The Boreal Forest Region: North America's Bird Nursery

CANADIAN BOREAL INITIATIVE

BOREAL SONGBIRD INITIATIVE

BIRD STUDIES CANADA / ÉTUDES D'OISEAUX CANADA

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Commissioned by the
Boreal Songbird Initiative
and the
Canadian Boreal Initiative

April 2005

Acknowledgements

This report was modeled after a previous report on the importance of Canada's Boreal Forest Region to landbirds in the Western Hemisphere (Blancher 2003). However analyses reported here were updated to incorporate more recent data, and expanded to include non-landbirds and the full extent of the North American Boreal Forest Region including much of Alaska.

Species range information came largely from Ridgely et al. (2003) shape files. These data were provided by NatureServe in collaboration with Robert Ridgely, James Zook, The Nature Conservancy - Migratory Bird Program, Conservation International - Center for Applied Biodiversity Science, World Wildlife Fund - US, and Environment Canada - WILDSPACE. Thanks especially to Andrew Couturier, Bird Studies Canada who overlaid these shape files onto jurisdictional maps, a BCR layer, and lat/long degree blocks, thus enabling us to calculate proportions of range for each species. Thanks to Environment Canada, Ontario Region, for providing the BCR shape file used for analyses in this report.

Breeding Bird Survey data were obtained from the very useful U.S. Geological Survey web pages devoted to this survey. The methods of estimating population size from BBS data were developed in conjunction with Ken Rosenberg (Cornell Lab of Ornithology) and with input from the Partners in Flight Science Committee during development of the PIF North American Landbird Conservation Plan (Rich et al. 2004). We would also like to thank the thousands of volunteers who collected the data used here.

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ISBN 0-9733409-2-4

Published by:
Canadian Boreal Initiative
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Ottawa, Ontario
K2P 1A1
Tel: (613) 230-4739
www.borealcanada.ca

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1601 2nd Avenue, Suite 615
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P.O. Box 160, 115 Front Street
Port Rowan, Ontario N0E 1M0
Tel: (888)448-2473
www.bsc-eoc.org

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Executive Summary

The Boreal Forest of North America, stretching from Alaska to Newfoundland, at 5.9 million square kilometers (1.5 billion acres) is one of the largest forested areas in the Western Hemisphere. Encompassing one quarter of the world's intact forest ecosystems, the region contains more intact forest than even the Brazilian Amazon.

This report provides the first-ever comprehensive analysis of the Boreal Forest Region's vital role in sustaining North American bird life.

Key Findings

Building on previous studies showing the Boreal Forest Region's importance to some bird species, this new research demonstrates that the Boreal Forest Region is vital to the abundance of bird life in the U.S. and Canada, and also contributes in a significant way to the abundance of birds in Mexico, the Caribbean, and Central and South America.

The study's findings demonstrate that the Boreal Forest Region is critical to the well-being of many species of familiar waterfowl, shorebirds, waterbirds and landbirds found in the U.S. and Canada. Nearly half of all North American birds (325 species) rely on the Boreal Forest Region. Over 300 of those species regularly breed in the Boreal Forest Region. The responsibility of the region in sustaining some bird populations is even more impressive. Key findings include:

- Eighty per cent of the waterfowl species of North America, 63% of finch species, and 53% of warbler species breed in the Boreal Forest Region;
- In at least 96 species, 50% or more of their entire breeding populations occur within the Boreal Forest Region;
- Nearly 100% of the global populations of the tree-nesting Bonaparte's Gull, the bog-inhabiting Palm Warbler, and the elusive Short-billed Dowitcher nest within the Boreal Forest Region; and
- Over 80% of the populations of the coastal wintering White-winged Scoter, the rapidly disappearing Rusty Blackbird, and the massive Great Gray Owl nest in the Boreal Forest Region.

Significance

The vastness of the Boreal Forest Region makes it one of the few remaining places on earth where entire ecosystems function. These ecosystems support some of the greatest abundance of wildlife on the continent, including massive caribou herds, intact predator-prey systems with healthy populations of top predators like wolves and large numbers of birds. In fact, the Boreal Forest Region represents 26% of the land area of the U.S. and Canada - yet this report shows that it supports nearly 50% of North America's bird species.

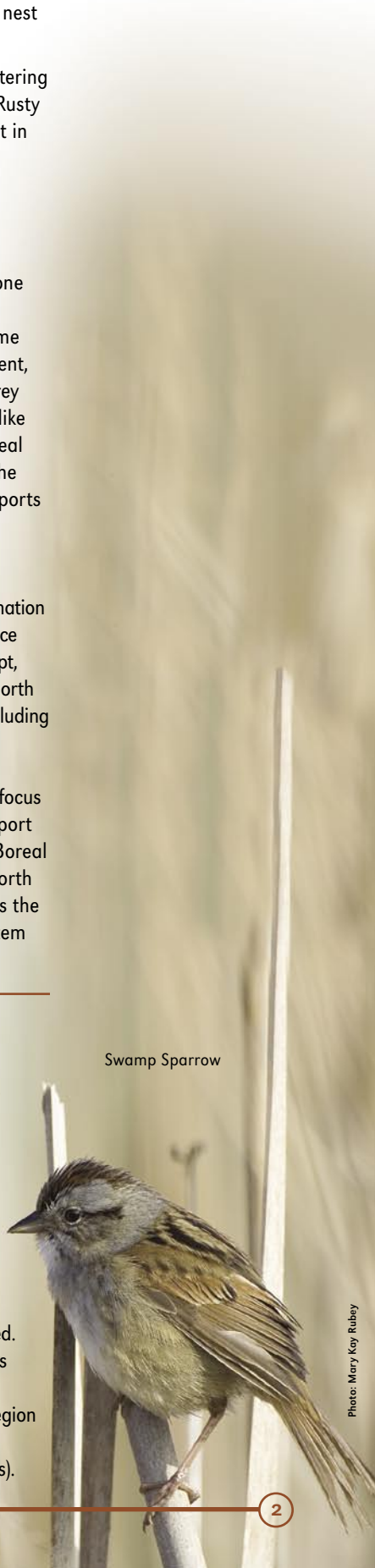
The research employed recently-developed scientific modeling techniques that combine Geographic Information System (GIS) mapping with broad scale bird abundance information. The procedure made it possible to attempt, for the first time, to fully quantify the importance of North America's Boreal Forest Region for all bird species including waterfowl, waterbirds, shorebirds and landbirds.

