

Blueprint for Minnesota Bird Conservation

Recommendations for Minnesota's Boreal Hardwood Transition Region

Spring 2014



The *Blueprint for Minnesota Bird Conservation* is a project of Audubon Minnesota written by Lee A. Pfannmuller (leepfann@msn.com) and funded by the Environment and Natural Resources Trust Fund. For further information please contact Mark Martell at mmartell@audubon.org (651-739-9332).

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An Implementation Blueprint for Minnesota Bird Conservation

Why is a Conservation Blueprint Needed?

Numerous national, regional, and state conservation plans that broadly address Minnesota birds and the landscapes they inhabit have been produced over the past 10-15 years. Most of these plans are strategic in nature, establishing very broad conservation and management goals. Although they compile and summarize important resource information, they rarely provide managers with specific, on-the-ground targets and management tools. Most plans also address such a large number of species that it can be challenging to know which species are the highest priorities, which species, if targeted, can provide the most conservation benefits for other species, and which species can be addressed most effectively.

This effort is designed to build on these previous planning initiatives, not replace them. The goal is to achieve a common bird conservation agenda for Minnesota conservation organizations, agencies, and citizens by creating one clear *operational blueprint that provides specific guidance for Minnesota bird conservation*. It builds upon existing efforts by: identifying the highest priorities in each ecological region using select conservation focal species; synthesizing the best proven conservation practices for each species; establishing measurable goals for species' population targets; and identifying key sites for conservation work in the next decade.

Designed to push conservation beyond broad habitat protection goals, the blueprint will enable everyone interested in the conservation of Minnesota's avifauna to assess whether we are implementing the correct actions to sustain these species as integral components of Minnesota's landscape for years to come.

Data Sources

A wealth of information is available about Minnesota birds, their distribution, breeding biology, population trends, and habitat requirements. Primary data sources used for Audubon's initiative included the Minnesota Ornithologists' Union, the North American Bird Conservation Initiative, Joint Ventures, the Minnesota Department of Natural Resources, National Audubon Society and the U.S. Geological Survey. A list of primary data sources can be found at the end of the plan. After reviewing these documents, data were placed into an Excel database designed to summarize relevant information on all Minnesota birds, including 314 regular species, 42 casual species and 78 accidental species. Over 640 fields of data were compiled and provided the basis for all subsequent analysis summarized in this document. Copies of the database are available upon request from Audubon Minnesota.

Blueprint's Organization

This document, a conservation blueprint for Minnesota's Boreal Hardwood Transition Bird Conservation Region, represents one of four major products produced by Audubon's *Blueprint for Minnesota Bird Conservation*:

1. A brochure on Minnesota's Stewardship Species;
2. Species Accounts for 78 Priority Species;
3. Conservation Blueprints for nine Target Conservation Species; and
4. Conservation Blueprints for Minnesota's four Bird Conservation Regions

The Blueprint for the Boreal Hardwood Transition Region is not written like a typical planning document. Instead, it is designed to provide key information and tools that addresses three primary questions:

1. Which birds are we going to focus on?
2. How are we going to protect these species?
3. Where are we going to work?

Information is provided primarily in tables, brief descriptions about how priorities were selected and short vignettes that summarize species priorities and goals. The Blueprint includes the following:

- An descriptive overview of the region including its avifauna, landscape features, and management issues and opportunities;
- A list of Highest, High and Moderate Priority birds in the region;
- Identification of Target Conservation Species in the region;
- Identification of Stewardship Species that should be primary targets in the region;
- Assessment of the monitoring efforts currently underway for the highest priority species and recommendations for future monitoring;
- Identification of priority habitats to focus conservation actions on;
- Identification of habitat protection and restoration goals in the region;
- Identification of habitat management considerations for the highest priority species; and
- Identification of Important Bird Areas that are a target for future work by Audubon and its conservation partners.

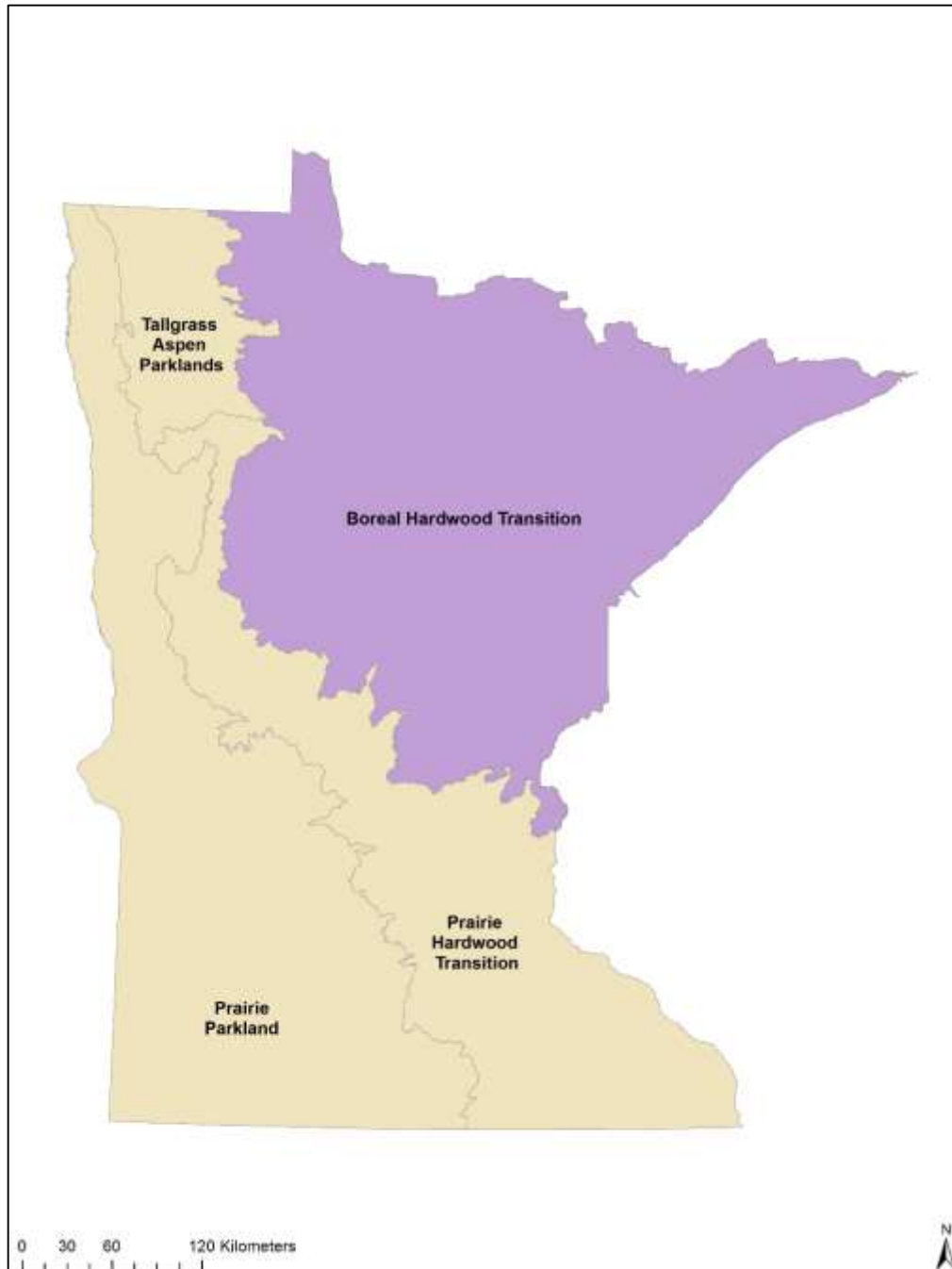
More detailed information on those species that were selected as Target Conservation Species is provided in conservation blueprints for each species. An Executive Summary also provides an overall description of the entire Implementation Blueprint. All these documents are available on the Audubon Minnesota website (mn.audubon.org).

The Boreal Hardwood Transition Region

Administrative Boundaries and Issues

The boundary of Audubon Minnesota's Boreal Hardwood Transition Region is identical to the Ecological Classification System boundary for the Laurentian Mixed Forest Province in Minnesota (*Minnesota Department of Natural Resources 2005*) (Figure 1).

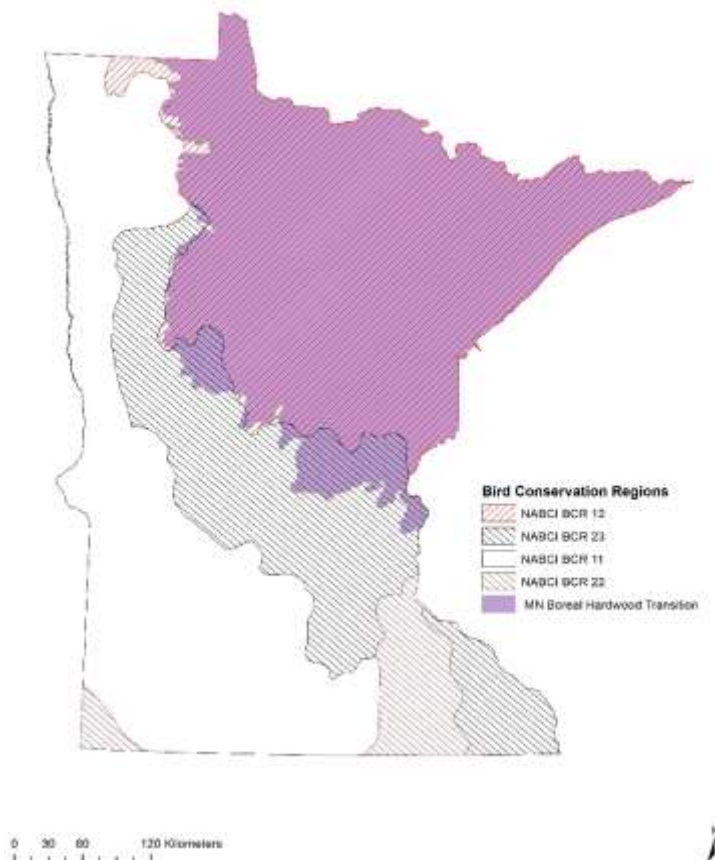
Figure 1. Audubon Minnesota's Boreal Hardwood Transition Region from Minnesota's Ecological Classification System



Nearly all the quantitative data for this document originate from an assortment of plans developed by partners working under the umbrella of the North American Bird Conservation Initiative (NABCI) (see Selected Resources). Specifically this includes the U.S. Shorebird Conservation Plan, the North American Waterfowl Management Plan, the North American Waterbird Conservation Plan and Partners in Flight, also known as the North American Landbird Conservation Plan. Minnesota also includes portions of two Joint Ventures, the Prairie Potholes and the Upper Mississippi River/Great Lakes. Each Joint Venture also has prepared conservation plans for waterfowl, waterbirds, landbirds and shorebirds and these documents were integral to Audubon’s *Conservation Blueprint*.

For planning purposes, NABCI delineated bird conservation regions using the Commission for Environmental Cooperation’s (1997) hierarchical framework of nested ecological regions. Although the boundaries are very similar to the boundaries that have been delineated for Minnesota’s native vegetation, they are not identical. The NABCI region that most closely corresponds with the Boreal Hardwood Transition in Minnesota is Bird Conservation Region (BCR) 12, also referred to as the Boreal Hardwood Transition Region (Figure 2). The major difference between BCR12 and Audubon’s Boreal Hardwood Transition Region shown in Figure 1 is that the former includes a small portion of the Tallgrass Aspen Parklands and excludes the very southern region portions of in east-central Minnesota (i.e., the southern half of the Mille Lacs Uplands subsection).

Figure 2. NABCI Boundaries for the Boreal Hardwood Transition BCR compared to the boundaries of Audubon Minnesota’s Boreal Hardwood Transition Region



Because Minnesota’s Ecological Classification System boundaries have become a standard reference for land managers throughout the state, this document adopts those boundaries. They are similar enough to the NABCI boundaries to allow a reasonable extension of the NABCI data for BCR12 to Audubon Minnesota’s Boreal Hardwood Transition Region (whose boundaries are identical to the Laurentian Mixed Forest Province of Minnesota’s Ecological Classification System; Figure 1).

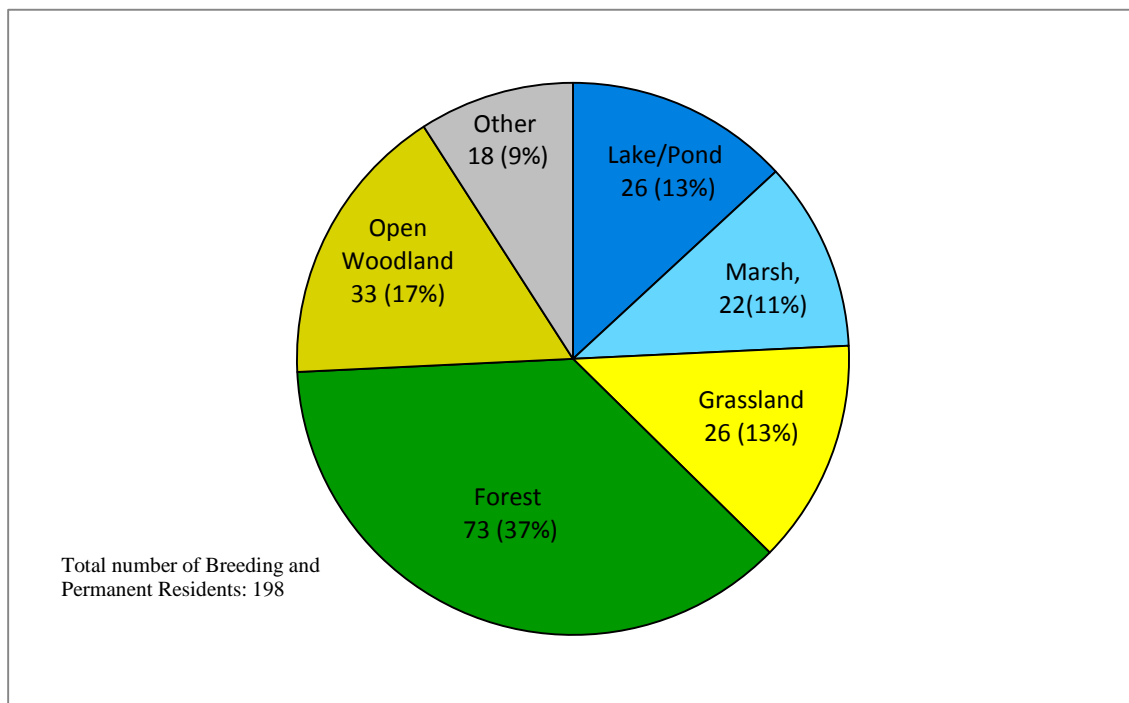
Vegetation/Landscape Features

The Boreal Hardwood Transition Region is broadly described as the transition zone between the boreal forest to the north and the eastern deciduous forest to the south and east. Although the age and composition of the forest has changed significantly since pre-settlement times, a significant portion of the region remains in forest cover. Detailed descriptions of the province and subsections can be found in “A Field Guide to the Native Plant Communities of Minnesota: The Laurentian Mixed Forest Province” (*Minnesota Department of Natural Resources 2005*) and in “Tomorrow’s Habitat for the Wild and Rare: An Action Plan for Minnesota Wildlife” (*Minnesota Department of Natural Resources 2006a*).

