama, Georgia, North Carolina and South Carolina are not included in the Singing-ground Survey and, therefore, are not included in calculations for the bird conservation region. Historical time period refers to 1970 to 1975. Maryland total includes data from District of Columbia.

	Historical	Current
Maryland	2,079,744	2,079,744
New Jersey	1,018,630	1,018,630
Pennsylvania	2,955,731	2,955,731
Virginia	11,416,467	11,416,467
Total	17,470,572	17,470,572
Manageable acres		
Maryland	674,000	473,400
New Jersey	227,100	280,900
Pennsylvania	572,100	580,800
Virginia	7,277,700	7,105,500
Total	8,700,900	8,440,600

Table 29-07B. Calculation of singing male and of singing-male deficit, in acres, for woodcock in BCR 29. Alabama, Georgia, North Carolina and South Carolina are not included in the Singing-ground Survey and, therefore, are not included in calculations for the bird conservation region. Historical time period refers to 1970 to 1975. Maryland total includes data from District of Columbia. The population deficit is not simply the current population of singing males minus the historical level; the deficit considers the density of singing males on manageable acres for each time period.

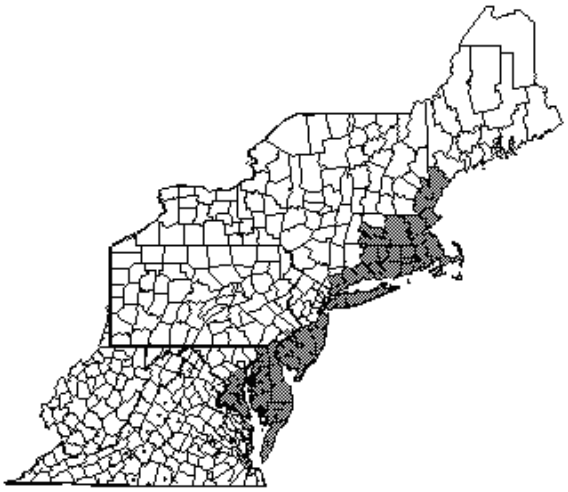
Population of singing males	Historical	Current
Maryland	4,158	1,308
New Jersey	5,243	909
Pennsylvania	8,111	2,439
Virginia	20,188	5,499
Total	37,700	10,155
Population deficit of singing males		
Maryland		2,850
New Jersey		4,334
Pennsylvania		5,672
Virginia		14,689
Total		27,545

Table 29-07C. Calculation of habitat goals for woodcock in BCR 29.

	Habitat goal
Maryland	133,950
New Jersey	203,698
Pennsylvania	266,584
Virginia	690,383
Total	1,294,615

Bird Conservation Region 30: New England/Mid-Atlantic Coast

Scot J. Williamson
Wildlife Management Institute



Affected States: Maine, New Hampshire, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Delaware, Maryland and Virginia
Current Area of Forestland: 7,655,000 acres (3,097,900 ha) (773,800 acres [313,150 ha] of small-diameter and nonstocked forest)
Woodcock Trend Estimate (1966–2004): -4.89
Percent of Change per Year (1994–2004): -3.65
Woodcock Population Estimate (1970): 99,722
Singing Males Only (2004): 35,661

Physiography and Habitat Description

BCR 30 occupies the coastal portions of New England and the mid-Atlantic states. Counties included within the BCR-30 analysis are York County in southeastern Maine; the two coastal counties of New Hampshire; all of Massachusetts and Connecticut that lay east of the Berkshires; Rhode Island; the Long Island region of New York; southern New Jersey; the DelMarva Peninsula region of Delaware, Maryland and Virginia; and the counties in Maryland and Virginia that border the Chesapeake Bay. Extensive descriptions of the region's physiography, vegetation and climate can be found in Dettmers and Rosenberg (2000) and on the U.S. Department of Agriculture, Forest Service Ecoregion Website (http://www.fs.fed.us/land/pubs/ecoregions).

Forest Composition

Primary forest types in BCR 30 include northern hardwood, Appalachian oak and northeastern oak-pine forest (Table 30-01). Dominant forest types change on a north to south gradient. The northernmost portions of the bird conservation region in Maine and New Hampshire are composed equally of the maple/beech/birch, oak/hickory and white/red/jack pine groups. Moving south, the white/red/jack pine group is no longer a dominant forest type, the maple/beech/birch type declines and the oak/hickory type increases. The aspen/birch type is nowhere common within BCR 30 and is absent south of Rhode Island. Portions of the bird conservation region from Long Island (in New York) south through New Jersey, Delaware, Maryland and Virginia feature increasing occurrences of the loblolly/shortleaf pine group.

Natural Disturbance Regimes

Fire played an important role in shaping BCR 30's habitats. Key outcomes of fire disturbance include the maintenance of oak-dominated forests and the creation of pitch pine barren habitats. Residential and urban development has curtailed fire as an important ecological factor. Insects and diseases are still an important natural disturbance, especially the

exotic varieties. Gypsy moth, beech bark disease, chestnut blight, Dutch elm disease and hemlock woolly adelgid—among others—affect forest composition and structure. Disturbance to bird conservation region forests may also be occasionally expected from hurricanes and ice storms.

Cultural History

Native Americans hunted, fished and farmed the land before European settlement in the early 1600s. European settlers accelerated and expanded the cultivation and cutting of bird conservation region forests. By the early 1900s, roughly 70 percent of the land had been cleared for agriculture or settlement. Farm abandonment resulted in a spike in early successional habitats in the mid-1900s. Since then, urbanization and maturation of forests have resulted in steady declines in availability of woodcock habitat.

Trends in Forested Habitats

Comparisons of forest inventory analysis (FIA) data between 1970 and 2005 illustrate the change in the availability of early successional (seedling/sapling) habitats available to woodcock. Seedling/sapling habitat occurrence, expressed as a percentage of the forested landscape, have declined from 34 percent to 10 percent in BCR 30 (Table 30-02). All portions of the bird conservation region, except those portions in Virginia and Maryland, have a lower percentage of the forest characterized as seedling/sapling today than in the 1970s (Figure 30-01). The largest percent losses of seedling/sapling habitat have occurred in the portions of the bird conservation region in New Jersey (50 percent), Maine (45 percent) and Rhode Island (35 percent). Massachusetts and Connecticut portions have experienced greater than a 25-percent decrease in seedling/sapling habitats.

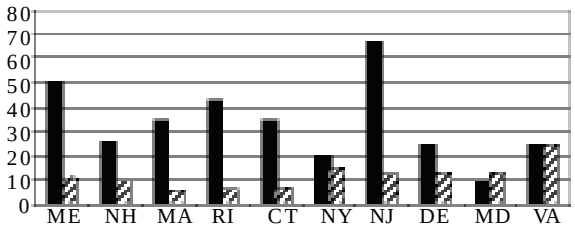


Figure 30-01. Percent of forested landscapes characterized as seedling/sapling size class in the 1970s and in 2005 for portions of states comprising BCR 30.

Seedling/sapling habitat in BCR 30 has declined from 2.9 million acres (1.2 million ha) in the 1970s to 800,000 acres (323, 750 ha) in 2005. The largest decreases in seedling/sapling acreage occurred in those portions of the bird conservation region in New Jersey (640,000 acres [259,000 ha]), Massachusetts (599,000 acres [242,400 ha]) and Connecticut (401,000 acres [162,280 ha]) (Figure 30-02).

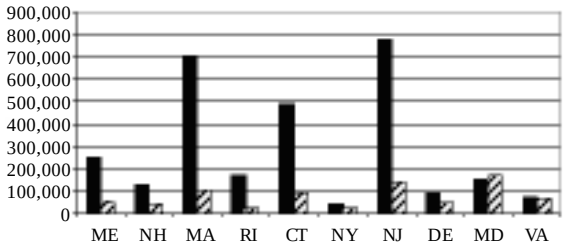


Figure 30-02. Acreage of seedling/sapling habitats in the 1970s and in 2005 for portions of states comprising BCR 30.