Unlike most analyses of large ecoregions where the focus is primarily on threatened and rare species, this report examines the role of a large-scale ecosystem - the Boreal Forest Region - in maintaining the abundance of North American bird life. In doing so, the report measures the stewardship responsibility of a global scale ecosystem towards a continent's wildlife.

Introduction

The Boreal Forest Region of North America, stretching from Alaska across 6,000 kilometers (3,500 miles) to Newfoundland and Labrador is, at 5.9 million square kilometers (1.5 billion acres), the largest wilderness left in North America and represents 25% of the world's remaining intact forests (CBI 2005). Its vastness also makes it one of the few remaining places on earth where entire ecosystems function. These ecosystems support some of the greatest abundance of wildlife on the continent including massive caribou herds, intact predator-prey systems with healthy populations of top predators like wolves and large numbers of birds (Ricketts et al. 1999).

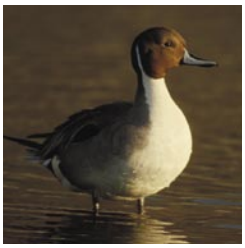
While all this has been known about North America's Boreal Forest Region, its importance has sometimes been overlooked precisely because of its abundant wildlife. Most global level conservation assessments of large ecoregions have focused on the number of different species of animals and plants (Karieva and Marvier 2003). Areas with a high number of different species tend to be given more attention, especially when many of those species have become rare so that they can rightly be considered endangered. In contrast, the Boreal Forest Region has lower species diversity and fewer rare species than most tropical regions and significant threats to the Boreal Forest Region ecosystem have only recently become more widely-understood (CBI 2005, Schmiegelow et al., unpubl. ms).



Swamp Sparrow

Photo: Mary Kay Rubey

Evening Grosbeak



Northern Pintail

In recent years, some scientists and conservation organizations have begun considering abundance and intactness of ecosystems as equally important factors in developing conservation priorities (Karieva and Marvier 2003, Ricketts et al. 1999, Schmiegelow et al., unpubl. ms). Through its Important Bird Areas program, BirdLife International was one of the first organizations to explicitly consider abundance as well as rarity in conservation (Chipley et al. 2003, Fishpool and Evans 2001, Heath and Evans 2000, Wells 1998, Wells et al. 2005). More recently, the Partners In Flight coalition and its members have highlighted the concept that some regions have a high stewardship responsibility for maintaining species that are still abundant (Rich et al. 2004, Rosenberg and Wells 2005, Rosenberg and Wells 2000, Wells and Rosenberg 1999, Rosenberg and Wells 1995).

This report analyzes, for the first time, the stewardship responsibility of a global scale ecosystem towards a continent's wildlife - in this case, North America's avian populations. Specifically we answer the following questions:

How many bird species use North America's Boreal Forest Region?

What types of birds use North America's Boreal Forest Region?

How many birds in total breed in North America's Boreal Forest Region?

How many and what kinds of species are particularly reliant on North America's Boreal Forest Region?

How important is North America's Boreal Forest Region for birds during spring and fall migration?

Where do birds that breed in North America's Boreal Forest Region spend the winter?

Table 1:

Estimated Number of Birds Breeding in North America's Boreal Forest Region by Bird Group

Bird Group	Estimated Breeding Population	% of U.S./Canada Population
Landbirds	1,600,000,000	30%
Shorebirds	7,000,000	30%
Waterbirds	14,000,000	n/a
Waterfowl	26,000,000	38%

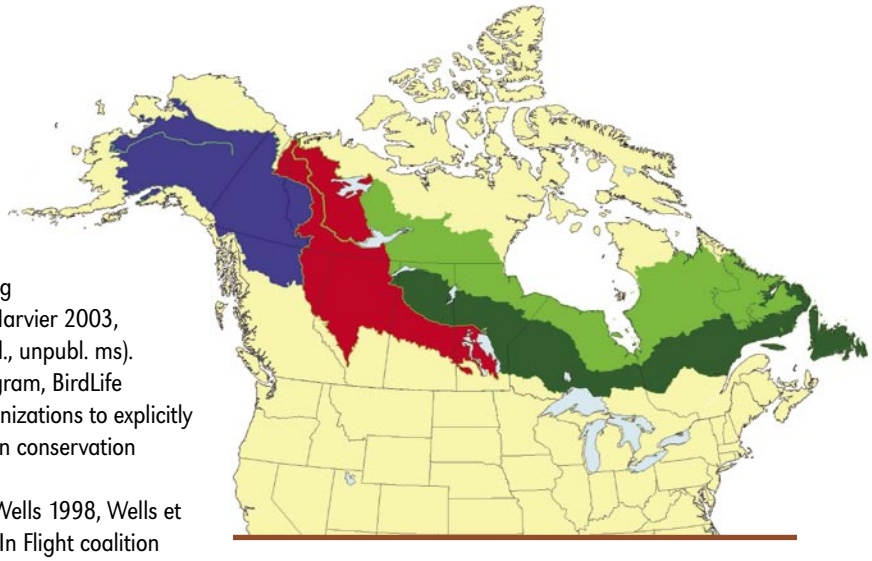


Figure 1: Bird Conservation Regions in North America's Boreal Forest Region[1]