Bird Community

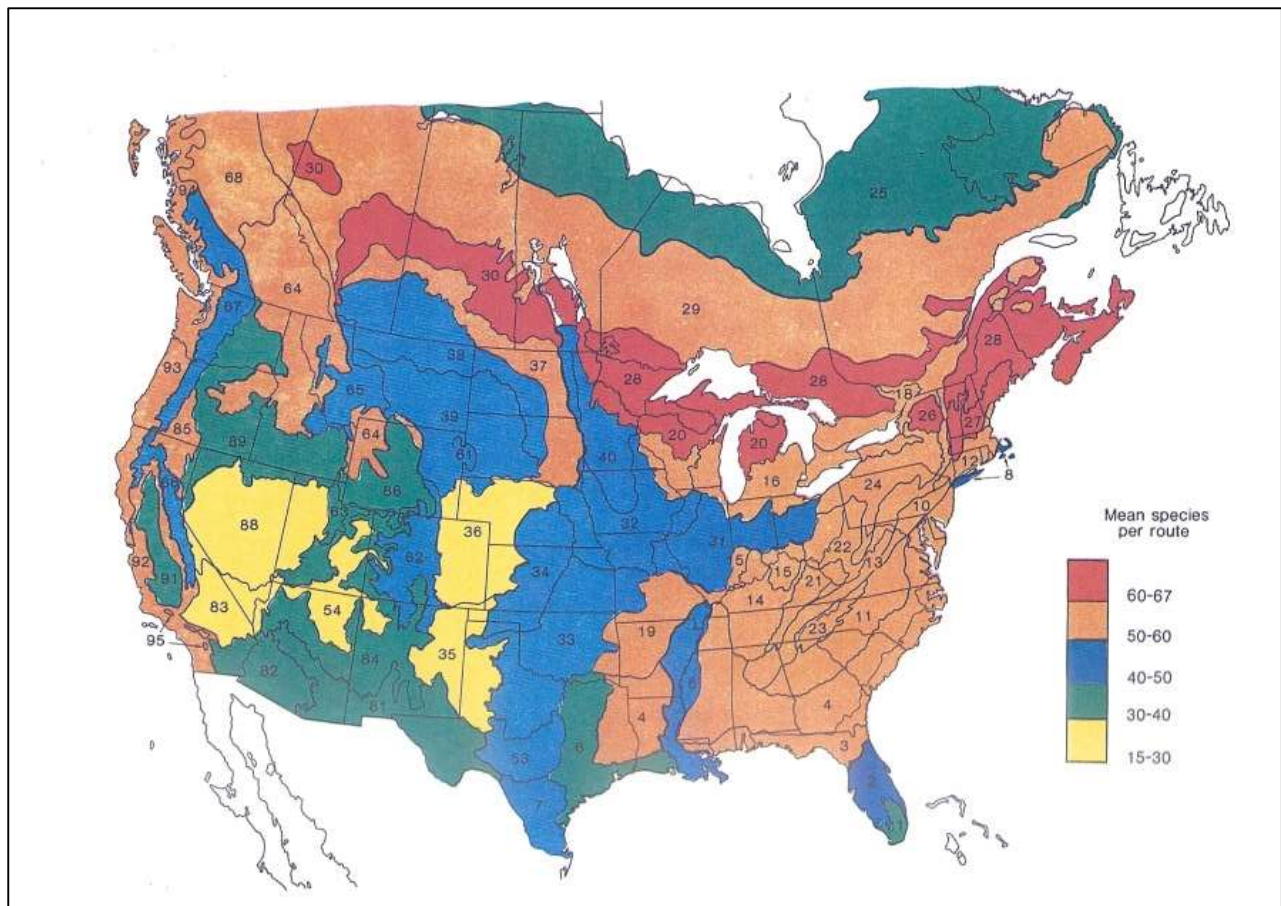
The Boreal Hardwood Forest Region of Minnesota supports 164 regular breeding species, 34 permanent residents, and over 80 species that do not breed in the region but depend on critical habitats for migration. Figure 3 shows the distribution of the 198 breeding birds and permanent residents among five broad habitat categories. The dominance of forest species reflects the high forest cover in the region.

Figure 3. Number and Percentage of Breeding Species and Permanent Residents in Major Habitats of the Boreal Hardwood Transition Region



Perhaps the most significant aspect of the avifauna of the Boreal Hardwood Transition Region is its sheer diversity. With an array of different woodpeckers, flycatchers, vireos, kinglets, wrens, thrushes and 26 breeding warbler species, the northwoods is alive with song from mid-May through early July as all these birds scramble to establish breeding territories. Indeed, Minnesota’s northern forest region is part of a broad band of forests that stretch from the Maritime Provinces of Canada, west across the Great Lakes Region and then north into central Canada, which supports a greater diversity of breeding birds than anywhere else in North America (Figure 4; area shown in red).

Figure 4. The Diversity of Breeding Birds in North America as measured by the Federal Breeding Bird Survey (mean number of birds/route)



Data from a variety of sources, including the federal Breeding Bird Survey (*Sauer et al. 2014*), the North American Bird Conservation Initiative (see Selected Resources) and the Minnesota Waterfowl Survey (*Dexter 2012*), were used to assess the population trend of all breeding species specifically within the Boreal Hardwood Transition Region (i.e. not their statewide trend).

One of the unique data sources not available for the other bird conservation regions in Minnesota, is a long-term forest breeding bird monitoring program in northern Minnesota established by the Natural Resources Research Institute (*Danz et al. 2008*). The program was established in 1991 on the Chippewa and Superior National

Forests, and in 1992 on the Chequamegon National Forest in Wisconsin and the St. Croix region of east-central Minnesota. The Forest Service is mandated to monitor certain management indicator species but this monitoring program expands beyond indicator species and includes all forest songbird species that can be adequately sampled using point count methodology. Currently, 435 stands (1,271 points) within the three national forests are surveyed once during each breeding season (June 1 to July 10). Surveys in the St. Croix region of east-central Minnesota were discontinued after 2003 due to lack of funding. A comprehensive report reviewing all of the data collected since 1991 will be published later in 2014 as a General Technical Report through the U.S. Forest Service. Data available through 2007 was used in the assessment of species priorities for this Blueprint.

Using these data sources, a summary of the population trends of breeding birds in the Boreal Hardwood Region is shown in Figure 5; population trends for birds in each major habitat are further depicted in Figure 6.

Figure 5. Population Trends of Breeding Species in the Boreal Hardwood Transition Region

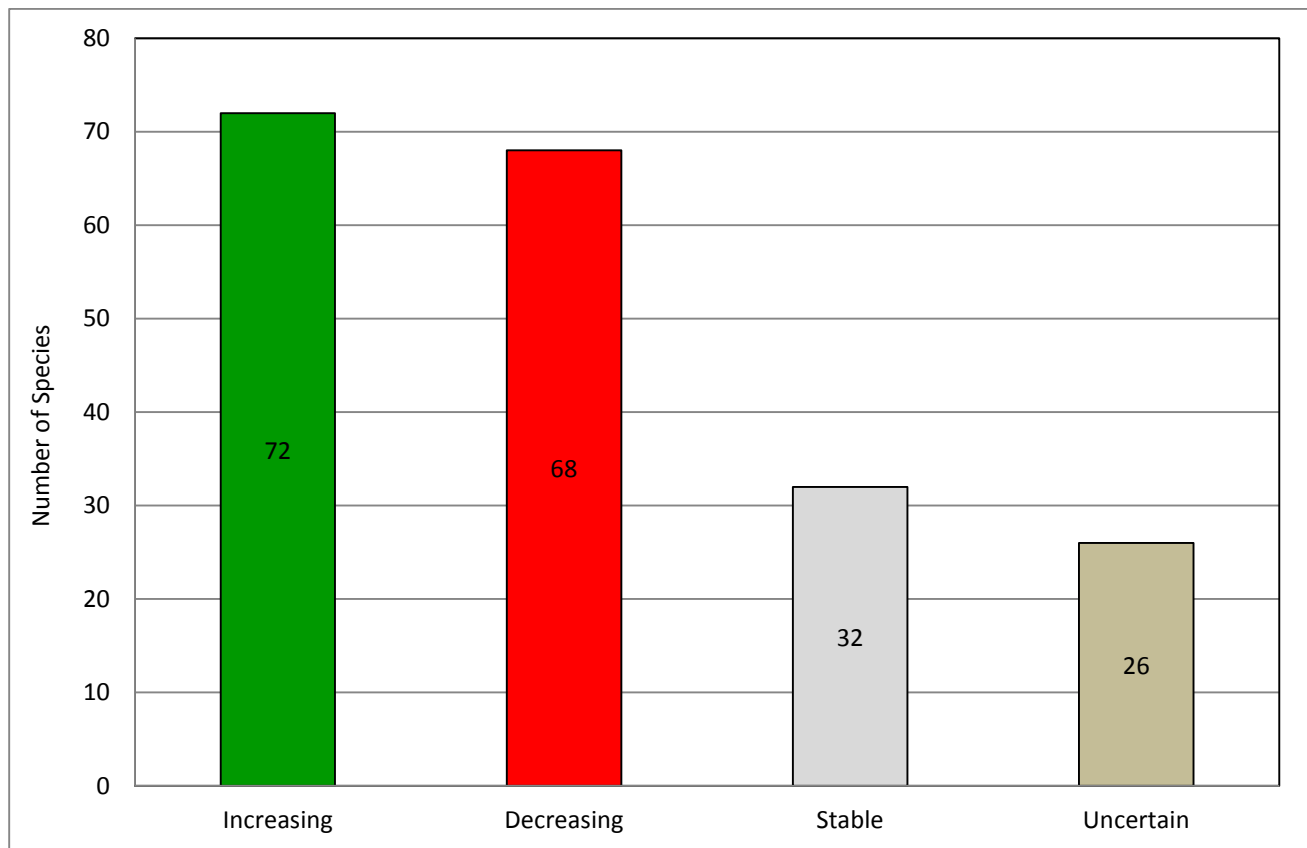
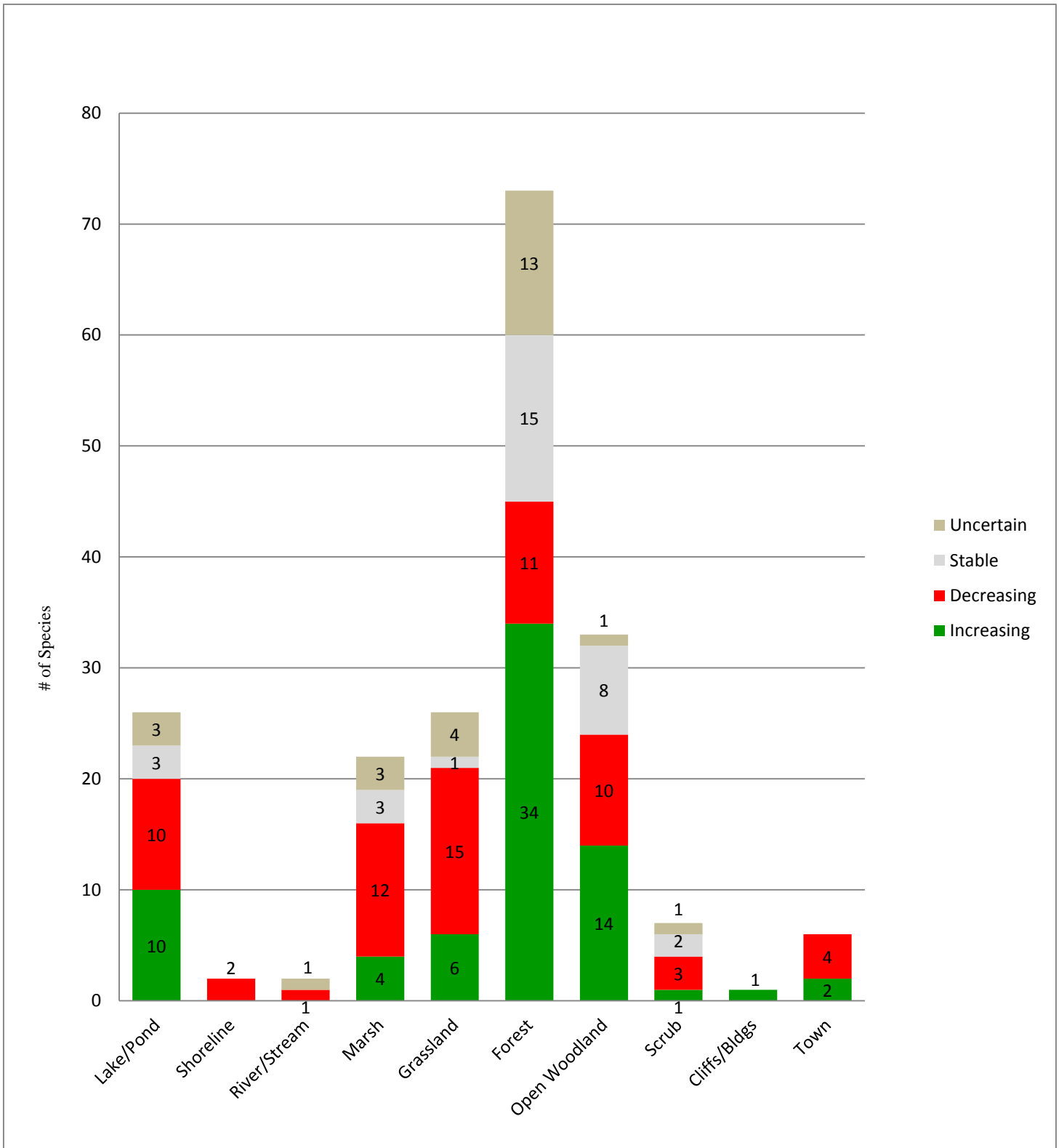


Figure 6. Population Trends of Breeding Birds in the Boreal Hardwood Transition Region by Major Habitat



Management Issues/Opportunities

Much has been written about the changes to Minnesota's northern forest region known as the Boreal Hardwood Transition Region. Towering stands of old-growth red and white pine, coupled with extensive stands of spruce-balsam fir-paper birch that dominated the landscape prior to European settlement (Figure 7) changed dramatically as logging, mining and fire suppression became the principal change agents. Although much of the region remains in forest cover, the composition, average stand age, and spatial pattern of the forest has changed as a variety of relatively younger aspen communities now dominate the landscape (Figure 8). Further west, in the province's Big Bog country, the expansive peatlands of Koochiching, Lake of the Woods, and Beltrami counties remain largely as they did in presettlement times. Old drainage ditches are still a visible reminder of early attempts to drain these areas that proved largely futile. Today much of the Big Bog is in public ownership. A little over one million acres in size, the Boundary Waters Canoe Area Wilderness is another prominent feature of the region along the border with Canada. With its final establishment in 1978, logging has not occurred in the wilderness since 1979.