Nonstocked (nonforested) habitat is used by woodcock for roosting and singing ground. Between the 1970s and 2005, BCR 30 lost 86,500 acres (35,000 ha) of nonstocked habitat, approximately an 80-percent decline. Largest losses occurred in portions of the bird conservation region in New Jersey, Massachusetts and Maryland (Figure 30-03).

Trends in Wetland Habitats

Comparisons of national wetland inventory data

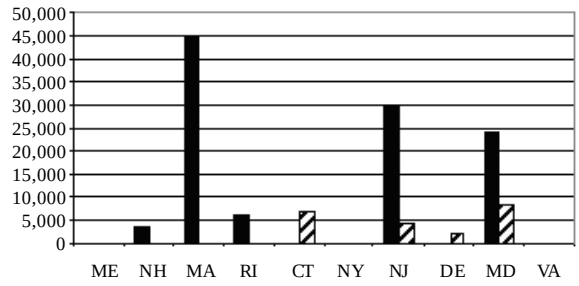


Figure 30-03. Acreage characterized as nonstocked (nonforested) habitat in the 1970s and in 2005 for portions of states comprising BCR 30.

illustrate the change in the availability of shrub/scrub (alder) and forested wetlands, both critical components of woodcock habitat. Forested wetlands have declined in the bird conservation region from 1.3 million acres (526,100 ha) in 1950 to 1 million acres (404,700 ha) in 1990 (Koenig 2004, personal communication) (Figure 30-04). Shrub/scrub (alder) wetland acreage in BCR 30 has declined from 535,000 acres (216,500 ha) in 1950 to 382,000 acres (154,600 ha) in 1990 (Koenig DATE, personal communication) (Figure 4). Since the 1950s, BCR 30 has lost 465,000 acres (188,180 ha) of wetland

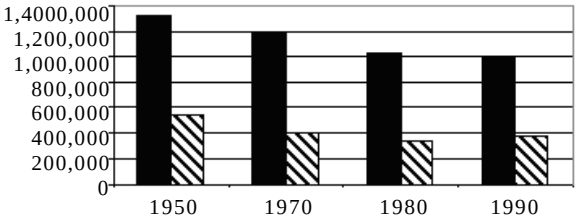


Figure 30-04. Acreage of forested wetlands (PFO) and shrub/scrub wetlands (PSS) in BCR 30.

woodcock habitats, with 225,000 acres (91,055 ha) lost since the 1970s.

Ownership Patterns of Habitat in BCR 30

The majority (82.2 percent) of woodcock habitat in BCR 30 occurs on privately owned forestland (Table 30-03). Nonfederal, publicly owned forestland accounts for 16.1 percent (1.2 million acres [485,630 ha]) of BCR 30. There are no U.S. Department of Agriculture Forest Service holdings in the bird conservation region. Other federal holdings amount to 137,000 acres (55,440 ha) or 1.2 percent of the bird conservation region.

Harvest and Population Status

Importance to Populations

BCR 30 provides regional woodcock populations breeding, migration and wintering habitats. Singing-ground survey results (Sauer and Bortner 1991) reflect a mosaic of varying densities, from 1 to 4 and from 0.1 to 1.0 woodcock per route. Highest singing-ground counts in the bird conservation region are found in Massachusetts, Connecticut, New Jersey, Delaware and on the Delmarva Peninsula. When compared to other bird conservation regions in woodcock breeding range, however, BCR 30 supports a low breeding population.

BCR 30's highest value to woodcock is as a migratory pathway. Woodcock from northern bird conservation regions funnel through BCR 30, with high concentrations found in southern New Jersey and the Delmarva Peninsula. Cape May, New Jersey, is recognized as a significant migratory concentration area worthy of protection (Owen 1980). Woodcock leaving eastern Maine have been documented to pass Cape May, New Jersey, in 8 to 18 days (McAuley 2005, personal communication). Stopover habitats available as feeding covers are critically important to migrating woodcock.

Woodcock are believed to winter in the southernmost extension of BCR 30, covering extreme southern New Jersey, the Delmarva Peninsula and portions of Virginia that are adjacent to the Chesapeake Bay (Owen 1980). Straw et al. (1994) suggest common to

abundant densities of wintering woodcock may be found in the Delmarva Peninsula. Southern New Jersey and eastern Maryland and Virginia are believed to support scattered to common densities of wintering woodcock (Straw et al. 1994). The importance of these wintering habitats compared to habitats in the Gulf Coast states has not been documented, but Krohn and Clark (1977) suggest that South Atlantic states winter the majority of woodcock breeding east of the Appalachians.

Harvest and Population Status

Woodcock from BCR 30 are well represented in U.S. Fish and Wildlife Service woodcock wing-collection surveys. High numbers of woodcock wings are submitted by hunters in those portions of the bird conservation region in Maine, coastal Massachusetts, coastal Connecticut, New York and southern New Jersey. Lower numbers are submitted from the tip of the Delmarva Peninsula, northern New Jersey, New Hampshire and eastern Massachusetts, exclusive of Cape Cod.

Harvest data are not available for counties within the bird conservation region, but statewide averages for those states with the majority of area of the bird conservation region illustrate harvest densities (Kelley 2004). In 2004, Connecticut, Massachusetts and New Jersey each had between 1,000 and 1,400 woodcock hunters, who hunted from 4,000 to 6,300 days total and who harvested from 2,400 to 4,000 woodcock per state. Rhode Island had 100 hunters who hunted 700 days and took 100 woodcock. Delaware had 400 hunters who hunted 1,600 days and took 400 woodcock. Extrapolating to the entire bird conservation region is uncertain, but an estimate is that BCR 30 supported 4,500 woodcock hunters who took 12,000 woodcock in 2004.

Population Trends

Singing-ground Survey Trends. The long-term trend in woodcock population suggests decreasing population size, with a decrease of 4.89 percent per year. Short-term trends suggest the rate of decline is lessening, with a 3.65 percent change per year from1995 to 2004. At the state level, short-term trends in singing ground surveys (Kelley 2004) suggest that New Jersey has a statistically significant decreasing woodcock population while all other states in the bird conservation region show a statistically nonsignificant increasing trend. Long-term trends (1968 to 2004) show all states in the bird conservation region, except New Hampshire, with a statistically significant decreasing trend in woodcock numbers.

Population Estimates. Between the 1970s and 2004, all states have witnessed a substantial decrease in woodcock singing-male density. Average density across BCR 30 has decreased from 1.47 males to 0.48 males, a 67-percent decrease. New Jersey, New York and Delaware have each witnessed decreases of greater than 75 percent in singing males. Maine and New Hampshire have experienced declines of less than 35 percent.

Population Deficits. States within BCR 30 have lost 64,000 singing males between the 1970s and 2004. New Jersey has witnessed the greatest loss in singing males with a reduction of more than 17,000. Only New Hampshire has a population deficit of less than 1,500 singing males.

Habitat Goals and Management Recommendations

To restore woodcock to 1970s densities, new habitat will need to be created on 2.6 million acres (1.05 million ha) of bird conservation region forestland (Table 30-04). The calculation of acres needing to be managed was based upon the 1970 average of 48.2 acres (19.5 ha) of young forest and shrubland per

singing male. No state has enough habitat to support 1970 densities. New Jersey has the largest habitat deficit, with 828,000 acres (335,000 ha) of new habitat needed in order to return to earlier densities. New York and New Jersey will each have to manage greater than 70 percent of the forested acres remaining in the states' portion of the bird conservation region to achieve the desired woodcock density. New Hampshire's deficit is the smallest of BCR 30 states with 37,000 acres (15,000 ha) of new woodcock habitat needed. In New Hampshire, reaching the density goal will mean improving habitat on 7 percent of the forested acreage remaining in the state's portion of the bird conservation region. On average, states in the bird conservation region need to manage 31 percent of their remaining forestland to meet woodcock density goals.