Delineation of North America's Boreal Forest Region

Analyses in this report are based on the area within the following four Bird Conservation Regions (BCRs, U.S. NABCI Committee 2000):

- BCR 4: Northwestern Interior Forest (blue in Figure 1)
- BCR 6: Boreal Forest Region Taiga Plains (red)
- BCR 7: Taiga Shield and Hudson Plains (light green)
- BCR 8: Boreal Forest Region Softwood Shield (dark green)

How many bird species use North America's Boreal Forest Region?

Nearly 400 species (399 or 57% of regularly-occurring birds of the U.S. and Canada) are known to occur within some portion of the Boreal Forest Region of Alaska and Canada. Excluding species that are exclusively marine or coastal or that occur in only a tiny portion of the Boreal Forest Region, there are 325 species (47%) that occur regularly in the Boreal Forest Region (Appendix 1). Of these, 303 species (43%) breed in the forests, thickets, and wetlands of the Boreal Forest Region. The remaining 22 species occur as migrants or winterers within the region.

What types of birds use North America's Boreal Forest Region?

The array of types and families of birds that regularly use the Boreal Forest Region is impressive. At least 47 families of birds are represented, making up 67% of all bird families that regularly occur in the U.S. and Canada. The list includes loons, grebes, swans, ducks, hawks, sandpipers, gulls, owls, vireos, flycatchers, warblers,

1 The Canadian Boreal Initiative (CBI) defines the Canadian Boreal region using the National Ecological Framework for Canada Ecozones (NEFC). The following NEFC ecozones are considered to be Boreal: Boreal Shield, Boreal Cordillera, Boreal Plains, Taiga Shield, Taiga Cordillera, Taiga Plains, and Hudson Plains. The Canadian Bird Conservation Regions in Figure 1 approximate Canada's Boreal region according to the CBI definition, although some differences exist.

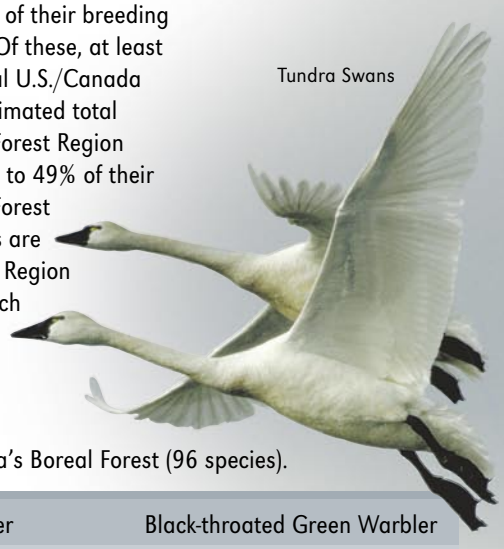
and sparrows. Certain families have an especially high representation in the Boreal Forest Region. Thirty-five of 44 waterfowl species (80%) in the U.S. or Canada breed in the Boreal Forest Region. Similarly, among warblers, 27 of 51 species (53%) in the U.S. or Canada breed in the Boreal Forest Region. Among thrushes, 13 of the 14 thrush species (93%) in the U.S. and Canada are Boreal Forest Region breeders. Among finches, the number is 10 of 16 (63%).

How many birds in total breed in North America's Boreal Forest Region?

The number of birds breeding in North America's Boreal Forest Region is estimated at between 1.65 and 3 billion (Table 1). Of these, landbirds are by far the most numerous, making up 97% of all birds that breed in the Boreal Forest Region. The importance of the Boreal Forest Region as a breeding ground for many bird groups is staggering. An estimated 38% (26 million) of all of the waterfowl of Canada and the U.S. breed in the Boreal Forest Region. Approximately 30% of all shorebirds (7 million) and 30% of all landbirds (1-3 billion) that breed in the U.S. and Canada do so within the Boreal Forest Region.

How many and what kinds of species are particularly reliant on North America's Boreal Forest Region?

A total of 276 species have 5% or more of their breeding range within the Boreal Forest Region. Of these, at least 96 species representing 14% of the total U.S./Canada avifauna have 50% or more of their estimated total breeding population within the Boreal Forest Region (Table 2). Another 55 species have 25% to 49% of their breeding population within the Boreal Forest Region (Table 3). A wide variety of birds are represented among these Boreal Forest Region birds, including several species from each major bird group: waterfowl, waterbirds, shorebirds and landbirds.



Tundra Swans

Photo: © Ducks Unlimited Canada

Table 2:

Species With 50% or More of Estimated Western Hemisphere Breeding Population in North America's Boreal Forest (96 species).