Figure 7. Presettlement Forests of the Great Lakes States (Cole et al. 1998)

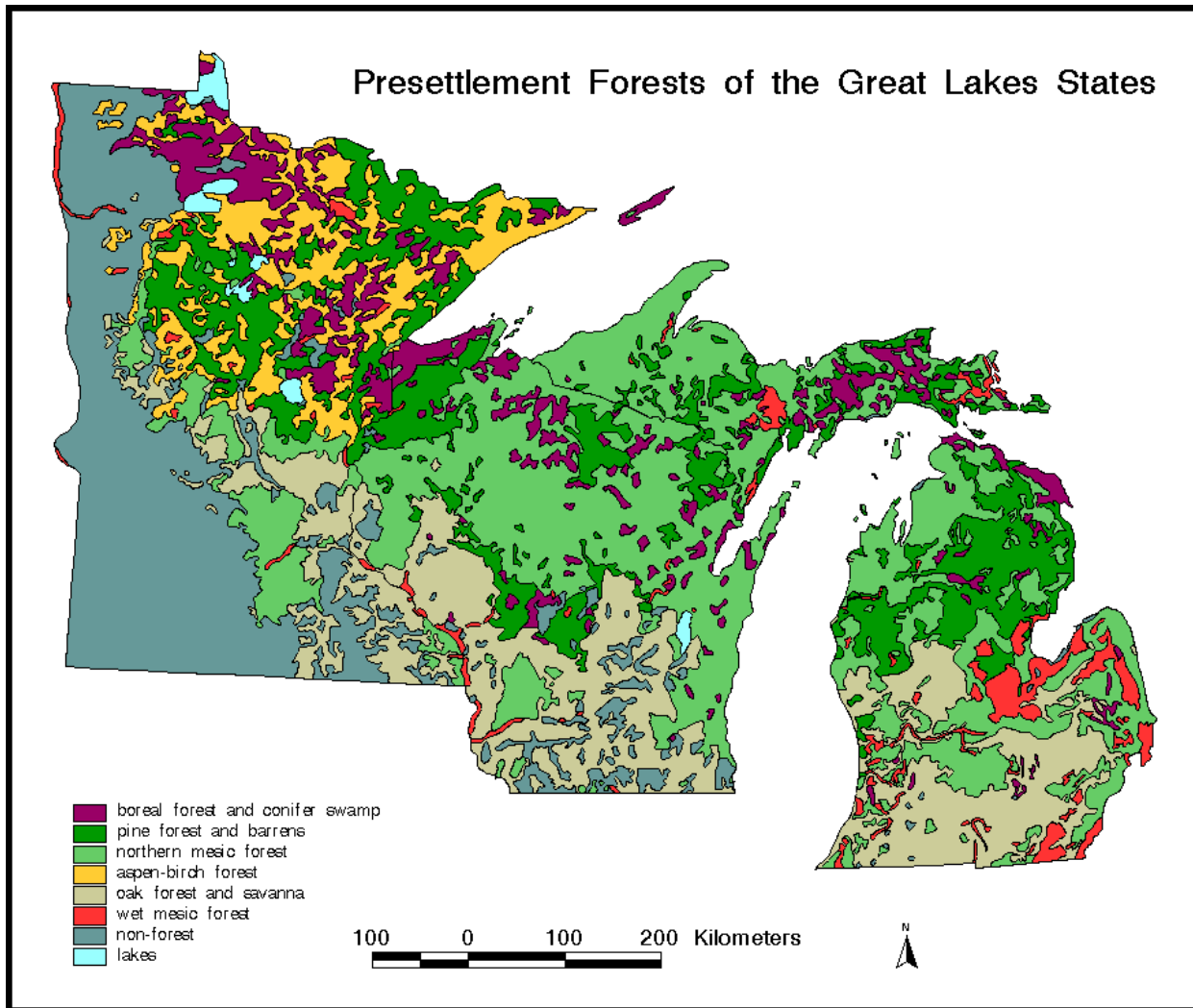
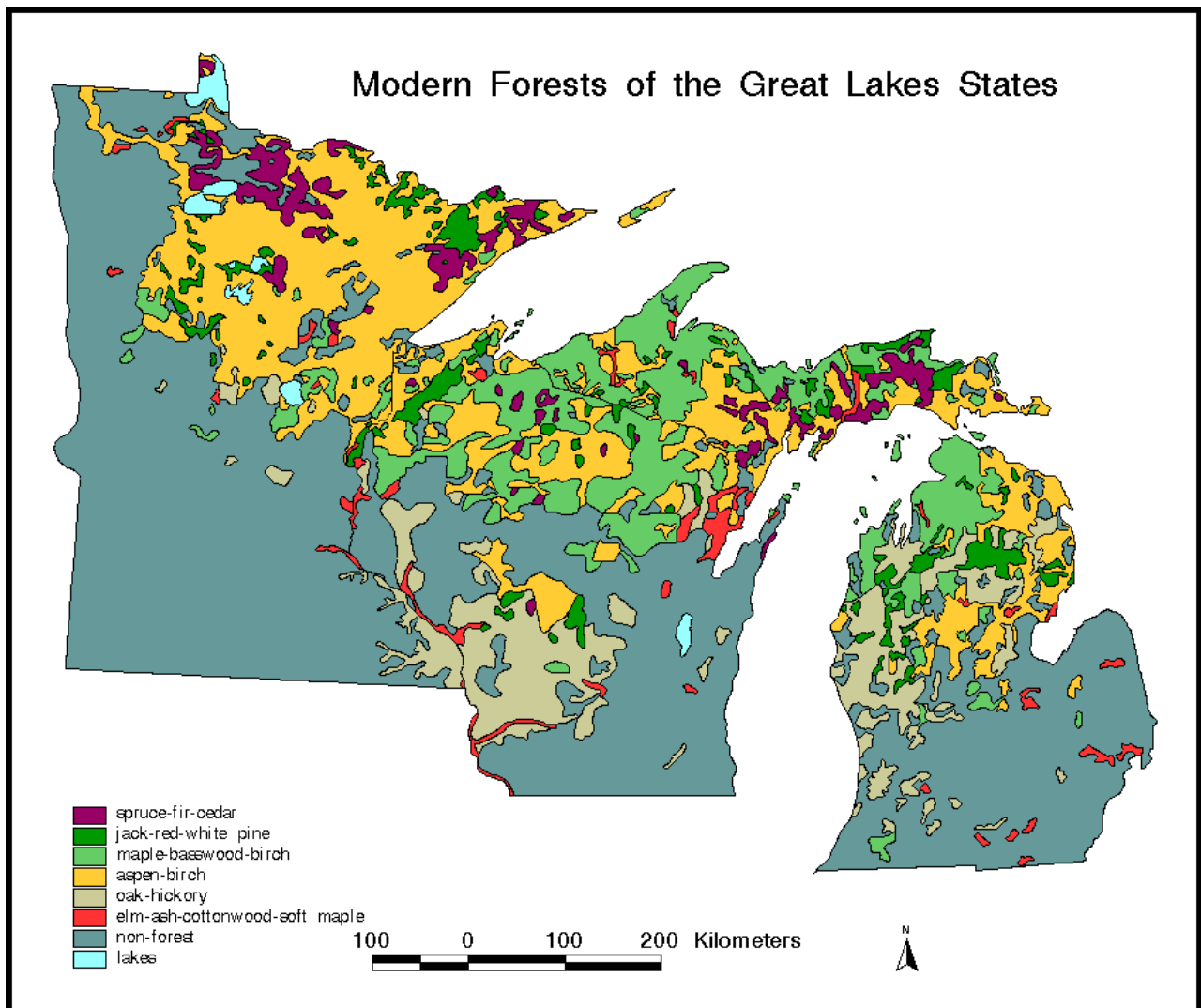


Figure 8. Modern Forests of the Great Lakes States (Cole et al. 1998)



Nearly all the birds that occupied the Boreal Hardwood Transition Region prior to European settlement are still present today. Although the composition and age of the forest has changed, the landscape was, and continues to be, a rich mosaic of different forest cover types and stand ages that combine to support a rich diversity of forest birds. The only species that disappeared for a brief period was the Peregrine Falcon in the 1950s. Its departure was not due to landscape changes but to the use of DDT. Reintroduction efforts began in earnest in 1982 with a focus on releasing birds from hack towers atop urban buildings. From those initial efforts Minnesota now supports more than 50 nesting pairs, including several that nest in their original habitat along the North Shore.

Some forest birds are more common and widespread today than prior to European settlement. Writings of some of the early naturalists, such as John James Audubon and Arthur Wilson, reveal that many birds dependent on young deciduous forests, or young mixed deciduous-coniferous forests, were relatively uncommon in landscapes where older forests were dominant. For example, it is reported that the Chestnut-sided Warbler, now an

abundant species in northern Minnesota, was only seen once by Audubon during his lifetime. Like the Chestnut-sided Warbler, other young forest species such as the Nashville Warbler and Golden-winged Warbler, spread northward as the pine forests were logged and the southern forests were cleared for agriculture and urban development.

Today, one of the unique features of the northern forest landscape is the extent of land in public ownership. In addition to millions of acres within the region's 55 state forests (3 million acres) and two national forests (Chippewa and Superior, 4.5 million acres) each northern county owns and manages a significant amount of land. The overwhelming majority of their collective statewide ownership of 2.8 million acres lies in the Boreal Hardwood Transition Region. These lands are managed primarily for timber; approximately 38% of all the timber harvested on public land is from lands managed by the northern counties. Due to the extent of forest land in public ownership, Minnesota has been a leader in promoting sustainable forestry practices on all ownerships. The Minnesota Forest Resources Council, established by the Sustainable Forest Resources Act of 1995, is a unique group of individuals, representing a broad diversity of forest interests, whose sole responsibility is to promote sustainable management of Minnesota's forests.

Changes in the region's forest have been accompanied by many others changes, including the establishment of open pit mines along the Iron Range and the growth of local communities, each spurred on by mining, logging and tourism. Perhaps some of the strongest development pressure in the region is in the triangle that stretches from Bemidji east to Grand Rapids and south to Brainerd. Known for its abundance of clear, deep lakes, this region was long a destination for vacationers and those wishing to own a piece of the north woods. In the 1950s the median number of homes per lakeshore mile was just three; today it is more than sixteen. Whereas most of those homes in the 1950s were weekend retreats, today many have been torn down or upgraded to year-round residences, placing even greater pressure on the region's lakes. In addition, the counties in which all three of these communities are located are projected to increase in population from 2005-2035 from a low of 8.4% in Itasca County (Grand Rapids) to a high of 34.8% in Crow Wing County (Brainerd). The only county in the region that will not see any growth is Koochiching County which is projected to decline by 7.6%.

This projected growth will place even greater stress on the remaining forests, wetlands, lakes and rivers and the community of birds dependent on them. Landscape planning initiatives that are underway, as well as a host of conservation programs, will provide opportunities to balance natural resource conservation and growth. Some important conservation opportunities that benefit birds in the province are briefly summarized below.

Forest Landscapes

- ***Minnesota Department of Natural Resources (DNR), Subsection Forest Resource Management Planning***
Since 2000, the DNR has been developing vegetation management plans for forestland under its administrative control using the subsection level of the Ecological Classification System (ECS) to define the boundaries of the base planning unit. These Subsection Resource Management Plans (SFRMPs) establish forest management direction for land administered primarily by the Divisions of Forestry and Fish and Wildlife that are available for forest management activities.

Plans have been developed for all the ECS subsections in the Boreal Hardwood Transition Region: the Agassiz Lowlands Subsection, the Border Lakes Subsection, the Chippewa Plains/Pine Moraines and Outwash Plains Plateau Subsections, the North Shore Subsections (North Shore Highlands, Tomi Uplands and Laurentian Uplands) and the North-4 Subsections (the St. Louis Moraines, the Tamarack Lowlands, the Nashwauk Uplands and the Little Fork-Vermillion Uplands). The habitat needs of forest birds are one of many considerations in the development of these plans.

- ***National Forest Planning Efforts***

Both the Superior and Chippewa National Forests are actively engaged in forest planning efforts that address all resources encompassed within their boundaries, from productive timber to rare plants and animals. Both the Chippewa National Forest and Superior National Forest completed their most recent forest plans in 2004.

- ***Minnesota Forest Resources Council Landscape Planning Efforts***

The 1995 Minnesota Sustainable Forest Resources Act laid the foundation for large-scale forest management by establishing the Landscape Program. Designed to build a collaborative approach to sustainable forest management on all land ownerships, both public and private, the Minnesota Forest Resources Council is responsible for the Program. The primary means of program implementation is the establishment of regional committees to solicit the ideas of all members of the community who are interested in forest resources in a specific forest landscape. The objective is to have the regional committees collectively identify, discuss, and resolve important, locally-based forest resource management issues. The council has delineated six regional forest landscapes and citizen committees are active in each. Two of the landscapes fully encompass portions of the Boreal Hardwood Transition Region: the Northeast Landscape and the Northern Landscape; large portions of the province are also included in the East Central Landscape and the North Central Landscape. The conservation needs of forest wildlife, including birds, are among the resource issues addressed by each committee.

- ***Shoreline Restoration Programs***

Lake and rivers are an important component of the landscape in the Boreal Hardwood Transition Region. The shorelines of these waters are historically a rich environment for a diversity of birds, including herons, egrets, grebes, rails, ducks and an array of songbirds. Because people are equally attracted to these shorelines for recreation and housing, increasing development pressure has eroded their value to wildlife and contributed to a host of additional challenges including degraded water quality, increased prevalence of invasive species and eroding shorelines. In recent years more attention is being directed at the need to protect “the water’s edge”. More dollars are being directed at the acquisition of Aquatic Management Areas to target lakeshore protection and the restoration of degraded lakeshore habitat to create a rich and diverse vegetative shoreline that improves and protects water quality and creates wildlife habitat. The Minnesota Department of Natural Resources, Board of Soil and Water Resources, county and city governments, and lake associations have all been engaged in programs to restore valuable shoreline habitats.

- ***Lake Superior’s Coastline***

Given the significance of Lake Superior and its extensive coastline, the Minnesota Lake Superior Coastal Program began nearly twenty years ago. It is a voluntary federal-state partnership dedicated to the comprehensive management of the lakes’ coastal resources. The Program provides technical and financial resources to local communities along the lake. Federal dollars are used to generate local matches to fund projects that preserve, develop and restore or enhance coastal resources.

What Birds are we going to focus on? Priority Breeding Species

Identification of Priority Breeding Species

The purpose of the Table 1 is to provide resource professionals with a rank order of breeding species priorities in the Boreal Hardwood Transition Region. It does not include **all** breeding birds that are declining but focuses on those that have experienced significant declines in the region, are dependent on vulnerable habitat, and have been recognized as priorities by various resource agencies (see Appendix 1 for details on selection of priority species). Because the number of species in each category is still relatively large, and the purpose of this document is to be strategic about identifying a small number of species that should be the focus of conservation efforts in the short term, this plan goes further in identifying a select number of conservation target species (shown in red). The process for selecting these species is summarized in Appendix 2.

Table 1. Priority Breeding Birds in the Boreal Hardwood Transition Region

Breeding Bird Species Priorities in the Boreal Hardwood Transition Region			
Very Rare	Highest Level: I	High Level: II	Moderate Level: III
Piping Plover ^{1,2,3}	American Black Duck ^{1,3}	Blue-winged Teal ³	Ring-necked Duck
Rusty Blackbird ¹	Pied-billed Grebe	Hooded Merganser	Common Goldeneye
Red Crossbill	American Bittern ¹	Virginia Rail ¹	Red-breasted Merganser
White-winged Crossbill	Least Bittern ¹	Sora	Spruce Grouse ¹
	Yellow Rail ^{1,2,3}	Upland Sandpiper ^{1,3}	Common Loon
	Black Tern ^{1,3}	Belted Kingfisher	Great Blue Heron
	Common Tern ^{1,2,3}	Short-eared Owl ^{1,2}	Northern Goshawk¹
	Eastern Whip-poor-will ^{1,3}	Boreal Owl ¹	American Kestrel
	Chimney Swift ³	Northern Flicker	Spotted Sandpiper
	Red-headed Woodpecker ^{1,3}	Olive-sided Flycatcher ^{1,3}	American Woodcock ^{1,3}
		Northern Rough-winged Swallow ¹	Black-billed Cuckoo ¹
		Bank Swallow	Eastern Wood-Pewee
		Barn Swallow	Least Flycatcher ¹
		Veery ^{1,3}	Purple Martin
		Wood Thrush ^{1,3}	Winter Wren ¹
		Bay-breasted Warbler ¹	Brown Thrasher ¹
		Connecticut Warbler ^{1,3}	Golden-winged Warbler ^{1,3}
		Canada Warbler ^{1,3}	Chestnut-sided Warbler
		Bobolink ¹	Cape May Warbler ^{1,3}
		Purple Finch	Black-throated Blue Warbler ¹
			Ovenbird ¹
			Mourning Warbler
			Common Yellowthroat
			Field Sparrow ¹
			Nelson's Sparrow ^{1,2}
			Scarlet Tanager
			Rose-breasted Grosbeak ¹

Note: Species in bold **Red** are Target Conservation Species in the Boreal Hardwood Transition Region (see Appendix 2).