Potential for Habitat Management

Private Land Habitat Management

Given that greater than 80 percent of BCR 30 is privately owned forestland, the potential for the bird conservation region to provide habitat for woodcock will largely depend upon the actions of private landowners. Critical assessments of the potential of private land management for woodcock include:

1. Are landowners informed?
2. Are sources of technical assistance available to landowners?
3. Are financial incentives available to motivate landowners to manage woodcock habitat?
4. Are markets for commercial timber products produced through woodcock habitat management?

Existing state and federal programs attempt to provide landowners with the technical assistance and funding to improve woodcock habitat. The Ruffed Grouse Society Coverts Program is active in New Hampshire, Connecticut, Massachusetts, Maryland, New York and Virginia. The U.S. Department of Agriculture, Natural Resources Conservation Service provides cost-share assistance to private landowners through their Wildlife Habitat Improvement Project (WHIP) funds. The U.S. Fish and Wildlife Service's Partners for Fish and Wildlife Program has prioritized early successional habitat.

A new initiative begun by the Wildlife Management Institute in 2005 has organized technical assistance, outreach and funding opportunities for woodcock and other early successional habitat species under one initiative. Twenty-three partners have agreed to cooperate on the objective of the initiative, which is to implement the Woodcock Conservation Plan in New England and New York. The initiative's approach is to develop demonstration areas on suitable public land to showcase exemplary habitat management for woodcock, to provide extensive outreach to private landowners in the vicinity of the demonstration area and to provide technical assistance and funding to private landowners interested in managing their land for woodcock.

Federal Land Habitat Management

Critically important migratory stopover habitat is available on Cape May and on some national wildlife refuges in New Jersey and Virginia. Both refuges have prioritized habitat management and protection for migratory birds.

The Rachel Carson National Wildlife Refuge (in Maine) was established to preserve 10 important estuaries that are key points along migration routes of waterfowl and other migratory birds. Refuge land is approximately 4,700 acres (1,900 ha) in 10 geographic units from Kittery to Cape Elizabeth, Maine. In 1989, the refuge boundary expanded to include salt marsh, freshwater wetlands and "critical edge" uplands around each of nine divisions.

The Biddeford Pool Division, the tenth division of the refuge, was created to serve as a key staging area in southern Maine for a large number and diversity of shorebirds. When it is completed, the refuge will be about 7,600 acres (3,075 ha).

The Parker River National Wildlife Refuge, Massachusetts, consists of 4,662 acres (1,883 ha) of diverse upland and wetland habitats, including sandy beach and dune, shrub/thicket, bog, swamp, freshwater marsh, salt marsh and associated creek, river, mud flat and salt panne. These and other refuge habitats support varied and abundant populations of resident and migratory wildlife, including more than 300 species of birds and additional species of mammals, reptiles, amphibians, insects and plants. Portions of refuge land are mowed to maintain open habitats, providing food and cover for such migratory bird species as woodcock and bobolink.

The Eastern Massachusetts National Wildlife Refuge Complex includes eight refuges, some of which provide habitat for woodcock. Three comprehensive conservation plans (CCPs) have been developed that detail status and management opportunities for woodcock. The Assabet River National Wildlife Refuge (2,230 acres) identifies woodcock as breeding residents and outlines management direction for woodcock habitats. Great Meadows National Wildlife Refuge (3,863 acres [1,563 ha]) provides a mix of wetland, upland field, scrub/shrub and forested habitats, and it lists woodcock as a resident. Oxbow National Wildlife Refuge (1,667 acres [675 ha]) includes wetland and forested habitats along the Nashua River and lists woodcock as a resident.

Chesapeake Marshlands National Wildlife Refuge Complex is strategically located as an important stopover habitat for migrating woodcock, but refuge management is more heavily focused on forest-interior dwelling, neotropical migrants than on species requiring young forest and shrubland. Adjacent private forestland and state wildlife management areas may be managed more to woodcock benefit.

Silvio Conte National Wildlife Refuge provides important technical assistance to private landowners in BCR 30 as well as management opportunities for woodcock on refuge land.

U.S. Department of Defense

Camp Edwards Military Reservation (in Massachusetts) is strategically located and is a large aggregation of potential woodcock habitat.

State Land Habitat Management

Each state in BCR 30 has numerous opportunities for woodcock management on state wildlife management areas, state parks and state forests.

Other Planning Efforts and Assessments

The measured decline of woodcock has prompted various planning and assessment efforts to highlight the importance of conservation actions dedicated to the improvement of woodcock habitat quality and quantity.

The Atlantic Coast Joint Venture, the New Jersey Division of Fish and Wildlife and the International Association of Fish and Wildlife Agencies hosted a workshop for the Southern New England/Mid-Atlantic Bird Conservation Region (BCR 30), December 7 through 9, 2004, in Cape May, New Jersey. This workshop brought together 85 state, federal and nongovernmental organizations from 10 states to review and to reach consensus on the highest priorities for bird conservation in BCR 30. Using information from the major continental and regional bird conservation plans,

as well as from the draft state comprehensive wildlife conservation strategies and refuge plans, these partners reached consensus on priority bird species, habitat-species suites, threats to these species and habitats, focus areas and priority conservation actions (habitat and nonhabitat conservation projects as well as monitoring, research and outreach projects). Woodcock were identified as belonging to the group requiring the highest level of conservation concern.

The Partners in Flight Bird Conservation Plan for Southern New England (Dettmers and Rosenberg 2000) covers the approximate area of BCR 30. Woodcock are listed as a high-priority species representing the early successional scrub/pitch pine barrens habitat type.

The U.S. Shorebird Conservation Plan (Brown et al. 2000) presents the conclusions and recommendations of regional technical working groups who assessed the current status, the conservation threats, and the opportunities and population goals for shorebirds. The North Atlantic Shorebird Working Group (Niles and Clark 2000) identified woodcock as a high-priority species.

Congress created the State Wildlife Grants Program to fund to every state and territory to support cost-effective conservation aimed at keeping wildlife from becoming endangered. In order to receive federal funds through the State Wildlife Grants Program, Congress charged each state and territory with developing a state wildlife action plan. These strategies will outline species, habitat priorities and the actions that need to be taken to conserve both. Woodcock had been included on the species of greatest conservation concern lists for all states in BCR 30.

The Northeast Association of Fish and Wildlife Agencies published a list of wildlife of regional conservation concern in the Northeast (Therres 1999) and included woodcock on it.

Table 30-01. Current composition, in acres (percentage of column total), of major forest types in BCR 30.