Trumpeter Swan	Sora	Yellow-bellied Sapsucker	Black-throated Green Warbler
American Wigeon	Whooping Crane	American Three-toed Woodpecker	Blackburnian Warbler
American Black Duck	Semipalmated Plover	Black-backed Woodpecker	Palm Warbler
Green-winged Teal	Greater Yellowlegs	Olive-sided Flycatcher	Bay-breasted Warbler
Ring-necked Duck	Lesser Yellowlegs	Yellow-bellied Flycatcher	Blackpoll Warbler
Greater Scaup	Solitary Sandpiper	Alder Flycatcher	Black-and-white Warbler
Lesser Scaup	Wandering Tattler	Least Flycatcher	Northern Waterthrush
Surf Scoter	Spotted Sandpiper	Northern Shrike	Connecticut Warbler
White-winged Scoter	Whimbrel	Blue-headed Vireo	Mourning Warbler
Black Scoter	Hudsonian Godwit	Philadelphia Vireo	Wilson's Warbler
Bufflehead	Surfbird	Gray Jay	Canada Warbler
Common Goldeneye	Least Sandpiper	Boreal Chickadee	Clay-colored Sparrow
Barrow's Goldeneye	Short-billed Dowitcher	Gray-headed Chickadee	Le Conte's Sparrow
Hooded Merganser	Wilson's Snipe	Ruby-crowned Kinglet	Fox Sparrow
Common Merganser	Red-necked Phalarope	Gray-cheeked Thrush	Lincoln's Sparrow
Ruffed Grouse	Little Gull	Swainson's Thrush	Swamp Sparrow
Spruce Grouse	Bonaparte's Gull	Hermit Thrush	White-throated Sparrow
White-tailed Ptarmigan	Mew Gull	Bohemian Waxwing	White-crowned Sparrow
Pacific Loon	Herring Gull	Tennessee Warbler	Golden-crowned Sparrow
Common Loon	Common Tern	Orange-crowned Warbler	Dark-eyed Junco
Horned Grebe	Arctic Tern	Nashville Warbler	Rusty Blackbird
Red-necked Grebe	Northern Hawk Owl	Magnolia Warbler	Gray-crowned Rosy-Finch
Merlin	Great Gray Owl	Cape May Warbler	Pine Grosbeak
Yellow Rail	Boreal Owl	Yellow-rumped Warbler	White-winged Crossbill

Photo: Glen Tepke

Black-and-white Warbler

Photo: Mary Kay Rubey

Common Loon

Table 3:

Species With 25-49% of Estimated Western Hemisphere Breeding Population in North America's Boreal Forest Region (55 species).

Greater White-fronted Goose	Franklin's Gull	Varied Thrush
Canada Goose	Black Tern	American Pipit
Northern Shoveler	Long-eared Owl	Cedar Waxwing
Northern Pintail	Belted Kingfisher	Yellow Warbler
Common Eider	Hairy Woodpecker	Chestnut-sided Warbler
Long-tailed Duck	Northern Flicker	American Redstart
Red-breasted Merganser	Western Wood-Pewee	Ovenbird
Double-crested Cormorant	Eastern Phoebe	American Tree Sparrow
American Bittern	Red-eyed Vireo	Chipping Sparrow
Osprey	Black-billed Magpie	Savannah Sparrow
Sharp-shinned Hawk	Tree Swallow	Nelson's Sharp-tailed Sparrow
Northern Goshawk	Bank Swallow	Smith's Longspur
Broad-winged Hawk	Black-capped Chickadee	Rose-breasted Grosbeak
Sandhill Crane	Red-breasted Nuthatch	Purple Finch
American Golden-Plover	Winter Wren	Common Redpoll
Semipalmated Sandpiper	Golden-crowned Kinglet	Pine Siskin
Dunlin	Arctic Warbler	Evening Grosbeak
Stilt Sandpiper	Veery	
American Woodcock	American Robin	

American Bittern

More than 80% of the populations of 35 species are found in the Boreal Forest Region (Table 4). This includes a surprising variety of species including Palm Warbler (> 90% of population in Boreal Forest Region), Short-billed Dowitcher (> 90% of population in Boreal Forest Region), Northern Shrike, (> 90%), Bonaparte's Gull (> 90%), Spruce Grouse (> 90%), Red-necked Grebe (> 90%), Gray Jay (80-90%), Bufflehead (80-90%), White-winged Scoter (80-90%), Rusty Blackbird (80-90%), and Great Gray Owl (80-90%). For these species, the Boreal Forest Region is virtually their only stronghold on earth.

How important is North America's Boreal Forest Region for birds during spring and fall migration?

Virtually all species of Boreal nesting birds also make use of parts of the Boreal Forest Region during migration. Some birds rely more on the Boreal Forest Region for migratory stop-over habitat than for breeding or wintering. These 29 bird species (Table 5) include some that do not breed anywhere in the Boreal Forest Region. For example, the White-rumped Sandpiper does not breed in the Boreal Forest Region but makes

Table 4:

Species With More Than 80% of Estimated Western Hemisphere Breeding Population in North America's Boreal Forest Region (35 species).