¹ Minnesota Species in Greatest Conservation Need (*Minnesota Department of Natural Resources 2006a*).

² Minnesota State Listed Species (*Minnesota Administrative Rules, Chapter. 6134.0200, Subpart 2(B)*).

³ Upper Mississippi Valley/Great Lakes Joint Venture Focal Species (<http://uppermissgreatlakesjv.org/docs/JV2007All-BirdPlanFinal2-11-08.pdf>).

Target Conservation Breeding Species

Identification of Target Conservation Species in the Boreal Hardwood Transition Region

Species that Audubon Minnesota will highlight as Target Conservation Species in the Boreal Hardwood Transition Region depend on the following key habitats: Mature Coniferous Forest Upland (focus on Jack Pine); Lowland Coniferous Forest; Mature/Old-growth Hardwood Forest Upland; Shorelines; Wetlands; Deep Lakes; Rivers (headwater to large); and Riparian (further details can be found in Appendix 2).

- ❖ **Common Goldeneye:** The Common Goldeneye is a Target Conservation Species for Riparian Habitats, Non-forested Wetlands, Deep Lakes, and Rivers (Headwater to Large). The primary requirement is a mature riparian forest bordering the pond or lake that is old enough to support cavity trees. Protecting its habitat also may provide suitable habitat for the following priority species: American Black Duck, Blue-winged Teal, Ring-necked Duck, Hooded Merganser, Red-breasted Merganser and Common Loon.
- ❖ **Red-breasted Merganser:** The Red-breasted Merganser is a Target Conservation Species for Riparian Habitats, Deep Lakes and Rivers (Headwater to Large). Protecting its habitat also may provide suitable habitat for the Common Goldeneye and Common Loon.
- ❖ **Spruce Grouse:** The Spruce Grouse is a Target Conservation Species for Lowland Coniferous Forests and Upland Coniferous Jack Pine Forests. It also may utilize upland Black Spruce stands. Protecting its habitat may provide suitable habitat for other priority species such as the Olive-sided Flycatcher, Connecticut Warbler, Cape May Warbler and Purple Finch.
- ❖ **Common Loon:** The Common Loon is a Target Conservation Species for Shoreline Habitats, Deep Lakes and Riparian areas. Protecting its habitat also may provide suitable habitat for the Red-breasted Merganser and Common Goldeneye.
- ❖ **Northern Goshawk:** The Northern Goshawk is a Target Conservation Species for Mature Forest Upland communities, particularly large, unfragmented tracts. Protecting its habitat also may provide suitable habitat for the following priority species:

Chimney Swift	Eastern Wood Pewee	Scarlet Tanager
Boreal Owl	Least Flycatcher	Rose-breasted Grosbeak
Veery	Black-throated Blue Warbler	Purple Finch
Wood Thrush	Canada Warbler	

- ❖ **Common Tern:** The Common Tern is a Target Conservation Species for the Shoreline community. Protecting its habitat also may provide suitable habitat for the Piping Plover and Spotted Sandpiper.
- ❖ **Belted Kingfisher:** The Belted Kingfisher is a Target Conservation Species for the River and Riparian communities. Protecting its habitat also may provide suitable habitat for the Northern Rough-winged Swallow.
- ❖ **Boreal Owl:** The Boreal Owl is a Target Conservation species for the Mature Forest Upland communities, particularly the Aspen-Birch-Balsam Fir-White Spruce community. Protecting its habitat also may provide suitable habitat for the following priority species:

Northern Goshawk	Veery	Canada Warbler
Eastern Wood Pewee	Wood Thrush	Scarlet Tanager
Least Flycatcher	Ovenbird	Rose-breasted Grosbeak
Winter Wren	Black-throated Blue Warbler	Purple Finch

- ❖ **Olive-sided Flycatcher:** The Olive-sided Flycatcher is a Target Conservation Species for the Lowland Coniferous Forest community and Riparian forest community, with a more focused niche on lowland conifers that are semi-open, often located along streams or lakes and with some dead standing timber. Protecting its habitat also may provide suitable habitat for two other conservation target species, the Connecticut Warbler and Purple Finch.
- ❖ **Connecticut Warbler:** The Connecticut Warbler is a Target Conservation Species for the Lowland Coniferous Forest community. Protecting its habitat also may provide habitat for the Olive-sided Flycatcher, if the right conditions are met. It may also provide habitat for the Purple Finch and Spruce Grouse.

Minnesota Goals for Target Conservation Species in the Boreal Hardwood Transition Region

A brief background is provided only for those species for which a detailed conservation blueprint has **not** been prepared. The detailed blueprints were developed for conversation target species that are categorized as the Highest Priority.

1. **Common Goldeneye**

Minnesota Goal: Ensure the protection of a sustainable breeding population in Minnesota.

Minnesota Objectives:

- Actively support the array of planning efforts that address the needs of the Common Goldeneye including:
 - ✓ The Minnesota Department of Natural Resources' Long Range Duck Plan (*Minnesota Department of Natural Resources 2006b*);
 - ✓ The habitat protection and restoration goals of the Upper Mississippi Valley/Great Lakes Joint Venture Waterfowl Plan (*Soulliere et al. 2007*);
 - ✓ The Minnesota Department of Natural Resources Subsection Forest Management Plans; and
 - ✓ The Minnesota Forest Resources Council Landscape plans.
- Ensure that the Minnesota Forest Resources Council's Riparian Forest Guidelines are implemented on all Important Bird Areas in the Boreal Hardwood Transition Region (*Minnesota Forest Resources Council 2013*).
- Actively support the collection of better population data on breeding Common Goldeneyes in northern Minnesota

Background: In general, we know very little about the population status and trends of Minnesota's forest ducks, particularly the group of ducks known as sea ducks. Sea ducks are diving ducks that usually depend on large bodies of water and frequently occur in coastal waters during the winter. The vast majority of conservation efforts focus instead on prairie wetland waterfowl. The Common Goldeneye was selected as a conservation target species because of its dependence on waters located adjacent to mature riparian forests with trees large enough and old enough to provide cavities for a bird this size. Support and engagement with forest planning efforts is essential to ensure that sustainable management of riparian forests is a priority.

The Upper Mississippi Valley/Great Lakes Joint Venture Waterfowl plan also has established habitat goals in the region to protect a suite of waterfowl that utilize similar habitats. Specifically the goals are as follows:

- Marsh habitat with associated shrub/forest
Action: Protect a total 18,186 ha of marsh habitat with associated shrub/forest in Minnesota’s portion of BCR12 and restore a total of 3,637 ha.
- Extensive open water
Action: Protect a total of 13,418 ha of extensive open water in Minnesota’s portion of BCR12 and restore a total of 2,803 ha.

2. **Red-breasted Merganser**

Minnesota Goal: Ensure the protection of a sustainable breeding population in Minnesota.

Minnesota Objectives:

- Actively support the array of planning efforts that address the needs of the Red-breasted Merganser including
 - ✓ The Minnesota Department of Natural Resources’ Long Range Duck Plan (*Minnesota Department of Natural Resources 2006b*);
 - ✓ The habitat protection and restoration goals of the Upper Mississippi Valley/Great Lakes Joint Venture Waterfowl Plan (*Soulliere et al 2007*).
 - ✓ The Minnesota Department of Natural Resources Subsection Forest Management Plans; and
 - ✓ The Minnesota Forest Resources Council Landscape plans.
- Ensure that the Minnesota Forest Resources Council’s Riparian Forest Guidelines are implemented on all Important Bird Areas in the Boreal Hardwood Transition Region (*Minnesota Forest Resources Council 2013*).
- Actively support the collection of better population data on breeding Red-breasted Mergansers in northern Minnesota

Background: Like all forest ducks, we know very little about the population status and trends of the Red-breasted Merganser. Minnesota’s Waterfowl Survey only surveys wetlands and lakes in western and central Minnesota. When mergansers are observed the Common and Red-breasted Merganser are always combined into one count and simply reported as Mergansers. The Red-breasted Merganser’s dependence on deep, clear waters with good cover nearby for nesting is critical.

Like the Common Goldeneye, the Upper Mississippi Valley/Great Lakes Joint Venture Waterfowl plan has established habitat goals in the region to protect a suite of waterfowl that utilize similar habitats. The specific goal is for extensive open water and is identical to that established for the Common Goldeneye:

- Extensive Open Water
Action: Protect a total of 13,418 ha of extensive open water in BCR12 and restore a total of 2,803 ha

3. **Spruce Grouse**

Minnesota Goal: Ensure the protection of a sustainable breeding population in Minnesota

Minnesota Objectives:

- ✓ Actively support the Spruce Grouse Continental Conservation Plan (*Williamson et al. 2008*);

- ✓ Support efforts by the Minnesota Department of Natural Resources to conduct surveys in select landscapes such as the Red Lake/Beltrami Island area;
- ✓ Advocate for habitat measures that ensure the sustainability of the Jack Pine-Black Spruce habitat that Spruce Grouse utilize through the various forest planning initiatives underway in Minnesota.

Background: Although the Spruce Grouse is a game species in Minnesota, relatively little focus has been placed on this rather elusive bird of the Boreal Hardwood Transition Region. During the 2009-2010 hunting season there were an estimated 10,000 Spruce Grouse hunters with an estimated total harvest of 19,000 birds (*Dexter 2012*). Because the Spruce Grouse does not lend itself to any easy survey techniques that can be easily replicated, little is known about its population status and trends, outside of what annual harvest statistics demonstrate. Population estimates, derived from assessing available habitat and estimating the density of birds in different cover types, vary anywhere from a low of 22,000 birds in Minnesota to a high of 88,000. The Continental Conservation Plan outlines a series of habitat management measures to implement; they emphasize this is particularly important in the southern portion of the species range, which includes Minnesota.

4. **Common Loon**

Minnesota Goal: Maintain the current population level, estimated at 11,000-12,000 breeding pairs.

Minnesota Objectives:

- ✓ Actively support the Minnesota Pollution Control Agency and the Department of Natural Resources in their promotion of non-toxic fishing sinkers and lures.
- ✓ Support annual implementation of the Minnesota Department of Natural Resources' statistically designed Minnesota Loon Monitoring Program.
- ✓ Actively support the formal adoption of Minnesota's updated shoreland rules.

Background: In Minnesota, the yodel and tremolo calls of loons heard on northern lakes is part of the "up north" experience. Their mere presence on a lake suggests that the water is clean, clear and harbors a healthy fish population. But the increasing pressures we place on our lakes raise concerns about the future of this iconic species. The Minnesota Department of Natural Resources began a long-term loon monitoring program in 1994 that is statistically designed to sample loon populations in six index areas. Because of the importance of this species to our northern forest region, and its high visibility to the public, the annual implementation of this monitoring program is a high priority. Equally important is the need to update Minnesota's outdated shoreland rules to protect critical shoreland nesting areas.

5. **Northern Goshawk**

Minnesota Goal: Maintain a sustainable breeding population of Northern Goshawks in Minnesota.

Minnesota Objectives: Implement the Minnesota Department of Natural Resources Northern Goshawk Management Considerations on public lands (*Minnesota Department of Natural Resources 2003*).

Background: The Northern Goshawk is considered by Partners in Flight to be a priority species in the state and both the Superior and Chippewa National Forests have classified it as a Sensitive Species. A rough estimate of its population size in Minnesota is 1,500 individuals. The Partners in Flight goal is to maintain the current population and that goal is adopted for Minnesota as well. Although the goshawk is generally considered to be a habitat generalist, nesting typically occurs in mature to old-growth forests with an abundance of larger trees with high canopy closure. The Minnesota Department of Natural Resources has developed a set of Goshawk Management Considerations that provide guidance for maintaining appropriate habitat.

6. Common Tern

Minnesota Goal: Maintain a Minnesota population of Common Terns $\geq 1,000$ pairs.

Minnesota Objectives:

- ✓ Protect and maintain three island nesting colonies in Minnesota and work to restore or enhance one nesting colony site.
- ✓ Minnesota colonies must produce at least 1.1 young per breeding pair for the state to maintain its current population

Background: Further details can be found in the Conservation Blueprint for Minnesota’s Common Terns, available on Audubon Minnesota’s website.

7. Belted Kingfisher

Minnesota Goal: Increase Minnesota’s population by 50% from a current estimate of approximately 20,000 birds to approximately 30,000 birds.

Minnesota Objectives:

- ✓ Actively support riparian forest conservation efforts through the various forest planning initiatives underway in the northern forest.
- ✓ Identify and conserve known nesting burrows.
- ✓ Support stream restoration efforts that maintain the natural cycles in stream systems (i.e. flooding and erosion) which help create suitable nesting habitat.

Background: In 2010, the Partners in Flight Tri-national Conservation Plan identified the Belted Kingfisher as a Common Species in Decline, noting a 53% decline throughout its range from 1966-2009. It is also considered a Regional Stewardship Species in NABCI’s BCR12, the Boreal Hardwood Transition Region. The loss of critical stream habitat, particularly for nesting burrows, is considered the major cause for its decline. Minnesota has adopted the Partners in Flight population goal to increase populations by 50%.

8. Boreal Owl

Minnesota Goal: Maintain a sustainable breeding population of Boreal Owls in Minnesota.

Minnesota Objectives:

- ✓ Ensure that public forest owners (Superior National Forest, the State of Minnesota, and St. Louis, Lake and Cook counties) maintain sufficient mature mixed deciduous/coniferous stands on their public lands to support a breeding population of Boreal Owls.
- ✓ Support Minnesota’s Owl Monitoring Program which is run by Hawk Ridge Bird Observatory.

Background: Although its status in Minnesota was not known for many years, the Boreal Owl is likely a regular breeding species in the northeast regions of St. Louis, Lake and Cook counties and has probably been so for many years. However, like most uncommon owls, our knowledge of its status, distribution and population trends is poorly understood. Population levels probably fluctuate widely depending on a variety of factors, including weather. Because it is depending on mature aspen for nesting cavities, there is concern about its status as the availability of older aspen has declined. Better population data is needed, but in lieu of its availability the maintenance of sufficient older aspen stands for nesting is the best insurance for sustaining a nesting population.

9. Olive-sided Flycatcher:

Minnesota Goal: Increase the Minnesota population of Olive-sided Flycatchers by 100%.

Minnesota Objective: Protect 565 km² of suitable habitat and restore 565 km² of suitable habitat in Minnesota. Emphasis should be placed on:

- ✓ Retaining some snags and live residual trees in harvest of lowland conifer stands.
- ✓ Retaining snags in lowland conifer salvage operations following wind damage or fire.
- ✓ Retaining large enough stands of lowland conifer forests, at least 50 acres in size.

Background: A regular breeder in northeastern and north central Minnesota, the Olive-sided Flycatcher has the largest, statistically significant population trend for a forest-dependent bird in Minnesota. Since 1966, it has experienced an average annual decline of 3.0%; this has decreased slightly during the past ten years to 2.7% (2002-2012). The Flycatcher is a Sensitive Species on the Superior National Forest, a Bird of Conservation Concern in BCR12 and a Focal Species in the Upper Mississippi Valley/Great Lakes Joint Venture Region. The species is dependent on lowland conifer forests, particularly those that are open, in riparian areas and with an abundance of dead standing timber. Factors thought responsible for its decline include loss of wintering habitat, loss of dead standing timber and a decline in insects on its breeding grounds. The Olive-sided Flycatcher is an aerial insectivore, the majority of which are experiencing major population declines. The specific habitat protection and restoration objectives are from the Upper Mississippi Valley/Great Lakes Joint Venture Landbird Conservation Plan.

10. Connecticut Warbler:

Minnesota Goal: Increase the Minnesota's population of Connecticut Warblers by 50%.