	Connecticut	Delaware	Massachusetts	Maryland	Maine	New Hampshire	New Jersey	New York	Rhode Island	Virginia	Total
Aspen/Birch group	18,100	0	29,900	0	32,800	21,500	0	0	2,900	0	105,200
	(17.2)	(0.0)	(28.4)	(0.0)	(31.2)	(20.4)	(0.0)	(0.0)	(2.8)	(0.0)	
Elm/Ash/Cottonwood	117,400	13,300	96,000	58,400	27,500	11,600	39,200	4,600	18,600	200	386,800
Group	(30.4)	(3.4)	(24.8)	(15.1)	(7.1)	(3.0)	(10.1)	(1.2)	(4.8)	(0.1)	
Loblolly/Shortleaf	0	49,400	31,800	266,600	0	0	347,700	27,100	1,000	101,000	824,600
pine group	(0.0)	(6.0)	(3.9)	(32.2)	(0.0)	(0.0)	(42.2)	(3.3)	(4.1)	(0.0)	
Maple/Beech/	339,200	9,400	532,200	21,000	135,600	133,700	26,200	43,100	52,800	0	1,293,200
Birch group	(26.2)	(0.7)	(41.2)	(1.6)	(10.5)	(10.3)	(2.0)	(3.3)	(4.1)	(0.0)	
Nonstocked	6,900	0	0	0	0	0	0	0	0	0	6,900
	(100.0)										
Oak/Gum/	0	25,500	3,300	124,800	0	0	64,500	0	0	19,700	237,800
Cypress group											
Oak/Hickory group	698,200	240,600	663,600	671,000	110,000	112,300	441,800	87,700	215,200	86,700	3,327,100
Oak/Pine group	24,000	37,300	188,400	209,900	8,500	50,900	197,600	6,500	20,300	48,800	792,200
Pinyon/Juniper group	5,900	0	3,300	0	0	0	17,800	5,300	0	0	32,300
Spruce/Fir group	0	0	0	0	6,200	6,800	0	0	3,700	0	16,700
White pine/Red pine/	59,800	0	267,900	0	166,300	106,300	0	0	25,300	0	625,600
Jack pine group											

Table 30-02 Current and historical (1965–1980) stand-size distribution, in acres (percentage of column total), of forestland in BCR 30 and in portions of individual states within the bird conservation region.

	Current stand-size distribution					Historical stand-size distribution				
	Total forestland	Large diameter[1,2]	Medium diameter[1,3]	Small diameter[1,4]	Non-stocked[1,5]	Total forestland	Large diameter[1,2]	Medium diameter[1,3]	Small diameter[1,4]	Non-stocked[1,5]
Connecticut	1,269,500	842,200	332,400	88,000	6,900	1,406,500	443,000	474,800	488,700	0
	(100.0)	(66.3)	(26.2)	(6.9)	(0.5)	(100.0)	(31.5)	(33.8)	(34.7)	(0.0)
Delaware	375,600	252,400	74,300	47,000	1,800	384,500	207,100	83,300	94,100	0
	(100.0)	(67.2)	(19.8)	(12.5)	(0.5)	(100.0)	(53.9)	(21.7)	(24.5)	(0.0)
Maine	487,000	190,600	244,500	51,900	0	498,900	147,600	98,000	253,300	0
	(100.0)	(39.1)	(50.2)	(10.7)	(0.0)	(100.0)	(29.6)	(19.6)	(50.8)	(0.0)
Maryland	1,351,800	858,000	316,900	168,700	8,200	1,615,400	1,043,900	390,600	156,900	24,000
	(100.0)	(63.5)	(23.4)	(12.5)	(0.5)	(100.0)	(64.6)	(24.2)	(9.7)	(1.5)
Massachusetts	1,822,800	1,171,300	545,700	105,800	0	2,039,900	600,200	689,900	705,000	44,800
	(100.0)	(64.3)	(29.9)	(5.8)	(0.0)	(100.0)	(29.4)	(33.8)	(34.6)	(2.2)
New Hampshire	443,100	267,900	133,300	41,900	0	497,300	231,100	135,300	127,500	3,400
	(100.0)	(60.5)	(30.1)	(9.5)	(0.0)	(100.0)	(46.5)	(27.2)	(25.6)	(0.7)
New Jersey	1,134,900	431,900	559,500	139,100	4,400	1,161,000	158,500	200,600	777,700	29,500
	(100.0)	(38.1)	(49.3)	(12.3)	(0.4)	(100.0)	(13.7)	(17.3)	(67.0)	(2.5)
New York	174,300	106,100	42,300	25,900	0	226,700	117,400	64,800	44,500	0
	(100.0)	(60.9)	(24.3)	(14.9)	(0.0)	(100.0)	(51.8)	(28.6)	(19.6)	(0.0)
Rhode Island	339,700	172,500	145,900	21,300	0	395,300	87,900	133,000	168,300	6,100
	(100.0)	(50.8)	(42.9)	(6.3)	(0.0)	(100.0)	(22.2)	(33.6)	(42.6)	(1.5)
Virginia	256,400	134,700	58,800	62,800	0	284,252	119,065	96,332	68,855	0
	(100.0)	(52.6)	(22.9)	(24.5)	(0.0)	(100.0)	(41.9)	(33.9)	(24.2)	(0.0)
Total	7,655,000	4,427,500	2,453,700	752,500	21,300	8,509,752	3,155,765	2,366,632	2,884,855	107,800
	(100.0)	(57.8)	(22.9)	(9.8)	(0.3)	(100.0)	(37.1)	(27.8)	(33.9)	(1.3)

1 Percentages for various diameter categories and nonstocked category refer to percent of total forestland for current and historical time periods within each state.
2 Softwoods are at least 9 inches, and hardwoods are at least 11 inches in diameter at breast height.
3 Trees are at least 5 inches in diameter at breast height but are smaller than large-diameter trees.
4 Saplings are 1 to 5 inches diameter at breast height. Softwood seedlings are more than 6 inches tall, and hardwood seedlings are more than 12 inches tall.
6 Commercial forest land on which stocking of trees is less than 16.7 percent.

Table 30-03: Forest ownership in states located within BCR 30.

Ownership	Connecticut	Delaware	Massachusetts	Maryland	Maine	New Hampshire	New Jersey	New York	Rhode Island	Virginia	Total
Other federal	6,800	0	35,400	14,300	0	0	48,500	13,100	3,500	15,600	137,200
Private	1,029,200	350,600	1,461,000	1,211,200	479,100	385,200	725,400	155,400	258,900	233,200	6,289,200
State/County/Municiple	233,500	25,000	326,600	125,900	7,900	57,800	361,100	5,900	77,300	7,700	1,228,700
U.S. Forest Service	0	0	0	0	0	0	0	0	0	0	0
Total	1,269,500	375,600	1,823,000	1,351,400	487,000	443,000	1,135,000	174,400	339,700	256,500	7,655,100

Table 30-04A. Compilation of historical and current population and habitat, in acres, for woodcock in BCR 30.

	Historical	Current
Connecticut	2,943,206	2,943,206
Delaware	1,593,139	1,593,139
Maine	813,658	813,658
Maryland	4,910,202	4,910,202
Massachusetts	5,685,485	5,685,485
New Hampshire	753,837	753,837
New Jersey	3,553,677	3,553,677
New York	2,428,870	2,428,870
Rhode Island	988,826	988,826
Virginia	2,043,040	2,043,040
Total	25,713,939	25,713,939
Manageable acres		
Connecticut	1,406,500	1,269,500
Delaware	384,500	375,500
Maine	498,900	487,000
Maryland	1,615,400	1,351,800
Massachusetts	2,039,900	1,822,800
New Hampshire	497,300	443,100
New Jersey	1,161,000	1,134,900
New York	226,700	174,300
Rhode Island	395,300	339,700
Virginia	284,252	256,300
Total	8,509,752	7,654,900

Table 30-04B. Calculation of singing males and of singing-mail deficit for woodcock in BCR 30.