Surf Scoter	Bonaparte's Gull	Tennessee Warbler
White-winged Scoter	Herring Gull	Cape May Warbler
Black Scoter	Great Gray Owl	Palm Warbler
Bufflehead	American Three-toed Woodpecker	Blackpoll Warbler
Common Goldeneye	Black-backed Woodpecker	Connecticut Warbler
Spruce Grouse	Yellow-bellied Flycatcher	Lincoln's Sparrow
Red-necked Grebe	Alder Flycatcher	White-throated Sparrow
Whooping Crane	Northern Shrike	Dark-eyed Junco
Lesser Yellowlegs	Philadelphia Vireo	Rusty Blackbird
Solitary Sandpiper	Gray Jay	Pine Grosbeak
Surfbird	Boreal Chickadee	White-winged Crossbill
Short-billed Dowitcher	Bohemian Waxwing	

Table 5:

Species in Which the Area of North America's Boreal Forest Region Occupied During Migration Exceeds the Area Occupied During Breeding or Wintering (29 species).

Greater White-fronted Goose	American Golden-Plover	Dunlin
Snow Goose	Pacific Golden-Plover	Stilt Sandpiper
Ross's Goose	Semipalmated Plover	Buff-breasted Sandpiper
Brant	Hudsonian Godwit	Long-billed Dowitcher
Cackling Goose	Red Knot	American Pipit
Tundra Swan	Sanderling	Harris's Sparrow
Gadwall	Semipalmated Sandpiper	Lapland Longspur
Rough-legged Hawk	White-rumped Sandpiper	Smith's Longspur
Whooping Crane	Baird's Sandpiper	Snow Bunting
Black-bellied Plover	Pectoral Sandpiper	

Whooping Crane

Photo: Mary Kay Rubey

extensive use of wetlands within the Boreal Forest Region during its fall and spring migration. Other shorebirds like the Pectoral Sandpiper, which have insignificant portions of the breeding range in the Boreal zone, are also highly reliant on Boreal Forest Region wetlands during migration. Waterfowl like the Greater White-fronted Goose, Snow Goose, Cackling Goose, Tundra Swan, and Greater Scaup also regularly migrate through a large part of the Boreal Forest Region. Not quantified here is use of the Boreal Forest Region by "moult-migrants", birds that migrate north into the Boreal Forest Region after breeding to undergo moult, a practice common among many waterfowl species.

Where do birds that breed in North America's Boreal Forest Region spend the winter?

Approximately 94% of individual birds migrate out of the Boreal Forest Region after breeding, judging by migratory shifts in range between breeding and wintering grounds. These Boreal migrants winter in many countries throughout the western hemisphere, with several species wintering outside of the hemisphere. More species winter in the U.S. (lower 48) than in any other country or region–a total of 204 species or approximately 63% of Boreal Forest Region breeding

Photo: Mary Kay Rubey

Sora


Pine Grosbeak

birds (Table 6). Mexico is a close second in importance with 190 species (59%), followed by Central America (115 species-36%), South America (87 species-27%) and the Caribbean (86 species–27%). If species with less than 10% of their breeding range in the Boreal Forest Region are excluded, the number of migrant species wintering in all of these regions is still high, ranging from 59 species wintering in South America, to 137 in the United States (Table 6).

Several of these species winter largely in a single country or region. Red-necked Grebes, American Black Ducks, Yellow Rails, Rusty Blackbirds, Smith's Longspurs, Harris's Sparrows, and Golden-crowned Sparrows are among species whose entire wintering population occurs only within the U.S. Virtually all Cape May Warblers winter in the Caribbean. Most Baird's Sparrows winter in Mexico while Yellow-bellied Flycatchers, Philadelphia Vireos, Wilson's Warblers and Magnolia Warblers are restricted in winter to Mexico and Central America. Birds like the Hudsonian Godwit, Blackpoll Warbler and Connecticut Warbler are among those found only in South America in winter. And the Arctic Tern, a breeding bird of wetlands in the western Boreal Forest Region, winters in the sub-Antarctic Ocean.

Table 6:

Number of Species of Boreal Migrants by Wintering Region (excluding species with <1% of winter range in the wintering region).

	Wintering Region				
Boreal Migrant Species	**U.S.A. (lower 48)**	**Mexico**	**Central America**	**Caribbean**	**South America**
>1% breed in Boreal Forest Region	204	190	115	86	87
>10% breed in Boreal Forest Region	137	128	81	65	59

Table 7:

Species With More Than 5% of Western Hemisphere Wintering Range in North America's Boreal Forest Region (44 species).

Gray Partridge	Gyrfalcon	Black-capped Chickadee
Ruffed Grouse	Great Horned Owl	Boreal Chickadee
Spruce Grouse	Snowy Owl	Gray-headed Chickadee
Willow Ptarmigan	Northern Hawk Owl	Red-breasted Nuthatch
Rock Ptarmigan	Barred Owl	Brown Creeper
White-tailed Ptarmigan	Great Gray Owl	American Dipper
Blue Grouse	Boreal Owl	European Starling
Sharp-tailed Grouse	Downy Woodpecker	Bohemian Waxwing
Northern Goshawk	Hairy Woodpecker	Snow Bunting
Golden Eagle	American Three-toed Woodpecker	Pine Grosbeak
	Black-backed Woodpecker	Red Crossbill
	Pileated Woodpecker	White-winged Crossbill
	Northern Shrike	Common Redpoll
	Gray Jay	Hoary Redpoll
	Blue Jay	Pine Siskin
	Black-billed Magpie	Evening Grosbeak
	Common Raven	House Sparrow

Photo: Mary Kay Rubey

Great Gray Owl

Of the 276 species with 5% or more of their breeding range in the Boreal Forest Region, only a hardy 44 have 5% or more of their wintering range within the Boreal Forest Region (Table 7). Fifteen species are highly reliant on Boreal Forest Region lands for 50% or more of their winter range. Some of these–the essentially non-migratory species–rely on the Boreal Forest Region year-round. Such species include the Boreal Chickadee, Northern Hawk-Owl, Gray Jay, Spruce Grouse, Great Gray Owl, Boreal Owl, American Three-toed Woodpecker, Black-backed Woodpecker, and Willow Ptarmigan.