Minnesota Objectives: Protect 300,000 ha (741,316 acres) of existing upland and lowland conifer forest habitat area and enhance or restore 56,500 ha (139,615 acres) in Minnesota's Boreal Hardwood Transition Region. This goal will sustain Connecticut Warblers only if at least 7,400 ha of lowland coniferous forest is included in the overall protection goal of 300,000 ha and 3,800 ha of lowland coniferous forest is included in the overall restoration goal of 56,500 ha. Management should maintain openings and a dense understory.

Background: A species of Minnesota's northern forests, the Connecticut Warbler is most commonly found in lowland conifer forests of the state's extensive peatlands. Aside from the Kirtland Warbler, the Connecticut Warbler has the most restrictive breeding distribution of any wood warbler. It has experienced a 1.8% average annual decline in Minnesota since 1966 (1966-2012). Throughout its range, it is estimated that the species has declined by 70%. A Sensitive Species on the Chippewa and Superior National Forests, the Connecticut Warbler is a focal species for the Upper Mississippi Valley/Great Lakes Joint Venture Region.

The habitat goal is based on the highest habitat needs of species within the Evergreen Forest Guild which included the Olive-sided Flycatcher, Connecticut Warbler and Cape May Warbler (Habitat Goals, UMVGL JV Landbird Implementation Strategy). The species with the largest habitat need was the Cape May Warbler. To meet the needs of the Connecticut Warbler alone, the recommendation is to protect 7,400 ha of lowland coniferous habitat and restore/enhance 3,800 ha of lowland coniferous habitat.

Minnesota Stewardship Species

Minnesota Stewardship Species present in the Boreal Hardwood Transition Region

Bird conservation plans typically focus on identifying species that are declining and facing significant threats and then delineating conservation actions to halt those declines. Audubon Minnesota's *Conservation Blueprint* follows that framework. However, as part of the process for identifying priority species it became clear that there are several species that reach exceptionally high abundance in Minnesota due to the quantity of quality habitat that meets their needs during the breeding season. The Golden-winged Warbler and Sedge Wren are outstanding examples; Minnesota supports 42% and 33% of their global populations respectively. Their future survival may well depend on how well Minnesota protects and manages their key habitats. Although no other species reach the level of significance globally that these two species do, there are several that reach very high levels of abundance in the state. For example, although the percentage of their population in Minnesota seems low the Veery, Chestnut-sided Warbler and Nashville Warbler, reach their highest abundance south of Canada in the forests of Minnesota.

A total of 12 species that breed in Minnesota have been designated as Minnesota's Stewardship Species. These species had to meet two criteria: 1) >5% of their global population occurs in Minnesota; and 2) >5% of their North American breeding range occurs in Minnesota. Because of the number of birds that our state supports we have a unique responsibility to ensure that we maintain suitable habitat to sustain their robust populations. The percent of each Stewardship Species population that occurs in the Boreal Hardwood Transition Region is shown in Table 2.

Table 2. Minnesota Stewardship Species (species highlighted in red are most important in the region)

Stewardship Species	Percentage of Global Population in Boreal Hardwood Transition Region of Minnesota	Percentage of Global Population in Minnesota
Trumpeter Swan	State population is about 10-15% of global population; % in Boreal Hardwood Transition Region unknown	12%
American White Pelican	Less than 1%	18%
American Woodcock	6.9%	10%
Black-billed Cuckoo	4.6%	10%
Sedge Wren	15.3%	33%
Veery	5.4%	6%
Golden-winged Warbler	39.9%	42%
Nashville Warbler	5.1%	5%
Chestnut-sided Warbler	5.3%	6%
Bobolink	3.1%	13%
Rose-breasted Grosbeak	3.1%	6%
Baltimore Oriole	1.0%	5%

Note: The percent of each species population that occurs in the Boreal Hardwood Transition Region was obtained from the Partners in Flight database: http://rmbo.org/pif_db/lape/; http://rmbo.org/pif_db/laped/. Numbers for the American White Pelican come from King and Anderson (2005); numbers for the American Woodcock come from Kelly et al. (2008).

Recommendations regarding Stewardship Species

1. American White Pelican

Background: American White Pelicans have been increasing their distribution and abundance in Minnesota since the 1970s. As their numbers have increased so have concerns of lakeshore residents and anglers that pelicans are negatively impacting local fish populations. In fact, in 2011, a Minnesota man

was sentenced for destroying nearly 2,500 pelican eggs and chicks on Minnesota Lake, located in the Prairie Parkland Region. Surveys in 2004 and 2010 documented 6 nesting locations for pelicans in the Boreal Hardwood Transition Region. Although their population numbers are relatively low in the region, these colonies are still important.

Table 3. American White Pelican Breeding Colonies in the Boreal Hardwood Transition Region in 2004 and 2010

Site	County	Number of Nests	
		2004	2010
Red Lake	Beltrami	340	0
Crowduck Island	Lake of the Woods	242	408
Little Massacre Island	Lake of the Woods	277	185
O'Dell Island	Lake of the Woods	25	0
Techout Island	Lake of the Woods	25	143
Red Lake Rock	Lake of the Woods	0	292

Recommendations:

- Work with conservation partners to educate the public regarding the pelican’s ecological role in the lake ecosystem and ensure that colony sites are protected and not vandalized.
- Aerial surveys of the six colony locations should be conducted every 3 years.
- Consult with Ontario resource agencies to assess the status of pelican colonies that are located on the Canadian side of Lake of the Woods so an accurate lake-wide assessment can be made.

2. American Woodcock

Background: Approximately 7% of this eastern forest species global population occurs in Minnesota’s Boreal Hardwood Transition Region. In light of the species range-wide decline, biologists have established the Upper Great Lakes Young Forest Initiative which is designed to promote the stewardship of early successional forests (both young forests and shrublands) that the species is so dependent upon. Their primary efforts have been the establishment of Best Management Practices for Woodcock and demonstration areas.

Recommendations:

- Support the recommendations of the American Woodcock Conservation Plan for the Boreal Hardwood Transition Region (*Kelly et al. 2008*).
- Support the Best Management Practices developed by the Young Forest Initiative for the Upper Great Lakes region and their applicability in appropriate habitats (*Wildlife Management Institute, 2009*).

3. Golden-winged Warbler

Background: **Over 40% of the global population of Golden-winged Warblers occurs in Minnesota’s Boreal Hardwood Transition Region;** statewide, Minnesota supports approximately 42.2% of the species global population (in 2013 this estimate was increased to 47%). Long considered an inhabitant of young woodland/shrubland habitat and shrubby wetlands in Minnesota, recent research documents that Golden-wings require a patchwork of different forest habitats for survival during the breeding season including “shrubby wetland edges for foraging and song perches, shrubby uplands or young forests for nesting and foraging, and mature forests with shrubby understories for cover, nesting and foraging” (*Niemi 2014*). This premiere stewardship species is the focus of considerable attention and research,

including the recent completion of the Golden-winged Warbler Status Assessment and Conservation Action Plan (*Buehler et al. 2006*).

Recommendations:

- Support forest management planning and implementation efforts that emphasize landscape level management that includes multiple cover types and stand ages.
- Continue to monitor the species population trends monitored by the federal Breeding Bird Survey.

4. Black-billed Cuckoo, Sedge Wren, Veery, Nashville Warbler, Chestnut-sided Warbler

Recommendations: Annually monitor the populations via the federal Breeding Bird Survey.

Migrant Species

Importance of the Boreal Hardwood Transition Region for Migrant Species

In addition to the region's legendary abundance of breeding birds, it is also well-known for concentrations of migrants and wintering birds. Diving ducks and loons can concentrate in large numbers on many of the region's large lakes; shorebirds heading to destinations hundreds or even thousands of miles away use stopover habitat in the Duluth-Superior harbor, and boreal owls (Boreal Owls, Great Gray Owls, Hawk Owls and Snowy Owls) appear in winters when small mammal populations are low in the Canadian provinces to our north. Finally, the fall migration of raptors draws thousands to the North Shore each year to observe this spectacular natural event.

Recommendations for Migrants in the Boreal Hardwood Transition Region

1. Support federal, state and county forest management practices and landscape planning efforts that promote a healthy, diverse forest landscape.
2. Support the Hawk Ridge Bird Observatory and its emphasis on public education and management of migrating raptors.

How are we going to protect these species?

Monitoring

Monitoring species population trends is the key to assessing their long-term status and determining whether conservation actions are having an impact on the species distribution and abundance. Audubon's *Conservation Blueprint* makes the following recommendations for monitoring the highest priority and Target Conservation Species in the Boreal Hardwood Transition Region. Tables 6 and 7 summarize current monitoring that occurs for these species and assesses additional needs.

Recommendations for Species Monitoring

- Marsh Birds:** Investigate the establishment of a statewide marsh bird monitoring program
 - Assess whether the newly developed Marsh Bird Monitoring Program initiated by the USFWS and promoted by the Midwest Avian Partnership has applicability in Minnesota.
 - Ensure that the program is designed to provide significant information on hard-to-detect marsh birds, such as Yellow Rails, Virginia Rails and Least Bitterns.
 - Investigate opportunities to collaborate with the Minnesota Department of Natural Resources' new statewide, statistically designed, wetland monitoring program as an alternative approach to the USFWS's Marsh Bird Monitoring Program.
 - Investigate opportunities to collaborate with the newly proposed Sentinel Wetlands Program that will be administered by the MNDNR.
- Common Tern:** Despite its name, the Common Tern is not common in Minnesota. A state threatened species, the tern has been documented in past years at 7 colony sites, including a new site in Crow Wing County. All but one colony is located in the Boreal Hardwood Transition Region. Each colony should be monitored at least once every 3-5 years. Further details can be found in the Common Tern's Conservation Blueprint.

Table 4. Common Tern Nesting Colonies in Minnesota

Site	County	Region
Northwest Angle	Lake of the Woods	Boreal Hardwood Transition
Pine and Curry Island, Lake of the Woods	Lake of the Woods	Boreal Hardwood Transition
Pelican Island, Leech Lake*	Cass	Boreal Hardwood Transition
Gull Island, Mille Lacs Lake*	Mille Lacs	Boreal Hardwood Transition
Interstate Island, Duluth-Superior Harbor*	St. Louis	Boreal Hardwood Transition
Cotton Lake (may not be active anymore)	Becker	Prairie Hardwood Transition
Bird Island, Pelican Lake	Crow Wing County	Boreal Hardwood Transition

**These sites are monitored annually by USFWS, MNDNR and/or Leech Lake Tribal Biologists*

- Eastern Whip-poor-will:** Very little is known about the distribution and abundance of Whip-poor-wills in Minnesota. Their crepuscular nature means they are not well-surveyed by the Breeding Bird Survey. Investigate initiating a nightjar survey using the protocol established by the U.S. Nightjar Survey Network at select IBAs in the Boreal Hardwood Transition Region that have support appropriate habitats (dry deciduous/mixed forests with shade, open areas for foraging; sparse ground cover; open woodlands). (<http://ccb-wm.org/nightjar/United%20States%20Nightjar%20Survey%20Network.pdf>)

4. **Red-headed Woodpecker:** Partner with the Red-headed Recovery Effort to report sightings on select Important Bird Areas in the Boreal Hardwood Transition Region (refer to Red-headed Woodpecker Conservation Blueprint at <http://mn.audubon.org>).
5. Monitor priority species identified in Table 5 that are good indicators of key habitats in the Boreal Hardwood Transition Region with the Federal Breeding Bird Survey (See Appendix 2 for discussion).

Table 5. Priority Species that should be monitored using the Breeding Bird Survey in the Boreal Hardwood Transition Region to indicate the “health” of the key habitats they represent

Habitats	Indicator Species to Monitor
Mature Forest Uplands	Ovenbird (Moderate Priority Species) Least Flycatcher (Moderate Priority Species)
Mature Mixed Deciduous-Coniferous Forests	Black-throated Green Warbler Canada Warbler (High Priority Species) Nashville Warbler (Stewardship Species) Parula Warbler
Lowland Coniferous Forests	Yellow-rumped Warbler
Early Successional Forest	Chestnut-sided Warbler (Moderate Priority Species) Veery (High Priority Species and Stewardship Species) White-throated Sparrow Rose-breasted Grosbeak (Moderate Priority Species and Stewardship Species)
Open Wetland	Sedge Wren (Stewardship Species)
Shrublands: Upland	Eastern Bluebird Tree Swallow
Shrublands: Lowland	Swamp Sparrow

Table 6. Status of current monitoring efforts and assessment of additional needs for the Highest Priority and Target Conservation Species in the Boreal Hardwood Transition Region: Waterfowl and Waterbirds

Boreal Hardwood Transition Region	Habitat	Status of Current Monitoring Efforts for Priority Species in the Boreal Hardwood Transition Region	USGS Breeding Bird Survey (BBS)				New Monitoring Efforts Needed	
			Moderate	Deficient	Important Deficiency	No Data	Warrants individual site monitoring	New statewide monitoring effort needed
Highest Priority Species and Target Conservation Species (red)		Other Established Surveys						
			Regional Credibility	Precision of Data				
Waterfowl								
American Black Duck	Wetland	MNDNR Waterfowl Survey does not adequately cover species primary range in Minnesota		MN BBS Data has an important deficiency				Expand waterfowl survey coverage area
Common Goldeneye	Wetland/Lake	MNDR Waterfowl Survey does not adequately cover species primary range in Minnesota		MN BBS Data has an important deficiency				Expand waterfowl survey coverage area
Red-breasted Merganser	Lake	MNDNRn Waterfowl Survey does not adequately cover species primary range in Minnesota		MN BBS Data has an important deficiency				Expand waterfowl survey coverage area
Waterbirds								
Common Loon	Lake	MN Loon Monitoring Survey		MN BBS Data of moderate precision				
Pied-billed Grebe	Wetland			MN BBS Data has a deficiency		Monitor via BBS		Yes
American Bittern	Wetland			MN BBS Data has a deficiency		Monitor via BBS		Yes
Least Bittern	Wetland			MN BBS Data has an important deficiency				Yes
Yellow Rail	Wetland			Not detected by BBS				Yes
Black Tern	Wetland			MN BBS Data of moderate precision		Monitor via BBS		Yes
Common Tern	Shoreline			Not detected by BBS		Annually census all sites that support breeding colonies		

¹ The categories depict the credibility of the BBS data for each species. Definitions can be found at: <http://www.mbr-pwrc.usgs.gov/bbs/credhm09.html>. Briefly data with moderate precision reflects data with at least 14 samples in the long term, of moderate precision. Yellow credibility means the data have a deficiency because of the species low abundance (<1.0 birds/route), a small sample size (< 14 routes), or the results cannot detect a 3% per year population change over time. Data with an important deficiency means the species has a low abundance (<0.1 birds/route), small sample size (< 5 routes), and/or the results cannot detect a 5% per year change in population.

Table 7. Status of current monitoring efforts and assessment of additional needs for the Highest Priority and Target Conservation Species in the Boreal Hardwood Transition Region: Landbirds

Boreal Hardwood Transition Region	Habitat	Status of Current Monitoring Efforts for Priority Species in the Boreal Hardwood Transition Region				New Monitoring Efforts Needed	
		USGS Breeding Bird Survey				Warrants individual site monitoring	New statewide monitoring effort needed
Highest Priority Species and Conservation Target Species (red)		Moderate	Deficient	Important Deficiency	No Data		
				Regional Credibility	Precision of Data		
Landbirds							
Spruce Grouse	Forest Upland Jack Pine			Not detected by BBS		Assess status on priority IBAs with an emphasis on High Conservation Value Forests (HCVFs) ²	
Northern Goshawk	Mature Forest Uplands			MN BBS Data has an important deficiency		Assess status on priority IBAs with an emphasis on HCVFs	
Boreal Owl	Mature Forest Uplands			MN BBS Data has an important deficiency		Monitor results of Owl Survey managed by Hawk Ridge; assess status on priority IBAs with an emphasis on HCVFs	
Eastern Whip-poor-will	Open Woodland			MN BBS Data has an important deficiency			Yes
Chimney Swift	Residential			MN BBS Data of moderate precision		Monitor with BBS	
Belted Kingfisher	Rivers/Lakes			MN BBS Data has a deficiency		Monitor with BBS	
Red-headed Woodpecker	Open Woodland			MN BBS Data of moderate precision		See Species Conservation Plan	
Olive-sided Flycatcher	Lowland Conifer			MN BBS Data has a deficiency		Monitor with BBS	
Connecticut Warbler	Lowland Conifer			MN BBS Data has a deficiency		Monitor with BBS	

¹ The categories depict the credibility of the BBS data for each species. Definitions can be found at: <http://www.mbr-pwrc.usgs.gov/bbs/credhm09.html>. Briefly data with moderate precision reflects data with at least 14 samples in the long term, of moderate precision. Yellow credibility means the data have a deficiency because of the species low abundance (<1.0 birds/route), a small sample size (< 14 routes), or the results cannot detect a 3% per year population change over time. Data with an important deficiency means the species has a low abundance (<0.1 birds/route), small sample size (< 5 routes), and/or the results cannot detect a 5% per year change in population.