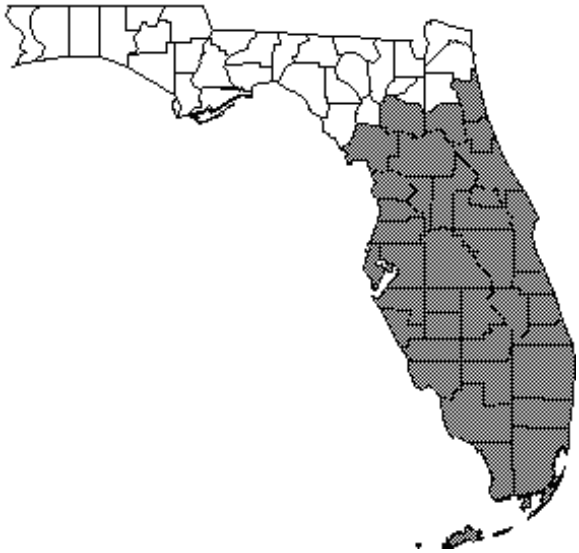
Population of singing males	Historical	Current
Connecticut	10,258	3,387
Delaware	5,198	1,377
Maine	6,004	3,904
Maryland	13,423	3,737
Massachusetts	24,198	12,086
New Hampshire	4,319	3,089
New Jersey	20,645	2,983
New York	7,906	2,706
Rhode Island	3,764	1,301
Virginia	3,978	1,079
Total	99,691	35,650
Population deficit of singing males		
Connecticut		5,872
Delaware		3,699
Maine		1,956
Maryland		7,496
Massachusetts		9,536
New Hampshire		759
New Jersey		17,198
New York		3,372
Rhode Island		1,934
Virginia		2,507
Total		54,329

Table 30-04C. Calculation, in acres, of habitat goals for woodcock in BCR 30.

	Habitat goals
Connecticut	283,020
Delaware	178,287
Maine	94,299
Maryland	361,291
Massachusetts	459,628
New Hampshire	36,597
New Jersey	828,948
New York	162,533
Rhode Island	93,204
Virginia	120,858
Total	2,618,665

Bird Conservation Region 31: Peninsular Florida

Scot Williamson
Wildlife Management Institute



Affected State: Florida
Current Area of Forestland: 5,180,338 acres (2,096,430 ha) (1,714,745 [693, 940 ha] acres of small-diameter and nonstocked forest)
Woodcock Trend Estimate: not applicable
Percent of Change per Year: not applicable
Woodcock Population Estimate: not applicable
Singing Males Only: not applicable

Physical Description

BCR 31 occupies the portions of peninsular Florida south of Dixie, Gilchrest, Columbia, Union, Bradford, Duval and Clay counties. Woodcock are believed to be year-around residents in the northern half of BCR 31 and to be nonbreeding residents in the southern half (Keppie and Whiting 1994). Primary forest types in BCR 31 include slash pine, bald cypress/water tupelo and mixed upland hardwoods (Table 31-01). Twenty-one forest types are present in the BCR, but 15 types occur on less than 5 percent of the forested acreage in it (Table 1). Fire has shaped the representation of many types, especially on xeric uplands. Hurricanes are the only dominant natural disturbance factor. Wetlands are common to abundant. And, wet flatwoods or floodplain bottomland hardwood forests may be especially important to woodcock.

Trends in Forested Habitats

Comparisons of forest inventory analysis (FIA) data between 1970 and 2002 illustrate the change in the availability of early successional (seedling/sapling) habitats available to woodcock. Seedling/sapling habitat occurrence, expressed as a percentage of the forested landscape, has increased from 29 percent to 22 percent (Table 31-02). The occurrence of nonstocked forestland, which may represent certain seasonally important types of woodcock habitat, have declined from 22 percent to less than 4 percent. In the 30 years between the surveys, BCR 31 has also lost over 1 million acres (404,700 ha) of forestland.

Trends in Wetland Habitats

Comparisons of national wetland inventory data illustrate the change in the availability of shrub/scrub (alder) and forested wetlands, both critical components of woodcock habitat. Forested wetlands have declined in the bird conservation region from 4.5 million acres (1.82 million ha) in 1950 to 2.9 million acres (1.17 million ha) in 1990 (Koenig 2004 personal communication) (Figure 31-01). Shrub/scrub wetland acreage in BCR 31 has declined from 2.7 million acres (1.09 million ha) in 1950 to 2.5 million acres (1.01 million ha) in 1990

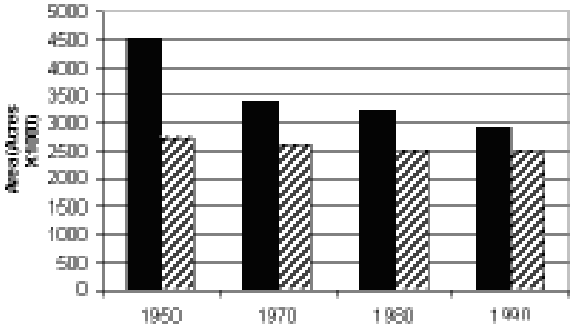


Figure 31-01. Acreage of forested wetlands (PFO) and shrub/scrub wetlands (PSS) in BCR 31.

(Koenig 2004 personal communication) (Figure 31-01). Since the 1950s, BCR 31 has lost 1.8 million acres (728,400 ha) of wetland woodcock habitats.

Ownership Patterns of Habitat

The majority (80.5 percent) of woodcock habitat in BCR 31 occurs on privately owned forestland (Table 31-03). Nonfederal, publicly owned forestland accounts for 10.5 percent (543,000 acres [220,000 ha]) of BCR 31. National forest holdings total 335,000 acres (135,600 ha, 6.5 percent).

Other Planning Efforts and Assessments

The Florida Wildlife Action Plan does not list woodcock as a species of greatest conservation need in BCR 31.

Harvest

Woodcock from BCR 31 are lightly represented in U.S. Fish and Wildlife Service woodcock wing-receipt studies. Approximately half of the counties in the bird conservation region are not represented by woodcock wing receipts from 1963 to 2001. Thirteen counties account for 1 to 101 wing receipts, and 5 counties account for 101 to 501 wing receipts.

Harvest data are not available for counties within the BCR 31, but statewide averages for those states with the majority of area within the bird conservation region illustrate harvest densities (Kelley and Rau 2005). In 2005, Florida accounted for 1,100 woodcock harvested by 1,000 hunters.

Population Trends

Florida is not within the woodcock Singing-ground Survey area.

Importance to Populations

BCR 31 provides limited value to regional woodcock populations as breeding, migration and wintering habitats. Keppie and Whiting (1994) show woodcock year-around and show wintering habitat covering the bird conservation region. Kelley and Rau (2005) show woodcock breeding range ending north of BCR 31. Harvest rates are generally low.

Table 31-01. Current composition, in acres, of major forest types in BCR 31 (U.S. Forest Service 2002).

Forest type	Acres	Percentage
Bald cypress/Water tupelo	656,292	12.7
Eastern redcedar/Hardwood	7,687	0.1
Sable palm	210,077	4.1
Loblolly pine	141,420	2.7
Loblolly pine/Hardwood	60,456	1.2
Longleaf pine	224,374	4.3
Longleaf pine/Oak	140,147	2.7
Mixed upland hardwoods	566,745	10.9
Other pine/Hardwood	101,264	2.0
Pond pine	55,544	1.1
Sand pine	297,338	5.7
Slash pine	1,412,880	27.3
Slash pine/Hardwood	227,849	4.4
Southern scrub oak	284,414	5.5
Sugarberry/Hackberry/Elm/Green ash	104,416	2.0
Sweetbay/Swamp tupelo/Red maple	438,875	8.5
Sweetgum/Nuttall oak/Willow oak	183,615	3.5
Sweetgum/Yellow poplar	40,283	0.8
Sycamore/Pecan/American elm	2,909	0.1
White oak/Red oak/Hickory	13,583	0.3
Willow	10,170	0.2
Total	5,180,338	100.0

Table 31-02. Timberland, in acres (percent of column total), by stand-size class in BCR 31 for current and historical (1970–1975) periods (Miles 2004). Percentages for various diameter categories and nonstocked category refer to percent of total forestland for current and historical periods within each state. Softwoods equal at least 9 inches, and hardwoods equal at least 11 inches in diameter at breast height. Trees measure at least 5 inches in diameter at breast height, but are smaller than large-diameter trees. Saplings 1 to 5 inches diameter at breast height. Softwood seedlings are more than 6 inches tall, and hardwood seedlings are more than 12 inches tall. Commercial forestland on which stocking of trees is less than 16.7 percent.