Data, Analyses & Limitations

Most analyses in this report rely on two datasets, chosen for their applicability to the greatest number of species and comparability with other parts of North America and the Western Hemisphere.

1) The first is Digital Distribution Maps of the Birds of the Western Hemisphere (Ridgely et al. 2003). Shape files of these maps were overlain with jurisdictional outlines and Bird Conservation Regions to measure the proportion of breeding, wintering and transient range of each species in the Boreal Forest Region and elsewhere.

   An implicit assumption in the use of distribution maps is that a region's importance to a species is strongly related to the proportion of that species' range in the region. This assumption is reasonable for most species, but may break down for species with highly clumped distributions, such as breeding seabirds and other colonial waterbirds. For these species, use of colony counts if available across a species range would provide a more accurate assessment of relative importance of the Boreal Forest Region.

2) The second is North American Breeding Bird Survey (BBS) data http://www.pwrc.usgs.gov/bbs/. Data from the 1990s decade were analyzed to provide an alternative measure of the proportion of breeding birds of each species in combinations of jurisdiction and BCR within the United States, and within Canada south of the arctic. These data also provided a means to estimate population sizes of landbirds (for methods, see Rich et al. 2004) and for some additional species without published estimates in continental conservation plans.

BBS analyses in the Boreal Forest Region were based on a reasonably high number of individual survey routes (265 with data from the 1990s). However, the distribution of routes is biased towards the southern parts of the Boreal Forest Region. Routes were stratified by province / state / territory and BCR to minimize effects of this bias, but low sample size in the northern parts of the Boreal Forest Region results in low precision in estimates of bird numbers for many species. Some species, particularly many non-landbirds, are not sampled well by BBS surveys. For this reason, estimates of population sizes of shorebirds, waterfowl and waterbirds relied on continental estimates provided in continental plans (Donaldson et al. 2000 & Brown et al. 2001 for shorebirds, Kushlan et al. 2002 and Milko et al. 2003 for waterbirds, and NAWMP 2004 for waterfowl). Continental estimates were multiplied by proportion of range or proportion of BBS population in the Boreal Forest Region to give an approximate estimate of breeding population size in the Boreal Forest Region. For waterfowl in particular, a more accurate estimate of the proportion of continental populations that occur in the Boreal Forest Region should be possible with the use of various waterfowl survey datasets, not treated in this report.

Proportions of western hemisphere population for all birds were based on a combination of BBS proportions within the BBS survey area, and proportion of breeding range elsewhere in the hemisphere.

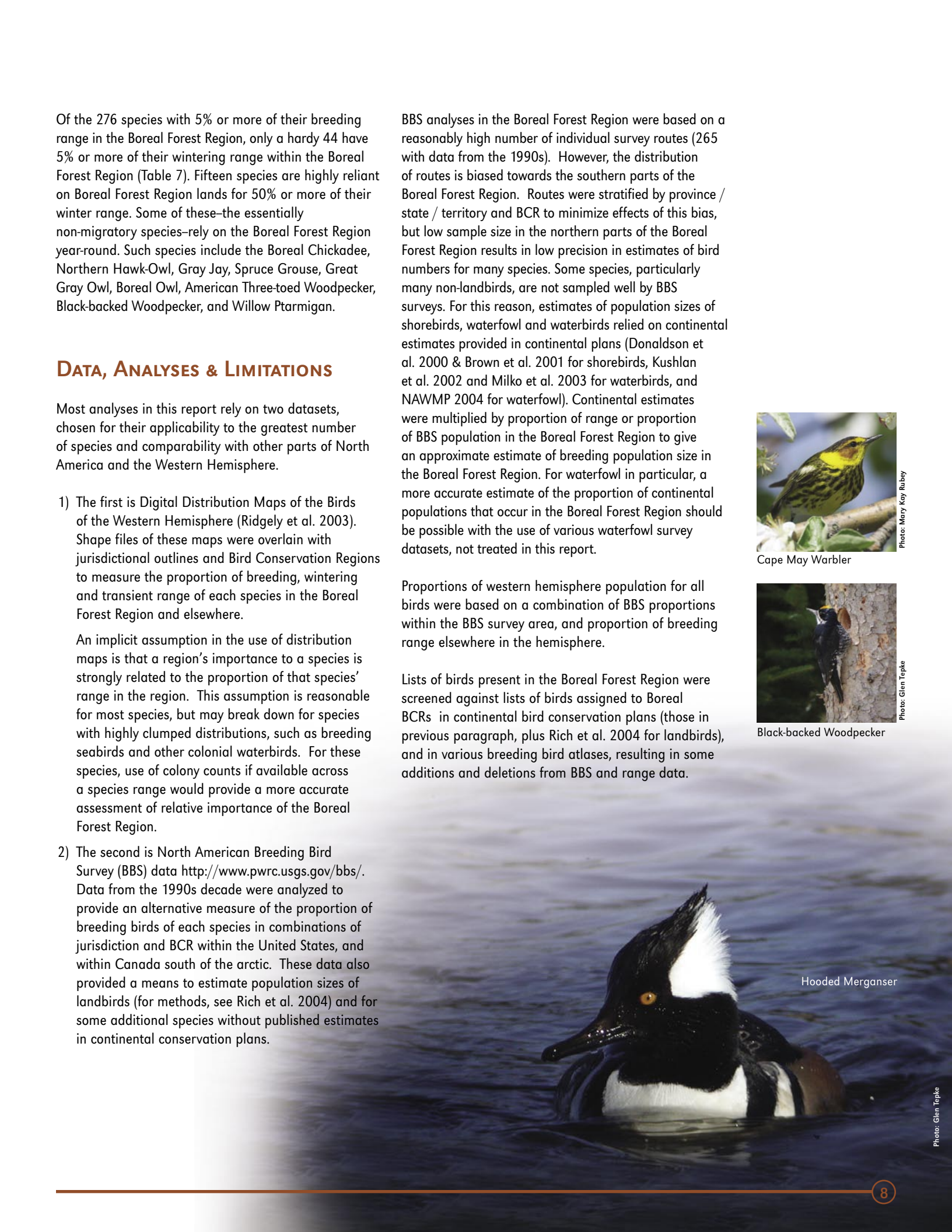
Lists of birds present in the Boreal Forest Region were screened against lists of birds assigned to Boreal BCRs in continental bird conservation plans (those in previous paragraph, plus Rich et al. 2004 for landbirds), and in various breeding bird atlases, resulting in some additions and deletions from BBS and range data.