²Initial focus should be on the region’s priority IBAs (see “Where will we work?”); then, if resources are available, identify select IBAs that are most important for the individuals species. High Conservation Value Forests are a designation required by the Forest Stewardship Council for forest certification and are areas of outstanding biological or cultural significance; HCVF’s within IBAs should be a priority for assessment.

Habitat Protection, Restoration, and Management

The key to focused habitat protection is identifying which habitats are most critical to those species in need of conservation attention. Audubon’s *Conservation Blueprint* relies on the analysis conducted by Minnesota’s Comprehensive Conservation Strategy (*Minnesota Department of Natural Resources 2006a*) and key stakeholder input. Table 8 lists all habitats present in the Boreal Hardwood Transition Region; habitats shaded in **RED** are identified as key habitats (see footnotes below) for Species in Greatest Conservation Need in a particular ecological subsection. See Appendix 2 for a discussion of which key habitats were selected for the Boreal Hardwood Transition Region. Target Conservation Species for the region were selected to represent the key habitats selected. Table 9 lists the habitat associations for each of the region’s highest priority and Target Conservation species.

Table 8. Key Habitats in the Boreal Hardwood Transition Region

Boreal Hardwood Transition	Landscapes	Habitats ¹	Key Habitats in each Ecological Subsection within the Boreal Hardwood Transition Region (Percent of habitat present in the subsection in the 1990s) ²												
			Agassiz Lowlands	Border Lakes	Chippewa Plains	Glacial Lake Superior Plain	Laurentian Uplands	Little Fork Vermillion Uplands	Mille Lacs Upland	Nashwauk Uplands	North Shore Highlands	Pine Moraines & Outwash Plains	St. Louis Moraines	Tamarack Lowlands	Toimi Uplands
Forest	Forest Lowland Deciduous	0.8	0.6	3.2	1.7	0.3	2.6	3.2	1.7	0.9	1.2	3.8	4.8	1.6	0
	Forest Lowland Coniferous	44.5	13.0	15.4	10.0	35.3	37.3	12.4	21.3	20.3	5.9	18.8	39.5	33.5	9
	Forest Upland Coniferous	1.1	22.4	8.3	Pine flats 13.0	17.4	5.9	1.7	Red-white pine: 9.9	Red-white pine: 8.2	Red-white pine: 6.7	Red-white pine: 4.3	Red-white pine: 4.7	9.7	12
	Forest Upland Deciduous Aspen-Oak	13.7	40.4	25.8	Aspen 46.6	36.1	33.6	22.9	31.9	50.3	30.7	37.5	19.2	38.9	1
	Forest Upland Deciduous Hardwood	0.8	0.1	13.2	Mixed hardwood pine 3.8	0.3	2.2	Mixed hardwood pine 8.9	Mixed hardwood pine 1.7	5.4	7.5	Mixed 9.3	1.7	2.9	3
	Open	Shoreline-Dunes-Cliff/Talus	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Shrub Lowland	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0
	Shrub/Woodland-Upland	0.6	Jack Pine 4.9	Jack pine 2.5	0.9	Jack pine 4.7	Jack pine 3.0	Jack pine 0.3	Jack Pine 19.4	4.9	Jack pine 4.9	4.4	Jack pine 3.0	Jack Pine 7.9	7
	Grassland	4.2	0.7	0.3	11.1	0.5	6.2	12.8	5.2	1.8	8.0	7.2	14.6	2.1	0
	Cropland	8.0	0.2	14.4	11.0	0.0	4.0	24.7	1.2	1.1	16.0	2.6	5.2	0.1	0
	Developed	0.0	0.1	0.7	0.1	0.0	0.3	0.3	0.7	2.7	0.4	0.2	0.2	0.2	0
	Wetland	9.7	1.4	5.8	0.8	1.1	2.5	6.6	0.9	0.7	7.5	3.8	5.5	1.3	5
Aquatic	Lake Deep	14.3	14.8	7.2	0.9	2.2	1.8	5.2	5.0	2.9	9.4	6.4	1.0	1.4	4
	Lake Shallow	2.3	1.4	3.2	0.1	2.1	0.6	1.0	1.1	0.8	1.8	1.7	0.6	0.4	0
	River Headwater to Large	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	12
	River Very Large	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0

¹Background on Habitat Classification:

- Many different classifications have been used in Minnesota to classify bird habitats. These classifications range from a simple classification of cover types to more complex classifications that incorporate age and structural features of the habitats. One of the principal challenges is that classifications that focus on the plant community rarely incorporate the stand and landscape level features that are important to birds when they select a site(s) for nesting. In addition, the habitats birds use may vary throughout the breeding season, from courtship to nesting to brood rearing.
- For the sake of simplicity, we have used the habitat classification that was developed for Minnesota's Comprehensive Wildlife Conservation Strategy (CWCS): "Tomorrow's Habitat for the Wild and Rare: An Action Plan for Minnesota Wildlife" (Minnesota Department of Natural Resources 2006a). The advantages are that the CWCS is widely available, the habitat classification was developed in consultation with Minnesota County Biological Survey plant community ecologists, it has been cross-walked with Minnesota's Native Plant Community Types, and it incorporates seral stages of plant community succession (e.g. the Shrub Upland Habitat includes plant communities that are successional stages of upland forest communities).

²Background on Key Habitat Analysis:

- Key habitats were identified by the Minnesota Comprehensive Wildlife Conservation Strategy. Five different analyses were developed to identify key habitats in each ecological subsection. A prime factor in all five analyses was the use of the habitat by the plan's designated Species in Greatest Conservation Need (SGCN), many of which are also priority species in this plan. Data shown above only includes those key habitats that supported SGCN birds.

Table 9. Habitat Associations of Highest Priority and Target Conservation Species in the Boreal Hardwood Transition Region

Perhaps the most distinguishing habitat feature of the northern Minnesota landscape is its heterogeneity. Within 100 meters, the habitat may change from a mature aspen/birch/fir forest to a small alder wetland and then to a red and white pine upland. Add this complexity to the fact that different bird species may be responding to landscape level features, stand cover types or microhabitat features within a stand, and the challenge of classifying birds into clearly defined habitat types is obvious. Furthermore, a prime concern for Minnesota’s forest birds is the retention of older forests, a feature that is not represented in the table below.

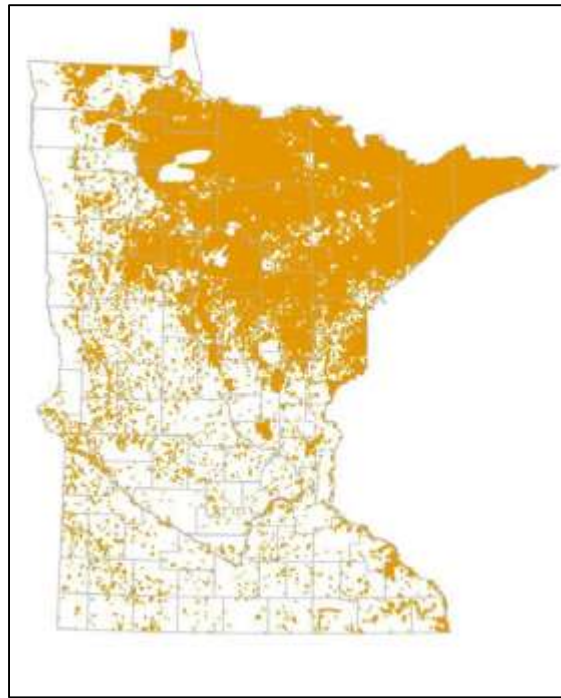
Boreal Hardwood Transition Region	Habitats															
	Forests					Open Landscapes							Aquatic			
Highest Priority and Conservation Target Species (Red) in the Boreal Hardwood Transition Region	Lowland Deciduous	Lowland Coniferous	Upland Coniferous	Upland Deciduous Aspen	Upland Deciduous Hardwood	Shoreline/Dunes	Shrub Lowland	Shrub Upland	Surrogate Grassland	Cropland	Developed	Wetland Non-forested	Lake Deep	Lake Shallow	River: Headwaters to Large	River: Very Large
Highest Priority																
American Black Duck																
Pied-billed Grebe																
American Bittern																
Least Bittern																
Yellow Rail		Sedge Meadow														
Black Tern																
Common Tern																
Eastern Whip-poor-will																
Chimney Swift																
Red-headed Woodpecker																
Additional Focal Species																
Common Goldeneye																
Red-breasted Merganser																
Spruce Grouse																
Common Loon																
Northern Goshawk																
Boreal Owl																
Belted Kingfisher																
Olive-sided Flycatcher																
Connecticut Warbler																

Recommendations for Habitat Protection, Restoration and Management for Breeding Species in the Boreal Hardwood Transition Region

- Opportunities for Habitat Protection, Restoration and Management

One of the defining features of the Boreal Hardwood Transition Region is the predominance of public ownership. As Figure 9 so clearly illustrates, there are few places in the region that are not within 0.5 mile of public land. Indeed the U.S Forest Service, Minnesota Department of Natural Resources and northern counties own and manage significant acreages. The primary issue in the Boreal Hardwood Transition Region is not habitat protection but rather habitat management and, to a limited extent, habitat restoration particularly focused in riparian areas.

Figure 9. Distribution of Lands within Minnesota that are within 0.5 miles of Public Ownership (*Minnesota Department of Natural Resources and U.S. Forest Service 2008*)



- Recommendations for Habitat Protection, Restoration and Management

1. Focus habitat protection, restoration and management efforts on the following key habitats:
 - a. Mature/Old-growth Forest Upland Coniferous
 - b. Forest Lowland Coniferous
 - c. Mature/Old-growth Forest Upland Hardwood
 - d. Shoreline/Talus/Cliff
 - e. Non-forested Wetlands
 - f. Deep Lakes
 - g. River: Headwater to Large
 - h. Riparian Areas

Background: These habitats were identified as Key Habitats in the Boreal Hardwood Transition Region (See Table 8 and discussion in Appendix 2).

2. Support the habitat protection and restoration goals established by the Upper Mississippi Valley/Great Lakes (UMVGL) Joint Venture for key habitats in the Region (Table 10 and Table 11) as a broad guide for bird conservation efforts in the region.

Background: Despite the extensive public acreage it is still important to ensure that the habitat requirements for important species are addressed and that sufficient acres are available that meet the critical needs of these species. The Upper Mississippi River/Great Lakes Joint Venture has delineated habitat protection and restoration targets that were derived by selecting focal species for each major habitat and modeling the habitat needed to achieve established population goals. The data is for that portion of the larger Boreal Hardwood Transition Region that occurs in Minnesota. The Upper Joint Venture uses a different habitat classification than that used in Minnesota's Conservation Blueprint, which is modeled after *Tomorrow's Habitat for the Wild and Rare* (Minnesota Department of Natural Resources 2006a). The JV habitats were translated to fit the classification used by Minnesota's Conservation Blueprint, with the exception of the Dry Mudflats which has no analog in the Minnesota classification. Those habitats highlights in Red in both Table 10 and 11 correspond to key habitats identified by this plan.

3. Ensure that the above habitat protection efforts meet the Minnesota Conservation Goals and Objectives for Target Conservation Species in the Boreal Hardwood Transition Region.
4. Habitat protection efforts should also meet the minimum habitat size requirements for the region's highest priority species and Target Conservation Species (Table 12).

Table 10. UMVGL Joint Venture Habitat Protection Goals for Breeding Birds in the Boreal Hardwood Transition Region

Habitat	Bird Groups				Total Acreage
	Waterfowl	Waterbirds	Shorebirds	Landbirds	
Non-forested Wetlands	135,943 ha	6,513 ha	9,189 ha	-	151,645 ha
Dry Mudflats (agricultural)			656 ha		656 ha
Shoreline/Islands with limited vegetation		3 Islands	83 ha		3 islands + 83 ha
Upland Deciduous and Mixed Deciduous/Coniferous				498,000 ha	498,000 ha
Upland Coniferous				300,000 ha	300,000 ha
Lowland Deciduous				-	-
Shrub Lowland				632,000 ha	632,000 ha
Grasslands (Native Prairie and Surrogate Grasslands)				58,000 ha	58,000 ha
Oak Savanna (Mixed wooded openland)				40,000 ha	40,000 ha
Total Acreage	135,943 ha	6,513 ha + 3 islands	9,928 ha	1,528,000 ha	1,680,384 ha + 3 islands

*The forest category includes deciduous forest, mixed forest, and woody wetlands. JV focal species for this category were considered to be forest generalists

Table 11. UMVGL Joint Venture Habitat Restoration Goals for Breeding Birds in the Boreal Hardwood Transition Region

Habitat	Bird Groups				Total Acreage
	Waterfowl	Waterbirds	Shorebirds	Landbirds	
Non-forested Wetlands	27,188 ha	5,943 ha	10,750 ha	-	43,881 ha
Dry Mudflats (agricultural)			944 ha	-	944 ha
Shoreline/Islands with Limited Vegetation		1 island	83 ha	-	83 ha + 1 island
Upland Deciduous and Mixed Deciduous/Coniferous				240,000 ha	240,000 ha
Upland Coniferous				56,500 ha	56,500 ha
Lowland Deciduous				-	-
Shrub Lowland				84,000 ha	84,000 ha
Grasslands (Native Prairie and Surrogate Grasslands)				58,000 ha	58,000 ha
Oak Savanna (Mixed wooded openland)				40,000 ha	40,000 ha
Total Acreage	27,188 ha	5,943 ha + 1 island	11,777 ha	478,500 ha	523,408 ha + 1 island

*The forest category includes deciduous forest, mixed forest, and woody wetlands. JV focal species for this category were considered to be forest generalists

Table 12. Minimum Habitat Requirements for Target Conservation Species to consider in Habitat Protection, Restoration and Management Efforts

Minimum Habitat Area Required for Species	Habitats							
	Wetlands	Sedge Meadows	Lakes	Open Woodlands	Young Upland and Lowland Forest	Mature Upland Forest	Mature Black Spruce –Tamarack and Open Bog Forest	Mesic Upland Forest
> 0.2 ha	Pied-billed Grebe							
> 0.9 ha				Red-headed Woodpecker (prefers >1.5 ha)				
> 5 ha	American Black Duck							
> 10 ha	American Bittern	Yellow Rail						
	Least Bittern							
> 20 ha	Black Tern		Common Loon (>24 ha)				Olive-sided Flycatcher (may require relatively large blocks of habitat, > 20 ha in size)	
							Connecticut Warbler (selects large, unfragmented forest landscapes but individual stands may be ≤40 ha)	
> 100 ha								
> 1000 ha			Common Tern			Goshawk (Breeding territories in Minnesota range from 4800 – 7700 ha)		

Note: The literature does not provide minimum habitat area requirements and/or habitat area is not a strong predictor of the species presence/absence for the following species: Common Goldeneye, Red-breasted Merganser, Spruce Grouse, Eastern Whip-poor-will, Chimney Swift, Boreal Owl and Belted Kingfisher.