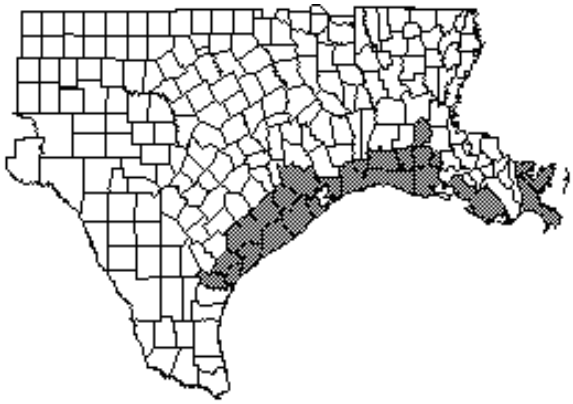
Year	Large diameter	Medium diameter	Small diameter	Nonstocked	Total stand-size class
1970	2,003,800	1,554,200	1,380,200	1,356,200	6,294,400
	(31.8)	(24.7)	(21.9)	(21.5)	
2002	2,105,058	1,360,535	1,517,705	197,040	5,180,338
	(40.6)	(26.3)	(29.3)	(3.8)	

Table 31-03. Area of timberland, in acres, by ownership classes in BCR 31 (Miles 2004).

Ownership	Total	Percentage
County/Municipal	57,115	1.1
National forest	334,930	6.5
Other federal	75,870	1.5
Other local government	0	0.0
Private	4,168,774	80.7
State	543,649	10.5
U.S. Department of Defense	0	0.0
U.S. Fish and Wildlife Service	0	0.0
U.S. National Park Service	0	0.0
All	5,180,338	100.0

Bird Conservation Region 37: Gulf Coastal Prairie

James R. Kelley, Jr.
U.S. Fish and Wildlife Service



Affected States: Texas and Louisiana
Current Area of Forestland: 1,470,799 acres (595,218 ha) (324,604 acres [131,364 ha] of small-diameter and nonstocked forest)
Woodcock Trend Estimate: not applicable
Percent of Change per Year: not applicable
Woodcock Population Estimate: not applicable
Singing Males Only: not applicable

Physiography and Habitat Description

Historical forest inventory data for this bird conservation region is lacking, preventing estimation of habitat trends. Early succesional habitat occupies approximately 22 percent of the timberland in BCR 37 (Table 37-01). Major forest types include loblolly pine (19 percent), bald cypress/water tupelo (15 percent), loblolly pine/hardwood (12 percent), sweetgum/Nuttall oak/willow oak (10 percent) and sugarberry/hackberry/elm/green ash (8 percent, Tables 37-02–37-04). Flatwoods are the dominant (62 percent) physiographic class on which major forest types within the region are found, with broad floodplains/bottomland and swamp/bogs also holding large acreages (Table 37-05). Approximately 93 percent of the 1.4 million acres (566,560 ha) of timberland in the region is under private ownership. Whereas, state or county forests comprise approximately 5 percent of all timberland (Table 37-06).

Harvest and Population Status

Although woodcock breed in BCR 37, the region is also an important woodcock wintering area for the Central Region population. Estimates from the harvest information program (HIP) indicate that 5,500 hunters in Louisiana harvested 18,100 birds throughout the state in 2005 (Kelley and Rau 2006). HIP estimates for woodcock hunters in Texas ranged from 5,900 to 6,200 hunters in 2004 and 2005. However, harvest estimates for the state have been low (0 to 800 birds; Kelley and Rau 2005, 2006).

Population and Habitat Goals

This bird conservation region is not covered by the Singing-ground Survey; therefore, no population trends or estimates are available.

Keppie and Whiting (1994) indicated that diurnal habitat use by woodcock includes a variety of forest types, including bottomland hardwoods and mature longleaf pine, especially if they were recently burned. Preferred vegetation structure varies from dense regenerating stands to open sawtimber stands with distinct understory. Nocturnal habitat use is similar to northern portions of the species range (open pastures, agricultural fields, etc.). Prescribed burning in pineland may benefit woodcock by removing pine needles and clearing the forest floor to provide easier

access to earthworms (Krementz and Jackson 1999). Where possible, loblolly pine stands should be managed to include a greater hardwood component (Krementz et al. 2007). Woodcock management in this bird conservation region should emphasize maintenance of early successional habitat for locally breeding birds, as well as for wintering migrants.

Table 37-01. Current stand-size distribution of timberland, in acres (percentage of column total), in BCR 37 and in portions of individual states within the bird conservation region.

	Current stand-size distribution				
	Total timberland	Large diameter	Medium diameter	Small diameter	Nonstocked
Louisiana	1,039,713	546,315	306,504	186,894	0
	(70.7)	(52.5)	(29.5)	(18.0)	(0.0)
Texas	431,086	202,339	91,056	131,169	1,523
	(29.3)	(46.9)	(21.1)	(31.6)	(0.4)
Total	1,470,799	748,707	397,588	323,081	1,523
	(100.0)	(50.9)	(27.0)	(22.0)	(0.1)

Table 37-02. Percentage composition of forest types between states within BCR 23.

Forest type	Louisiana	Texas	Total
Baldcypress/Water tupelo	87.8	12.2	100.0
Loblolly pine	54.6	45.4	100.0
Sugarberry/Hackberry/Elm/ Green ash	92.8	7.2	100.0
Loblolly pine/Hardwood	62.6	37.4	100.0
Sweetgum/Nuttall oak/ Willow oak	69.3	30.7	100.0
Slash pine	87.9	12.1	100.0
Willow	100.0	0.0	100.0
Other exotic hardwoods	35.9	64.1	100.0
Mixed upland hardwoods	38.1	61.9	100.0
Longleaf pine	100.0	0.0	100.0
Sweetbay/Swamp tupelo/ Red maple	84.2	15.8	100.0
Swamp chestnut oak/ Cherrybark oak	77.3	22.7	100.0
Cottonwood/Willow	100.0	0.0	100.0
White oak/Red oak/Hickory	76.2	23.8	100.0
Sycamore/Pecan/American elm	74.5	25.5	100.0
Longleaf pine/Oak	100.0	0.0	100.0
Sweetgum/Yellow poplar	100.0	0.0	100.0
Overcup oak/Water hickory	100.0	0.0	100.0
Total	87.8	12.2	100.0

Table 37-03. Forest composition of timberland, in acres (percentage of column total) within BCR 37.