Photo: Mary Kay Rubey

Cape May Warbler

Photo: Glen Tepke

Black-backed Woodpecker



Hooded Merganser

Photo: Glen Tepke

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Appendix 1.

Bird Species That Regularly Occur in North America's Boreal Forest Region During Breeding, Migration, or Wintering Seasons (325 species).

Greater White-fronted Goose	Broad-winged Hawk	Bonaparte's Gull	Warbling Vireo	Black-throated Green Warbler
Snow Goose	Swainson's Hawk	Mew Gull	Philadelphia Vireo	Townsend's Warbler
Ross's Goose	Red-tailed Hawk	Ring-billed Gull	Red-eyed Vireo	Blackburnian Warbler
Brant	Rough-legged Hawk	California Gull	Gray Jay	Pine Warbler
Cackling Goose	Golden Eagle	Herring Gull	Blue Jay	Palm Warbler
Canada Goose	American Kestrel	Thayer's Gull	Clark's Nutcracker	Bay-breasted Warbler
Trumpeter Swan	Merlin	Iceland Gull	Black-billed Magpie	Blackpoll Warbler
Tundra Swan	Gyrfalcon	Lesser Black-backed Gull	American Crow	Black-and-white Warbler
Wood Duck	Peregrine Falcon	Glaucous-winged Gull	Common Raven	American Redstart
Gadwall	Prairie Falcon	Glaucous Gull	Horned Lark	Ovenbird
American Wigeon	Yellow Rail	Sabine's Gull	Purple Martin	Northern Waterthrush
American Black Duck	Virginia Rail	Ross's Gull	Tree Swallow	Connecticut Warbler
Mallard	Sora	Caspian Tern	Violet-green Swallow	Mourning Warbler
Blue-winged Teal	American Coot	Common Tern	Northern Rough-winged Swallow	MacGillivray's Warbler
Northern Shoveler	Sandhill Crane	Arctic Tern	Bank Swallow	Common Yellowthroat
Northern Pintail	Whooping Crane	Forster's Tern	Cliff Swallow	Wilson's Warbler
Green-winged Teal	Black-bellied Plover	Black Tern	Barn Swallow	Canada Warbler
Canvasback	American Golden-Plover	Rock Pigeon	Black-capped Chickadee	Scarlet Tanager
Redhead	Pacific Golden-Plover	Mourning Dove	Mountain Chickadee	Western Tanager
Ring-necked Duck	Semipalmated Plover	Black-billed Cuckoo	Chestnut-backed Chickadee	Spotted Towhee
Greater Scaup	Piping Plover	Great Horned Owl	Boreal Chickadee	Eastern Towhee
Lesser Scaup	Killdeer	Snowy Owl	Gray-headed Chickadee	American Tree Sparrow
Common Eider	Eurasian Dotterel	Northern Hawk Owl	Red-breasted Nuthatch	Chipping Sparrow
Harlequin Duck	American Avocet	Northern Pygmy-Owl	White-breasted Nuthatch	Clay-colored Sparrow
Surf Scoter	Greater Yellowlegs	Barred Owl	Brown Creeper	Brewer's Sparrow
White-winged Scoter	Lesser Yellowlegs	Great Gray Owl	House Wren	Vesper Sparrow
Black Scoter	Solitary Sandpiper	Long-eared Owl	Winter Wren	Savannah Sparrow
Long-tailed Duck	Willet	Short-eared Owl	Sedge Wren	Baird's Sparrow
Bufflehead	Wandering Tattler	Boreal Owl	Marsh Wren	Le Conte's Sparrow
Common Goldeneye	Spotted Sandpiper	Northern Saw-whet Owl	American Dipper	Nelson's Sharp-tailed Sparrow
Barrow's Goldeneye	Upland Sandpiper	Common Nighthawk	Golden-crowned Kinglet	Fox Sparrow
Hooded Merganser	Whimbrel	Whip-poor-will	Ruby-crowned Kinglet	Song Sparrow
Common Merganser	Bristle-thighed Curlew	Chimney Swift	Arctic Warbler	Lincoln's Sparrow
Red-breasted Merganser	Hudsonian Godwit	Ruby-throated Hummingbird	Bluethroat	Swamp Sparrow
Ruddy Duck	Bar-tailed Godwit	Rufous Hummingbird	Northern Wheatear	White-throated Sparrow
Gray Partridge	Marbled Godwit	Belted Kingfisher	Eastern Bluebird	Harris's Sparrow
Ring-necked Pheasant	Ruddy Turnstone	Lewis's Woodpecker	Mountain Bluebird	White-crowned Sparrow
Ruffed Grouse	Black Turnstone	Red-headed Woodpecker	Townsend's Solitaire	Golden-crowned Sparrow
Spruce Grouse	Surfbird	Yellow-bellied Sapsucker	Veery	Dark-eyed Junco
Willow Ptarmigan	Red Knot	Red-naped Sapsucker	Gray-cheeked Thrush	Lapland Longspur
Rock Ptarmigan	Sanderling	Red-breasted Sapsucker	Bicknell's Thrush	Smith's Longspur
White-tailed Ptarmigan	Semipalmated Sandpiper	Downy Woodpecker	Swainson's Thrush	Snow Bunting
Blue Grouse	Western Sandpiper	Hairy Woodpecker	Hermit Thrush	Rose-breasted Grosbeak