- Recommendations for Habitat Management

Table 13. Management Recommendations for Wetland Target Conservation Species

Data gathered from a series of publications listed in each individual species account compiled for the Minnesota Bird Conservation Plan; when available, data specific for Minnesota was selected.

Species	Minimum Area	Water Depth	Vegetation height (cm)	Visual obstruction (Robel pole)	Cattail Cover (%)	Bare ground cover (%)	Wetland Drawdowns	Disturbance (burning, mowing, grazing)	Other Important Features
								Always leave some areas untreated	
American Black Duck	> 5ha	-	-	-	≥14%	-			Wetlands located < 160 m from rivers for broods
Common Goldeneye					Prefer few emergents				Nests in tree cavities; will use nest boxes; Prefer lakes free of competitor fish
Red-breasted Merganser									Prefers large, deep lakes
Common Loon	> 20 ha	-	-	-	-	-	-	-	Most common on clear oligotrophic to mesotrophic lakes with abundant small fish, nesting islands, floating bogs, and quiet, secluded areas to rear their chicks
Pied-billed Grebe	>0.2 ha	> 25 cm	-	-	Dense stands (>10cm ² stem basal area/m ²)	-	Avoid complete drying to prevent die-offs of dragonflies and fish	-	-
American Bittern	> 10 ha	< 61 cm	30-203	44-49	-	-	-	Not more often than 2-5 years	-
Least Bittern	> 10 ha	> 30 cm	-	-	-	-	-	-	-
Yellow Rail	> 10 ha	3-4 cm	-	-	-	-	-	Periodic burning	-
Black Tern	> 20 ha	> 30 cm	-	-	-	-	-	Remove woody vegetation along wetland margin	-
Common Tern	> 1000 ha	-	-	-	-	60-90%	-	-	Natural or artificial islands with sand, gravel or cobble; Ring-billed gull control may be necessary
Belted Kingfisher		-	-	-	-	-	-	-	Clear, running water so prey are visible; earthen banks devoid of vegetation for nest burrows; can include gravel pits, road cuts and sand quarries

Table 14. Management Recommendations for Forest Target Conservation Species

Data gathered from a series of publications listed in each individual species account compiled for the Minnesota Bird Conservation Plan

Species	Minimum Area	Forest Type	Forest Age	Forest Structure	Cavity Trees	Special Features
Spruce Grouse		Upland Jack Pine-Black Spruce and Lowland Conifers	Young to mid-aged successional stands	Dense stands with well-developed mid-story; prefer areas with greater canopy cover and shorter tree	-	General found in trees that are branched between 4-8 m from the ground and where live canopy is greater than 50% of tree height
Northern Goshawk	4800-7700 ha	Upland Coniferous Upland Deciduous Upland Mixed Forest	Mature (>50 years) to Old-growth (mean dbh of trees 8-10 inches)	60-90% canopy closure; hunts in forests with flight corridors between vegetation layers (4-12 ft between top of subcanopy and bottom of canopy)	-	Trees selected for nesting are often the largest in the stand; the Minnesota DNR has developed North Goshawk Management Considerations (2003) with detailed management guidance.
Boreal Owl		Lowland Conifer Upland Conifer Upland Aspen Forest Upland Mixed Forest	Mature to Old-growth; sawtimber sized aspen stands.	Tall overstory canopy, higher basal area, large snags and a high percentage of coniferous canopy cover in stand were important for sites where song perches were located.	Uses abandoned cavities excavated by woodpeckers; usually in old aspen stands with conifers	Roost sites are usually located in lowland black spruce tracts; song perches are usually large coniferous trees
Eastern Whip-poor-will		Dry deciduous or mixed forest	Regeneration to pole-stage forest stands	Forests usually adjacent to forest openings that are used for foraging	-	An open forest understory is important; manage forest to create openings either by fire or forest management; home range of about 125 acres should include about 50% open habitat
Chimney Swift		Town	Formerly old-growth forests	-	Cavities or hollows in old-growth forests; chimneys in towns	Specific recommendations regarding chimney management available at: http://www.wisconsinbirds.org/plan/species/chsw.htm ; alternatively one can build a nesting tower
Red-headed Woodpecker	> 1.5 ha	Oak Savanna; Open oak woodland ; Bottomland hardwoods	Mature; Overall stand decadence important	Open understory; can be created by prescribed burning and thinning	Snags should be 30-90 cm dbh; maintain snags in groups - not widely dispersed	Presence of mast trees (i.e. oaks, hickory or beech) is important
Olive-sided Flycatcher	> 20 ha	Upland and Lowland Coniferous; Upland and Lowland Shrubland	The presence of openings with snags or scattered live trees is more important than stand age	Coniferous forests with forest openings are important; often along riparian edges where there is a natural edge and standing dead trees.	-	Often associated with recently burned forests; most important stand feature is presence of standing live or dead trees, usually pine, spruce or tamarack trees. The flycatcher perches atop these trees and forages for insects; may require relative large blocks of boreal forest (>50 acres)
Connecticut Warbler	> 20 ha	Lowland Coniferous Peatland/Open Bog	Mature	Scattered trees, dense undergrowth	-	Moss ground cover under a layer of low-lying Labrador tea and swamp laurel up to 3 feet high

Habitat Protection and Restoration for Migrating and Wintering Waterfowl in the Boreal Hardwood Transition Region

In addition to providing habitat protection and restoration goals for all breeding birds in the Upper Mississippi Valley/Great Lakes Joint Venture, the UMVGL JV also provided habitat protection and restoration goals for migrating and wintering waterfowl, which often utilize different habitats during these seasons. Once, again, the habitat targets were derived by selecting focal species for each major habitat and modeling the habitat needed to achieve established population goals. The data is for that portion of BCR12 that occurs in Minnesota. The Upper Mississippi Valley/Great Lakes Joint Venture plans used a different habitat classification than that used in Minnesota’s Conservation Blueprint, which is modeled after *Tomorrow’s Habitat for the Wild and Rare (2006a)*. The JV habitats were translated to fit the classification used by Minnesota’s Conservation Blueprint.

Table 15. Habitat Protection and Restoration Goals for Migrating and Wintering Waterfowl

Habitat	Protection	Restoration
Non-forested Wetlands	21,681 ha	687 ha
Lake Deep (extensive open water; > 20 cm)	13,418 ha	2,803 ha
Total Acreage	35,099 ha	3,490 ha

Recommendations for Habitat Protection and Restoration for Migrating and Wintering Waterfowl and Migrating Shorebirds in the Boreal Hardwood Transition Region:

- Support the Habitat Protection and Restoration goals established by the Upper Mississippi Valley/Great Lakes Joint Venture for BCR 12 in Minnesota as a broad guide for bird conservation in the Boreal Hardwood Transition Region.
- Ensure that the above habitat protection and restoration efforts meet the Minnesota Conservation Goals and Objectives for the Conservation Target Species in the Boreal Hardwood Transition Region.

Where are we going to work?

Breeding Grounds

Important Bird Areas to Focus on in Minnesota's Boreal Hardwood Transition Region

- Significant IBAs to focus efforts on for Priority Species

A broad analysis of the IBAs in Minnesota's Boreal Hardwood Transition Region was conducted to assess their relative importance using the following criteria:

1. Presence of priority species
2. Threats to the site
3. Need to act
4. Ability to acquire funding
5. IBA aligns with partner priorities
6. Bird Life ranking
7. Audubon Minnesota capabilities/capacity

Following this analysis, a more detailed analysis of the sites importance to the priority species was conducted. The result was the identification of two sites that are especially important; both are peatland IBAs. The peatlands of northern Minnesota are unique and recognized has having international significance. They also harbor a unique assemblage of breeding birds.

1. **Important Bird Areas for Breeding Birds in the Boreal Hardwood Transition Region**

An analysis of IBAs that are most important to the priority breeding species in the Boreal Hardwood Transition Region identified two large bog complexes as top priorities.

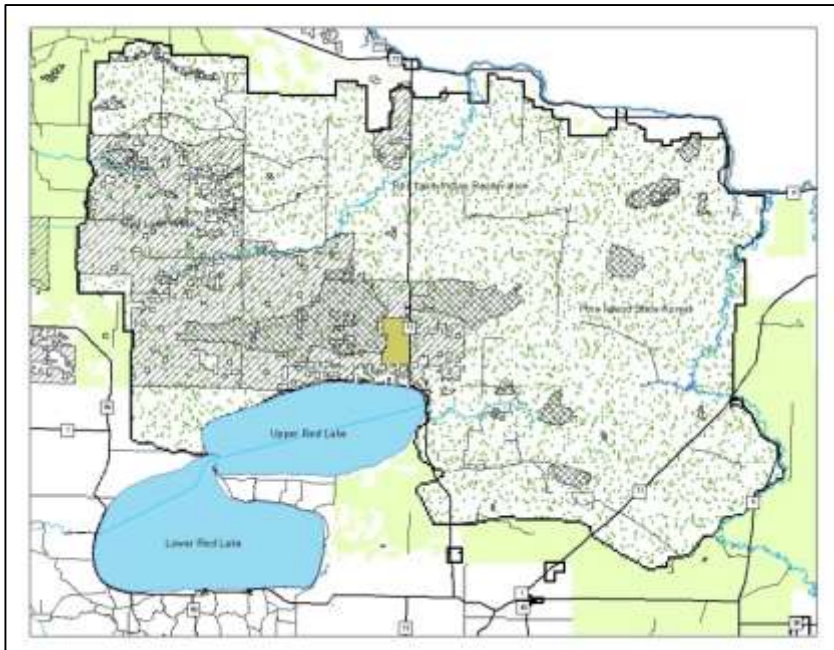
- **Sax-Zim Bog, St. Louis County**



Recommendations for Sax-Zim Bog IBA:

1. Spend additional time carefully delineating the IBA boundaries
2. Conduct an updated assessment of the priority bird species present on the IBA, with a focus on the conifer lowland species.
3. Assess whether additional monitoring work, beyond the annual monitoring conducted by the Floodwood Breeding Bird Survey route is warranted for the breeding bird species.
4. Regularly document use of the site by wintering owls.
5. Conservation partners should work to:
 - Continue to promote the unique summer and winter birding opportunities at Sax-Zim Bog.
 - Work with public land managers to ensure that forest management activities in the IBA benefit and/or sustain populations of priority bird species.

- **Big Bog IBA (Beltrami, Koochiching, Lake of the Woods County)**



Recommendations for Big Bog IBA:

1. Seek international recognition of the Big Bog IBA as a unique ecosystem with a unique assemblage of breeding birds.

Special Note: Audubon Minnesota should consider adding at least one other IBA that represents more of an upland mixed forest landscape, with interspersed lakes and wetlands.

Migration Stopovers

Important Bird Areas to Focus on in Minnesota's Boreal Hardwood Transition Region

- Significant IBAs to focus efforts on for Priority Species
Perhaps the most important IBA in Minnesota for Migration is the Hawk Ridge IBA, internationally recognized for its spectacular raptor migration, numbering in the tens of thousands each fall. Audubon Minnesota should place a priority on assisting with local efforts to protect and manage this site.

Selected Resources

Waterfowl

Ringelman, J.K., R. E. Reynolds and R.R. Johnson. 2005. Prairie Pothole Joint Venture: 2005 Implementation Plan, Section II-Waterfowl Plan.

U.S. Fish and Wildlife Service, U.S. Department of the Interior, the Canadian Wildlife Service, Environment Canada, and SEMARNAP Mexico. 2004. 2004 Strategic Guidance: Strengthening the Biological Foundation. North American Waterfowl Management Plan.

U.S. Fish and Wildlife Service, U.S. Department of the Interior, the Canadian Wildlife Service, Environment Canada, and SEMARNAP Mexico. 2004. 2004 Implementation Framework: Strengthening the Biological Foundation. North American Waterfowl Management Plan.

Waterbirds

Beyersbergen, G.W., N.D. Niemuth, and M.R. Norton, coordinators. 2004. Northern Prairie & Parkland Waterbird Conservation Plan. A plan associated with the Waterbird Conservation for the Americas initiative. Published by the Prairie Pothole Joint Venture, Denver, Colorado. 183 pp.

Kushlan, J. M. J. Steinkamp, K. C. Parsons, J. Capp, M. A. Cruz, M. Coulter, I. Davidson, L. Dickson, N. Edelson, R. Elliot, R. M. Erwin, S. Hatch, S. Kress, R. Milko, S. Miller, K. Mills, R. Paul, R. Phillips, J. E. Saliva, B. Sydeman, J. Trapp, J. Wheeler, and K. Wohl. 2002. Waterbird Conservation for the Americas: The North American Waterbird Conservation Plan, Version 1. Waterbird Conservation for the Americas. Washington, DC, U.S.A.

Niemuth, N.D. 2005. Prairie Pothole Joint Venture: 2005 Implementation Plan, Section IV-Waterbird Plan.

Shorebirds

Brown, S., C. Hickey, B. Harrington, and R. Gill, eds. 2001. The U.S. Shorebird Conservation Plan, 2nd ed., Manomet Center for Conservation Sciences, Manomet, MA. Northern Prairie and Parkland Waterbird Region Plan.

Granfors, D.A. and N.D. Niemuth. 2005. Prairie Pothole Joint Venture: 2005 Implementation Plan, Section III-Shorebird Plan.

Skagen, S.K. and G. Thompson. 2013. Northern Plains/Prairie Potholes Regional Shorebird Conservation Plan Version 1.0, Updated January 2013. [Online Version available at: <http://www.shorebirdplan.org/wp-content/uploads/2013/01/NORPLPP2.pdf>].

Landbirds

Berlanga H., J. A. Kennedy, T. D. Rich, M. C. Arizmendi, C. J. Beardmore, P. J. Blancher, G. S. Butcher, A. R. Couturier, A. A. Dayer, D. W. Demarest, W. E. Easton, M. Gustafson, E. Inigo-Elias, E. A. Krebs, A. O. Panjabi, V. Rodriguez Contreras, K. V. Rosenberg, J. M. Ruth, E. Santana Castellon, R. Ma. Vidal, and T. Will. 2010. Saving Our Shared Birds: Partners in Flight Tri-National Vision for Landbird Conservation. Cornell Lab of Ornithology: Ithaca, NY.

Fitzgerald, J.A., D.N. Pashley, S.J. Lewis and B. Pardo. 1998. Partners in Flight Bird Conservation Plan for the Northern Tallgrass Prairie (Physiographic Area 40). [Online available at: http://www.partnersinflight.org/bcps/plan/pl_40all.pdf]

Partners in Flight Science Committee 2013. Population Estimates Database, version 2013. Available at <http://rmbo.org/pifpopestimates>. Accessed on January 2014.

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

Rosenberg, K. V. 2004. Partners in Flight Continental Priorities and Objectives Defined at the State and Bird Conservation Region Levels: Minnesota. Cornell Lab of Ornithology.

Other

Buehler, D. A., J. L. Confer, R. A. Canterbury, T. C. Will, W. C. Hunter, R. Dettmers, and D. Demarest. 2006. Status Assessment and Conservation Plan for the Golden-winged Warbler, *Vermivora chrysoptera*, in the United States. U. S. Department of the Interior, Fish and Wildlife Service Biological Technical Publication FWS/BTP-R6XXX-2006, Washington, D.C.

Cole, K.L., M.B. Davis, F. Stearns, K. Walker and G. Guntenspergen. 1998; Historical Land Use Changes in the Great Lakes Region, in: Sisk, T.D., editor. 1998. Perspectives on the land use history of North America: a context for understanding our changing environment. U.S. Geological Survey, Biological Resources Division, Biological Science Report USGS/BRD/BSR-1998-0003 (Revised September 1999). 104 pp.