Forest type	Minnesota	Wisconsin	Total
Baldcypress/Water tupelo	192,676	269,802	219,478
	(18.5)	(6.2)	(14.9)
Cottonwood/Willow	22,378	0	22,378
	(2.2)	(0.0)	(1.5)
Loblolly pine	155,077	129,082	284,159
	(14.9)	(29.9)	(19.3)
Loblolly pine/Hardwood	109,501	65,463	174,964
	(10.5)	(15.2)	(11.9)
Longleaf pine	33,633	0	33,663
	(3.2)	(0.0)	(2.3)
Longleaf pine/Oak	12,692	0	12,692
	(1.2)	(0.0)	(0.9)
Mixed upland hardwoods	34,057	55,441	89,498
	(3.3)	(12.9)	(6.1)
Other exotic hardwoods	37,209	66,581	103,790
	(3.6)	(15.4)	(7.1)
Overcup oak/	9,103	0	9,103
Water hickory	(0.9)	(0.0)	(0.6)
Slash pine	80,907	11,154	92,061
	(7.8)	(2.6)	(6.3)
Sugarberry/Hackberry/	115,525	8,976	124,501
Elm/Green ash	(11.1)	(2.1)	(8.5)
Swamp chestnut oak/	24,848	7,285	32,133
Cherrybark oak	(2.4)	(1.7)	(2.2)
Sweetbay/Swamp tupelo/	26,549	4,995	31,544
Red maple	(2.6)	(1.2)	(2.1)
Sweetgum/Nuttall oak/	97,719	43,219	140,938
Willow oak	(9.4)	(10.0)	(9.6)
Sweetgum/Yellow poplar	9,103	0	9,103
	(0.9)	(0.0)	(0.6)
Sycamore/Pecan/	13,275	4,551	17,826
American elm	(1.3)	(1.1)	(1.2)
White oak/Red oak/	19,468	6,069	25,537
Hickory(1.9)	(1.4)	(1.7)	
Willow	45,963	0	45,963
	(4.4)	(0.0)	(3.1)
Total	1,039,713	431,135	1,470,848
	(100.0)	(100.0)	(100.0)

Table 37-04. Stand-size class composition (in thousands of acres) of the most common forest types found in states within BCR 37.

	Forest type																		
Stand-size class	Baldcypress/Water tupelo	Loblolly pine	Sugarberry/Hackberry/Elm/Green ash	Loblolly pine/Hardwood	Sweetgum/Nuttall oak/Willow oak	Slash pine	Willow	Other exotic hardwoods	Mixed upland hardwoods	Longleaf pine	Sweetbay/Swamp tupelo/Red maple	Swamp chestnut oak/Cherrybark oak	Cottonwood/Willow	White oak/Red oak/Hickory	Sycamore/Pecan/American elm	Longleaf pine/Oak	Sweetgum/Yellow poplar	Overcup oak/Water hickory	All forest types
Louisiana																			
Large	134.5	60.7	39.8	57.3	80.9	43.0	0.0	0.0	13.8	20.7	13.3	24.8	13.3	9.1	13.3	12.7	0.0	9.1	546.3
Medium	38.8	49.1	69.0	44.4	16.8	20.7	23.0	12.2	8.9	10.4	13.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	306.5
Small	19.4	45.3	6.7	7.8	0.0	17.1	23.0	25.0	11.4	2.6	0.0	0.0	9.1	10.4	0.0	0.0	9.1	0.0	186.9
Texas																			
Large	15.7	87.0	0.0	33.4	30.2	0.0	0.0	3.0	15.4	0.0	0.0	6.1	0.0	6.1	4.6	0.0	0.0	0.0	201.4
Medium	5.6	20.6	9.0	14.4	13.1	0.0	0.0	22.1	7.6	0.0	5.0	1.2	0.0	0.0	0.0	0.0	0.0	0.0	98.4
Small	5.6	21.5	0.0	17.7	0.0	11.2	0.0	41.5	32.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	129.8
Total																			
Large	150.2	147.7	39.8	90.7	111.1	43.0	0.0	3.0	29.2	20.7	13.3	30.9	13.3	15.2	17.8	12.7	0.0	9.1	747.7
Medium	44.4	69.6	78.0	58.8	29.9	20.7	23.0	34.3	16.5	10.4	18.3	1.2	0.0	0.0	0.0	0.0	0.0	0.0	404.9
Small	25.0	66.8	6.7	25.5	0.0	28.3	23.0	66.5	43.8	2.6	0.0	0.0	9.1	10.4	0.0	0.0	9.1	0.0	316.7

Table 37-05. Physiographic class composition (in thousands of acres) of the most common forest types found in states within BCR 23.

Physiographic class	Forest types																		
	Baldcypress/Water tupelo	Loblolly pine	Sugarberry/Hackberry/Elm/Green ash	Loblolly pine/Hardwood	Sweetgum/Nuttall oak/Willow oak	Slash pine	Willow	Other exotic hardwoods	Mixed upland hardwoods	Longleaf pine	Sweetbay/Swamp tupelo/Red maple	Swamp chestnut oak/Cherrybark oak	Cottonwood/Willow	White oak/Red oak/Hickory	Sycamore/Pecan/American elm	Longleaf pine/Oak	Sweetgum/Yellow poplar	Overcup oak/Water hickory	All forest types
Broad floodplains/ Bottomland	45.5	0.0	12.3	33.0	11.0	8.9	23.0	0.0	5.6	0.0	0.0	0.0	13.3	0.0	17.8	0.0	0.0	9.1	179.5
Flatwoods	4.6	249.7	82.4	126.2	110.6	62.9	0.0	91.5	72.3	31.1	18.3	23.7	0.0	16.4	0.0	12.7	9.1	0.0	912.8
Narrow floodplains/ Bottomland	0.0	16.4	10.4	6.1	11.1	0.0	0.0	12.3	6.1	0.0	0.0	8.5	9.1	0.0	0.0	0.0	0.0	0.0	79.9
Rolling uplands	0.0	18.1	19.5	9.7	8.2	20.3	0.0	0.0	5.6	2.6	0.0	0.0	0.0	9.1	0.0	0.0	0.0	0.0	92.9
Small drains	5.6	0.0	0.0	0.0	0.0	0.0	13.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	18.8
Swamps/Bogs	163.9	0.0	0.0	0.0	0.0	0.0	9.7	0.0	0.0	0.0	13.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	186.9
Total	219.5	284.2	124.5	175.0	140.9	92.1	46.0	103.8	89.5	33.7	31.5	32.1	22.4	25.5	17.8	12.7	9.1	9.1	1,470.8

Table 37-06. Forest ownership in BCR 37, in acres.

Ownership	Total	Louisiana	Texas
County/Municipal	29,061	7,284	21,777
National forest	0	0	0
Other federal	0	0	0
Other local government	10,365	10,365	0
Private	1,371,779	980,457	391,322
State	41,594	32,743	8,851
U.S. Department of Defense	9,136	0	9,136
U.S. Fish and Wildlife Service	8,864	8,864	0\
U.S. National Park Service	0	0	0
All	1,470,999	1,039,713	431,086

Appendix I

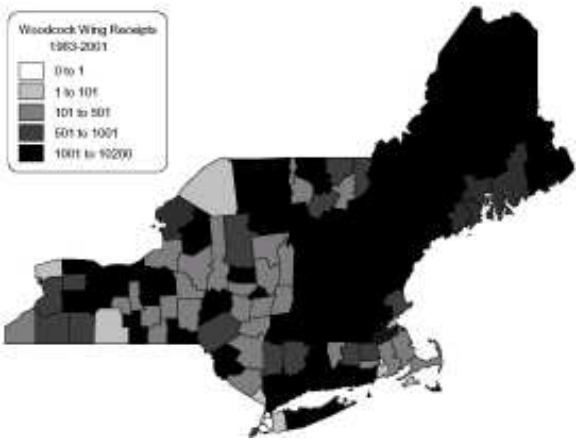


Figure AI-01: Number of woodcock wing receipts from U.S. hunters in the northeastern portion of the eastern region, 1963–2001.