Sharp-tailed Grouse	Least Sandpiper	American Three-toed Woodpecker	Wood Thrush	Indigo Bunting
Red-throated Loon	White-rumped Sandpiper	Black-backed Woodpecker	American Robin	Bobolink
Pacific Loon	Baird's Sandpiper	Northern Flicker	Varied Thrush	Red-winged Blackbird
Common Loon	Pectoral Sandpiper	Pileated Woodpecker	Gray Catbird	Eastern Meadowlark
Yellow-billed Loon	Purple Sandpiper	Olive-sided Flycatcher	Brown Thrasher	Western Meadowlark
Pied-billed Grebe	Rock Sandpiper	Western Wood-Pewee	European Starling	Yellow-headed Blackbird
Horned Grebe	Dunlin	Eastern Wood-Pewee	Eastern Yellow Wagtail	Rusty Blackbird
Red-necked Grebe	Stilt Sandpiper	Yellow-bellied Flycatcher	Red-throated Pipit	Brewer's Blackbird
Eared Grebe	Buff-breasted Sandpiper	Alder Flycatcher	American Pipit	Common Grackle
Western Grebe	Short-billed Dowitcher	Least Flycatcher	Sprague's Pipit	Brown-headed Cowbird
American White Pelican	Long-billed Dowitcher	Hammond's Flycatcher	Bohemian Waxwing	Baltimore Oriole
Double-crested Cormorant	Wilson's Snipe	Dusky Flycatcher	Cedar Waxwing	Gray-crowned Rosy-Finch
American Bittern	American Woodcock	Pacific-slope Flycatcher	Tennessee Warbler	Pine Grosbeak
Great Blue Heron	Wilson's Phalarope	Eastern Phoebe	Orange-crowned Warbler	Purple Finch
Black-crowned Night-Heron	Red-necked Phalarope	Say's Phoebe	Nashville Warbler	Red Crossbill
Osprey	Red Phalarope	Great Crested Flycatcher	Northern Parula	White-winged Crossbill
Bald Eagle	Pomarine Jaeger	Eastern Kingbird	Yellow Warbler	Common Redpoll
Northern Harrier	Parasitic Jaeger	Loggerhead Shrike	Chestnut-sided Warbler	Hoary Redpoll
Sharp-shinned Hawk	Long-tailed Jaeger	Northern Shrike	Magnolia Warbler	Pine Siskin
Cooper's Hawk	Franklin's Gull	Yellow-throated Vireo	Cape May Warbler	American Goldfinch
Northern Goshawk	Little Gull	Cassin's Vireo	Black-throated Blue Warbler	Evening Grosbeak
Red-shouldered Hawk	Black-headed Gull	Blue-headed Vireo	Yellow-rumped Warbler	House Sparrow

Bird Studies Canada is recognized nation-wide as a leading and respected not-for-profit conservation organization dedicated to advancing the understanding, appreciation and conservation of wild birds and their habitats, in Canada and elsewhere, through studies that engage the skills, enthusiasm and support of its members, volunteers, staff and the interested public.

The **Boreal Songbird Initiative (BSI)** is a non-profit organization dedicated to educating Americans about the importance of the Boreal Forest to migratory birds. BSI is part of the Boreal Songbird Network, a network of U.S. organizations including the American Bird Conservancy, Ducks Unlimited, the National Wildlife Federation, Defenders of Wildlife, the Audubon Society, and the Natural Resources Defense Council, working to raise awareness about the Boreal Forest and assist efforts in Canada and Alaska to conserve it.

The **Canadian Boreal Initiative** was created in response to both the opportunities and threats facing Canada's Boreal Forest Region. Based in Ottawa, CBI brings together a wide range of conservation organizations, First Nations, industry leaders and others to create new solutions for Boreal conservation and sustainable development. It supports scientific research to advance thinking on conservation-based planning for the Boreal Forest Region, and acts as a catalyst by supporting a variety of on-the-ground efforts across the Boreal by conservation groups, First Nations and others.

In 2003, CBI convened the Boreal Leadership Council, an extraordinary group of conservation organizations, First Nations and resource companies. In concert with members of the Council, CBI developed and launched the Boreal Forest Conservation Framework – a vision for protection and sustainable development of Canada's entire Boreal ecosystem.