Commission for Environmental Cooperation. 1997. Ecological Regions of North America: Toward a Common Perspective. (<http://www3.cec.org/islandora/en/item/1701-ecological-regions-north-america-toward-common-perspective-en.pdf>).

Danz, N.P., A. Bracey and G J. Niemi. 2008. Breeding Bird monitoring in Great Lakes National Forests 1991-2007. NRRI Technical Report NRRI/TR-2008/11, University of Minnesota, Duluth, MN.

Dexter, M.H., editor. 2012. Status of wildlife populations, fall 2012. Unpub. Rep., Division of Fish and Wildlife, Minn. Dept. Nat. Res., St. Paul, Minnesota. 311 pp.

Johnson, Douglas H., and Jill A. Dechant-Shaffer (Series Coordinators). 2002. Effects of management practices on wetland birds. Northern Prairie Wildlife Research Center, Jamestown, ND. Northern Prairie Wildlife Research Center. Online. <http://www.npwrc.usgs.gov/resource/literatr/wetbird/index.htm> (Version 12Dec2003).

Johnson, Douglas H., Lawrence D. Igl, and Jill A. Dechant Shaffer (Series Coordinators). 2004. Effects of management practices on grassland birds. Northern Prairie Wildlife Research Center, Jamestown, ND. Jamestown, ND: Northern Prairie Wildlife Research Center. Online. <http://www.npwrc.usgs.gov/resource/literatr/grasbird/index.htm> (Version 12AUG2004).

Kelly, J., S. Williamson and T.R. Cooper. 2008. 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. A Wildlife Management Institute Publication.

King, D.T. and D. W. Anderson. 2005. Recent Population Status of the American White Pelican: A Continental Perspective. USDA National Wildlife Research Center. Staff Publications, Paper 40.

McDonald, K. 2013. Is Anyone Paying Attention? We've Lost 9.7 Million Acres of RP Land in Five Years. [Online at: <http://www.bigpictureagriculture.com/2013/03/weve-lost-9-7-million-acres-of-crp-land-in-five-years-334.html>].

Minnesota Administrative Rules. Chapter 6134. Endangered, Threatened, Special Concern Species. Department of Natural Resources. Part 6134.0200. Animal Species. [Online available at: <https://www.revisor.mn.gov/rules/?id=6134.0200>].

Minnesota Department of Natural Resources. 2003. Northern Goshawk Management Considerations. June 2003.

Minnesota Department of Natural Resources. 2005. Field Guide to the Native Plant Communities of Minnesota: The Prairie Parkland and Tallgrass Aspen Parklands Provinces. Ecological Land Classification Program, Minnesota County Biological Survey and Natural Heritage and Nongame Research Program. MNDNR, St. Paul, MN.

Minnesota Department of Natural Resources. 2006a. *Tomorrow's Habitat for the Wild and Rare: An Action Plan for Minnesota Wildlife*, Comprehensive Wildlife Conservation Strategy. Division of Ecological Services, Minnesota Department of Natural Resources.

Minnesota Department of Natural Resources. 2006b. Long Range Duck Recovery Plan. Division of Fish and Wildlife, Minnesota Department of Natural Resources.

Minnesota Department of Natural Resources. 2007. Range Distribution Maps for Minnesota Birds by Ecological Subsection. Division of Fish and Wildlife, Minnesota Department of Natural Resources.

Minnesota Department of Natural Resources. 2010. Shallow Lakes Program Plan. Minnesota Department of Natural Resources, Division of Fish and Wildlife, Wildlife Management Section. December 2010.

Minnesota Department of Natural Resources. 2012. 2012 Waterfowl Breeding Population Survey: Minnesota. Compiled by Steve Cordts. Wetland Wildlife Populations and Research Program. Division of Fish and Wildlife, Minnesota Department of Natural Resources, Bemidji, MN.

Minnesota Department of Natural Resources and U.S. Forest Service. 2008. Minnesota Stewardship Spatial Analysis Project Methodology and Analysis Documentation.

Minnesota Forest Resources Council. 2013. Sustaining Minnesota Forest Resources: Voluntary Site-Level Forest Management Guidelines for Landowners, Loggers and Resource Managers. 2013. St Paul, Minnesota.

Minnesota Prairie Plan Working Group. 2011. Minnesota Prairie Conservation Plan. Minnesota Prairie Plan Working Group, Minneapolis, MN. 55p.

Niemi, G. 2014. Golden Birds, Golden Opportunities. Minnesota Conservation Volunteer. Minnesota Department of Natural Resources. May – June 2014.

Roberts, T. S. 1932. The Birds of Minnesota. University of Minnesota Press.

Sauer, J. R., J. E. Hines, J. E. Fallon, K. L. Pardieck, D. J. Ziolkowski, Jr., and W. A. Link. 2014. *The North American Breeding Bird Survey, Results and Analysis 1966 - 2012. Version 02.19.2014* [USGS Patuxent Wildlife Research Center](http://www.mbr-pwrc.usgs.gov/bbs/bbs.html), Laurel, MD. Online at: <http://www.mbr-pwrc.usgs.gov/bbs/bbs.html>.

U.S. Forest Service. 2012. National Forest System Land Management Planning: Final rule and record of decision. Federal Register Vol. 77. No. 68. Pp 21162-21276.

Wildlife Management Institute. 2009. Best Management Practices for Woodcock and Associated Species: Upper Great Lakes Woodcock and Young Forest Initiative.

Williamson, S.J., D. Keppie, R. Davison, D. Budeau, S. Carriere, D. Rabe and M. Schroeder. 2008. Spruce Grouse Conservation Plan. Association of Fish and Wildlife Agencies. Washington, DC. 73 pages.

Appendix 1. Process for selection of Priority Breeding Species in the Boreal Hardwood Transition Region

- **Very Rare and Known to be Declining**

All of these species have historically been a component of Minnesota's northern forest avifauna but are extremely rare and have experienced documented declines in abundance and/or distribution. These species are considered too rare and/or sporadic in their occurrence to justify focused conservation efforts.

- **Highest Priority Level**

Two approaches were used to identify priority species in each ecological province. The first approach relied heavily on assessments compiled by a team of experts for each NABCI Bird Conservation Region; the second approach incorporates more data specific to the species population in Minnesota. The Highest Priority Level was determined as follows:

1. Landbirds

Landbird species that had the highest PIF Regional Combined Assessment Scores ($RCSb \geq 14$ and $PTr \geq 4$ and $TB \geq 4$; <http://www.rmbo.org/pif/scores/scores.html>) **and** which were declining in BCR12 (Boreal Hardwood Transition Bird Conservation Region) in Minnesota and were dependent on vulnerable habitat in Minnesota were classified as the Highest Priority Level species.

2. Waterbirds

Waterbird species that were rated "High Concern" in the Upper Mississippi Valley/Great Lakes Region by the North American Waterbird Conservation Plan (<http://www.pwrc.usgs.gov/nacwcp/pdfs/regional/NPPText.pdf>) **and** which were declining in BCR12 in Minnesota and were dependent on vulnerable habitat in Minnesota were classified as the Highest Priority Level species.

3. Shorebirds

Shorebird species that were rated "Highly Imperiled", "High Concern" or "Moderate Concern" in the Upper Mississippi Valley/Great Lakes Region by the U.S. Shorebird Conservation Plan (<http://www.fws.gov/shorebirdplan/RegionalShorebird/downloads/NORPLPP2.pdf>), the region was rated as very important for either migration or breeding for the species, **and** the species were declining in BCR12 in Minnesota and were dependent on vulnerable habitat in Minnesota were classified as the Highest Priority Level species.

4. Waterfowl

Waterfowl species that were rated "Highest" in the North American Waterfowl Management Plan 2004 Implementation Framework in the region (<http://www.fws.gov/birdhabitat/nawmp/files/ImplementationFramework.pdf>) **and** which were declining in the region in Minnesota and were dependent on vulnerable habitat in Minnesota were classified as the Highest Priority Level species.

- **High Priority Level**

1. Landbirds

Landbirds that had a high PIF Regional Combined Assessment Score ($RCSb \geq 14$ and $PTr + TB \geq 7$) **and** which were declining in BCR12 in Minnesota and were dependent on vulnerable habitat in Minnesota were classified as the High Priority Level species. Occasionally a species that met only one of these criteria was added if it was also recognized as a Priority species by other initiatives.

2. Waterbirds

Waterbird species that were rated "Moderate Concern" in the Upper Mississippi Valley/Great Lakes region by the North American Waterbird Conservation Plan **and** which were declining in BCR12 in Minnesota and were dependent on vulnerable habitat in Minnesota were classified as the High Priority Level species. Occasionally a species that met only one of these criteria was added if it was also recognized as a Priority species by other initiatives.

3. Shorebirds

Shorebird species that were rated “High Concern” or “Moderate Concern” in the Upper Mississippi Valley/Great Lakes Region by the U.S. Shorebird Conservation Plan, regardless of whether the region was rated as very important for migration or breeding, **and** the species were declining in BCR12 in Minnesota and were dependent on vulnerable habitat in Minnesota were classified as the High Priority Level species. Occasionally a species that met only one of these criteria was added if it was also recognized as a Priority species by other initiatives.

4. Waterfowl

Waterfowl species that were rated “High” or “Moderately High” in the North American Waterfowl Management Plan 2004 Implementation Framework in the region (<http://www.fws.gov/birdhabitat/nawmp/files/ImplementationFramework.pdf>) **and** which were declining in BCR12 in Minnesota and were dependent on vulnerable habitat in Minnesota were classified as the High Priority Level species. Occasionally a species that met only one of these criteria was added if it was also recognized as a Priority species by other initiatives.

- **Moderate Priority Level**

Species that met the criteria listed above by their respective North American Bird Conservation Plan as High Level Species **or** which were declining in BCR12 in Minnesota and were dependent on vulnerable habitat in Minnesota were classified as Moderate Level Priorities **if** they were also recognized by other initiatives as priority species (e.g. Joint Venture Focal Species, state listed species, PIF Continental Concern Species, PIF Stewardship Species).

Appendix 2. Process for Selection of Target Conservation Species in the Region

Target Conservation Species have been defined by various initiatives. In this plan the concept mirrors that of the U.S. Forest Service and the North American Joint Ventures. A target species is essentially a species “whose status and trends are likely to be responsive to changes in ecological conditions, permit inference to the integrity of the overall ecosystem and provide meaningful information regarding the effectiveness of the plan” (*U.S. Forest Service 2012*).

Selecting Target Conservation species in the Boreal Hardwood Transition Region is a challenging task for many reasons. One primary challenge is the diversity of cover types from surrogate grasslands to wetlands, lakes and rivers, to a complex array of upland and lowland forest cover types. Unlike the other three ecological provinces, much of the region remains in forest cover. As a result its avifauna is faring much better than birds dependent on forests, wetlands and grasslands elsewhere in the state. To address this challenge two approaches were used to help delineate target species. First, the key habitats present in the Laurentian Mixed Forest Ecological Province (i.e. the Ecological System’s analog to the Boreal Hardwood Transition Region), as delineated by *Tomorrow’s Habitat for the Wild and Rare: An Action Plan for Minnesota (Minnesota Department of Natural Resources 2006a)*, were identified. Specifically, we selected those habitats that were identified as Key Habitats in three or more ecological subsections.

In Minnesota’s Boreal Hardwood Transition Region, the following habitats were identified as “Key Habitats” (see Table 7):

Forest

1. Forest Upland Coniferous
 - a. Red Pine-White Pine
 - b. Jack Pine-Upland Black Spruce
2. Forest Lowland Coniferous
3. Forest Upland Hardwood
 - a. Mesic, mixed coniferous-deciduous upland hardwood forest
 - b. Aspen-Birch-Balsam Fir-White Spruce

Open

1. Shoreline/Talus/Cliff
2. Shrub Woodland/Upland (Jack Pine)
3. Non-forested Wetland

Aquatic

1. Lake Deep
2. River: Headwater to Large

Next, based on input from a group of key stakeholders from the region, we examined the issues and habitats that were most important to birds in the province. The consensus was that the following three habitats were most important to the avifauna of the Boreal Hardwood Transition Region:

1. Late-successional/old-growth forest habitats because they have declined significantly;
2. Lowland conifer forests because of our poor knowledge of these systems and because no targets have been established for the maintenance of old-growth lowland conifers by state or federal resource agencies; and

3. Riparian forest habitat because of their significant decline both from overall loss and, more importantly, degradation.

Two of these issues focus on mature or older forests, an issue that is not addressed directly by key habitats delineated in *Tomorrow's Habitat for the Wild and Rare*. In the end, the final decision was to:

1. Select Target Conservation Species for the following key habitats:
 - Forest Upland Coniferous: emphasis on Jack Pine (thereby combining the shrub upland Jack Pine habitat with the upland coniferous habitat (identified by *Tomorrow's Habitat*);
 - Lowland Coniferous Forests (identified by both *Tomorrow's Habitat* and the stakeholders);
 - Upland Hardwood Forests (identified by *Tomorrow's Habitat*) but with an emphasis on mature/old-growth upland hardwoods (identified by the stakeholders);
 - Shoreline habitats (identified by both *Tomorrow's Habitat* and the stakeholders);
 - Wetlands (identified by *Tomorrow's Habitat*);
 - Deep Lakes (identified by *Tomorrow's Habitat*);
 - Rivers: Headwaters to Large (identified by *Tomorrow's Habitat*);
 - Riparian habitats (identified by the stakeholders).

The only key habitat identified by *Tomorrow's Habitat* for which a Target Conservation Species was not specifically selected was the Upland Coniferous Forest/Red Pine-White Pine. The emphasis here would be on old-growth/mature stands. The only species truly unique to this forest type is the Pine Warbler, which also occurs in mature Jack Pine stands. The Pine Warbler is not a Priority Species in the region as its population is actually increasing and the increase is statistically significant in Minnesota as monitored by the Breeding Bird Survey.

2. Delineate a group of species that are well-monitored by the federal Breeding Bird Survey (BBS) that are good indicators for key habitats, reflecting the diversity of cover types, stand ages and stand structure that defines the Boreal Hardwood Transition Region. Select as many priority species from Table 1 as possible (for final recommendations see Table 7).

One or more conservation target species was then selected from amongst the pool of priority species shown in Table 1, for the most important key habitats in the region. To help guide this decision a prioritization matrix was established that assessed species using the following criteria:

1. Species Level of Priority
2. Species Ecological Significance
3. Species Management Significance
4. Cost Effectiveness and Feasibility of Managing
5. Species Sensitivity to Climate Change
6. Percent of the Species Global Breeding Range that occurs in Minnesota

Using these criteria, the priority was to select target species from the Highest Priority category of species shown in Table 1. When that was not feasible, species were selected from the other priority categories. In a few cases, one species may represent more than one key habitat. When possible, an effort was made to select species that are readily identifiable in the field. Table 14 shows the final selection of Target Conservation Species in the region and the Key Habitats they were selected to represent. Some species represent more than one key habitat

Table 16. Key Habitats in the Boreal Hardwood Transition Region and Target Conservation Species

Key Habitat	Target Conservation Species									
Forest Upland Coniferous (Jack Pine)			Spruce Grouse							
Forest Lowland Coniferous			Spruce Grouse						Olive-sided Flycatcher	Connecticut Warbler
Forest Upland Hardwood (mature)					Goshawk			Boreal Owl		
Shoreline				Common Loon		Common Tern				
Wetland	Goldeneye									
Lake Deep	Goldeneye	Red-breasted Merganser		Common Loon						
River: Headwater to Large	Goldeneye	Red-breasted Merganser					Belted Kingfisher			
Riparian	Goldeneye	Red-breasted Merganser		Common Loon			Belted Kingfisher		Olive-sided Flycatcher	