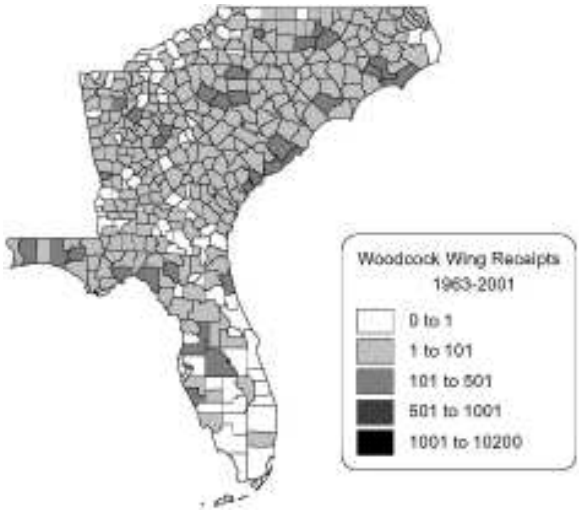


Figure AI-03: Number of woodcock wing receipts from U.S. hunters in the southern portion of the eastern region, 1963–2001.

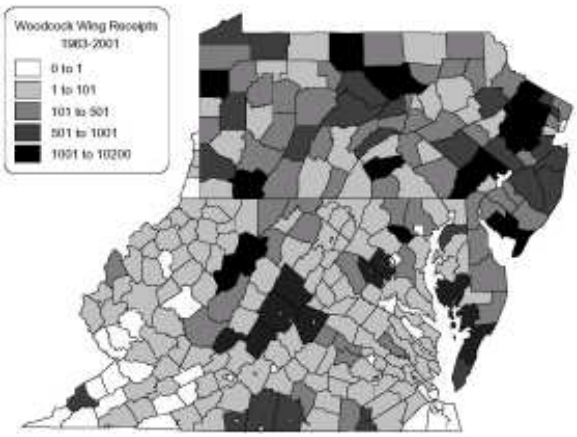


Figure AI-02: Number of woodcock wing receipts from U.S. hunters in the central portion of the eastern region, 1963–2001.

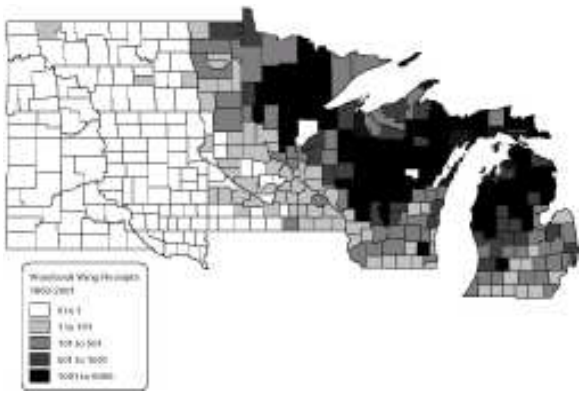


Figure AI-04: Number of woodcock wing receipts from U.S. hunters in the northern portion of the central region, 1963–2001.

Figure AI-05: Number of woodcock wing receipts from U.S. hunters in the central portion of the central region, 1963–2001.

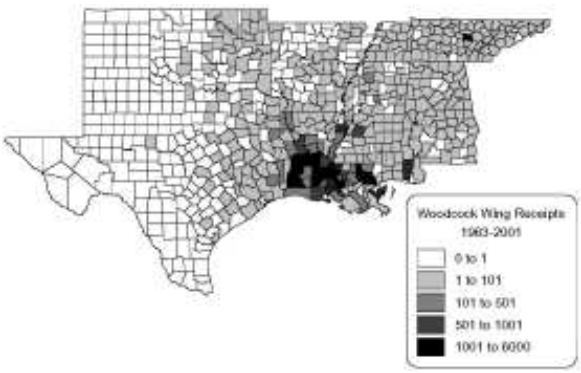


Figure AI-06: Number of woodcock wing receipts from U.S. hunters in the southern portion of the central region, 1963–2001.

Appendix II

Calculation of Woodcock Population and Habitat Goals

Population Goals

Our population goal is to return woodcock densities in each bird conservation region (BCR) on the breeding grounds (those areas covered by the Singing-ground Survey) to those densities that existed on suitable habitats during 1970 to 1975. Some habitats have been irrevocably lost to urbanization and development. Therefore, we cannot achieve the same population size that existed during 1970 to 1975. But, we can strive to achieve the same density that existed during 1970 to 1975 on the remaining habitat base.

A — total land-base acreage within BCR.

MA — manageable acres within BCR; manageable acres refer to the total area of timberland in the BCR, as determined by the U.S. Forest Service's forest inventory analysis.

P — population estimate of singing males in the BCR, as determined by the Singing-ground Survey (Figure AII-01).

ED — effective density of singing males calculated by P divided by MA found within the BCR during the period of interest

ED_{1970} — P_{1970} divided by MA_{1970}

ED_{2002} — P_{2002} divided by MA_{2002}

DD — density deficit = ED_{1970} minus ED_{2002}

PD — population deficit = DD multiplied by MA_{2002}; this represents the number of singing males that need to be added to the manageable acres in a given BCR to achieve the density found during 1970 to 1975.

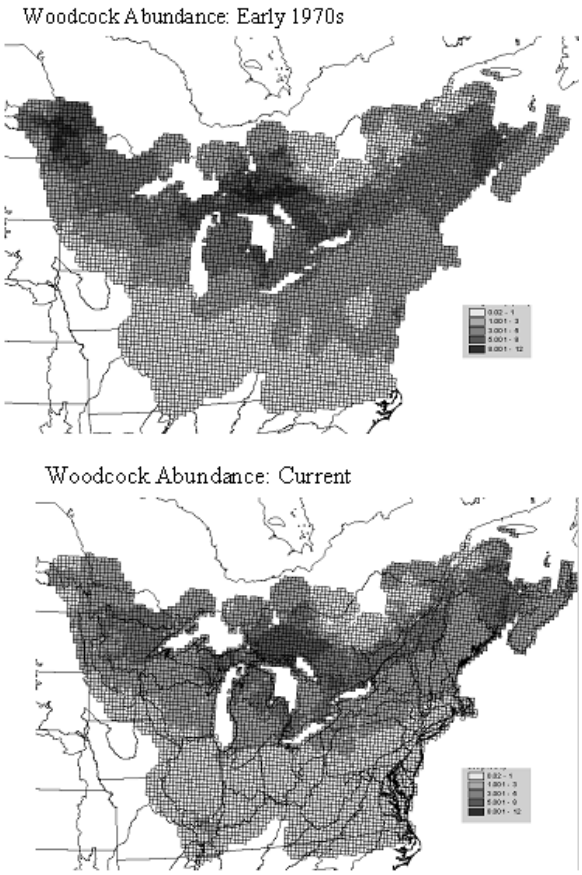


Figure AII-01. Historical and current estimated abundance of woodcock as determined by the Singing-ground Survey (J. Sauer 2004, unpublished data)

Breeding Habitat Goal

The breeding habitat goal for a BCR = PD multiplied by the habitat multiplier unique to each BCR (Table AII-01). The habitat multiplier is calculated as the total amount of early succesional habitat (small-diameter plus nonstocked forest) found in the BCR during the early 1970s, divided by the number of singing males estimated to be in the BCR for the same period. The habitat goal is additional acres of

woodcock habitat in a given breeding BCR that must be created to produce sufficient birds, such that singing-male densities will equal those found during 1970 to 1975.

Table AII-01A. Compilation of woodcock habitat, in acres, for BCR 23. Current data refers to 1998 to 2002; historical data refers to 1970 to 1975.

	Historical	Current
A	63,776,403	63,776,403
M A	12,091,750	14,363,381

Table AII-01B. Calculation of singing maile woodcock population deficit and habitat goal (in acres) for BCR 23). Current data refers to 1998 to 2002; historical data refers to 1970 to 1975[1].

	Historical	Current
P	306,005	232,114
ED	0.0253069	0.0161601
DD		0.0091468
PD		131,379
Habitat goal		1,522,683

[1] Habitat multiplier used for BCR 23 is 11.6 acres per singing male. Calculations were done for this region as a whole for illustrative purposes. Estimates will differ slightly if individual states are analyzed separately.

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